INTRODUCING THE
NEW BUK TYPE RANGE

- Improved power ratings
- New outlines
- Higher max. junction temperatures

• POWERMOS •

PRODUCT SPECIFICATIONS - 1989

Philips Components

PHILIPS

Philips Components

PowerMOS Transistors

Product specifications

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1 INTRODUCTION

1.1 Philips PowerMOS Transistors

Welcome to the new edition of the data book for Philips Components Power MOSFETs.

The data for each type now includes the completed performance curves in the graphical figures. The data in this book supercedes that in the Powermos Development Data book issued in Septmeber 1988, which introduced the NEW BUK TYPE RANGE. (Except for SOT82 outline types which are still in development).

The introductory sections of the earlier 1988 S9 Handbook with BUZ types are still applicable, and are not duplicated in this book.

2 TYPE NUMBERS

2.1 BUZ types

The first PowerMOS transistors that were introduced by Philips were the BUZ types. Some (but not all) of these will continue to be available as maintenance types. For details of which these are, please contact our local Sales Offices.

2.2 BUK types

The latest Philips Power MOSFETs and related products are all covered by the new BUK type numbering system, the whole BUK series having been reserved for Philips by Pro-Electron.

The BUK types have many attractive features that are improvements over the former BUZ types. These are described in section 3.

The BUK type numbers are made up as follows:

BUK followed by a 3-digit code and a hyphen followed by a voltage and a single or two letter suffix.

The 3-digit type codes have been chosen to a definite scheme. The first digit according to technology, the second digit according to outline, and the third digit according to chip size. Our scheme is shown in the following table. Items in parentheses do not appear in this book, but the scheme extends to future development products.

DIGIT	1st	2nd	3rd
CODE	TECHNOLOGY	OUTLINE	CHIP SIZE (mm^2)
0	(t.b.f.)	(t.b.f.)	-
1	(I.P.S.)	(ISOTOP)	(2)
2	(t.b.f.)	SOT-199	4
3	(P-MOSFET)	SOT-93	6
4	N-MOSFET	SOT-186	8
5	L^2FET	TO220AB	14
6	FREDFET	(SOT-82)	20
7	(SENSORFET)	(SOT-194)	25
8	(I.G.B.T.)	(SOT-223)	(36)
9	(L^2SENSORFET)	(SOT-263)	-

The voltage code is an integer of two to four digits corresponding to the component's main voltage rating V_{DS}.

The suffix is usually just one letter, either A or B. These indicate two grades of $R_{DS(ON)}$ from the same basic product. A second letter suffix will be used for ISOTOP modules to indicate the number of chips within the outline.

Example: BUK543-50A is Logic Level Fet in SOT-186 outline, with a 6 mm^2 chip, 50 V rating V_{DS} and top-grade $R_{DS(ON)}$.

3 FEATURES

3.1 New outlines

Further to the 1988 S9 handbook, Power MOSFETs are now available in two additional outlines:- Full-Packs, with isolation between the heatsink seating plane and the internal header. (SOT-199 and SOT-186).

3.2 Improved power and current ratings

The BUK range have higher power ratings than the corresponding BUZ types. This is because the BUK types are published with lower values of thermal resistance (junction to mounting base). This is quite a dramatic change, for example comparing the 40 W BUZ71 to the 75 W BUK453-50A which has a smaller chip size than the original BUZ71. The higher P_{tot} ratings also permit a higher I_D max rating at 25 ˚C for the same $R_{DS(ON)}$.

3.3 Higher maximum junction temperatures

All the low voltage types (upto 200 V) in TO220AB outline are published with T_j max 175 ˚C.

3.4 Higher design cell density

The low voltage designs are now using a high cell density of upto 1.6 million cells per square inch. Higher forward transconductance and lower on-state resistance are obtained by this means.

3.5 Logic level gate

A range of low voltage products (upto 200 V) is introduced with logic level gates. These can be fully switched on with only 5 V gate drive, which are compatible with being controlled by standard integrated circuits.

3.6 FREDFETs

A range of products is introduced with integral fast reverse recovery diode. These offer superior switching performance in inductive load applications such as motor-control in which the body-drain diode is often forced to conduct. The Philips FREDFETs have Platinum diffusion to reduce the minority carrier lifetime.

3.7 Ruggedness

Some of the products in this book are published with an avalanche energy rating for unclamped inductive load turn-off. Those types not yet featuring this in the development data will also be assigned an energy rating in the near future. Consult our local Sales Office for further details. The types that already have this published are 100 % tested on an unclamped inductive switching gear.

4 APPLICATIONS

The 1988 S9 handbook contains some of our application notes. Further application notes and reports are being prepared. Consult the local Philips Sales Office for details.

5 FUTURE PRODUCTS

Philips Components are working intensively on bringing new products to the market in PowerMOS and related technologies. These products will include the following technologies.

5.1 SensorFETs

PowerMOS transistors with integrated zero-loss current sensing in 5-terminal SOT-263 outline similar to TO220.

5.2 I.G.B.T.s

Insulated Gate Bipolar Transistors are under development at both 500 V and 800 V ratings, for currents upto 40 A. These will have lower on-state dissipation than ordinary Power MOSFETs with the same chip area and voltage rating.

5.3 ISOTOP

Power MOSFETs and I.G.B.Ts will be introduced in the ISOTOP outline for higher currents.

5.4 Larger chips

Larger chip designs 36 mm^2 are soon to be introduced for medium and high voltage types. Example - BUK438- series.

5.5 Smaller chips

Smaller chip designs are soon to be introduced for low voltage (Eg BUK551- series) and medium voltage (Eg BUK463-500 types).

5.6 Naked chip data

Philips Components PowerMOS transistors are already available as naked chips for mounting in hybrid applications. Data sheets for these are available upon request. Consult the local Philips Sales Office for details.

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W

MOSFET N-CHANNEL

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
MOSFET N	SOT199	50	0.028	29	BUK426-50A	30	45
MOSFET N	SOT199	50	0.03	29	BUK426-50B	30	45
MOSFET N	SOT199	100	0.057	15	BUK426-100A	20	45
MOSFET N	SOT199	100	0.065	15	BUK426-100B	19	45
MOSFET N	SOT199	200	0.16	10	BUK426-200A	11	45
MOSFET N	SOT199	200	0.2	10	BUK426-200B	10	45
MOSFET N	SOT199	800	3	1.5	BUK426-800A	2.4	45
MOSFET N	SOT199	800	4	1.5	BUK426-800B	2.1	45
MOSFET N	SOT199	1000	4	1.5	BUK426-1000A	2.1	45
MOSFET N	SOT199	1000	5	1.5	BUK426-1000B	1.9	45
MOSFET N	SOT199	400	0.4	6.5	BUK427-400A	6.9	45
MOSFET N	SOT199	400	0.5	6.5	BUK427-400B	6.2	45
MOSFET N	SOT199	450	0.6	6.5	BUK427-450B	5.6	45
MOSFET N	SOT199	500	0.6	6.5	BUK427-500A	5.6	45
MOSFET N	SOT199	500	0.8	6.5	BUK427-500B	4.8	45
MOSFET N	SOT199	600	1	6.5	BUK427-600A	4.3	45
MOSFET N	SOT199	600	1.2	6.5	BUK427-600B	3.9	45

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
MOSFET N	SOT93	50	0.028	29	BUK436-50A	50	125
MOSFET N	SOT93	50	0.033	29	BUK436-50B	46	125
MOSFET N	SOT93	100	0.057	15	BUK436-100A	33	125
MOSFET N	SOT93	100	0.065	15	BUK436-100B	31	125
MOSFET N	SOT93	200	0.16	10	BUK436-200A	19	125
MOSFET N	SOT93	200	0.2	10	BUK436-200B	17	125
MOSFET N	SOT93	800	3	1.5	BUK436-800A	4	125
MOSFET N	SOT93	800	4	1.5	BUK436-800B	3.5	125
MOSFET N	SOT93	1000	4	1.5	BUK436-1000A	3.5	125
MOSFET N	SOT93	1000	5	1.5	BUK436-1000B	3.1	125
MOSFET N	SOT93	400	0.4	6.5	BUK437-400A	14	180
MOSFET N	SOT93	400	0.5	6.5	BUK437-400B	12	180
MOSFET N	SOT93	450	0.6	6.5	BUK437-450B	11	180
MOSFET N	SOT93	500	0.6	6.5	BUK437-500A	11	180
MOSFET N	SOT93	500	0.8	6.5	BUK437-500B	10	180
MOSFET N	SOT93	600	1	6.5	BUK437-600A	9	180
MOSFET N	SOT93	600	1.2	6.5	BUK437-600B	7.8	180

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
MOSFET N	SOT186	50	0.13	8.5	BUK442-50A	10	22
MOSFET N	SOT186	50	0.15	8.5	BUK442-50B	9.2	22
MOSFET N	SOT186	60	0.13	8.5	BUK442-60A	10	22
MOSFET N	SOT186	60	0.15	8.5	BUK442-60B	9.2	22
MOSFET N	SOT186	100	0.25	5.5	BUK442-100A	6.6	22
MOSFET N	SOT186	100	0.3	5.5	BUK442-100B	6.1	22
MOSFET N	SOT186	50	0.08	9	BUK443-50A	13	25
MOSFET N	SOT186	50	0.1	9	BUK443-50B	12	25
MOSFET N	SOT186	100	0.16	5	BUK443-100A	9	25
MOSFET N	SOT186	100	0.2	5	BUK443-100B	8	25
MOSFET N	SOT186	200	0.4	3.5	BUK444-200A	5.3	25
MOSFET N	SOT186	200	0.5	3.5	BUK444-200B	4.7	25
MOSFET N	SOT186	400	1.5	1.5	BUK444-400A	2.7	25
MOSFET N	SOT186	400	1.8	1.5	BUK444-400B	2.4	25
MOSFET N	SOT186	450	2.3	1.2	BUK444-450B	2.1	25
MOSFET N	SOT186	500	2.3	1.2	BUK444-500A	2.1	25
MOSFET N	SOT186	500	2.8	1.2	BUK444-500B	1.9	25
MOSFET N	SOT186	600	4	1.2	BUK444-600A	1.6	25
MOSFET N	SOT186	600	4.5	1.2	BUK444-600B	1.5	25
MOSFET N	SOT186	800	6	1.0	BUK444-800A	1.4	30
MOSFET N	SOT186	800	8	1	BUK444-800B	1.2	30
MOSFET N	SOT186	50	0.038	20	BUK445-50A	21	30
MOSFET N	SOT186	50	0.045	20	BUK445-50B	20	30
MOSFET N	SOT186	100	0.08	13	BUK445-100A	14	30
MOSFET N	SOT186	100	0.1	13	BUK445-100B	12	30
MOSFET N	SOT186	200	0.23	7	BUK445-200A	7.6	30
MOSFET N	SOT186	200	0.28	7	BUK445-200B	7	30
MOSFET N	SOT186	400	0.8	2.5	BUK445-400A	4	30
MOSFET N	SOT186	400	1	2.5	BUK445-400B	3.8	30
MOSFET N	SOT186	450	1.3	2.5	BUK445-450B	3.1	30
MOSFET N	SOT186	500	1.3	2.5	BUK445-500A	3.1	30
MOSFET N	SOT186	500	1.5	2.5	BUK445-500B	2.9	30
MOSFET N	SOT186	600	2	2.5	BUK445-600A	2.5	30
MOSFET N	SOT186	600	2.6	2.5	BUK445-600B	2.2	30
MOSFET N	SOT186	800	3	1.5	BUK446-800A	2	30
MOSFET N	SOT186	800	4	1.5	BUK446-800B	1.7	30
MOSFET N	SOT186	1000	4	1.5	BUK446-1000A	1.7	30
MOSFET N	SOT186	1000	5	1.5	BUK446-1000B	1.5	30

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
MOSFET N	TO220AB	50	0.13	8.5	BUK452-50A	15	60
MOSFET N	TO220AB	50	0.15	8.5	BUK452-50B	14	60
MOSFET N	TO220AB	60	0.13	8.5	BUK452-60A	15	60
MOSFET N	TO220AB	60	0.15	8.5	BUK452-60B	14	60
MOSFET N	TO220AB	100	0.25	5.5	BUK452-100A	11	60
MOSFET N	TO220AB	100	0.3	5.5	BUK452-100B	10	60
MOSFET N	TO220AB	50	0.08	10	BUK453-50A	22	75
MOSFET N	TO220AB	50	0.1	10	BUK453-50B	20	75
MOSFET N	TO220AB	100	0.16	5	BUK453-100A	14	75
MOSFET N	TO220AB	100	0.2	5	BUK453-100B	13	75
MOSFET N	TO220AB	200	0.4	3.5	BUK454-200A	9.2	90
MOSFET N	TO220AB	200	0.5	3.5	BUK454-200B	8.2	90
MOSFET N	TO220AB	400	1.5	1.5	BUK454-400A	4.6	75
MOSFET N	TO220AB	400	1.8	1.5	BUK454-400B	4.2	75
MOSFET N	TO220AB	450	2.3	1.5	BUK454-450B	3.7	75
MOSFET N	TO220AB	500	2.3	1.5	BUK454-500A	3.7	75
MOSFET N	TO220AB	500	2.8	1.5	BUK454-500B	3.3	75
MOSFET N	TO220AB	600	4	1.2	BUK454-600A	2.8	75
MOSFET N	TO220AB	600	4.5	1.2	BUK454-600B	2.6	75
MOSFET N	TO220AB	800	6	1	BUK454-800A	2.4	85
MOSFET N	TO220AB	800	8	1	BUK454-800B	2.0	85
MOSFET N	TO220AB	50	0.038	20	BUK455-50A	41	125
MOSFET N	TO220AB	50	0.045	20	BUK455-50B	38	125
MOSFET N	TO220AB	100	0.08	13	BUK455-100A	26	125
MOSFET N	TO220AB	100	0.1	13	BUK455-100B	23	125
MOSFET N	TO220AB	200	0.23	7	BUK455-200A	14	125
MOSFET N	TO220AB	200	0.28	7	BUK455-200B	13	125
MOSFET N	TO220AB	400	0.8	2.5	BUK455-400A	7.3	100
MOSFET N	TO220AB	400	1	2.5	BUK455-400B	6.5	100
MOSFET N	TO220AB	450	1.3	2.5	BUK455-450B	5.7	100
MOSFET N	TO220AB	500	1.3	2.5	BUK455-500A	5.7	100
MOSFET N	TO220AB	500	1.5	2.5	BUK455-500B	5.3	100
MOSFET N	TO220AB	600	2	2.5	BUK455-600A	4.5	100
MOSFET N	TO220AB	600	2.5	2.5	BUK455-600B	4	100
MOSFET N	TO220AB	50	0.028	29	BUK456-50A	52	150
MOSFET N	TO220AB	50	0.03	29	BUK456-50B	51	150
MOSFET N	TO220AB	100	0.057	15	BUK456-100A	34	150
MOSFET N	TO220AB	100	0.065	15	BUK456-100B	32	150
MOSFET N	TO220AB	200	0.16	10	BUK456-200A	19	150
MOSFET N	TO220AB	200	0.2	10	BUK456-200B	17	150
MOSFET N	TO220AB	800	3	1.5	BUK456-800A	4	125
MOSFET N	TO220AB	800	4	1.5	BUK456-800B	3.5	125

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
MOSFET N	TO220AB	1000	4	1.5	BUK456-1000A	3.5	125
MOSFET N	TO220AB	1000	5	1.5	BUK456-1000B	3.1	125
MOSFET N	TO220AB	400	0.4	6.5	BUK457-400A	13	150
MOSFET N	TO220AB	400	0.5	6.5	BUK457-400B	11	150
MOSFET N	TO220AB	450	0.6	6.5	BUK457-450B	10	150
MOSFET N	TO220AB	500	0.6	6.5	BUK457-500A	10	150
MOSFET N	TO220AB	500	0.8	6.5	BUK457-500B	9	150
MOSFET N	TO220AB	600	1	6.5	BUK457-600A	8	150
MOSFET N	TO220AB	600	1.2	6.5	BUK457-600B	7.1	150

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W

L²FETs

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
L²FET	SOT186	50	0.15	8.5	BUK542-50A	9.2	22
L²FET	SOT186	50	0.18	8.5	BUK542-50B	8.4	22
L²FET	SOT186	60	0.15	8.5	BUK542-60A	9.2	22
L²FET	SOT186	60	0.18	8.5	BUK542-60B	8.4	22
L²FET	SOT186	100	0.28	5.5	BUK542-100A	6.3	22
L²FET	SOT186	100	0.35	5.5	BUK542-100B	5.6	22
L²FET	SOT186	50	0.085	10	BUK543-50A	13	25
L²FET	SOT186	50	0.1	10	BUK543-50B	12	25
L²FET	SOT186	100	0.18	5	BUK543-100A	8.3	25
L²FET	SOT186	100	0.22	5	BUK543-100B	7.5	25
L²FET	SOT186	50	0.042	20	BUK545-50A	20	30
L²FET	SOT186	50	0.055	20	BUK545-50B	18	30
L²FET	SOT186	100	0.085	13	BUK545-100A	13	30
L²FET	SOT186	100	0.11	13	BUK545-100B	12	30
L²FET	SOT186	200	0.23	7	BUK545-200A	7.6	30
L²FET	SOT186	200	0.28	7	BUK545-200B	7	30

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
L²FET	TO220AB	50	0.15	8.5	BUK552-50A	14	60
L²FET	TO220AB	50	0.18	8.5	BUK552-50B	13	60
L²FET	TO220AB	60	0.15	8.5	BUK552-60A	14	60
L²FET	TO220AB	60	0.18	8.5	BUK552-60B	13	60
L²FET	TO220AB	100	0.28	5.5	BUK552-100A	10	60
L²FET	TO220AB	100	0.35	5.5	BUK552-100B	8.5	60
L²FET	TO220AB	50	0.085	10	BUK553-50A	21	75
L²FET	TO220AB	50	0.1	10	BUK553-50B	20	75
L²FET	TO220AB	100	0.18	6.5	BUK553-100A	13	75
L²FET	TO220AB	100	0.22	6.5	BUK553-100B	12	75
L²FET	TO220AB	200	0.4	3.5	BUK554-200A	9.2	90
L²FET	TO220AB	200	0.5	3.5	BUK554-200B	8.2	90
L²FET	TO220AB	50	0.042	20	BUK555-50A	39	125
L²FET	TO220AB	50	0.055	20	BUK555-50B	35	125
L²FET	TO220AB	100	0.085	13	BUK555-100A	25	125
L²FET	TO220AB	100	0.11	13	BUK555-100B	22	125
L²FET	TO220AB	200	0.23	7	BUK555-200A	14	125
L²FET	TO220AB	200	0.28	7	BUK555-200B	13	125

FREDFETs

TECHNOLOGY	OUTLINE	V_{DS} max V	$R_{DS(ON)}$ Ω	@ I_D = A	DEVICE TYPE	I_D max A	P_D max W
FREDFET	SOT199	400	0.5	6.5	BUK627-400A	6.9	45
FREDFET	SOT199	400	0.6	6.5	BUK627-400B	6.2	45
FREDFET	SOT199	450	0.65	6.5	BUK627-450B	5.6	45
FREDFET	SOT199	500	0.65	6.5	BUK627-500A	5.6	45
FREDFET	SOT199	500	0.8	6.5	BUK627-500B	4.8	45
FREDFET	SOT199	500	0.9	6.5	BUK627-500C	4.5	45
FREDFET	SOT199	600	1	6.5	BUK627-600A	4.3	45
FREDFET	SOT199	600	1.2	6.5	BUK627-600B	3.9	45
FREDFET	SOT199	600	1.4	6.5	BUK627-600C	3.5	45
FREDFET	SOT93	400	0.5	6.5	BUK637-400A	14	180
FREDFET	SOT93	400	0.6	6.5	BUK637-400B	12	180
FREDFET	SOT93	450	0.65	6.5	BUK637-450B	11	180
FREDFET	SOT93	500	0.65	6.5	BUK637-500A	11	180
FREDFET	SOT93	500	0.8	6.5	BUK637-500B	10	180
FREDFET	SOT93	500	0.9	6.5	BUK637-500C	9.5	180
FREDFET	SOT93	600	1	6.5	BUK637-600A	9	180
FREDFET	SOT93	600	1.2	6.5	BUK637-600B	7.8	180
FREDFET	SOT93	600	1.4	6.5	BUK637-600C	7	180
FREDFET	TO220AB	450	1.3	2.5	BUK655-450B	5.7	100
FREDFET	TO220AB	500	1.3	2.5	BUK655-500A	5.7	100
FREDFET	TO220AB	500	1.5	2.5	BUK655-500B	5.3	100
FREDFET	TO220AB	500	1.7	2.5	BUK655-500C	5	100
FREDFET	TO220AB	400	0.5	6.5	BUK657-400A	13	150
FREDFET	TO220AB	400	0.6	6.5	BUK657-400B	11	150
FREDFET	TO220AB	450	0.65	6.5	BUK657-450B	10	150
FREDFET	TO220AB	500	0.65	6.5	BUK657-500A	10	150
FREDFET	TO220AB	500	0.8	6.5	BUK657-500B	9	150
FREDFET	TO220AB	500	0.9	6.5	BUK657-500C	8.5	150
FREDFET	TO220AB	600	1	6.5	BUK657-600A	8	150
FREDFET	TO220AB	600	1.2	6.5	BUK657-600B	7.1	150
FREDFET	TO220AB	600	1.4	6.5	BUK657-600C	6.5	150

TYPE			PAGE
BUK426-50A	MOSFET N	SOT199	19
BUK426-50B	MOSFET N	SOT199	19
BUK426-100A	MOSFET N	SOT199	24
BUK426-100B	MOSFET N	SOT199	24
BUK426-200A	MOSFET N	SOT199	29
BUK426-200B	MOSFET N	SOT199	29
BUK426-800A	MOSFET N	SOT199	34
BUK426-800B	MOSFET N	SOT199	34
BUK426-1000A	MOSFET N	SOT199	39
BUK426-1000B	MOSFET N	SOT199	39
BUK427-400A	MOSFET N	SOT199	44
BUK427-400B	MOSFET N	SOT199	44
BUK427-450B	MOSFET N	SOT199	49
BUK427-500A	MOSFET N	SOT199	54
BUK427-500B	MOSFET N	SOT199	54
BUK427-600A	MOSFET N	SOT199	59
BUK427-600B	MOSFET N	SOT199	59
BUK436-50A	MOSFET N	SOT93	64
BUK436-50B	MOSFET N	SOT93	64
BUK436-100A	MOSFET N	SOT93	69
BUK436-100B	MOSFET N	SOT93	69
BUK436-200A	MOSFET N	SOT93	74
BUK436-200B	MOSFET N	SOT93	74
BUK436-800A	MOSFET N	SOT93	79
BUK436-800B	MOSFET N	SOT93	79
BUK436-1000A	MOSFET N	SOT93	84
BUK436-1000B	MOSFET N	SOT93	84
BUK437-400A	MOSFET N	SOT93	89
BUK437-400B	MOSFET N	SOT93	89
BUK437-450B	MOSFET N	SOT93	94
BUK437-500A	MOSFET N	SOT93	99
BUK437-500B	MOSFET N	SOT93	99
BUK437-600A	MOSFET N	SOT93	104
BUK437-600B	MOSFET N	SOT93	104
BUK442-50A	MOSFET N	SOT186	109
BUK442-50B	MOSFET N	SOT186	109
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BUK442-60B	MOSFET N	SOT186	114
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BUK443-50B	MOSFET N	SOT186	124
BUK443-100A	MOSFET N	SOT186	129
BUK443-100B	MOSFET N	SOT186	129
BUK444-200A	MOSFET N	SOT186	134
BUK444-200B	MOSFET N	SOT186	134
BUK444-400A	MOSFET N	SOT186	139
BUK444-400B	MOSFET N	SOT186	139
BUK444-450B	MOSFET N	SOT186	144
BUK444-500A	MOSFET N	SOT186	149
BUK444-500B	MOSFET N	SOT186	149
BUK444-600A	MOSFET N	SOT186	154
BUK444-600B	MOSFET N	SOT186	154
BUK444-800A	MOSFET N	SOT186	159
BUK444-800B	MOSFET N	SOT186	159
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BUK445-500A	MOSFET N	SOT186	189
BUK445-500B	MOSFET N	SOT186	189
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BUK445-600B	MOSFET N	SOT186	194
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BUK446-1000B	MOSFET N	SOT186	204
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BUK452-50B	MOSFET N	TO220AB	209
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BUK452-100B	MOSFET N	TO220AB	219
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BUK453-50B	MOSFET N	TO220AB	224
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BUK454-200B	MOSFET N	TO220AB	234
BUK454-400A	MOSFET N	TO220AB	239
BUK454-400B	MOSFET N	TO220AB	239
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BUK454-500A	MOSFET N	TO220AB	249
BUK454-500B	MOSFET N	TO220AB	249
BUK454-600A	MOSFET N	TO220AB	254
BUK454-600B	MOSFET N	TO220AB	254
BUK454-800A	MOSFET N	TO220AB	259
BUK454-800B	MOSFET N	TO220AB	259
BUK455-50A	MOSFET N	TO220AB	264
BUK455-50B	MOSFET N	TO220AB	264
BUK455-100A	MOSFET N	TO220AB	269
BUK455-100B	MOSFET N	TO220AB	269
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BUK455-200B	MOSFET N	TO220AB	274
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BUK455-500A	MOSFET N	TO220AB	289
BUK455-500B	MOSFET N	TO220AB	289
BUK455-600A	MOSFET N	TO220AB	294
BUK455-600B	MOSFET N	TO220AB	294
BUK456-50A	MOSFET N	TO220AB	299
BUK456-50B	MOSFET N	TO220AB	299
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BUK456-100B	MOSFET N	TO220AB	304
BUK456-200A	MOSFET N	TO220AB	309
BUK456-200B	MOSFET N	TO220AB	309
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BUK456-800B	MOSFET N	TO220AB	314
BUK456-1000A	MOSFET N	TO220AB	319
BUK456-1000B	MOSFET N	TO220AB	319
BUK457-400A	MOSFET N	TO220AB	324
BUK457-400B	MOSFET N	TO220AB	324
BUK457-450B	MOSFET N	TO220AB	329
BUK457-500A	MOSFET N	TO220AB	334
BUK457-500B	MOSFET N	TO220AB	334
BUK457-600A	MOSFET N	TO220AB	339
BUK457-600B	MOSFET N	TO220AB	339
BUK542-50A	L^2FET	SOT186	344
BUK542-50B	L^2FET	SOT186	344
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BUK542-100B	L^2FET	SOT186	354
BUK543-50A	L^2FET	SOT186	359
BUK543-50B	L^2FET	SOT186	359
BUK543-100A	L^2FET	SOT186	364
BUK543-100B	L^2FET	SOT186	364
BUK545-50A	L^2FET	SOT186	369
BUK545-50B	L^2FET	SOT186	369
BUK545-100A	L^2FET	SOT186	374

TYPE			PAGE	TYPE	PAGE
BUK545-100B	L^2FET	SOT186	374		
BUK545-200A	L^2FET	SOT186	379		
BUK545-200B	L^2FET	SOT186	379		
BUK552-50A	L^2FET	TO220AB	384		
BUK552-50B	L^2FET	TO220AB	384		
BUK552-60A	L^2FET	TO220AB	389		
BUK552-60B	L^2FET	TO220AB	389		
BUK552-100A	L^2FET	TO220AB	394		
BUK552-100B	L^2FET	TO220AB	394		
BUK553-50A	L^2FET	TO220AB	399		
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BUK553-100B	L^2FET	TO220AB	404		
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BUK555-50A	L^2FET	TO220AB	414		
BUK555-50B	L^2FET	TO220AB	414		
BUK555-100A	L^2FET	TO220AB	419		
BUK555-100B	L^2FET	TO220AB	419		
BUK555-200A	L^2FET	TO220AB	424		
BUK555-200B	L^2FET	TO220AB	424		
BUK627-400A	FREDFET	SOT199	429		
BUK627-400B	FREDFET	SOT199	429		
BUK627-450B	FREDFET	SOT199	434		
BUK627-500A	FREDFET	SOT199	439		
BUK627-500B	FREDFET	SOT199	439		
BUK627-500C	FREDFET	SOT199	439		
BUK627-600A	FREDFET	SOT199	444		
BUK627-600B	FREDFET	SOT199	444		
BUK627-600C	FREDFET	SOT199	444		
BUK637-400A	FREDFET	SOT93	449		
BUK637-400B	FREDFET	SOT93	449		
BUK637-450B	FREDFET	SOT93	454		
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BUK637-500B	FREDFET	SOT93	459		
BUK637-500C	FREDFET	SOT93	459		
BUK637-600A	FREDFET	SOT93	464		
BUK637-600B	FREDFET	SOT93	464		
BUK637-600C	FREDFET	SOT93	464		
BUK655-450B	FREDFET	TO220AB	469		
BUK655-500A	FREDFET	TO220AB	474		
BUK655-500B	FREDFET	TO220AB	474		
BUK655-500C	FREDFET	TO220AB	474		
BUK657-400A	FREDFET	TO220AB	479		
BUK657-400B	FREDFET	TO220AB	479		
BUK657-450B	FREDFET	TO220AB	484		
BUK657-500A	FREDFET	TO220AB	489		
BUK657-500B	FREDFET	TO220AB	489		
BUK657-500C	FREDFET	TO220AB	489		
BUK657-600A	FREDFET	TO220AB	494		
BUK657-600B	FREDFET	TO220AB	494		
BUK657-600C	FREDFET	TO220AB	494		

The Avalanche Ruggedness of Power MOSFETs

Abstract

Recent advances in power MOS processing technology now enables power MOS transistors to dissipate energy while operating in the avalanche mode. This feature results in transistors able to survive in-circuit momentary overvoltage conditions, presenting circuit designers with increased flexibility when choosing device voltage grade against required safety margins.

This paper considers the avalanche characteristics of 'rugged' power MOSFETs and presents results from investigations into the physical constraints which ultimately limit avalanche energy dissipation in the VDMOS structure. Results suggest that the maximum sustainable energy is a function of the applied power density waveform, independent of device voltage grade and chip size.

The ability of a rugged device to operate reliably in a circuit subject to extreme interference is also demonstrated.

Introduction.

Susceptibility to secondary breakdown is a phenomenon which limits the power handling capability of a bipolar transistor to below its full potential. For a power MOSFET, power handling capability is a simple function of thermal resistance and operating temperature since the device is not vulnerable to a second breakdown mechanism. The previous statement holds true provided the device is operated at or below its breakdown voltage rating (B_{VDSS}) and not subject to overvoltage. Should the transistor be forced into avalanche by a voltage surge the structure of the device permits possible activation of a parasitic bipolar transistor which may then suffer the consequences of second breakdown. In the past this mechanism was typical of failure in circuits where the device became exposed to overvoltage. To reduce the risk of device failure during momentary overloads improvements have been introduced to the Power MOS design which enable it to dissipate energy while operating in the avalanche condition. The term commonly used to describe this ability is 'Ruggedness', however before discussing in further detail the merits of a rugged Power MOSFET it is worth considering the failure mechanism of non-rugged devices.

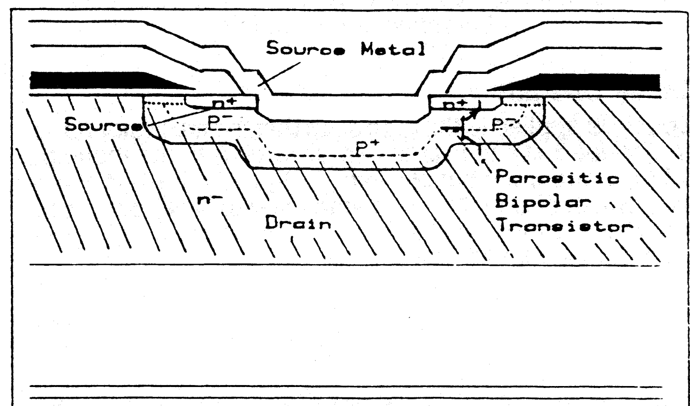


FIG 1: Cross Section Of A Typical Power MOS Cell.

Failure Mechanism Of A Non-Rugged Power MOS.

A power MOS transistor is made up of many thousands of cells, identical in structure. The cross section of a typical cell is shown in Fig. 1. When in the off-state or operating in saturation, voltage is supported across the p-n junction as shown by the shaded region. If the device is subjected to over-voltage (greater than the avalanche value of the device), the peak electric field, located at the p-n junction, rises to the critical value (approx. 200 kV / cm) at which avalanche multiplication commences. Computer modelling has shown that the maximum electric field occurs on the corner of the P+ diffusion. The electron-hole plasma generated by the avalanche process in this region gives rise to a source of electrons which are swept across the drain and a source of holes which flow through the P+ and P body regions towards the source metal contact. Clearly the P- region constitutes a resistance which will give rise to a potential drop beneath the n+. If this resistance is too large the p-n junction may become forward biased for relatively low avalanche currents. Also if the manufacturing process does not yield a uniform cell structure across the device or if defects are present in the silicon then multiplication may be a local event within the crystal. This would give rise to a high avalanche current density flowing beneath the source n+ and cause a relatively large potential drop sufficient to forward bias the p-n junction and hence activate the parasitic npn bipolar transistor inherent in the MOSFET structure. Due to the positive temperature coefficient associated with a forward biased p-n junction, current crowding will rapidly ensue with the likely result of second breakdown and eventual device destruction.

In order that a power MOS transistor may survive transitory excursions into avalanche it is necessary to manufacture a device with uniform cell structure, free from defects throughout the crystal and that within the cell the resistance beneath the n+ should be kept to a minimum. In this way a forward biasing potential across the p-n junction is avoided.

Definition Of Ruggedness.

The term 'Ruggedness' when applied to a power MOS transistor, describes the ability of that device to dissipate energy while operating in the avalanche condition. To test ruggedness of a device it is usual to use the method of unclamped inductive load turn-off using the circuit drawn in Fig. 2.

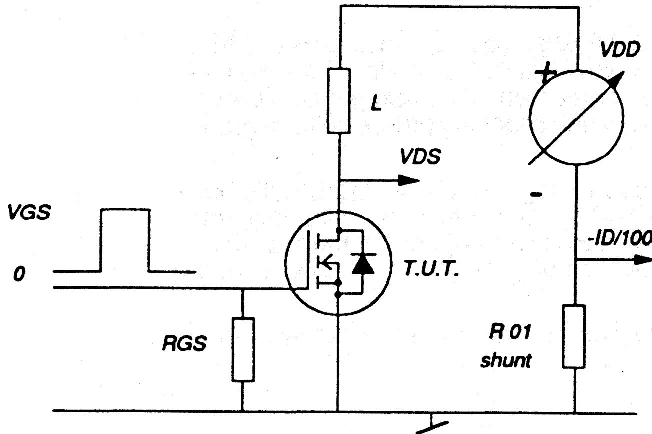


FIG. 2: Unclamped Inductive Load Test Circuit For Ruggedness Evaluation.

Circuit Operation:-

A pulse is applied to the gate such that the transistor turns on and load current ramps up according to the inductor value, L and drain supply voltage, V_{DD}. At the end of the gate pulse, channel current in the power MOS begins to fall while voltage on the drain terminal rises rapidly in accordance with equation 1.

$$\frac{dv}{dt} = L\frac{d^2I}{dt^2} \quad (1)$$

The voltage on the drain terminal is clamped by the avalanche voltage of the Power MOS for a duration equal to that necessary for dissipation of all energy stored in the inductor. Typical waveforms showing drain voltage and source current for a device undergoing successful test are shown in Fig. 3.

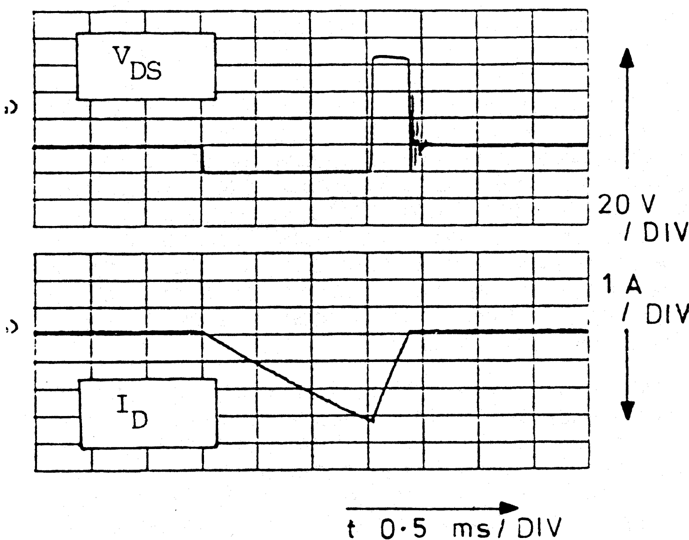


FIG. 3: Typical Waveforms taken from the Unclamped Inductive Load Test Circuit.

The energy stored in the inductor is given by equation 2 where I_D is the peak load current at the point of turn-off of the transistor.

$$W_{DSS} = 0.5LI_D^2 \quad (2)$$

All this energy is dissipated by the Power MOS while the device is in avalanche.

Provided the supply rail is kept below 50 % of the avalanche voltage, equation 2 approximates closely to the total energy dissipation by the device during turn-off. However a more exact expression which takes account of additional energy delivered from the power supply is given by equation 3.

$$W_{DSS} = \frac{BV_{DSS}}{BV_{DSS} - V_{DD}} 0.5LI_D^2 \quad (3)$$

Clearly the energy dissipated is a function of both the inductor value and the load current I_D, the latter being set by the duration of the gate pulse. The 50 Ohm resistor between gate and source is necessary to ensure a fast turn-off such that the device is forced into avalanche.

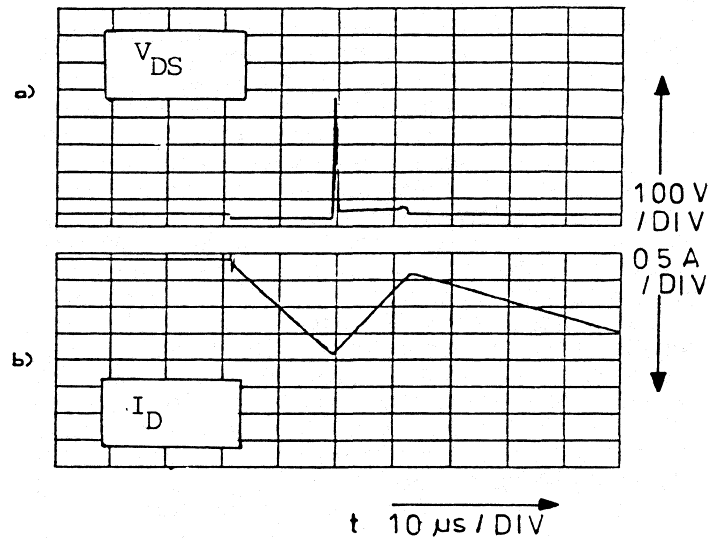


FIG. 4: Failure Waveforms Of A Non Rugged Power MOS Transistor.

The performance of a non-rugged device in response to the avalanche test is shown in Fig. 4. The drain voltage rises to the avalanche value followed by an immediate collapse to approximately 30 V. This voltage is typical of the sustaining voltage during Second Breakdown of a bipolar transistor, [1]. The subsequent collapse to zero volts after 12 µS signifies failure of the device. The transistor shown here was only able to dissipate a few micro joules at a very low current if a failure of this type was to be avoided.

Characteristics of A Rugged Power MOS.

I) The Energy Limitation Of A Rugged Device

The power waveform for a BUK627-500B (500 V, 0.8 Ohm) tested at a peak current of 15 A is presented in Fig. 5. The area within the triangle represents the maximum energy that this particular device type may sustain without failure at the above current. Fig. 6 shows the junction temperature variation in response to the power pulse, calculated from the convolution integral as shown in equation 4.

$$T_j(t) = \int_{\tau=0}^{\tau=t} P(t-\tau) Z_{th}(\tau) d\tau \qquad (4)$$

where $Z_{th}(\tau)$ = transient thermal impedance.

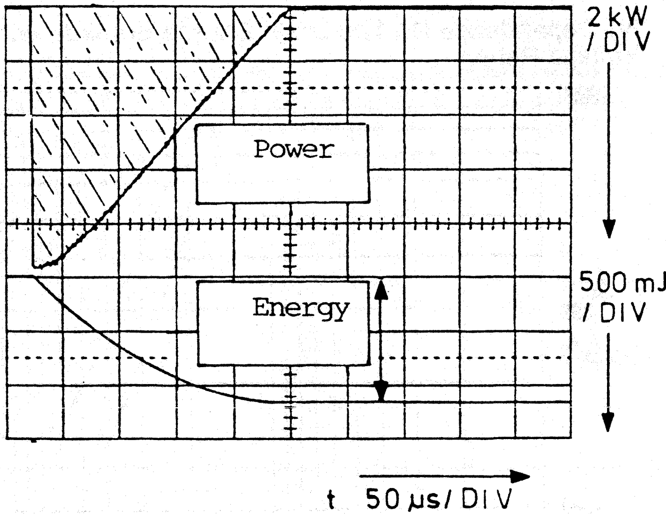


FIG. 5: Power and Energy Waveforms Prior To Failure For A Typical BUK627-500B

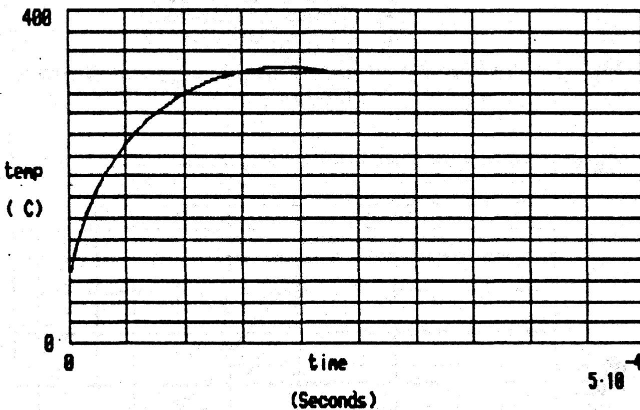


FIG. 6: Junction Temperature During The Power Pulse for the Avalanche Ruggedness Test On A Philips BUK627-500B.

Equation 4 predicts that the junction temperature will pass through a maximum during the test of 325 °C. The calculation of $Z_{th}(t)$ assumes that the power dissipation is uniform across the active area of the device. When the device operates in the avalanche mode the power will be dissipated more locally in the region of the p-n junction where the multiplication takes place. Consequently a local temperature above that predicted by equation 4 is likely to be present within the device.

Work on bipolar transistors [2] has shown that at a temperature of the order of 400 °C, the voltage supporting p-n region becomes effectively intrinsic as a result of thermal multiplication, resulting in a rapid collapse in the terminal voltage. It is probable that a similar mechanism is responsible for failure of the Power MOS with a local temperature approaching 400 °C resulting in a device short circuit. A subsequent rapid rise in internal temperature will result in eventual device destruction.

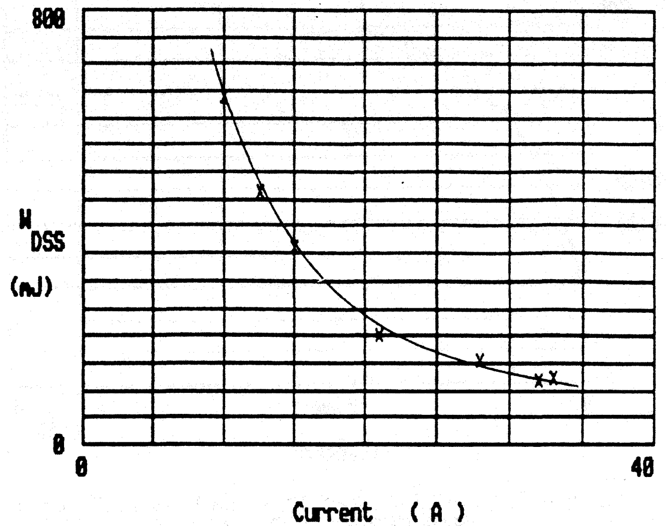


FIG. 7: Avalanche Energy against Current For A Typical Philips BUK553-50A

Clearly the rise in T_j is a function of the applied power waveform which is in turn related to circuit current, avalanche voltage of the device and duration of the energy pulse. Thus the energy required to bring about device failure will vary as a function of each of these parameters. The ruggedness of Power MOSFETS of varying crystal size and voltage specification together with dependence on circuit current is considered below.

ii) Sustainable Avalanche Energy As A Function Of Current.

The typical avalanche energy required to cause device failure is plotted as a function of peak current in Fig. 7 for a BUK553-50A (50 V, 0.085 Ohm Logic Level device). This result was obtained through destructive device testing using the circuit of Fig. 2 and a variety of inductor values.

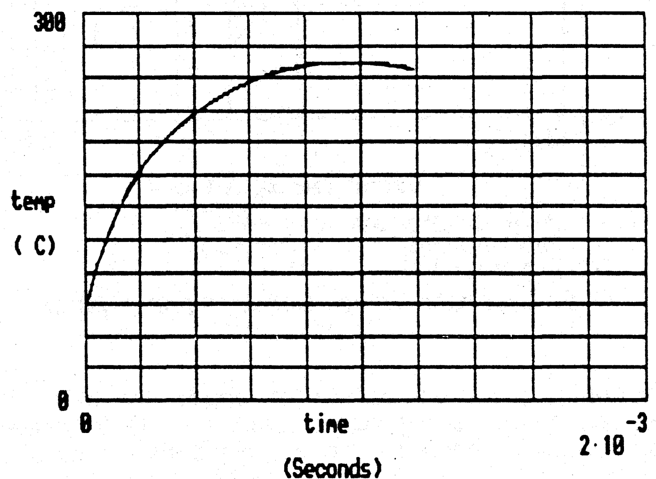


FIG. 8A: Temperature During Avalanche Test For A BUK553-50A; ID = 10 A

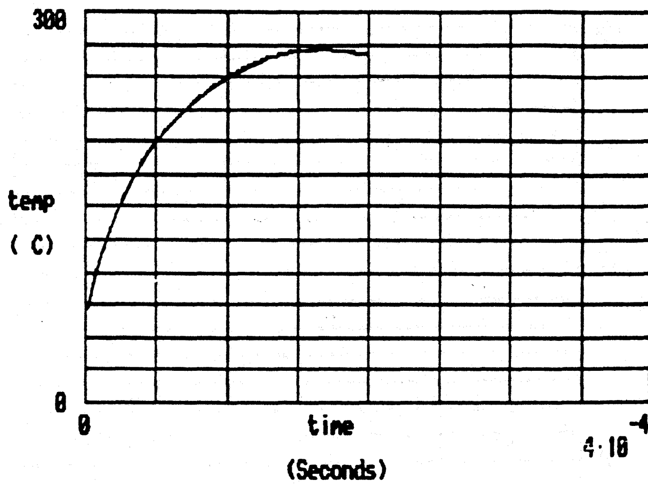
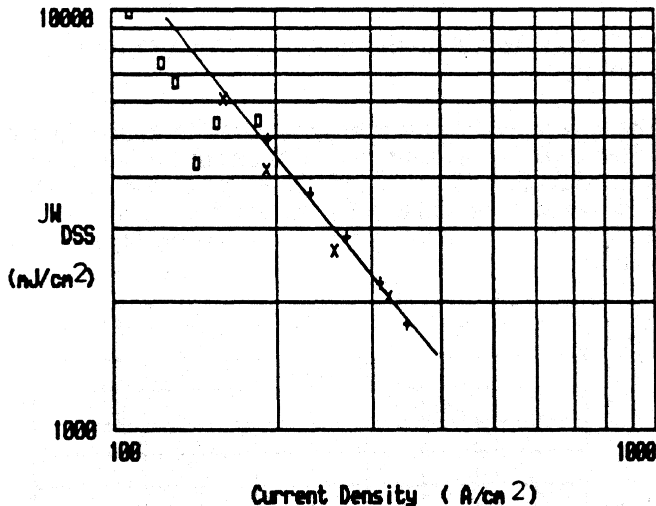


FIG. 8B: Temperature During Avalanche Test For A BUK553-50A; ID = 22 A

The plot shows that the effect of reducing current is to permit greater energy dissipation during avalanche prior to failure. This is an expected result since lower currents result in reduced power dissipation enabling avalanche to be sustained over a longer period. Temperature plots (Fig. 8) calculated for the 10 A and 22 A failure points confirm that the maximum junction temperature reached in each case is the same despite the different energy values. (N.B. The critical temperature is again underestimated as previously stated.)

iii) Effect of Crystal Size.



KEY: x Philips BUK553-100A (6.25 mm² chip)
\+ Philips BUK555-100A (13 mm² chip)
□ Competitor Devices (100 V)

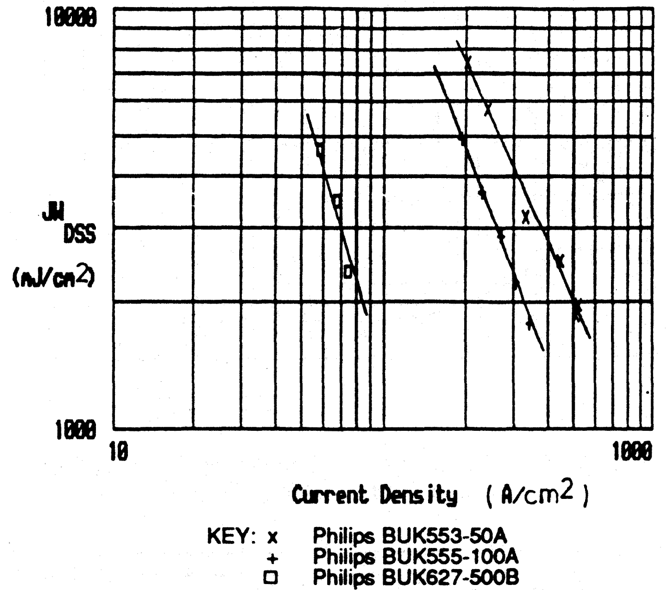
FIG. 9: Avalanche Energy Density Against Current Density

To enable a fair comparison of ruggedness between devices of various chip size it is necessary to normalise the results. Therefore instead of plotting avalanche energy against current, avalanche energy density and current density become more appropriate axes. Fig. 9 shows the avalanche energy density against current density failure locus for two 100 V Philips Power MOS types which are different only in silicon area. Also shown on this plot are two competitor devices of different chip areas (B_{VDSS} = 100 V). This result demonstrates two points:

a) the rise in T_j to the critical value for failure is dependent on the power density dissipated within the device as a function of time,

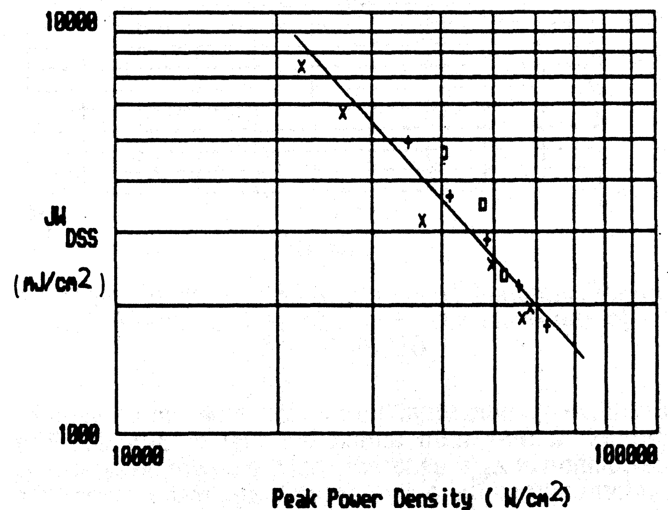
b) the sustainable avalanche energy scales proportional to chip size.

iv) Dependence On The Drain Source Breakdown Voltage Rating.



KEY: x Philips BUK553-50A
\+ Philips BUK555-100A
□ Philips BUK627-500B

FIG. 10: Avalanche Energy Density Against Current Density



KEY: x Philips BUK553-50A
\+ Philips BUK555-100A
□ Philips BUK627-500B

FIG. 11: Avalanche Energy Density Against Peak Power Density

Energy density against current density failure loci are shown for devices of several different breakdown voltages in Fig. 10. Presented in this form it is difficult to assess the relative ruggedness of each device since the current density is reduced for increasing voltage. If instead of peak current density, peak power density is used for the x-axis then comparison is made very simple. The data of Fig. 10 has been replotted in Fig. 11 in the above manner. Represented in this fashion the

ruggedness of each chip appears very similar highlighting that the maximum energy dissipation of a device while in avalanche is dependent only on the power density function.

Ruggedness Ratings.

It should be stressed that the avalanche energies presented in the previous section result in a rise of the junction temperature far in excess of the device rating and in practice energies should be kept within the specification. Ruggedness is specified in data for each device in terms of an unclamped inductive load test maximum condition; recommended energy dissipation at a particular current (usually the rated current of the device).

DEVICE TYPE	R_{DSON} (Ω)	V_{DS} (V)	I_D[1] (A)	W_{DSS} (mJ)
BUK552-50A	0.13	50	15	30
BUK552-100A	0.25	100	10	30
BUK553-50A	0.085	50	21	45
BUK553-100A	0.18	100	13	140
BUK627-500B	0.8	500	10	500

The ruggedness rating is chosen to protect against a rise in T_j above the maximum rating. Examples of ruggedness ratings for a small selection of devices are shown above.

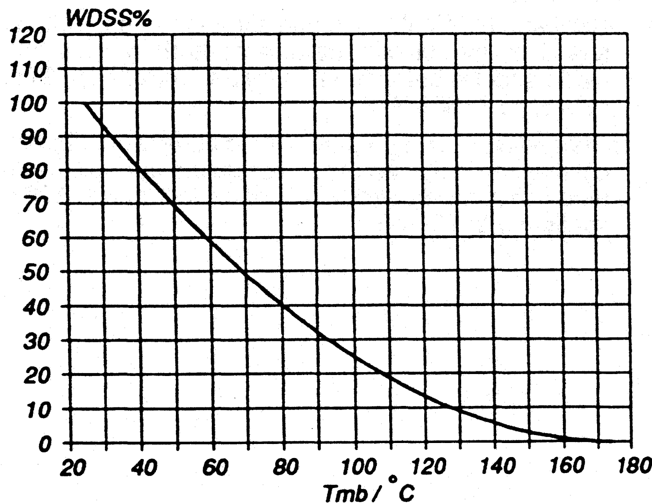


FIG. 12: Normalised Temperature Derating Curve

This data is applicable for T_j = 25 C. For higher operating temperatures the permissible rise in junction temperature during the energy test is reduced. Consequently ruggedness needs to be derated with increasing operating temperature. A normalised derating curve for devices with Tj max 175 °C is presented in Fig. 12.

Performance Of A Rugged Power MOS Device.

The ability of a rugged Power MOS transistor to survive momentary power surges results in excellent device reliability. The response of a BUK553-50A to interference spikes while switching a load is presented below. The test circuit is shown in Fig. 13 together with the profile of the interference spike. The interference generator produces pulses asynchronous to the switching frequency of the Power MOS. Fig. 14 shows the drain voltage and load current response at four instances in the switching cycle. Devices were subjected to 5000 interference spikes at a frequency of 5 Hz. No degradation in device performance was recorded.

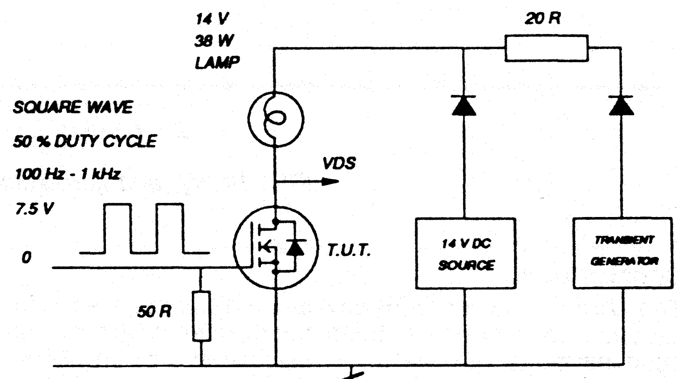


FIG. 13a: Test Circuit

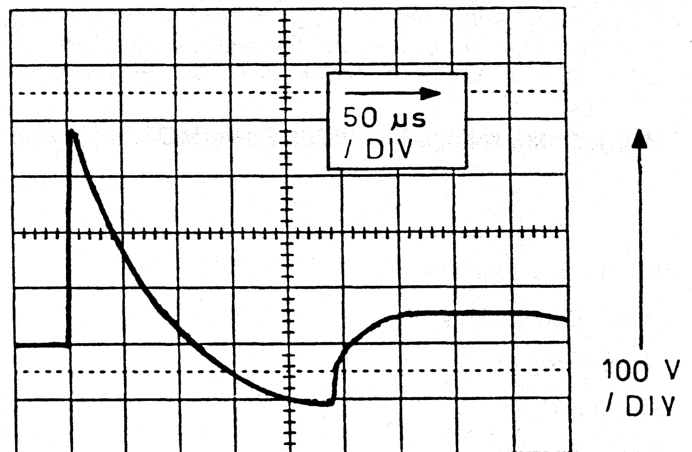
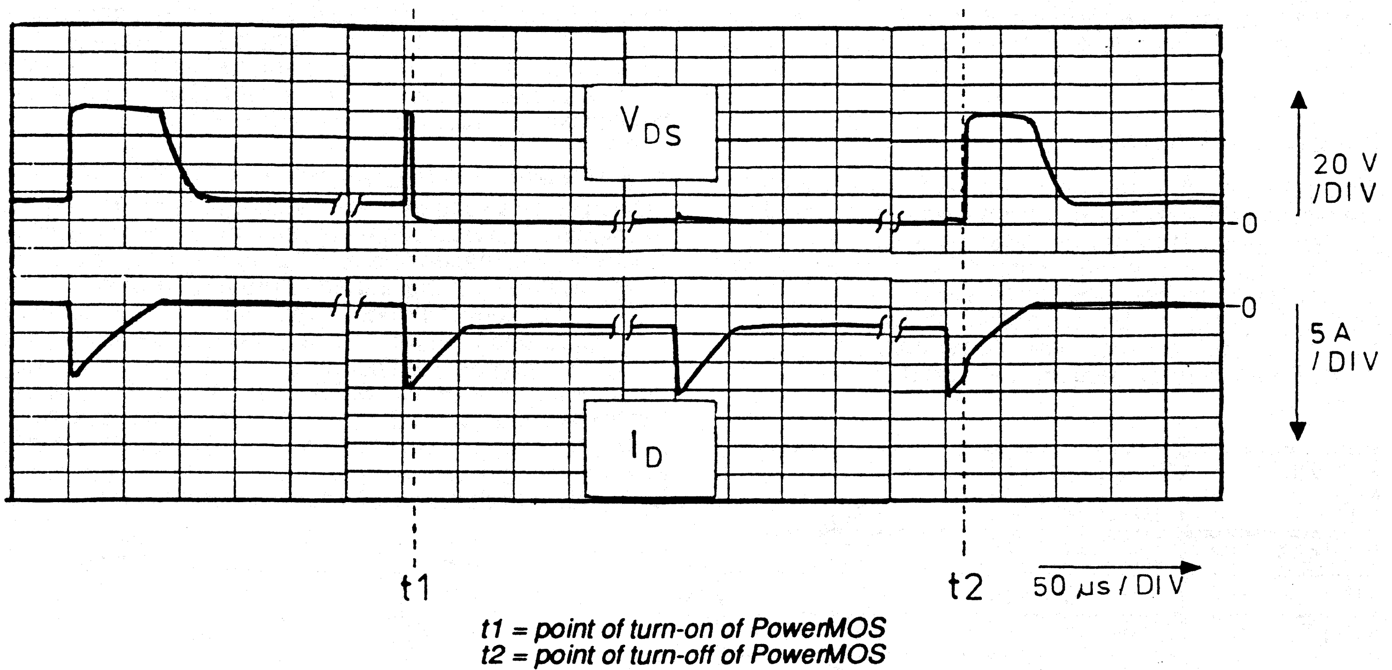


FIG. 13b: Output from Transient Generator.

1 Test Current



t1 = point of turn-on of PowerMOS
t2 = point of turn-off of PowerMOS

FIG. 14: V_{DS} and I_D waveforms for the circuit in fig. 13a

Conclusions.

The ability of power MOS devices to dissipate energy in the avalanche mode has been made possible by process optimisation to remove the possibility of turn-on of the parasitic bipolar structure. The failure mechanism of a rugged device is one of excessive junction temperature initiating a collapse in the terminal voltage as the junction area becomes intrinsic. The rise in junction temperature is dictated by the power density dissipation which is a function of crystal size, breakdown voltage and circuit current.

Ruggedness ratings for Philips PowerMOS are chosen to ensure that the specified maximum junction temperature of the device is not exceeded.

References.

1. DUNN and NUTTALL, An investigation of the voltage sustained by epitaxial bipolar transistors in current mode second breakdown. Int.J.Electronics, 1978, vol.45, no.4, 353-372
2. DOW and NUTTALL, A study of the current distribution established in npn epitaxial transistors during current mode second breakdown. Int.J.Electronics, 1981, vol.50, no.2, 93-108

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Stockport
Cheshere, U.K.

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK426	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	30	30	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.028	0.03	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	30	30	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	19	19	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	120	120	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 ˚C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 29 A BUK426-50A	-	0.024	0.028	Ω
		BUK426-50B	-	0.027	0.03	Ω

DYNAMIC CHARACTERISTICS

Ths = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 29 A	17	22	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	800	1000	pF
C_{rss}	Feedback capacitance		-	270	400	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	70	100	ns
$t_{d\,off}$	Turn-off delay time	R_{GS} = 50 Ω;	-	170	220	ns
t_f	Turn-off fall time	R_{gen} = 50 Ω	-	120	160	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

Ths = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	30	A
I_{DRM}	Pulsed reverse drain current	-	-	-	120	A
V_{SD}	Diode forward voltage	I_F = 30 A ; V_{GS} = 0 V	-	1.4	1.7	V
t_{rr}	Reverse recovery time	I_F = 30 A; -dI_F/dt = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.1	-	µC

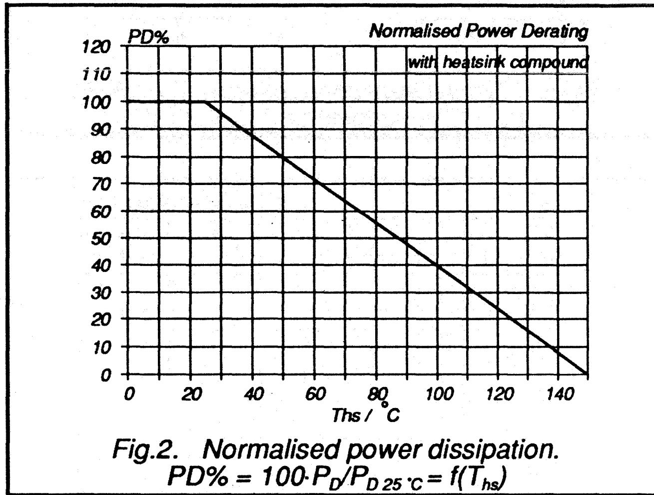


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

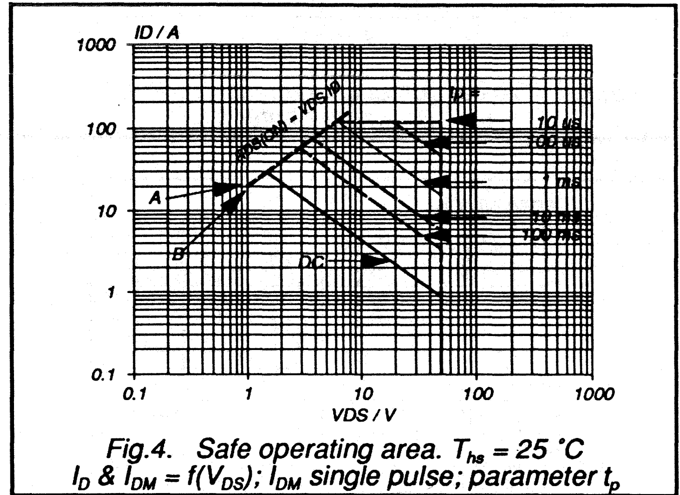


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

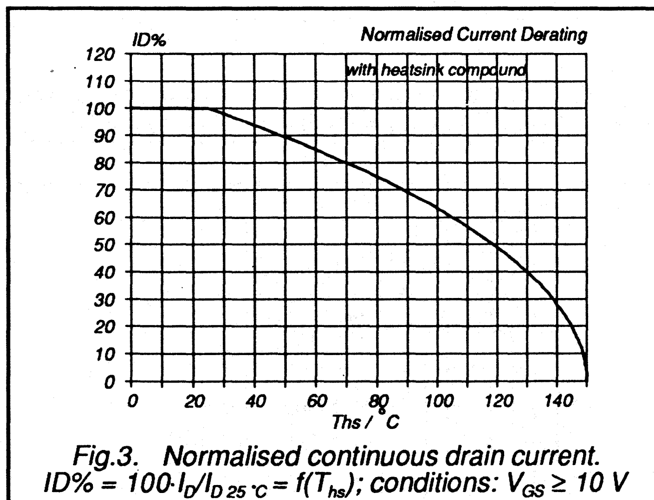


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

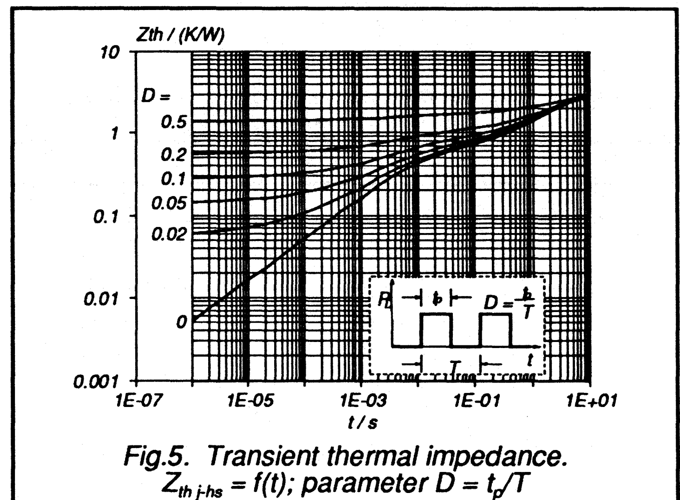


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

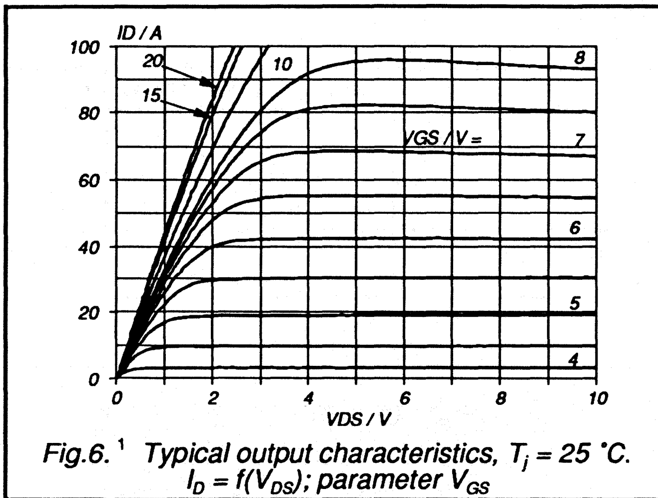


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

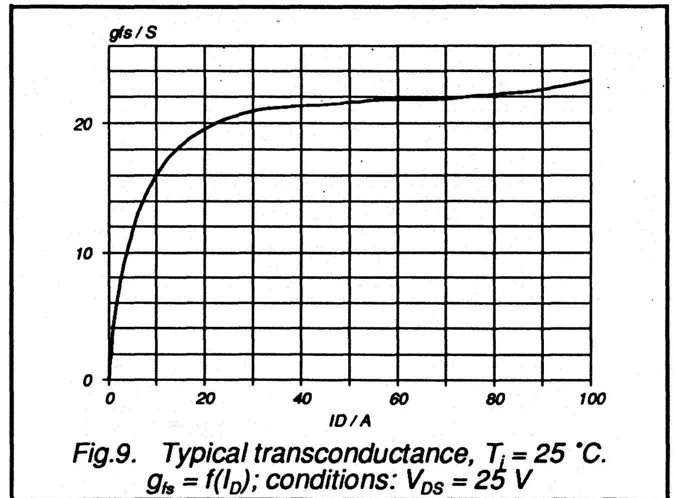


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

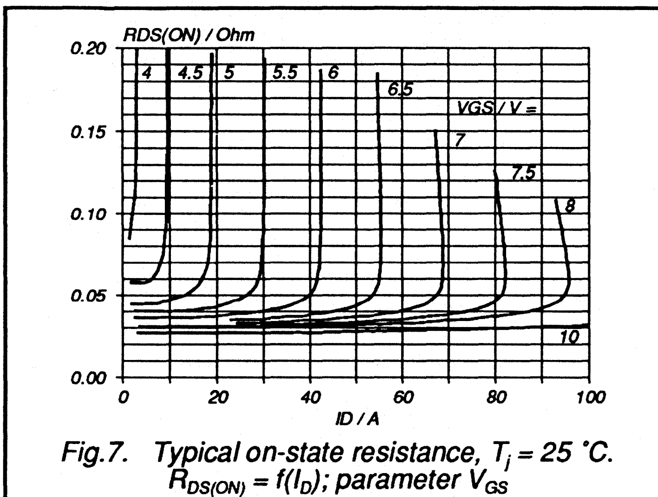


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

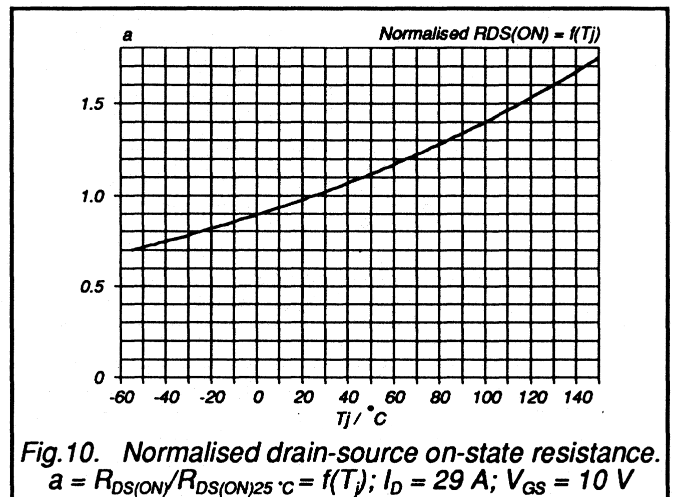


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 29 A; V_{GS} = 10 V

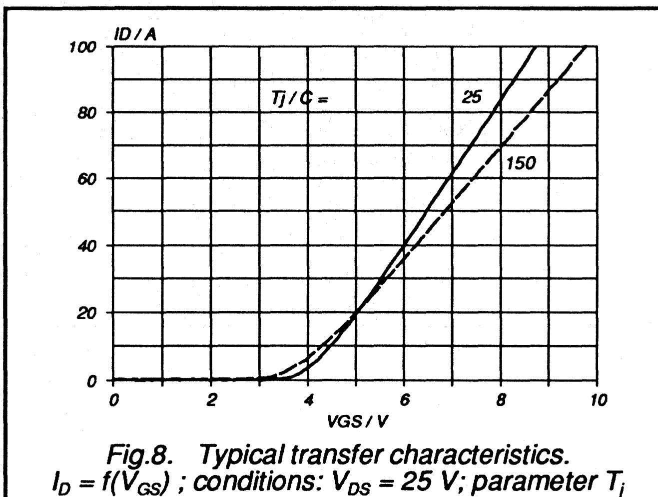


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

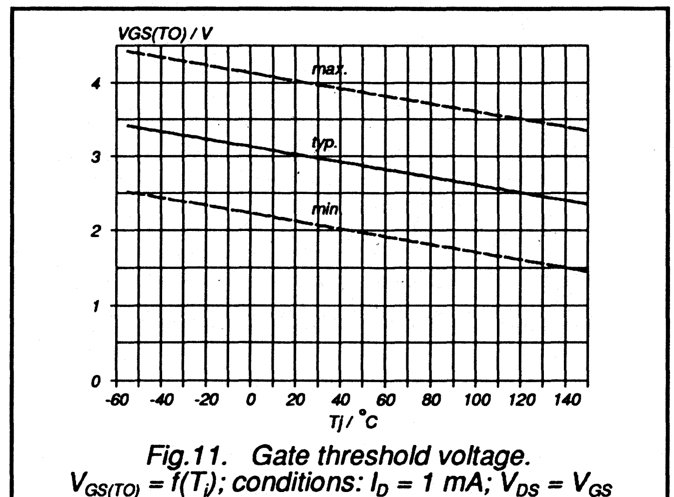


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

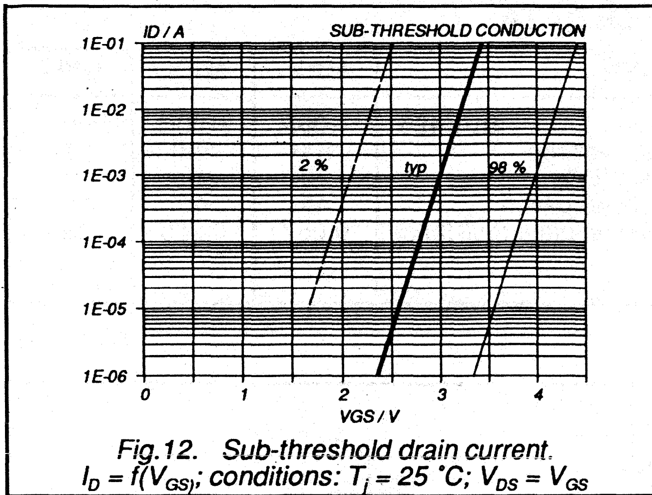


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

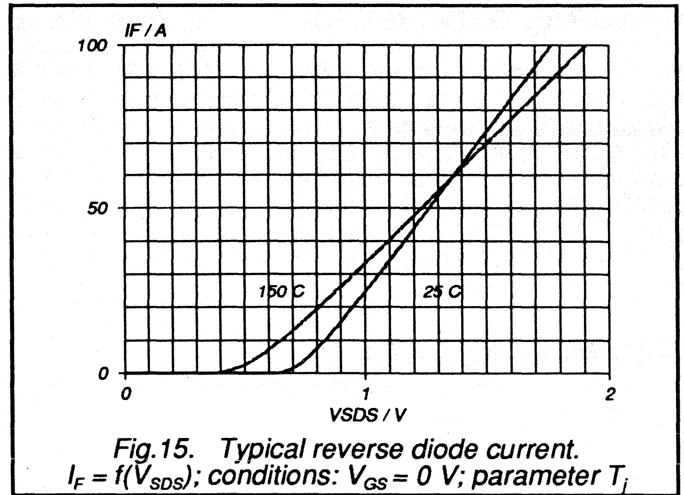


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

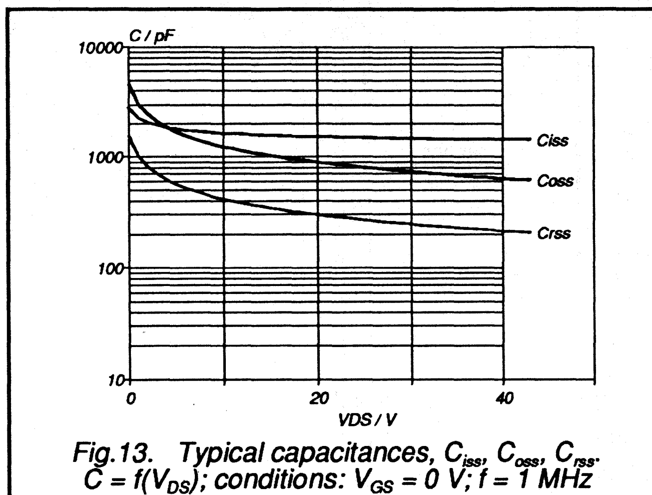


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

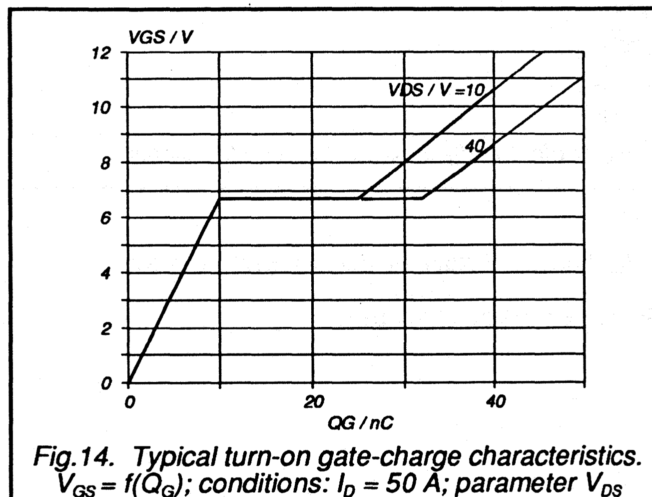


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 50$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK426	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	20	19	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.057	0.065	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

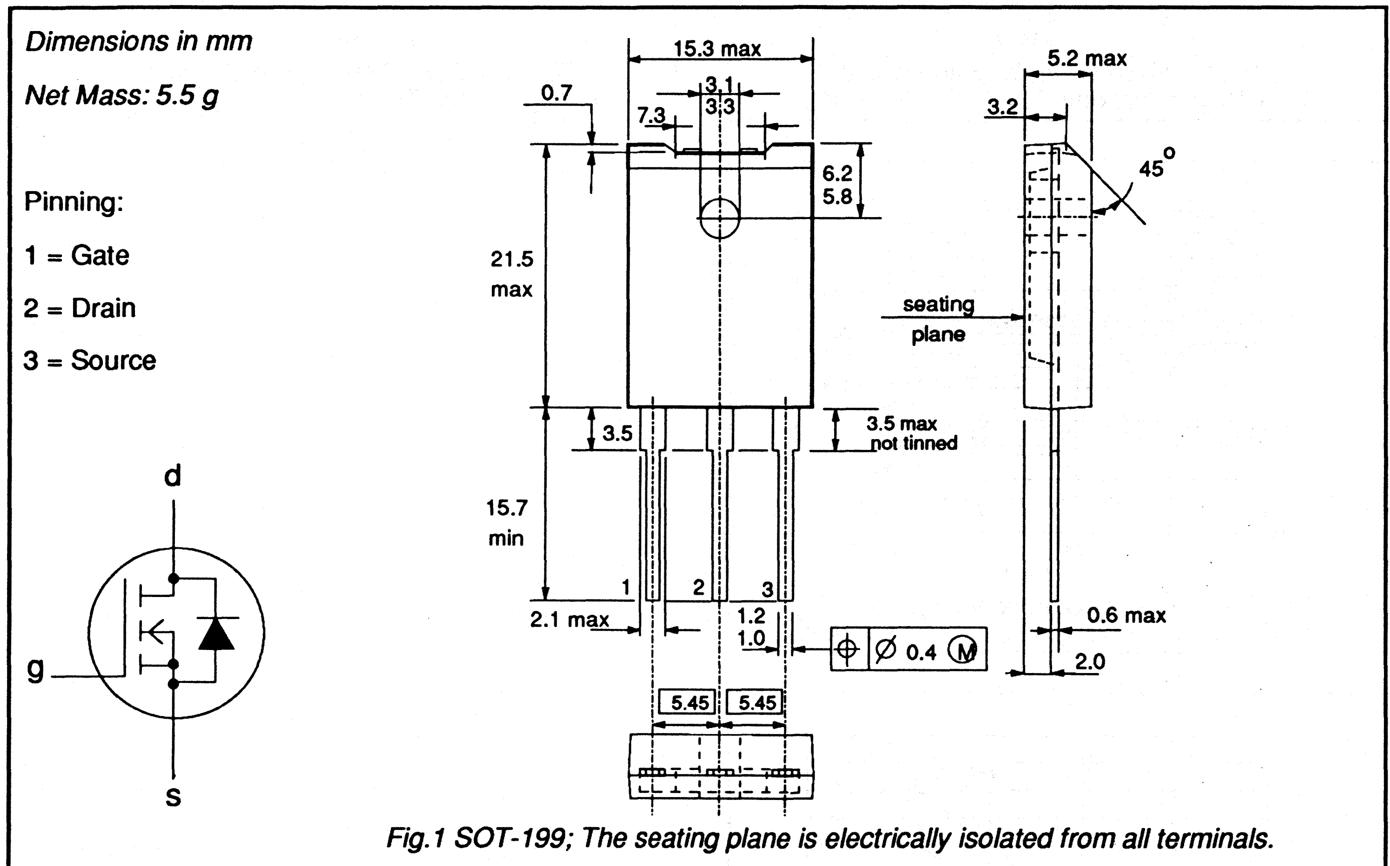


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	20	19	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	12	12	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	80	76	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\ j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 15 A **BUK426-100A**	-	0.052	0.057	Ω
		BUK426-100B	-	0.06	0.065	Ω

DYNAMIC CHARACTERISTICS

Ths = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 15 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	450	600	pF
C_{rss}	Feedback capacitance		-	130	200	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	150	200	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	65	85	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

Ths = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	20	A
I_{DRM}	Pulsed reverse drain current	-	-	-	80	A
V_{SD}	Diode forward voltage	I_F = 20 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 20 A; $-dI_F/dt$ = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.9	-	µC

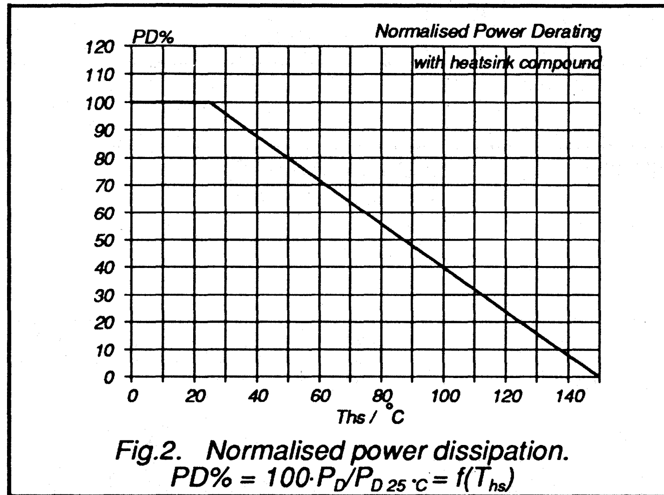


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

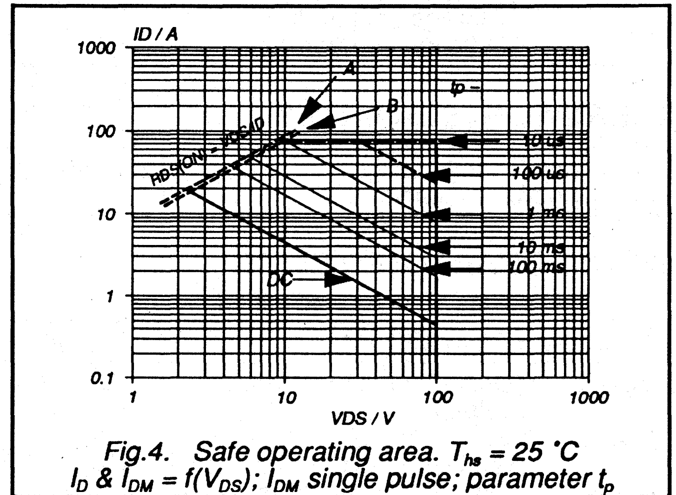


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

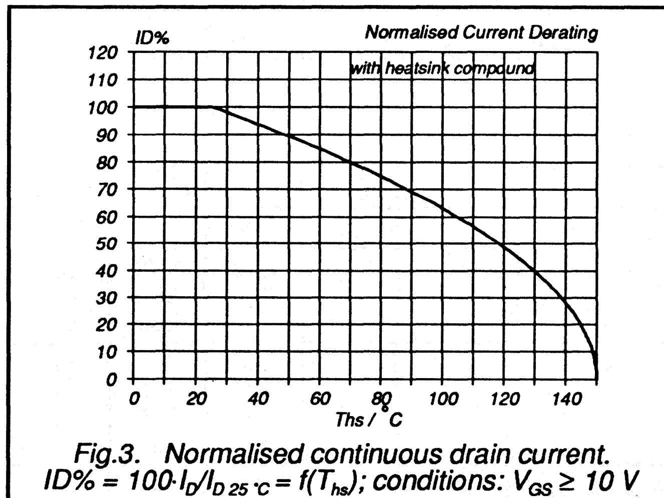


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

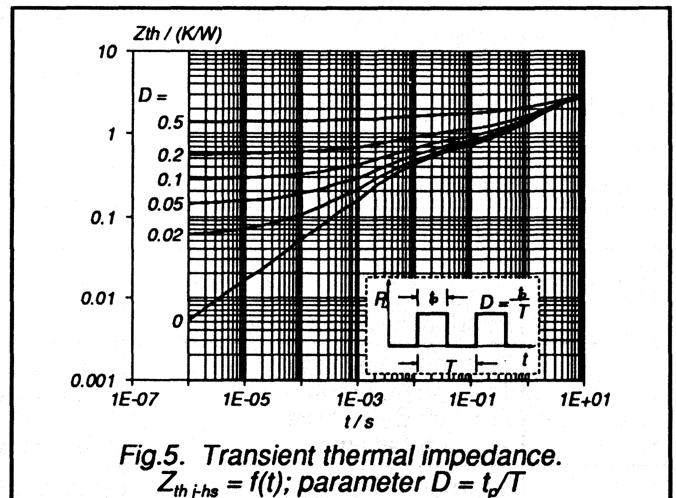


Fig.5. Transient thermal impedance.
$Z_{th\,j-hs} = f(t)$; parameter $D = t_p/T$

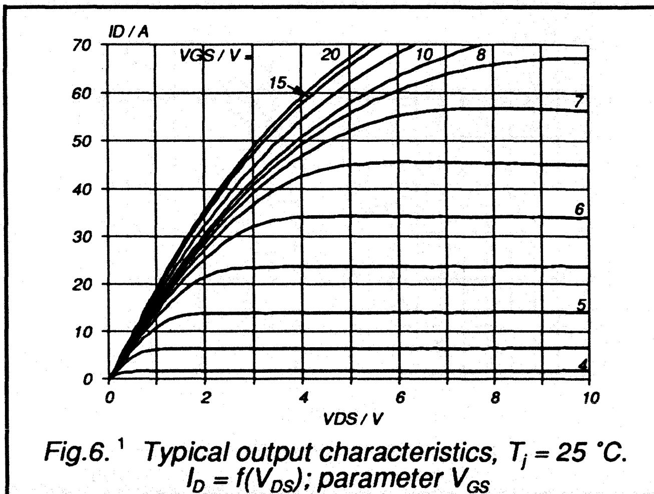


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

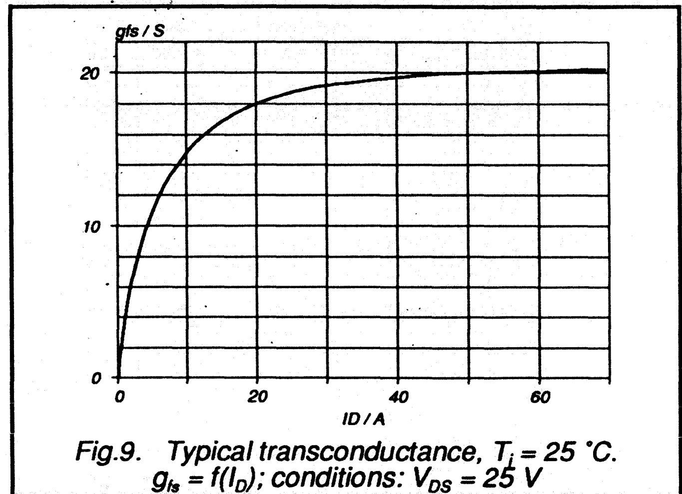


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

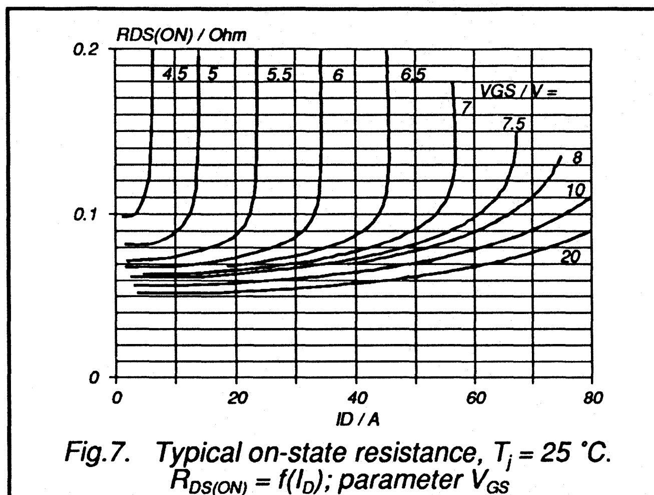


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

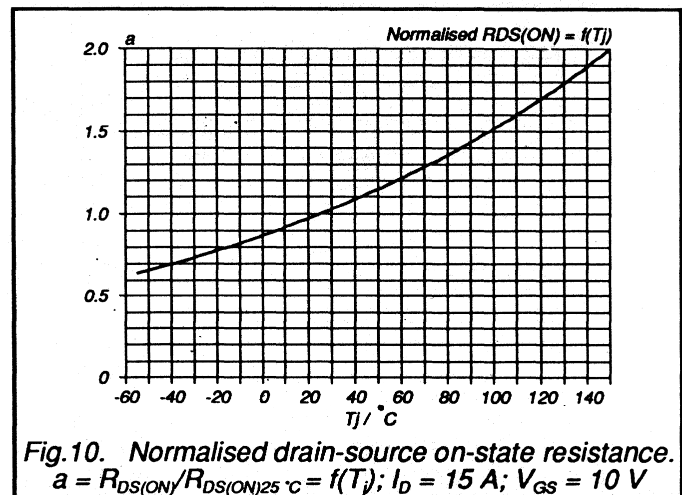


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 15$ A; $V_{GS} = 10$ V

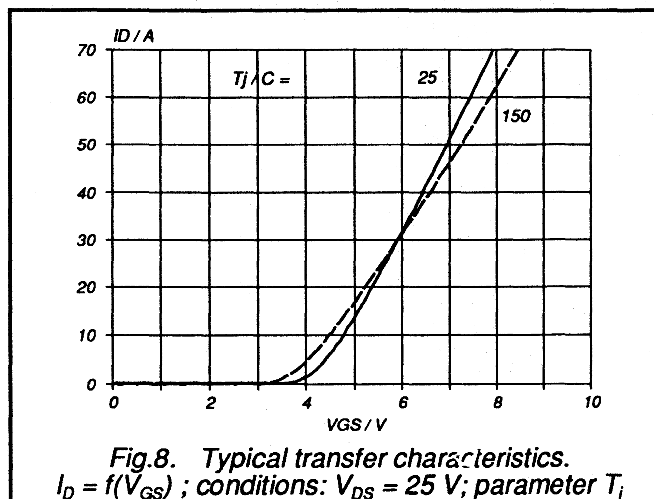


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

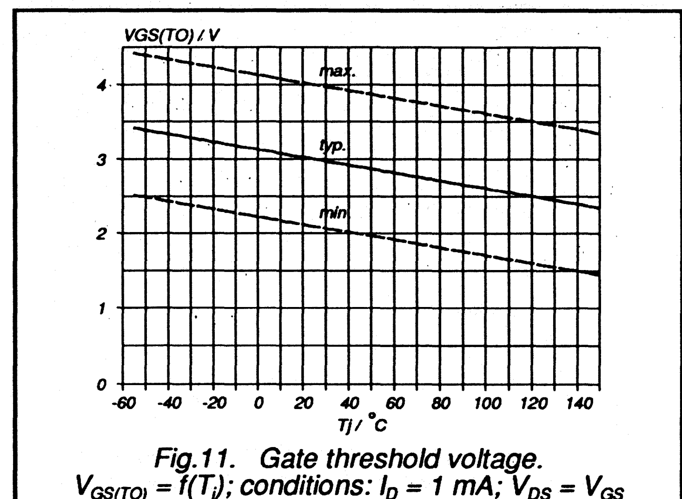


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

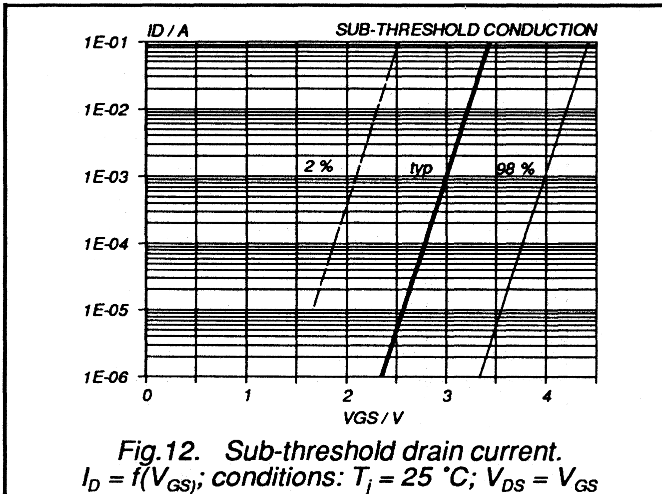


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

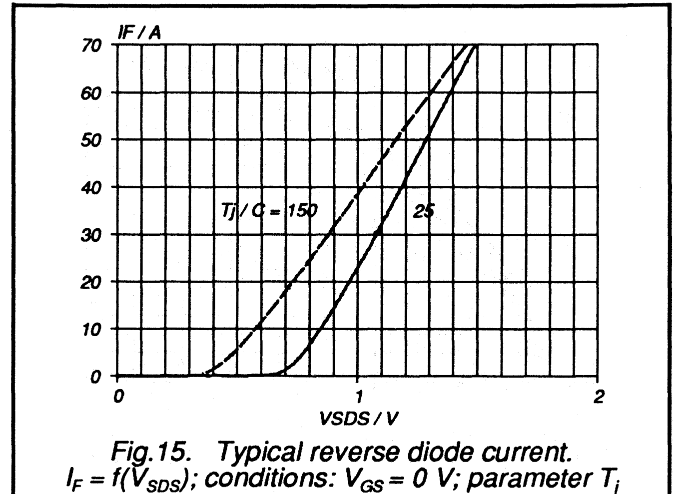


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

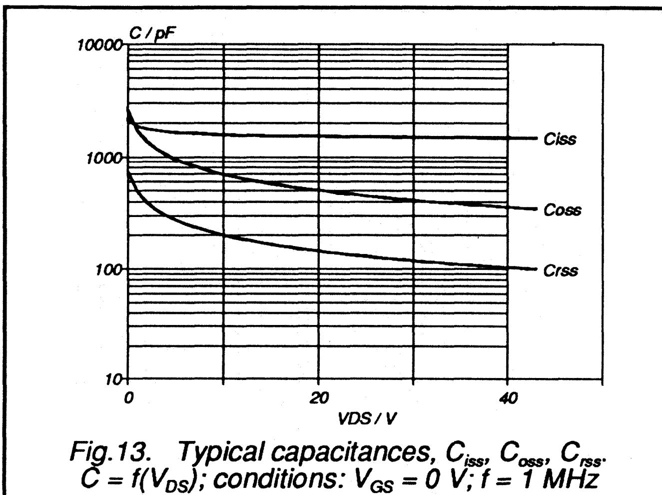


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

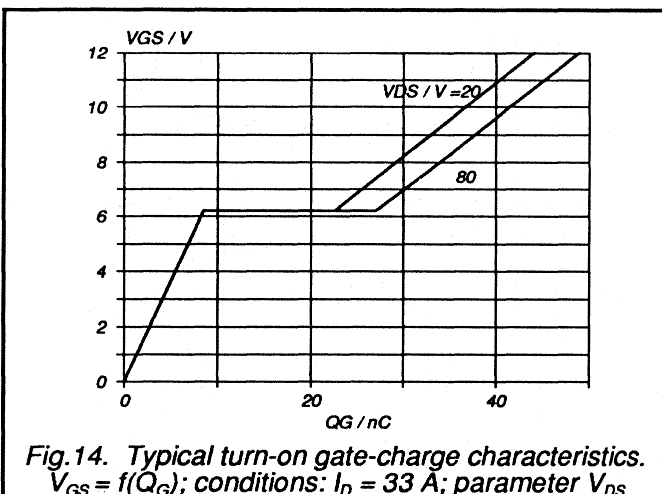


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 33$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK426	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	11	10	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.16	0.2	Ω

MECHANICAL DATA

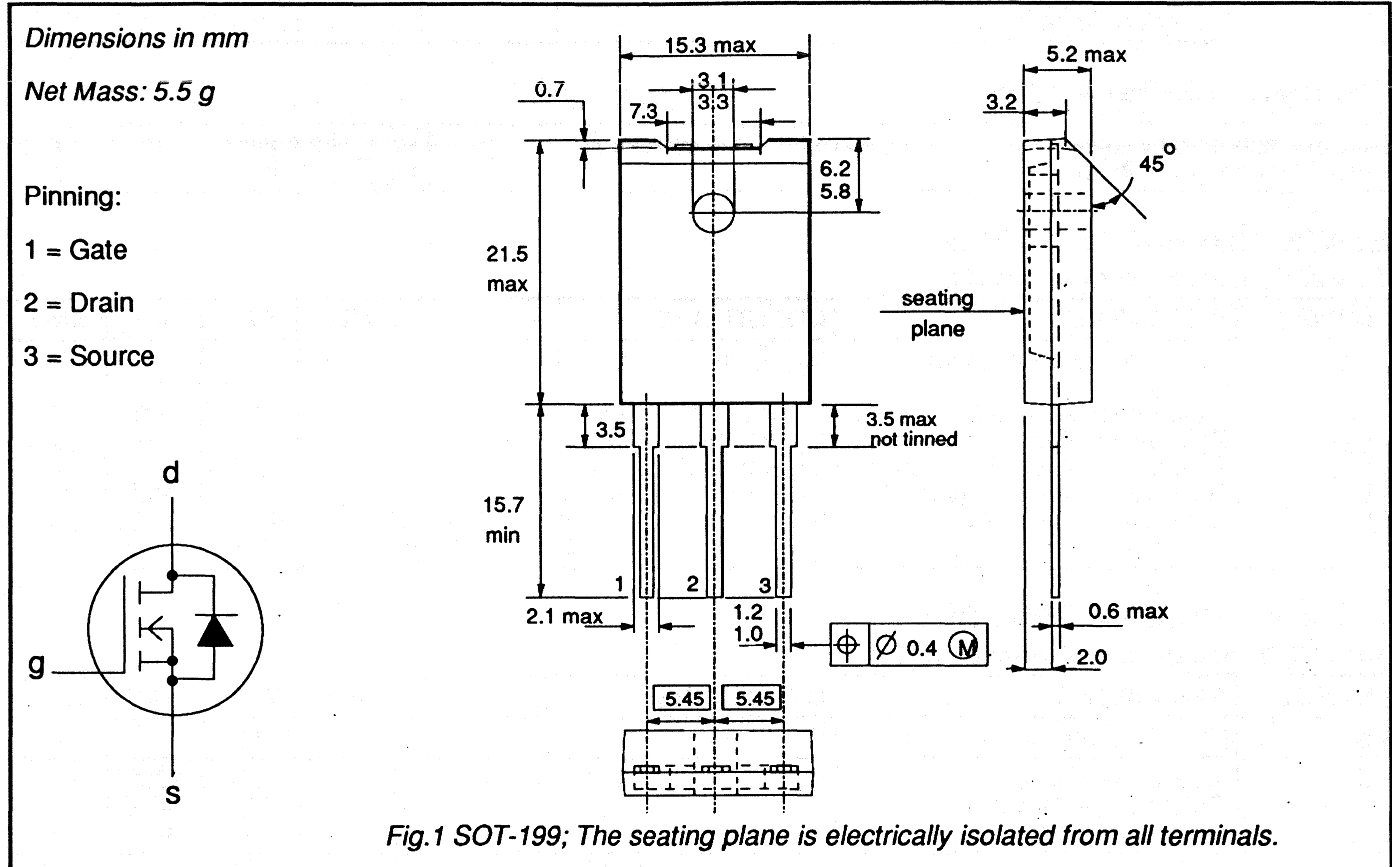


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	11	10	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	7	6.3	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	44	40	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 10 A BUK426-200A	-	0.15	0.16	Ω
		BUK426-200B	-	0.17	0.20	Ω

DYNAMIC CHARACTERISTICS

Ths = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	300	400	pF
C_{rss}	Feedback capacitance		-	60	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	145	185	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	50	70	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

Ths = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	11	A
I_{DRM}	Pulsed reverse drain current	-	-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 11 A; $-dI_F/dt$ = 100 A/µs;	-	650	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	4.1	-	µC

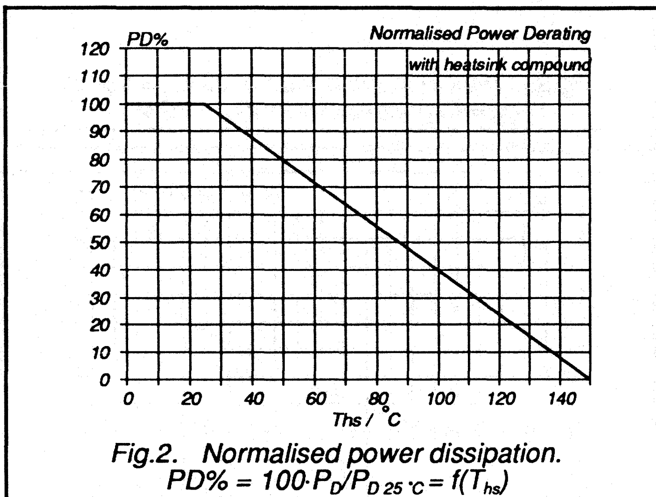


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

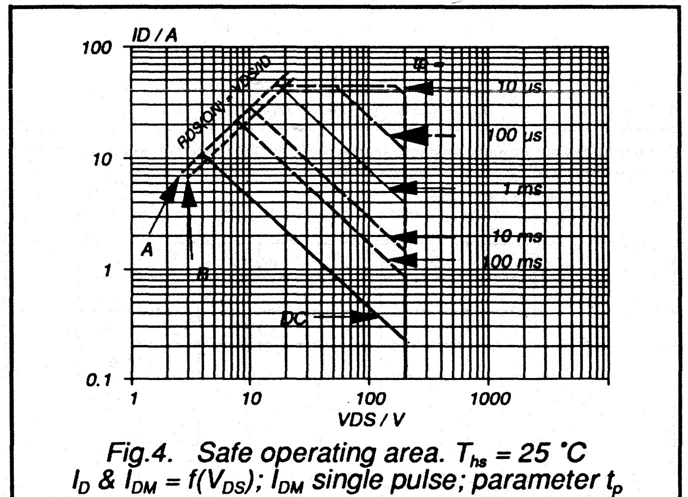


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

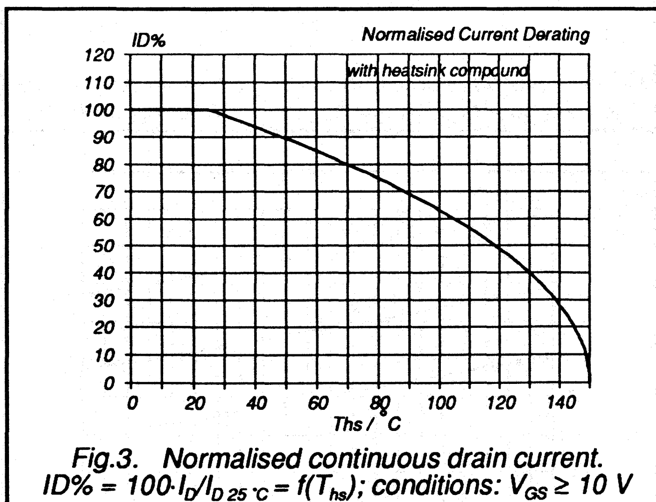


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

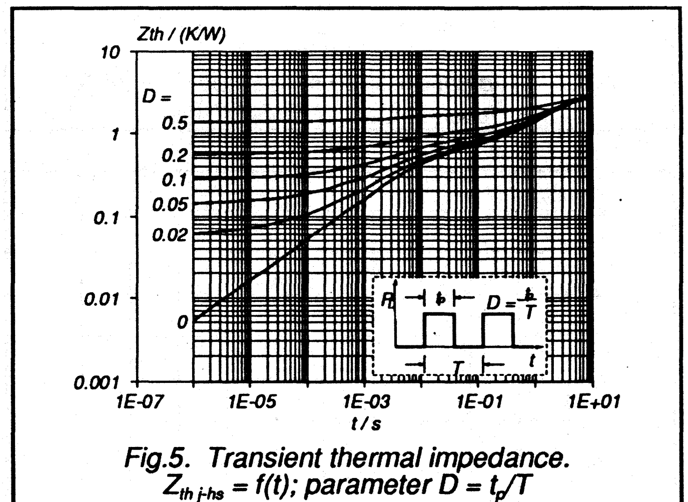


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

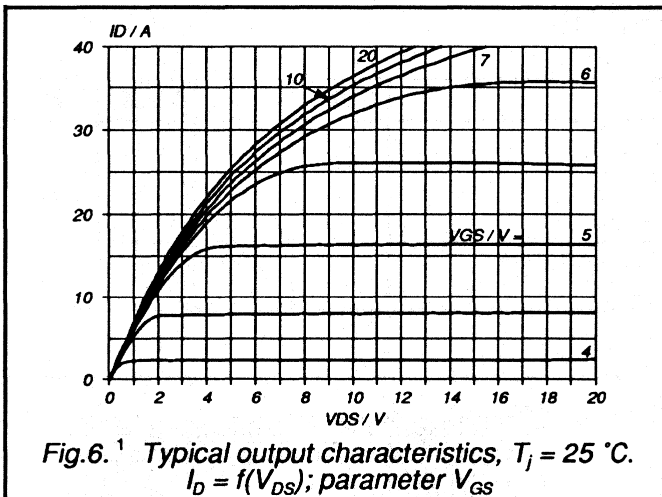


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

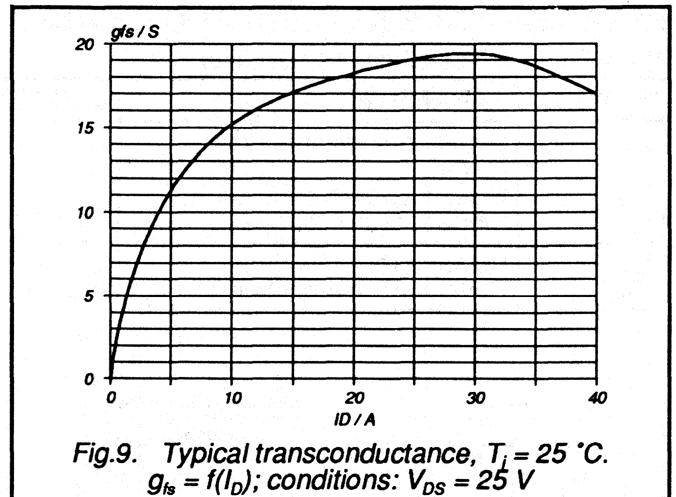


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

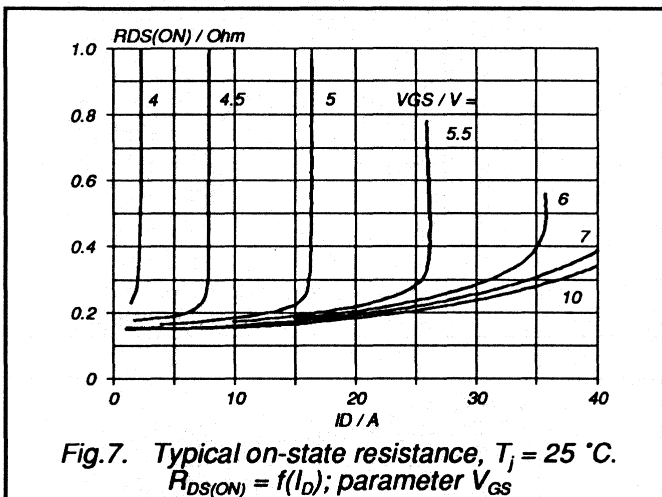


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

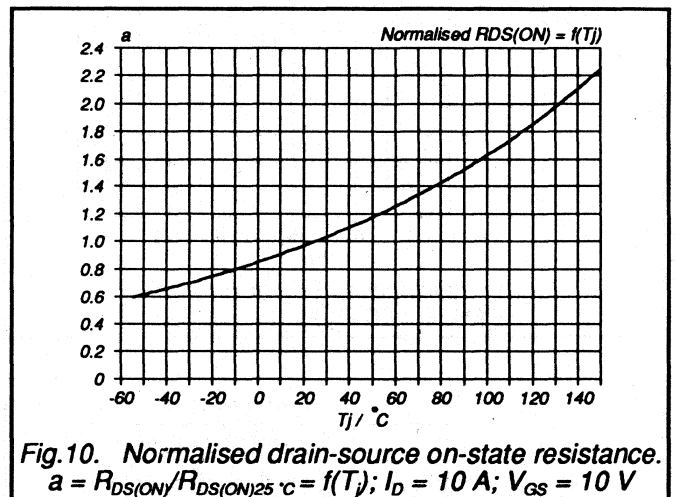


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 10 A; V_{GS} = 10 V

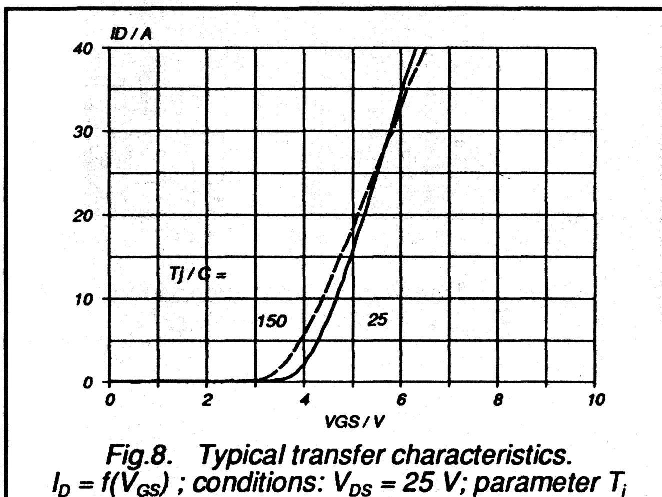


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

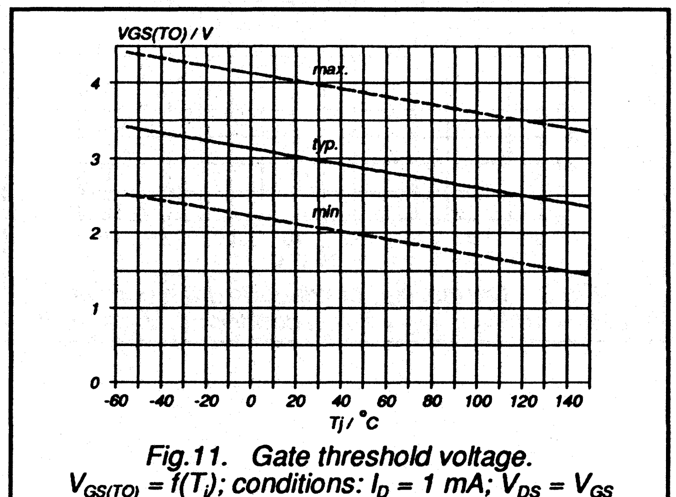


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

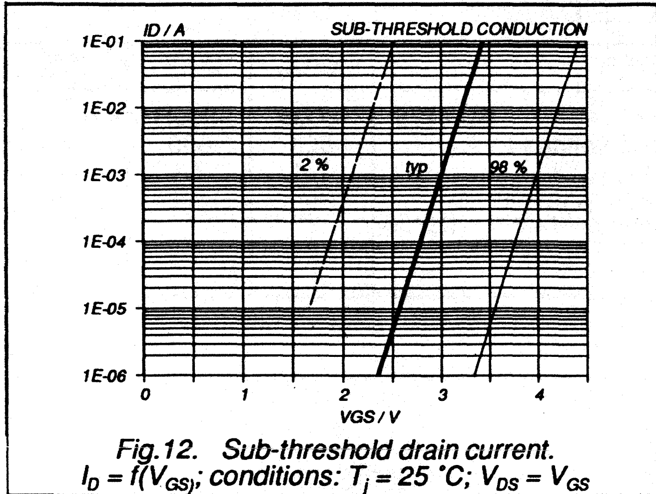


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

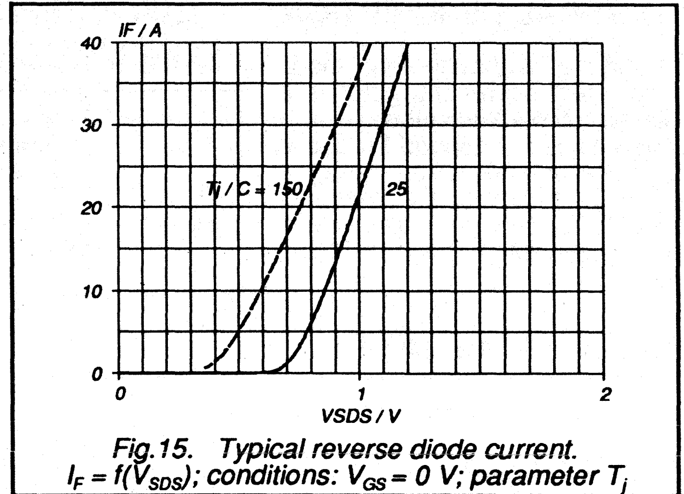


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

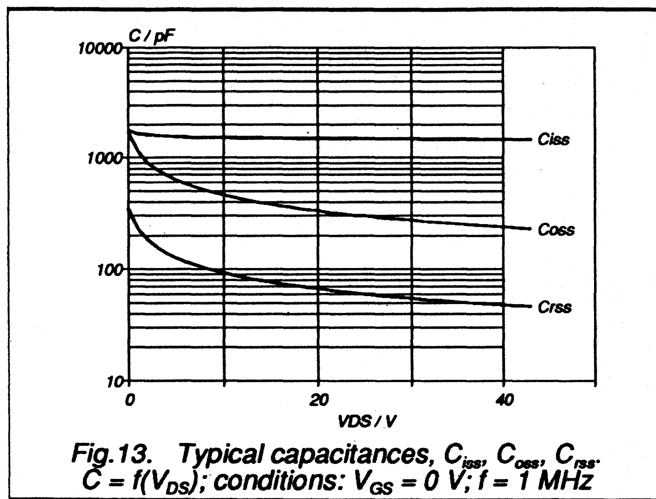


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

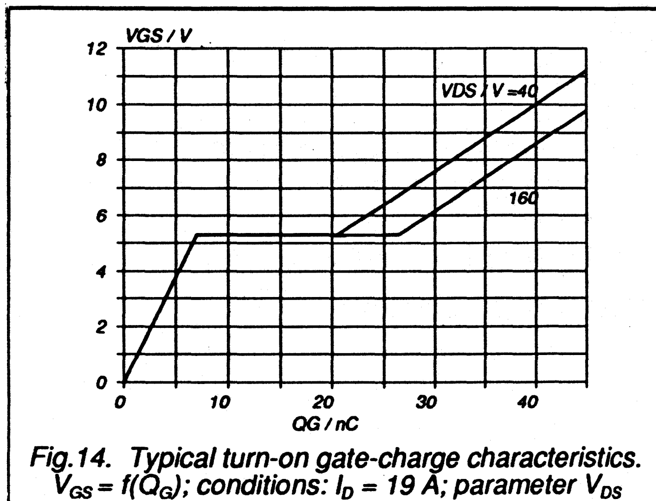


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 19$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK426	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	2.4	2.1	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	3	4	Ω

MECHANICAL DATA

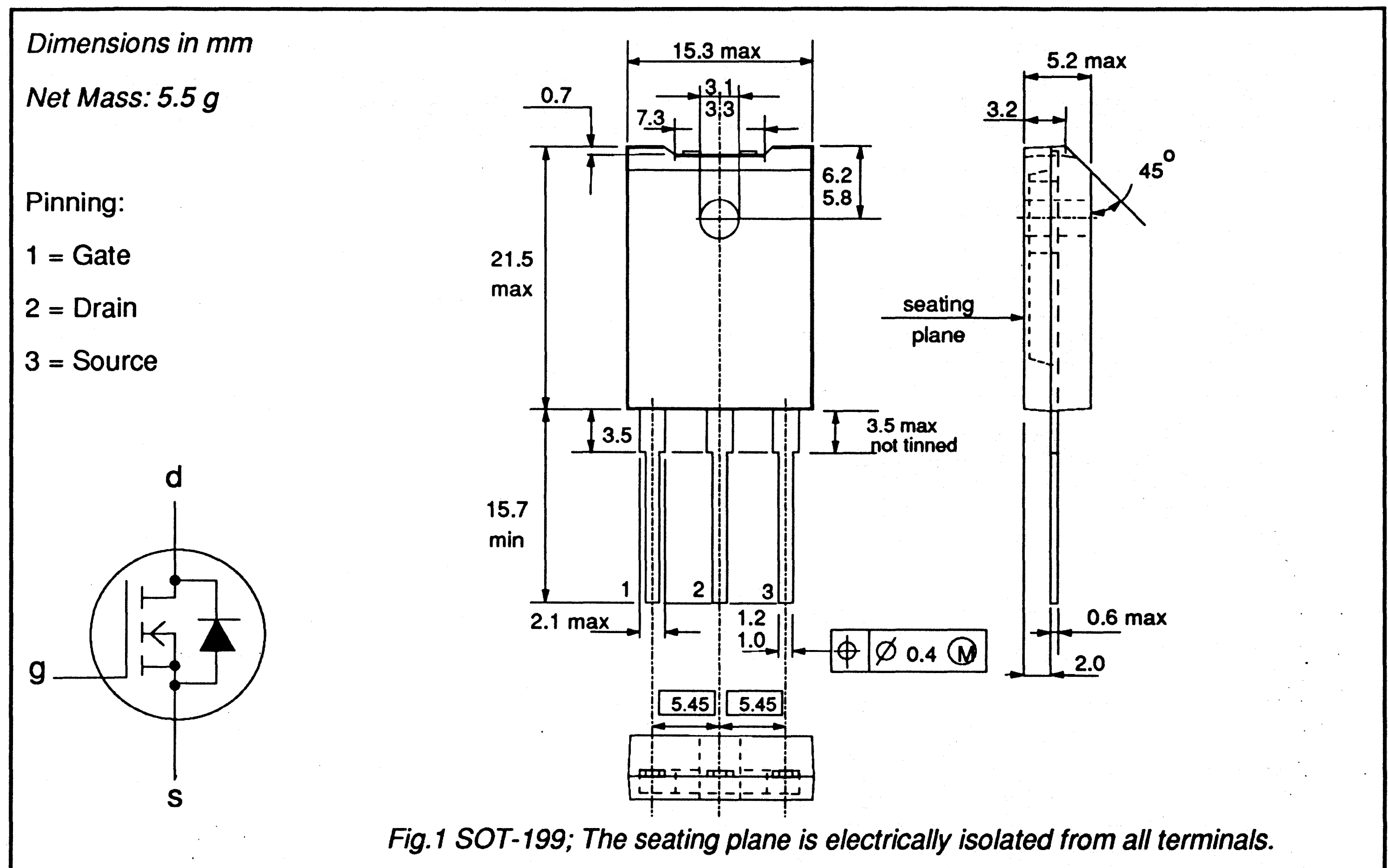


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	-800B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	2.4	2.1	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	1.5	1.3	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	10	8.4	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; BUK426-800A	-	2.7	3.0	Ω
		I_D = 1.5 A BUK426-800B	-	3.5	4.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.4	A
I_{DRM}	Pulsed reverse drain current	-	-	-	10	A
V_{SD}	Diode forward voltage	I_F = 2.4 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.4 A; -dI_F/dt = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

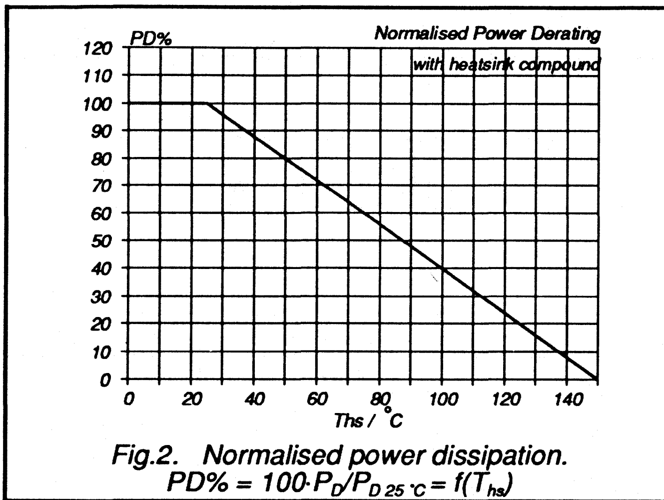


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

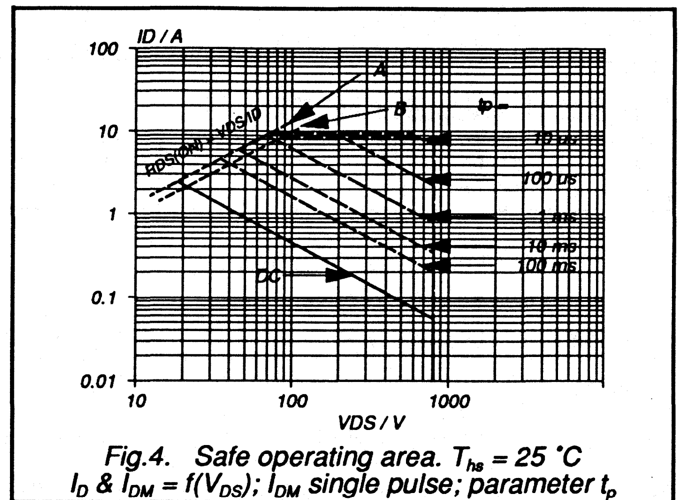


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

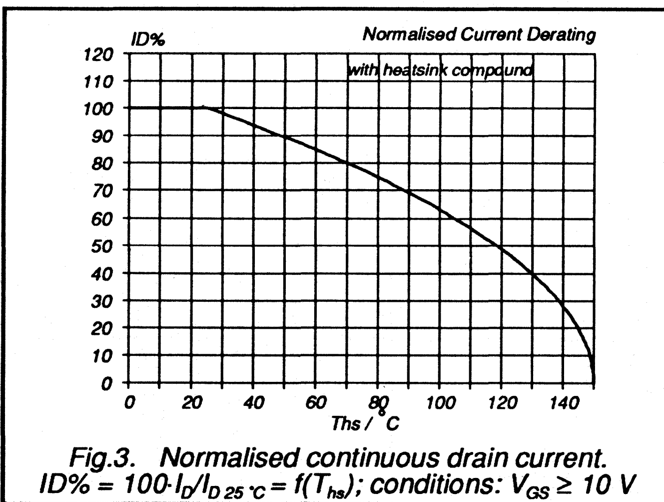


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

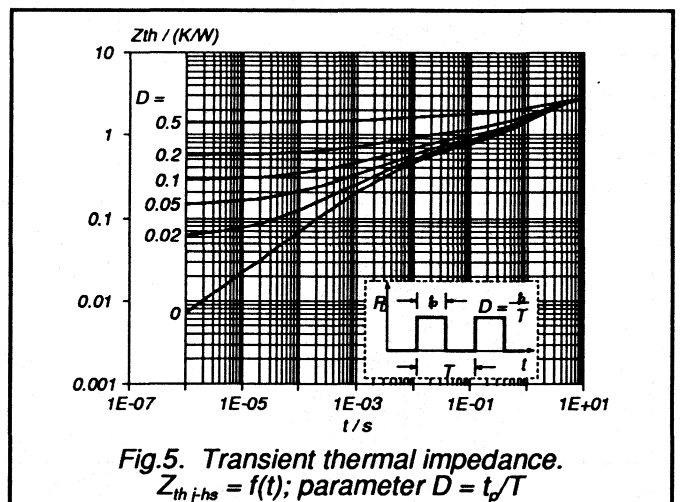


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

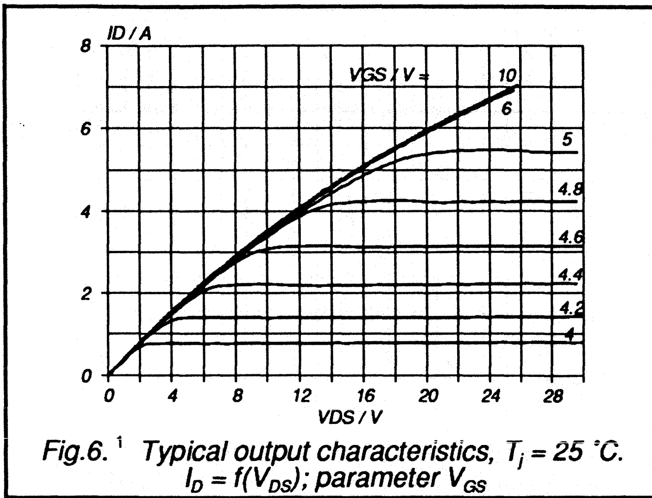


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

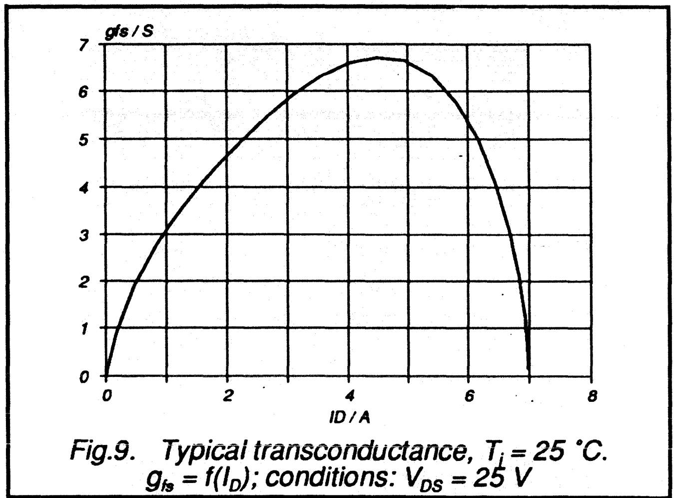


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

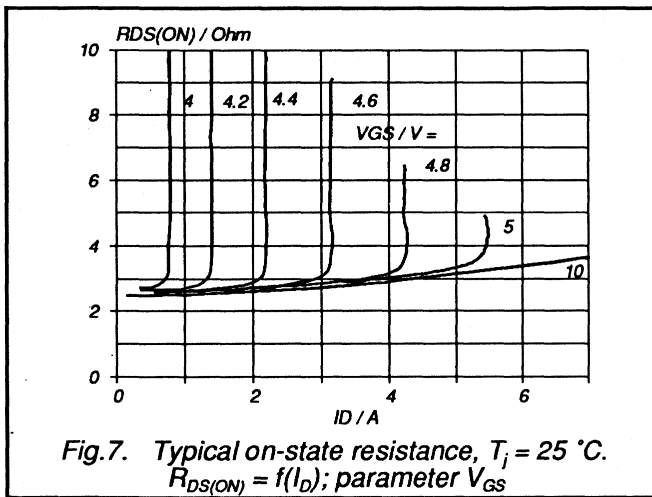


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

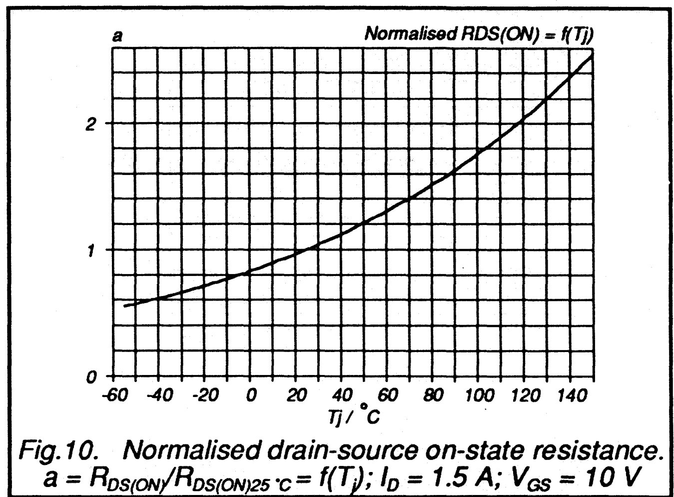


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

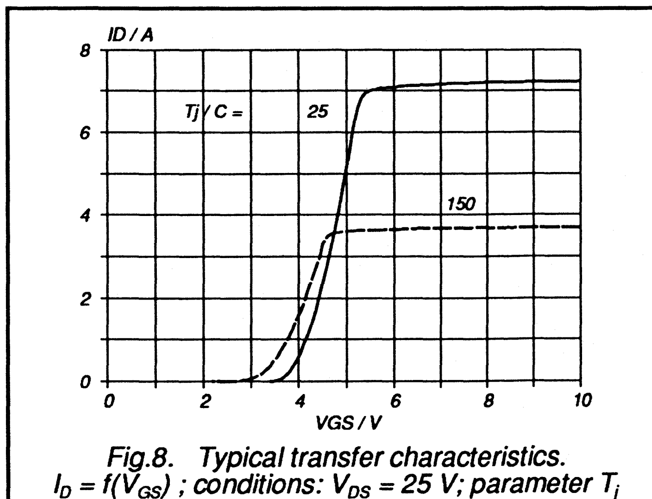


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

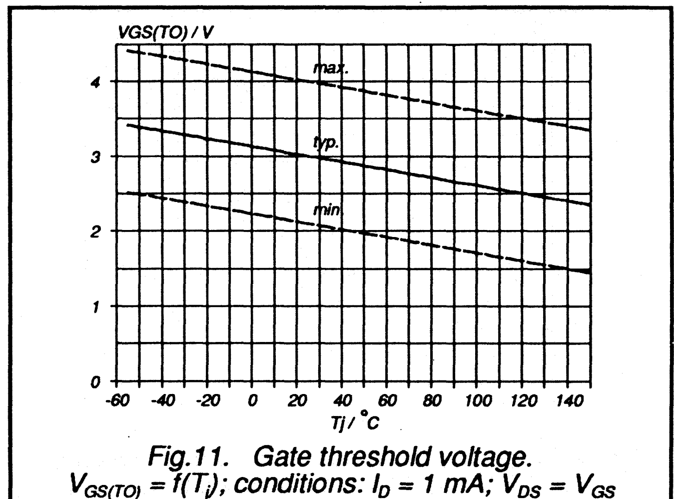


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

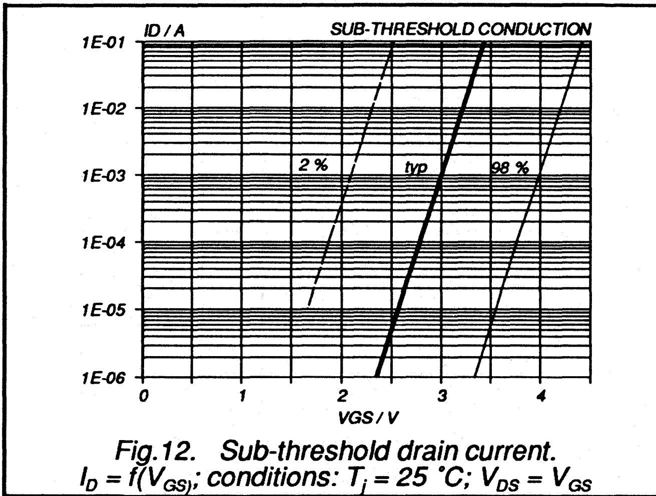


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

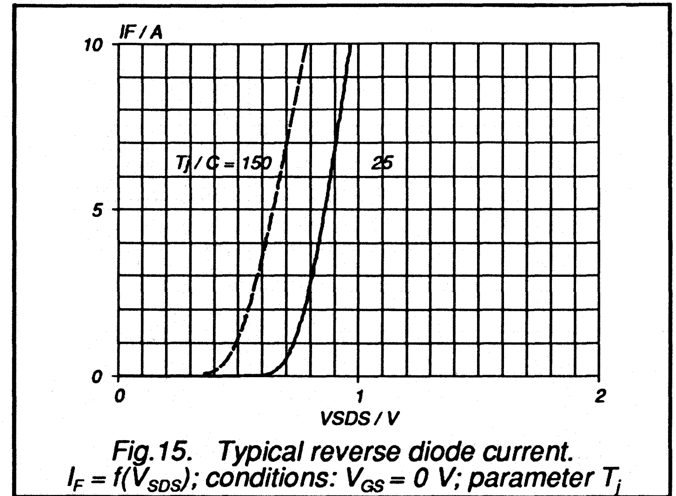


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

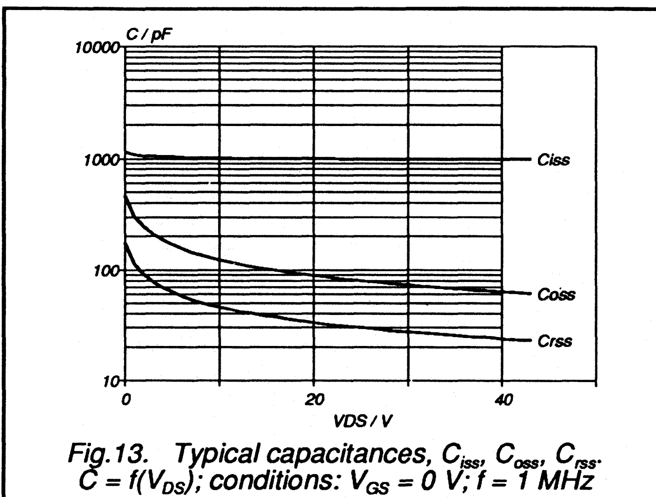


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

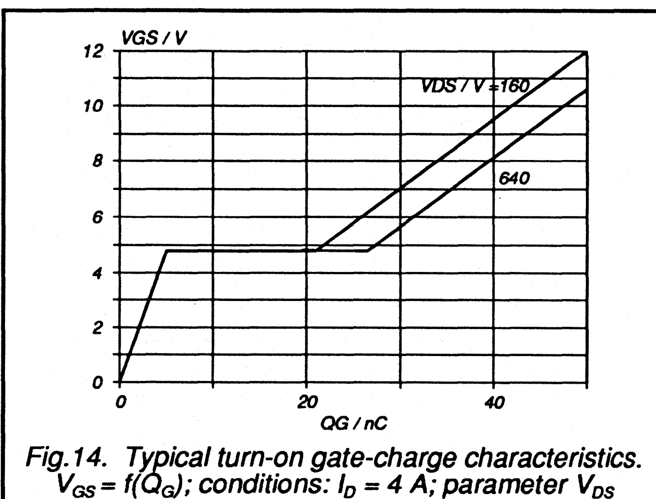


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK426	-1000A	-1000B	
V_{DS}	Drain-source voltage	1000	1000	V
I_D	Drain current (DC)	2.1	1.9	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	4	5	Ω

MECHANICAL DATA

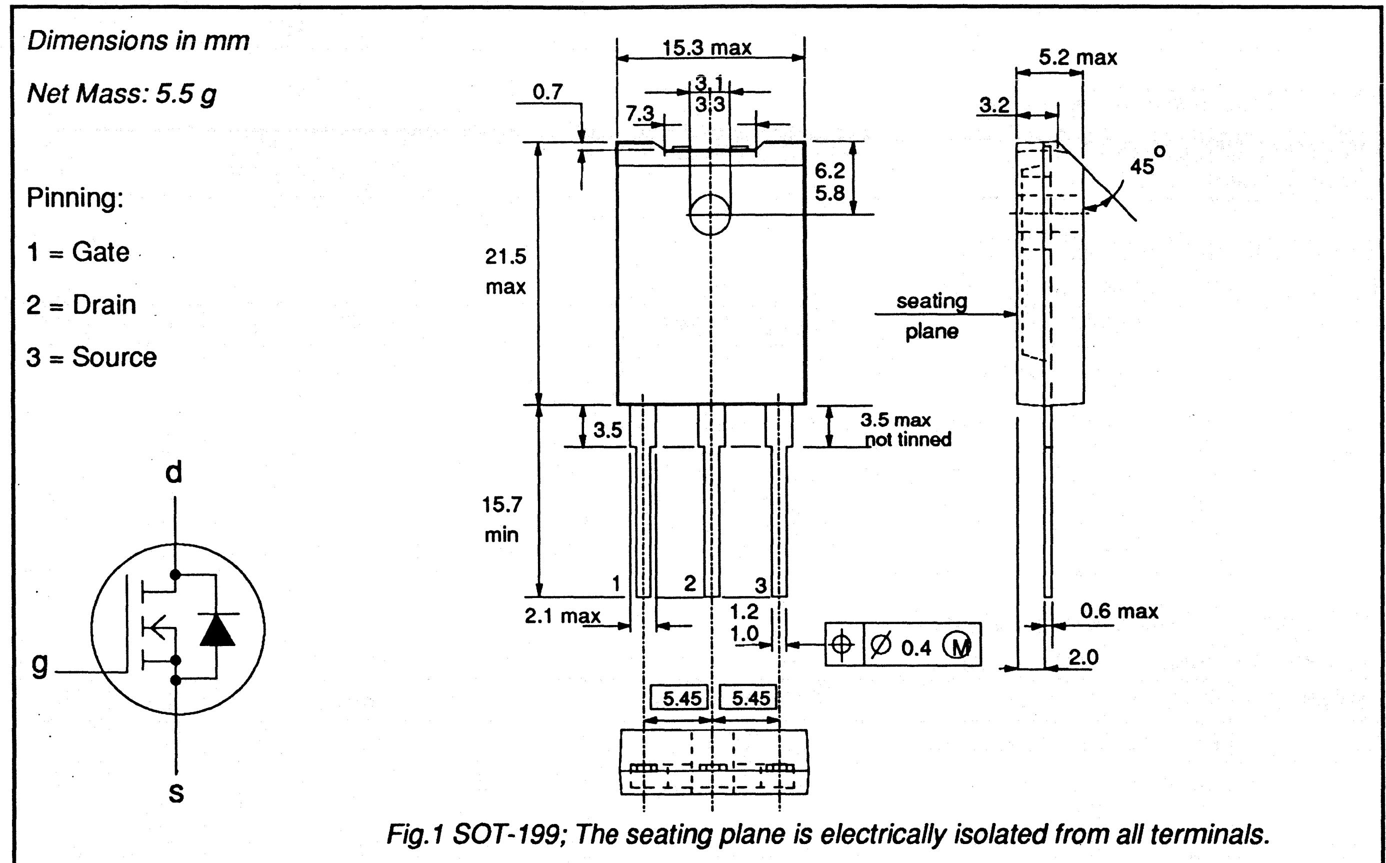


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	1000		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	1000		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-1000A	**-1000B**	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	2.1	1.9	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	1.3	1.2	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	8.4	8	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	1000	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A — **BUK426-1000A**	-	3.5	4.0	Ω
		BUK426-1000B	-	4.5	5.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.1	A
I_{DRM}	Pulsed reverse drain current	-	-	-	8.4	A
V_{SD}	Diode forward voltage	I_F = 2.1 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.1 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

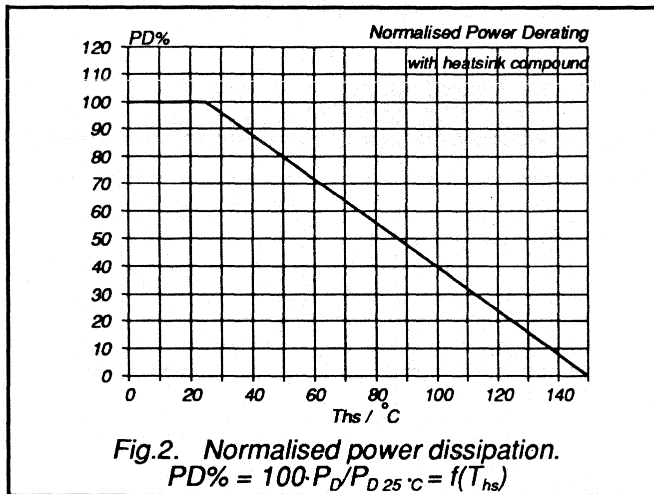


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

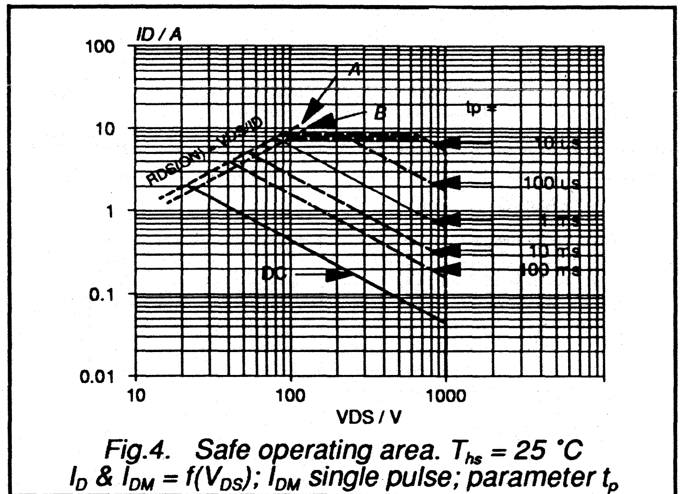


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

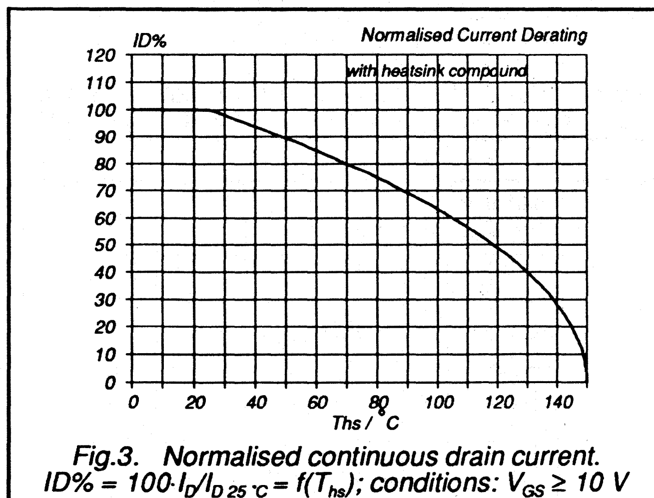


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

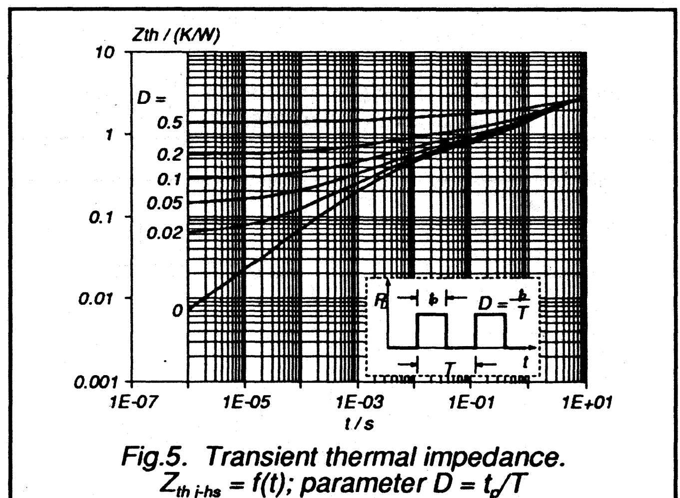


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

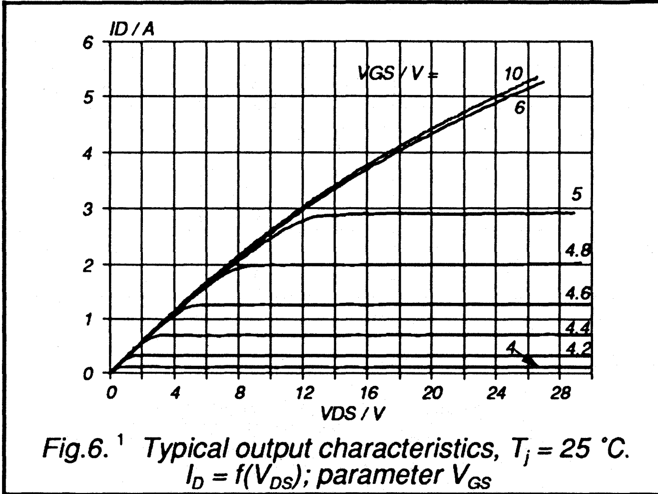


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

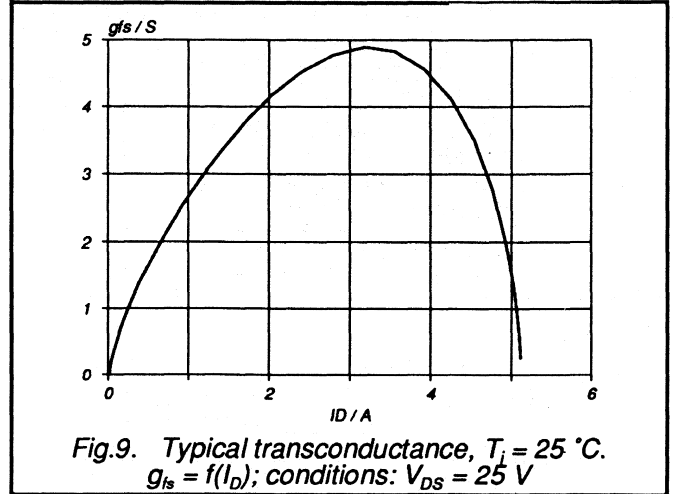


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

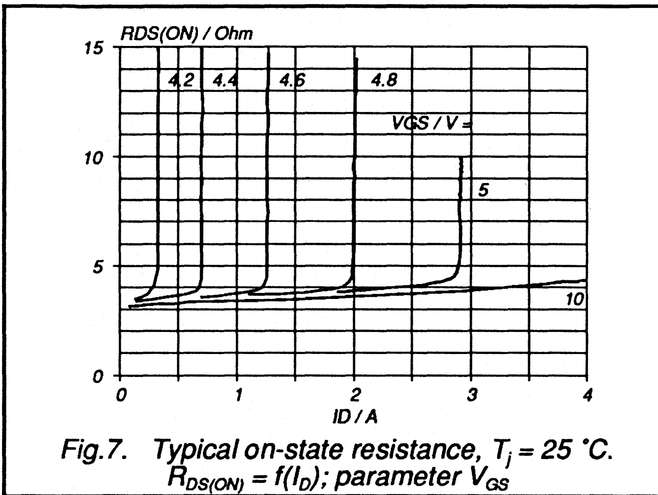


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

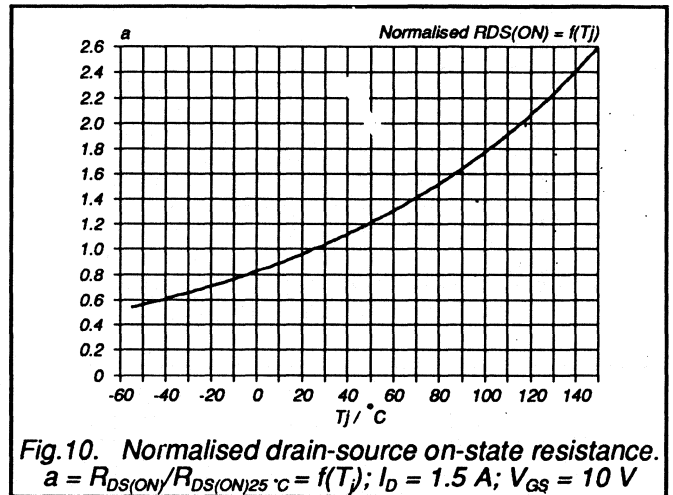


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

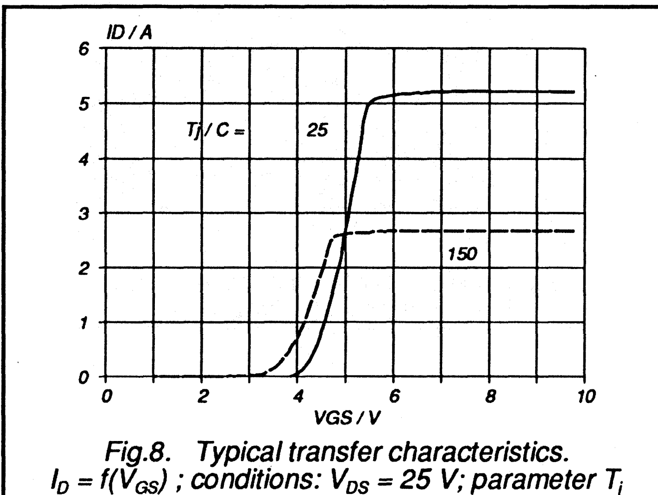


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

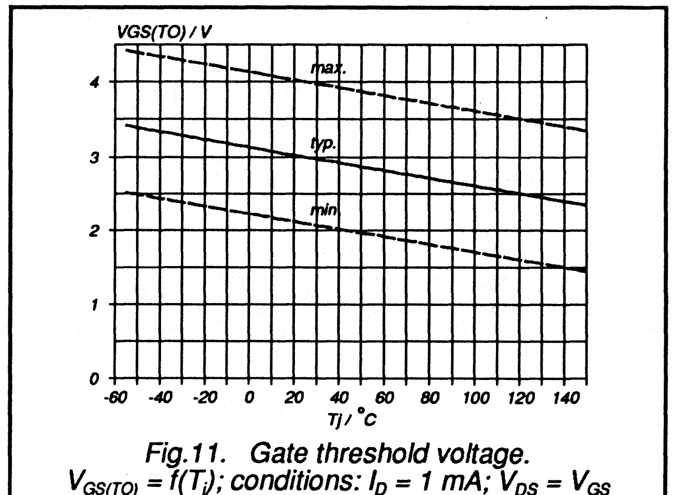


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

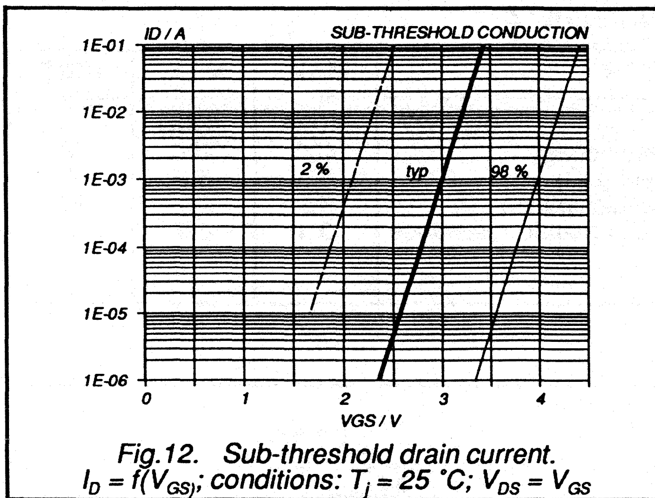


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

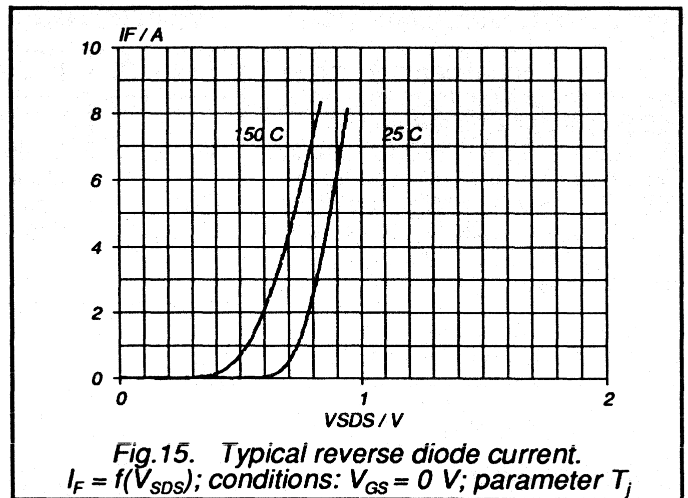


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

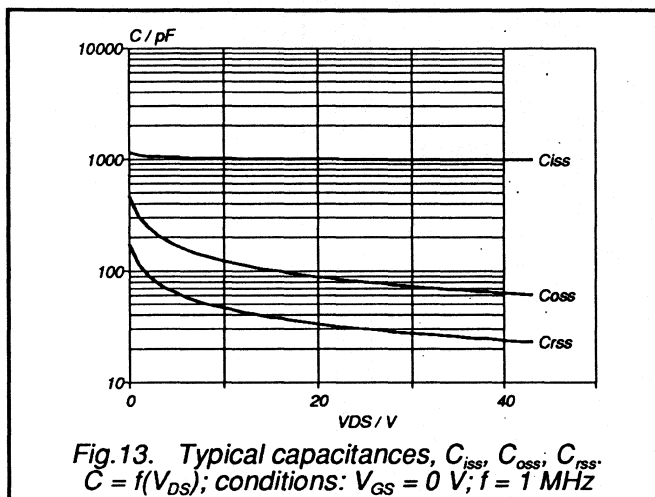


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

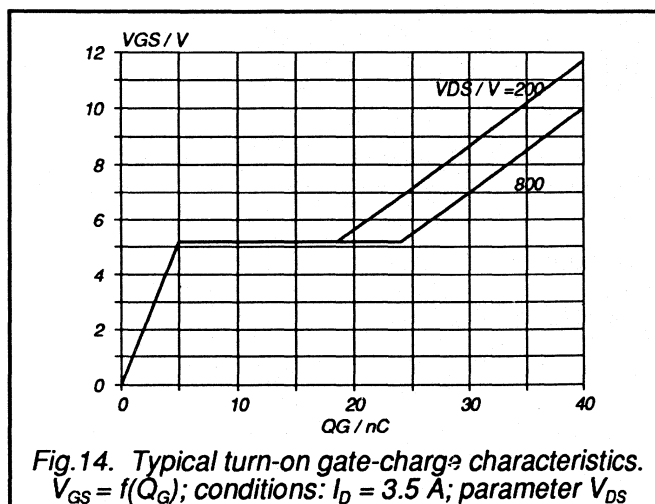


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK427	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	6.9	6.2	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.4	0.5	Ω

MECHANICAL DATA

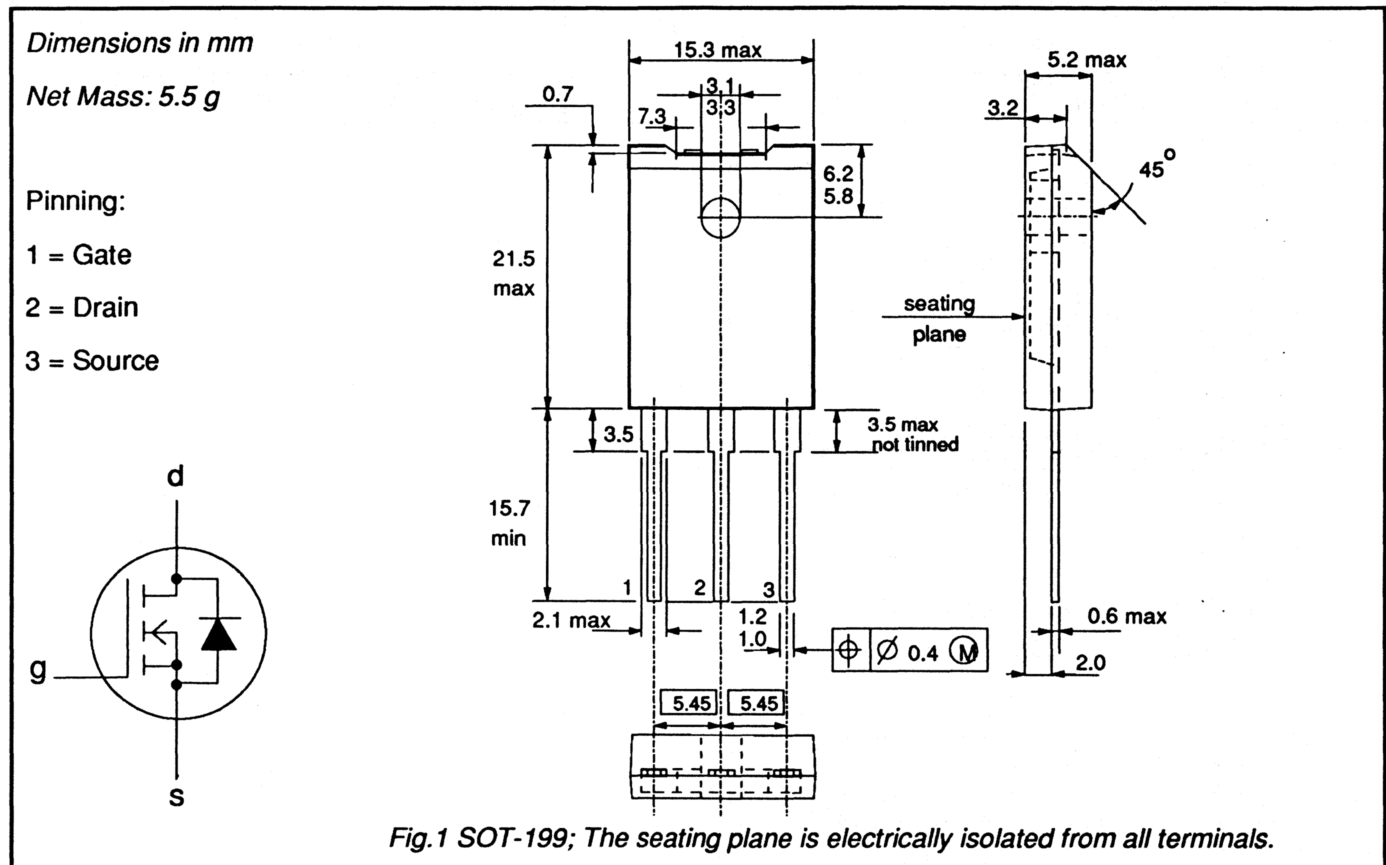


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	6.9	6.2	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	4.3	3.9	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	28	25	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A — BUK427-400A	-	0.35	0.4	Ω
		BUK427-400B	-	0.45	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\,off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	6.9	A
I_{DRM}	Pulsed reverse drain current	-	-	-	28	A
V_{SD}	Diode forward voltage	I_F = 6.9 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 6.9 A; -dI_F/dt = 100 A/μs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	μC

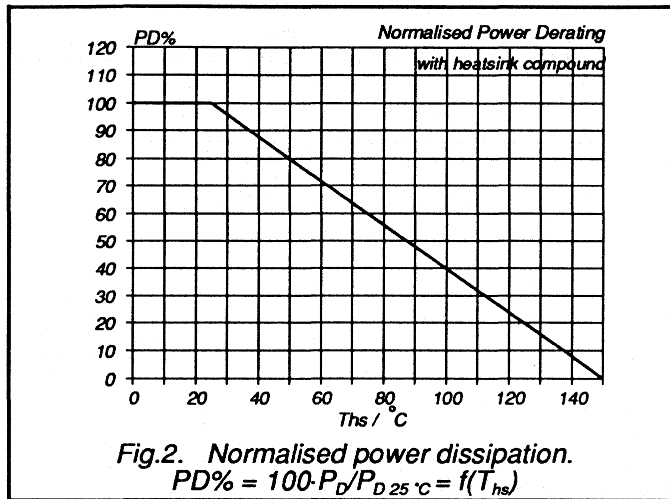


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

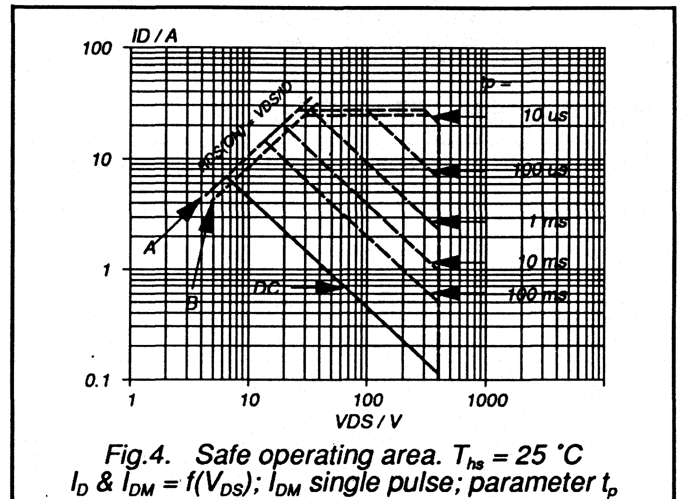


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

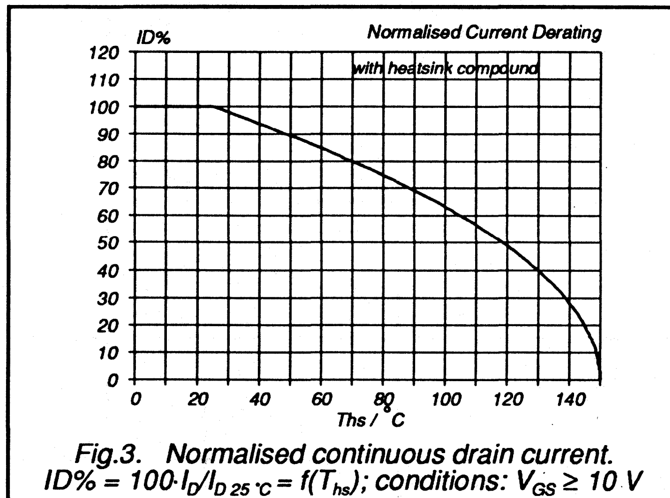


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

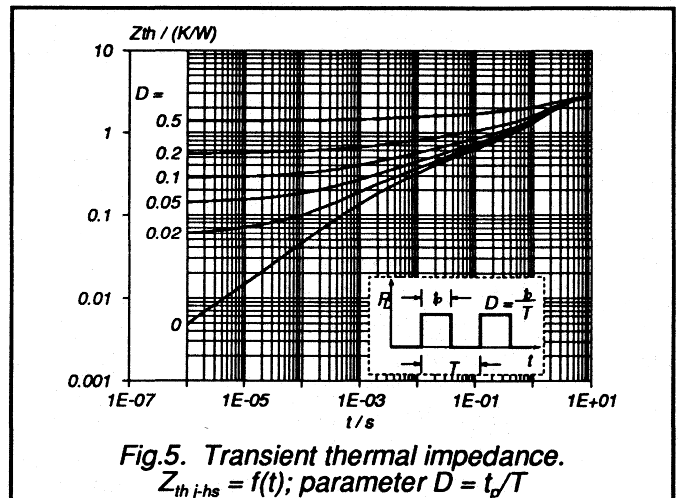


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

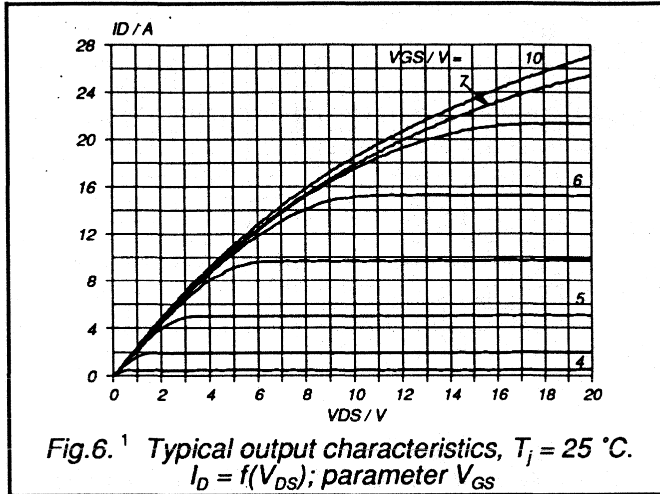


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

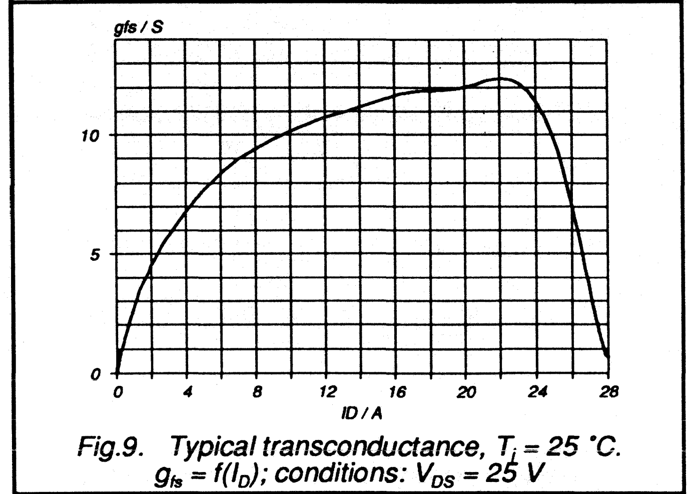


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

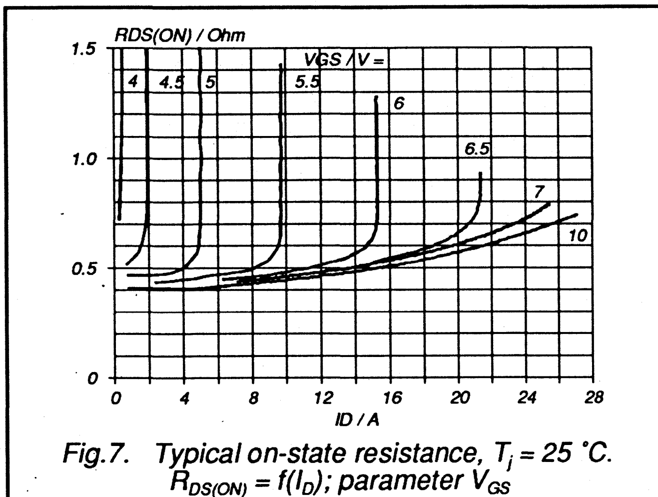


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

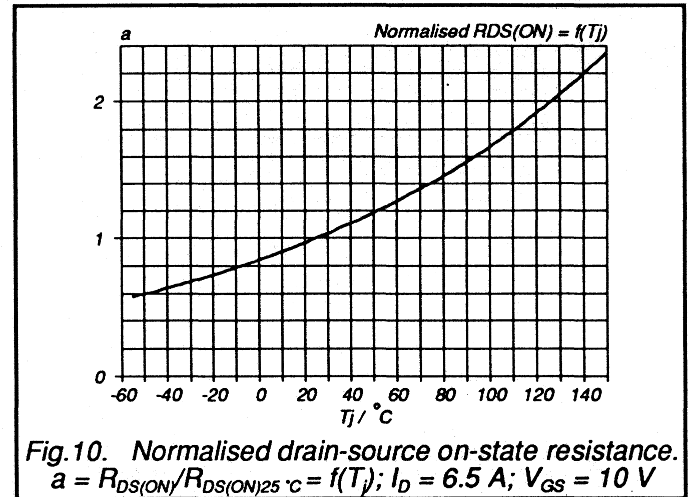


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

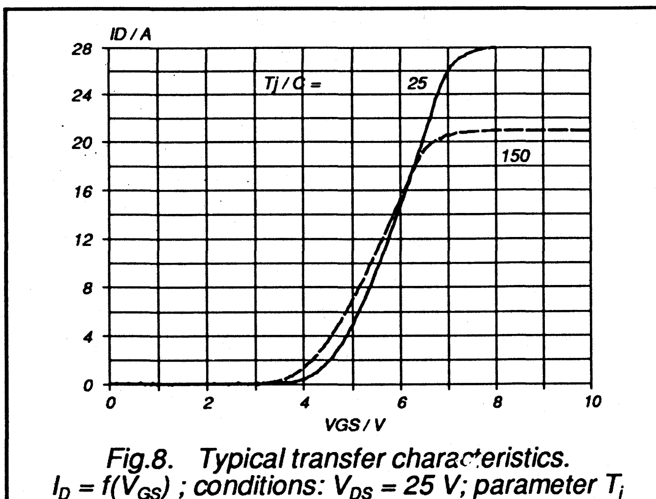


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

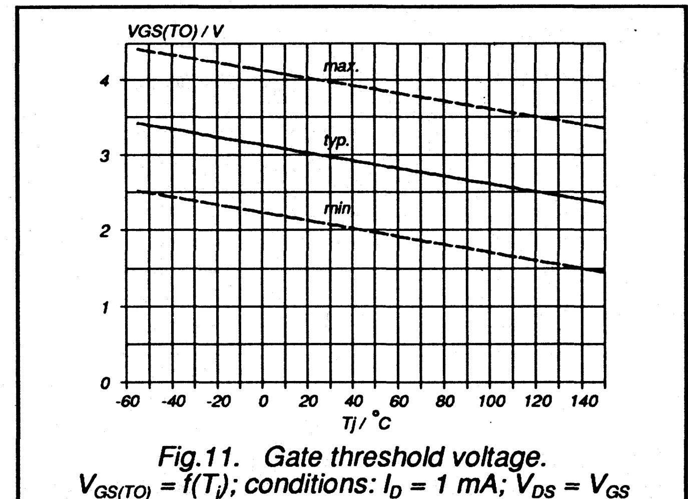


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

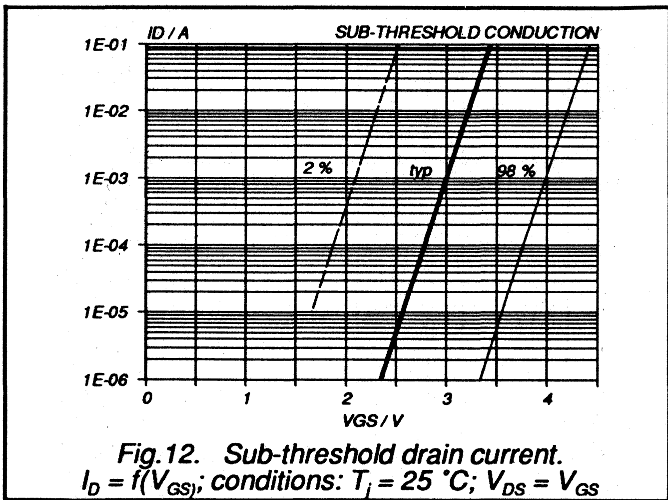


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

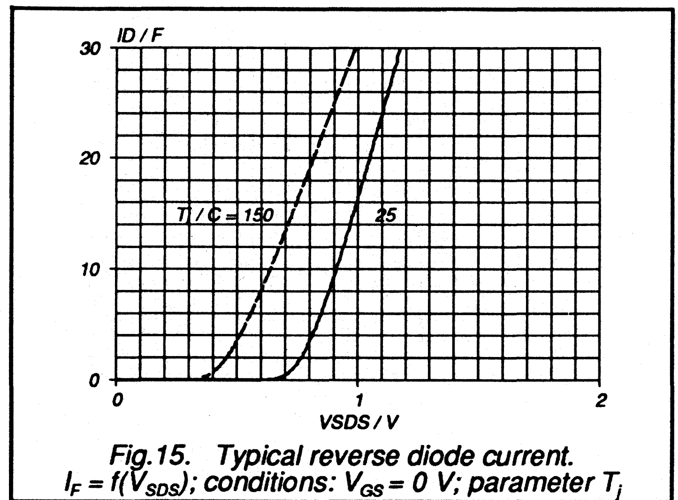


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

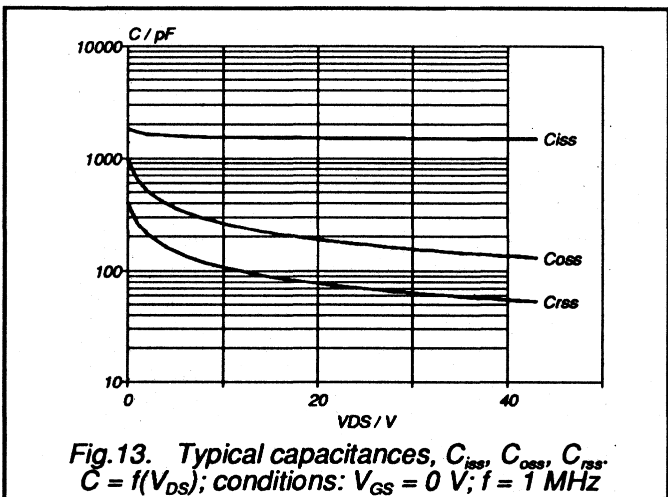


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

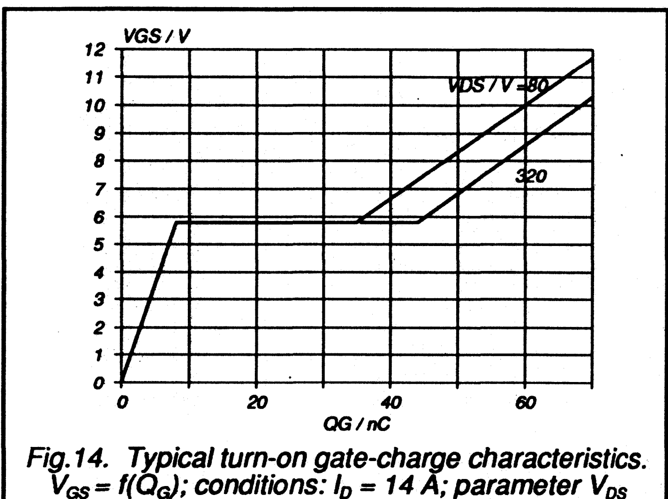


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	5.6	A
P_{tot}	Total power dissipation	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	5.6	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	3.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	22	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\ j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.55	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	22	A
V_{SD}	Diode forward voltage	I_F = 5.6 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 5.6 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; V_{DD} ≤ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

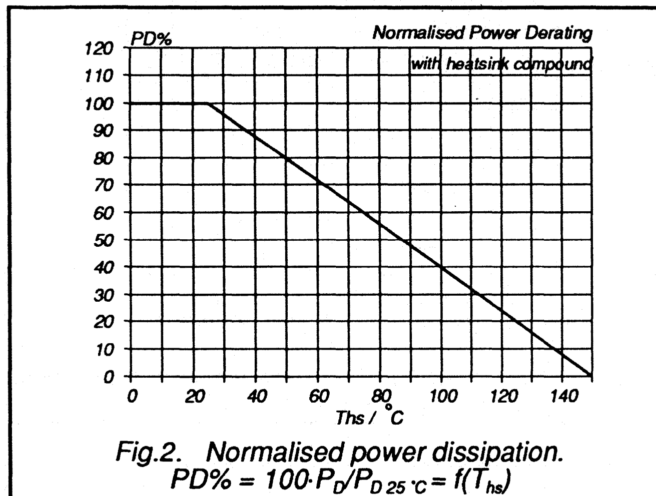


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^{\circ}C} = f(T_{hs})$

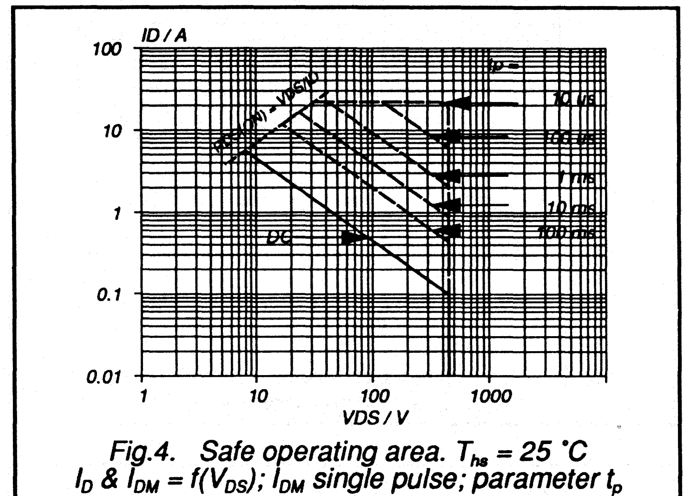


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

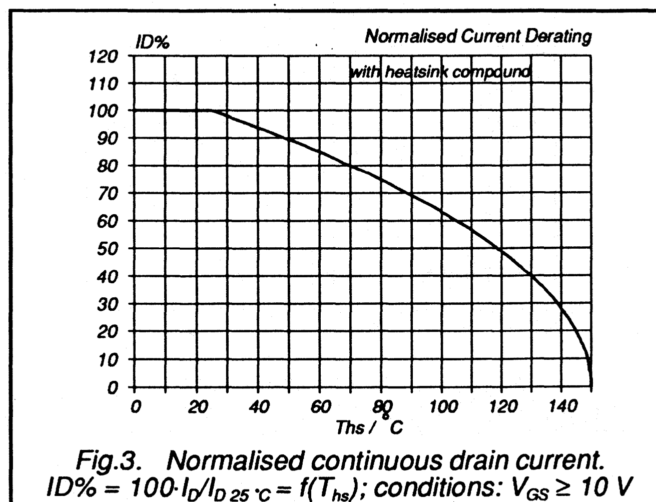


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^{\circ}C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

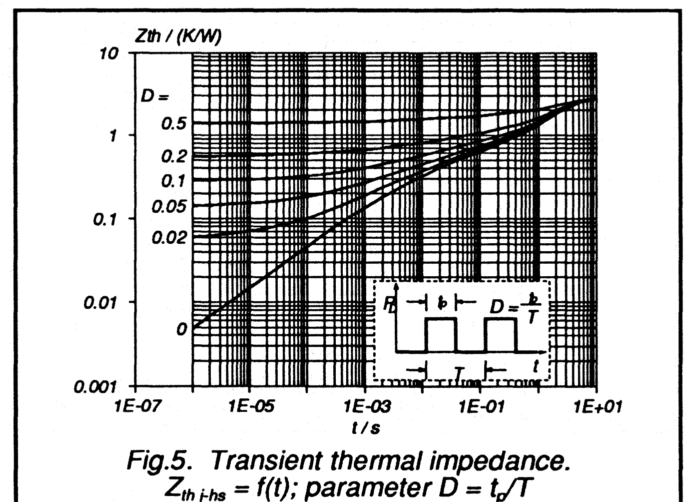


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

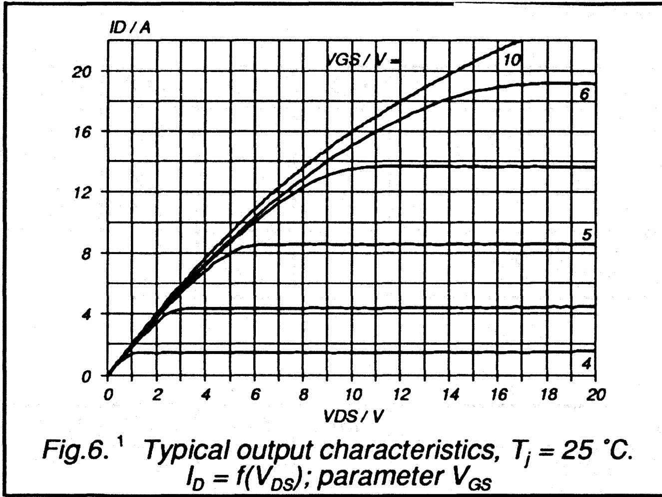


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

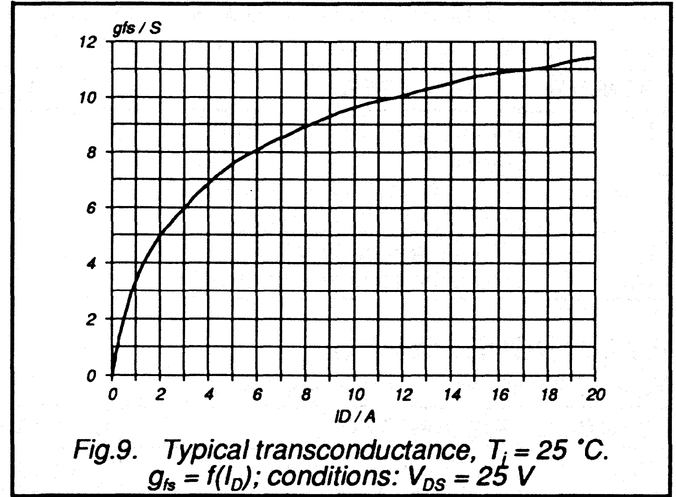


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

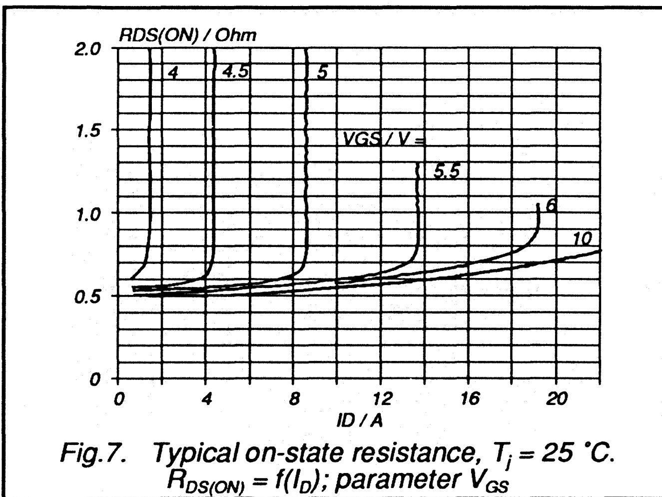


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

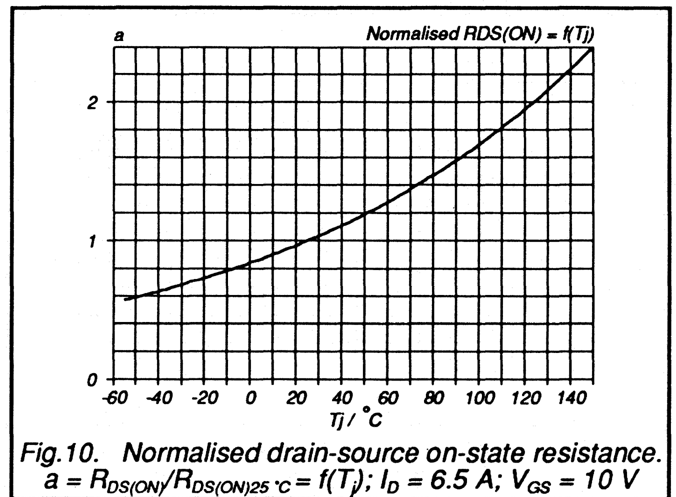


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

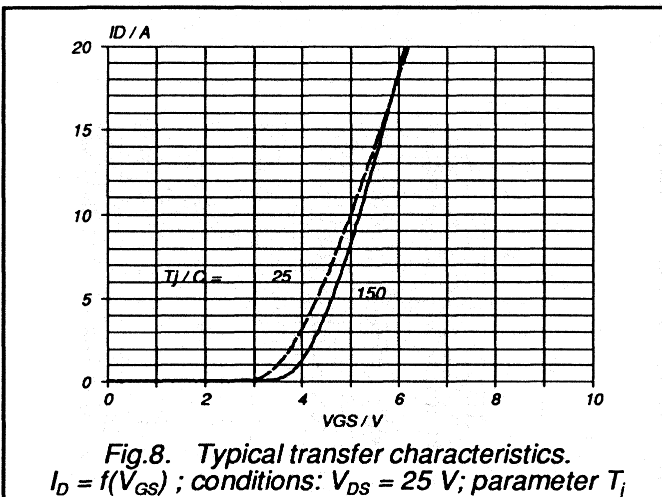


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

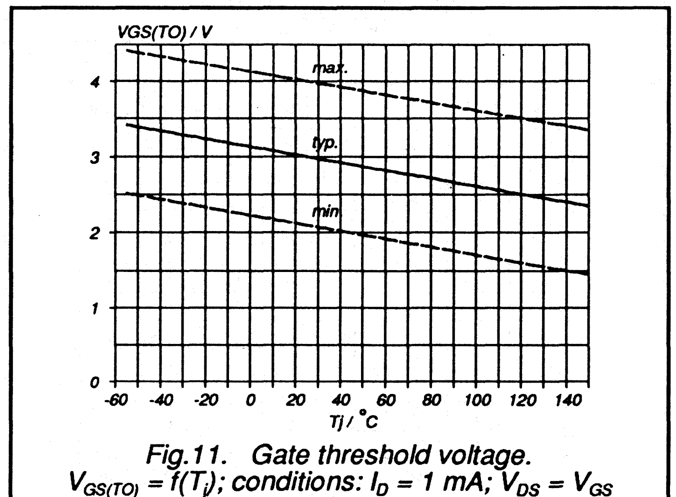


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

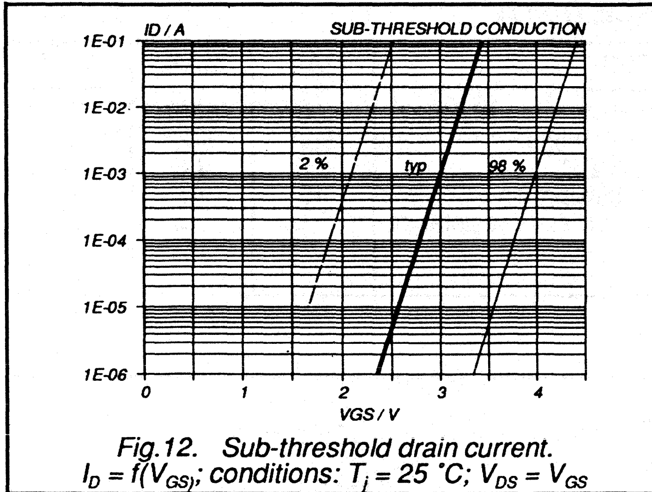


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

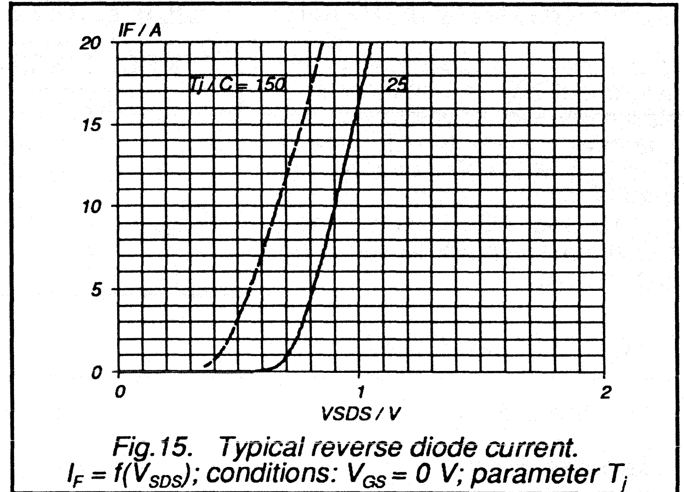


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

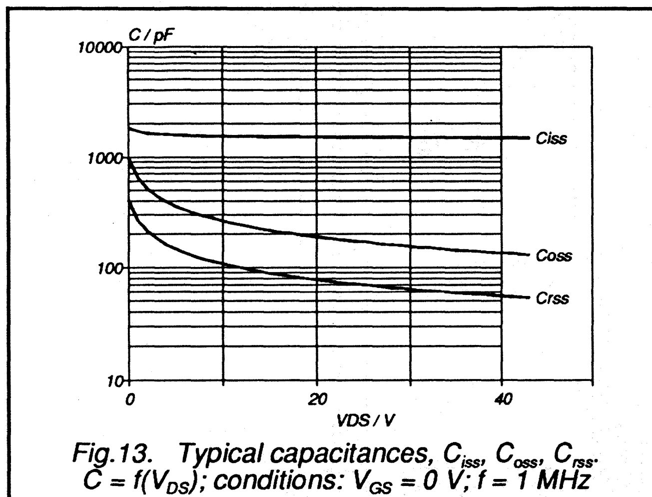


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

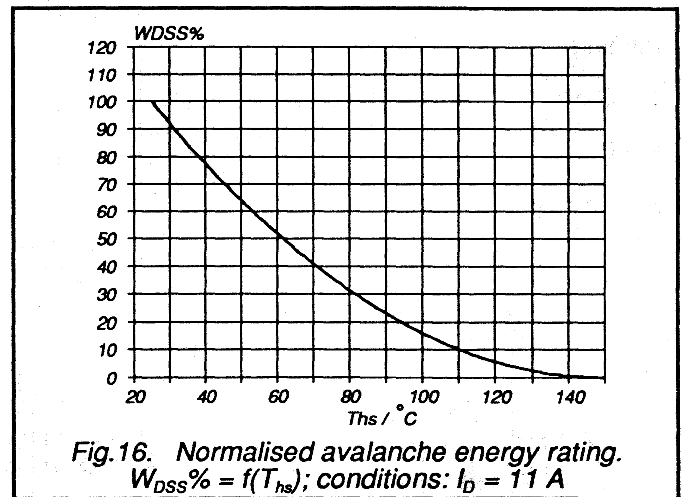


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 11$ A

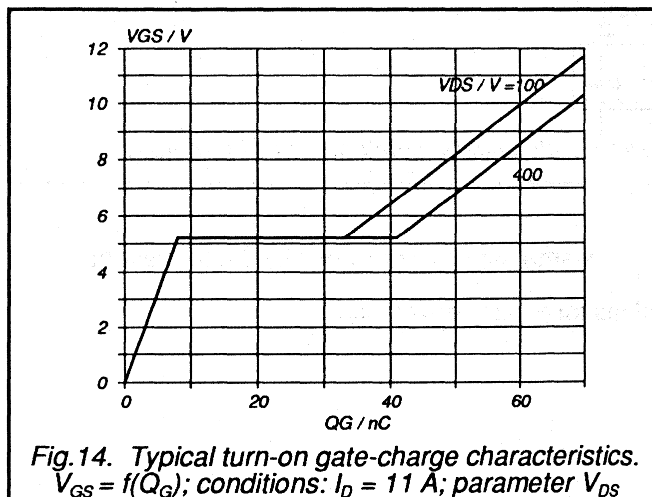


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

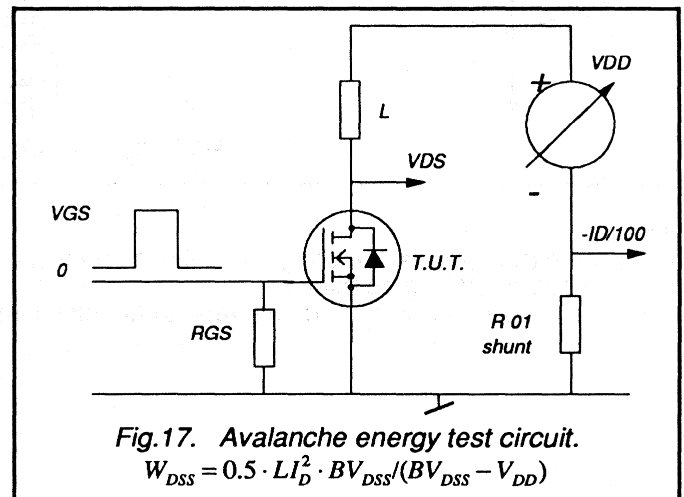


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK427	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	5.6	4.8	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	0.8	Ω

MECHANICAL DATA

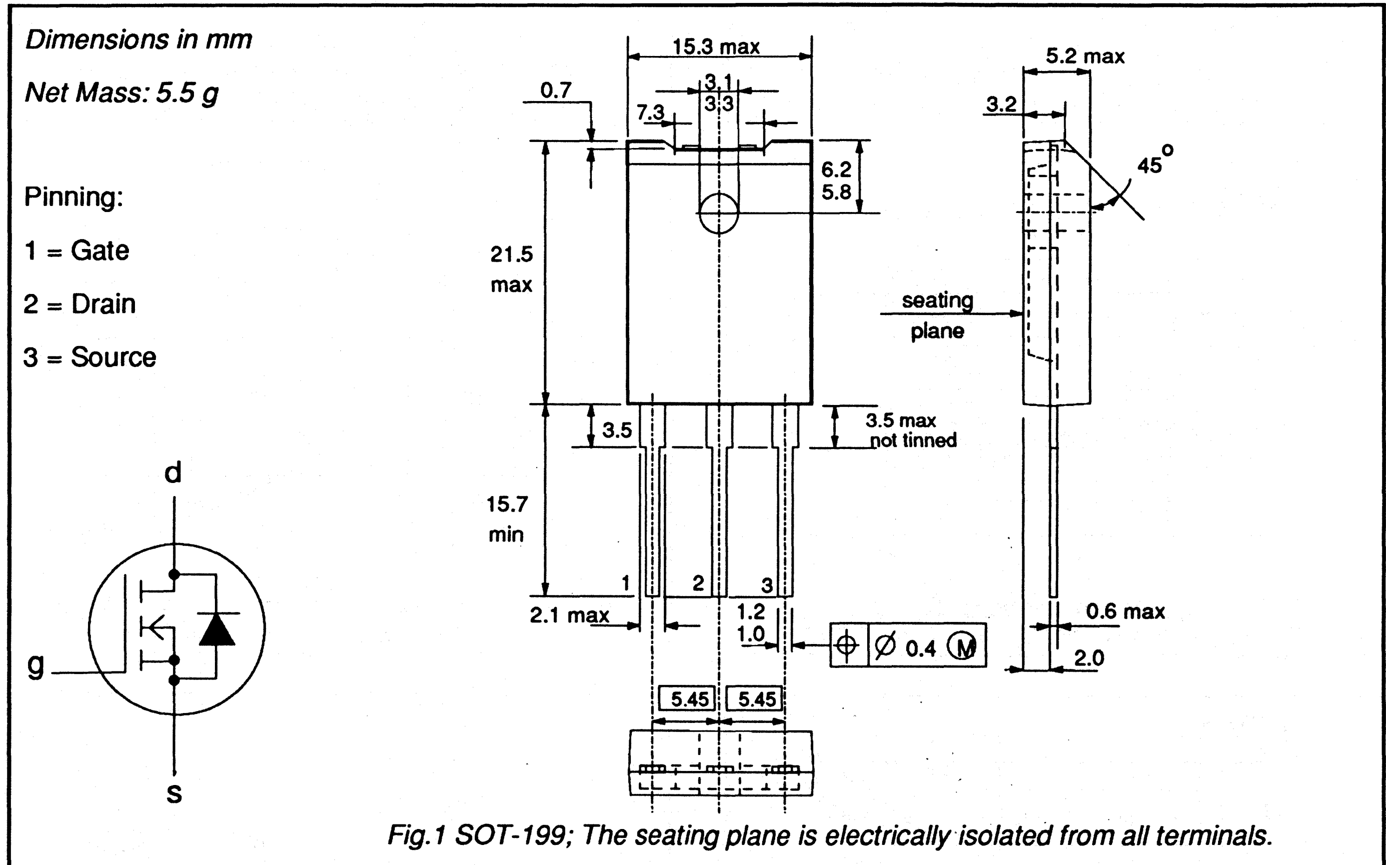


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	5.6	4.8	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	3.5	3.0	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	22	19.2	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A BUK427-500A	-	0.55	0.6	Ω
		BUK427-500B	-	0.7	0.8	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	22	A
V_{SD}	Diode forward voltage	I_F = 5.6 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 5.6 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

AVALANCHE RATING

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; $V_{DD} \leq$ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

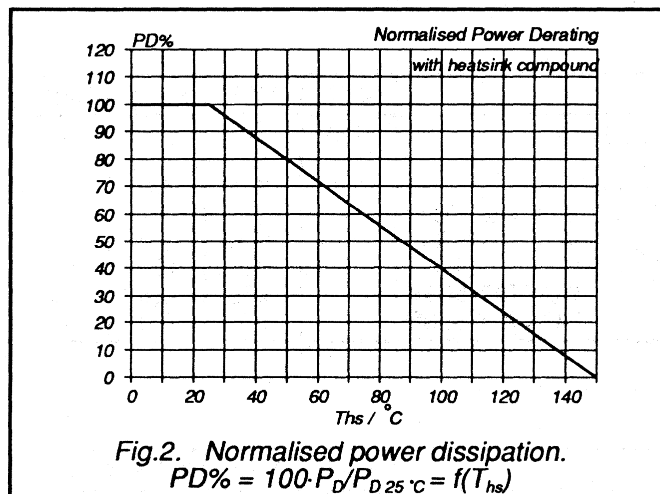


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

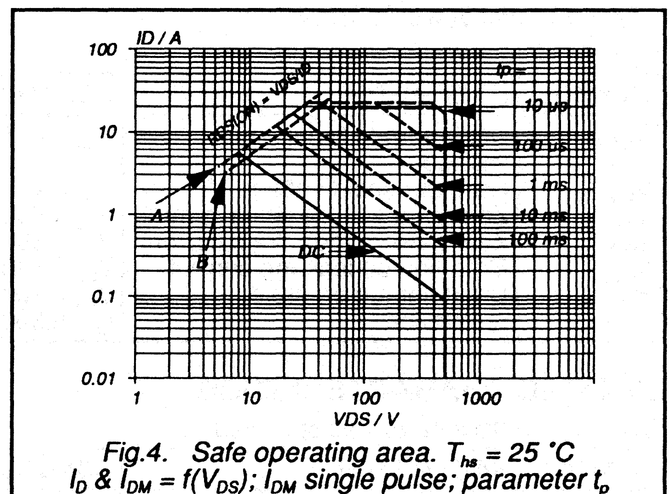


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

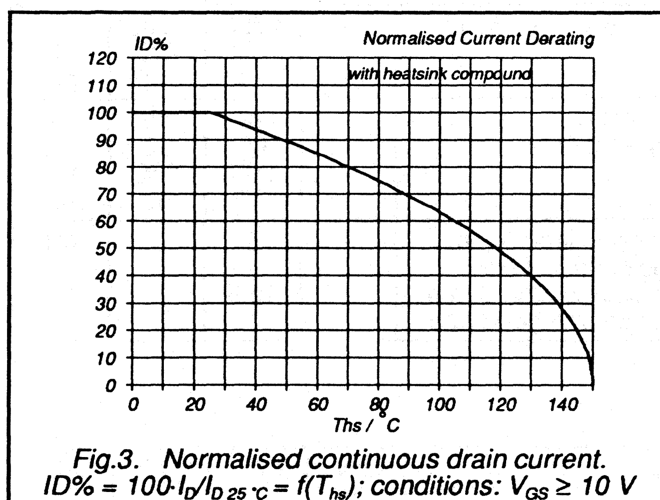


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

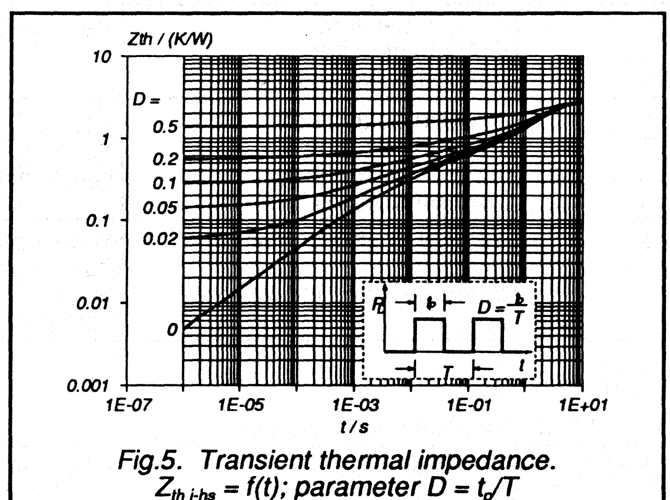


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

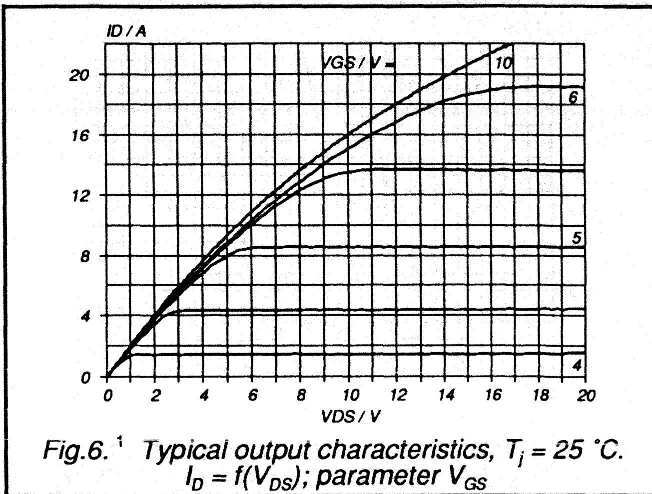


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

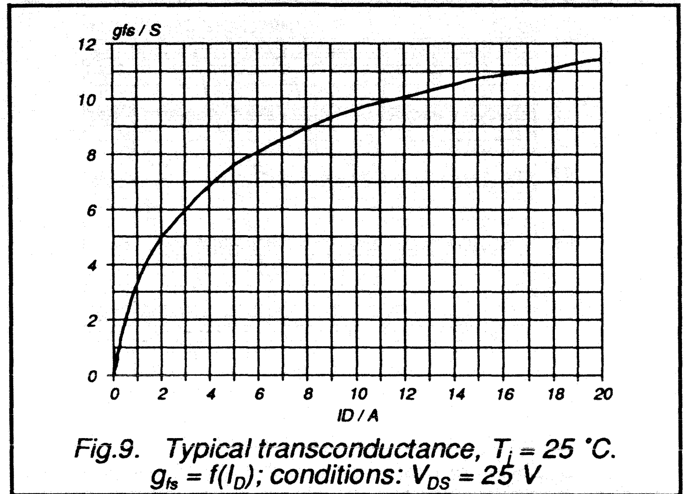


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

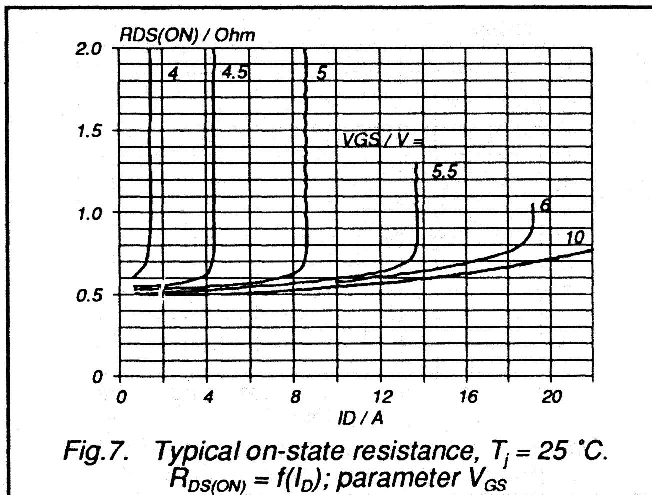


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

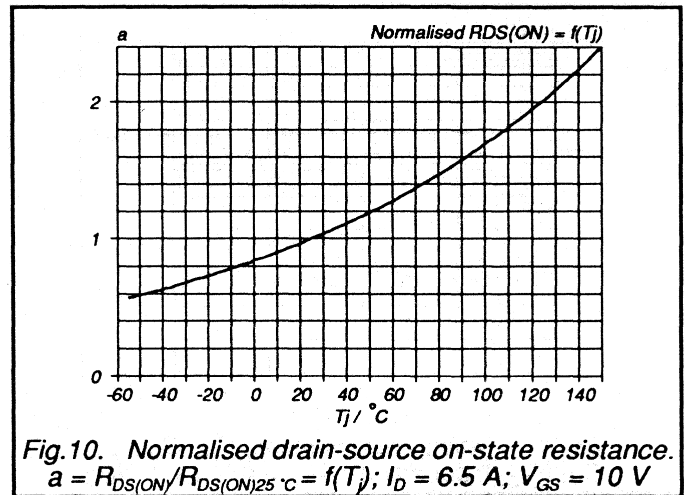


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

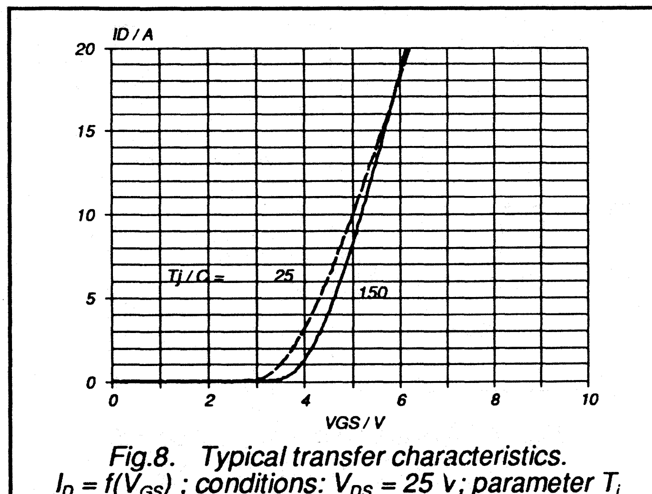


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ v; parameter T_j

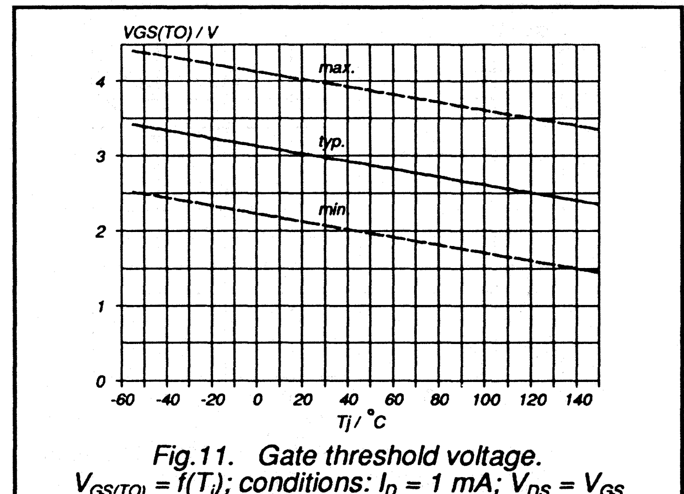


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

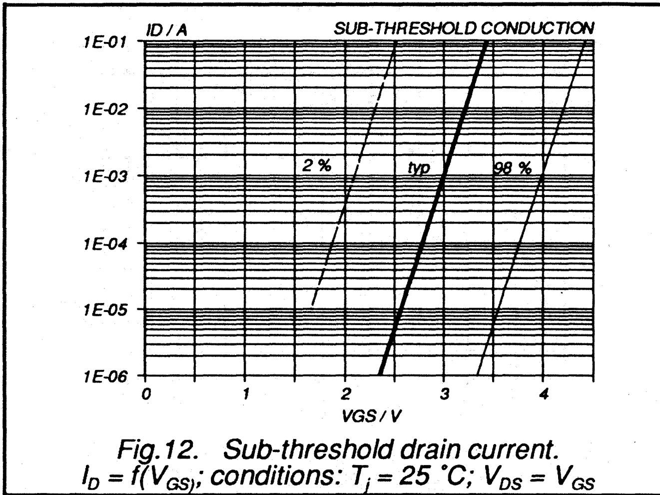


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

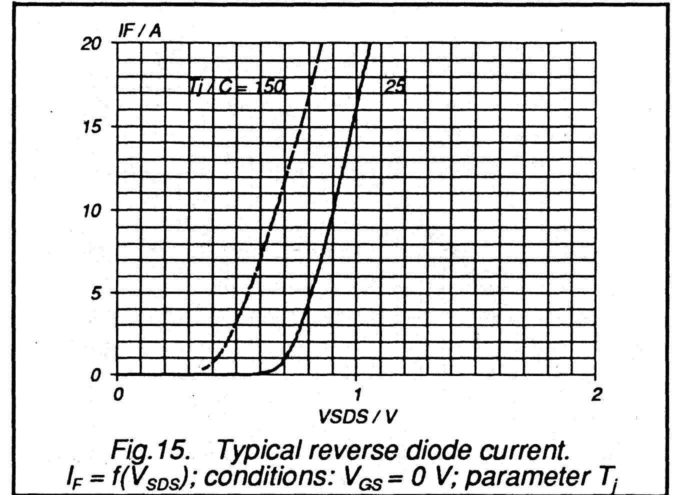


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

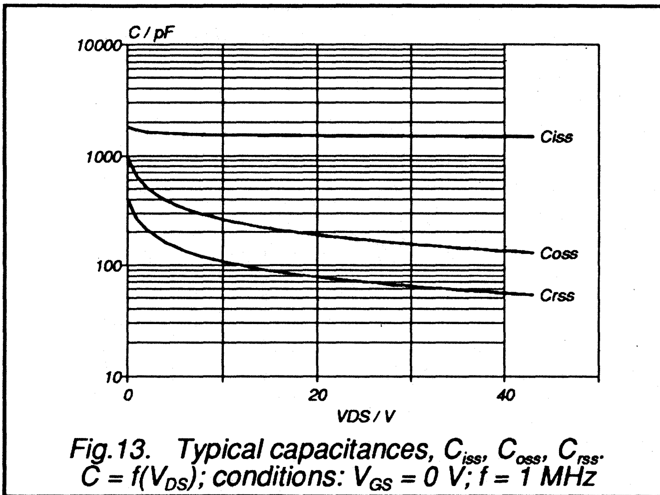


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

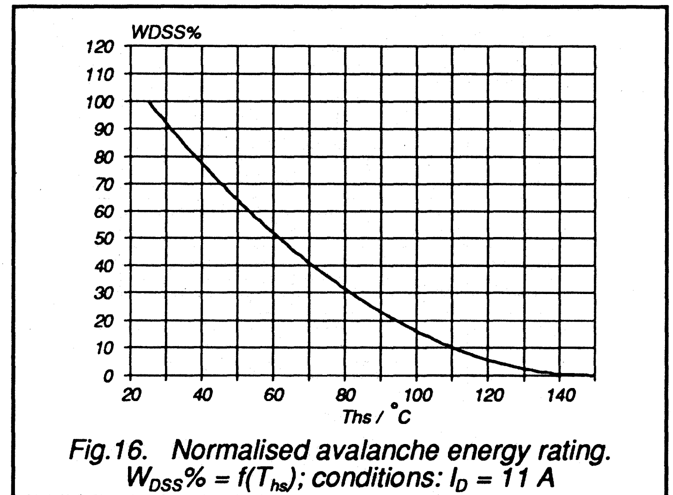


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 11$ A

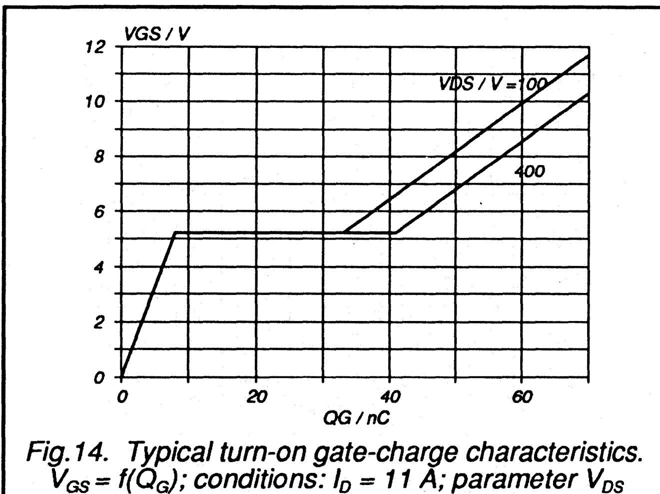


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

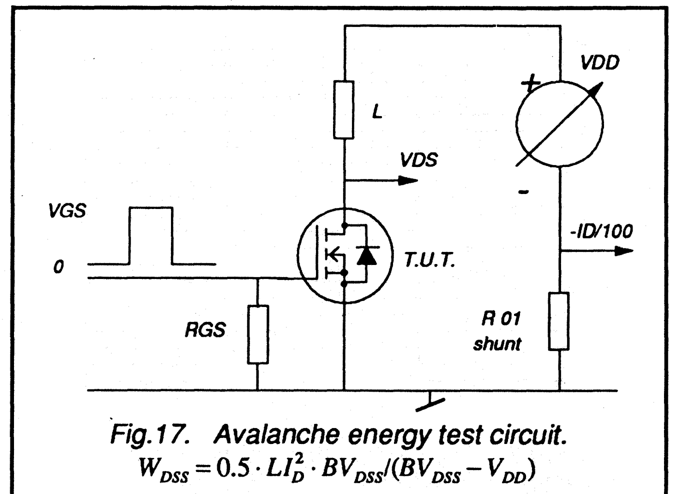


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK427	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	4.3	3.9	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	4.3	3.9	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	2.7	2.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	17.2	15.6	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A BUK427-600A	-	0.85	1.0	Ω
		BUK427-600B	-	1.0	1.2	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.3	A
I_{DRM}	Pulsed reverse drain current	-	-	-	17.2	A
V_{SD}	Diode forward voltage	I_F = 4.3 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 4.3 A; $-dI_F/dt$ = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

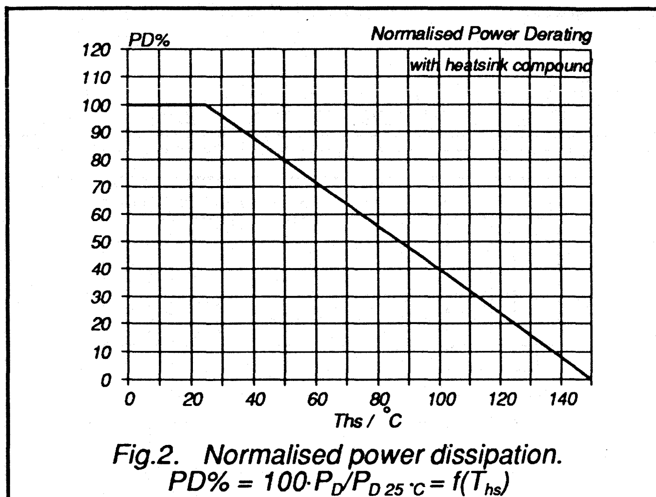


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

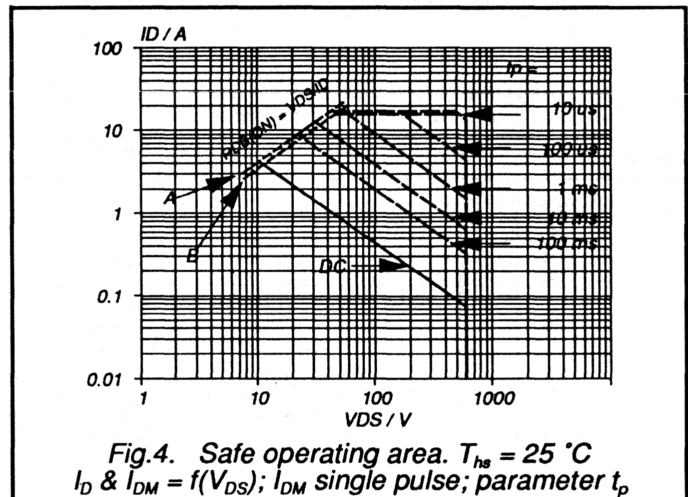


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

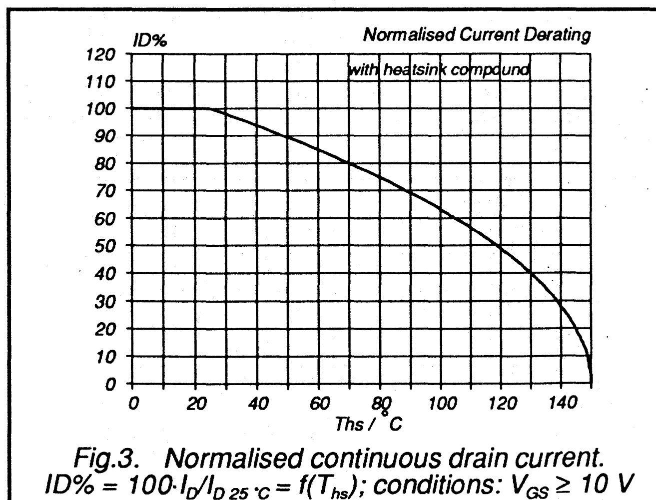


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

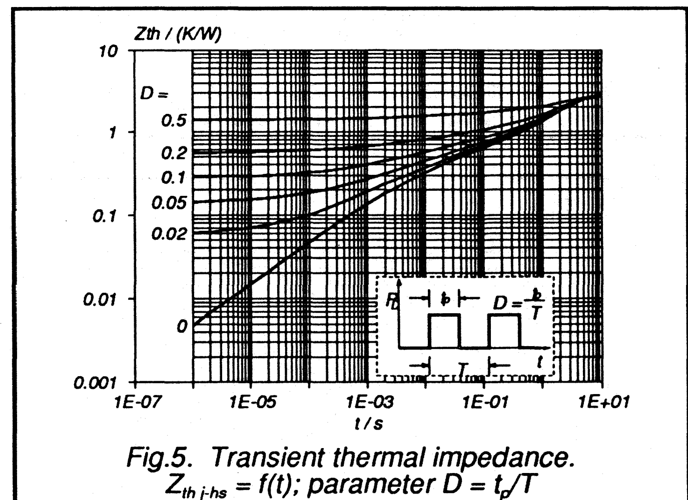


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

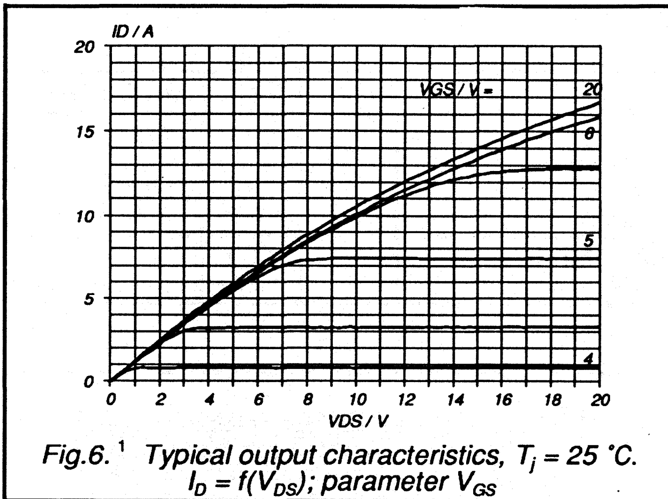


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

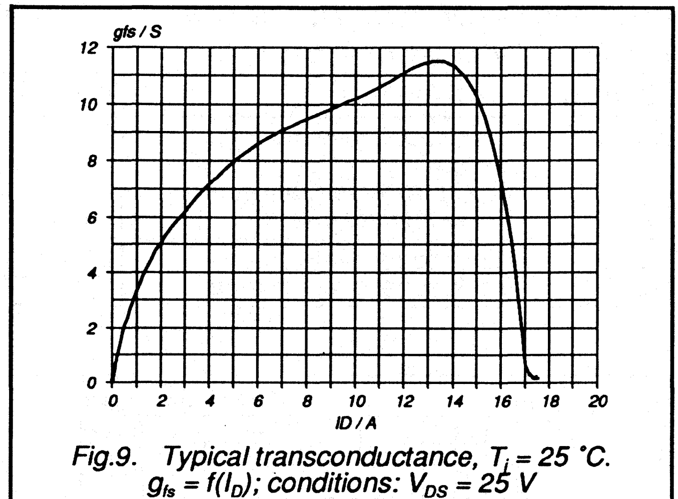


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

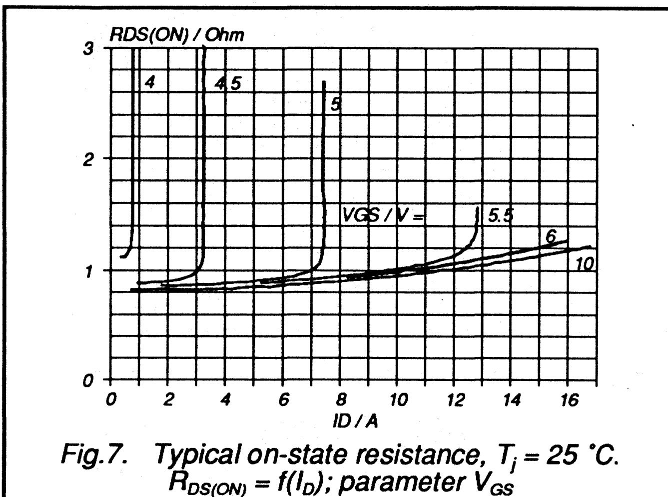


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

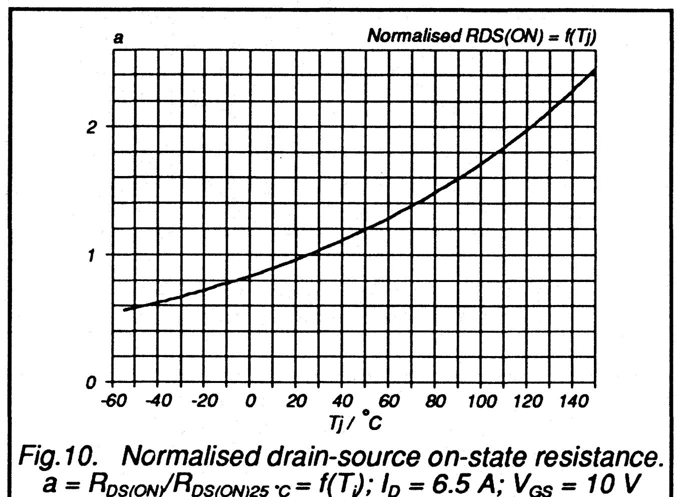


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

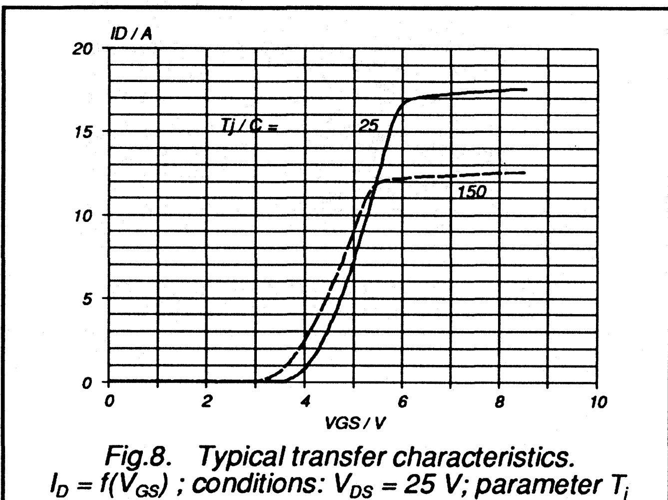


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

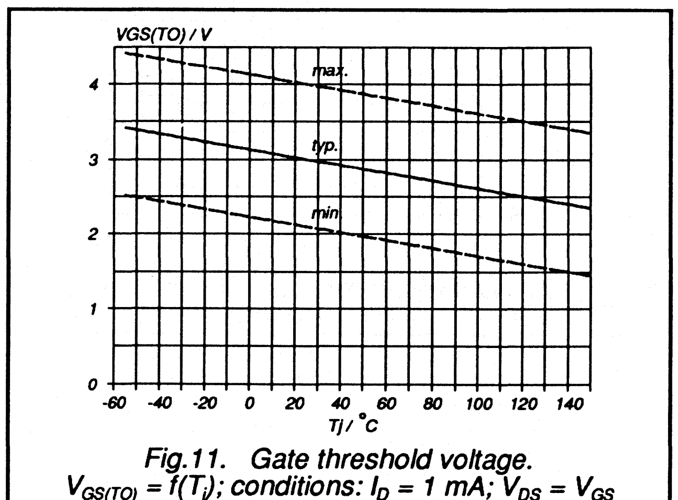


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

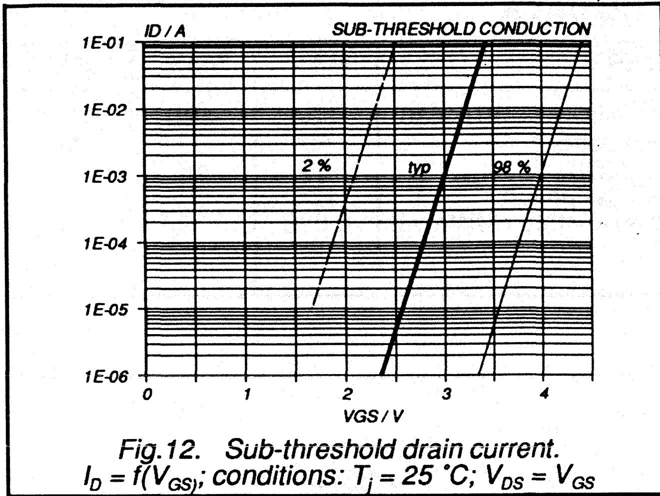


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

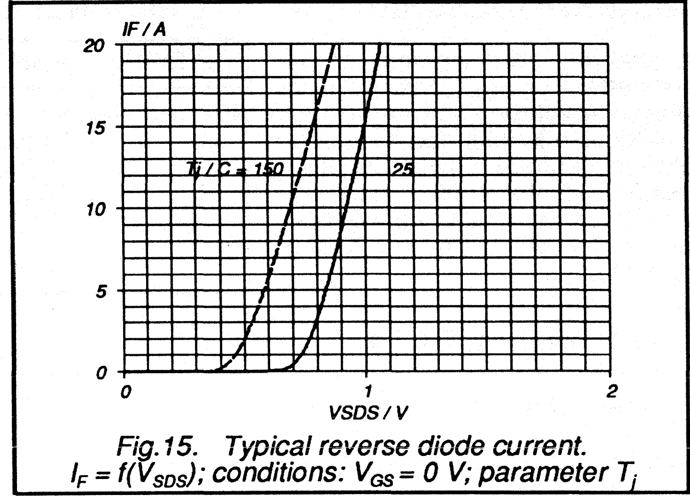


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

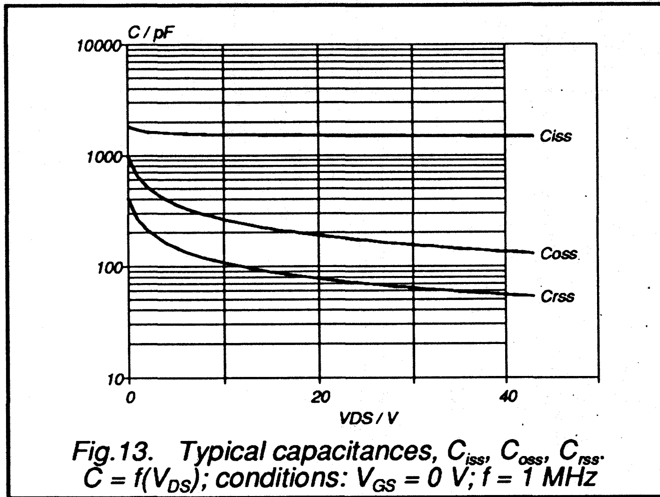


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

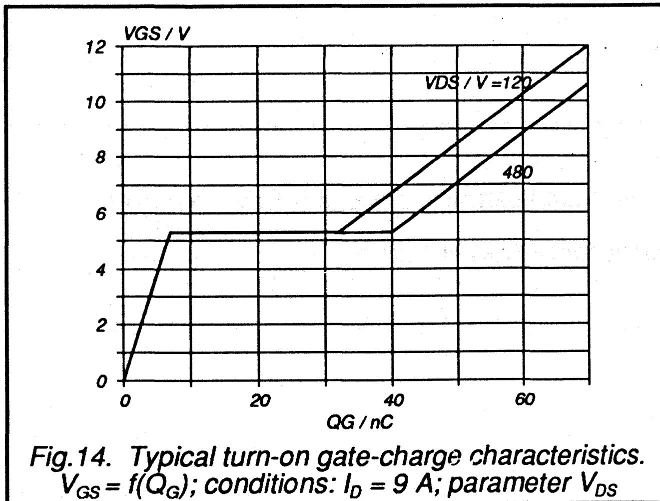


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK436	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	50	46	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.028	0.033	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

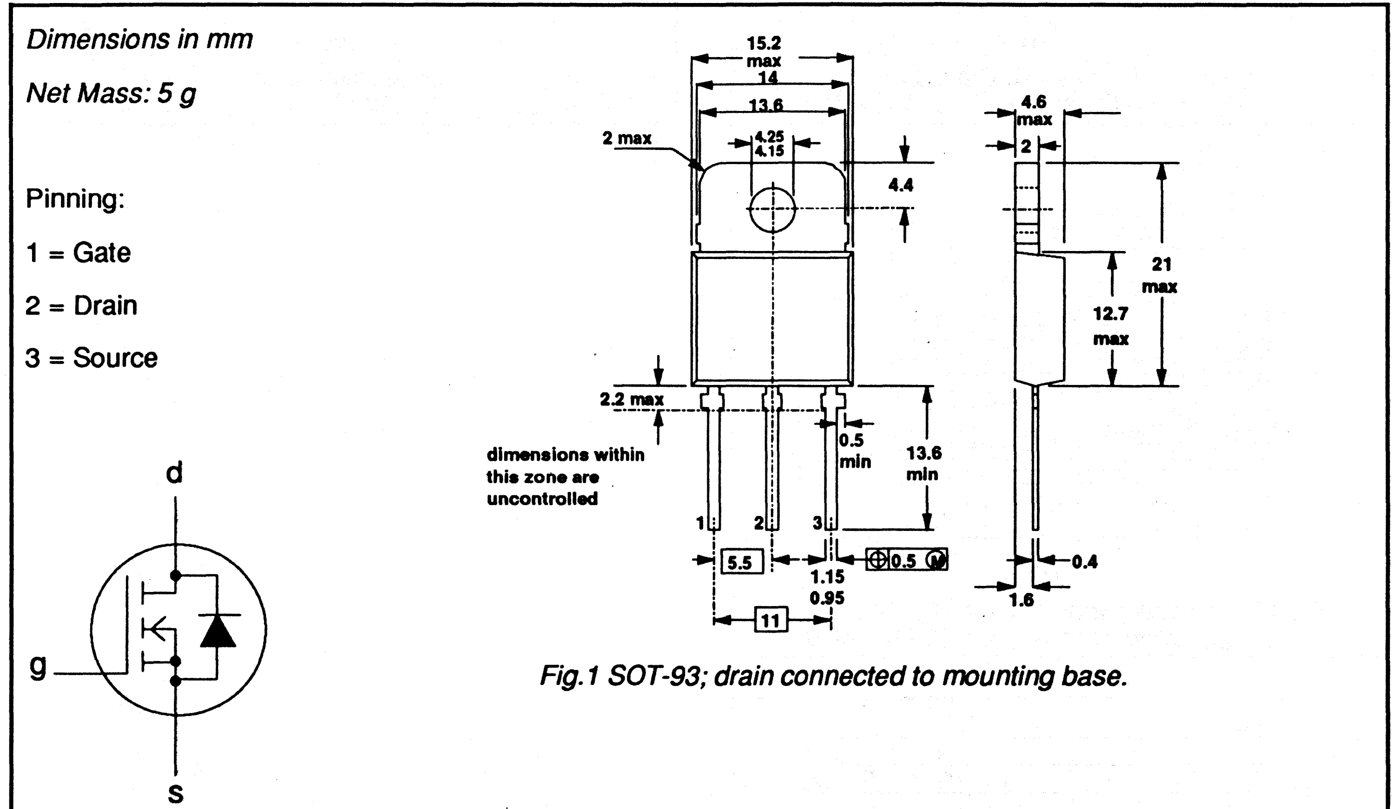


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	50	46	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	32	29	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	200	184	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 29 A **BUK436-50A**	-	0.025	0.028	Ω
		BUK436-50B	-	0.03	0.033	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 29 A	17	22	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	800	1000	pF
C_{rss}	Feedback capacitance		-	270	400	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	70	100	ns
$t_{d\,off}$	Turn-off delay time	R_{GS} = 50 Ω;	-	170	220	ns
t_f	Turn-off fall time	R_{gen} = 50 Ω	-	120	160	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	50	A
I_{DRM}	Pulsed reverse drain current	-	-	-	200	A
V_{SD}	Diode forward voltage	I_F = 50 A ; V_{GS} = 0 V	-	1.9	2.4	V
t_{rr}	Reverse recovery time	I_F = 50 A; -dI_F/dt = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.1	-	µC

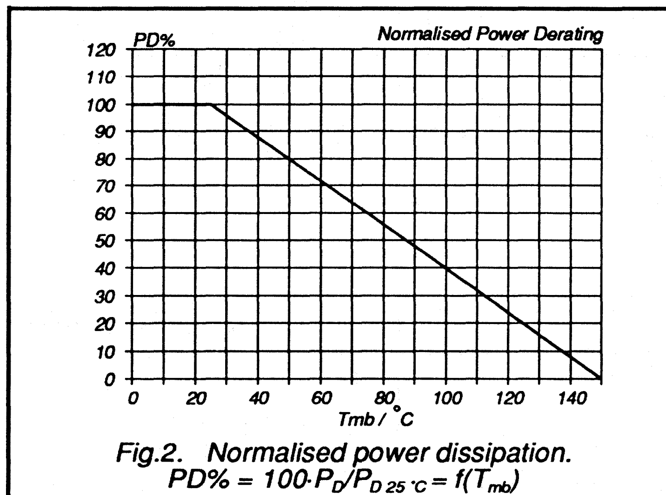


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

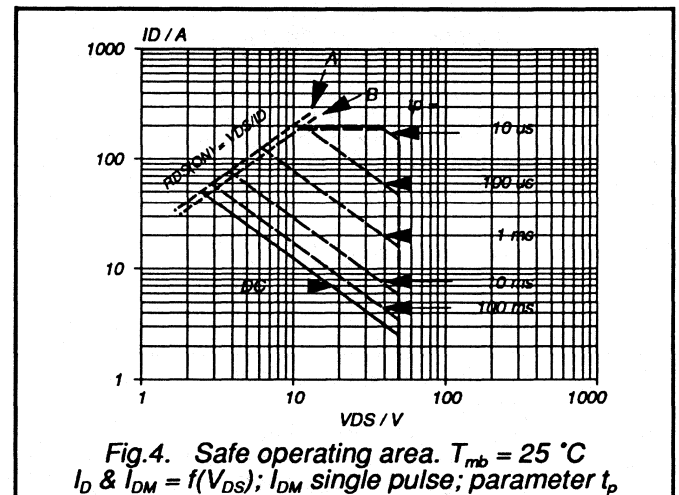


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

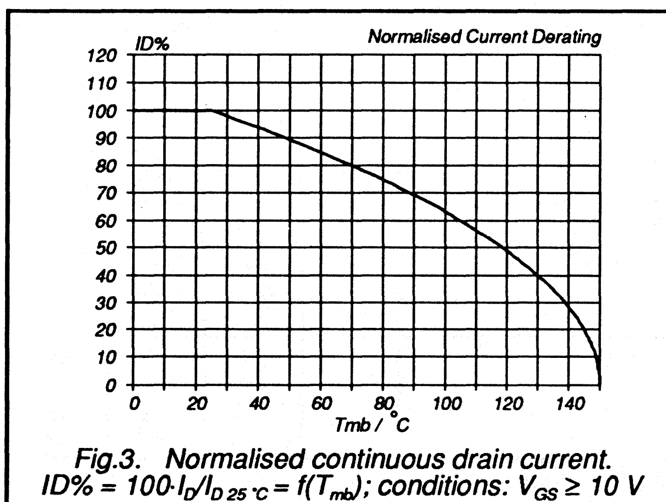


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

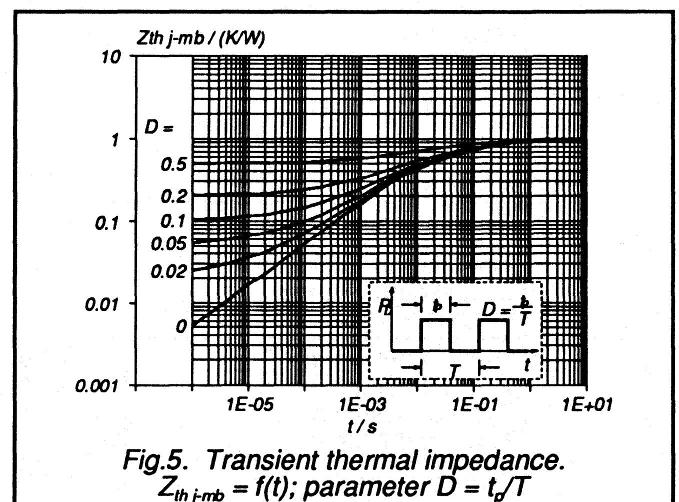


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb}$ = f(t); parameter D = t_p/T

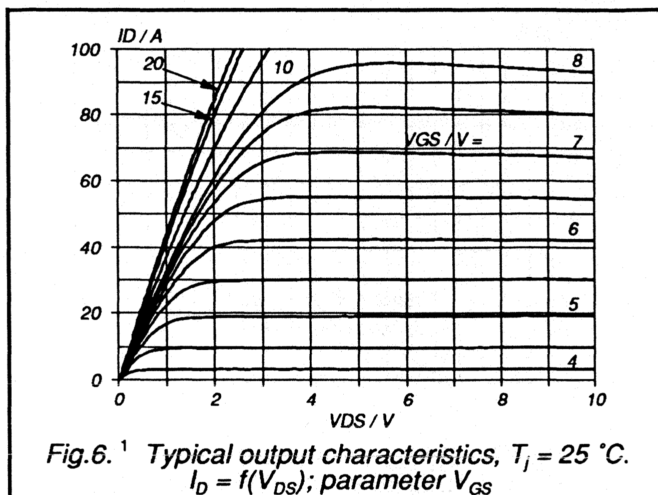


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

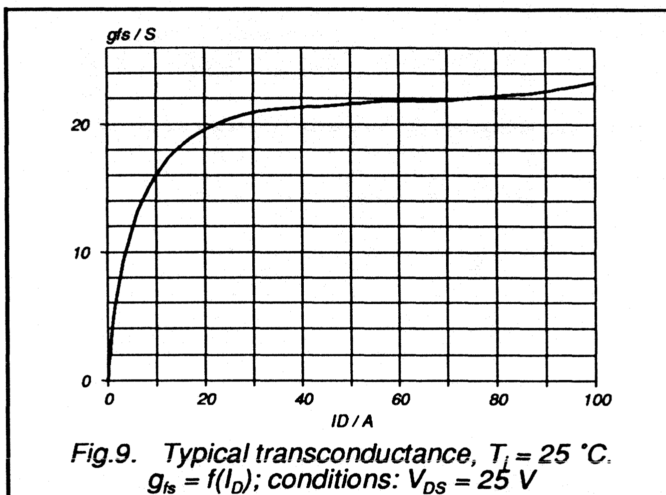


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

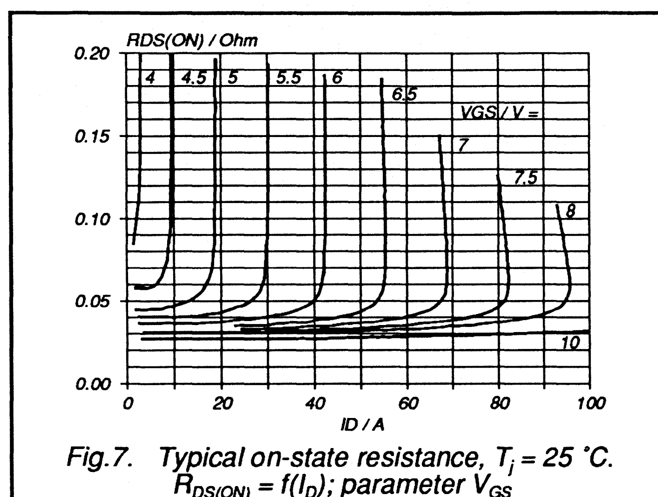


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

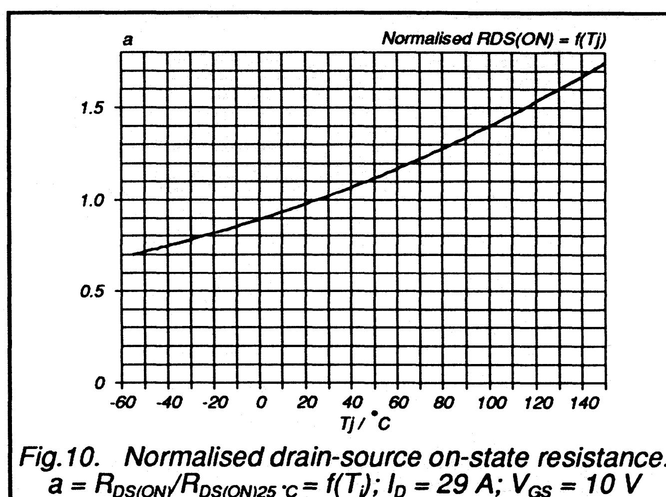


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 29$ A; $V_{GS} = 10$ V

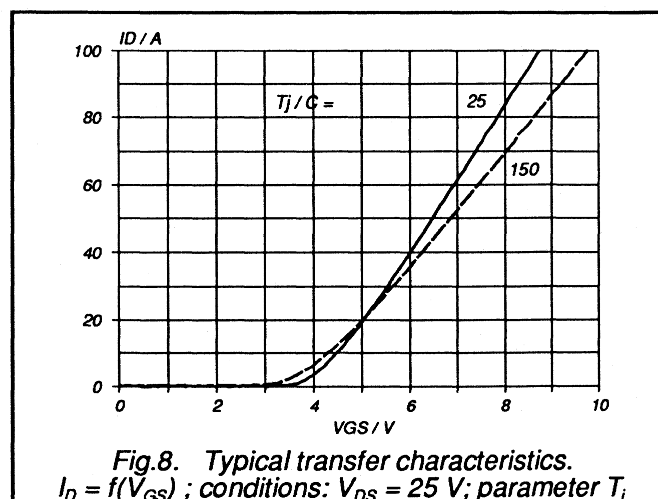


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

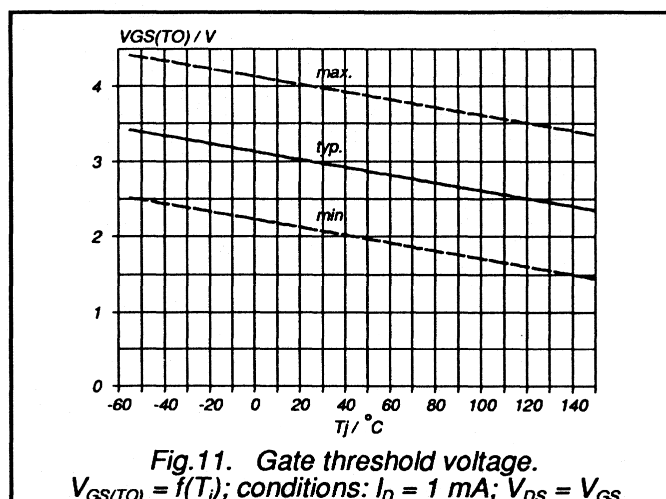


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

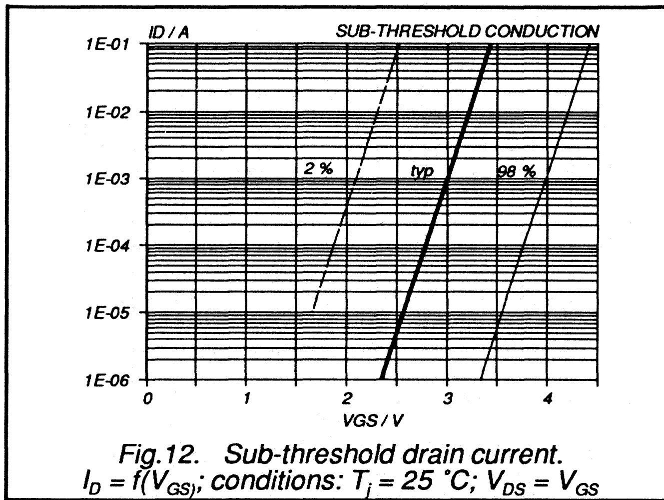


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

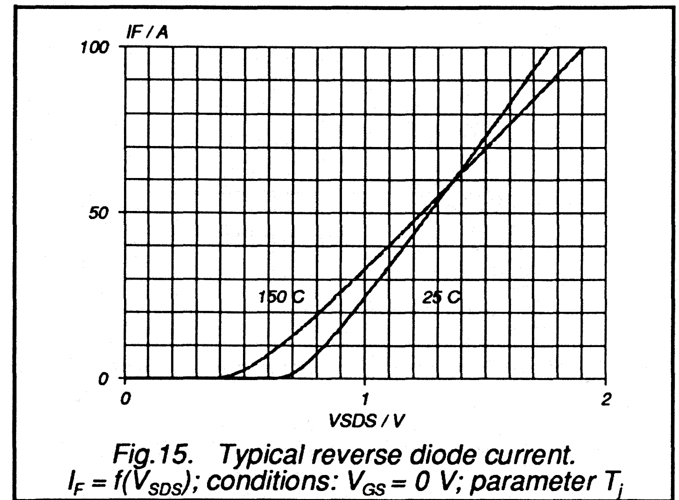


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

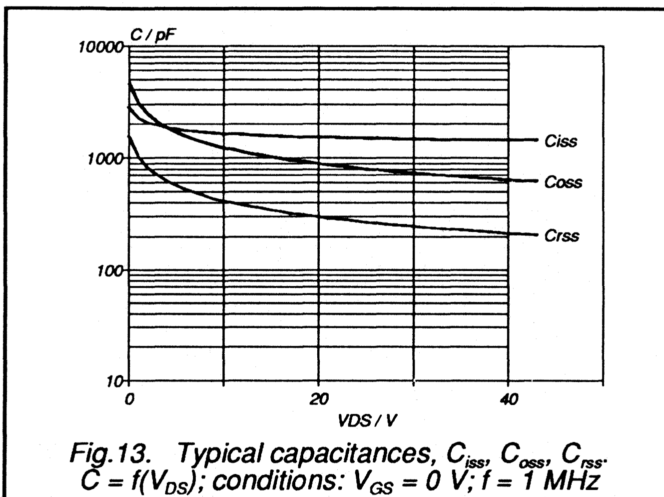


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

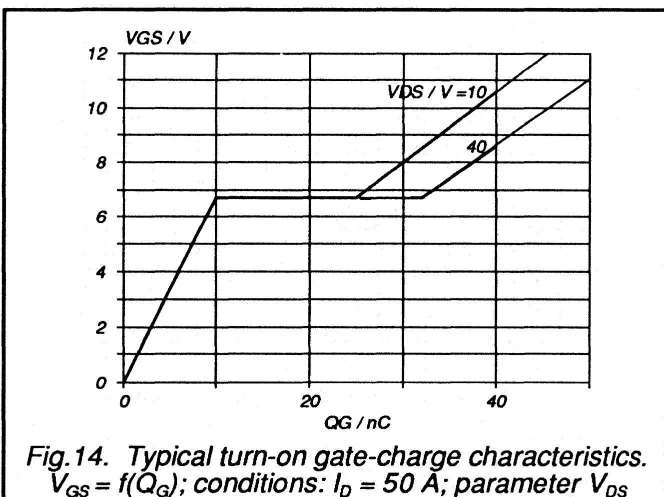


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 50$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK436	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	33	31	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.057	0.065	Ω

MECHANICAL DATA

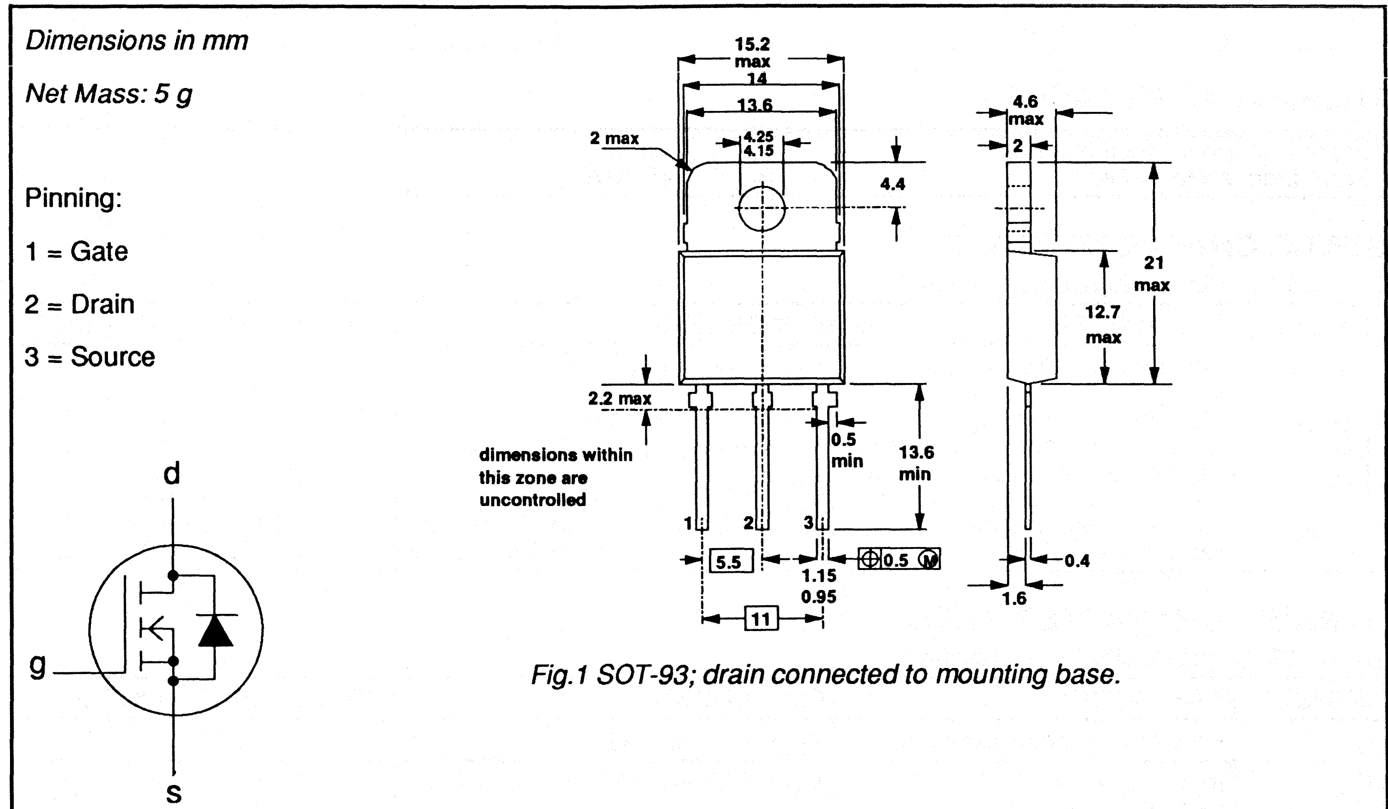


Fig.1 SOT-93; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	33	31	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	20	19	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	132	124	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK436-100A**	-	0.052	0.057	Ω
		I_D = 15 A **BUK436-100B**	-	0.06	0.065	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 15 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	450	600	pF
C_{rss}	Feedback capacitance		-	130	200	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	150	200	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	65	85	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	33	A
I_{DRM}	Pulsed reverse drain current	-	-	-	132	A
V_{SD}	Diode forward voltage	I_F = 33 A ; V_{GS} = 0 V	-	1.4	1.7	V
t_{rr}	Reverse recovery time	I_F = 33 A; $-dI_F/dt$ = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.9	-	µC

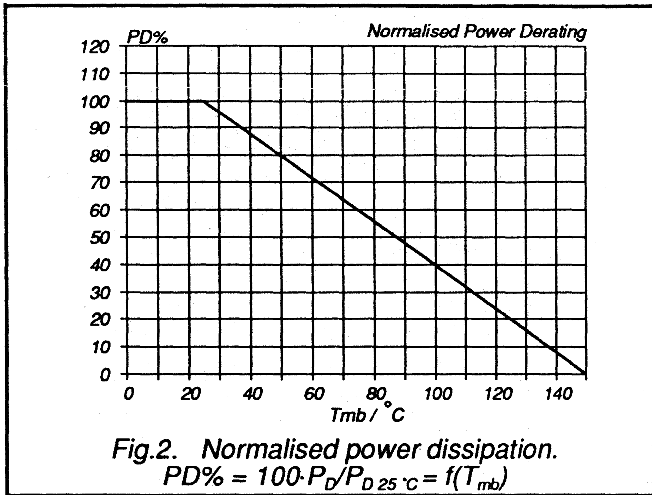


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

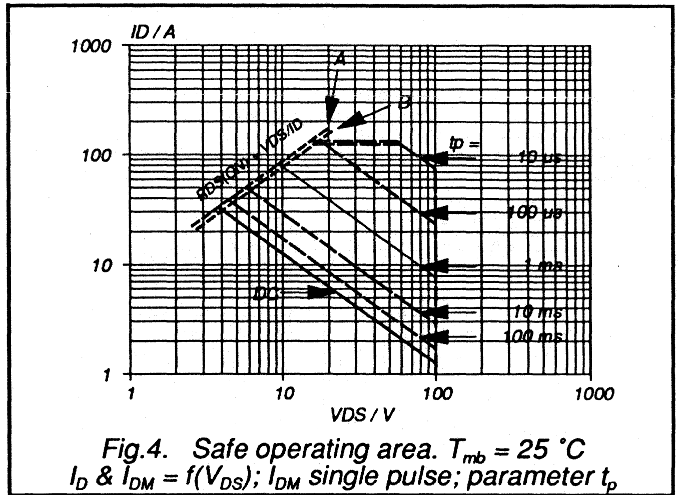


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

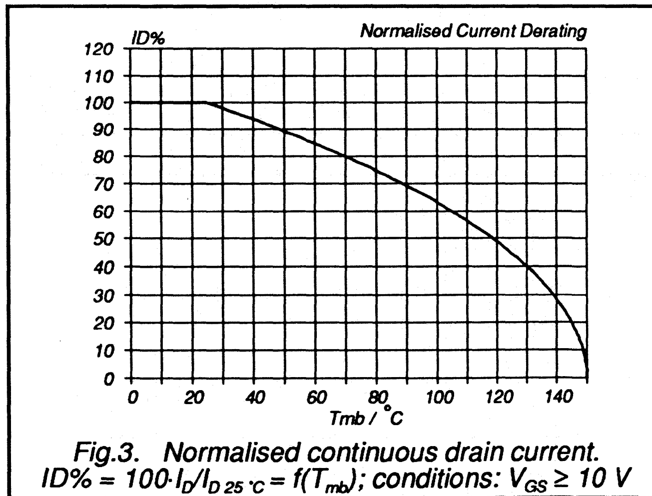


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

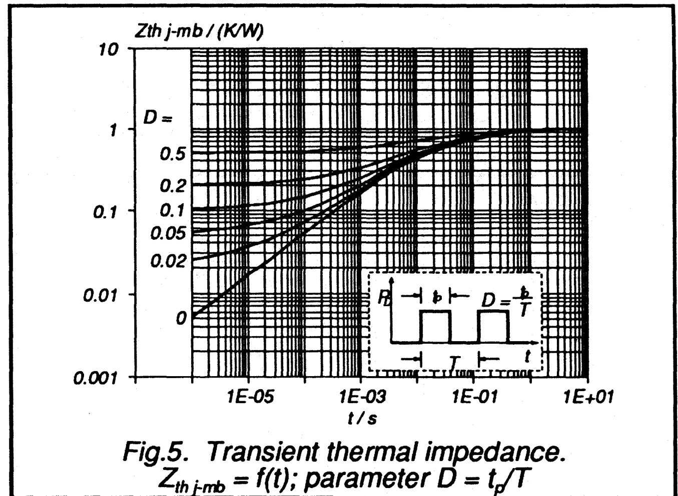


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

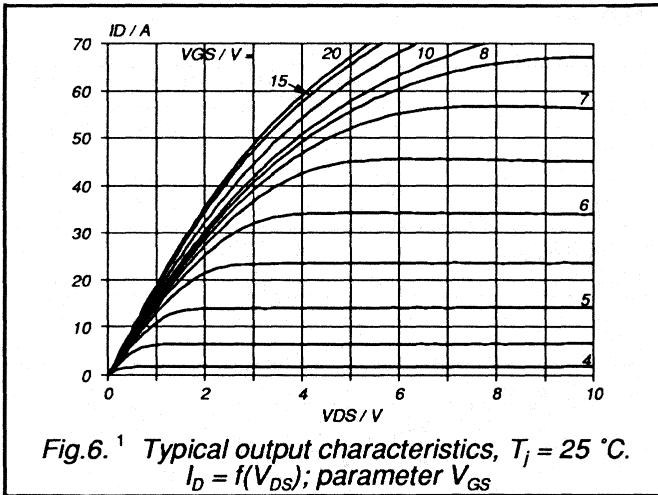


Fig.6. [1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

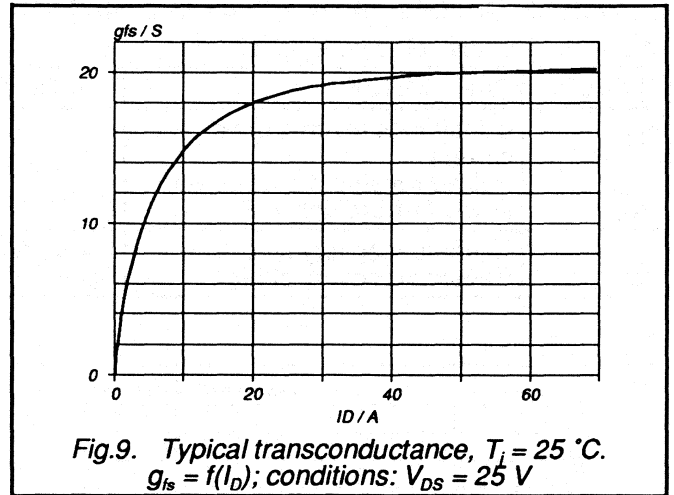


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

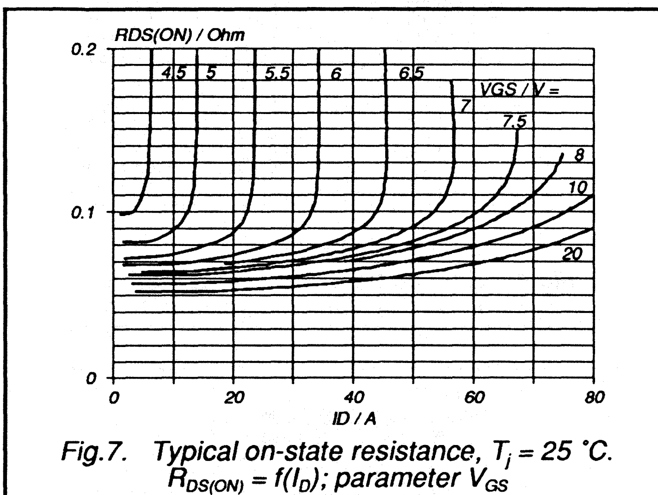


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

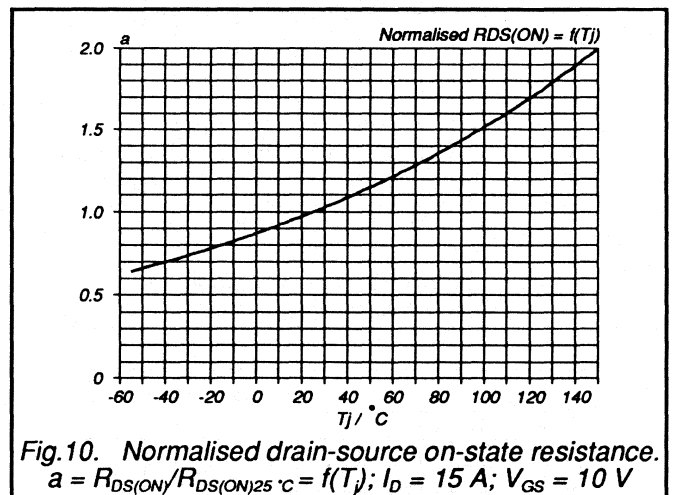


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 15$ A; $V_{GS} = 10$ V

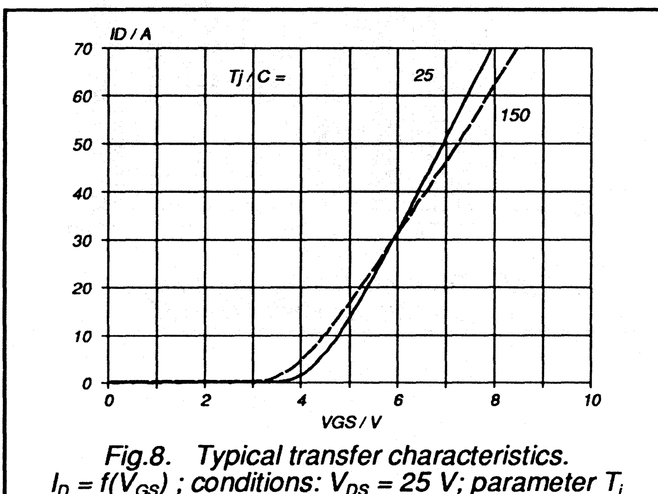


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

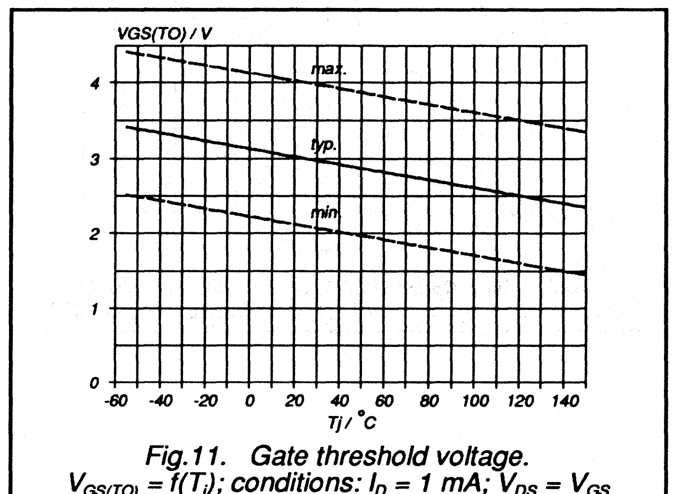


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

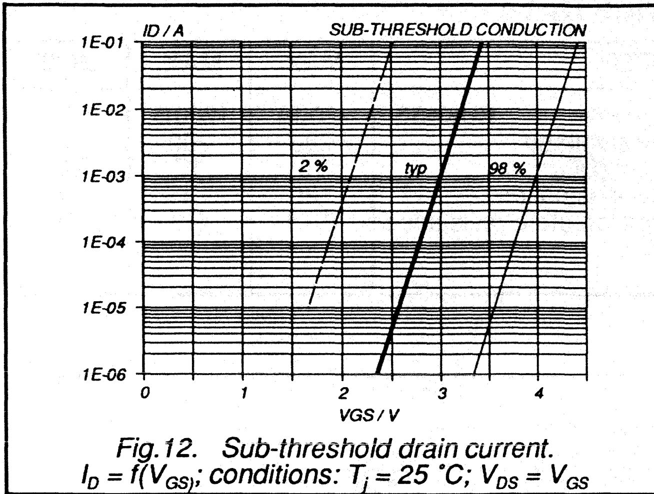


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

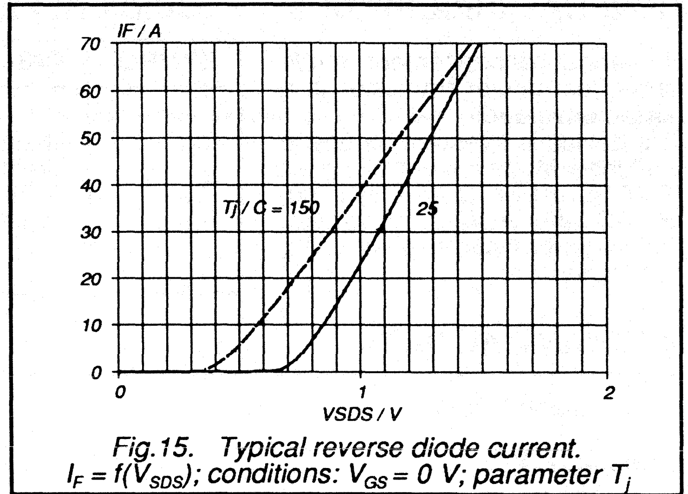


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

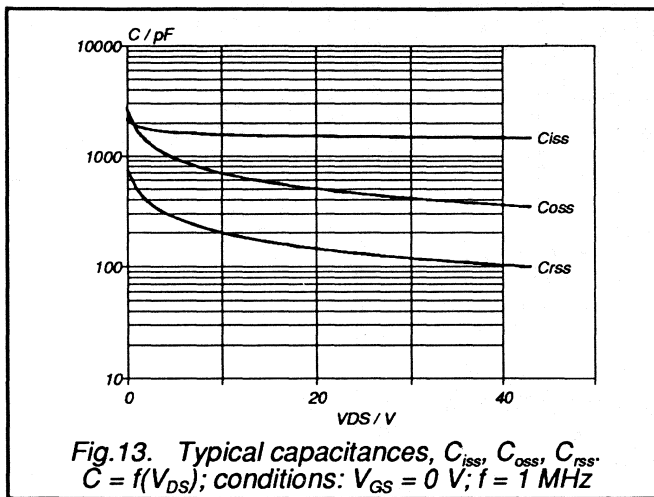


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

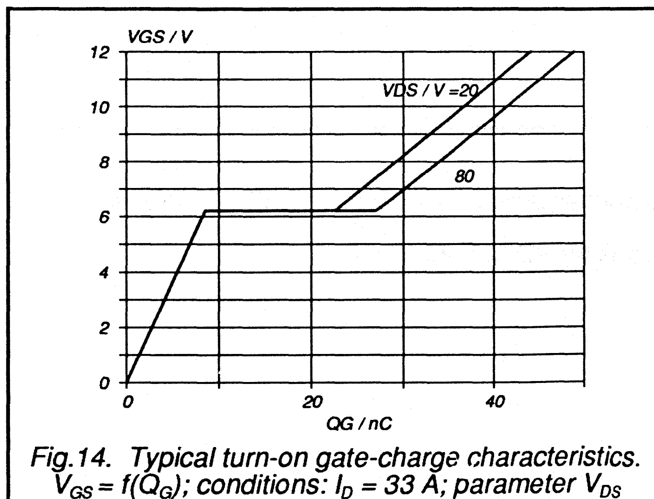


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 33$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK436	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	19	17	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.16	0.2	Ω

MECHANICAL DATA

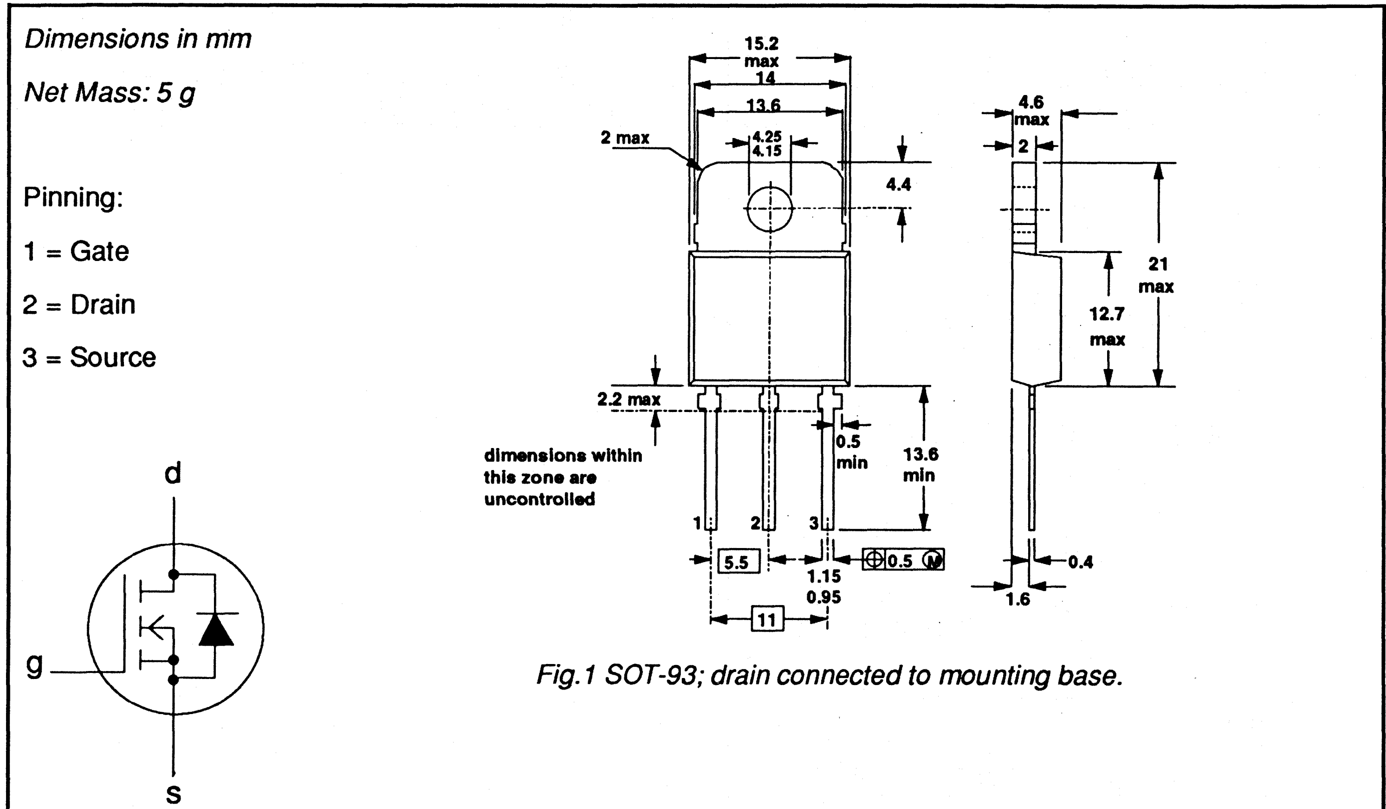


Fig.1 SOT-93; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	19	17	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	12	11	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	76	68	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 10 A; **BUK436-200A**	-	0.15	0.16	Ω
		BUK436-200B	-	0.17	0.20	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	300	400	pF
C_{rss}	Feedback capacitance		-	60	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	145	185	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	50	70	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	19	A
I_{DRM}	Pulsed reverse drain current	-	-	-	76	A
V_{SD}	Diode forward voltage	I_F = 19 A ; V_{GS} = 0 V	-	1.0	1.7	V
t_{rr}	Reverse recovery time	I_F = 19 A; $-dI_F/dt$ = 100 A/µs;	-	650	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	4.1	-	µC

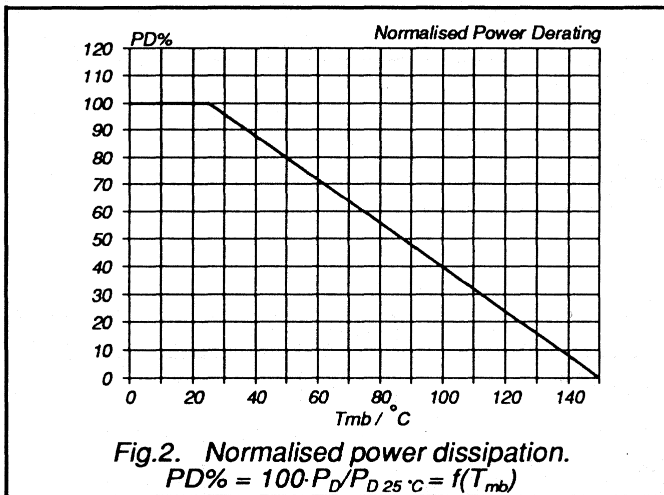


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

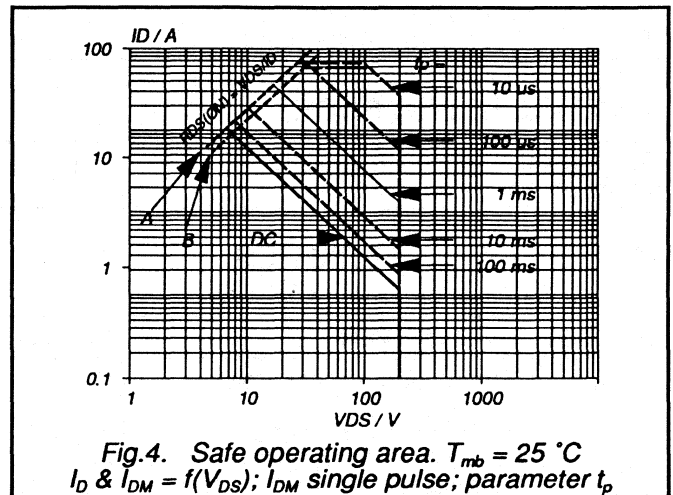


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

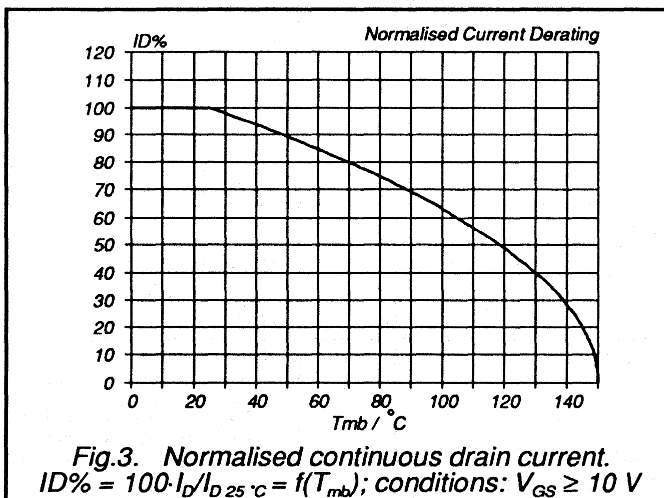


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

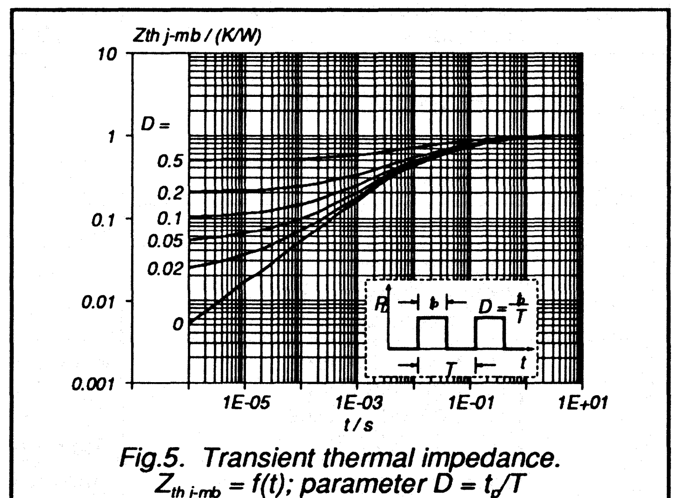


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

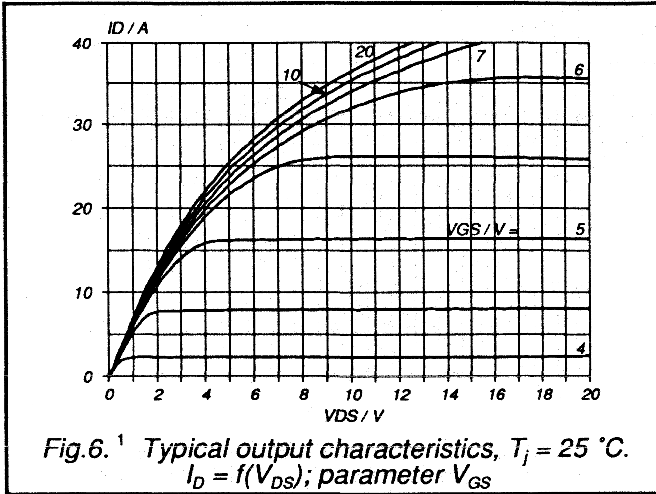


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

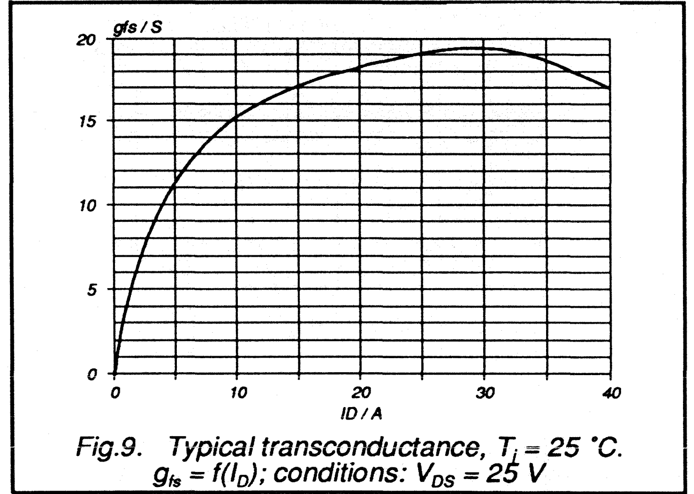


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

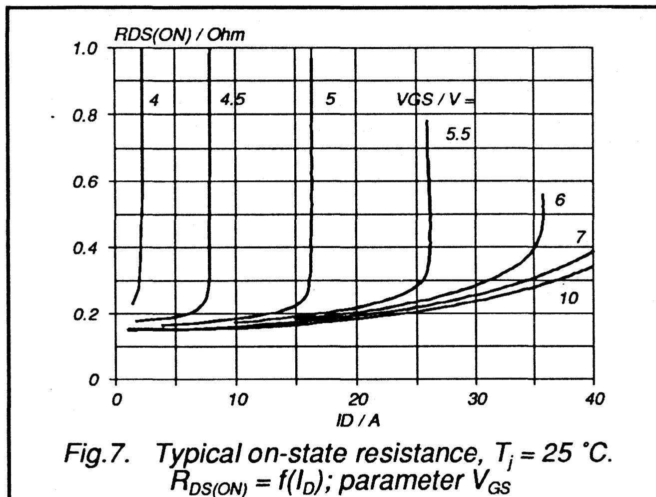


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

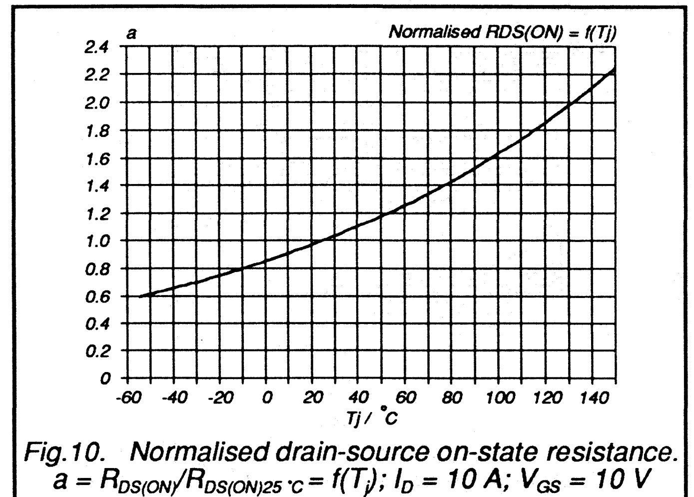


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 10 A; V_{GS} = 10 V

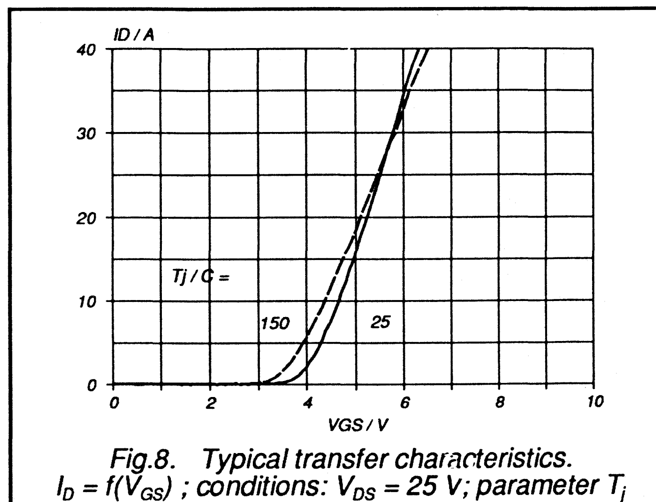


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

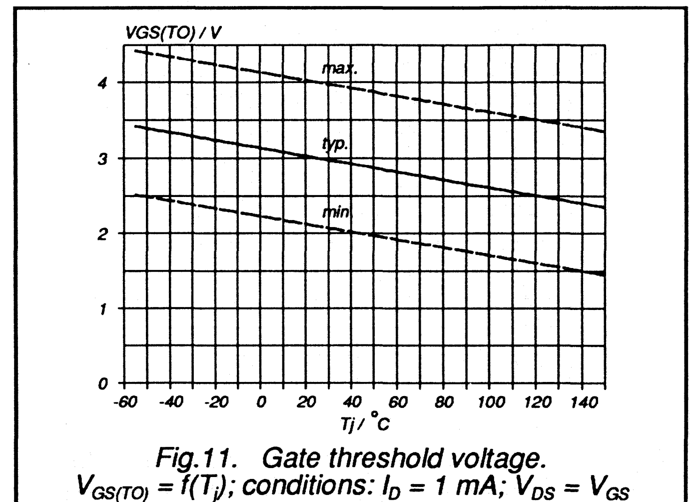


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

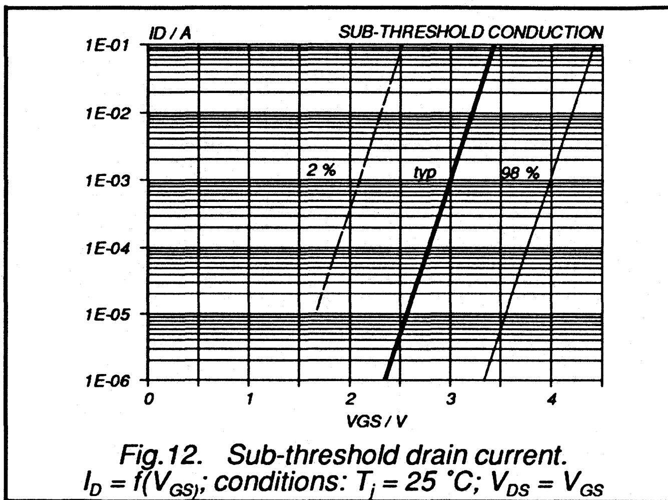


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

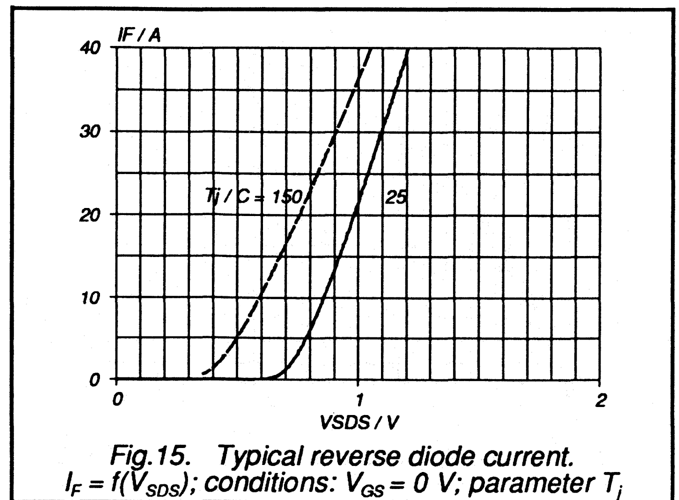


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

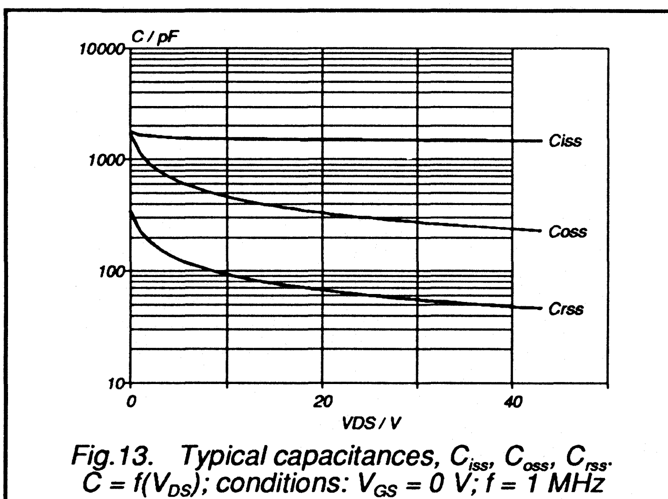


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

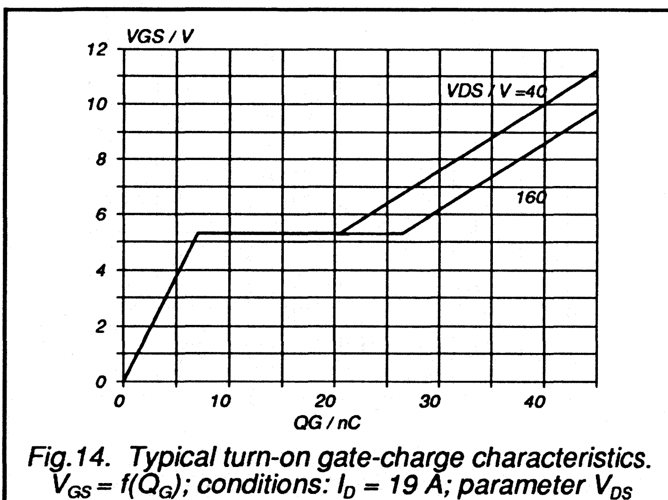


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 19$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK436	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	4	3.5	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	3	4	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	**-800B**	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	4.0	3.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.5	2.2	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	16	14	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A **BUK436-800A**	-	2.7	3.0	Ω
		BUK436-800B	-	3.5	4.0	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.0	A
I_{DRM}	Pulsed reverse drain current	-	-	-	16	A
V_{SD}	Diode forward voltage	I_F = 4.0 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 4.0 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

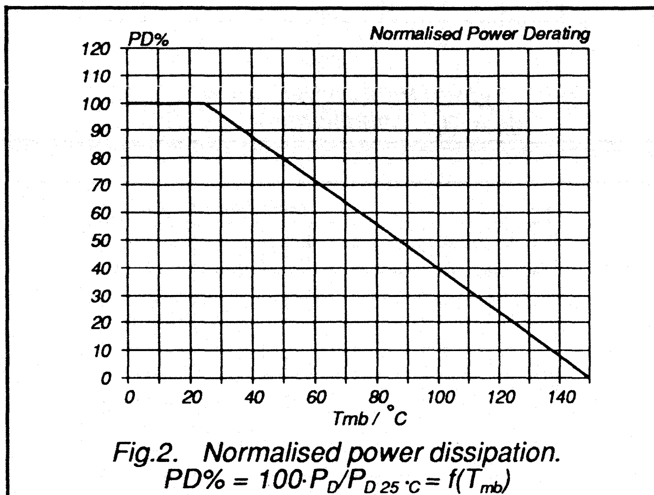


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

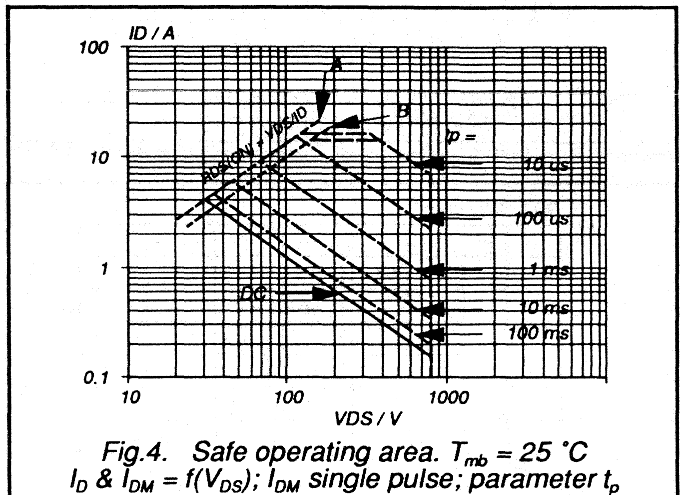


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

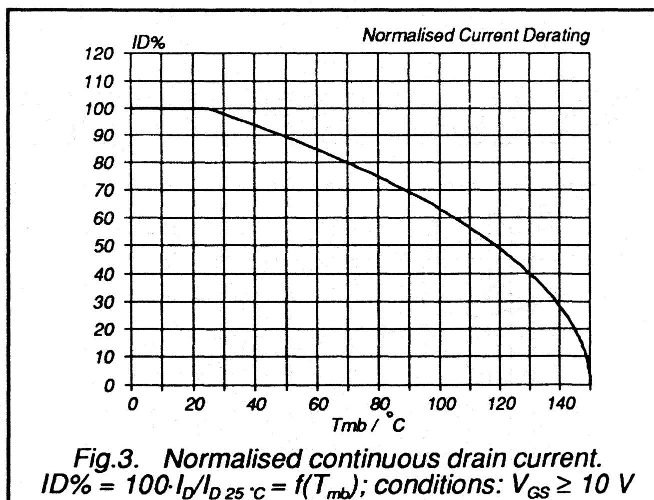


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

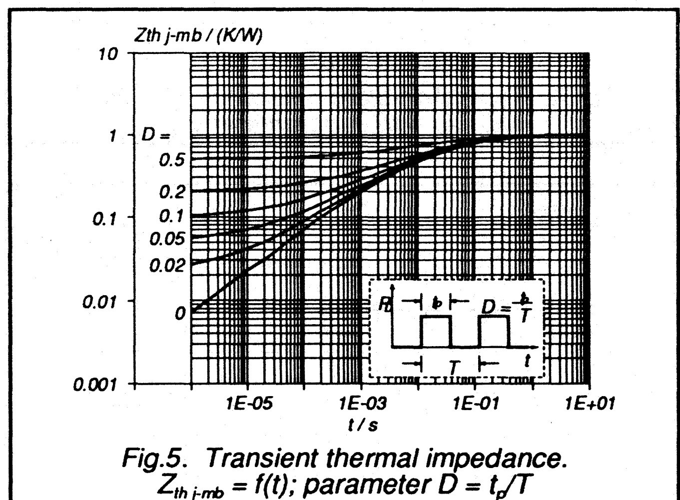


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

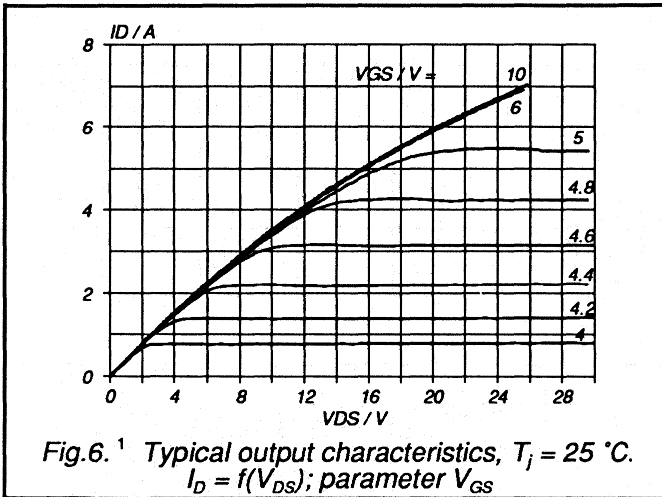


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

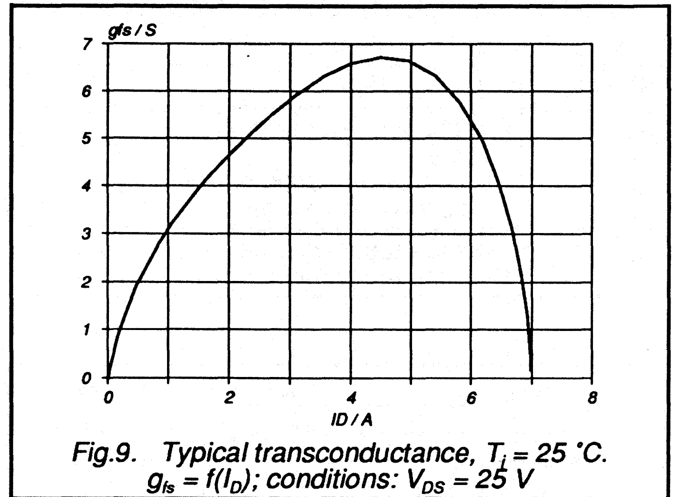


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

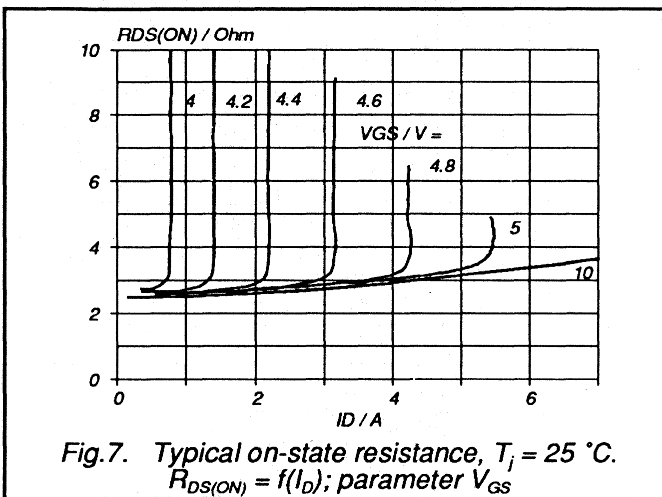


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

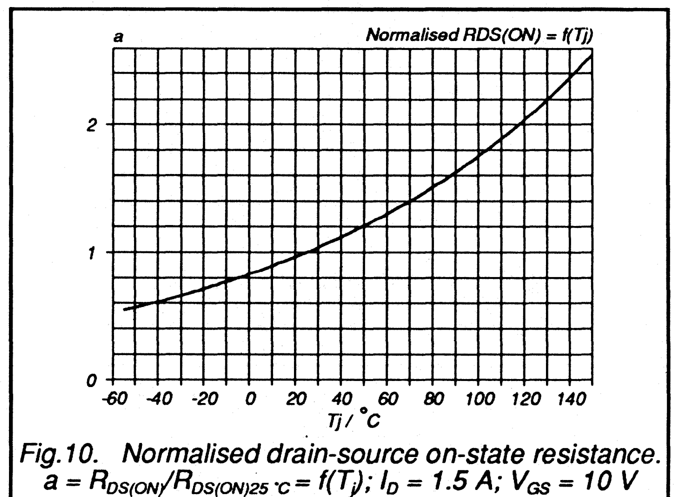


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

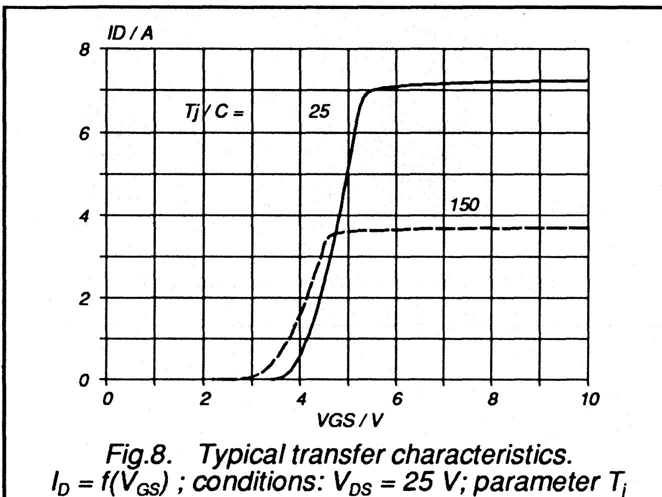


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

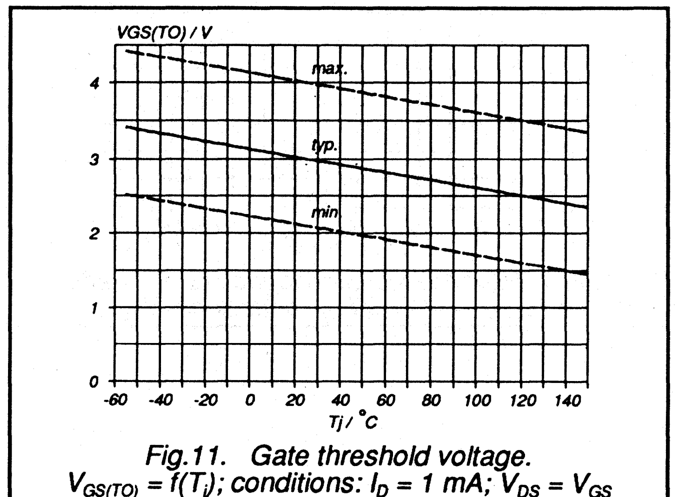


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

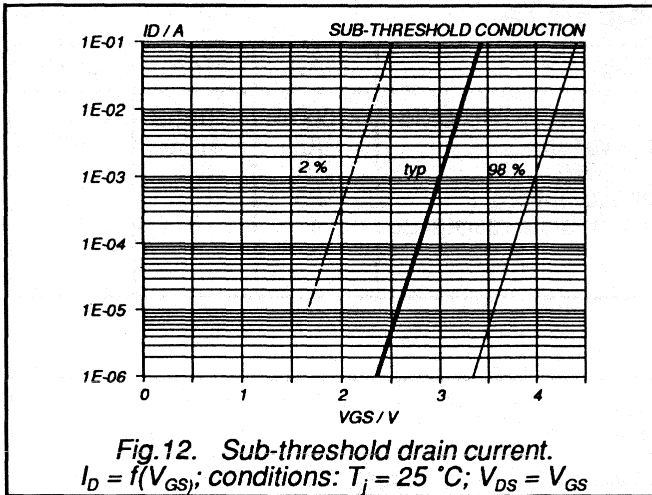


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

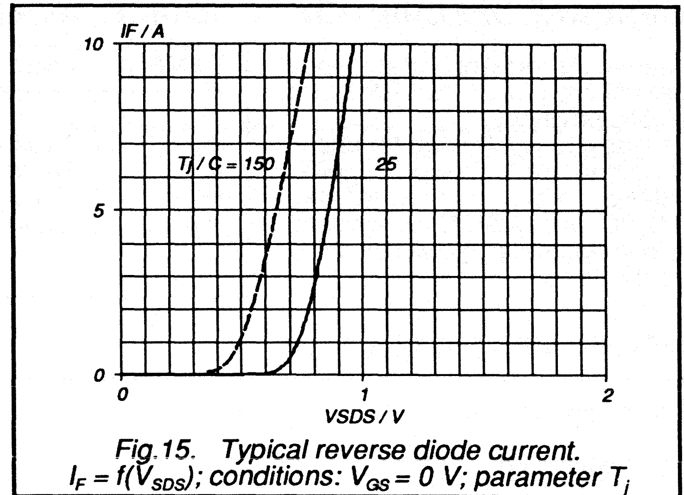


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

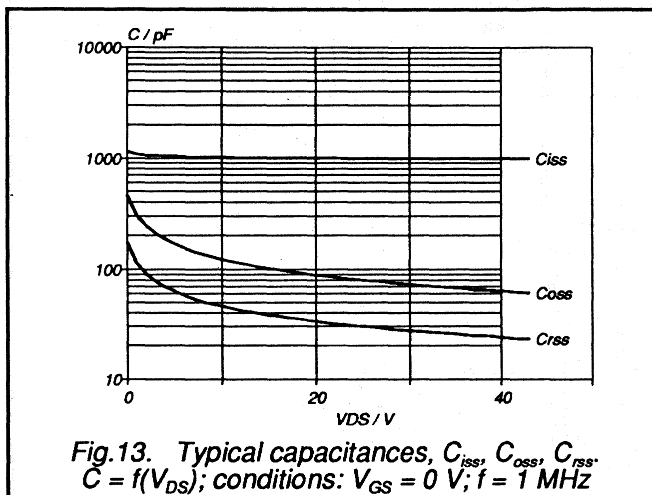


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

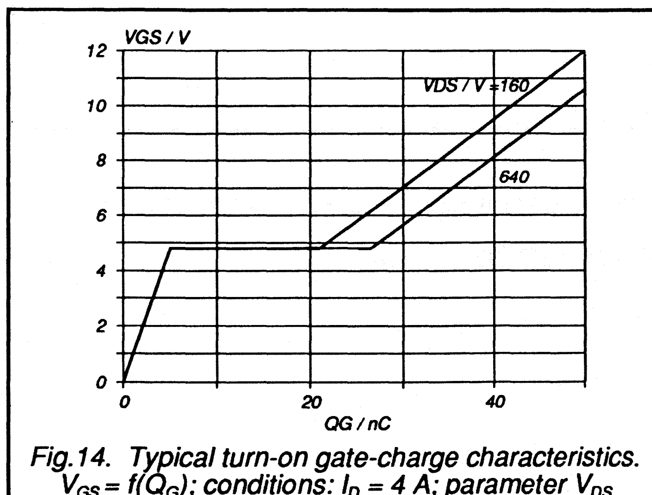


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK436	-1000A	-1000B	
V_{DS}	Drain-source voltage	1000	1000	V
I_D	Drain current (DC)	3.5	3.1	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	4	5	Ω

MECHANICAL DATA

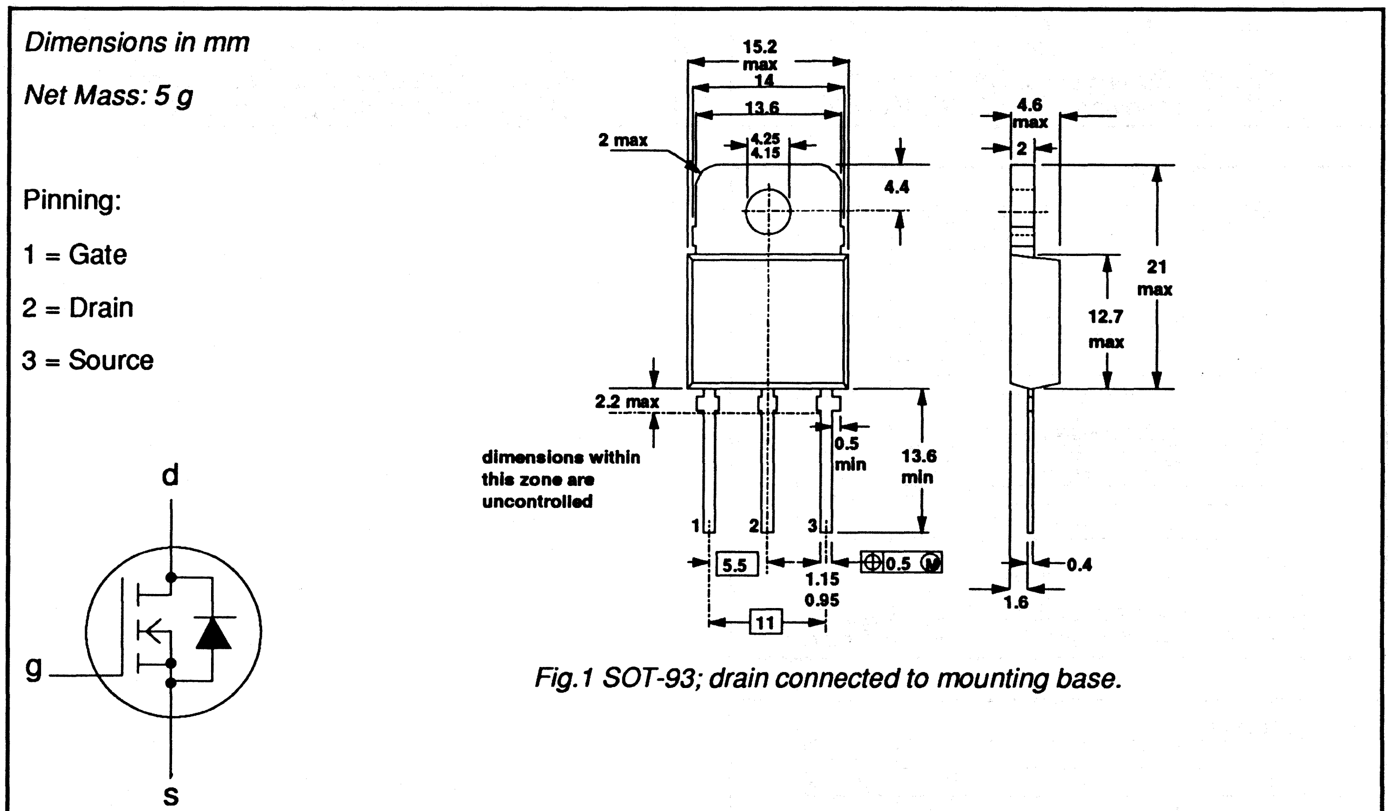


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	1000		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	1000		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-1000A	-1000B	
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	3.5	3.1	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	2.2	2.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	14	12	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j-mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j-a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	1000	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A — BUK436-1000A	-	3.5	4.0	Ω
		BUK436-1000B	-	4.5	5.0	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	25	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\,off}$	Turn-off delay time		-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.5	A
I_{DRM}	Pulsed reverse drain current	-	-	-	14	A
V_{SD}	Diode forward voltage	I_F = 3.5 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 3.5 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

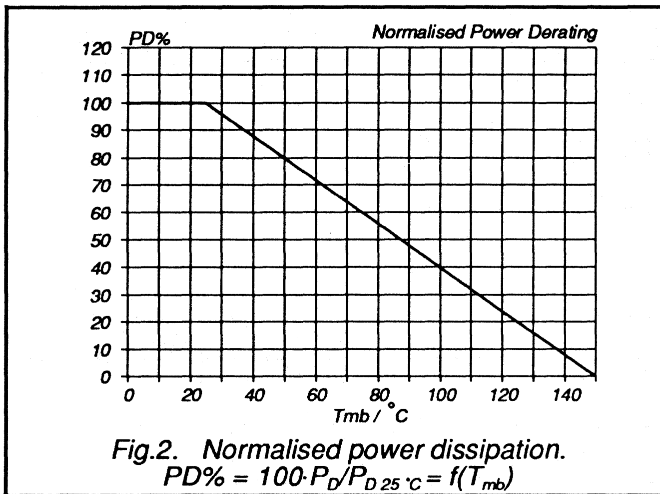


Fig.2. Normalised power dissipation.
PD% = 100·$P_D/P_{D\,25\,°C}$ = f(T_{mb})

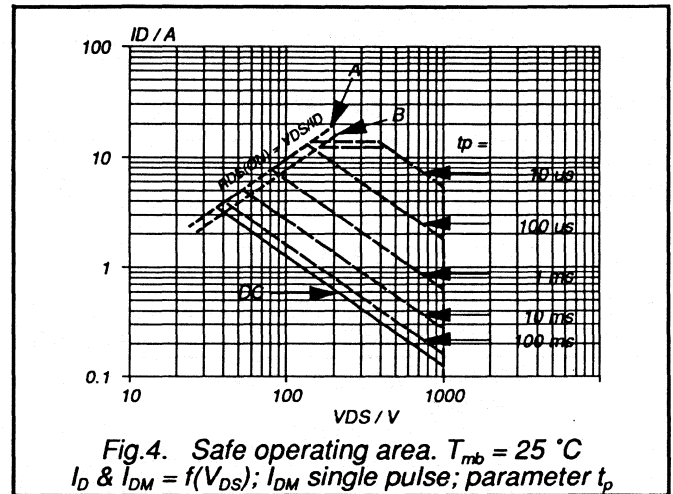


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

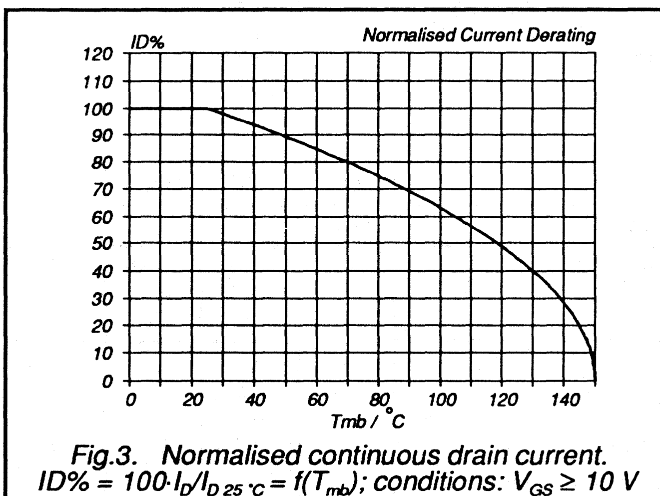


Fig.3. Normalised continuous drain current.
ID% = 100·$I_D/I_{D\,25\,°C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

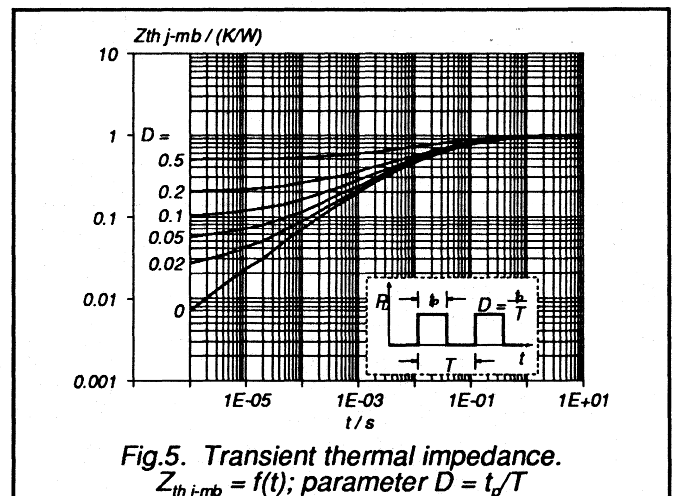


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

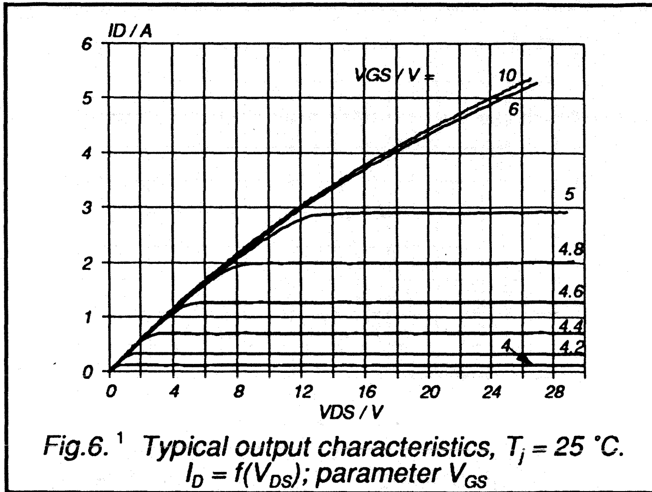


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

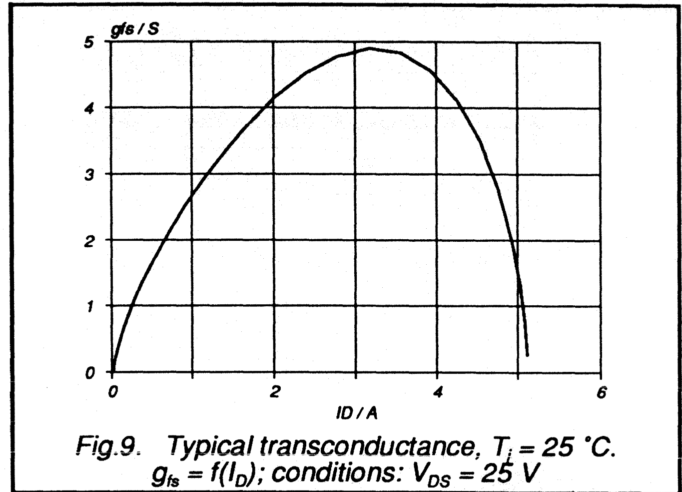


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

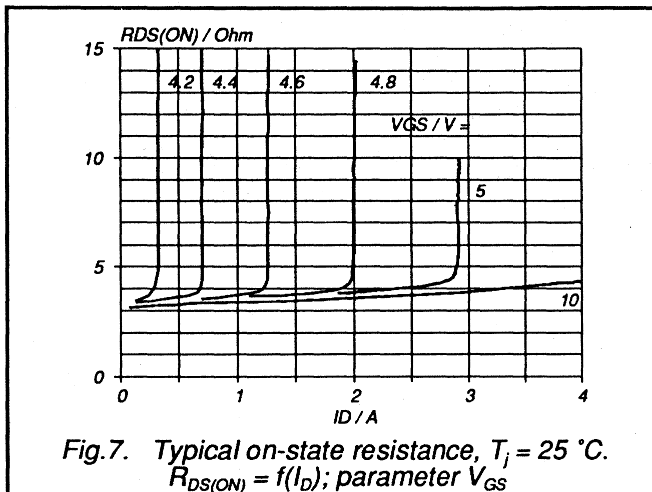


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

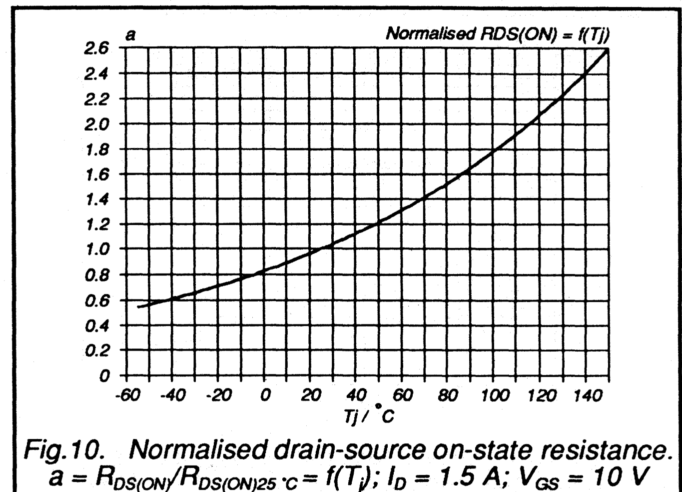


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

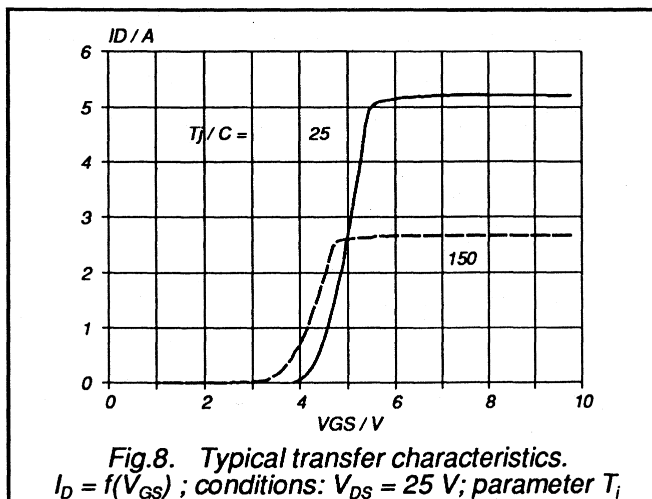


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

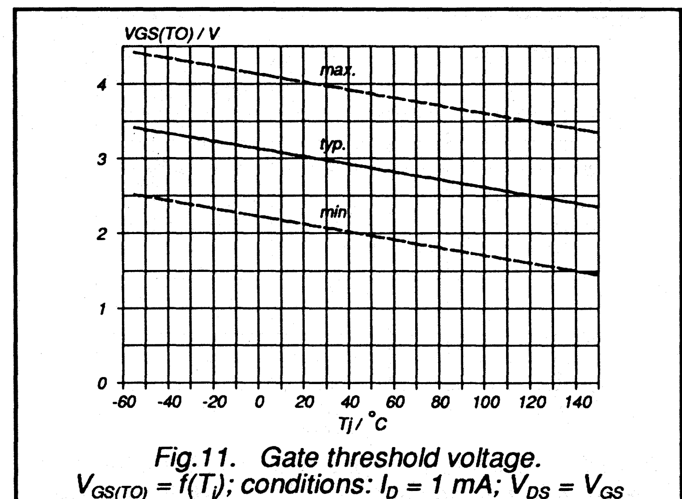


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

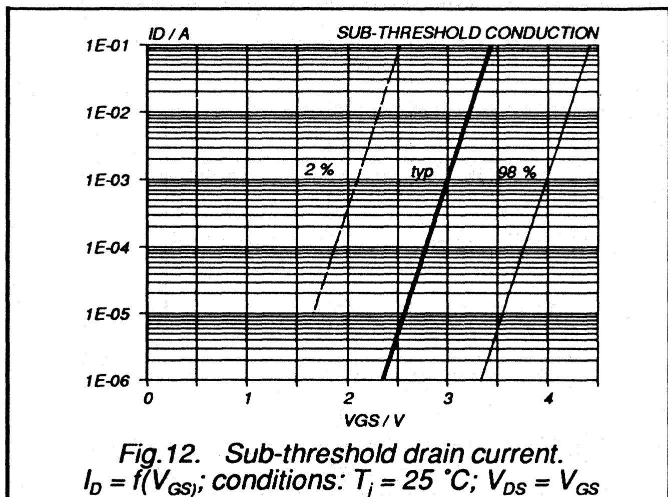


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

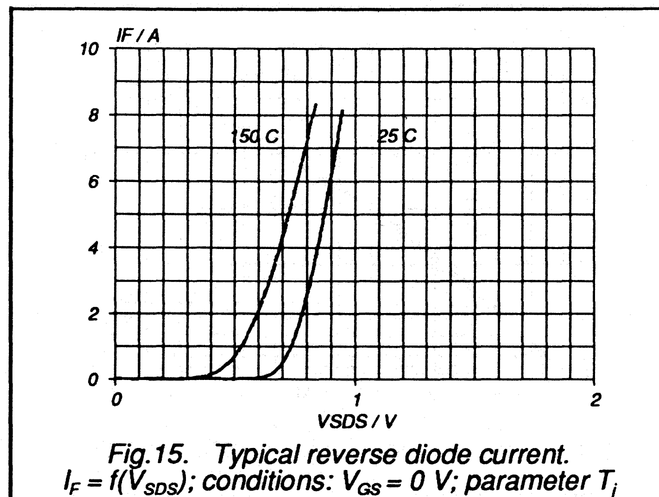


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

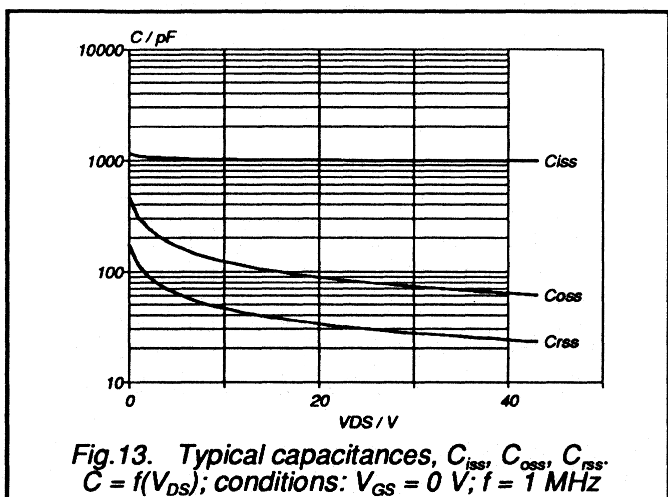


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

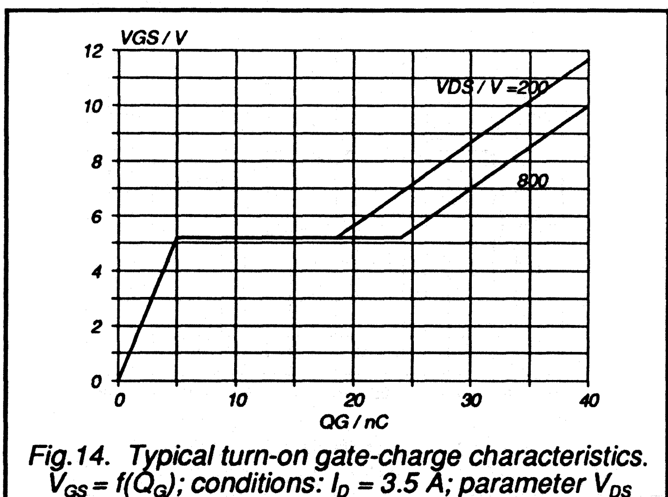


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK437	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	14	12	A
P_{tot}	Total power dissipation	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.4	0.5	Ω

MECHANICAL DATA

Dimensions in mm

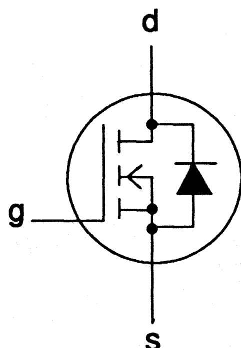
Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source



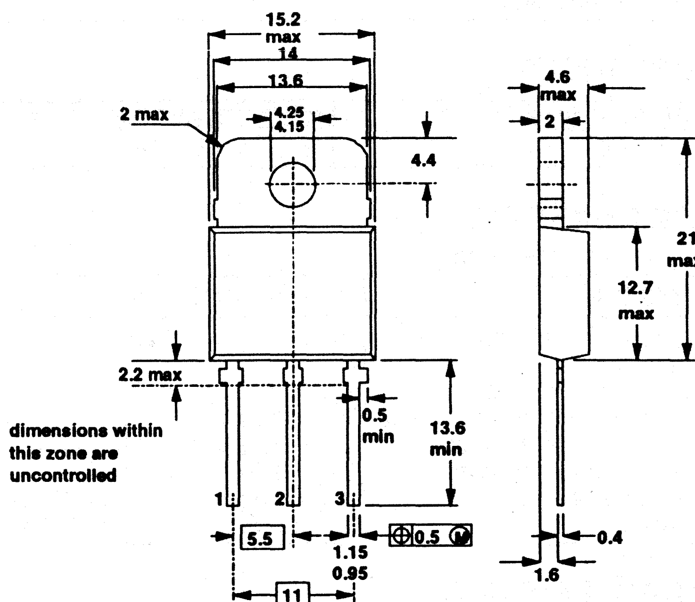


Fig.1 SOT-93; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	12	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	8.8	7.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	48	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb}$ = 0.69 K/W
From junction to ambient	$R_{th\ j-a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK437-400A**	-	0.35	0.4	Ω
		BUK437-400B	-	0.45	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 14 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

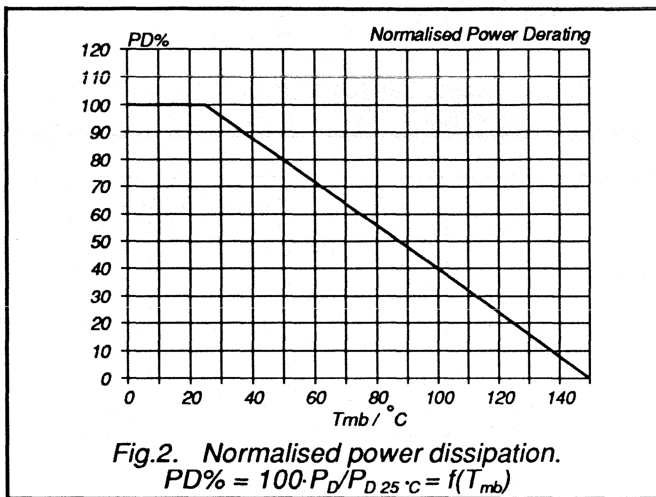


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

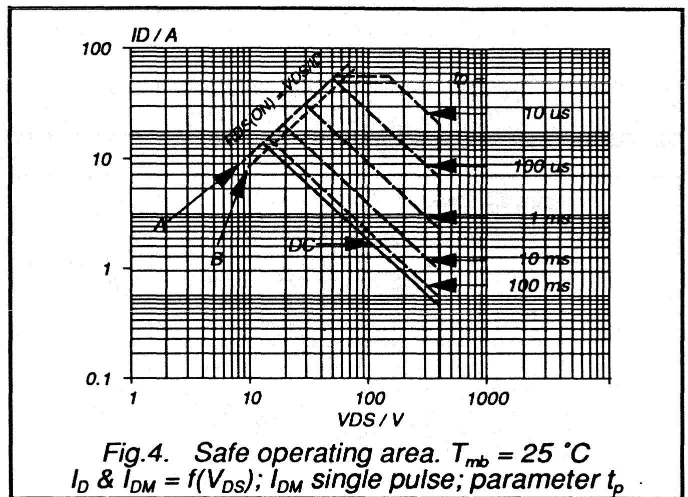


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = $f(V_{DS})$; I_{DM} single pulse; parameter t_p

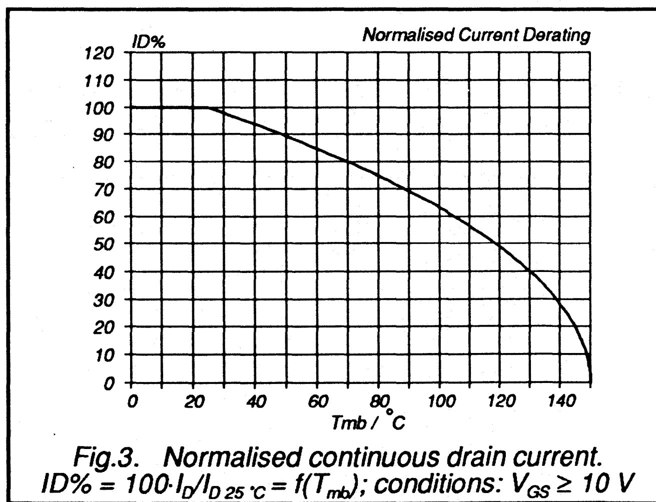


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

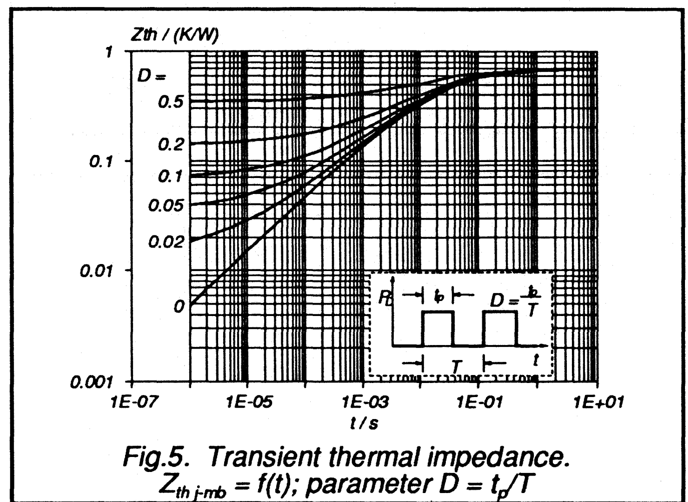


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

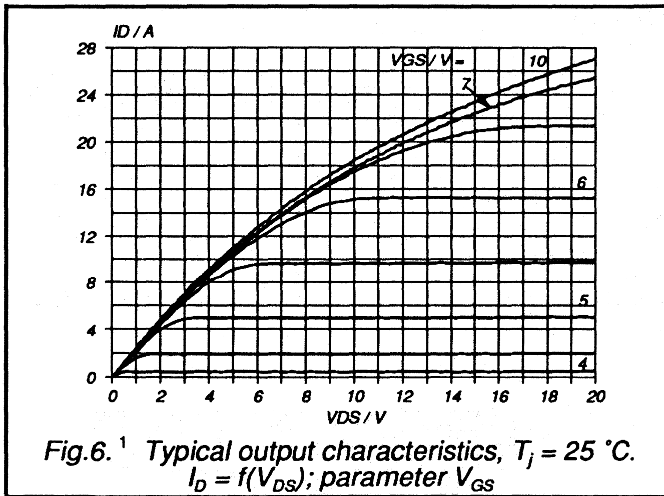


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

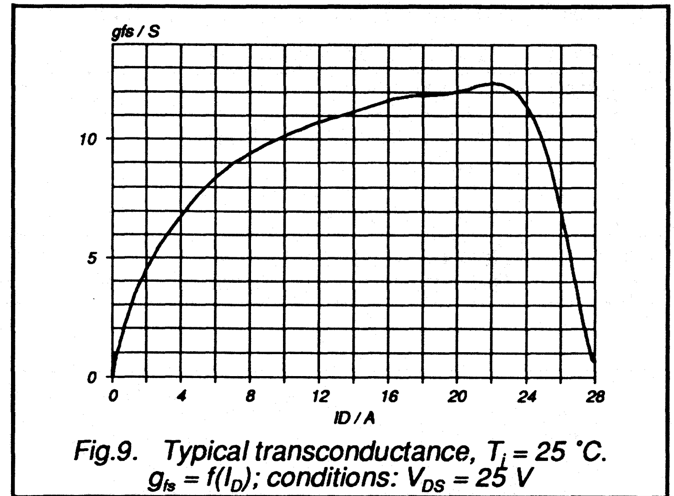


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

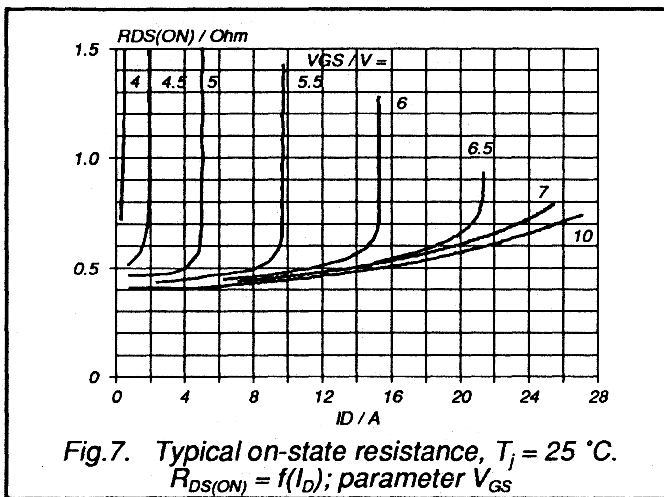


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

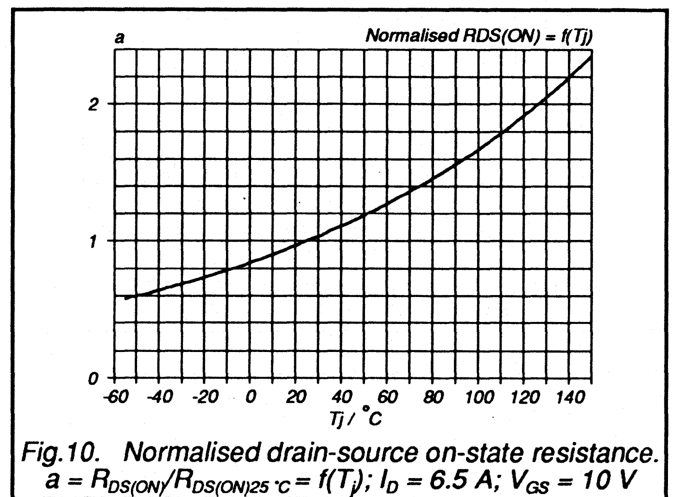


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

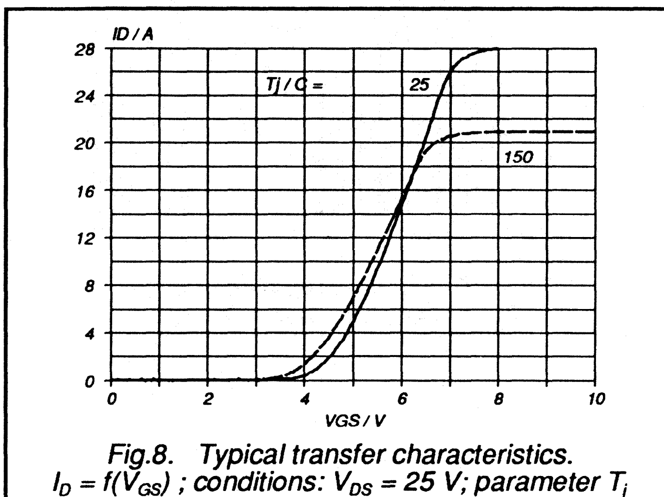


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

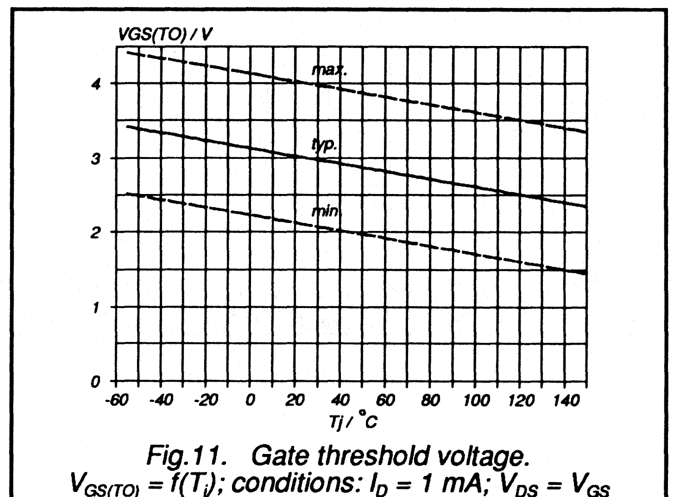


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

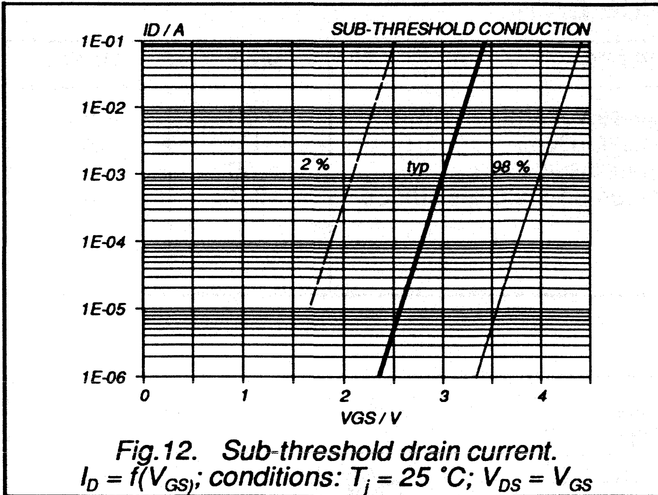


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

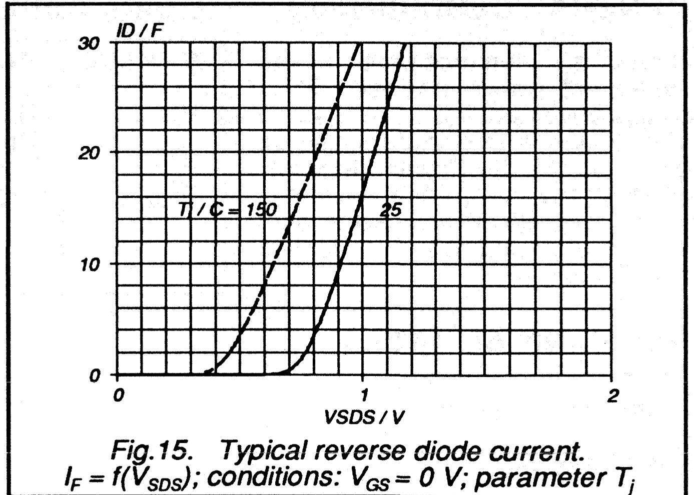


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

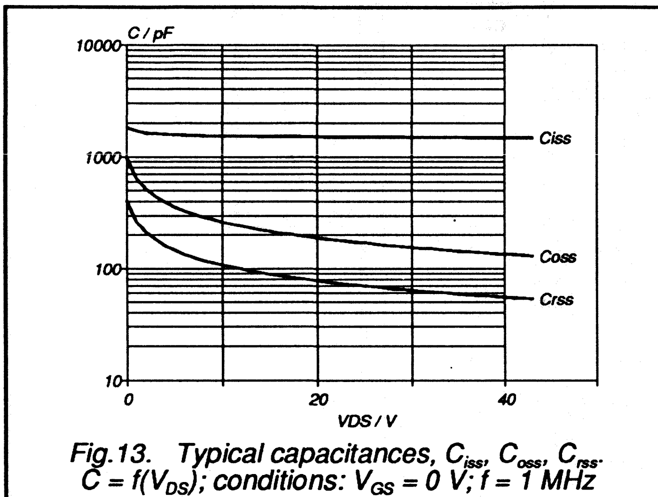


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

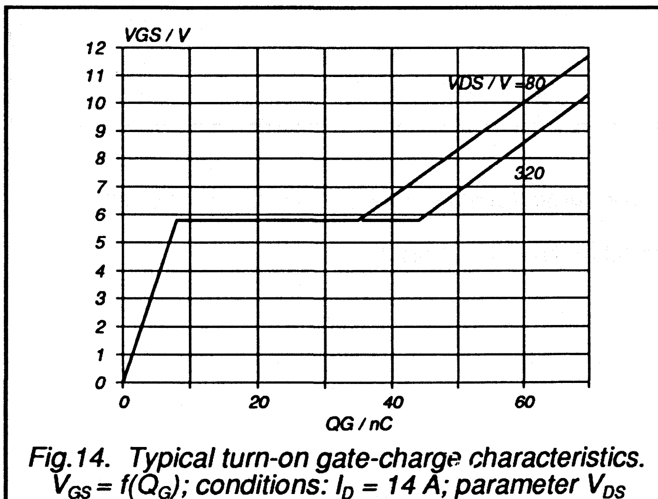


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	11	A
P_{tot}	Total power dissipation	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

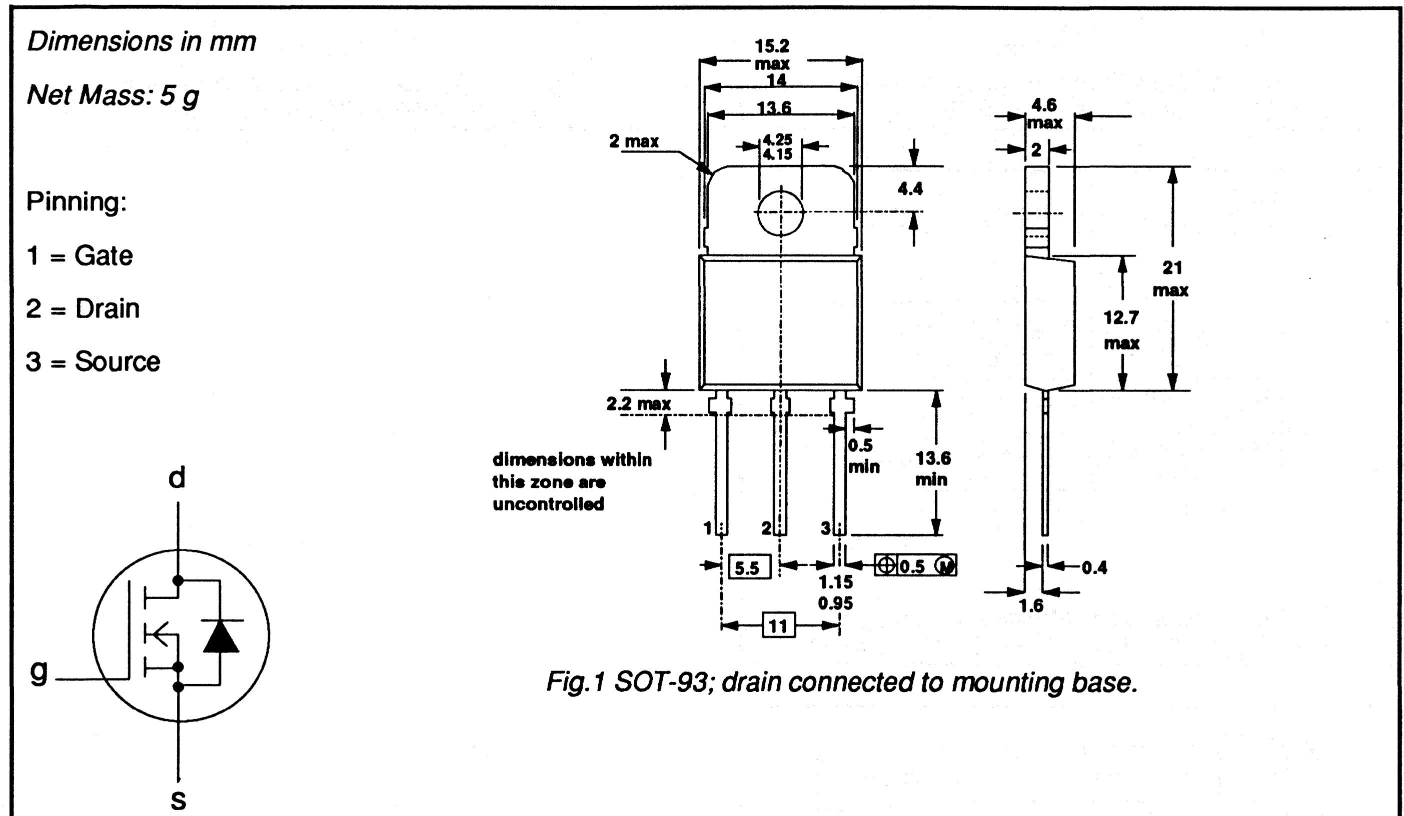


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	11	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	7.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	44	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	180	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.69 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.55	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	11	A
I_{DRM}	Pulsed reverse drain current	-	-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 11 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

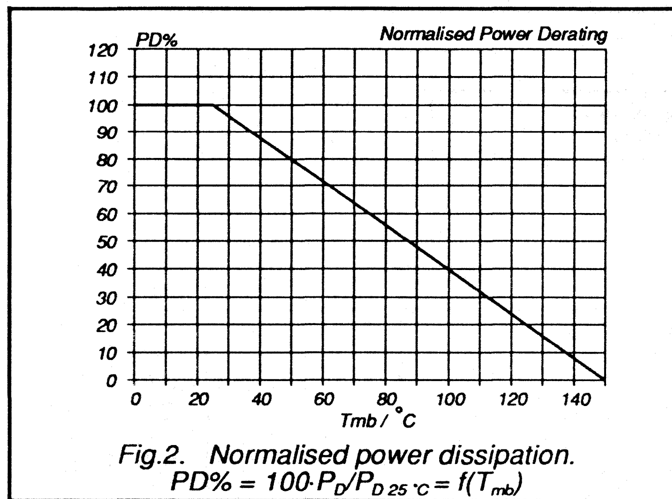


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\ 25\ ˚C}$ = f(T_{mb})

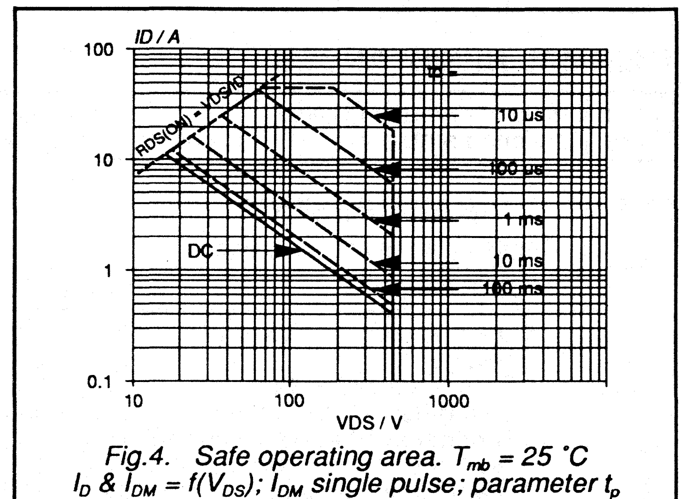


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

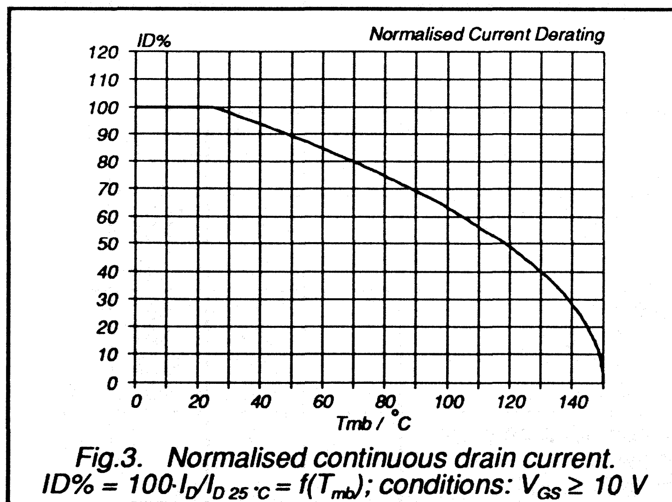


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\ 25\ ˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

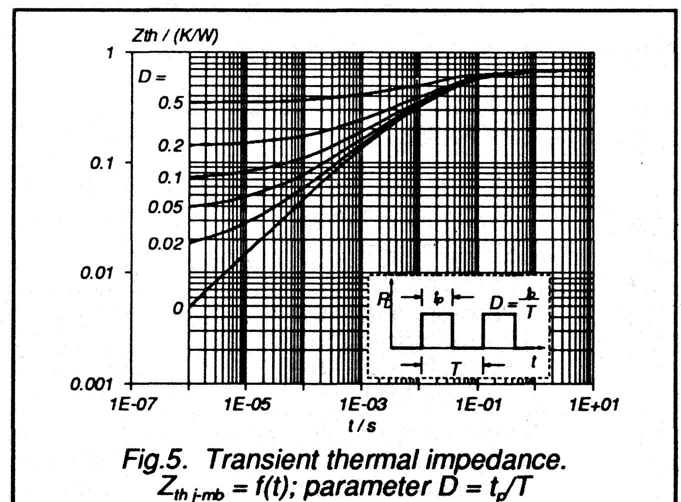


Fig.5. Transient thermal impedance.
$Z_{th\ j\text{-}mb}$ = f(t); parameter D = t_p/T

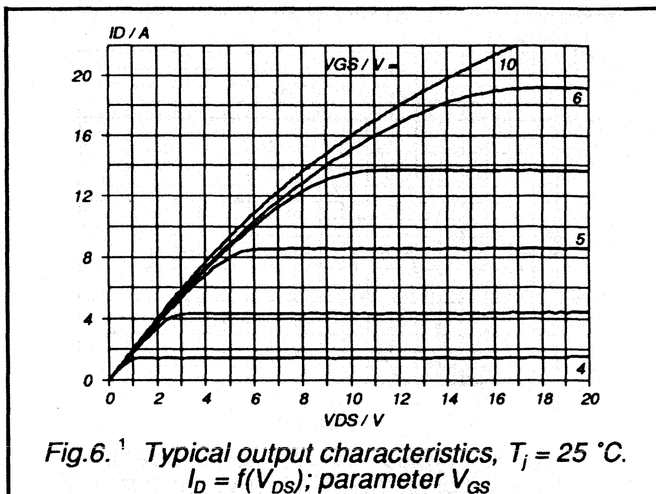


Fig.6. [1] *Typical output characteristics, T_j = 25 °C.*
$I_D = f(V_{DS})$; parameter V_{GS}

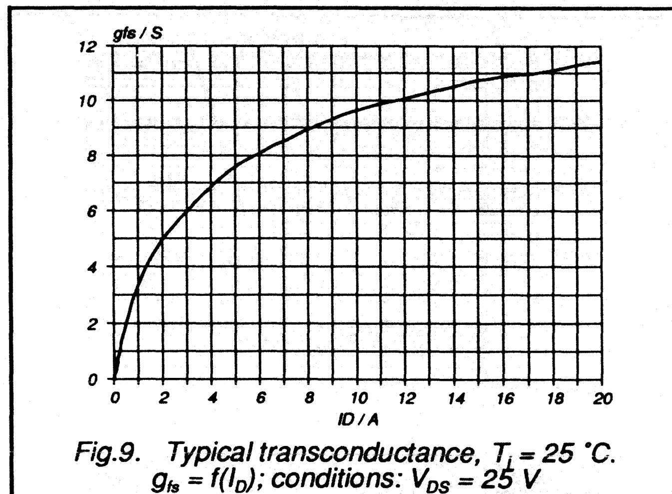


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

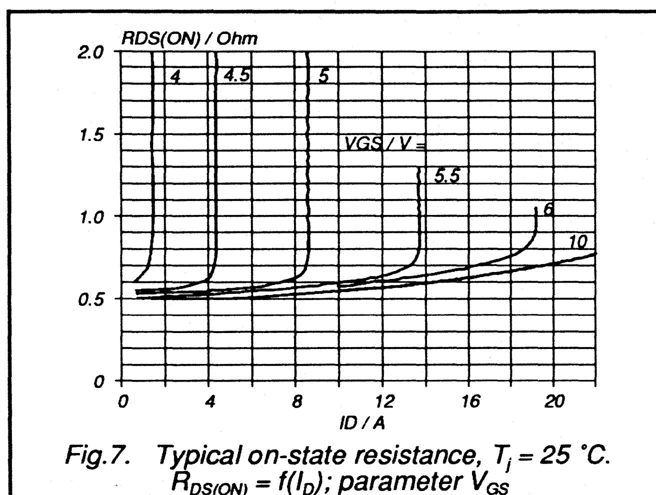


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

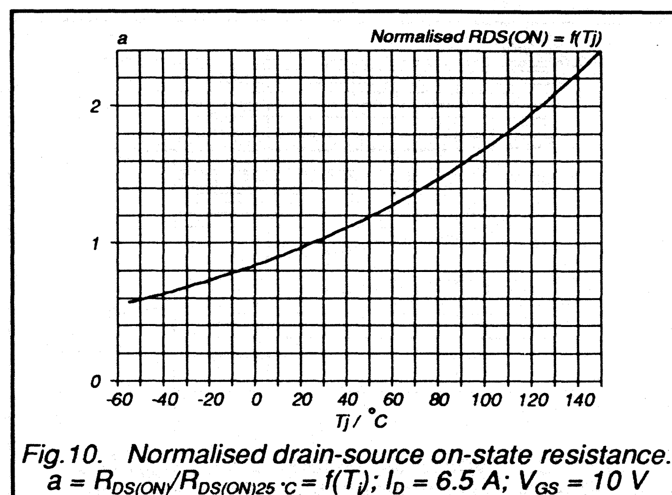


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

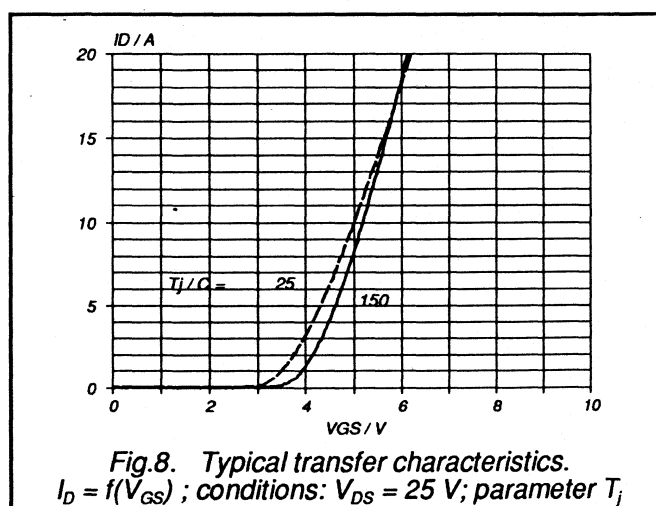


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

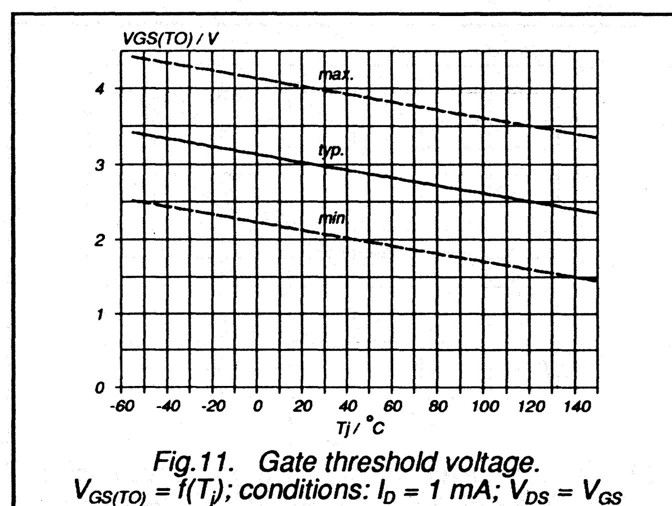


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

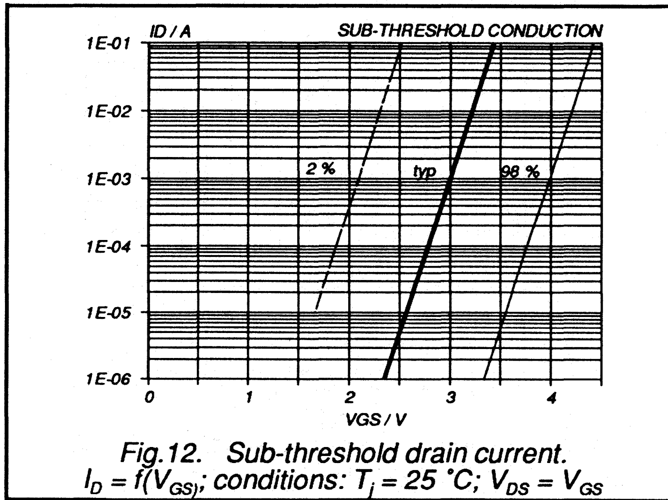


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

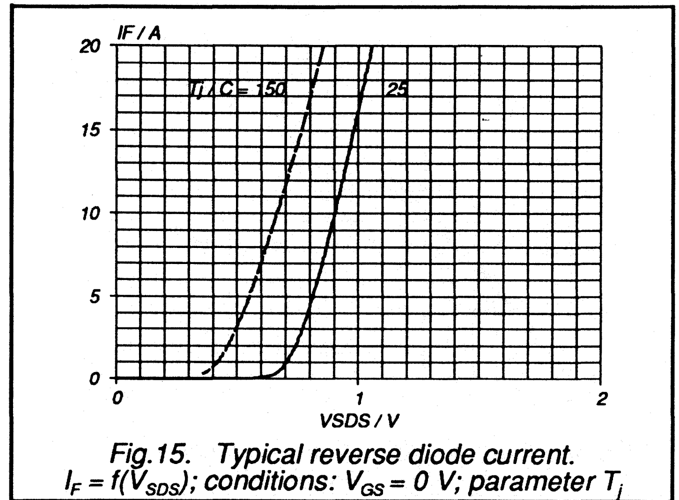


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

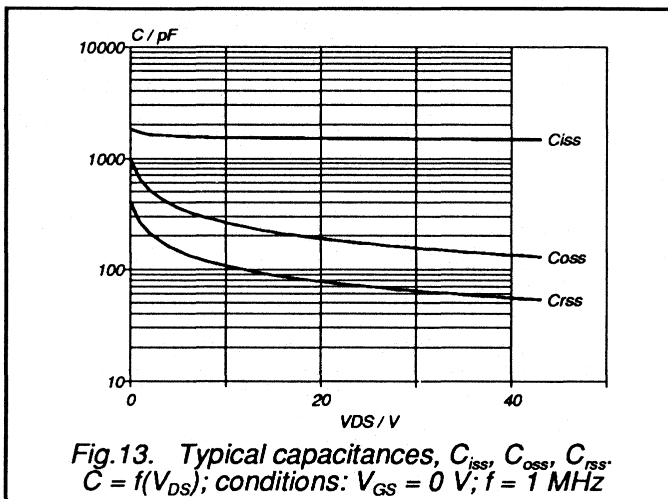


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

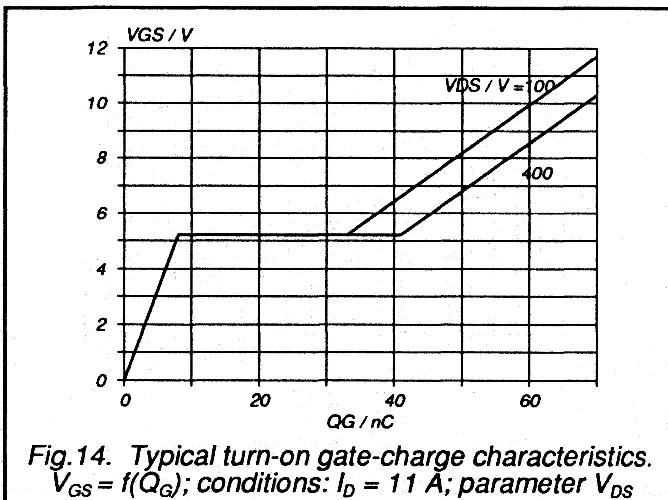


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK437	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	11	10	A
P_{tot}	Total power dissipation	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	0.8	Ω

MECHANICAL DATA

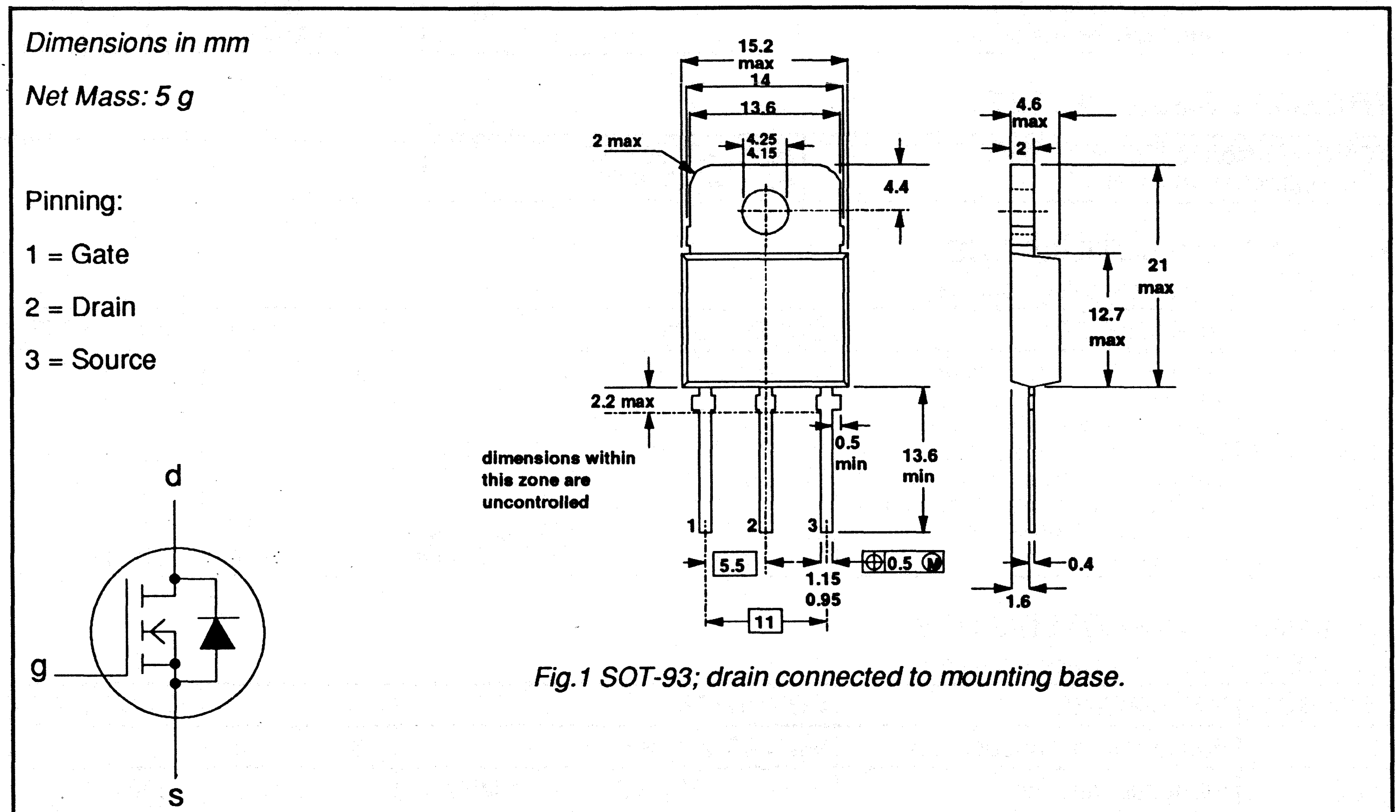


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	11	10	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	7.0	6.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	44	40	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.69 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK437-500A**	-	0.55	0.6	Ω
		BUK437-500B	-	0.7	0.8	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\,off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	11	A
I_{DRM}	Pulsed reverse drain current	-	-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 11 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

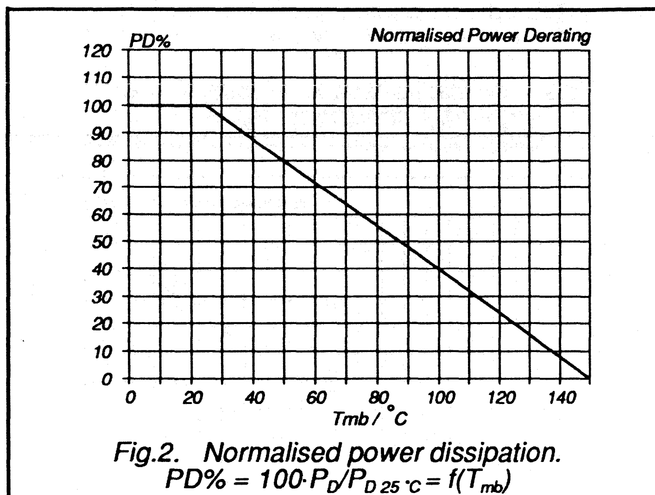


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

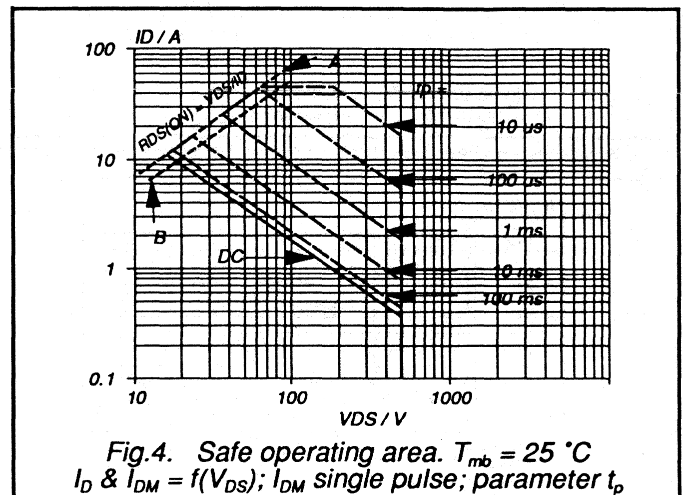


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

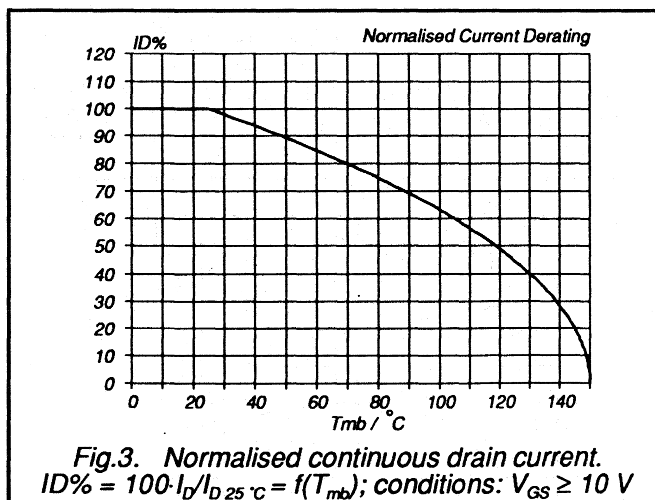


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

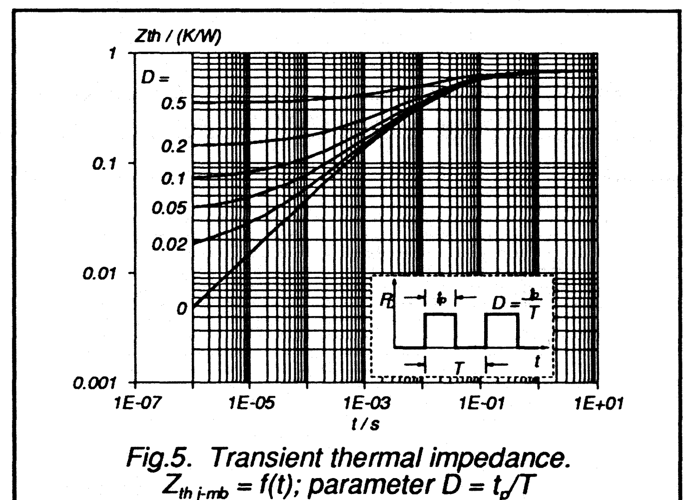


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

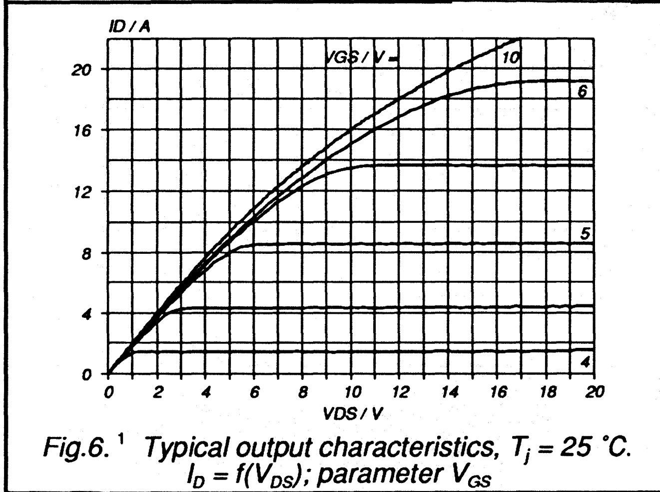


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

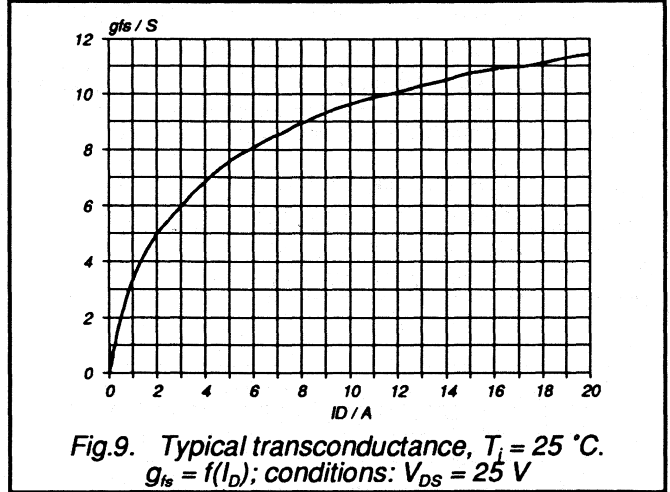


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

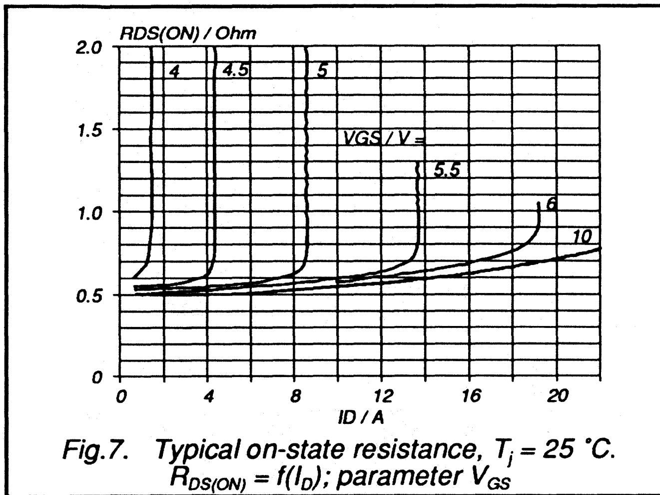


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

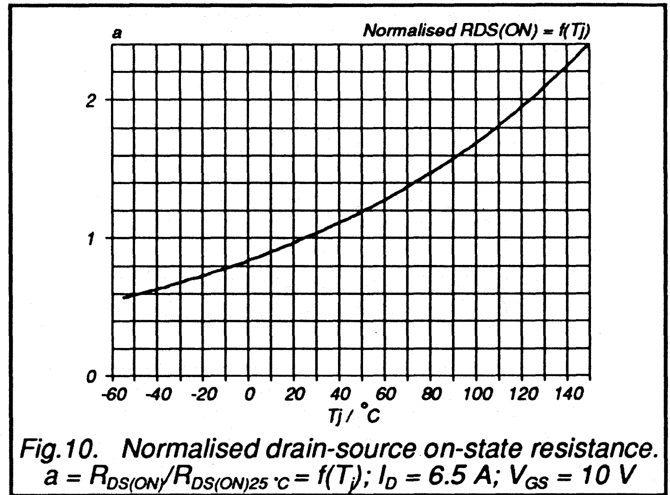


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

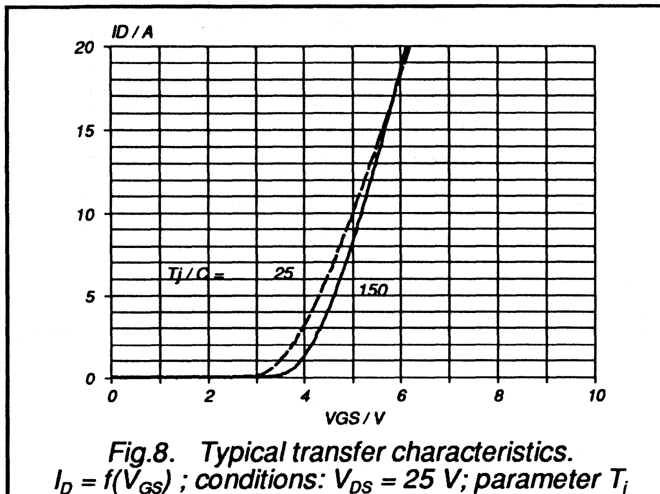


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

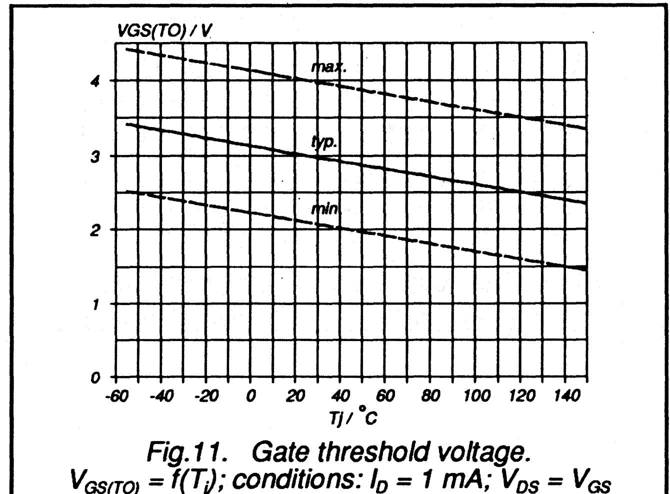


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

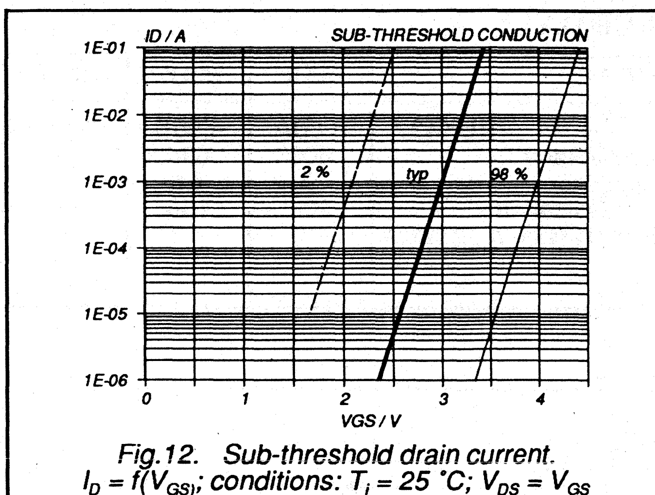


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

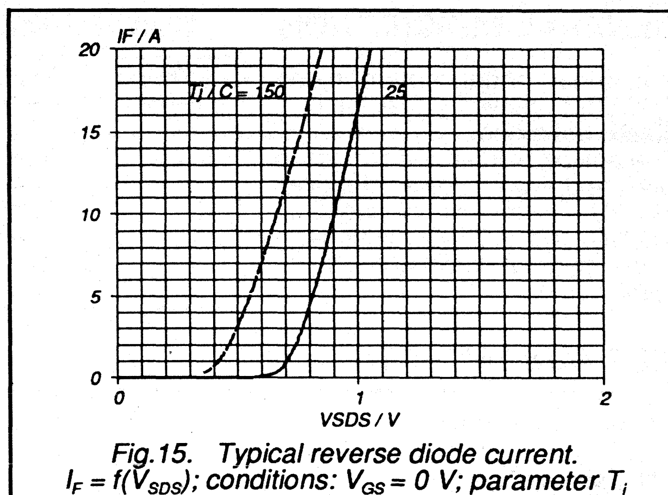


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

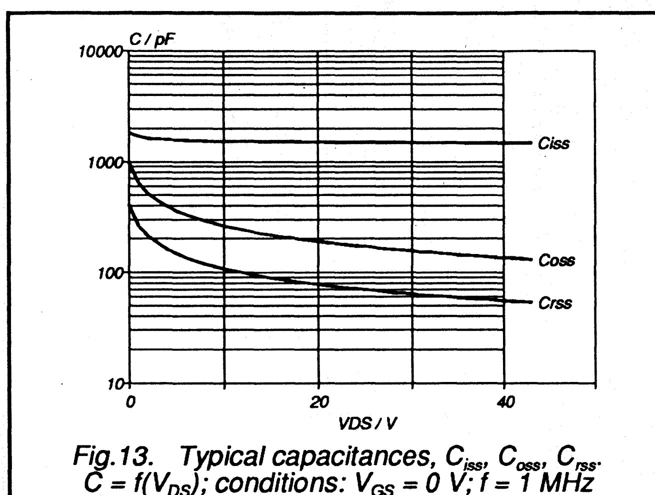


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

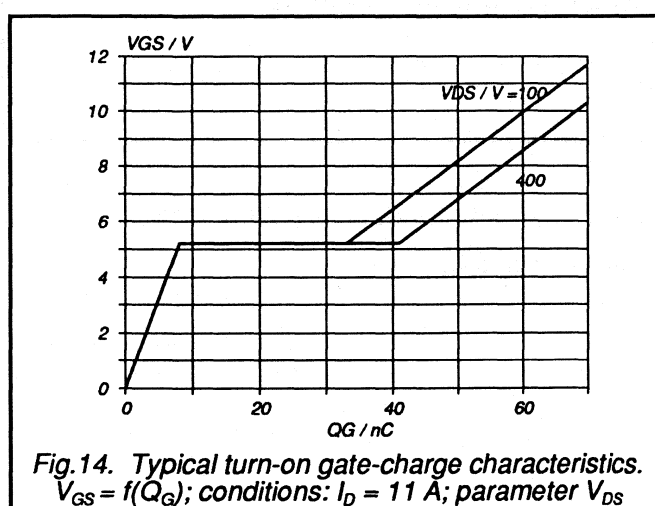


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK437	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	9	7.8	A
P_{tot}	Total power dissipation	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	Ω

MECHANICAL DATA

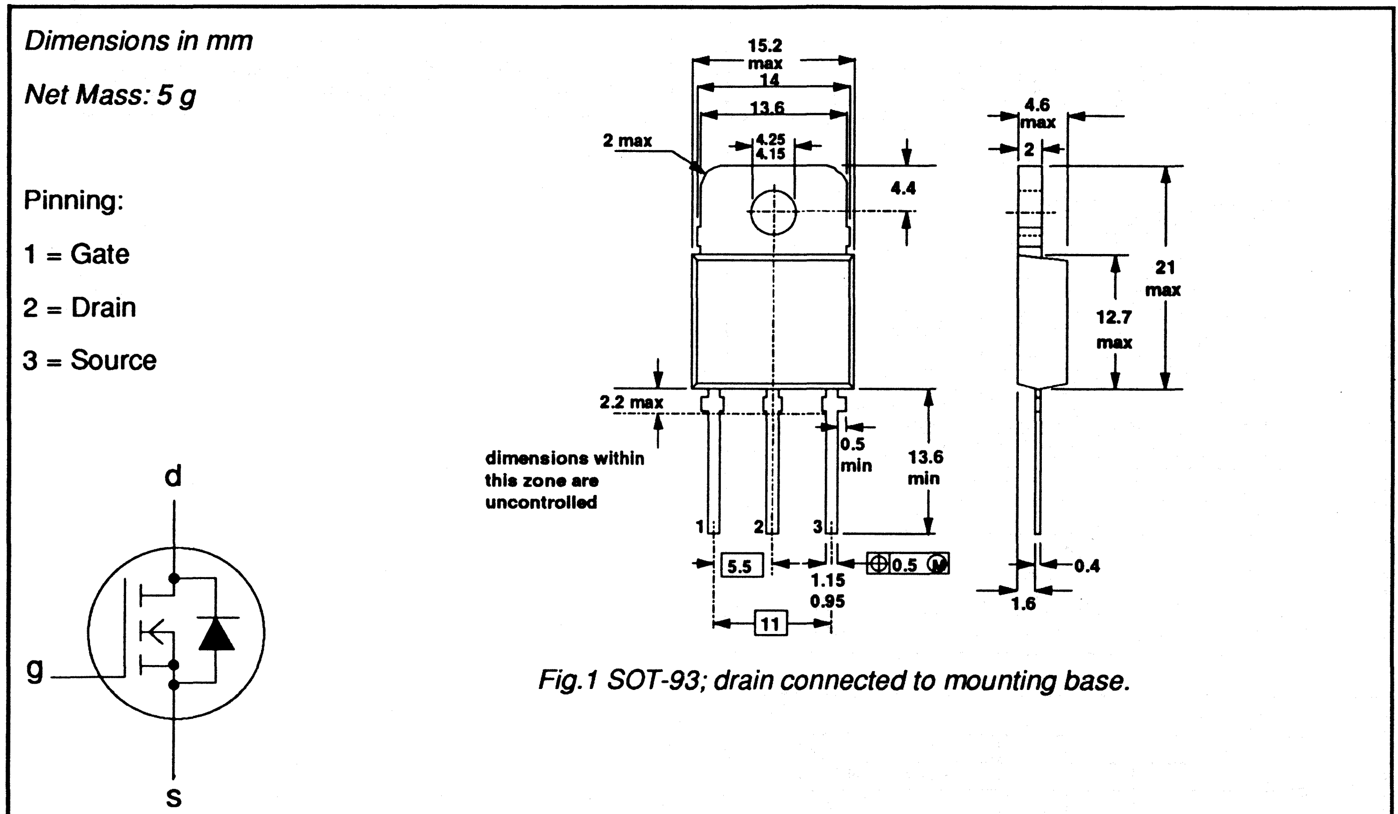


Fig.1 SOT-93; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9	7.8	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5.7	5.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	36	31	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.69 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK437-600A**	-	0.85	1.0	Ω
		I_D = 6.5 A **BUK437-600B**	-	1.0	1.2	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9	A
I_{DRM}	Pulsed reverse drain current	-	-	-	36	A
V_{SD}	Diode forward voltage	I_F = 9 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 9 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

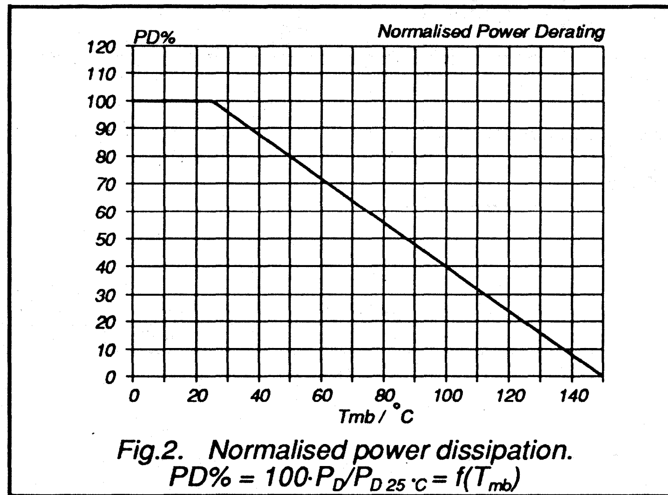


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

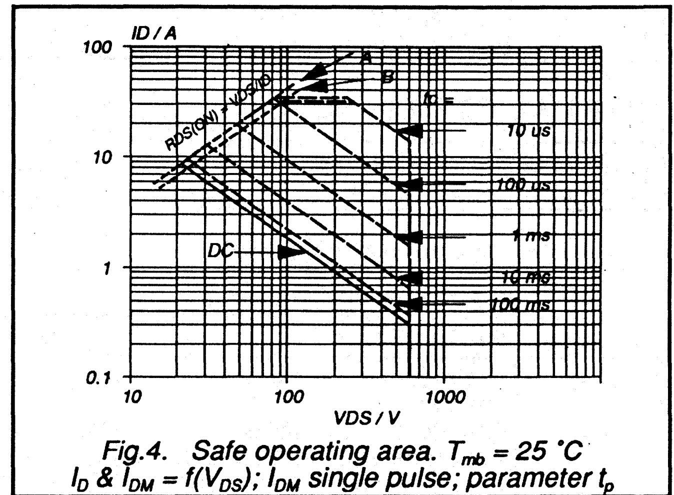


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

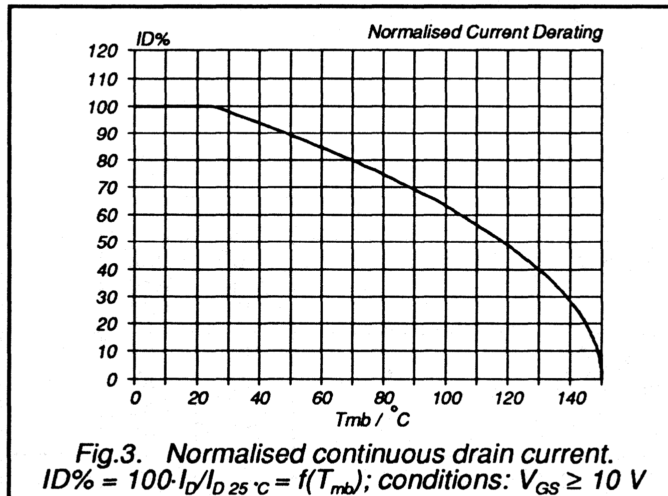


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

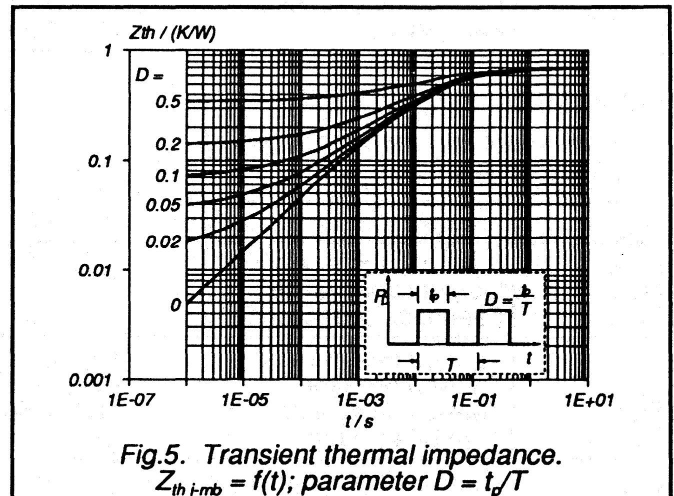


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

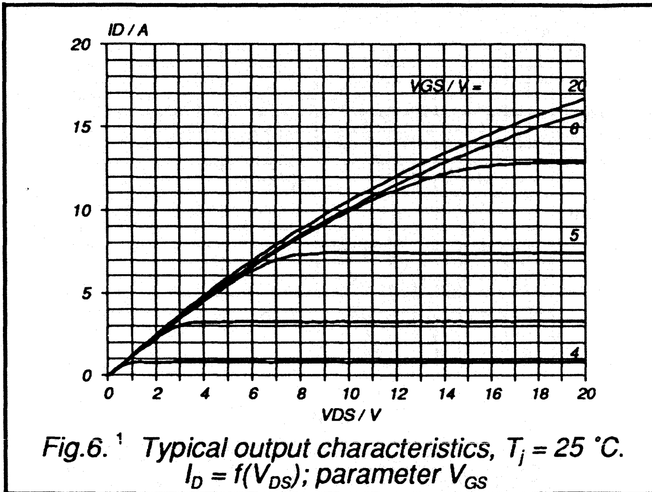


Fig.6.[1] Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

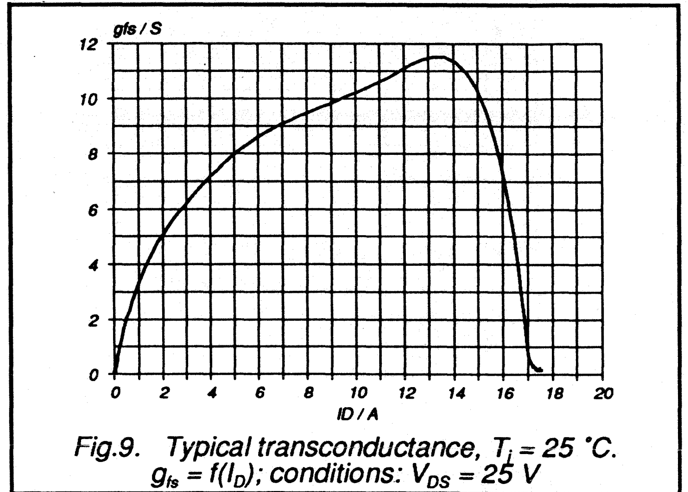


Fig.9. Typical transconductance, $T_j = 25\ ^\circ C$.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

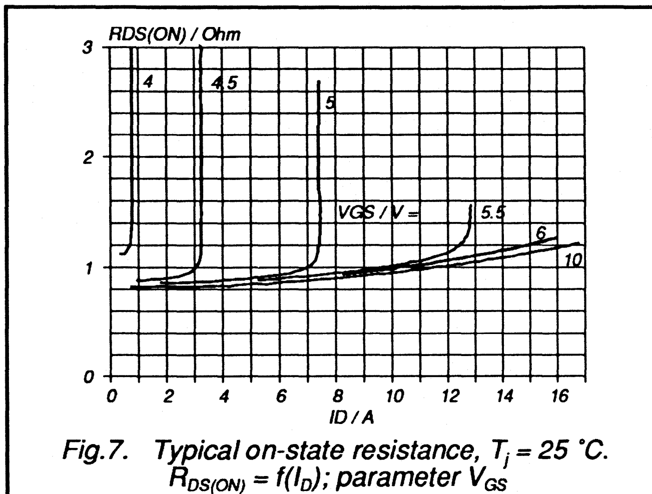


Fig.7. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

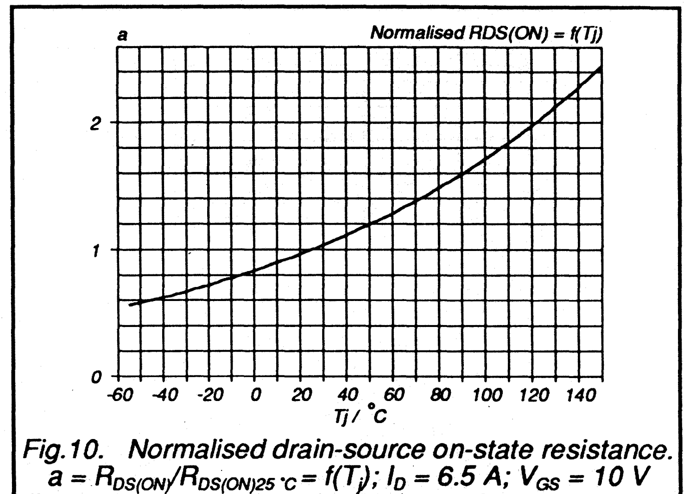


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

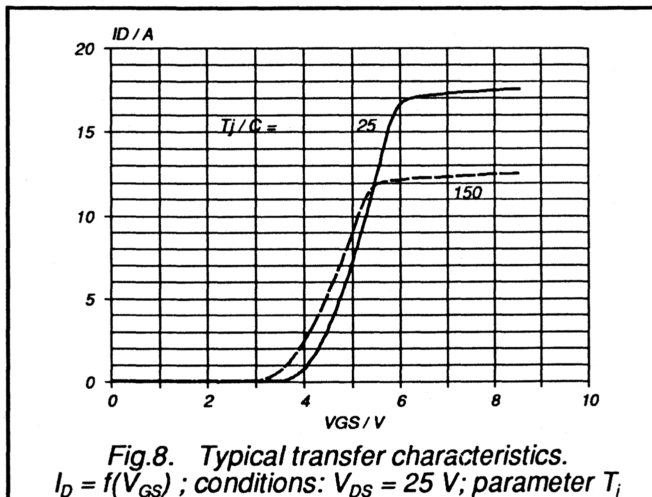


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

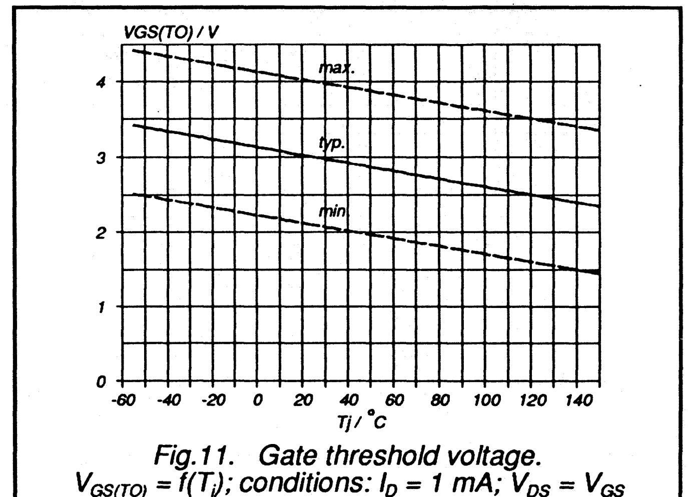


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

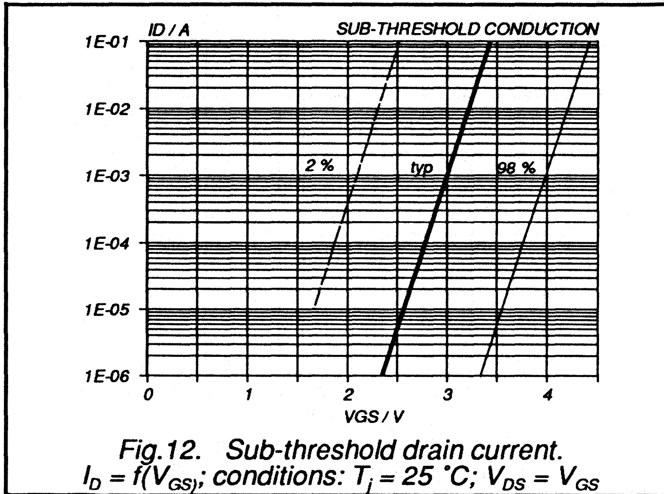


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

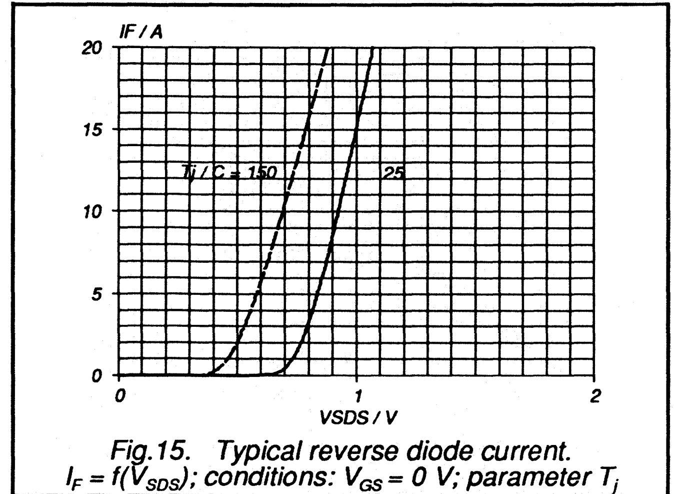


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

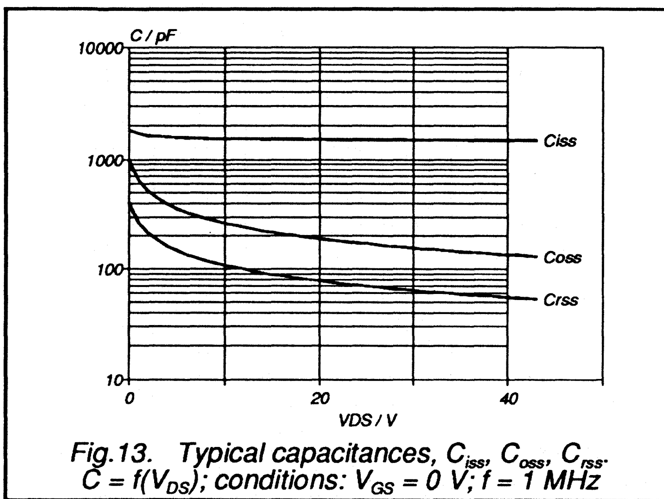


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

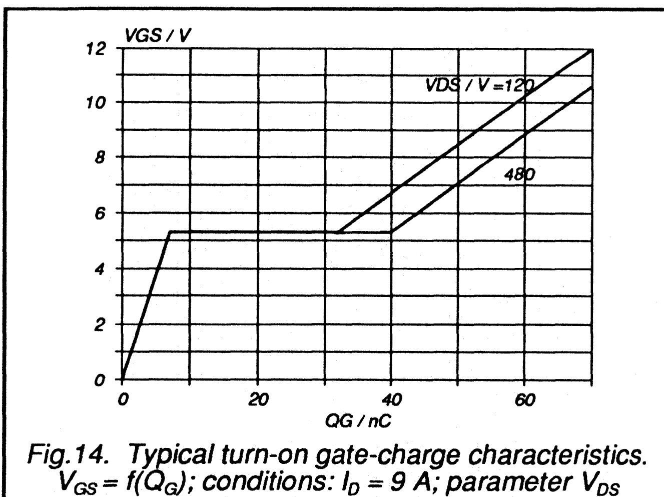


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK442	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	10	9.2	A
P_{tot}	Total power dissipation	22	22	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.13	0.15	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	10	9.2	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.4	5.8	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	40	37	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 5.68 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 8.5 A BUK442-50A	-	0.11	0.13	Ω
		BUK442-50B	-	0.13	0.15	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	3.5	4.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	70	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	8	14	ns
t_r	Turn-on rise time		-	25	45	ns
$t_{d\ off}$	Turn-off delay time		-	30	45	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	10	A
I_{DRM}	Pulsed reverse drain current	-	-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ; V_{GS} = 0 V	-	1.4	1.7	V
t_{rr}	Reverse recovery time	I_F = 10 A; $-dI_F/dt$ = 100 A/µs; V_{GS} = 0 V; V_R = 30 V	-	120	-	ns
Q_{rr}	Reverse recovery charge		-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 15.4 A ; $V_{DD} \leq 25$ V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	30	mJ

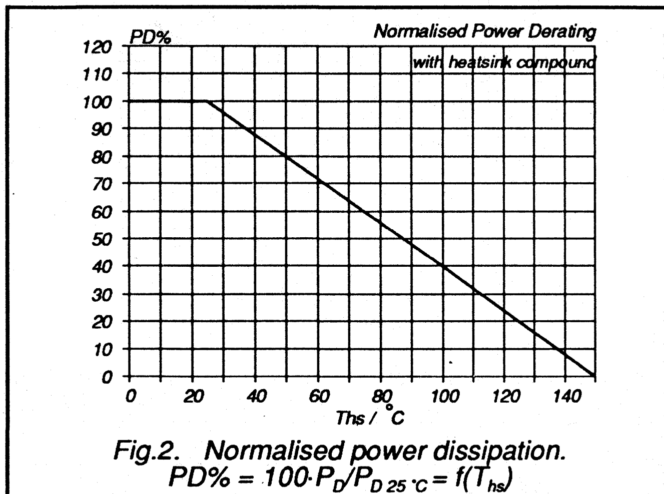


Fig.2. Normalised power dissipation. $PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

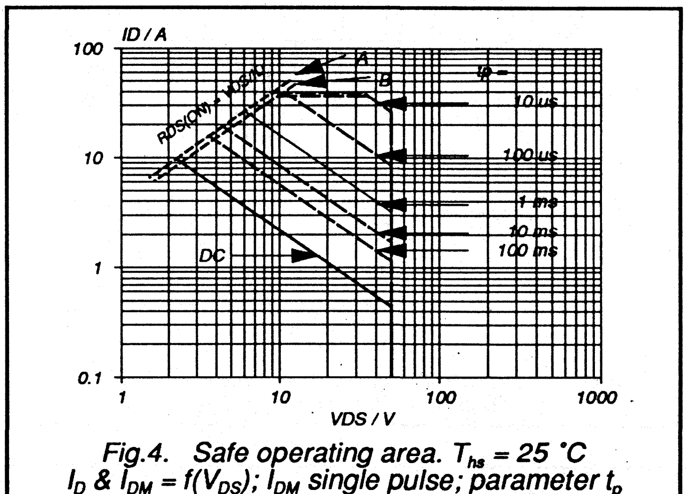


Fig.4. Safe operating area. T_{hs} = 25 ˚C I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

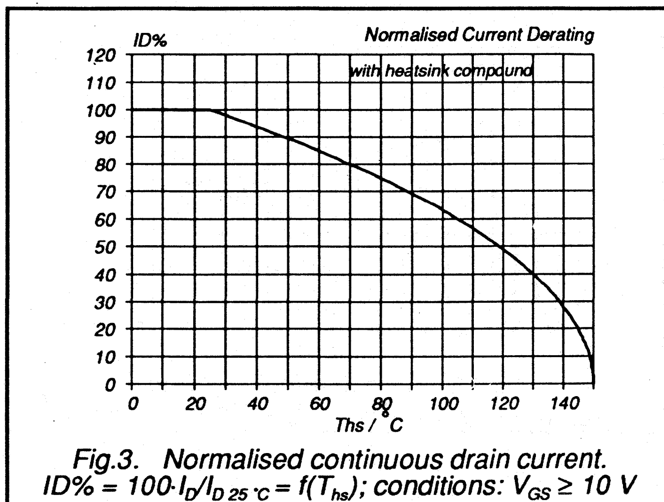


Fig.3. Normalised continuous drain current. $ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

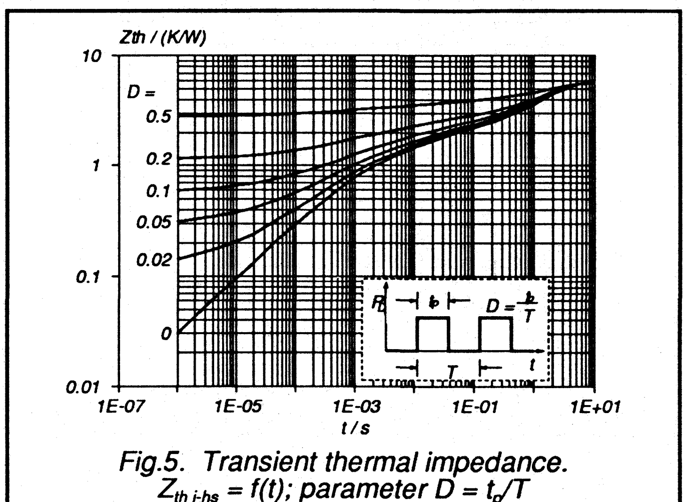


Fig.5. Transient thermal impedance. $Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

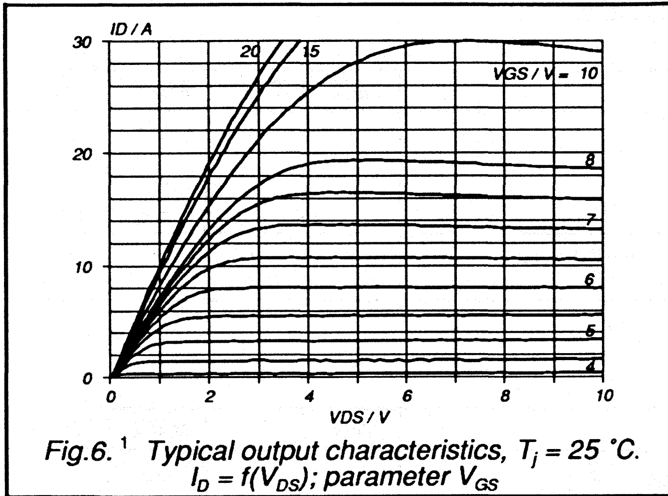


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

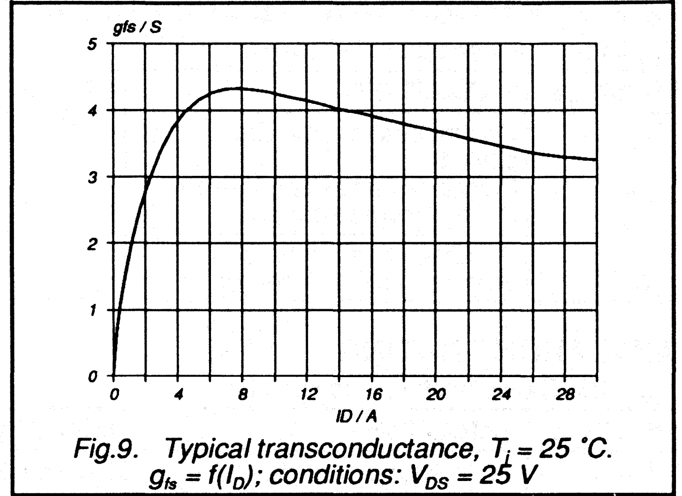


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

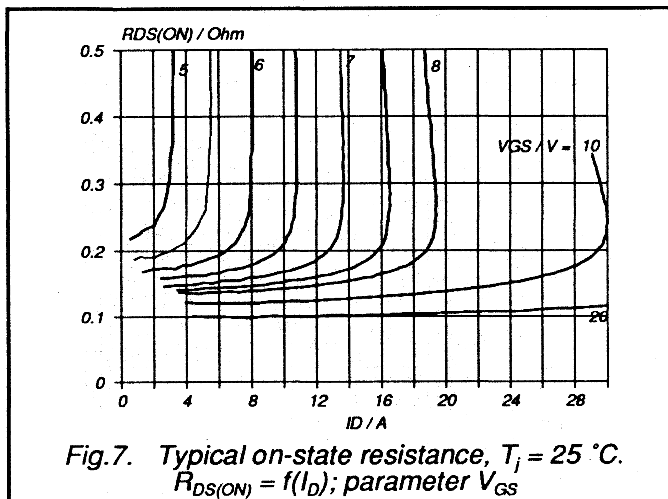


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

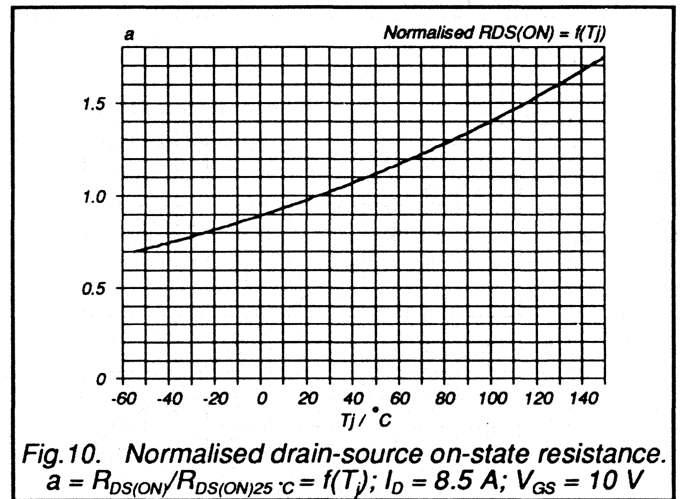


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 8.5$ A; $V_{GS} = 10$ V

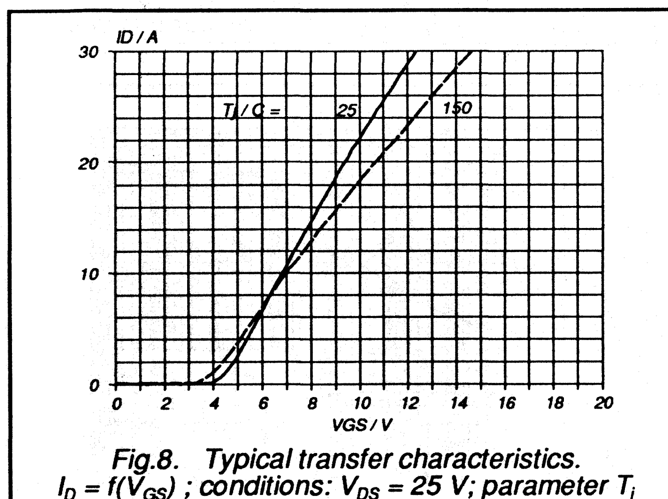


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

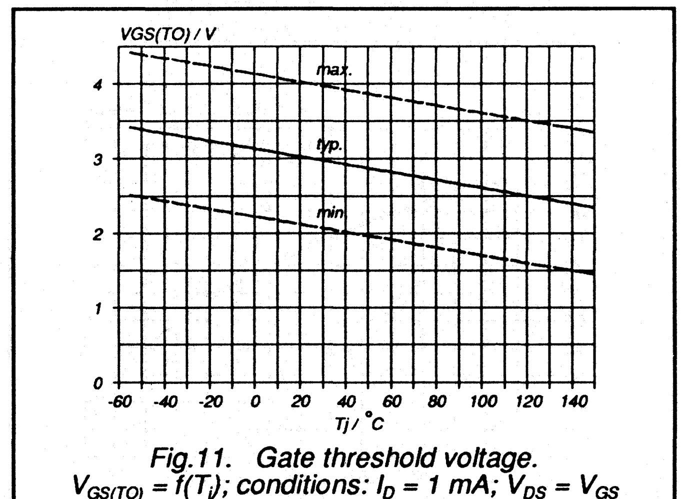


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

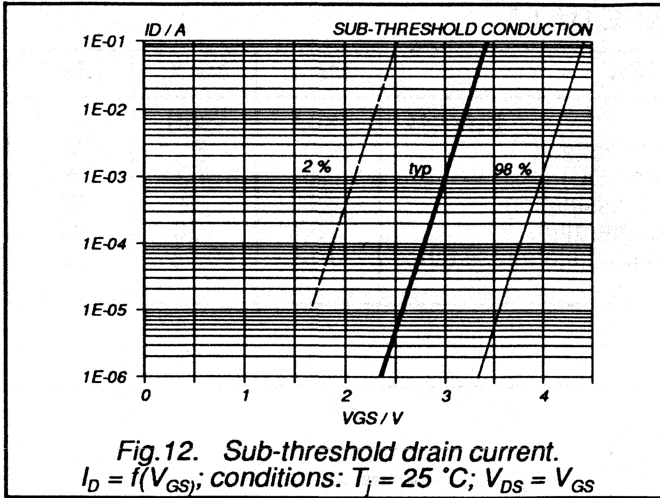


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

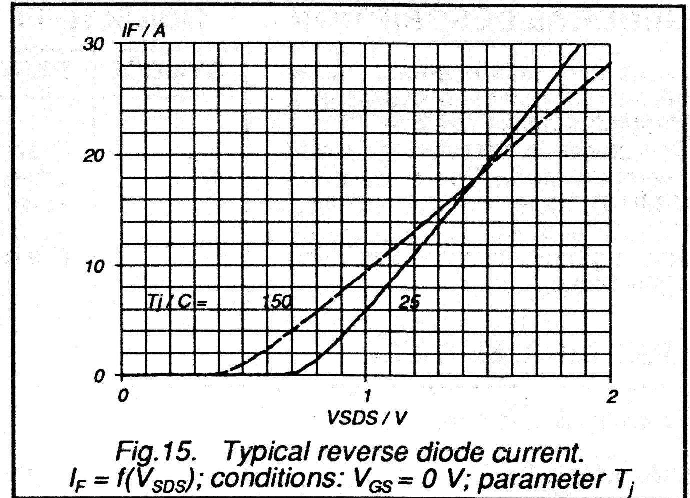


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

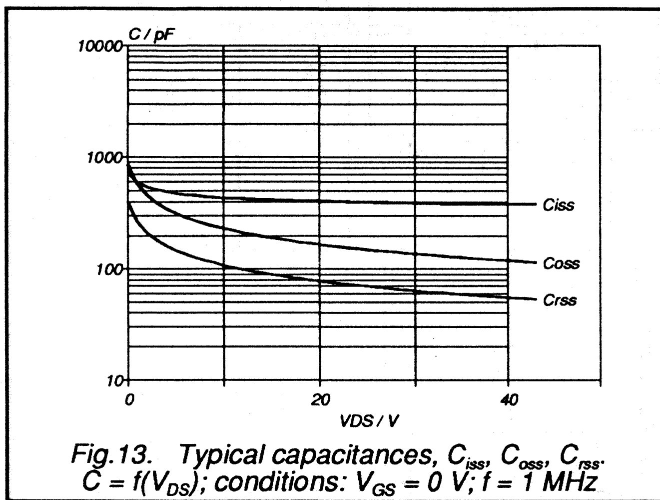


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

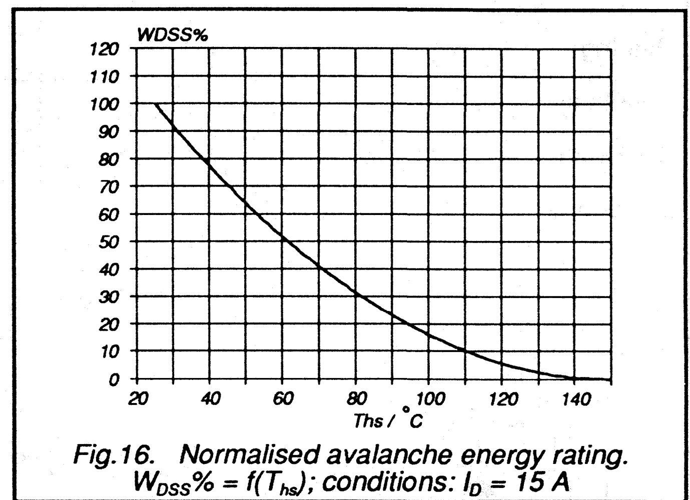


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 15$ A

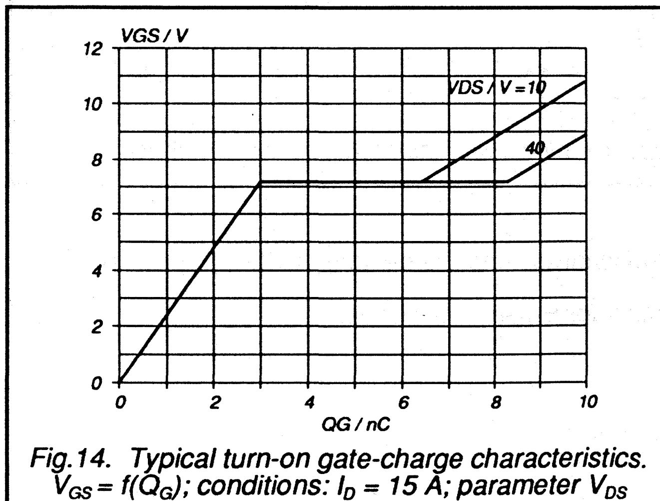


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 15$ A; parameter V_{DS}

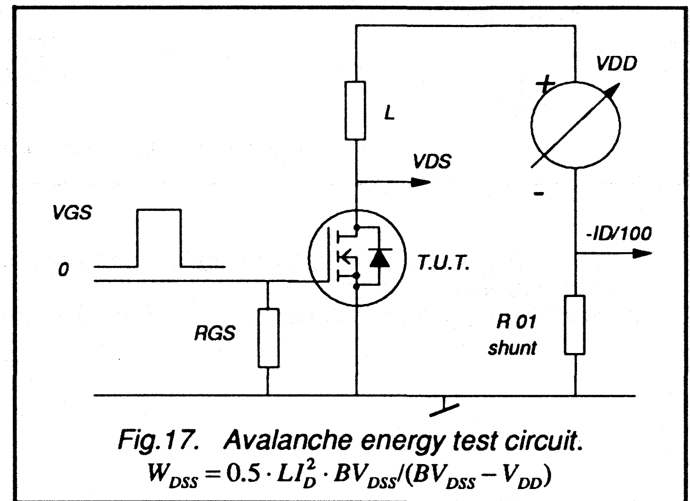


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK442	-60A	-60B	
V_{DS}	Drain-source voltage	60	60	V
I_D	Drain current (DC)	10	9.2	A
P_{tot}	Total power dissipation	22	22	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.13	0.15	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

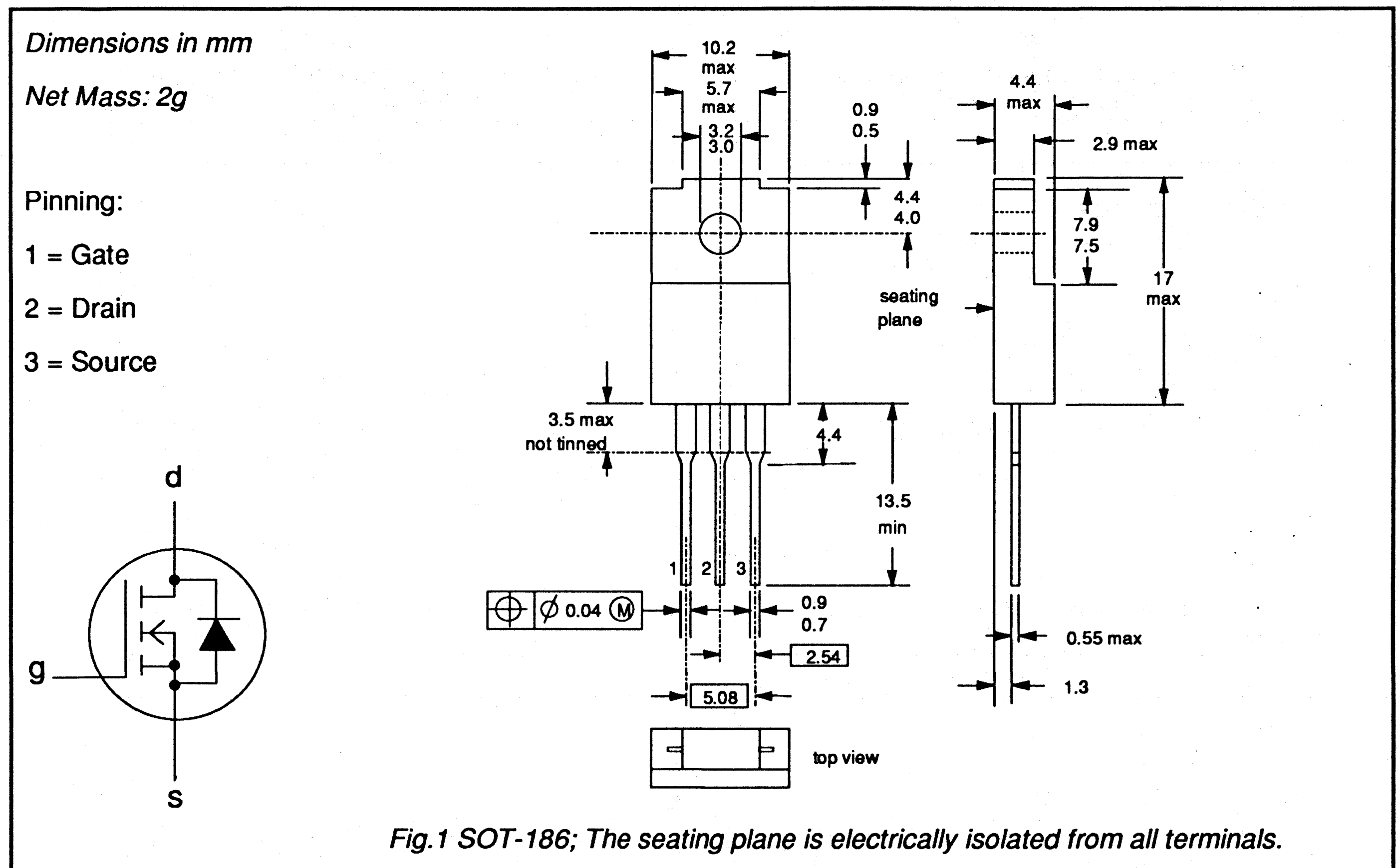


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	60		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	60		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-60A	-60B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	10	9.2	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.3	5.8	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	40	37	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 5.68 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	60	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 8.5 A **BUK442-60A**	-	0.11	0.13	Ω
		BUK442-60B	-	0.13	0.15	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	3.5	4.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	70	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	8	14	ns
t_r	Turn-on rise time		-	25	45	ns
$t_{d\ off}$	Turn-off delay time		-	30	45	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	10	A
I_{DRM}	Pulsed reverse drain current	-	-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ; V_{GS} = 0 V	-	1.4	1.7	V
t_{rr}	Reverse recovery time	I_F = 10 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 15 A ; V_{DD} ≤ 30 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	30	mJ

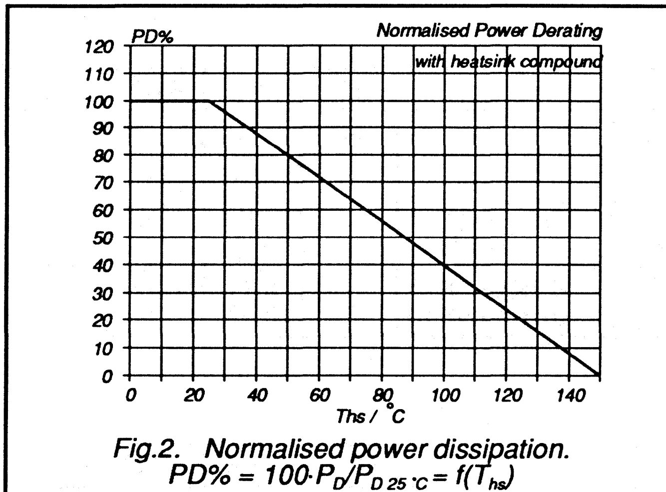


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

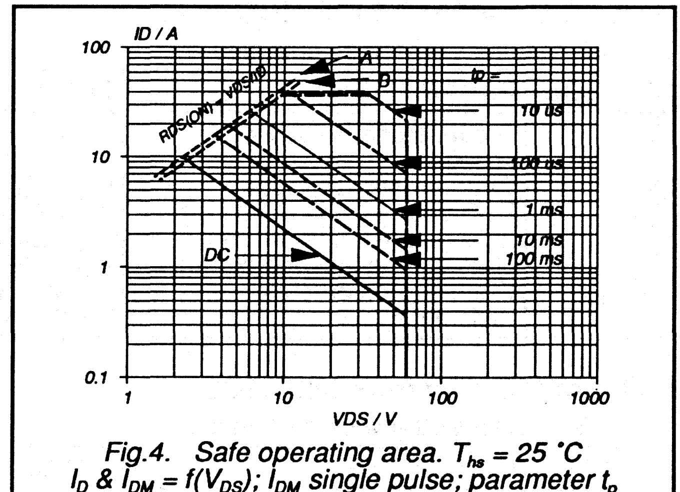


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

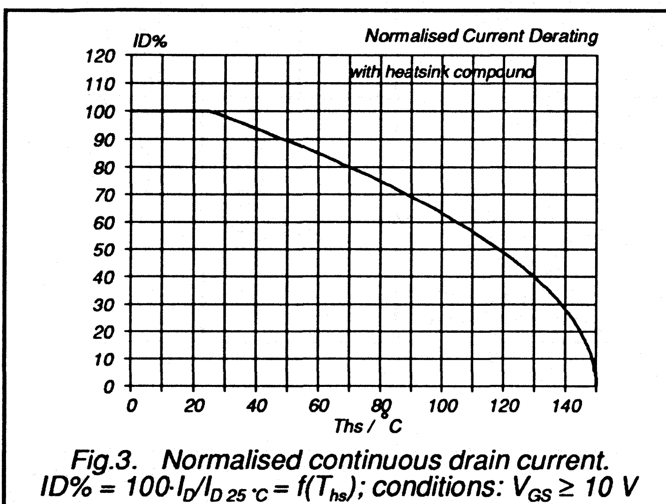


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

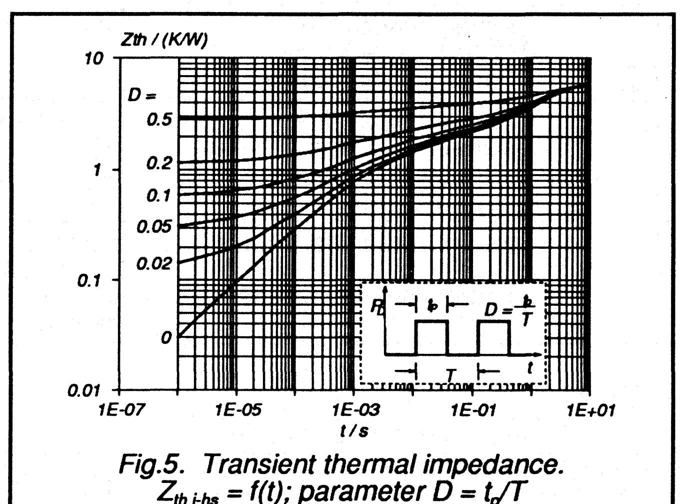


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

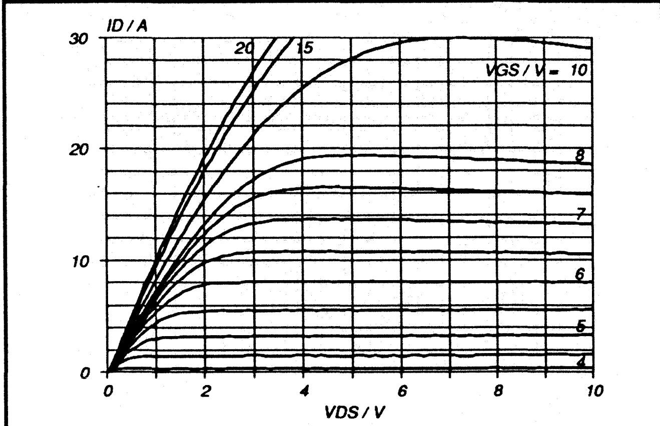


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

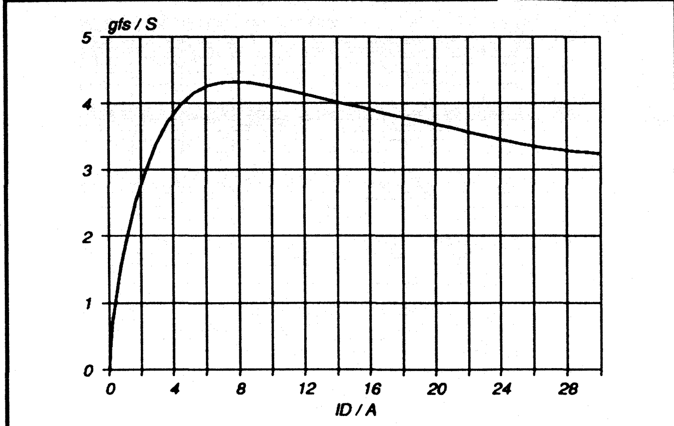


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

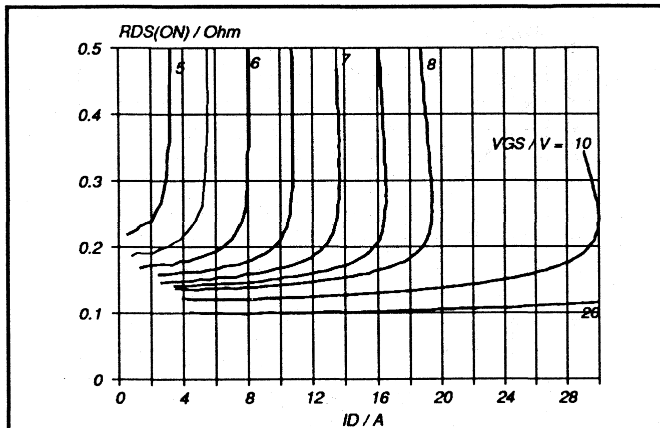


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

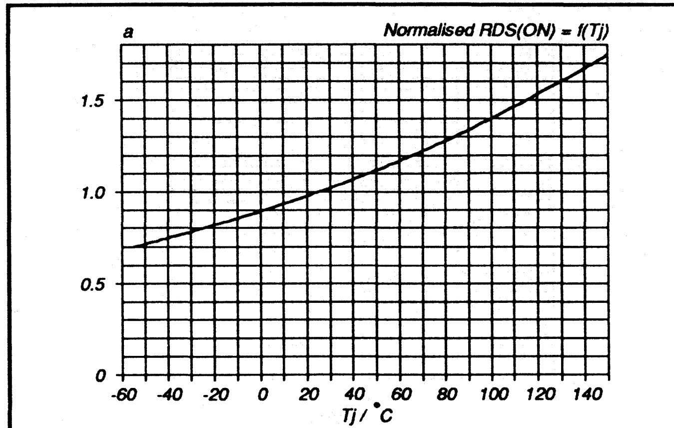


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 8.5$ A; $V_{GS} = 10$ V

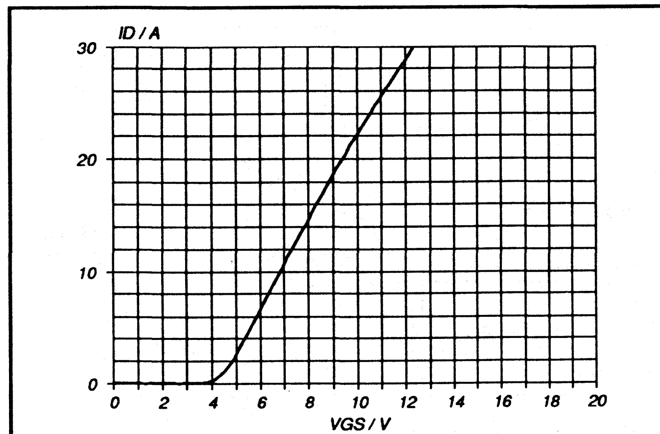


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

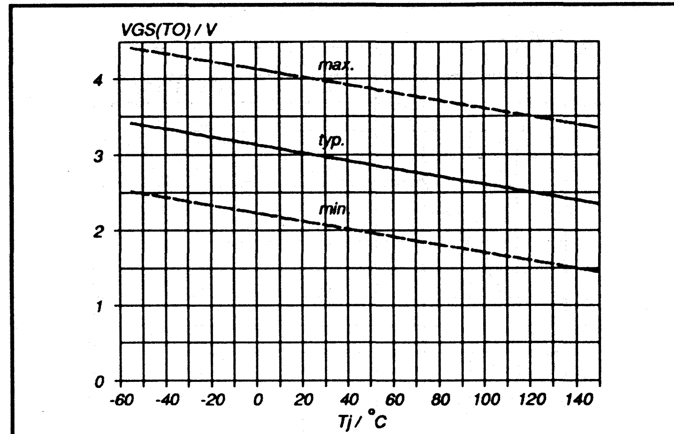


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

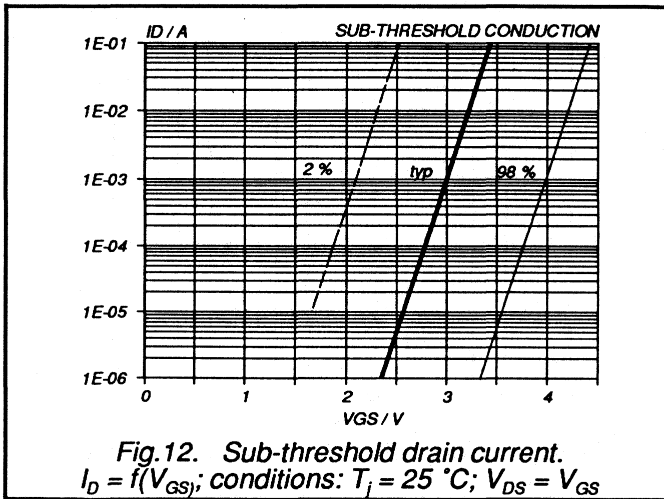


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

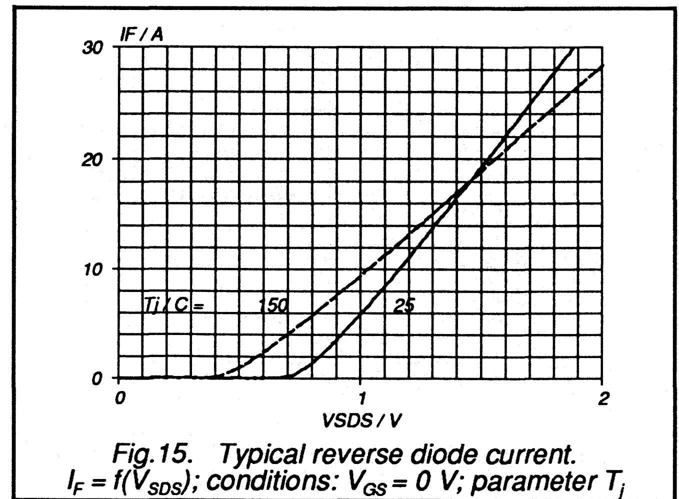


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

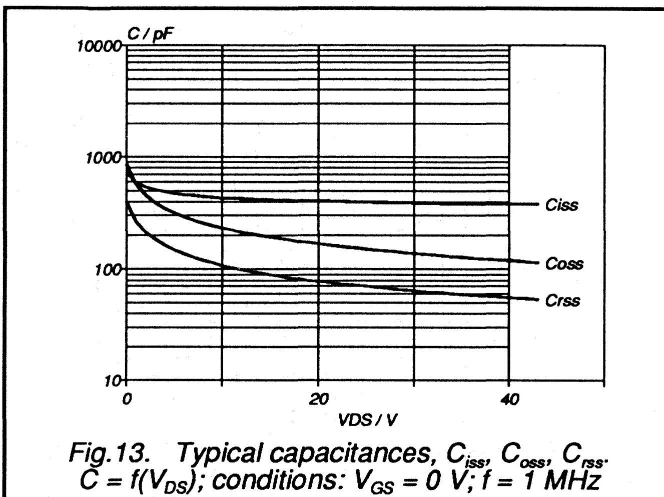


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

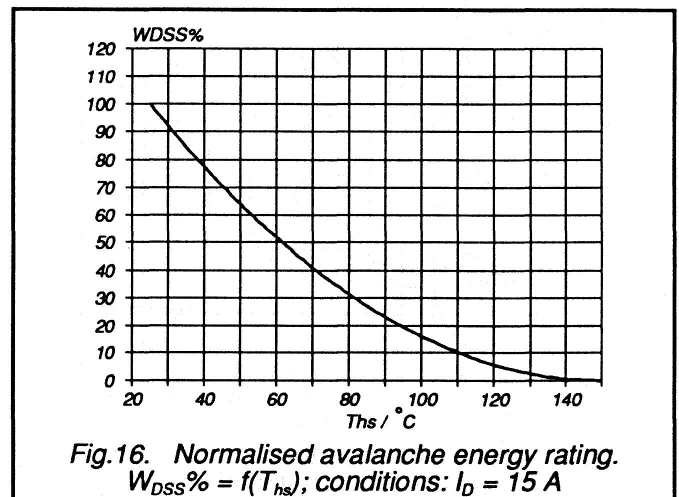


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 15$ A

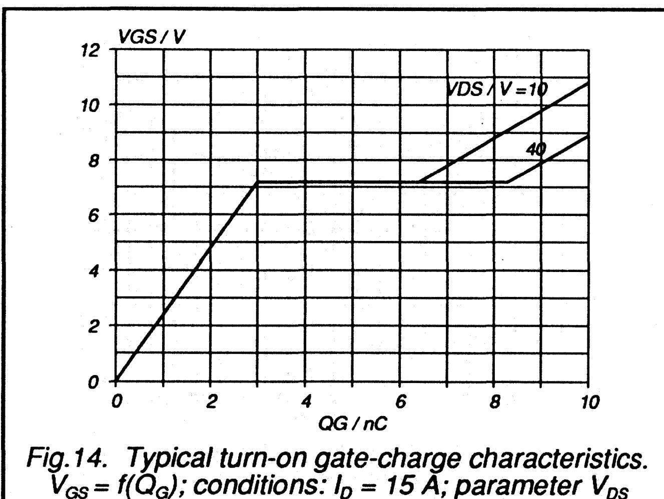


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 15$ A; parameter V_{DS}

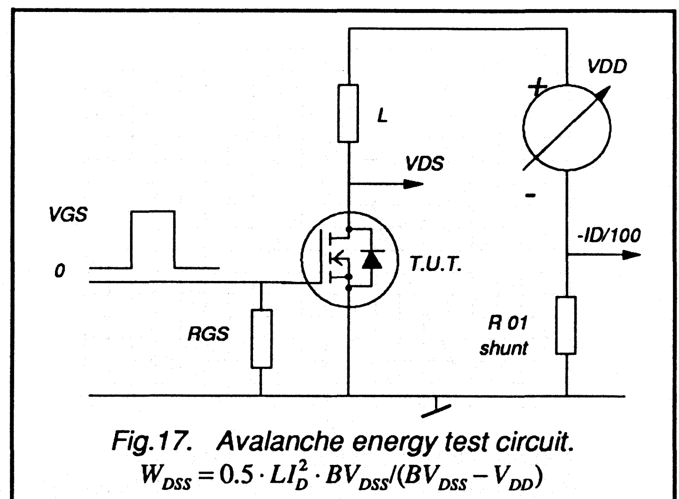


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK442	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	6.6	6.1	A
P_{tot}	Total power dissipation	22	22	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.25	0.3	Ω

MECHANICAL DATA

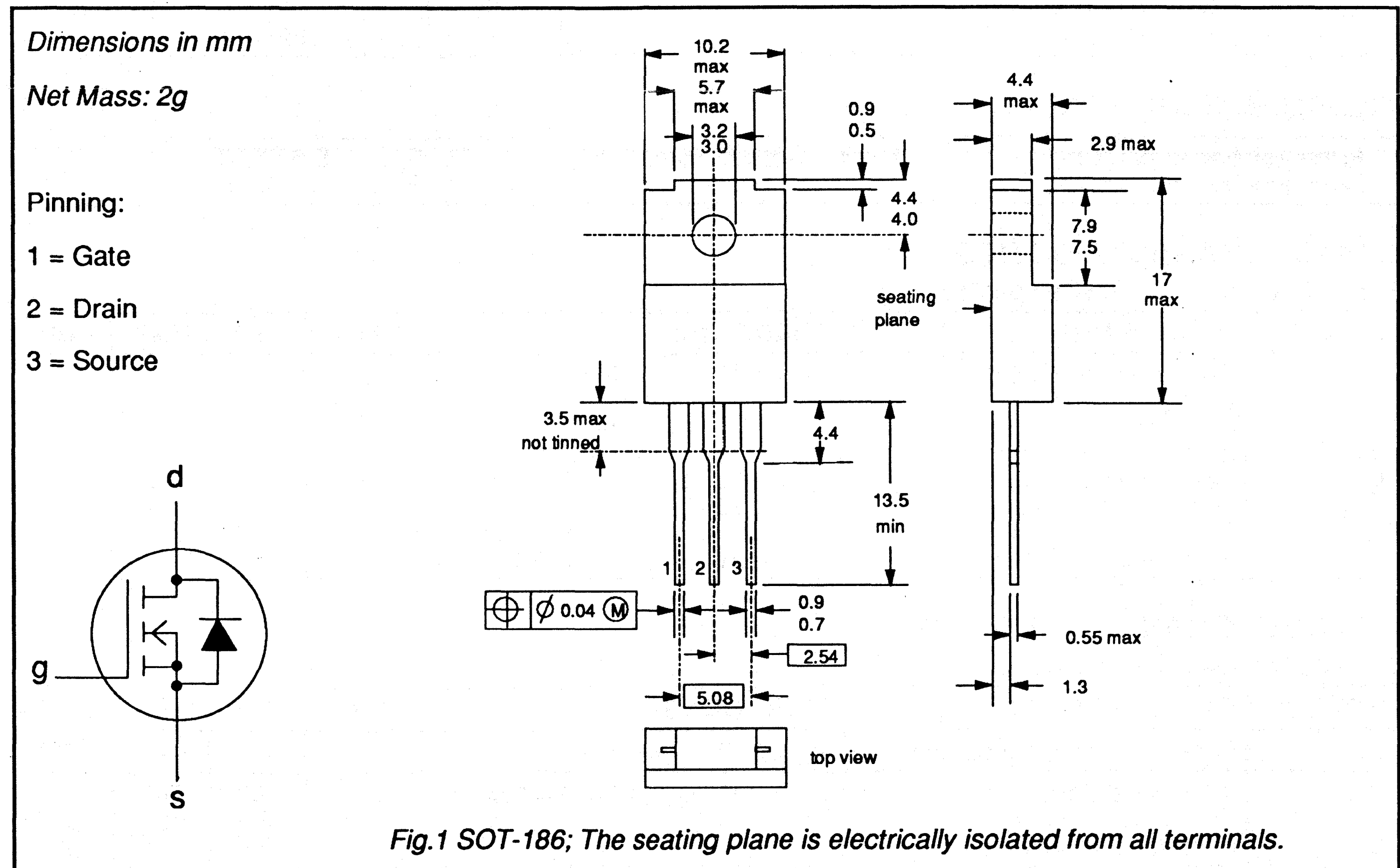


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	6.6	6.1	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	4.1	3.8	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	26	24	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5.68 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 5.5 A BUK442-100A	-	0.22	0.25	Ω
		BUK442-100B	-	0.25	0.3	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5.5 A	3	4.2	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	90	120	pF
C_{rss}	Feedback capacitance		-	35	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	9	14	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	30	45	ns
t_f	Turn-off fall time		-	20	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	6.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	26	A
V_{SD}	Diode forward voltage	I_F = 6.6 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 6.6 A; -dI_F/dt = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 11 A ; V_{DD} ≤ 50 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	35	mJ

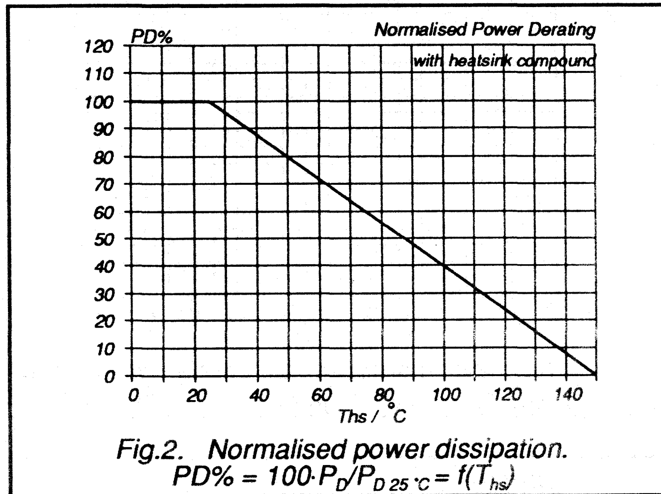


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,°C}$ = f(T_{hs})

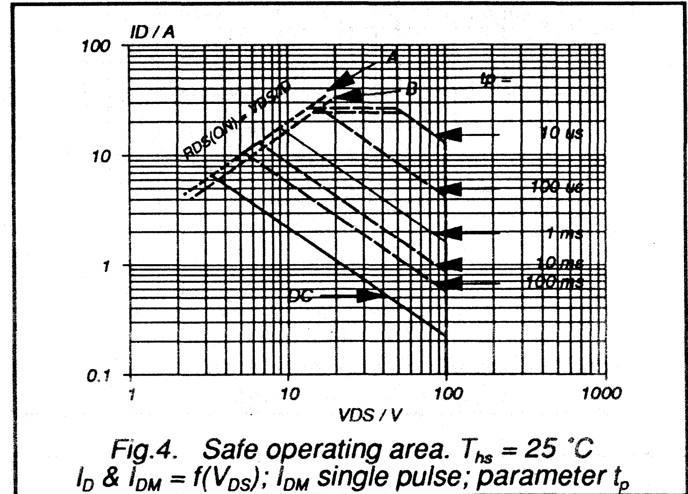


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

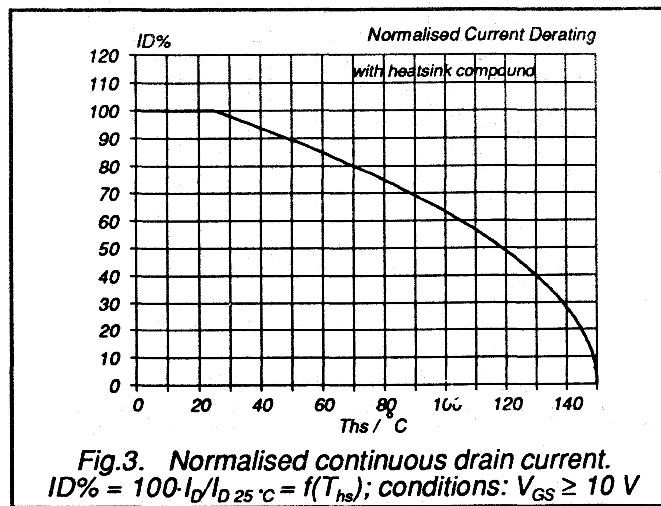


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,°C}$ = f(T_{hs}); conditions: V_{GS} ≥ 10 V

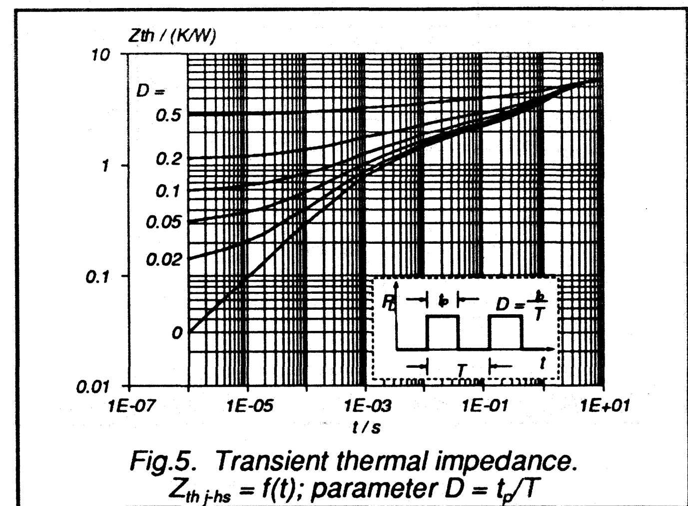


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs}$ = f(t); parameter D = t_p/T

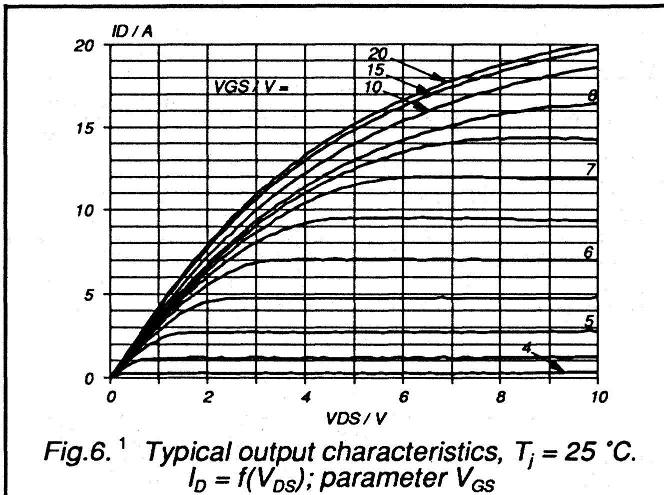


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

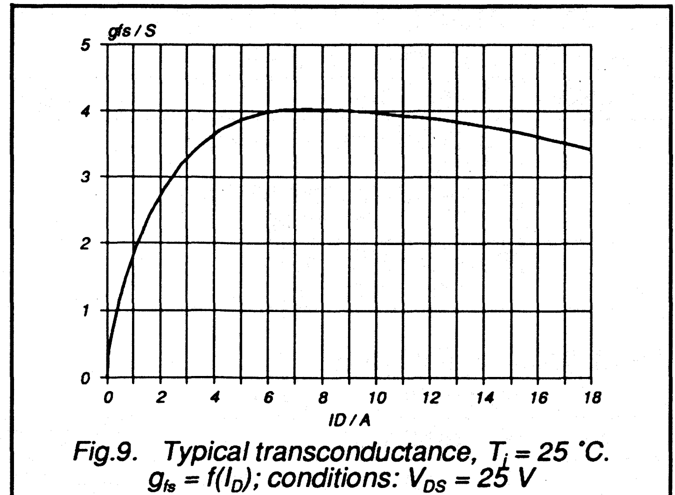


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

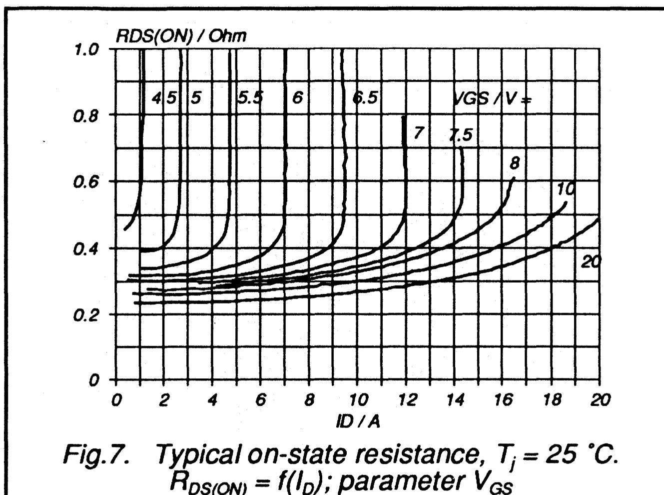


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

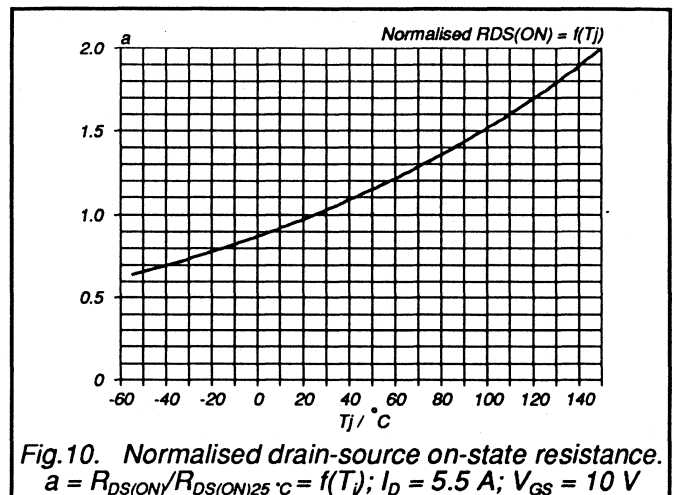


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; I_D = 5.5 A; V_{GS} = 10 V

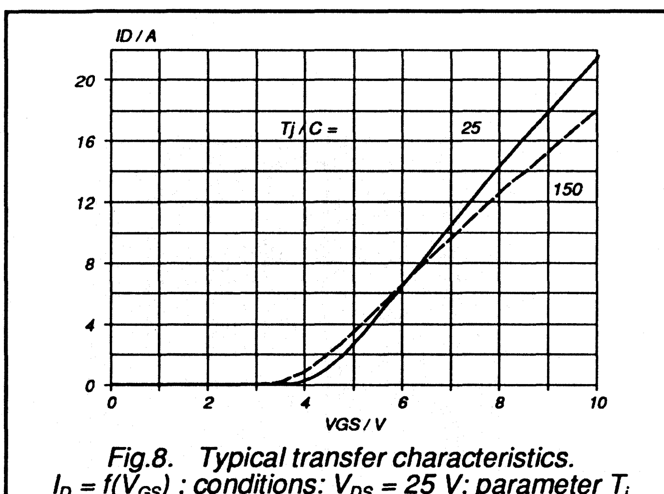


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

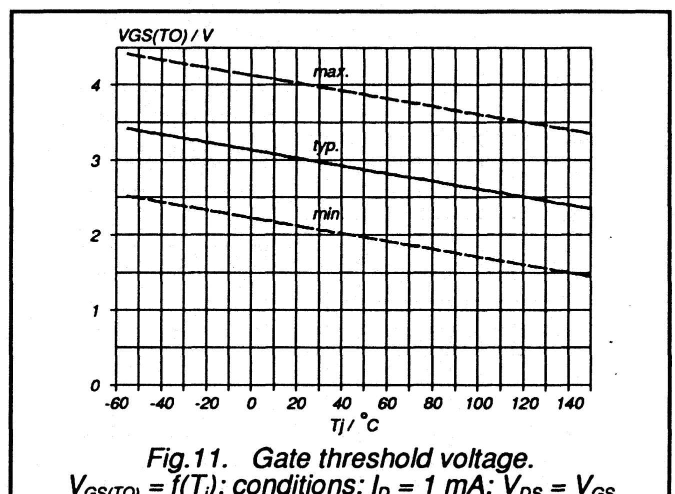


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

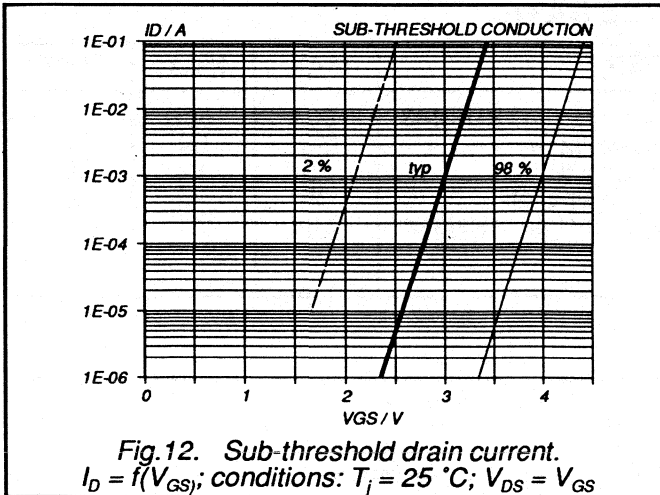


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

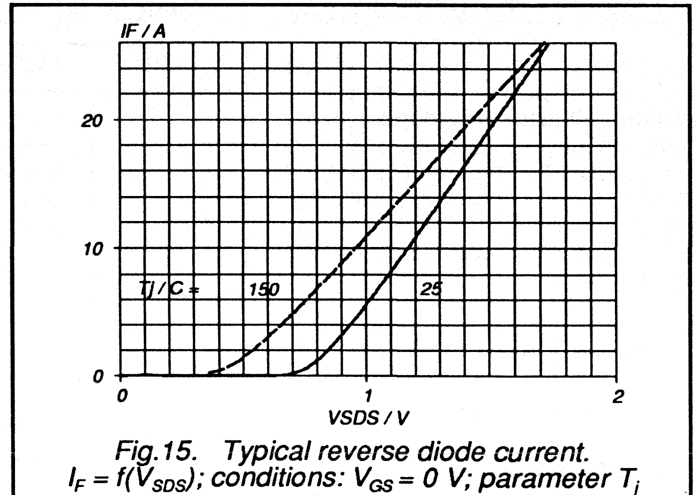


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

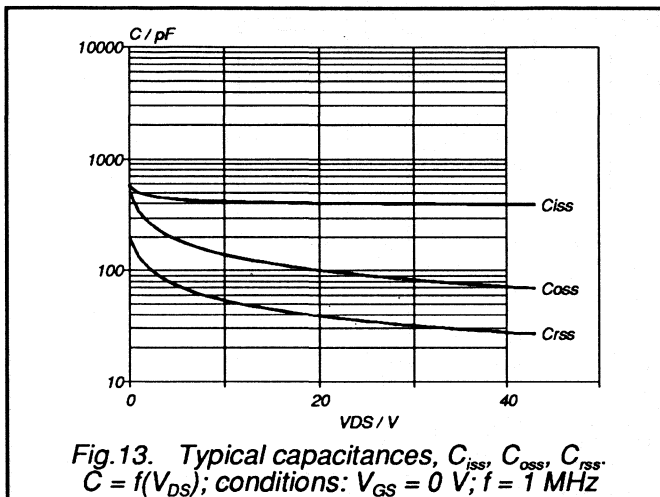


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

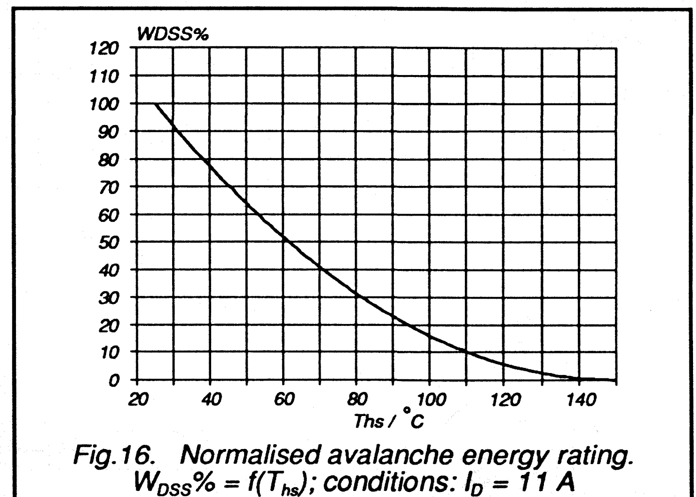


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 11$ A

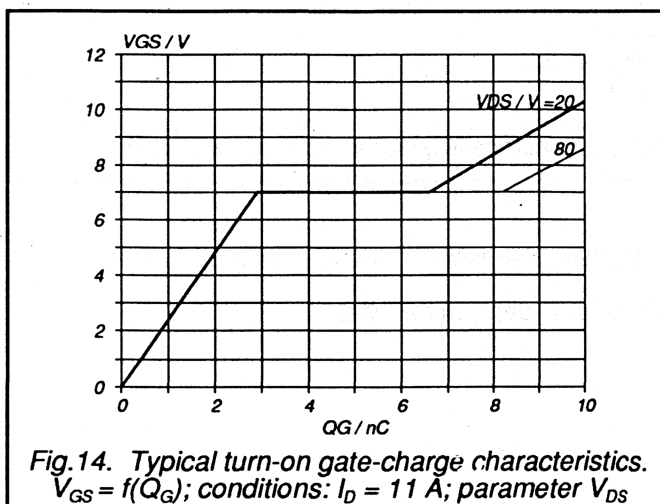


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

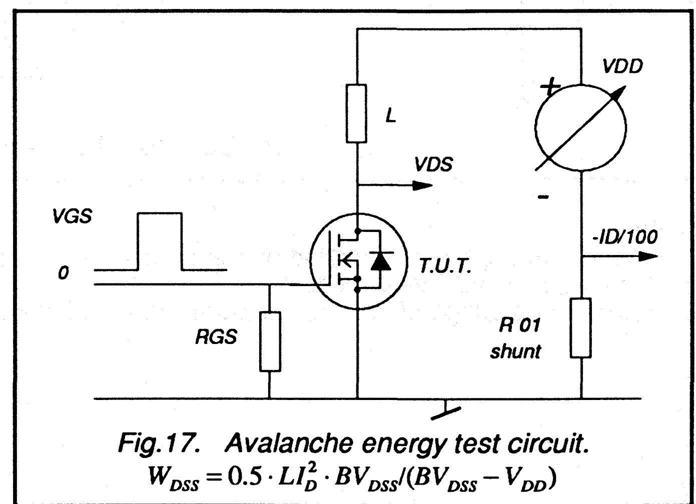


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK443	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	13	12	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.08	0.1	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

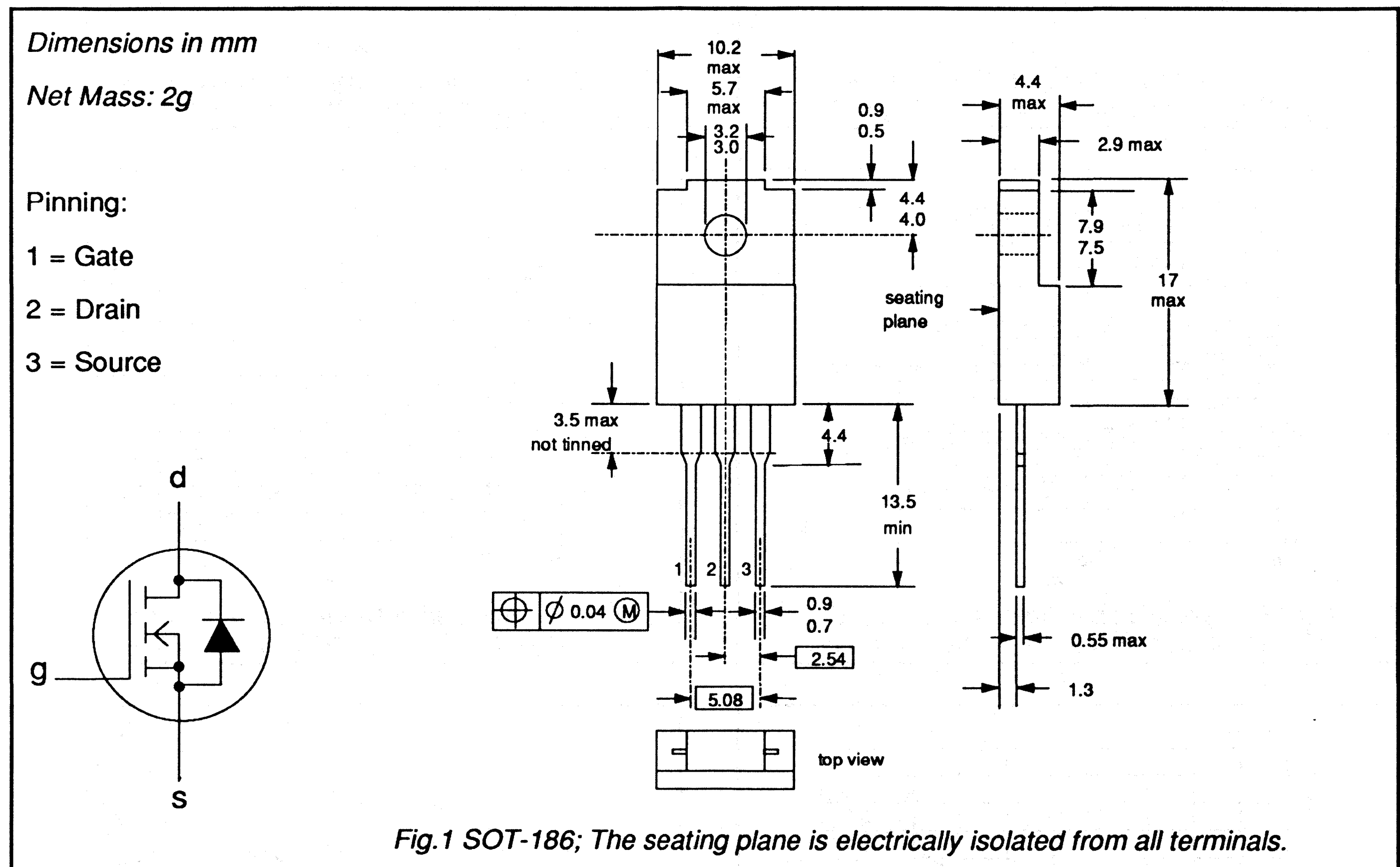


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	13	12	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	8.2	7.6	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	52	48	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j-hs}$ = 5 K/W
From junction to ambient		$R_{th\,j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 9 A — BUK443-50A	-	0.065	0.08	Ω
		BUK443-50B	-	0.08	0.10	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 9 A	4.5	6.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	650	825	pF
C_{oss}	Output capacitance		-	240	350	pF
C_{rss}	Feedback capacitance		-	120	160	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	10	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	35	55	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	60	90	ns
t_f	Turn-off fall time		-	55	80	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	13	A
I_{DRM}	Pulsed reverse drain current	-	-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 13 A; -dI_F/dt = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 13 A ; V_{DD} ≤ 25 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	50	mJ

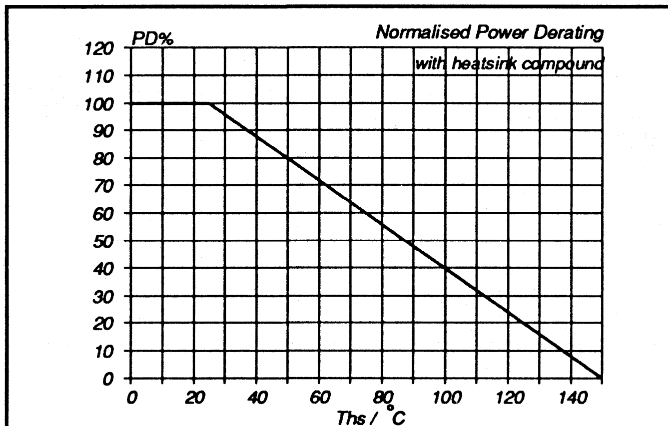


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

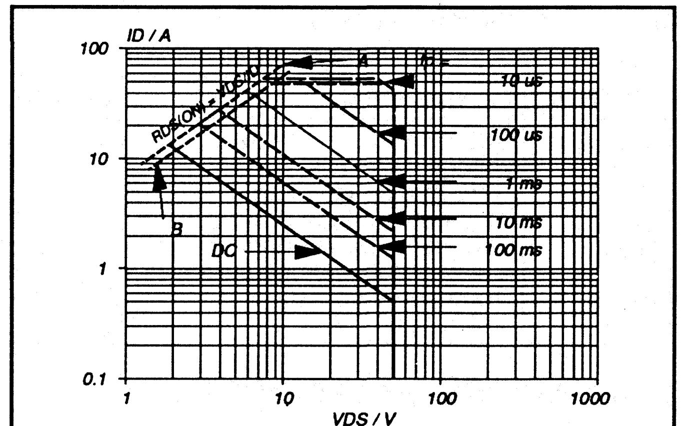


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

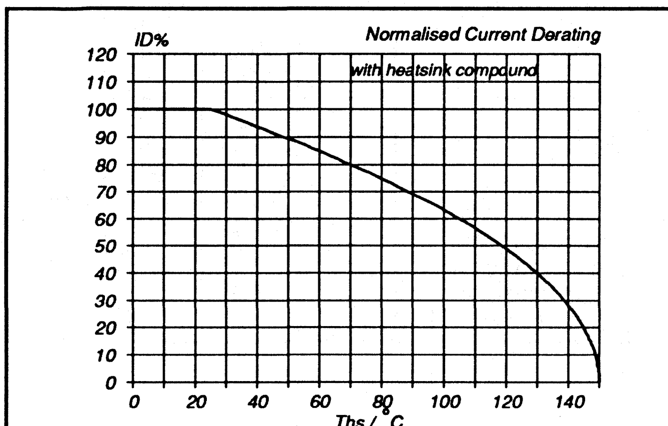


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

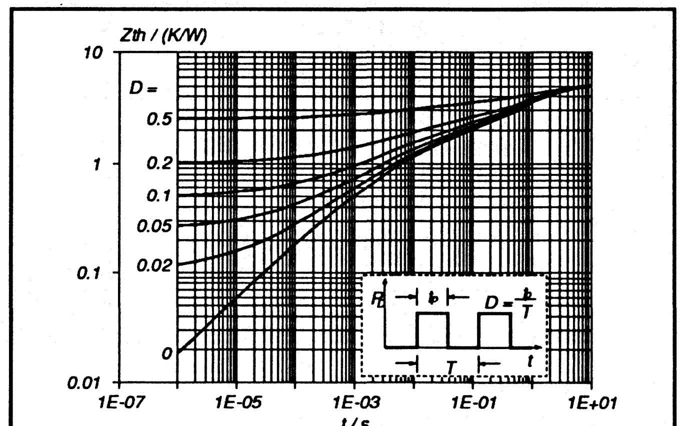


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

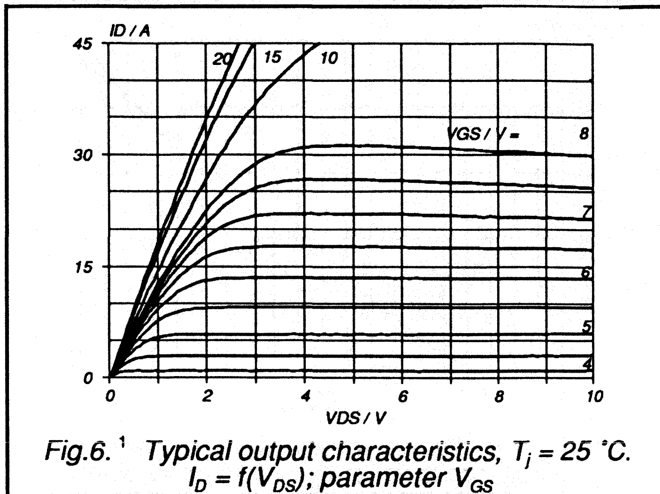


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

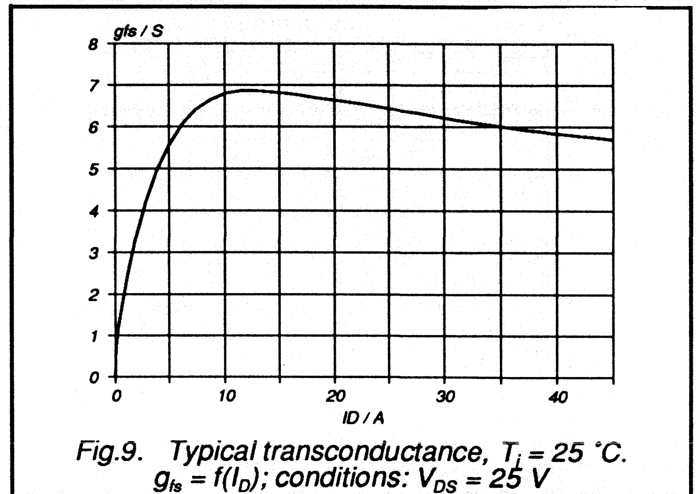


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

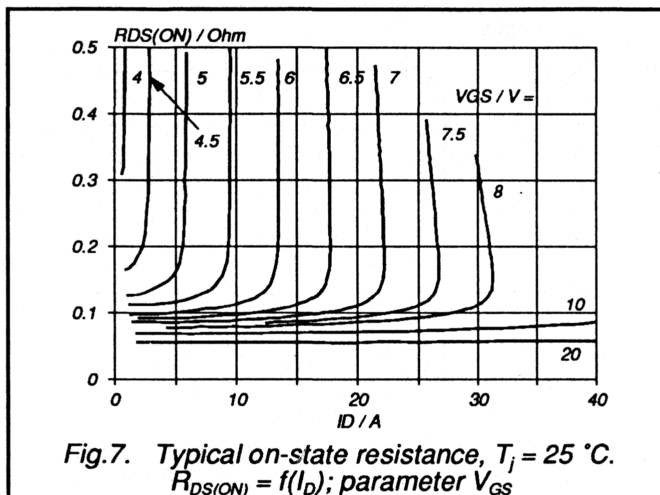


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

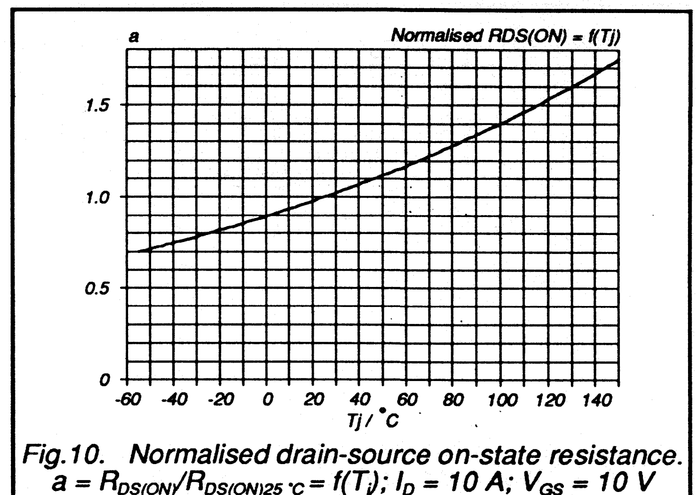


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 10$ A; $V_{GS} = 10$ V

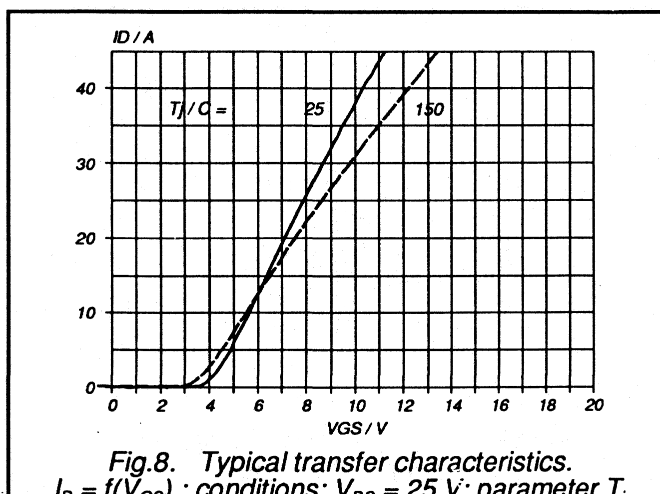


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

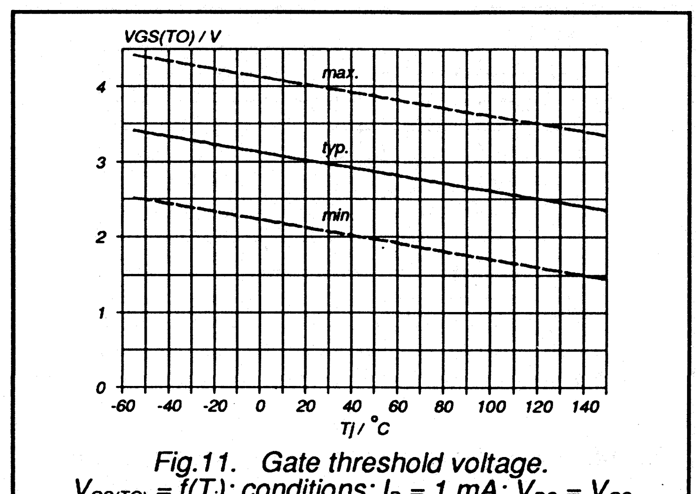


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

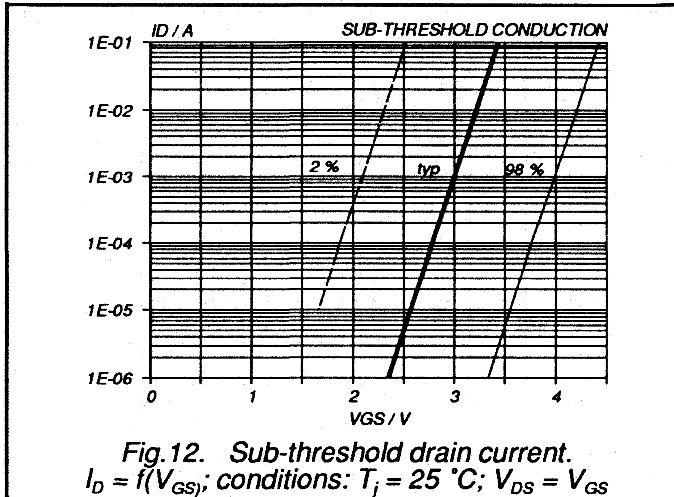


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

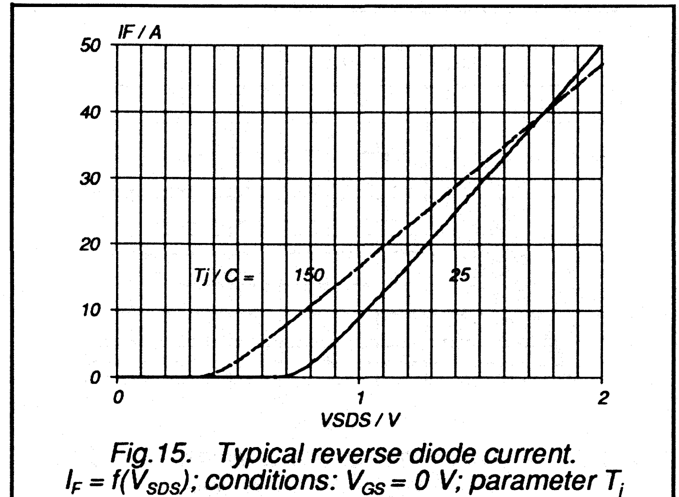


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

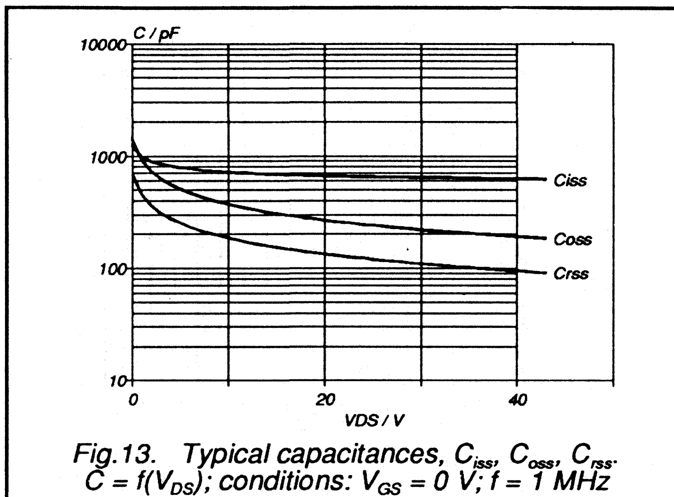


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

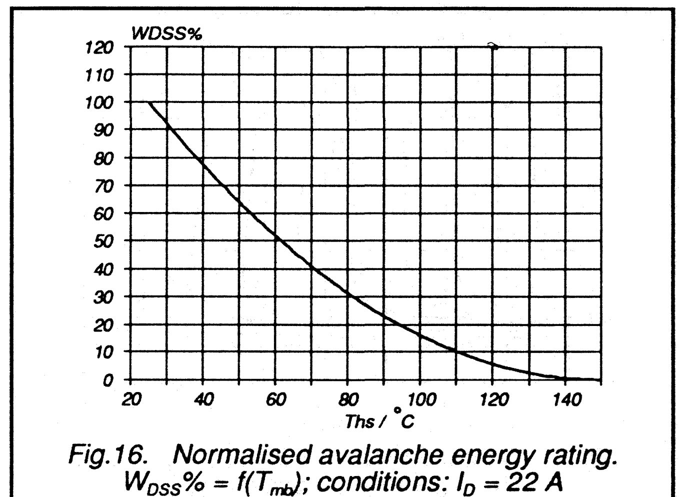


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 22$ A

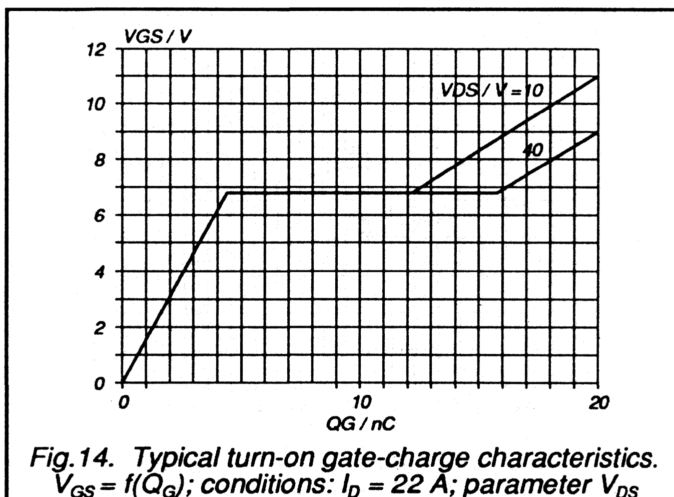


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 22$ A; parameter V_{DS}

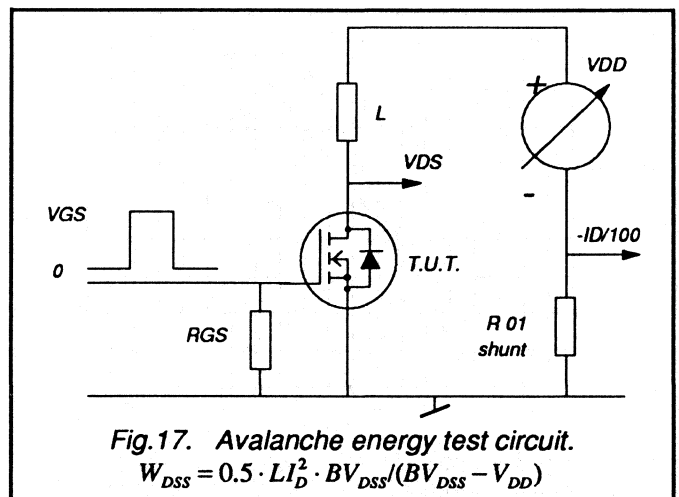


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK443	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	9	8	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.16	0.2	Ω

MECHANICAL DATA

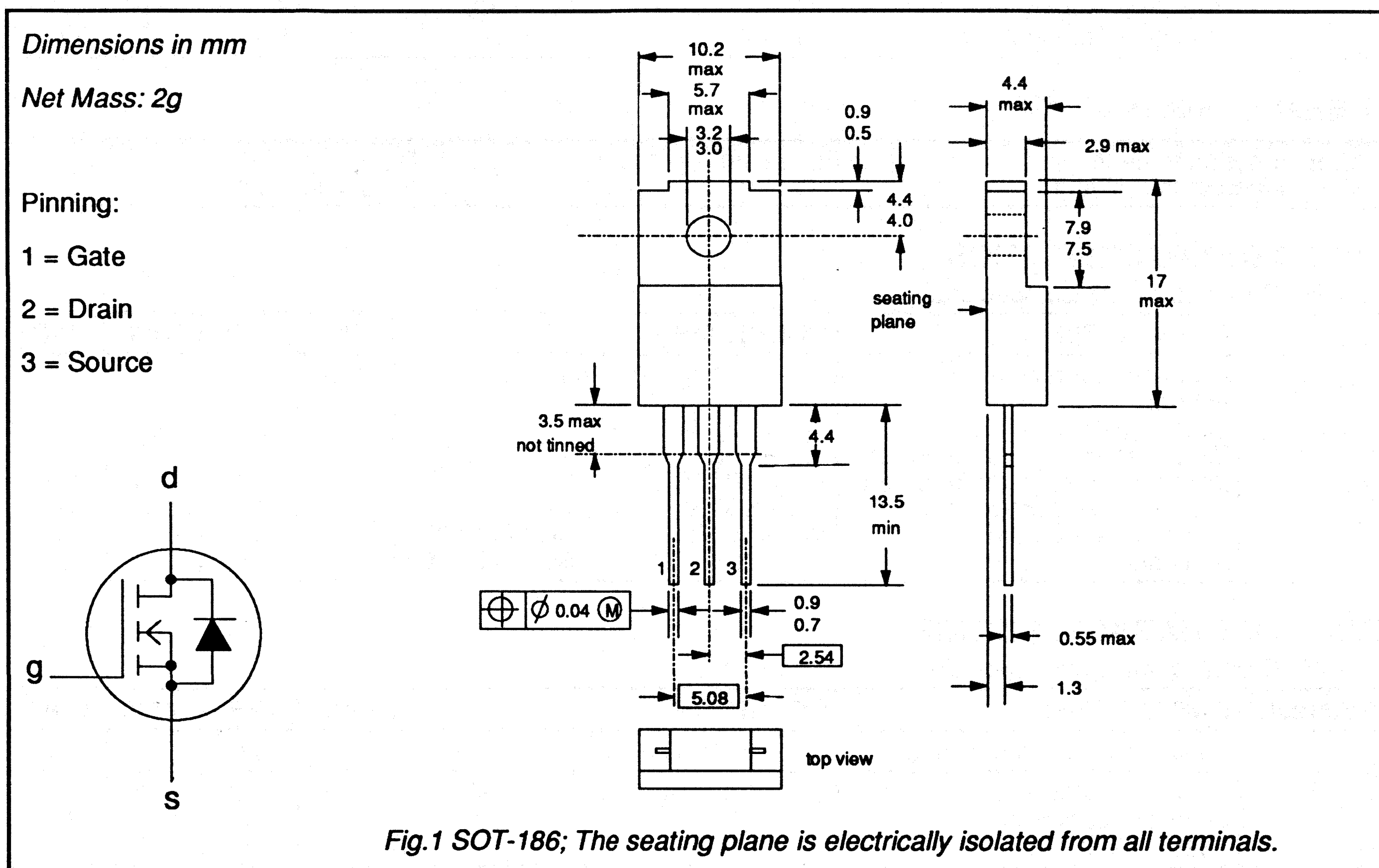


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	9	8	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	5.7	5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	36	32	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 5 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 5 A BUK443-100A	-	0.15	0.16	Ω
		BUK443-100B	-	0.17	0.2	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5 A	4.0	5.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	660	825	pF
C_{oss}	Output capacitance		-	140	200	pF
C_{rss}	Feedback capacitance		-	60	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.9 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	20	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\ off}$	Turn-off delay time		-	60	90	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9	A
I_{DRM}	Pulsed reverse drain current	-	-	-	36	A
V_{SD}	Diode forward voltage	I_F = 9 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 9 A; $-dI_F/dt$ = 100 A/µs;	-	170	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.3	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 9 A ; $V_{DD} \leq$ 50 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	70	mJ

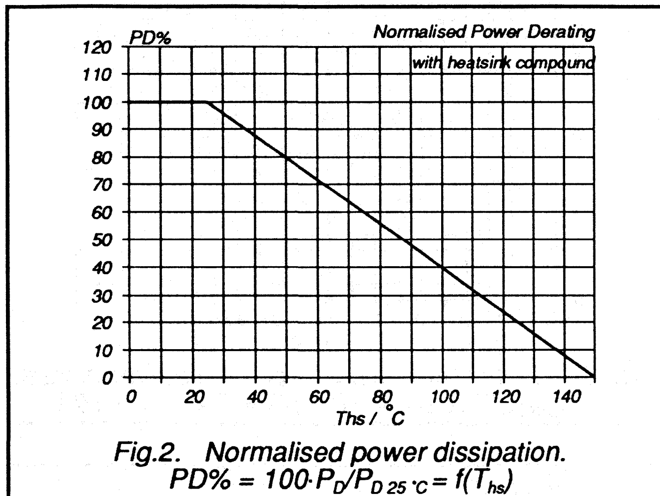


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

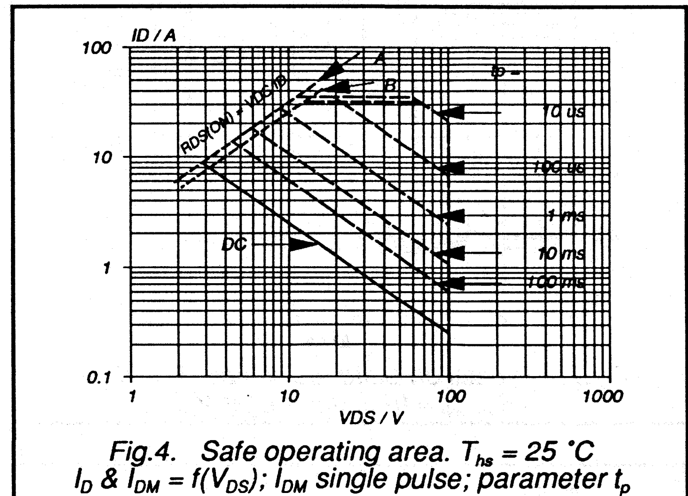


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

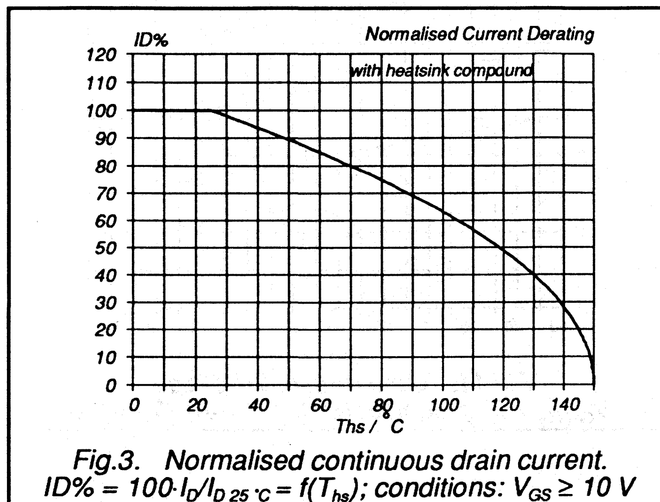


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq$ 10 V

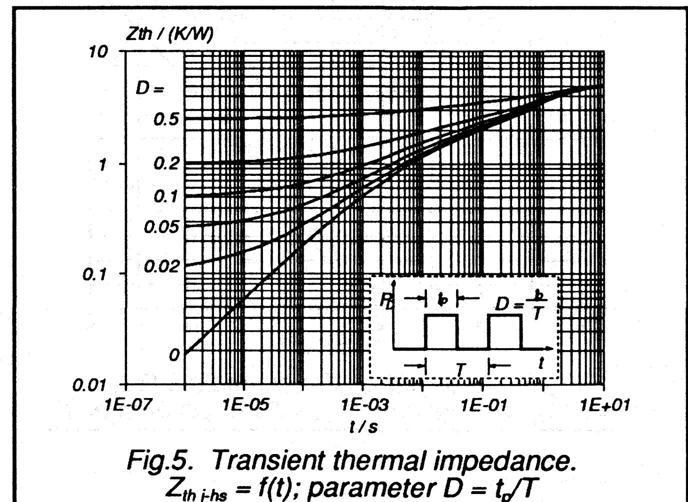


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

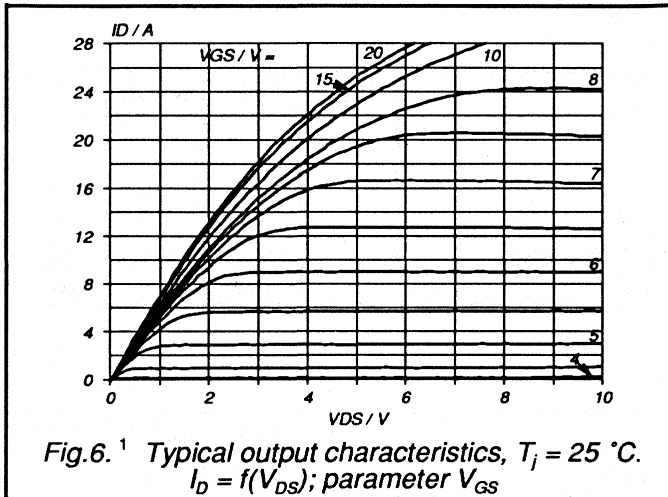


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

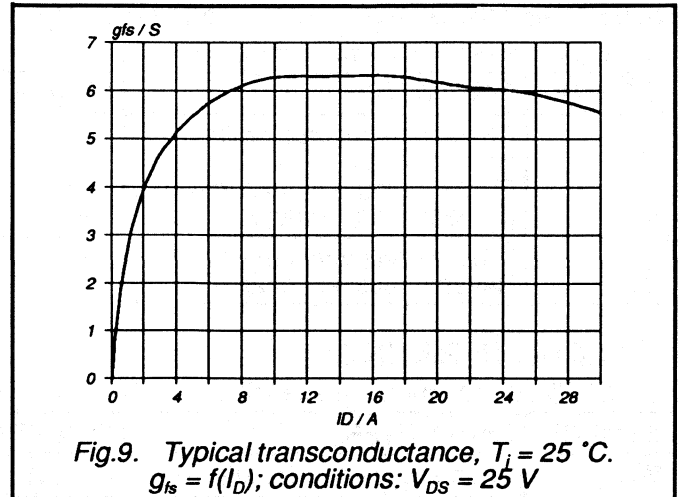


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

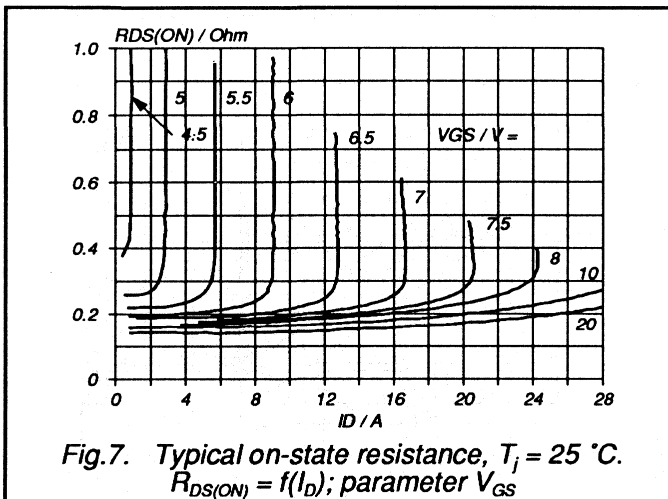


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

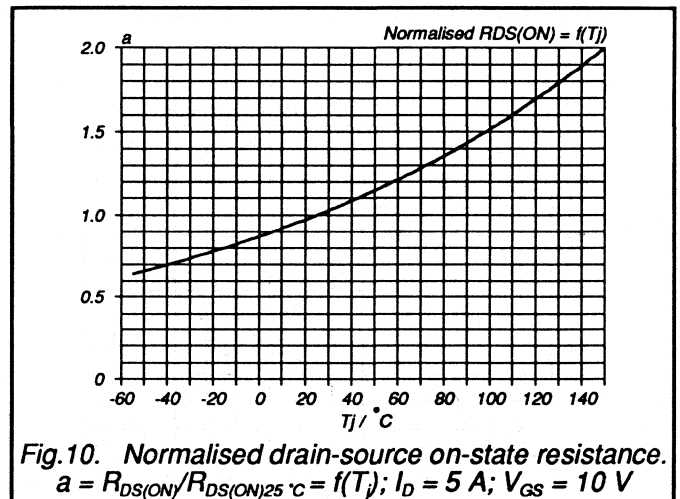


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 5 A; V_{GS} = 10 V

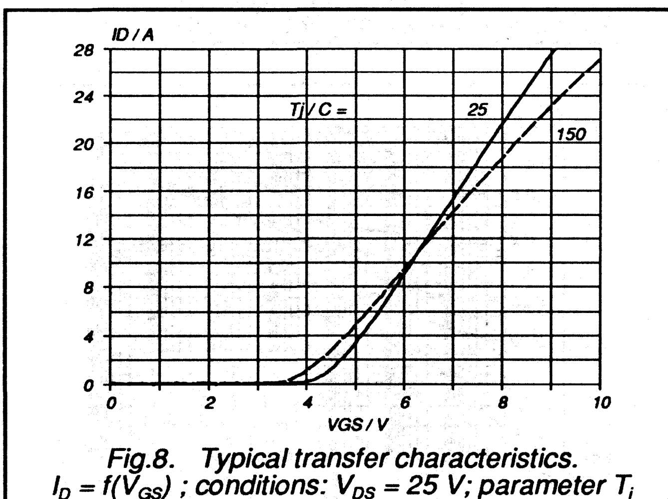


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

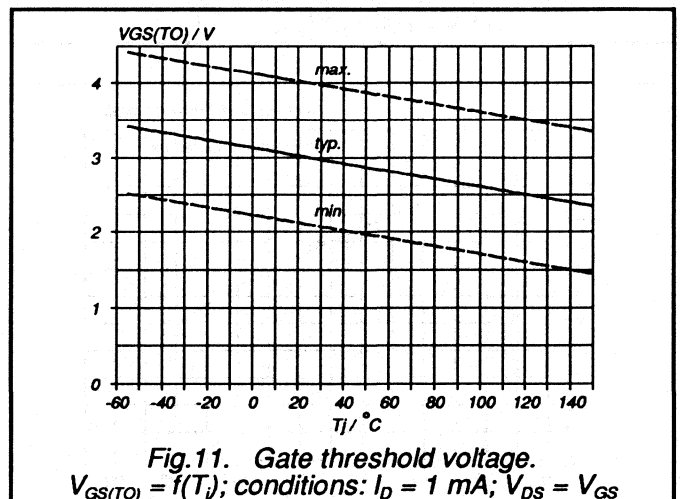


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

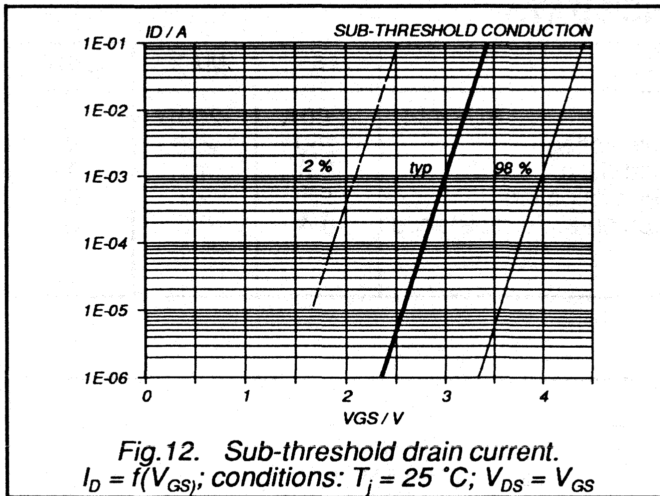


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

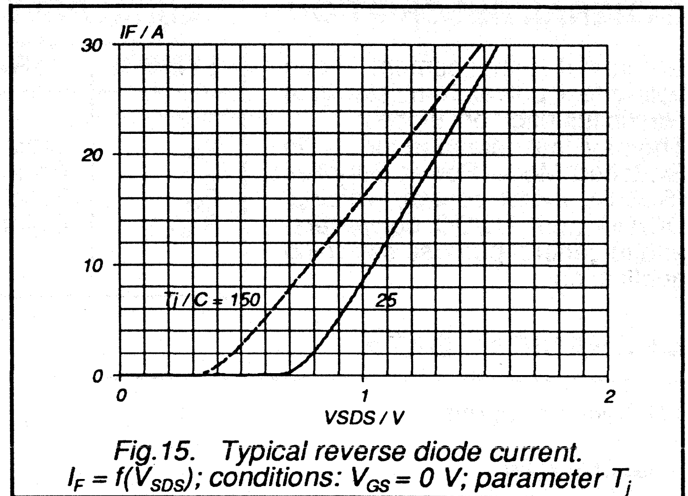


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

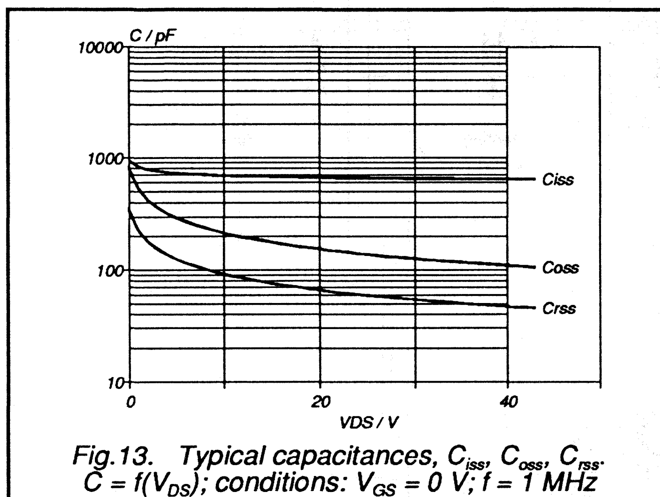


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

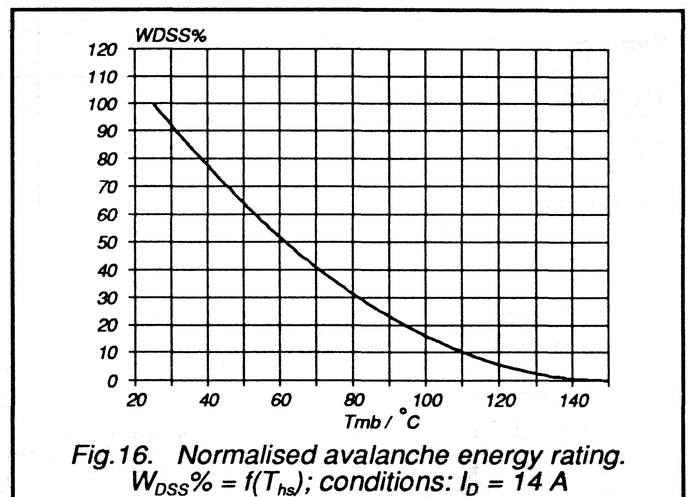


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 14$ A

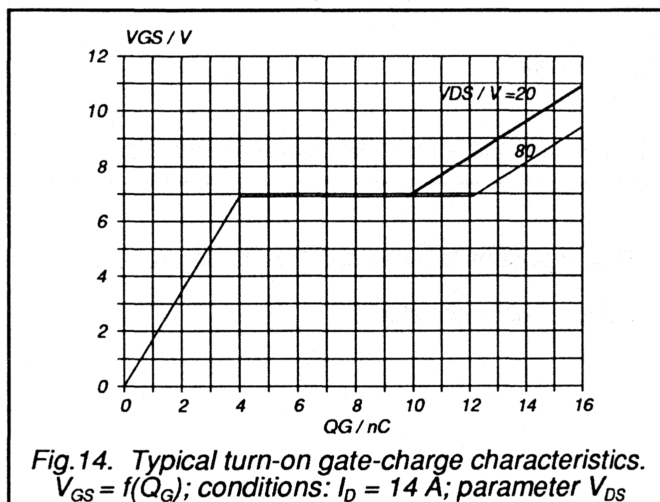


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

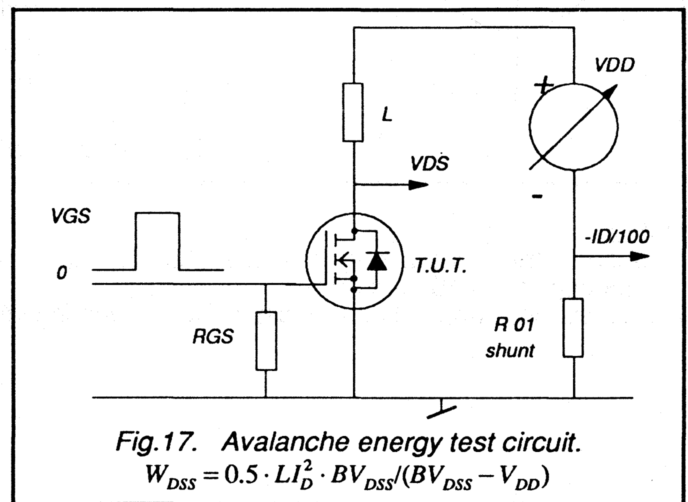


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK444	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	5.3	4.7	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.4	0.5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	5.3	4.7	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	3.3	3.0	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	21	19	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 ˚C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 3.5 A BUK444-200A	-	0.35	0.4	Ω
		BUK444-200B	-	0.4	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 3.5 A	3.5	5.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	700	850	pF
C_{oss}	Output capacitance		-	100	160	pF
C_{rss}	Feedback capacitance		-	50	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.9 A;	-	12	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	45	70	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	80	120	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.3	A
I_{DRM}	Pulsed reverse drain current	-	-	-	21	A
V_{SD}	Diode forward voltage	I_F = 5.3 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 5.3 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.6	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 9 A ; $V_{DD} \leq$ 100 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	50	mJ

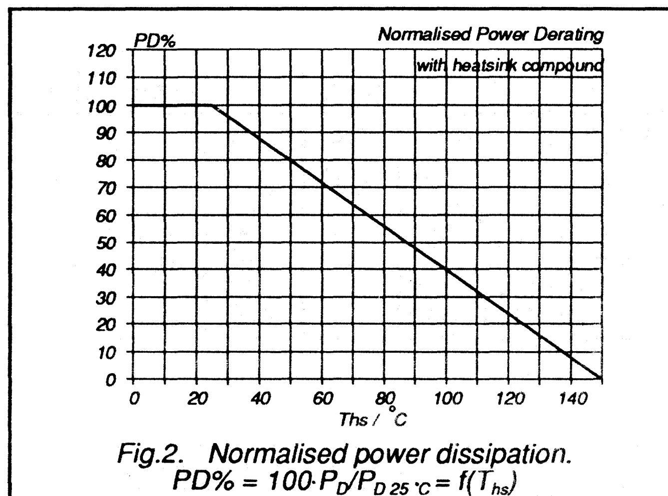


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

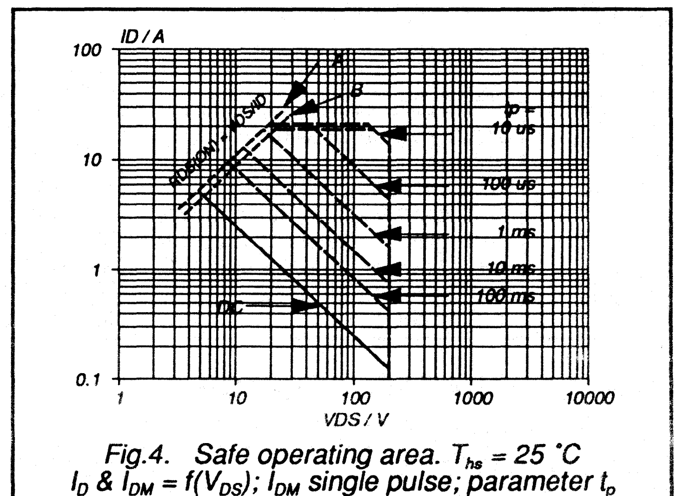


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

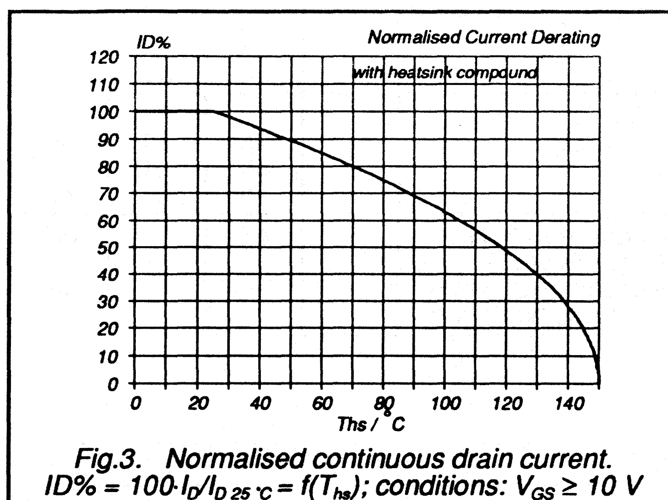


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

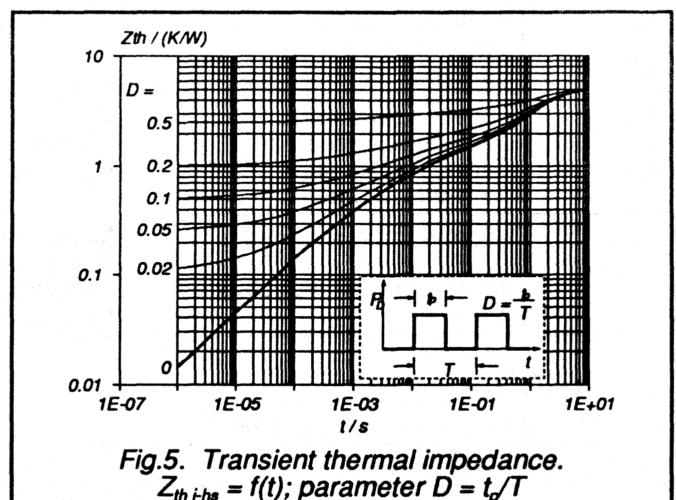


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

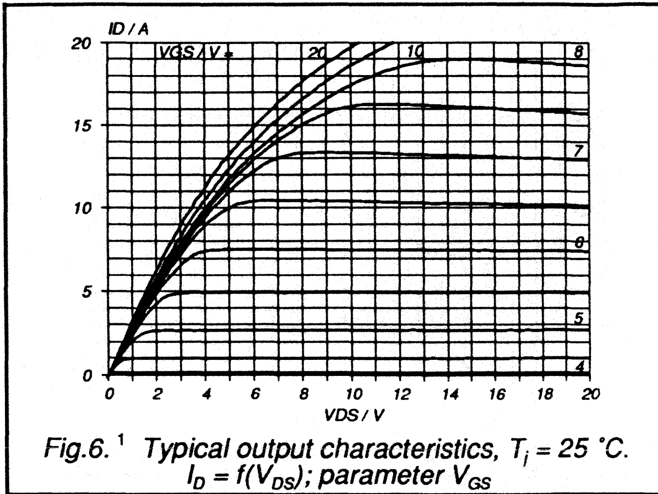


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

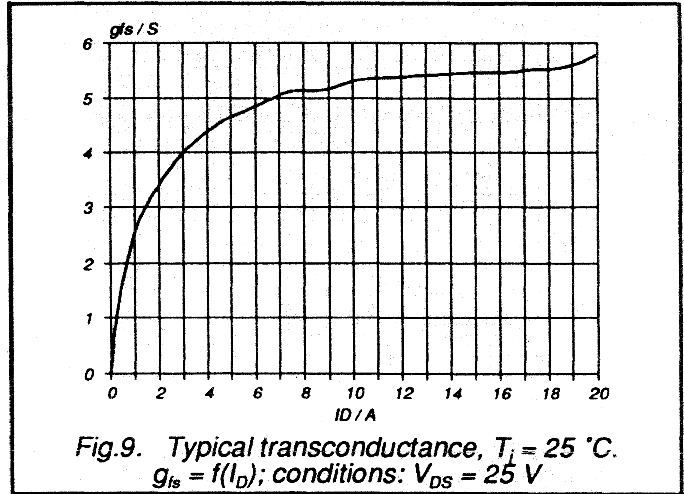


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

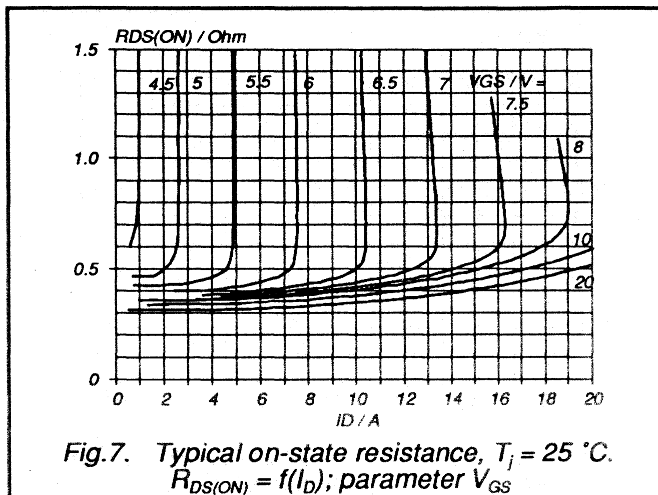


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

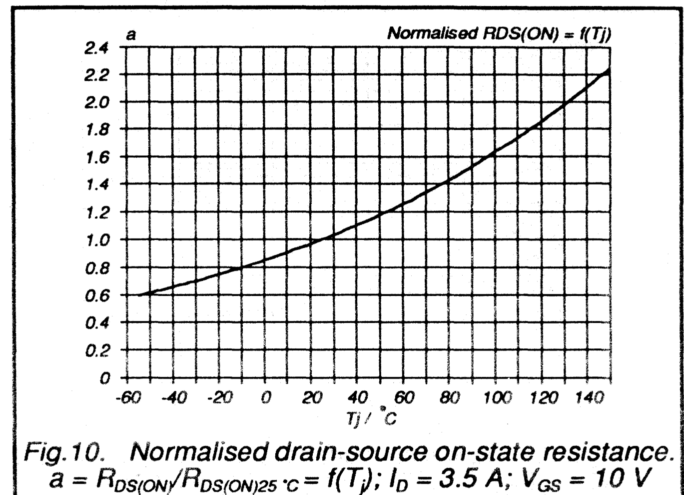


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ˚C} = f(T_j)$; I_D = 3.5 A; V_{GS} = 10 V

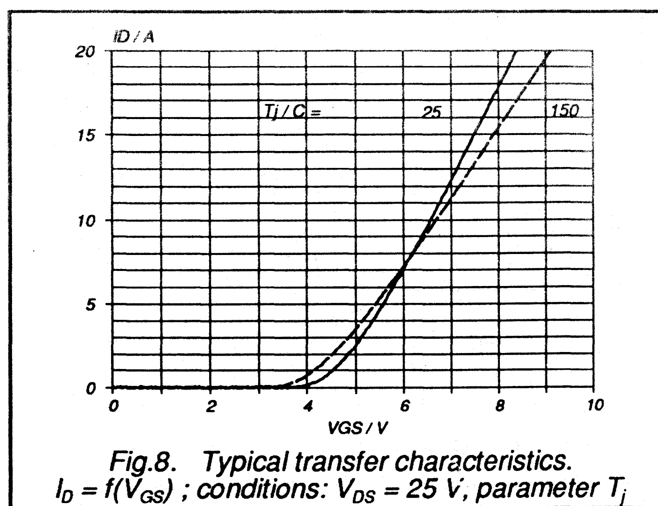


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V, parameter T_j

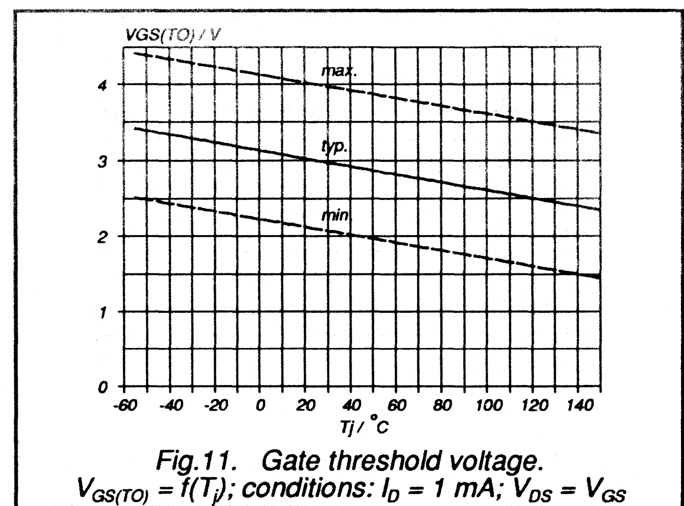


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

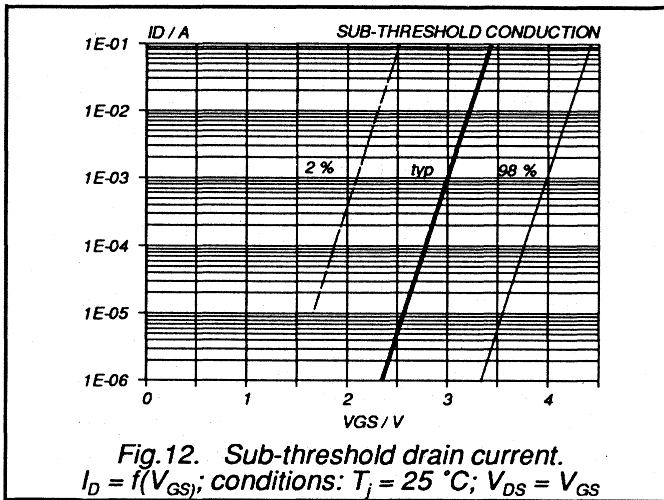


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

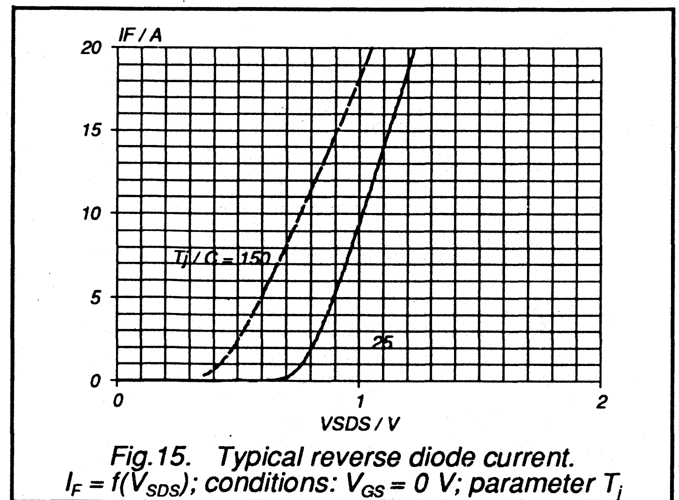


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

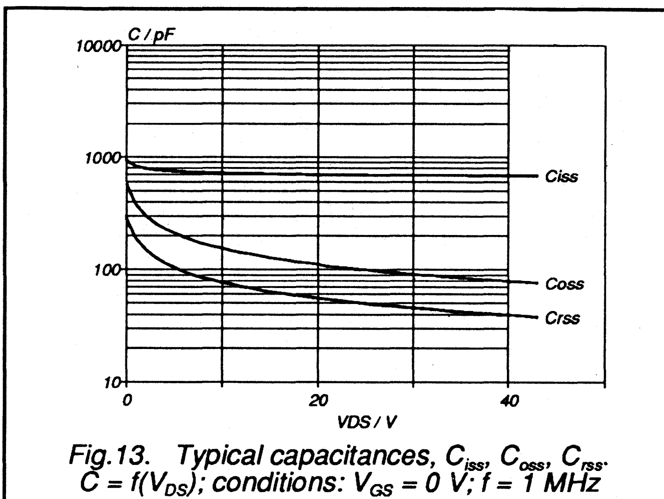


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

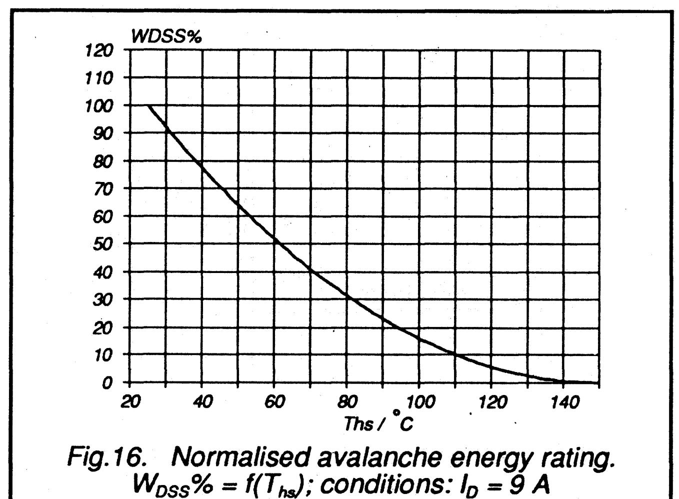


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 9$ A

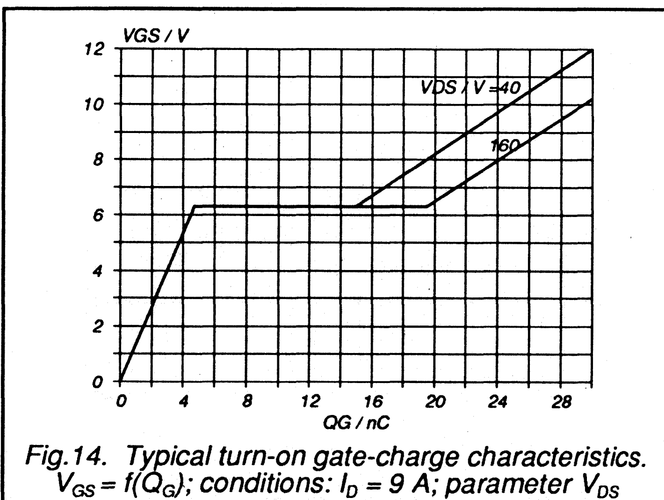


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

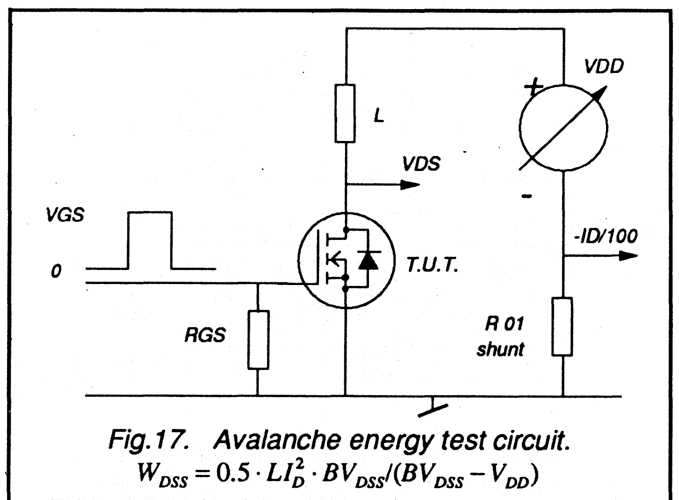


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK444	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	2.7	2.4	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.5	1.8	Ω

MECHANICAL DATA

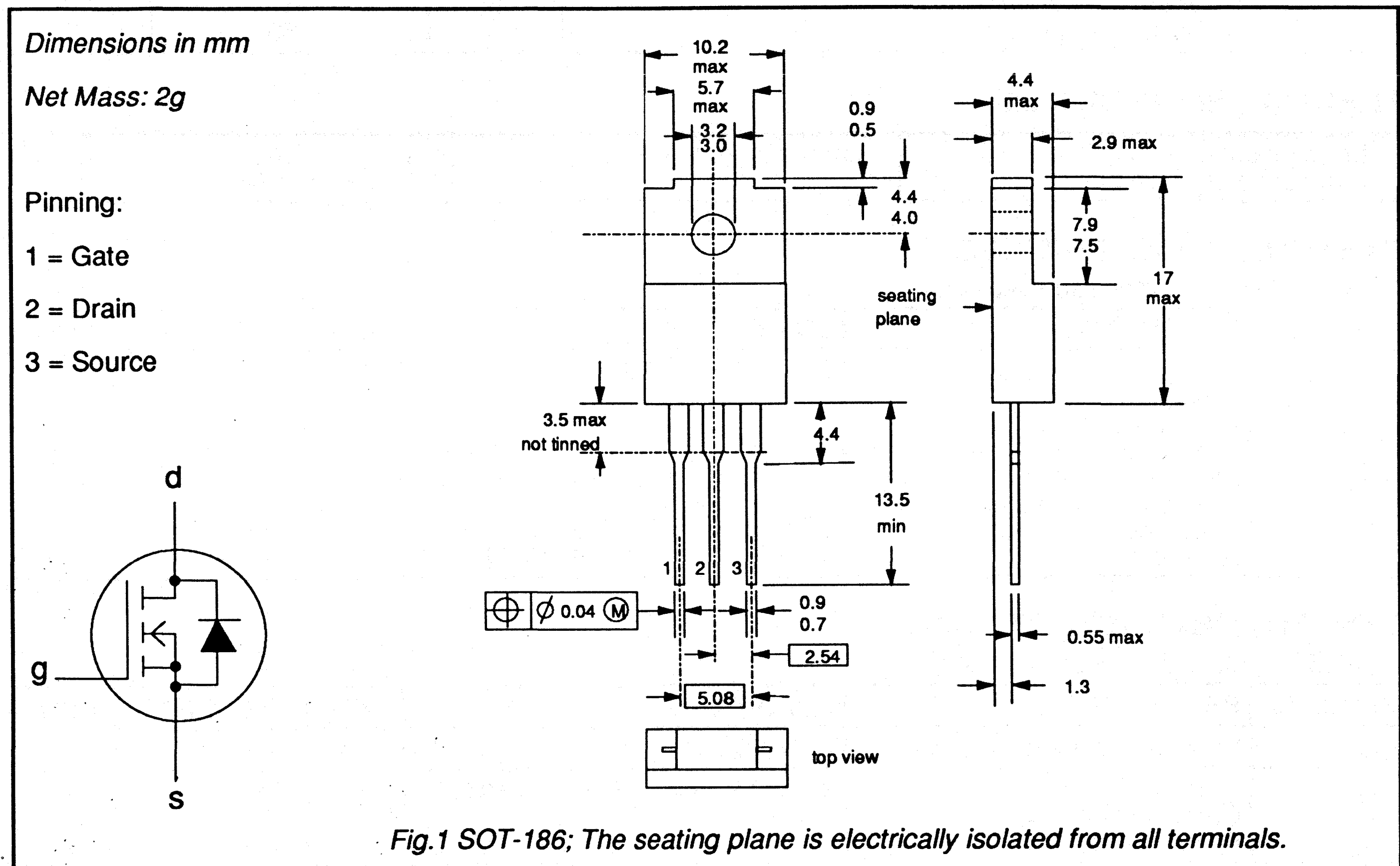


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	2.7	2.4	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	1.7	1.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	11	9.6	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 5 K/W
From junction to ambient		$R_{th\ j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A **BUK444-400A**	-	1.3	1.5	Ω
		BUK444-400B	-	1.6	1.8	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	2.1	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	360	500	pF
C_{oss}	Output capacitance		-	60	80	pF
C_{rss}	Feedback capacitance		-	25	60	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.5 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	11	A
V_{SD}	Diode forward voltage	I_F = 2.7 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 2.7 A; -dI_F/dt = 100 A/µs;	-	260	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	2.5	-	µC

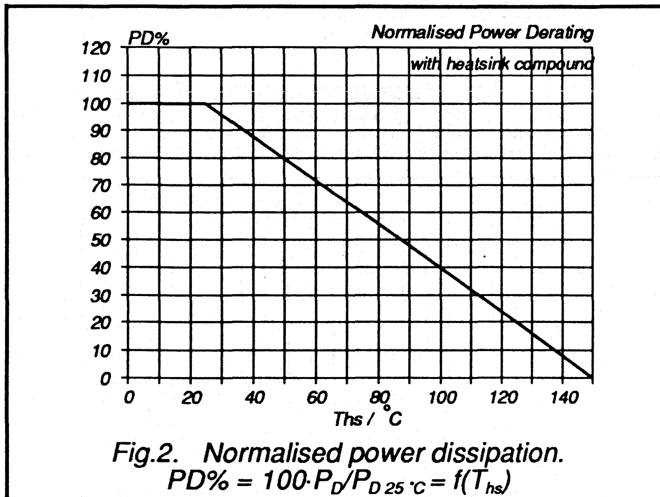


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

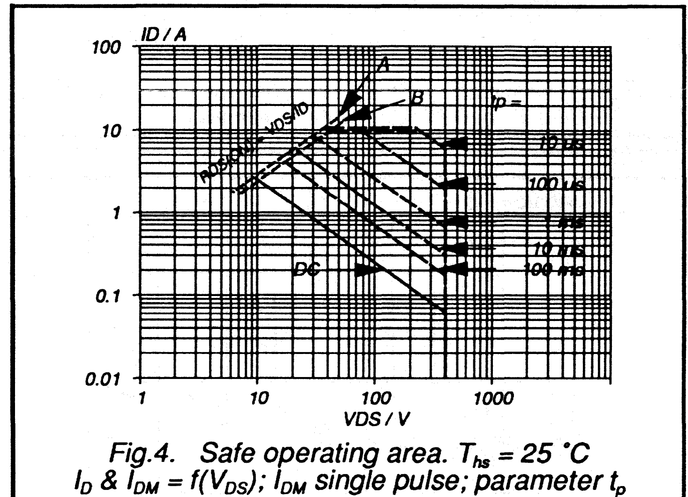


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

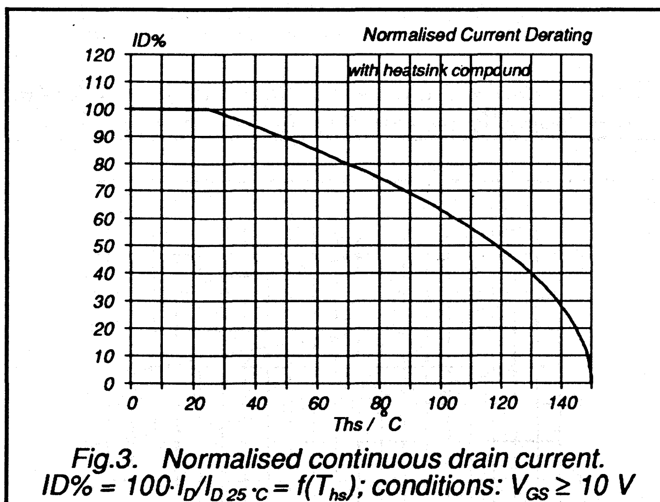


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

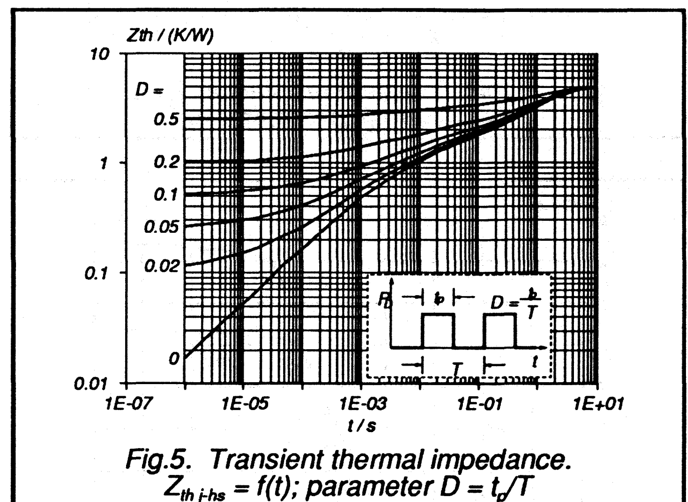


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

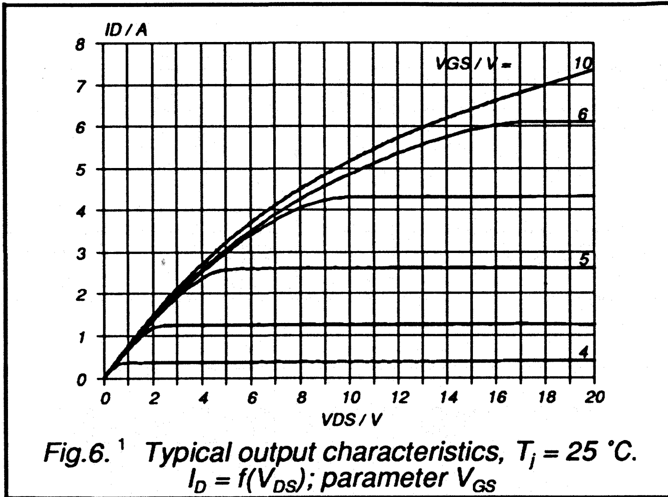


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

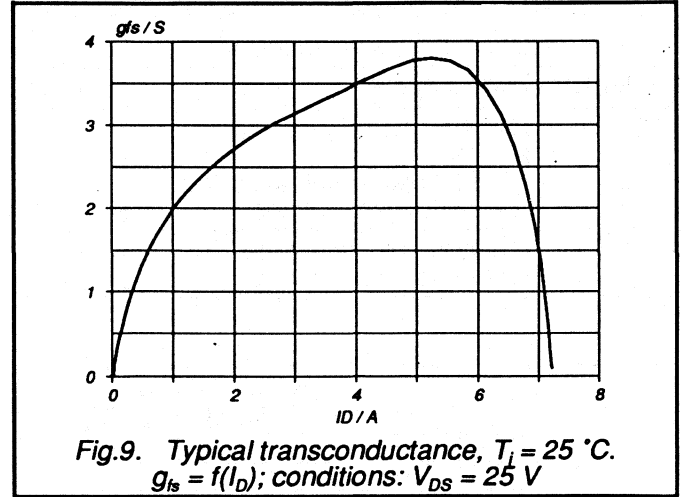


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

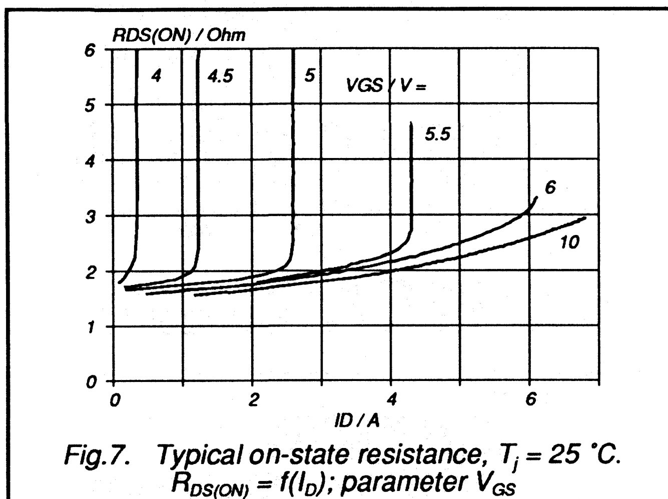


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

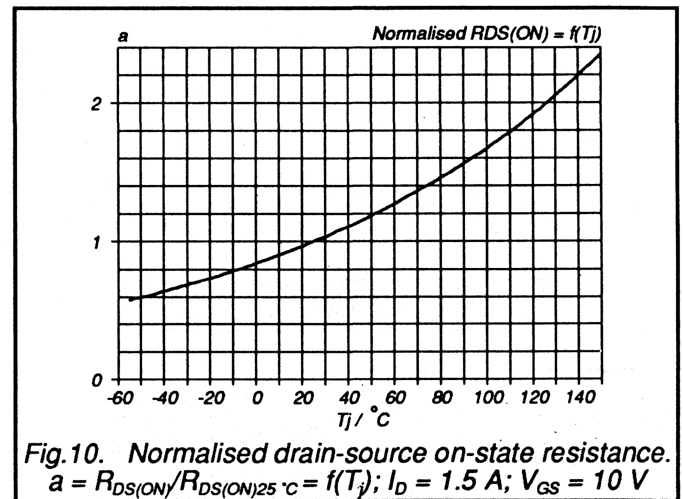


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

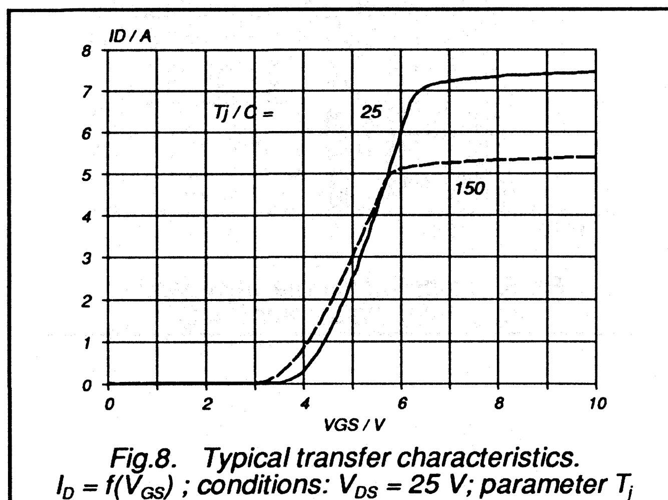


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

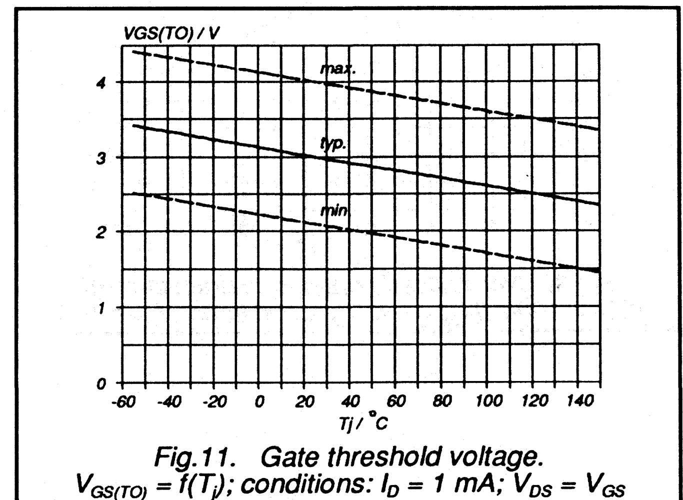


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

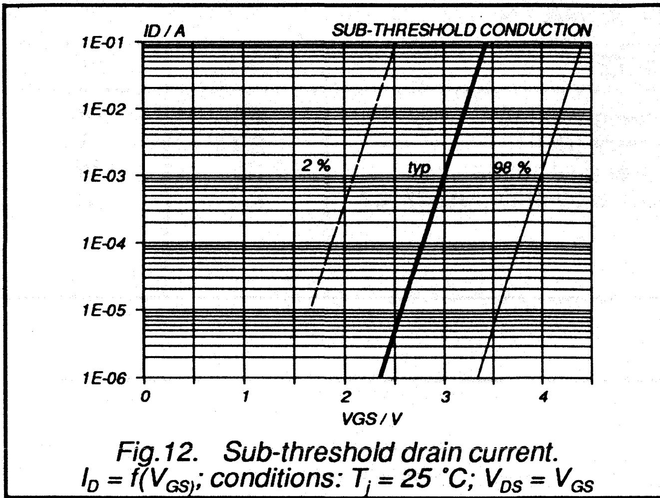


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

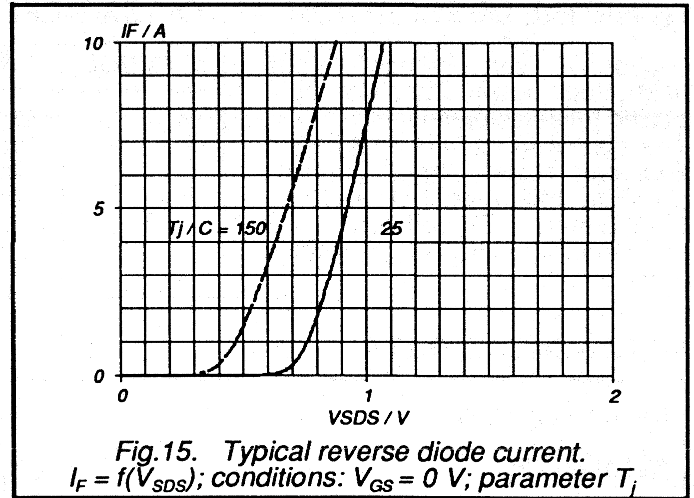


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

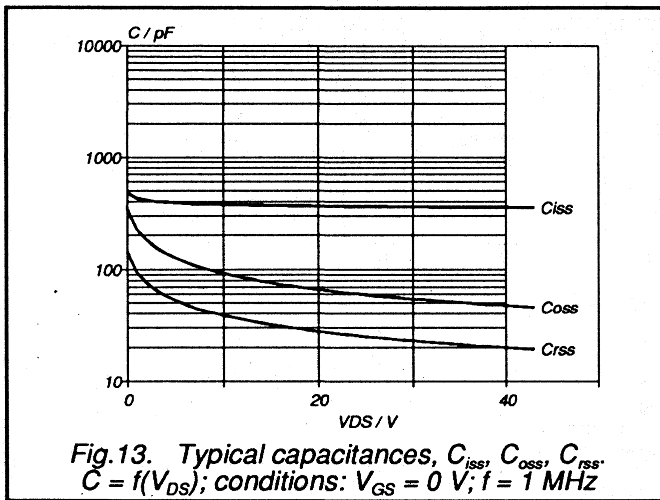


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

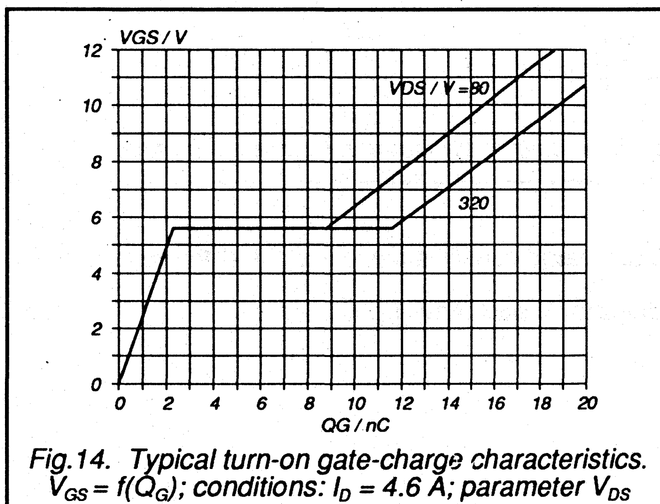


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4.6$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	2.1	A
P_{tot}	Total power dissipation	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.3	Ω

MECHANICAL DATA

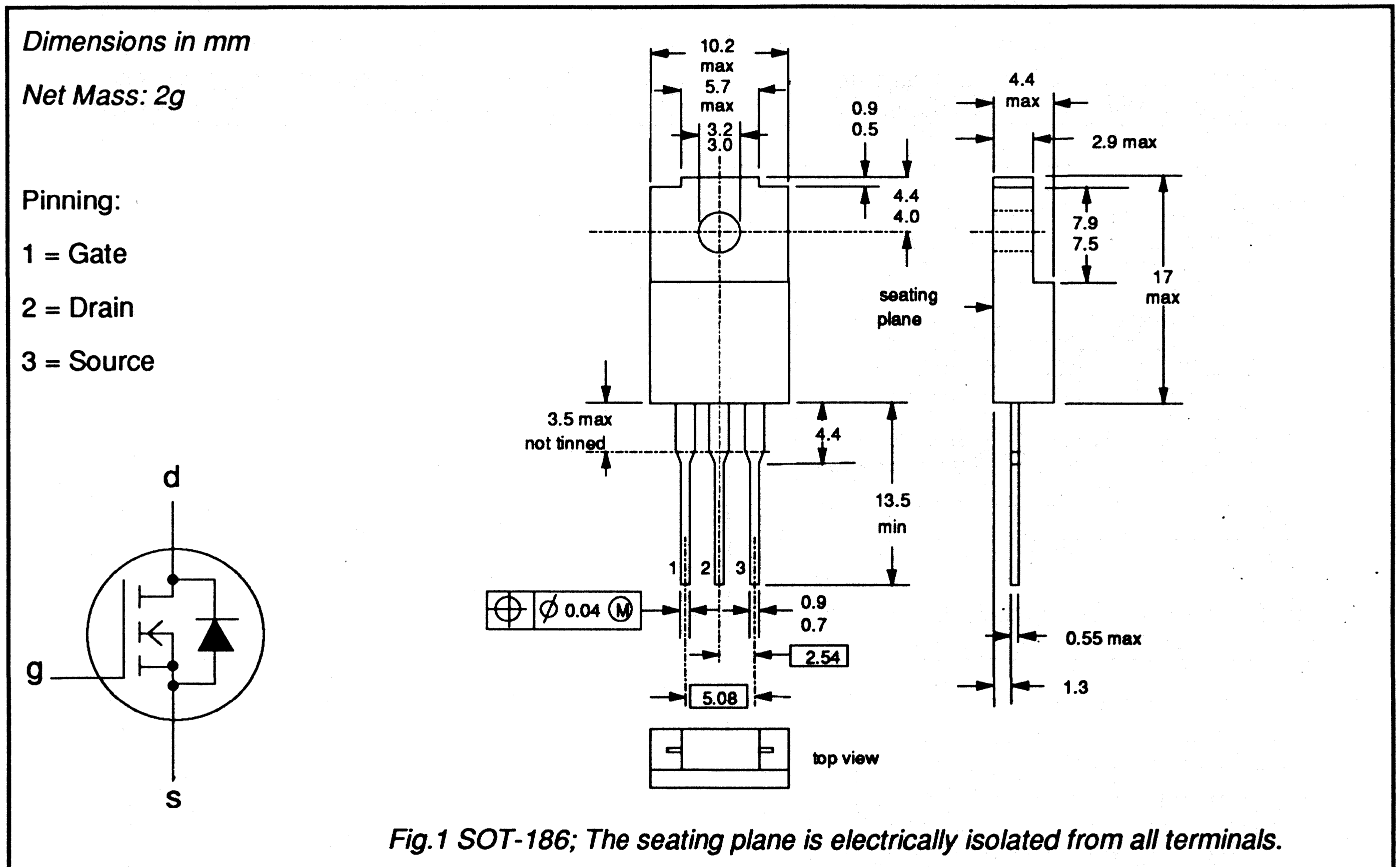


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	2.1	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	1.3	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	8.4	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	25	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 5 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.2 A	-	2.0	2.3	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.2 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	55	80	pF
C_{rss}	Feedback capacitance		-	20	55	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.1	A
I_{DRM}	Pulsed reverse drain current	-	-	-	8.4	A
V_{SD}	Diode forward voltage	I_F = 2.1 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.1 A; $-dI_F/dt$ = 100 A/µs;	-	270	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	2.0	-	µC

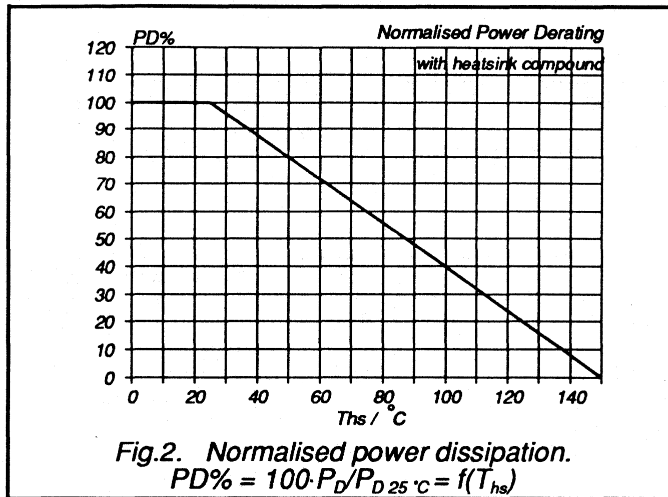


Fig.2. Normalised power dissipation. $PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

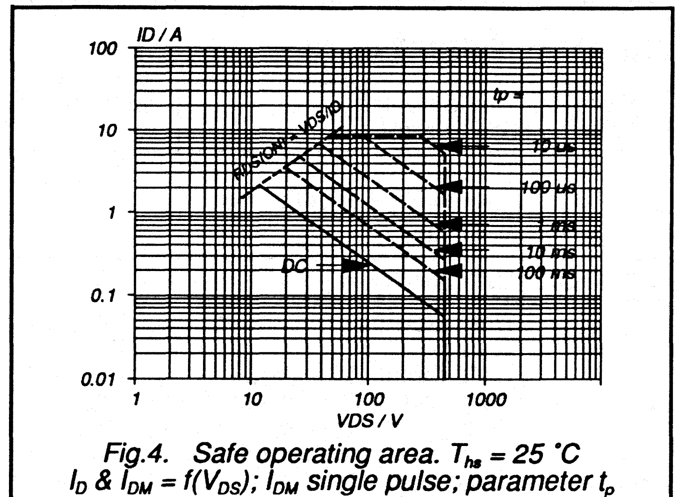


Fig.4. Safe operating area. T_{hs} = 25 ˚C I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

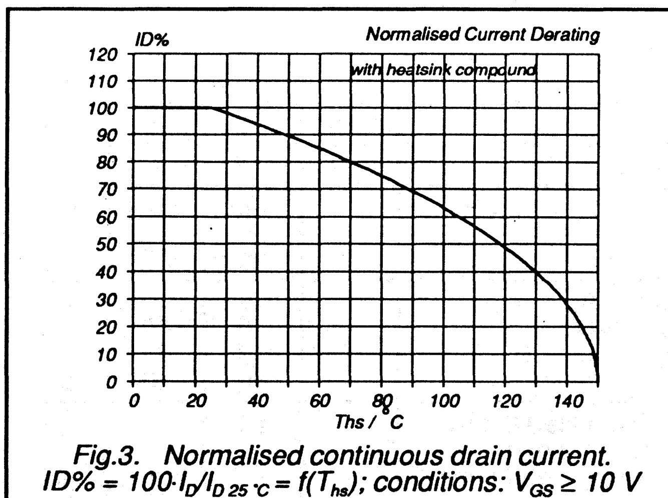


Fig.3. Normalised continuous drain current. $ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

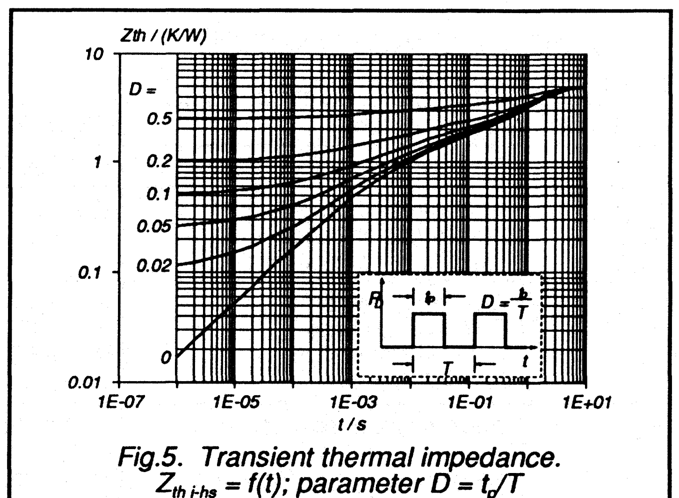


Fig.5. Transient thermal impedance. $Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

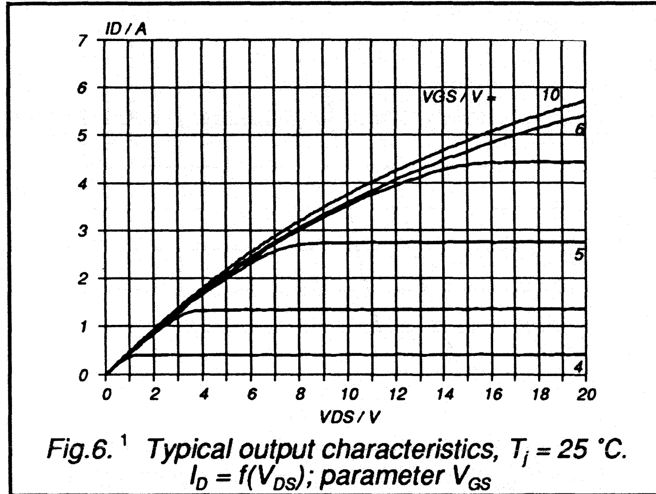


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

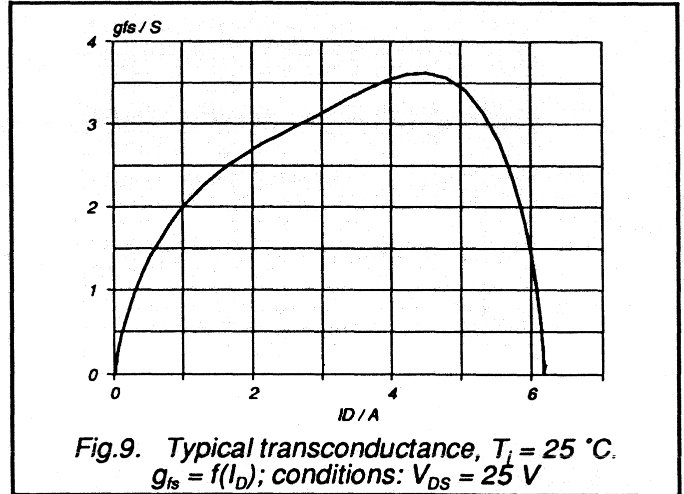


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

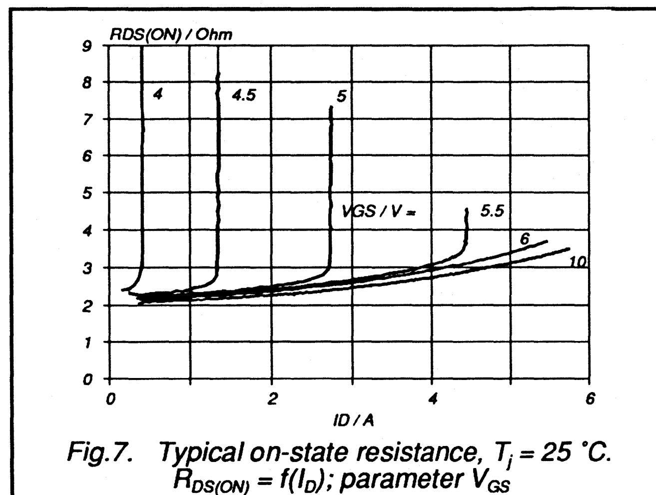


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

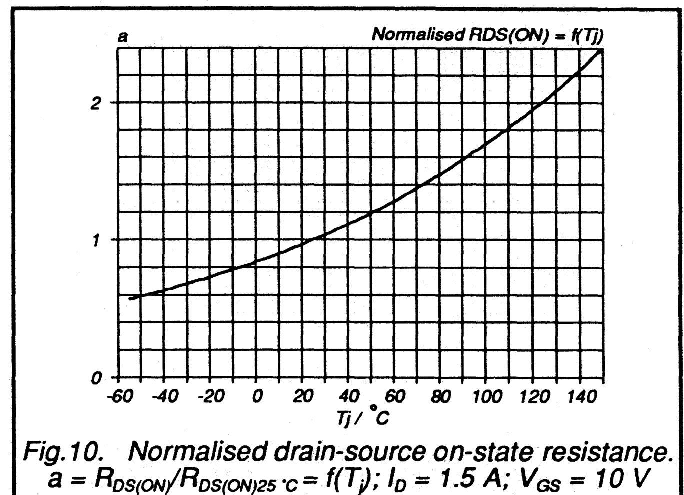


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

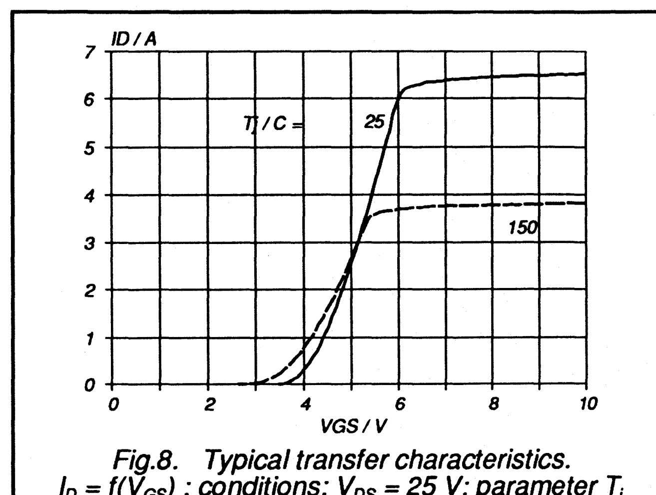


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

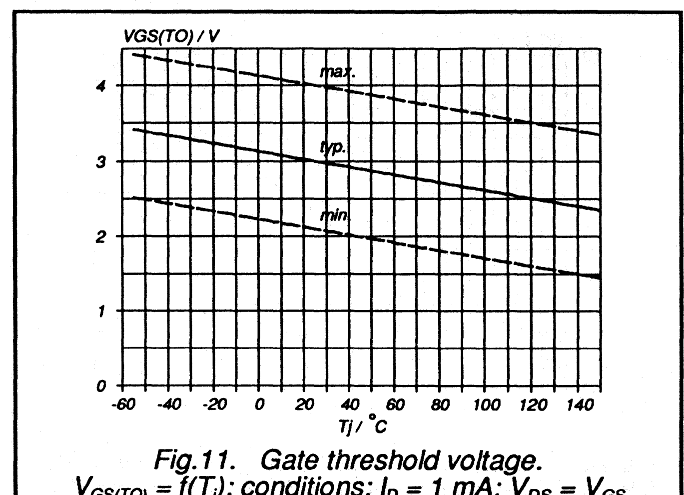


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

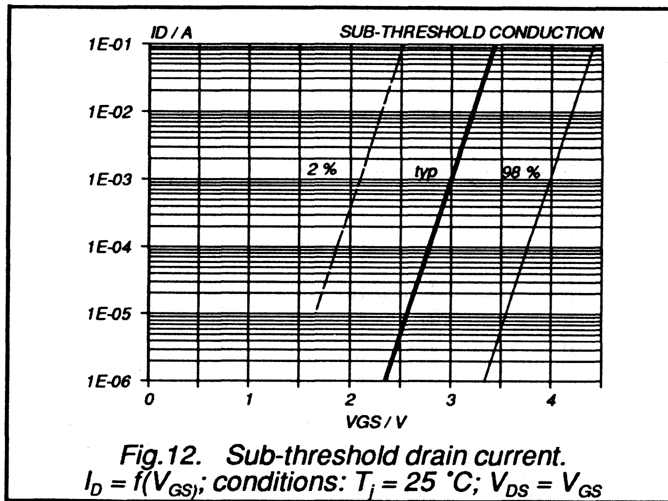


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

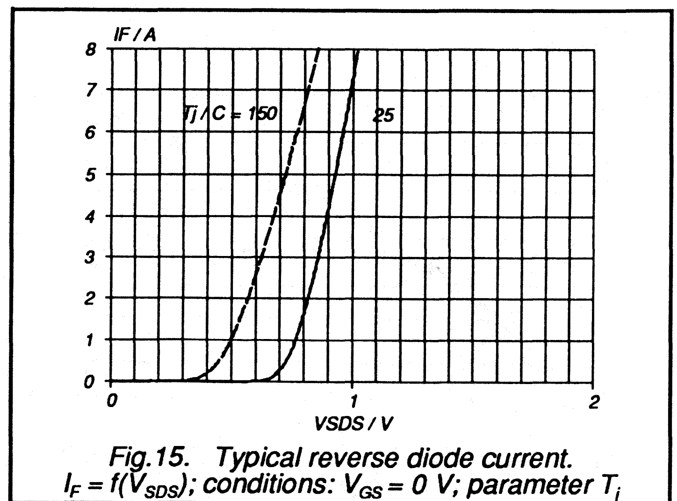


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

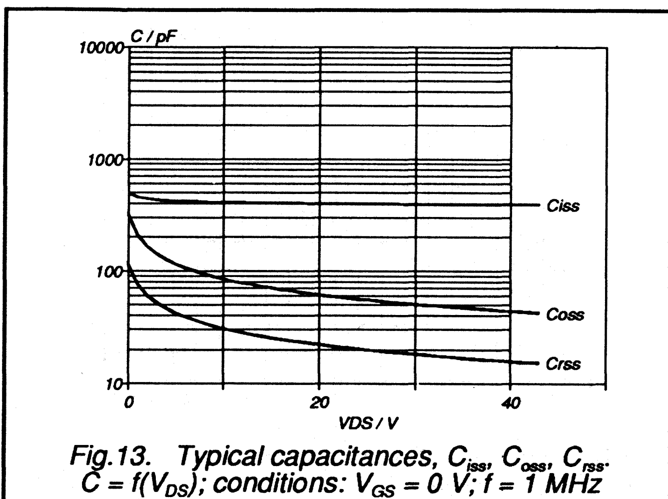


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

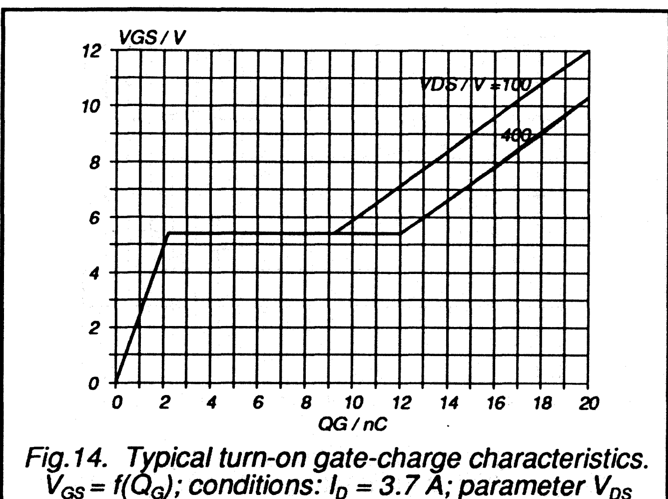


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK444	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	2.1	1.9	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.3	2.8	Ω

MECHANICAL DATA

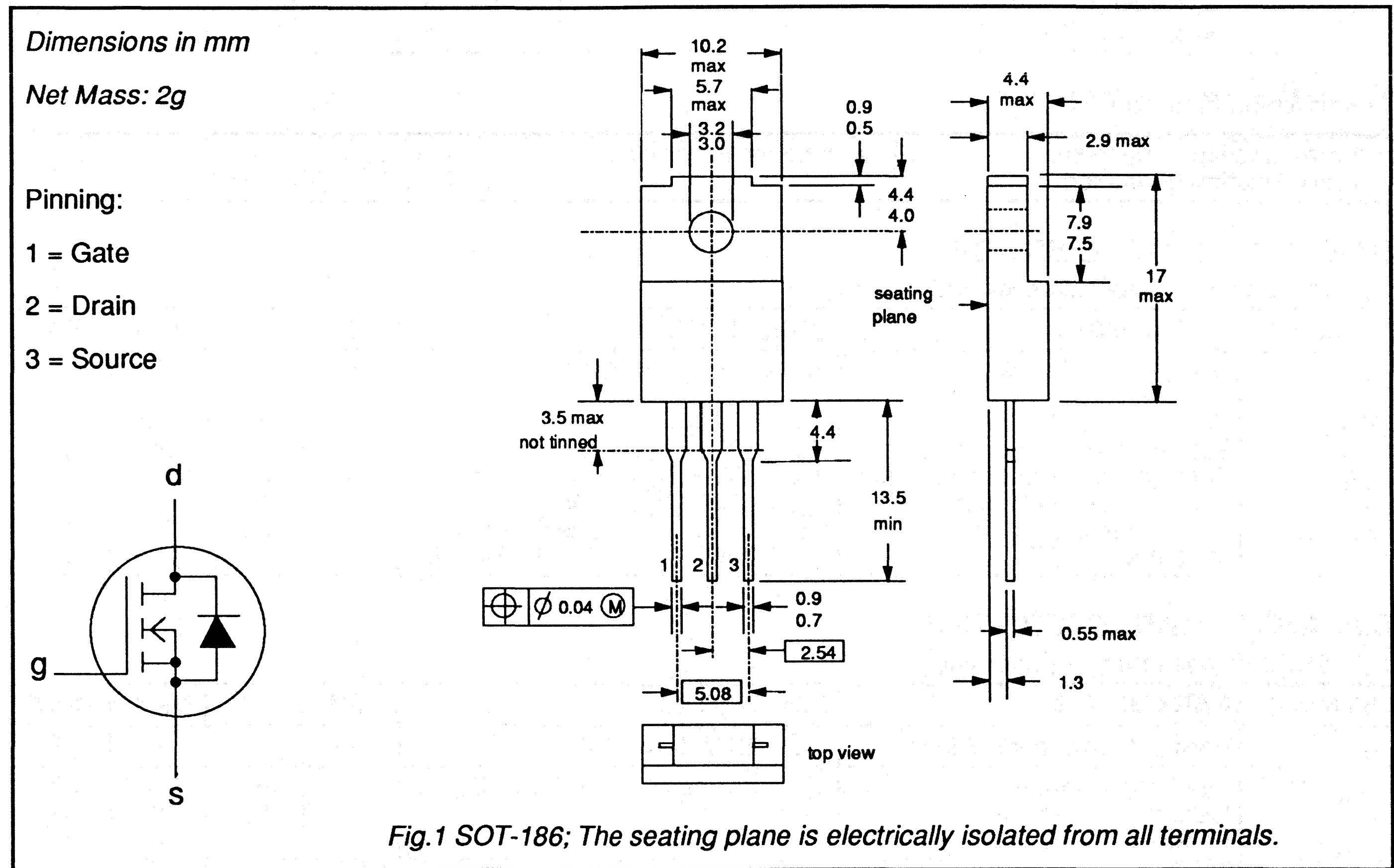


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	2.1	1.9	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	1.3	1.2	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	8.4	7.6	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 5 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	μA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.2 A BUK444-500A	-	2.0	2.3	Ω
		BUK444-500B	-	2.4	2.8	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.2 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	55	80	pF
C_{rss}	Feedback capacitance		-	20	55	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.1	A
I_{DRM}	Pulsed reverse drain current	-	-	-	8.4	A
V_{SD}	Diode forward voltage	I_F = 2.1 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.1 A; $-dI_F/dt$ = 100 A/µs;	-	270	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	2.0	-	µC

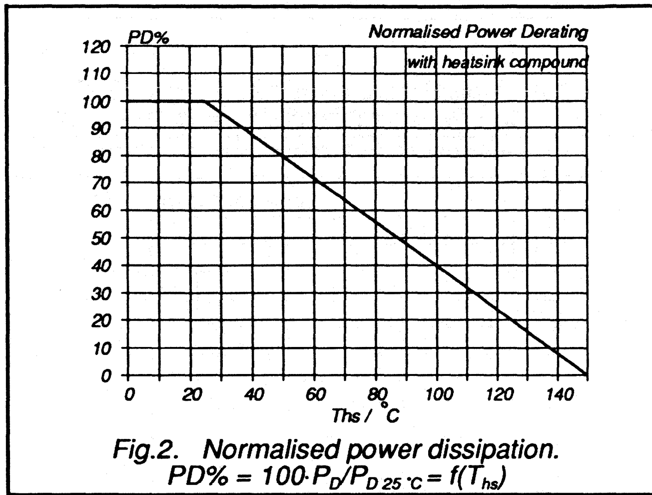


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

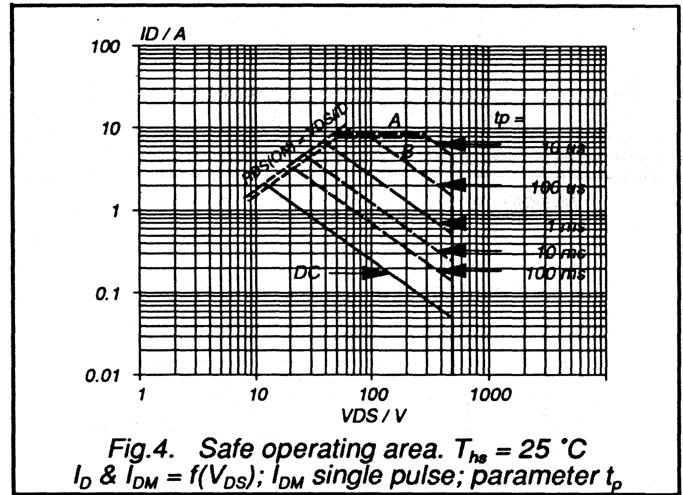


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

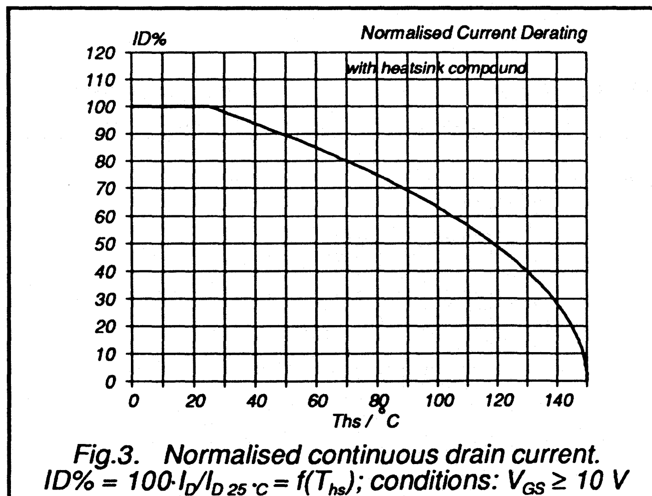


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

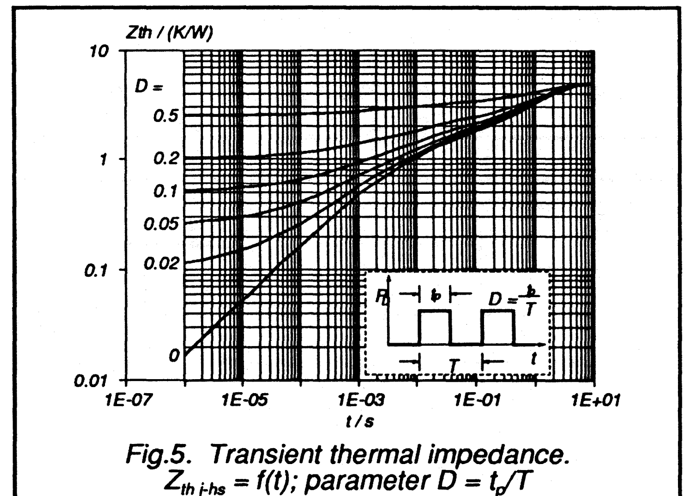


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

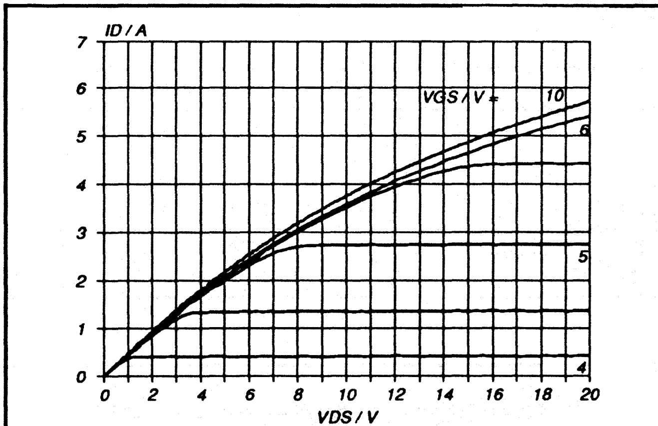


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

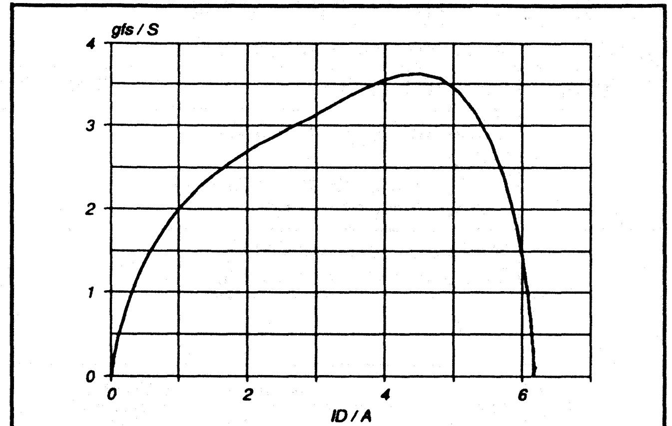


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

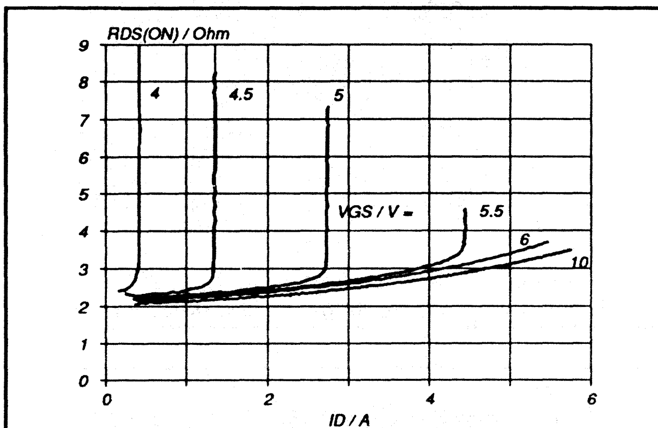


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

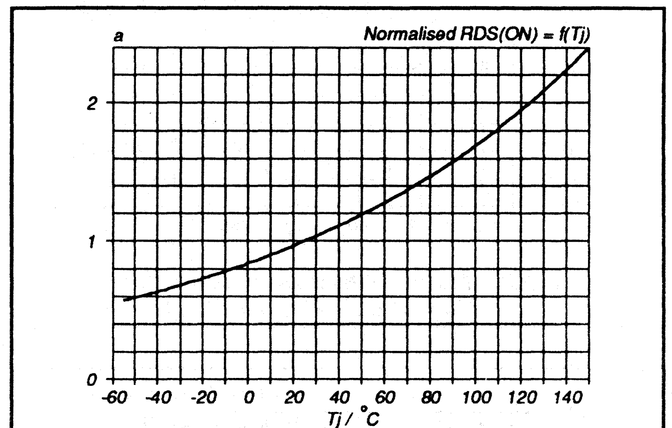


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

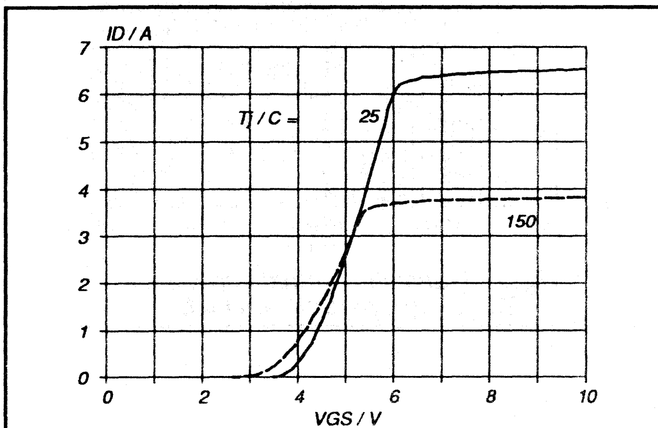


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

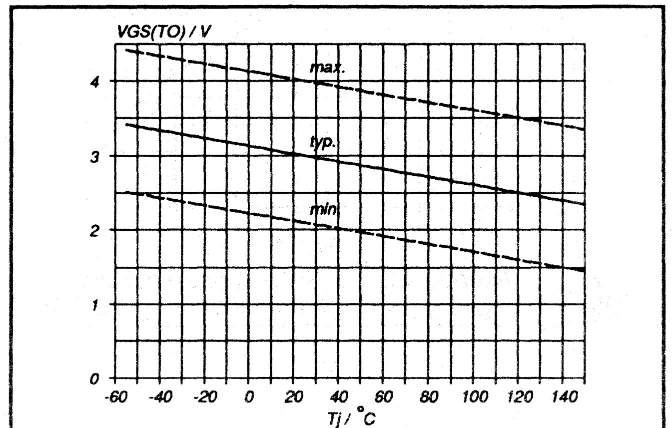


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$.

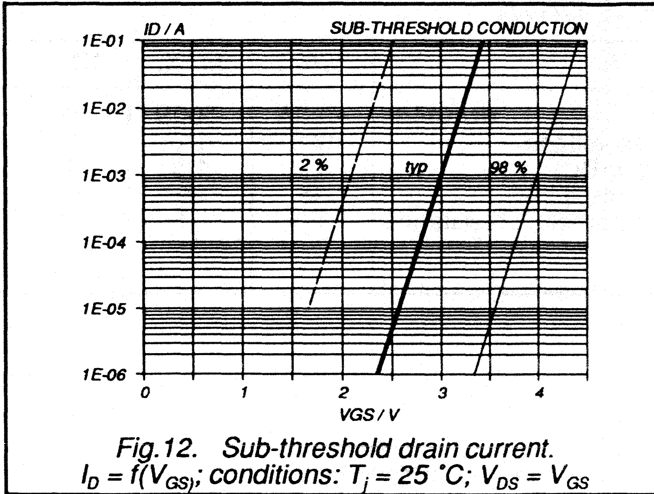


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

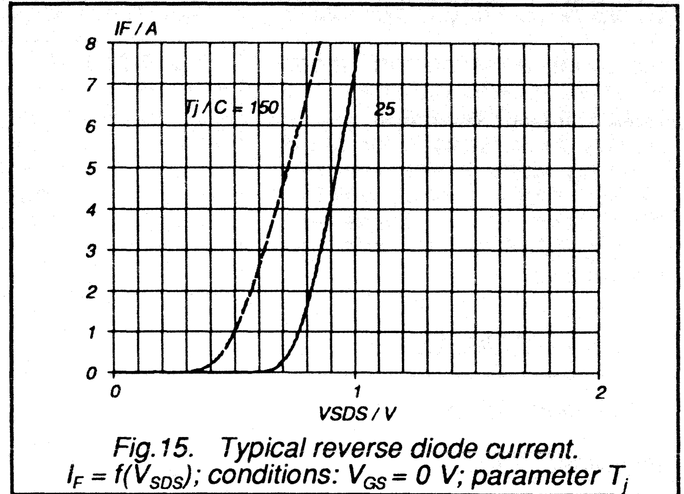


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

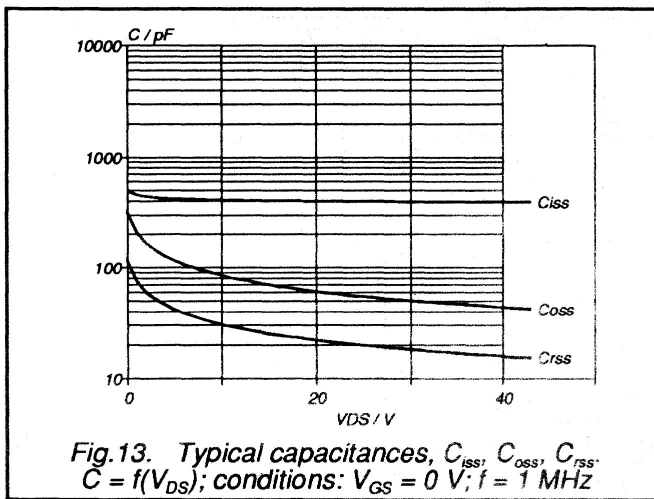


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

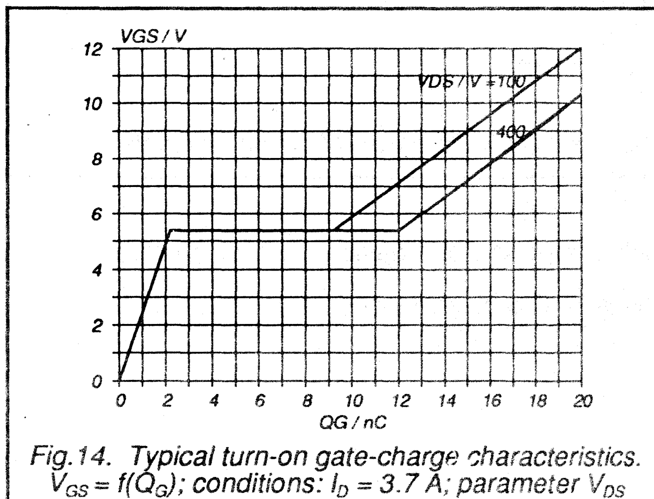


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK444	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	1.6	1.5	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance	4.0	4.5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

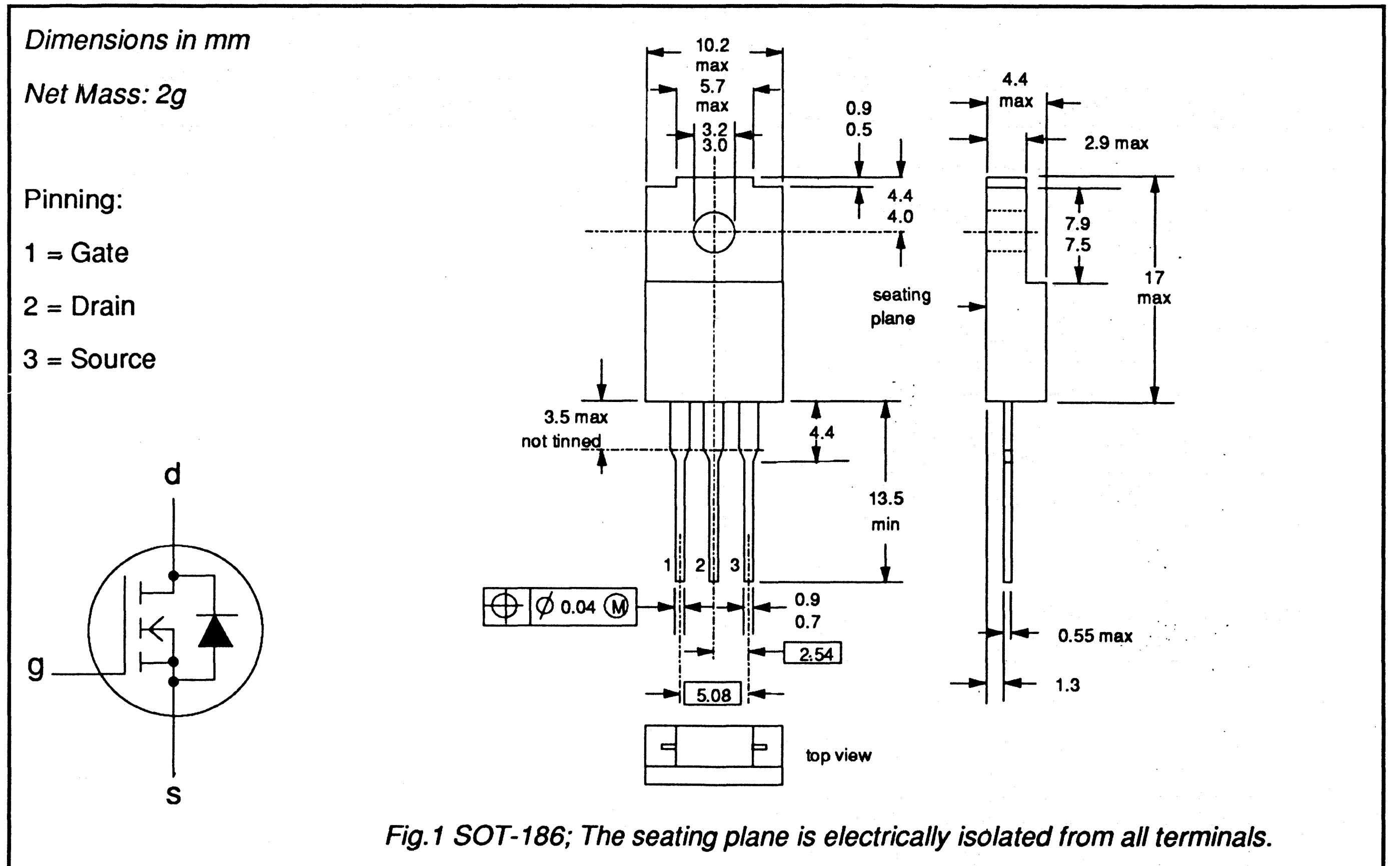


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	1.6	1.5	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	1.0	0.95	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	6.4	6	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.2 A BUK444-600A	-	3.8	4.0	Ω
		BUK444-600B	-	4.0	4.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.2 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	300	500	pF
C_{oss}	Output capacitance		-	50	80	pF
C_{rss}	Feedback capacitance		-	30	55	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.1 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	15	20	ns
t_r	Turn-on rise time		-	40	60	ns
$t_{d\,off}$	Turn-off delay time		-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	1.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	6.4	A
V_{SD}	Diode forward voltage	I_F = 1.6 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 1.6 A; $-dI_F/dt$ = 100 A/µs;	-	280	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	1.5	-	µC

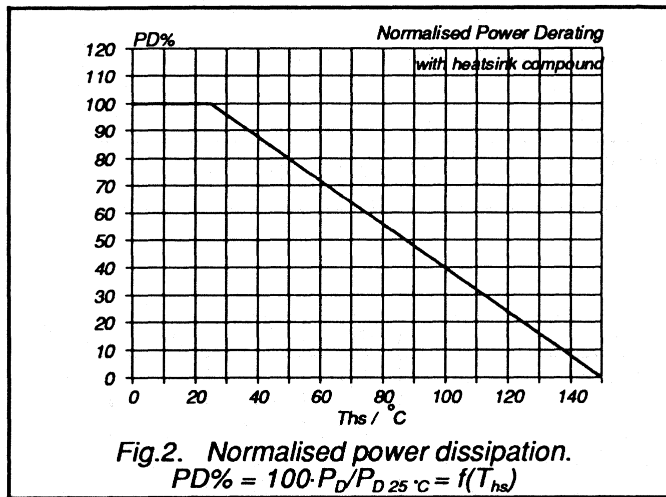


Fig.2. Normalised power dissipation. $PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

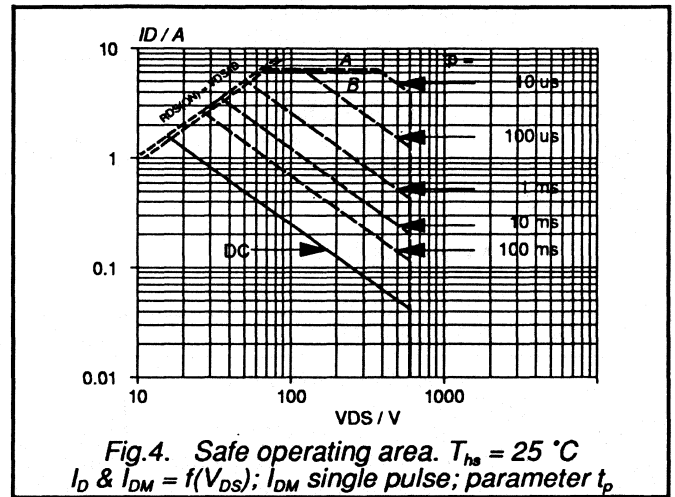


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

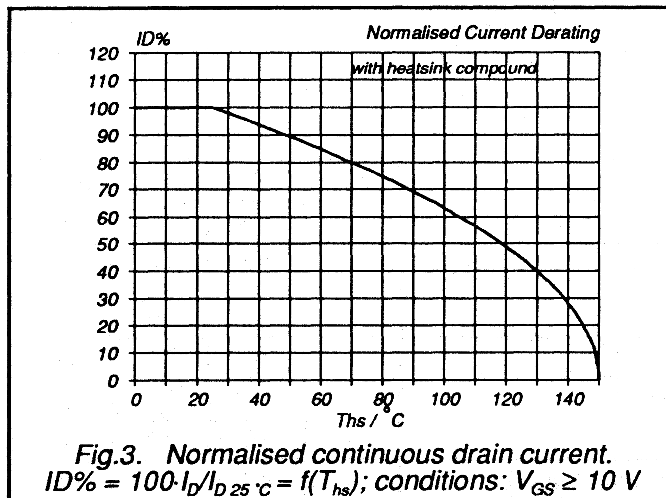


Fig.3. Normalised continuous drain current. $ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

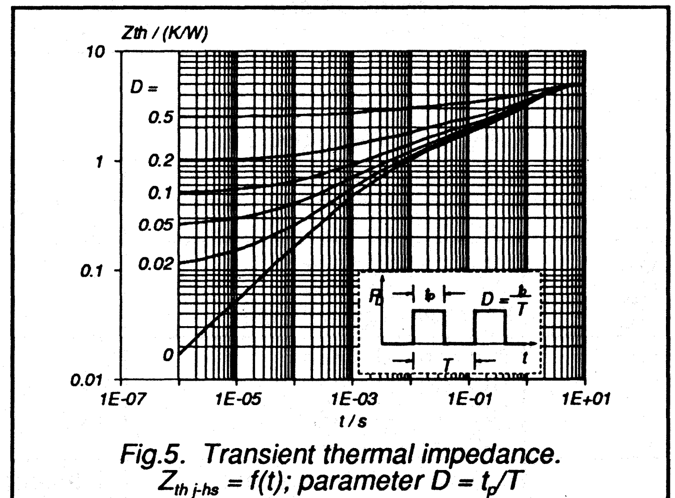


Fig.5. Transient thermal impedance. $Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

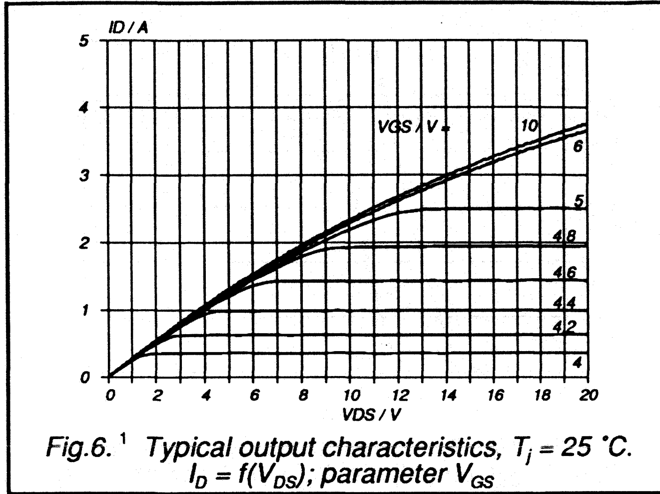


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

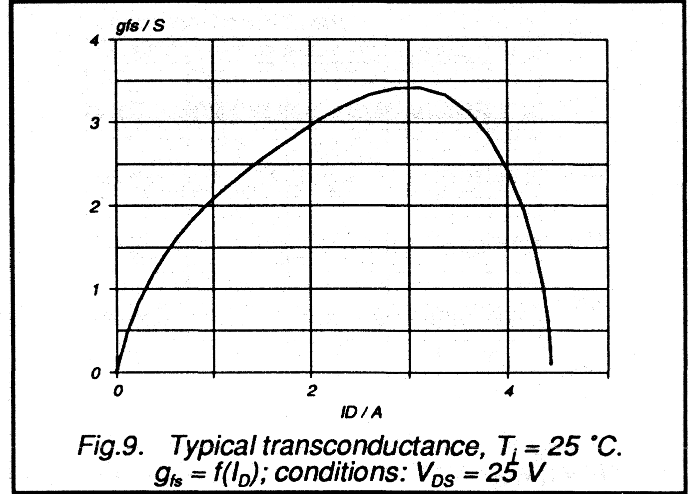


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

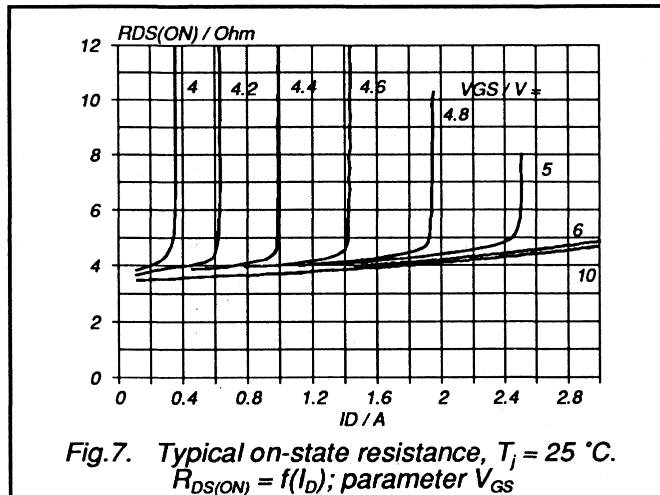


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

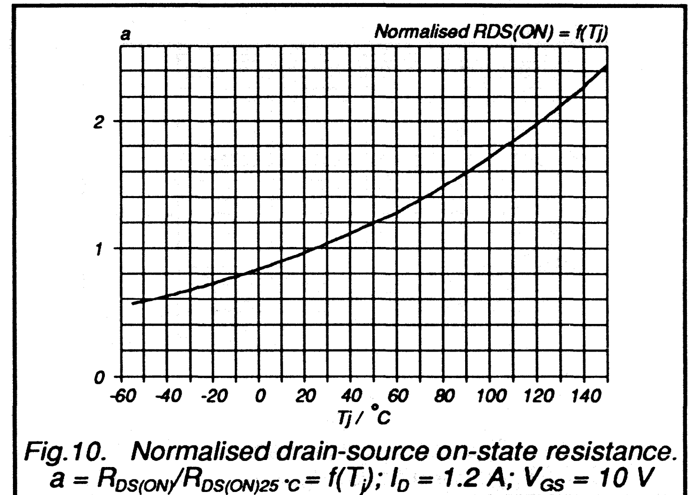


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.2$ A; $V_{GS} = 10$ V

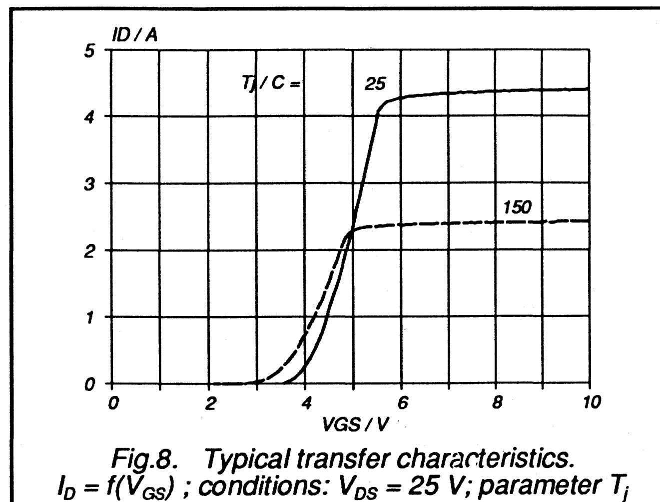


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

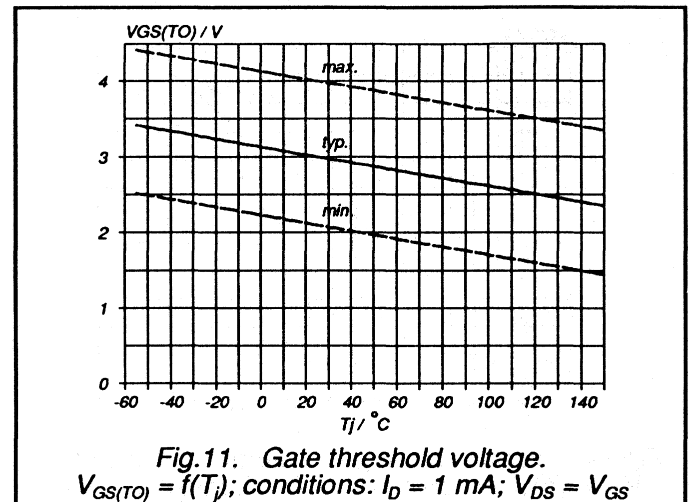


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

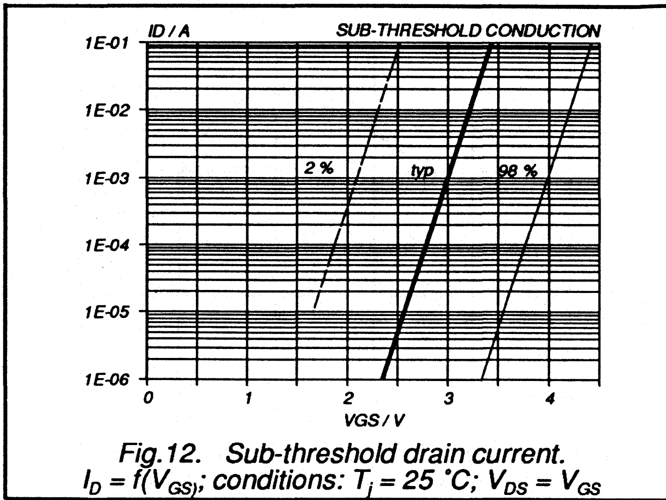


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

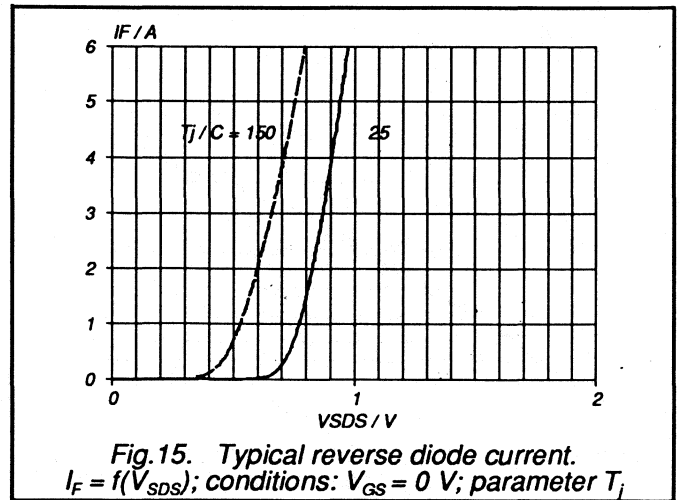


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

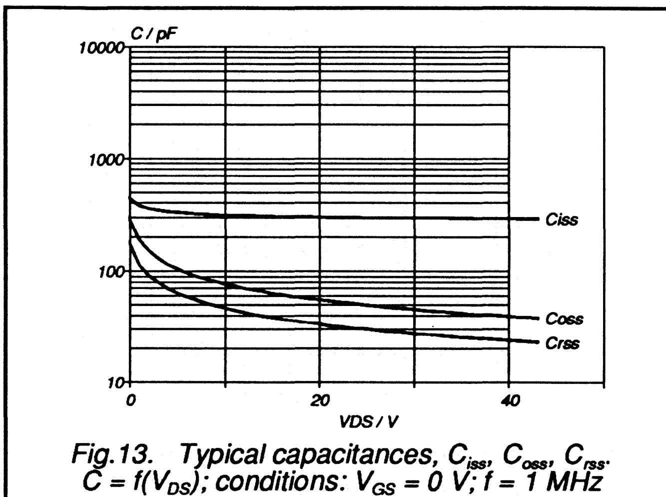


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

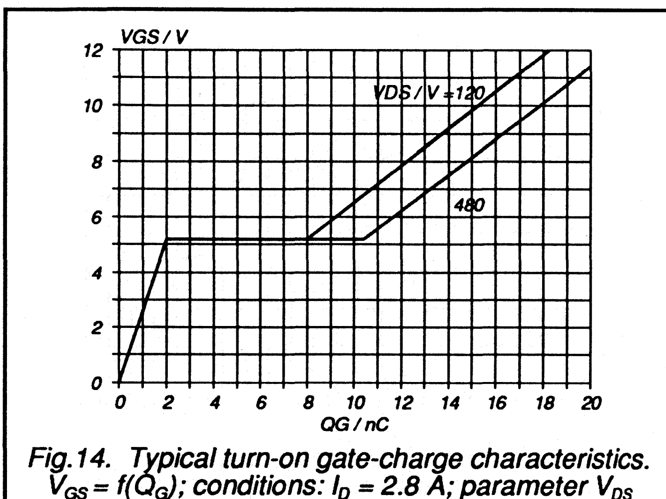


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 2.8$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK444	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	1.4	1.2	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	6	8	Ω

MECHANICAL DATA

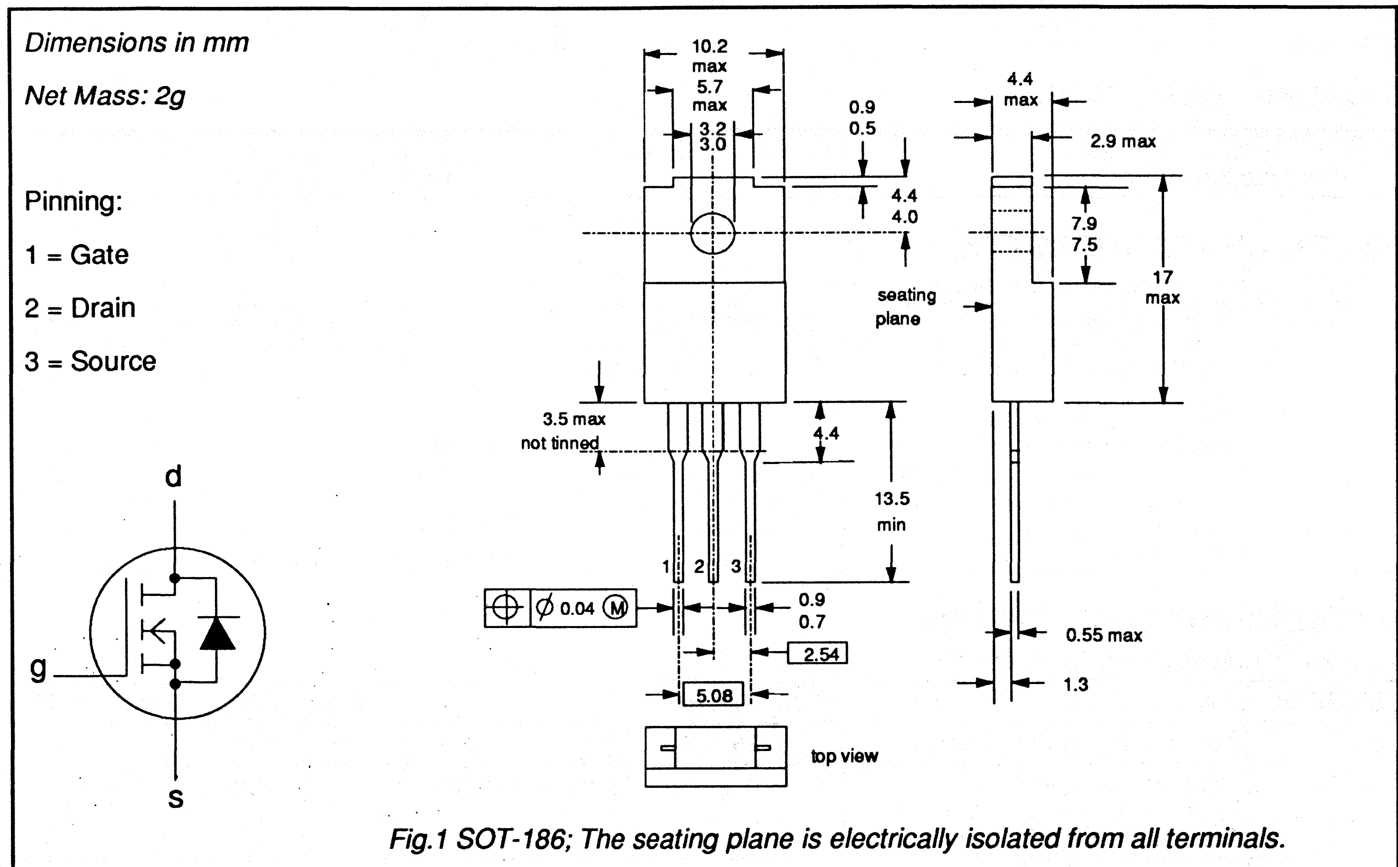


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	-800B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	1.4	1.2	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	0.9	0.75	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	5.6	4.8	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.0 A **BUK444-800A**	-	5.0	6.0	Ω
		BUK444-800B	-	6.0	8.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.0 A	1.0	2.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	450	750	pF
C_{oss}	Output capacitance		-	42	70	pF
C_{rss}	Feedback capacitance		-	15	30	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 1.9 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	15	20	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\,off}$	Turn-off delay time		-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	1.4	A
I_{DRM}	Pulsed reverse drain current	-	-	-	5.6	A
V_{SD}	Diode forward voltage	I_F = 1.4 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 1.4 A; $-dI_F/dt$ = 100 A/µs;	-	230	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	1.9	-	µC

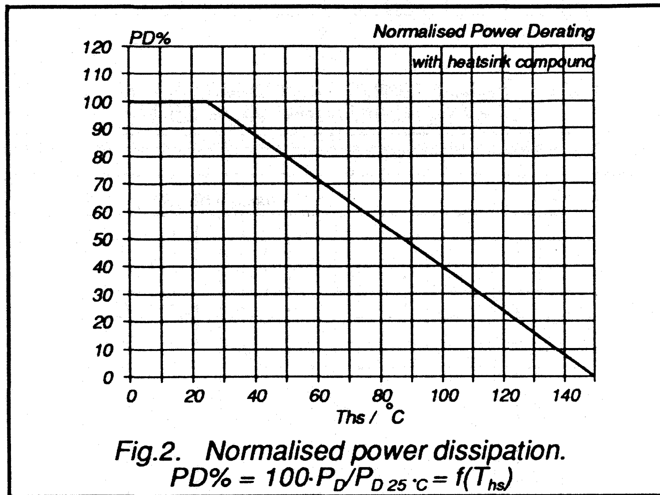


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

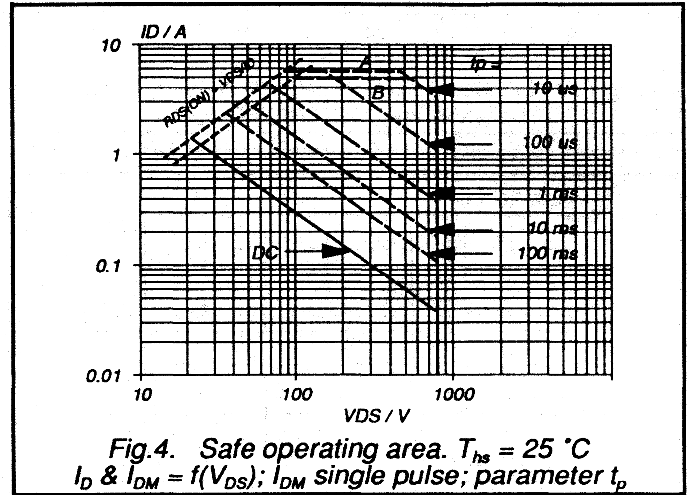


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

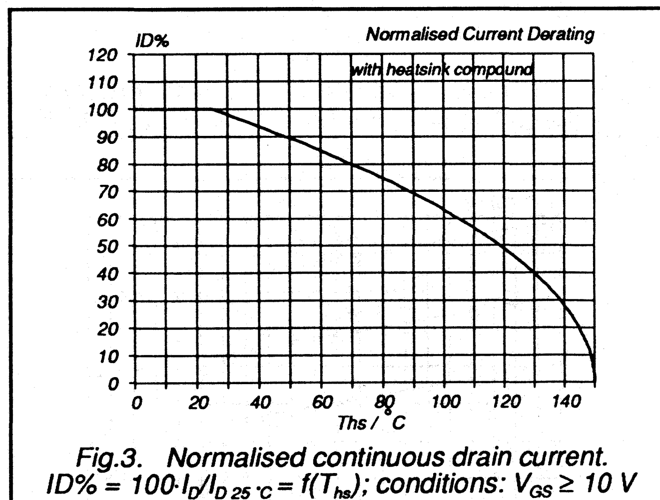


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

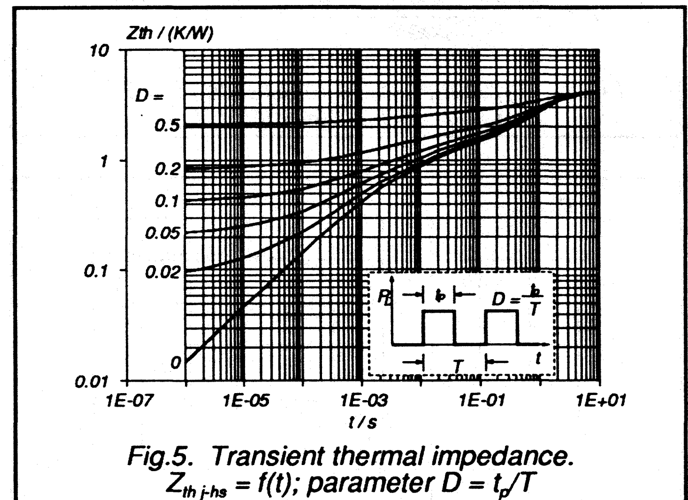


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

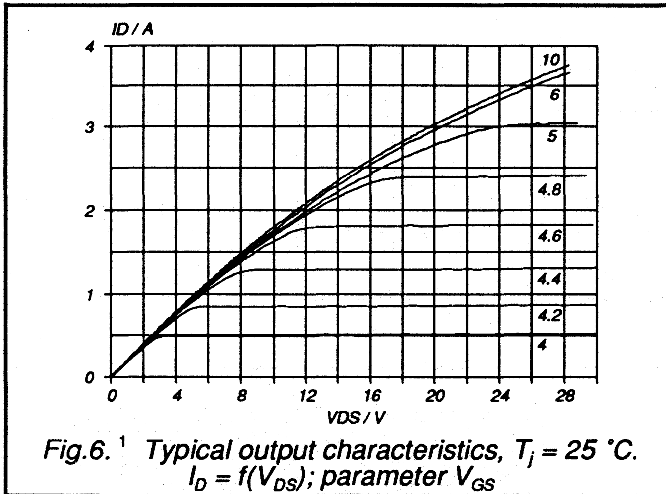


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

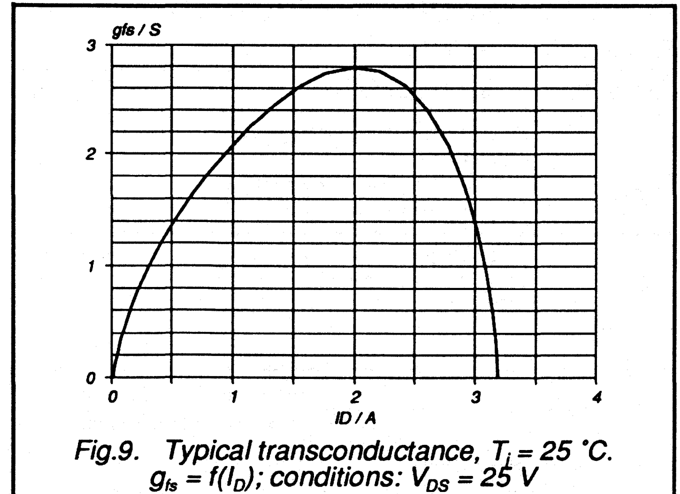


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

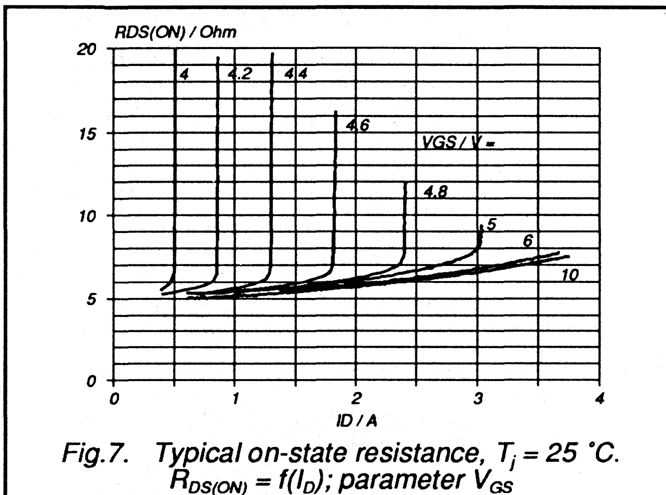


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

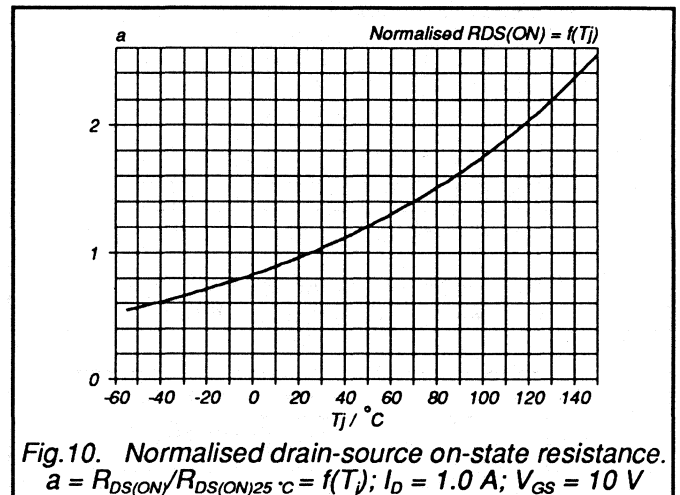


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.0$ A; $V_{GS} = 10$ V

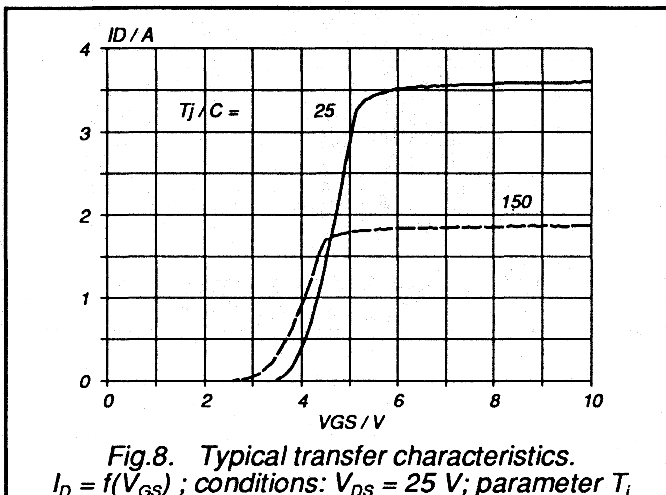


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

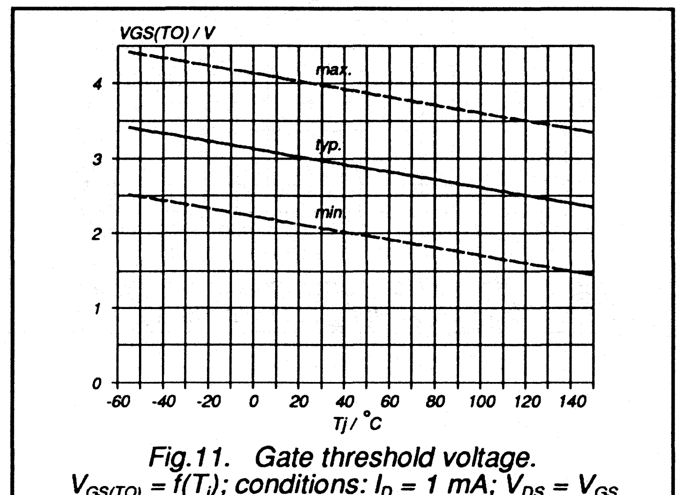


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

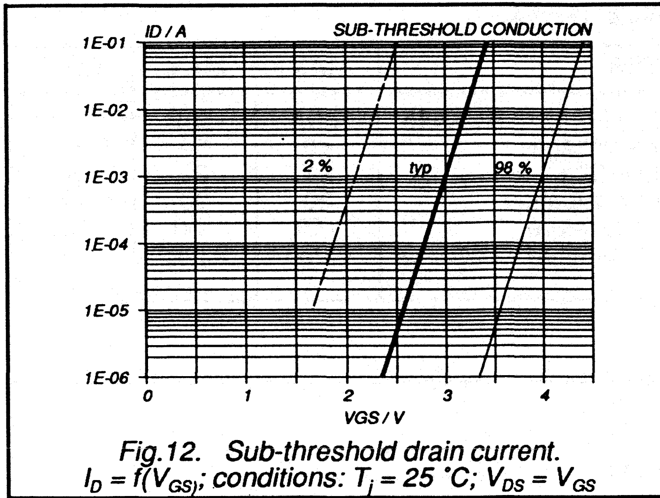


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: T_j = 25 °C; $V_{DS} = V_{GS}$

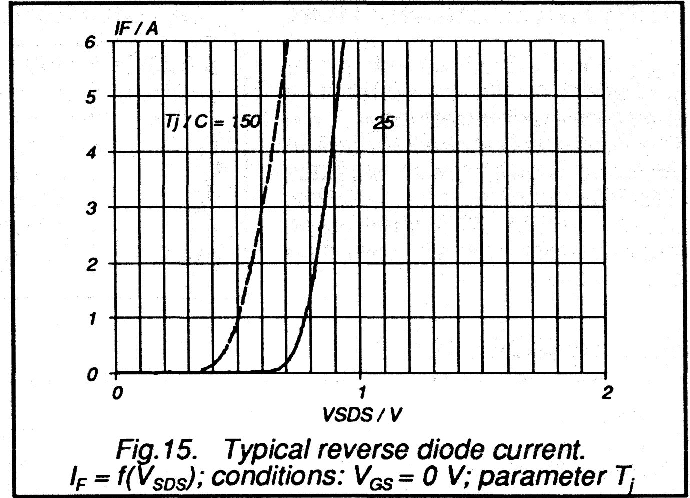


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: V_{GS} = 0 V; parameter T_j

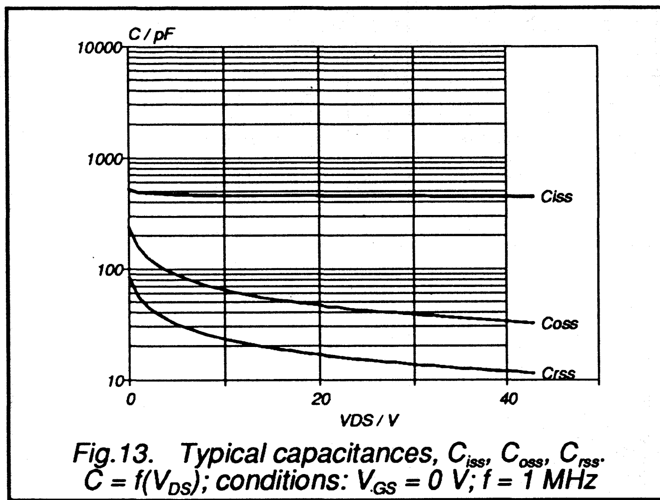


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: V_{GS} = 0 V; f = 1 MHz

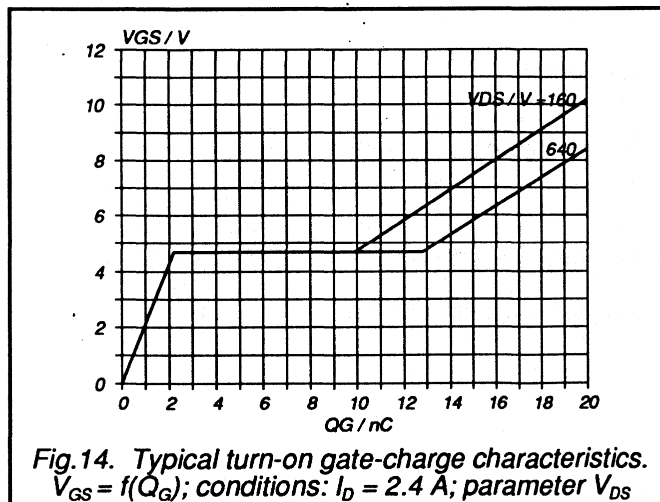


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: I_D = 2.4 A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	21	20	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.038	0.045	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	21	20	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	13	12.6	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	84	80	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 4.17 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 20 A **BUK445-50A**	-	0.03	0.038	Ω
		BUK445-50B	-	0.04	0.045	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 20 A	8	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1650	2000	pF
C_{oss}	Output capacitance		-	560	750	pF
C_{rss}	Feedback capacitance		-	300	400	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	25	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	125	160	ns
t_f	Turn-off fall time		-	100	130	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	21	A
I_{DRM}	Pulsed reverse drain current	-	-	-	84	A
V_{SD}	Diode forward voltage	I_F = 21 A ; V_{GS} = 0 V	-	1.4	1.8	V
t_{rr}	Reverse recovery time	I_F = 21 A; $-dI_F/dt$ = 100 A/µs;	-	250	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.30	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 41 A ; V_{DD} ≤ 25 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

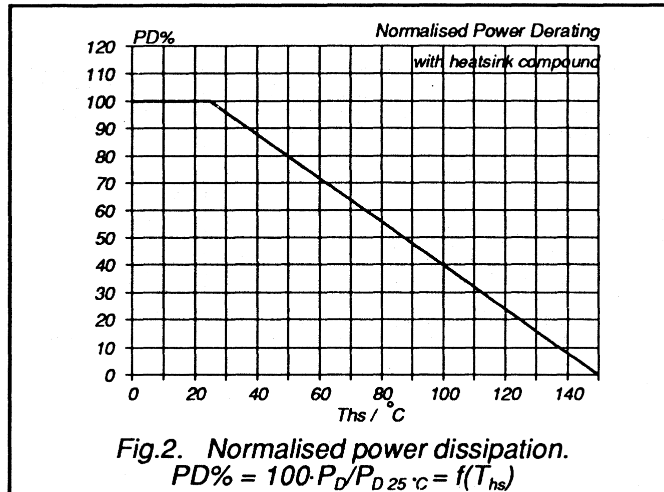


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^{\circ}C} = f(T_{hs})$

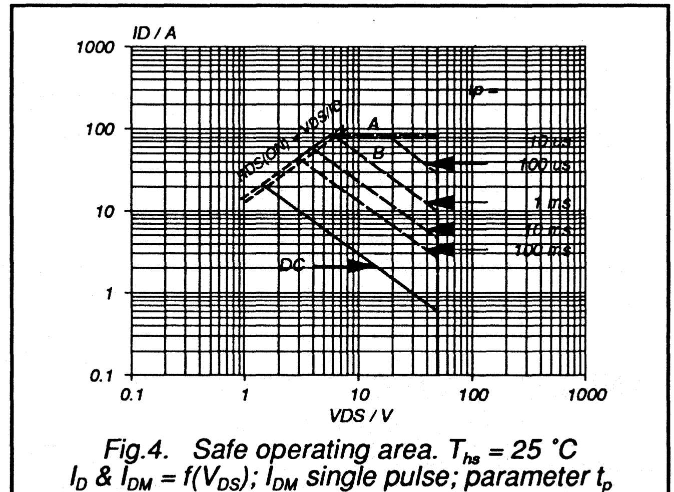


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

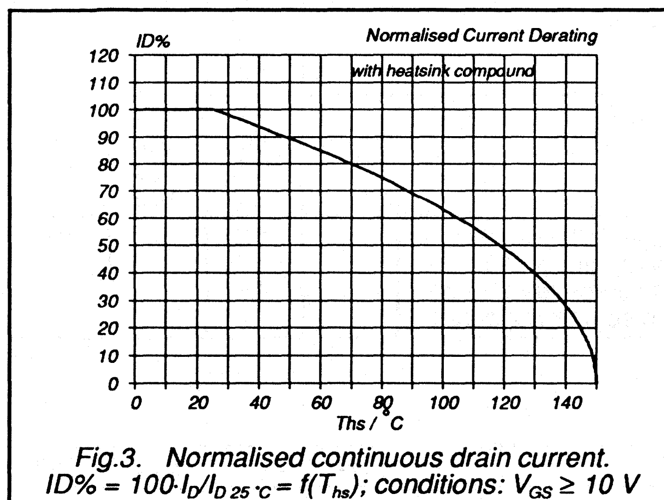


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^{\circ}C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

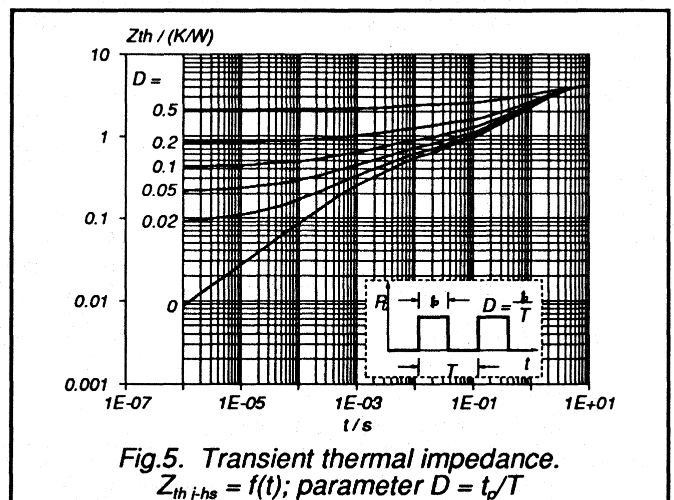


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

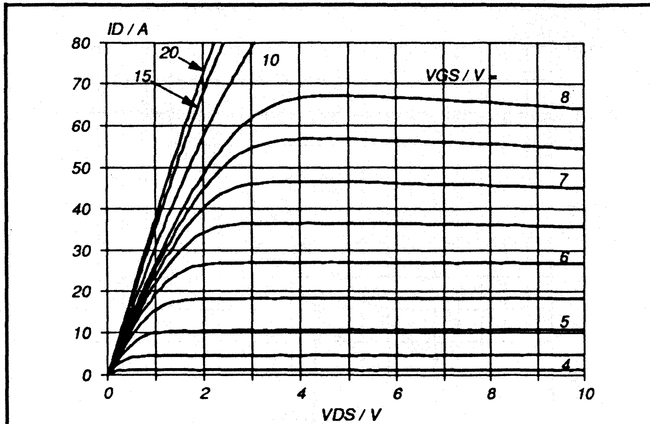


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C. $I_D = f(V_{DS})$; parameter V_{GS}

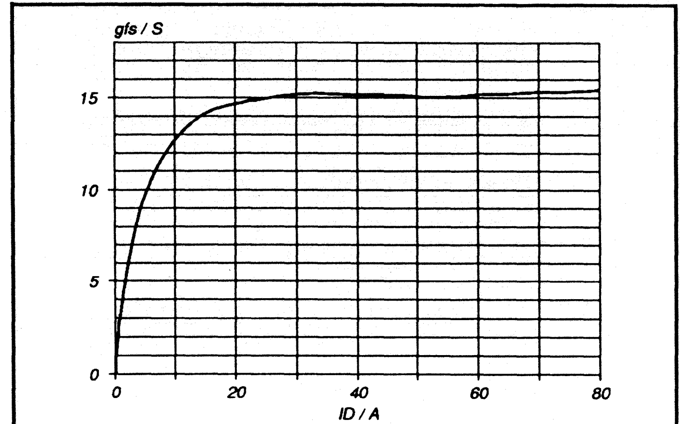


Fig.9. Typical transconductance, $T_j = 25$ °C. $g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

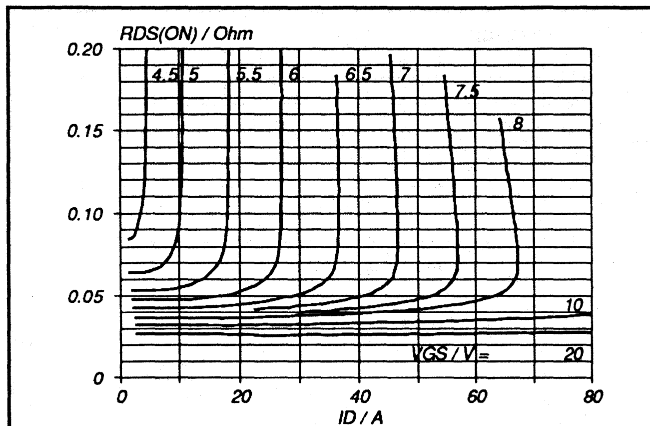


Fig.7. Typical on-state resistance, $T_j = 25$ °C. $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

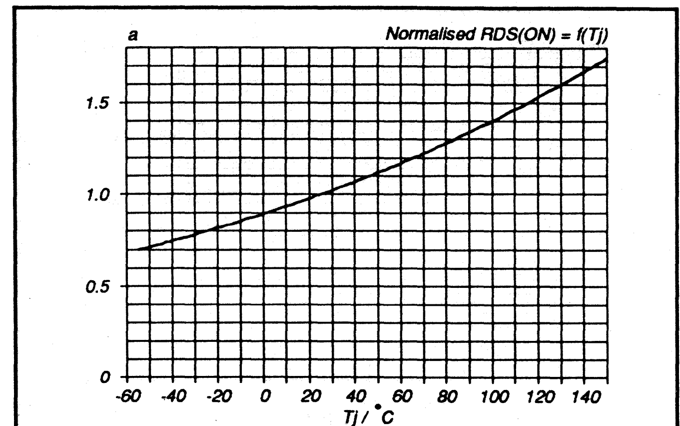


Fig.10. Normalised drain-source on-state resistance. $a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 20$ A; $V_{GS} = 10$ V

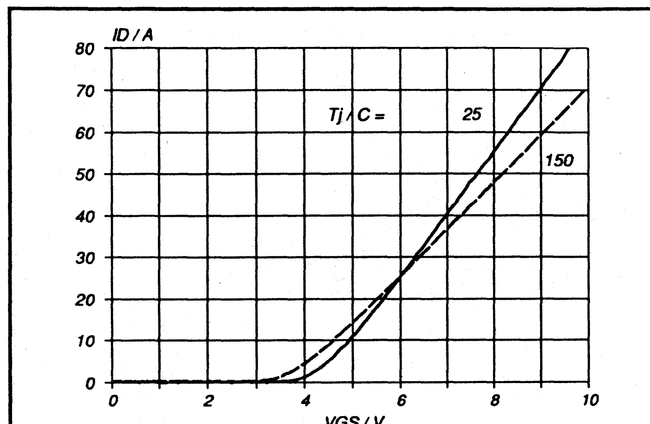


Fig.8. Typical transfer characteristics. $I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

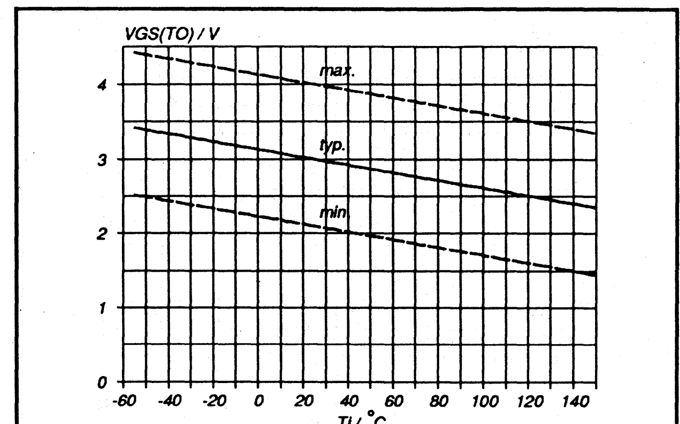


Fig.11. Gate threshold voltage. $V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

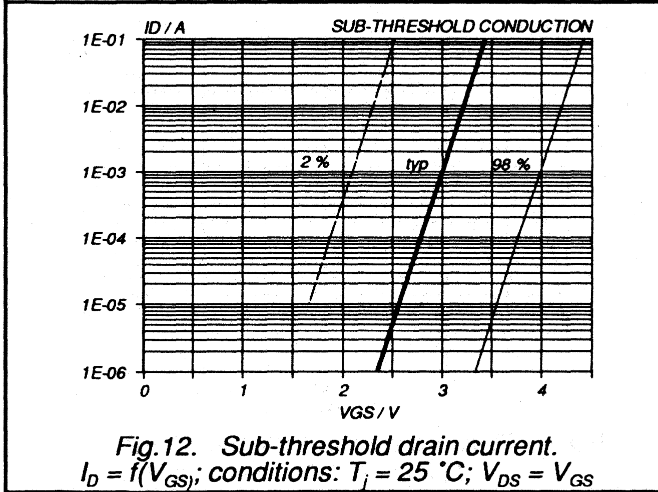


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

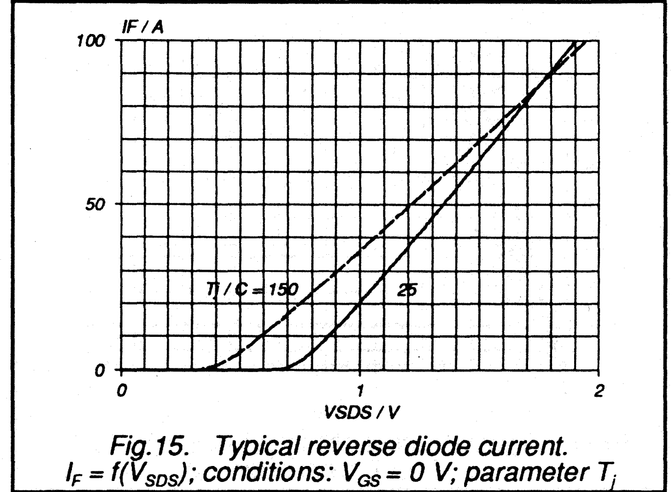


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

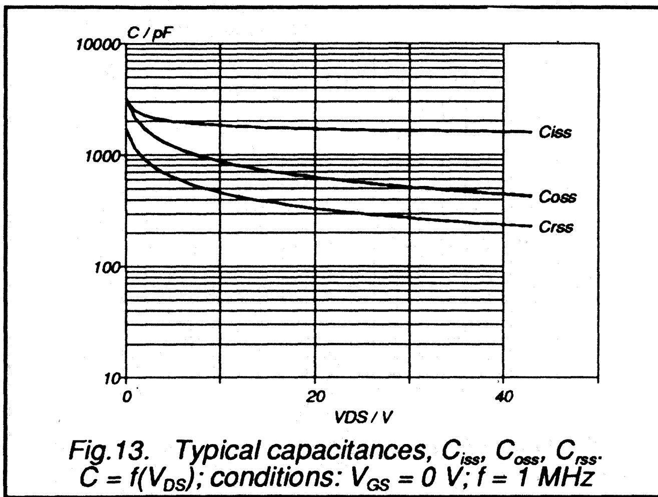


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

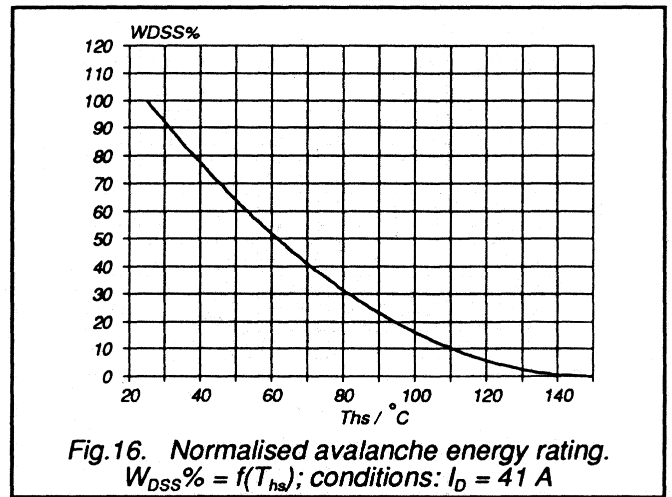


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 41$ A

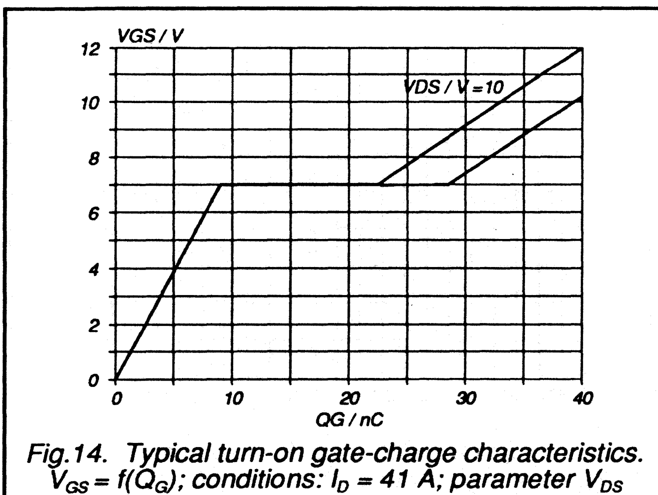


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 41$ A; parameter V_{DS}

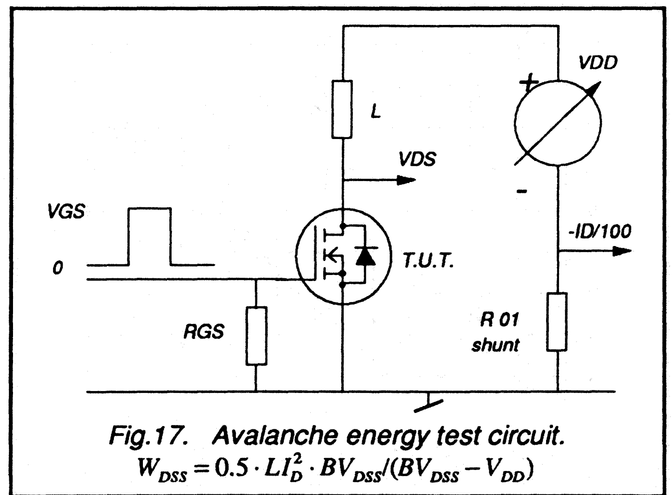


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYHSOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	14	12	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.08	0.1	Ω

MECHANICAL DATA

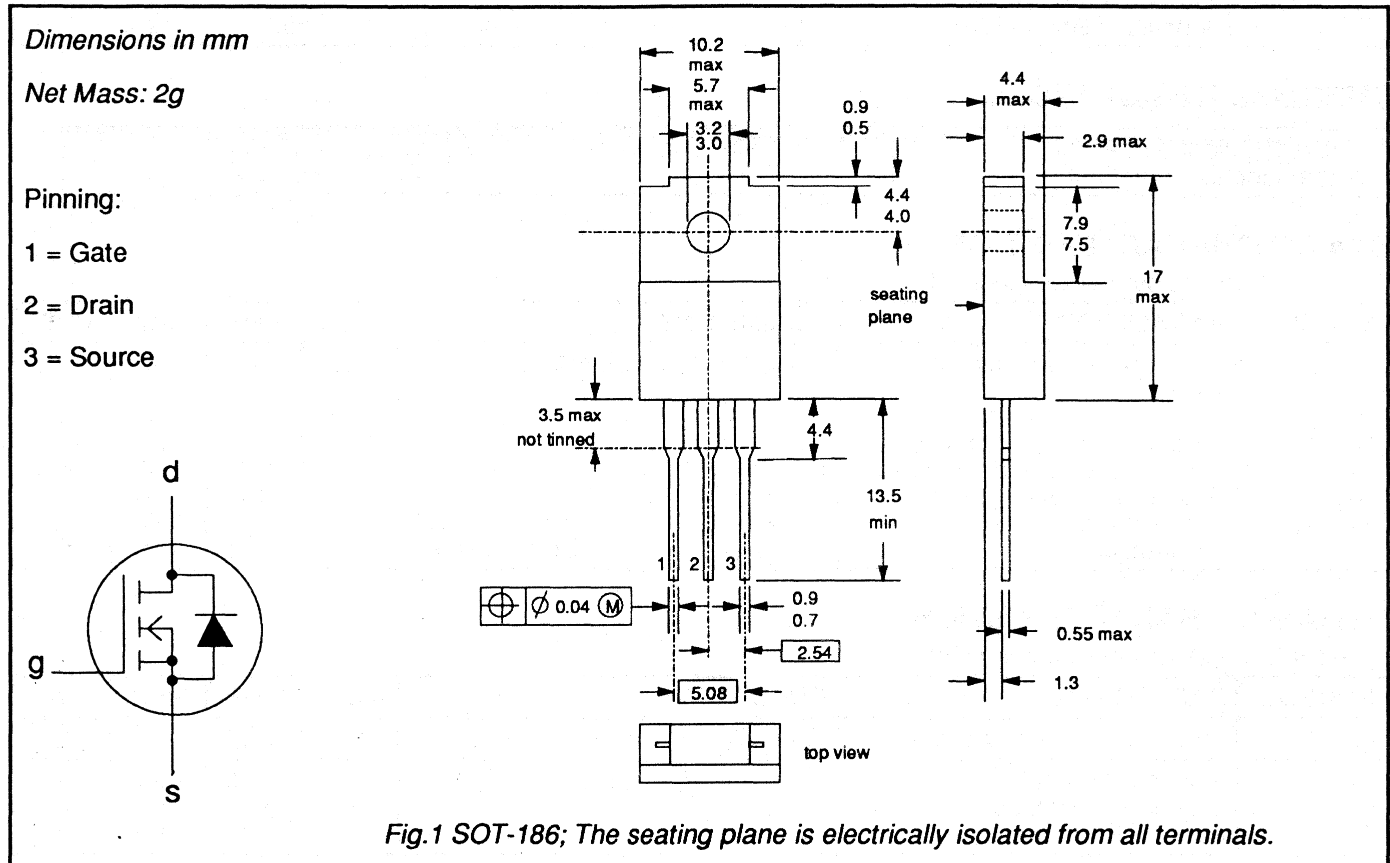


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYHSOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	14	12	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	8.7	7.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	56	48	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYHSOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 13 A **BUK445-100A**	-	0.07	0.08	Ω
		BUK445-100B	-	0.08	0.1	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYHSOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 13 A	10	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1650	2000	pF
C_{oss}	Output capacitance		-	350	500	pF
C_{rss}	Feedback capacitance		-	100	150	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	15	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	100	160	ns
t_f	Turn-off fall time		-	50	80	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYHSOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 14 A; -dI_F/dt = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYHSOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 26 A ; V_{DD} ≤ 50 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

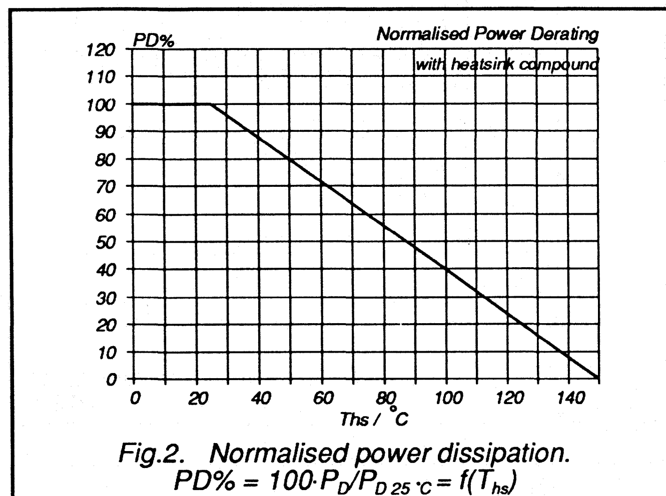


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

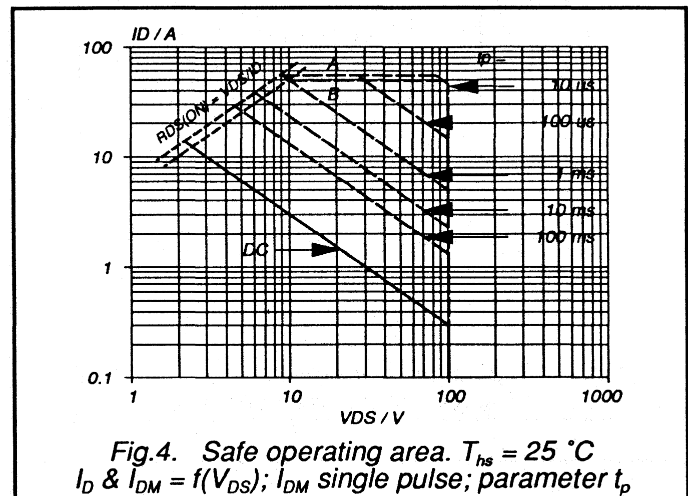


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

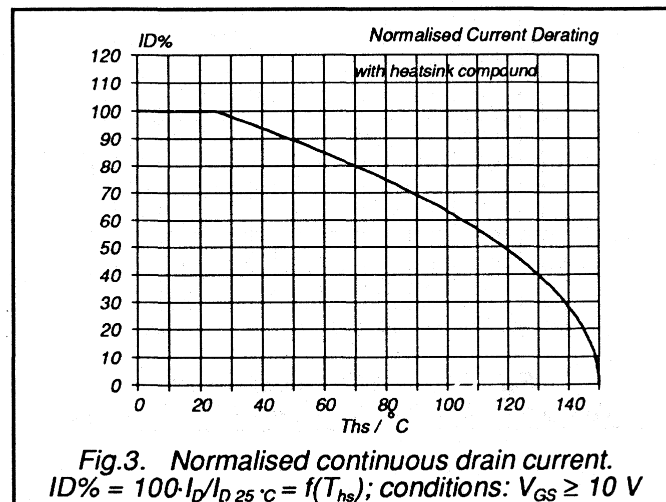


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

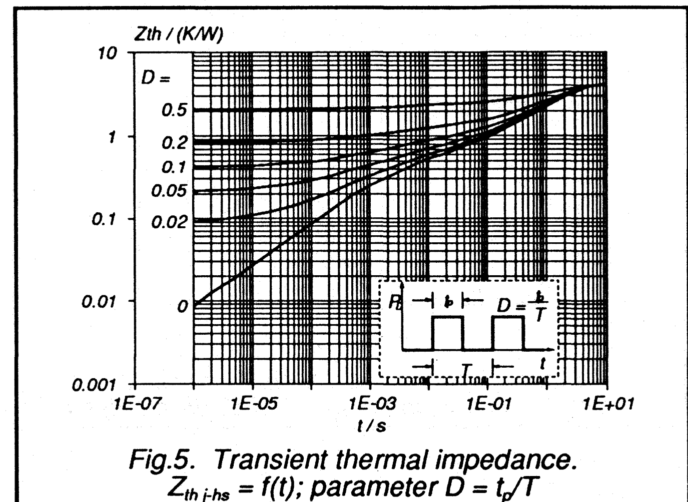


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

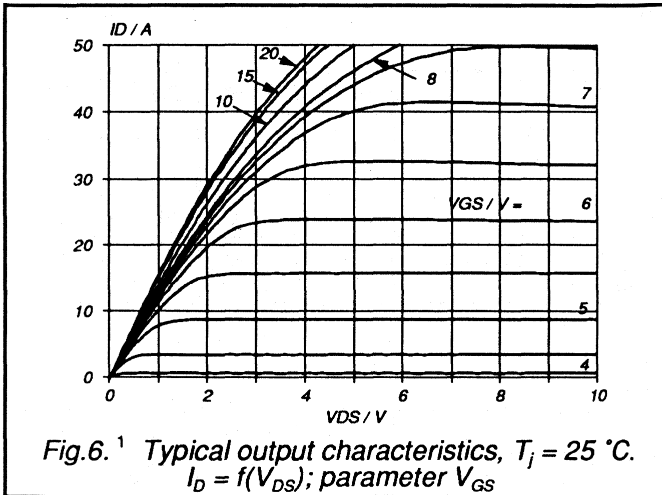


Fig.6.[1] Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

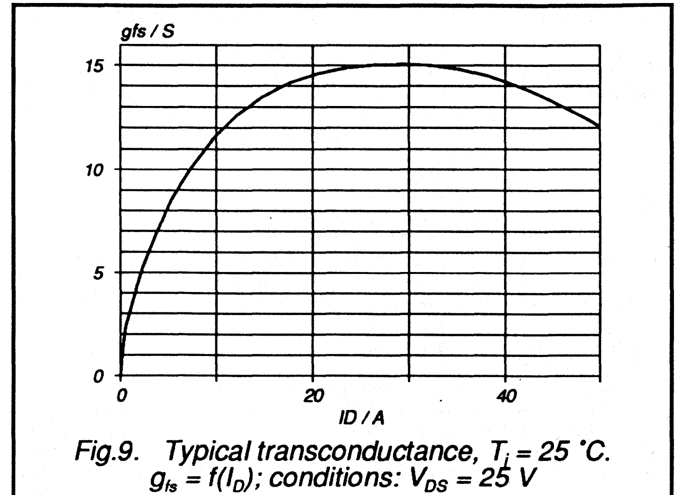


Fig.9. Typical transconductance, $T_j = 25\ ^\circ C$.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

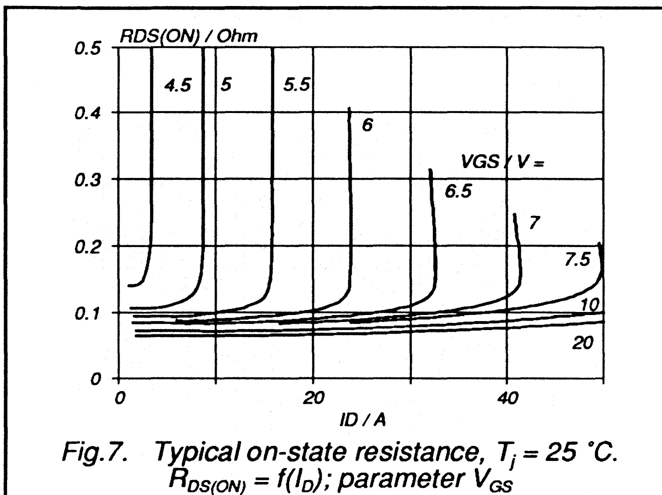


Fig.7. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

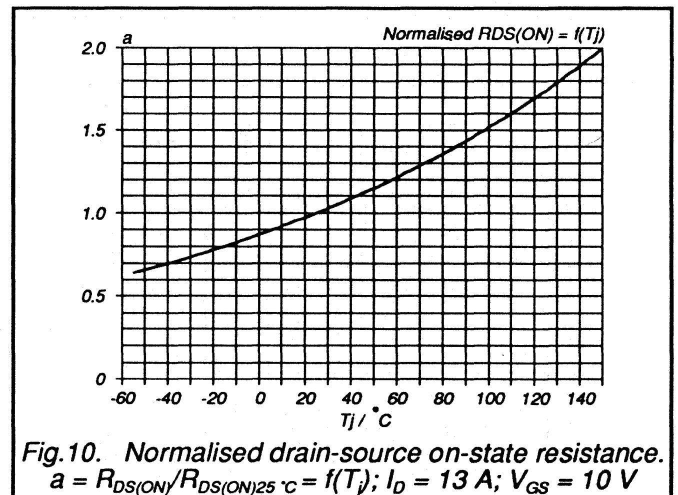


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; $I_D = 13$ A; $V_{GS} = 10$ V

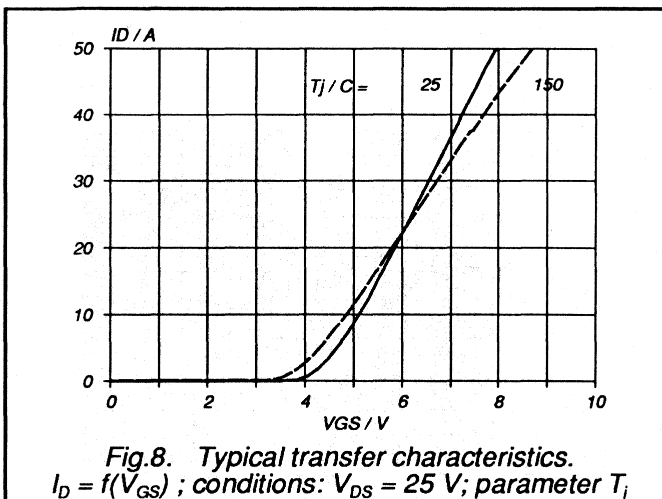


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

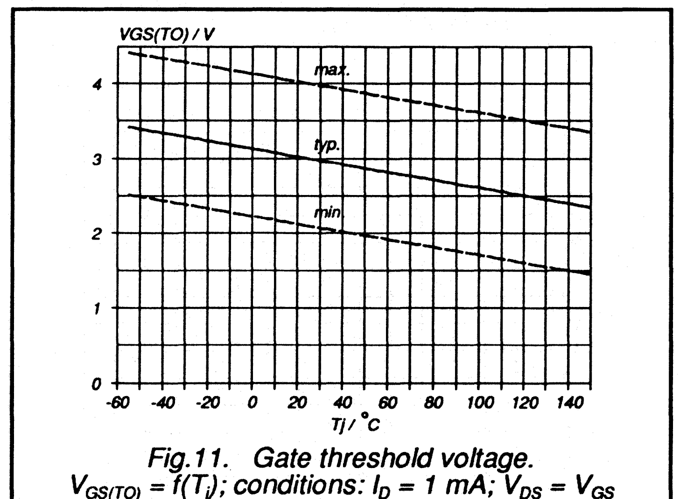


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

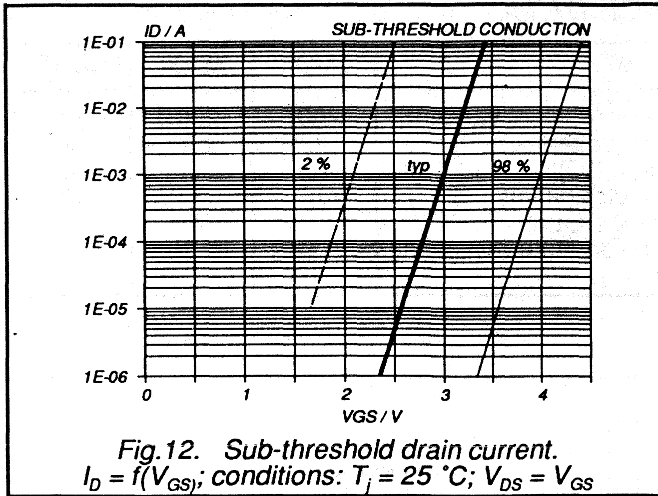


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

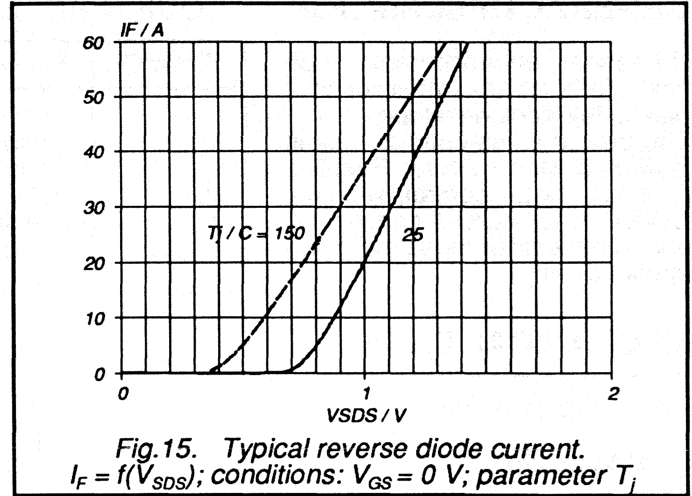


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

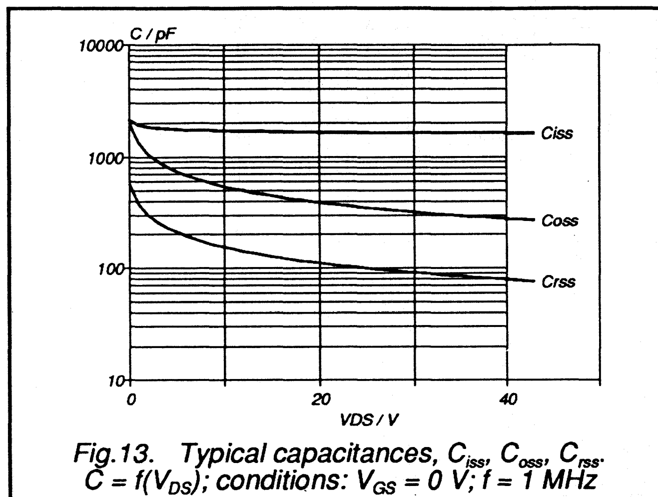


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

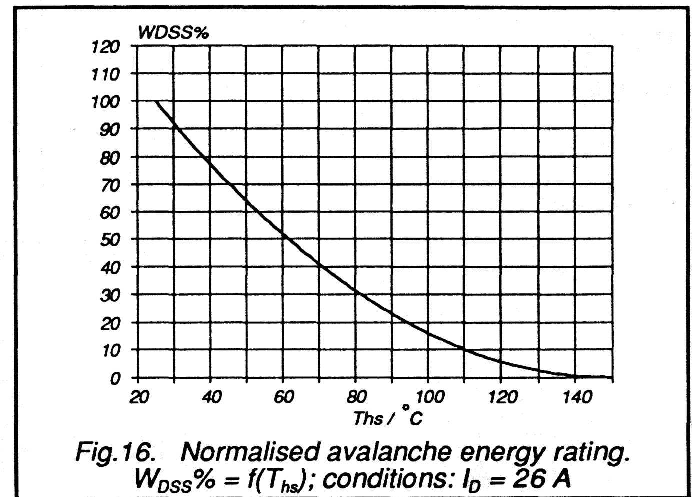


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 26$ A

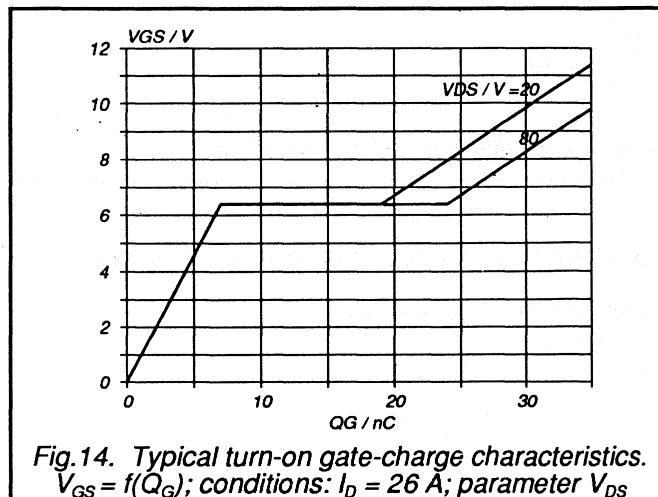


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 26$ A; parameter V_{DS}

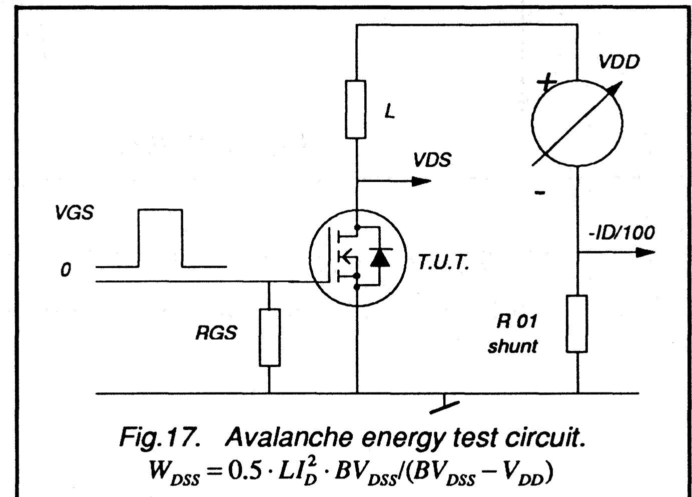


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	7.6	7	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.23	0.28	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

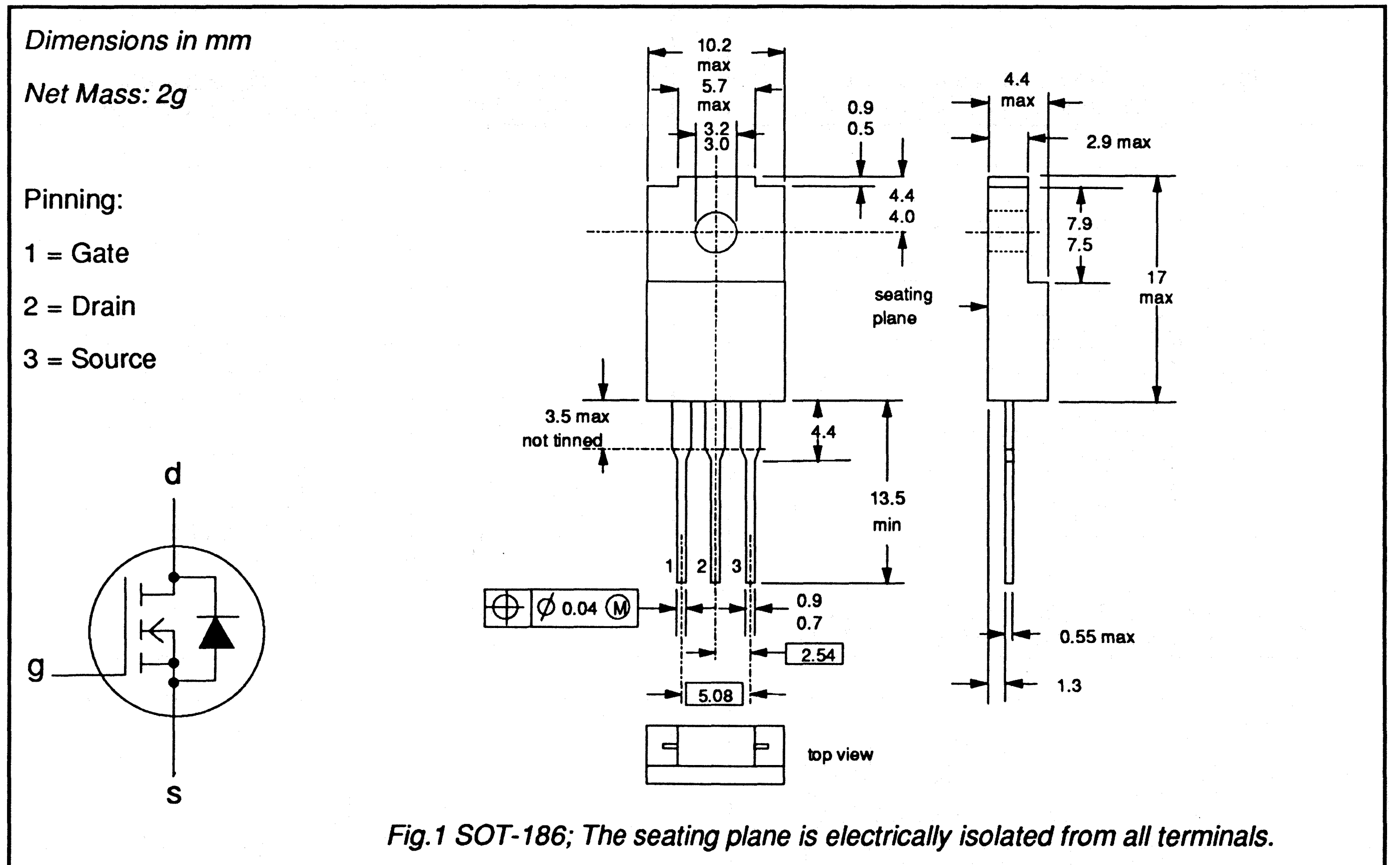


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	7.6	7	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	4.8	4.4	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	30	28	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 7 A **BUK445-200A**	-	0.2	0.23	Ω
		BUK445-200B	-	0.22	0.28	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 7 A	6	8.4	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1400	1750	pF
C_{oss}	Output capacitance		-	190	250	pF
C_{rss}	Feedback capacitance		-	55	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	18	30	ns
t_r	Turn-on rise time		-	35	60	ns
$t_{d\,off}$	Turn-off delay time		-	85	120	ns
t_f	Turn-off fall time		-	35	50	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	7.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	30	A
V_{SD}	Diode forward voltage	I_F = 7.6 A ; V_{GS} = 0 V	-	1.0	1.5	V
t_{rr}	Reverse recovery time	I_F = 7.6 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; $V_{DD} \leq$ 100 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

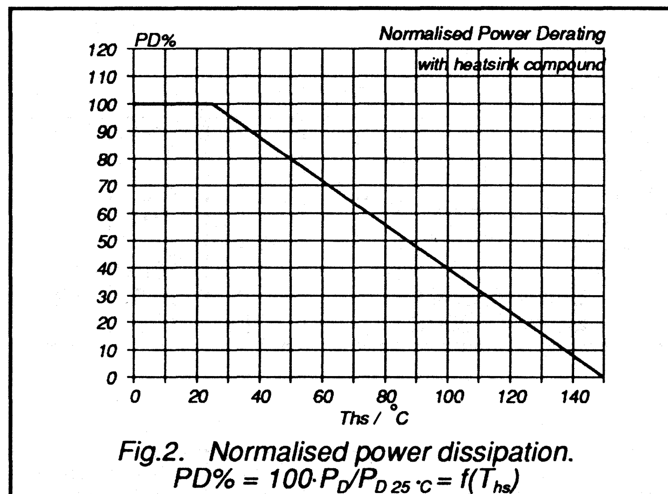


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

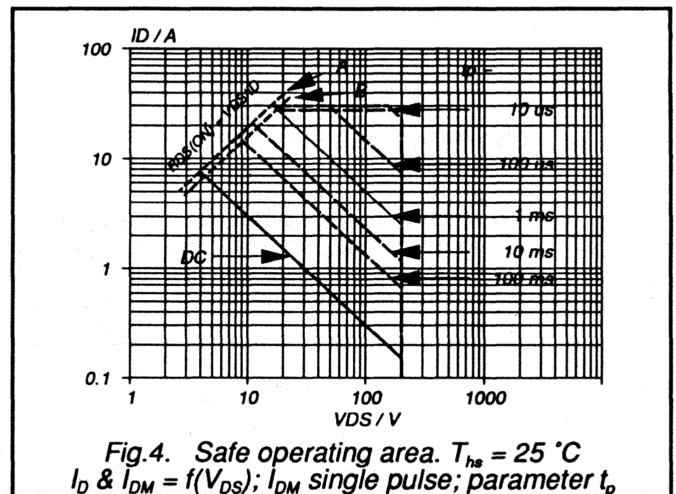


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

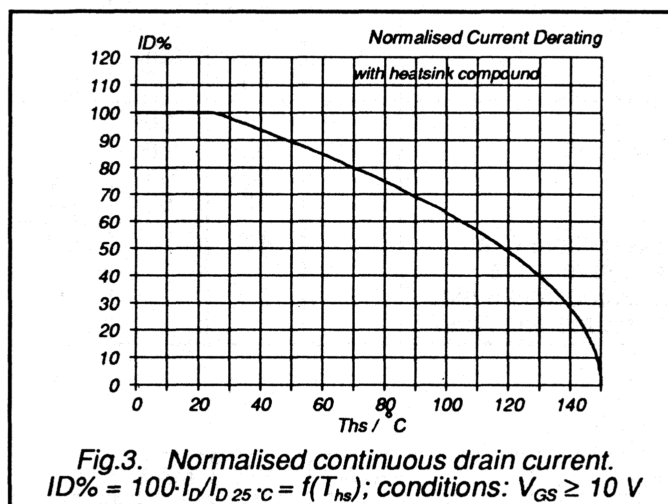


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

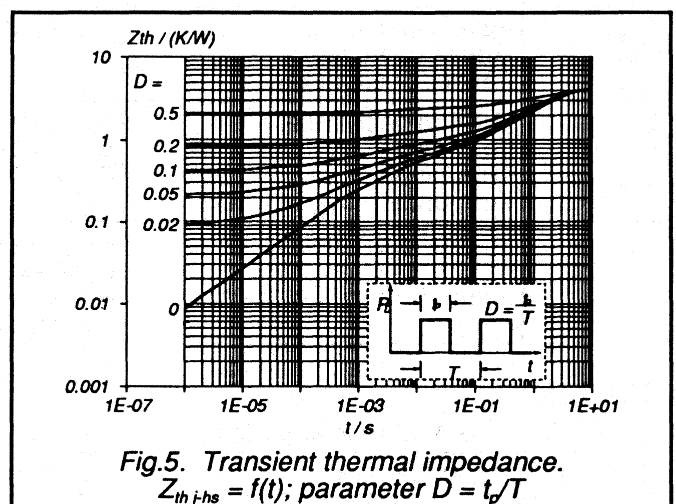


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

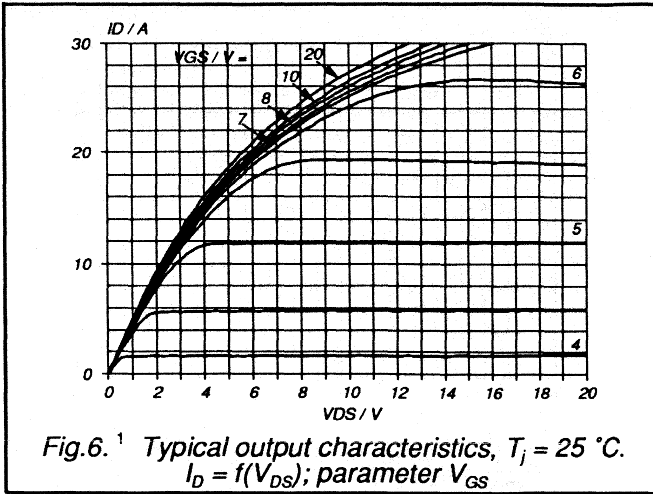


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

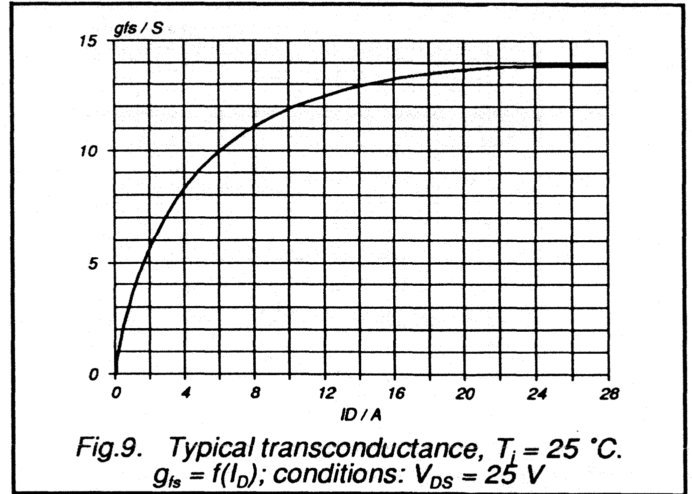


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

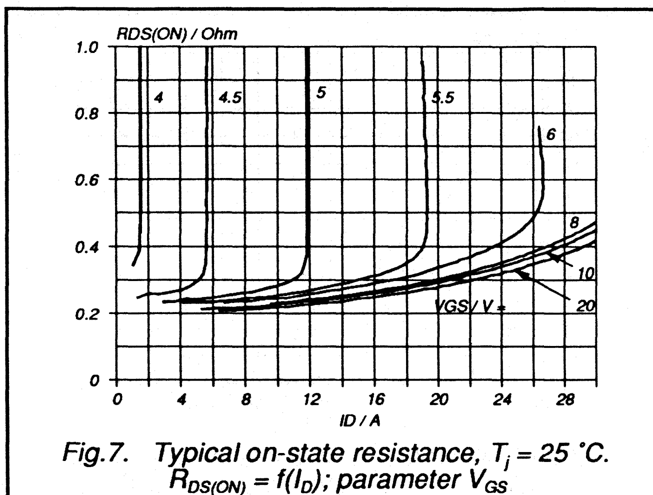


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

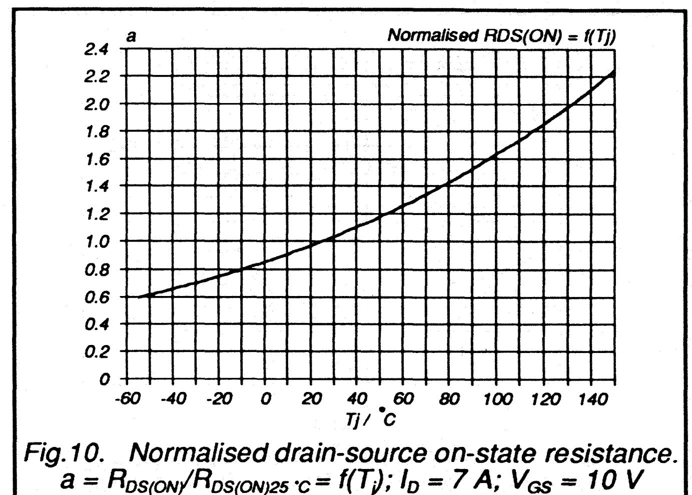


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 7 A; V_{GS} = 10 V

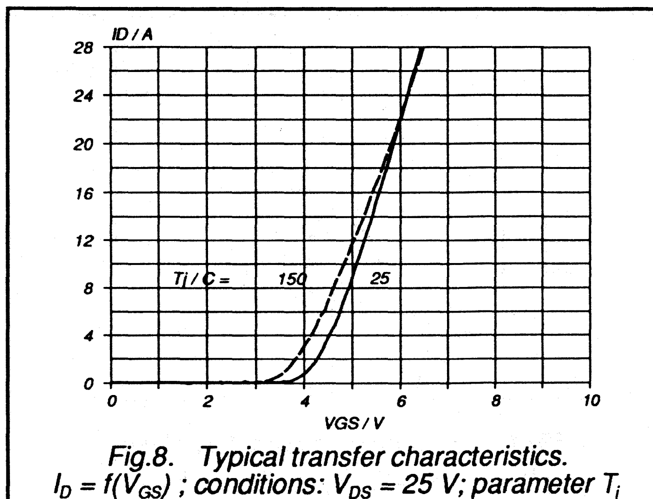


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

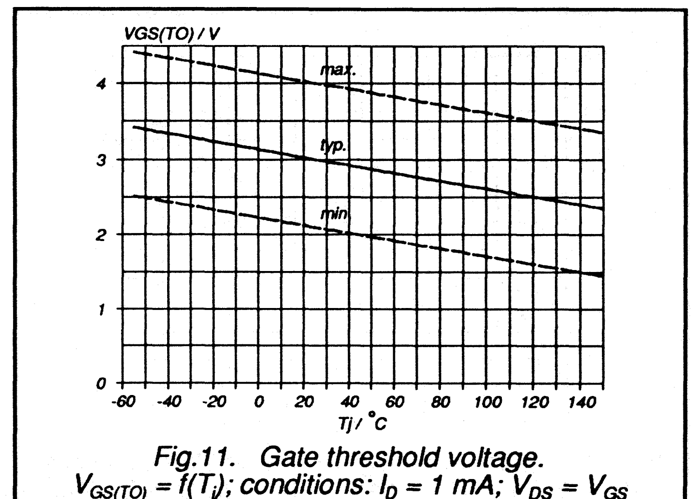


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

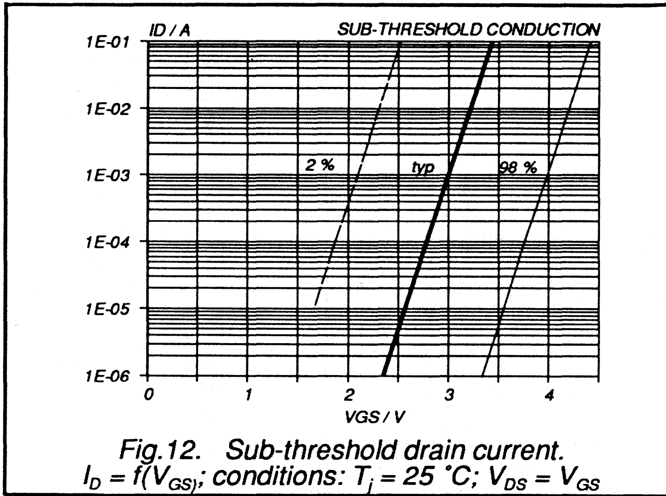


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

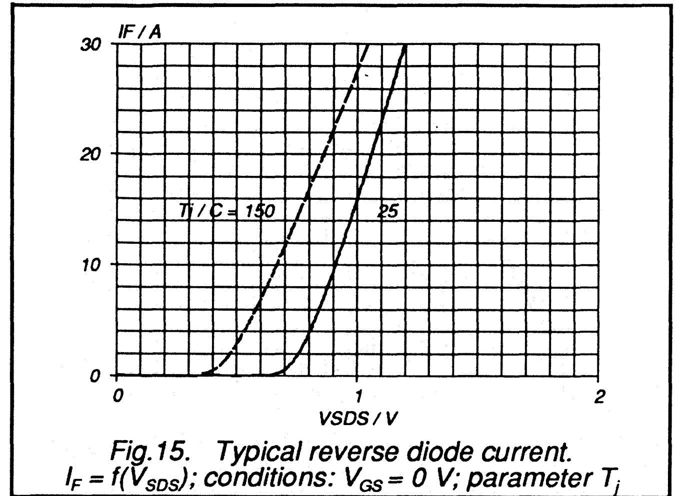


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

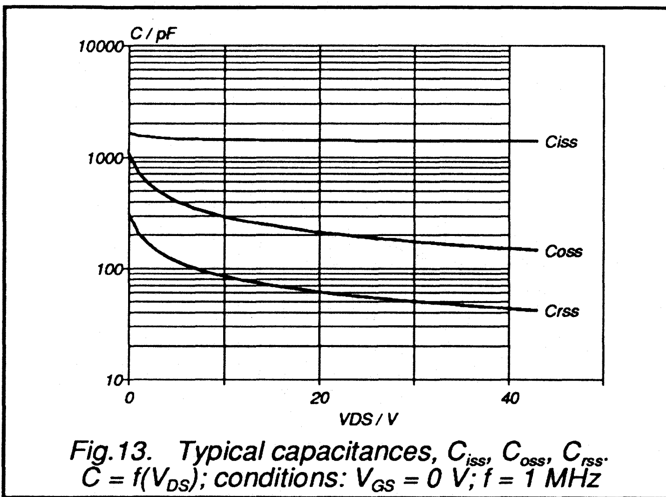


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

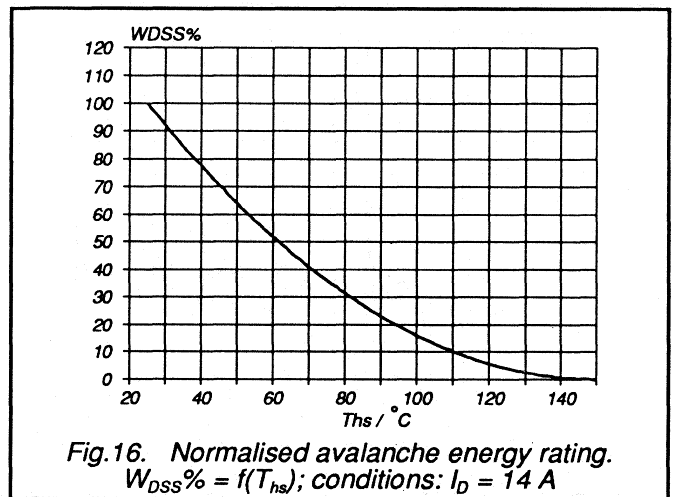


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 14$ A

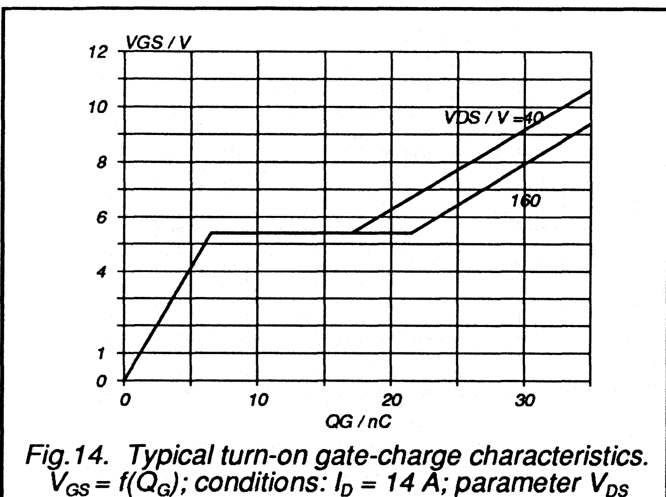


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

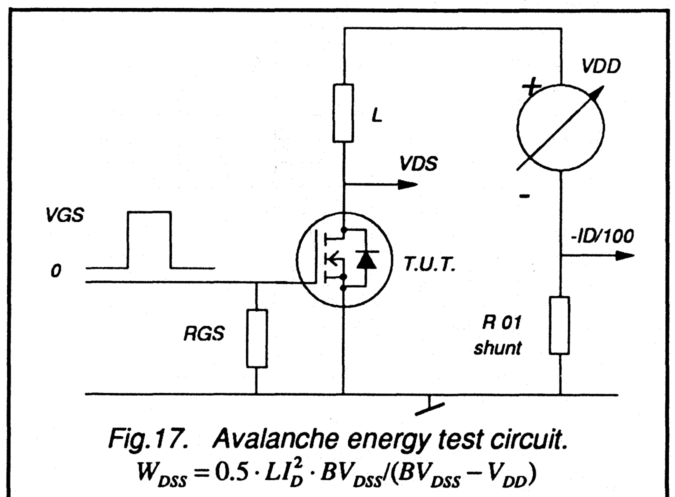


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	4.0	3.8	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.8	1.0	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	**-400B**	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	4.0	3.6	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	2.5	2.3	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	16	14	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.1 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK445-400A**	-	0.7	0.8	Ω
		I_D = 2.5 A **BUK445-400B**	-	0.9	1.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	120	180	pF
C_{rss}	Feedback capacitance		-	50	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.7 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	120	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.0	A
I_{DRM}	Pulsed reverse drain current	-	-	-	16	A
V_{SD}	Diode forward voltage	I_F = 4 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 4 A; -dI_F/dt = 100 A/µs;	-	1000	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	5.0	-	µC

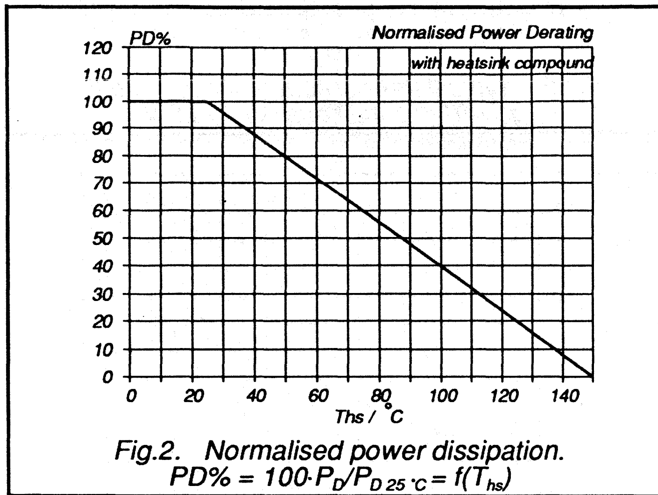


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^{\circ}C} = f(T_{hs})$

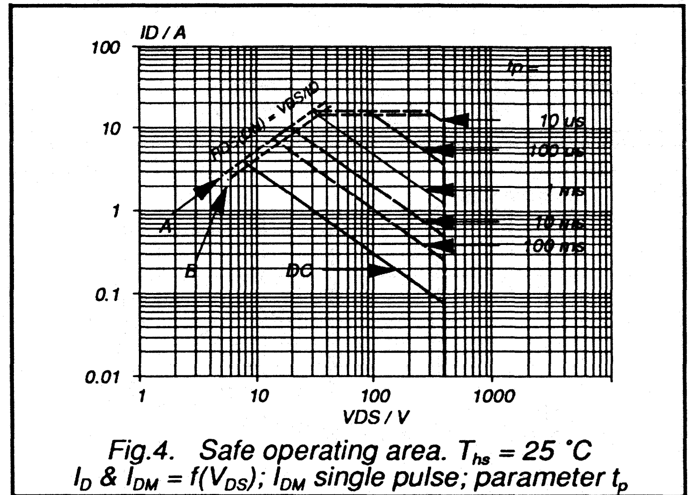


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

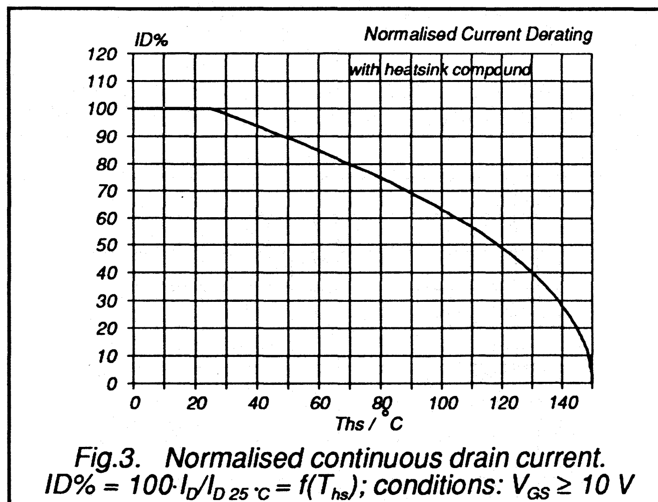


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^{\circ}C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

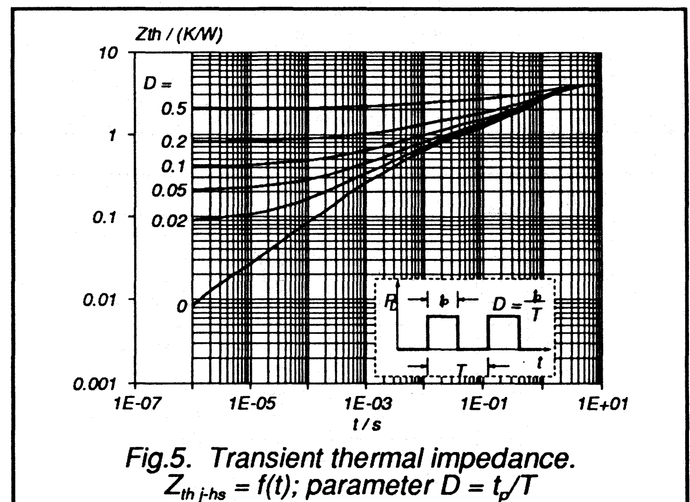


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs}$ = f(t); parameter D = t_p/T

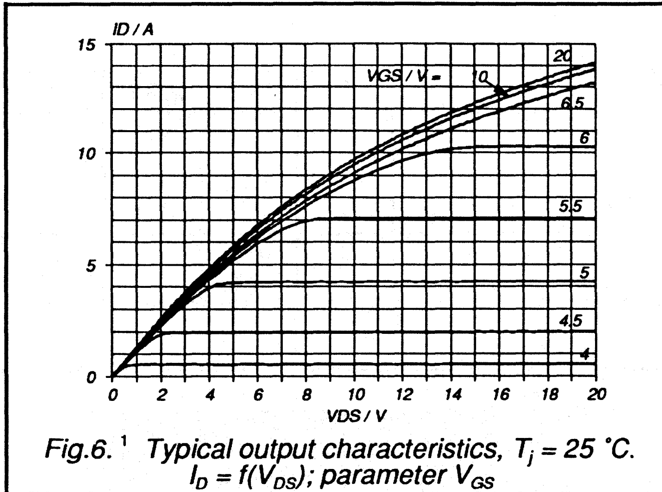


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

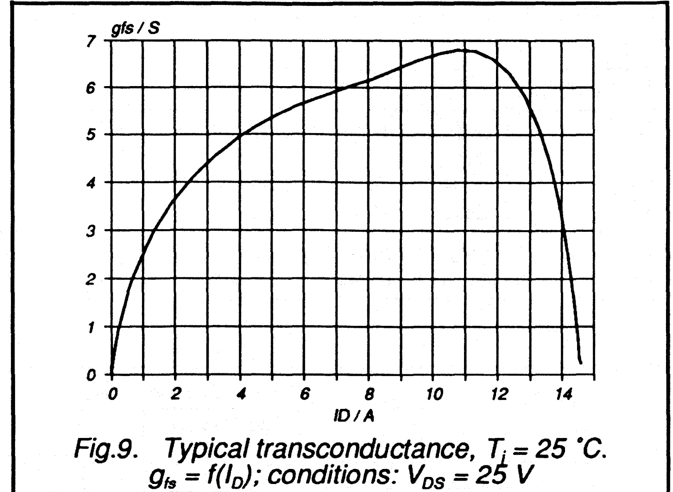


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

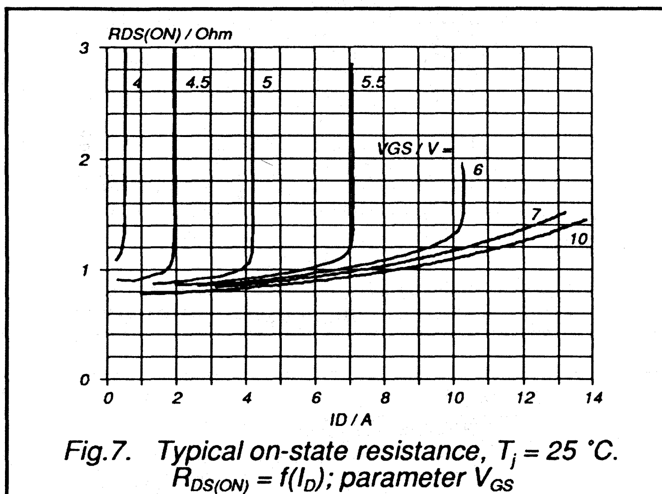


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

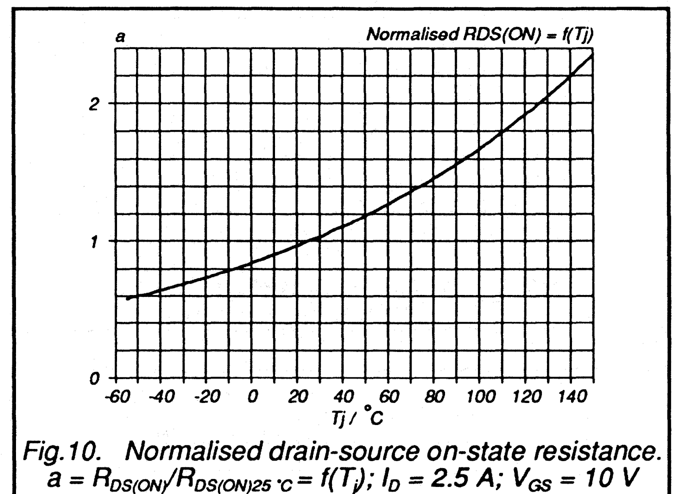


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

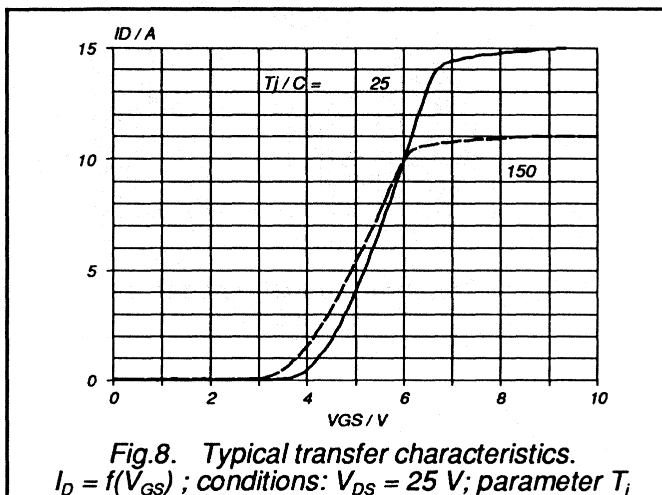


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

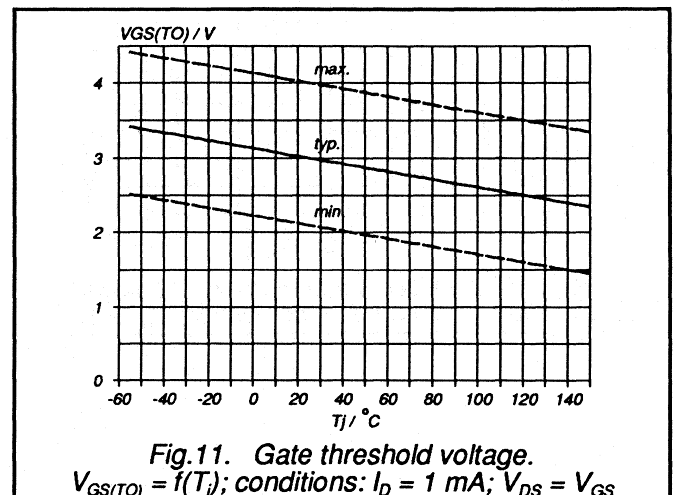


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

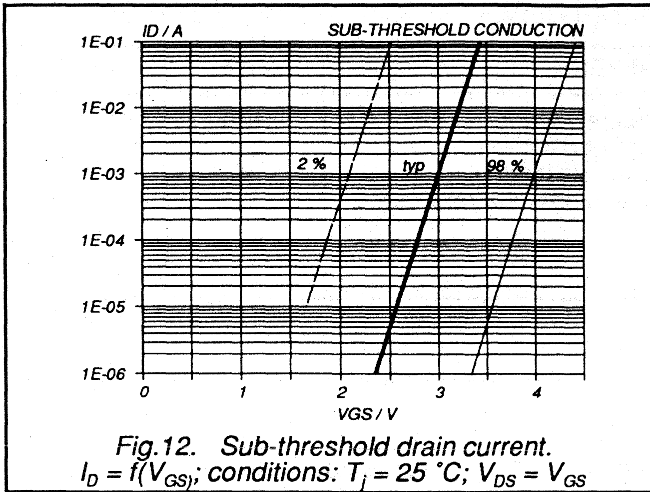


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

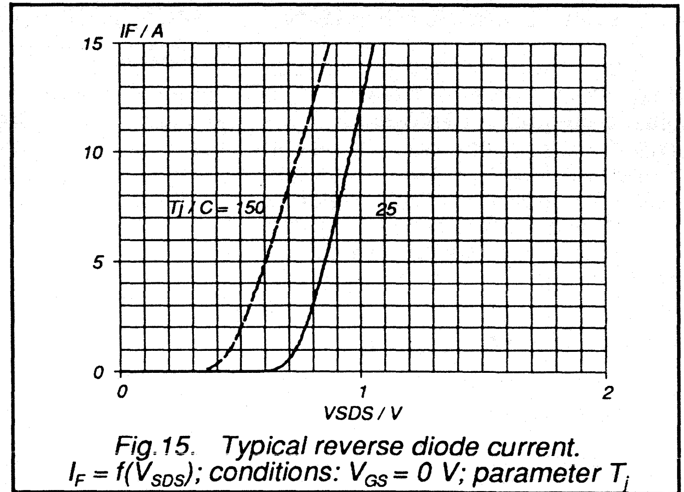


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

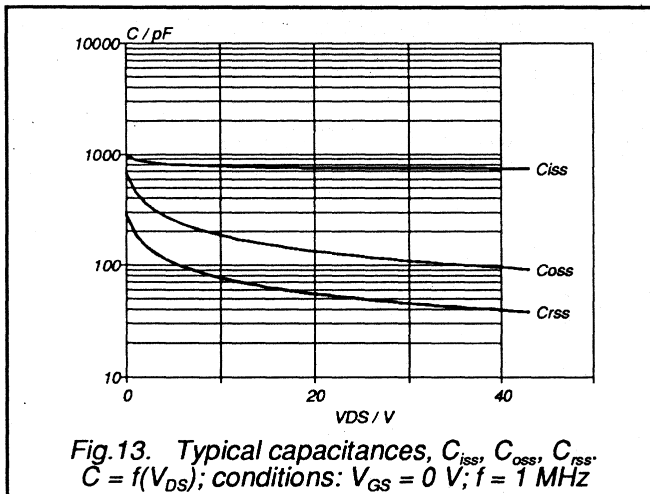


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

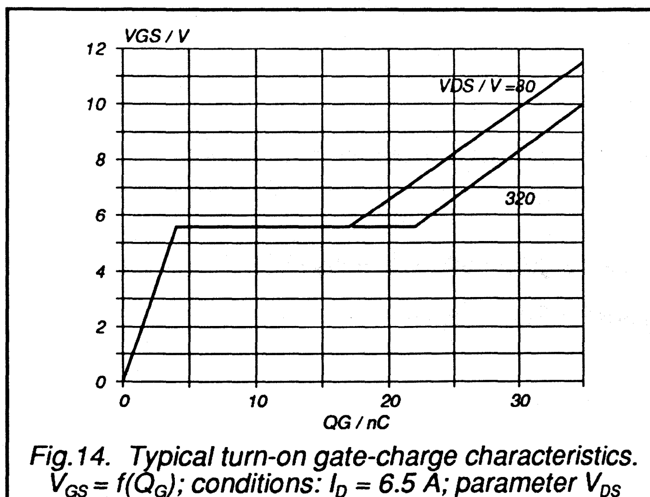


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 6.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	3.1	A
P_{tot}	Total power dissipation	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	Ω

MECHANICAL DATA

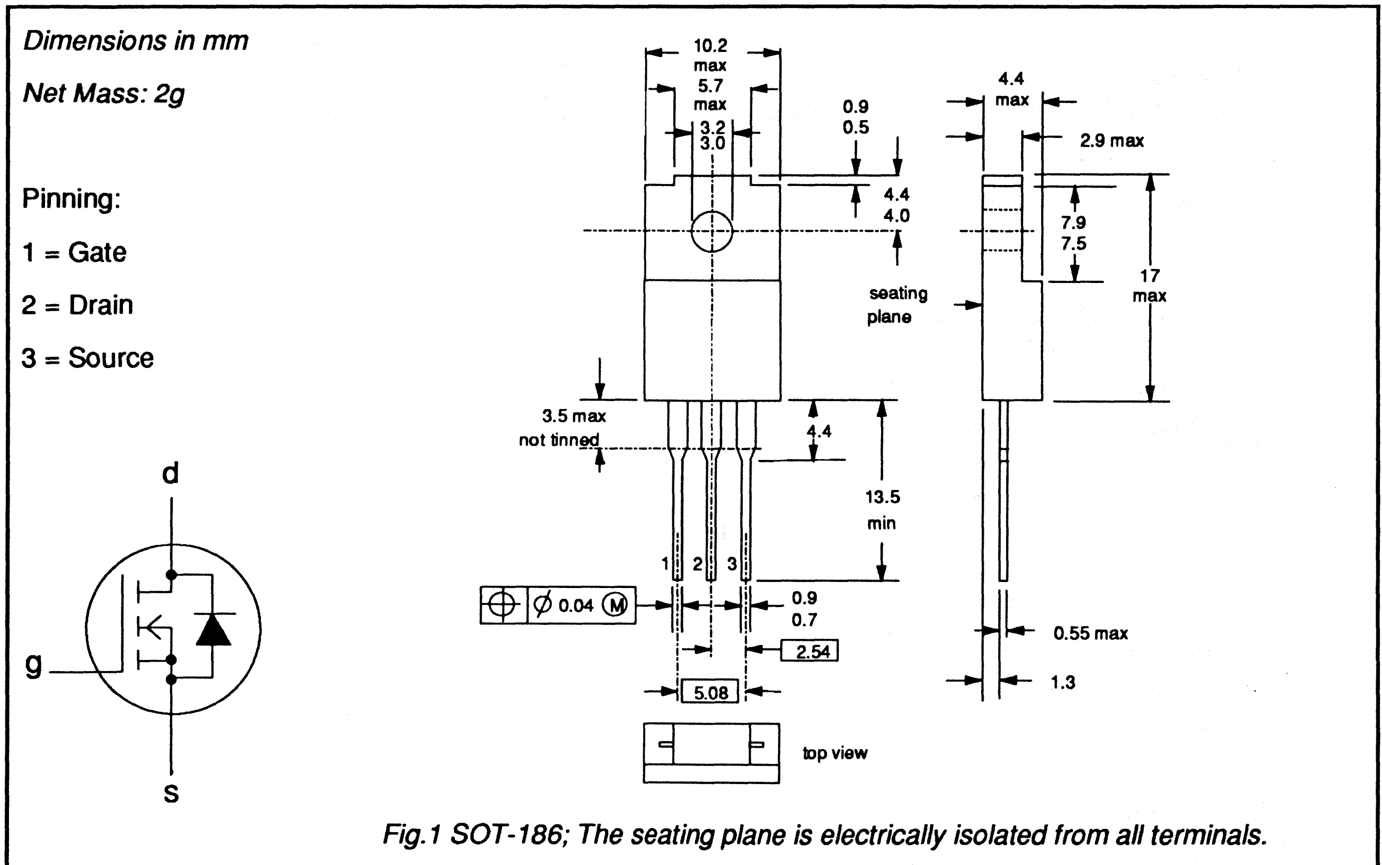


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{hs} = 25 °C	-	3.1	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	2	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	12	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30	W
T_{stg}	Storage temperature	-	- 55	150	°C
T_j	Junction Temperature	-	-	150	°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 4.1 K/W
From junction to ambient		$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A	-	1.2	1.3	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A;	-	10	45	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	45	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.1	A
I_{DRM}	Pulsed reverse drain current	-	-	-	12	A
V_{SD}	Diode forward voltage	I_F = 3.1 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 3.1 A; $-dI_F/dt$ = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

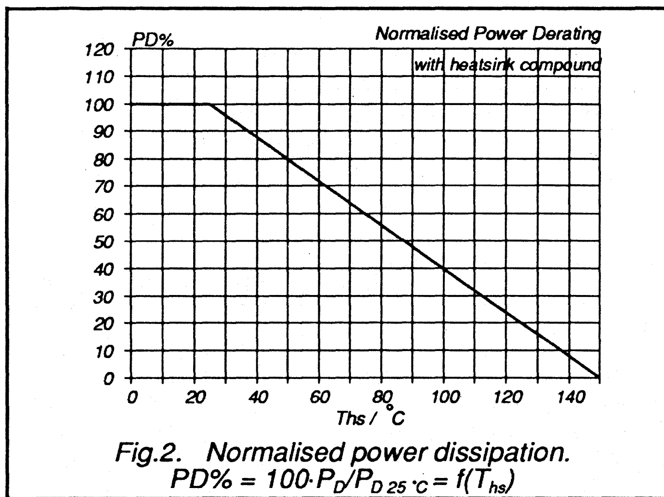


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

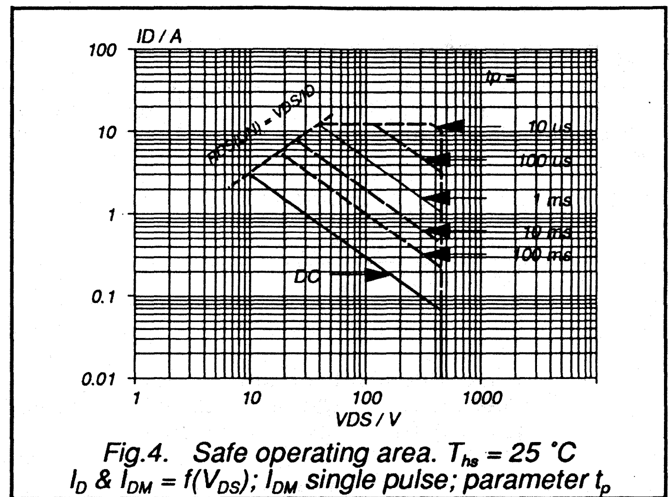


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

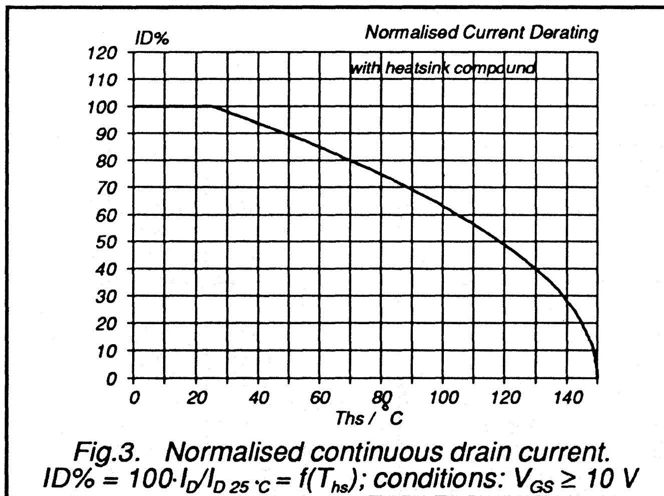


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

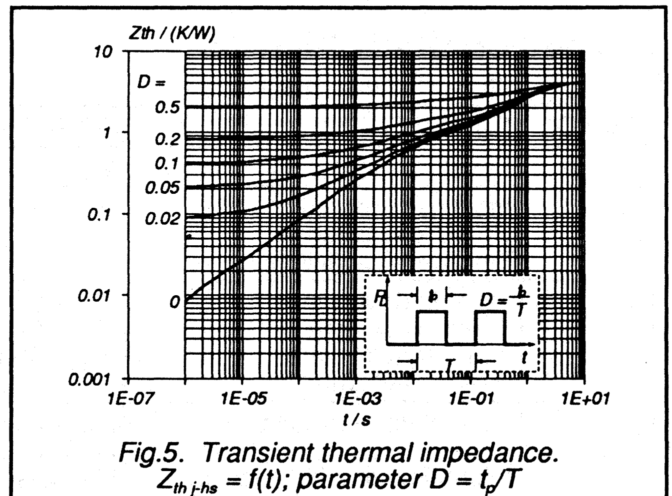


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

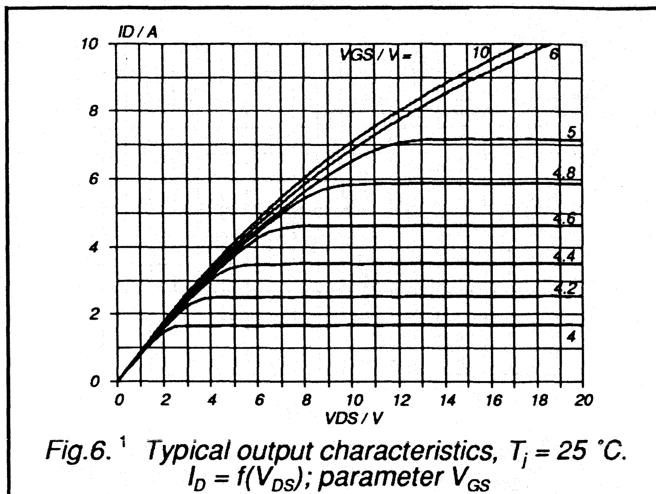


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

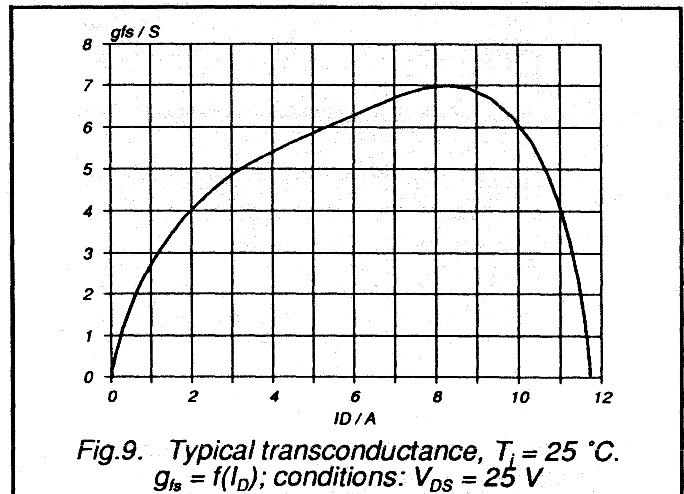


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

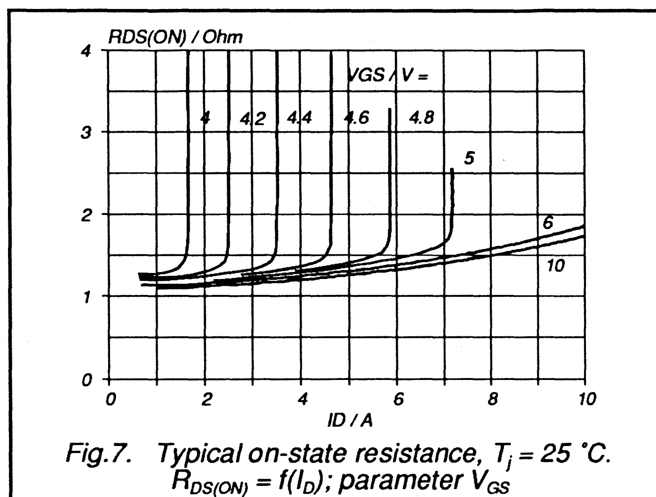


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

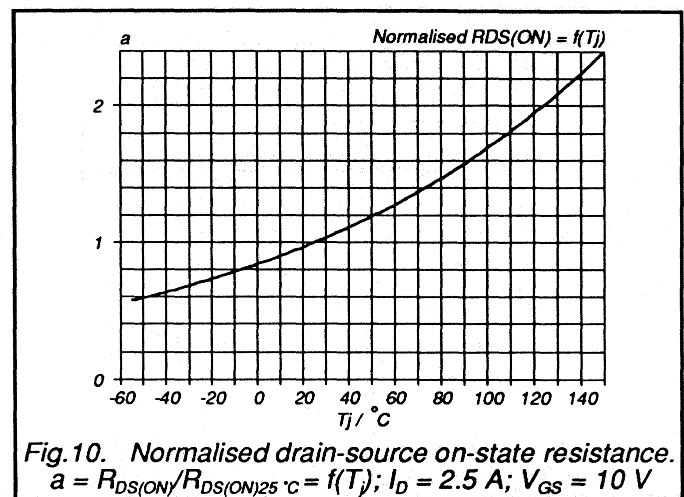


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

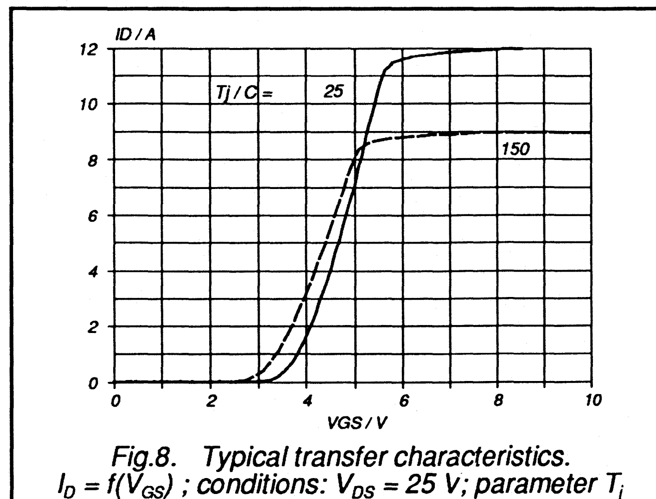


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

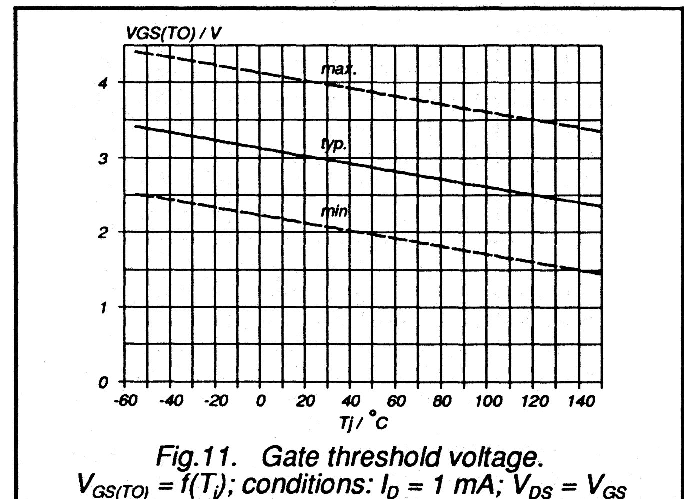


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

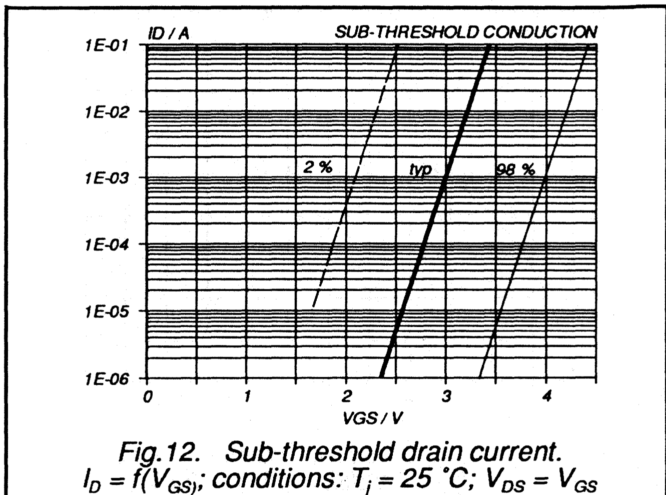


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

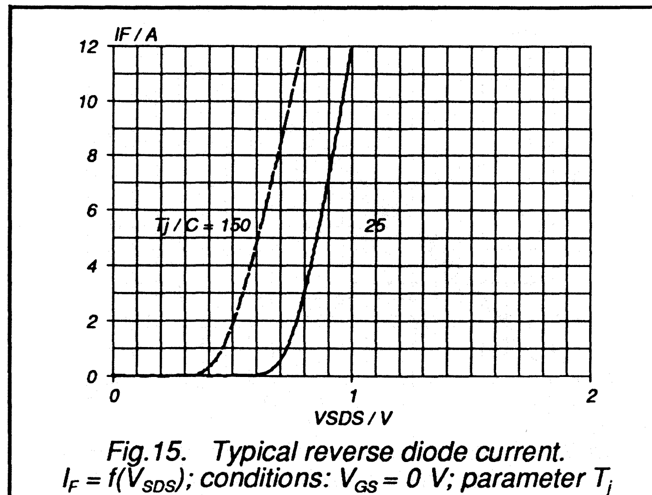


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

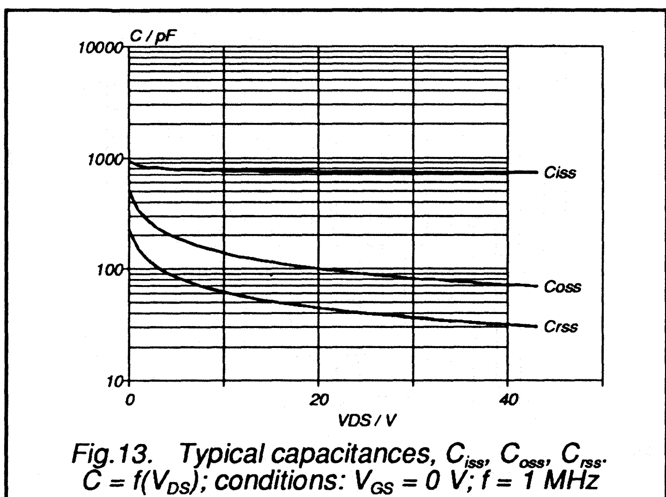


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

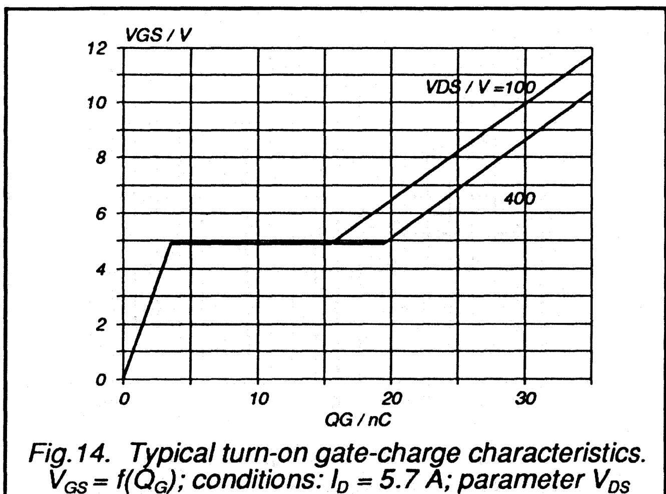


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	3.1	2.9	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	1.5	Ω

MECHANICAL DATA

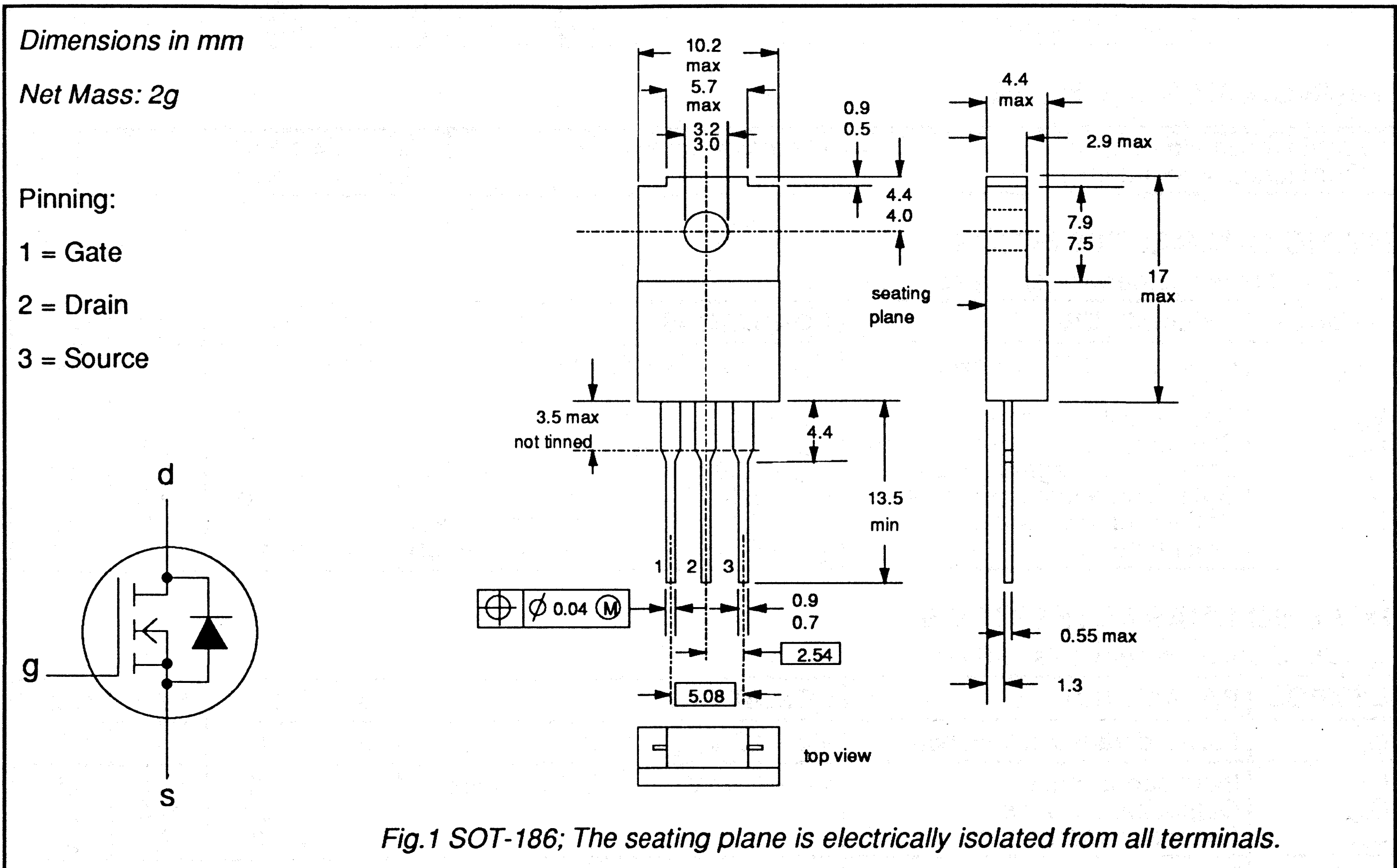


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	**-500B**	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	3.1	2.9	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	2	1.8	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	12	12	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 4.1 K/W
From junction to ambient		$R_{th\ j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK445-500A**	-	1.2	1.3	Ω
		I_D = 2.5 A **BUK445-500B**	-	1.4	1.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A;	-	10	45	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	45	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.1	A
I_{DRM}	Pulsed reverse drain current	-	-	-	12	A
V_{SD}	Diode forward voltage	I_F = 3.1 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 3.1 A; $-dI_F/dt$ = 100 A/µs; V_{GS} = 0 V; V_R = 100 V	-	1200	-	ns
Q_{rr}	Reverse recovery charge		-	6.0	-	µC

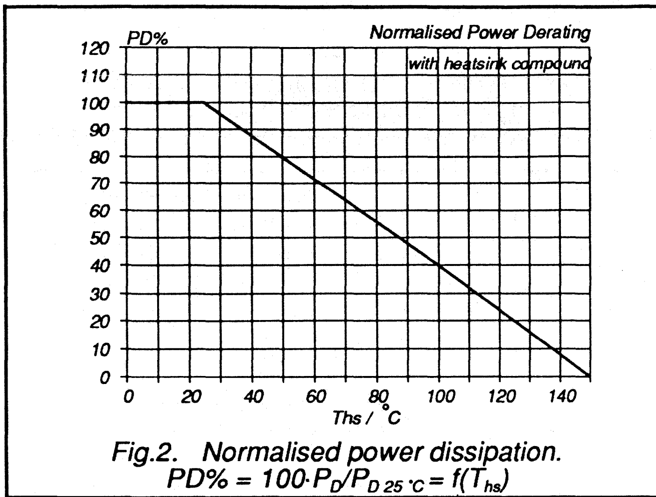


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

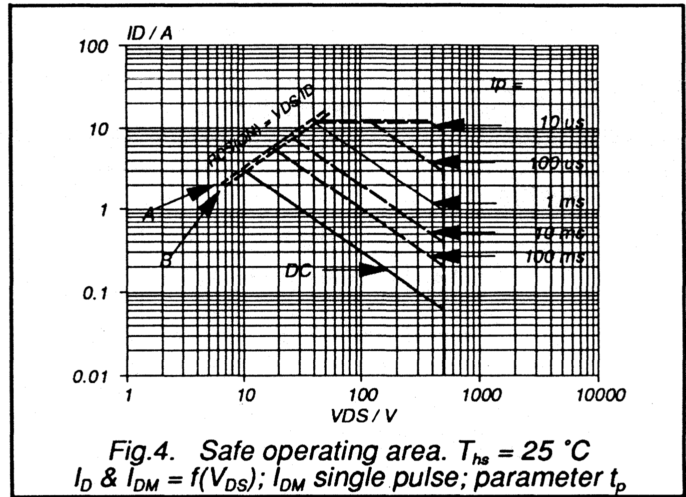


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

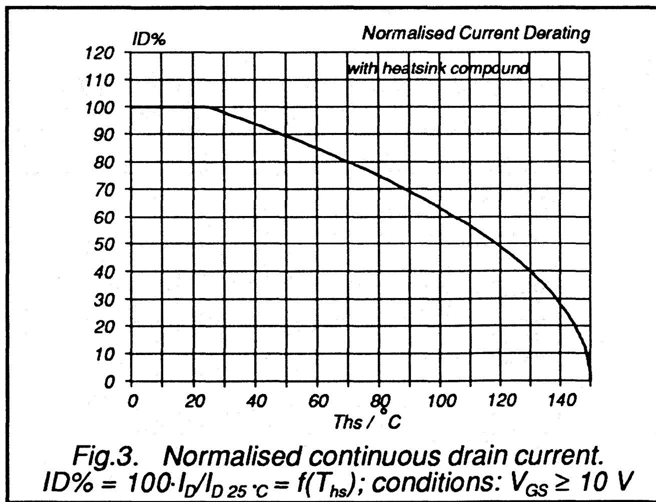


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

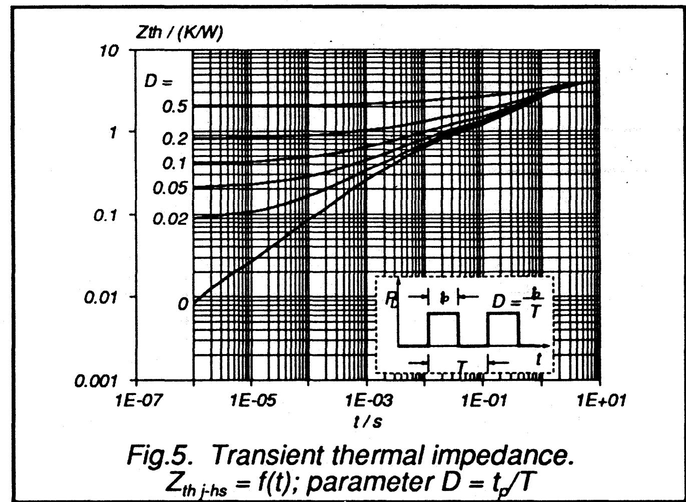


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

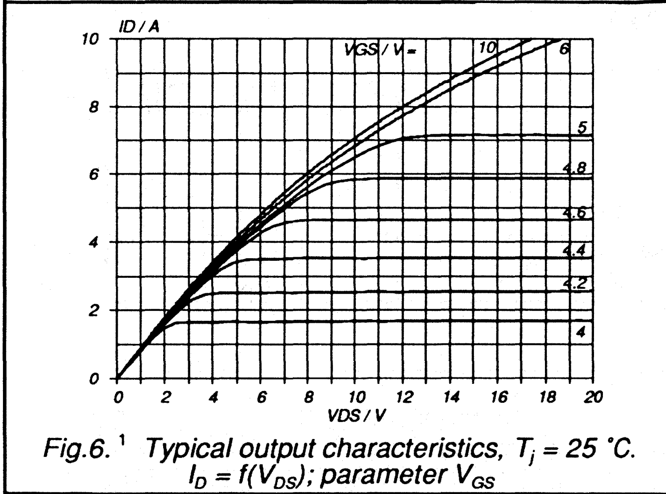


Fig.6. [1] Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

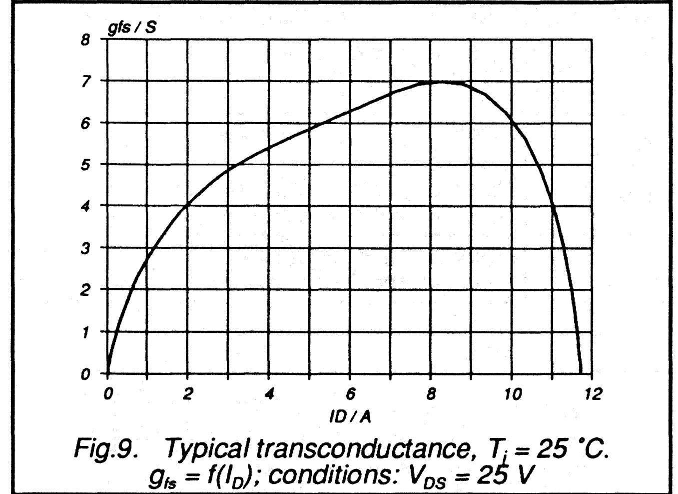


Fig.9. Typical transconductance, $T_j = 25\ ^\circ C$.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

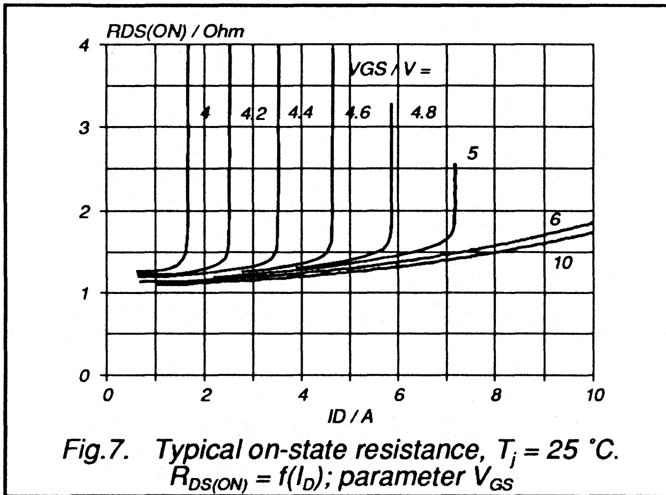


Fig.7. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

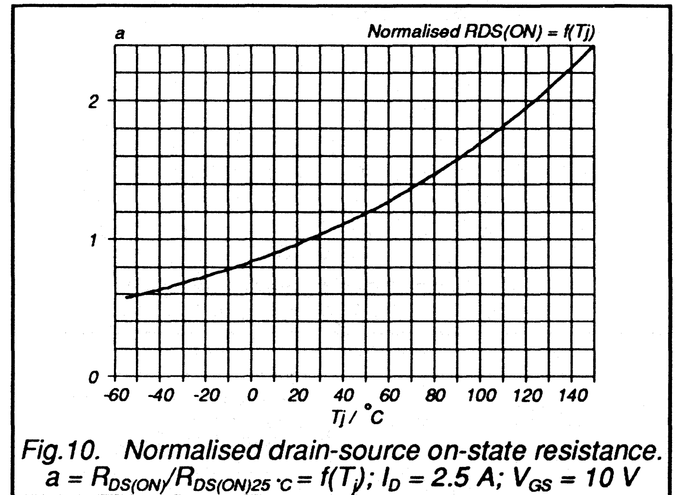


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; $I_D = 2.5$ A; $V_{GS} = 10$ V

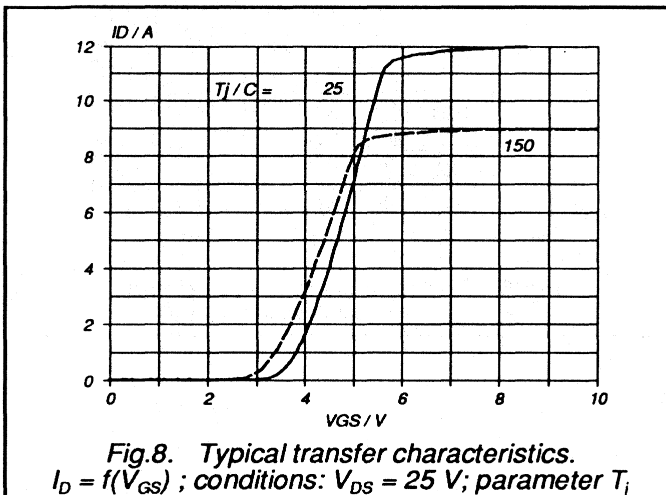


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

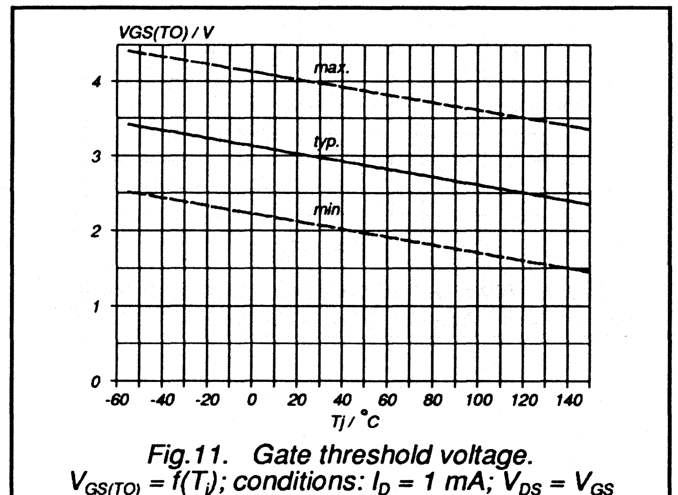


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

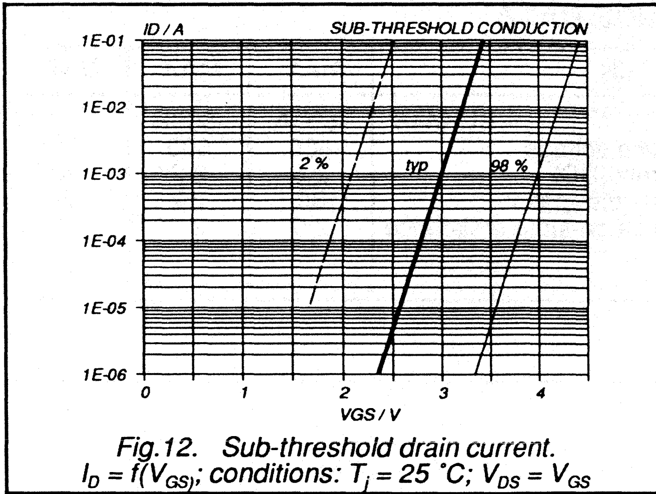


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

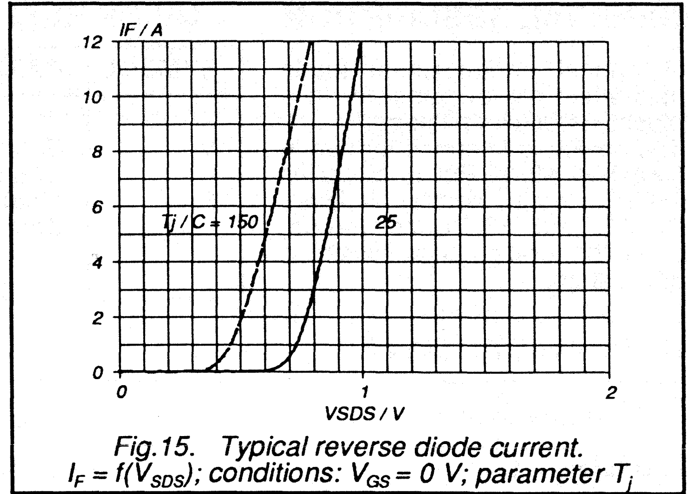


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

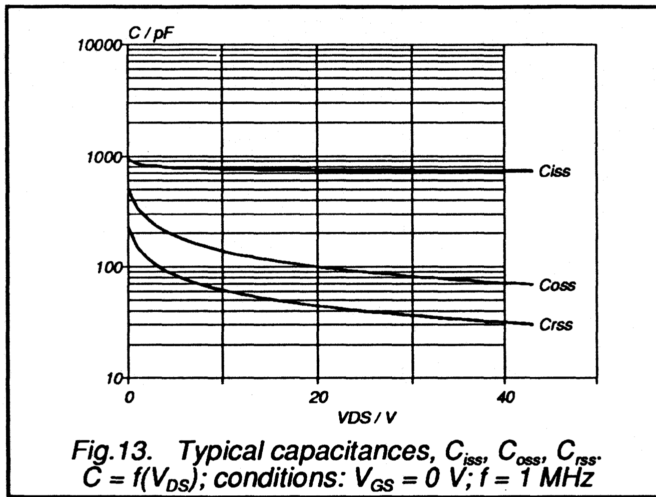


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

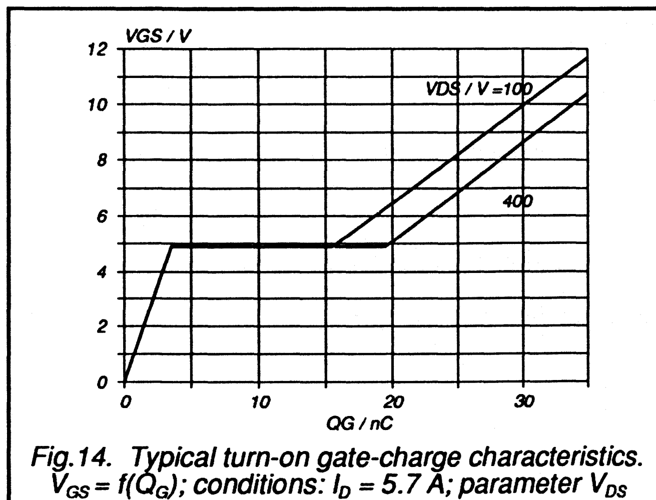


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK445	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	2.5	2.2	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.0	2.5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

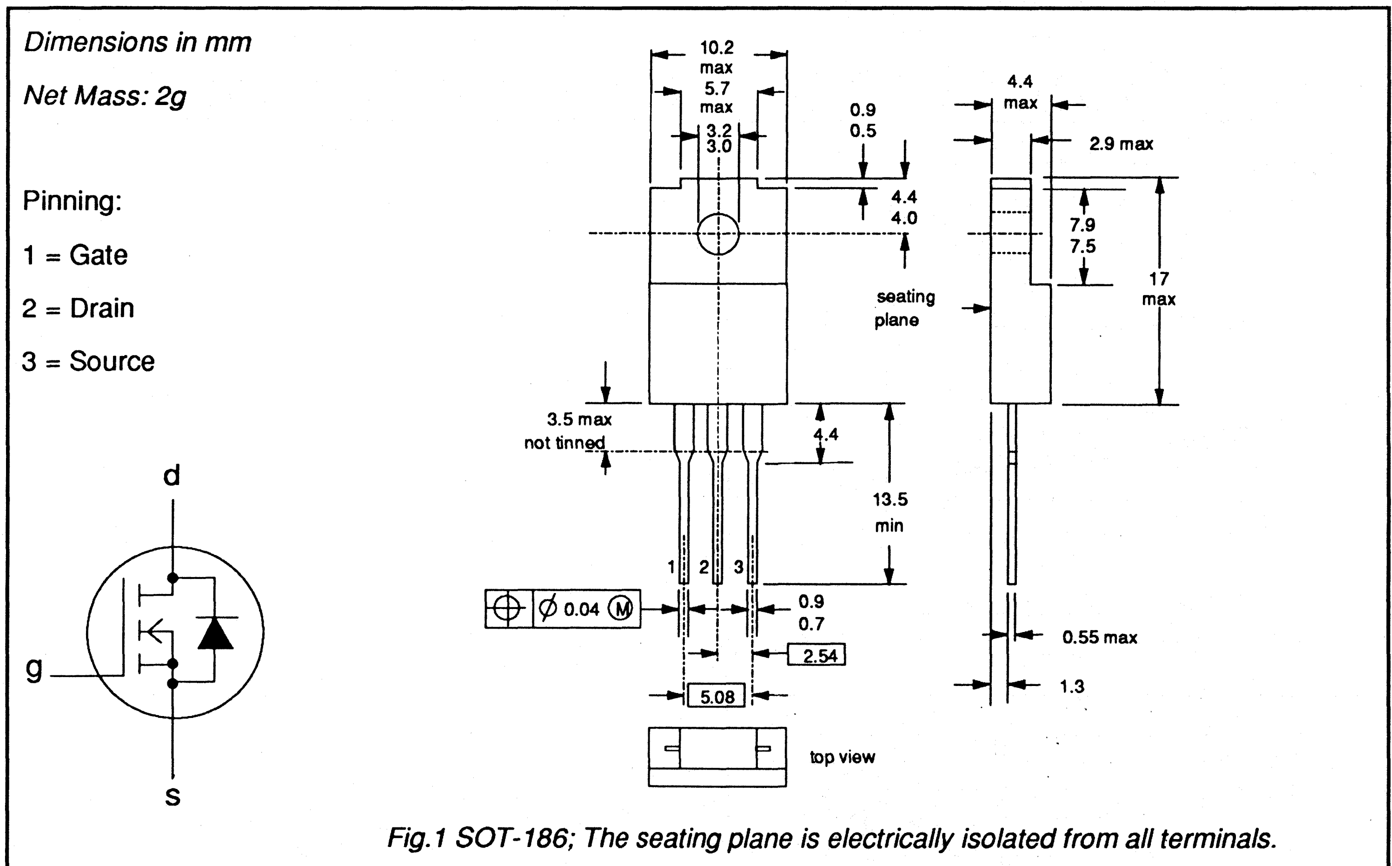


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	2.5	2.2	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	1.6	1.4	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	10	8.8	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.1 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A BUK445-600A	-	1.7	2.0	Ω
		BUK445-600B	-	2.1	2.5	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A;	-	10	45	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	45	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.5	A
I_{DRM}	Pulsed reverse drain current	-	-	-	10	A
V_{SD}	Diode forward voltage	I_F = 2.5 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 2.5 A; $-dI_F/dt$ = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

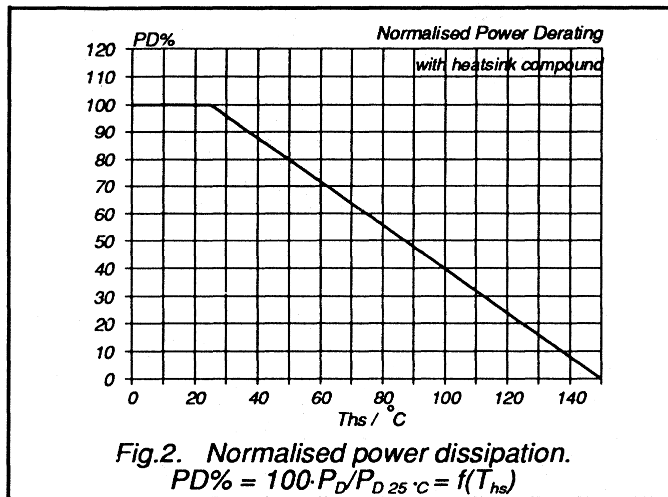


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

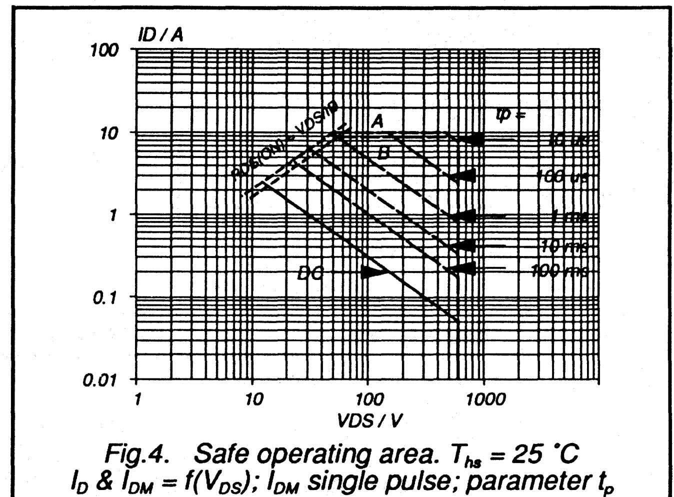


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

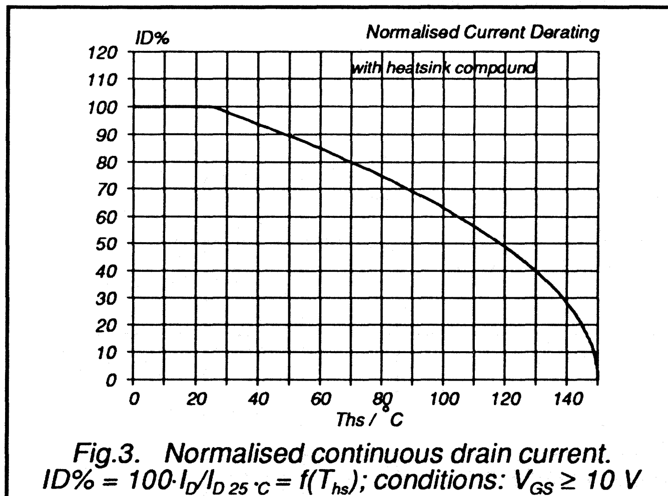


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

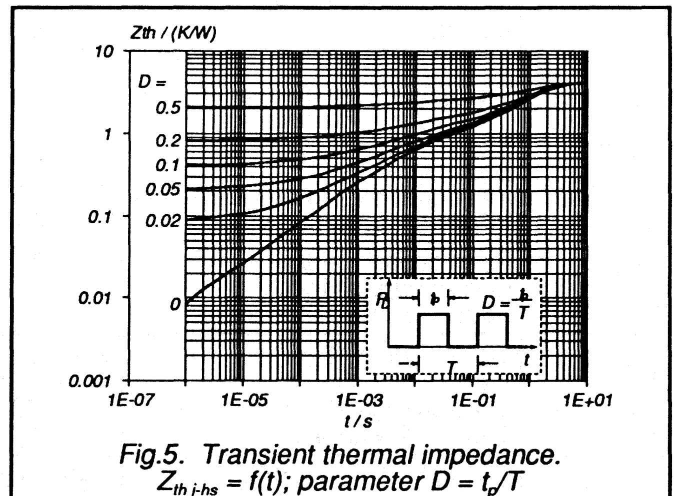


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

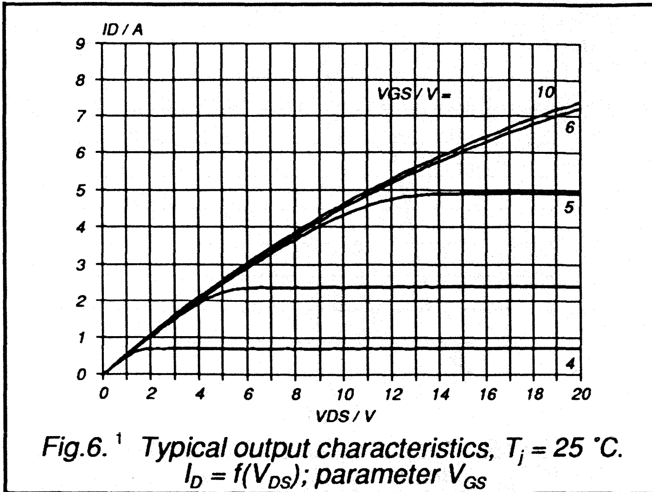


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

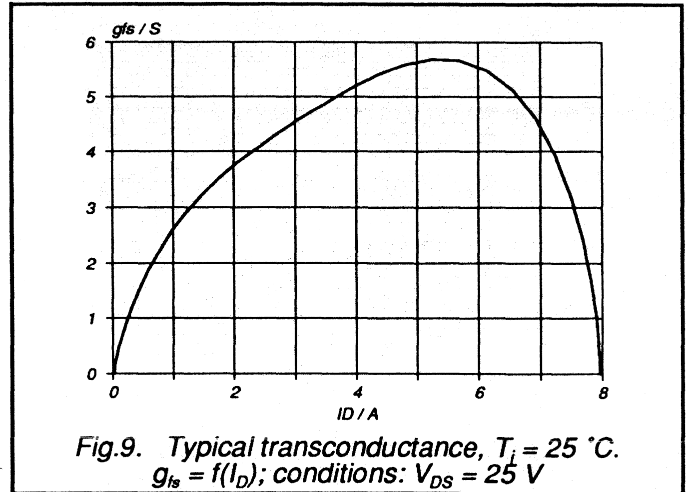


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

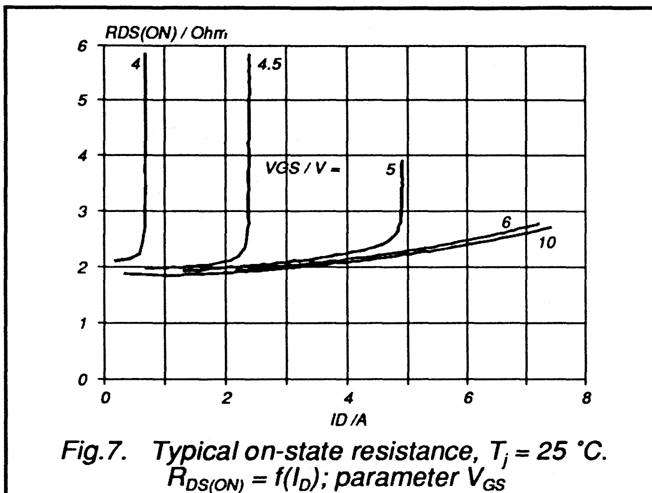


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

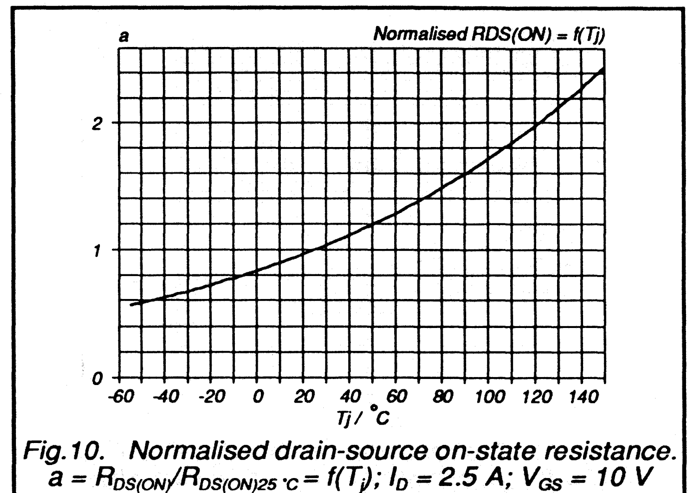


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

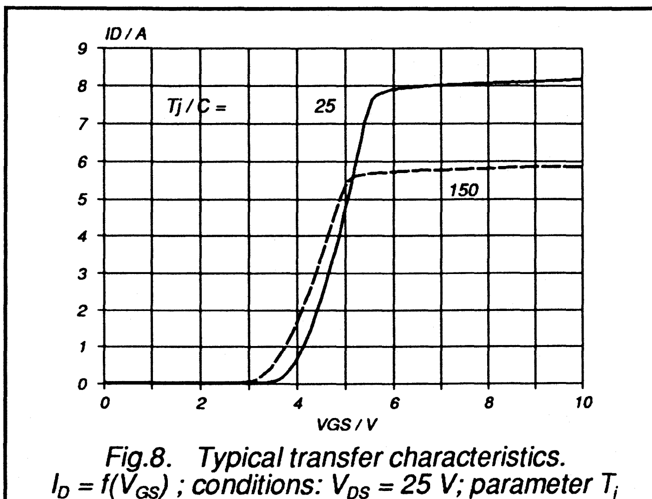


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

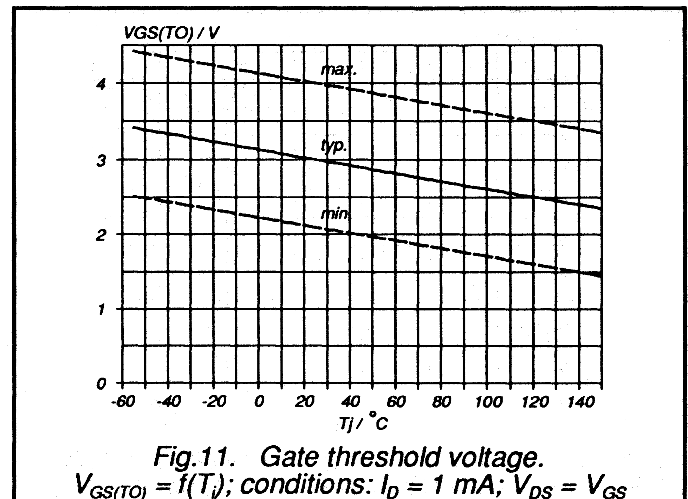


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

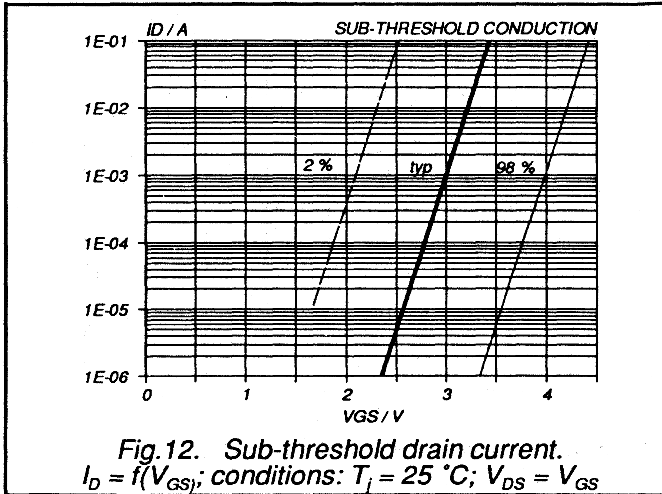


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

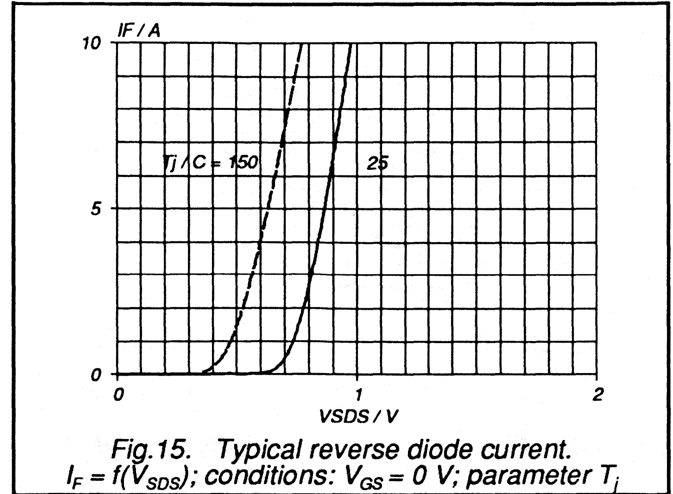


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

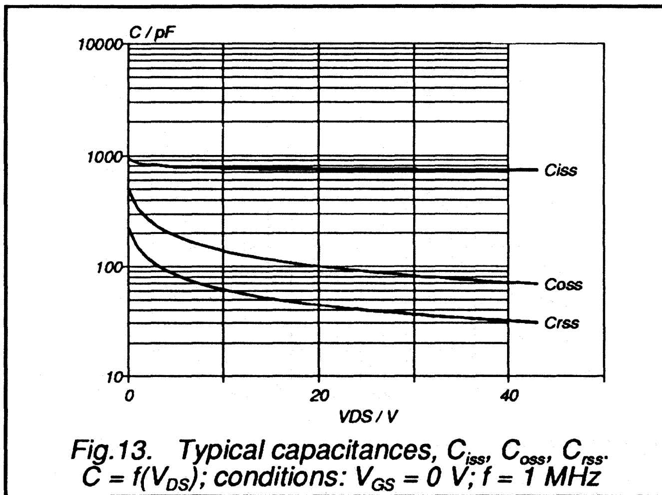


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

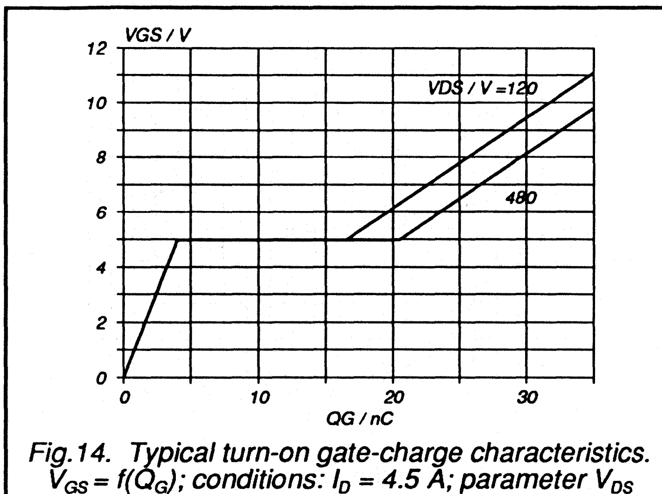


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK446	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	2.0	1.7	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	3	4	Ω

MECHANICAL DATA

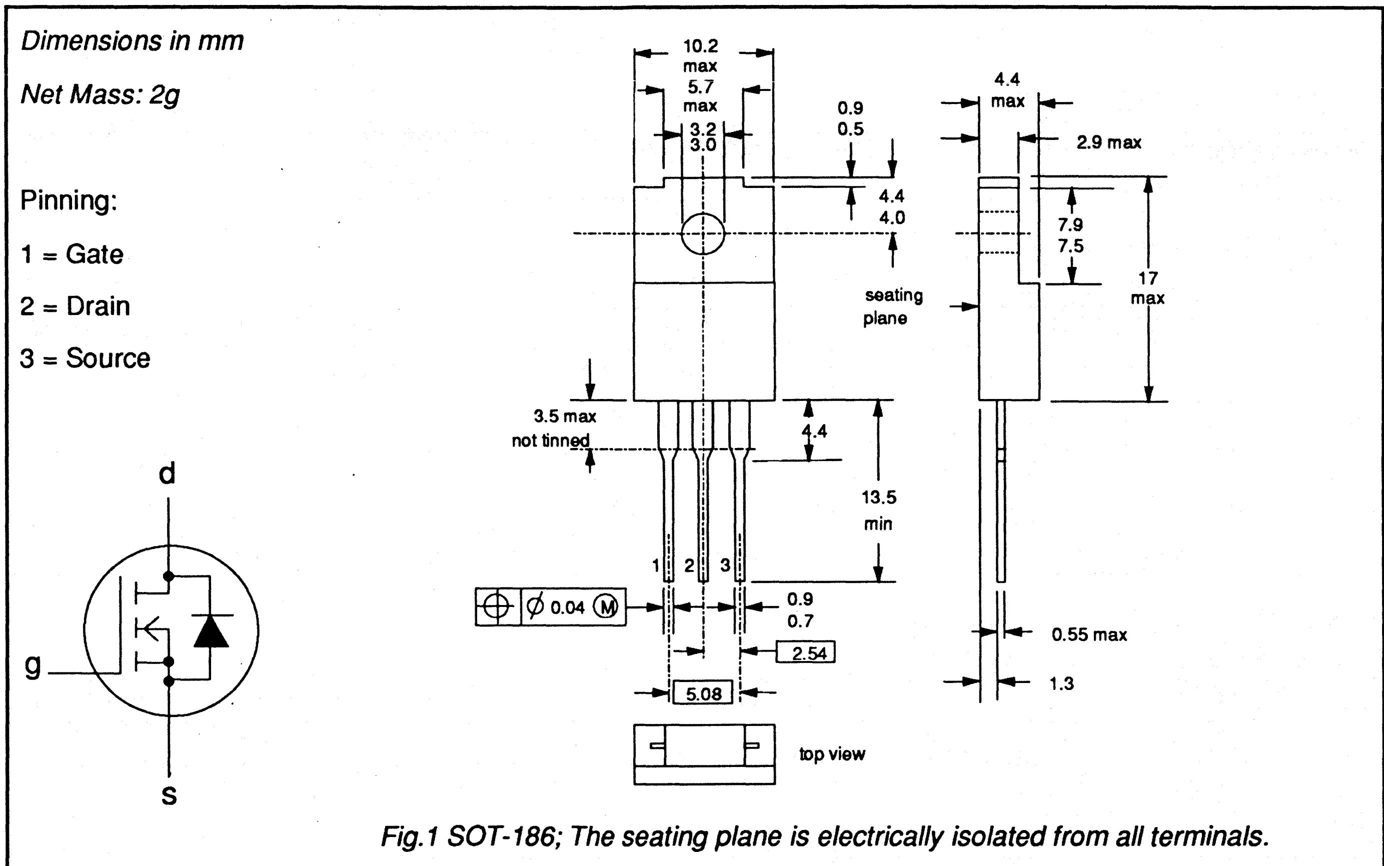


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	-800B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	2.0	1.7	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	1.3	1.1	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	8	6.8	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j-hs}$ = 4.16 K/W
From junction to ambient	-	$R_{th\,j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A **BUK446-800A**	-	2.7	3.0	Ω
		BUK446-800B	-	3.5	4.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.0	A
I_{DRM}	Pulsed reverse drain current	-	-	-	8	A
V_{SD}	Diode forward voltage	I_F = 2.0 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.0 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

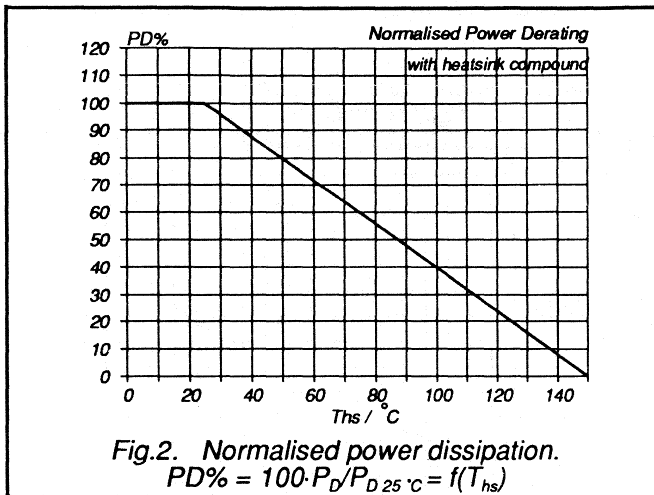


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

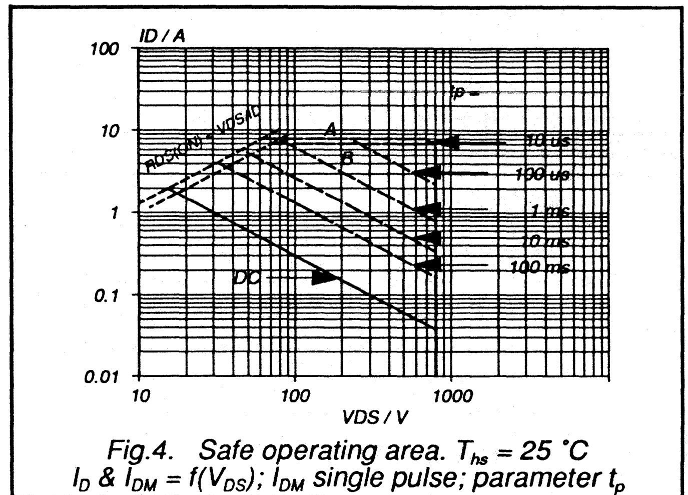


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

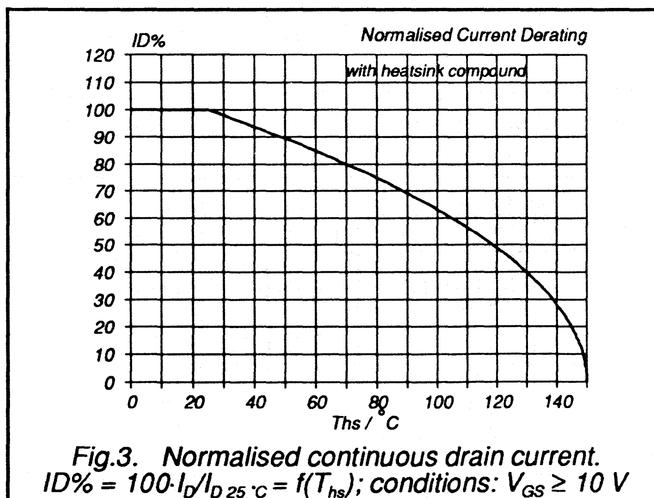


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

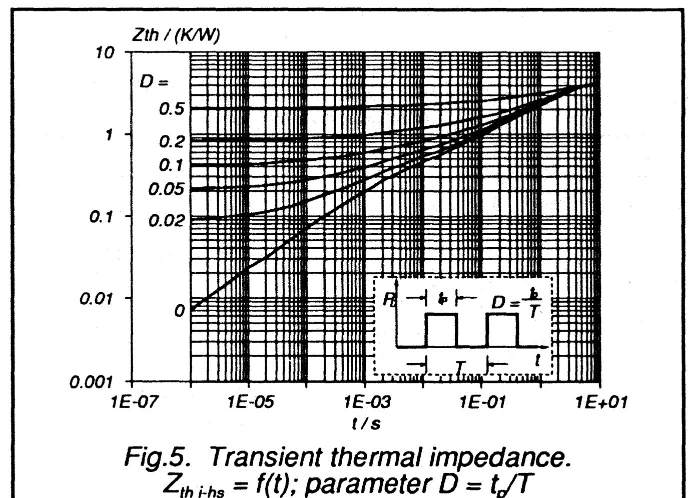


Fig.5. Transient thermal impedance.
$Z_{th\,j-hs} = f(t)$; parameter $D = t_p/T$

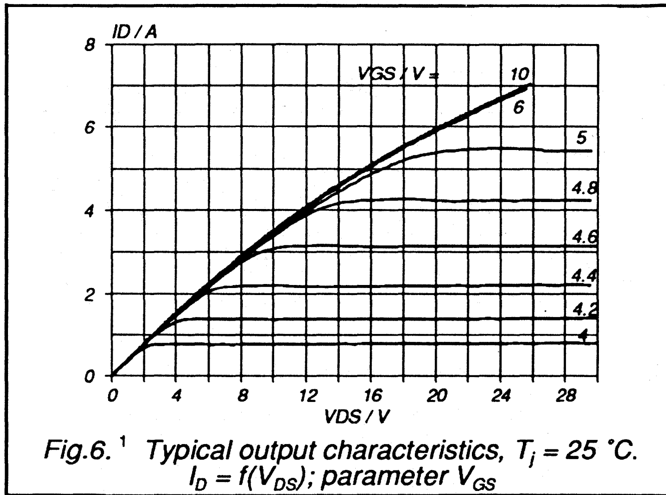


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

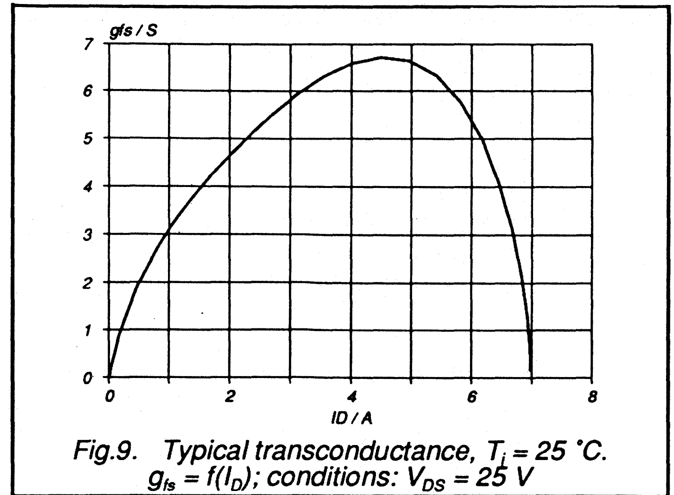


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

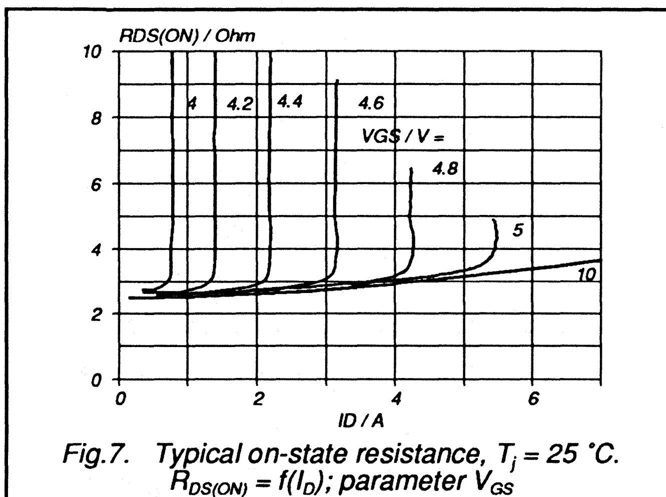


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

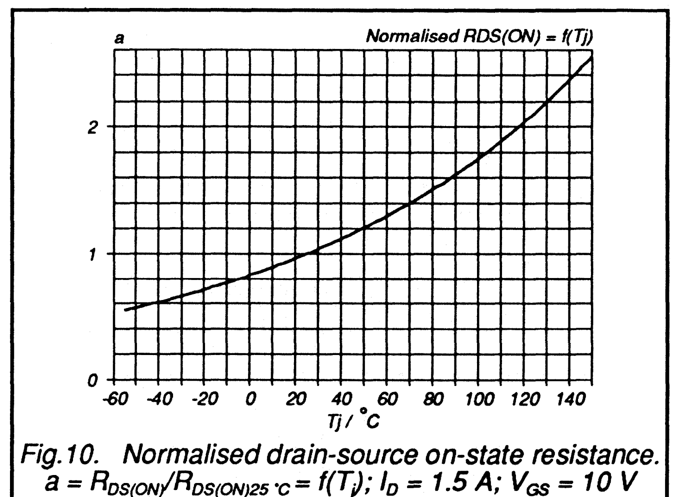


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

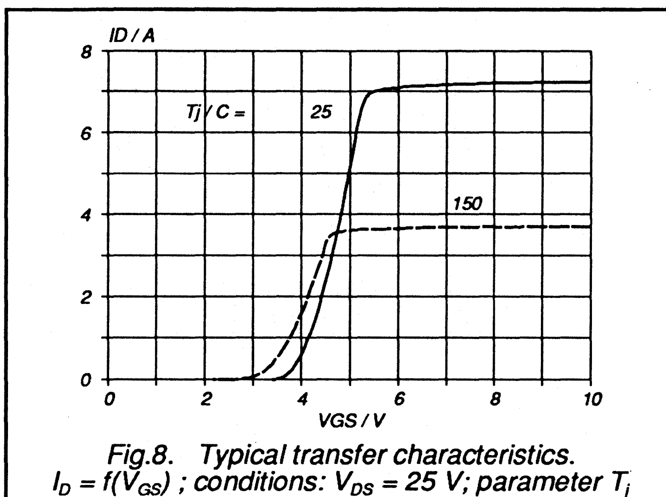


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

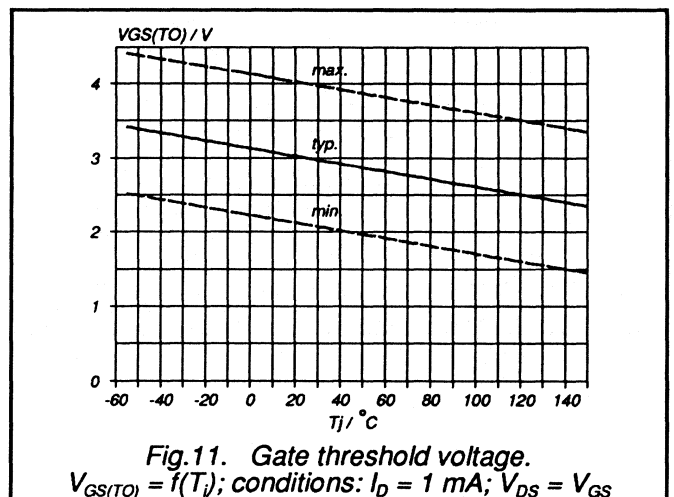


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

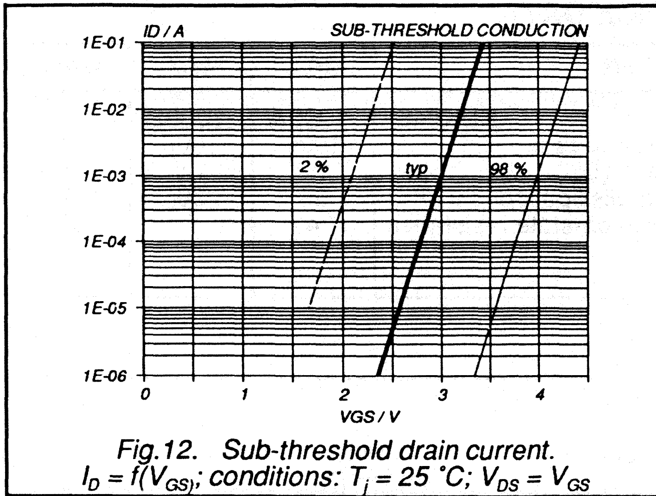


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

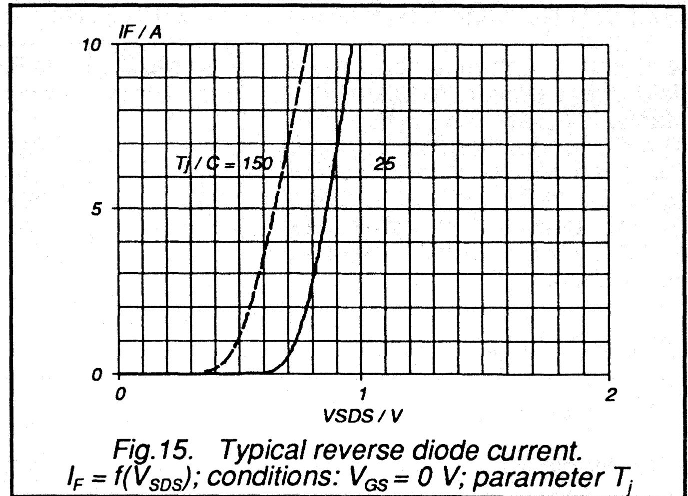


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

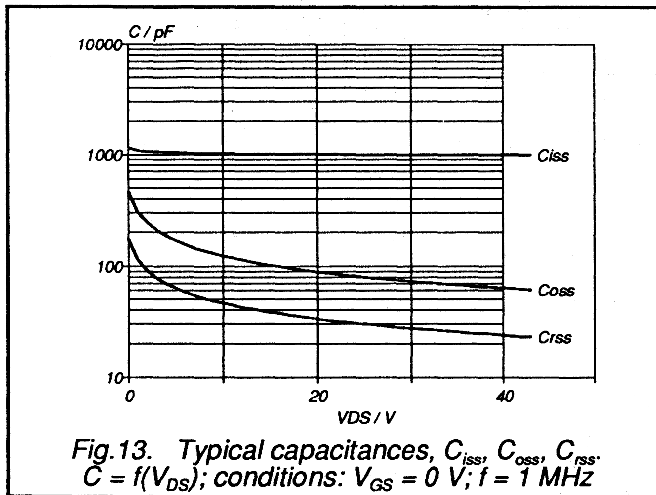


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

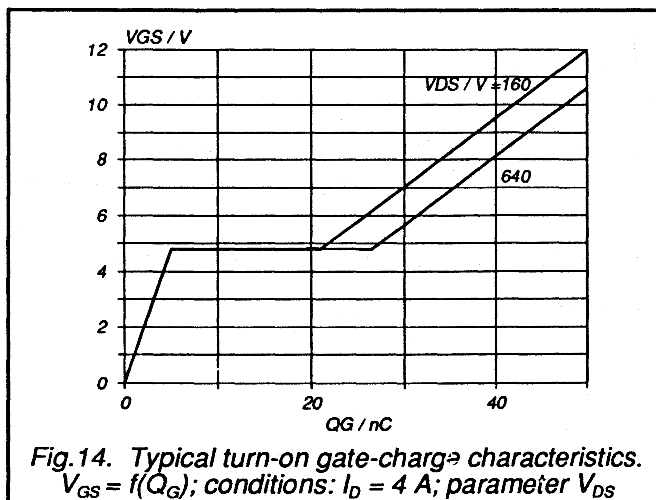


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK446	-1000A	-1000B	
V_{DS}	Drain-source voltage	1000	1000	V
I_D	Drain current (DC)	1.7	1.5	A
P_{tot}	Total power dissipation	30	30	W
$R_{DS(ON)}$	Drain-source on-state resistance	4	5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	1000		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	1000		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-1000A	-1000B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	1.7	1.5	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	1.1	1.0	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	6.8	6	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 4.16 K/W
From junction to ambient	-	$R_{th\ j-a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	1000	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A **BUK446-1000A**	-	3.5	4.0	Ω
		BUK446-1000B	-	4.5	5.0	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	25	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\ off}$	Turn-off delay time		-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	1.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	6.8	A
V_{SD}	Diode forward voltage	I_F = 1.7 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 1.7 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

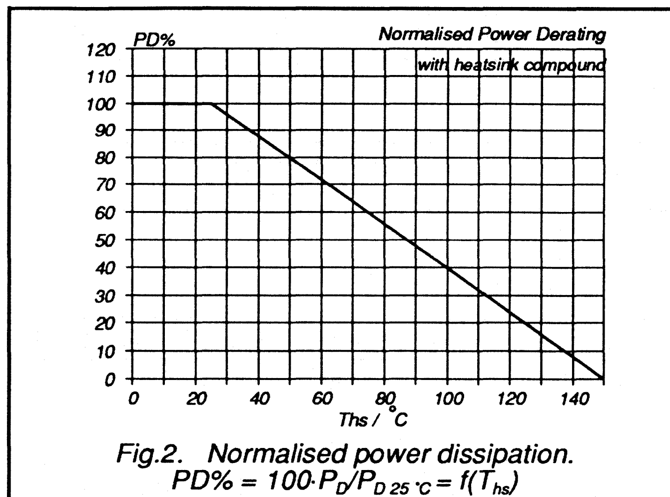


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

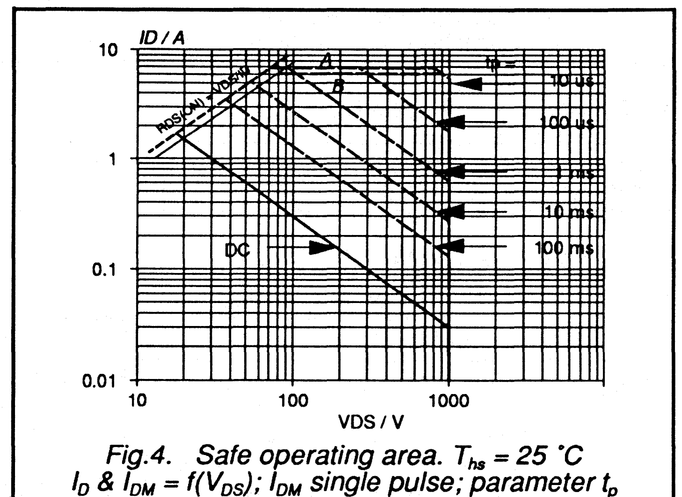


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

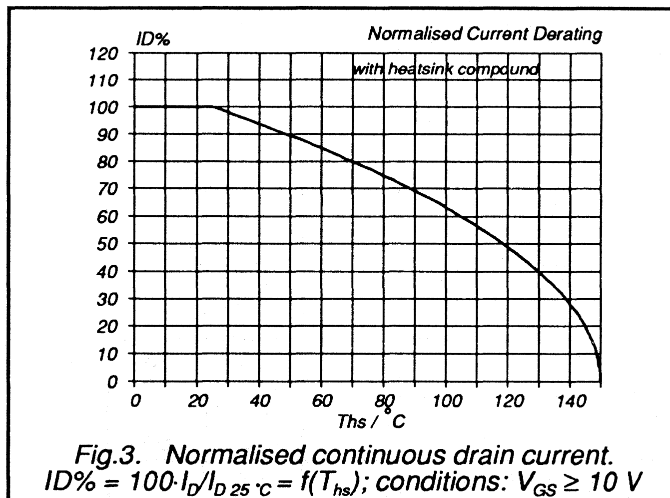


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

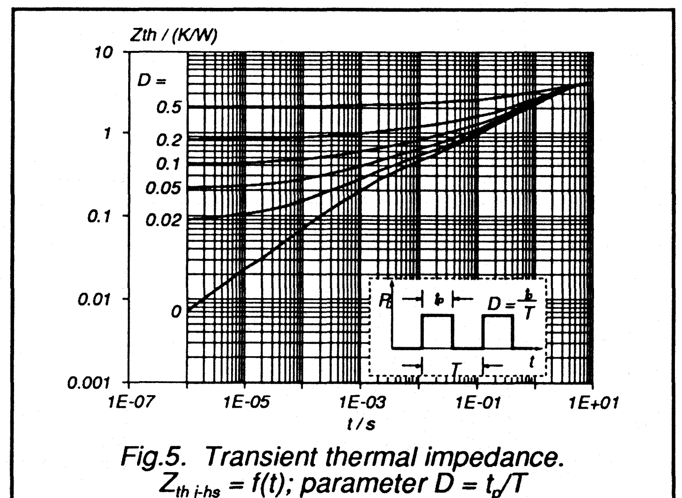


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

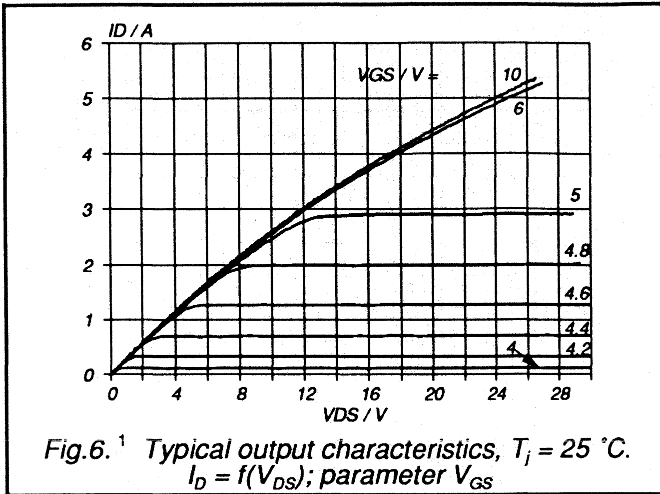


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

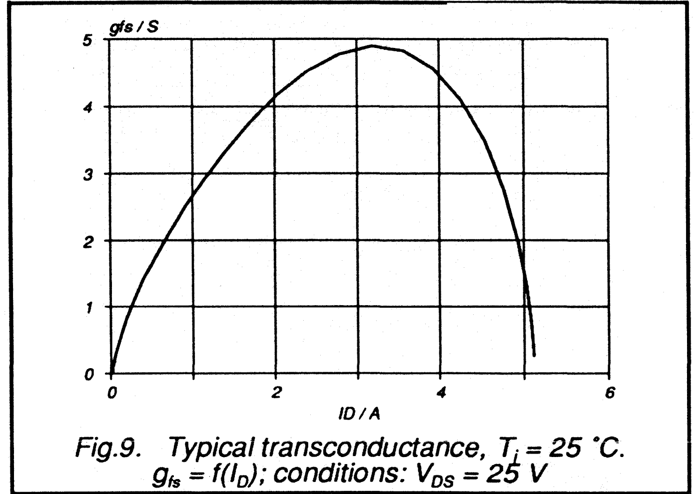


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

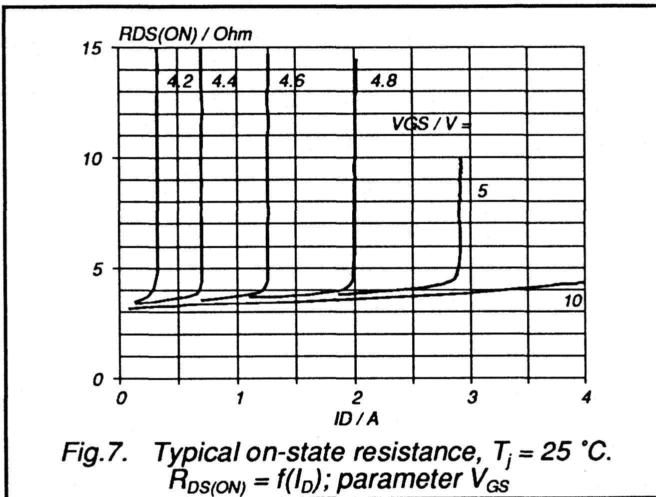


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

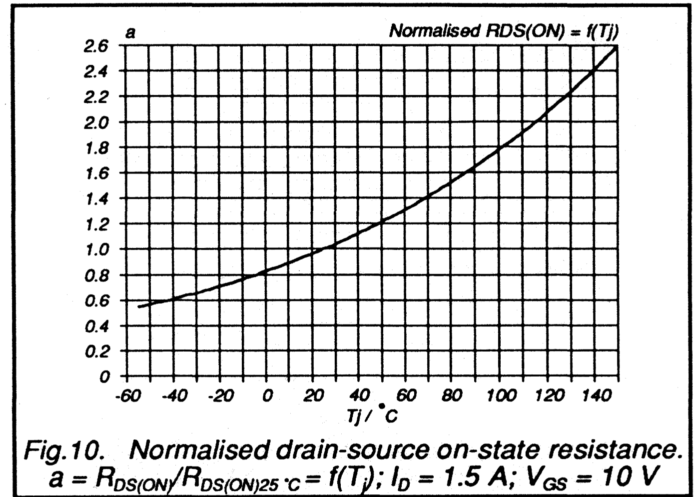


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

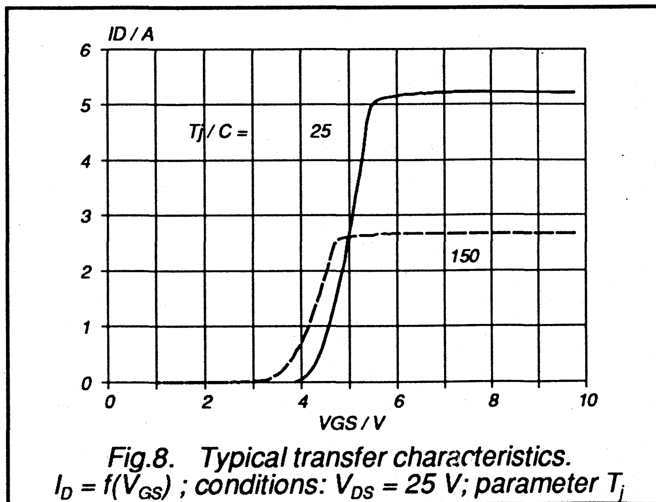


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

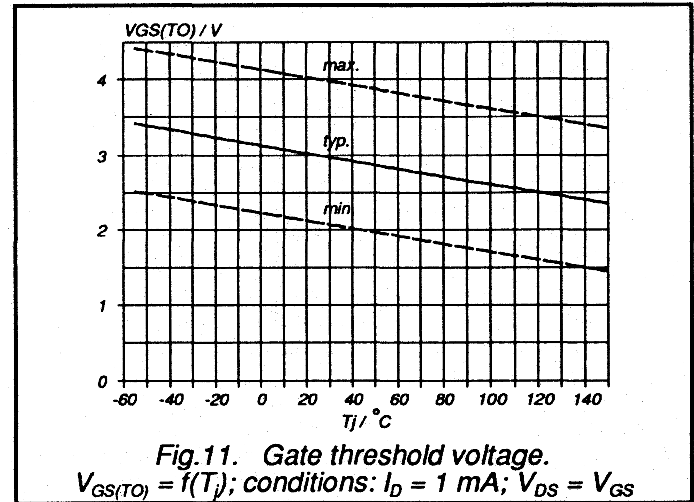


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

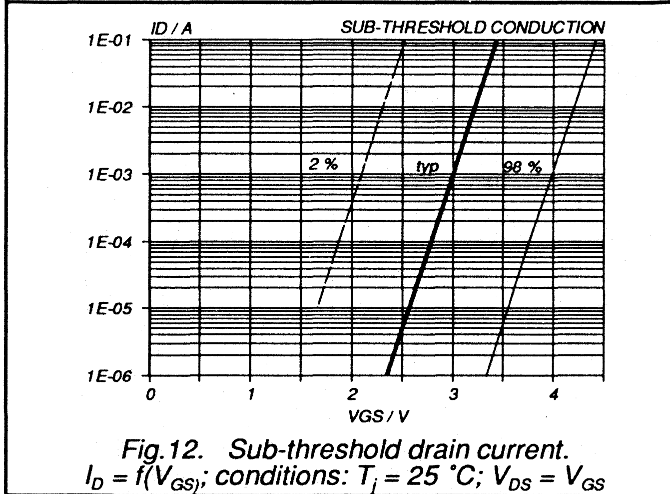


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

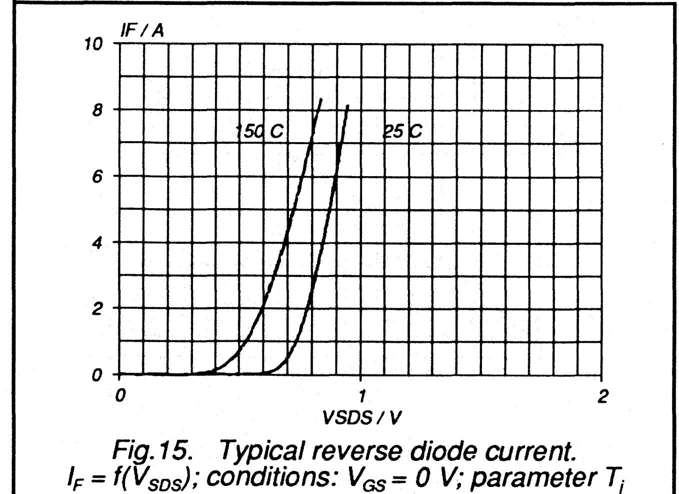


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

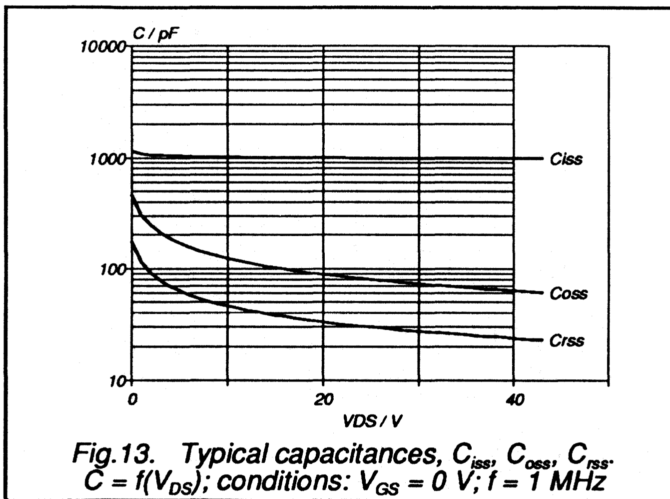


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

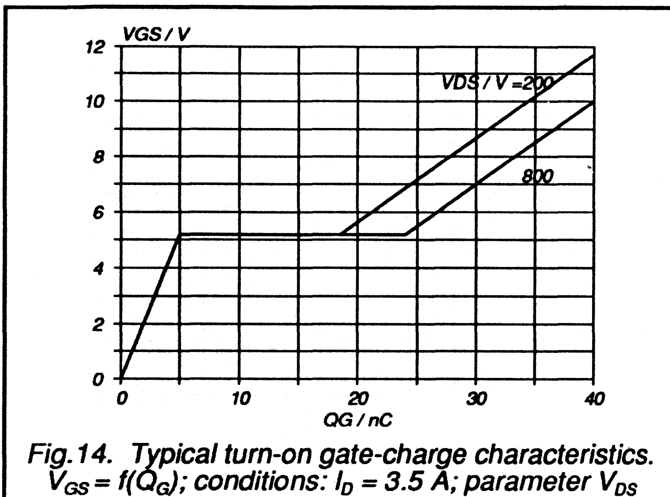


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK452	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	15	14	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.13	0.15	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	15	14	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	11	10	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	60	56	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2.5 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 8.5 A **BUK452-50A**	-	0.11	0.13	Ω
		BUK452-50B	-	0.13	0.15	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	3.5	4.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	70	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	8	14	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	45	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	30	45	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	15	A
I_{DRM}	Pulsed reverse drain current	-	-	-	60	A
V_{SD}	Diode forward voltage	I_F = 15 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 15 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 15 A ; $V_{DD} \leq$ 25 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	30	mJ

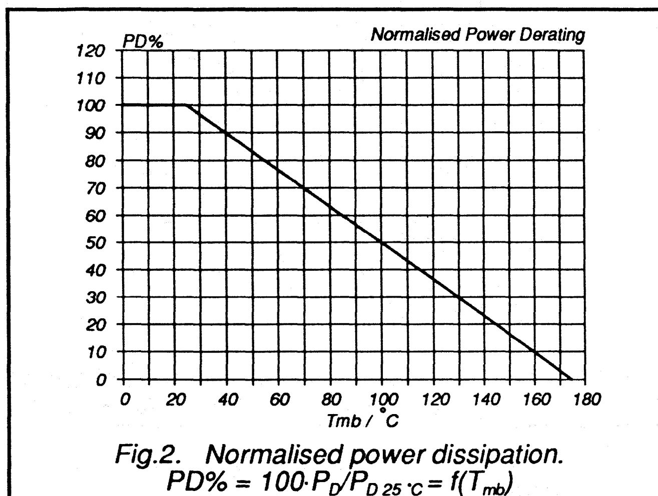


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

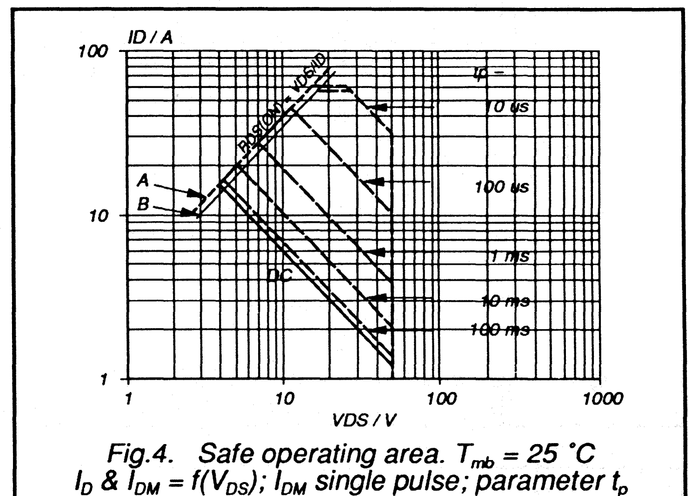


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

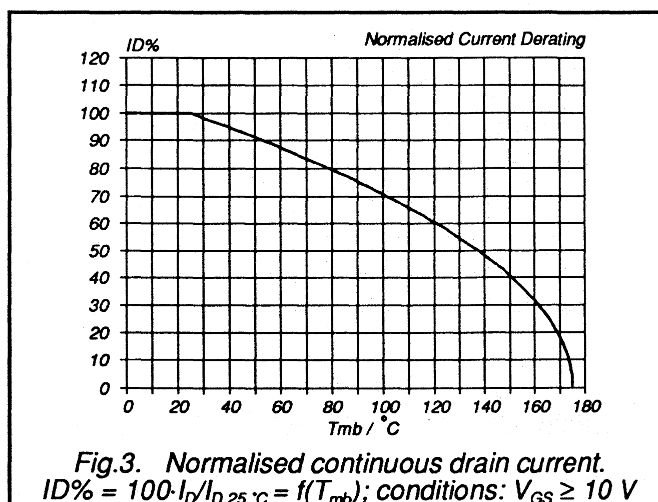


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

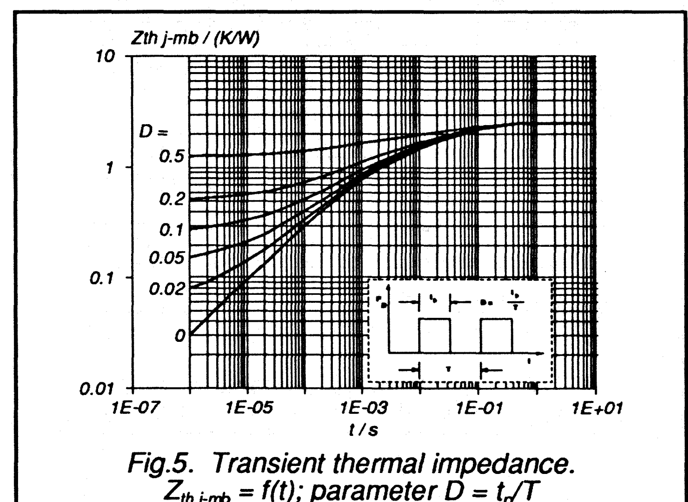


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

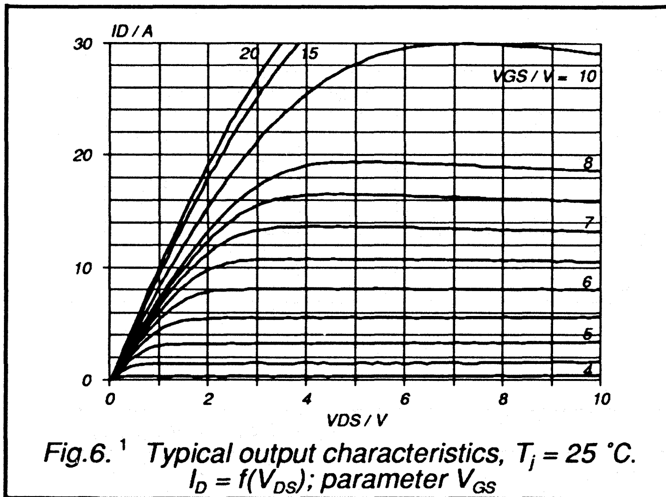


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

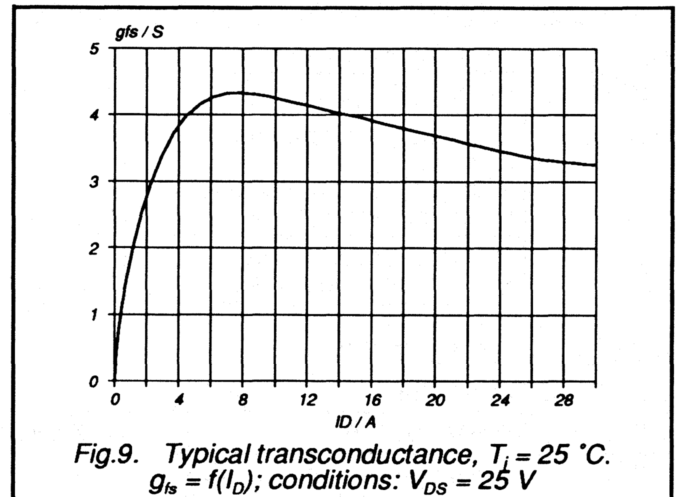


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

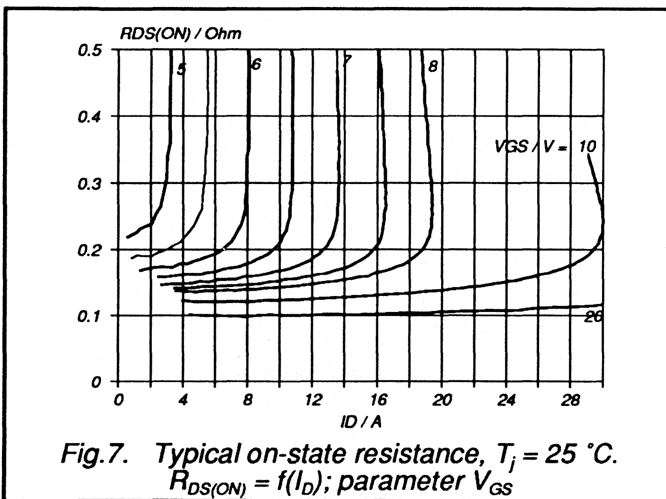


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

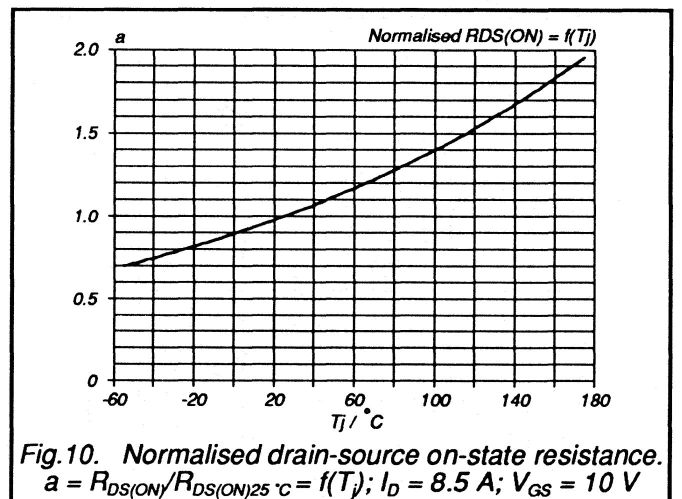


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 8.5 A; V_{GS} = 10 V

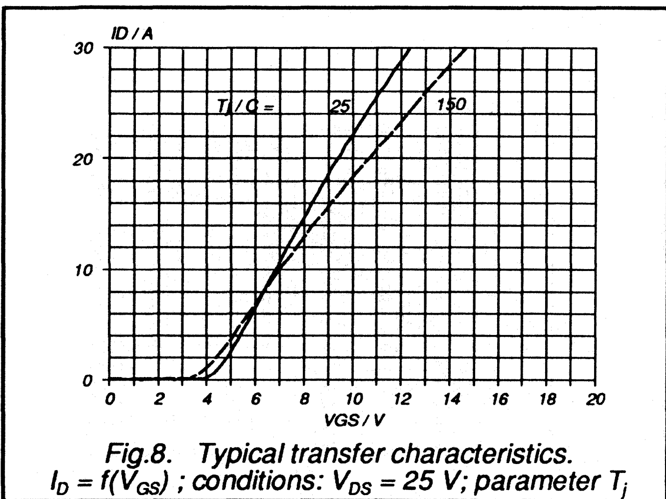


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

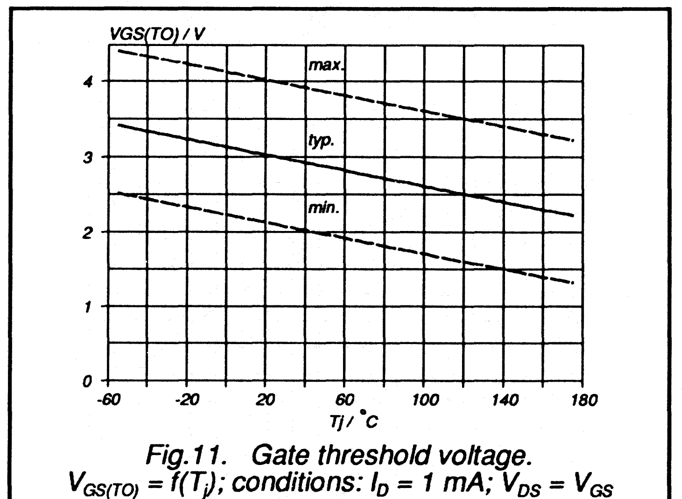


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

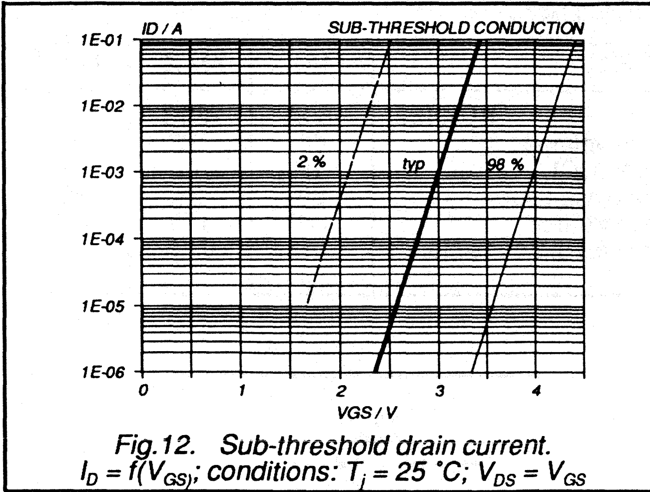


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

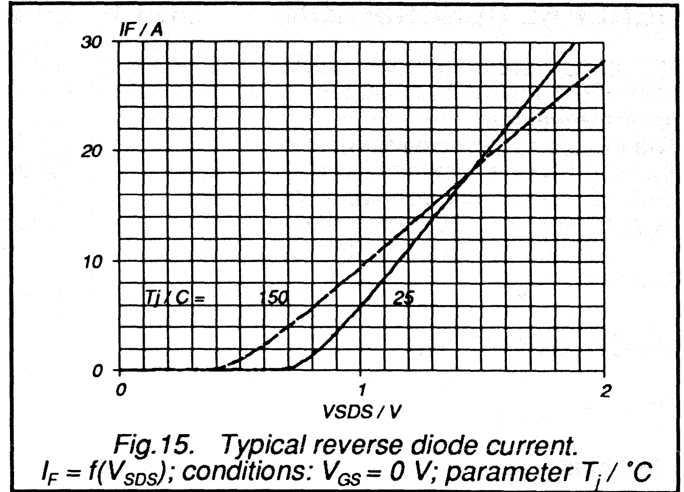


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j / °C

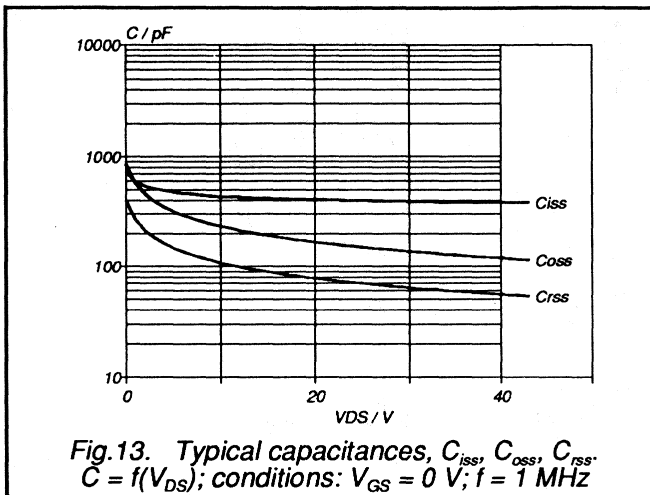


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

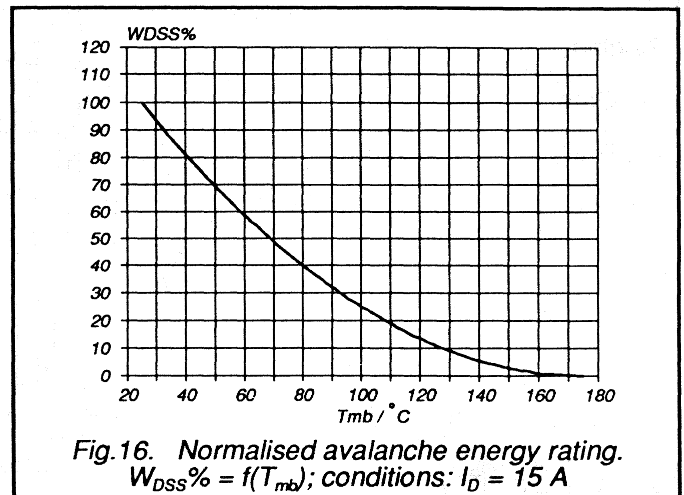


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 15$ A

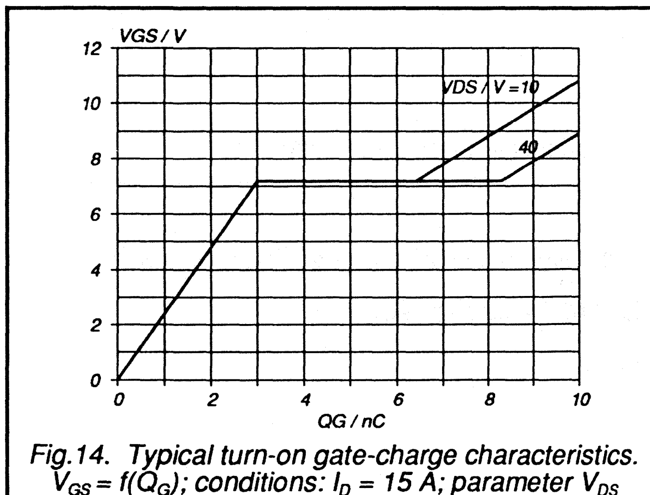


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 15$ A; parameter V_{DS}

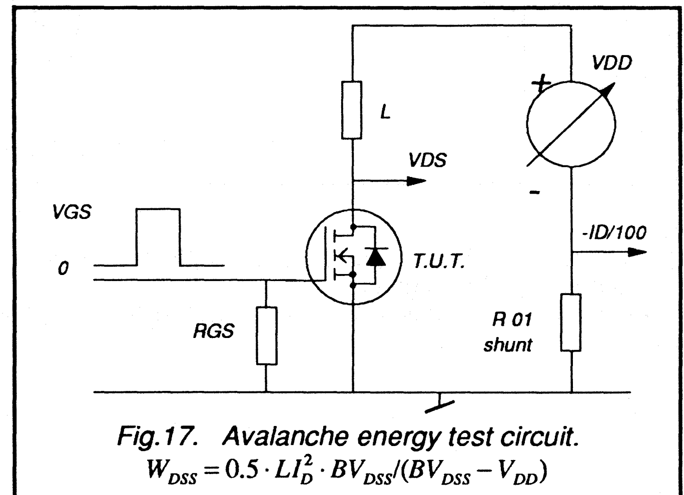


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK452	-60A	-60B	
V_{DS}	Drain-source voltage	60	60	V
I_D	Drain current (DC)	15	14	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.13	0.15	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	60		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	60		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-60A	**-60B**	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	15	14	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	11	10	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	60	56	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2.5 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	60	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 8.5 A **BUK452-60A**	-	0.11	0.13	Ω
		BUK452-60B	-	0.13	0.15	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	3.5	4.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	70	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	8	14	ns
t_r	Turn-on rise time		-	25	45	ns
$t_{d\,off}$	Turn-off delay time		-	30	45	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	15	A
I_{DRM}	Pulsed reverse drain current	-	-	-	60	A
V_{SD}	Diode forward voltage	I_F = 15 A ; V_{GS} = 0 V	-	1.4	1.7	V
t_{rr}	Reverse recovery time	I_F = 15 A; -dI_F/dt = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 15 A ; $V_{DD} \leq$ 30 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	30	mJ

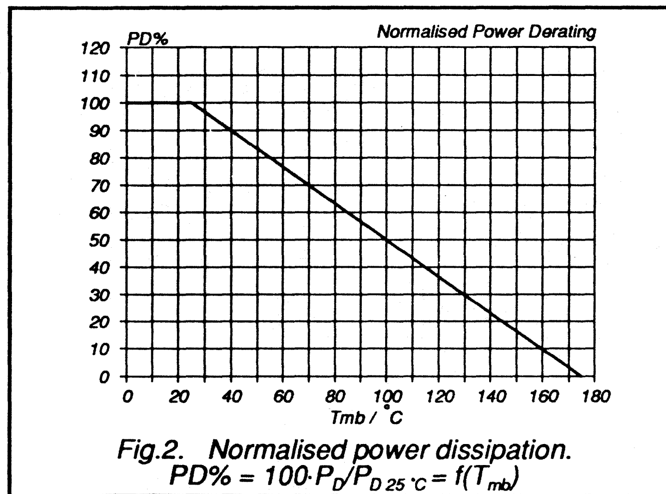


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

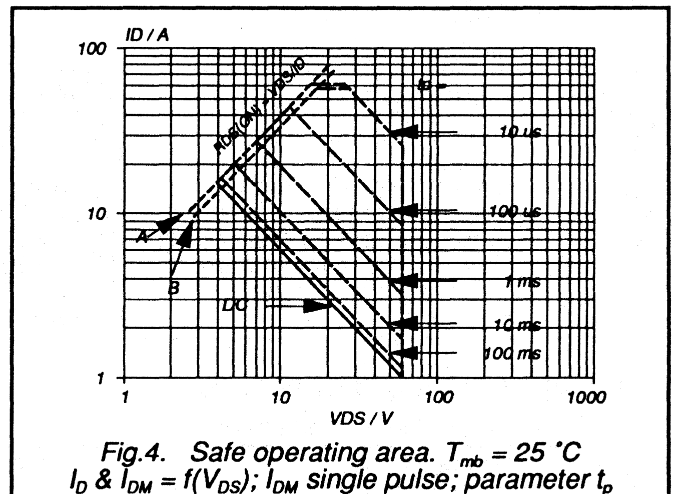


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

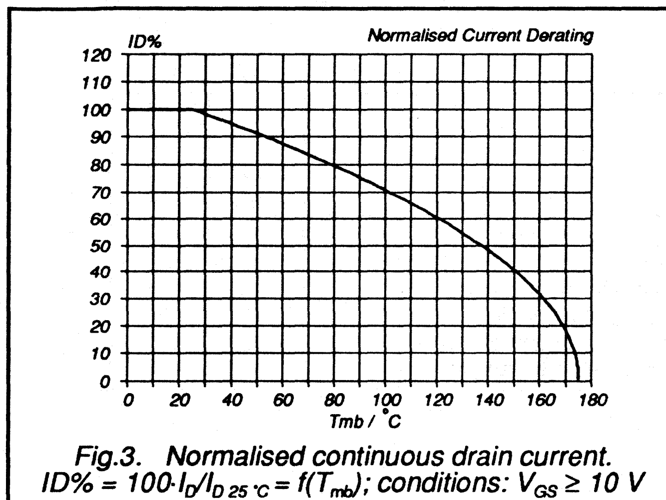


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: $V_{GS} \geq$ 10 V

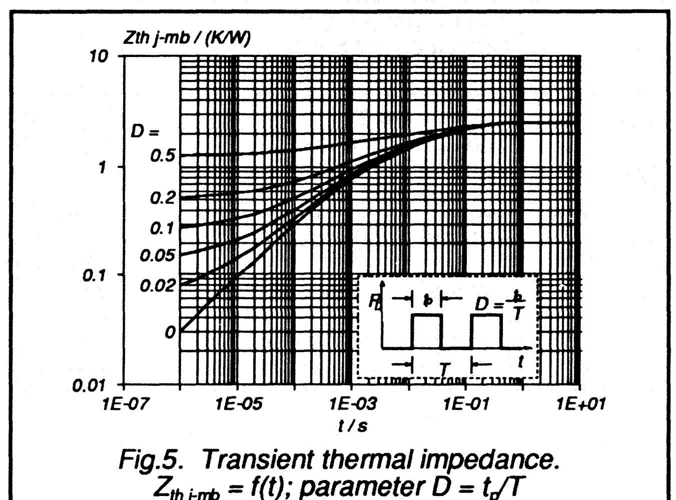


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb}$ = f(t); parameter D = t_p/T

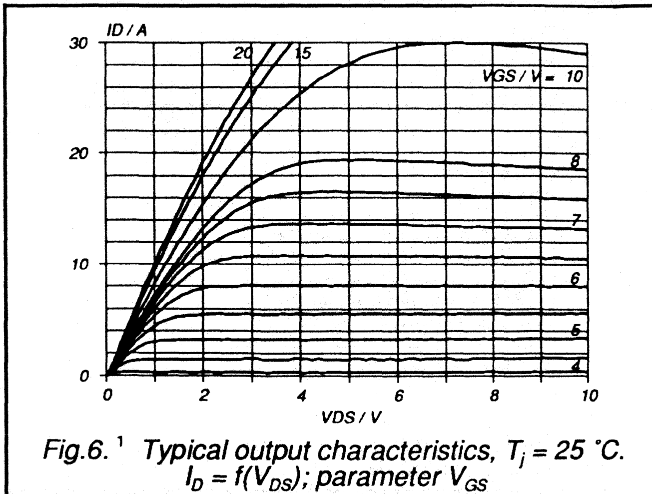


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

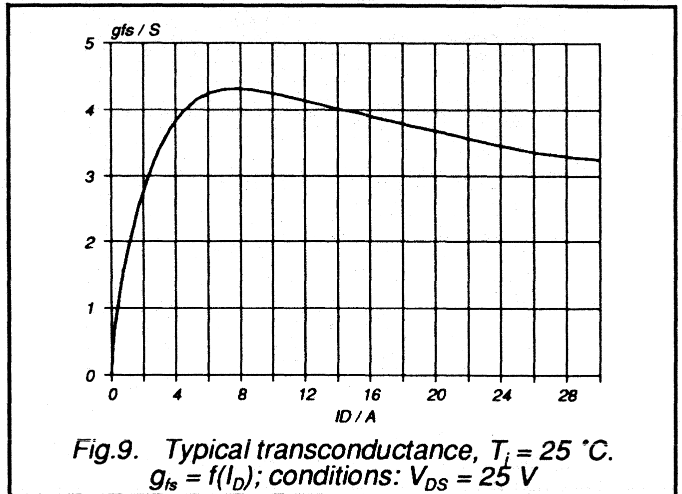


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

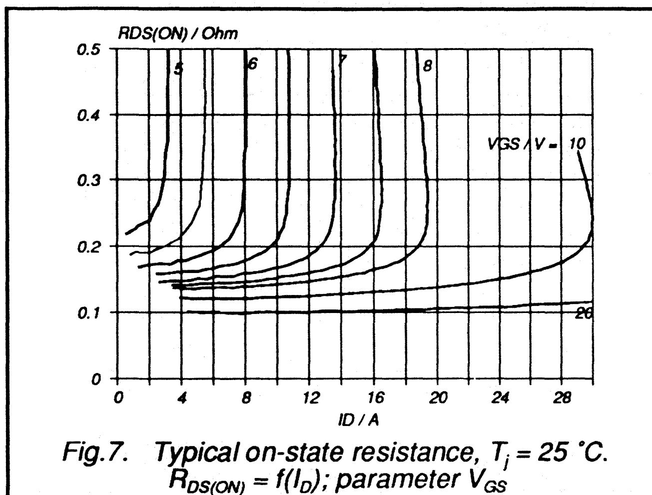


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

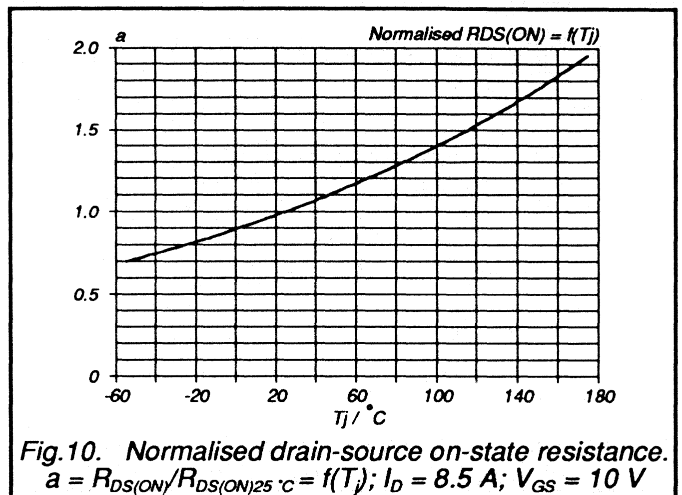


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 8.5 A; V_{GS} = 10 V

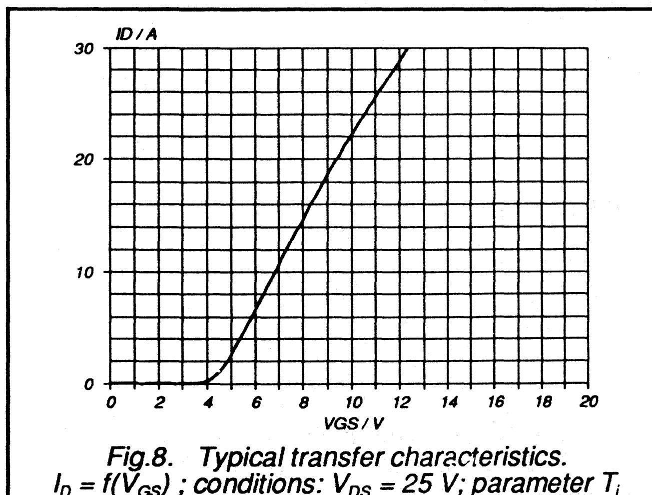


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

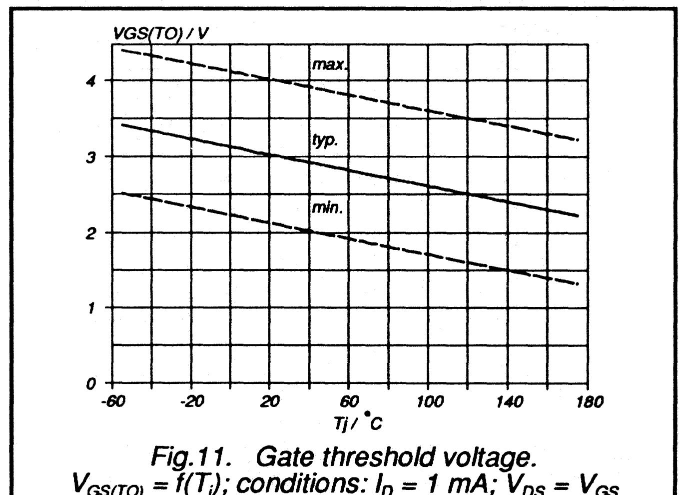


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

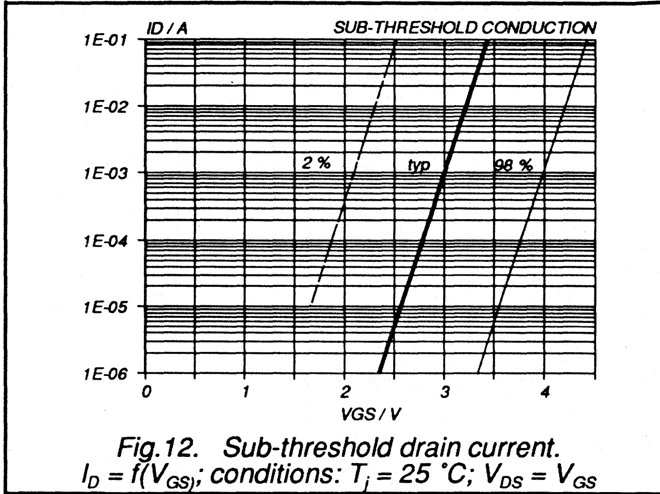


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: T_j = 25 °C; $V_{DS} = V_{GS}$

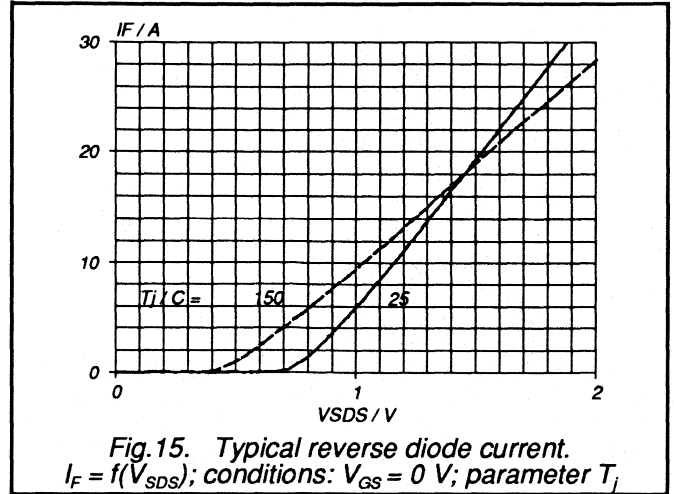


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: V_{GS} = 0 V; parameter T_j

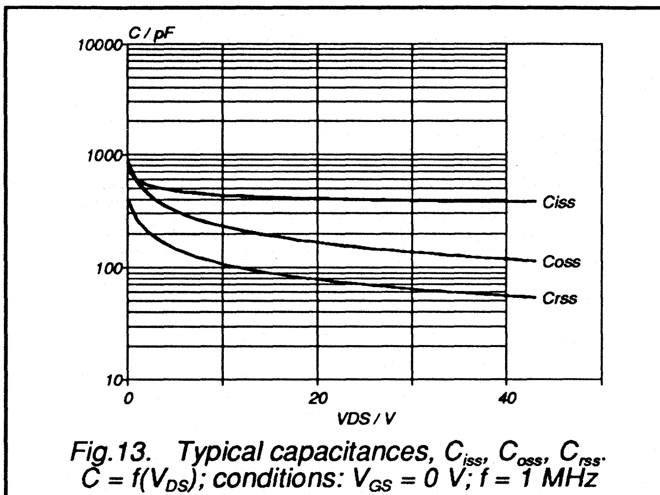


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: V_{GS} = 0 V; f = 1 MHz

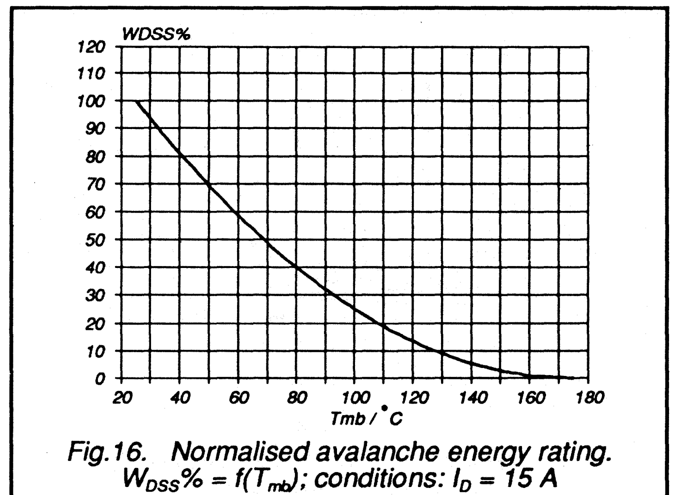


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: I_D = 15 A

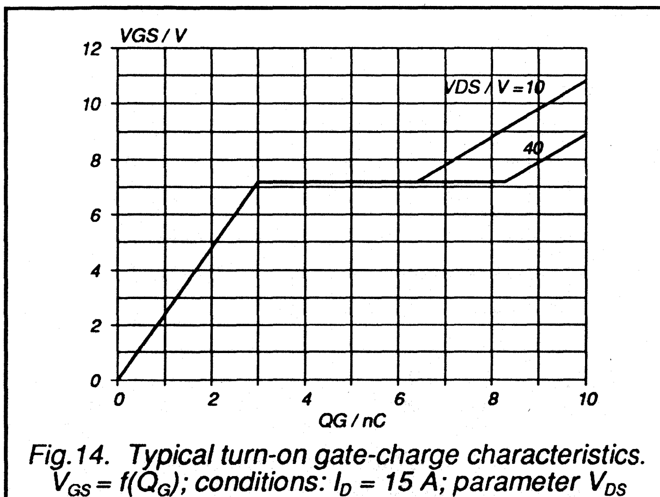


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: I_D = 15 A; parameter V_{DS}

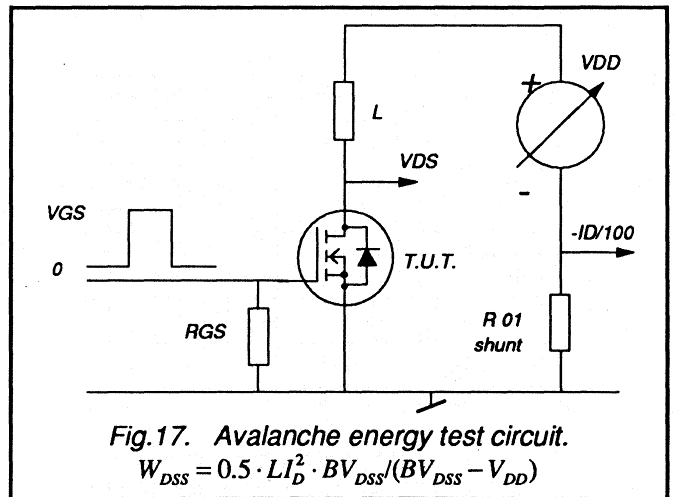


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK452	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	11	10	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.25	0.3	Ω

MECHANICAL DATA

Dimensions in mm

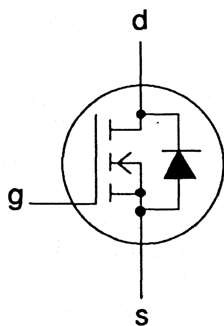
Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source



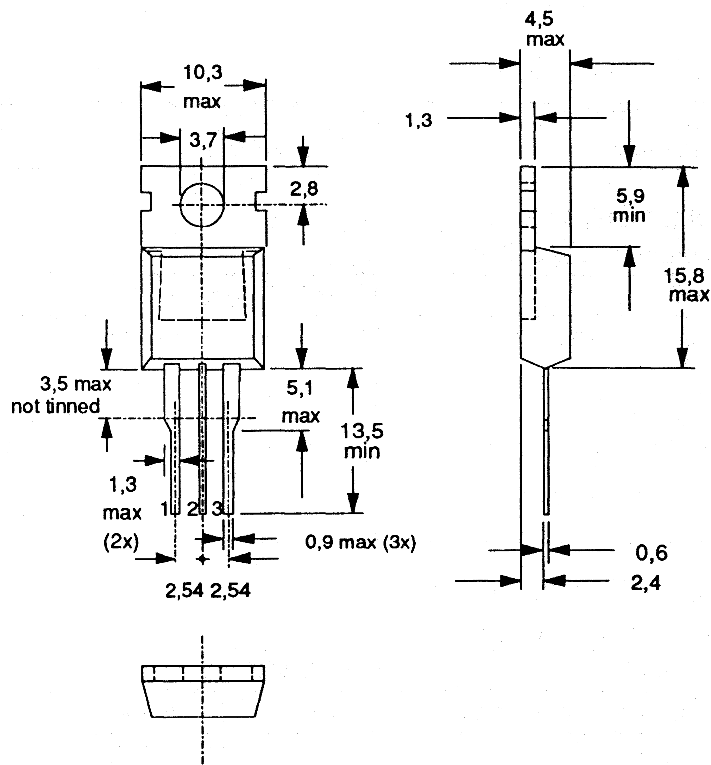


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	**-100B**	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	11	10	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	7.7	7	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	44	40	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb}$ = 2.5 K/W
From junction to ambient	$R_{th\ j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 5.5 A **BUK452-100A**	-	0.22	0.25	Ω
		BUK452-100B	-	0.25	0.3	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5.5 A	3	4.2	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	90	120	pF
C_{rss}	Feedback capacitance		-	35	50	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	9	14	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	30	45	ns
t_f	Turn-off fall time		-	20	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	11	A
I_{DRM}	Pulsed reverse drain current	-	-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 11 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 11 A ; $V_{DD} \leq 50$ V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	35	mJ

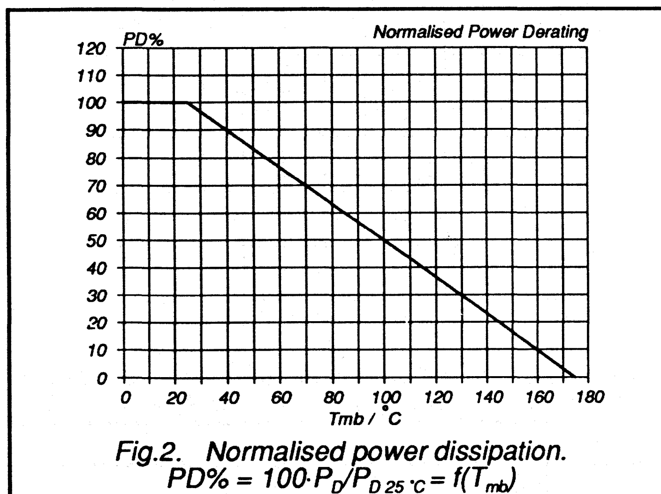


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

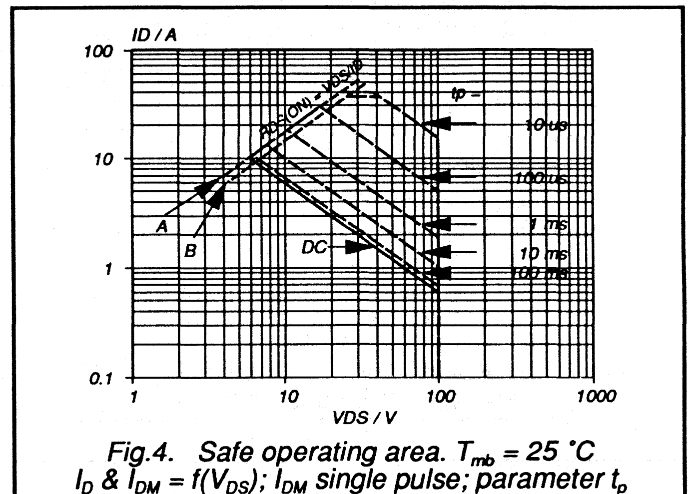


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

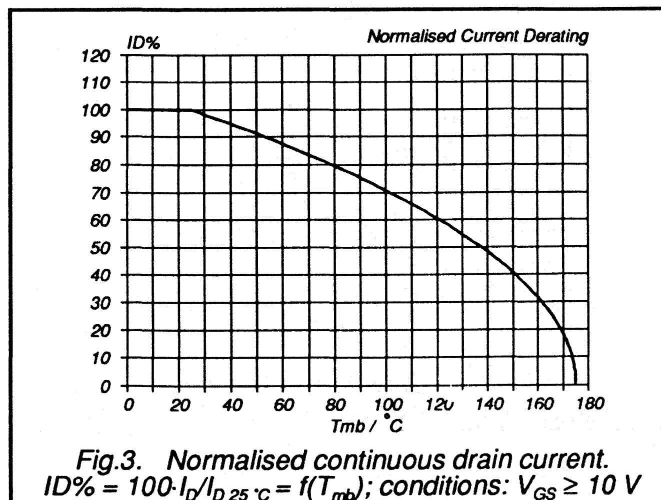


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

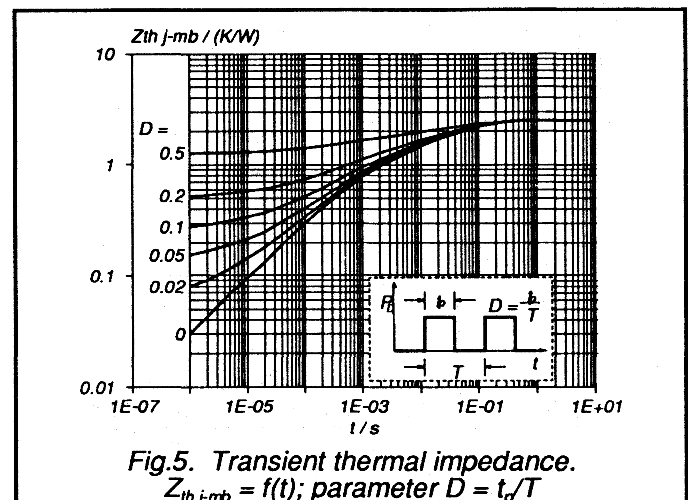


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

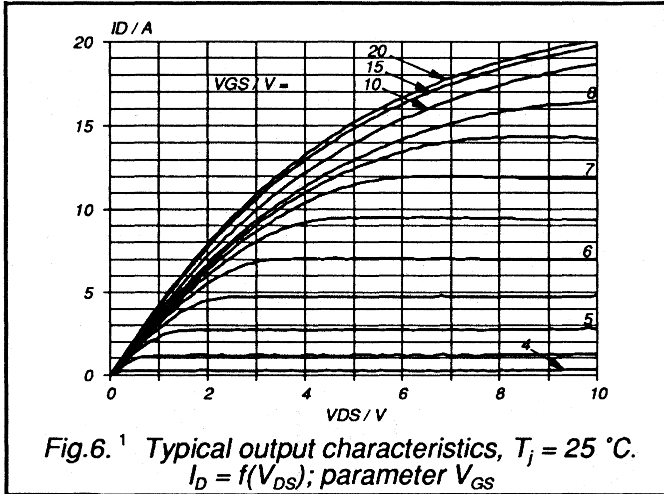


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

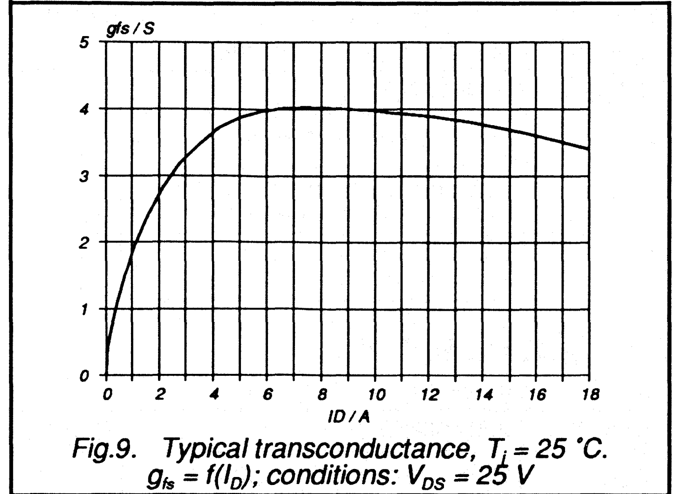


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

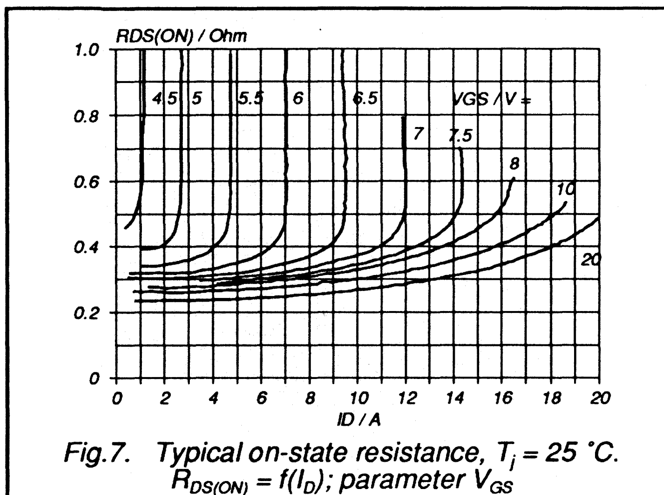


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

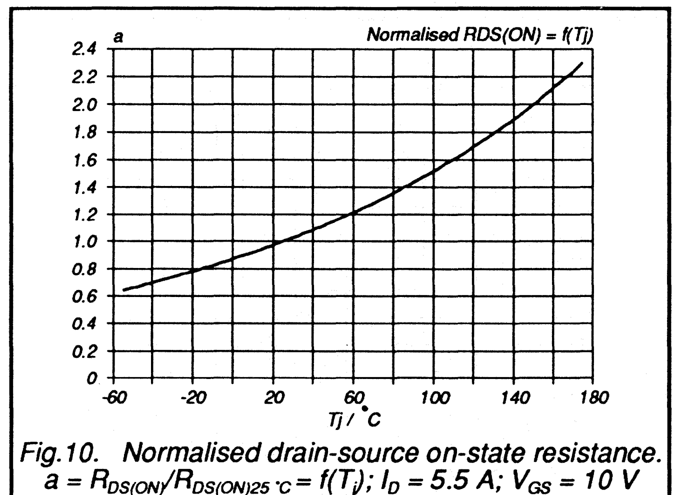


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 5.5 A; V_{GS} = 10 V

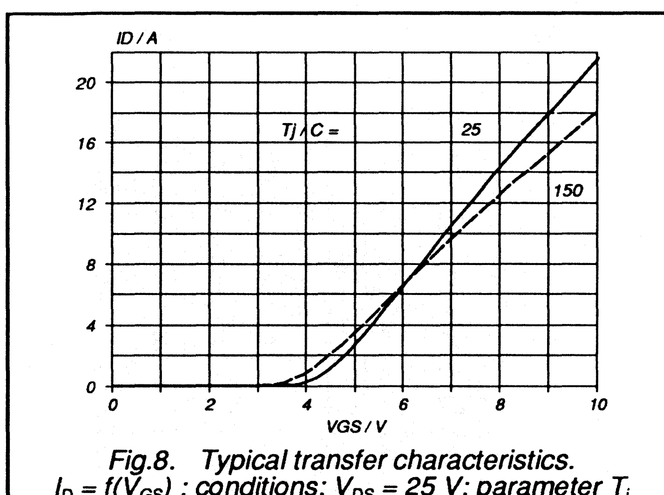


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

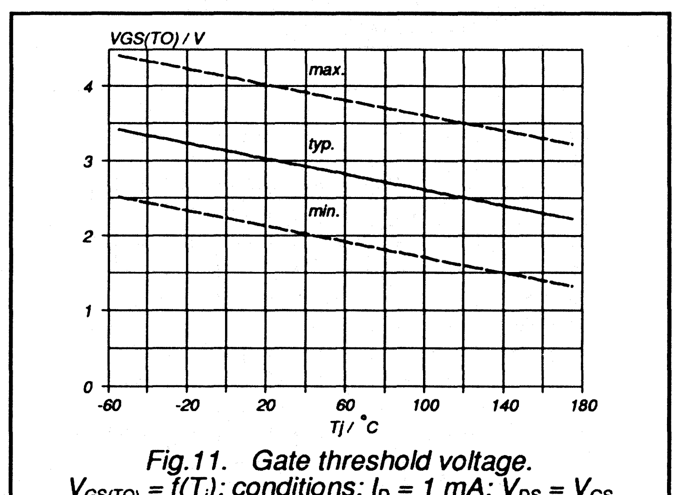


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

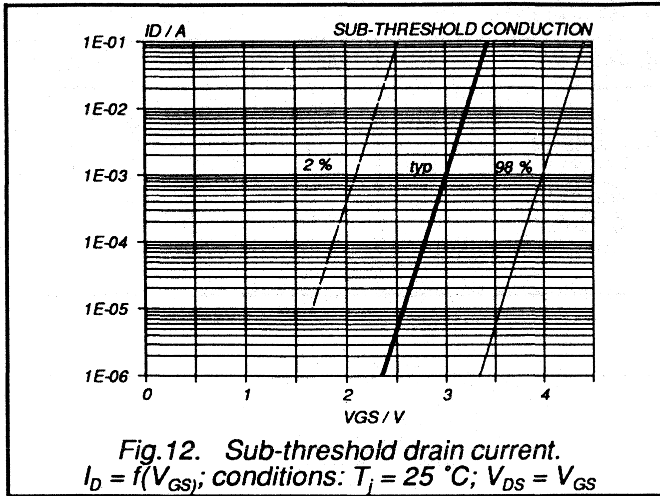


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

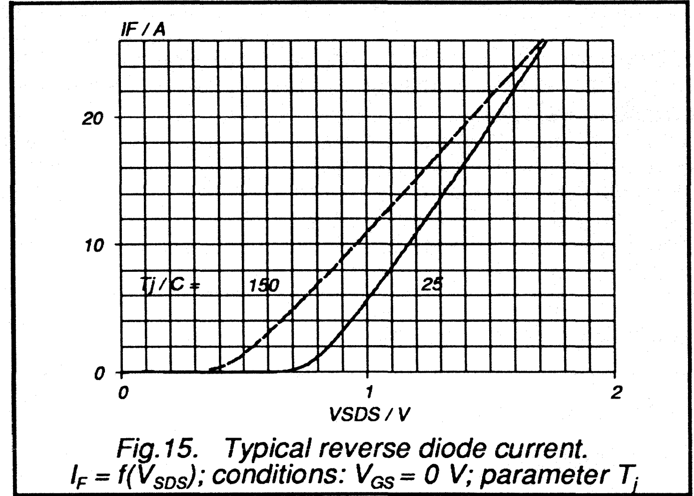


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

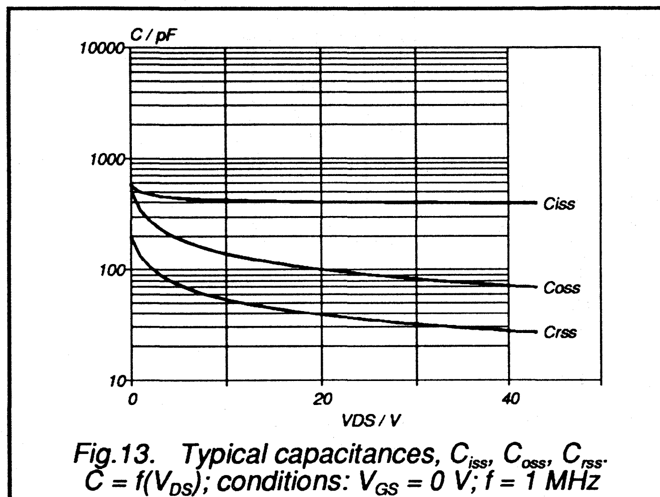


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

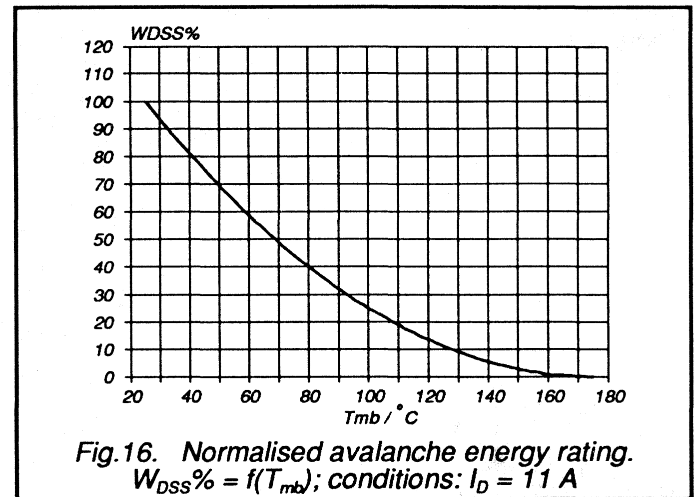


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 11$ A

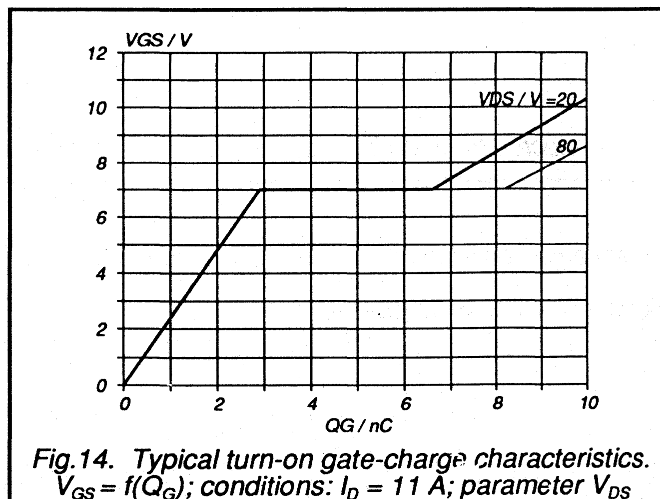


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

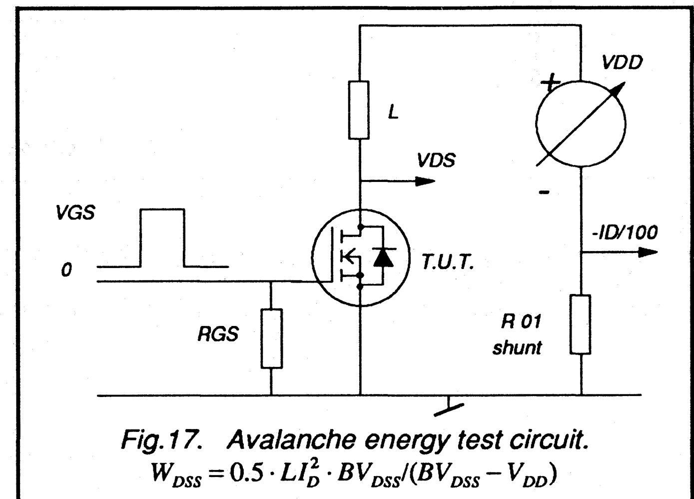


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK453	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	22	20	A
P_{tot}	Total power dissipation	75	75	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.08	0.10	Ω

MECHANICAL DATA

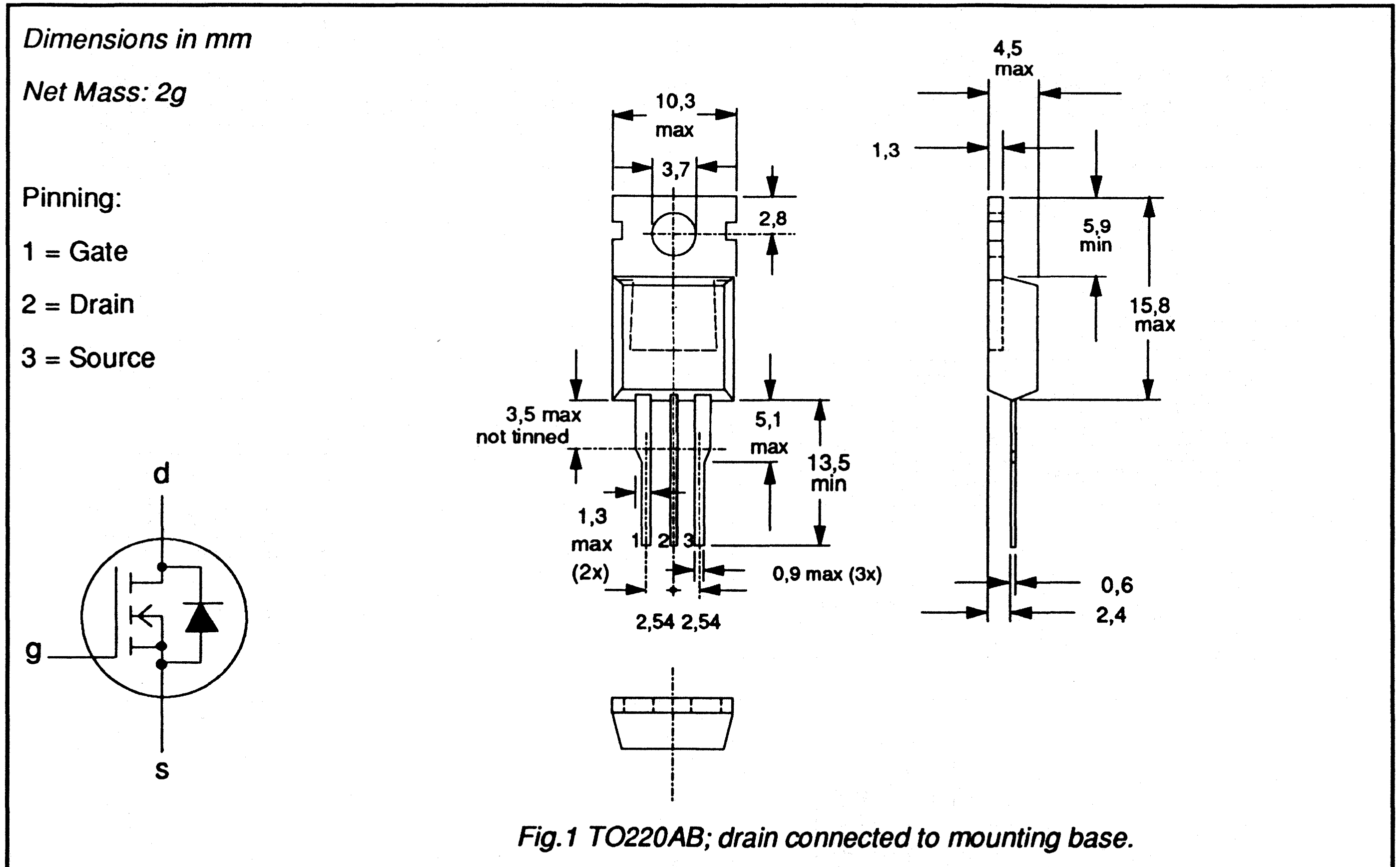


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	22	20	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	15	14	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	88	80	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j-mb}$ = 2 K/W
From junction to ambient	$R_{th\,j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 10 A BUK453-50A	-	0.07	0.08	Ω
		BUK453-50B	-	0.08	0.10	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	4.5	6.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	650	825	pF
C_{oss}	Output capacitance		-	240	350	pF
C_{rss}	Feedback capacitance		-	120	160	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	10	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	35	55	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	60	90	ns
t_f	Turn-off fall time		-	55	80	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	22	A
I_{DRM}	Pulsed reverse drain current	-	-	-	88	A
V_{SD}	Diode forward voltage	I_F = 22 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 22 A; -dI_F/dt = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 22 A ; V_{DD} ≤ 25 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	50	mJ

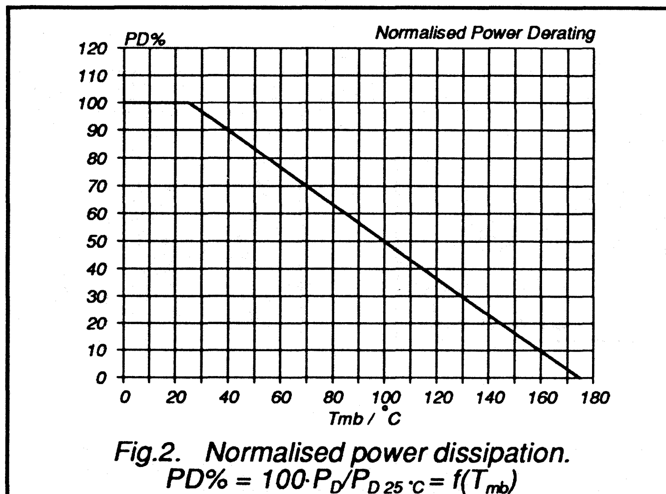


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

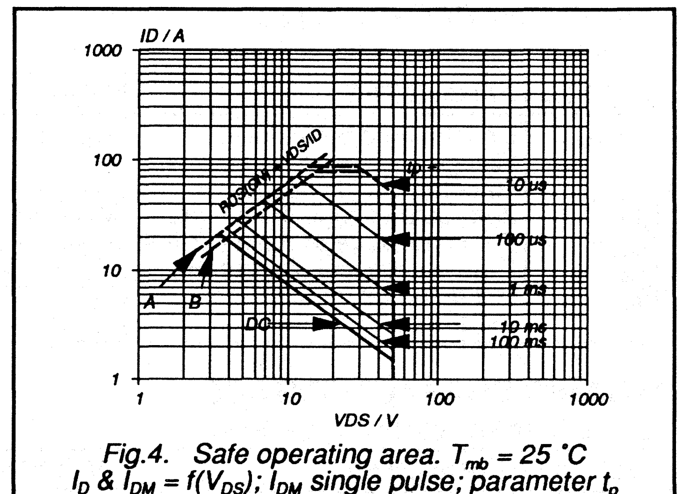


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

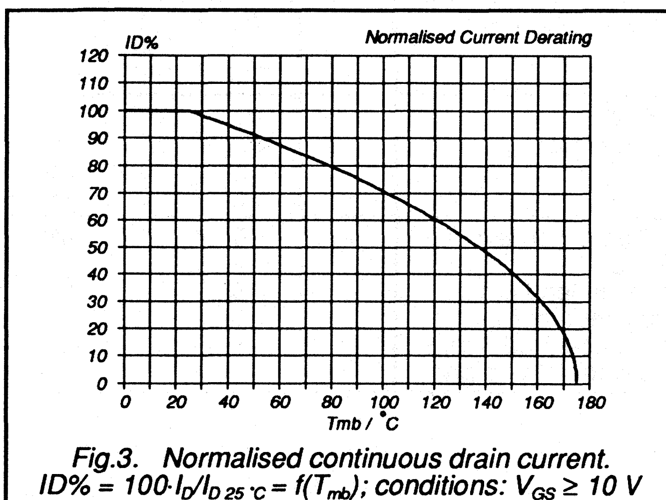


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

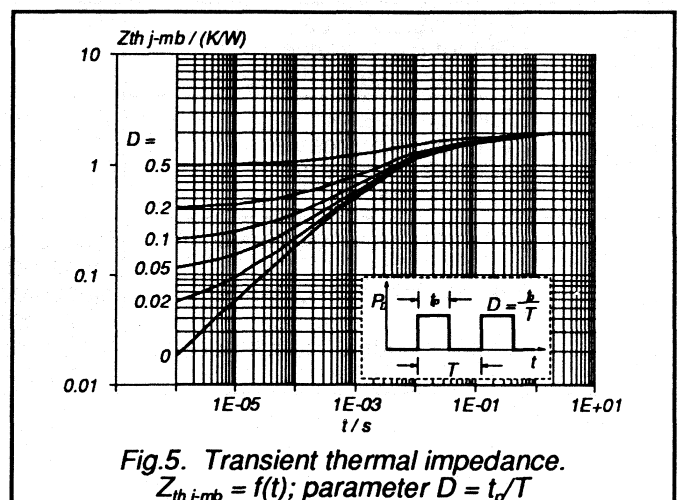


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

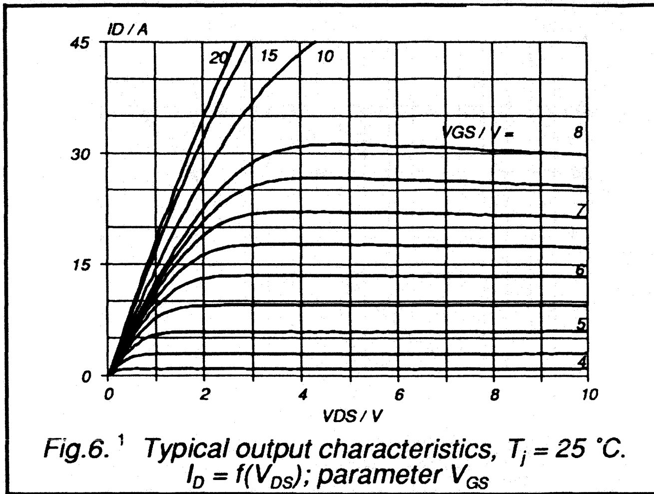


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

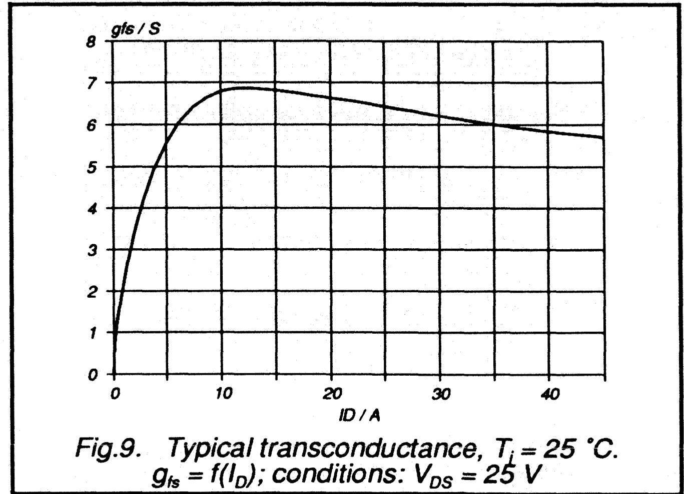


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

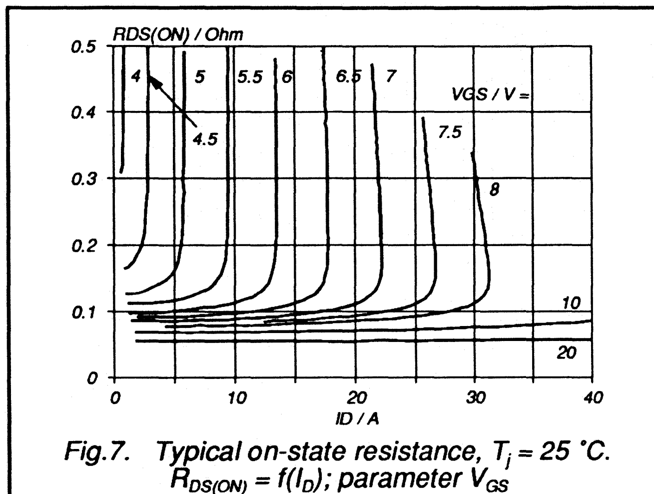


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

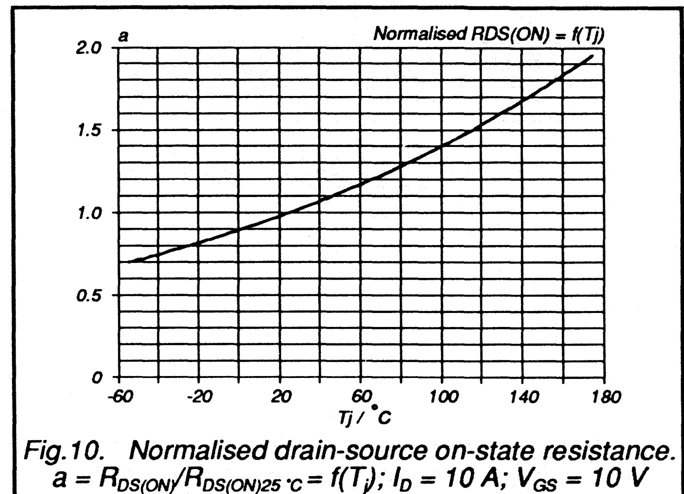


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 10$ A; $V_{GS} = 10$ V

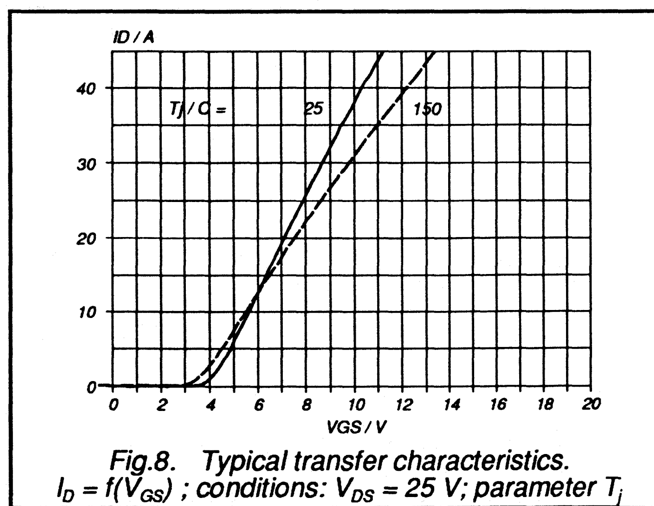


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

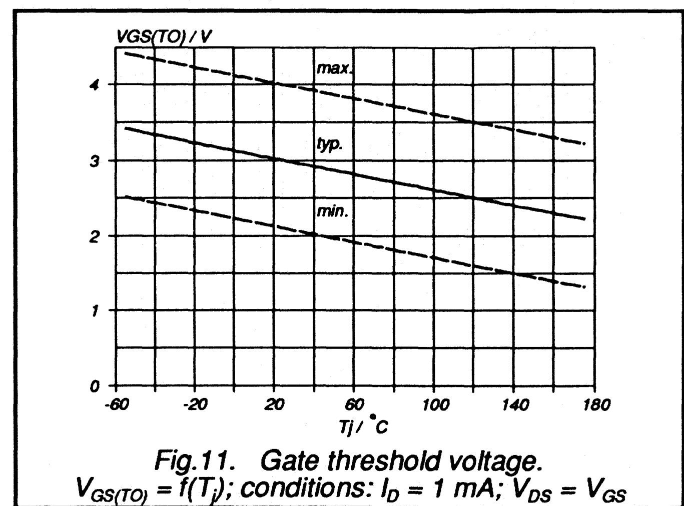


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

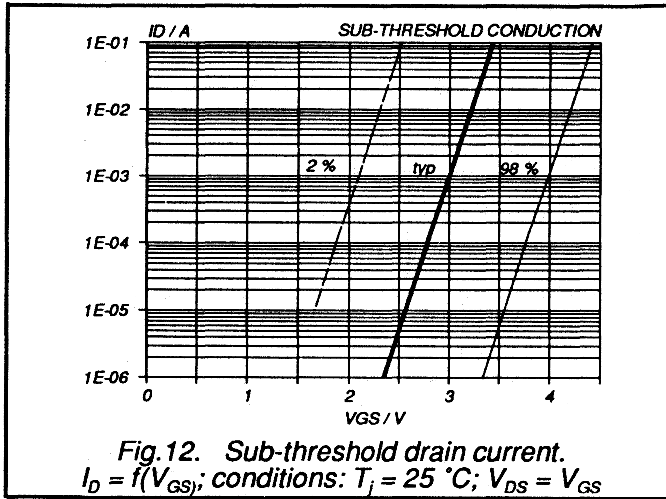


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

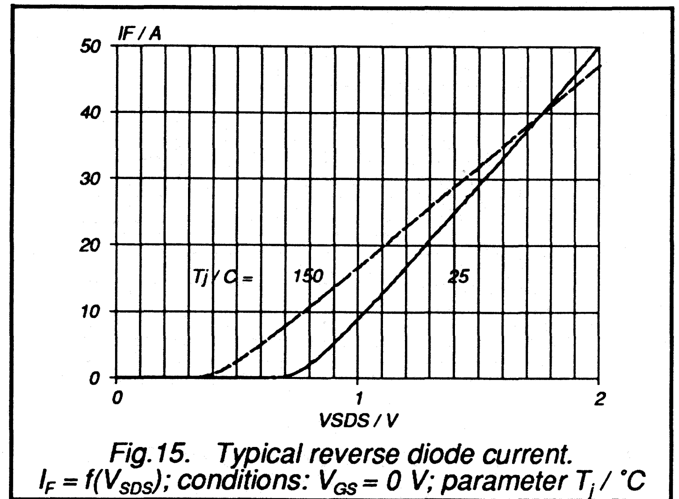


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j / °C

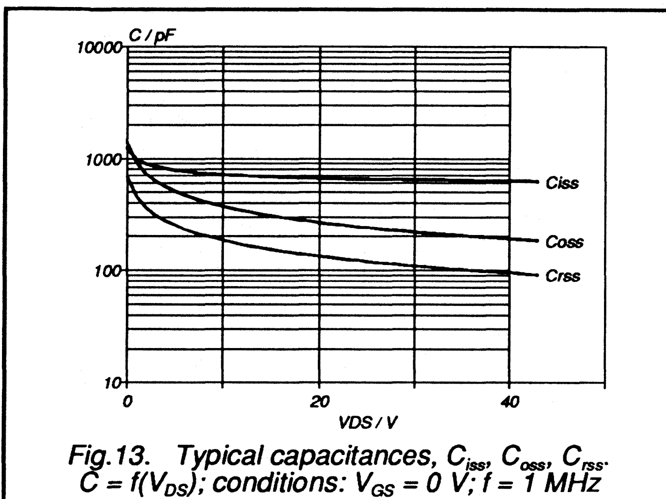


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

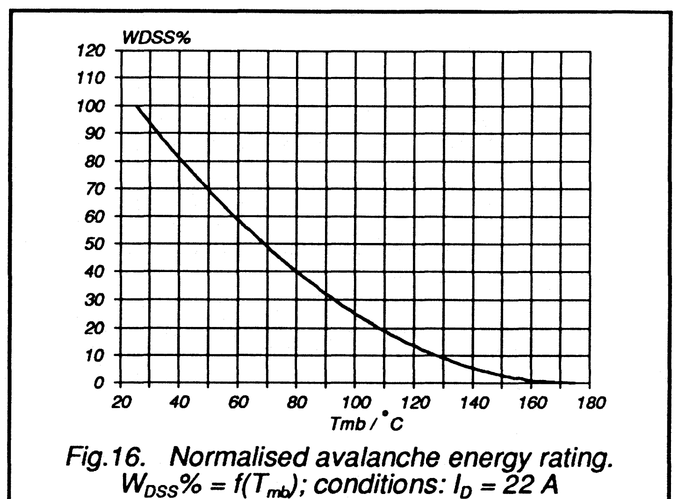


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 22$ A

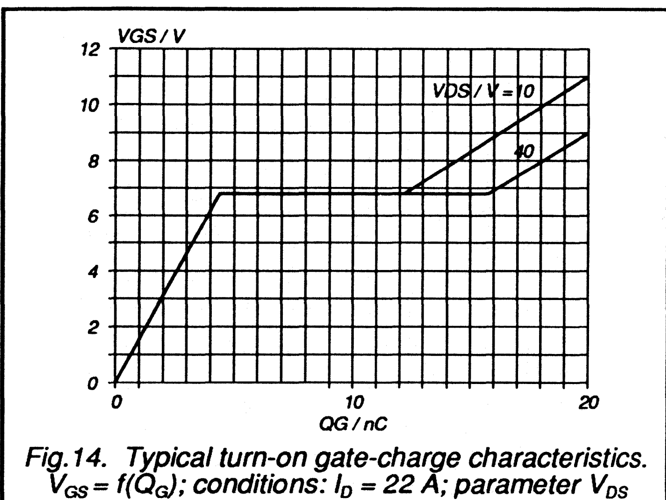


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 22$ A; parameter V_{DS}

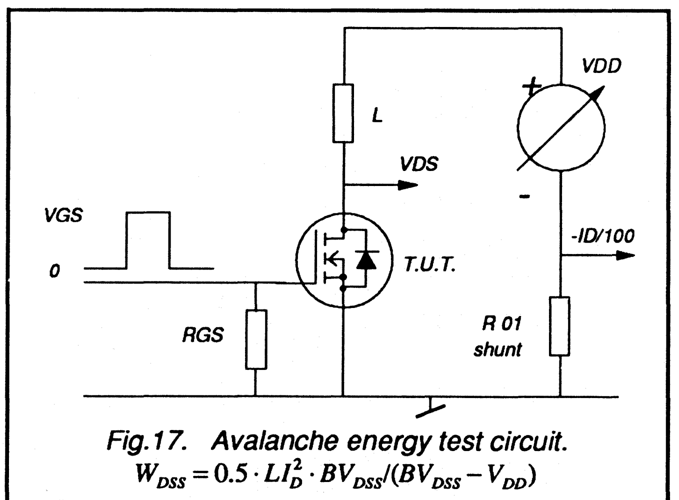


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot L I_D^2 \cdot BV_{DSS} / (BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK453	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	14	13	A
P_{tot}	Total power dissipation	75	75	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.16	0.20	Ω

MECHANICAL DATA

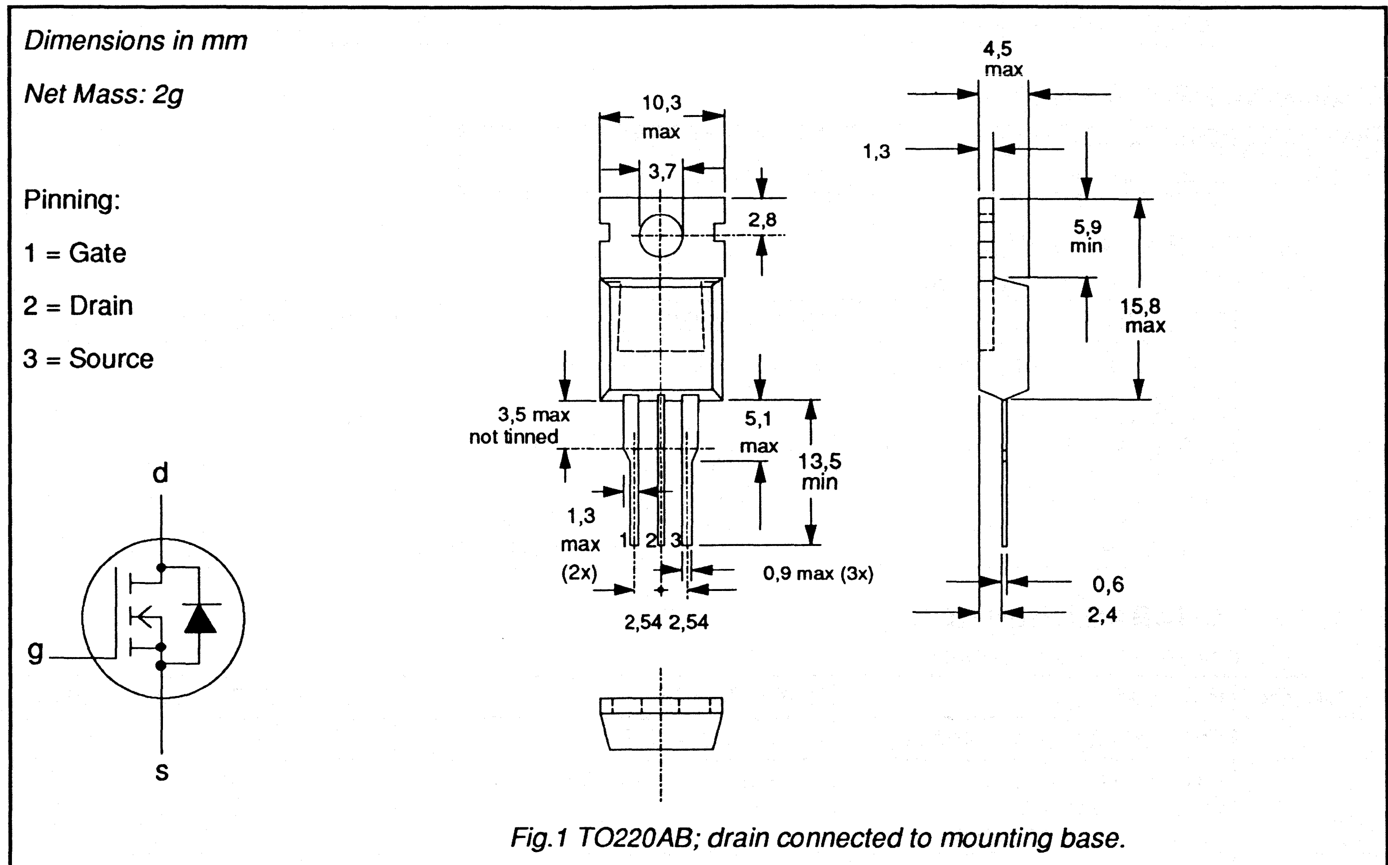


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	13	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	10	9	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	52	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK453-100A**	-	0.15	0.16	Ω
		I_D = 5 A **BUK453-100B**	-	0.15	0.20	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5 A	4.0	5.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	660	825	pF
C_{oss}	Output capacitance		-	140	200	pF
C_{rss}	Feedback capacitance		-	60	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	10	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	60	90	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 14 A; -dI_F/dt = 100 A/µs;	-	170	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.3	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; V_{DD} ≤ 50 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	70	mJ

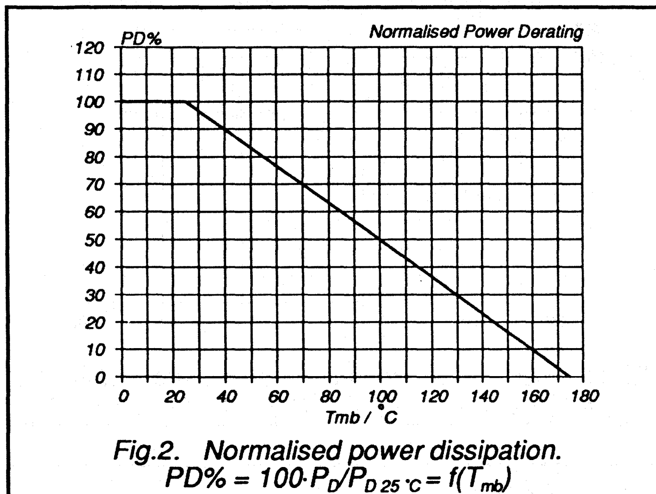


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

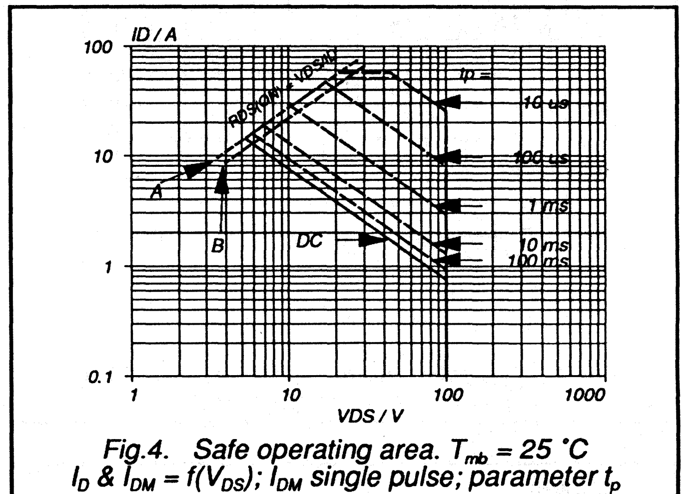


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

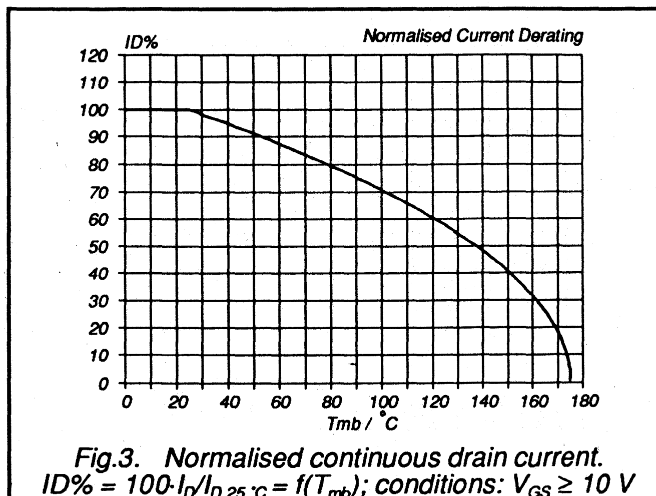


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: V_{GS} ≥ 10 V

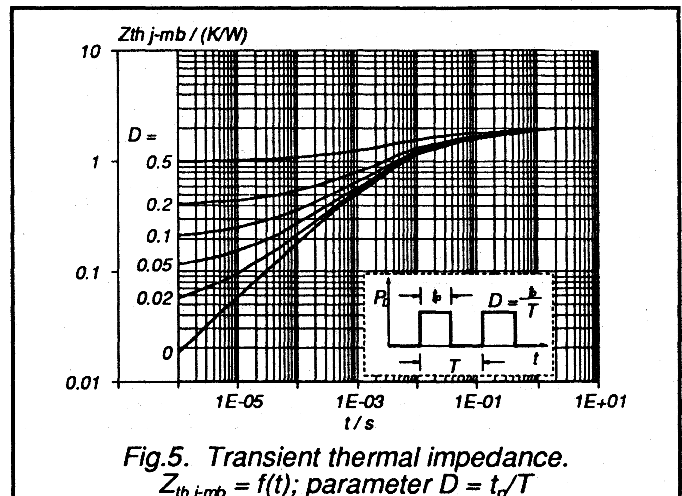


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

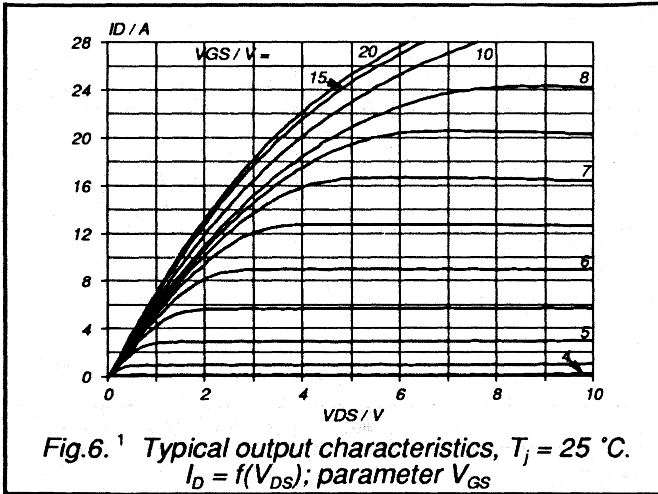


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

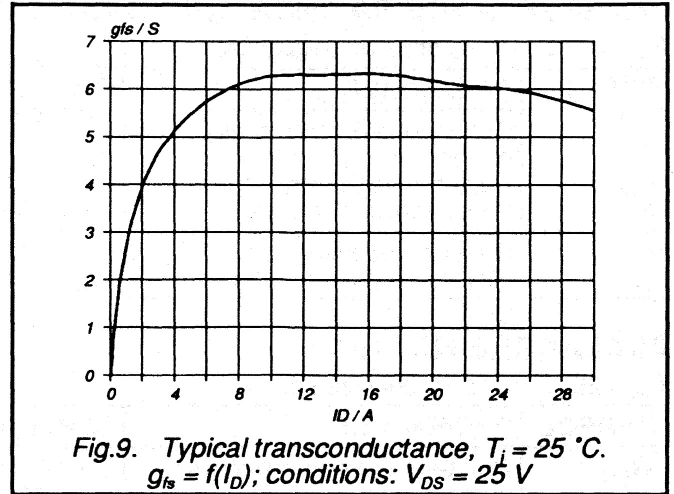


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

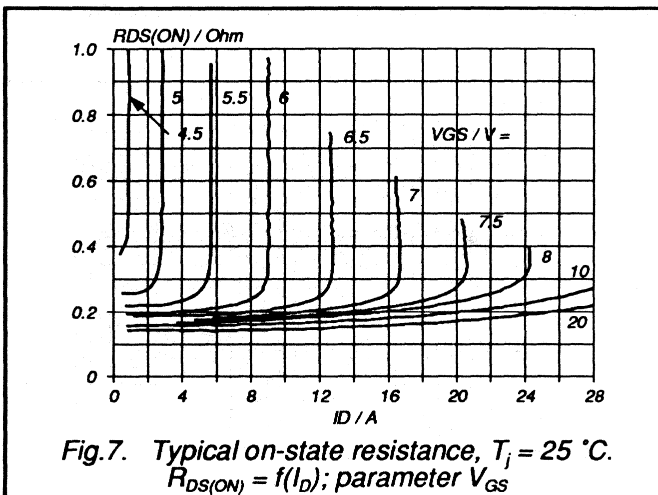


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

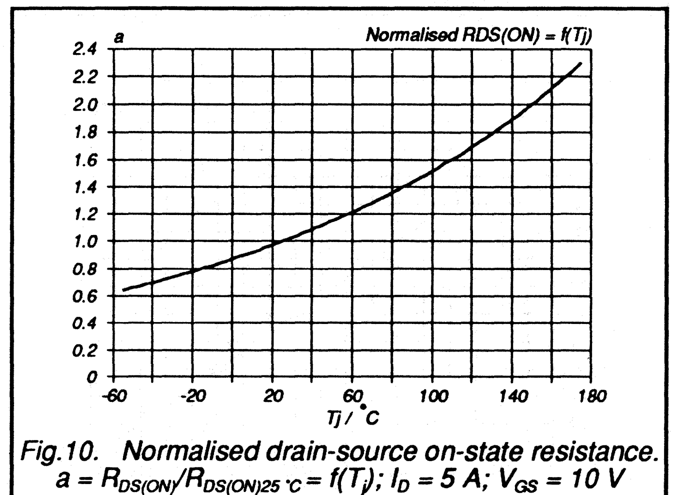


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 5 A; V_{GS} = 10 V

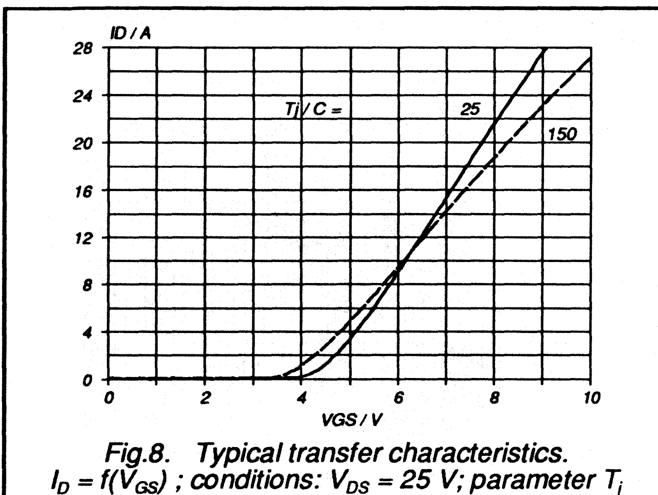


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

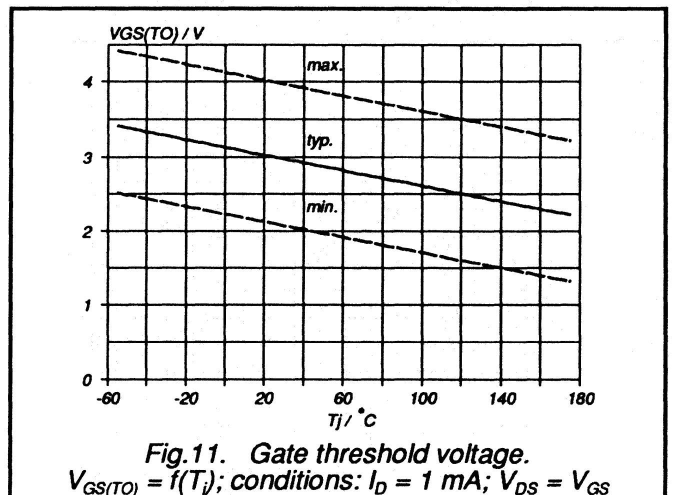


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

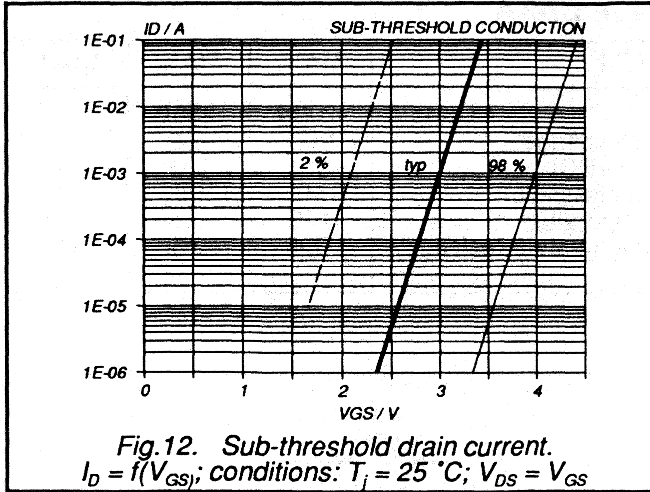


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

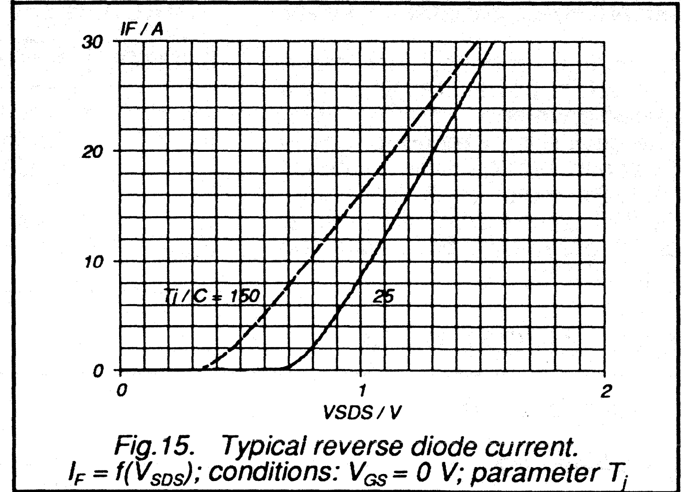


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

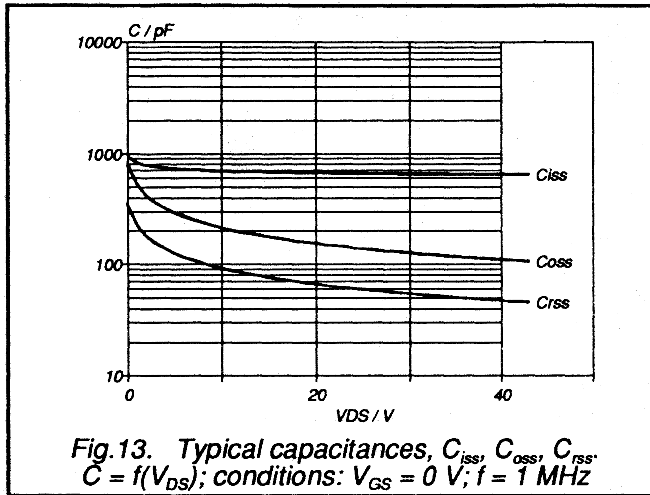


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

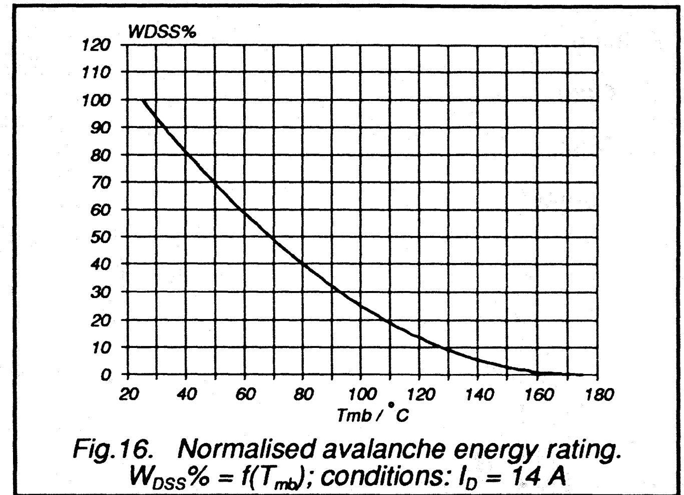


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 14$ A

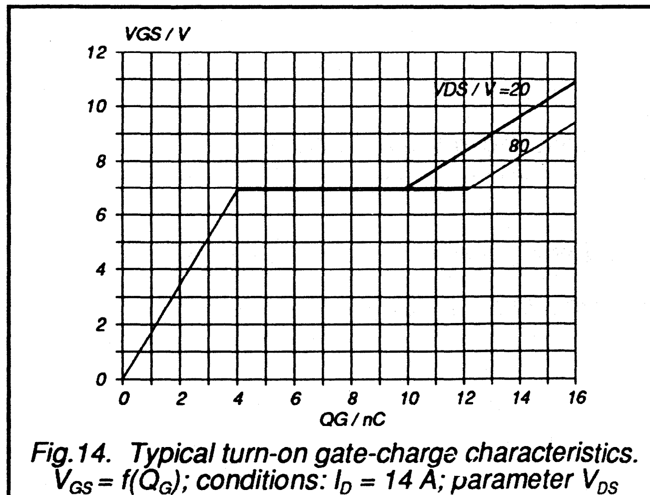


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

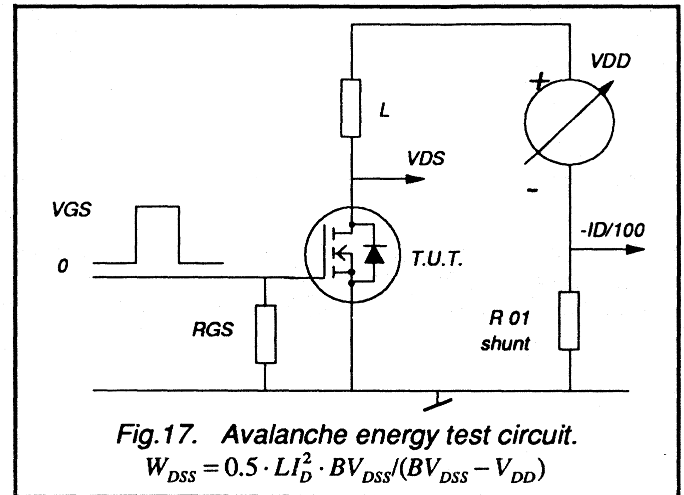


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK454	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	9.2	8.2	A
P_{tot}	Total power dissipation	90	90	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.4	0.5	Ω

MECHANICAL DATA

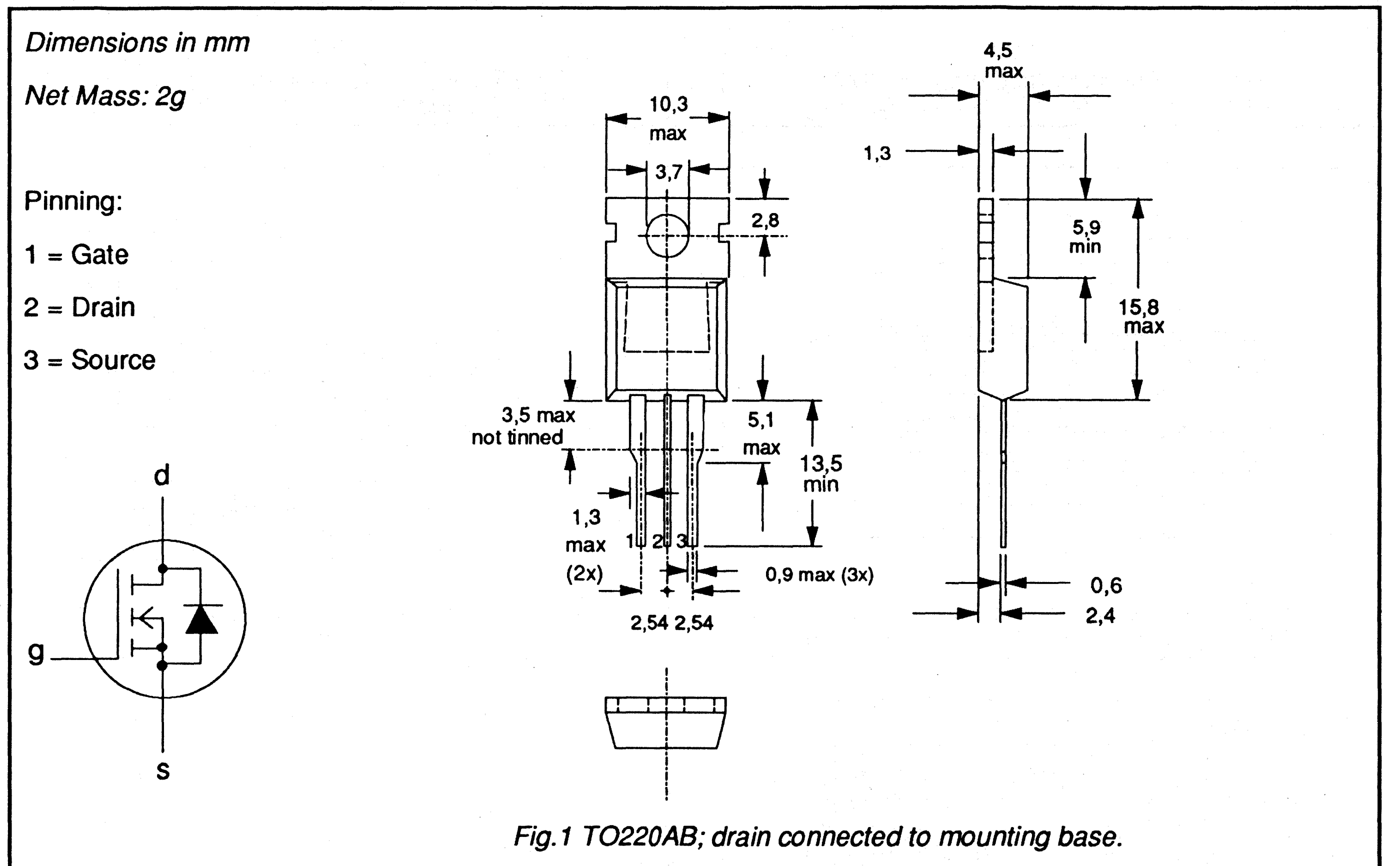


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9.2	8.2	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.5	5.8	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	36	33	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	90		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 3.5 A **BUK454-200A**	-	0.35	0.4	Ω
		BUK454-200B	-	0.4	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 3.5 A	3.5	5.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	700	850	pF
C_{oss}	Output capacitance		-	100	160	pF
C_{rss}	Feedback capacitance		-	50	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.9 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	12	20	ns
t_r	Turn-on rise time		-	45	70	ns
$t_{d\,off}$	Turn-off delay time		-	80	120	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9.2	A
I_{DRM}	Pulsed reverse drain current	-	-	-	36	A
V_{SD}	Diode forward voltage	I_F = 9.2 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 9.2 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	0.6	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 9 A ; $V_{DD} \leq$ 100 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	50	mJ

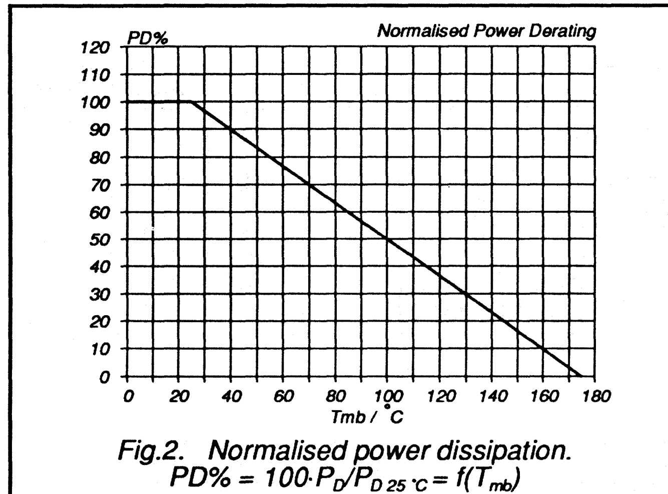


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

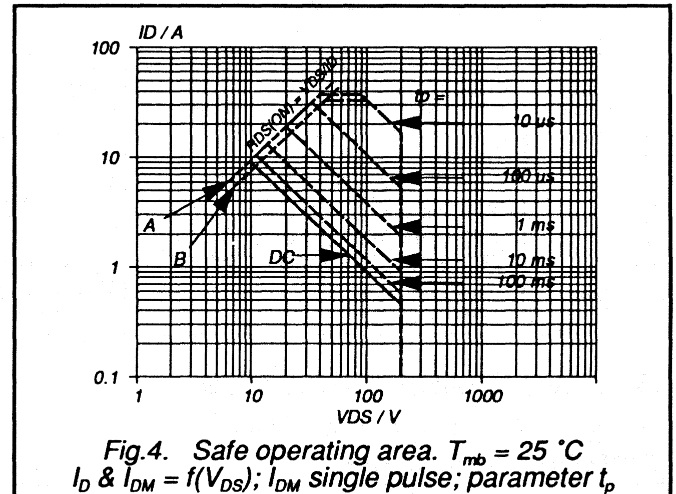


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

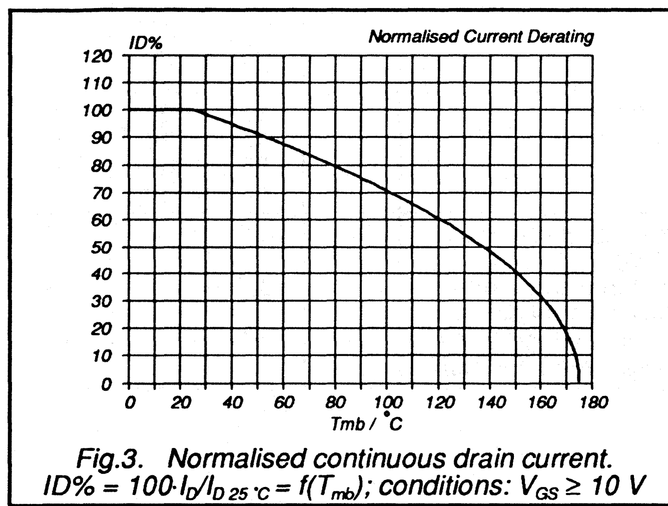


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

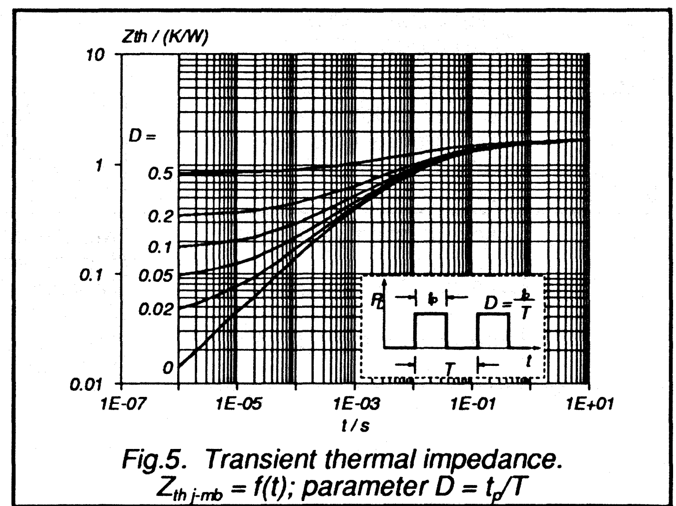


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

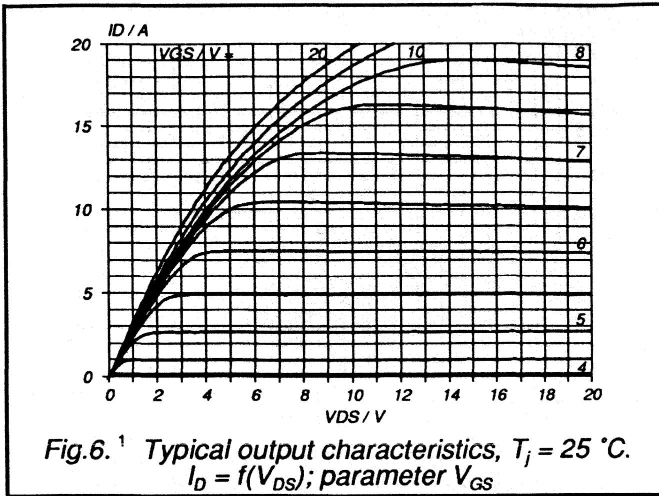


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

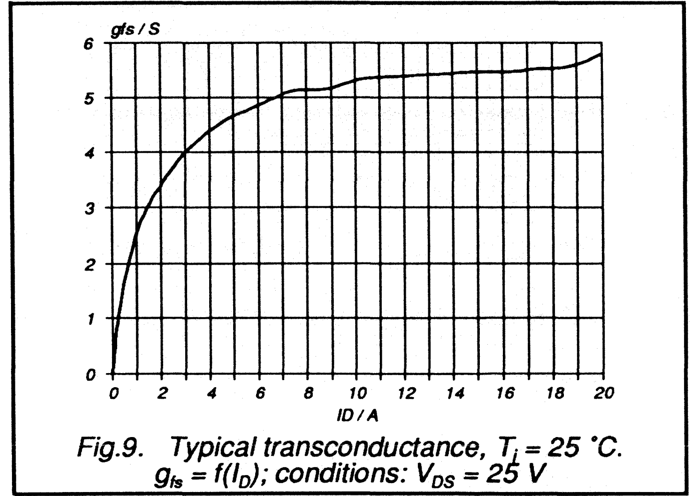


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

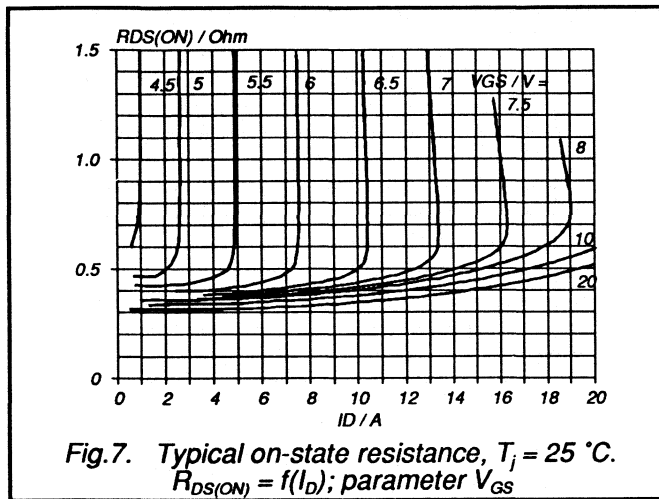


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

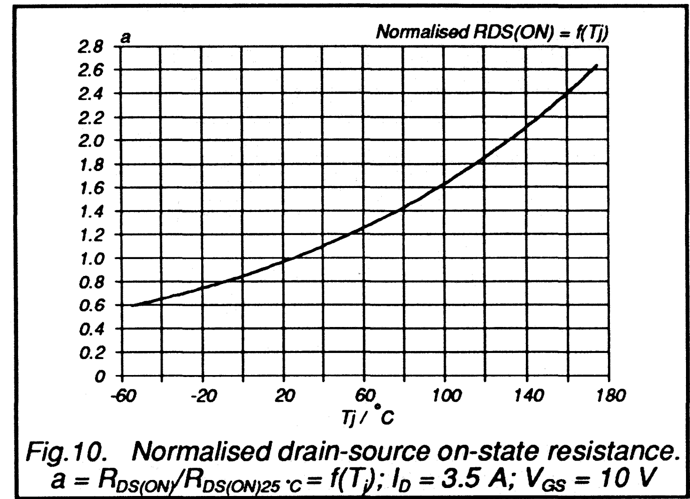


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 3.5 A; V_{GS} = 10 V

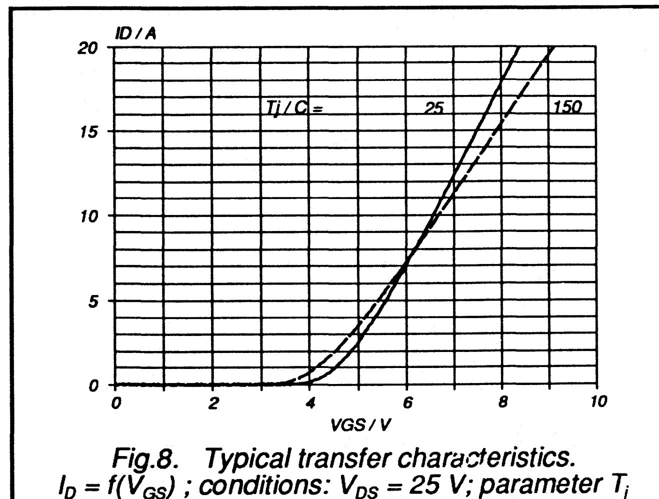


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

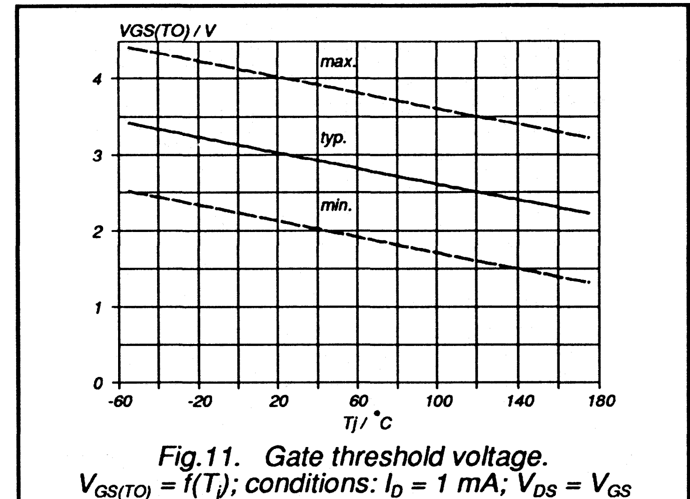


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

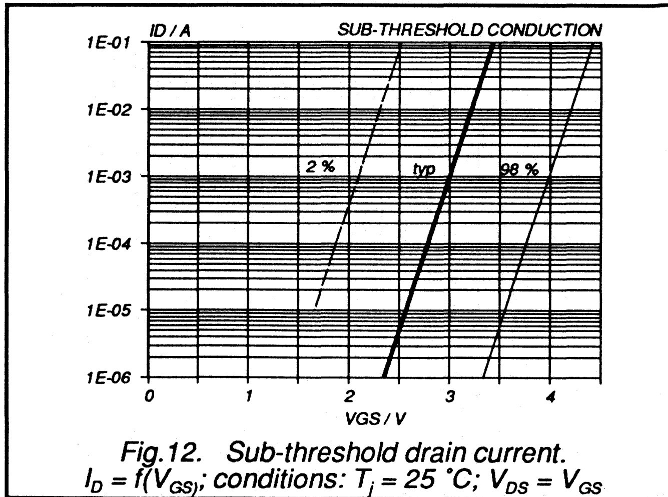


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

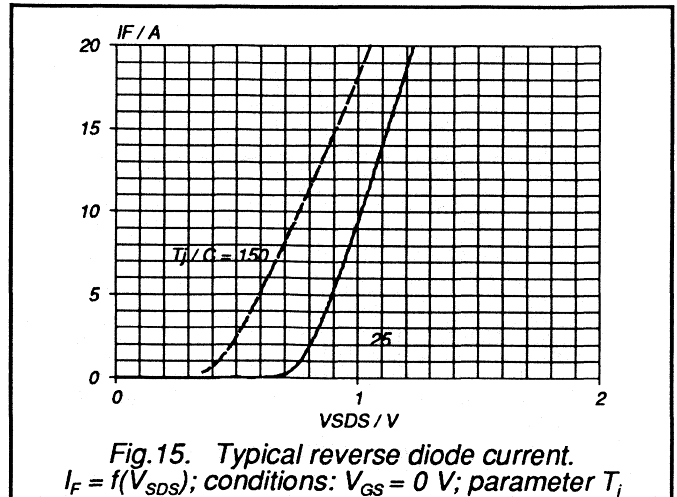


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

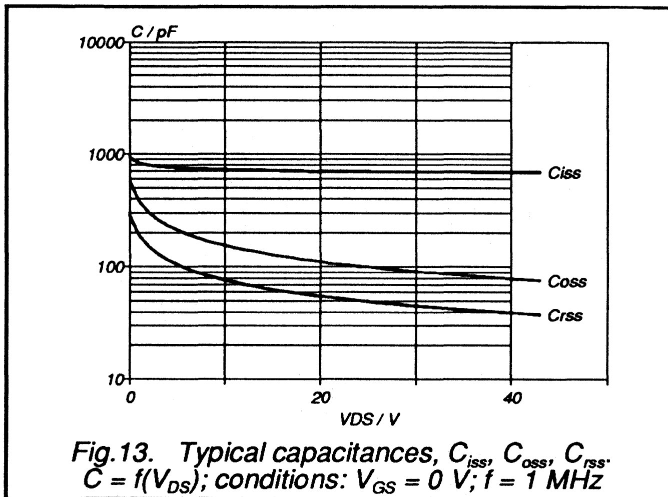


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

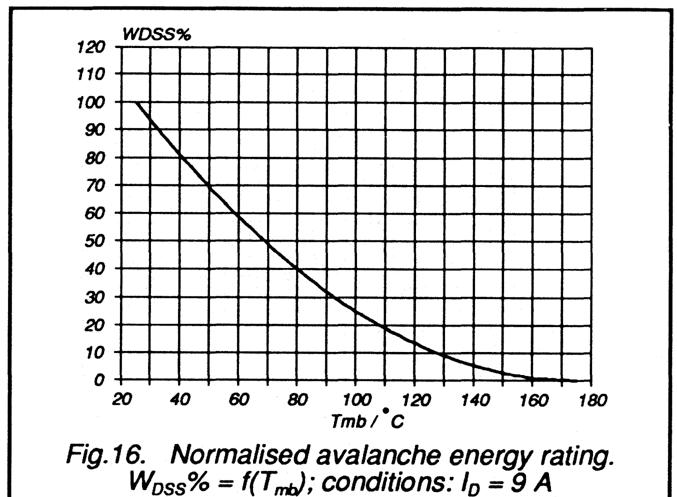


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 9$ A

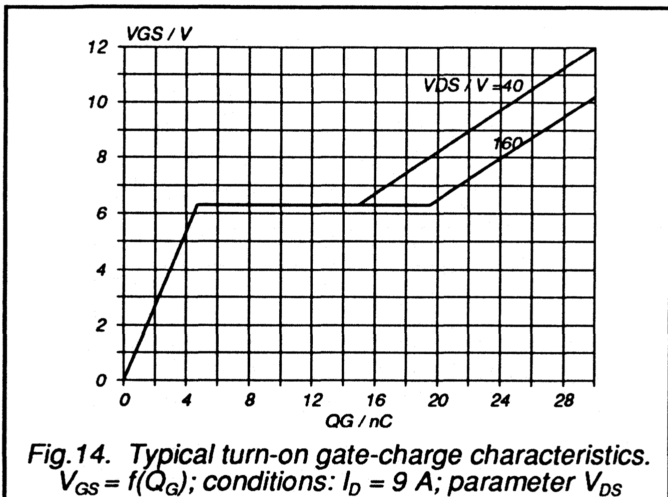


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

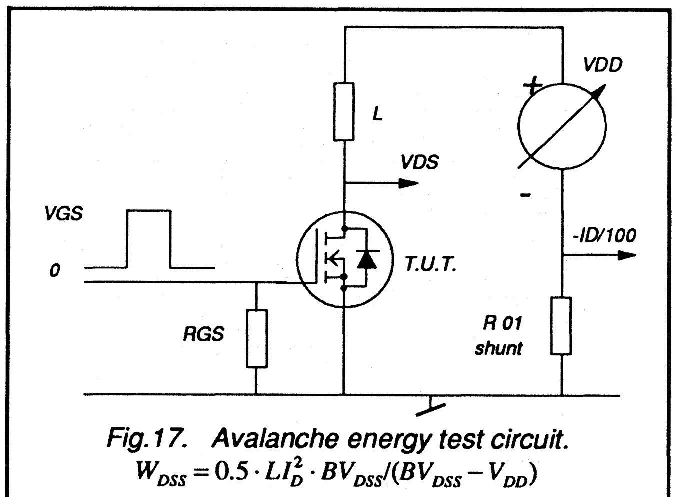


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK454	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	4.6	4.2	A
P_{tot}	Total power dissipation	75	75	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.5	1.8	Ω

MECHANICAL DATA

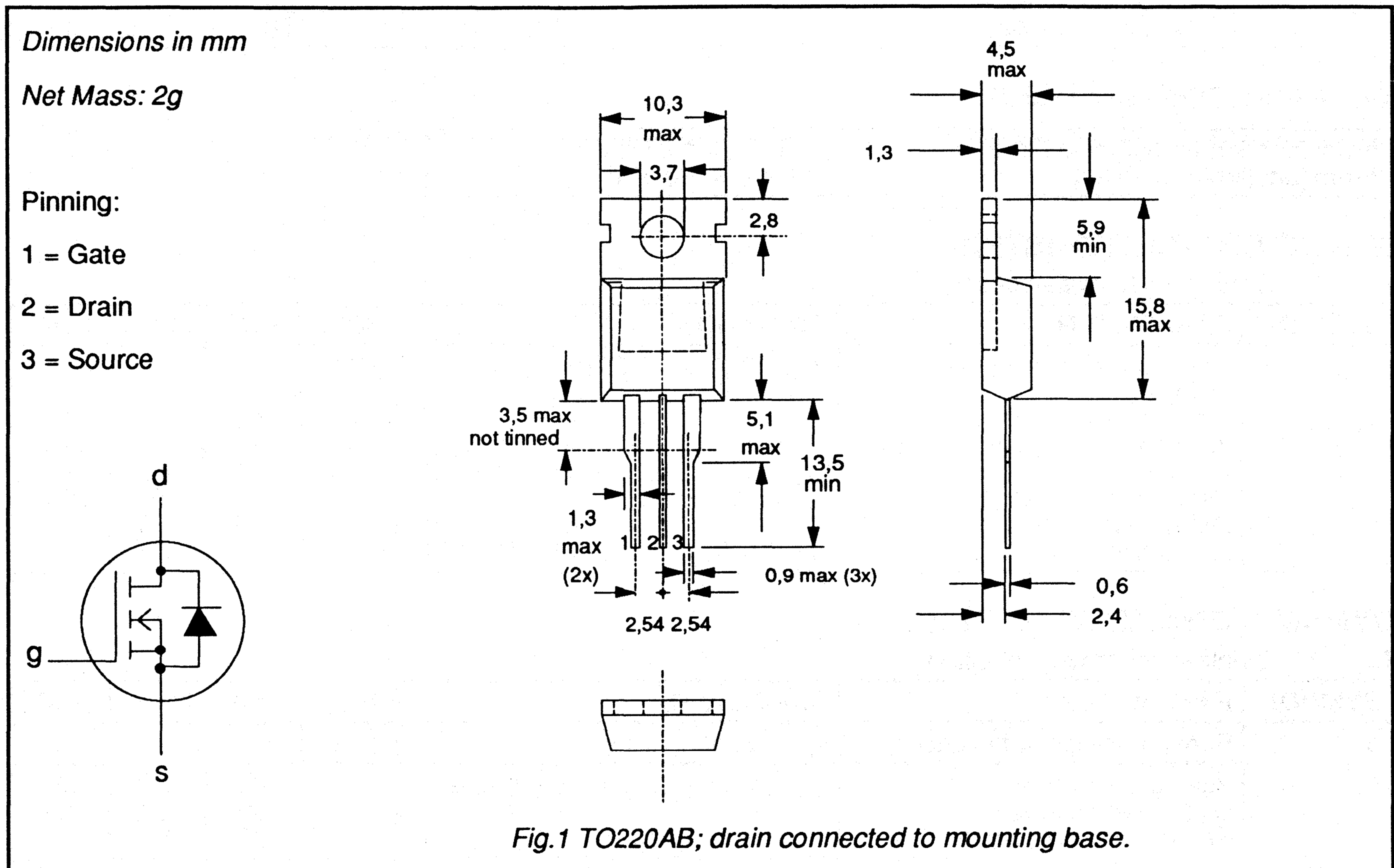


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	4.6	4.2	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.9	2.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	18	17	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A BUK454-400A	-	1.3	1.5	Ω
		BUK454-400B	-	1.5	1.8	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	2.1	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	360	500	pF
C_{oss}	Output capacitance		-	60	80	pF
C_{rss}	Feedback capacitance		-	25	60	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.5 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	15	20	ns
t_r	Turn-on rise time		-	40	60	ns
$t_{d\,off}$	Turn-off delay time		-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	18	A
V_{SD}	Diode forward voltage	I_F = 4.6 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 4.6 A; $-dI_F/dt$ = 100 A/μs;	-	300	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	2.5	-	μC

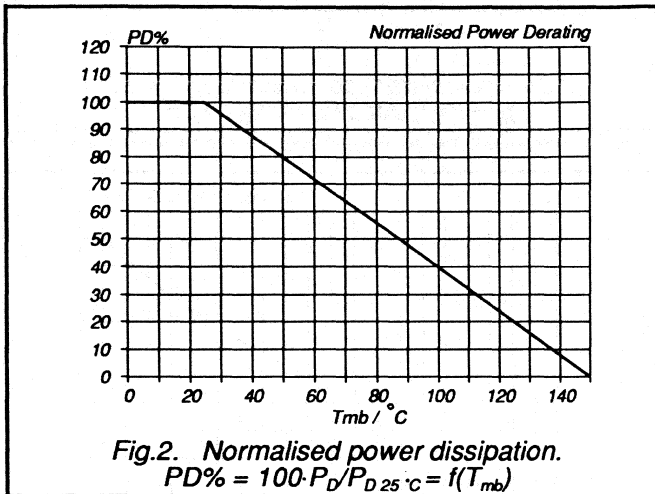


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

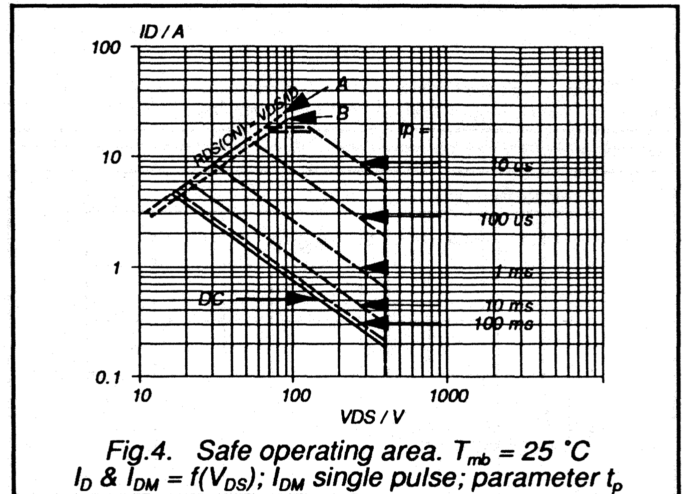


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

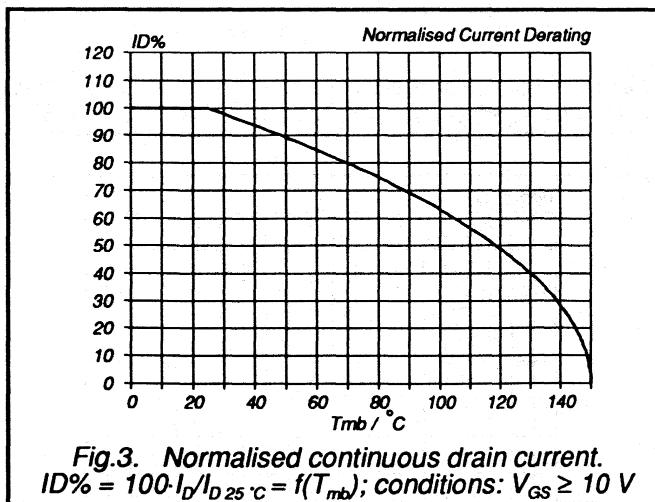


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

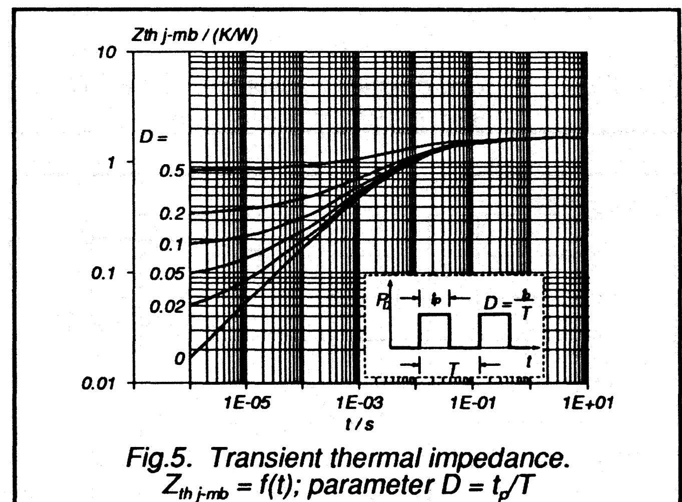


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

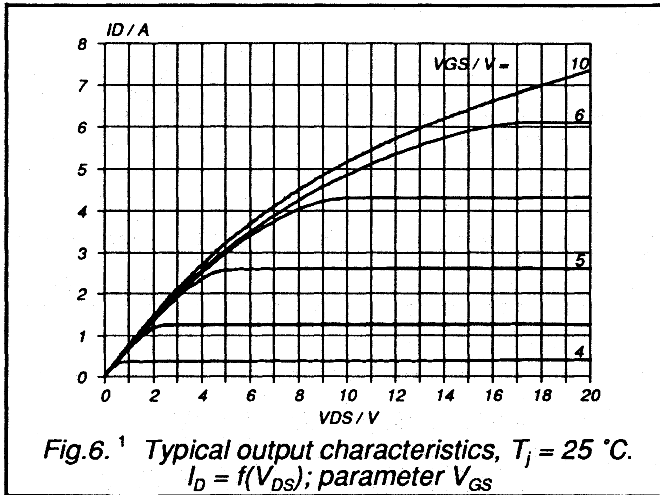


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

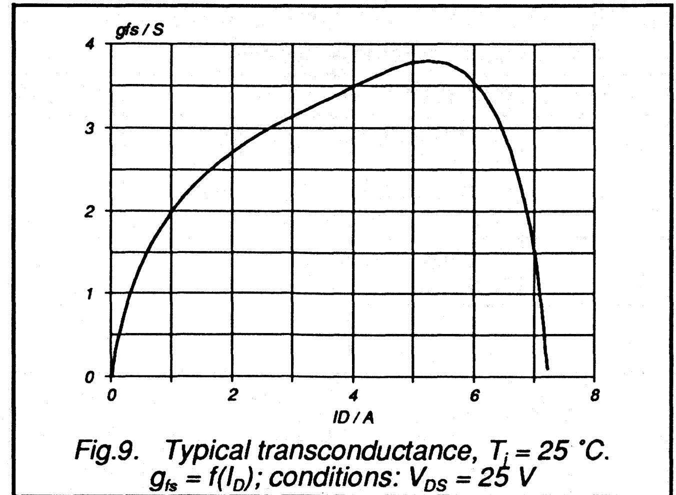


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

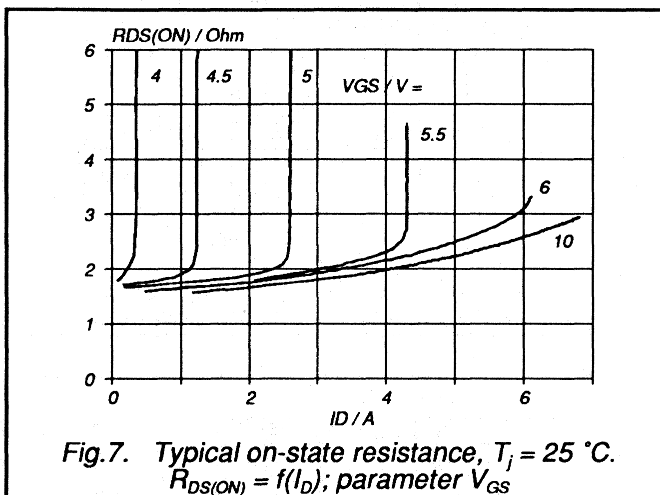


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

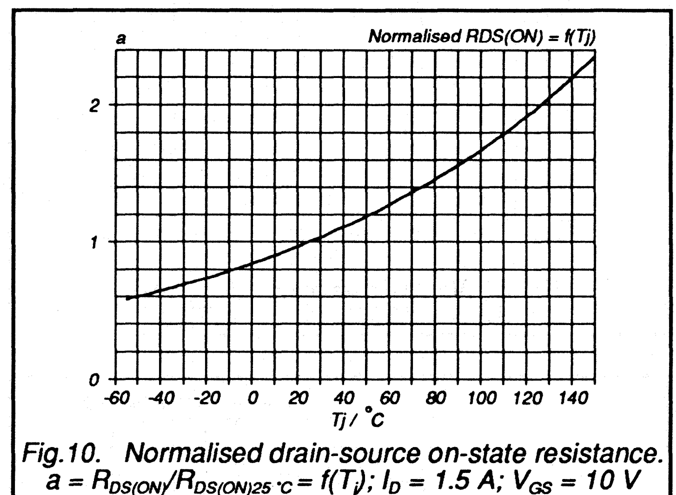


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

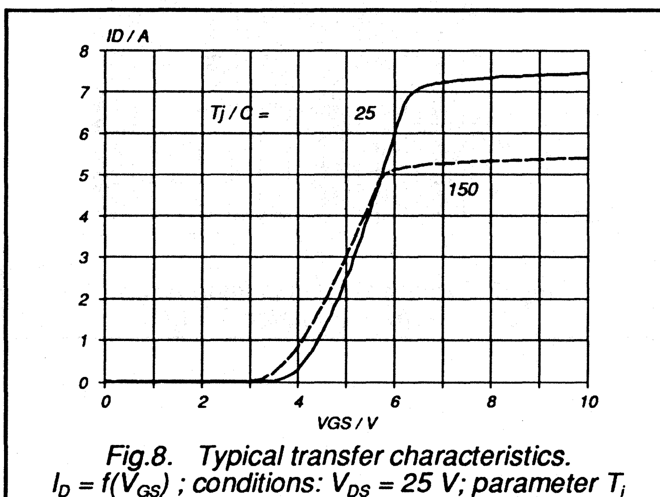


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

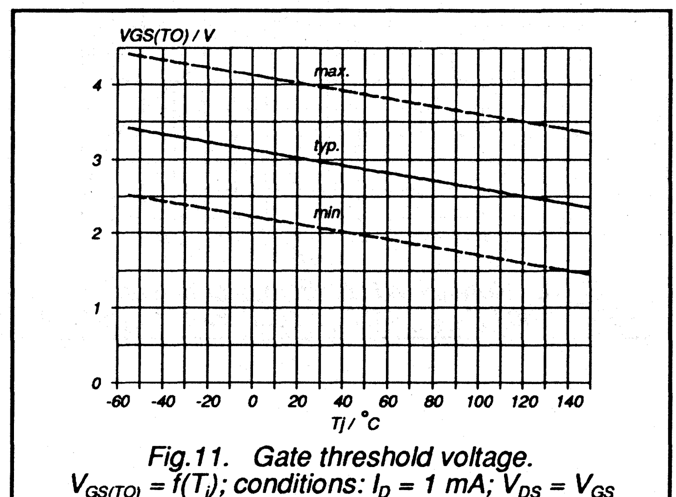


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

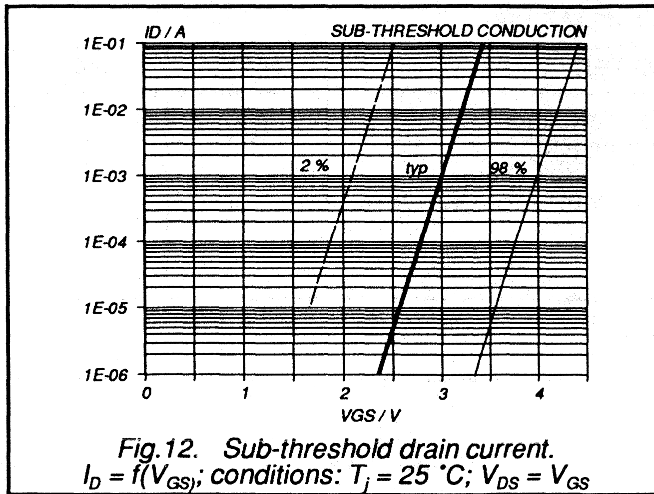


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

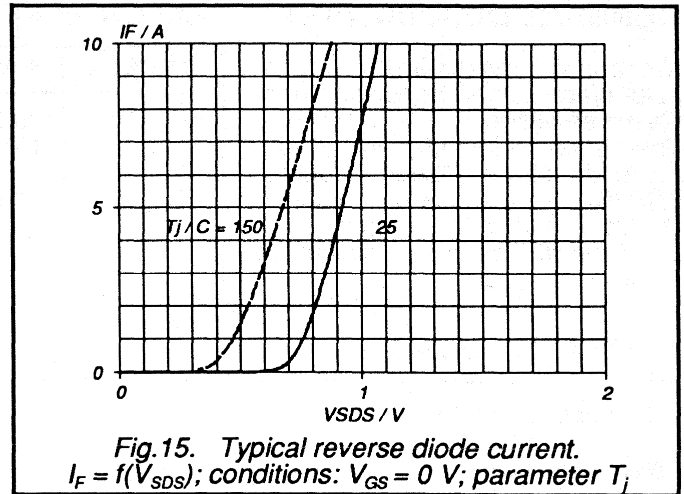


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

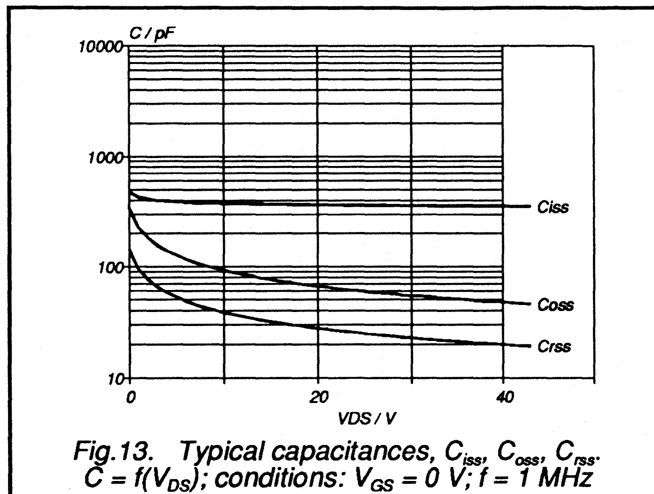


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

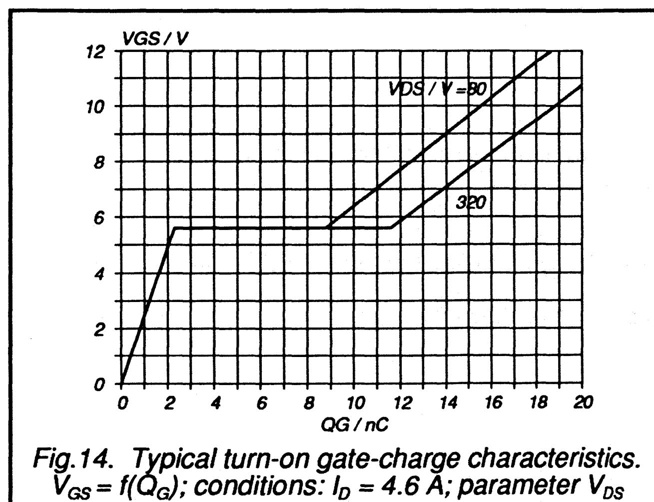


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4.6$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	3.7	A
P_{tot}	Total power dissipation	75	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.3	Ω

MECHANICAL DATA

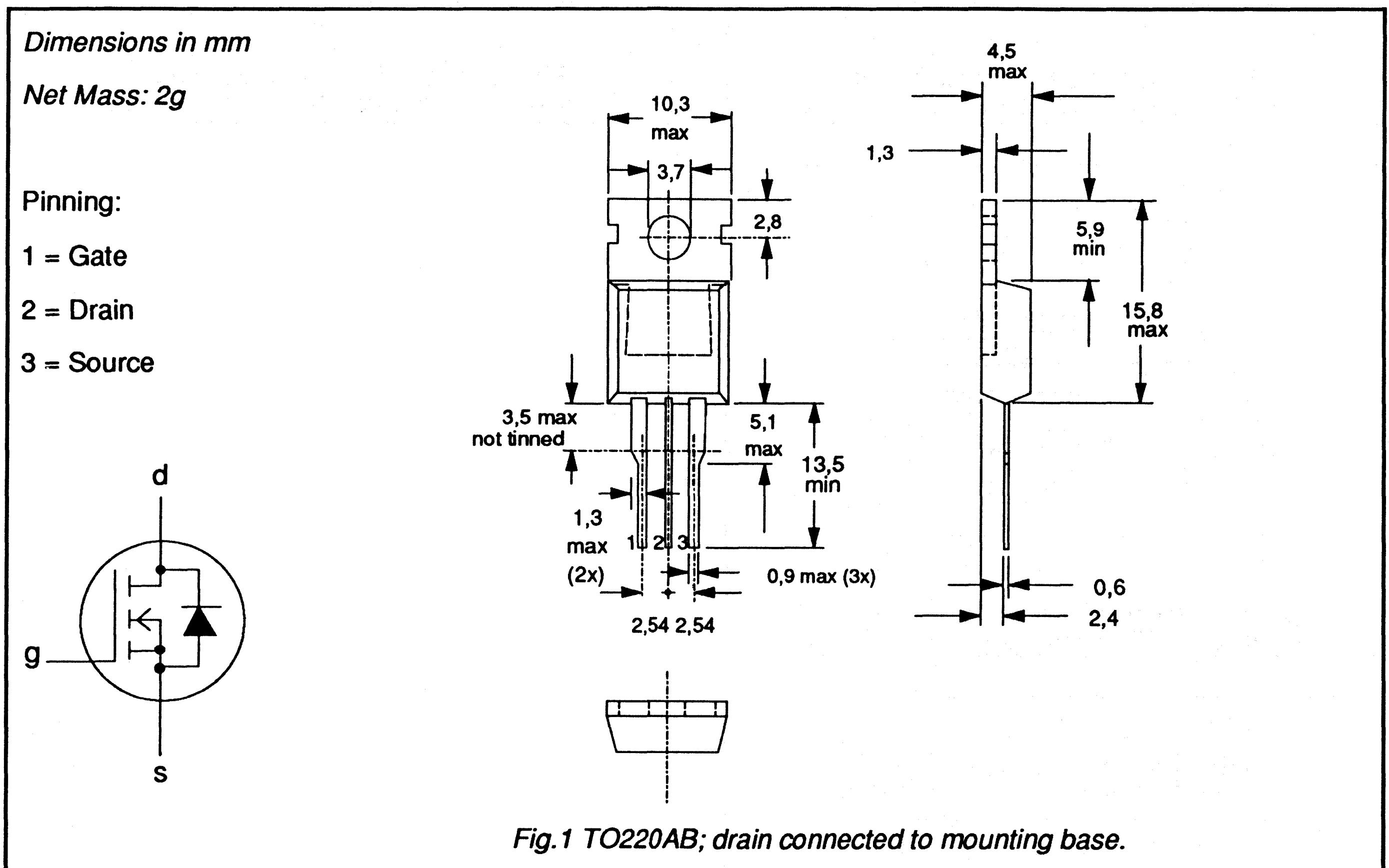


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	3.7	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	2.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	15	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	75	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A	-	2.0	2.3	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	55	80	pF
C_{rss}	Feedback capacitance		-	20	55	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.5 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	40	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	15	A
V_{SD}	Diode forward voltage	I_F = 3.7 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 3.7 A; -dI_F/dt = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	3.5	-	µC

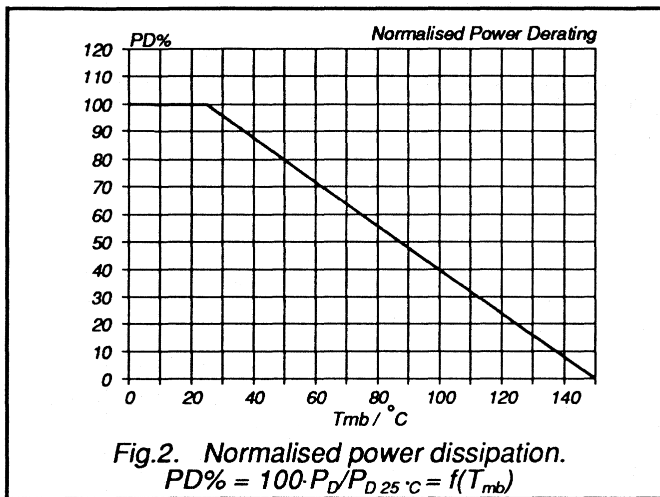


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

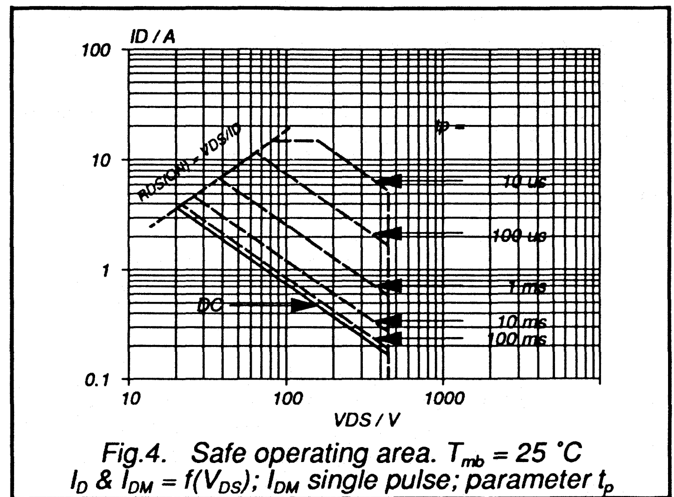


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

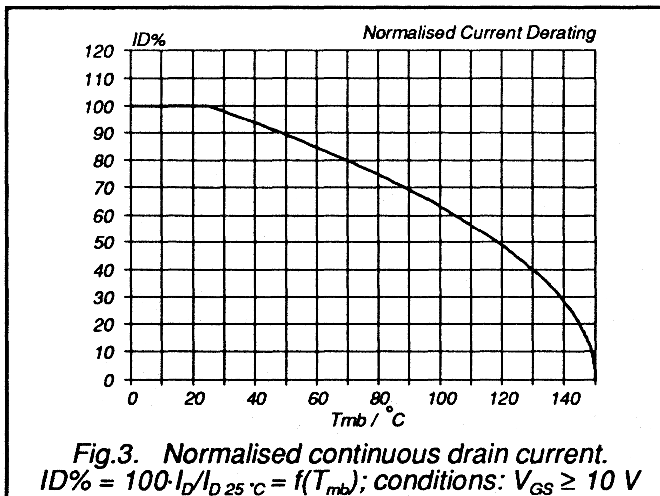


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

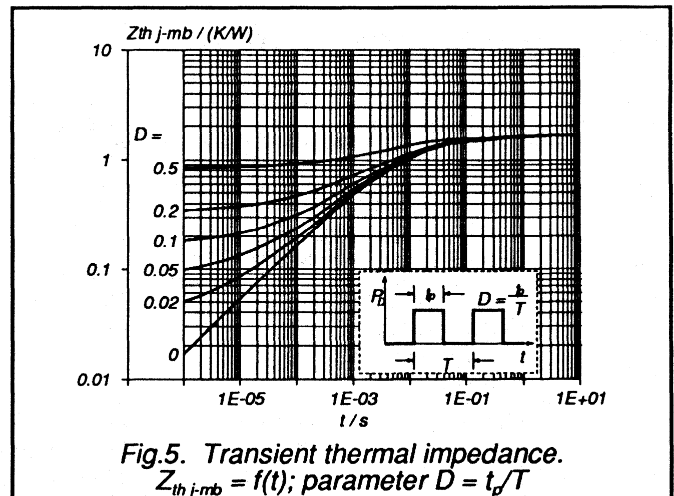


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

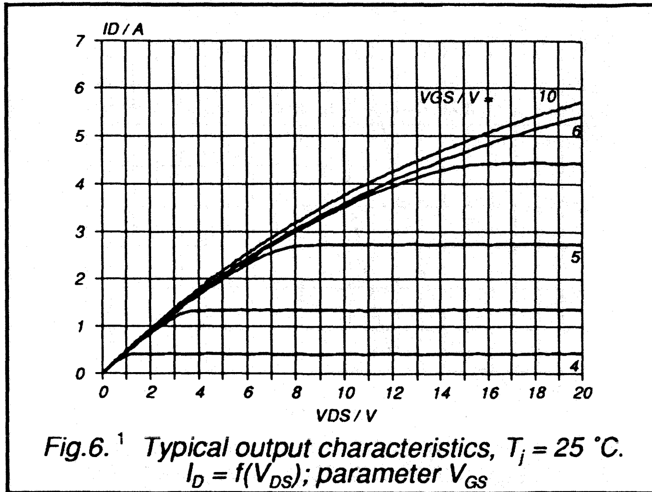


Fig.6.[1] Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

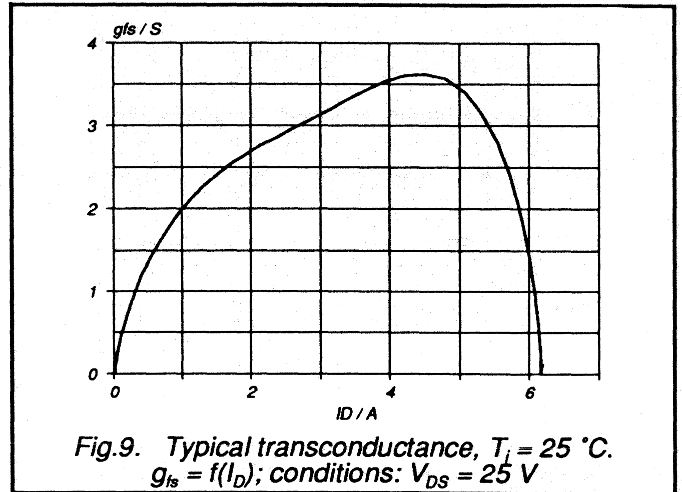


Fig.9. Typical transconductance, $T_j = 25\ ^\circ C$.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

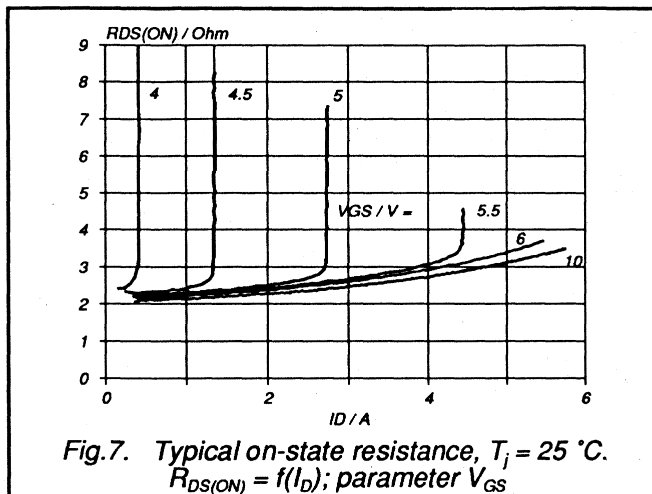


Fig.7. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

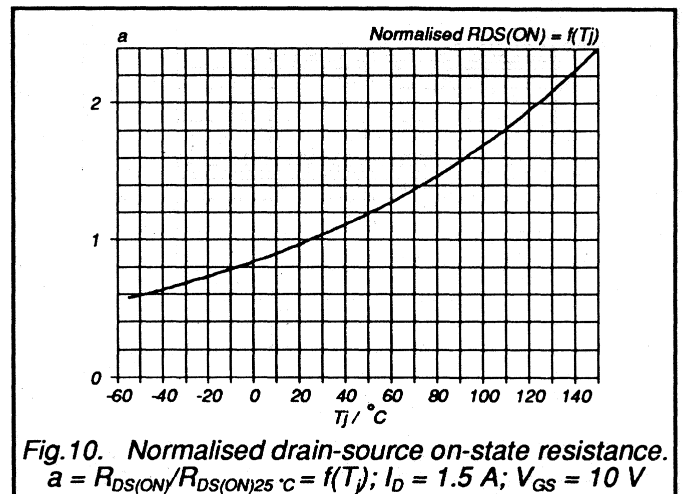


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

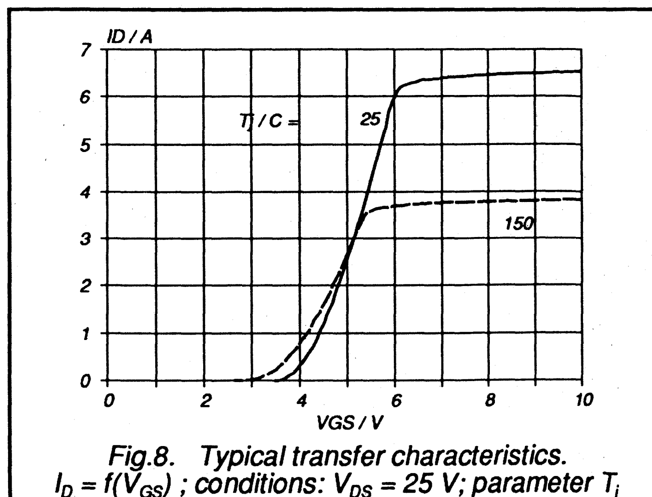


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

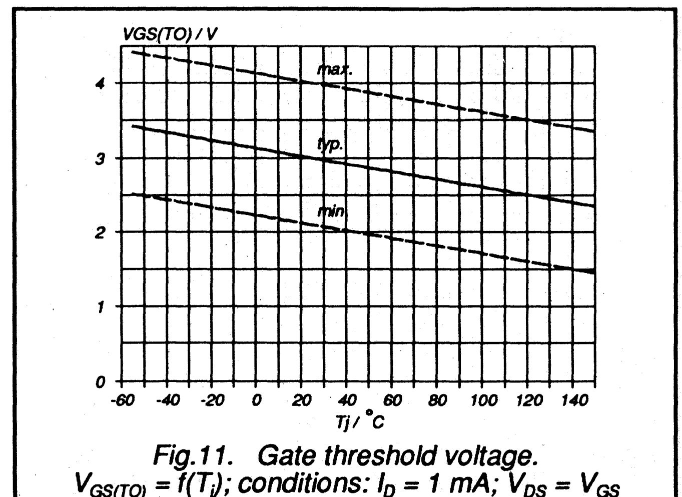


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

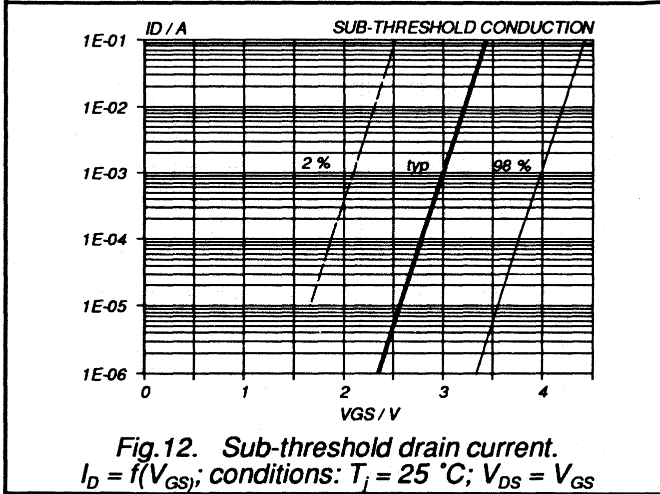


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

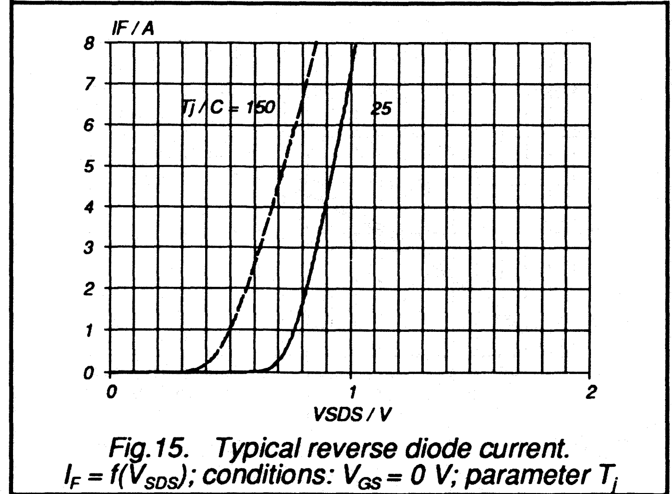


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

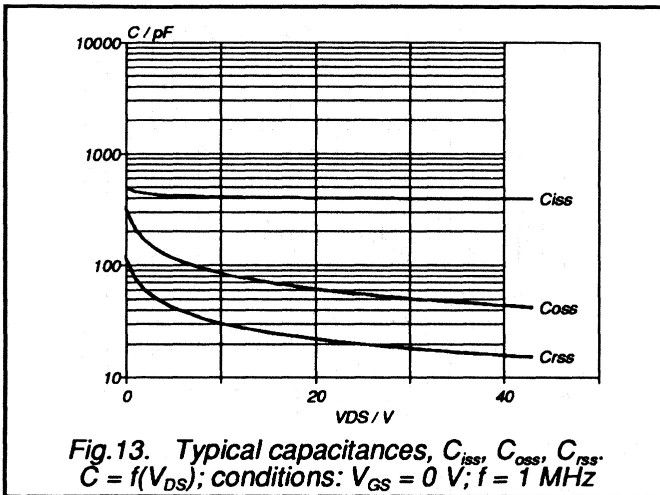


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

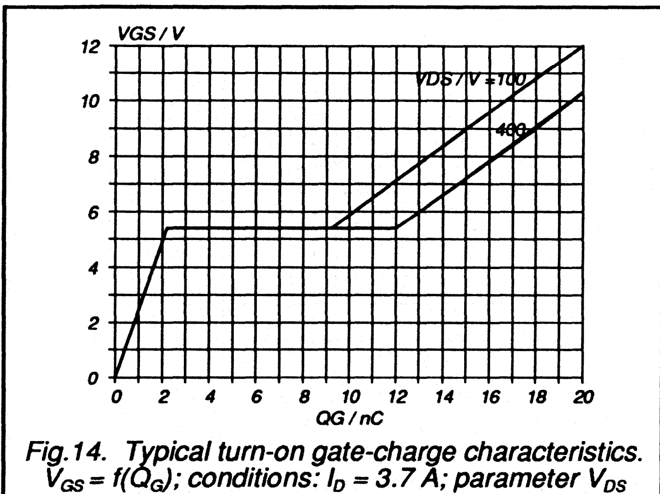


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK454	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	3.7	3.3	A
P_{tot}	Total power dissipation	75	75	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.3	2.8	Ω

MECHANICAL DATA

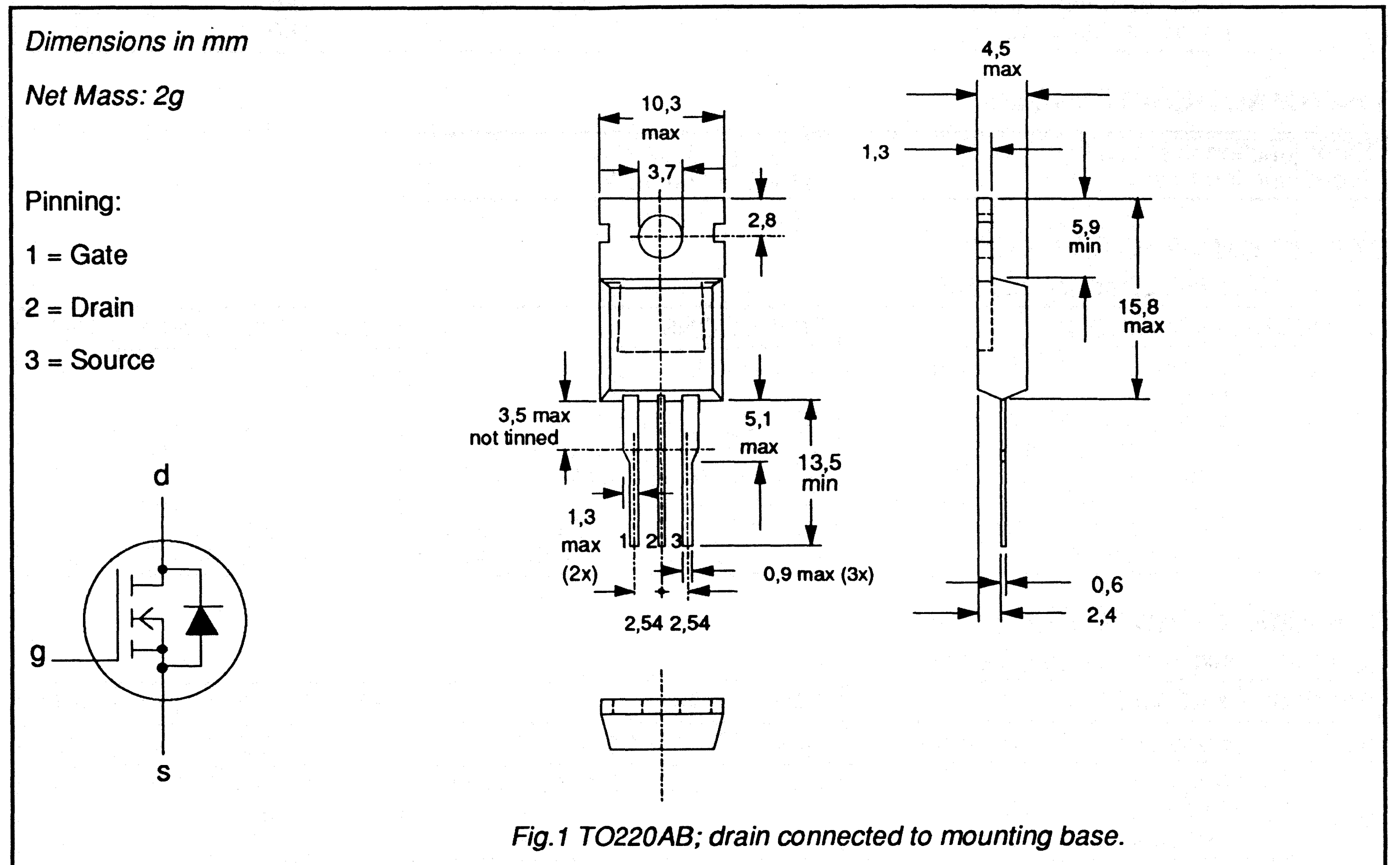


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	3.7	3.3	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.3	2.1	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	15	13	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A BUK454-500A	-	2.0	2.3	Ω
		BUK454-500B	-	2.3	2.8	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	500	pF
C_{oss}	Output capacitance		-	55	80	pF
C_{rss}	Feedback capacitance		-	20	55	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.5 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	40	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	15	A
V_{SD}	Diode forward voltage	I_F = 3.7 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 3.7 A; $-dI_F/dt$ = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	3.5	-	µC

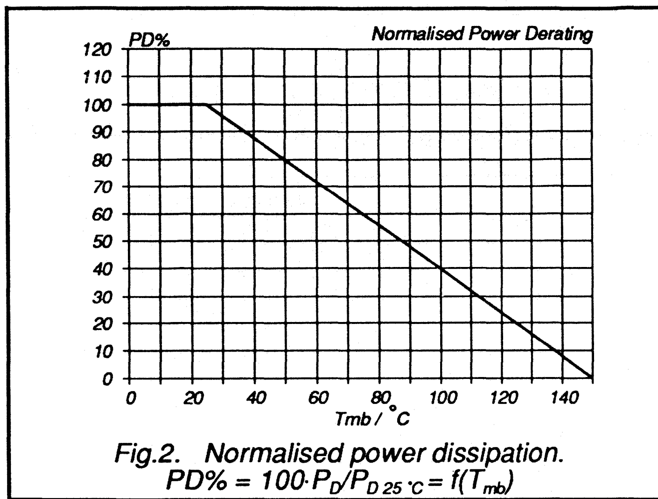


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

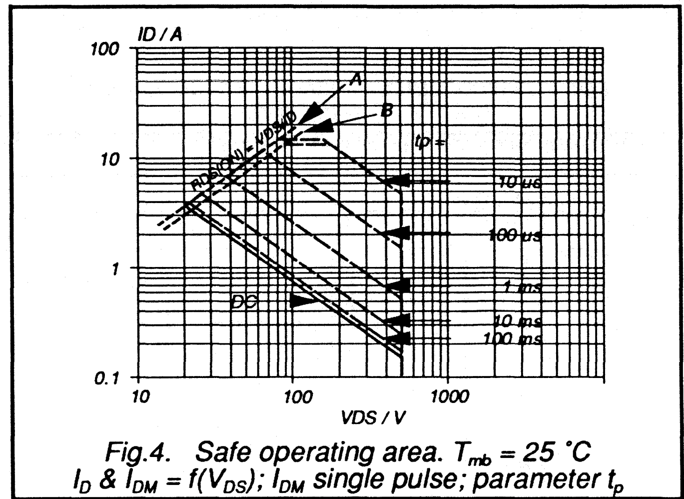


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

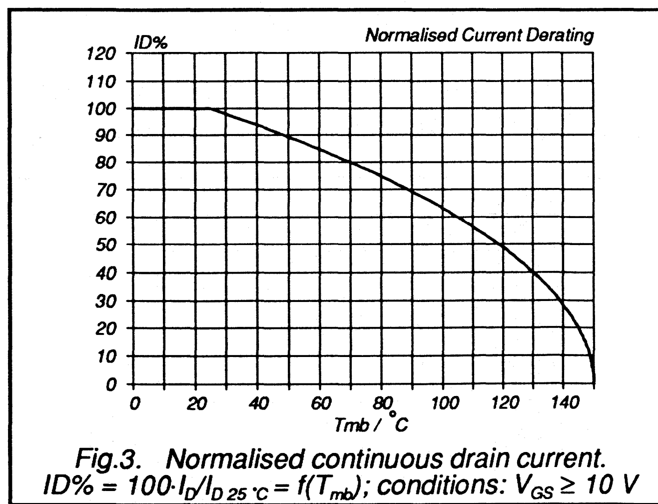


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

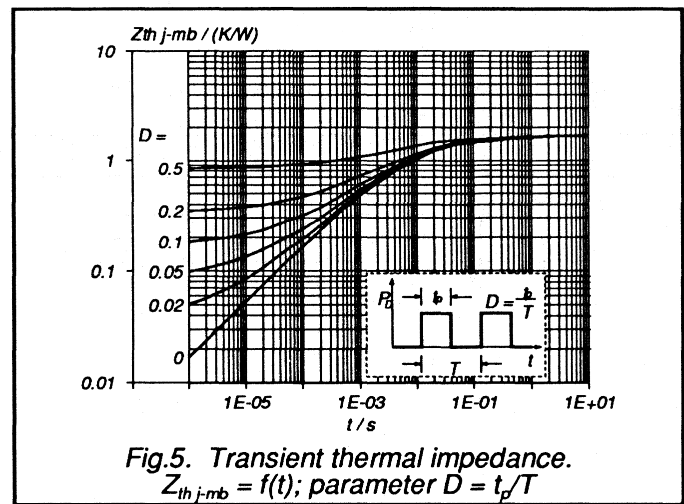


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

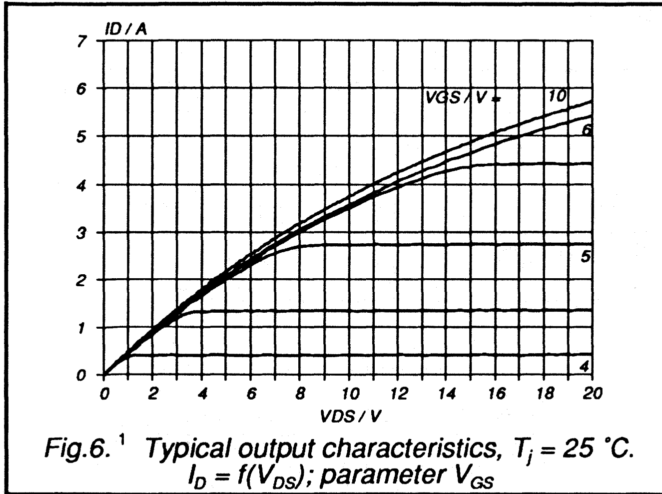


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

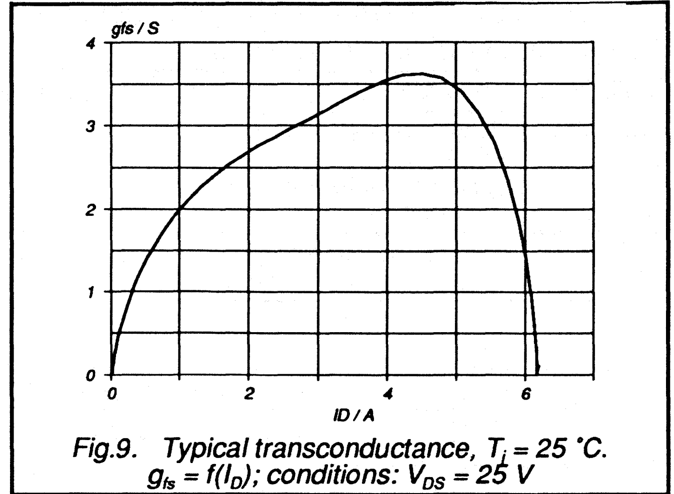


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

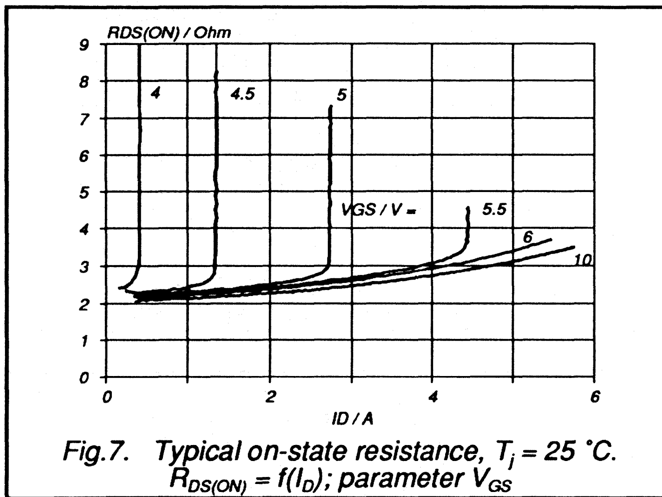


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

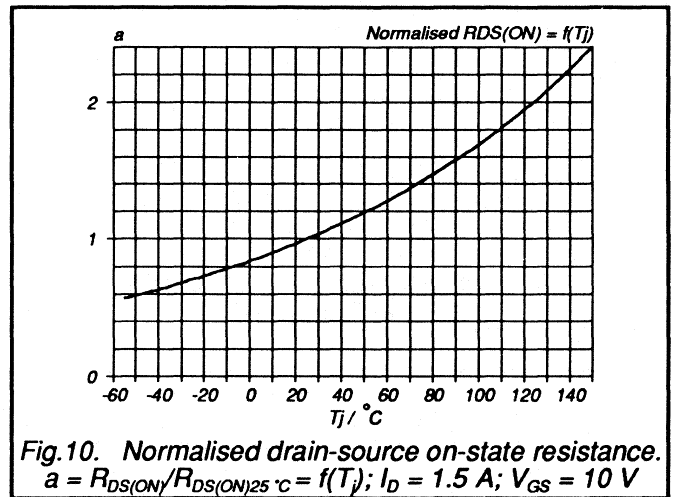


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

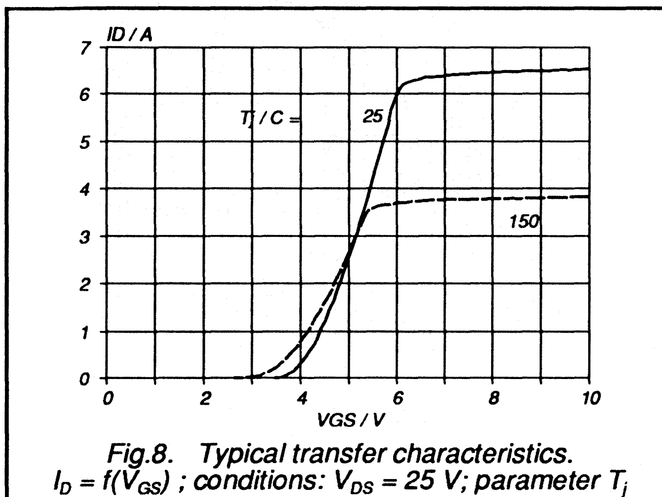


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

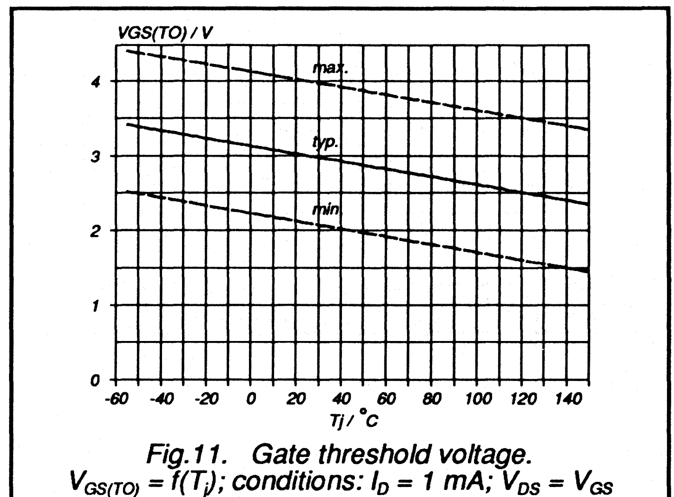


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

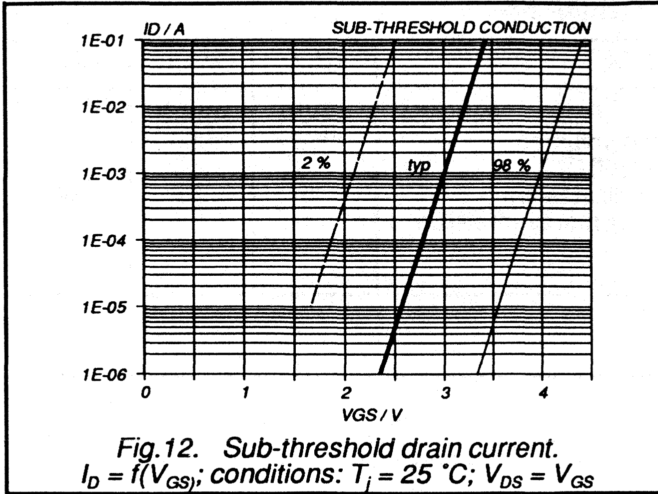


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

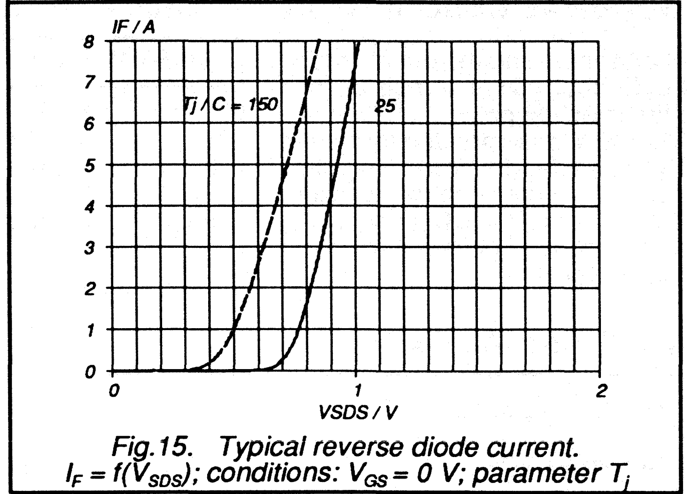


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

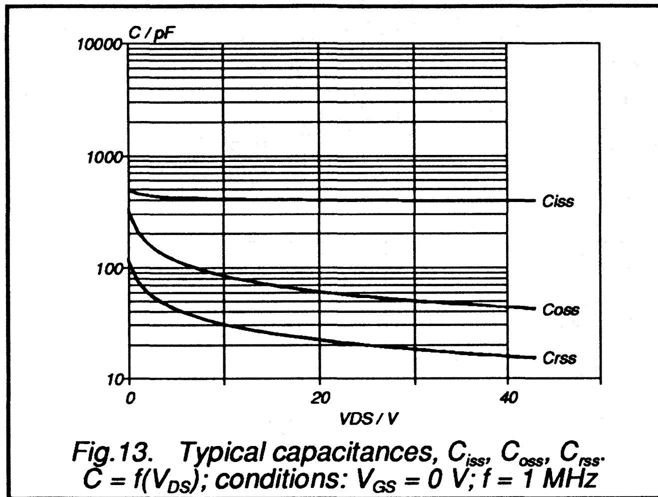


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

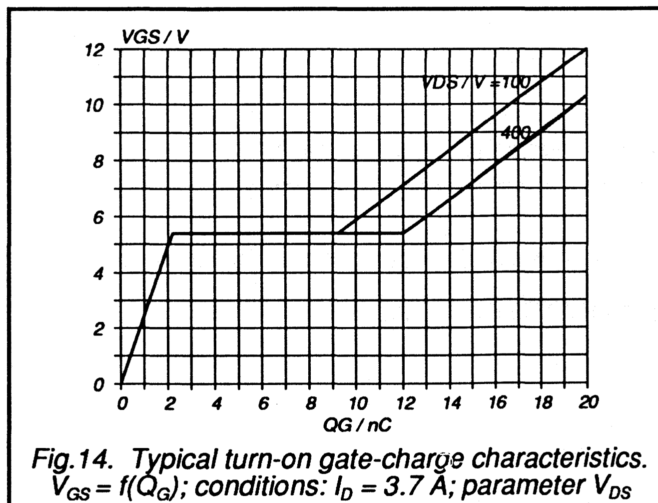


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK454	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	2.8	2.6	A
P_{tot}	Total power dissipation	75	75	W
$R_{DS(ON)}$	Drain-source on-state resistance	4.0	4.5	Ω

MECHANICAL DATA

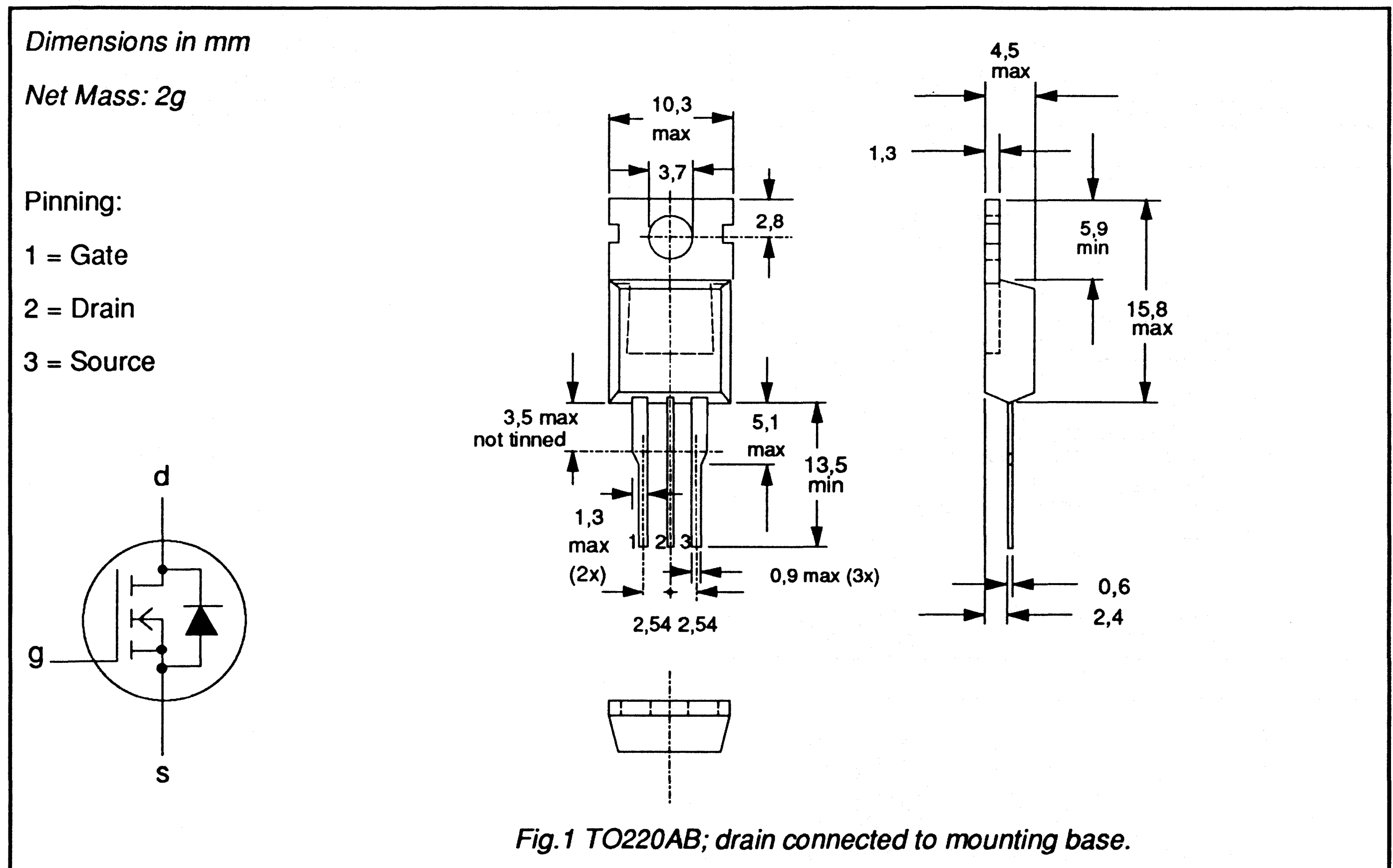


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	**-600B**	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	2.8	2.6	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	1.8	1.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	11.2	10.4	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	$R_{th\,j-mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.2 A **BUK454-600A**	-	3.8	4.0	Ω
		BUK454-600B	-	4.0	4.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.2 A	1.9	2.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	300	500	pF
C_{oss}	Output capacitance		-	50	80	pF
C_{rss}	Feedback capacitance		-	30	55	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.1 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	15	20	ns
t_r	Turn-on rise time		-	40	60	ns
$t_{d\,off}$	Turn-off delay time		-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.8	A
I_{DRM}	Pulsed reverse drain current	-	-	-	11.2	A
V_{SD}	Diode forward voltage	I_F = 2.8 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.8 A; $-dI_F/dt$ = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	3.5	-	µC

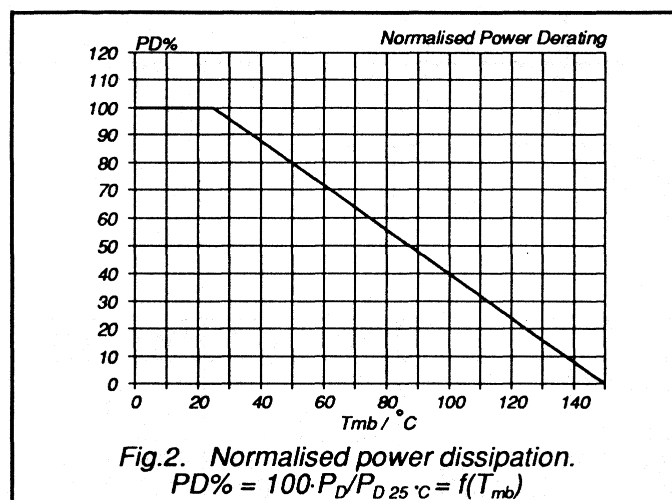


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

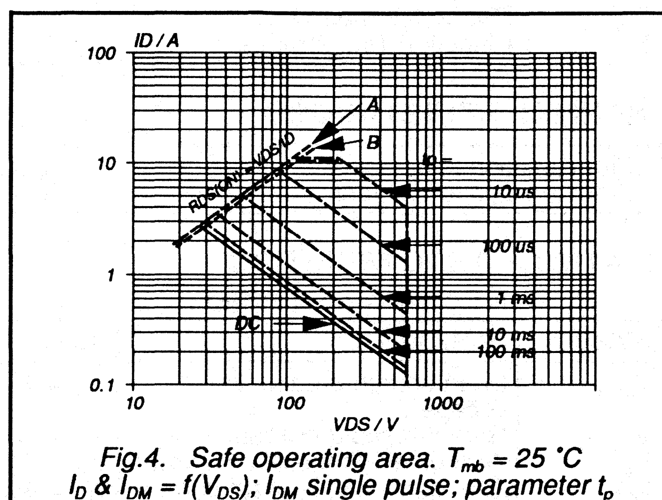


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

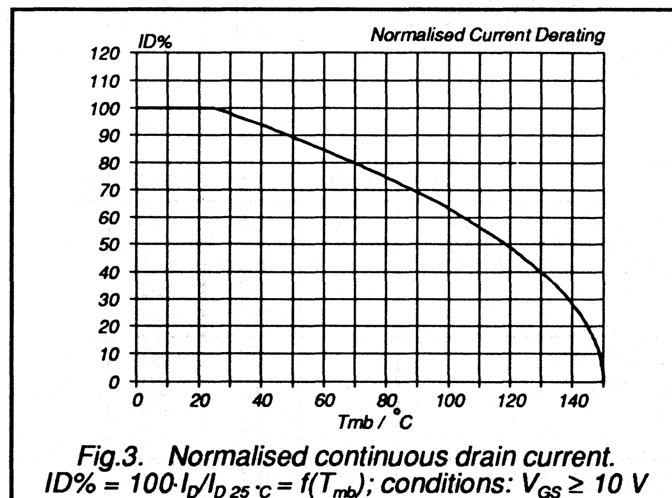


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

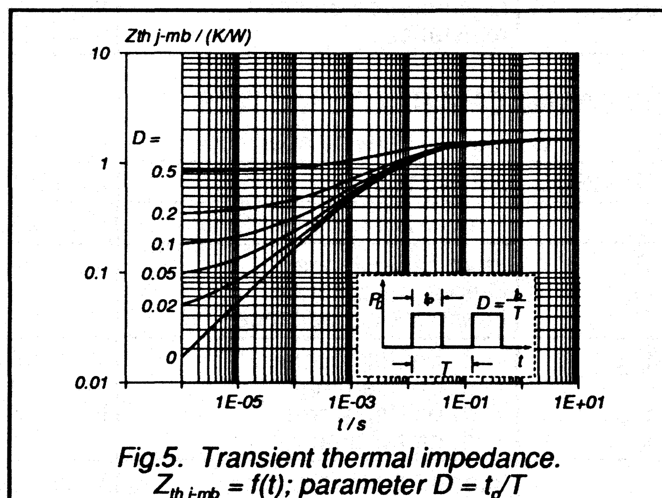


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

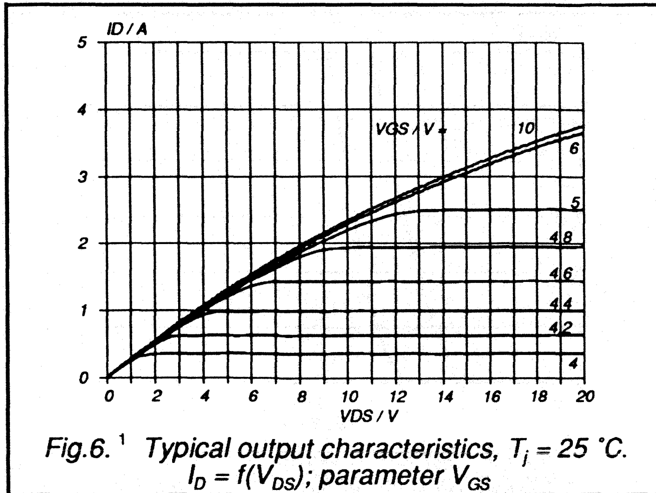


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

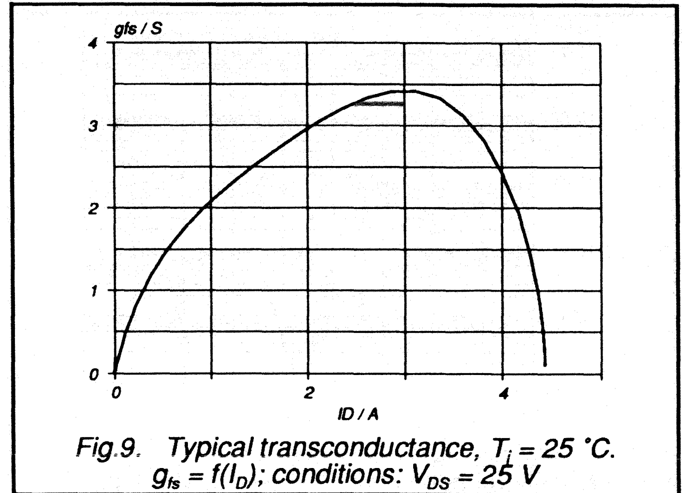


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

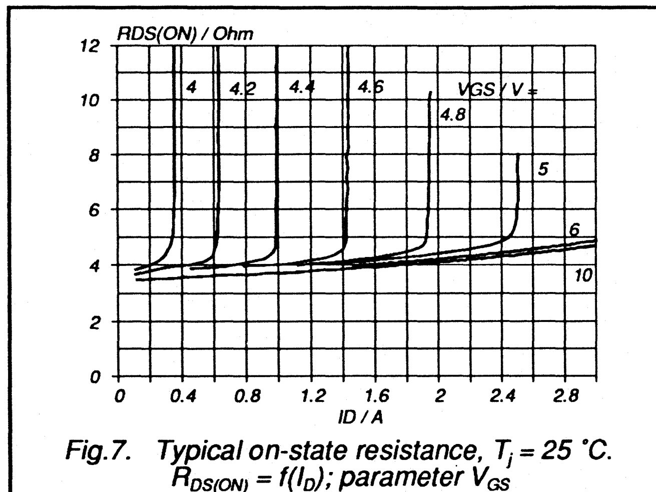


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

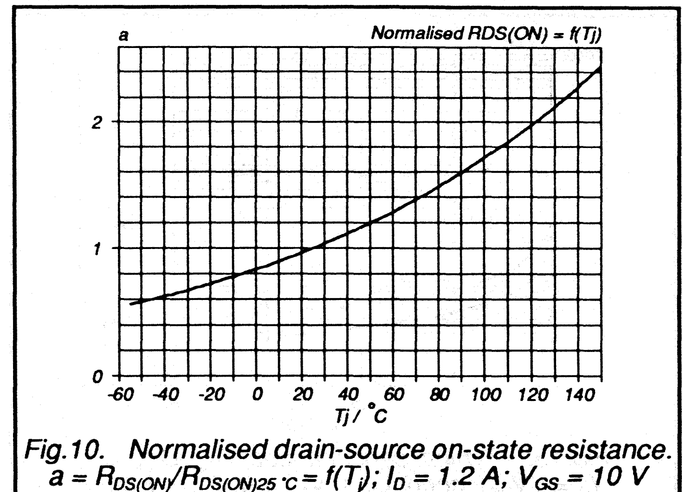


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.2$ A; $V_{GS} = 10$ V

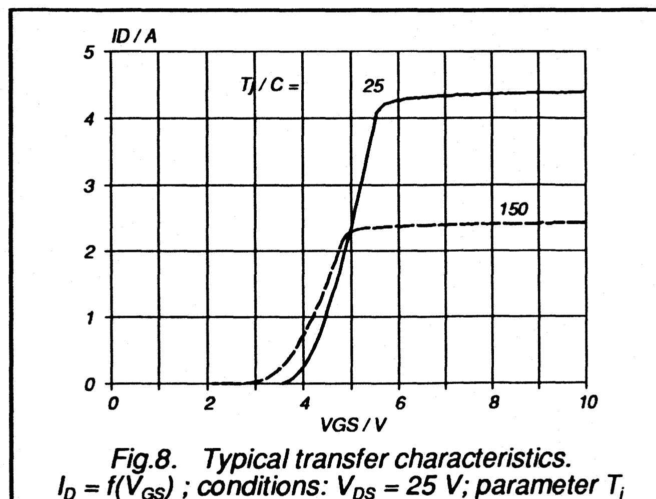


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

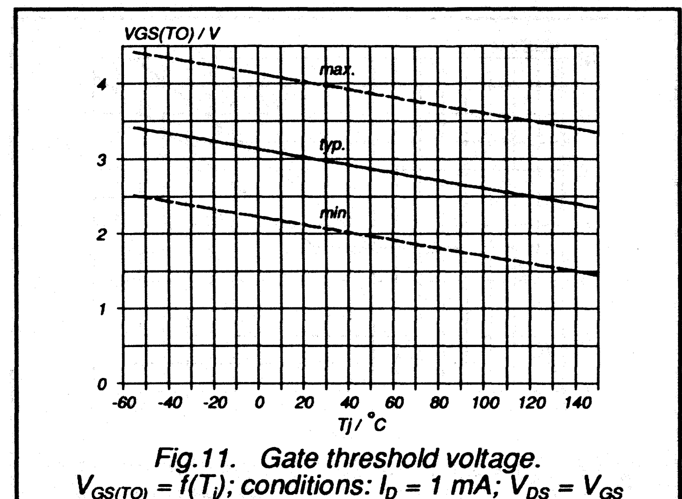


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

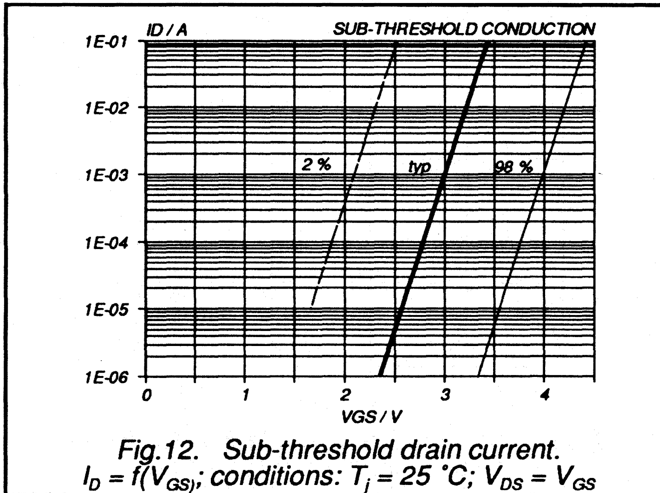


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

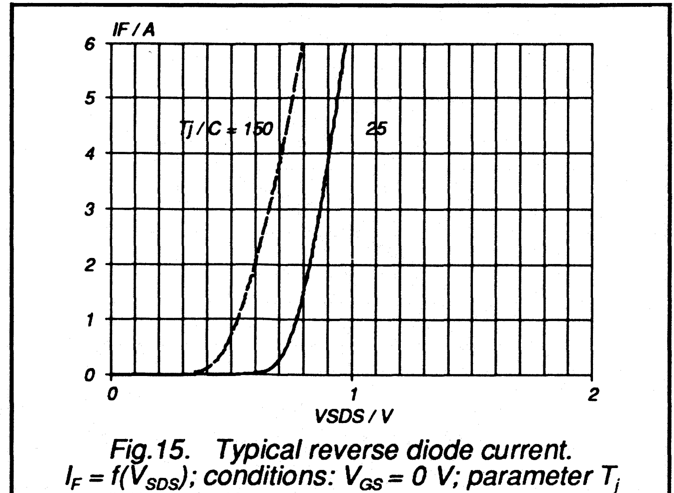


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

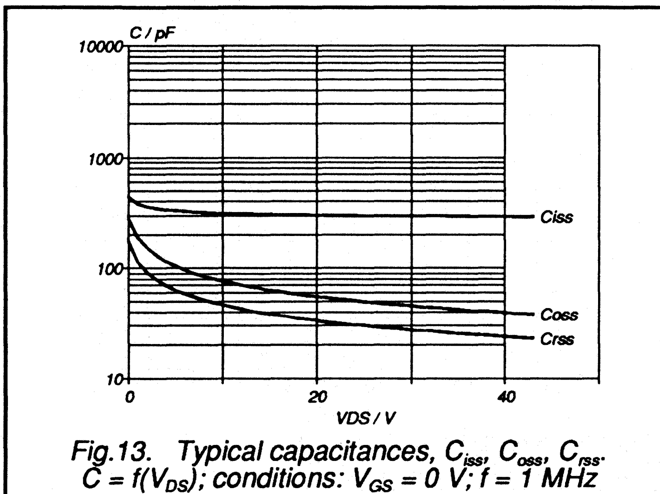


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

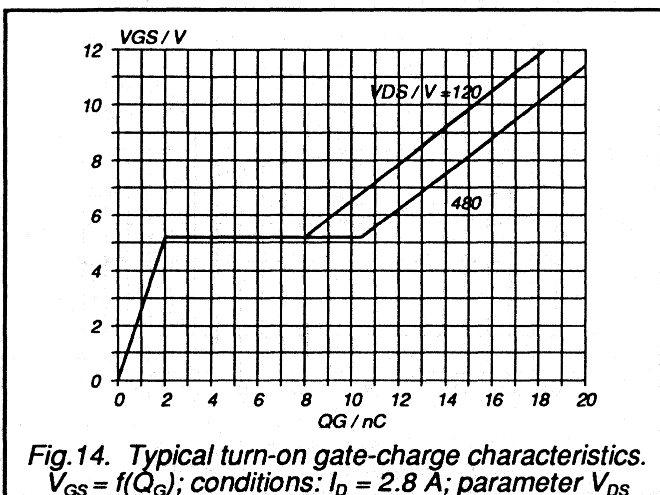


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 2.8$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK454	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	2.4	2.0	A
P_{tot}	Total power dissipation	85	85	W
$R_{DS(ON)}$	Drain-source on-state resistance	6	8	Ω

MECHANICAL DATA

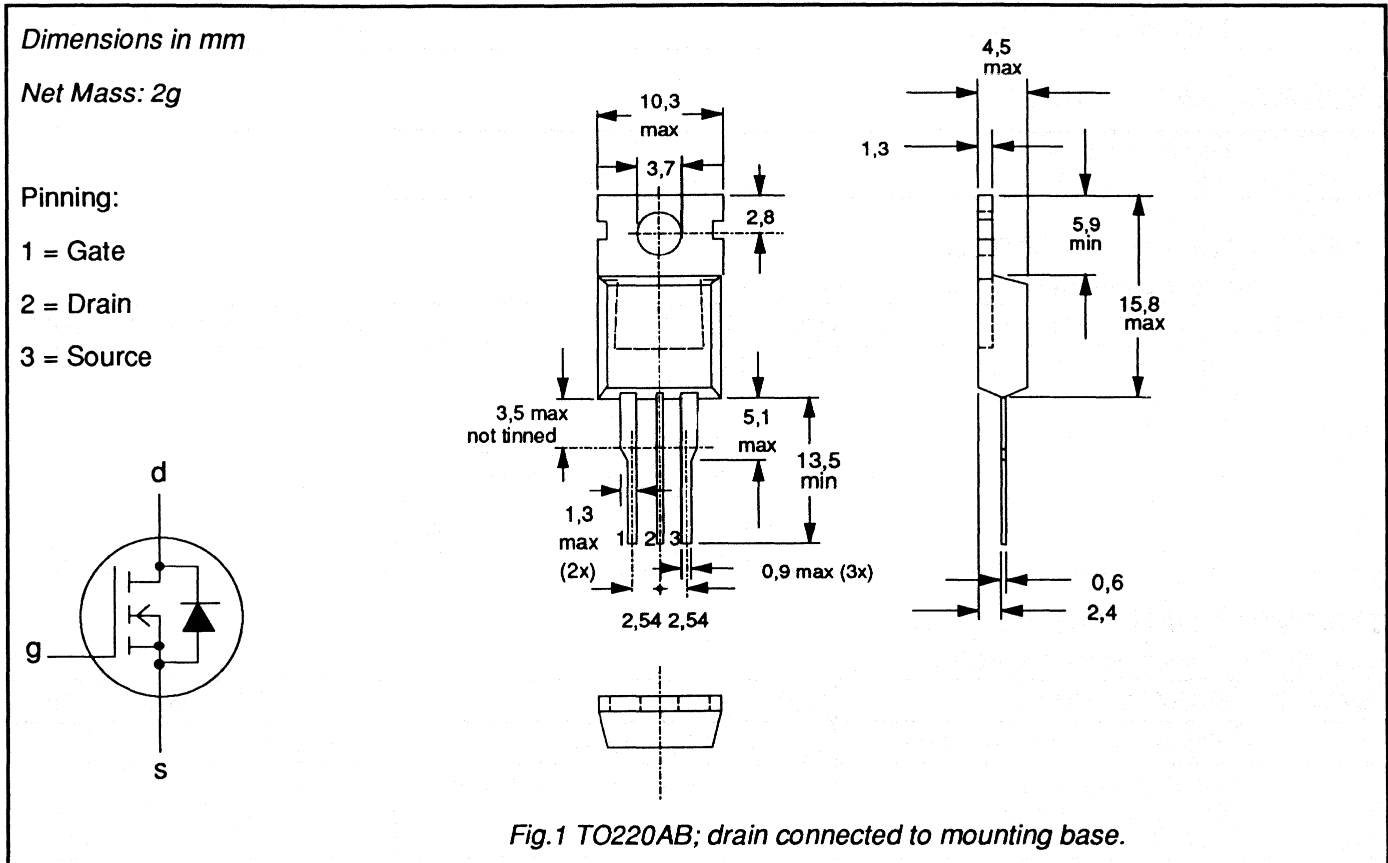


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	-800B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	2.4	2.0	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	1.5	1.25	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	9.5	8	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	85		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	$R_{th\ j-mb}$ = 1.47 K/W
From junction to ambient	$R_{th\ j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.0 A BUK454-800A	-	5	6	Ω
		BUK454-800B	-	6	8	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.0 A	1.0	2.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	450	750	pF
C_{oss}	Output capacitance		-	42	70	pF
C_{rss}	Feedback capacitance		-	15	30	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 1.9 A;	-	15	20	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	65	ns
t_f	Turn-off fall time		-	30	40	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	2.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	10	A
V_{SD}	Diode forward voltage	I_F = 2.6 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 2.6 A; $-dI_F/dt$ = 100 A/µs; V_{GS} = 0 V; V_R = 100 V	-	230	-	ns
Q_{rr}	Reverse recovery charge		-	1.9	-	µC

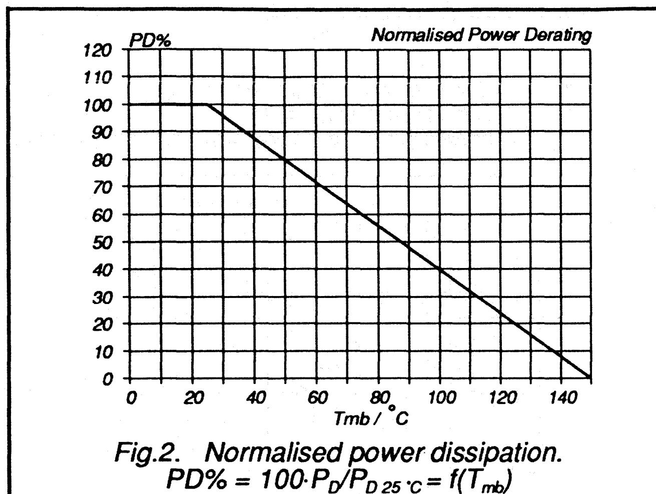


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

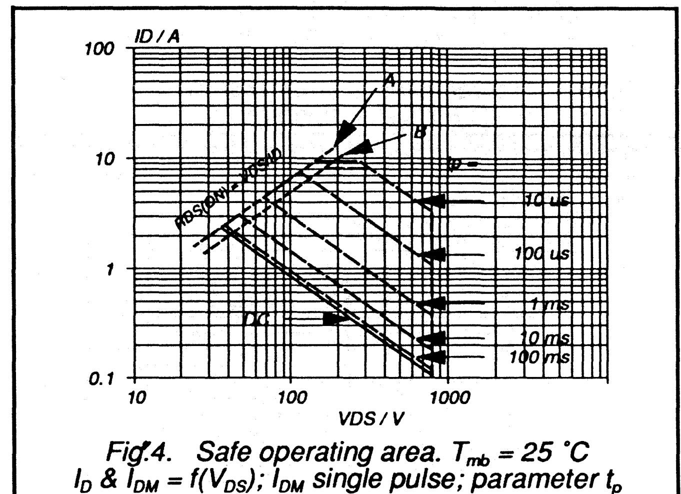


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

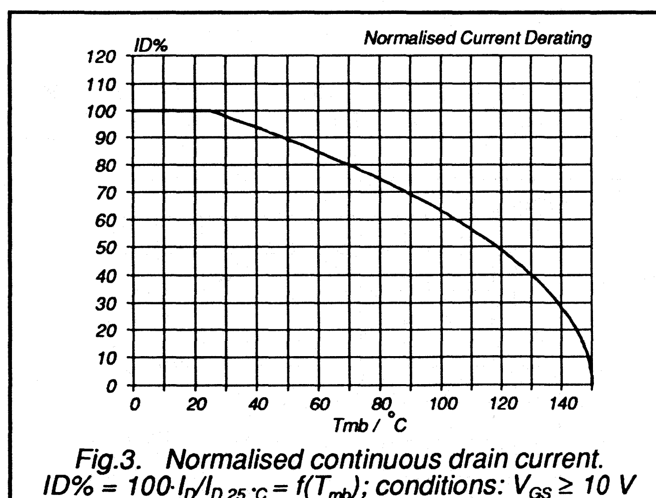


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

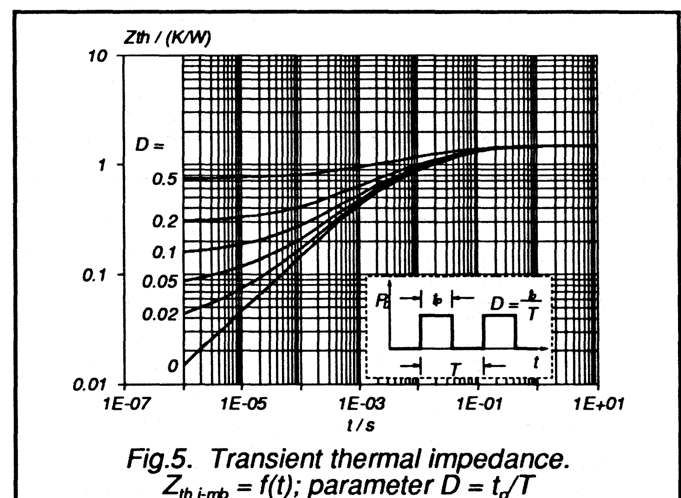


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

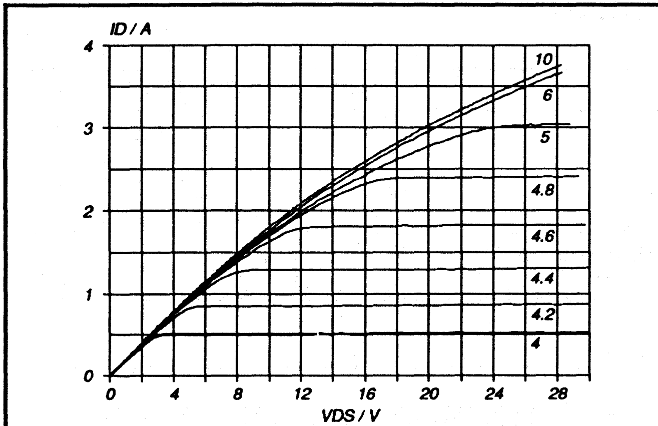


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

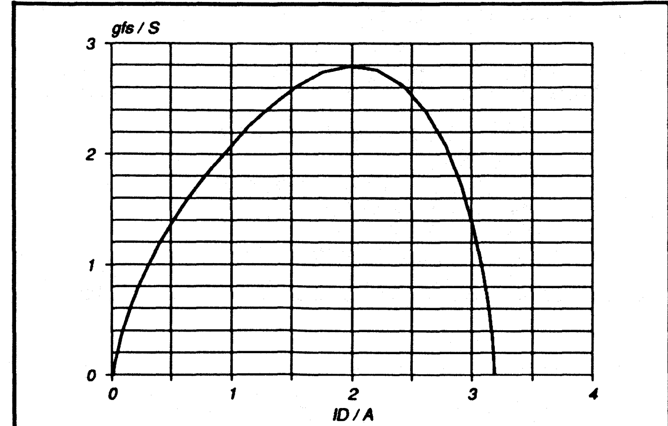


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

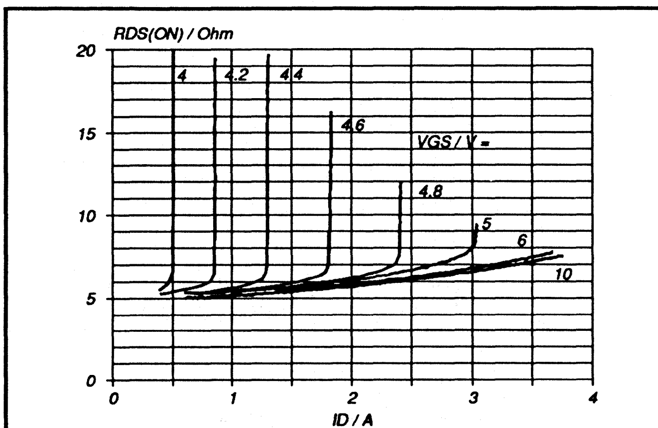


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

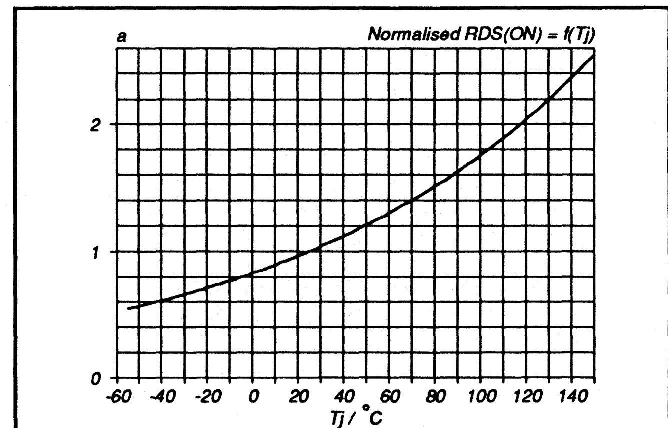


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 1.0 A; V_{GS} = 10 V

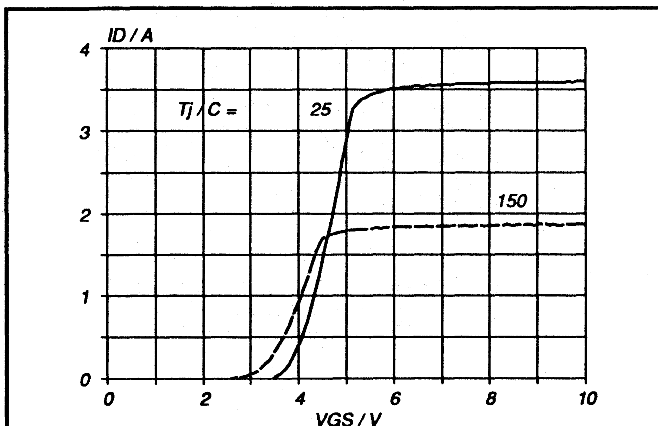


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

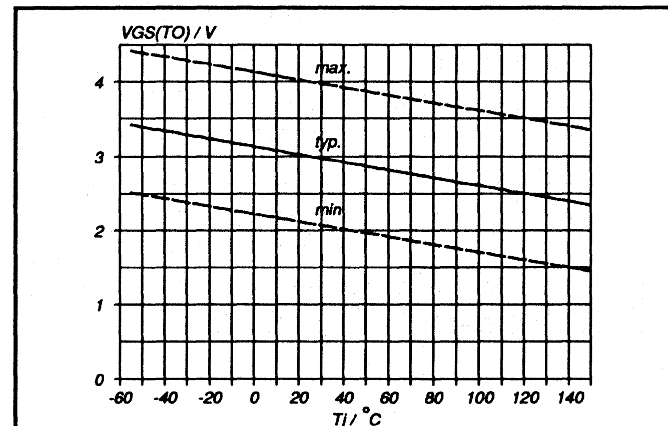


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

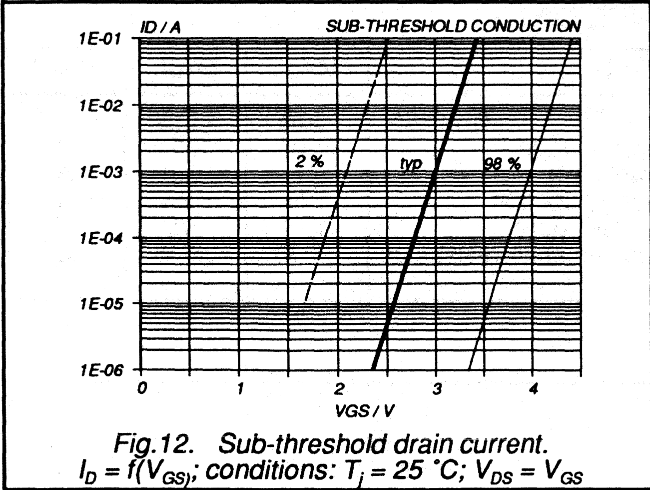


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

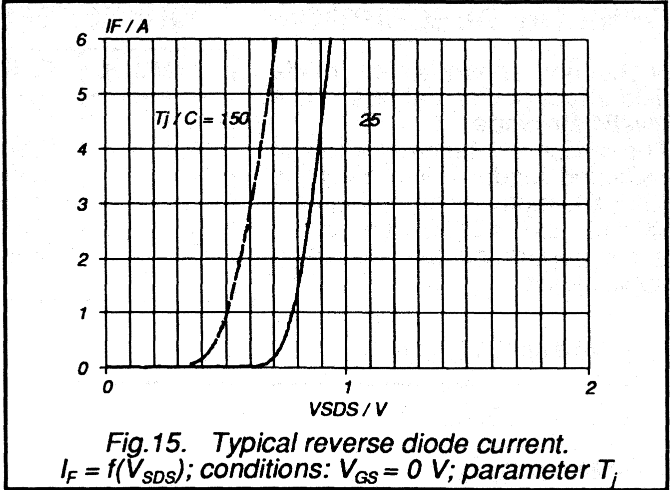


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

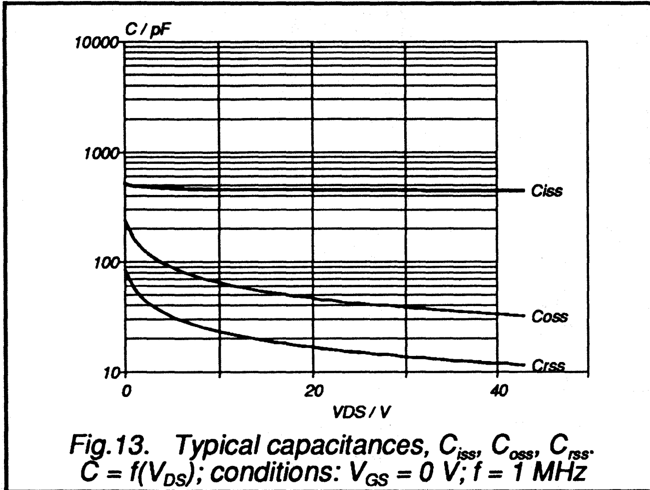


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

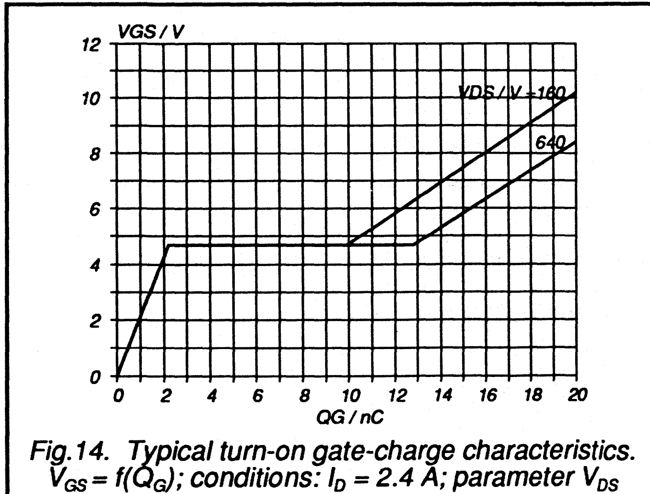


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 2.4$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	41	38	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.038	0.045	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	41	38	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	29	27	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	164	152	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j-mb}$ = 1.2 K/W
From junction to ambient	$R_{th\,j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 20 A — **BUK455-50A**	-	0.03	0.038	Ω
		BUK455-50B	-	0.04	0.045	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 20 A	8	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1650	2000	pF
C_{oss}	Output capacitance		-	560	750	pF
C_{rss}	Feedback capacitance		-	300	400	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	125	160	ns
t_f	Turn-off fall time		-	100	130	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	41	A
I_{DRM}	Pulsed reverse drain current	-	-	-	164	A
V_{SD}	Diode forward voltage	I_F = 41 A ; V_{GS} = 0 V	-	1.4	2.0	V
t_{rr}	Reverse recovery time	I_F = 41 A; $-dI_F/dt$ = 100 A/µs;	-	250	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.30	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 41 A ; V_{DD} ≤ 25 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

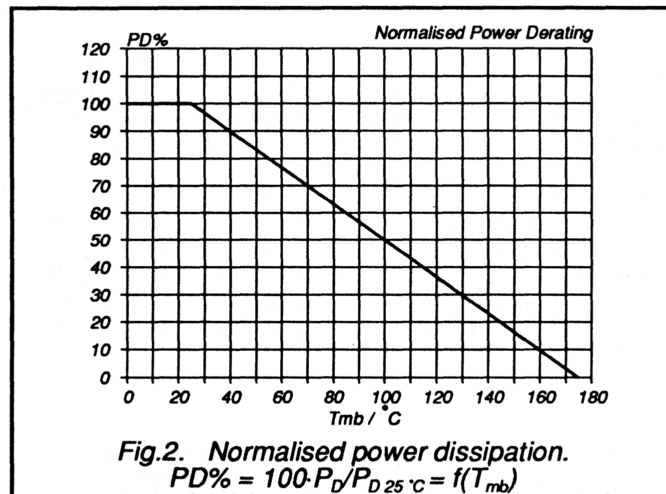


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

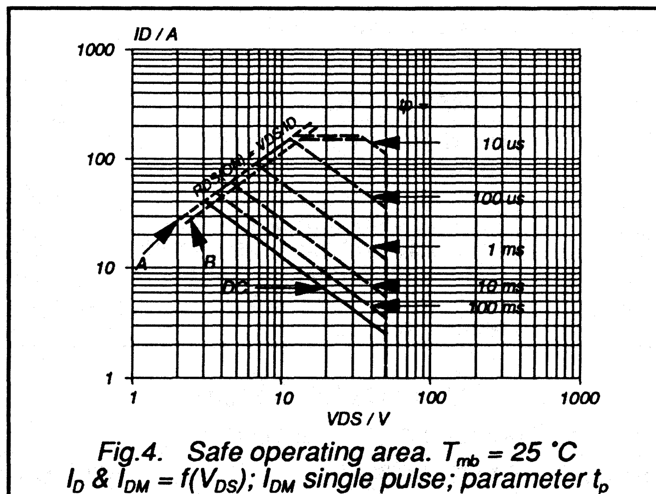


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

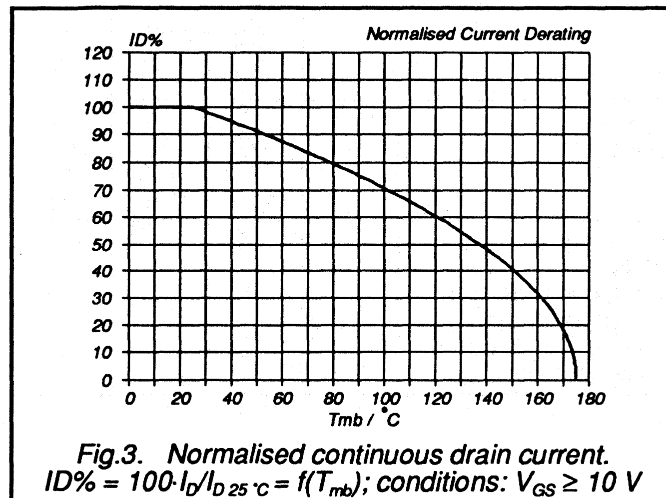


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

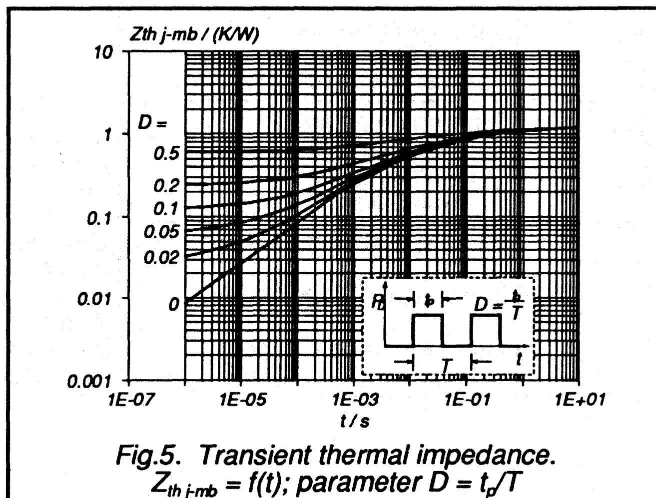


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb}$ = f(t); parameter D = t_p/T

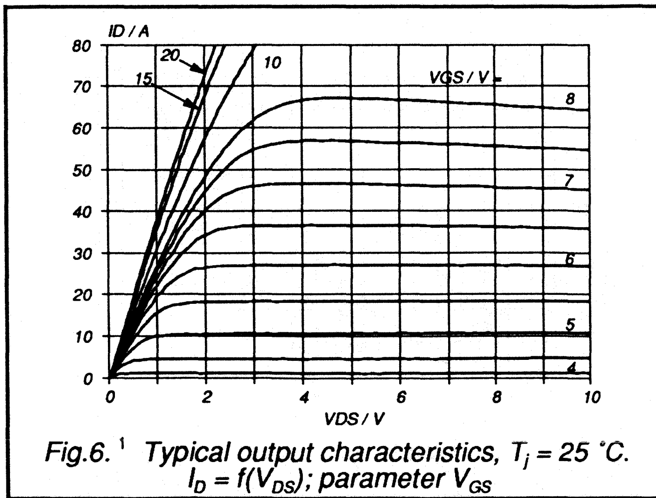


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C. $I_D = f(V_{DS})$; parameter V_{GS}

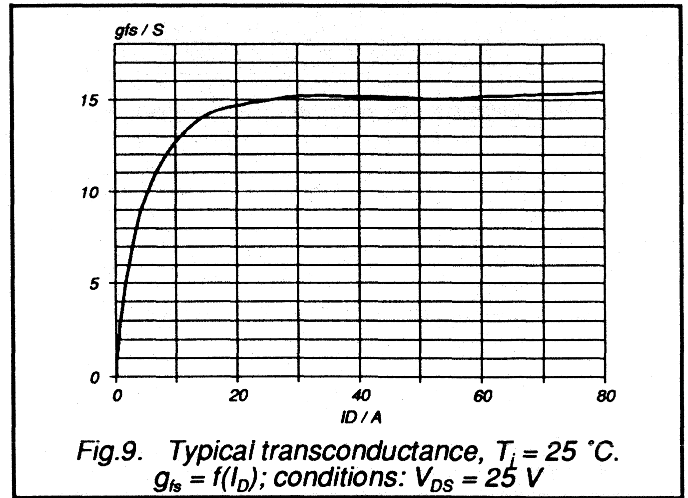


Fig.9. Typical transconductance, $T_j = 25$ °C. $g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

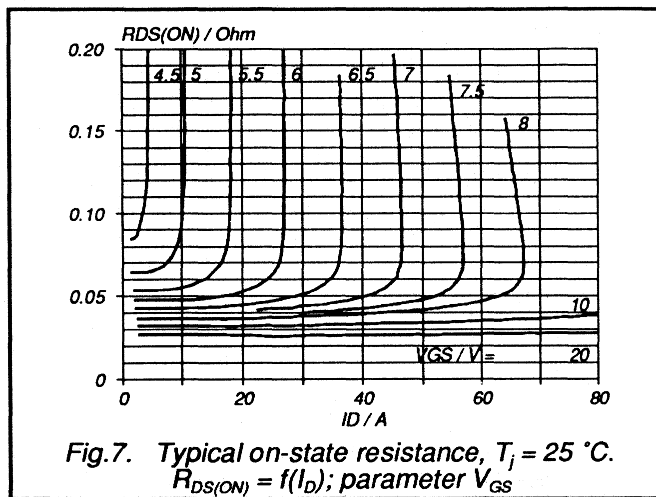


Fig.7. Typical on-state resistance, $T_j = 25$ °C. $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

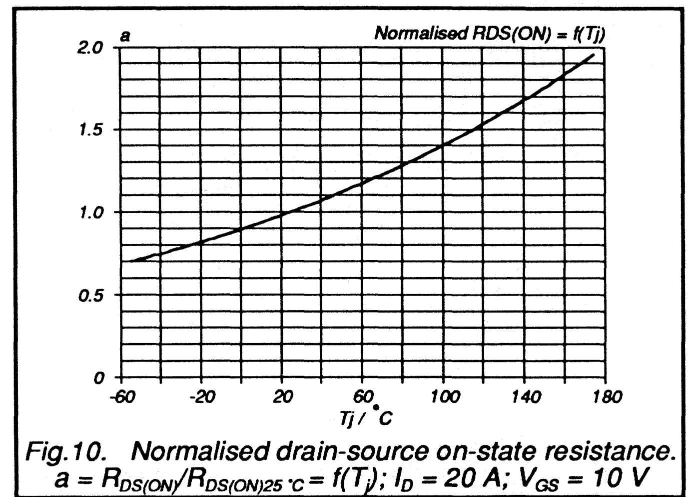


Fig.10. Normalised drain-source on-state resistance. $a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 20$ A; $V_{GS} = 10$ V

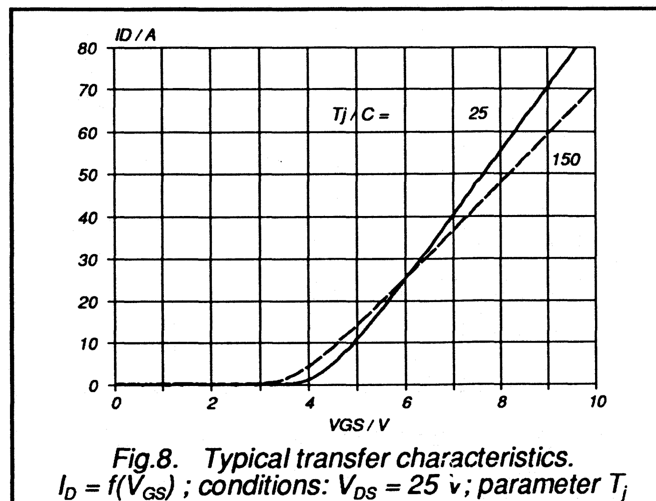


Fig.8. Typical transfer characteristics. $I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ v; parameter T_j

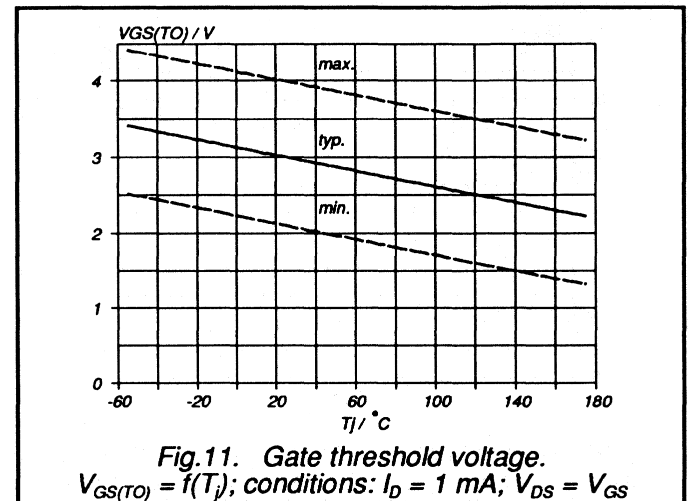


Fig.11. Gate threshold voltage. $V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

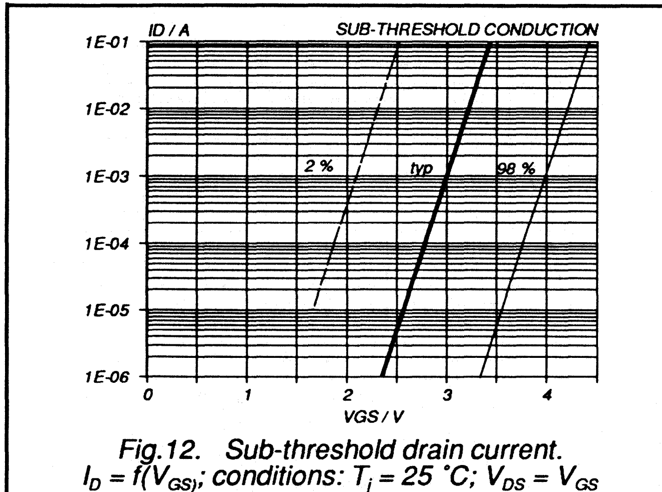


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

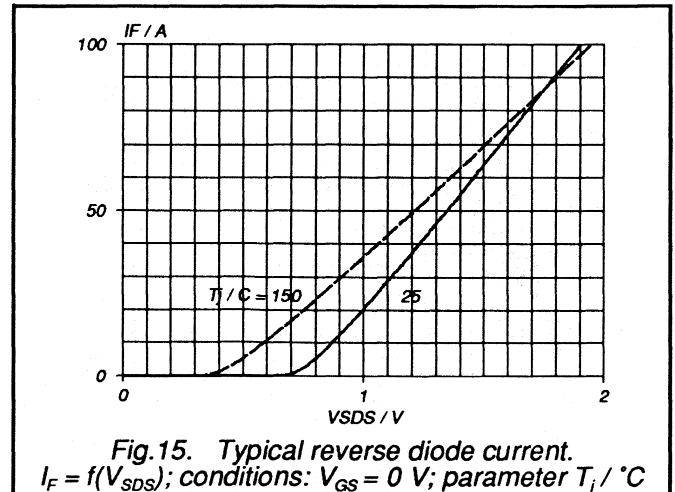


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j / °C

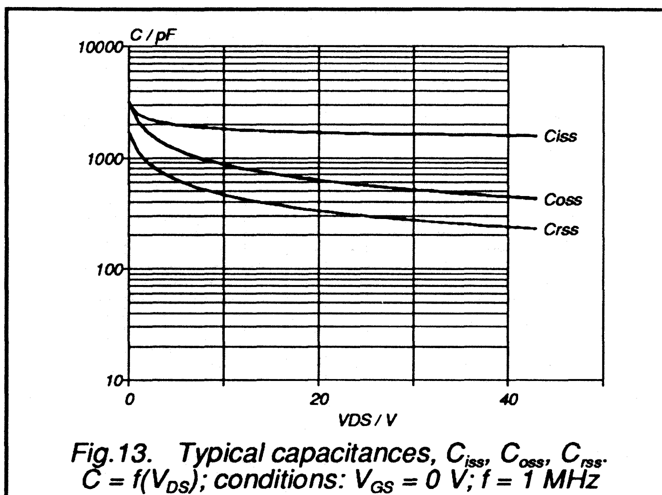


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

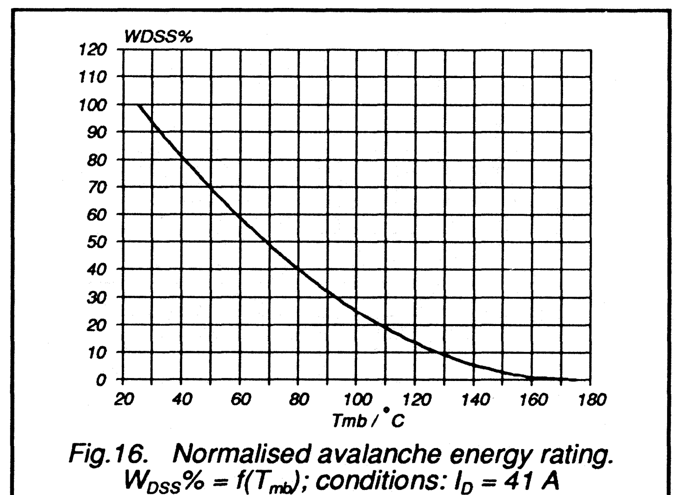


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 41$ A

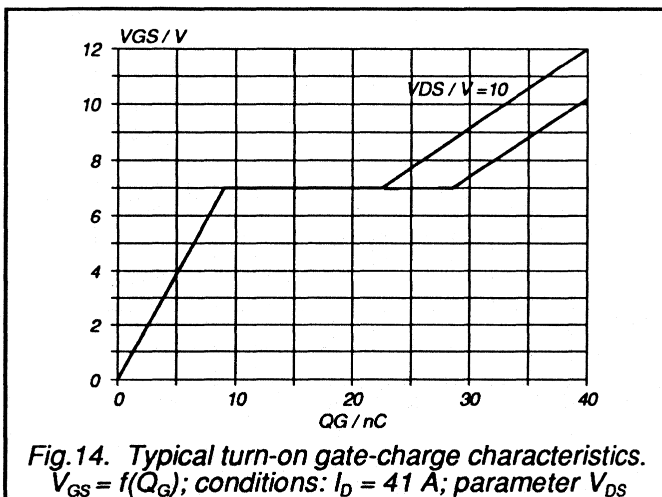


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 41$ A; parameter V_{DS}

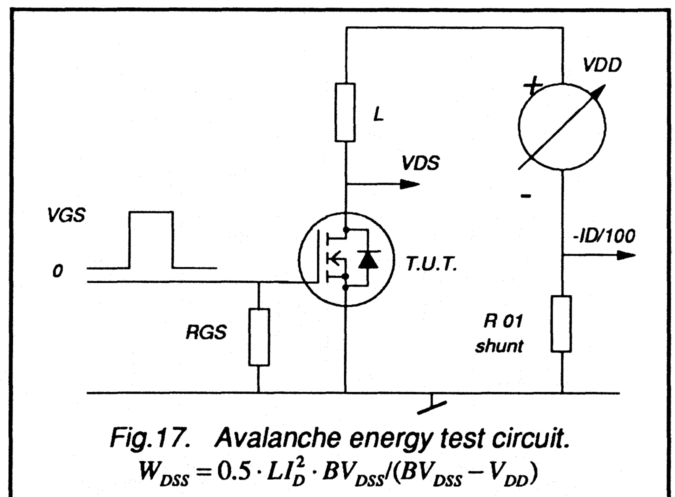


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	26	23	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.08	0.1	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

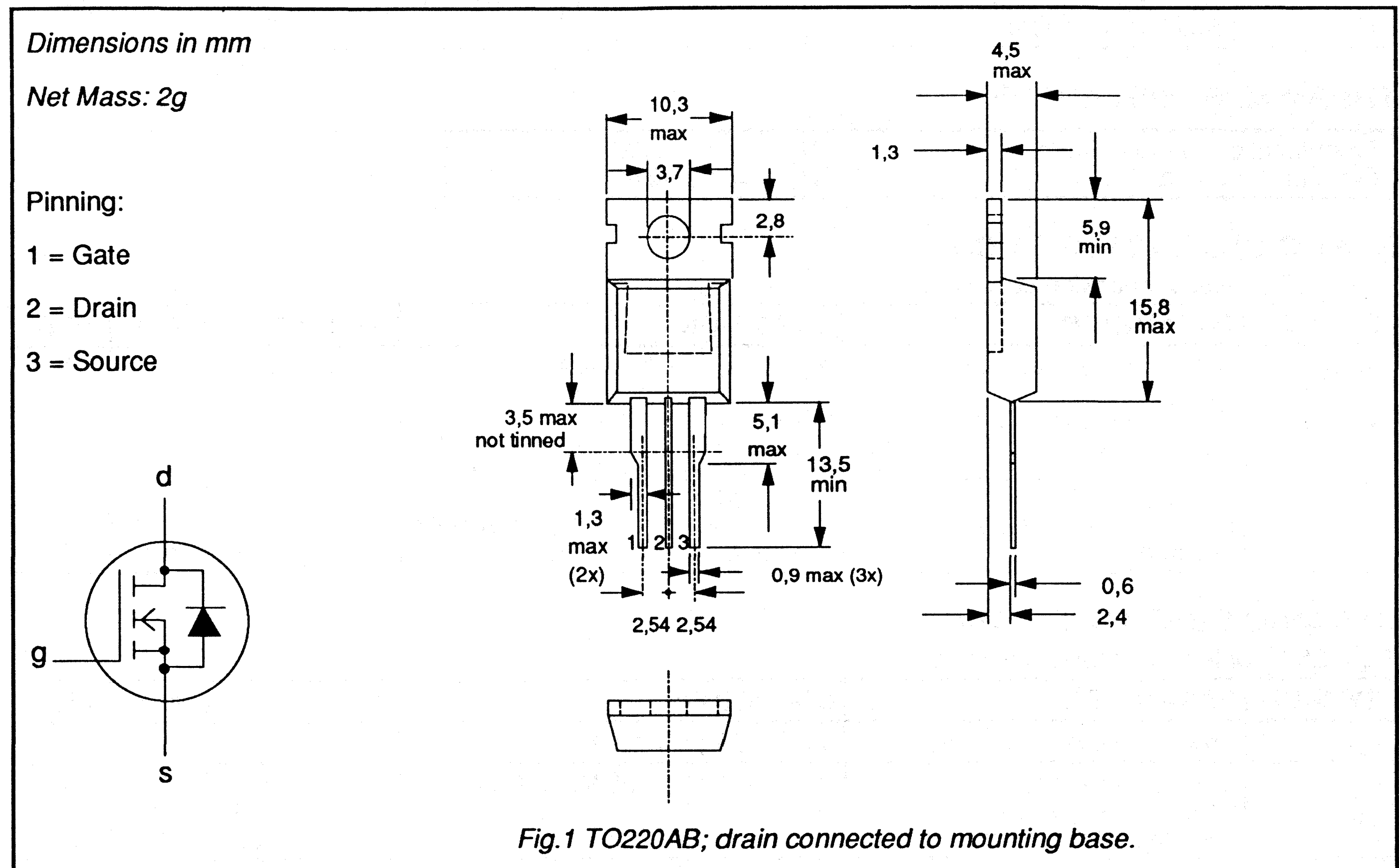


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	**-100B**	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	26	23	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	18	16	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	104	92	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb}$ = 1.2 K/W
From junction to ambient	$R_{th\ j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 13 A **BUK455-100A**	-	0.07	0.08	Ω
		BUK455-100B	-	0.08	0.1	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 13 A	10	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1650	2000	pF
C_{oss}	Output capacitance		-	350	500	pF
C_{rss}	Feedback capacitance		-	100	150	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	15	30	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\ off}$	Turn-off delay time		-	100	160	ns
t_f	Turn-off fall time		-	50	80	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	26	A
I_{DRM}	Pulsed reverse drain current	-	-	-	104	A
V_{SD}	Diode forward voltage	I_F = 26 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 26 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 26 A ; V_{DD} ≤ 50 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

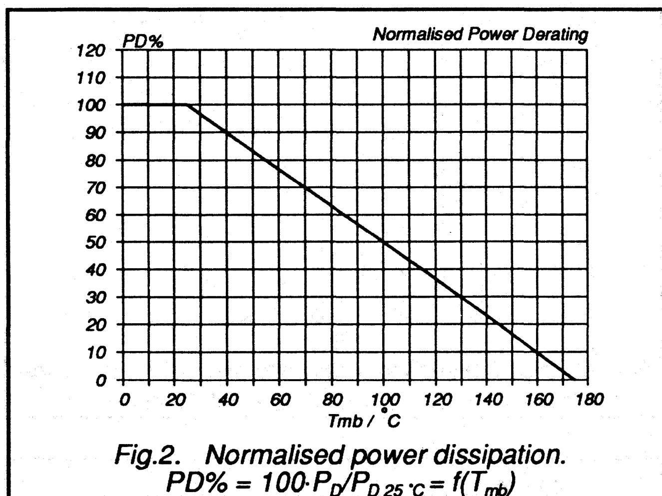


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

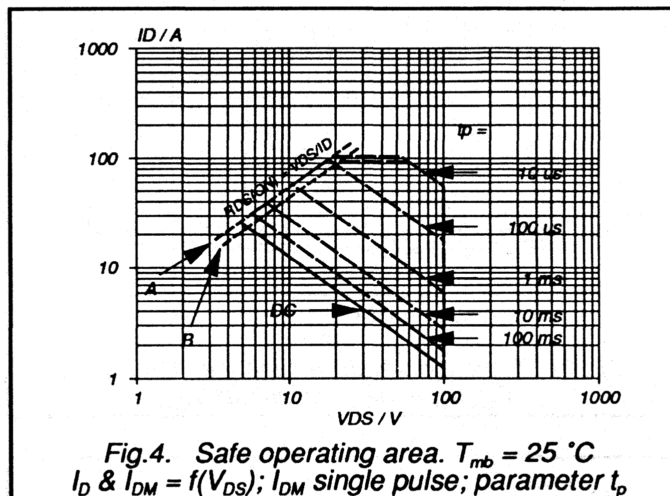


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

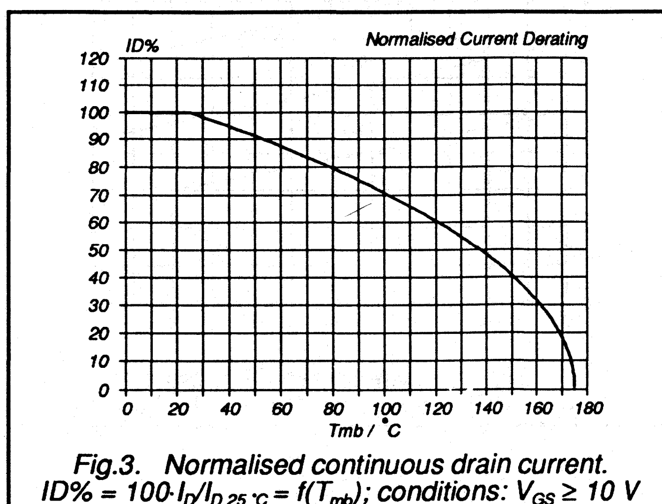


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

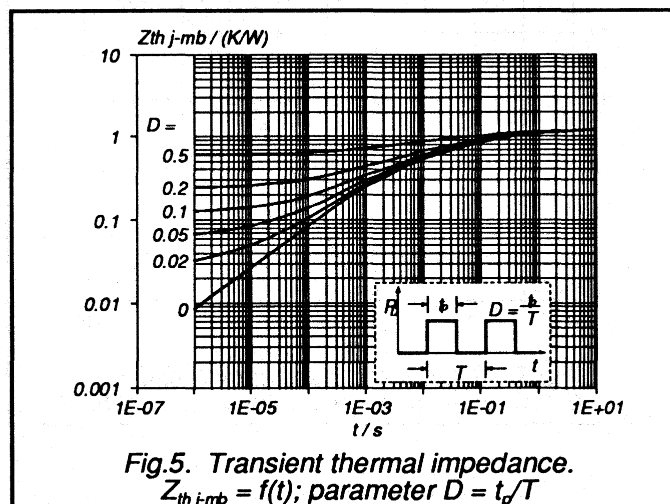


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

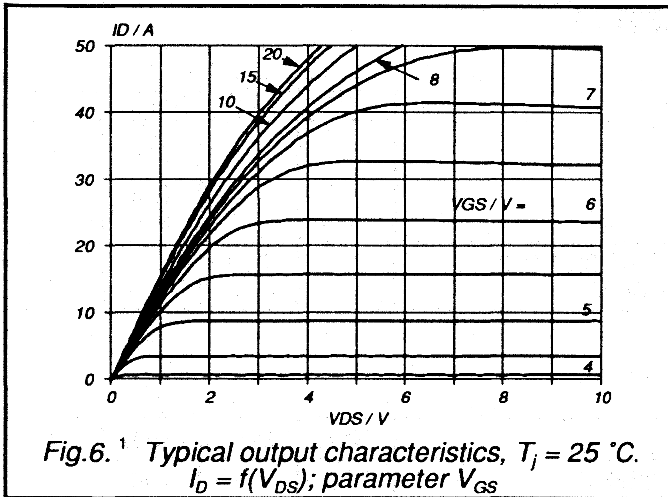


Fig.6. [1] *Typical output characteristics,* T_j *= 25 °C.*
$I_D = f(V_{DS})$*; parameter* V_{GS}

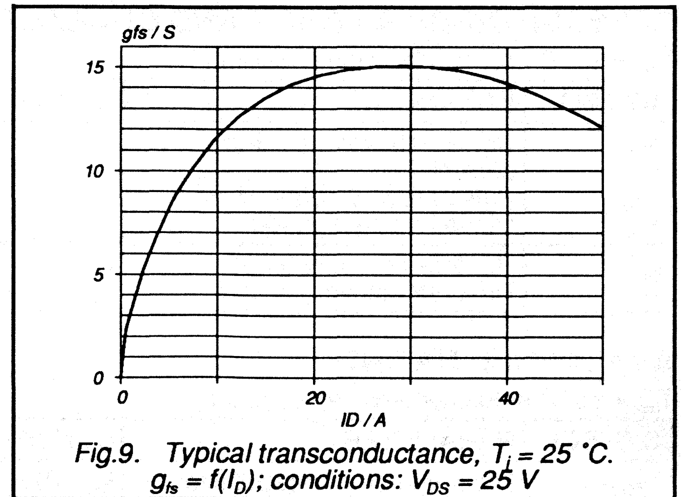


Fig.9. Typical transconductance, T_j *= 25 °C.*
$g_{fs} = f(I_D)$*; conditions:* V_{DS} *= 25 V*

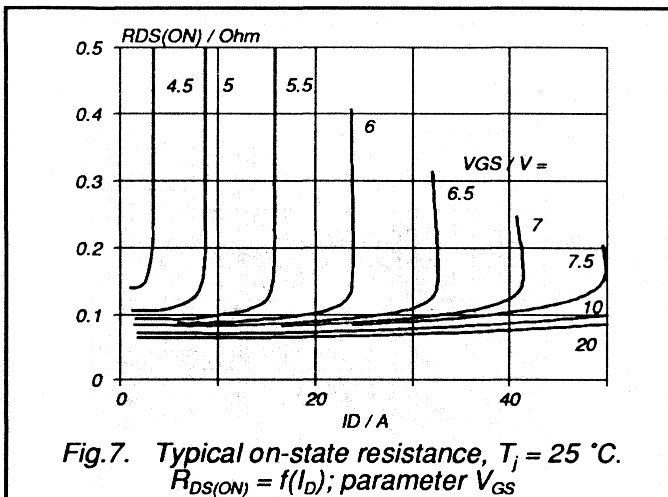


Fig.7. Typical on-state resistance, T_j *= 25 °C.*
$R_{DS(ON)} = f(I_D)$*; parameter* V_{GS}

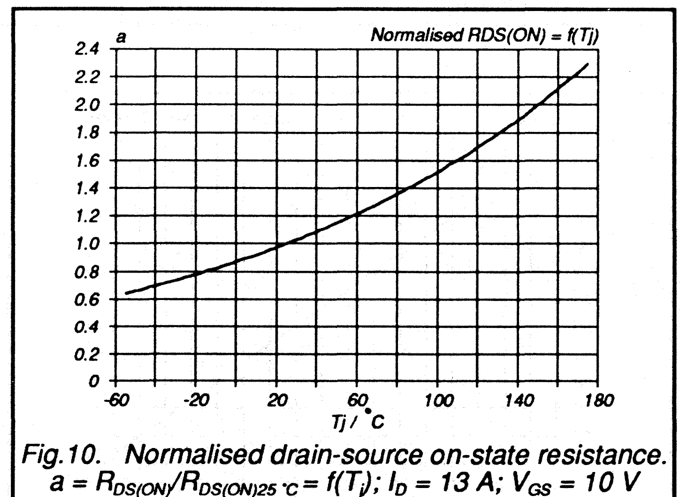


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$*;* I_D *= 13 A;* V_{GS} *= 10 V*

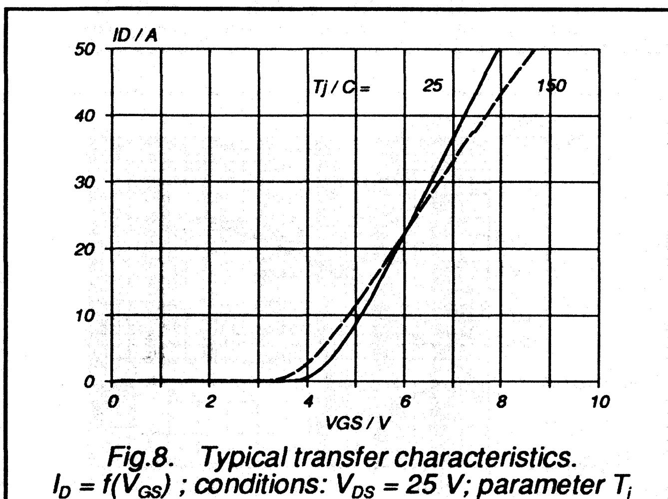


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$ *; conditions:* V_{DS} *= 25 V; parameter* T_j

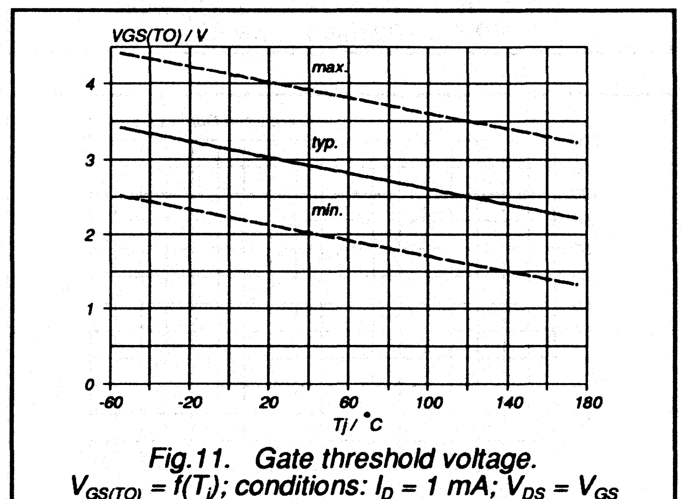


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$*; conditions:* I_D *= 1 mA;* $V_{DS} = V_{GS}$

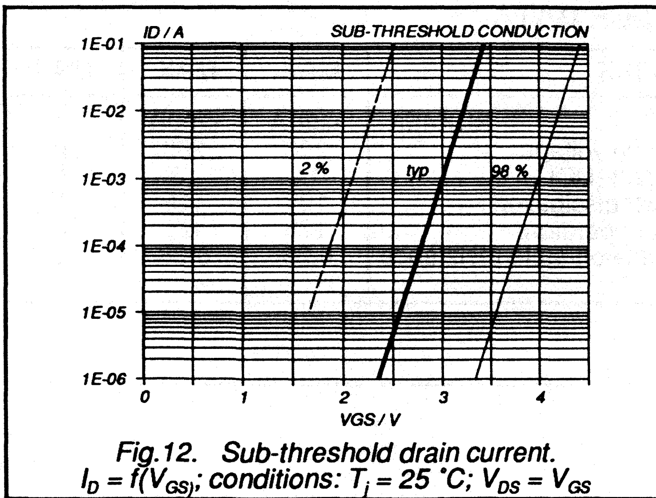


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

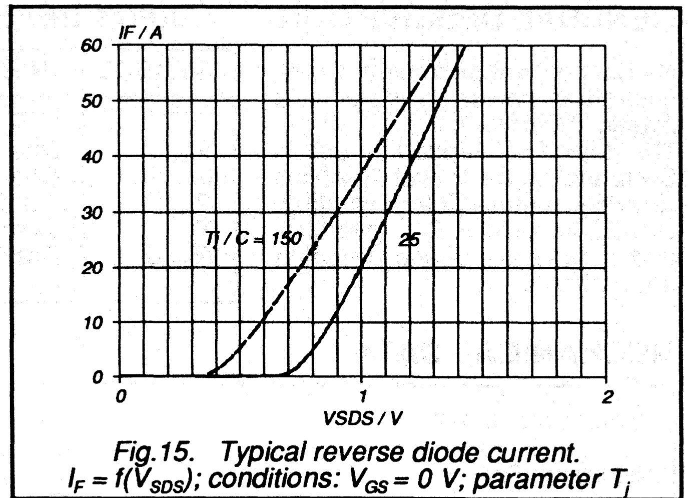


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

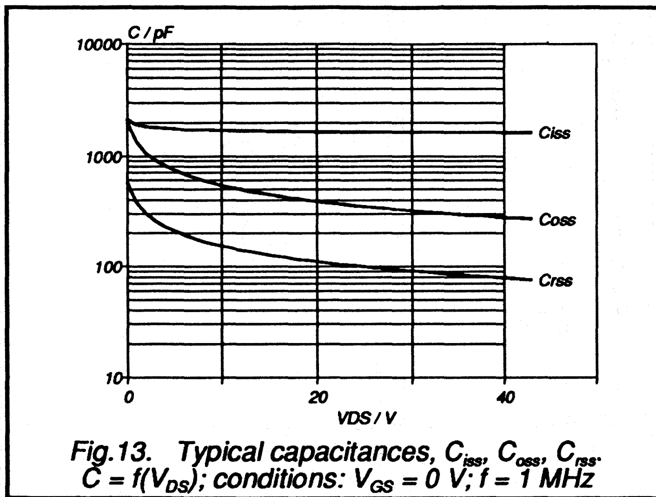


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

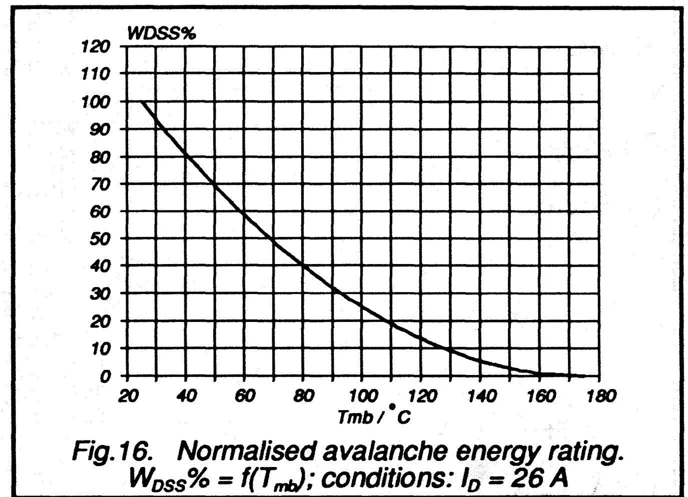


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 26$ A

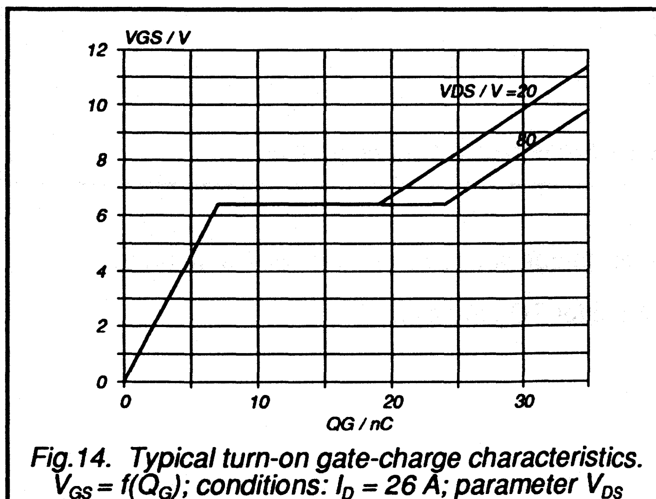


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 26$ A; parameter V_{DS}

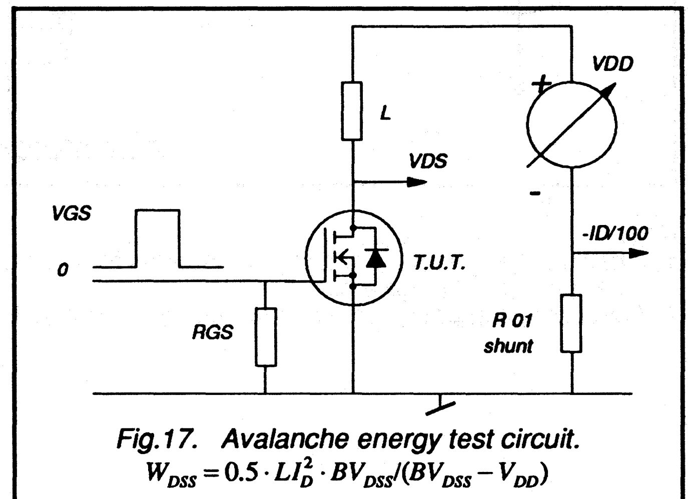


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	14	13	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.23	0.28	Ω

MECHANICAL DATA

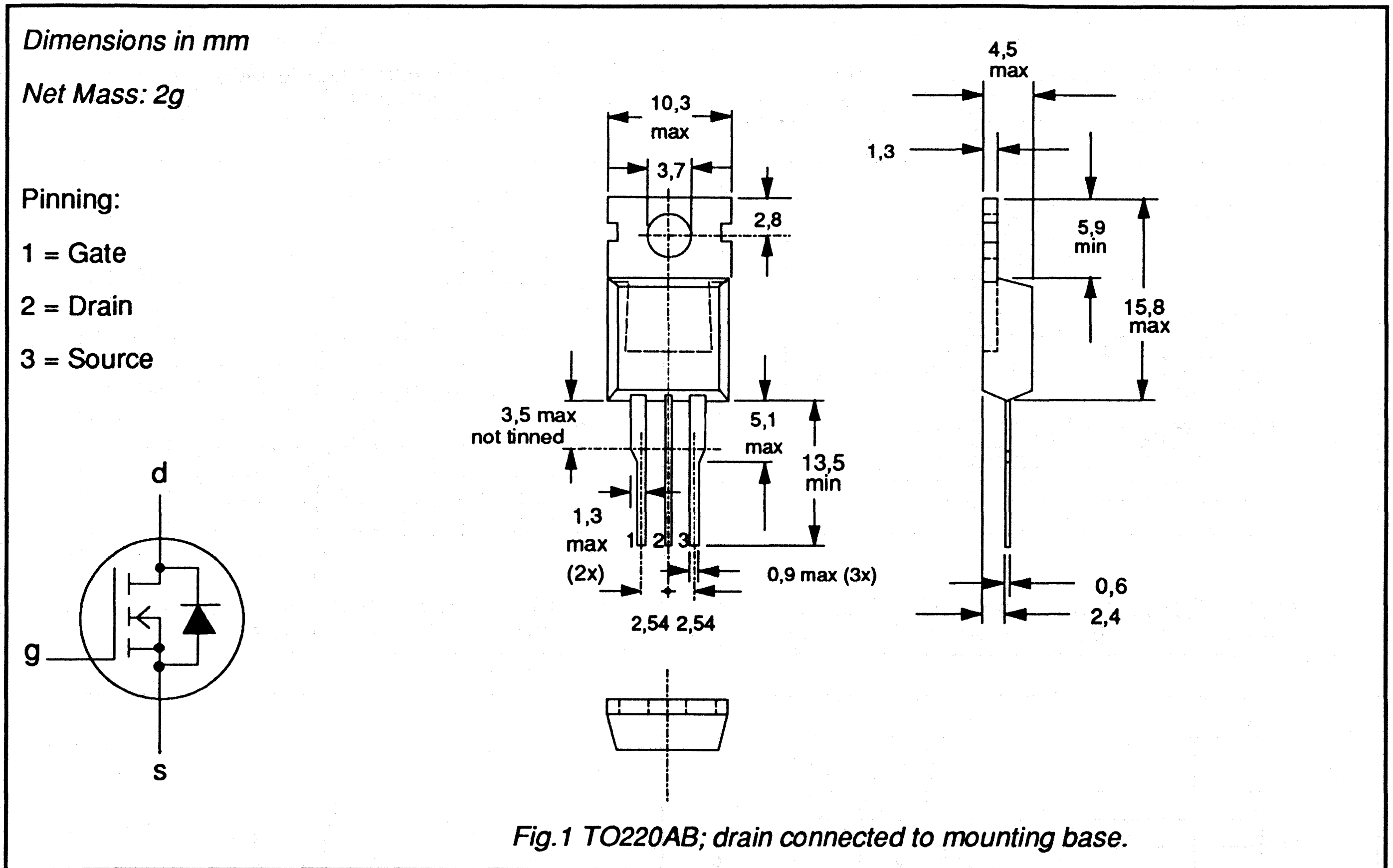


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	13	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	10	9	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	52	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 7 A **BUK455-200A**	-	0.2	0.23	Ω
		BUK455-200B	-	0.22	0.28	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 7 A	6	8.4	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1400	1750	pF
C_{oss}	Output capacitance		-	190	250	pF
C_{rss}	Feedback capacitance		-	55	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	18	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	35	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	85	120	ns
t_f	Turn-off fall time		-	35	50	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.0	1.5	V
t_{rr}	Reverse recovery time	I_F = 14 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; V_{DD} ≤ 100 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	100	mJ

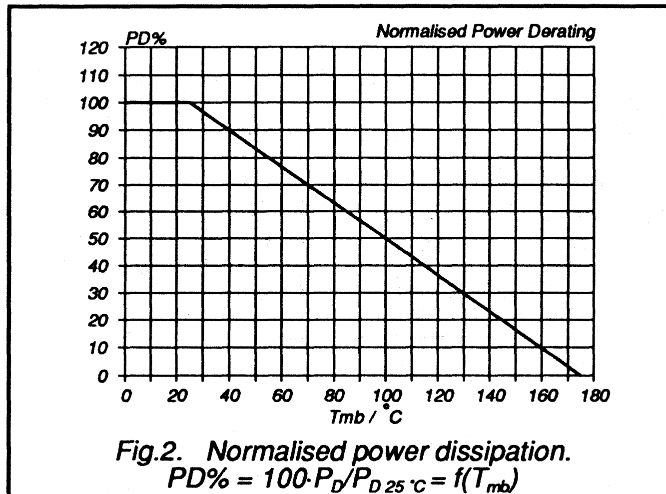


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

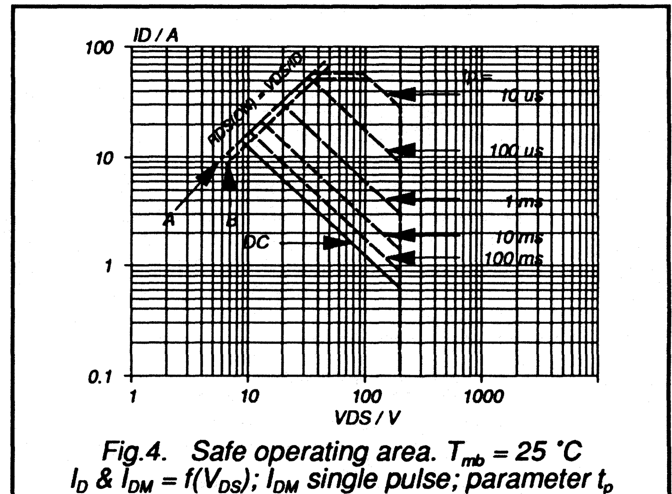


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

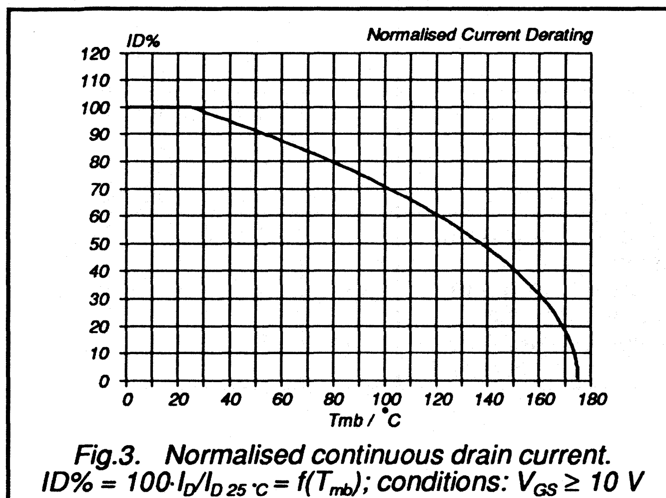


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

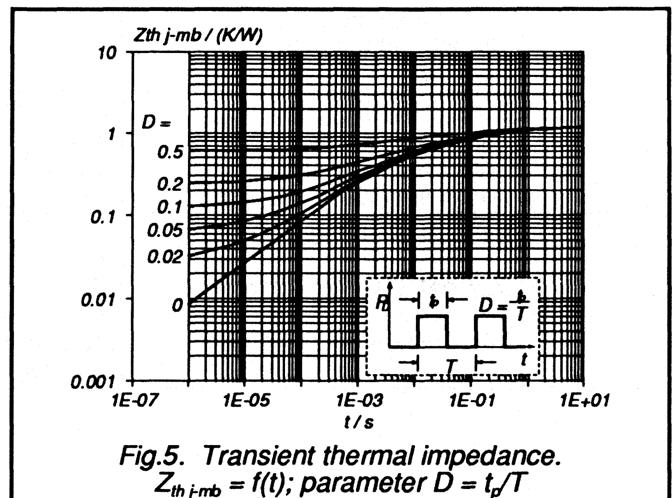


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

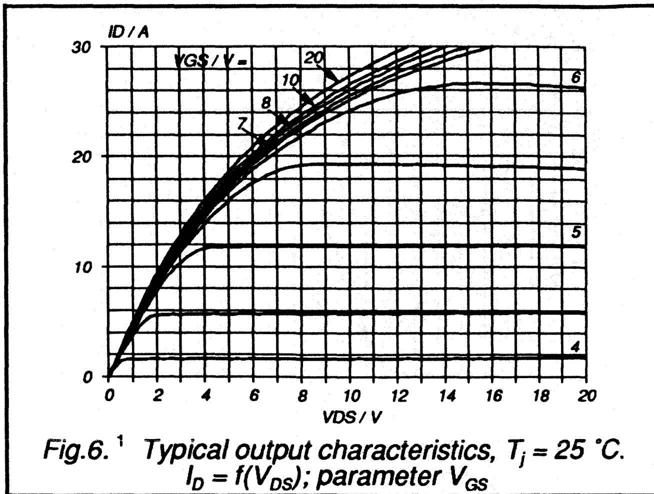


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

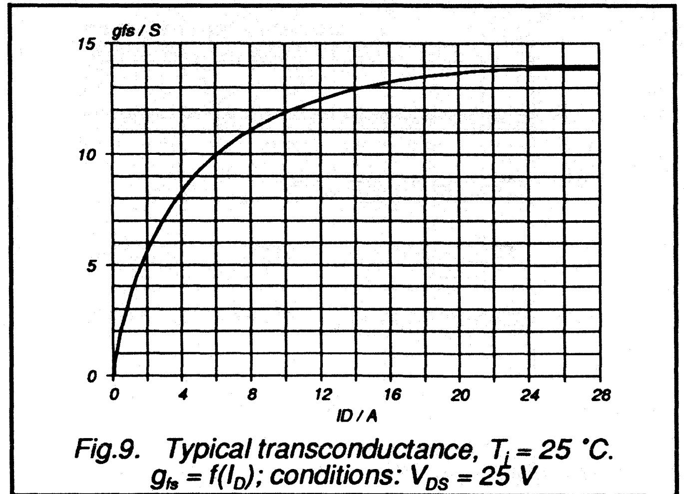


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

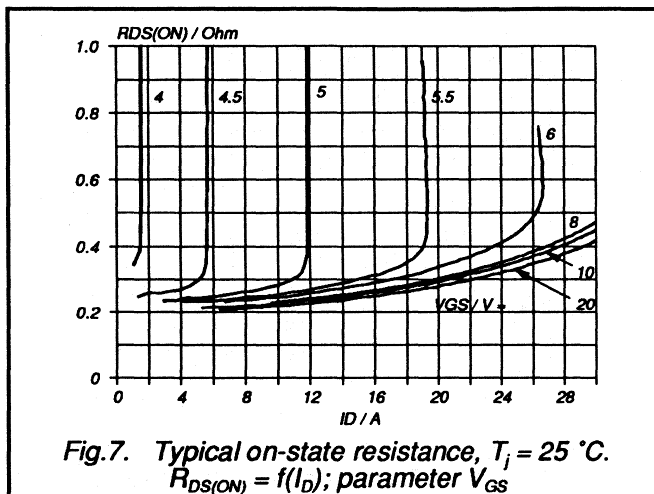


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

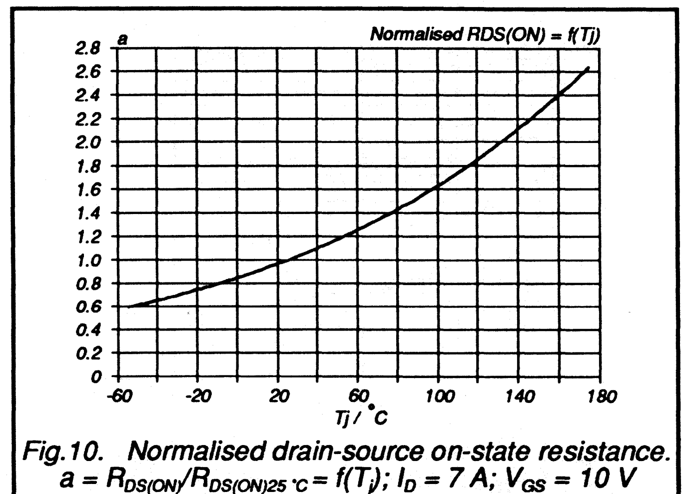


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 7 A; V_{GS} = 10 V

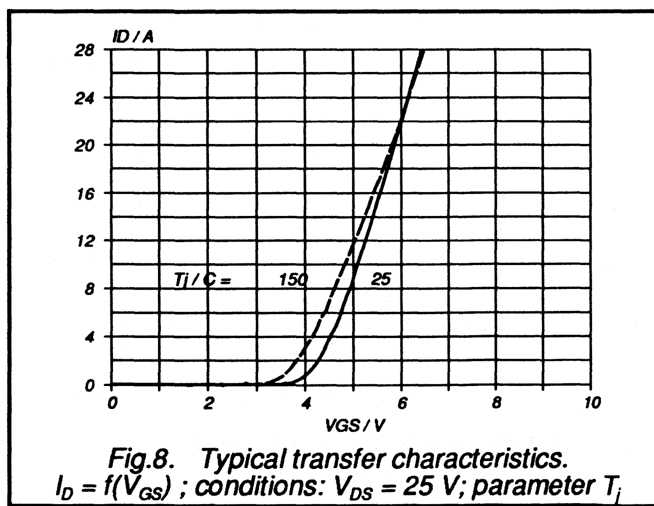


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

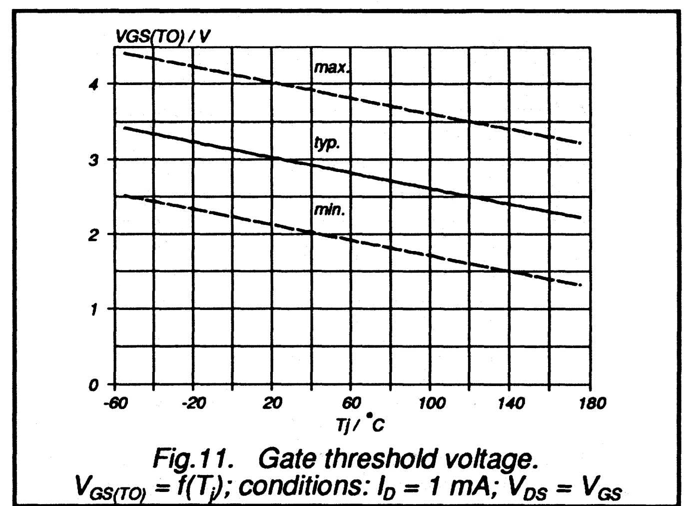


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

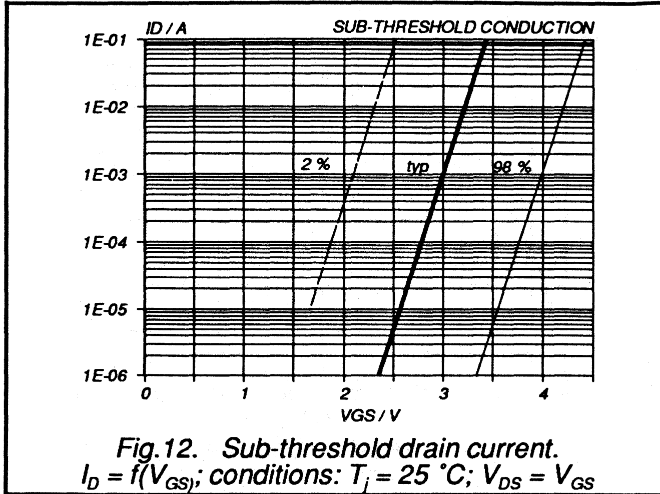


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

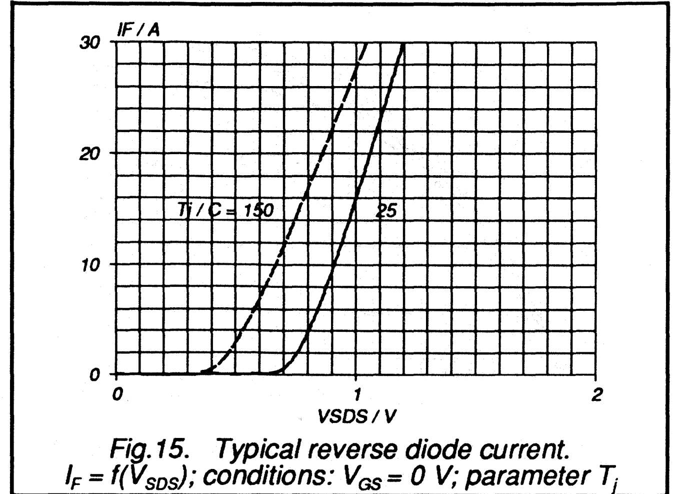


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

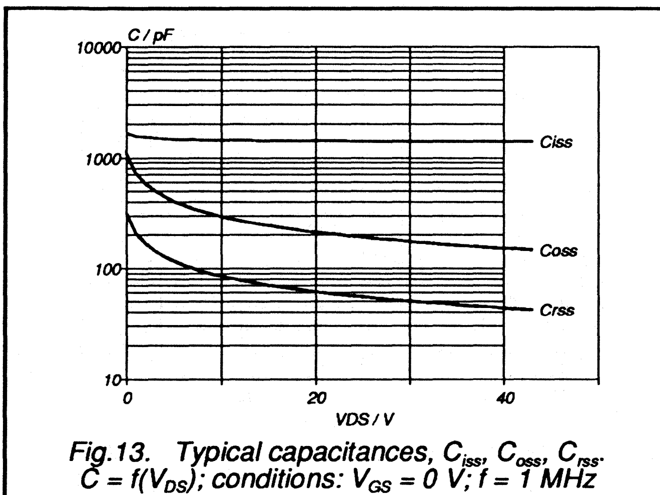


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

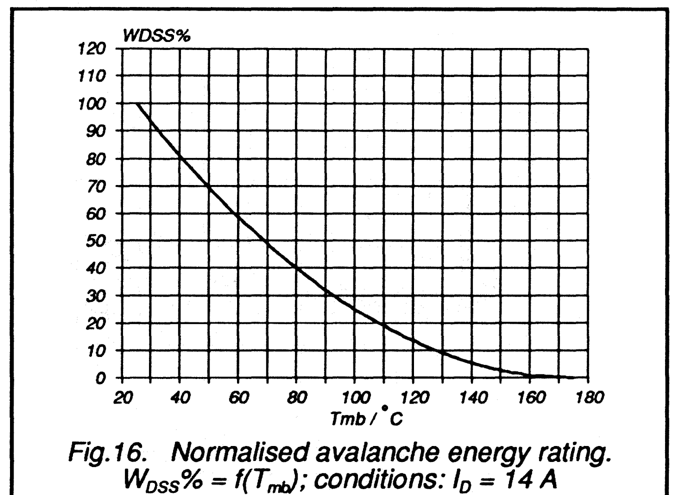


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 14$ A

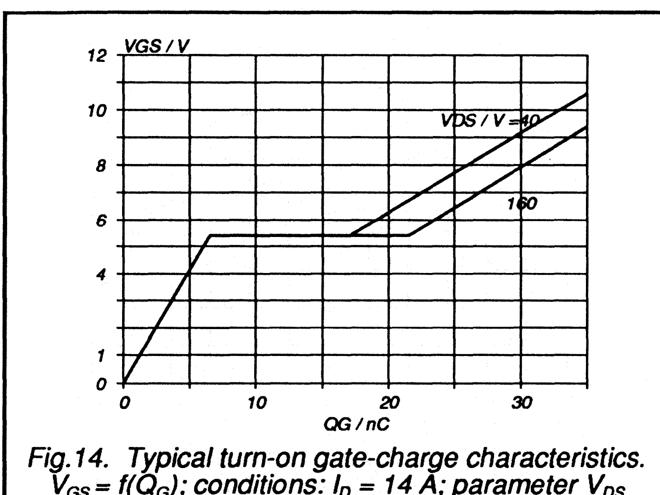


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

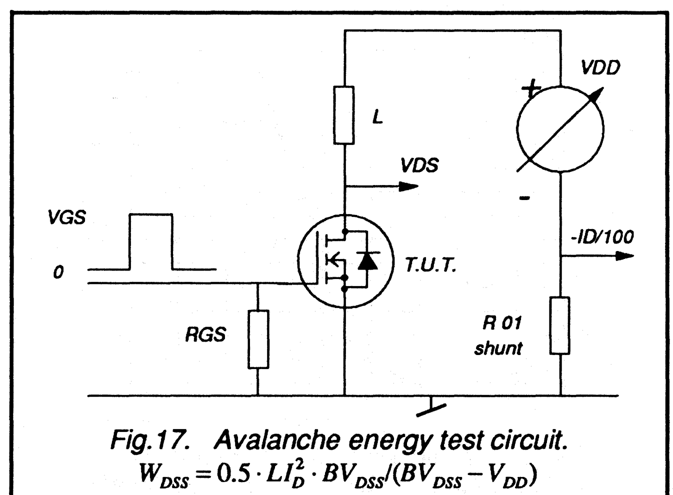


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	7.3	6.5	A
P_{tot}	Total power dissipation	100	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.8	1.0	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

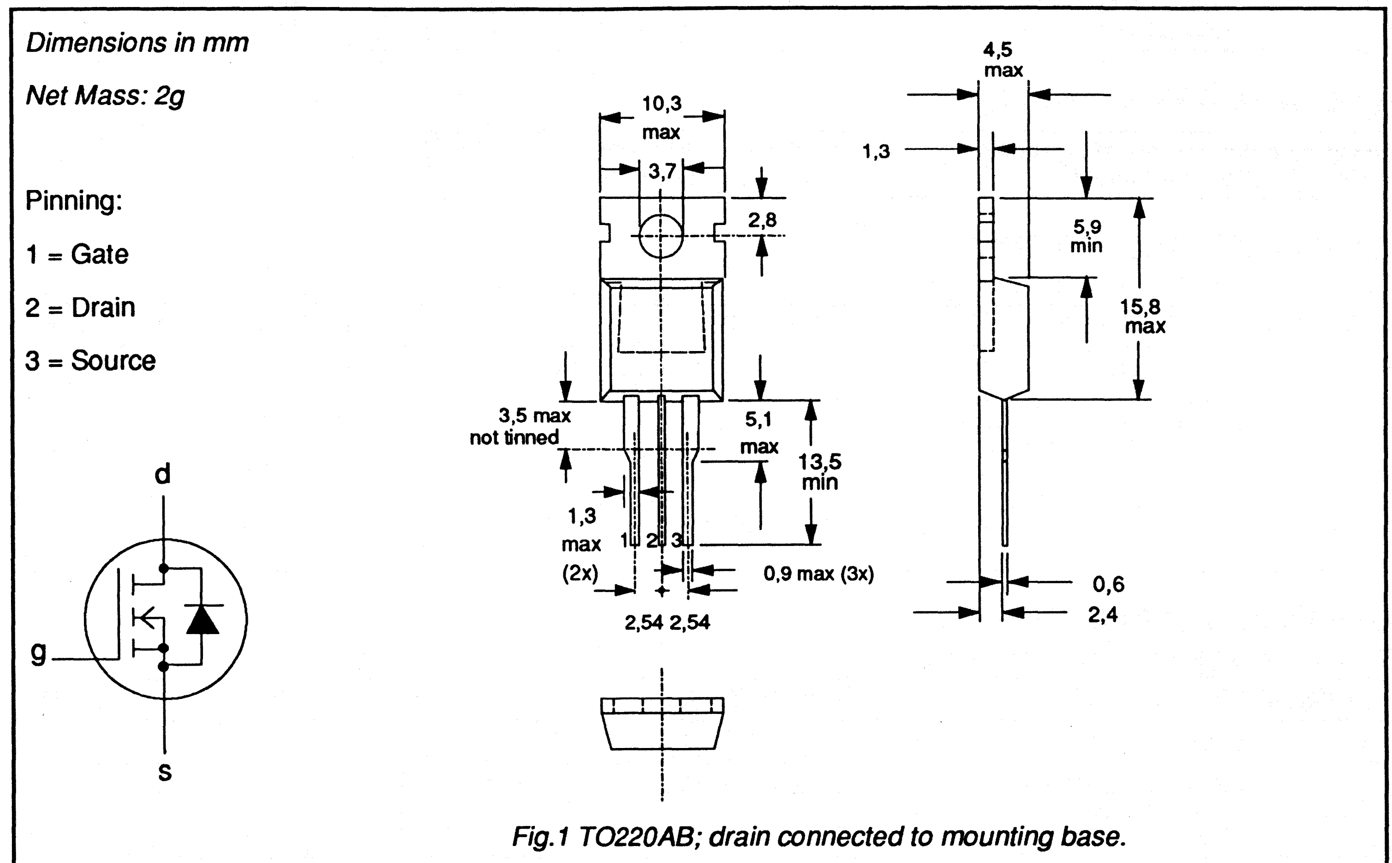


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	7.3	6.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	4.6	4.1	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	29	26	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A BUK455-400A	-	0.7	0.8	Ω
		BUK455-400B	-	0.9	1.0	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	120	180	pF
C_{rss}	Feedback capacitance		-	50	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.7 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	120	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	7.3	A
I_{DRM}	Pulsed reverse drain current	-	-	-	29	A
V_{SD}	Diode forward voltage	I_F = 7.3 A ; V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 7.3 A; -dI_F/dt = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

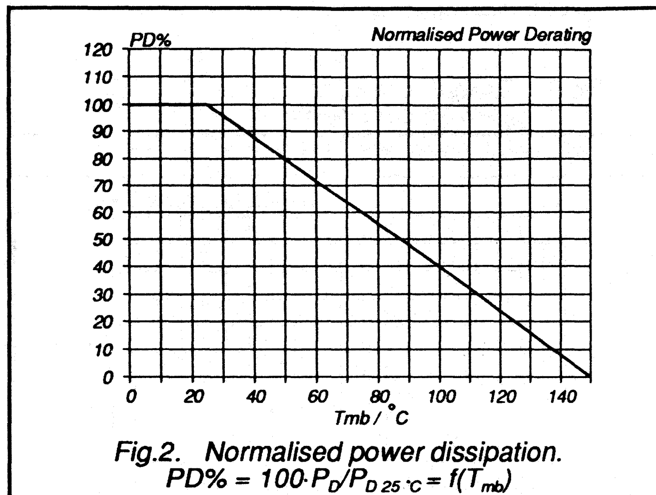


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

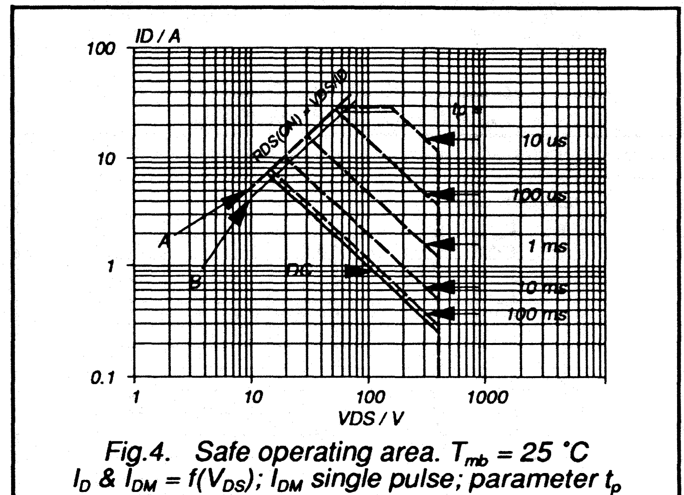


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

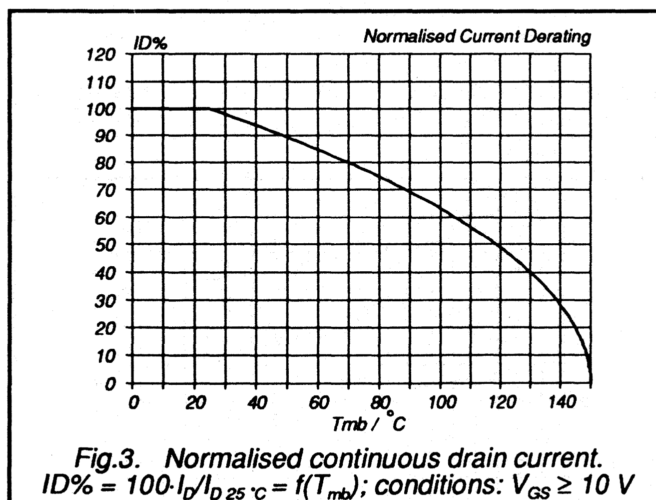


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

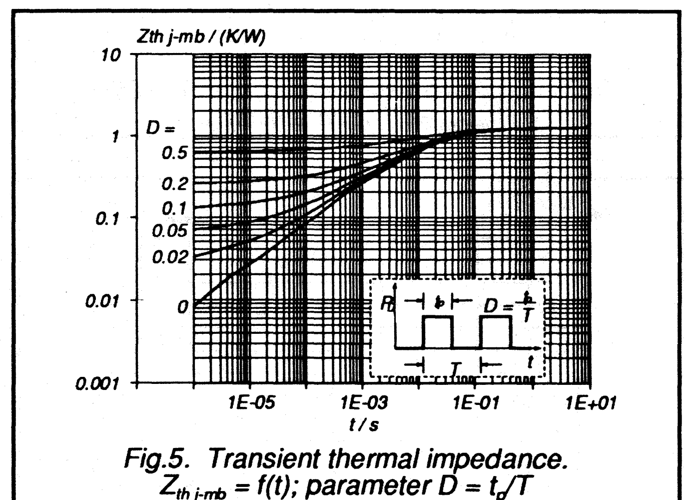


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

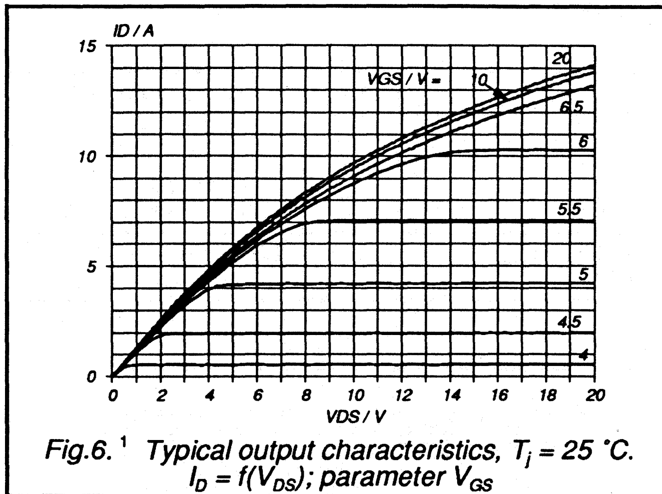


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

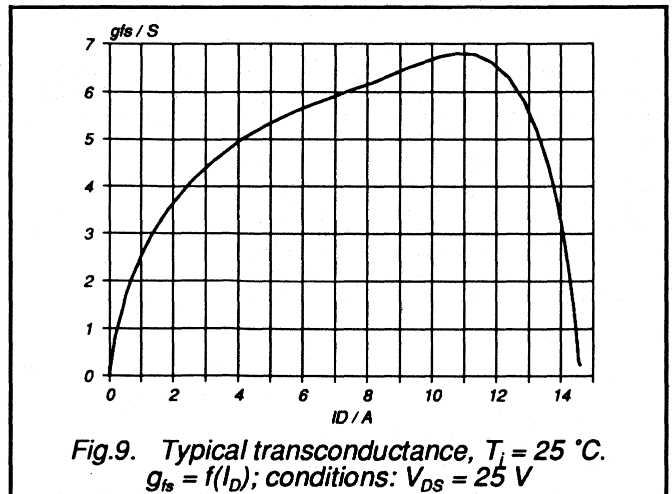


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

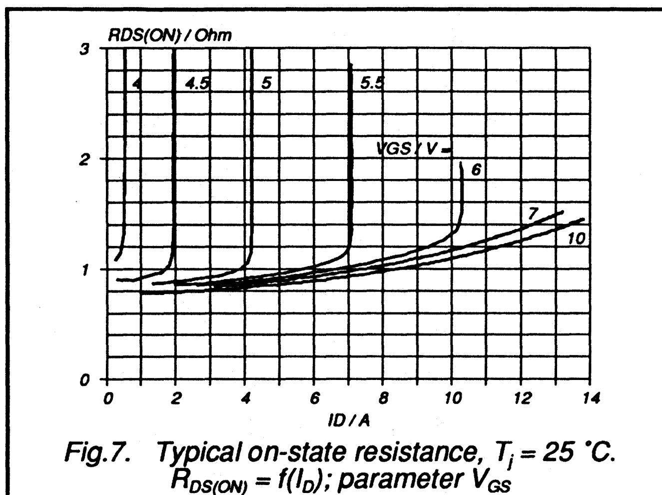


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

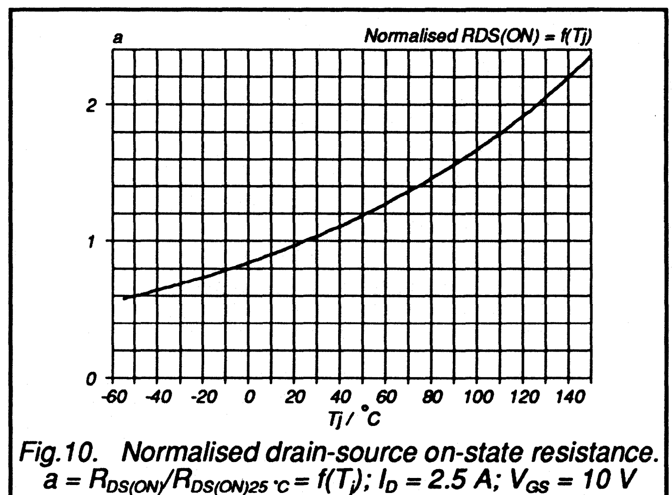


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

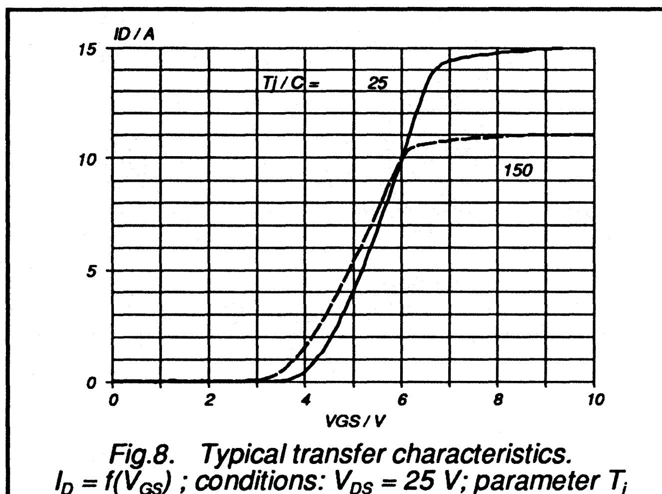


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

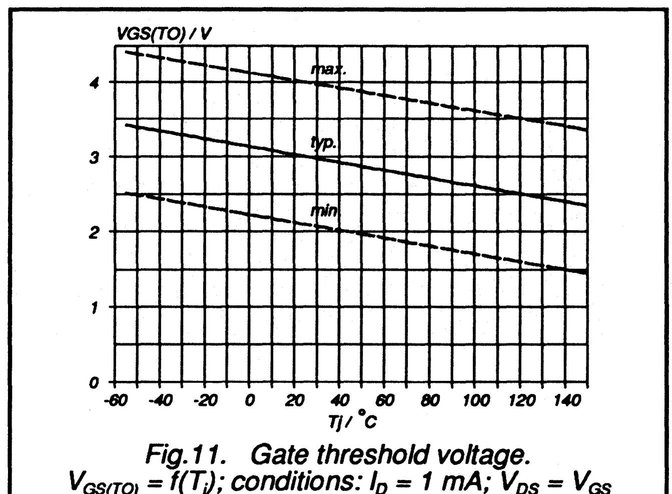


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

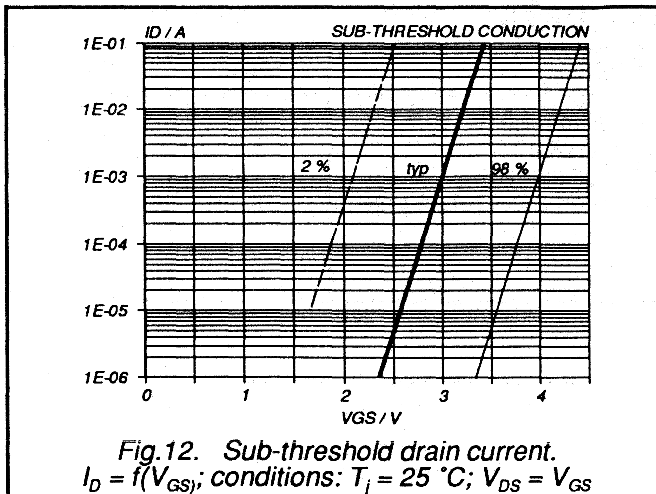


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

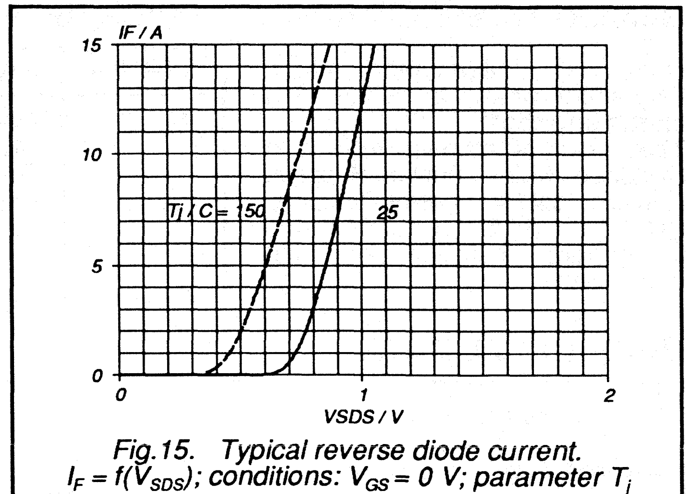


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

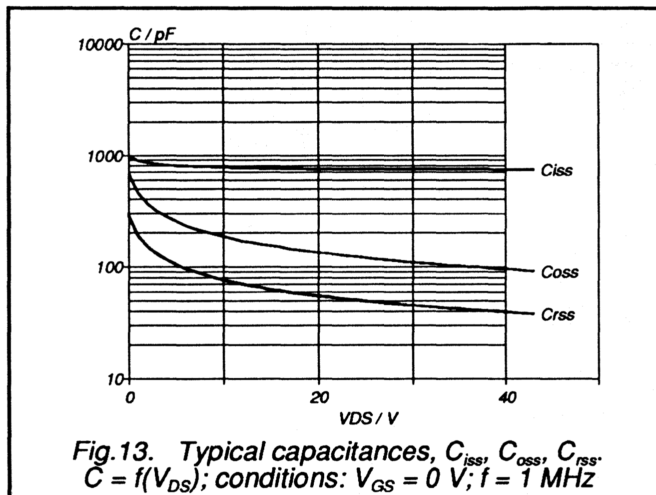


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

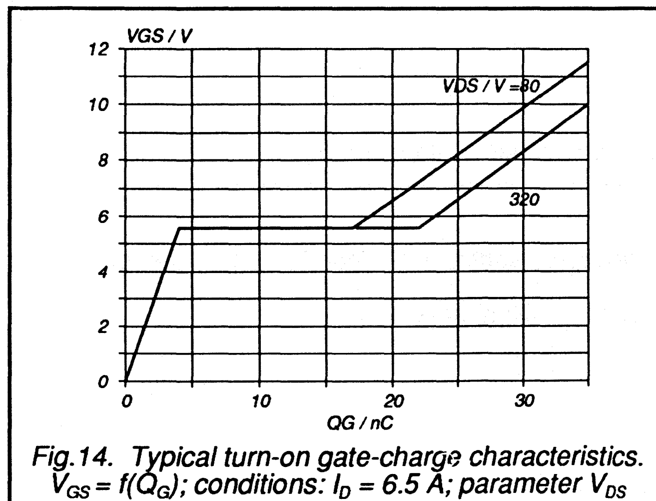


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 6.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	5.7	A
P_{tot}	Total power dissipation	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	Ω

MECHANICAL DATA

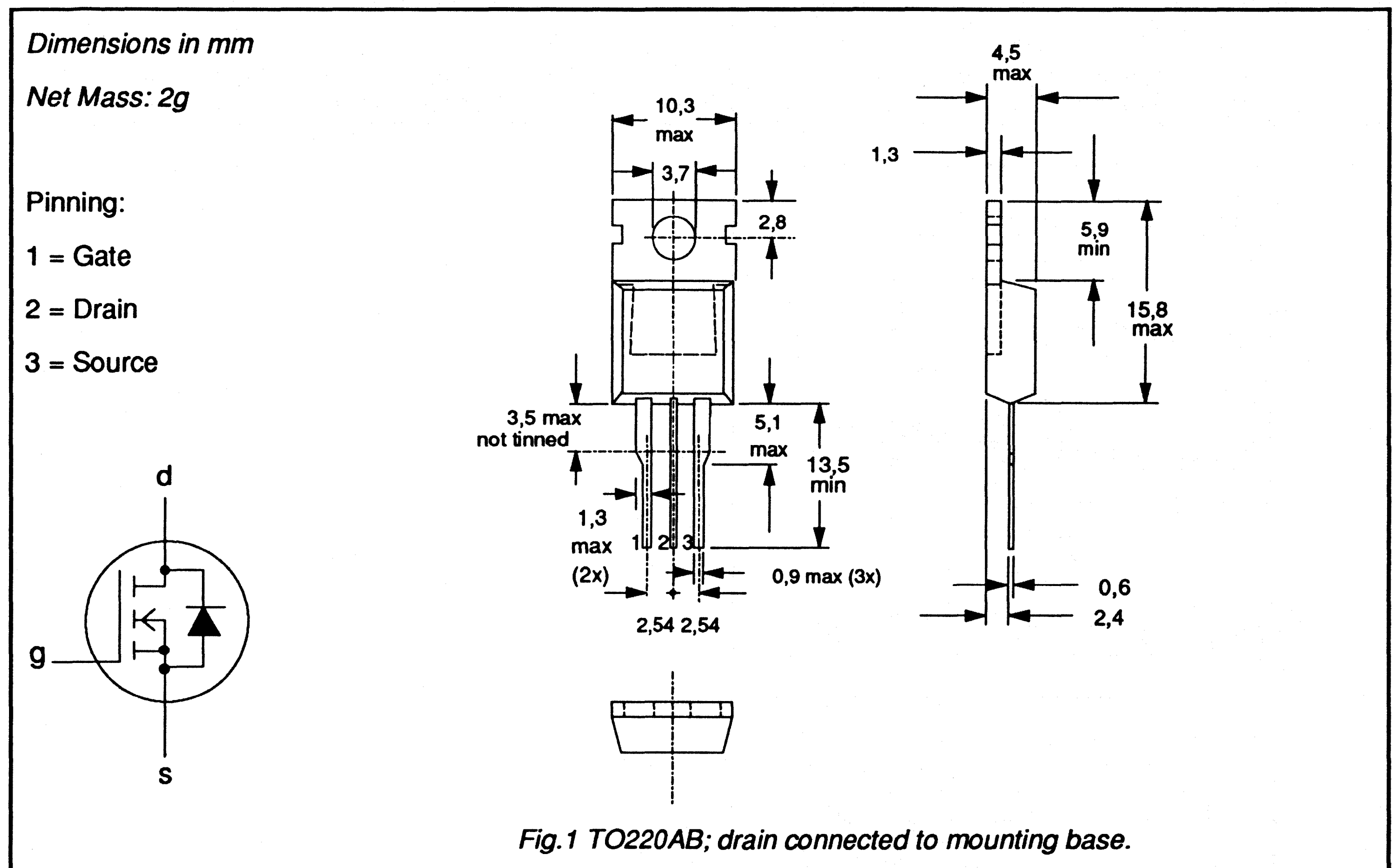


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 °C	-	5.7	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	3.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	23	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100	W
T_{stg}	Storage temperature	-	- 55	150	°C
T_j	Junction Temperature	-	-	150	°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A	-	1.2	1.3	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A;	-	10	45	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	45	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	23	A
V_{SD}	Diode forward voltage	I_F = 5.7 A ; V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.7 A; $-dI_F/dt$ = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

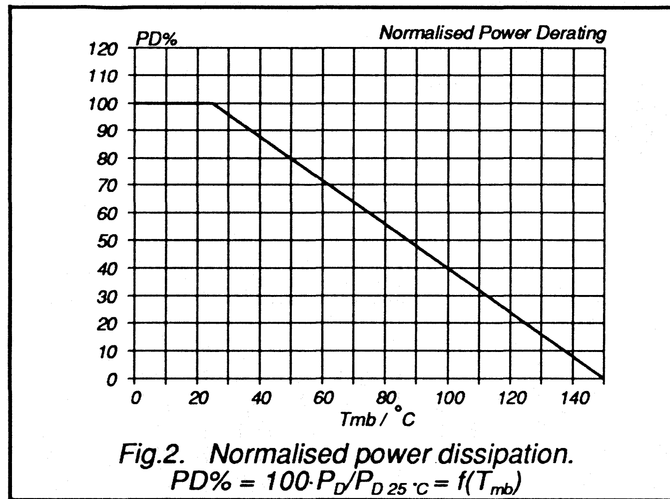


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

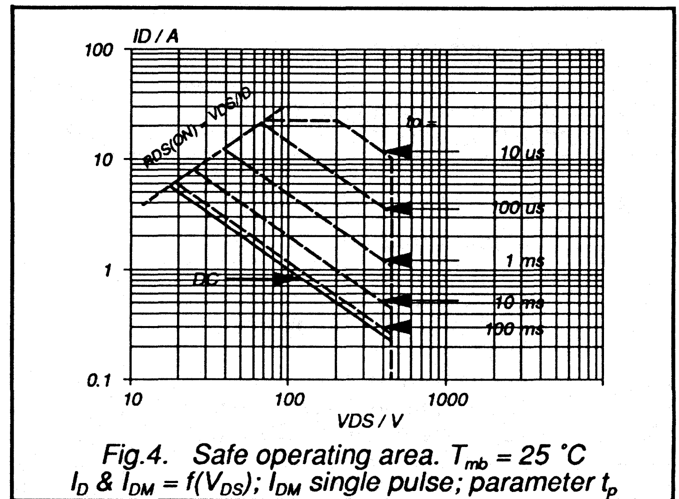


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

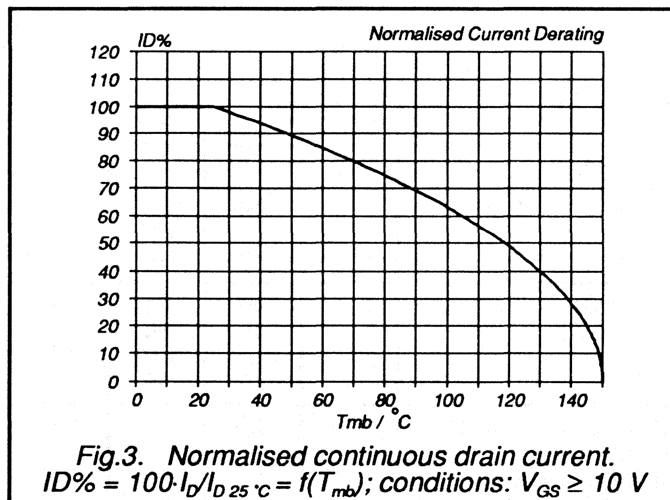


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

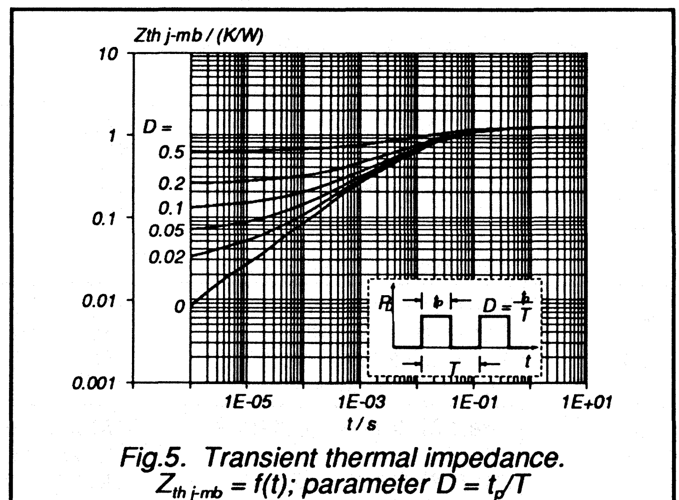


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

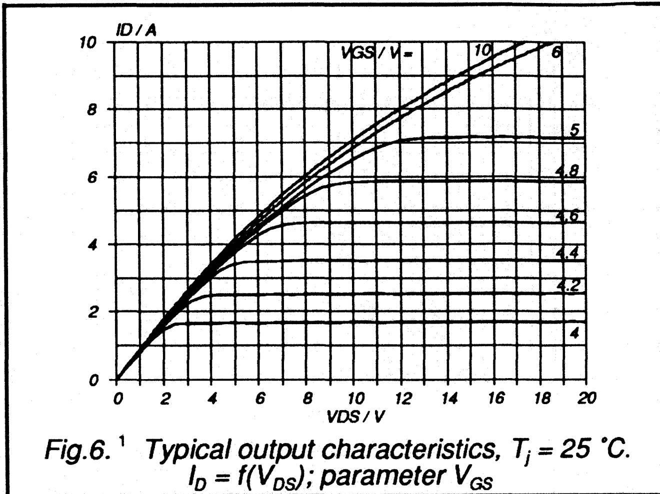


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

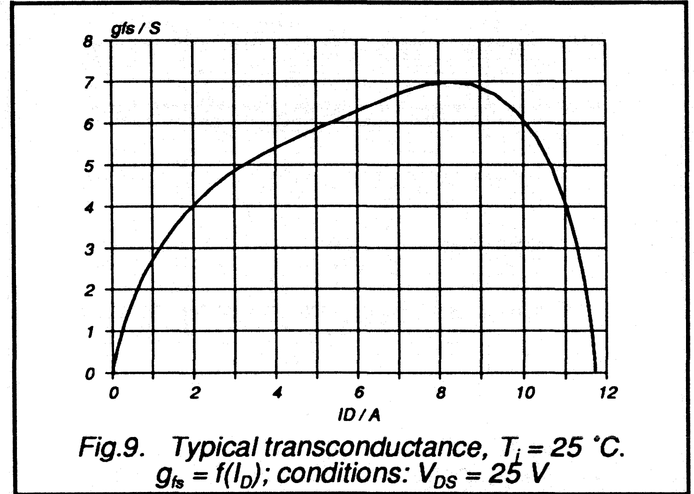


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

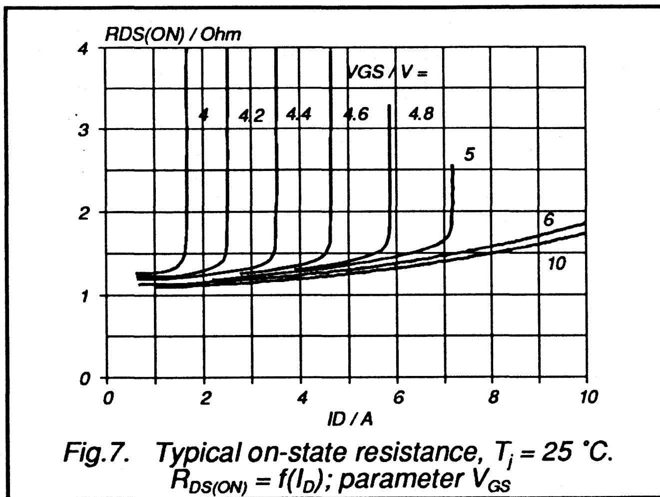


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

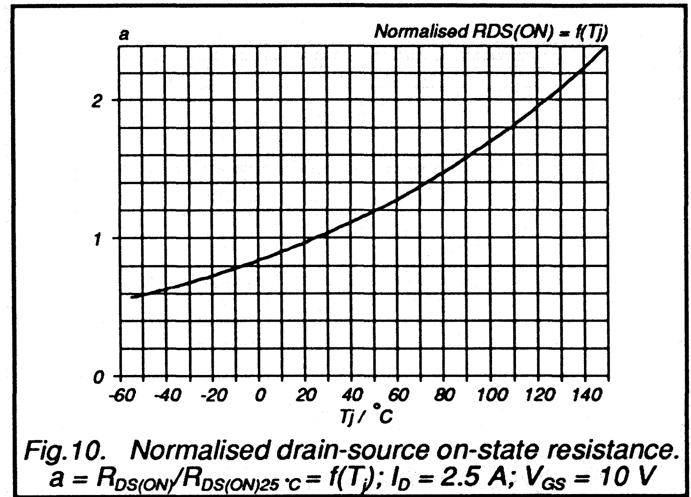


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

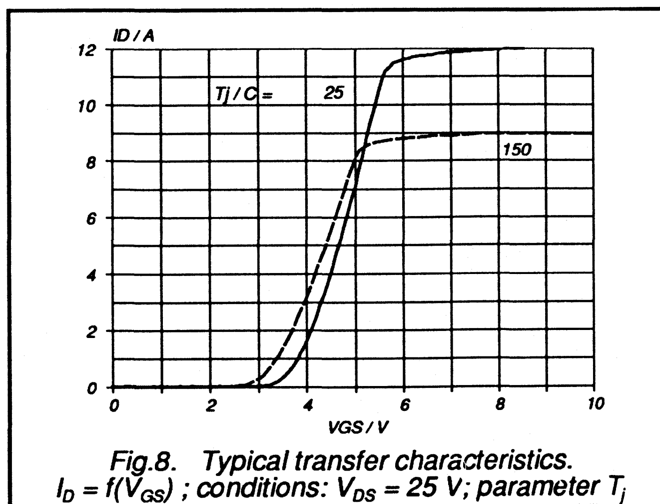


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

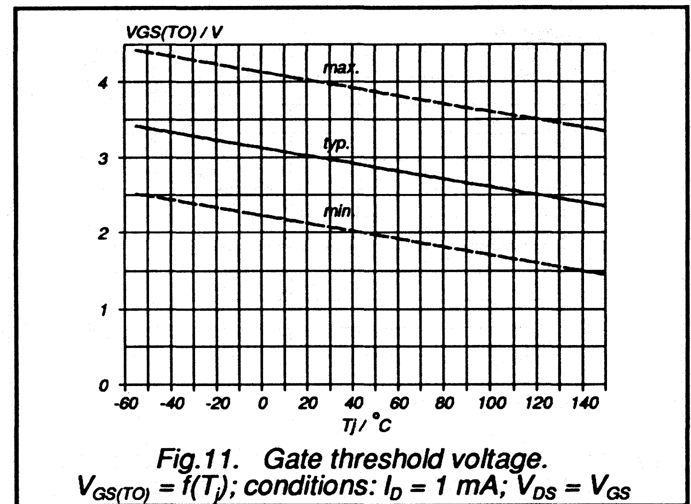


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

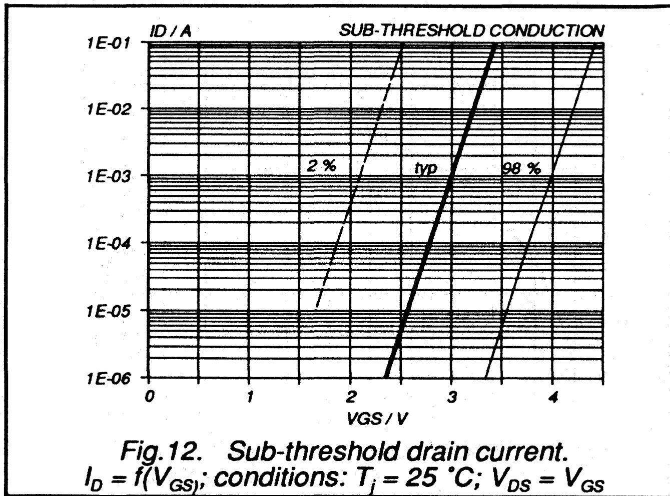


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

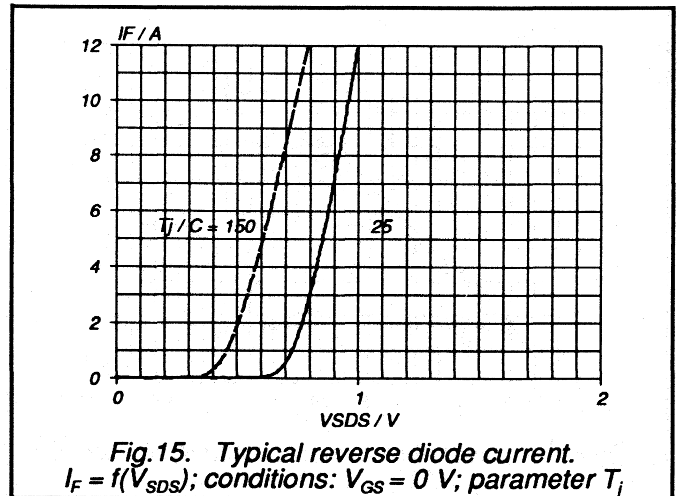


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

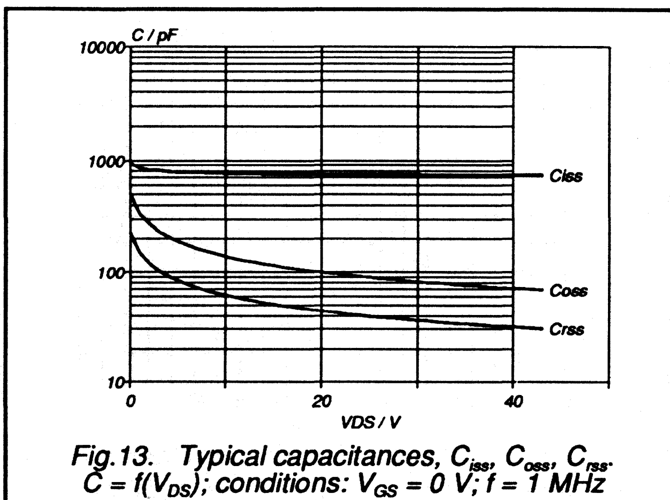


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

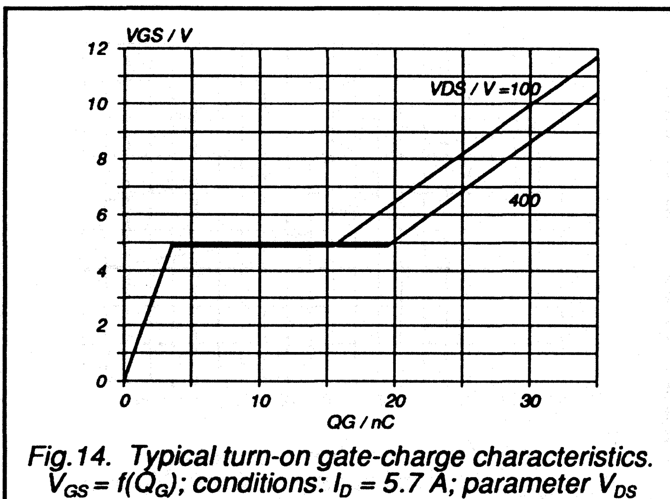


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	5.7	5.3	A
P_{tot}	Total power dissipation	100	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	1.5	Ω

MECHANICAL DATA

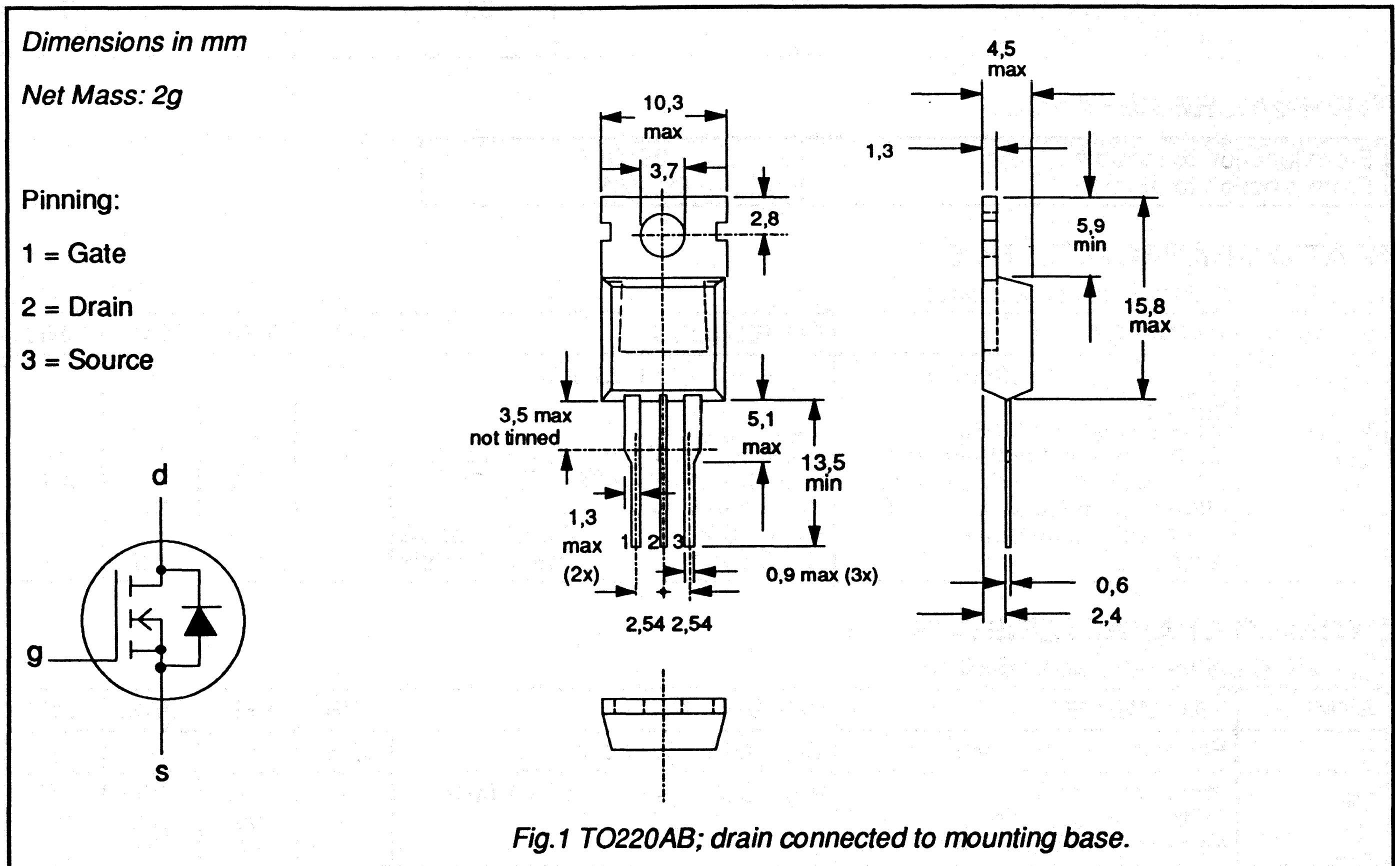


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	5.7	5.3	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	3.6	3.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	23	21	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A **BUK455-500A**	-	1.2	1.3	Ω
		BUK455-500B	-	1.4	1.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	45	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\,off}$	Turn-off delay time		-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	5.7	A
I_{DRM}	Pulsed reverse drain current	-	-	-	23	A
V_{SD}	Diode forward voltage	I_F = 5.7 A ; V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.7 A; $-dI_F/dt$ = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

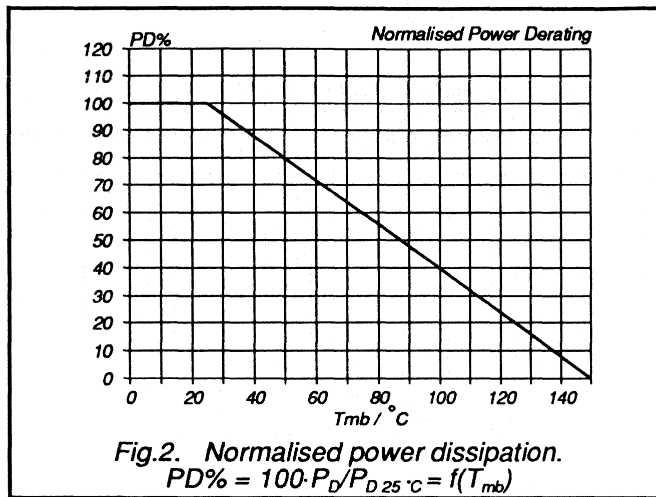


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^{\circ}C} = f(T_{mb})$

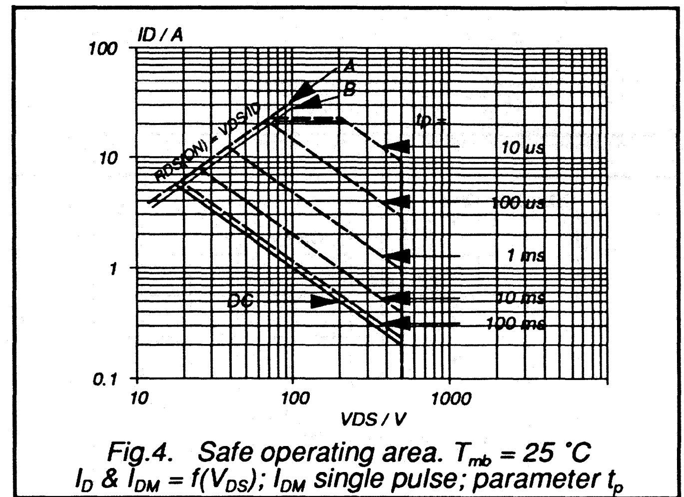


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

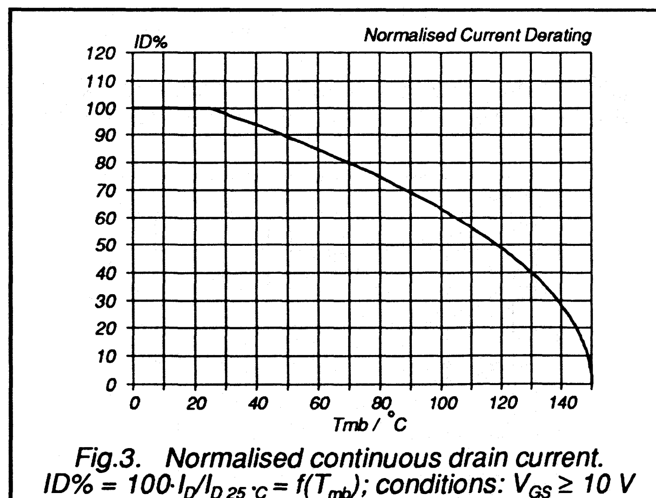


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^{\circ}C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

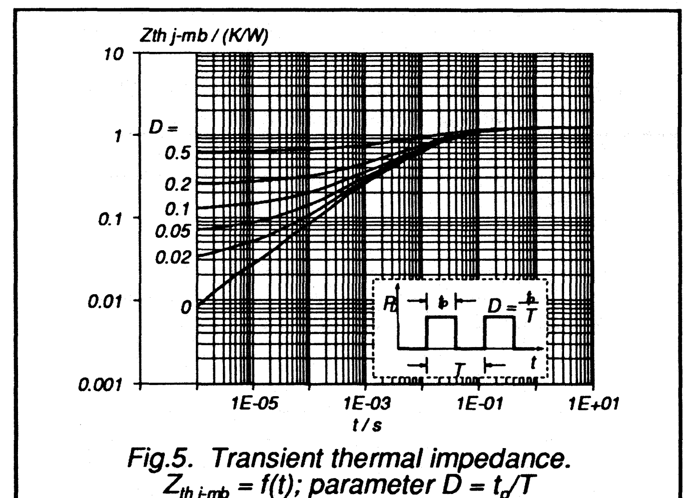


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

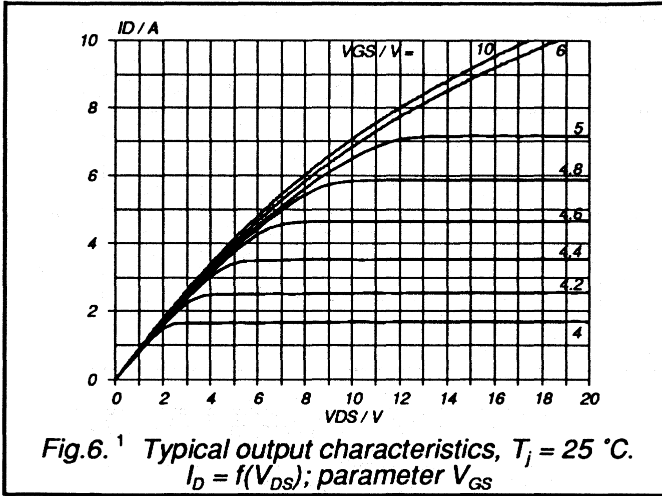


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

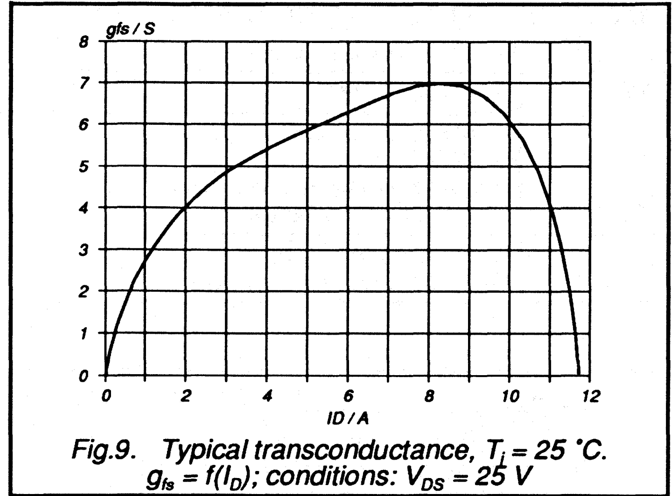


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

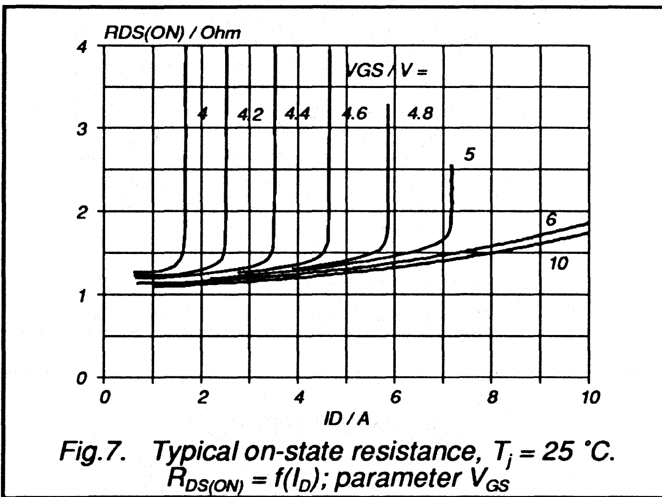


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

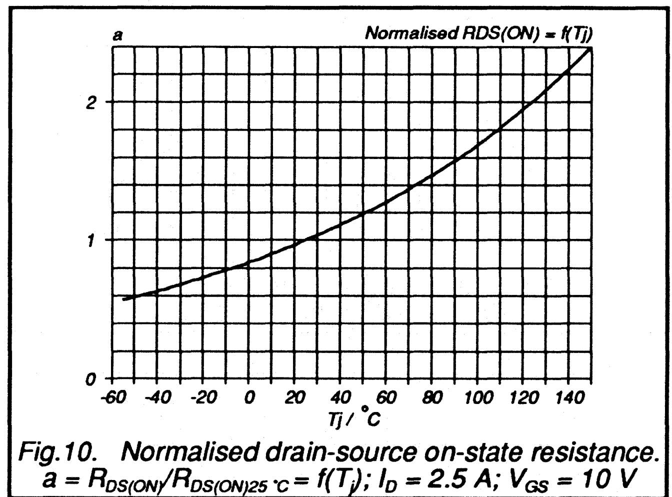


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 2.5$ A; $V_{GS} = 10$ V

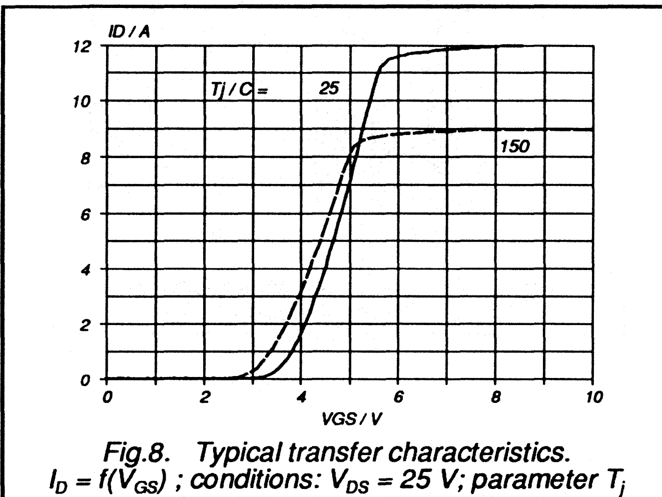


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

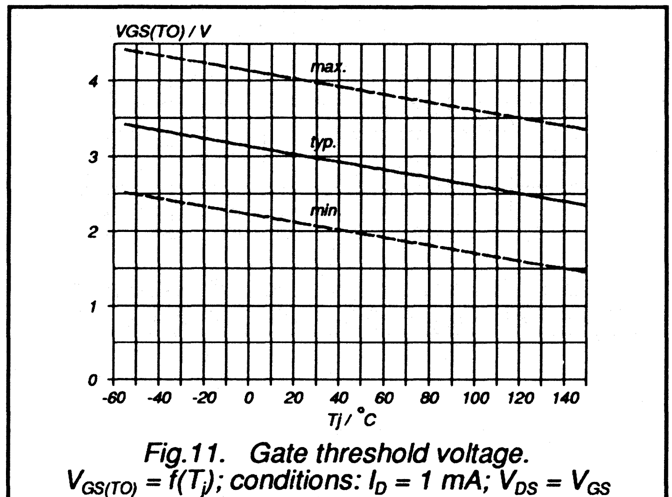


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

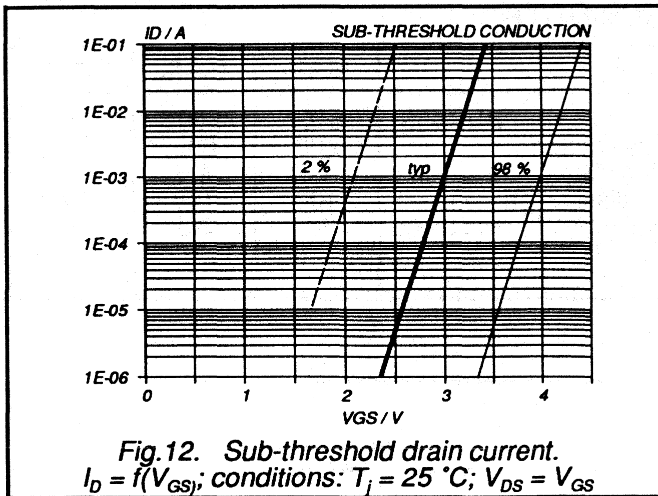


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

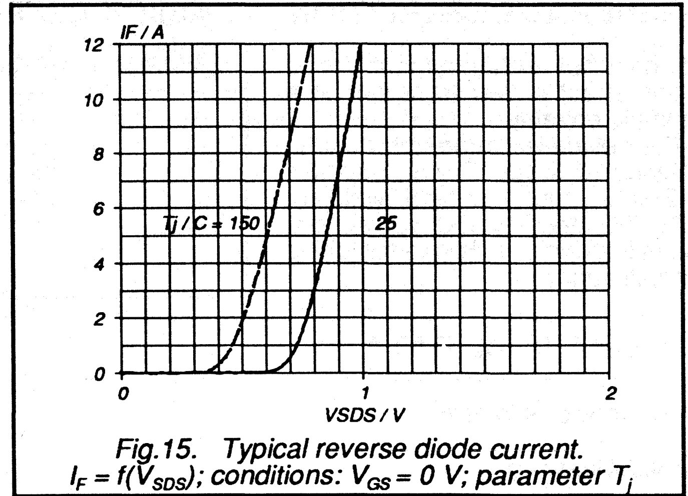


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

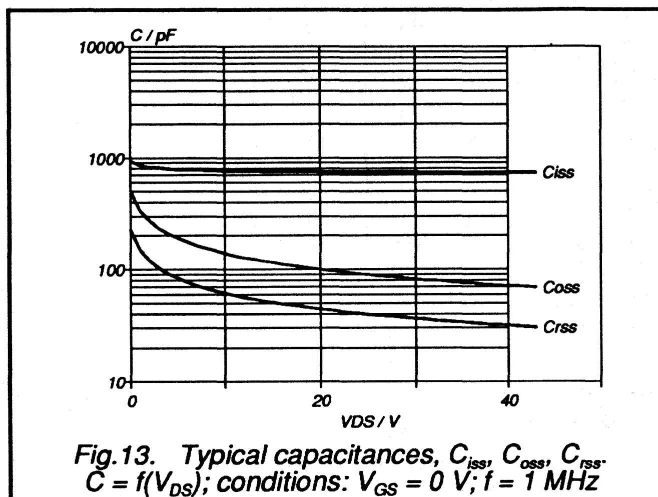


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

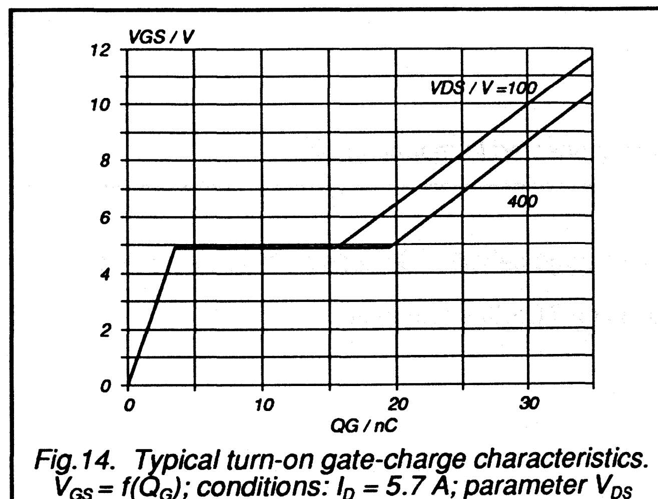


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK455	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	4.5	4.0	A
P_{tot}	Total power dissipation	100	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	2.0	2.5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	4.5	4.0	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.8	2.5	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	18	16	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A BUK455-600A	-	1.7	2.0	Ω
		BUK455-600B	-	2.1	2.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	3.5	4.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	45	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\,off}$	Turn-off delay time		-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.5	A
I_{DRM}	Pulsed reverse drain current	-	-	-	18	A
V_{SD}	Diode forward voltage	I_F = 4.5 A ; V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 4.5 A; $-dI_F/dt$ = 100 A/µs;	-	1200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

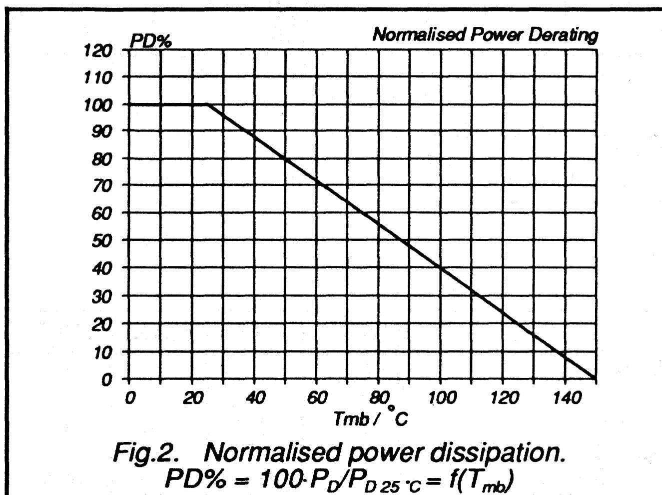


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

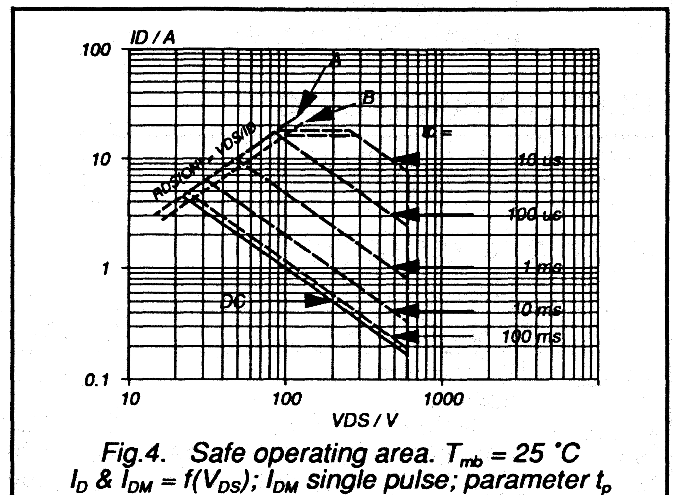


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

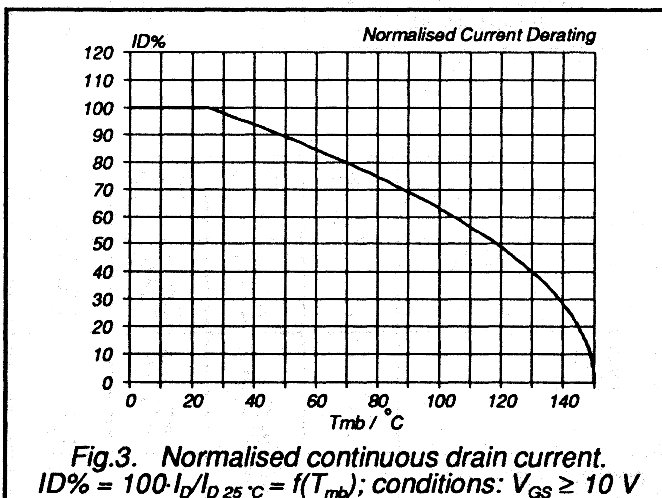


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

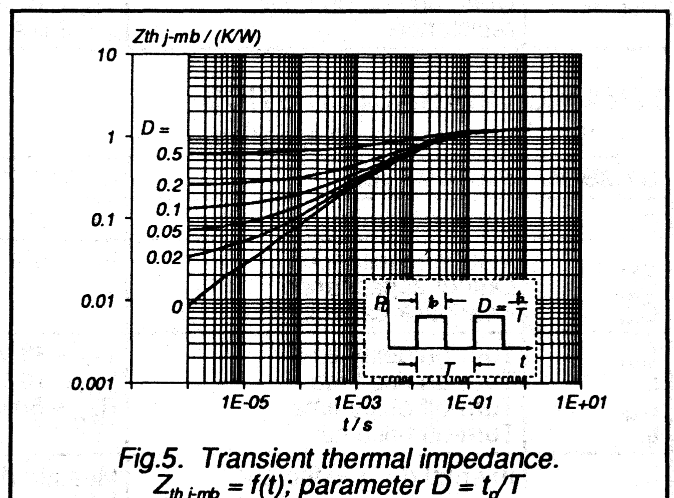


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

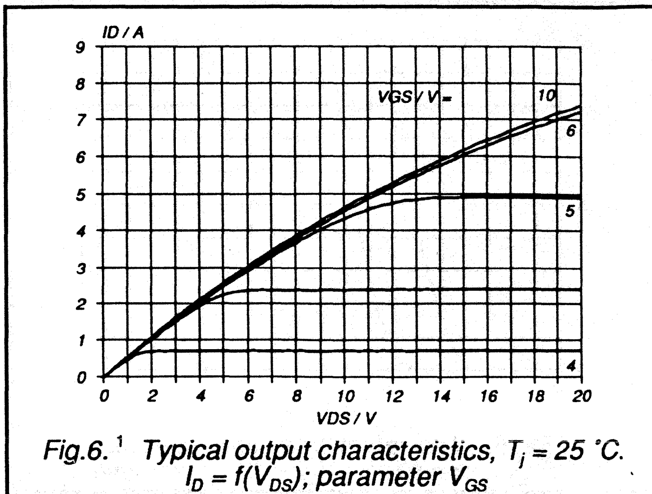


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

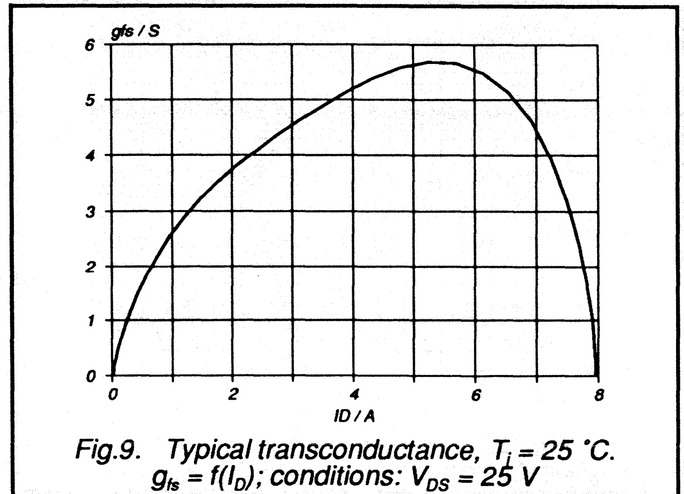


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

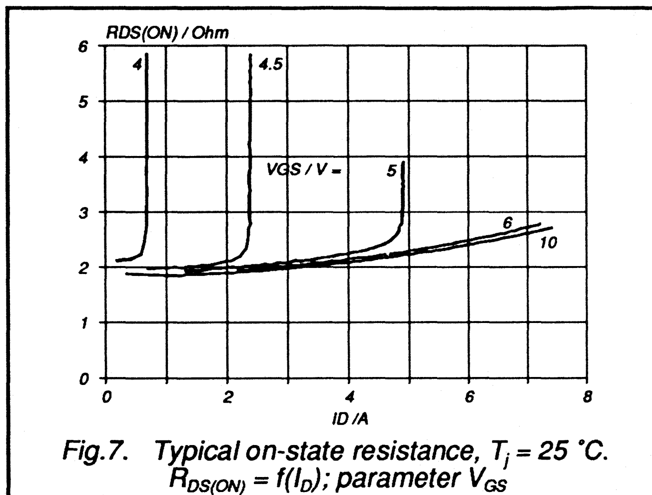


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

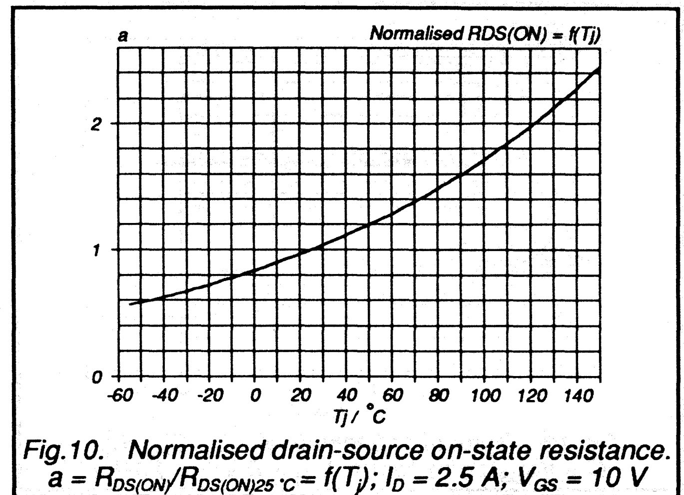


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

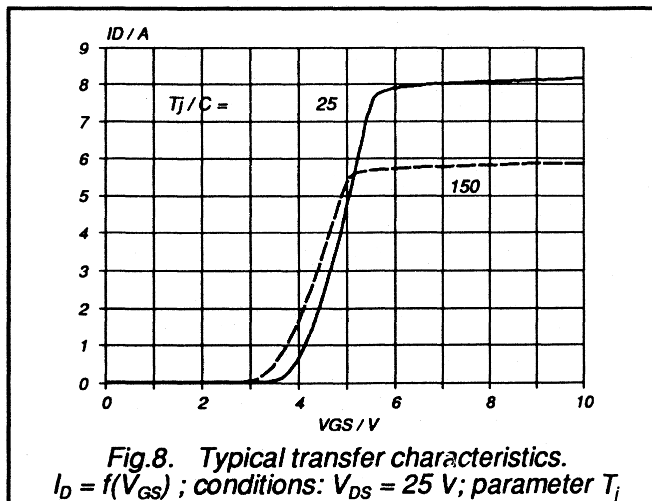


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

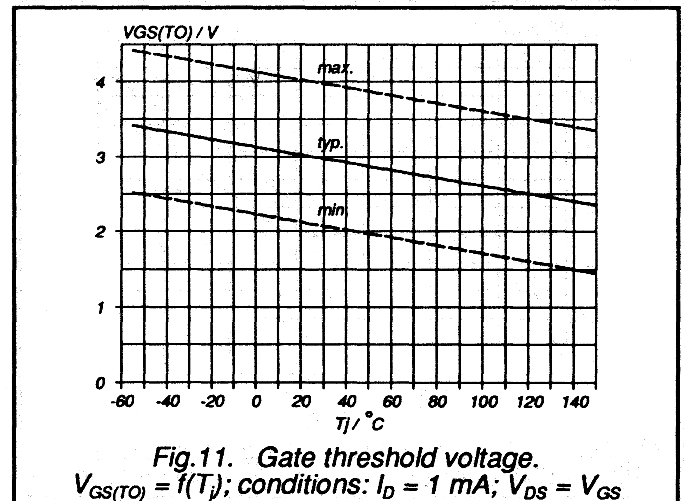


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

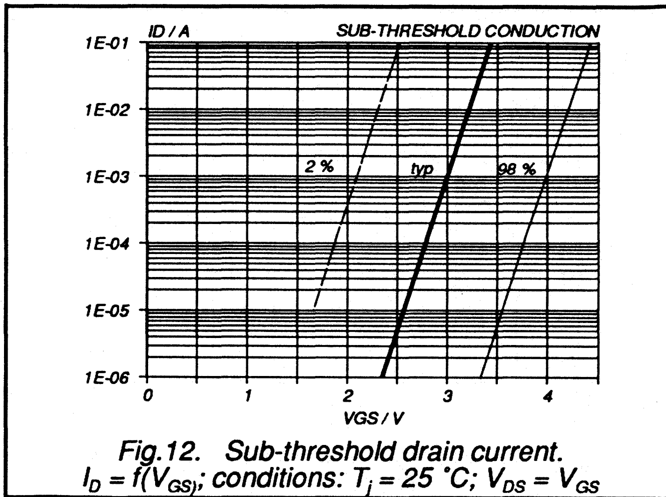


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

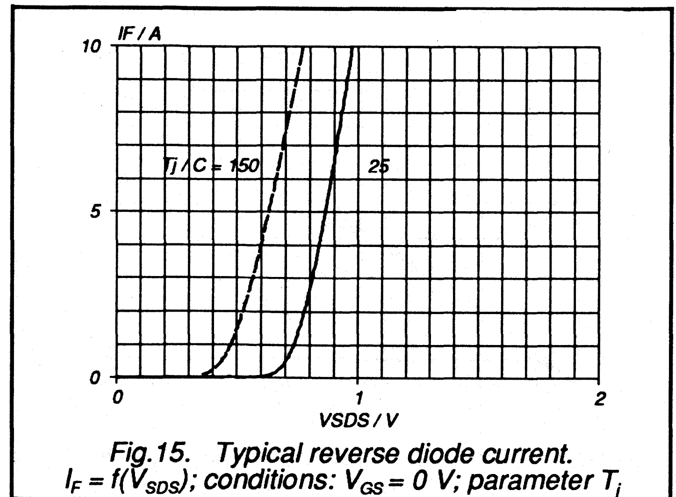


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

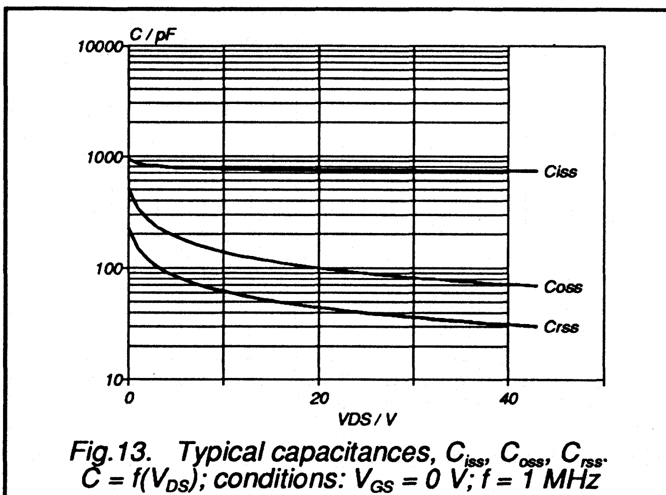


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

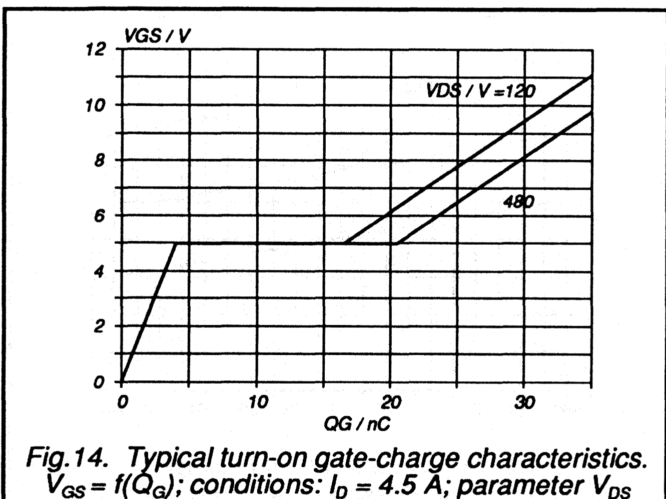


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK456	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	52	51	A
P_{tot}	Total power dissipation	150	150	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.028	0.03	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	52	51	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	36	36	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	208	200	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 29 A **BUK456-50A**	-	0.024	0.028	Ω
		BUK456-50B	-	0.027	0.030	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 29 A	17	22	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	800	1000	pF
C_{rss}	Feedback capacitance		-	270	400	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	70	100	ns
$t_{d\,off}$	Turn-off delay time	R_{GS} = 50 Ω;	-	170	220	ns
t_f	Turn-off fall time	R_{gen} = 50 Ω	-	120	160	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	52	A
I_{DRM}	Pulsed reverse drain current	-	-	-	208	A
V_{SD}	Diode forward voltage	I_F = 52 A ; V_{GS} = 0 V	-	1.8	2.5	V
t_{rr}	Reverse recovery time	I_F = 52 A; -dI_F/dt = 100 A/µs;	-	350	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.1	-	µC

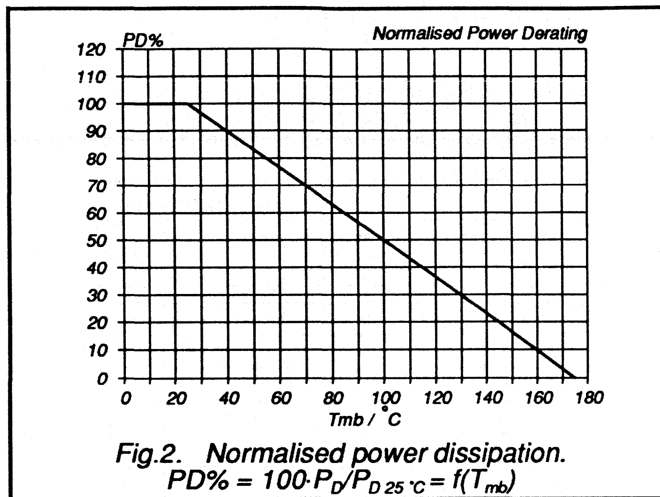


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

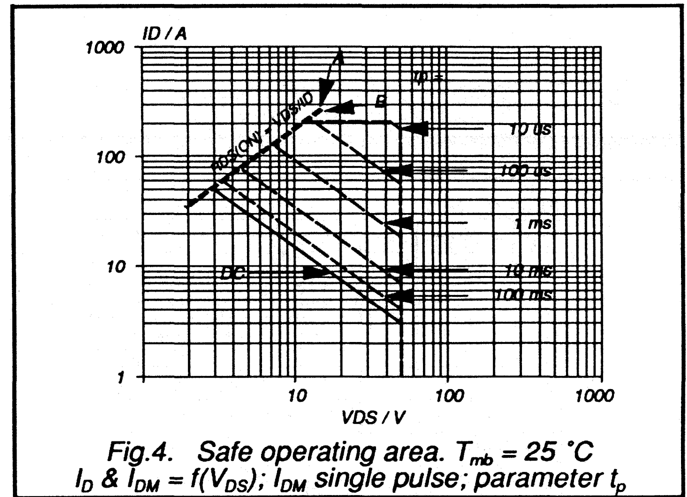


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

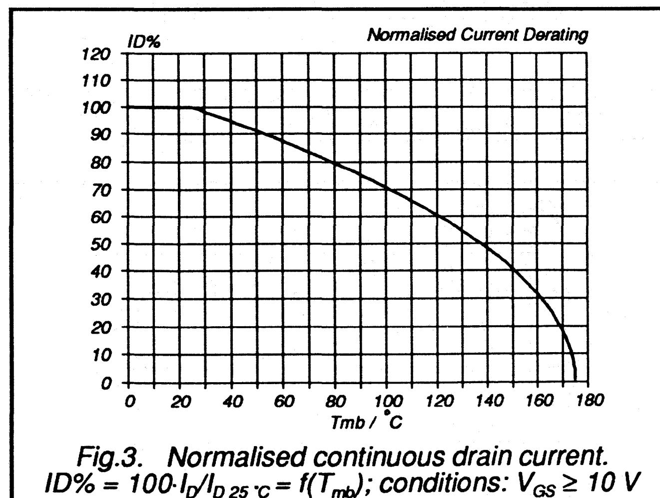


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

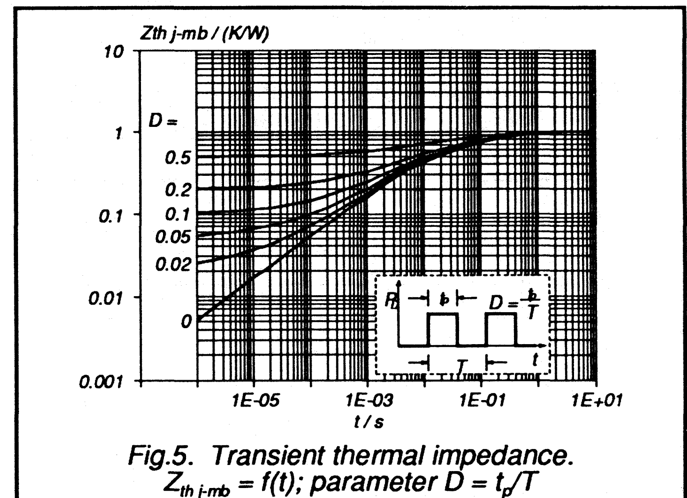


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

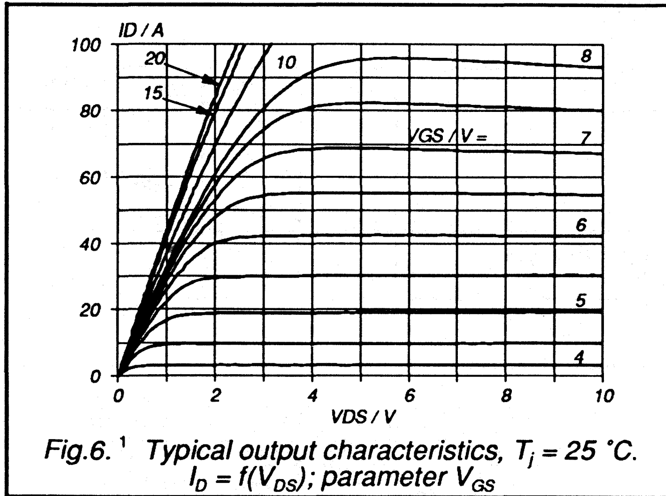


Fig.6. [1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

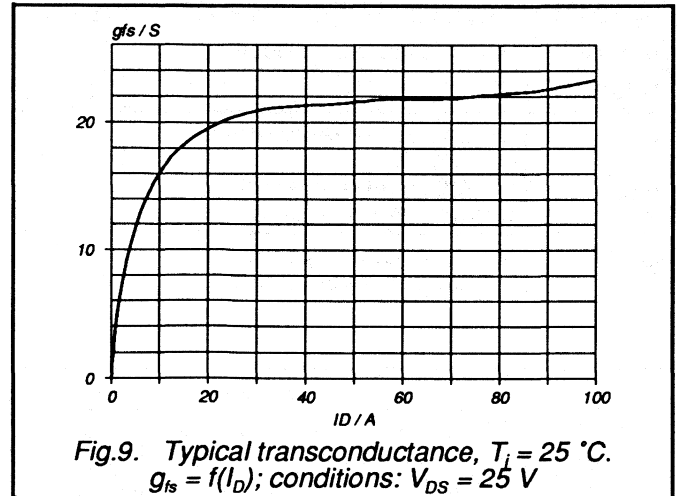


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

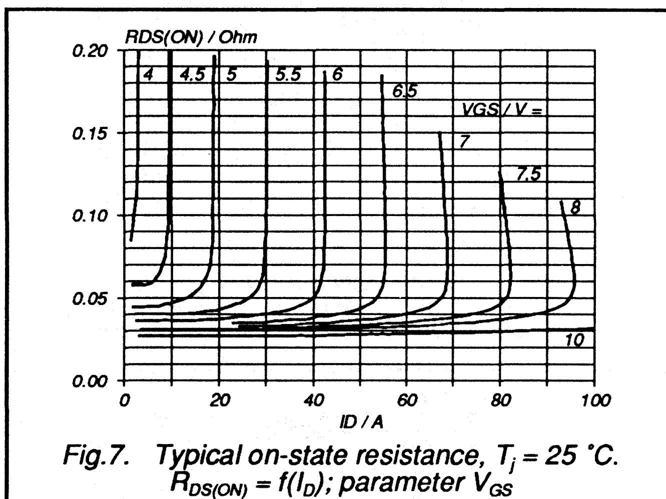


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

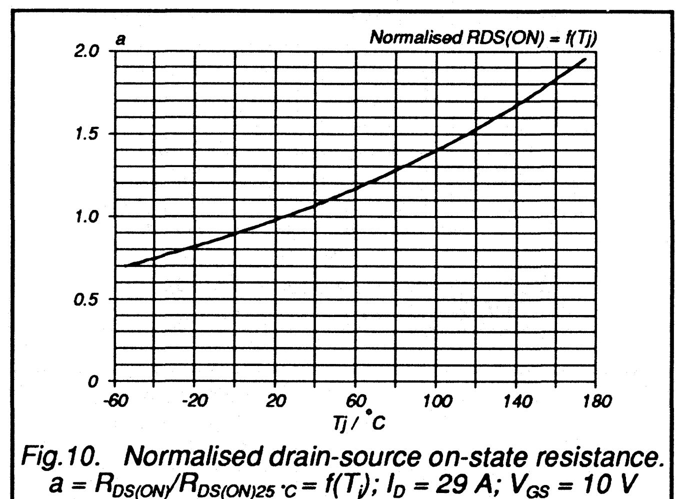


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 29$ A; $V_{GS} = 10$ V

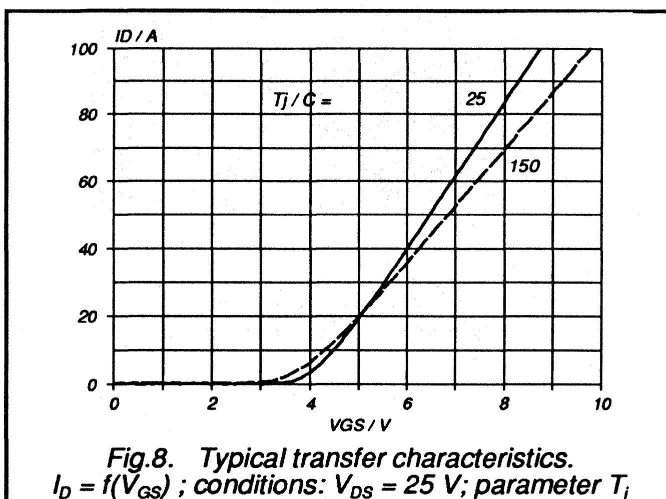


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

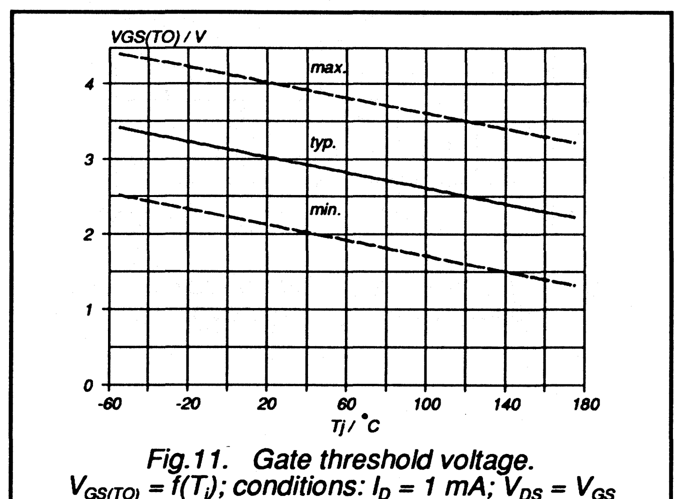


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

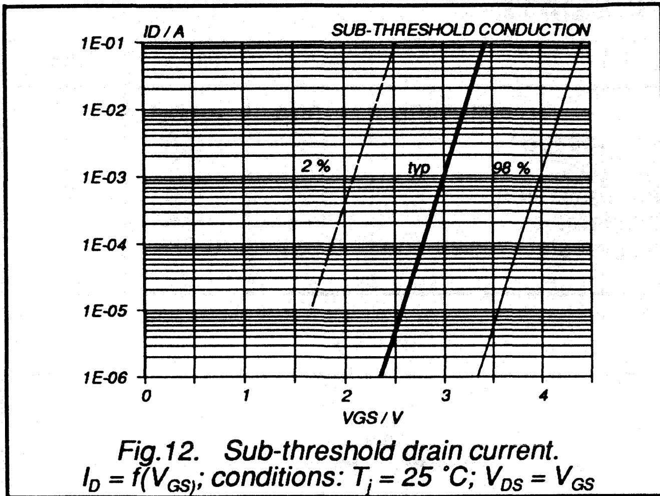


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

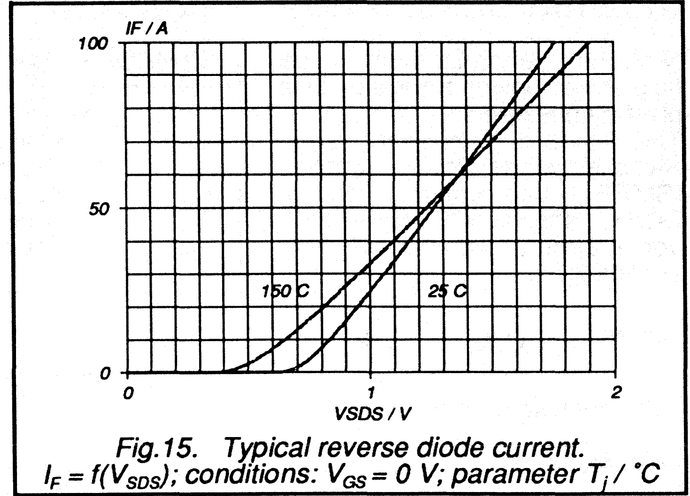


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j / °C

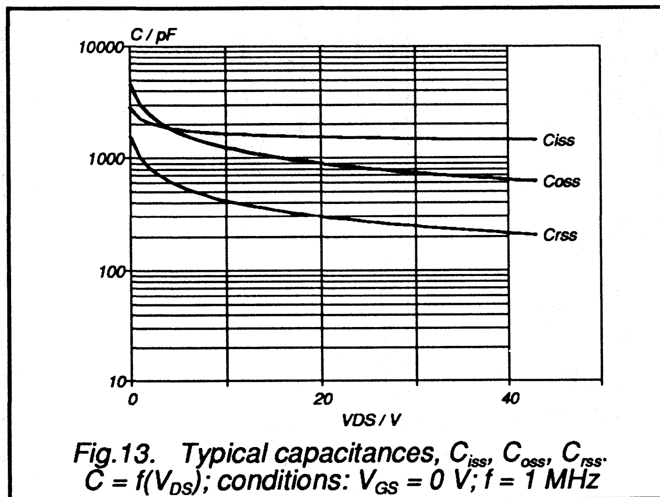


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

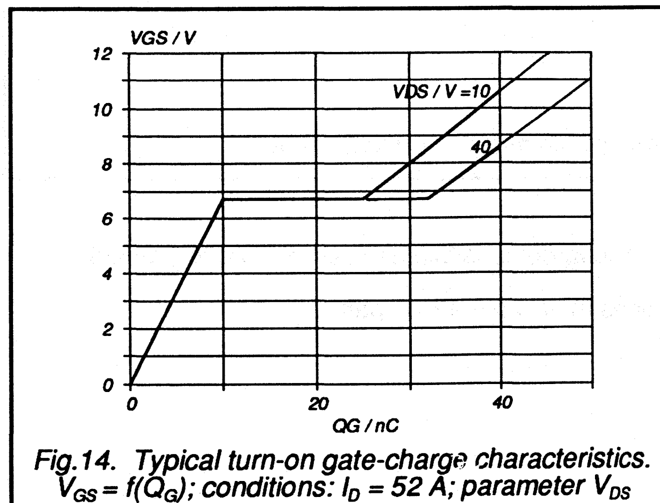


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 52$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK456	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	34	32	A
P_{tot}	Total power dissipation	150	150	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.057	0.065	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	34	32	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	24	22	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	136	128	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	150		W
T_{stg}	Storage temperature	-	- 55	175		˚C
T_j	Junction Temperature	-	-	175		˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 ˚C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 15 A **BUK456-100A**	-	0.052	0.057	Ω
		BUK456-100B	-	0.06	0.065	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 15 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	450	600	pF
C_{rss}	Feedback capacitance		-	130	200	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	150	200	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	65	85	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	34	A
I_{DRM}	Pulsed reverse drain current	-	-	-	136	A
V_{SD}	Diode forward voltage	I_F = 34 A ; V_{GS} = 0 V	-	1.8	2.5	V
t_{rr}	Reverse recovery time	I_F = 34 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	2.9	-	µC

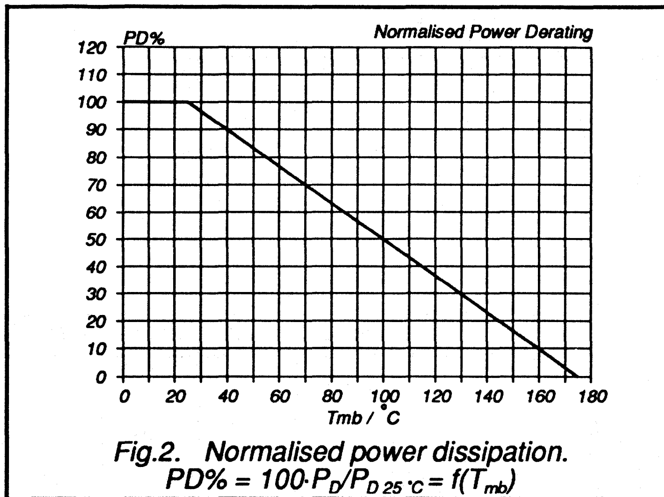


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

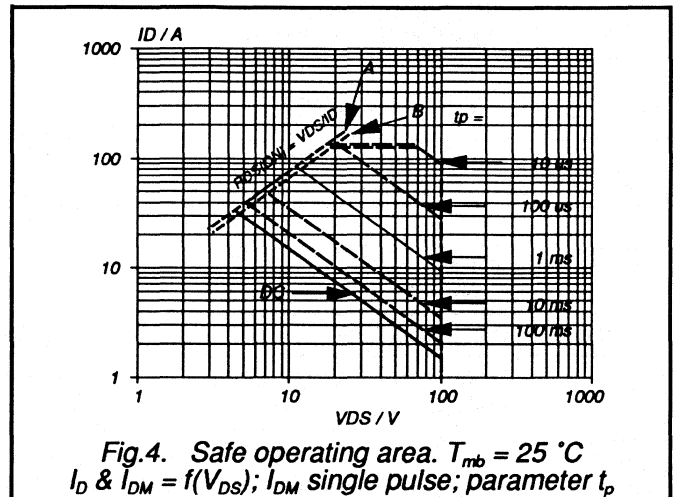


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

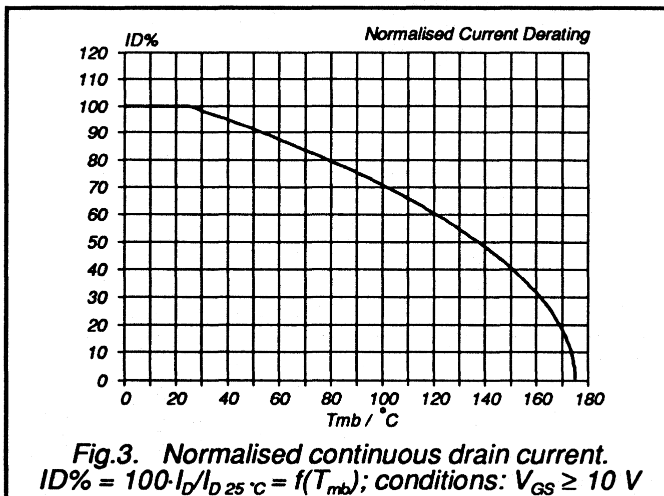


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

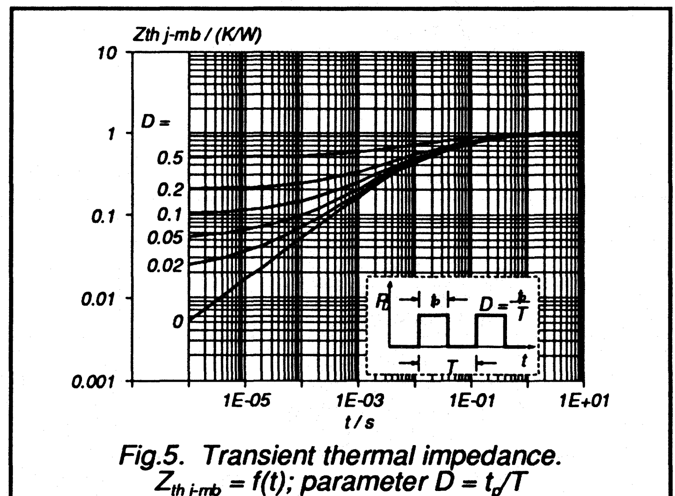


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

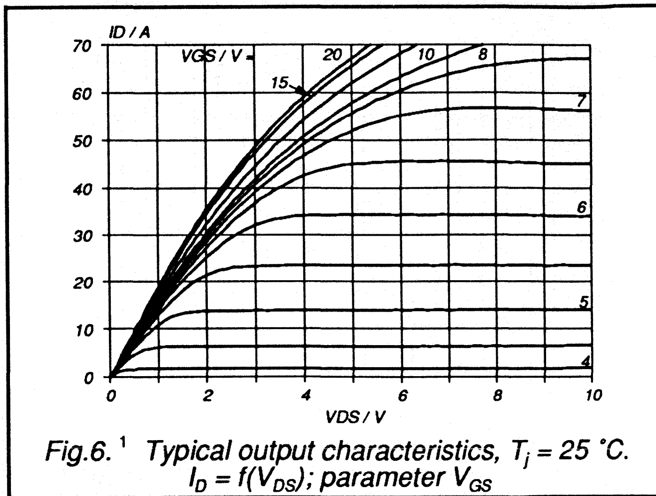


Fig.6. [1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

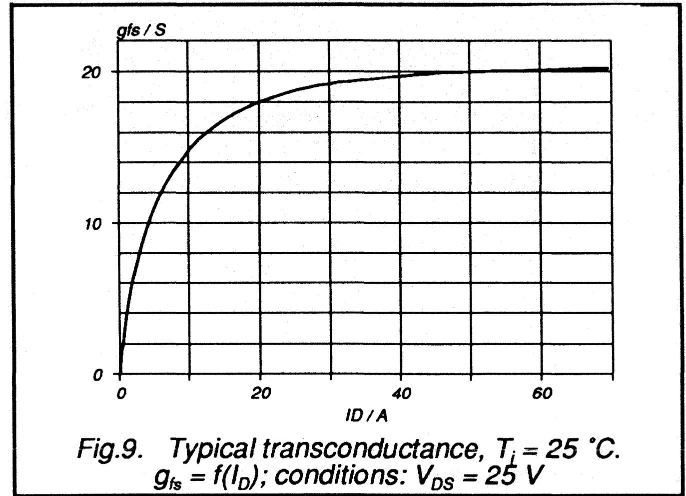


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

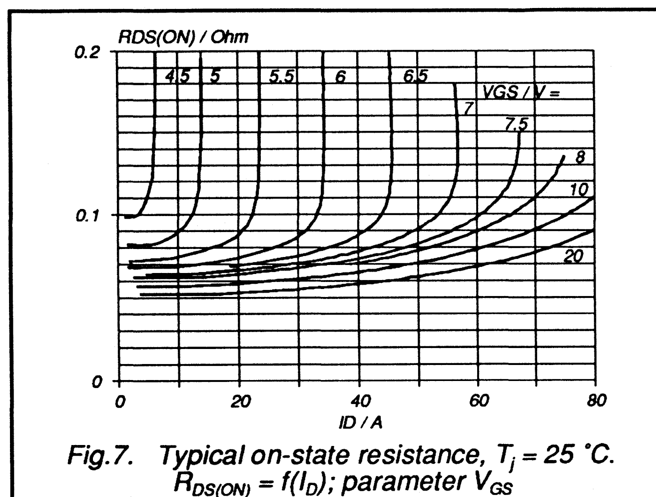


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

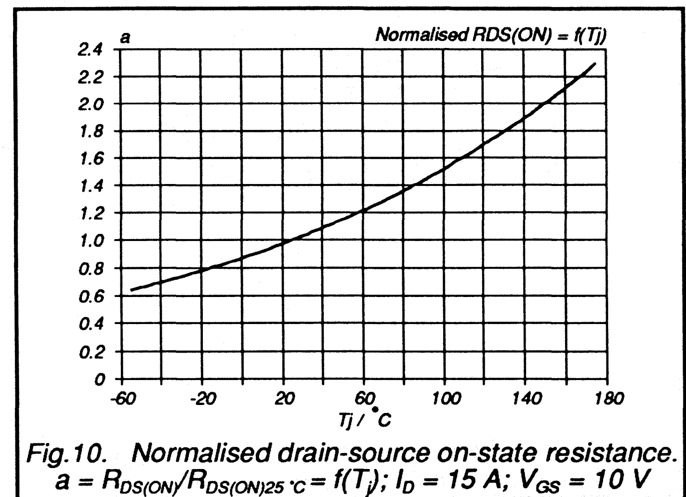


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 15 A; V_{GS} = 10 V

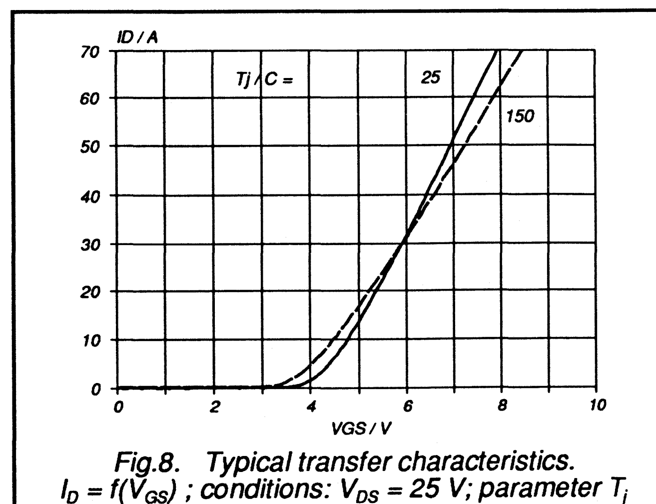


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

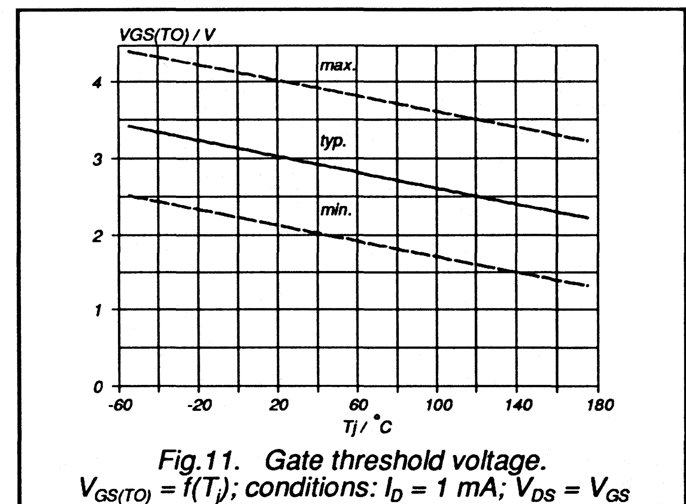


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

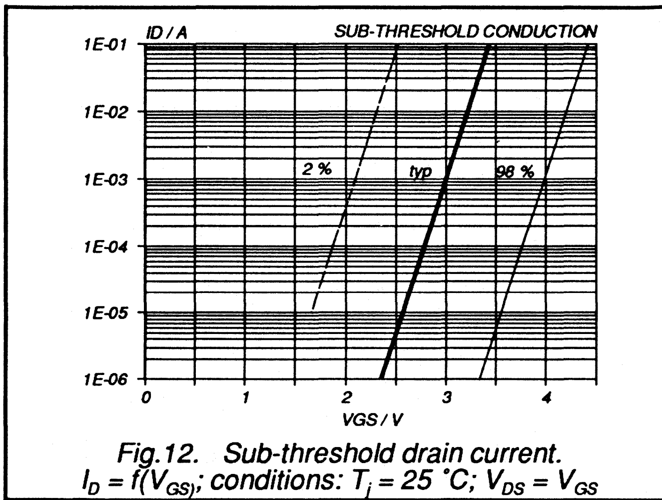


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

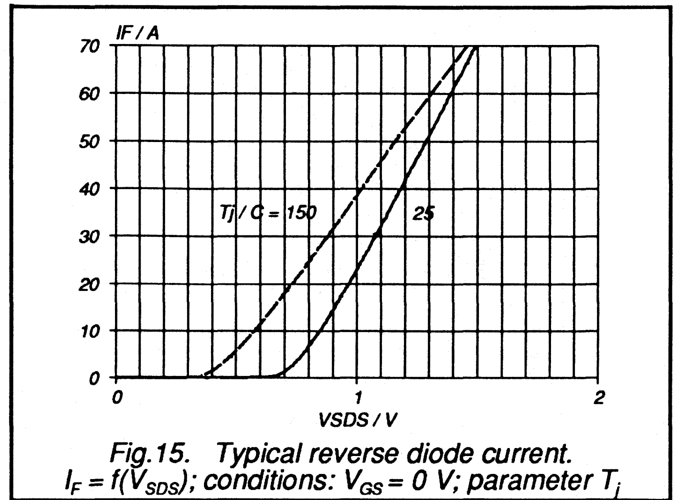


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

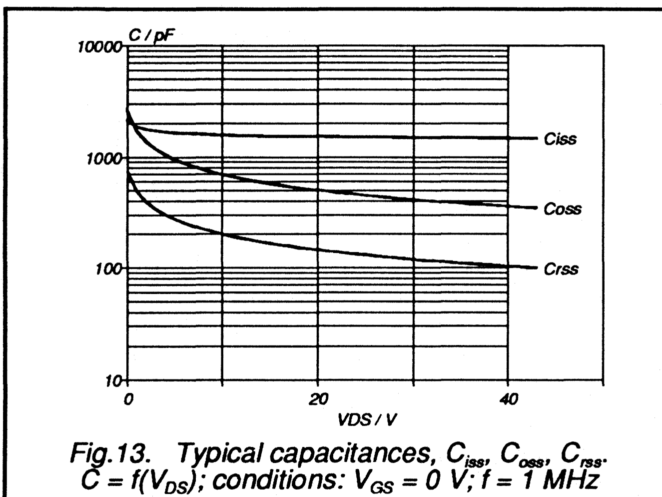


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

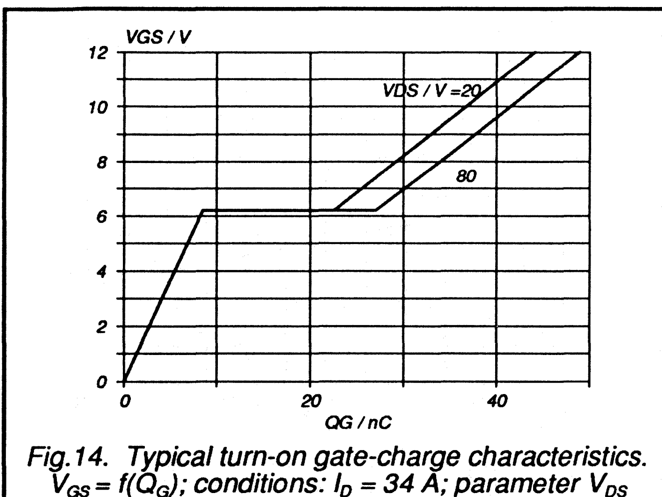


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 34$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK456	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	19	17	A
P_{tot}	Total power dissipation	150	150	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance	0.16	0.2	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	19	17	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	13	12	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	76	68	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb}$ = 1.0 K/W
From junction to ambient	$R_{th\ j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 10 A BUK456-200A	-	0.15	0.16	Ω
		BUK456-200B	-	0.18	0.20	Ω

DYNAMIC CHARACTERISTICS

Tmb = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	12	16	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	2000	pF
C_{oss}	Output capacitance		-	300	400	pF
C_{rss}	Feedback capacitance		-	60	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 10 V;	-	40	60	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω;	-	145	185	ns
t_f	Turn-off fall time	R_{GS} = 50 Ω	-	50	70	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

Tmb = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	19	A
I_{DRM}	Pulsed reverse drain current	-	-	-	76	A
V_{SD}	Diode forward voltage	I_F = 19 A ; V_{GS} = 0 V	-	1.0	1.7	V
t_{rr}	Reverse recovery time	I_F = 19 A; -dI_F/dt = 100 A/µs;	-	650	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	4.1	-	µC

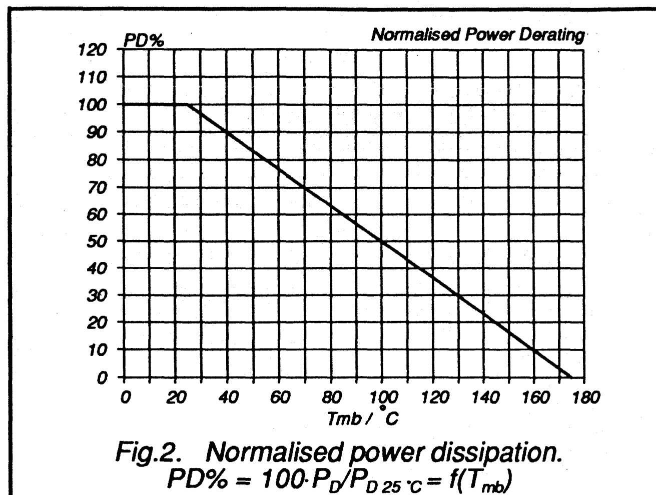


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

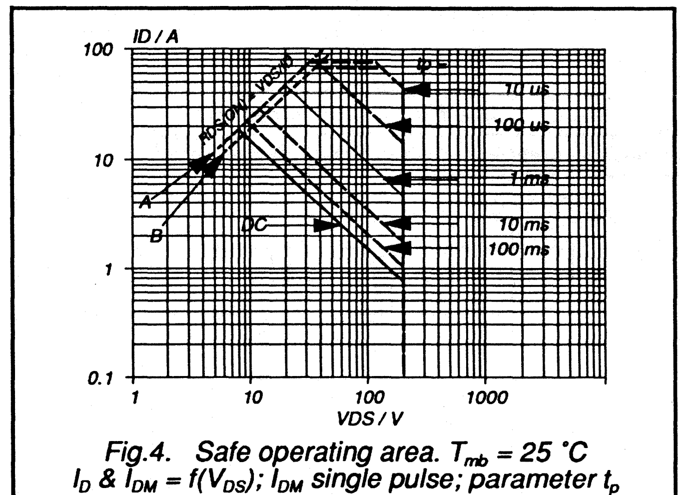


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

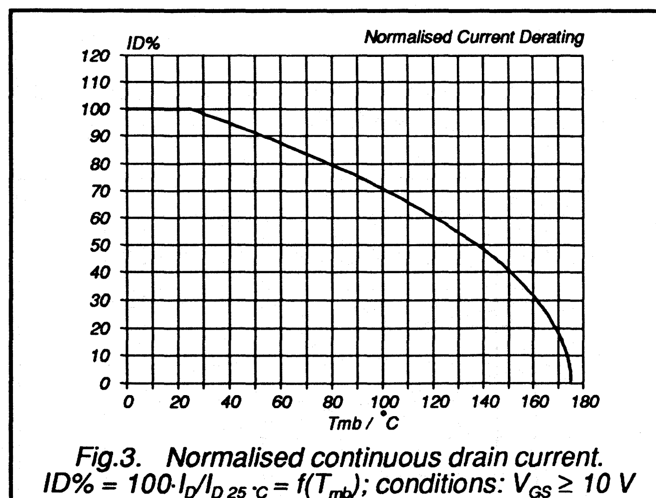


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

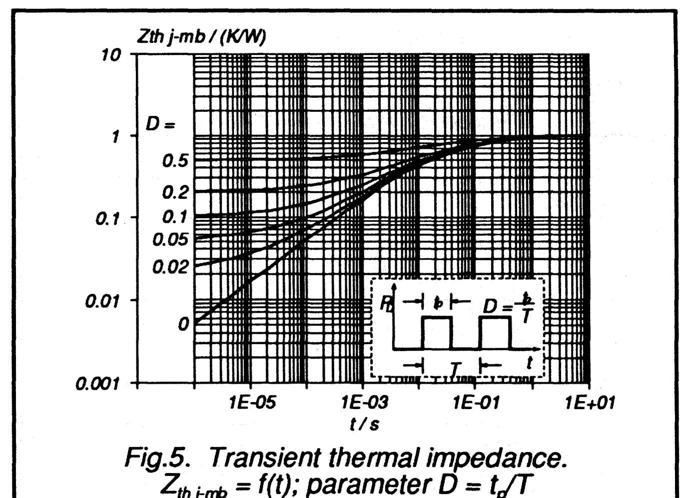


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

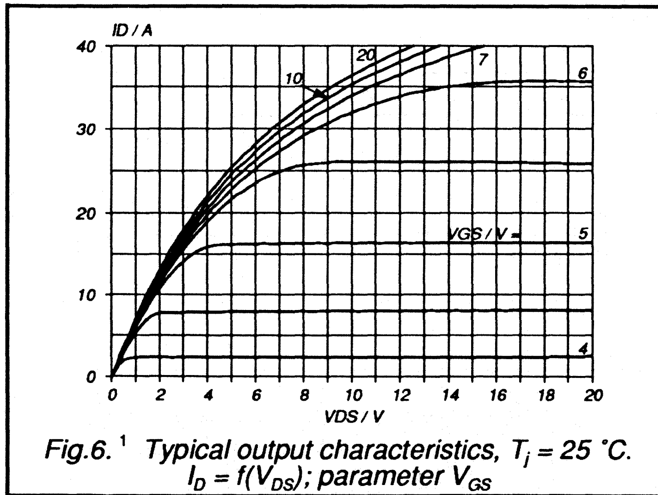


Fig.6. [1] *Typical output characteristics, T_j = 25 ˚C.*
$I_D = f(V_{DS})$; parameter V_{GS}

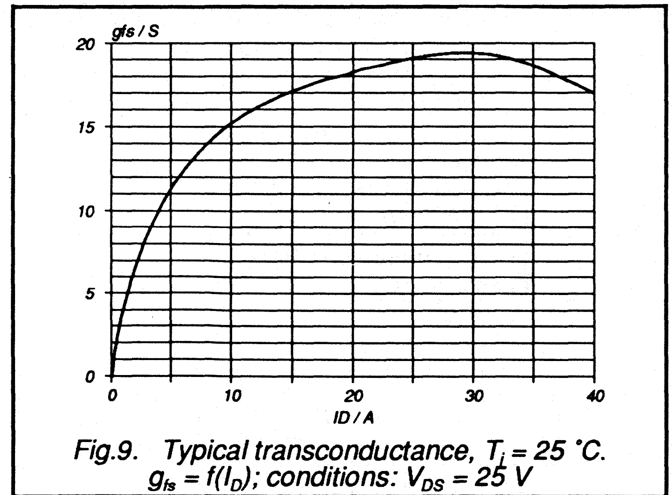


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

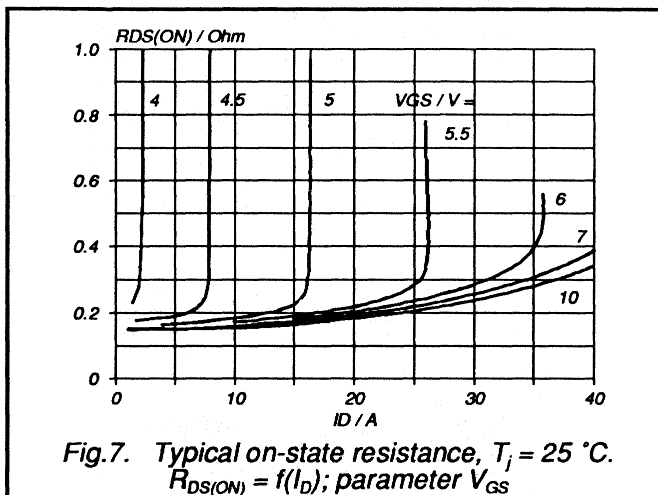


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

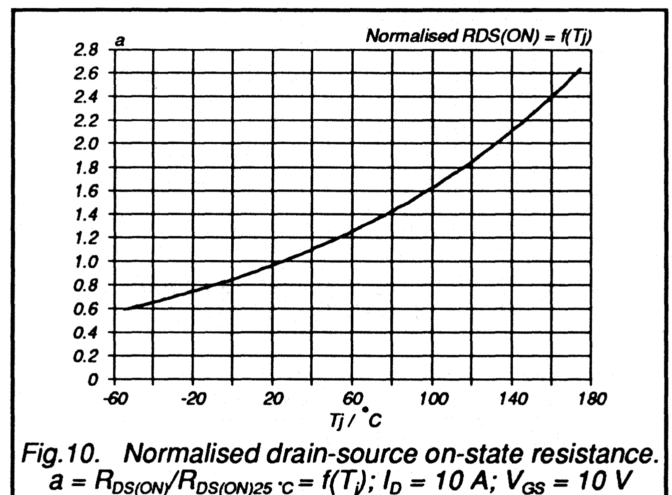


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 10 A; V_{GS} = 10 V

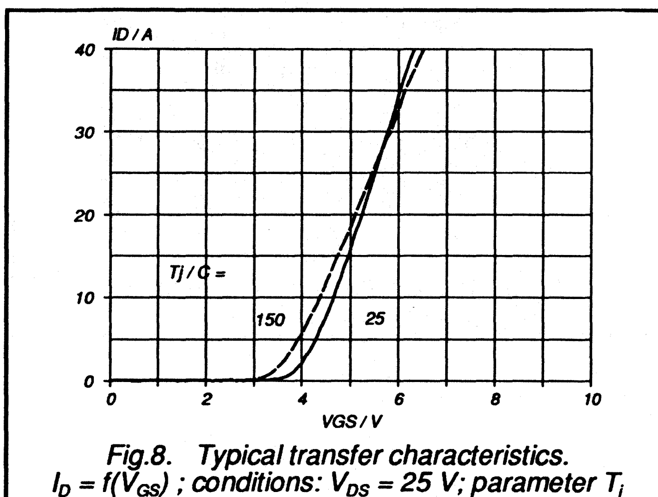


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

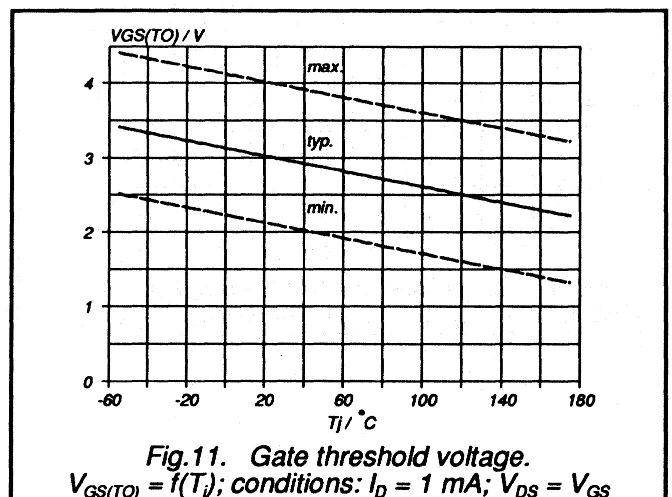


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

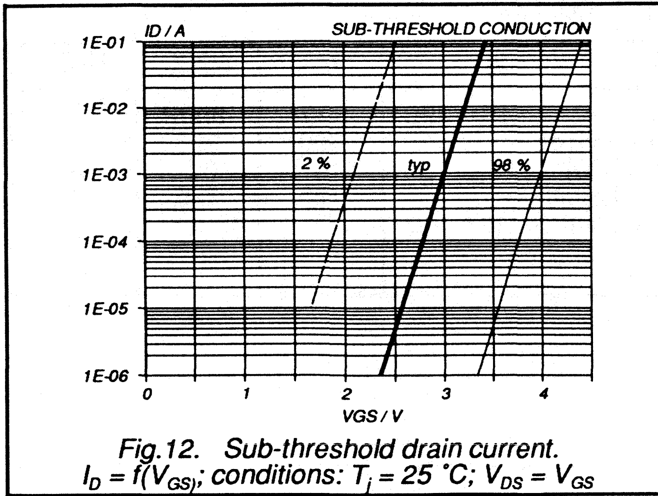


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

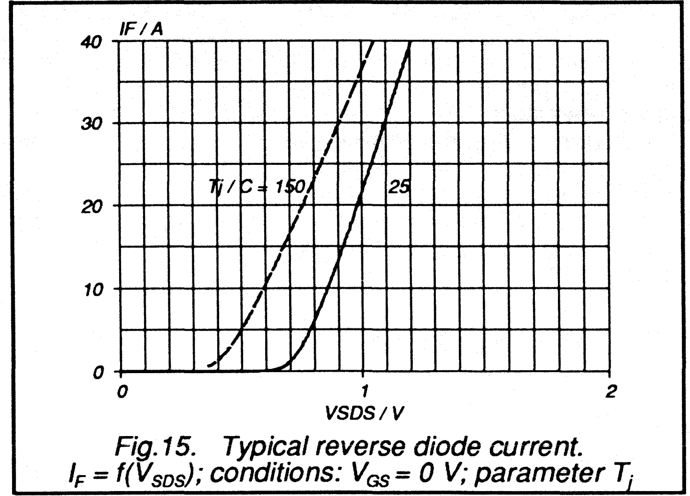


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

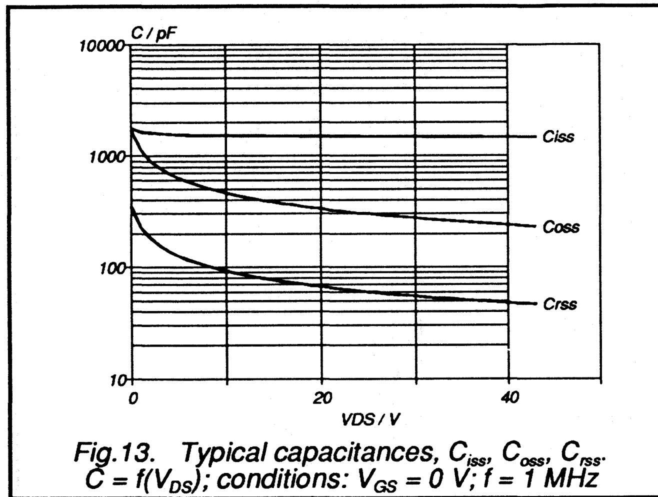


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

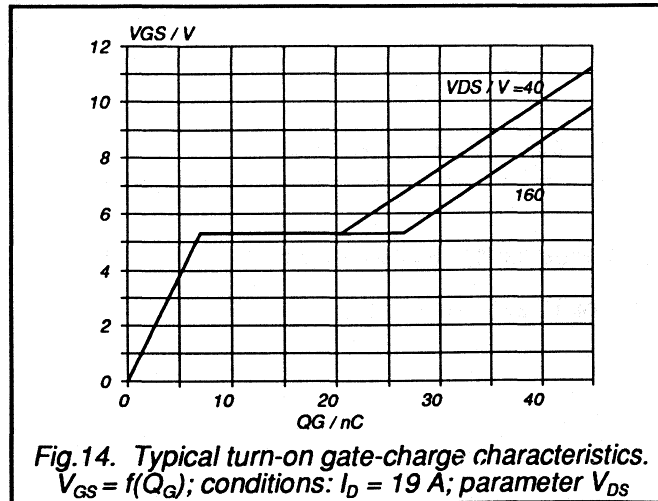


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 19$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK456	-800A	-800B	
V_{DS}	Drain-source voltage	800	800	V
I_D	Drain current (DC)	4	3.5	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	3	4	Ω

MECHANICAL DATA

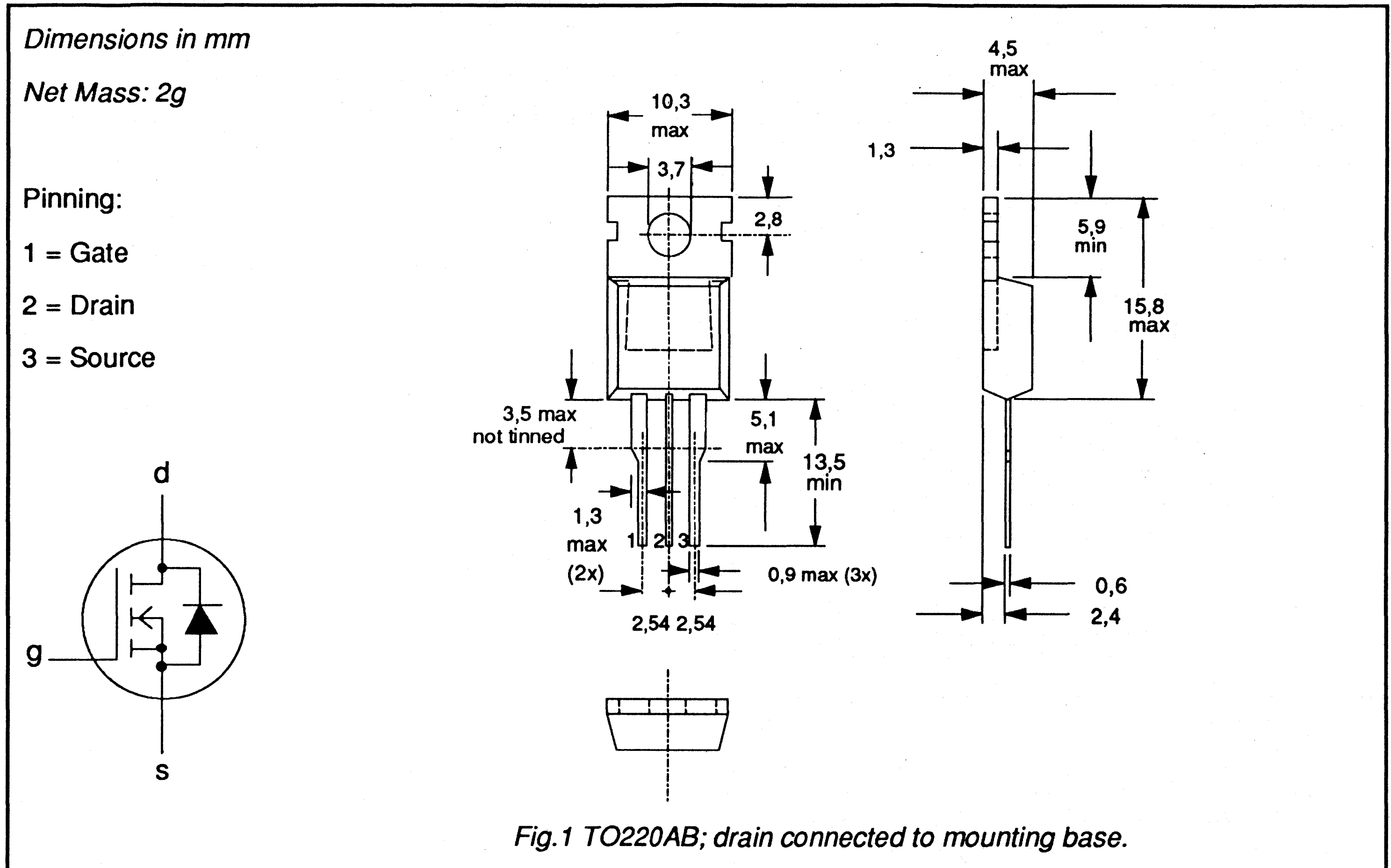


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	800		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	800		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-800A	-800B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	4.0	3.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.5	2.2	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	16	14	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	800	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 800 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state	V_{GS} = 10 V; **BUK456-800A**	-	2.7	3.0	Ω
	resistance	I_D = 1.5 A **BUK456-800B**	-	3.5	4.0	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A;	-	10	25	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	25	40	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	4.0	A
I_{DRM}	Pulsed reverse drain current	-	-	-	16	A
V_{SD}	Diode forward voltage	I_F = 4.0 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 4.0 A; $-dI_F/dt$ = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

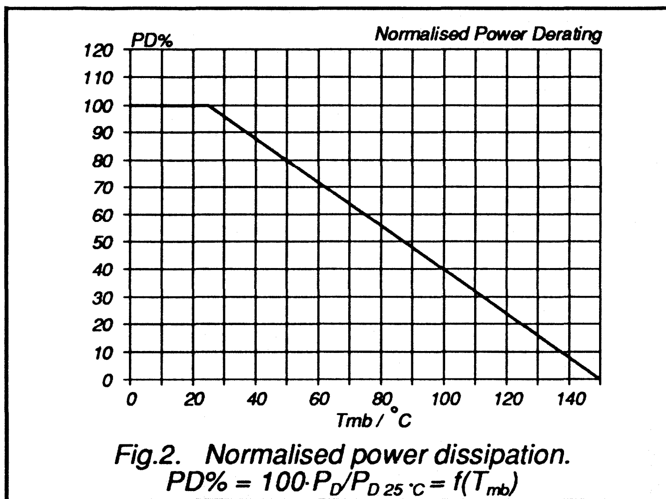


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

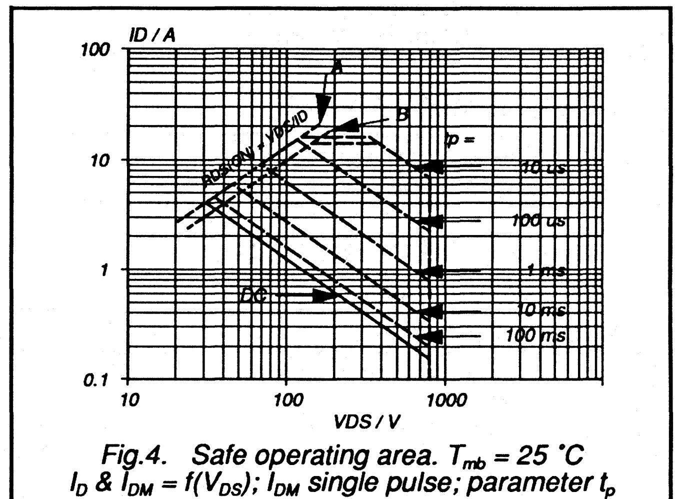


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

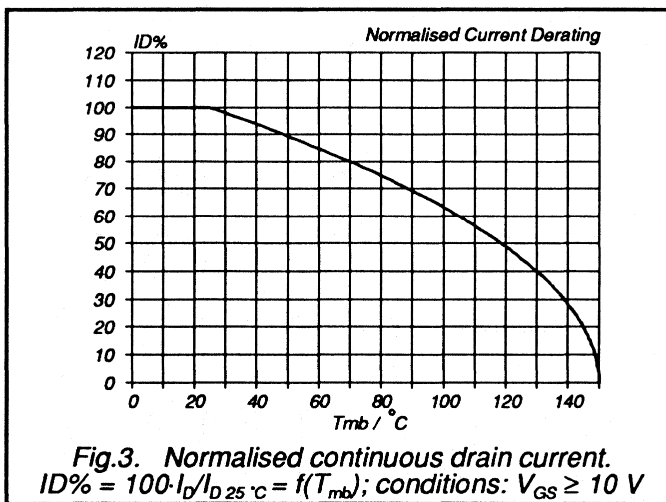


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

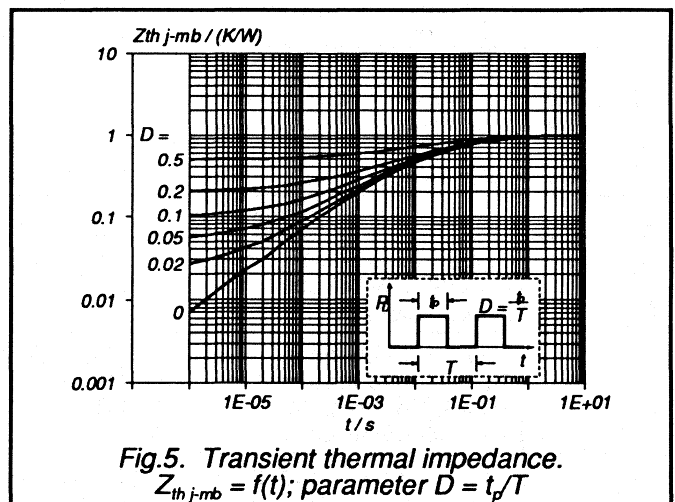


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

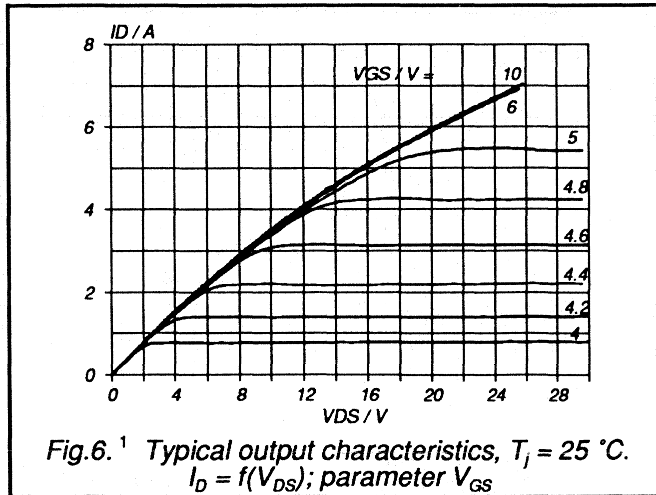


Fig.6. [1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

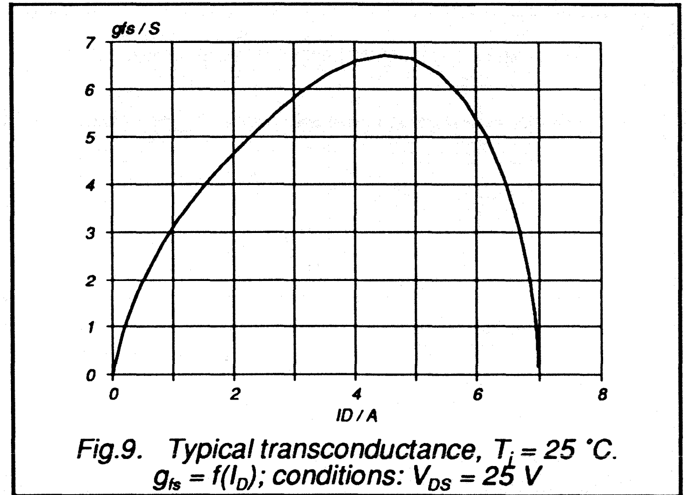


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

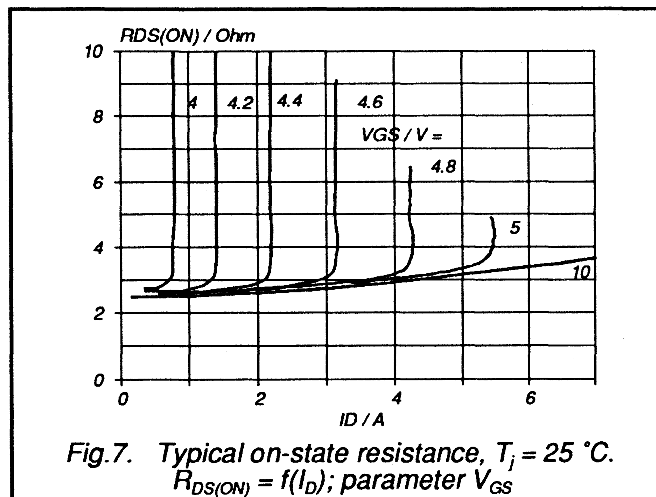


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

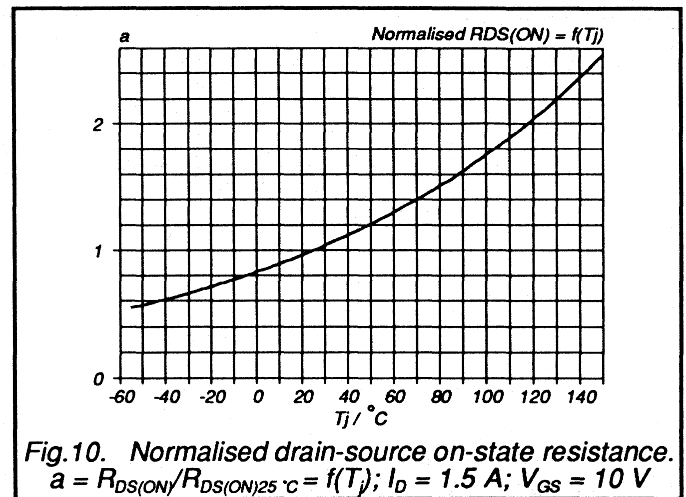


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 1.5$ A; $V_{GS} = 10$ V

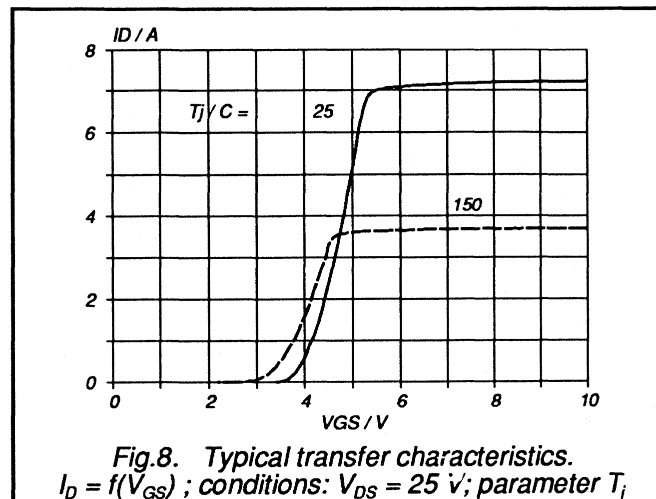


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

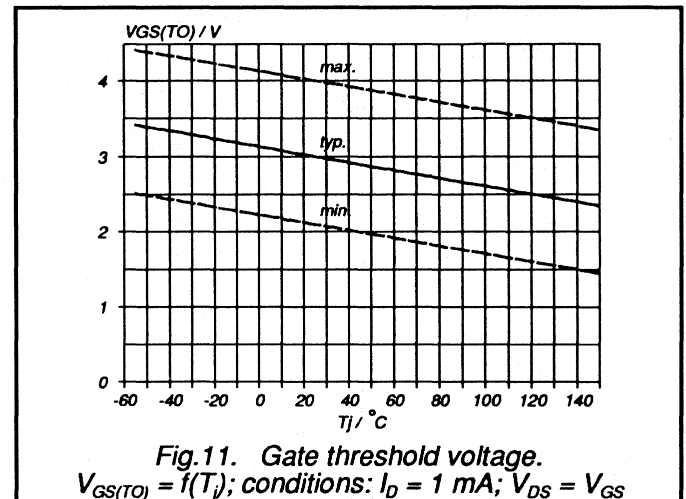


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

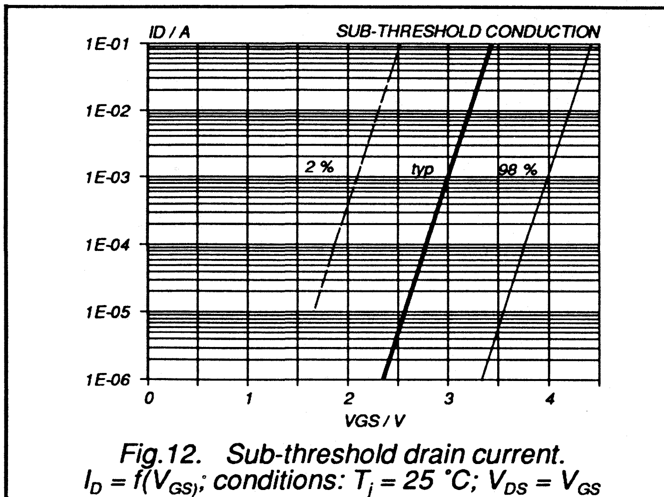


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

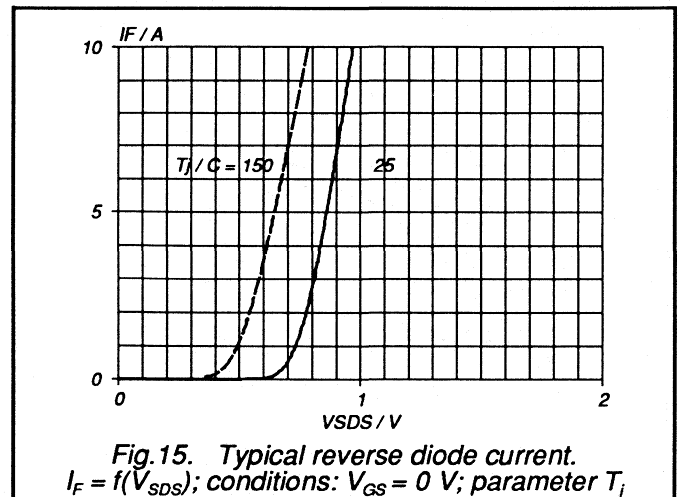


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

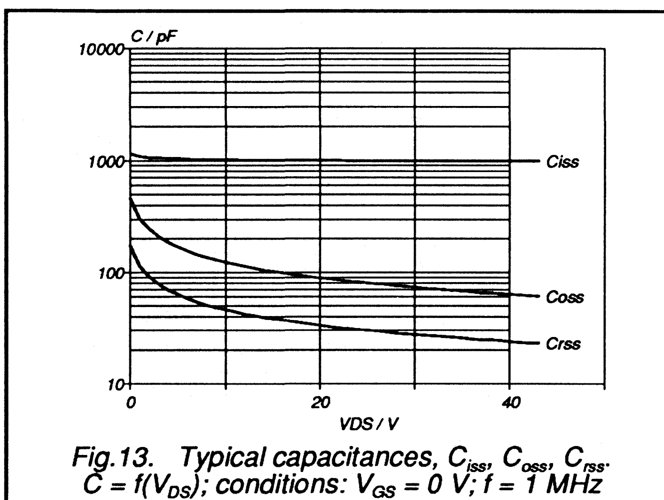


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

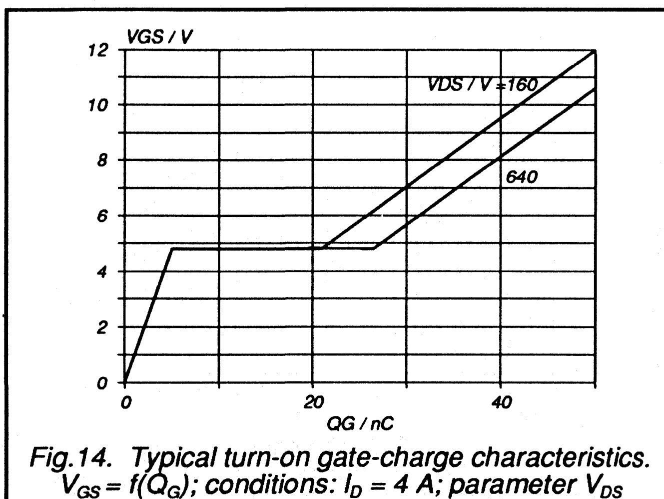


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 4$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK456	-1000A	-1000B	
V_{DS}	Drain-source voltage	1000	1000	V
I_D	Drain current (DC)	3.5	3.1	A
P_{tot}	Total power dissipation	125	125	W
$R_{DS(ON)}$	Drain-source on-state resistance	4	5	Ω

MECHANICAL DATA

Dimensions in mm

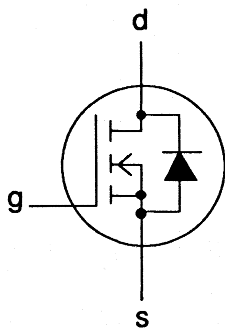
Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source



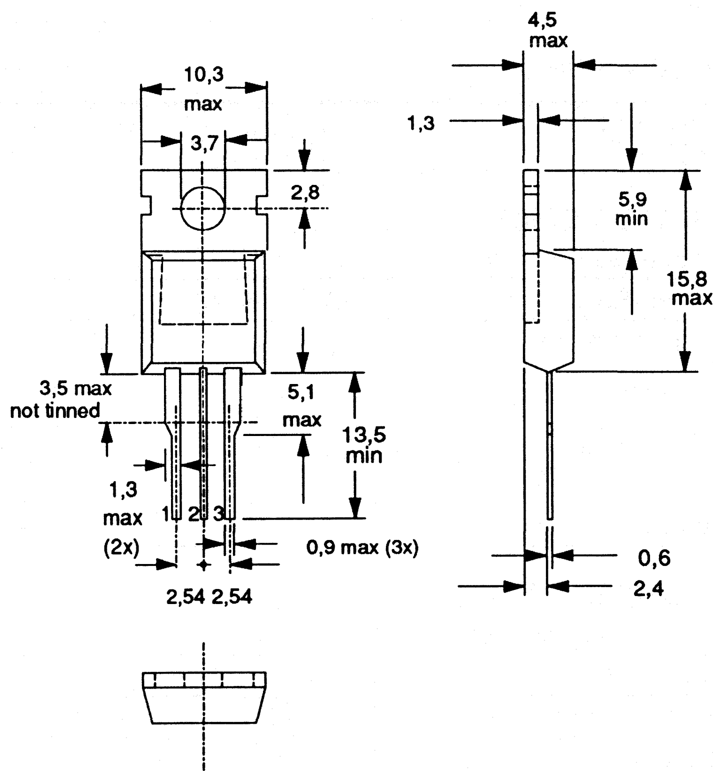


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	1000		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	1000		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-1000A	-1000B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	3.5	3.1	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	2.2	2.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	14	12	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.0 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	1000	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 1000 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 1.5 A **BUK456-1000A**	-	3.5	4.0	Ω
		BUK456-1000B	-	4.5	5.0	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 1.5 A	3.0	4.3	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1000	1250	pF
C_{oss}	Output capacitance		-	80	120	pF
C_{rss}	Feedback capacitance		-	30	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.3 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	25	ns
t_r	Turn-on rise time		-	25	40	ns
$t_{d\,off}$	Turn-off delay time		-	130	150	ns
t_f	Turn-off fall time		-	40	60	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	3.5	A
I_{DRM}	Pulsed reverse drain current	-	-	-	14	A
V_{SD}	Diode forward voltage	I_F = 3.5 A ; V_{GS} = 0 V	-	1.0	1.3	V
t_{rr}	Reverse recovery time	I_F = 3.5 A; -dI_F/dt = 100 A/µs;	-	1800	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	12	-	µC

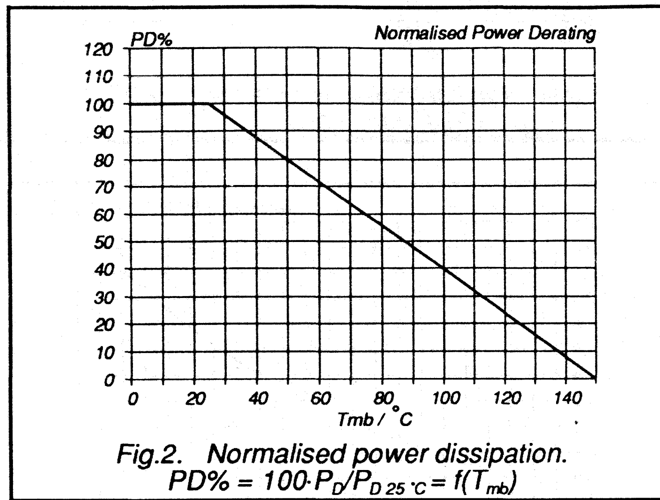


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

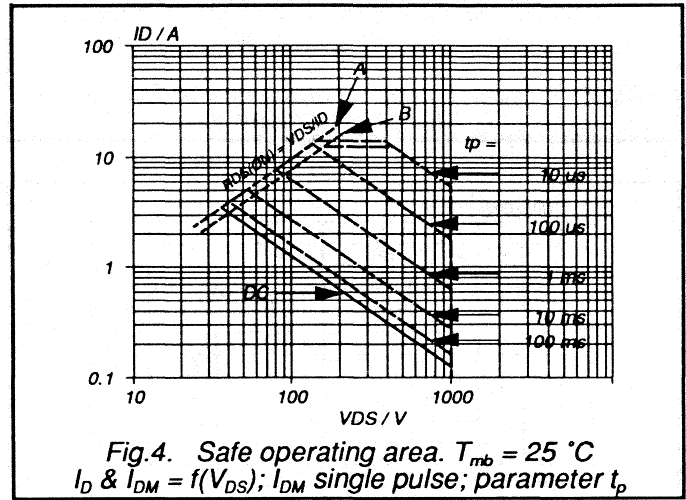


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

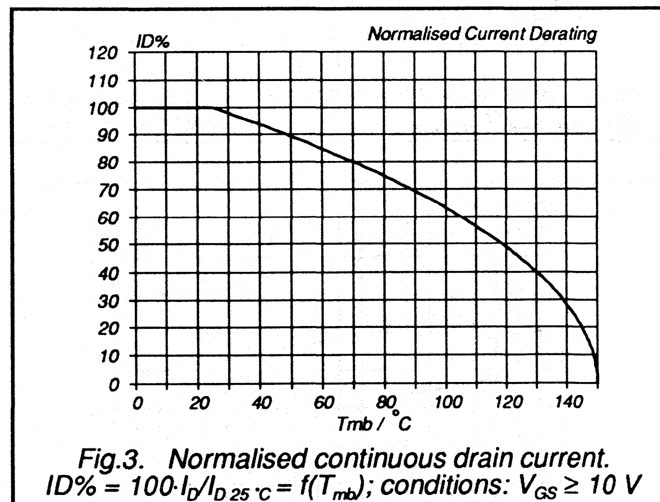


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

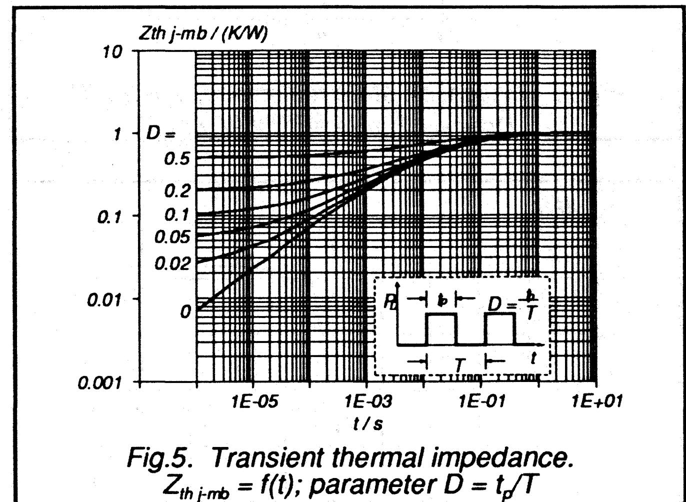


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

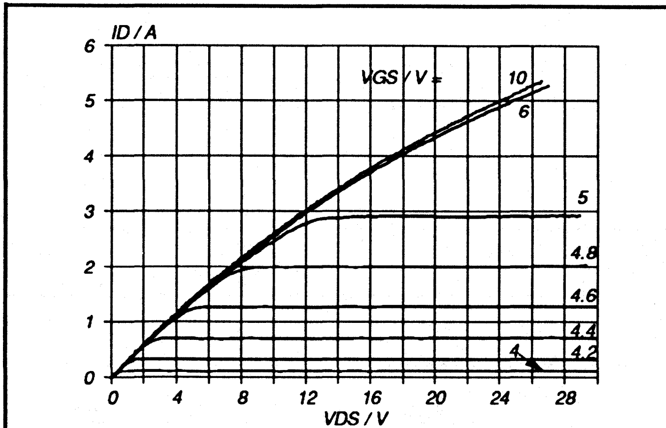


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

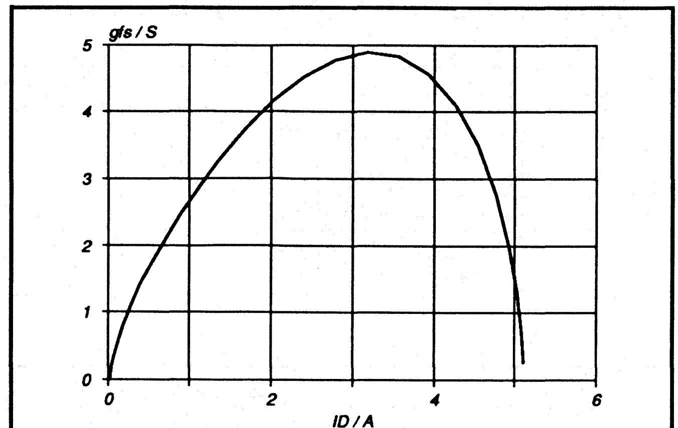


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

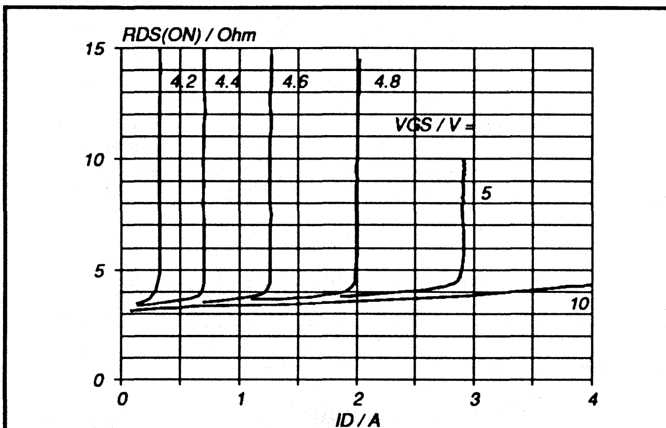


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

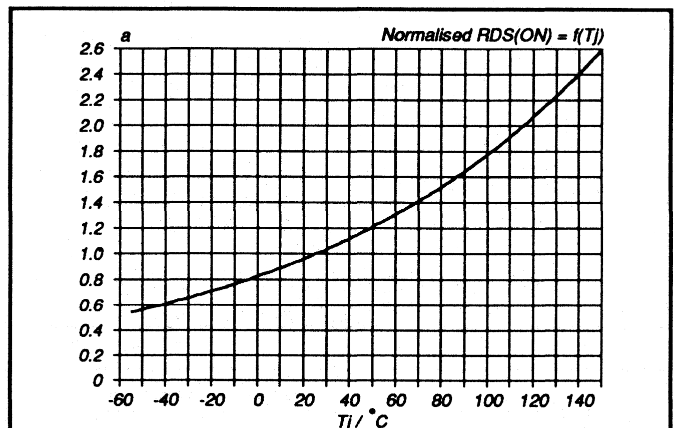


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 1.5 A; V_{GS} = 10 V

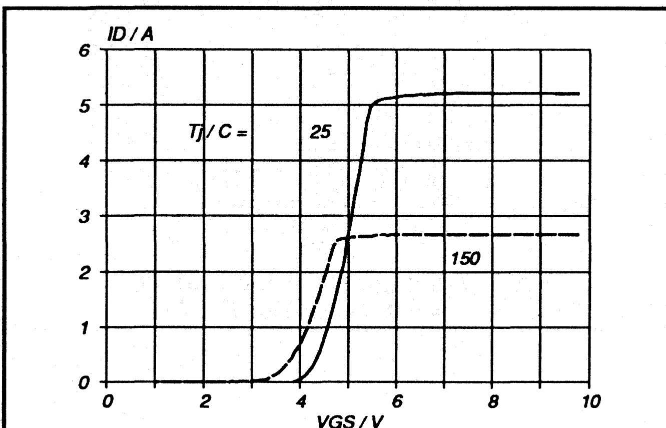


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

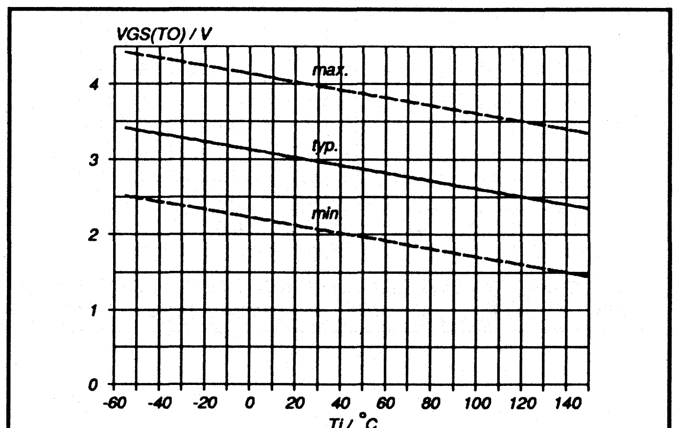


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

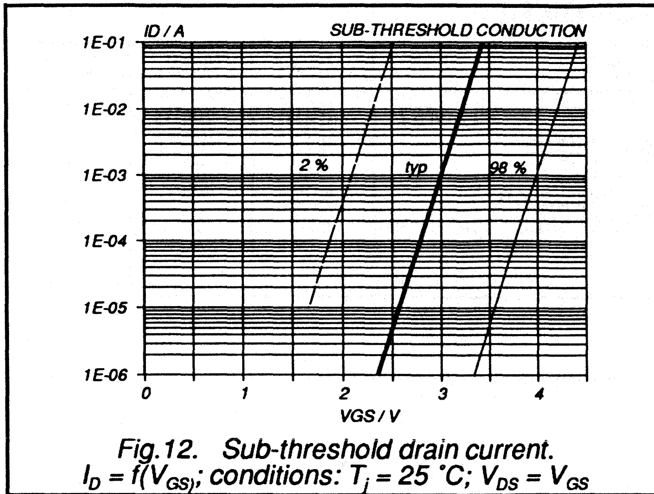


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

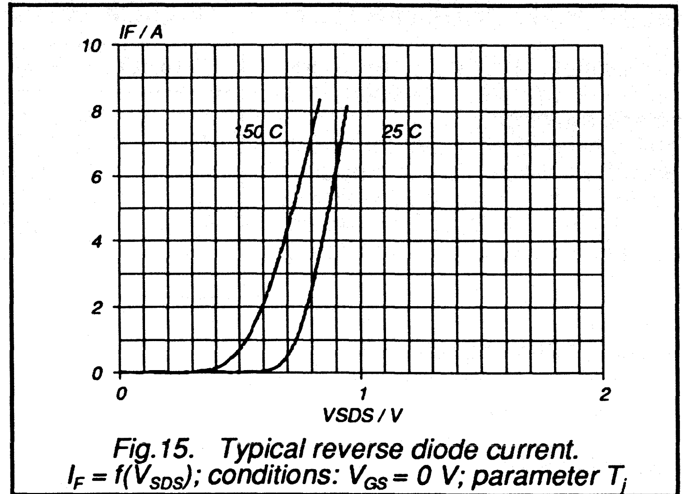


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

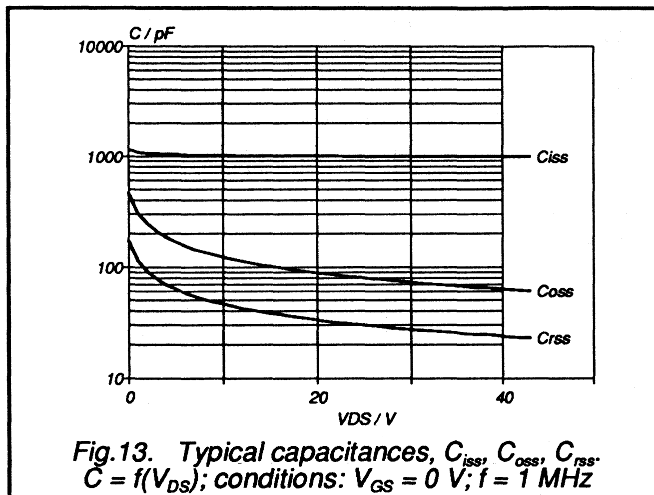


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

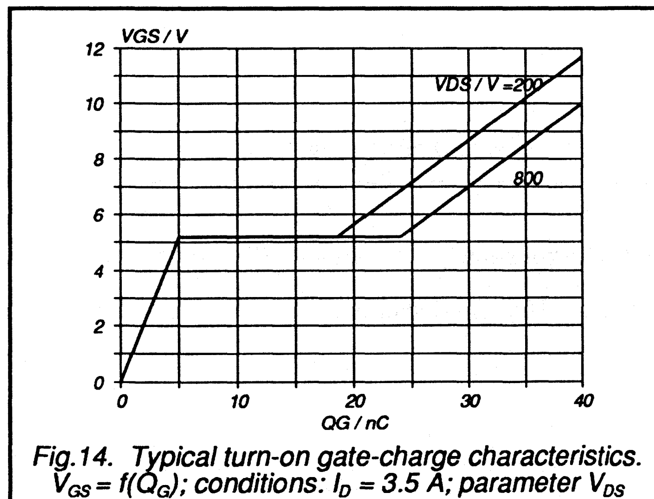


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 3.5$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK457	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	13	11	A
P_{tot}	Total power dissipation	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.4	0.5	Ω

MECHANICAL DATA

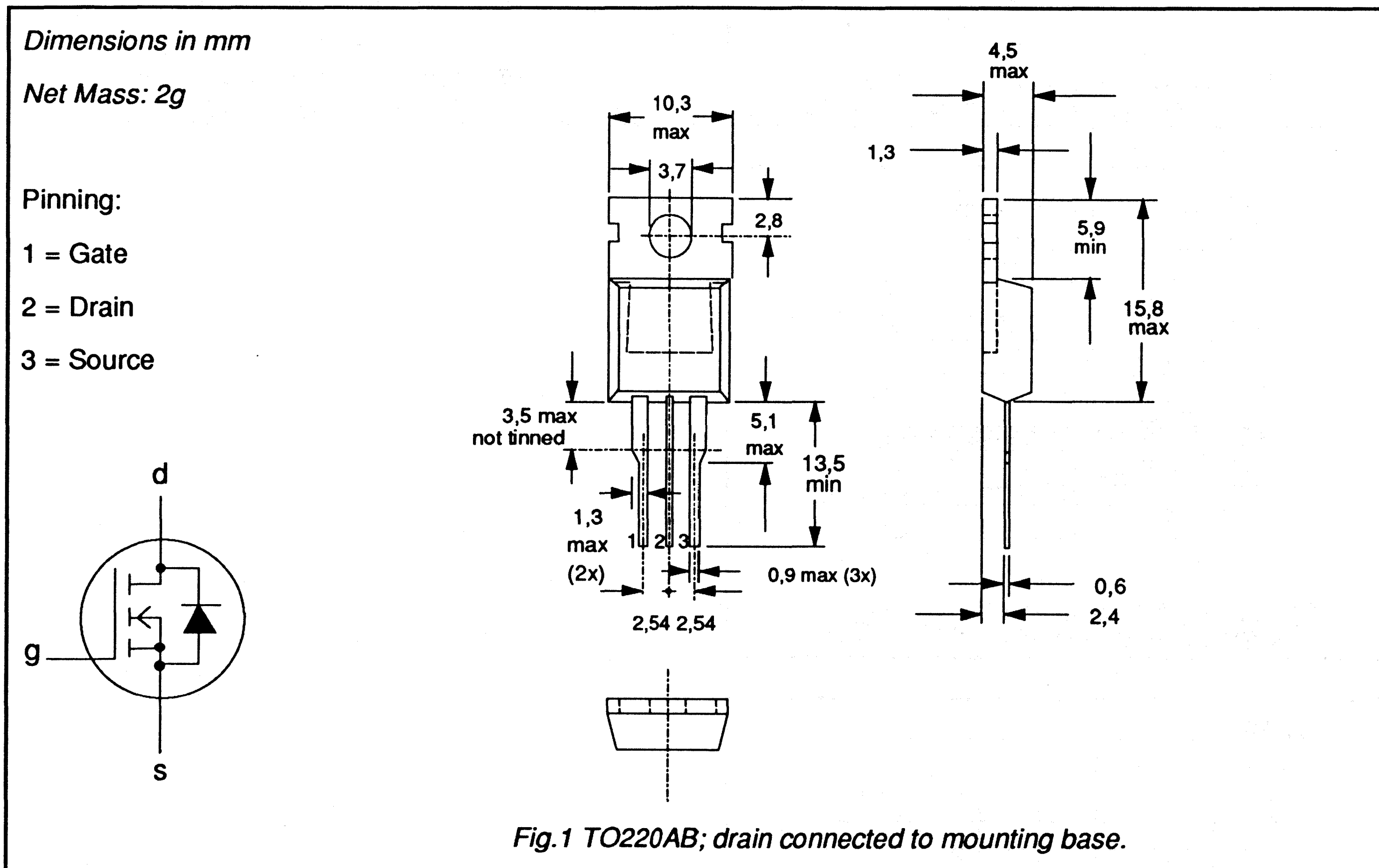


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	13	11	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	8.2	7	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	52	44	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK457-400A**	-	0.35	0.4	Ω
		BUK457-400B	-	0.45	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\,off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	13	A
I_{DRM}	Pulsed reverse drain current	-	-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 13 A; $-dI_F/dt$ = 100 A/μs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	μC

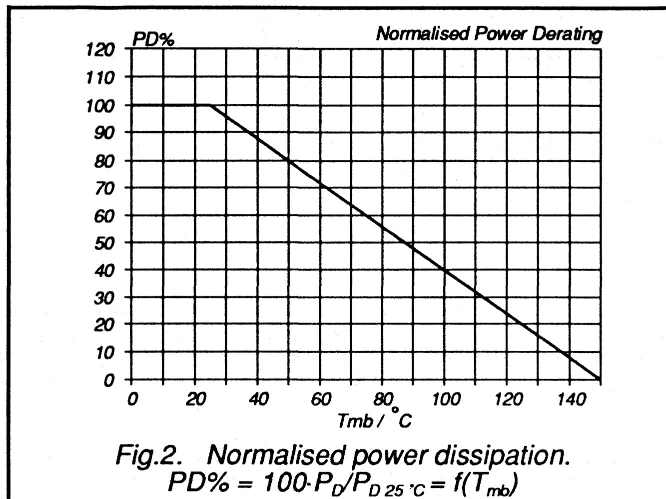


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

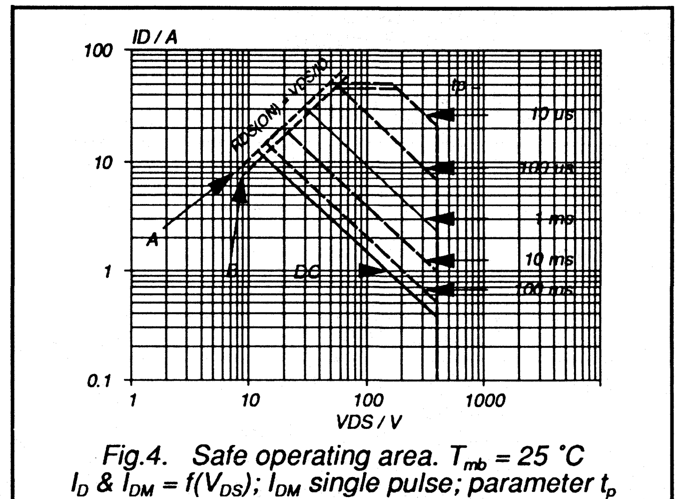


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

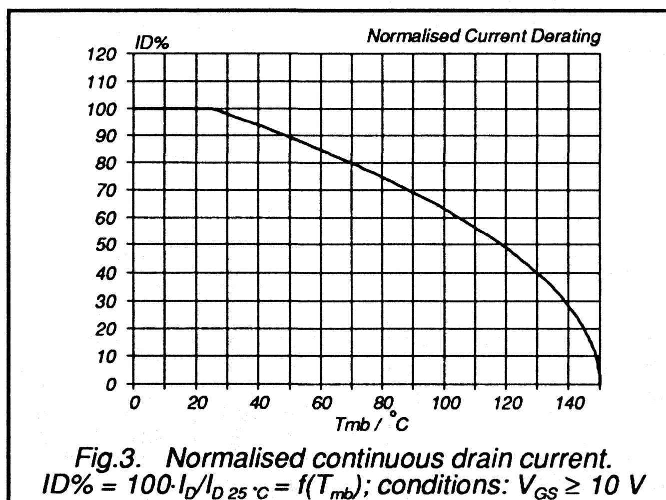


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

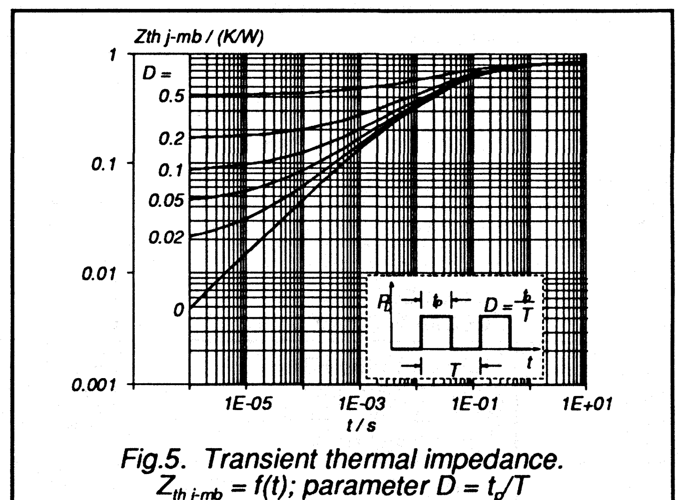


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

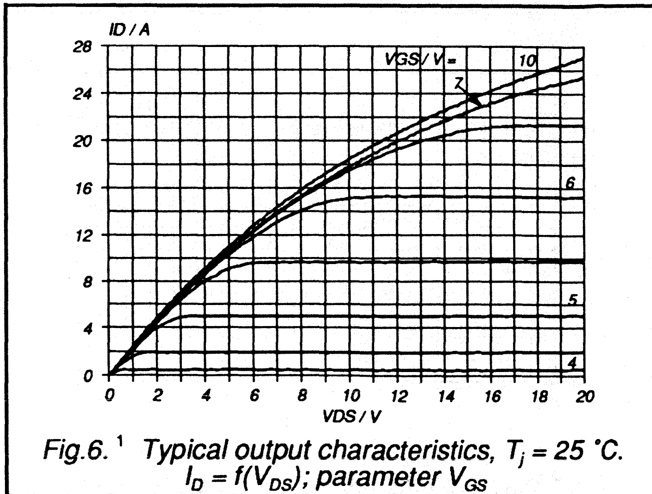


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

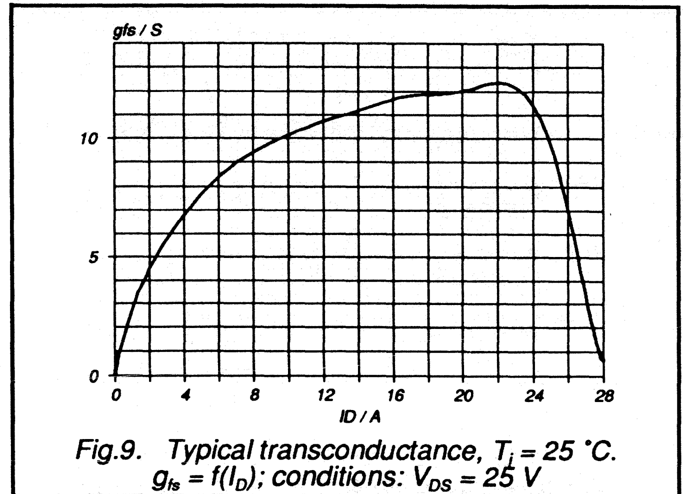


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

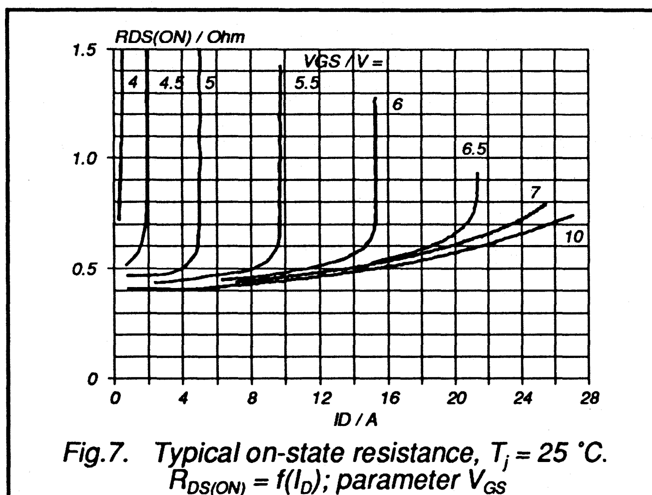


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

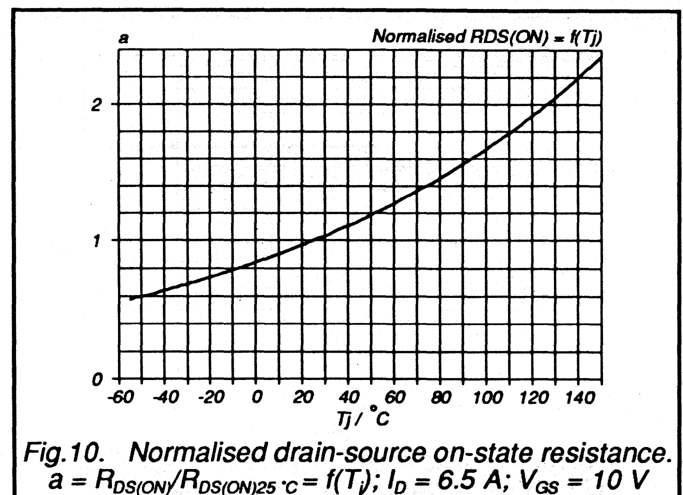


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

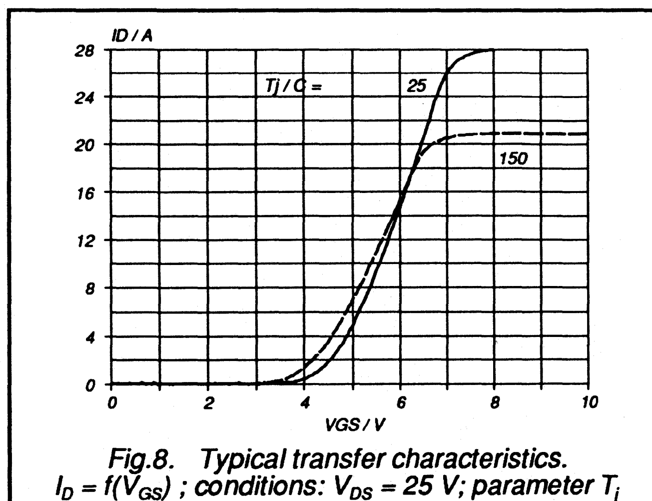


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

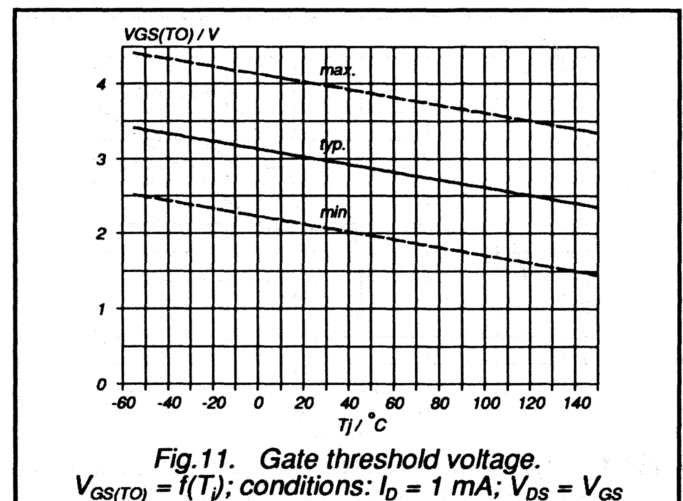


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

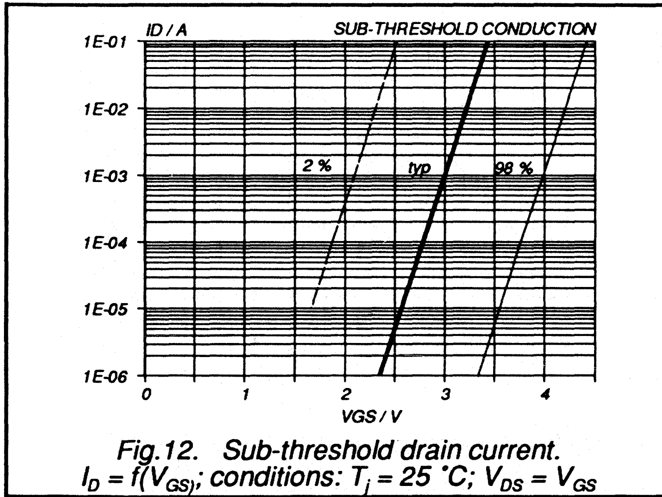


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

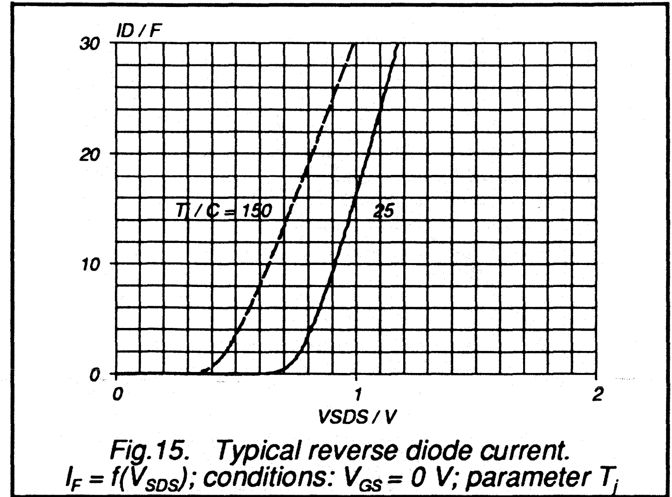


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

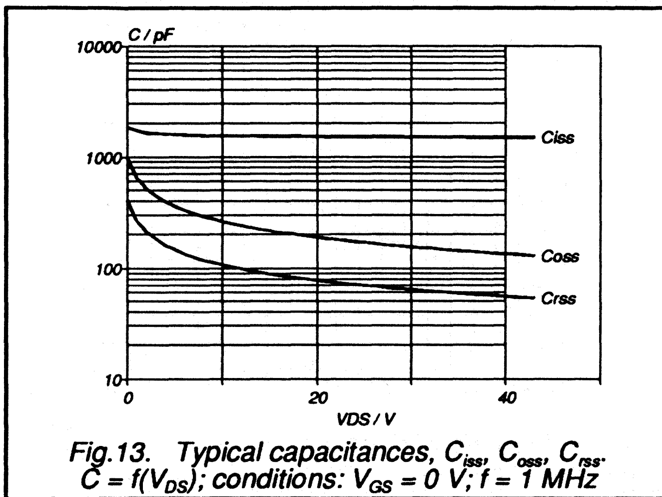


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

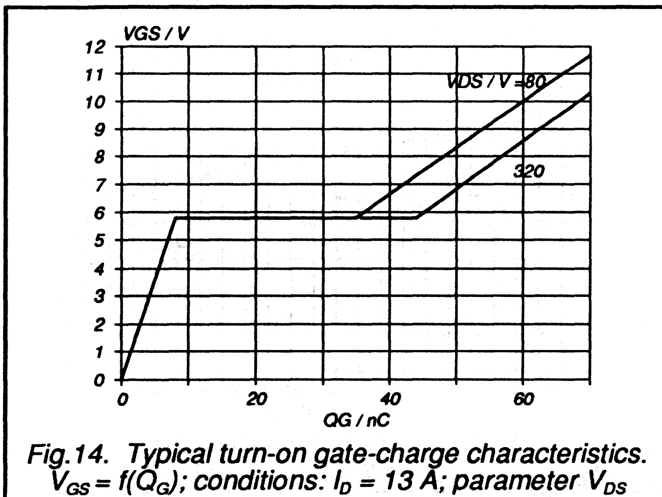


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 13$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	10	A
P_{tot}	Total power dissipation	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

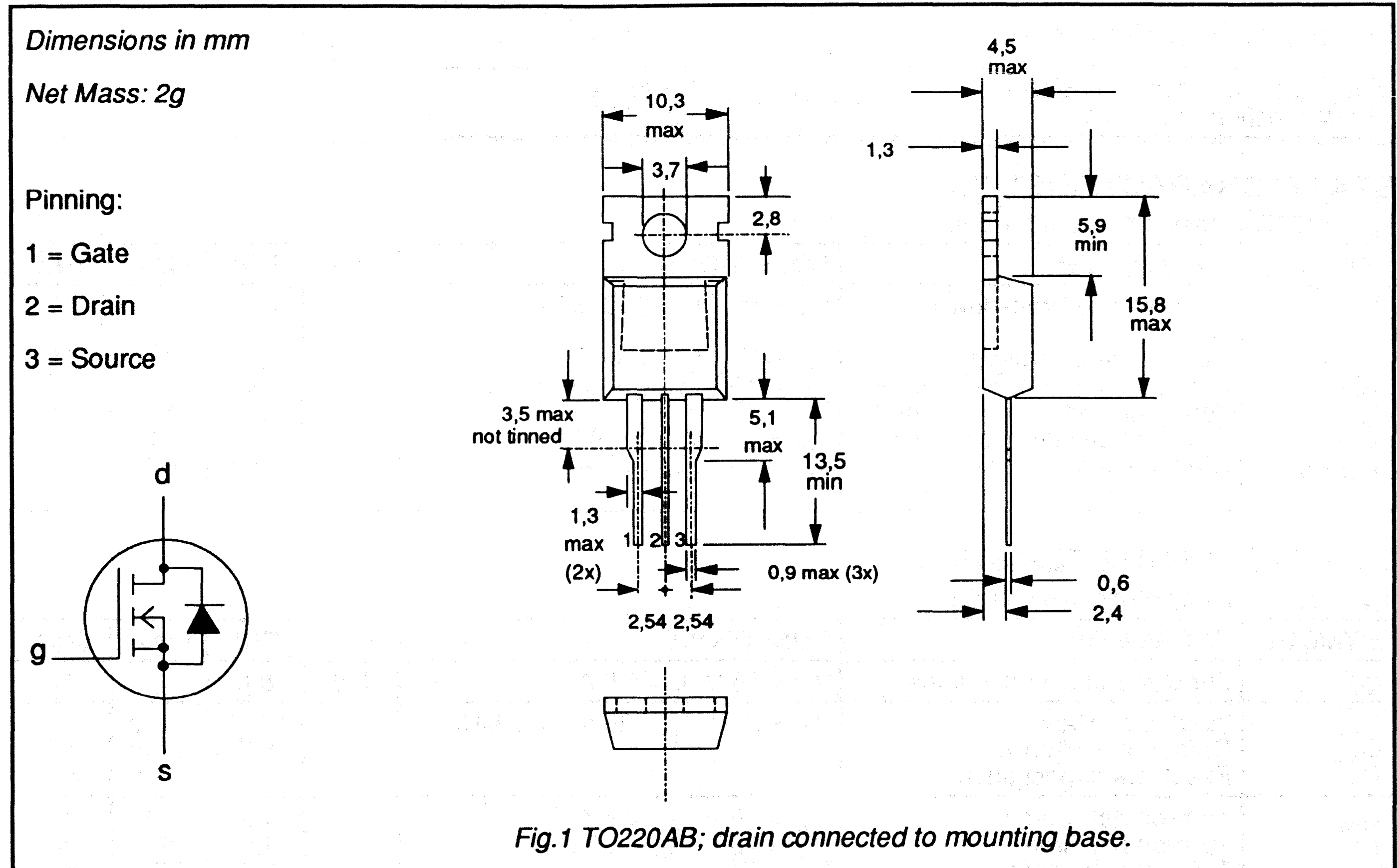


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	10	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	6.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	40	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	150	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.55	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	10	A
I_{DRM}	Pulsed reverse drain current	-	-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 10 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; V_{DD} ≤ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

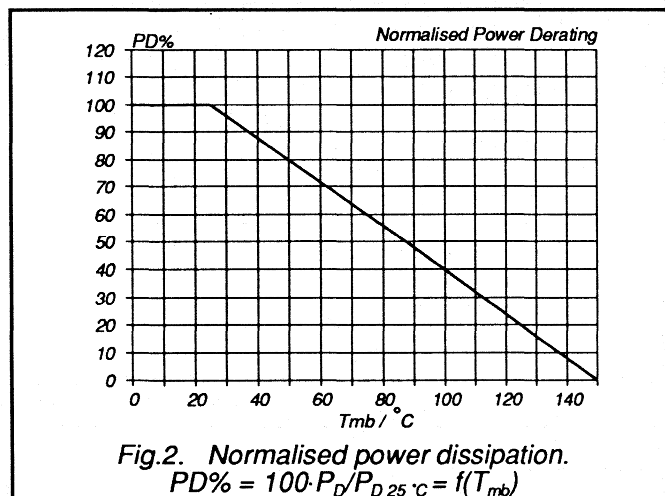


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

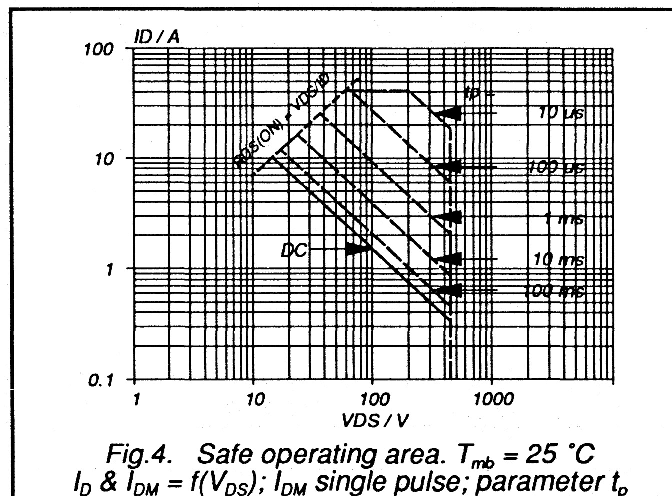


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = $f(V_{DS})$; I_{DM} single pulse; parameter t_p

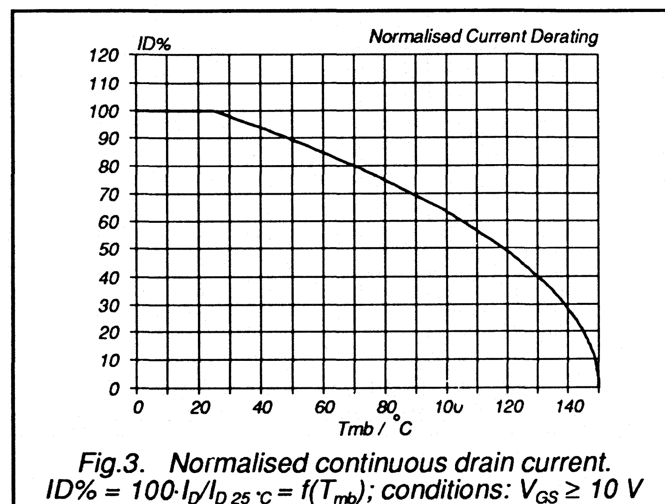


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

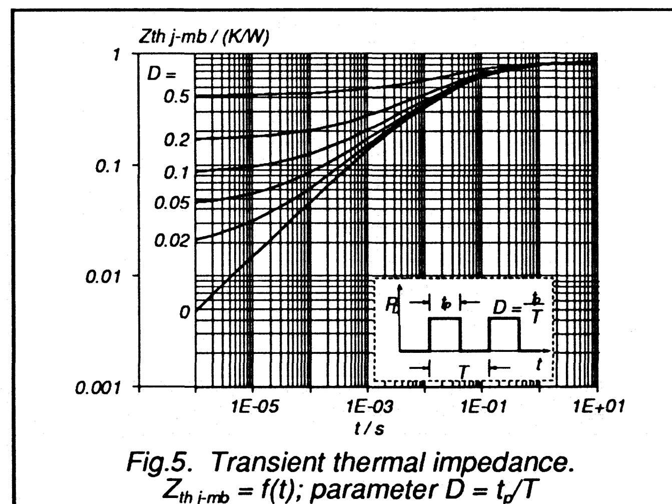


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

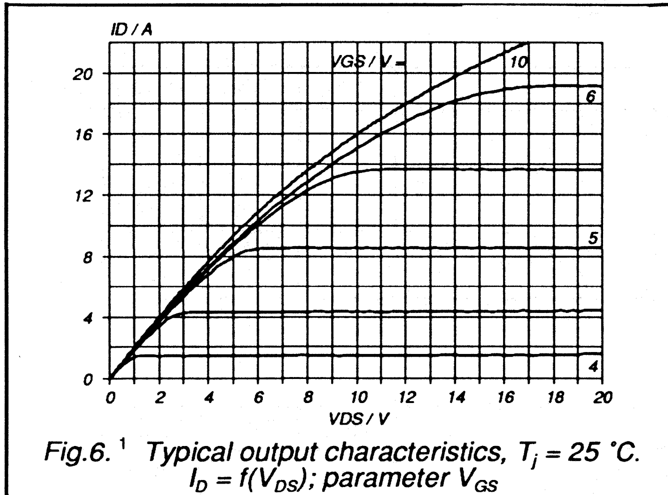


Fig.6. [1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

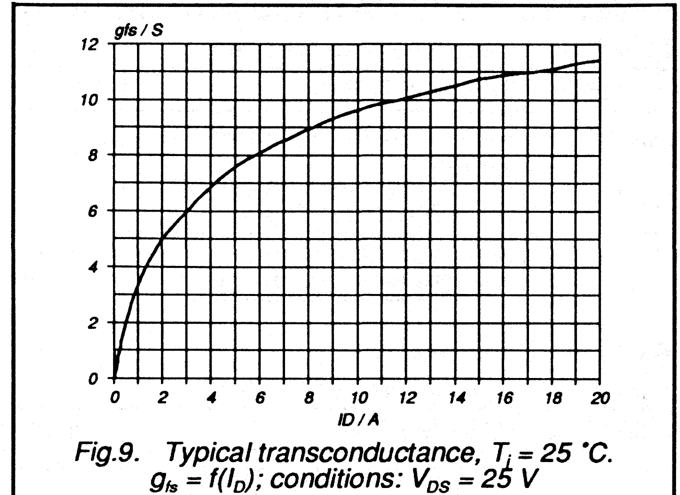


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

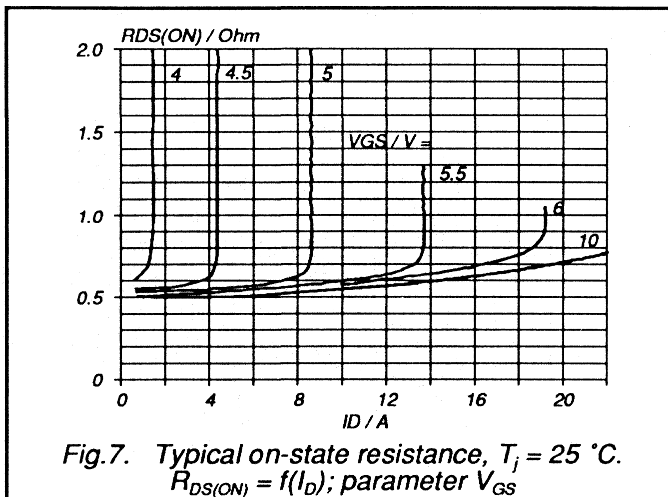


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

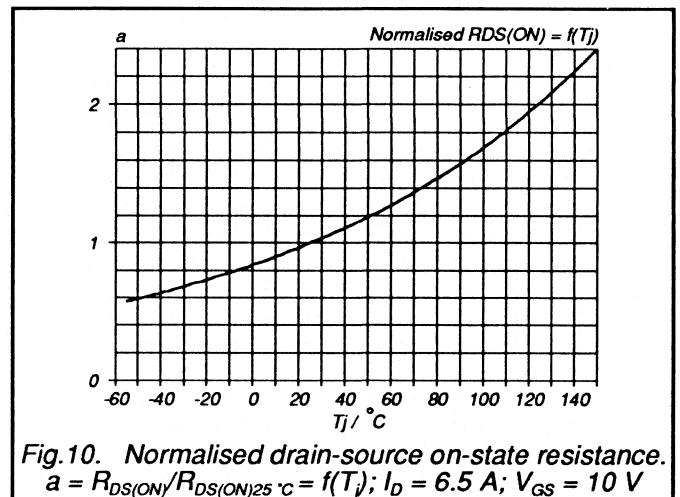


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

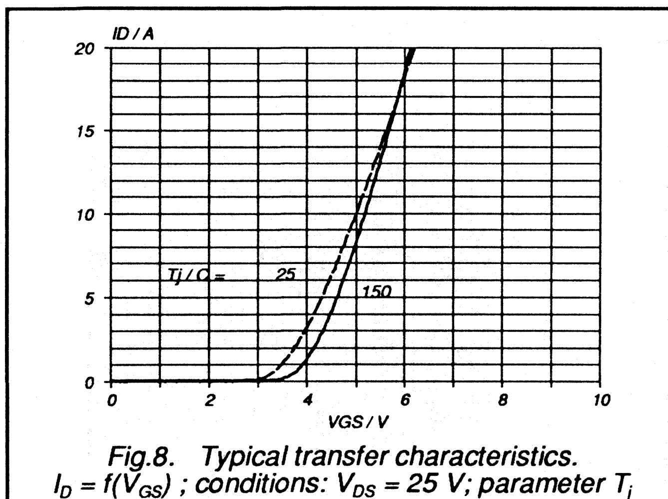


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

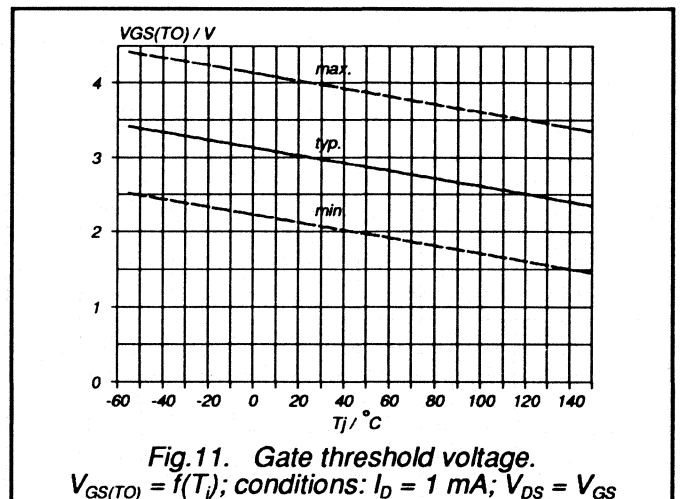


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

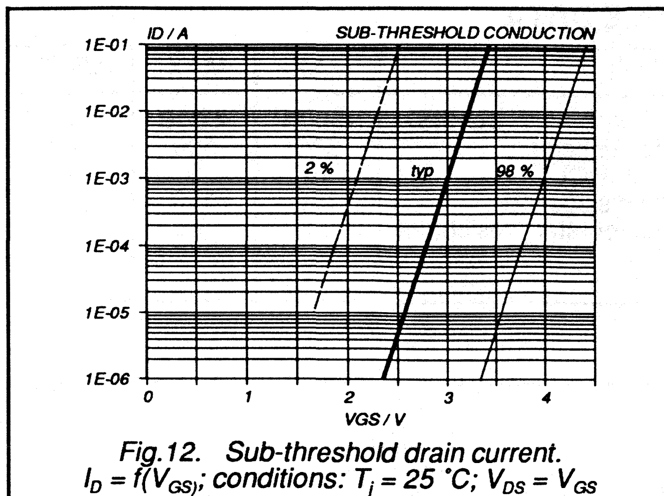


Fig.12. Sub-threshold drain current. $I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

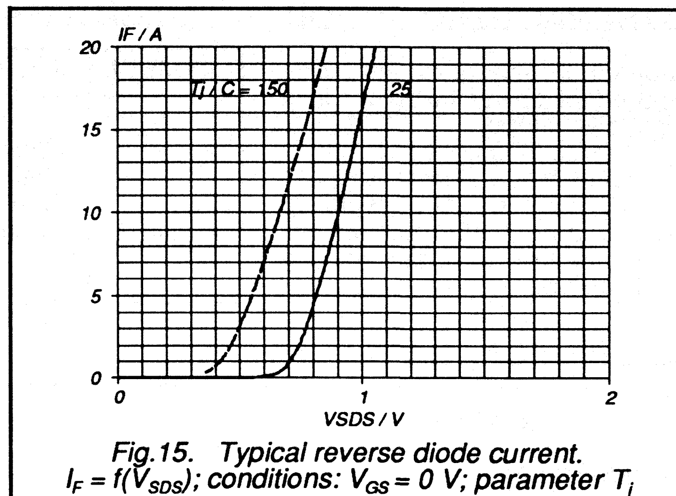


Fig.15. Typical reverse diode current. $I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

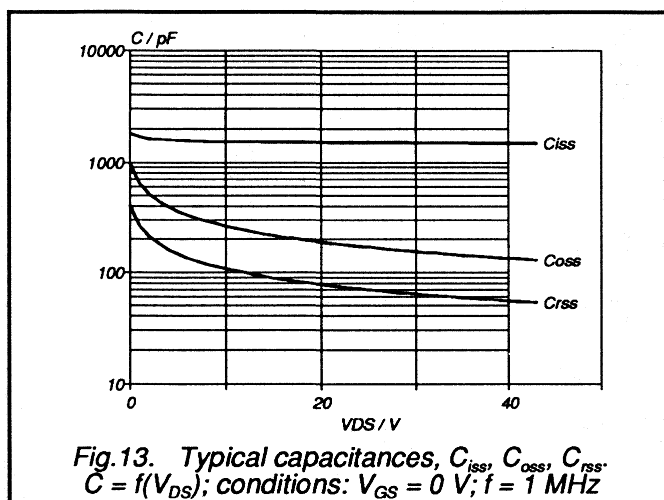


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}. $C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

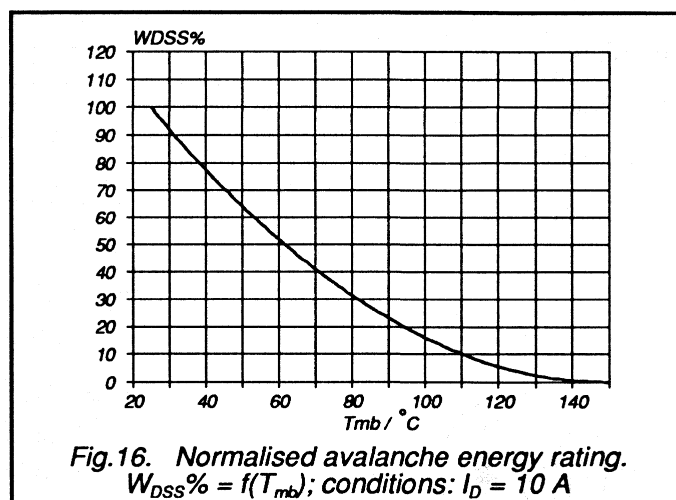


Fig.16. Normalised avalanche energy rating. $W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 10$ A

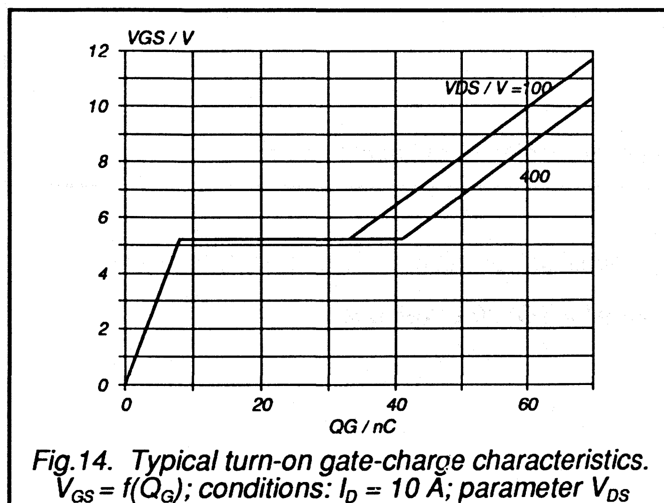


Fig.14. Typical turn-on gate-charge characteristics. $V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

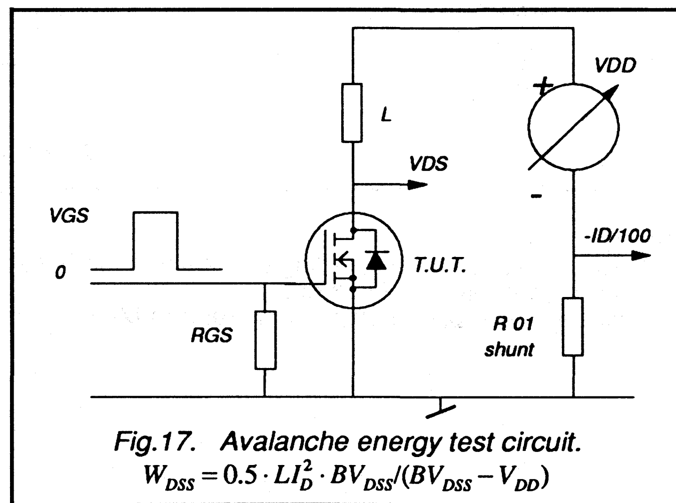


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK457	-500A	-500B	
V_{DS}	Drain-source voltage	500	500	V
I_D	Drain current (DC)	10	9	A
P_{tot}	Total power dissipation	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.6	0.8	Ω

MECHANICAL DATA

Dimensions in mm

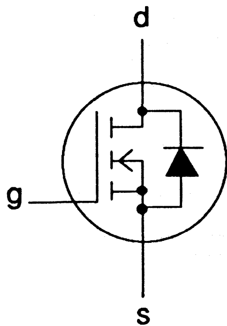
Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source



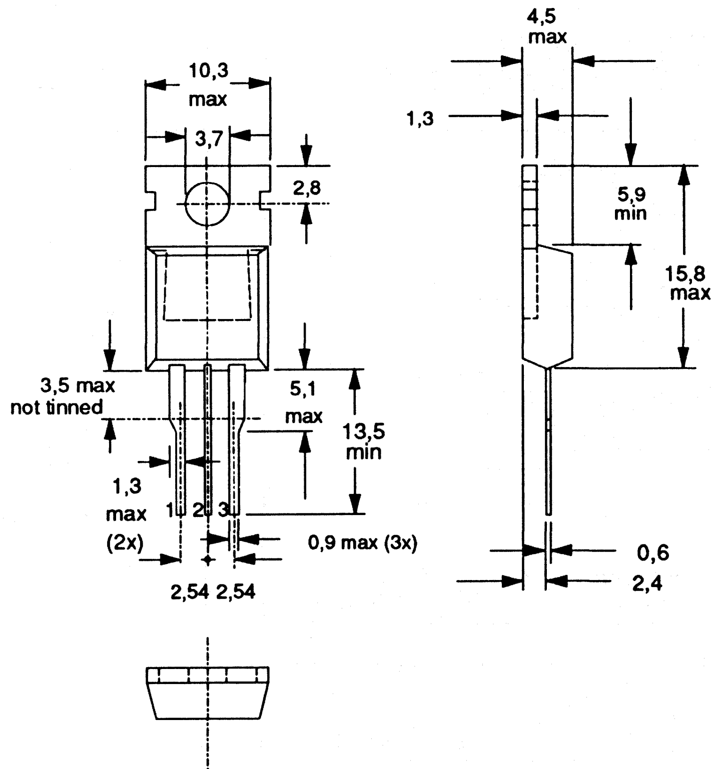


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	500		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-500A	-500B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	10	9	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.3	5.7	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	40	36	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A BUK457-500A	-	0.55	0.6	Ω
		BUK457-500B	-	0.7	0.8	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\,off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	10	A
I_{DRM}	Pulsed reverse drain current	-	-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ; V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 10 A; $-dI_F/dt$ = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; V_{DD} ≤ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

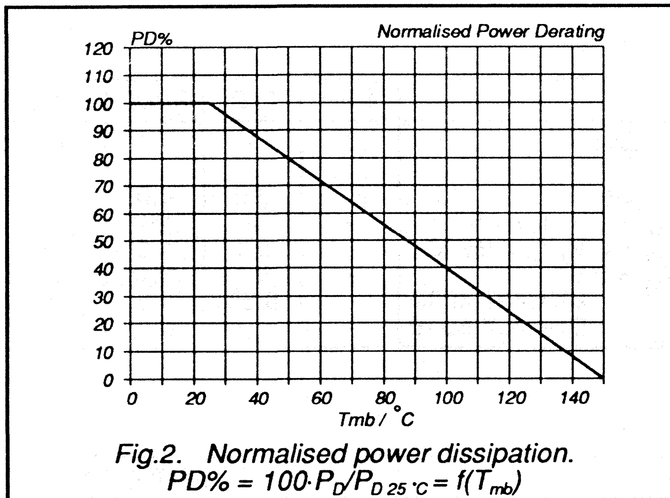


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

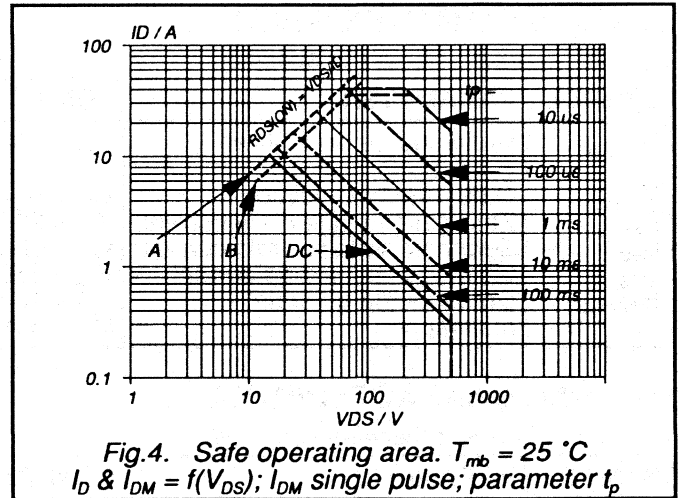


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

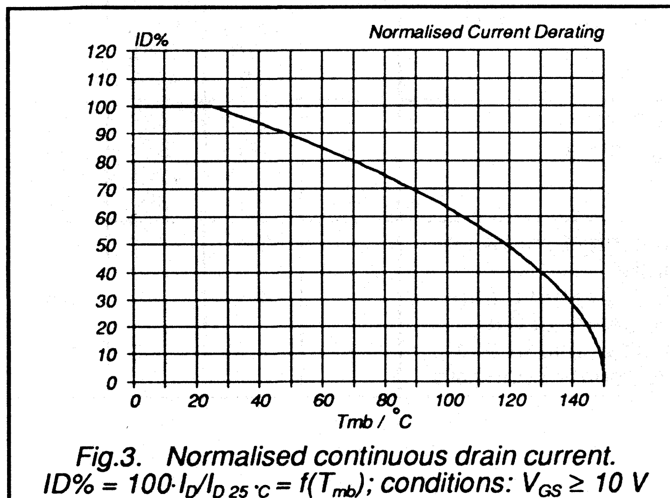


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

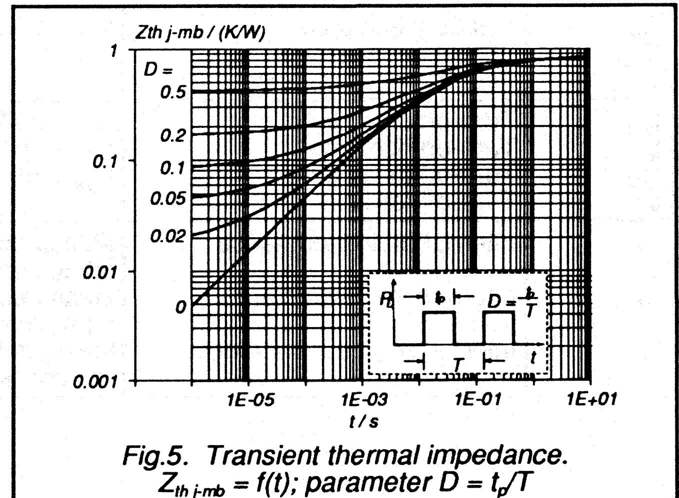


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

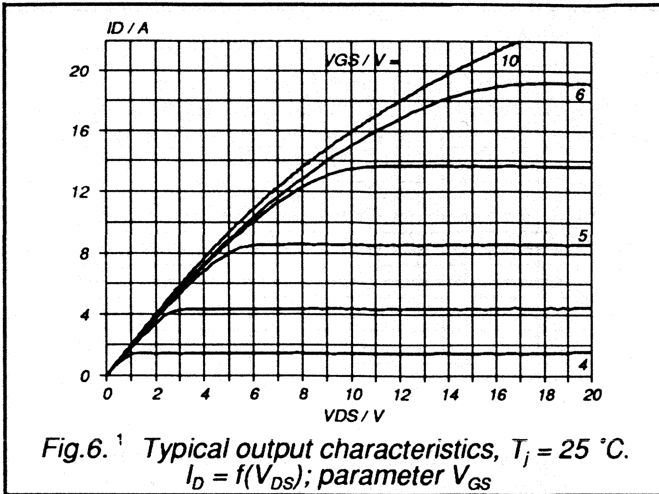


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

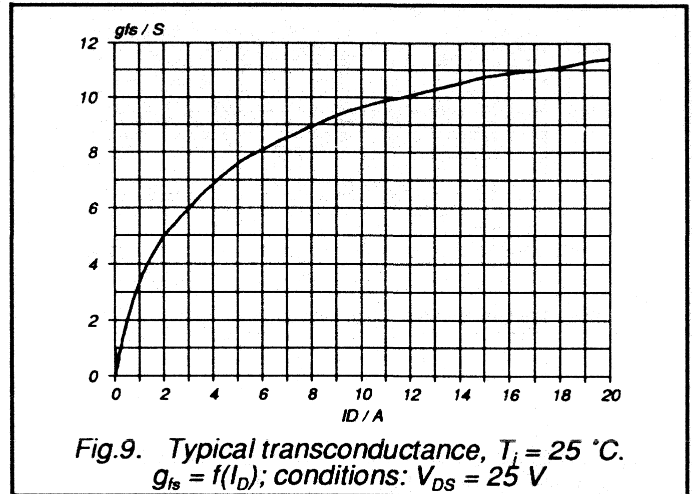


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

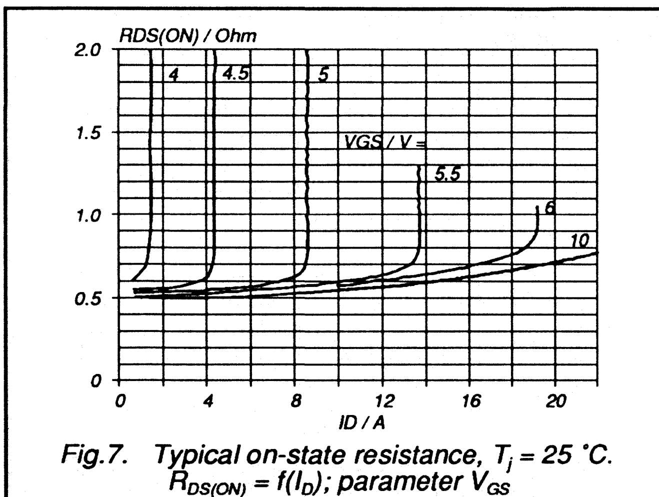


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

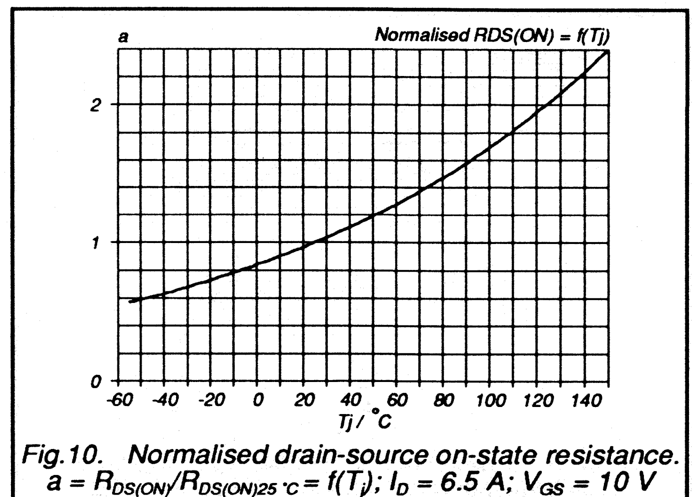


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

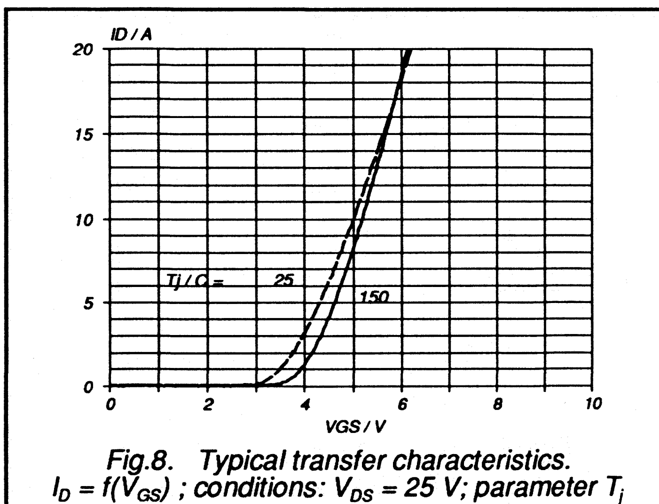


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

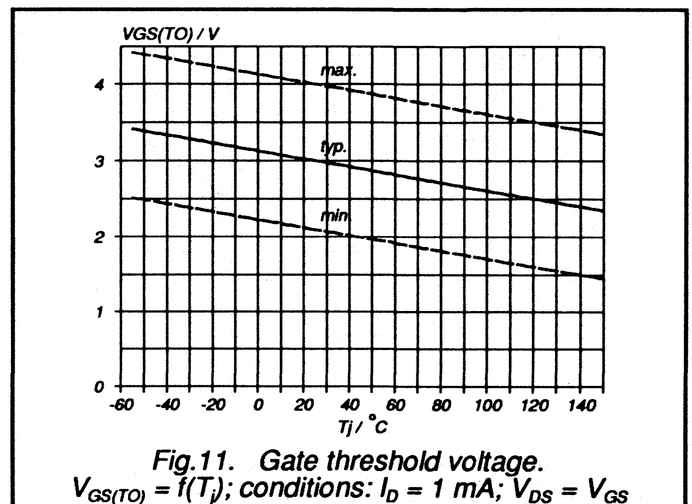


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

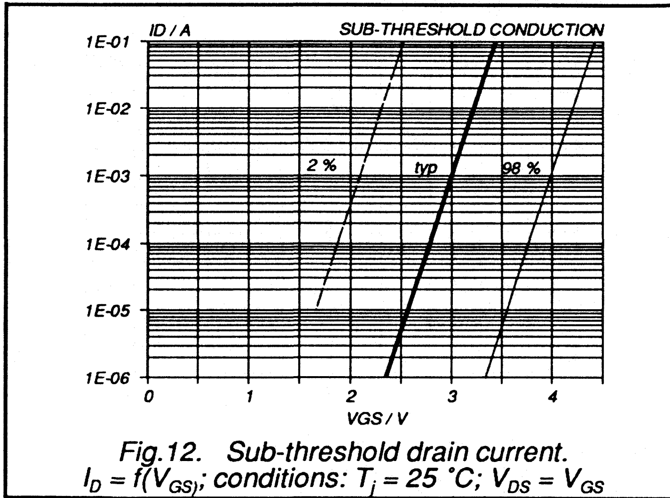


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

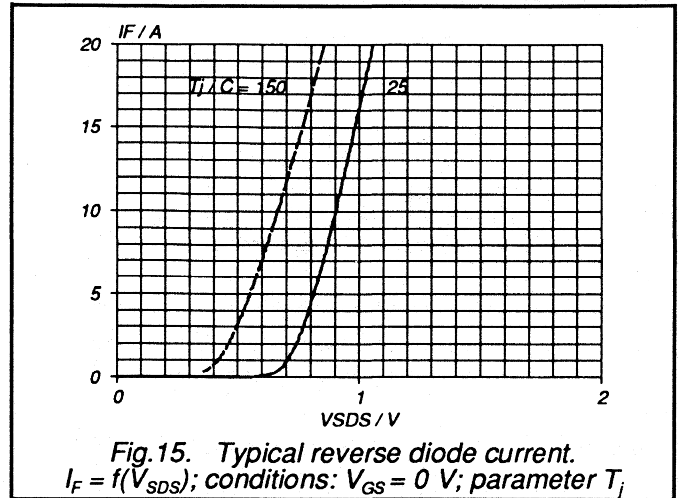


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

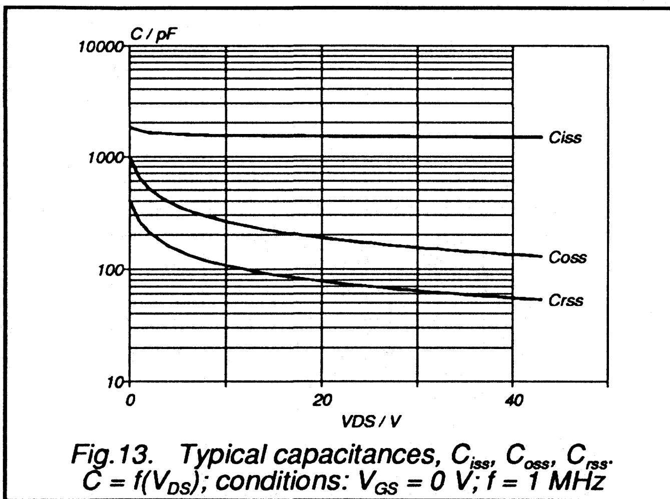


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

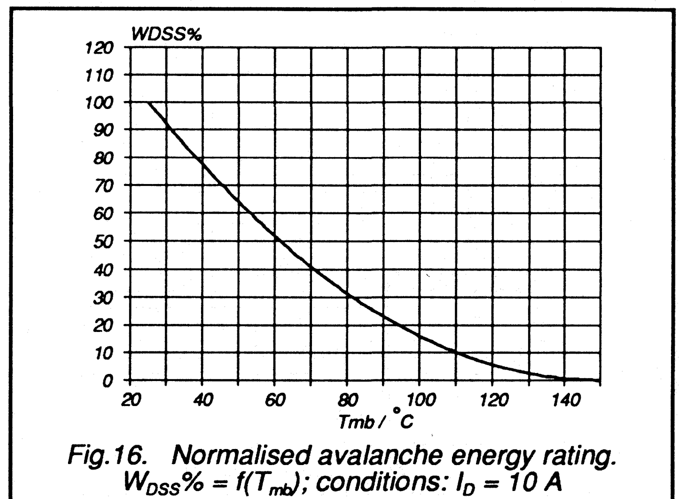


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 10$ A

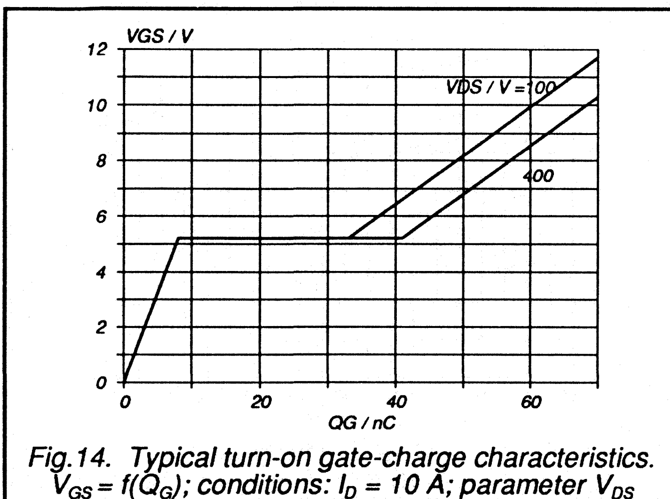


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

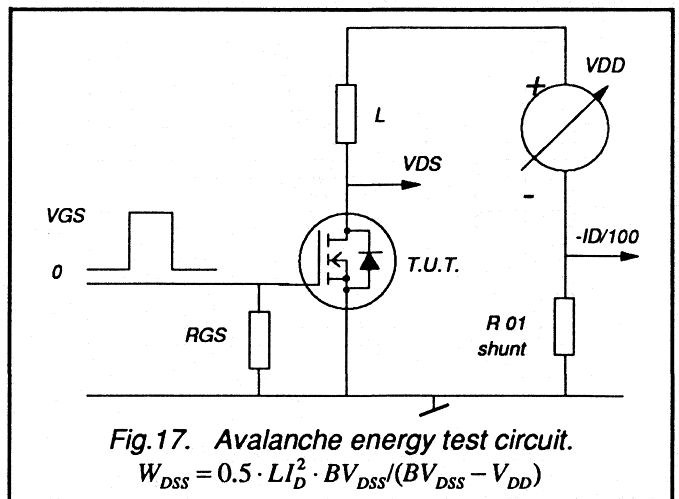


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK457	-600A	-600B	
V_{DS}	Drain-source voltage	600	600	V
I_D	Drain current (DC)	8	7.1	A
P_{tot}	Total power dissipation	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	Ω

MECHANICAL DATA

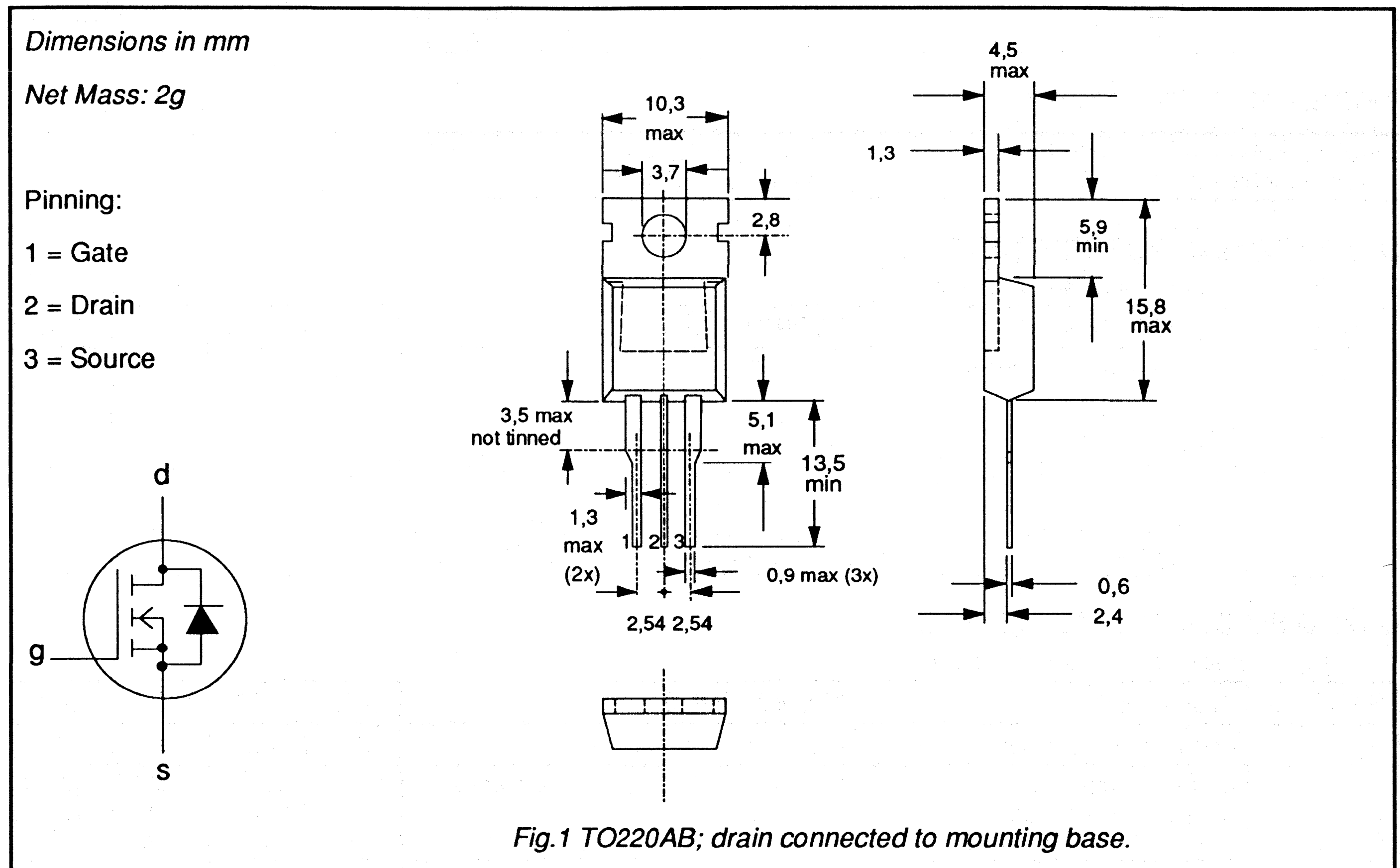


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	600		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-600A	-600B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	8	7.1	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5	4.5	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	32	28	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK457-600A**	-	0.85	1.0	Ω
		BUK457-600B	-	1.0	1.2	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	8	A
I_{DRM}	Pulsed reverse drain current	-	-	-	32	A
V_{SD}	Diode forward voltage	I_F = 8 A ;V_{GS} = 0 V	-	1.1	1.4	V
t_{rr}	Reverse recovery time	I_F = 8 A; -dI_F/dt = 100 A/µs;	-	500	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	6.0	-	µC

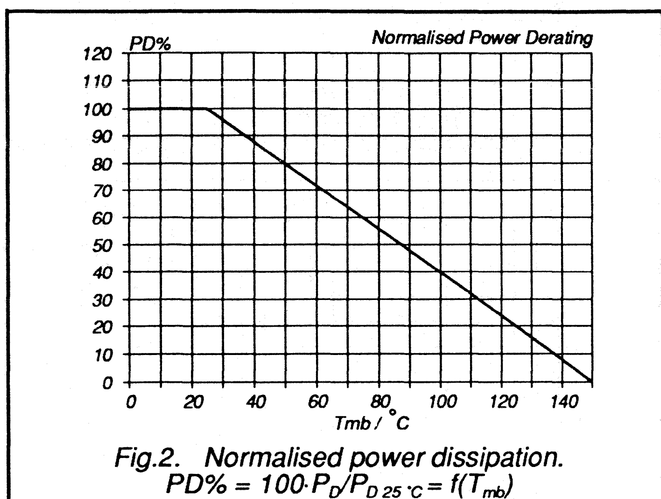


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

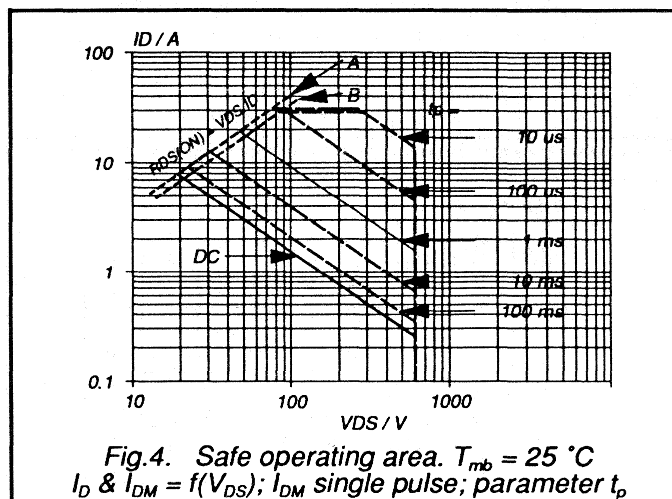


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

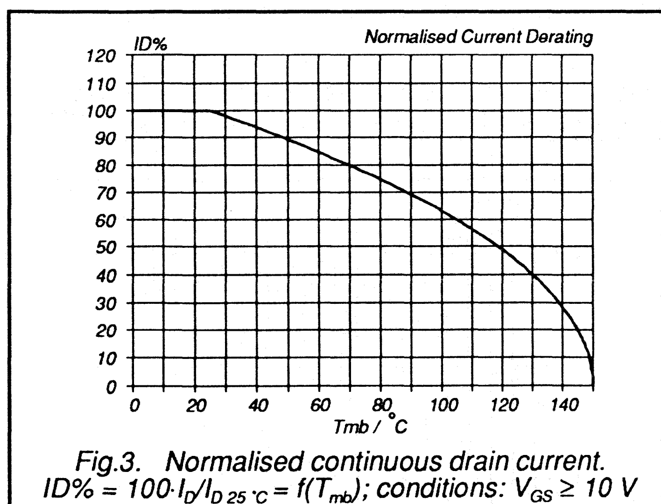


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

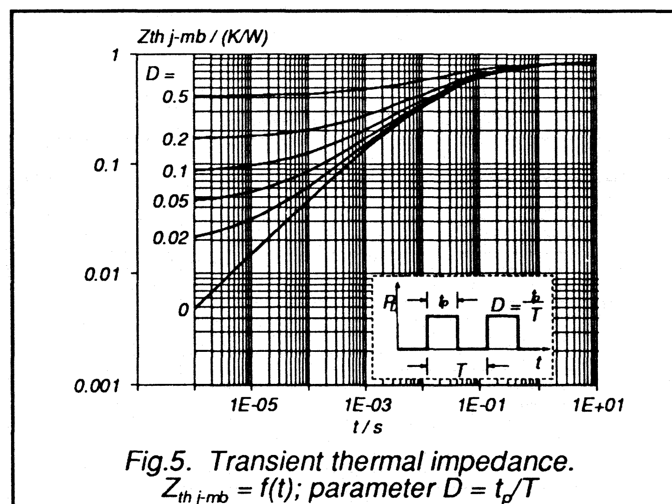


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

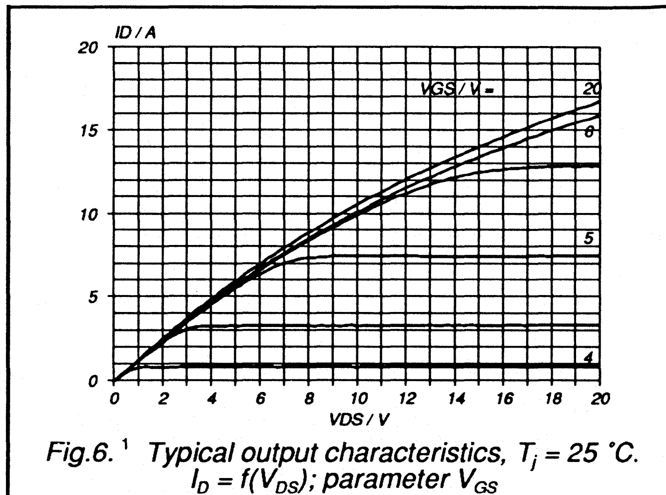


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

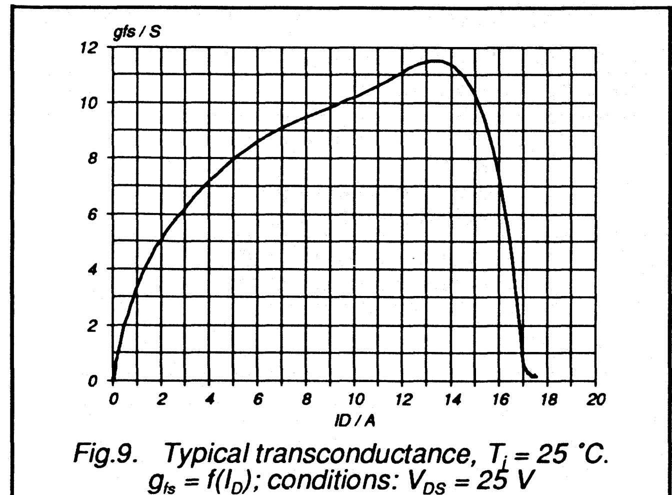


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

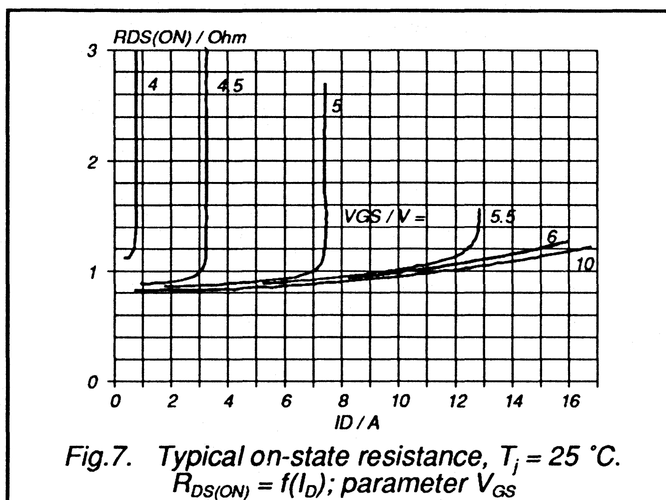


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

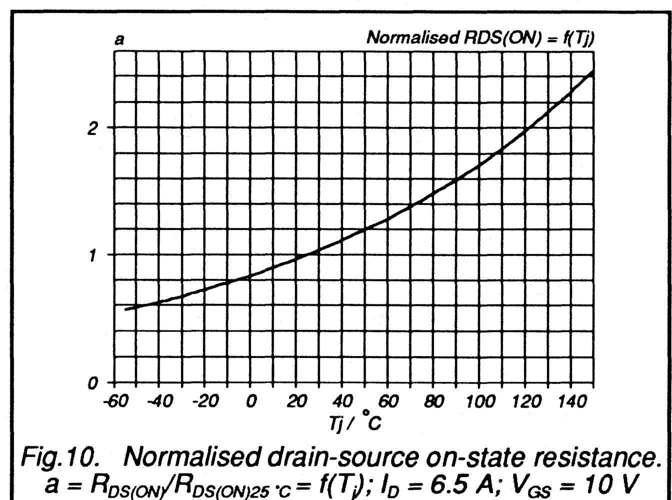


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ °C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

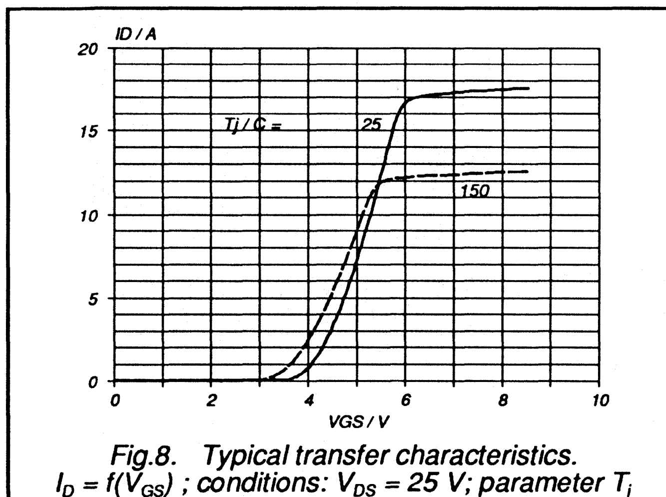


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

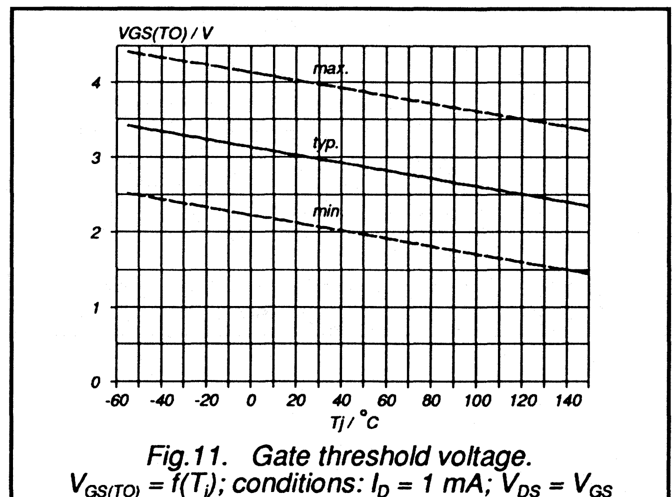


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

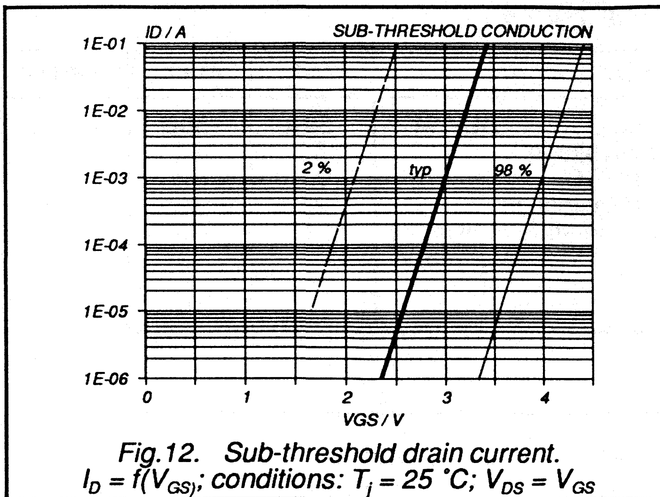


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

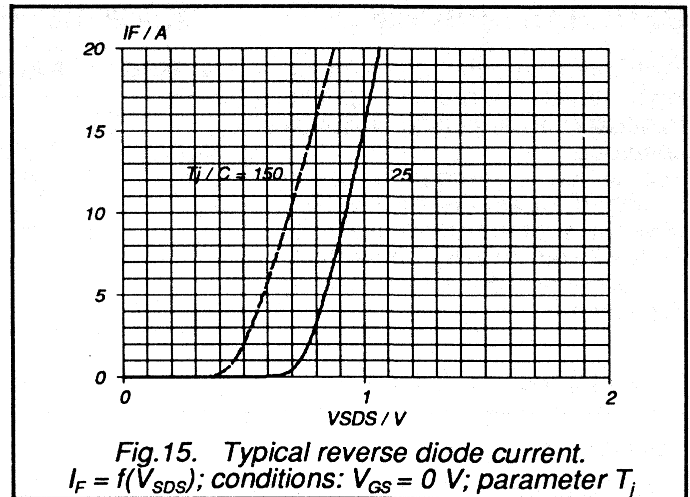


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

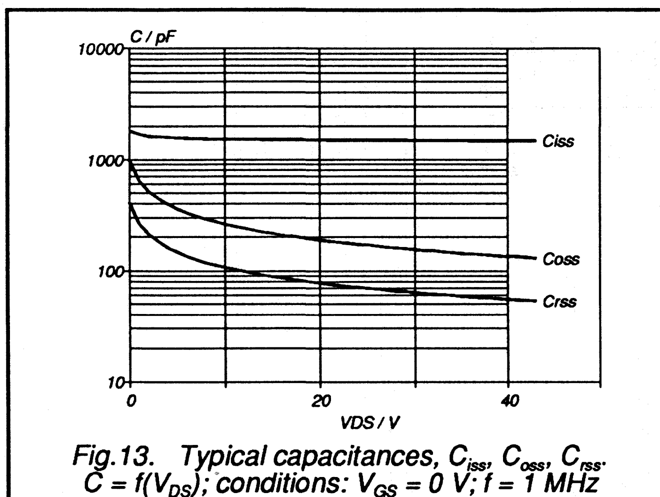


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

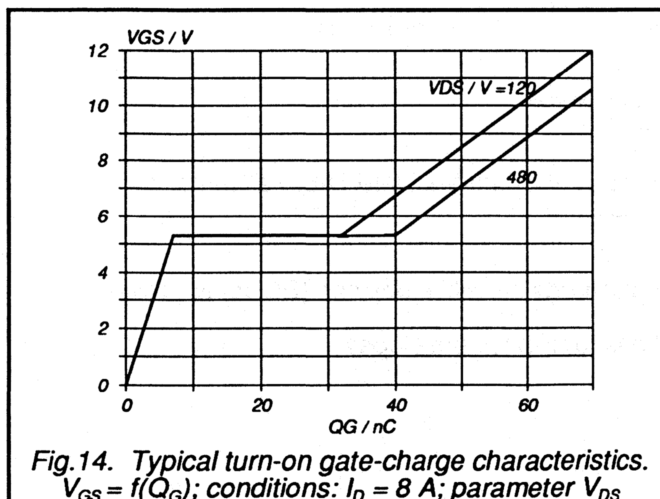


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 8$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK542	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	9.2	8.4	A
P_{tot}	Total power dissipation	22	22	W
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.15	0.18	Ω

MECHANICAL DATA

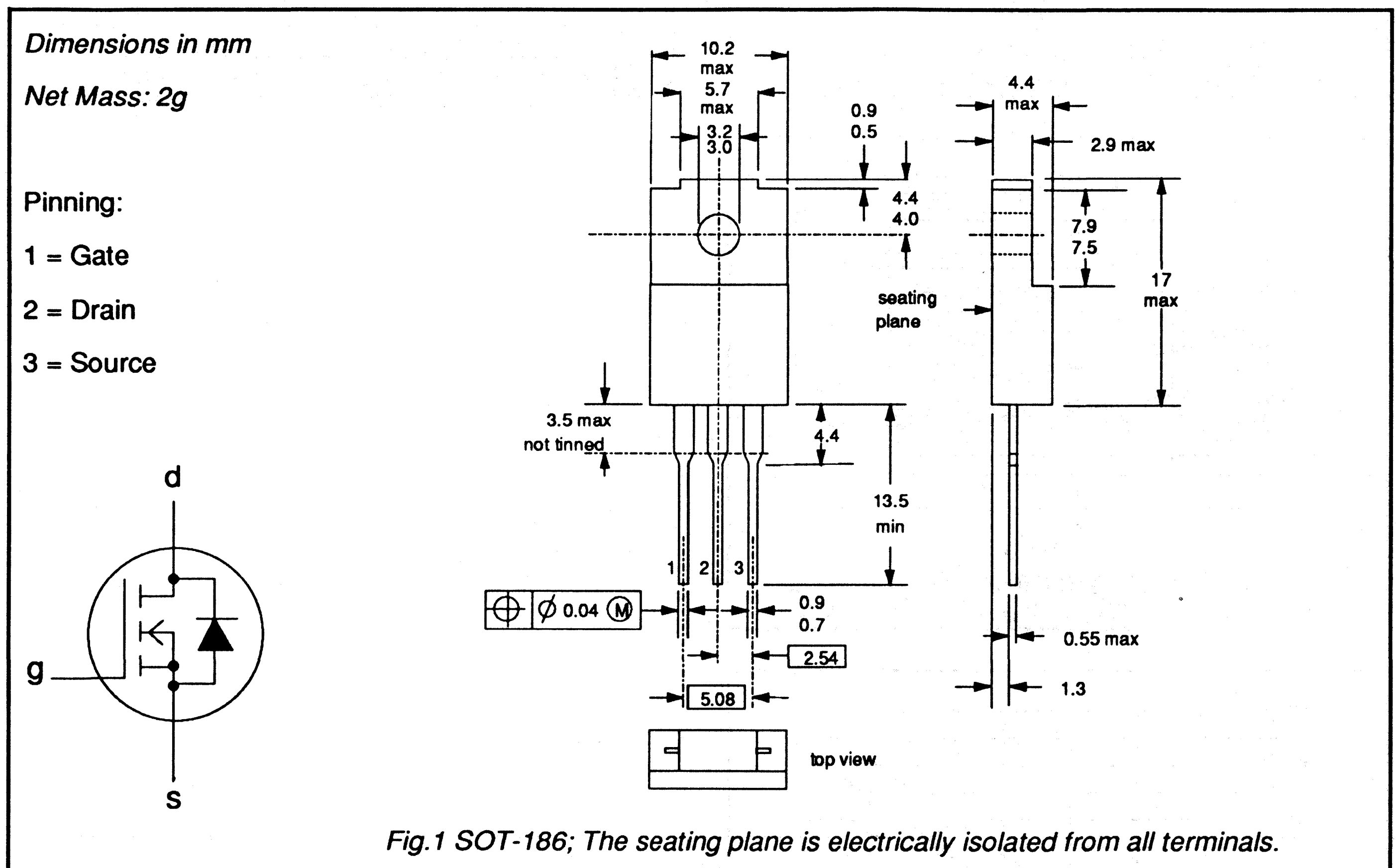


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9.2	8.4	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5.8	5.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	37	33	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5.68 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 8.5 A BUK542-50A	-	0.12	0.15	Ω
		BUK542-50B	-	0.15	0.18	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	5	6.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	65	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	12	18	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	60	80	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	70	ns
t_f	Turn-off fall time		-	45	70	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9.2	A
I_{DRM}	Pulsed reverse drain current	-	-	-	37	A
V_{SD}	Diode forward voltage	I_F = 9.2 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 9.2 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; V_{DD} ≤ 25 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

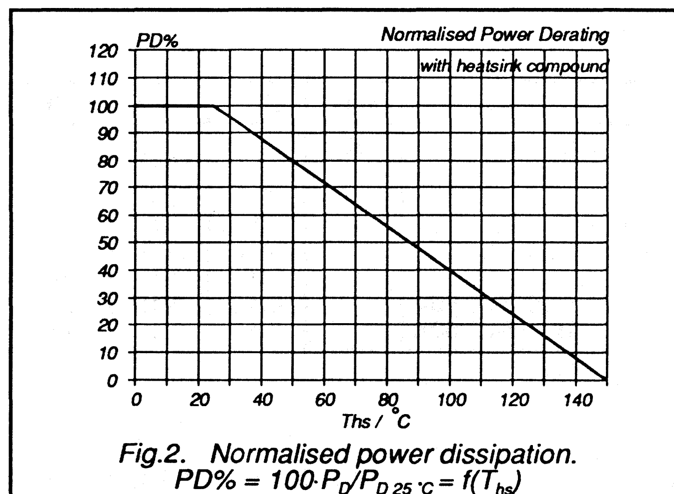


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

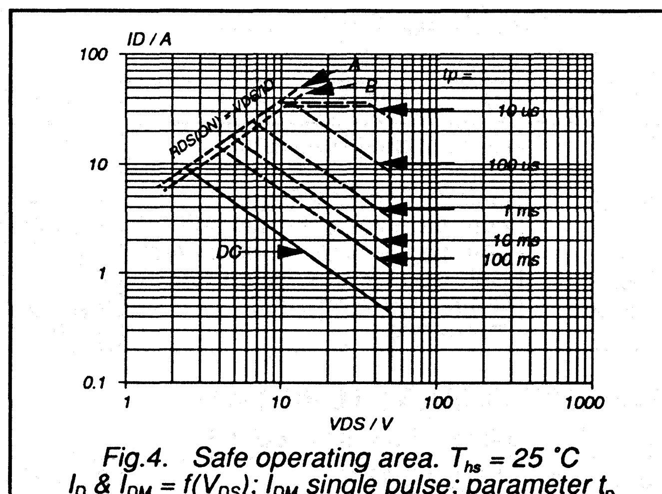


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = $f(V_{DS})$; I_{DM} single pulse; parameter t_p

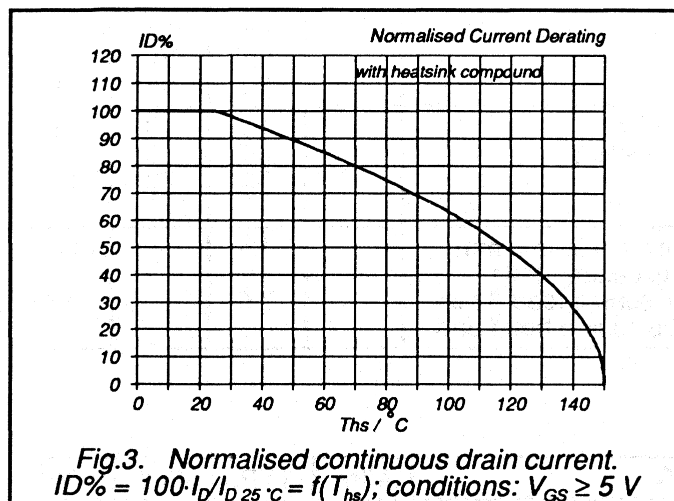


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: V_{GS} ≥ 5 V

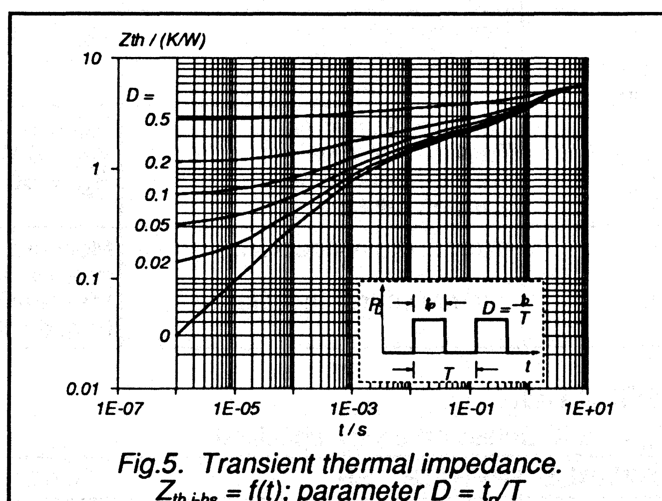


Fig.5. Transient thermal impedance.
$Z_{th\,j-hs} = f(t)$; parameter $D = t_p/T$

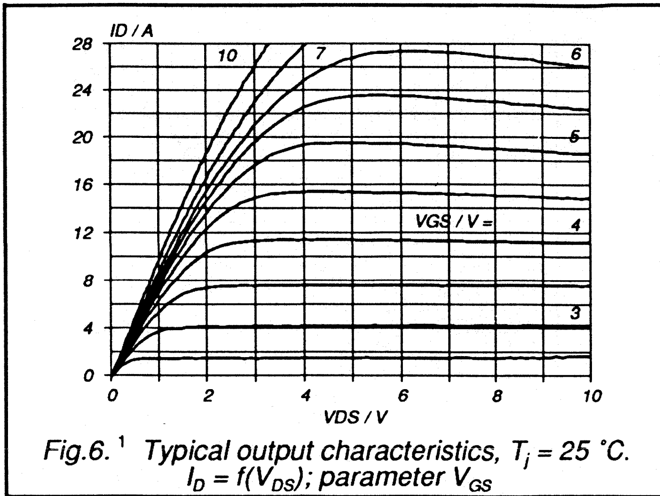


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

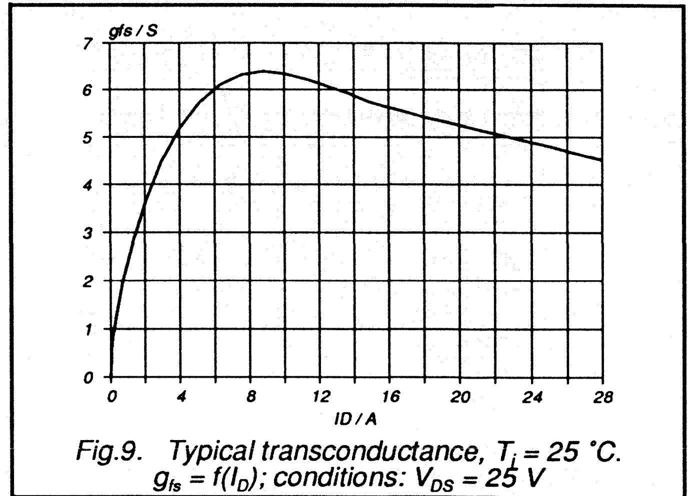


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

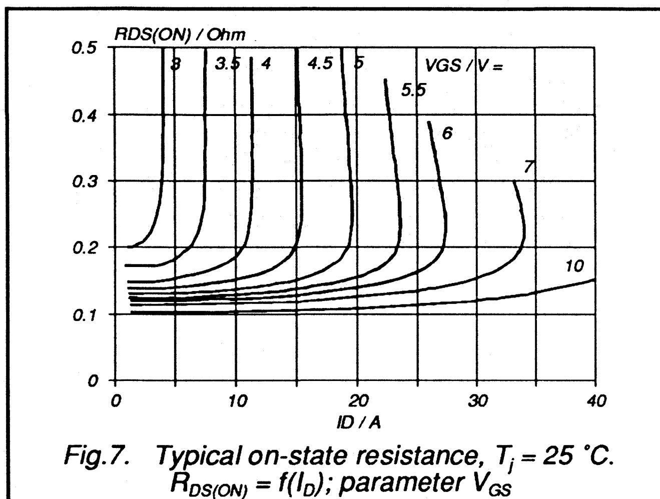


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

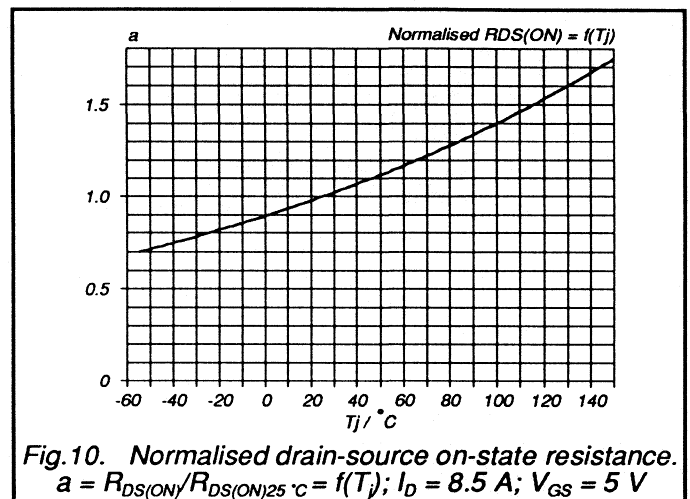


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 8.5 A; V_{GS} = 5 V

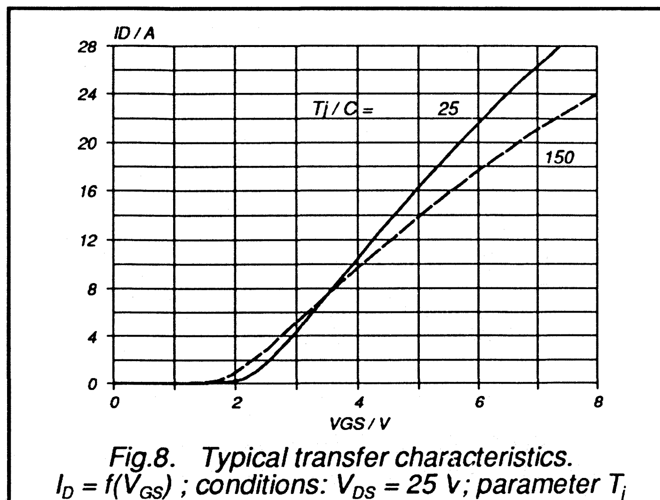


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

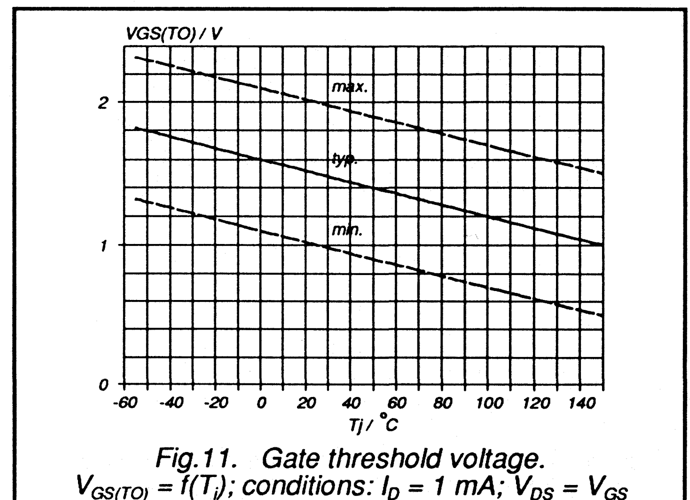


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

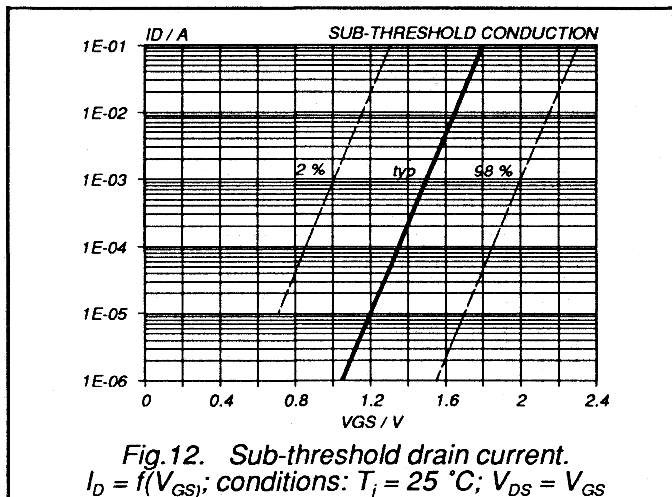


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

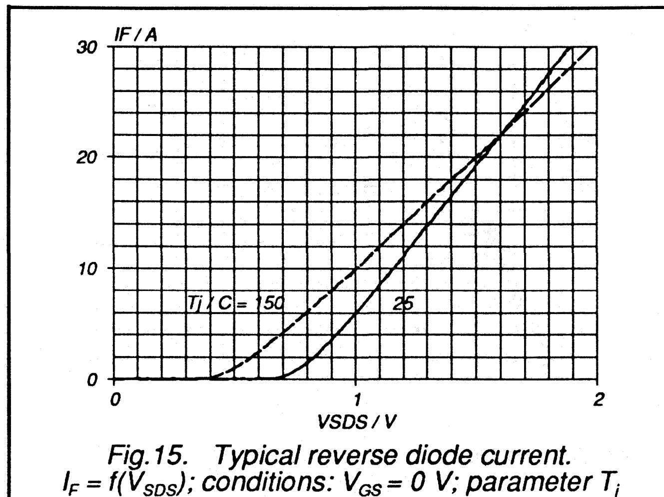


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

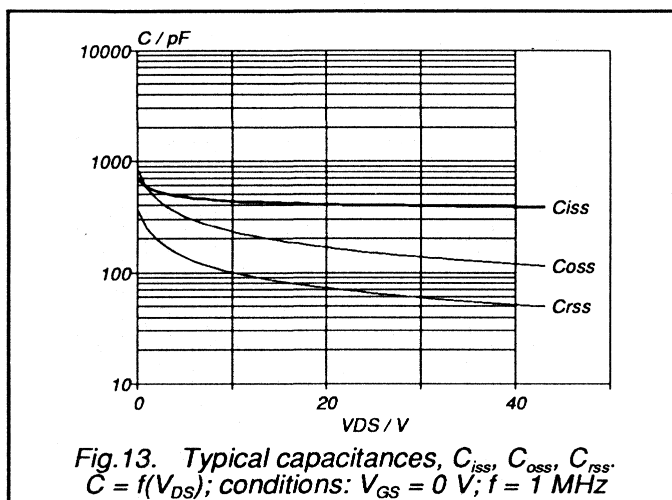


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

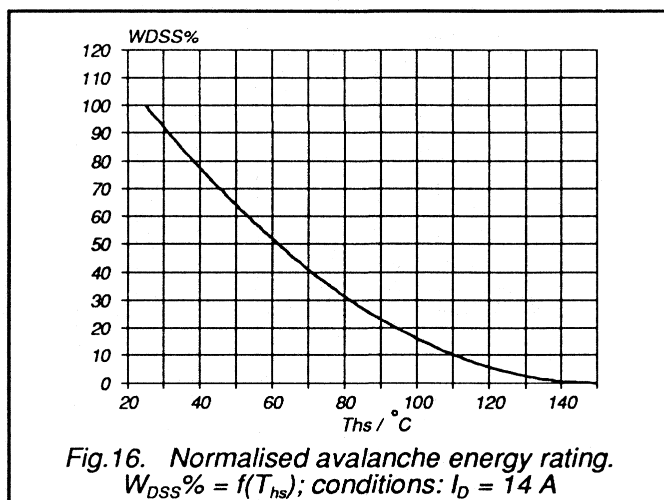


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 14$ A

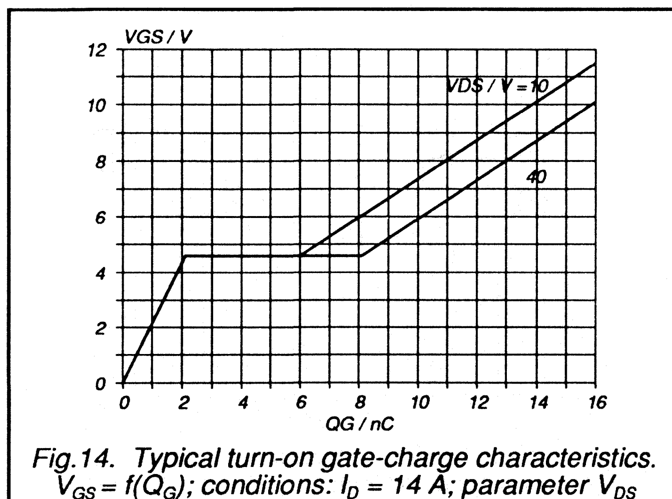


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

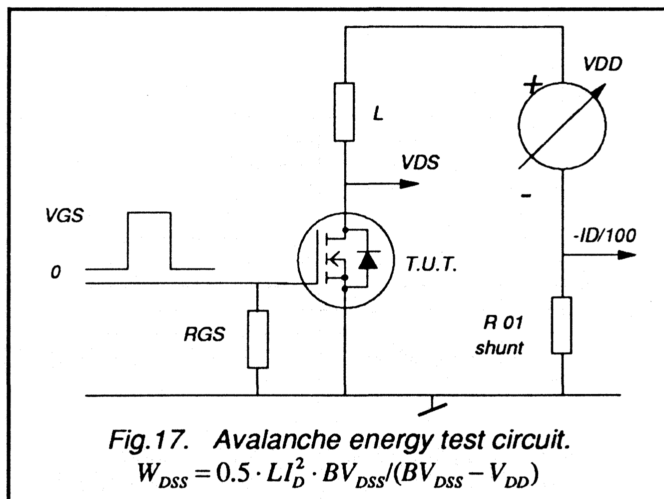


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK542	-60A	-60B	
V_{DS}	Drain-source voltage	60	60	V
I_D	Drain current (DC)	9.2	8.4	A
P_{tot}	Total power dissipation	22	22	W
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.15	0.18	Ω

MECHANICAL DATA

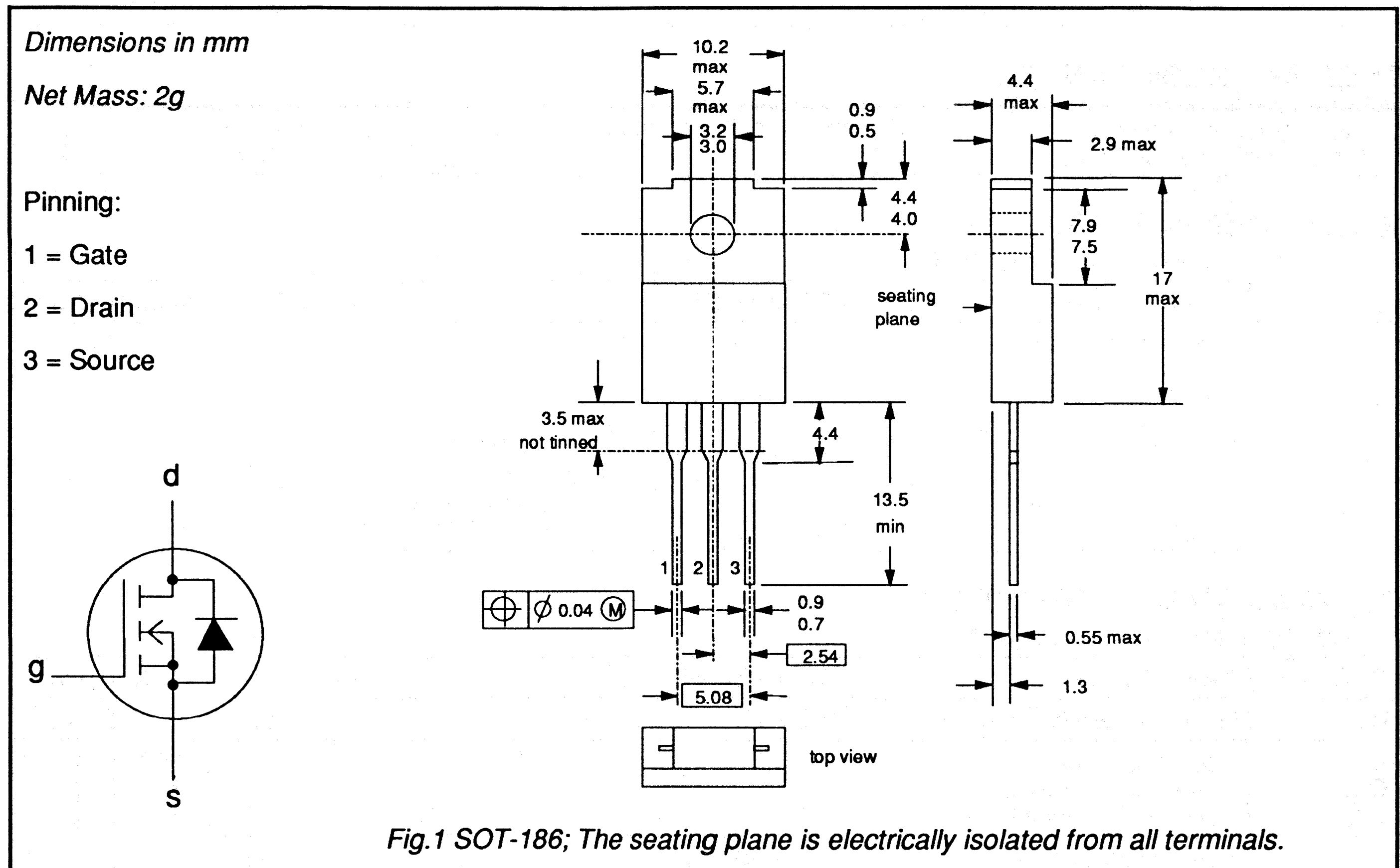


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	60		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	60		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-60A	-60B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9.2	8.4	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5.8	5.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	37	33	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5.68 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	60	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 8.5 A **BUK542-60A**	-	0.12	0.15	Ω
		BUK542-60B	-	0.15	0.18	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	5	6.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	65	100	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 5 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	12	18	ns
t_r	Turn-on rise time		-	60	80	ns
$t_{d\,off}$	Turn-off delay time		-	50	70	ns
t_f	Turn-off fall time		-	45	70	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9.2	A
I_{DRM}	Pulsed reverse drain current	-	-	-	37	A
V_{SD}	Diode forward voltage	I_F = 9.2 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 9.2 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; $V_{DD} \leq$ 25 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

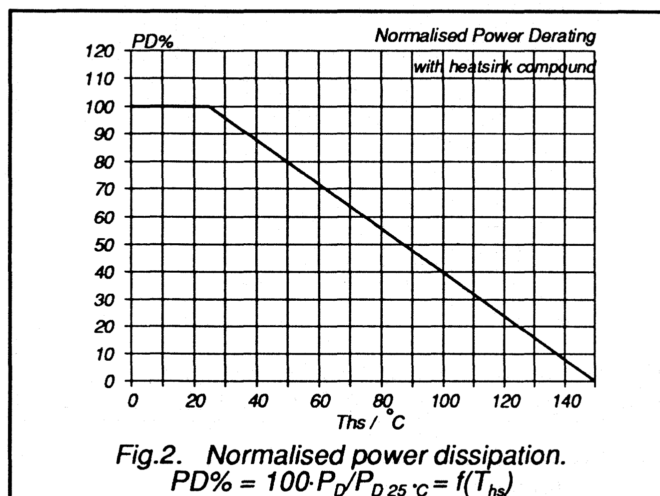


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

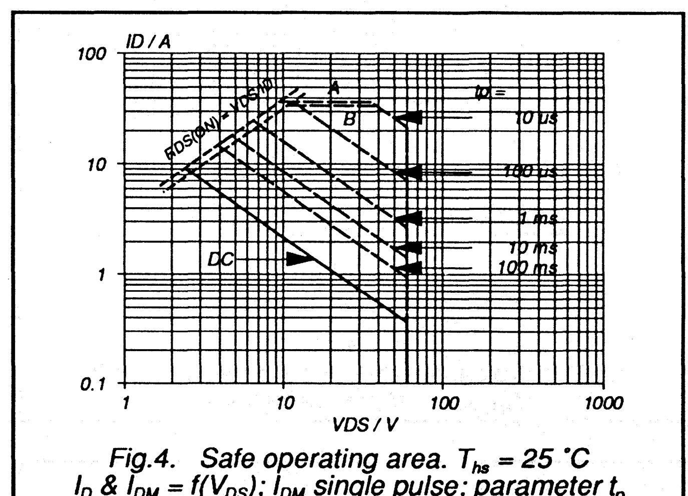


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

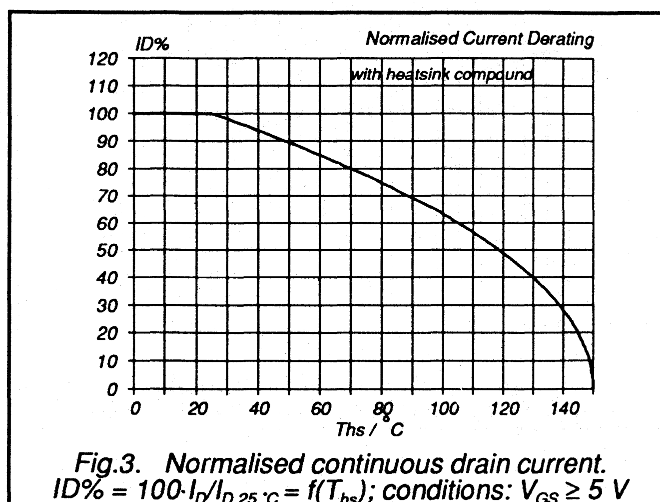


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

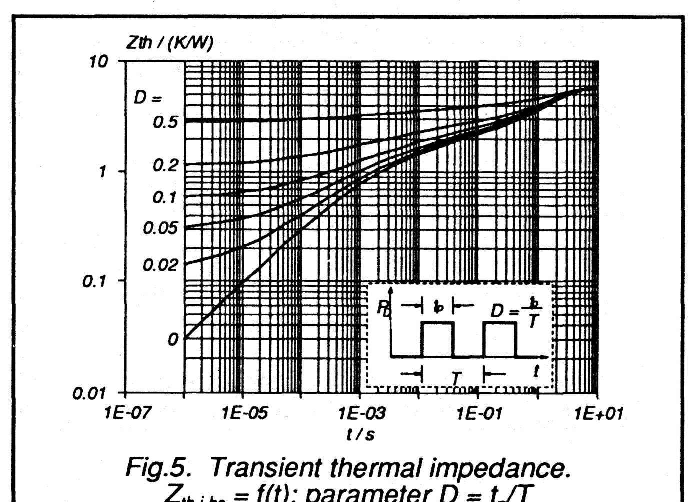


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

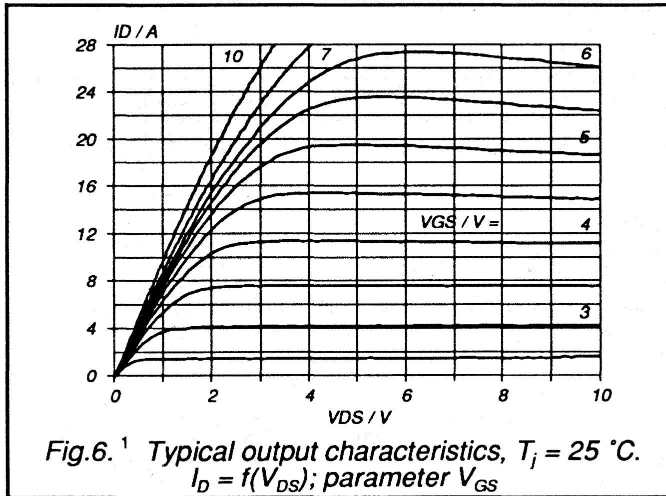


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

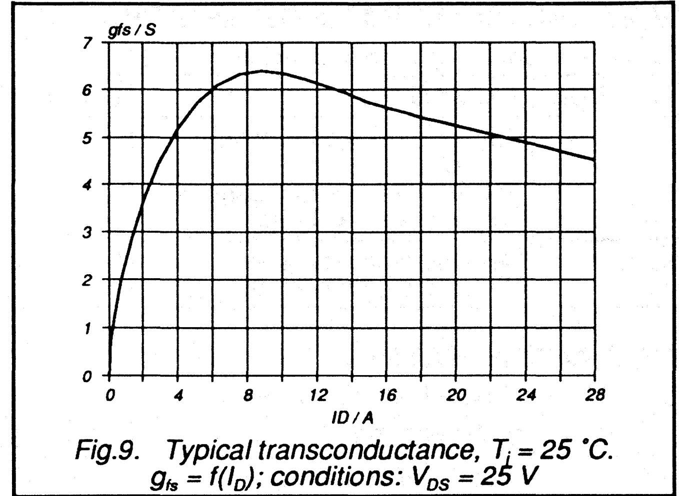


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

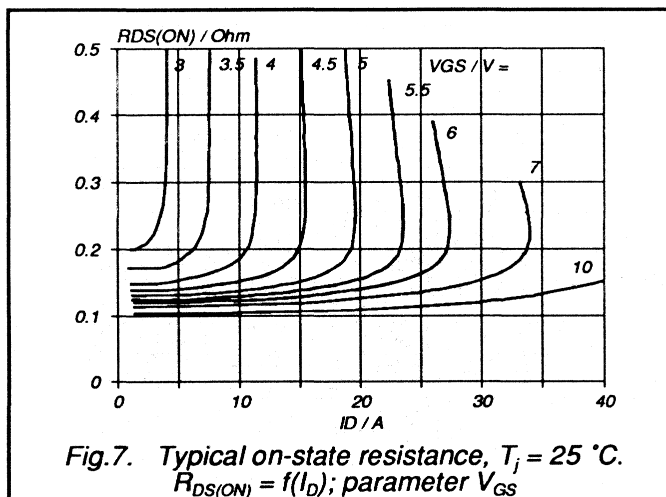


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

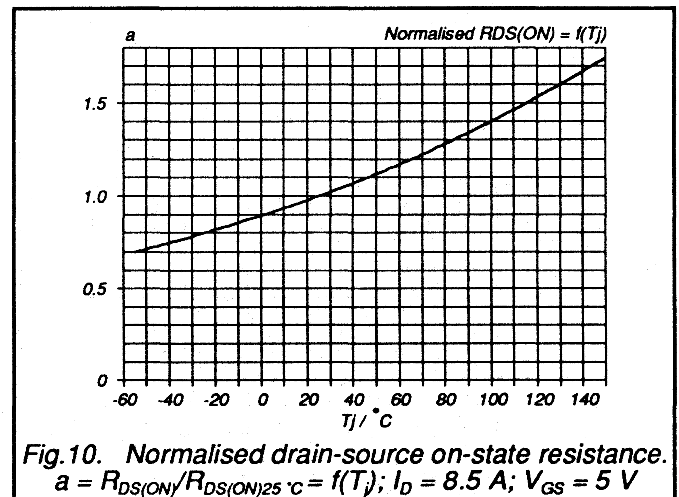


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 8.5 A; V_{GS} = 5 V

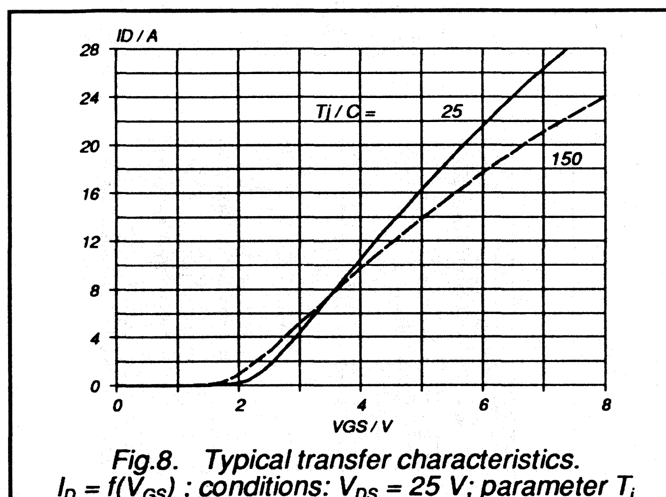


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

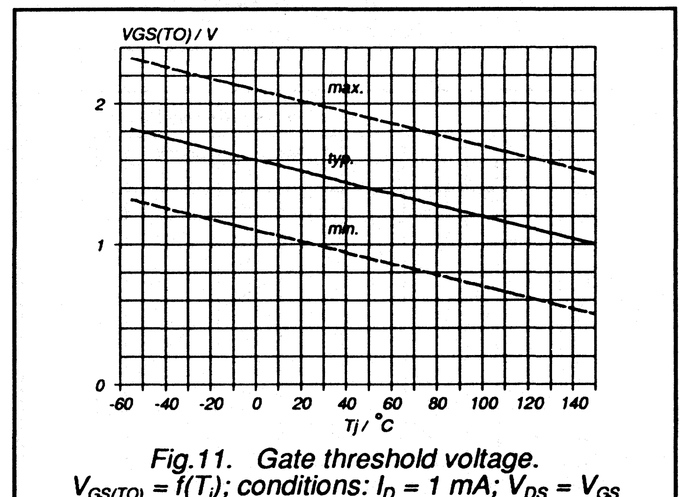


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

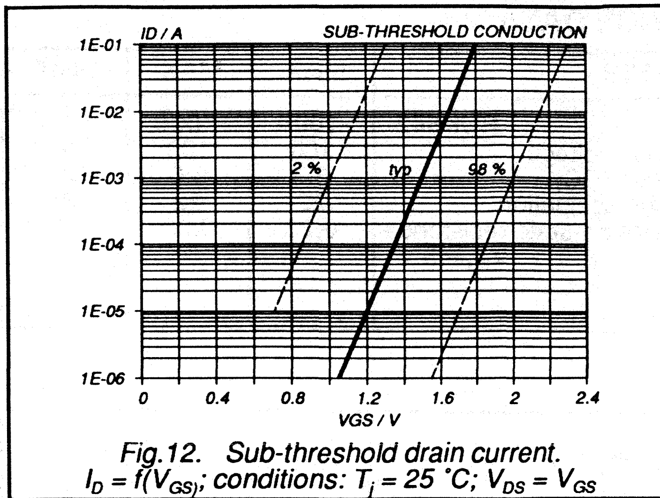


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25\ ^\circ C$; $V_{DS} = V_{GS}$

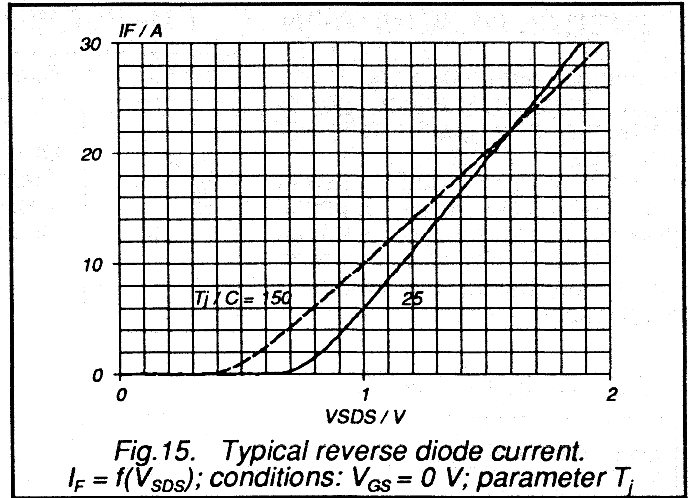


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

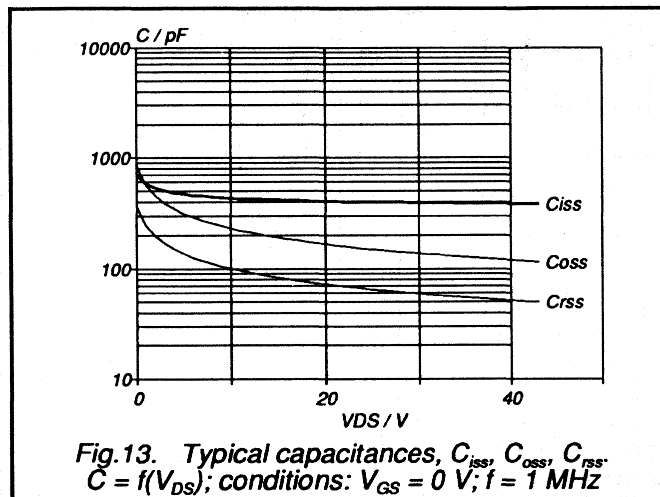


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

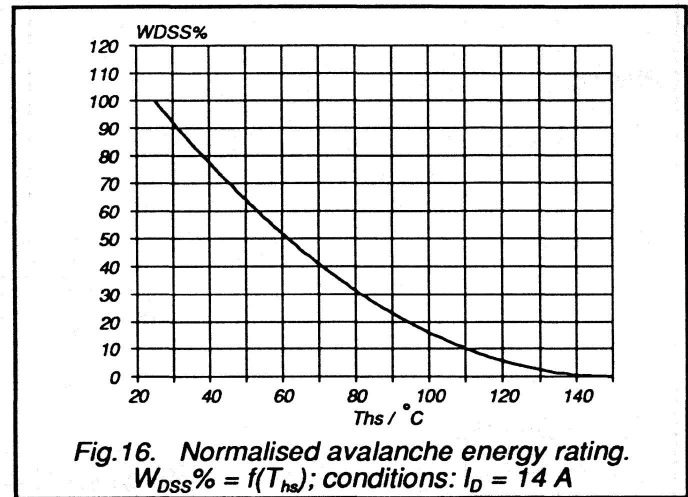


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 14$ A

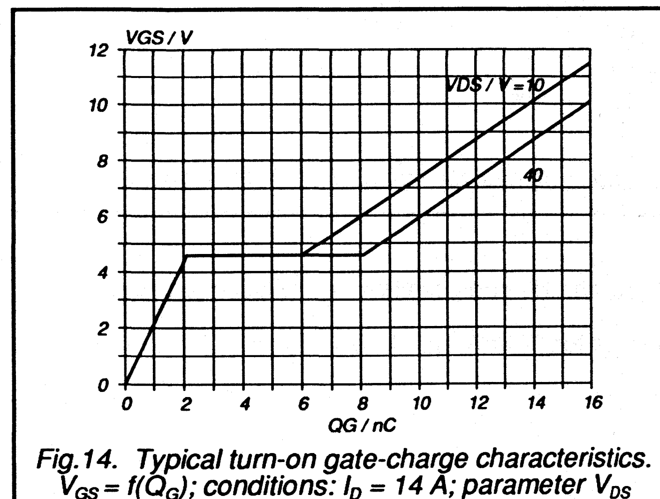


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

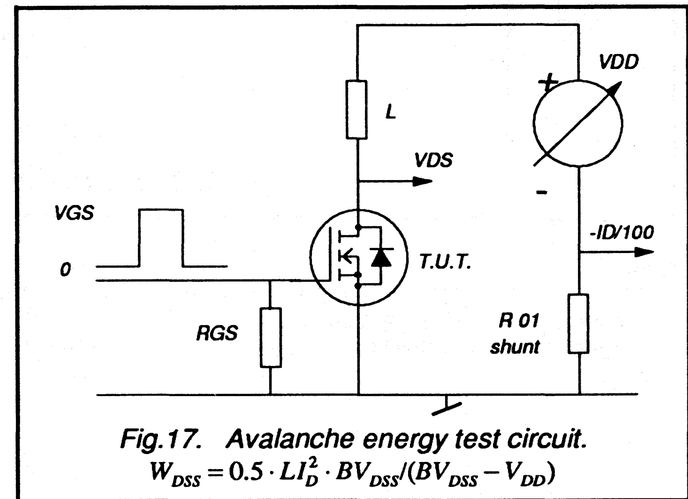


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK542	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	6.3	5.6	A
P_{tot}	Total power dissipation	22	22	W
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.28	0.35	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

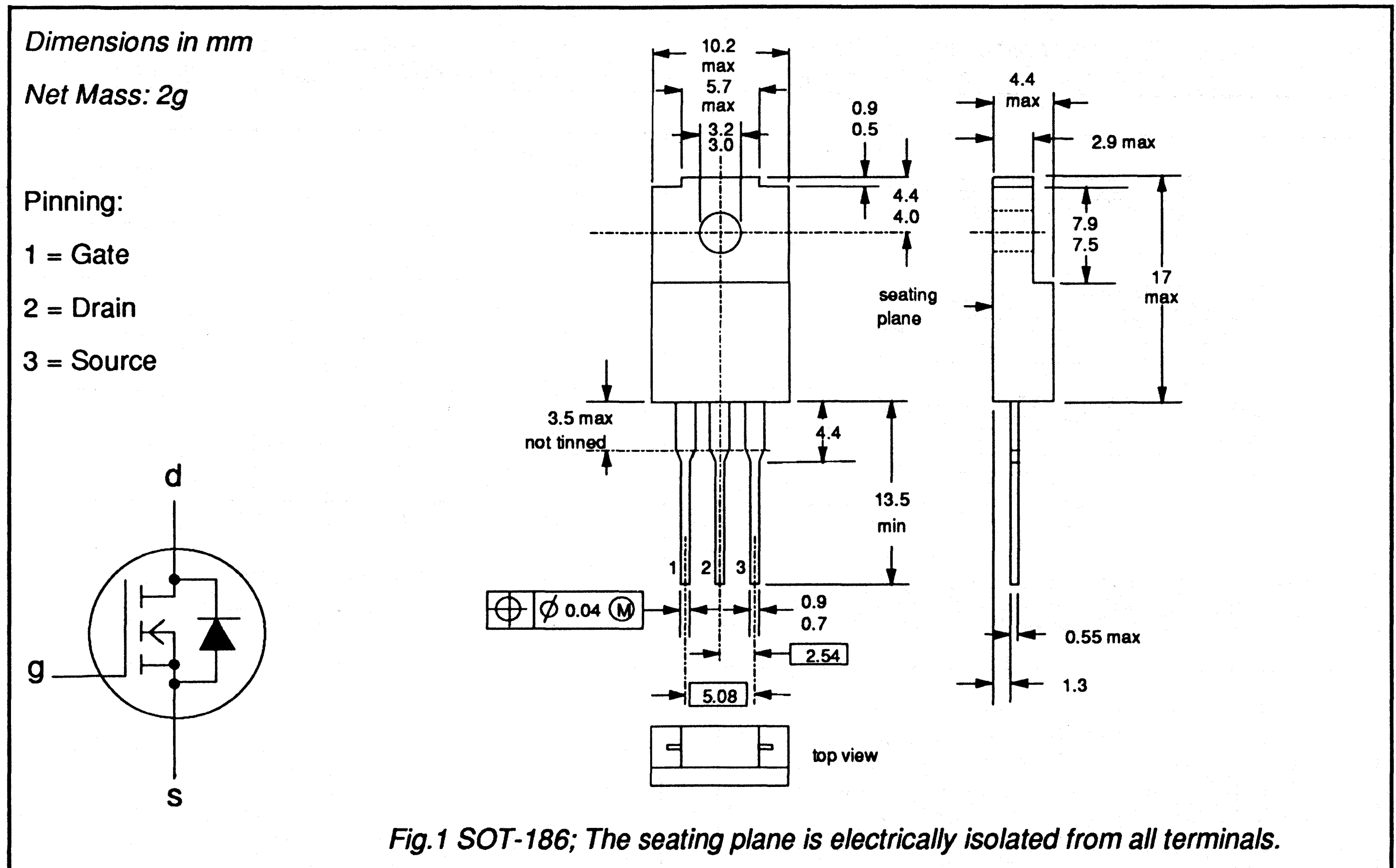


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	6.3	5.6	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	4	3.5	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	25	22	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	22		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 5.68 K/W
From junction to ambient		$R_{th\ j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 5.5 A BUK542-100A	-	0.25	0.28	Ω
		BUK542-100B	-	0.3	0.35	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5.5 A	4.5	6	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	90	120	pF
C_{rss}	Feedback capacitance		-	35	50	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 5 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	12	18	ns
t_r	Turn-on rise time		-	45	70	ns
$t_{d\ off}$	Turn-off delay time		-	50	70	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	6.3	A
I_{DRM}	Pulsed reverse drain current	-	-	-	25	A
V_{SD}	Diode forward voltage	I_F = 6.3 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 6.3 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; $V_{DD} \leq 50$ V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

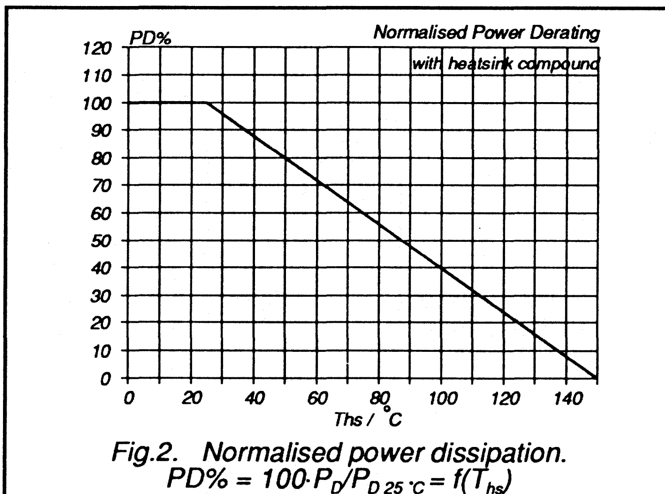


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

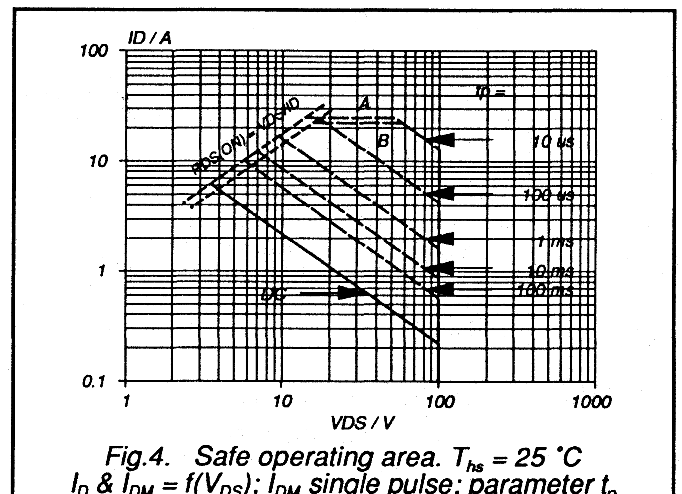


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

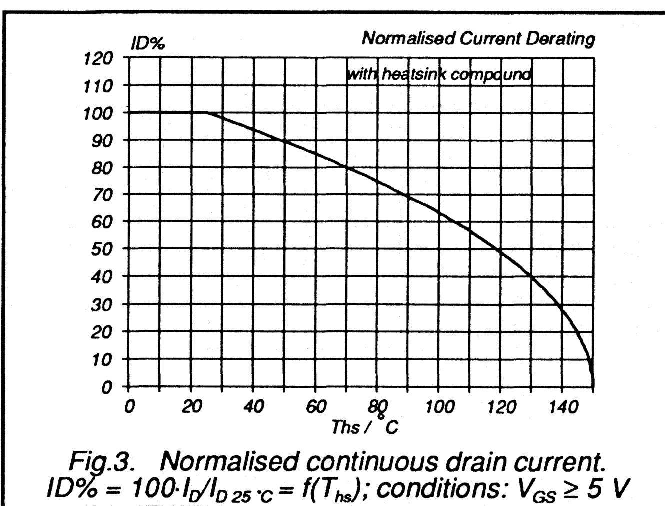


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

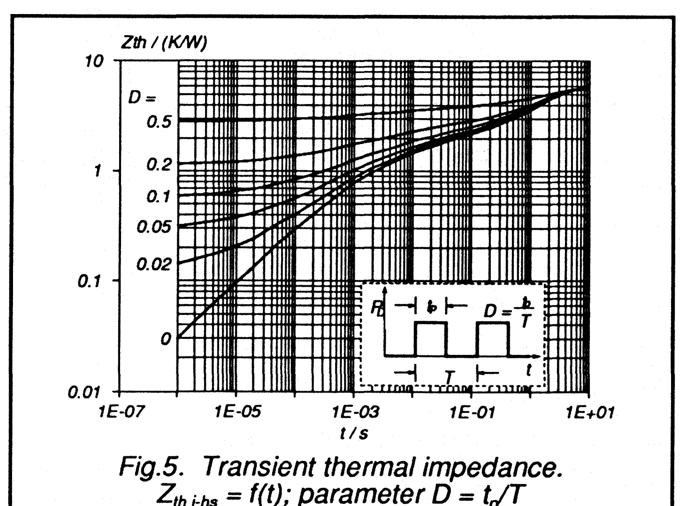


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

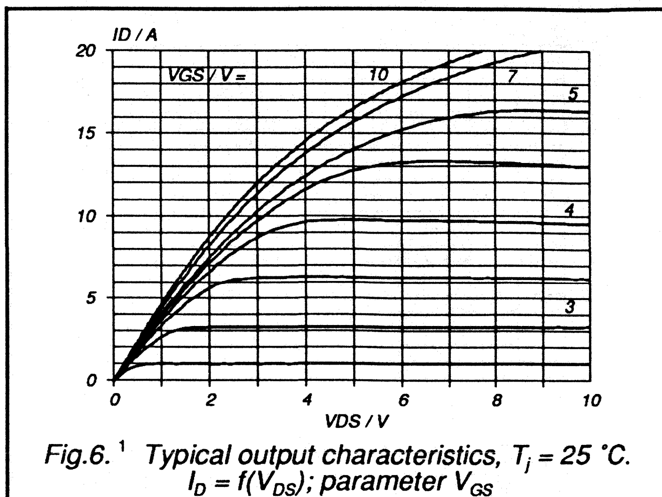


Fig.6. [1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

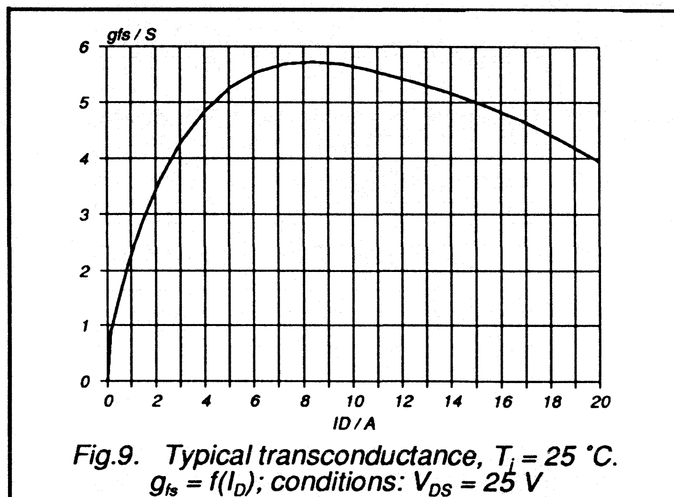


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

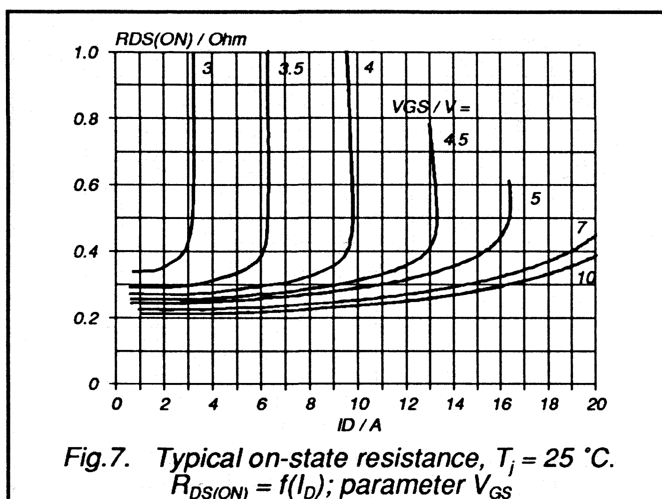


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

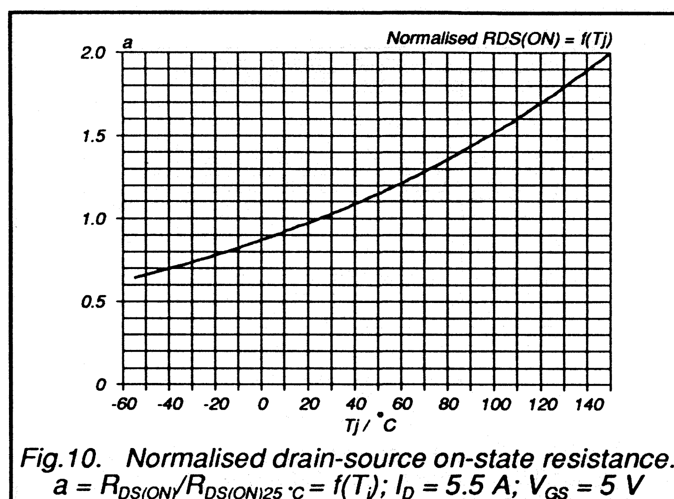


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 5.5$ A; $V_{GS} = 5$ V

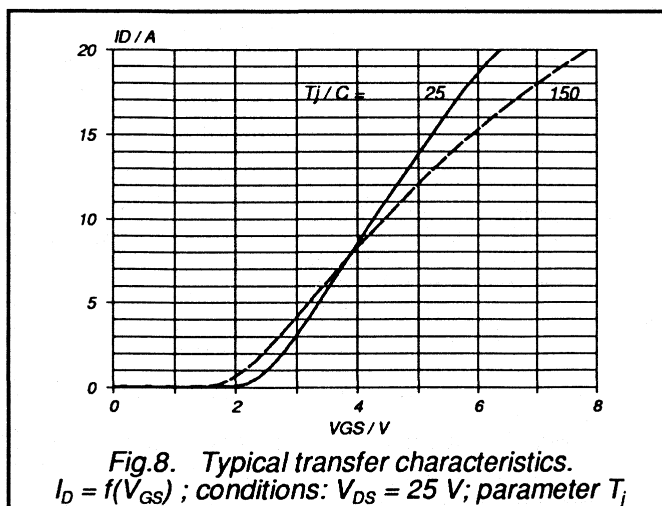


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

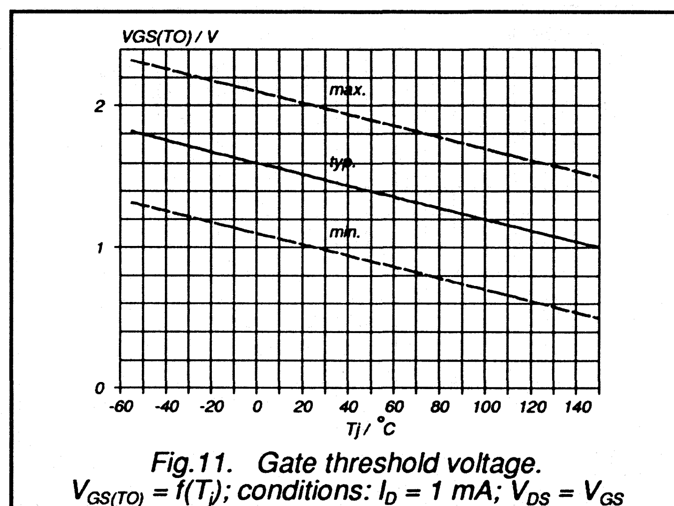


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

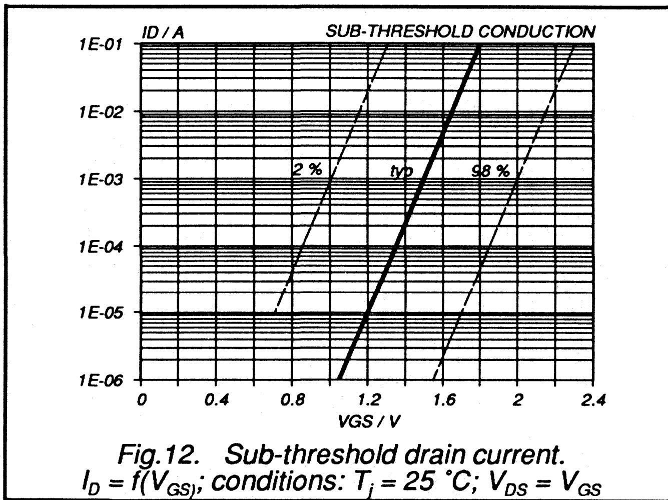


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

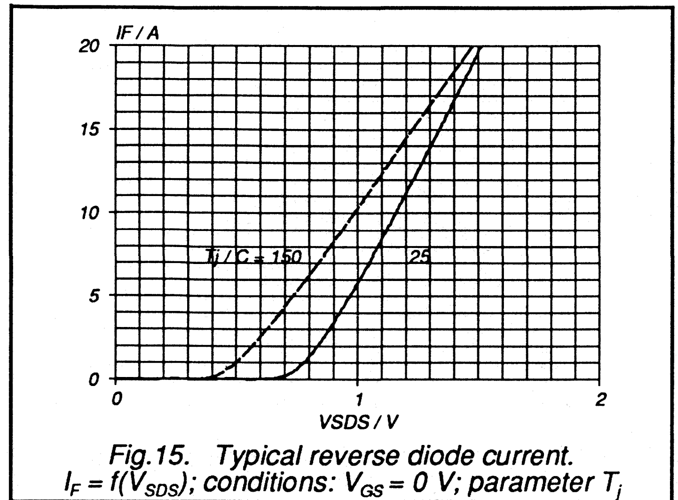


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

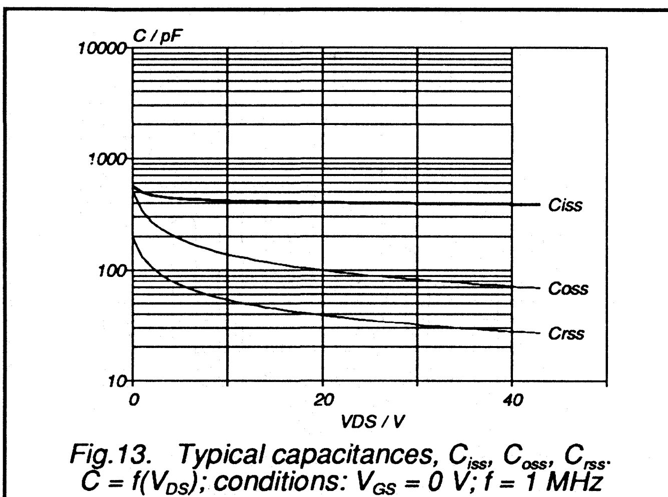


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

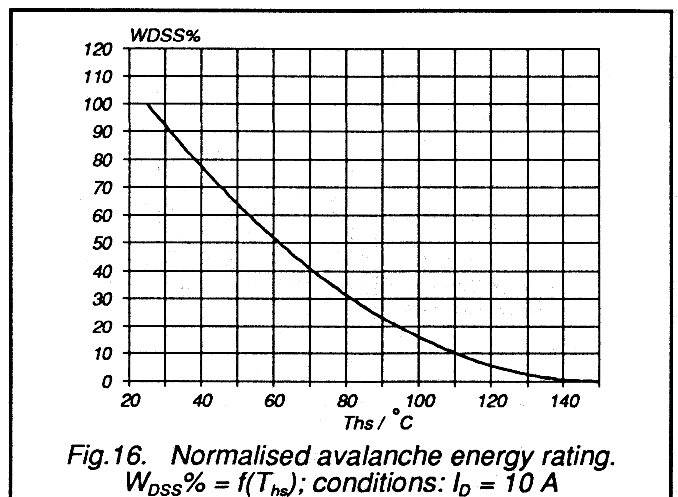


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 10$ A

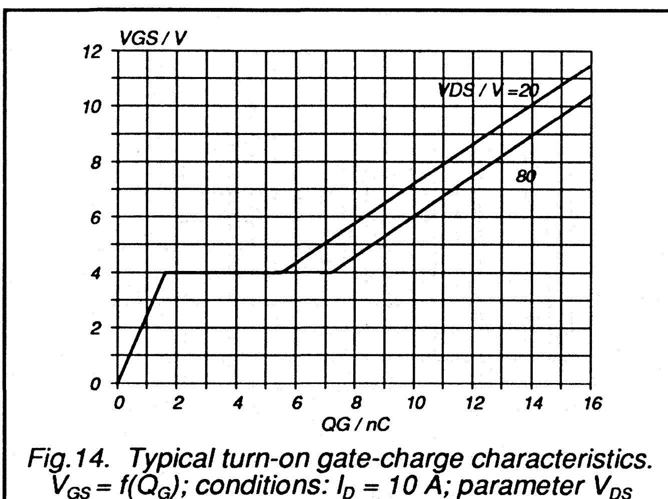


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

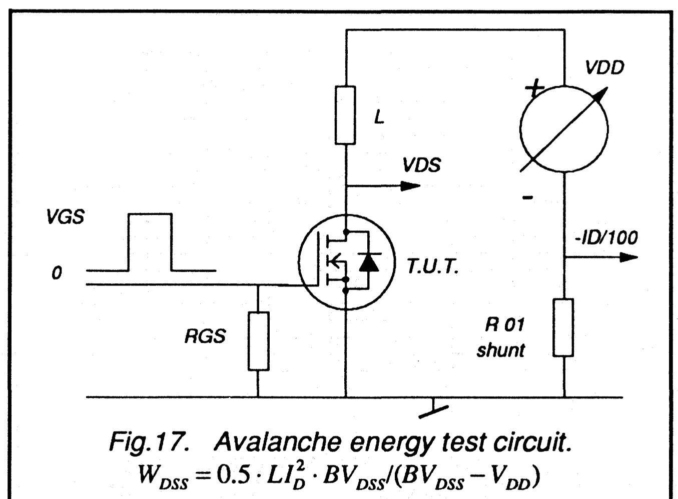


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK543	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	13	12	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} 5 V	0.085	0.1	Ω

MECHANICAL DATA

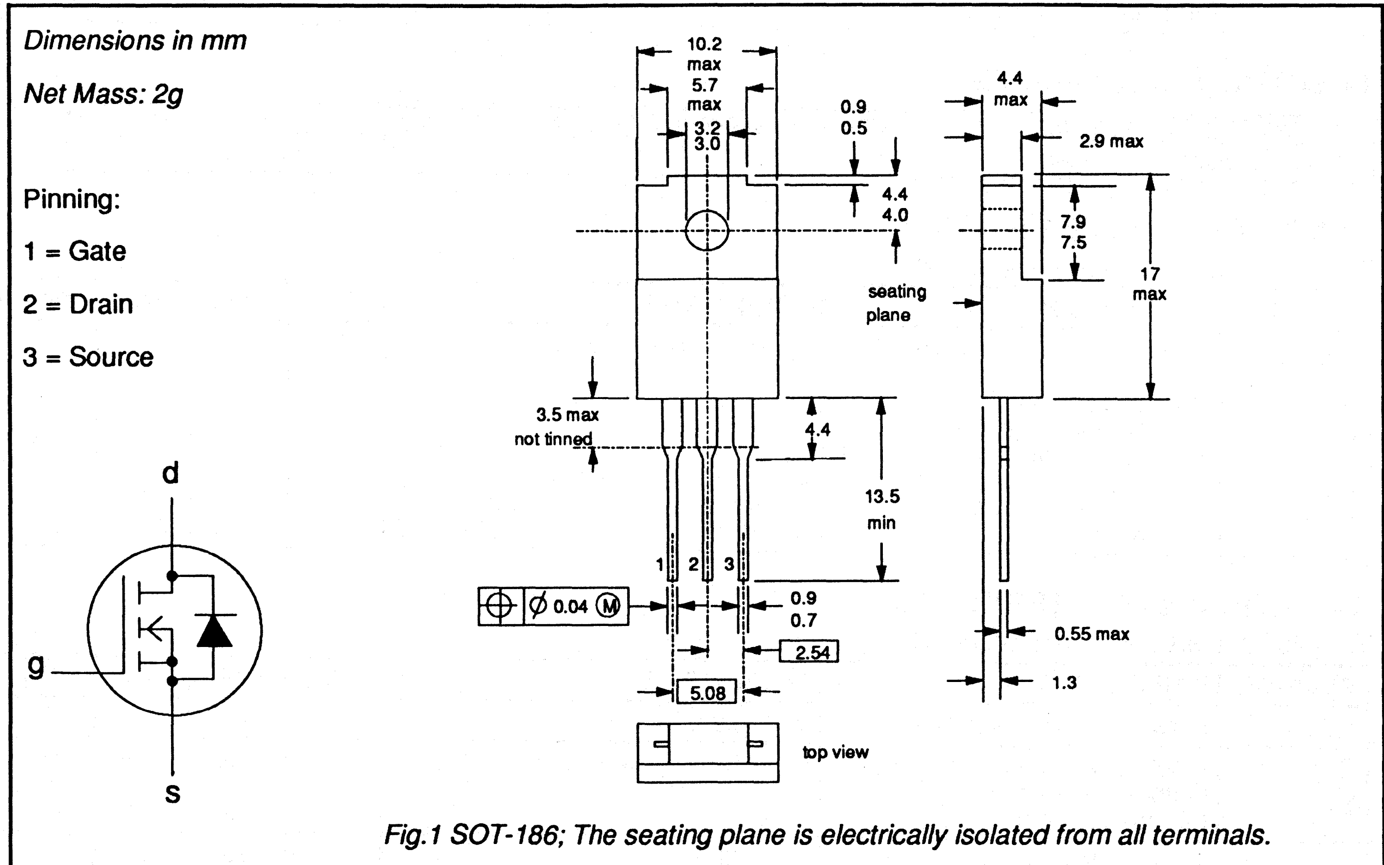


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	**-50B**	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	13	12	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	8.2	7.6	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	52	48	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 5 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 10 A **BUK543-50A**	-	0.075	0.085	Ω
		BUK543-50B	-	0.08	0.10	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	7	10	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	700	825	pF
C_{oss}	Output capacitance		-	240	350	pF
C_{rss}	Feedback capacitance		-	130	160	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	95	120	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	80	110	ns
t_f	Turn-off fall time		-	65	85	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	13	A
I_{DRM}	Pulsed reverse drain current	-	-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 13 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 20 A ; $V_{DD} \leq 25$ V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	45	mJ

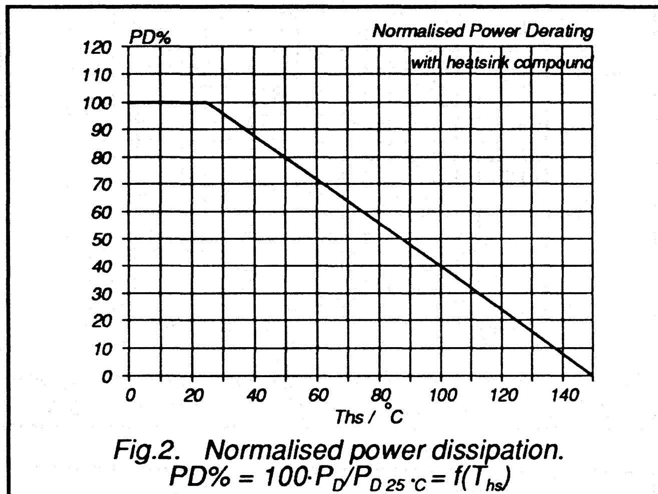


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

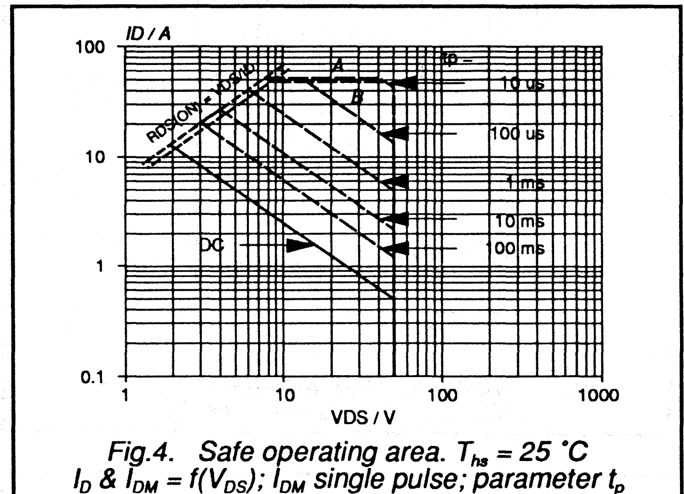


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

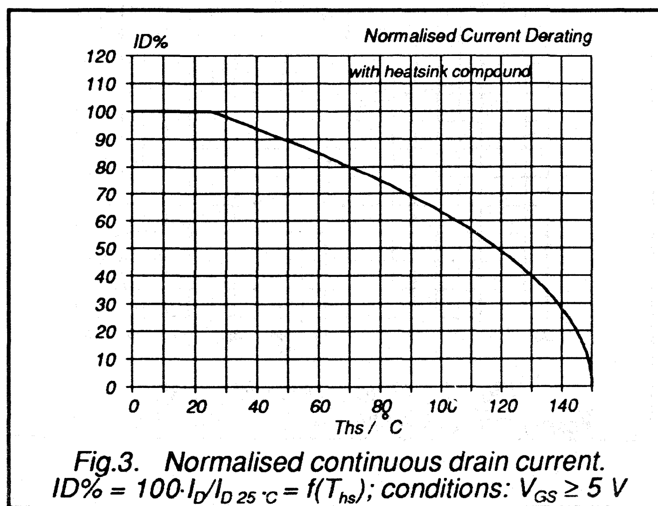


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

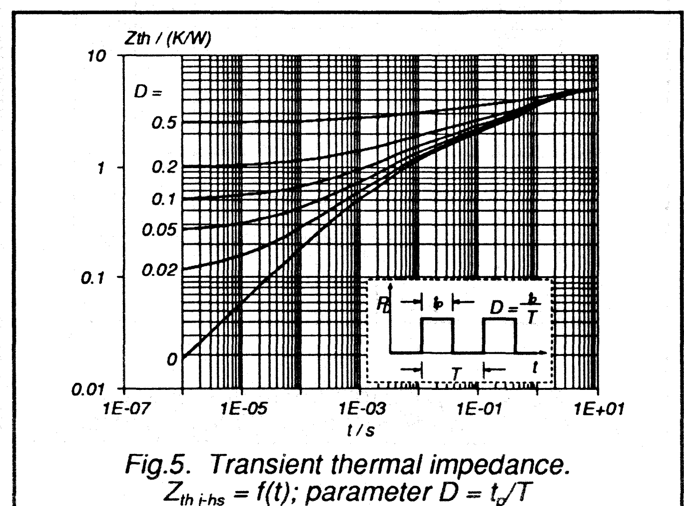


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

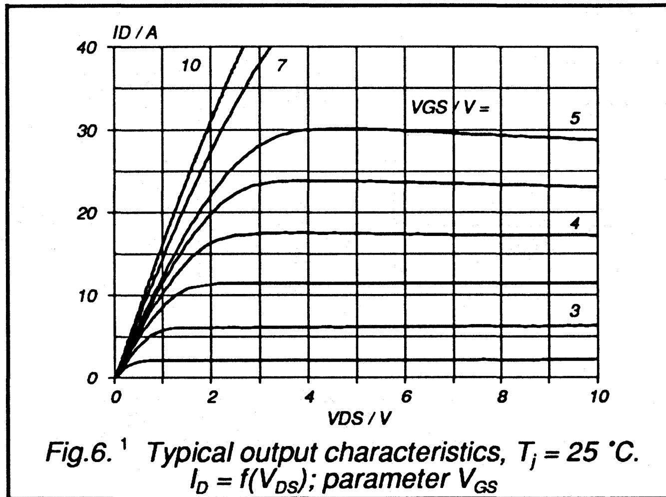


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

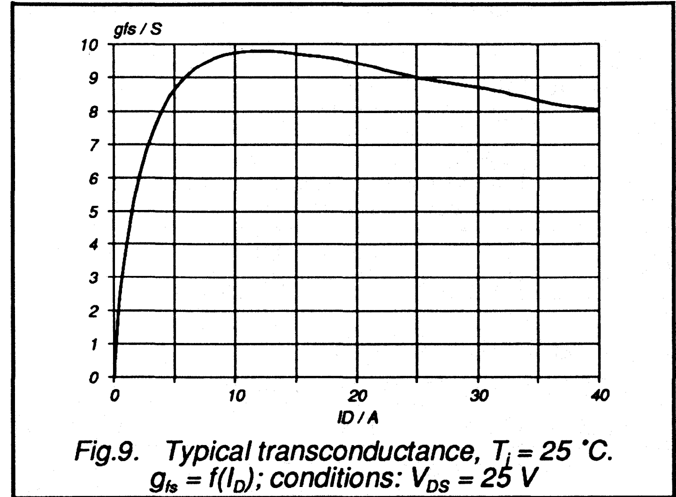


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

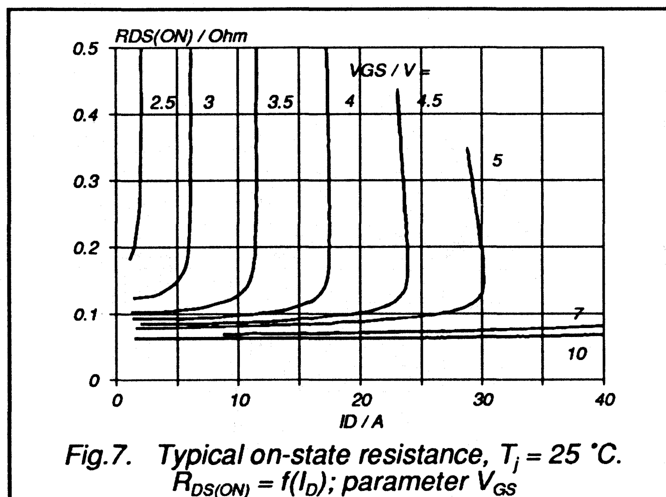


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

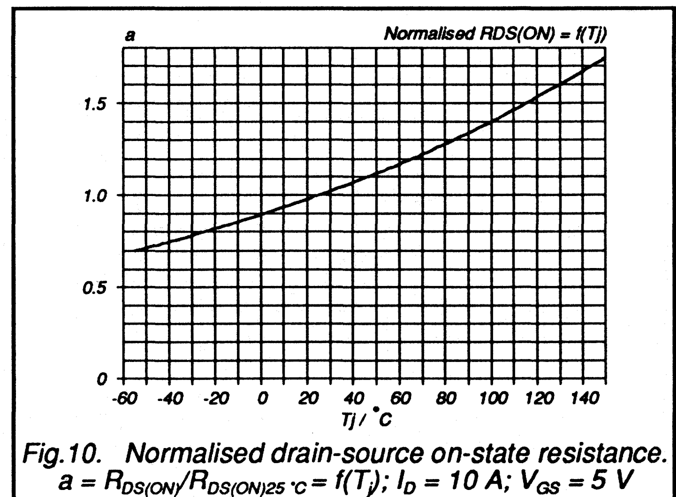


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 10 A; V_{GS} = 5 V

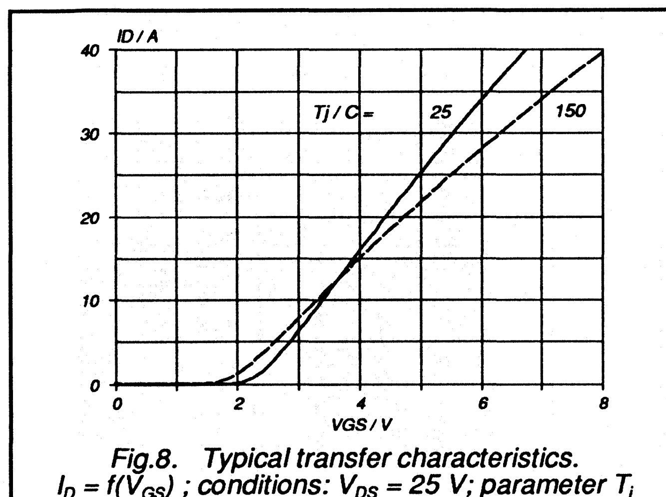


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

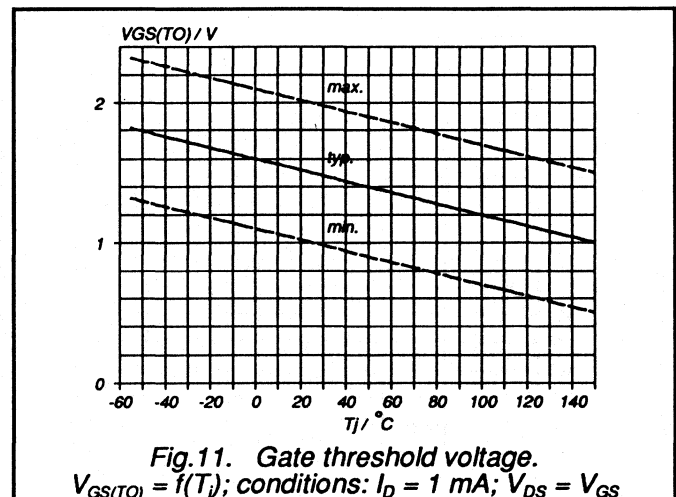


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

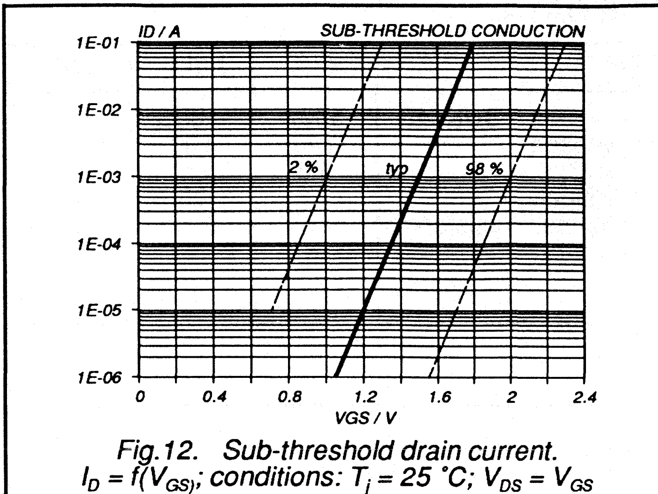


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

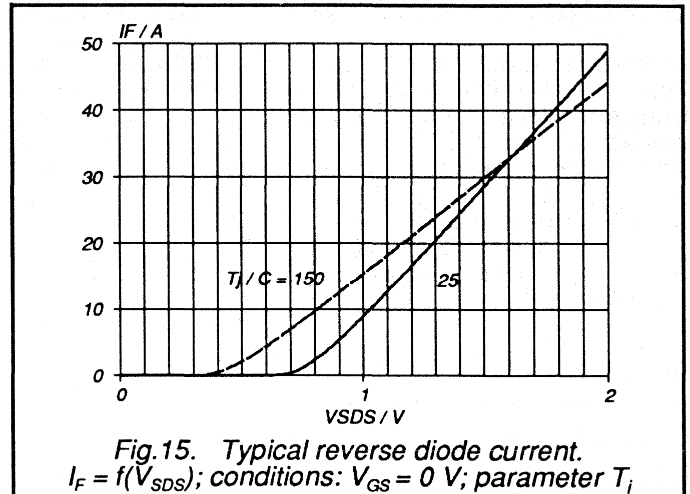


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

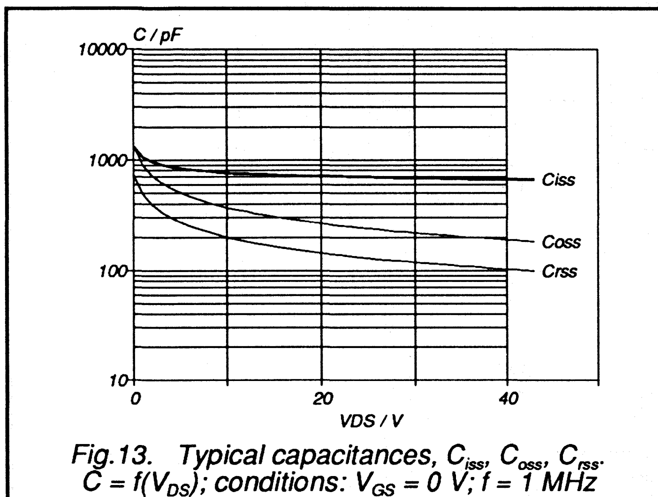


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

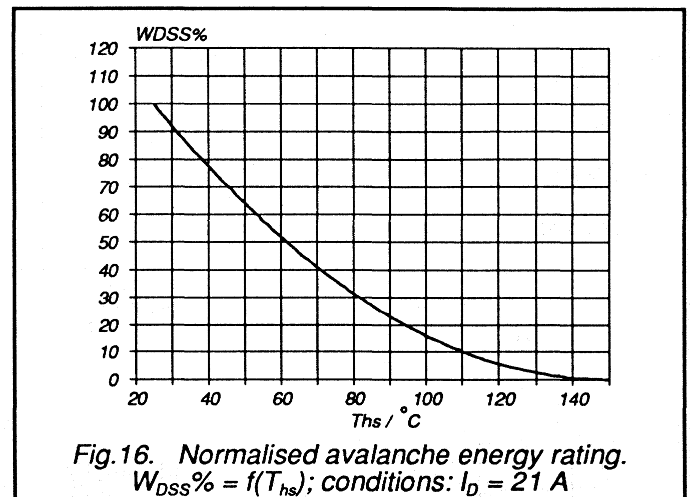


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 21$ A

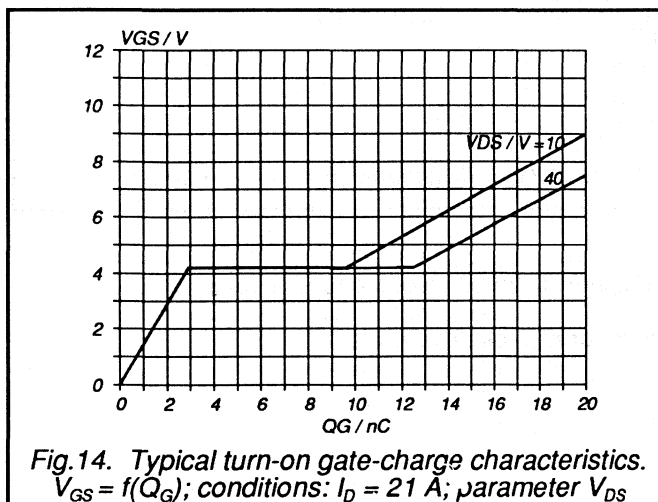


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 21$ A; parameter V_{DS}

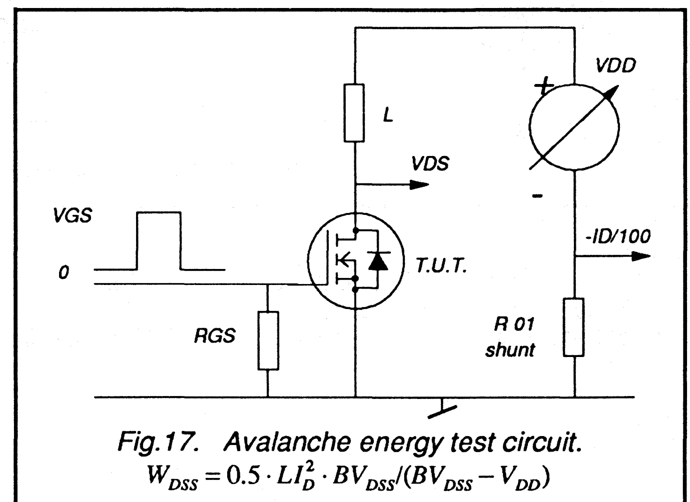


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK543	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	8.3	7.5	A
P_{tot}	Total power dissipation	25	25	W
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.18	0.22	Ω

MECHANICAL DATA

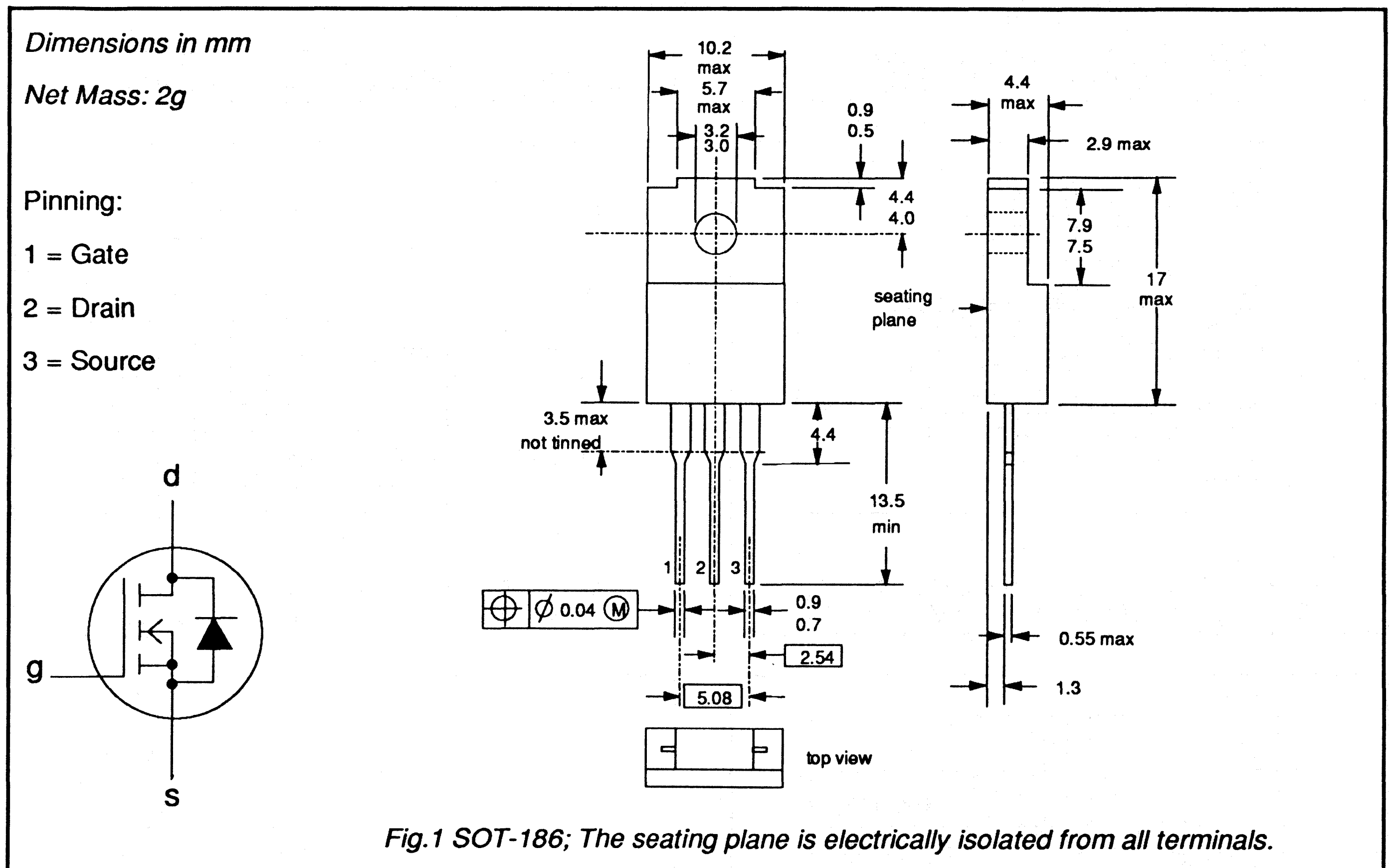


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	8.3	7.5	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	5.2	4.7	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	33	30	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	25		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 5 K/W
From junction to ambient		$R_{th\ j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 5 A BUK543-100A	-	0.17	0.18	Ω
		BUK543-100B	-	0.20	0.22	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5 A	6.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	620	825	pF
C_{oss}	Output capacitance		-	180	250	pF
C_{rss}	Feedback capacitance		-	90	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 5 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	20	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\ off}$	Turn-off delay time		-	90	115	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	8.3	A
I_{DRM}	Pulsed reverse drain current	-	-	-	33	A
V_{SD}	Diode forward voltage	I_F = 8.3 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 8.3 A; $-dI_F/dt$ = 100 A/µs;	-	170	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.3	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 13 A ; $V_{DD} \leq$ 50 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	70	mJ

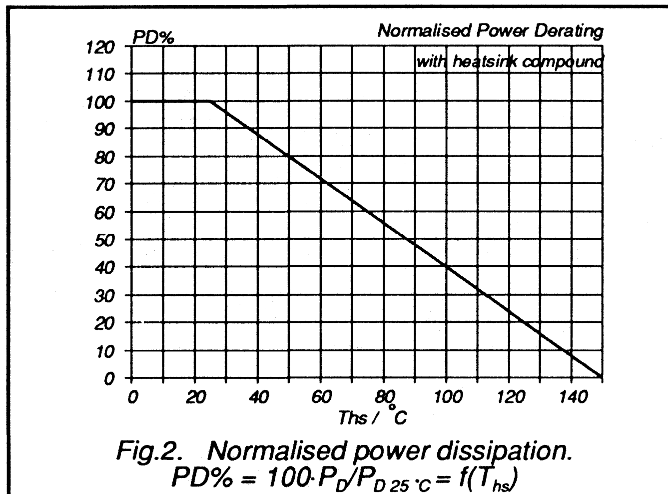


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

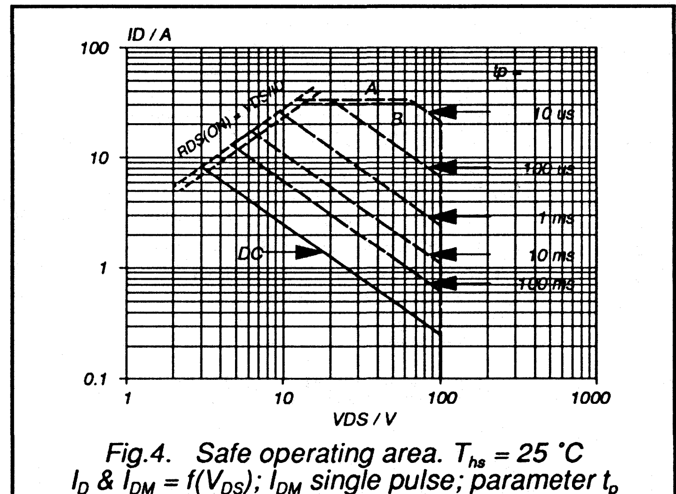


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

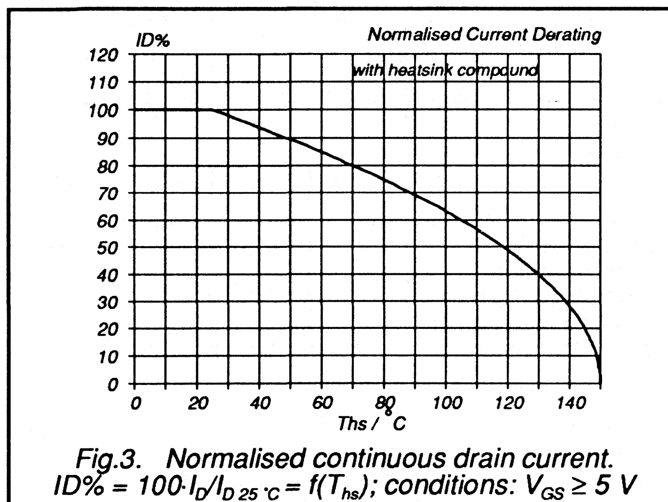


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

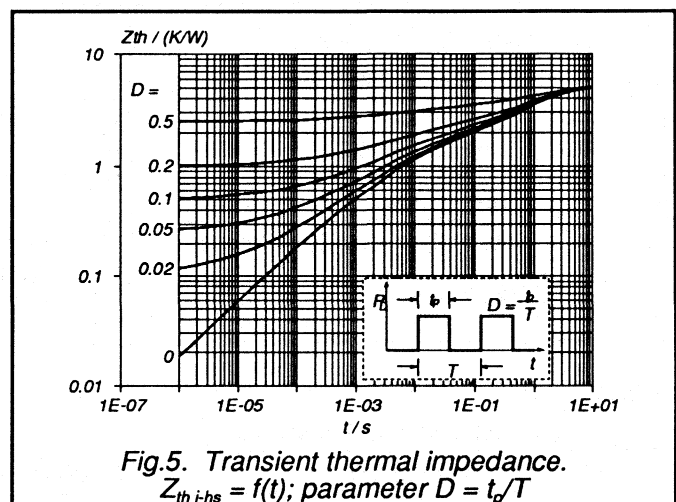


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

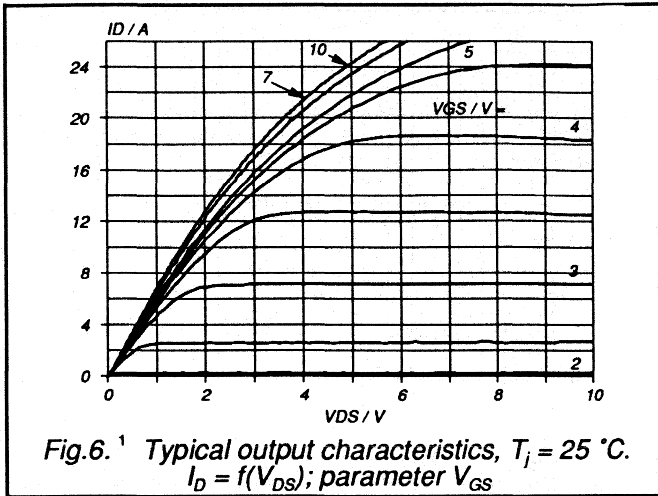


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

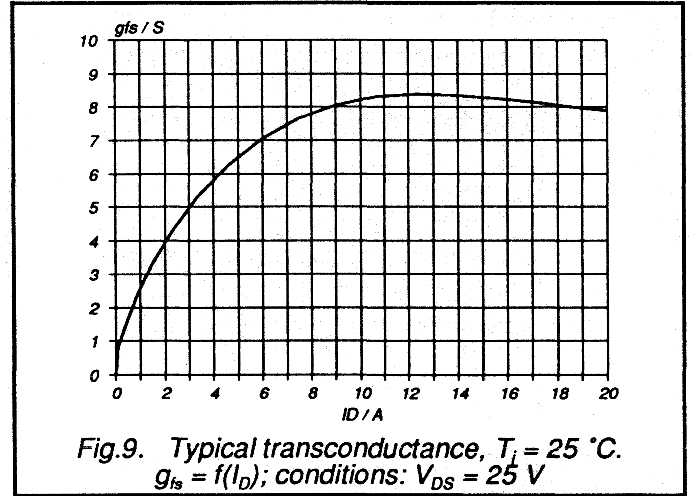


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

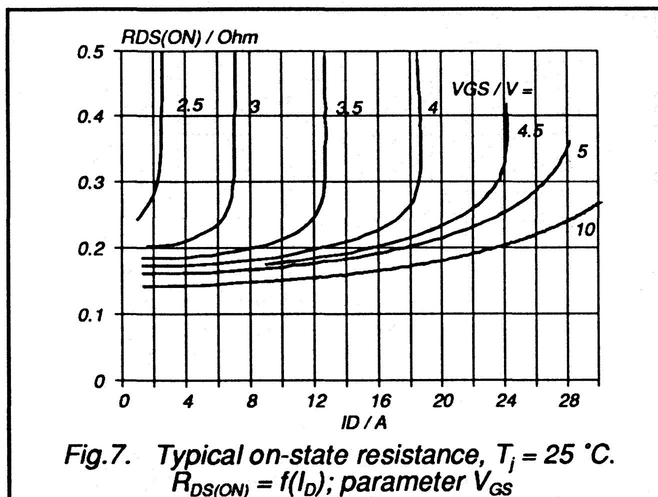


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

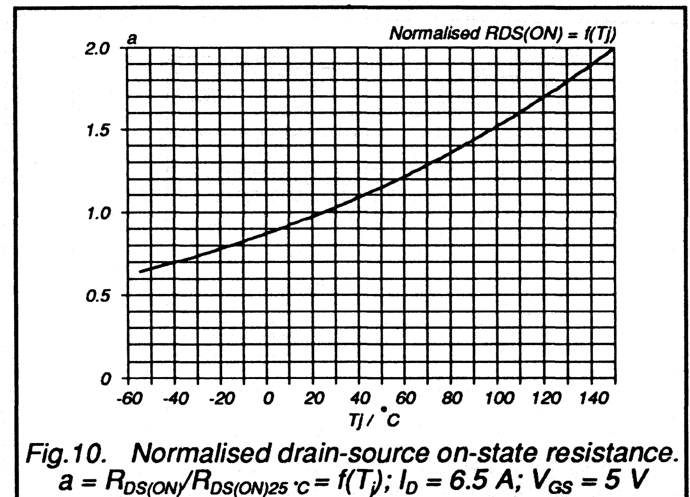


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 5 V

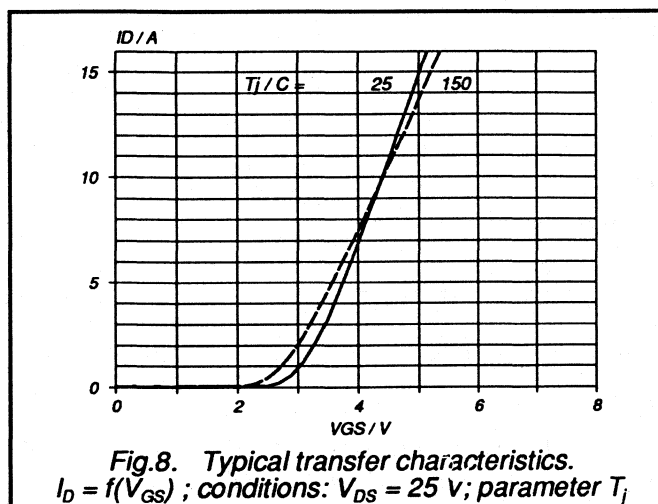


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

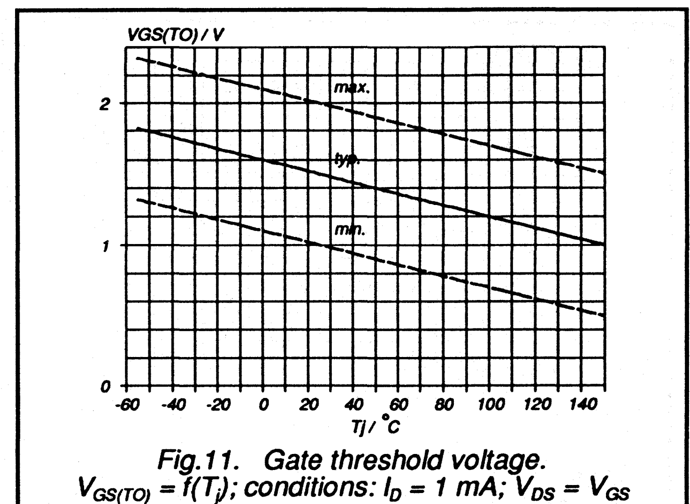


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

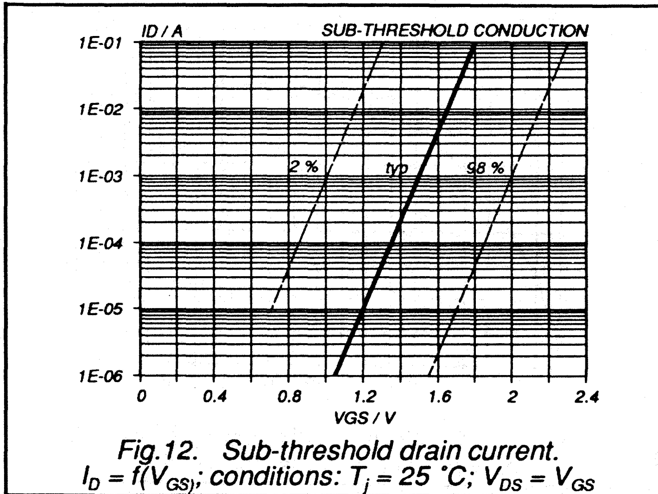


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

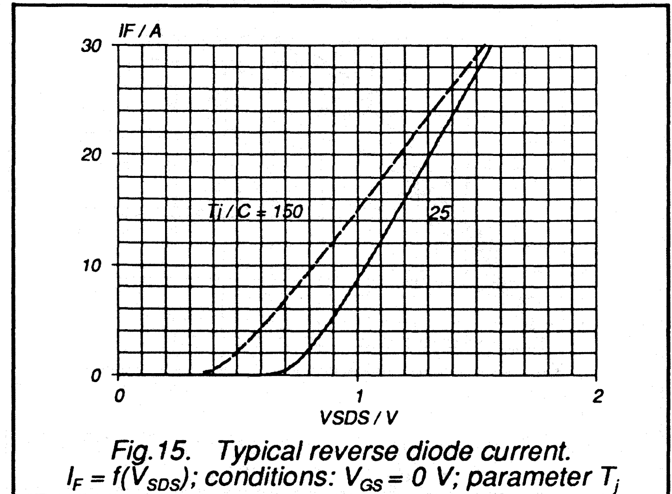


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

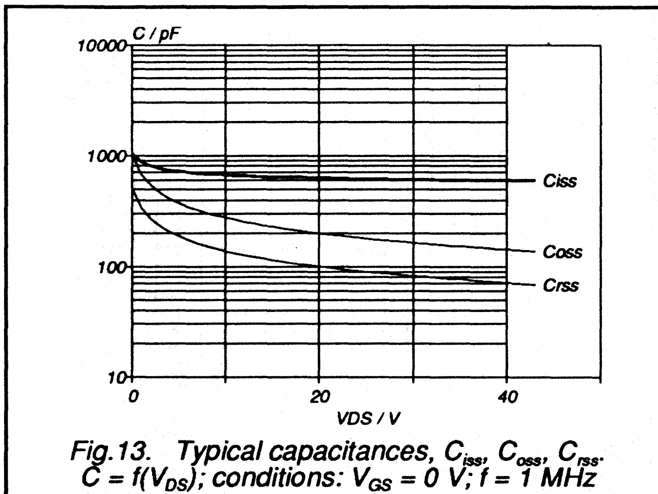


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

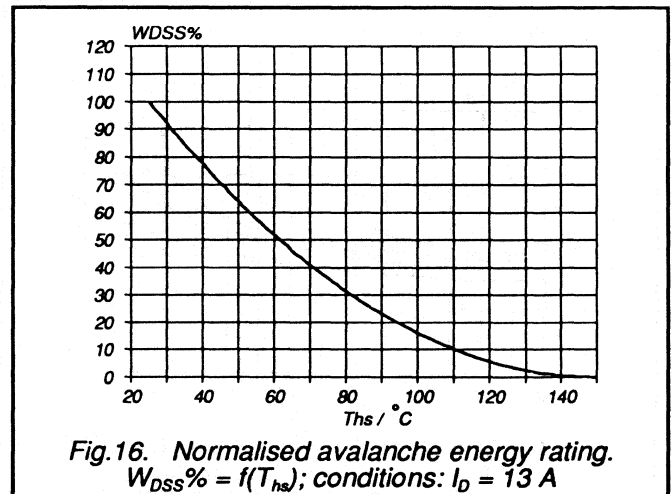


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 13$ A

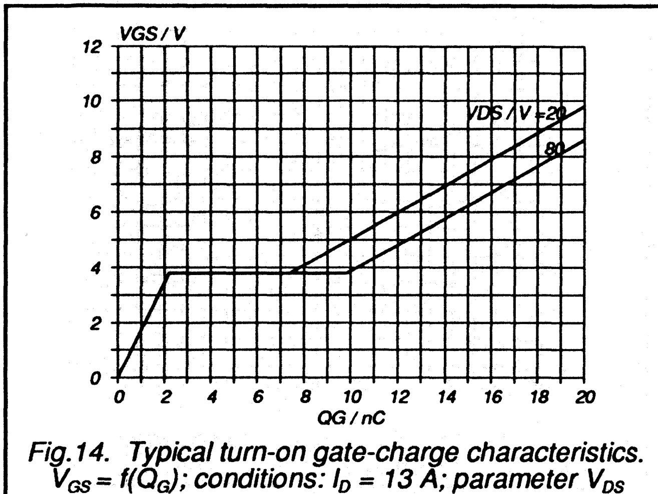


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 13$ A; parameter V_{DS}

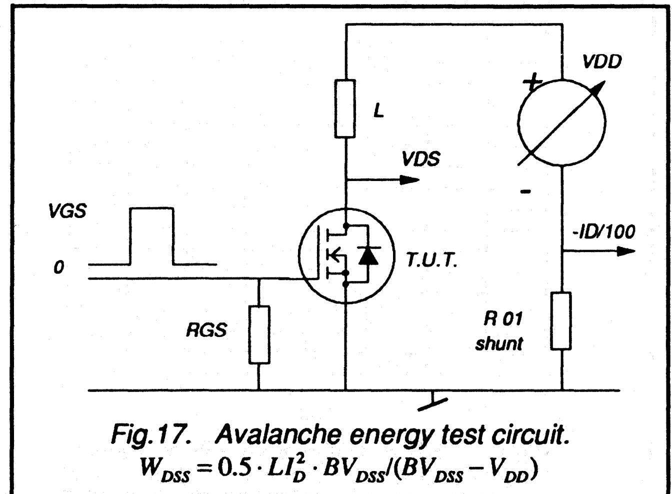


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK545	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	20	18	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.042	0.055	Ω

MECHANICAL DATA

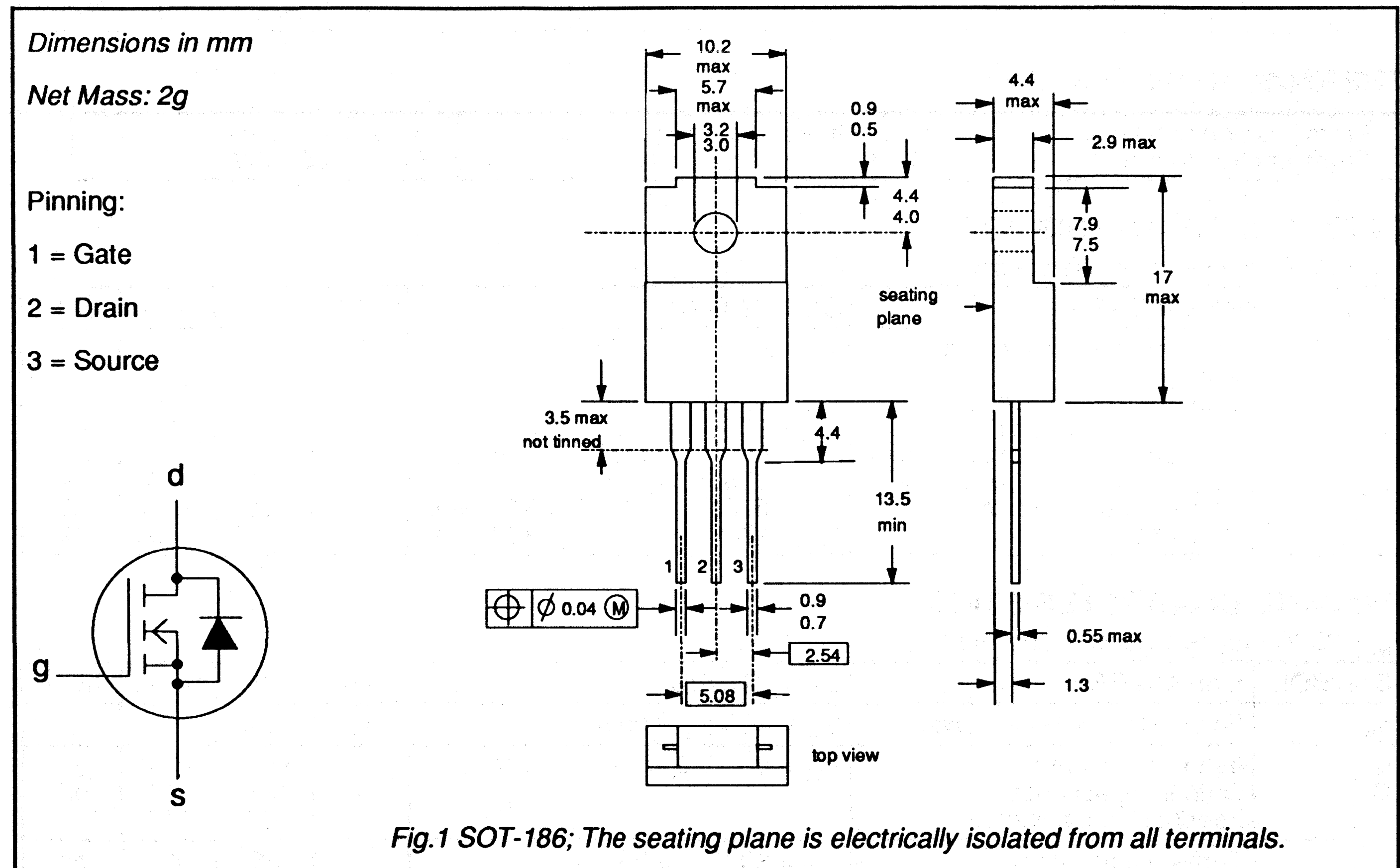


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	**-50B**	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	20	18	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	13	11	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	80	72	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 ˚C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 20 A **BUK545-50A**	-	0.035	0.042	Ω
		BUK545-50B	-	0.045	0.055	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 20 A	15	20	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1450	1750	pF
C_{oss}	Output capacitance		-	500	600	pF
C_{rss}	Feedback capacitance		-	220	275	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	120	150	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	160	220	ns
t_f	Turn-off fall time		-	110	145	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	20	A
I_{DRM}	Pulsed reverse drain current	-	-	-	80	A
V_{SD}	Diode forward voltage	I_F = 20 A ; V_{GS} = 0 V	-	1.4	2.0	V
t_{rr}	Reverse recovery time	I_F = 20 A; $-dI_F/dt$ = 100 A/µs;	-	250	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.30	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 39 A ; $V_{DD} \leq 25$ V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	90	mJ

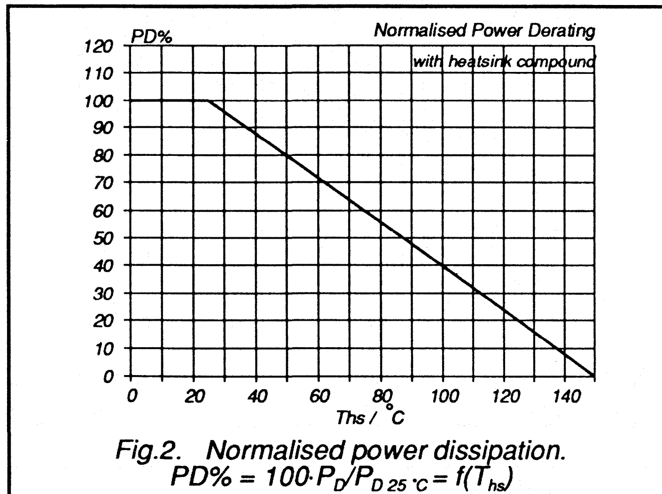


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

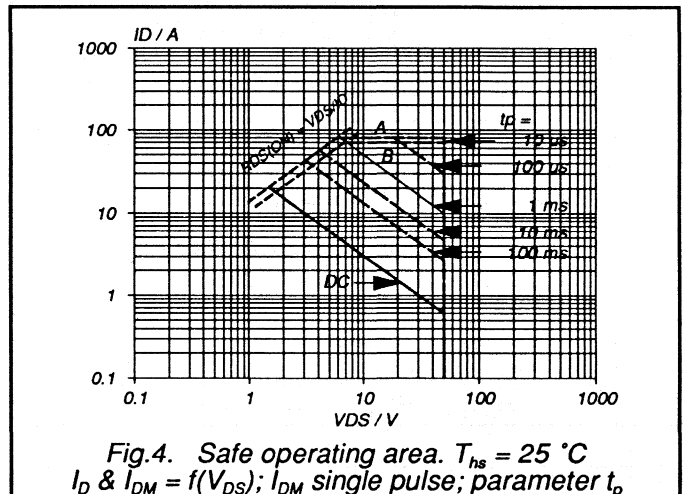


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

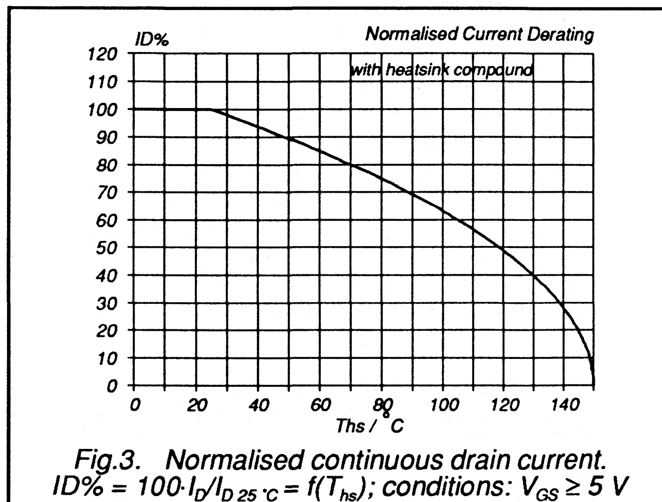


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

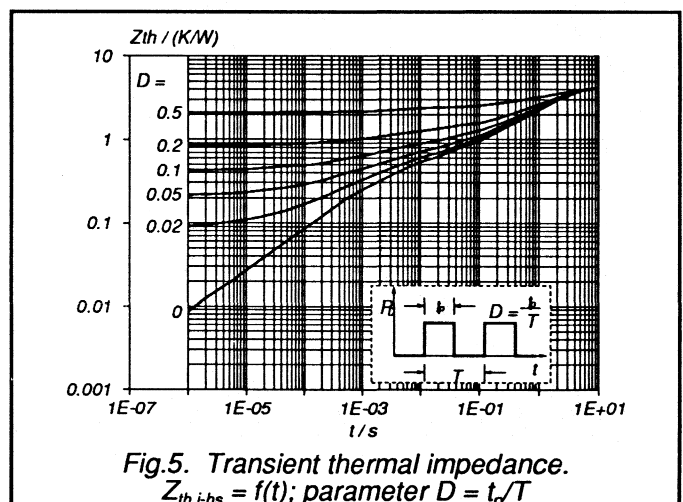


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

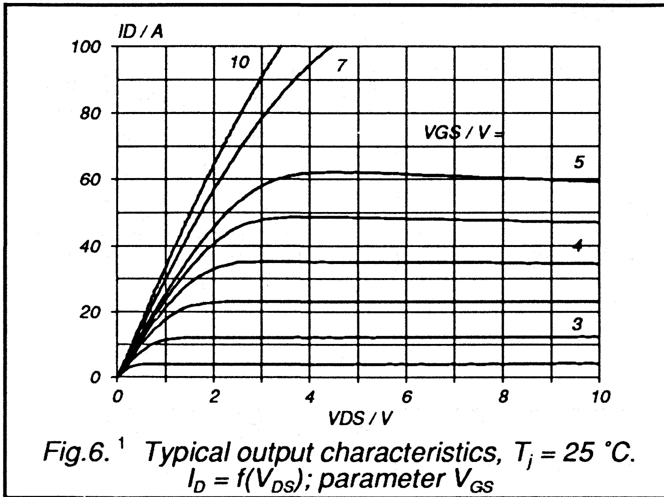


Fig.6.[1] Typical output characteristics, $T_j = 25\ ^\circ C$.
$I_D = f(V_{DS})$; parameter V_{GS}

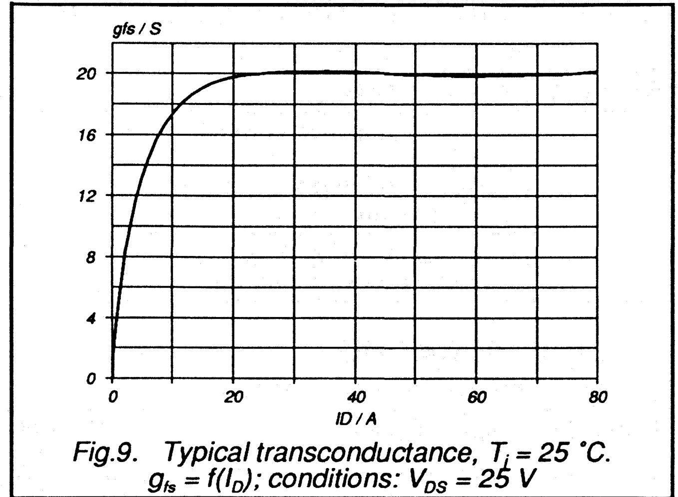


Fig.9. Typical transconductance, $T_j = 25\ ^\circ C$.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

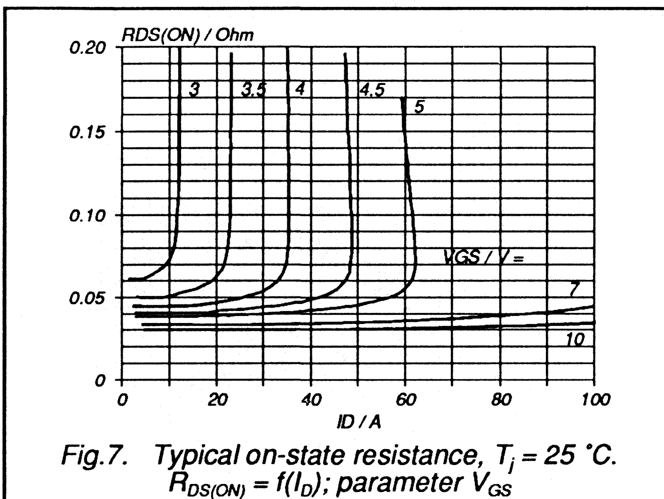


Fig.7. Typical on-state resistance, $T_j = 25\ ^\circ C$.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

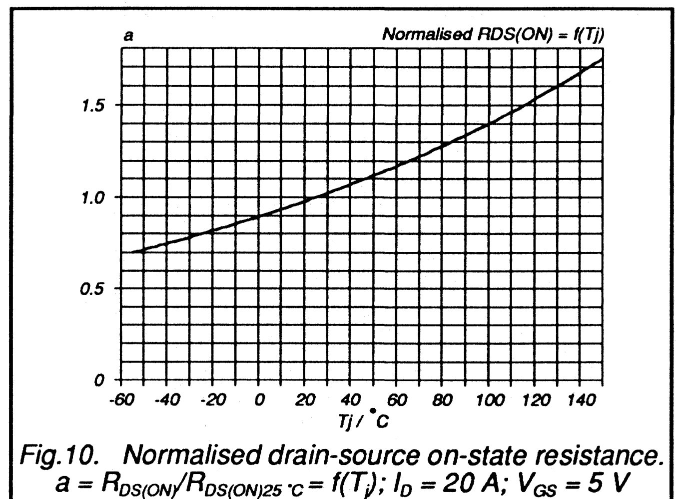


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ^\circ C} = f(T_j)$; $I_D = 20$ A; $V_{GS} = 5$ V

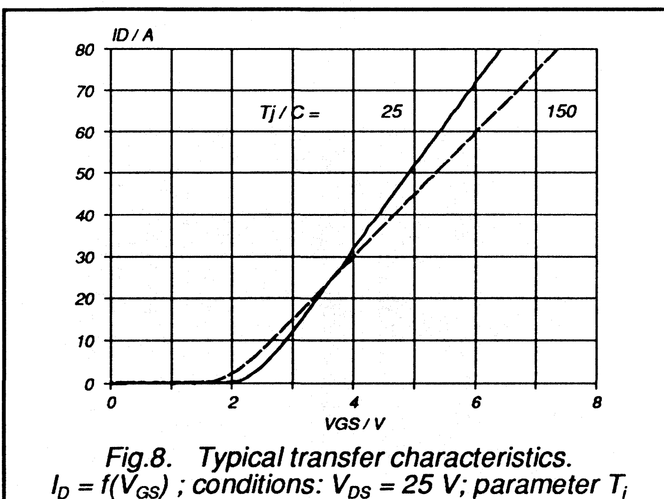


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

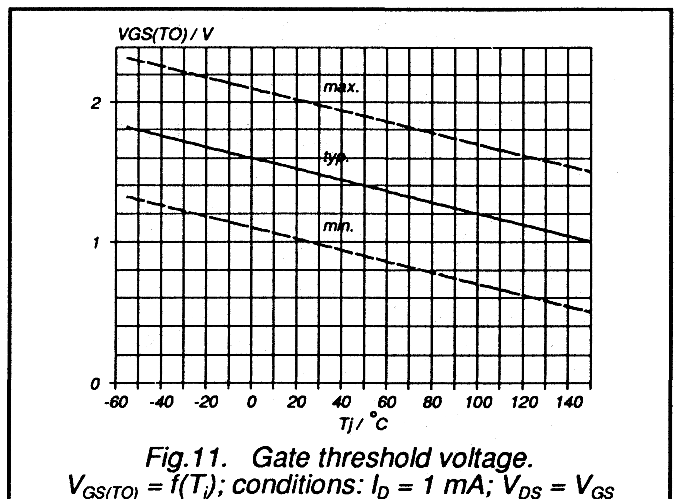


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

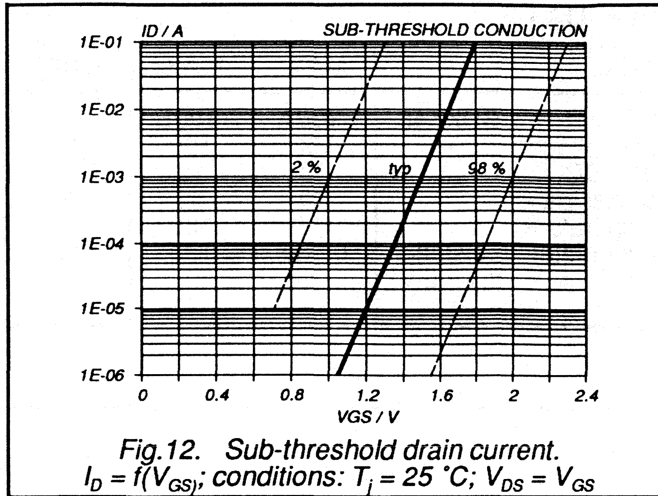


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

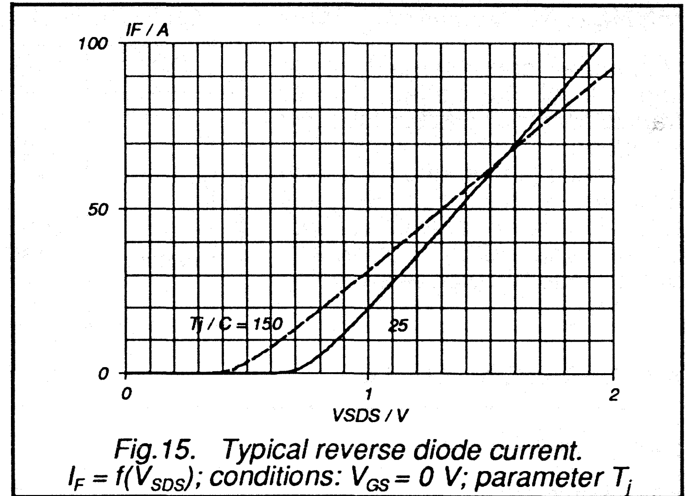


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

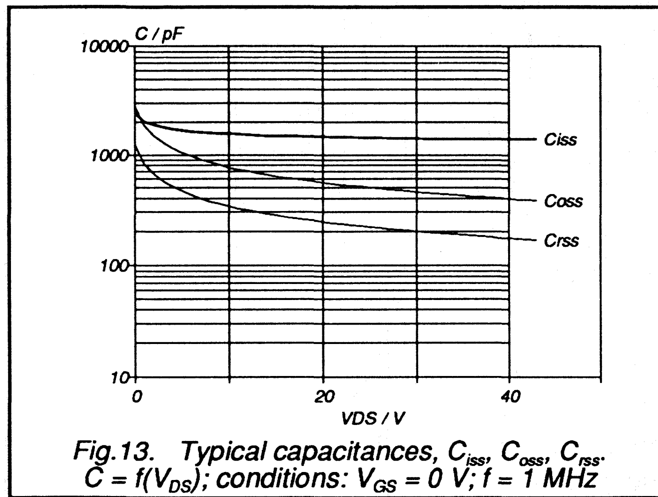


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

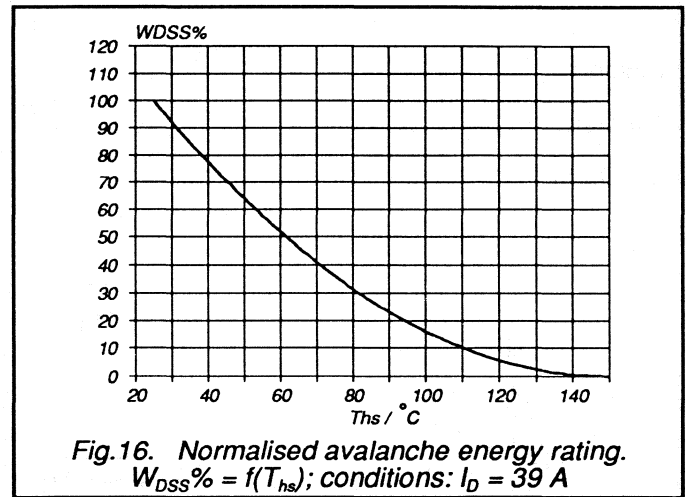


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 39$ A

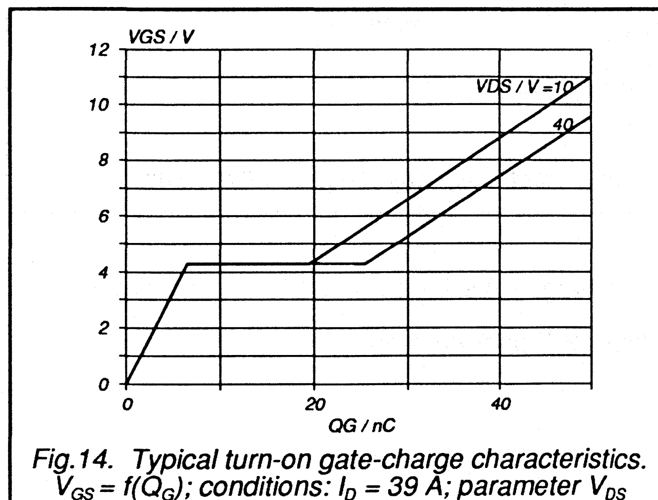


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 39$ A; parameter V_{DS}

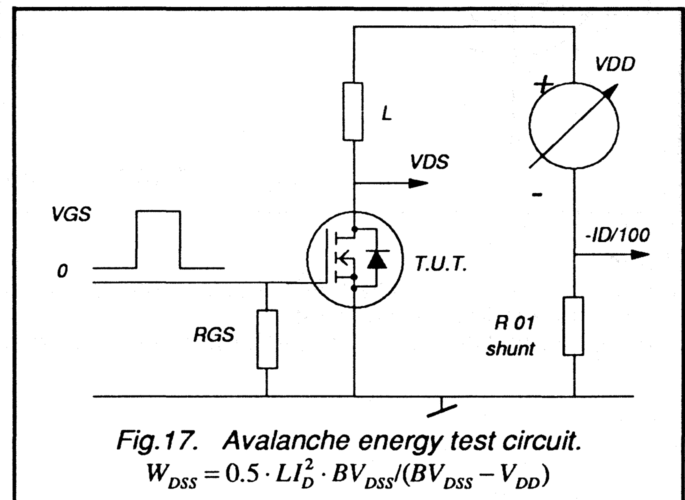


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK545	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	13	12	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 5$ V	0.085	0.11	Ω

MECHANICAL DATA

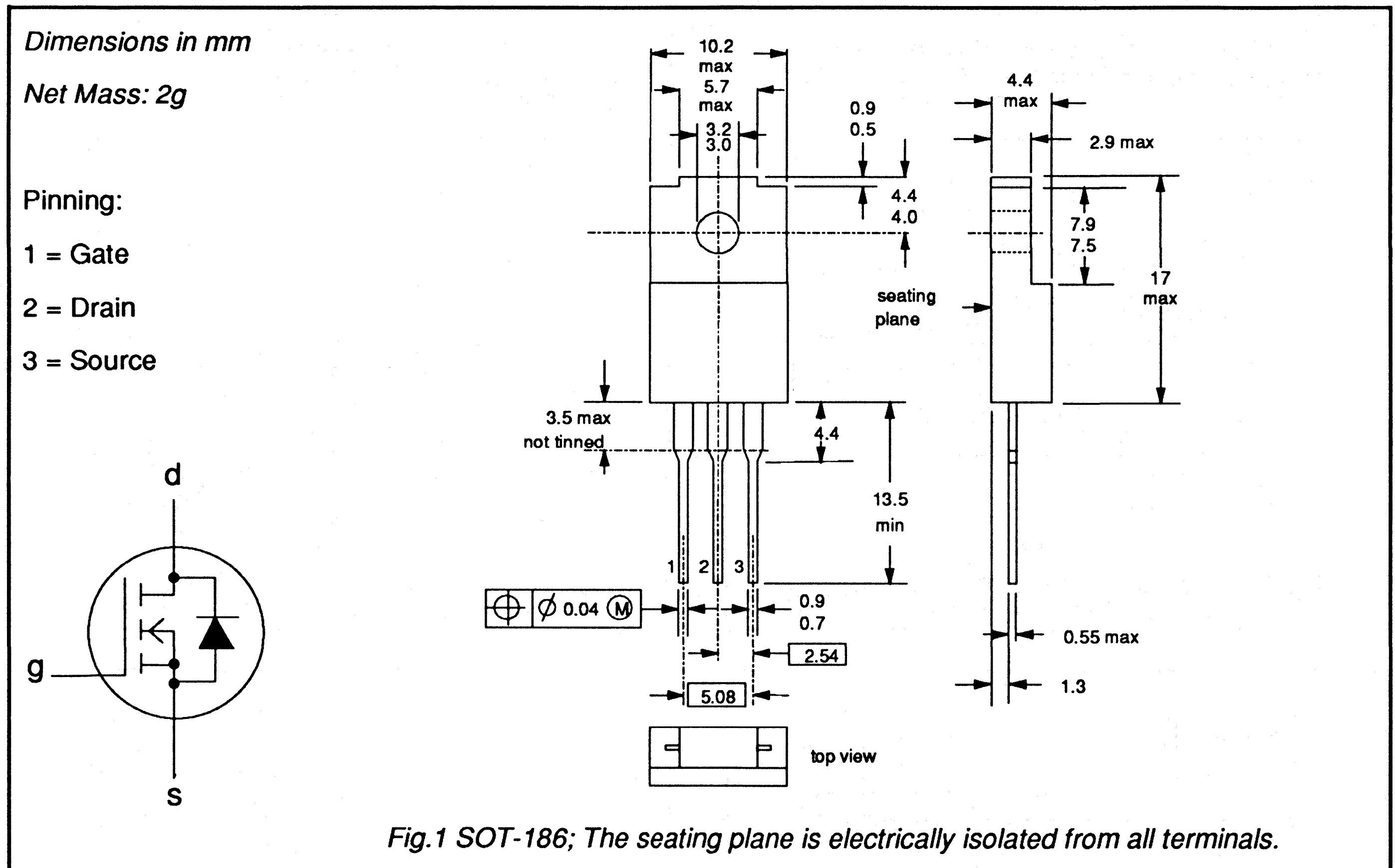


Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	13	12	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	8.2	7.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	52	48	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\ j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; BUK545-100A	-	0.075	0.085	Ω
		I_D = 13 A BUK545-100B	-	0.09	0.11	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 13 A	10	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1450	1750	pF
C_{oss}	Output capacitance		-	280	350	pF
C_{rss}	Feedback capacitance		-	100	150	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	65	85	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	135	180	ns
t_f	Turn-off fall time		-	80	110	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	13	A
I_{DRM}	Pulsed reverse drain current	-	-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 13 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 25 A ; V_{DD} ≤ 50 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	140	mJ

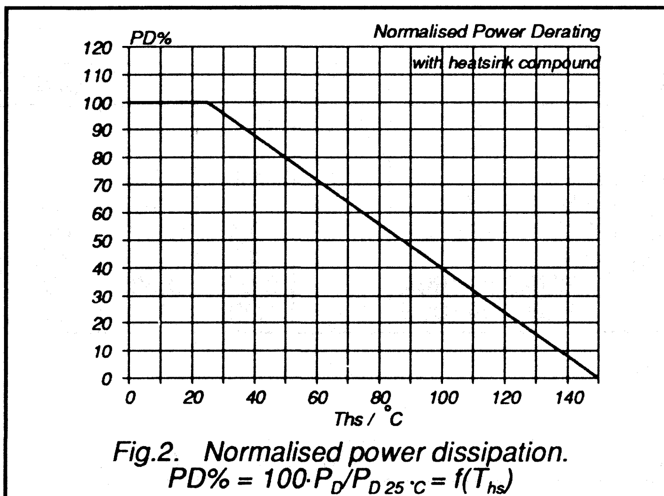


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

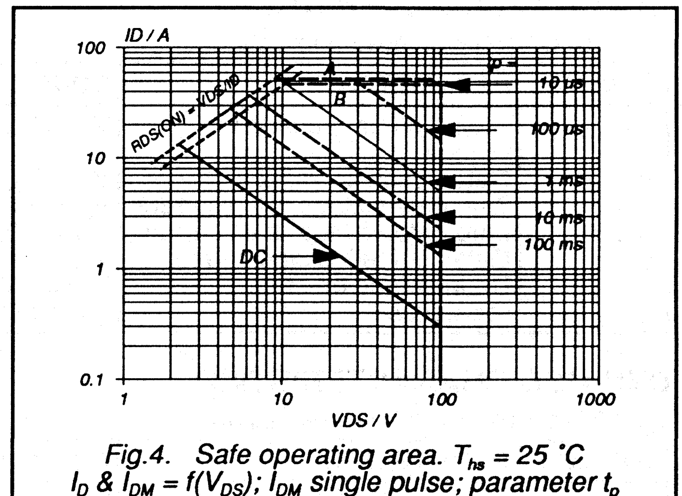


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

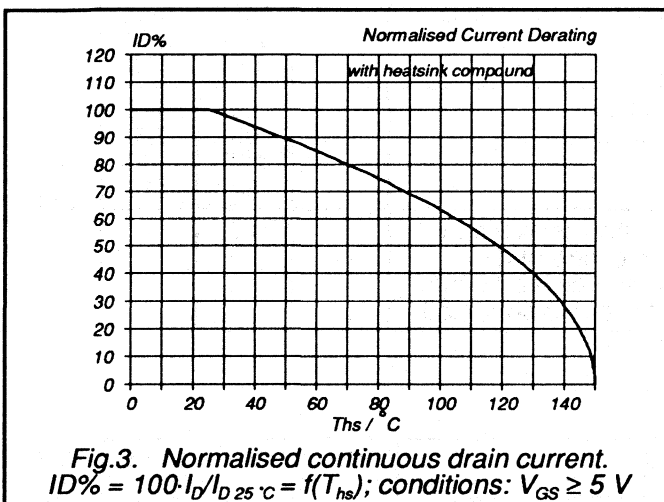


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 5$ V

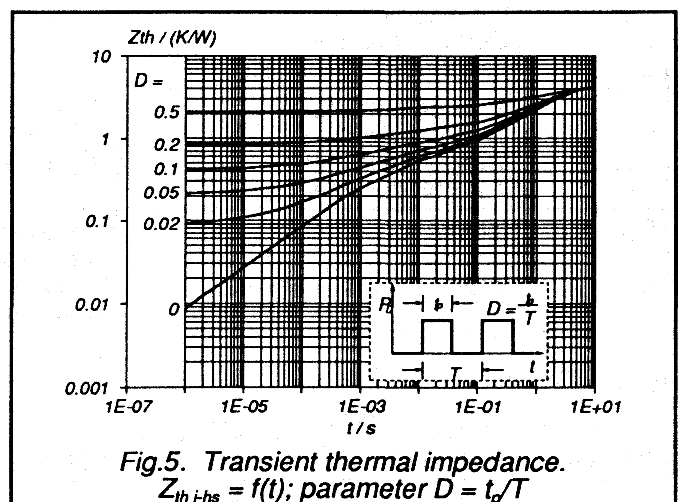


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

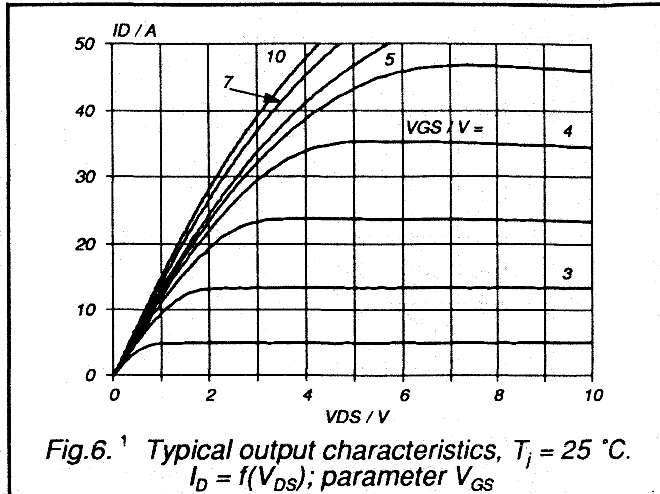


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

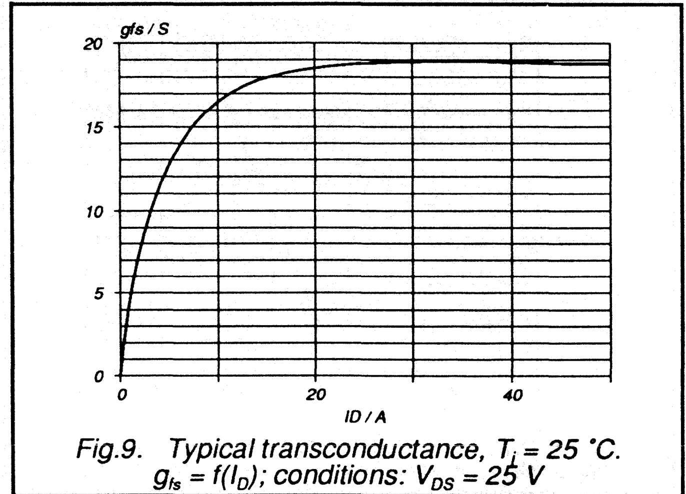


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

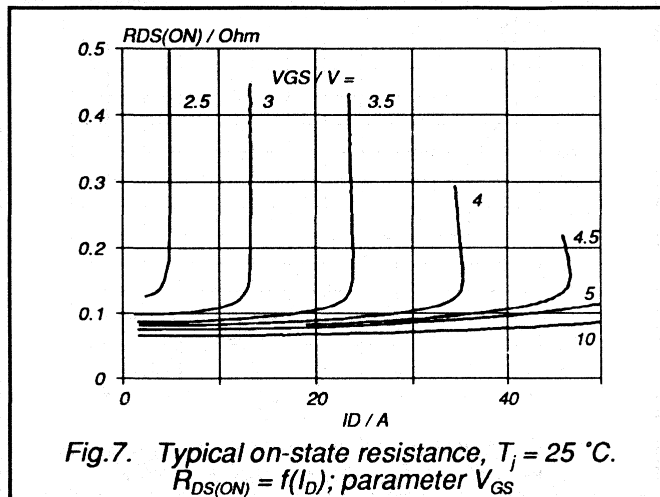


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

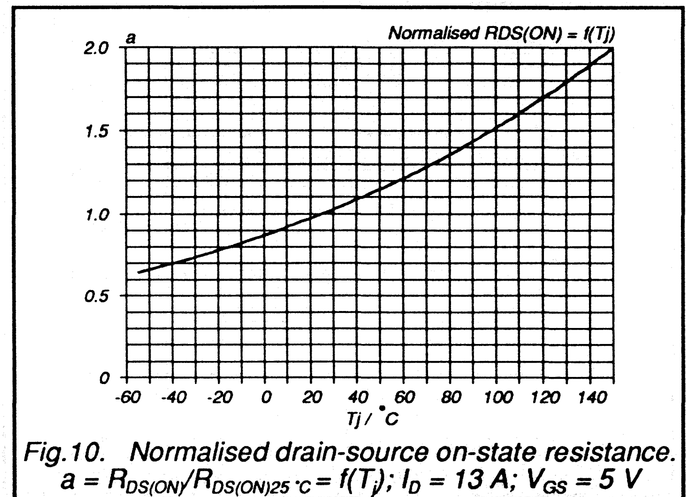


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 13 A; V_{GS} = 5 V

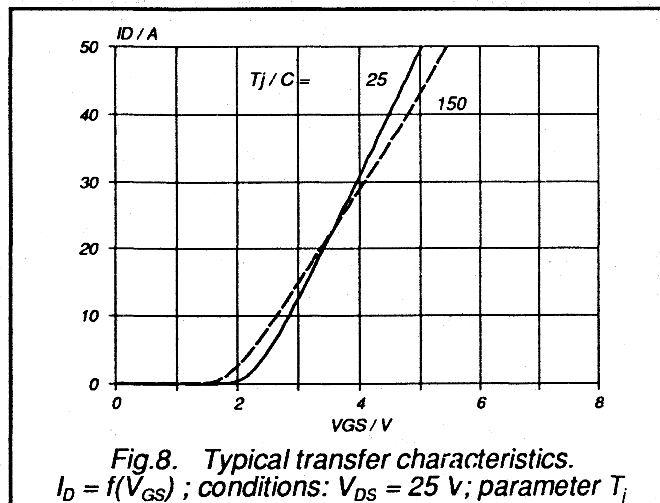


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

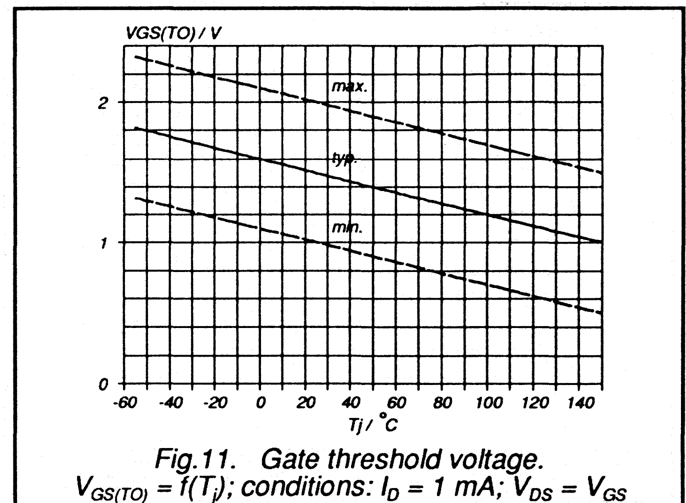


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

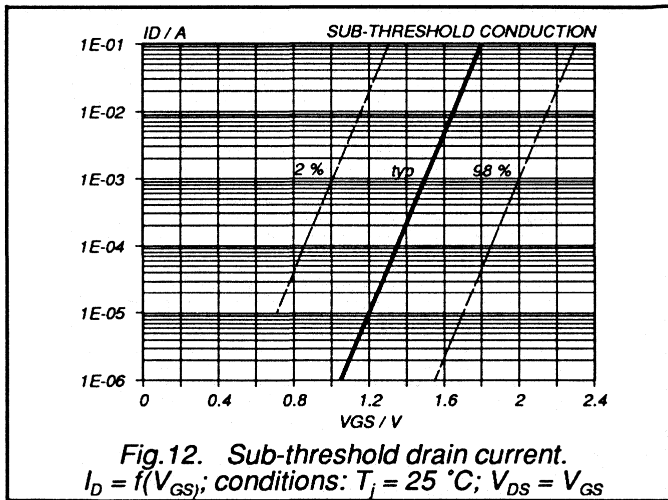


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

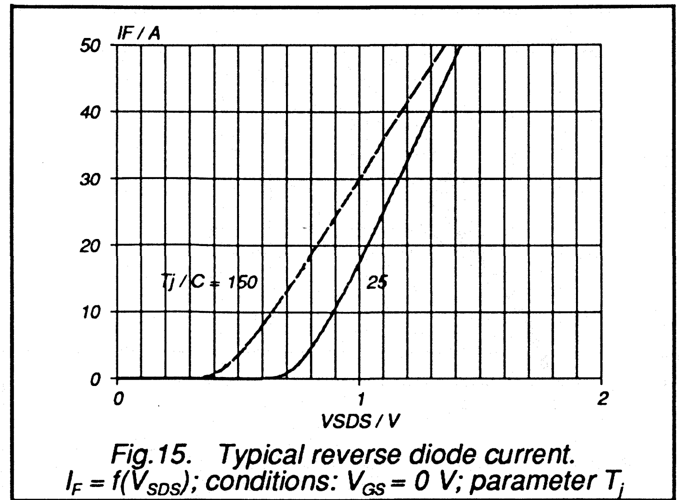


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

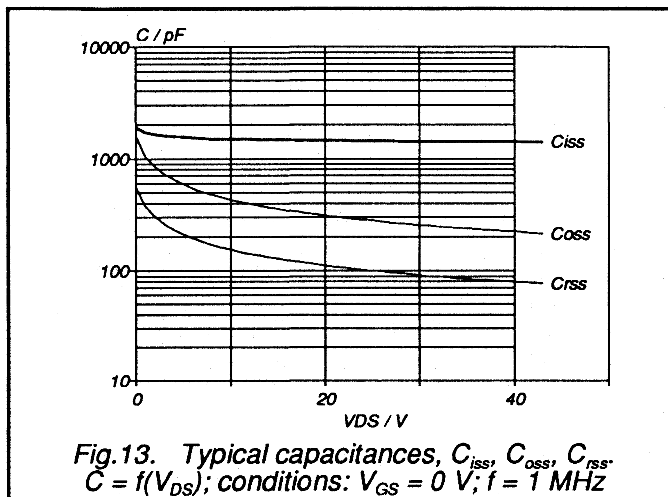


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

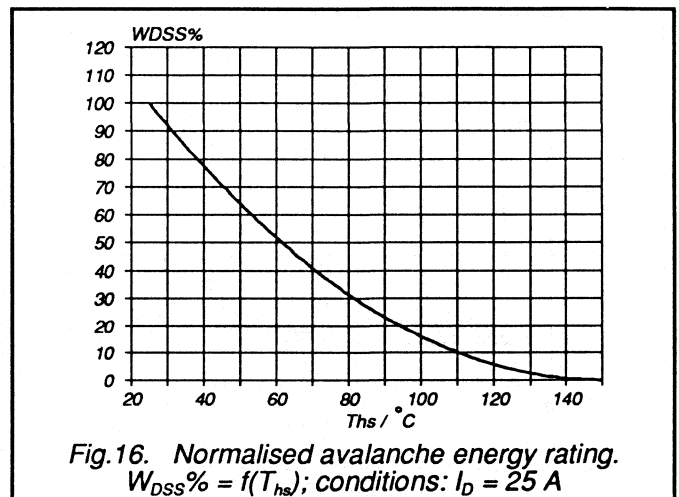


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 25$ A

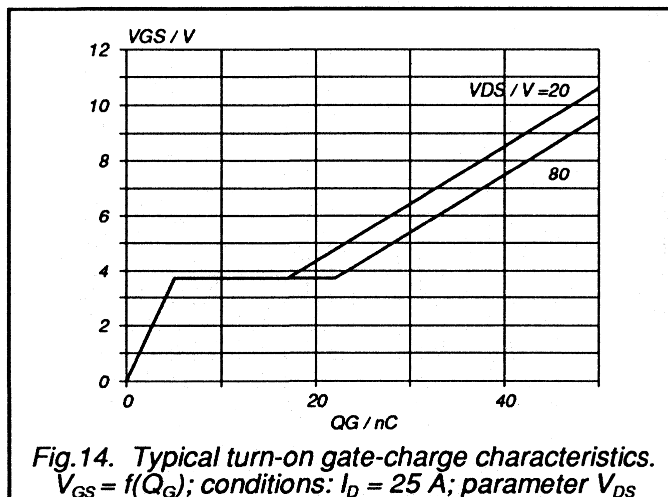


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 25$ A; parameter V_{DS}

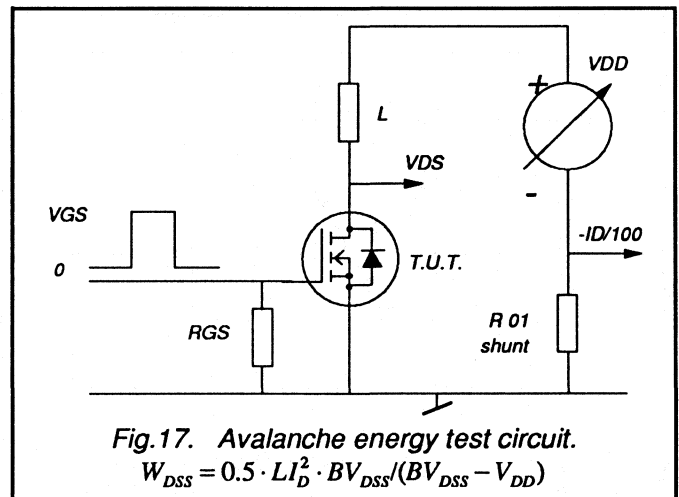


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic full-pack envelope.
The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK545	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	7.6	7	A
P_{tot}	Total power dissipation	30	30	W
T_j	Junction temperature	150	150	˚C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 5$ V	0.23	0.28	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 SOT-186; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-200A	-200B	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	7.6	7	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	4.8	4.4	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	30	28	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	30		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 4.17 K/W
From junction to ambient		$R_{th\,j\text{-}a}$ = 55 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 7 A **BUK545-200A**	-	0.2	0.23	Ω
		BUK545-200B	-	0.24	0.28	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 7 A	12	15	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1600	2000	pF
C_{oss}	Output capacitance		-	180	250	pF
C_{rss}	Feedback capacitance		-	55	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	45	75	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	140	180	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65% ; clean and dustfree	-	-	1500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	12	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	7.6	A
I_{DRM}	Pulsed reverse drain current	-	-	-	30	A
V_{SD}	Diode forward voltage	I_F = 7.6 A ; V_{GS} = 0 V	-	1.0	1.5	V
t_{rr}	Reverse recovery time	I_F = 7.6 A; -dI_F/dt = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; V_{DD} ≤ 100 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	100	mJ

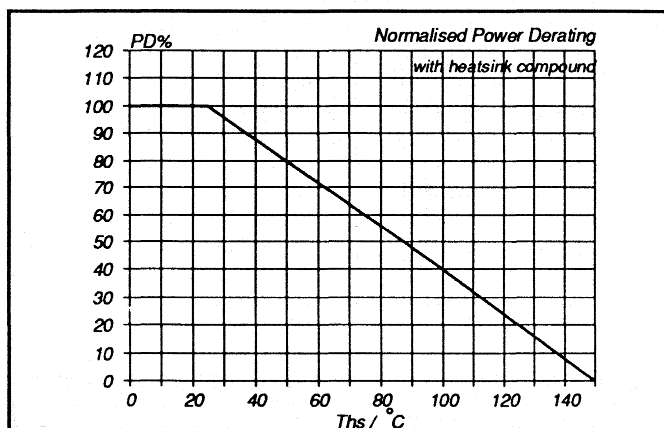


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{hs})

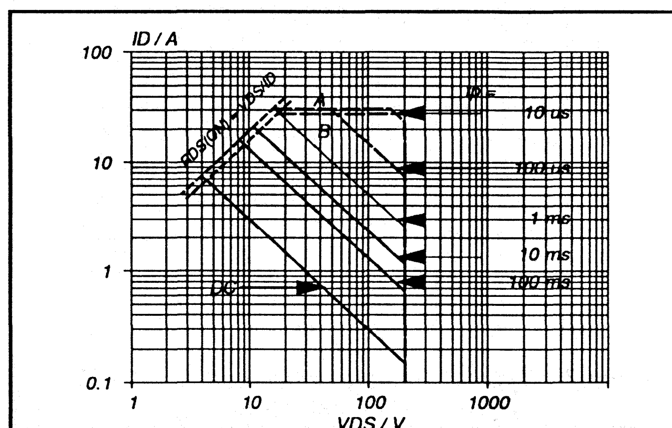


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

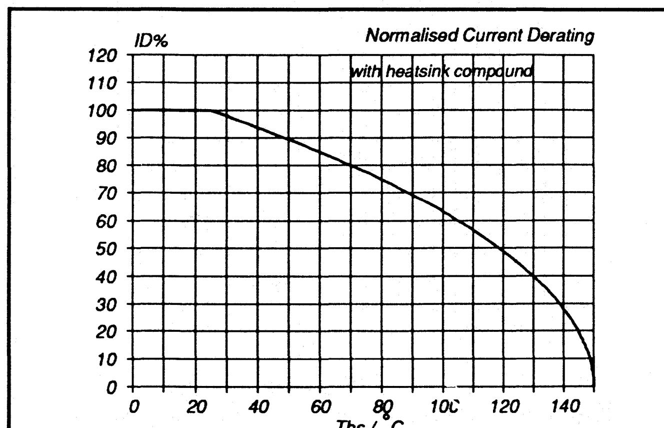


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{hs}); conditions: V_{GS} ≥ 5 V

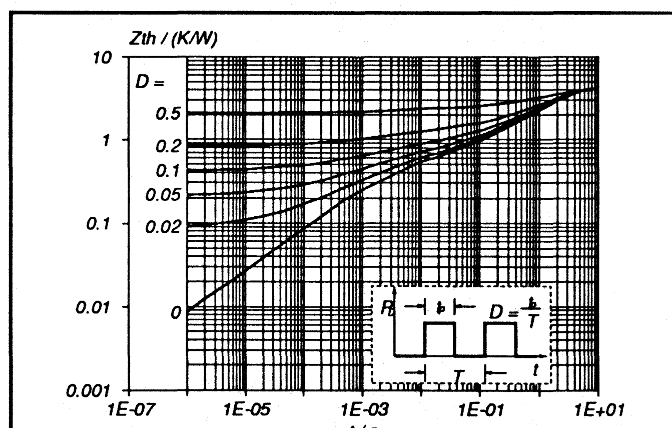


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs}$ = f(t); parameter D = t_p/T

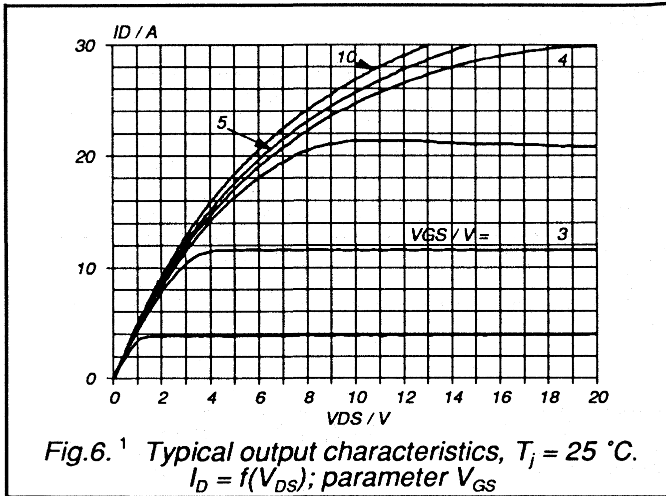


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

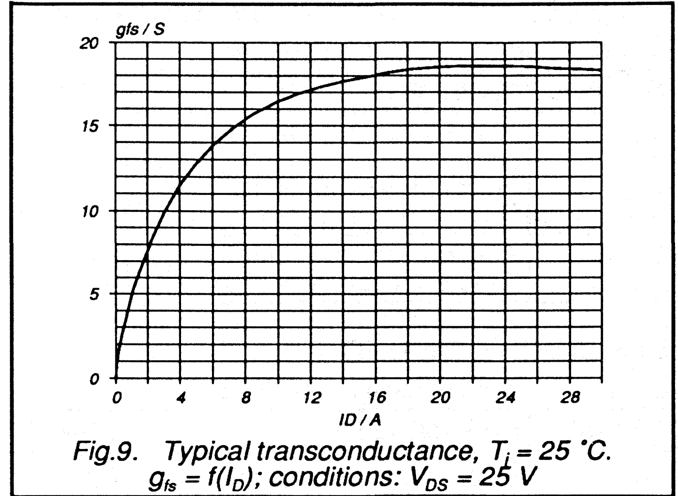


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

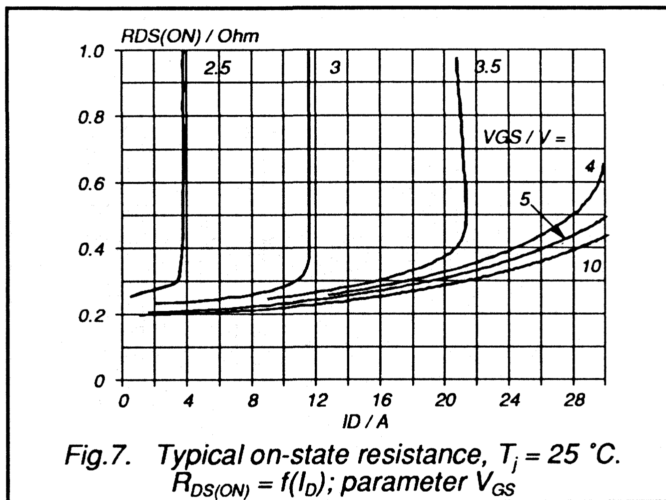


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

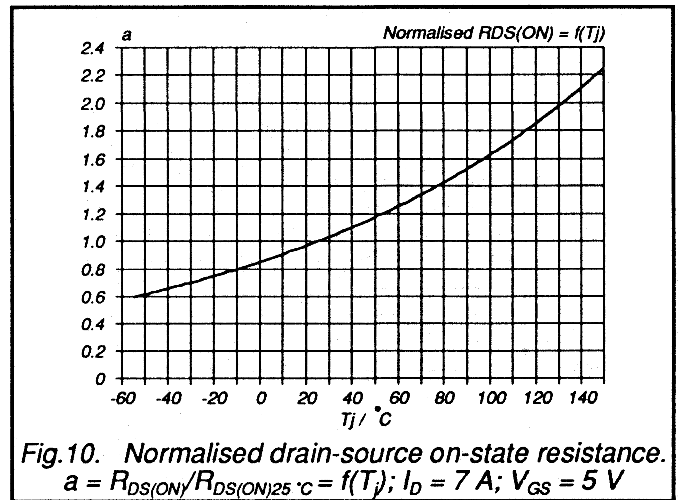


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 7$ A; $V_{GS} = 5$ V

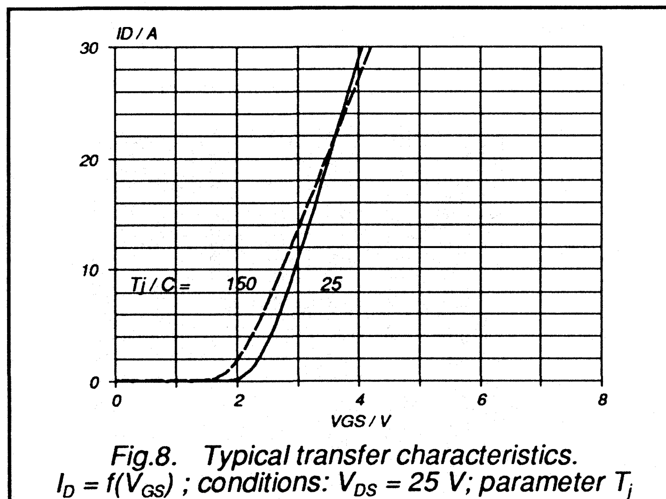


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

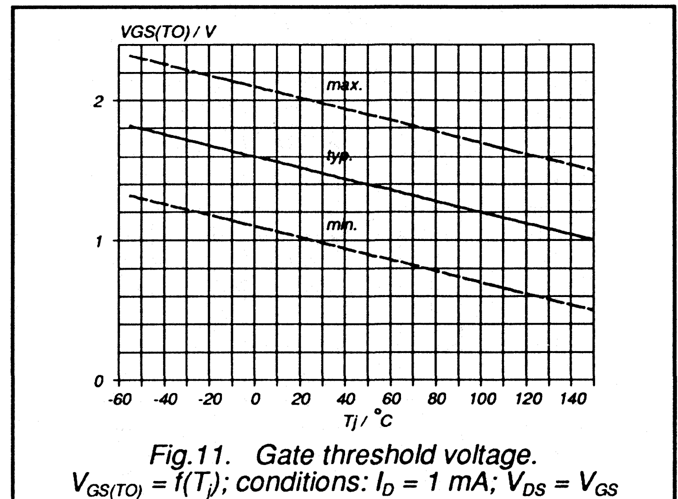


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

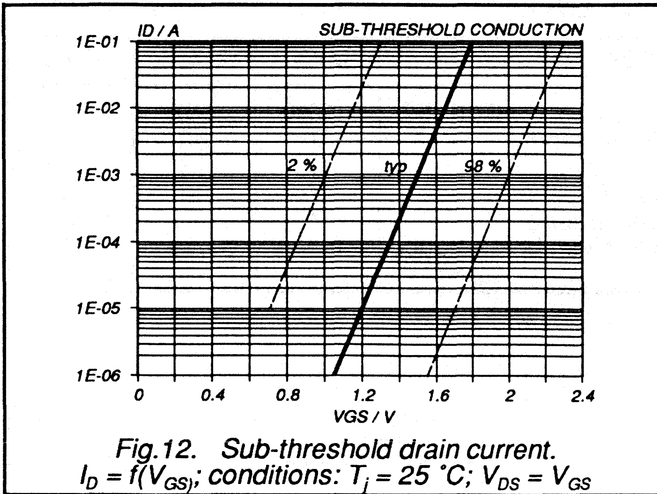


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

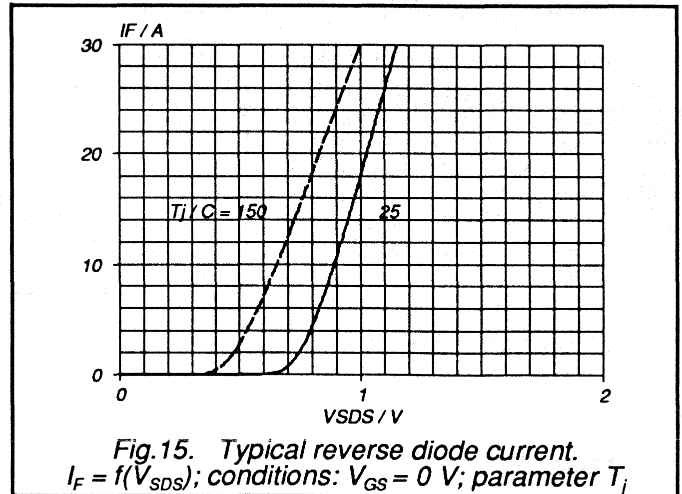


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

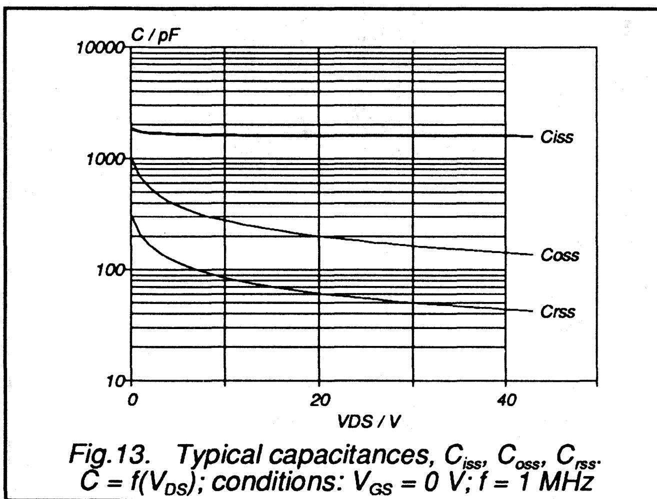


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

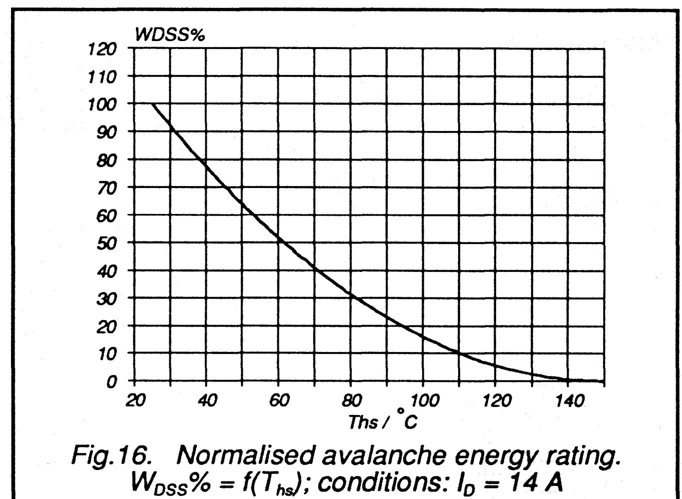


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 14$ A

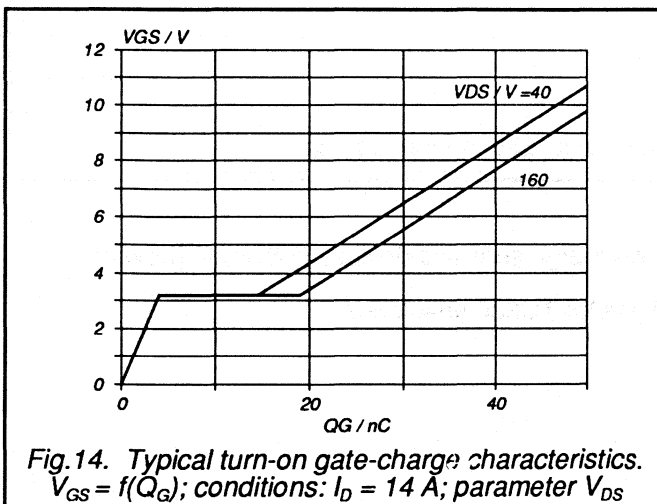


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

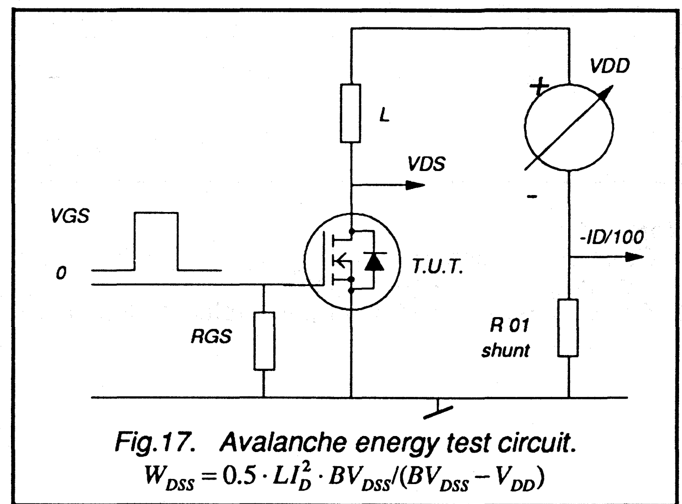


Fig.17. Avalanche energy test circuit.
$$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK552	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	14	13	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.15	0.18	Ω

MECHANICAL DATA

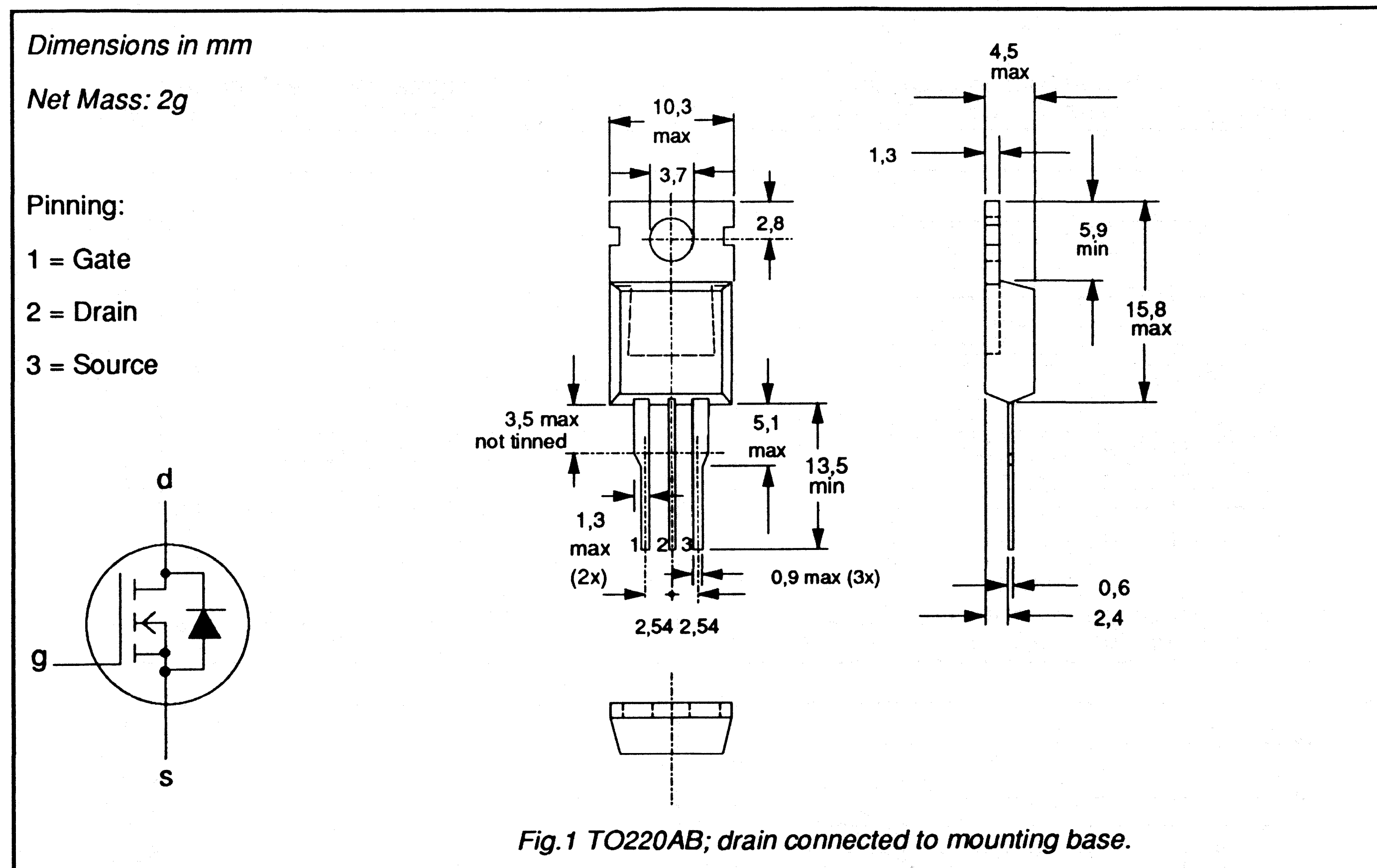


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	13	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	10	9	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	52	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 2.5 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 8.5 A **BUK552-50A**	-	0.12	0.15	Ω
		BUK552-50B	-	0.15	0.18	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	5	6.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	65	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	12	18	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	60	80	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	70	ns
t_f	Turn-off fall time		-	45	70	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 14 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; $V_{DD} \leq$ 25 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

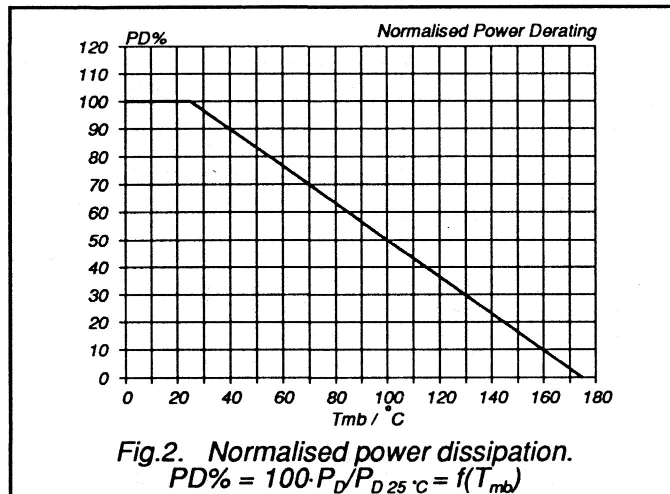


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

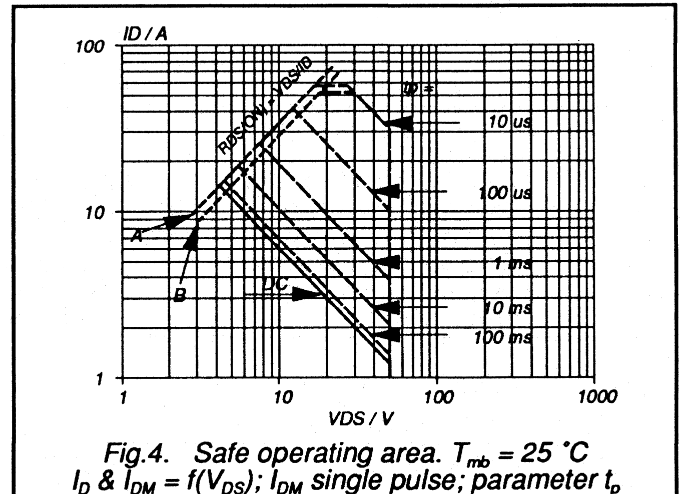


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

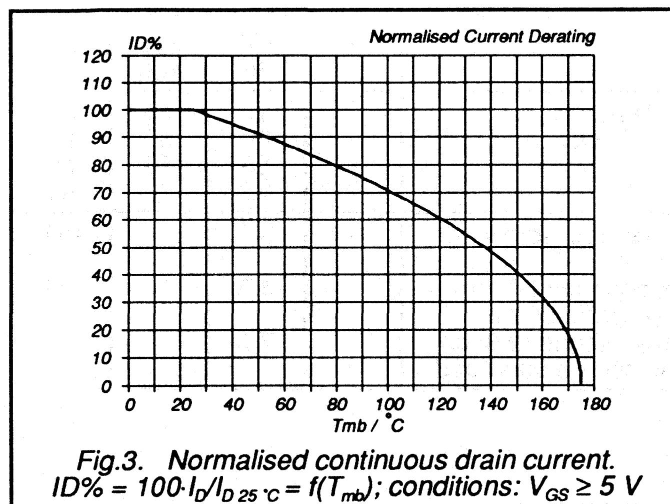


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

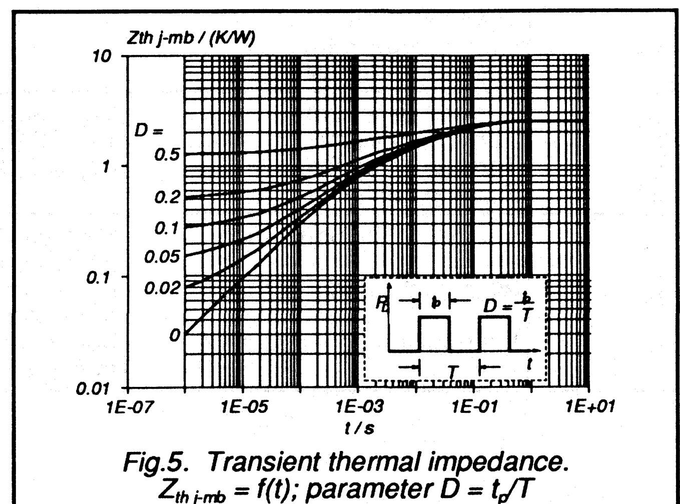


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

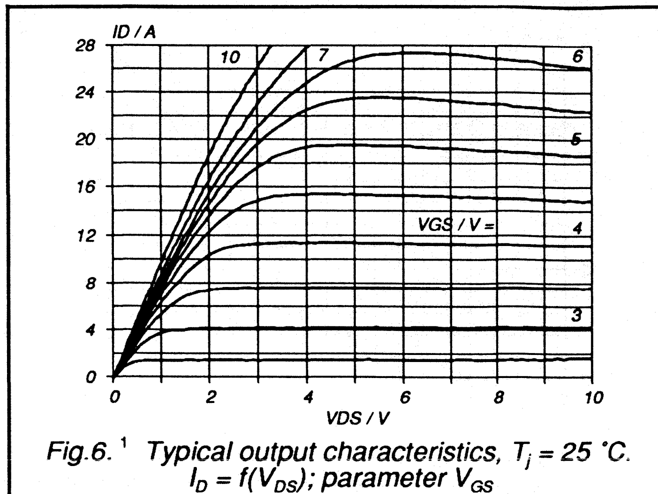


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

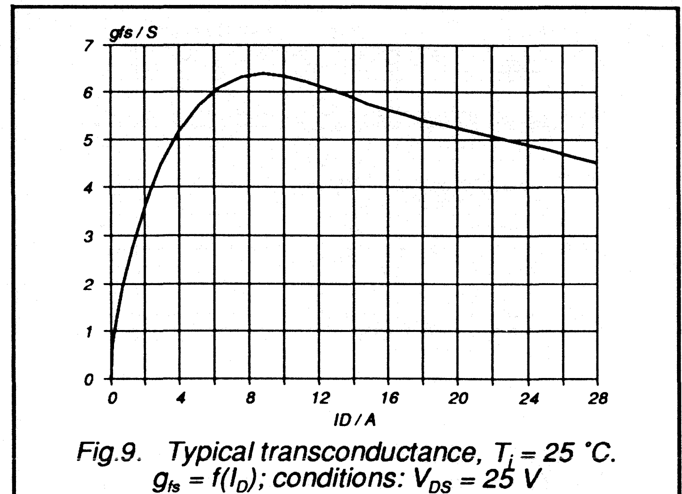


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

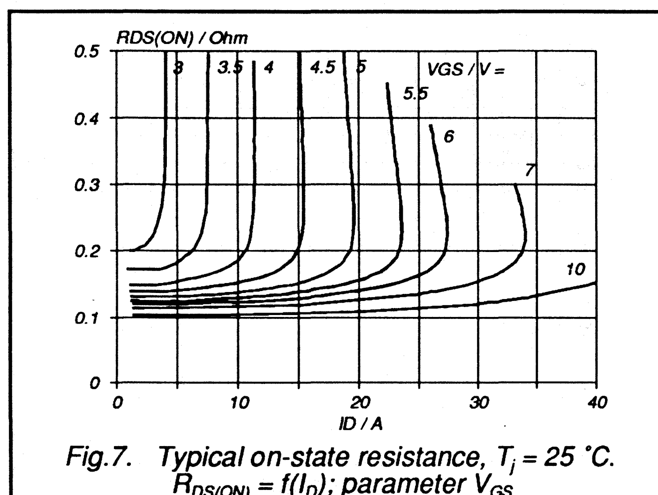


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

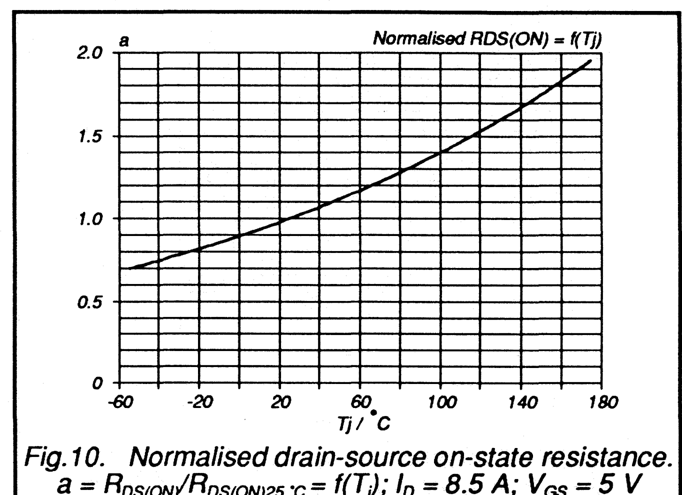


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 8.5 A; V_{GS} = 5 V

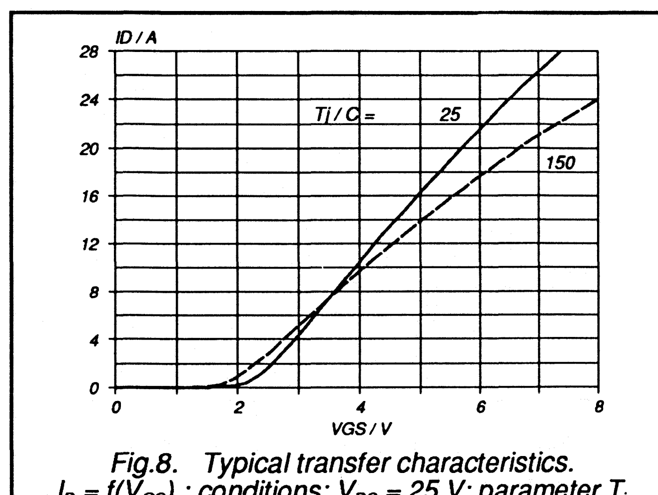


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

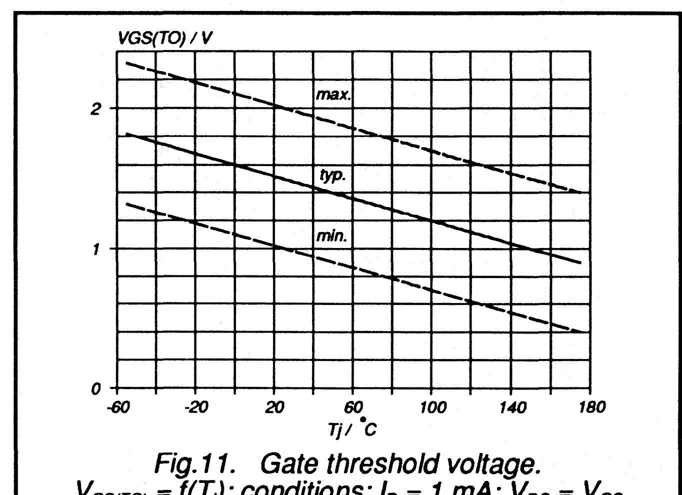


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

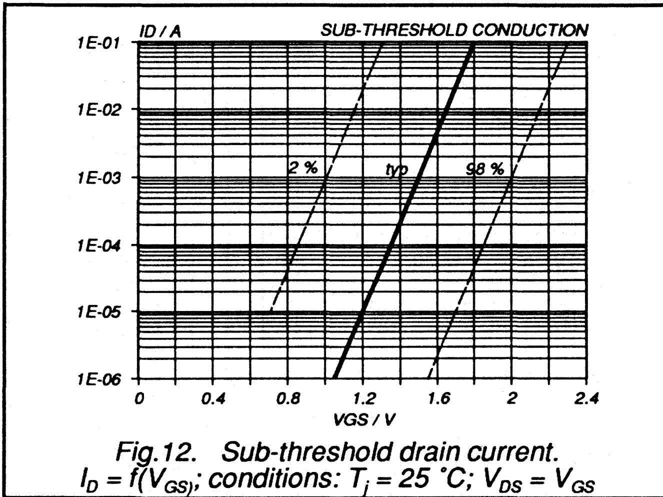


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

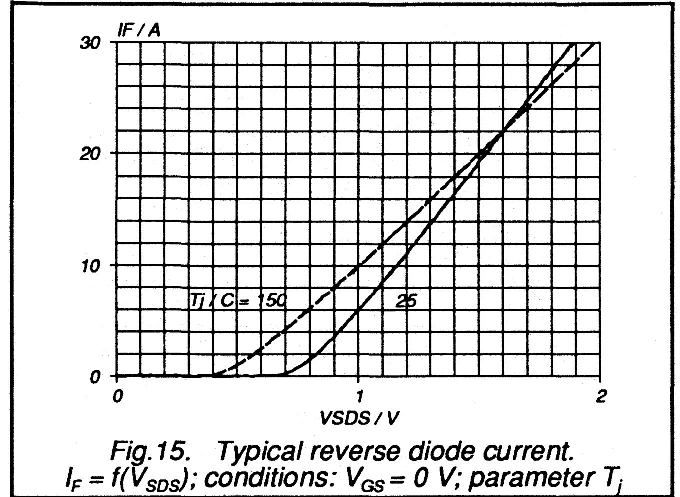


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

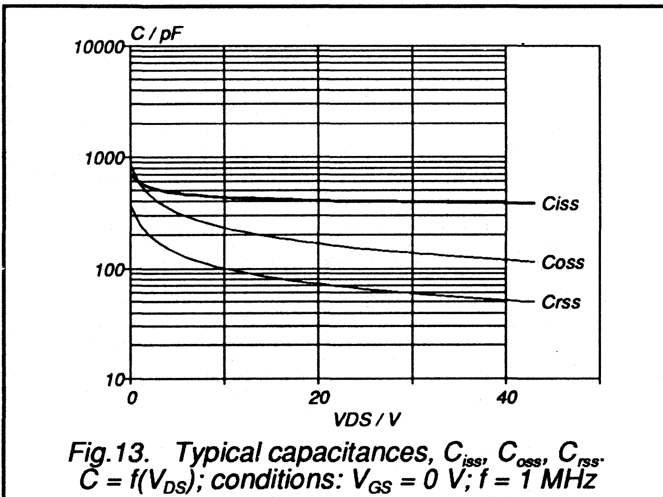


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

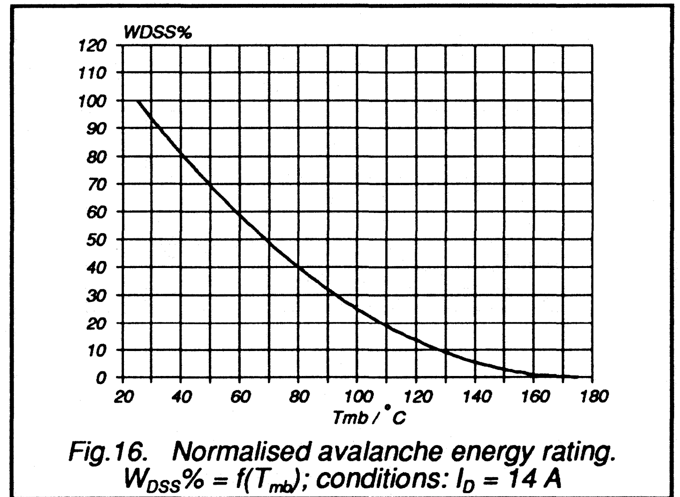


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 14$ A

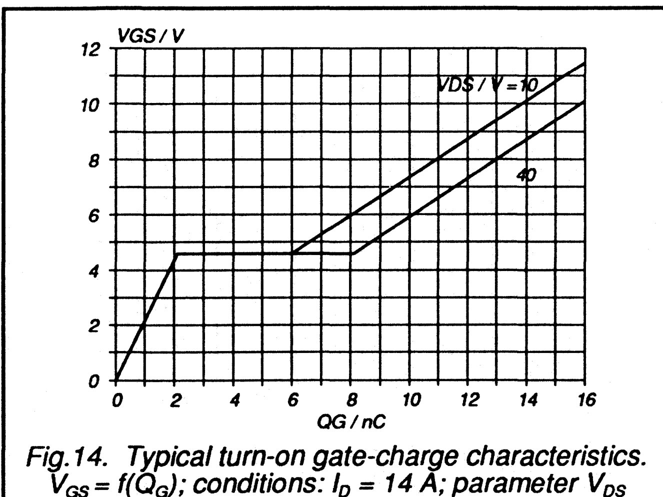


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

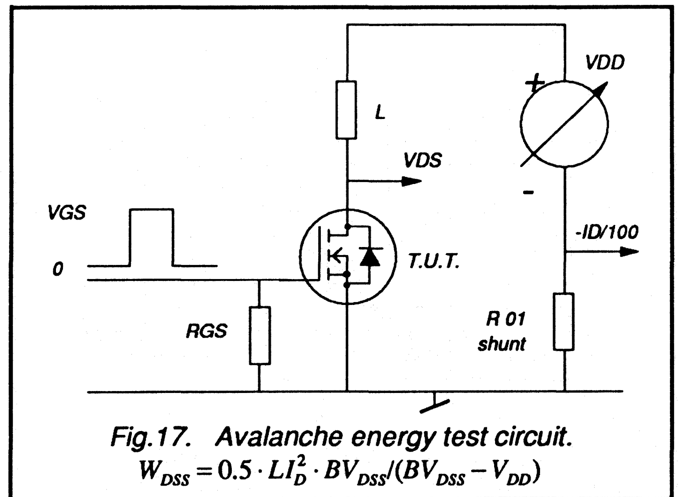


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK552	-60A	-60B	
V_{DS}	Drain-source voltage	60	60	V
I_D	Drain current (DC)	14	13	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.15	0.18	Ω

MECHANICAL DATA

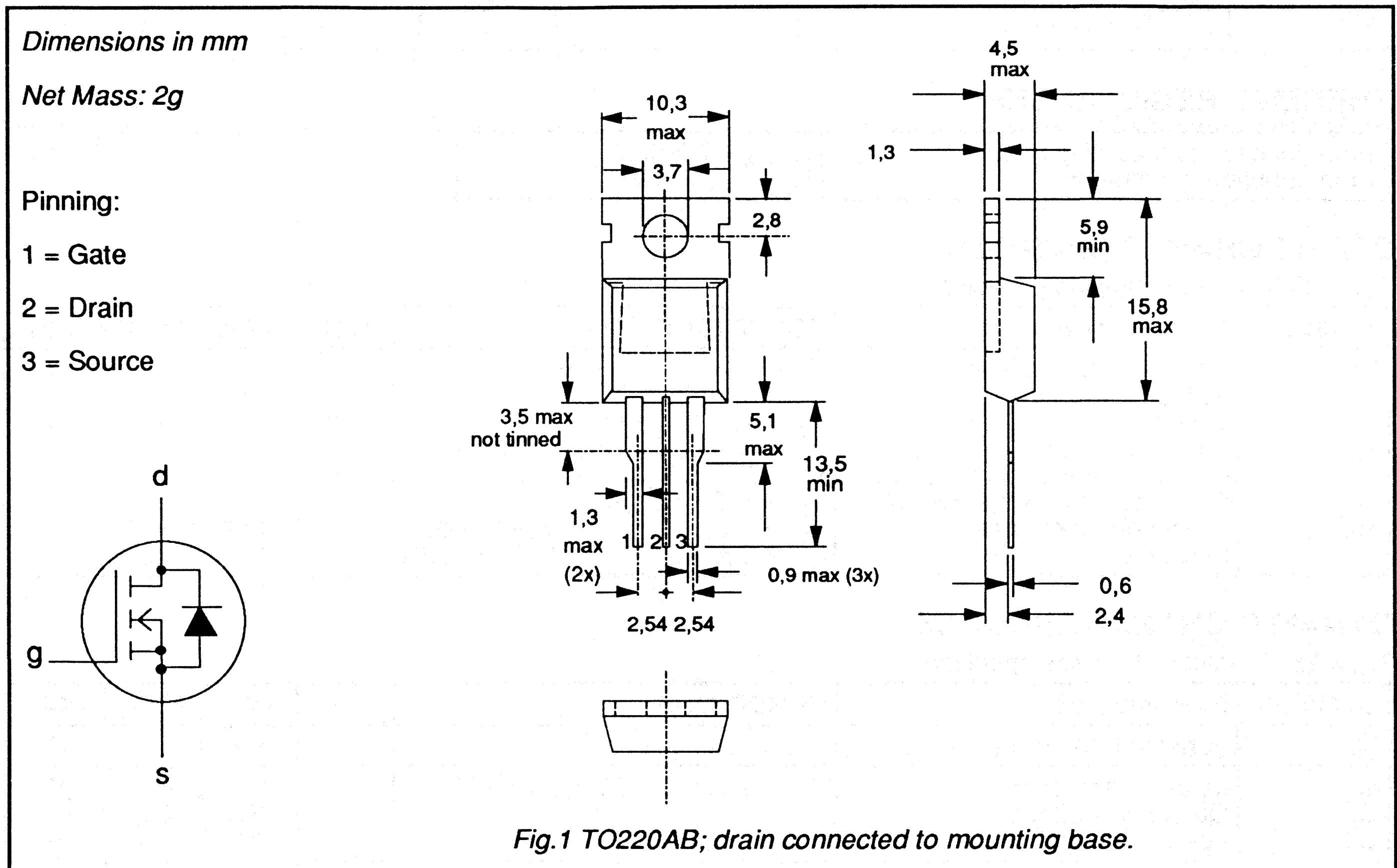


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	60		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	60		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-60A	-60B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	13	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	10	9	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	52	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 2.5 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	60	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 60 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state	V_{GS} = 5 V; **BUK552-60A**	-	0.12	0.15	Ω
	resistance	I_D = 8.5 A **BUK552-60B**	-	0.15	0.18	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 8.5 A	5	6.7	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	150	200	pF
C_{rss}	Feedback capacitance		-	65	100	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	12	18	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	60	80	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	70	ns
t_f	Turn-off fall time		-	45	70	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 14 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; $V_{DD} \leq 25$ V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

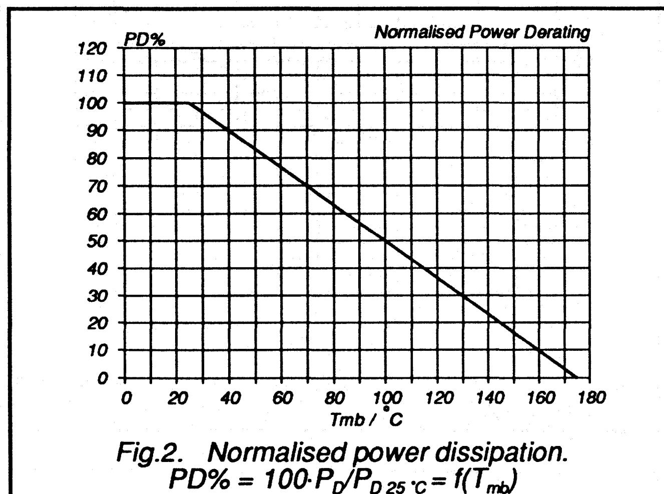


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

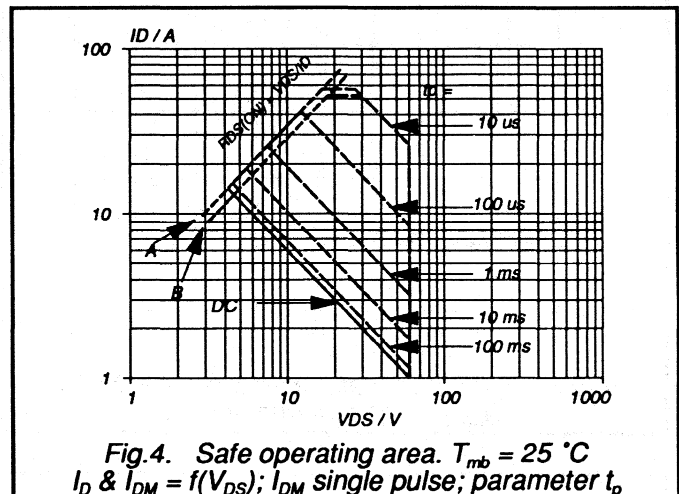


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

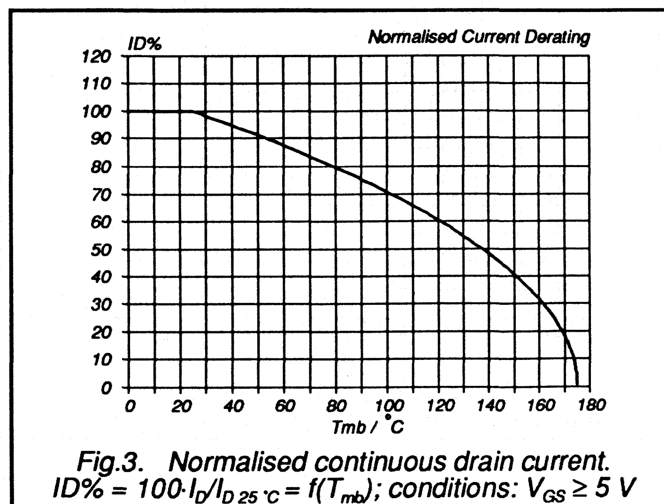


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

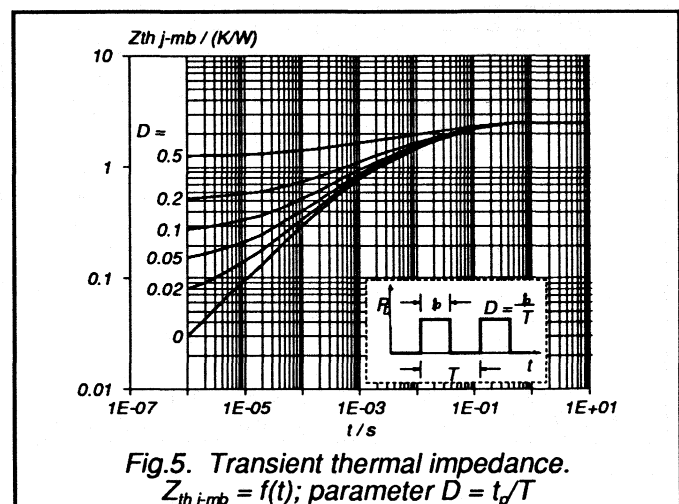


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

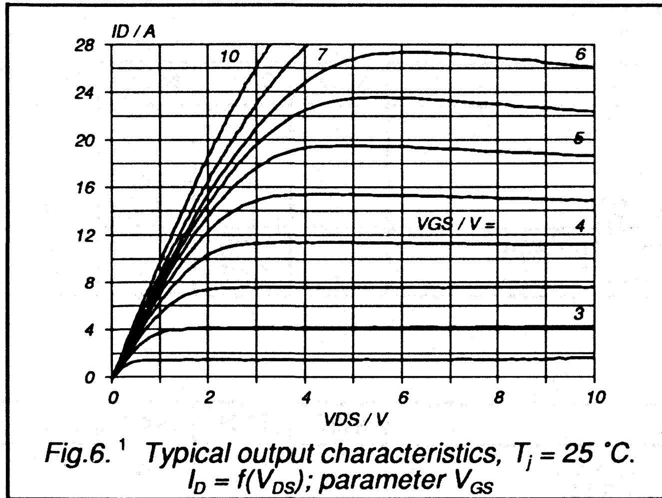


Fig.6. [1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

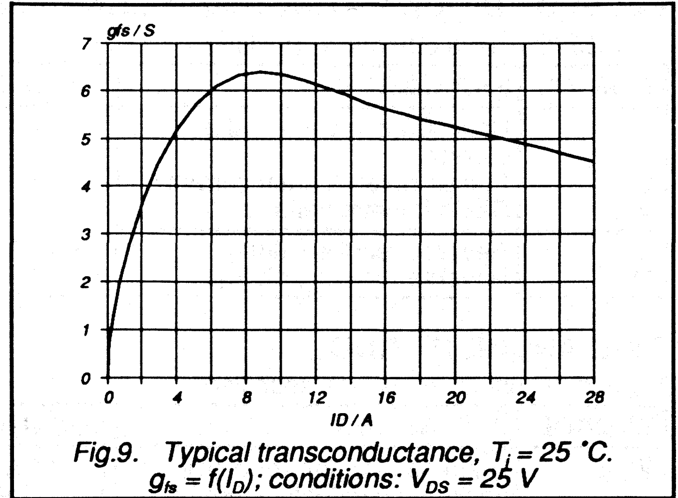


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

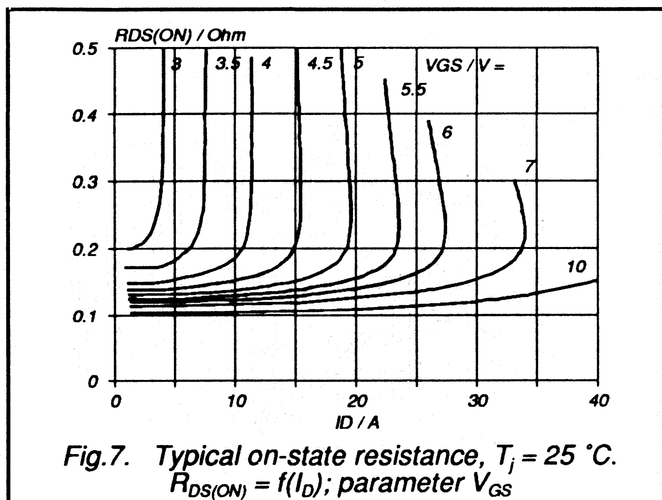


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

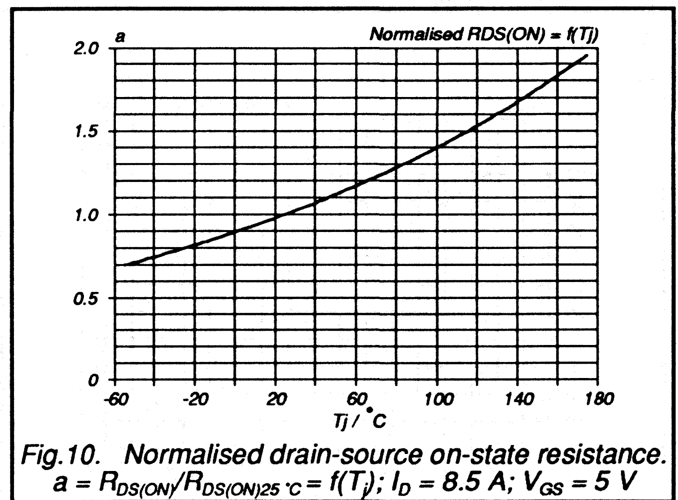


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 8.5$ A; $V_{GS} = 5$ V

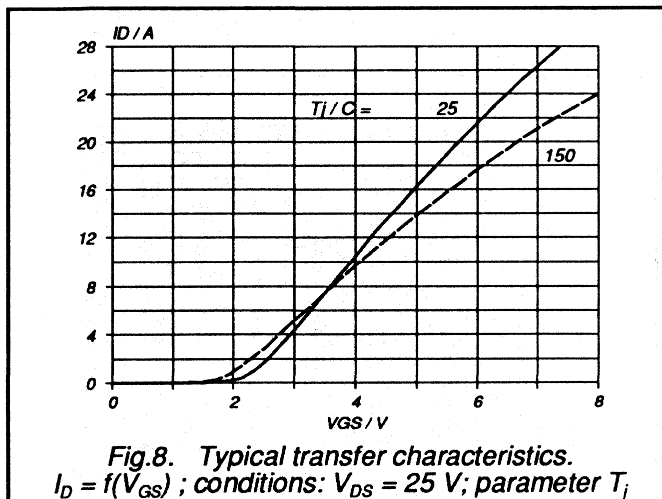


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

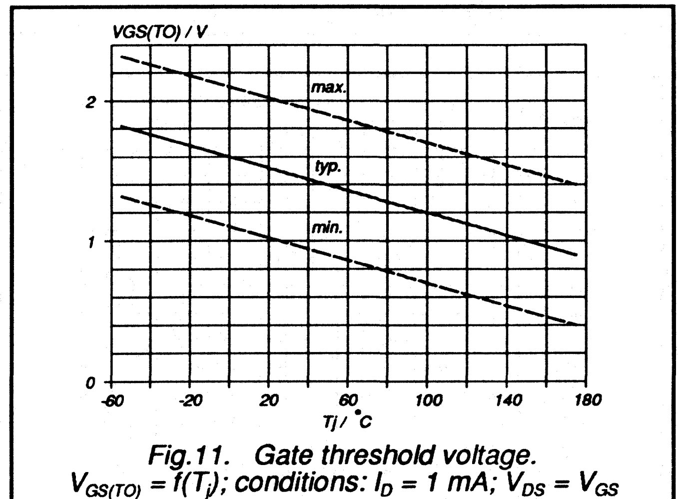


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

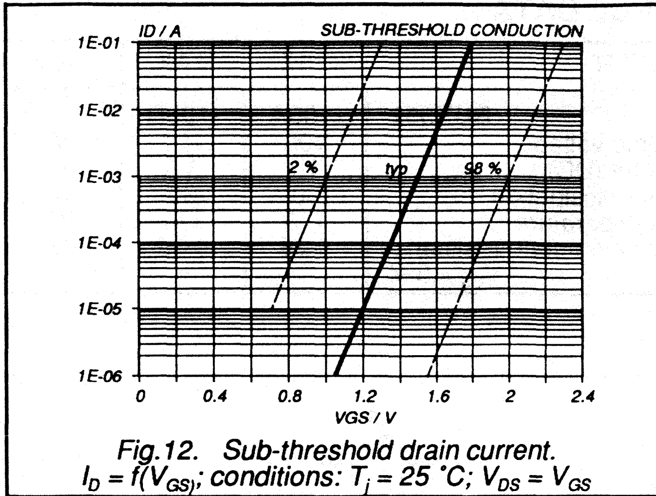


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

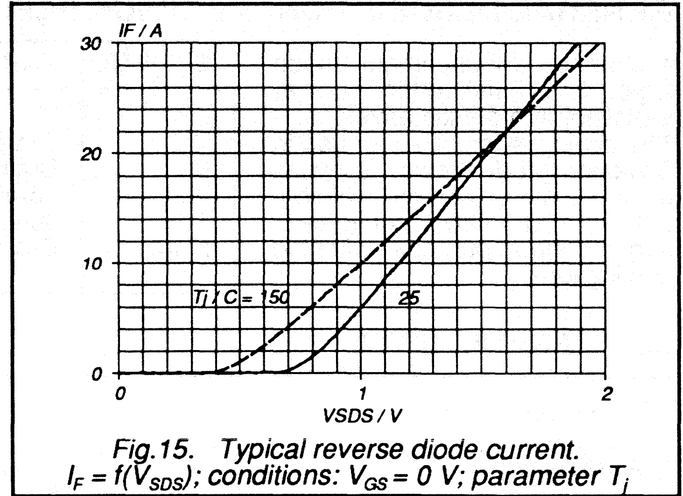


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

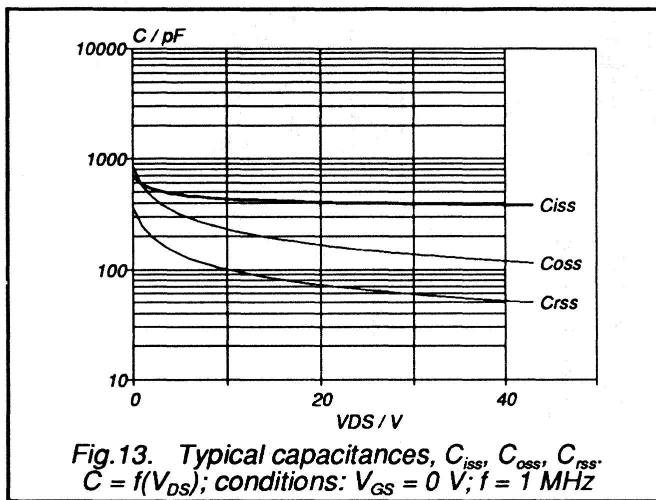


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

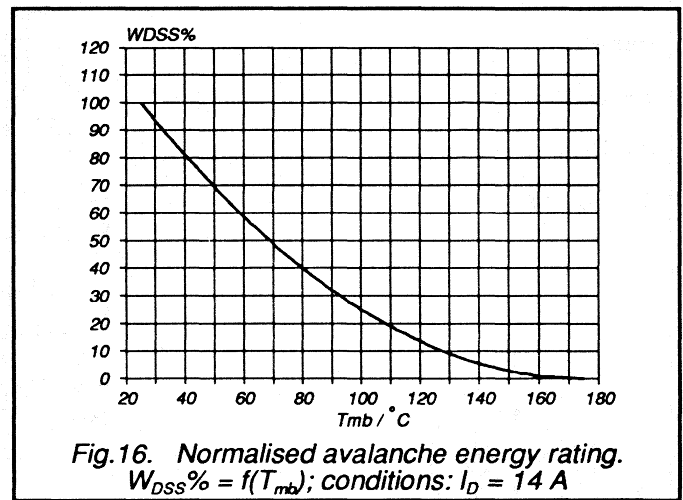


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 14$ A

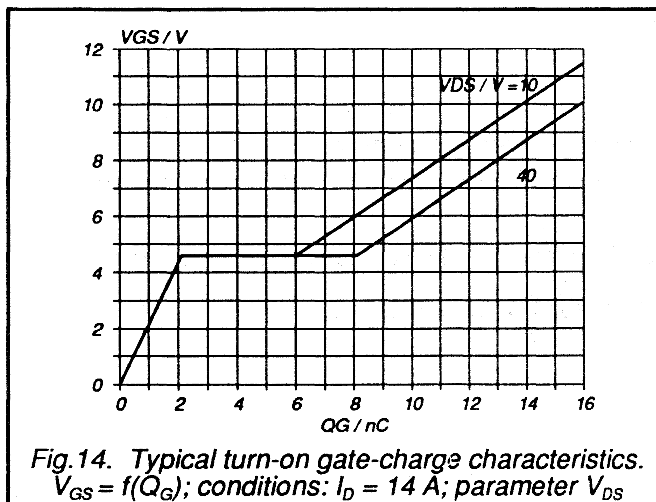


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

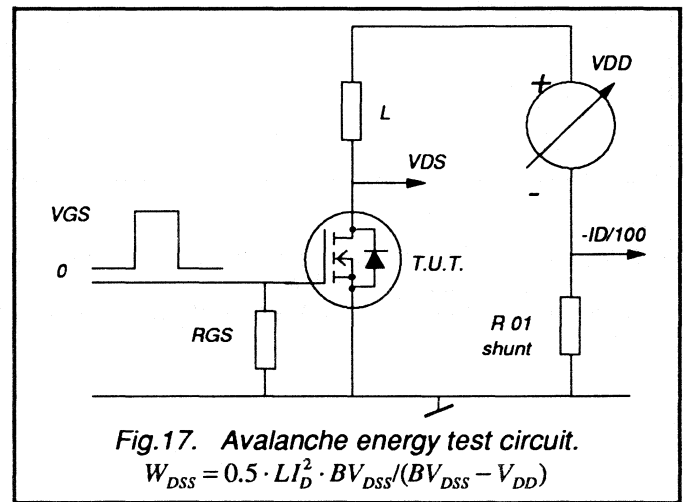


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK552	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	10	8.5	A
P_{tot}	Total power dissipation	60	60	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.28	0.35	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	10	8.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	7	6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	40	34	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	60		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2.5 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 5.5 A BUK552-100A	-	0.25	0.28	Ω
		BUK552-100B	-	0.3	0.35	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 5.5 A	4.5	6	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	400	600	pF
C_{oss}	Output capacitance		-	90	120	pF
C_{rss}	Feedback capacitance		-	35	50	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	12	18	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	45	70	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	50	70	ns
t_f	Turn-off fall time		-	30	45	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	10	A
I_{DRM}	Pulsed reverse drain current	-	-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 10 A; $-dI_F/dt$ = 100 A/µs;	-	120	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; $V_{DD} \leq 50$ V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	30	mJ

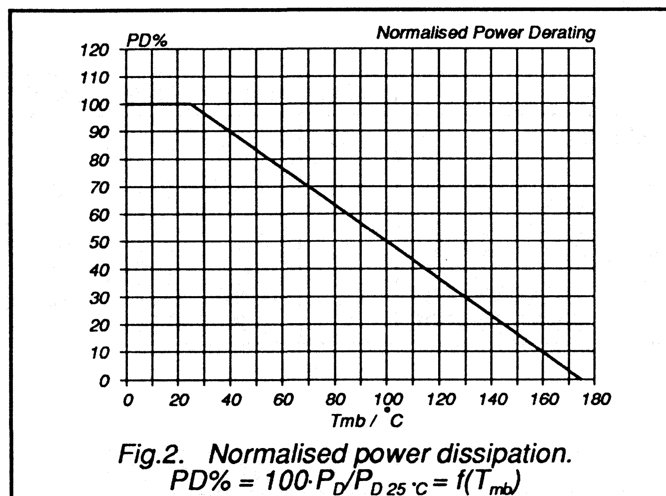


Fig.2. Normalised power dissipation. $PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

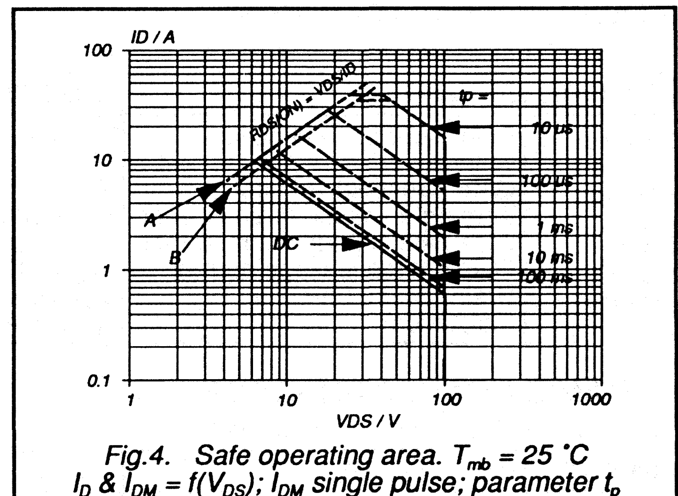


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

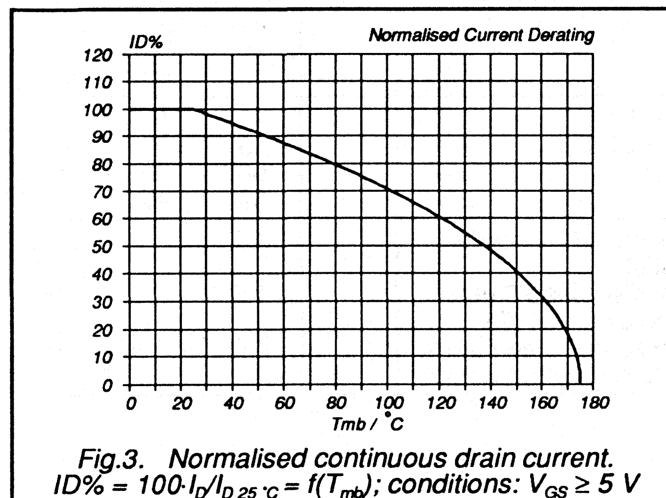


Fig.3. Normalised continuous drain current. $ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

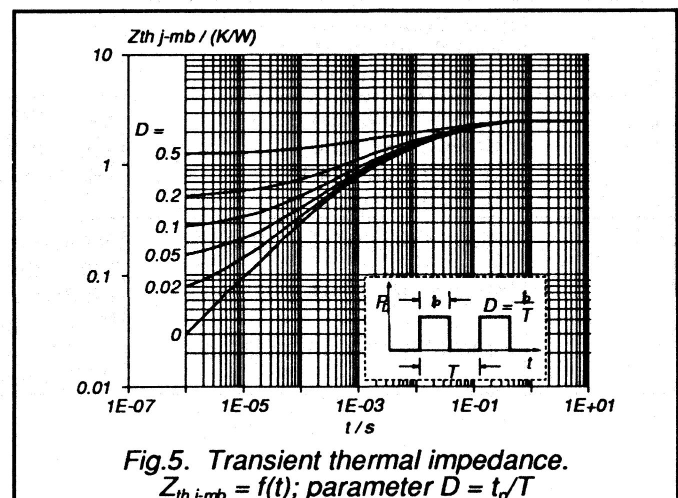


Fig.5. Transient thermal impedance. $Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

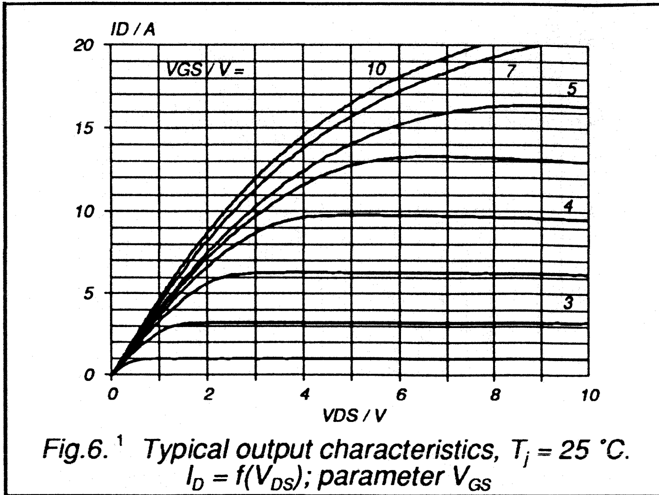


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

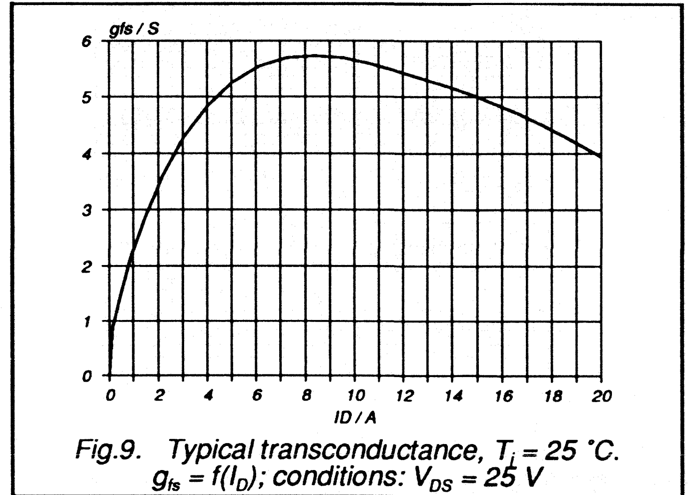


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

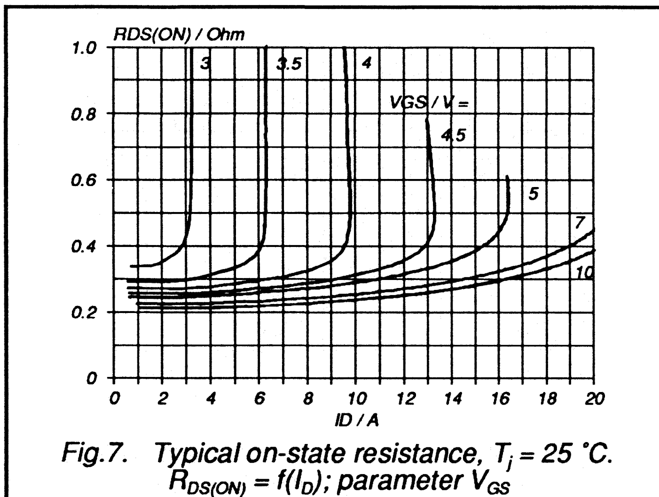


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

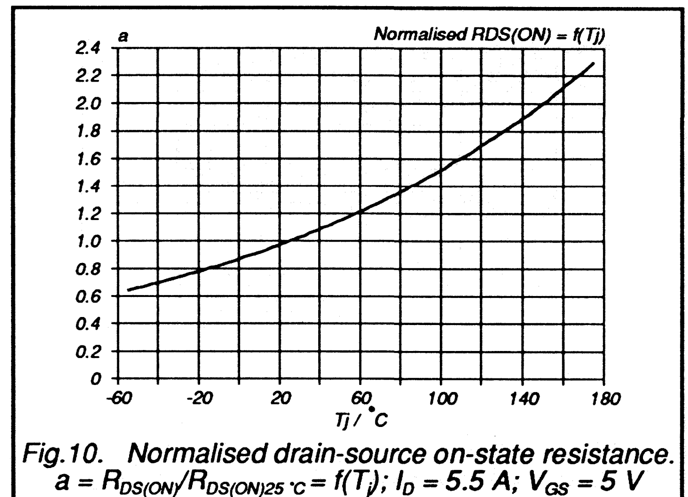


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ °C} = f(T_j)$; $I_D = 5.5$ A; $V_{GS} = 5$ V

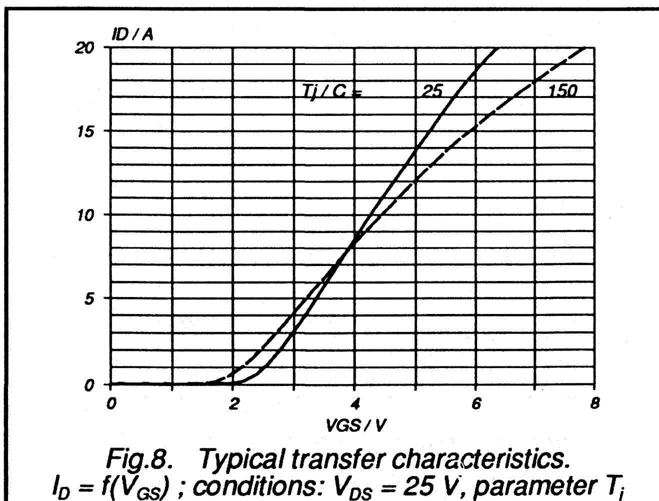


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V, parameter T_j

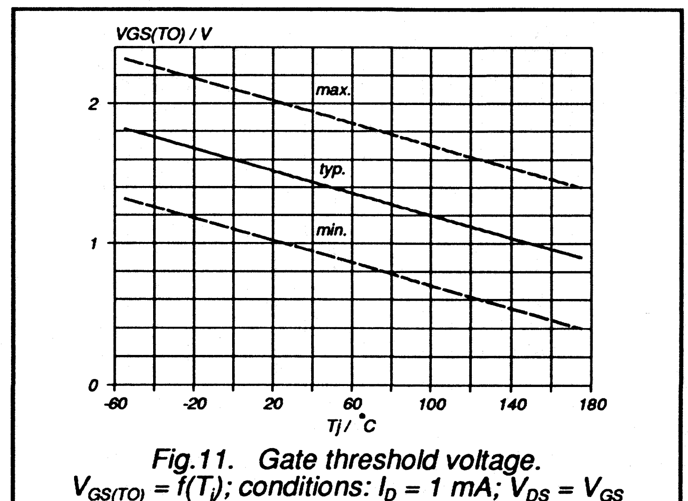


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

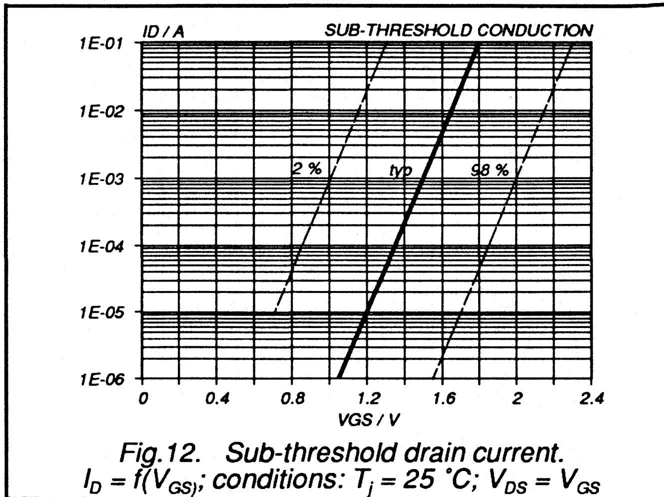


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

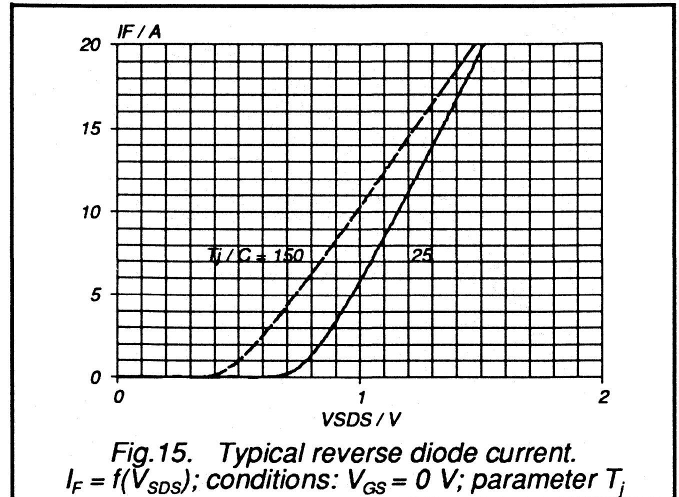


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

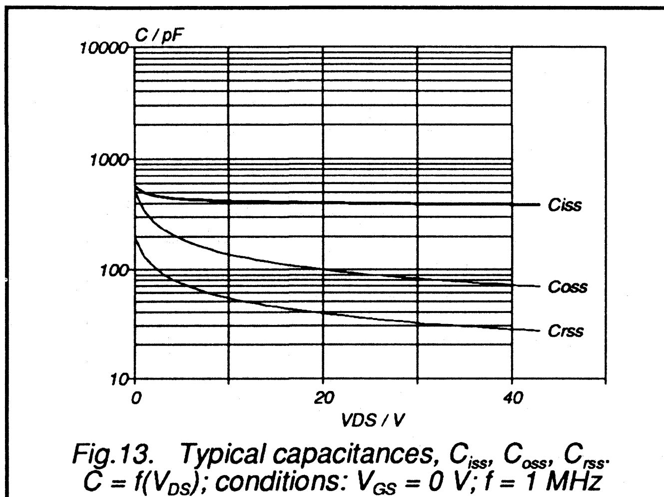


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

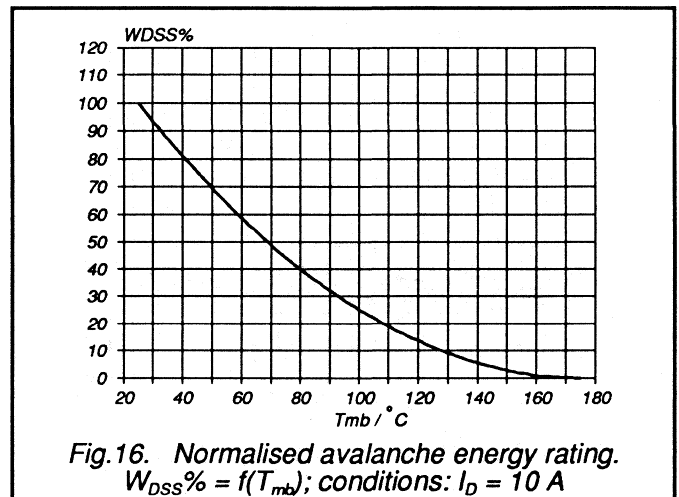


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 10$ A

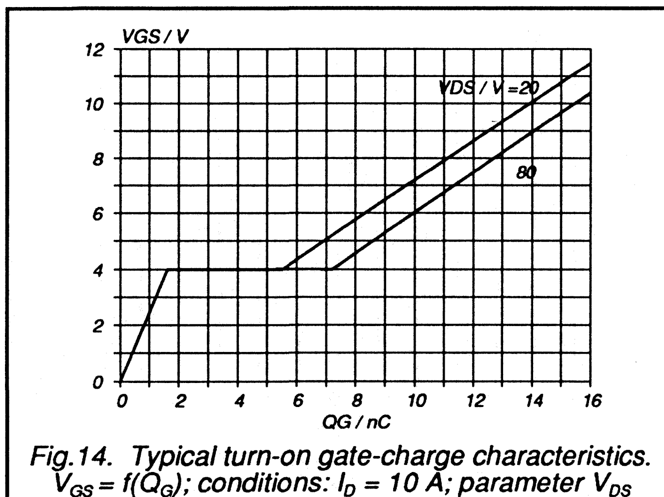


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

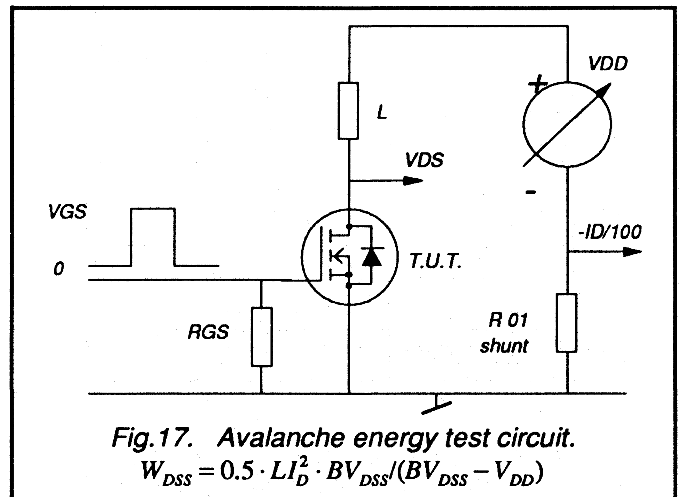


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK553	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	21	20	A
P_{tot}	Total power dissipation	75	75	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.085	0.10	Ω

MECHANICAL DATA

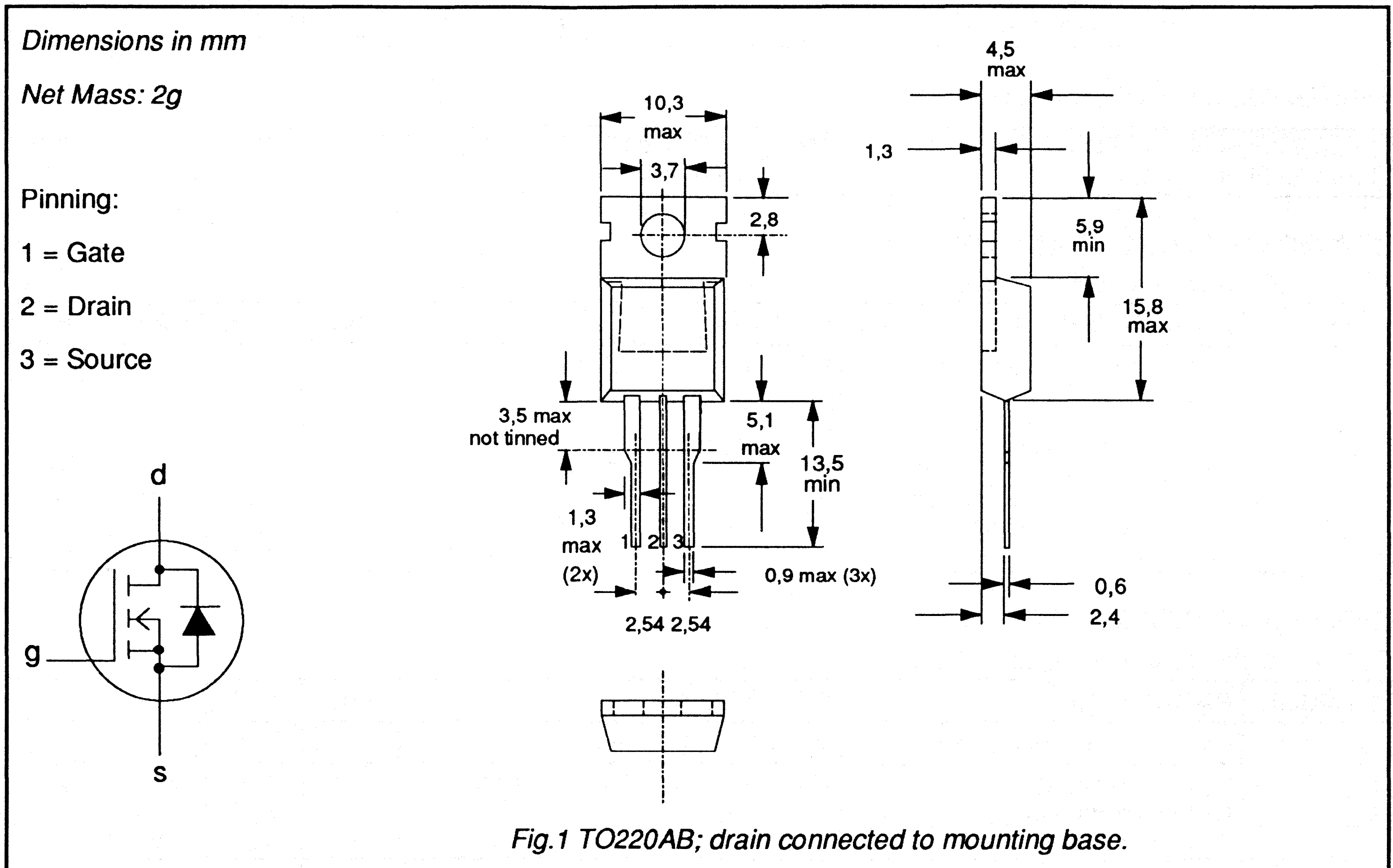


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	21	20	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	15	14	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	84	80	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 10 A **BUK553-50A**	-	0.075	0.085	Ω
		BUK553-50B	-	0.08	0.10	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 10 A	7	10	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	700	825	pF
C_{oss}	Output capacitance		-	240	350	pF
C_{rss}	Feedback capacitance		-	130	160	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	20	30	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	95	120	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	80	110	ns
t_f	Turn-off fall time		-	65	85	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	21	A
I_{DRM}	Pulsed reverse drain current	-	-	-	84	A
V_{SD}	Diode forward voltage	I_F = 21 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 21 A; $-dI_F/dt$ = 100 A/µs; V_{GS} = 0 V; V_R = 30 V	-	120	-	ns
Q_{rr}	Reverse recovery charge		-	0.15	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 20 A ; V_{DD} ≤ 25 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	45	mJ

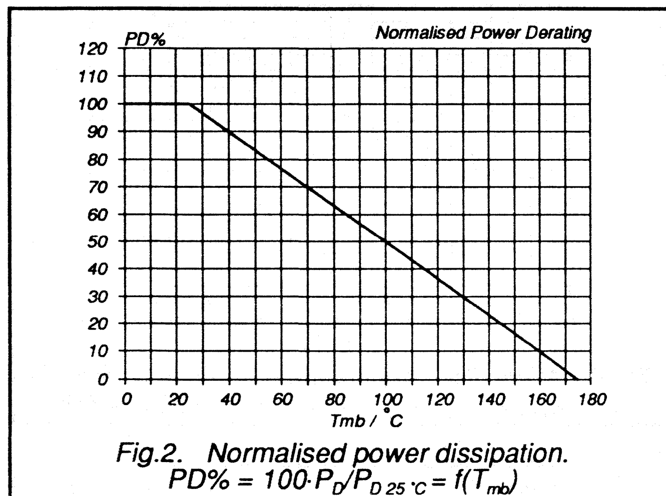


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

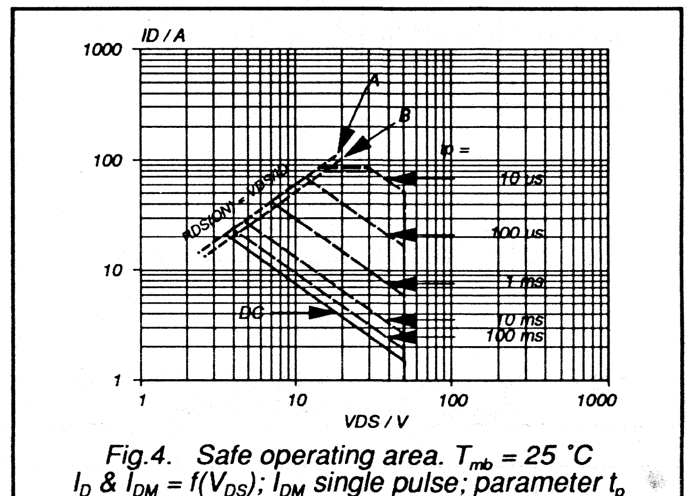


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

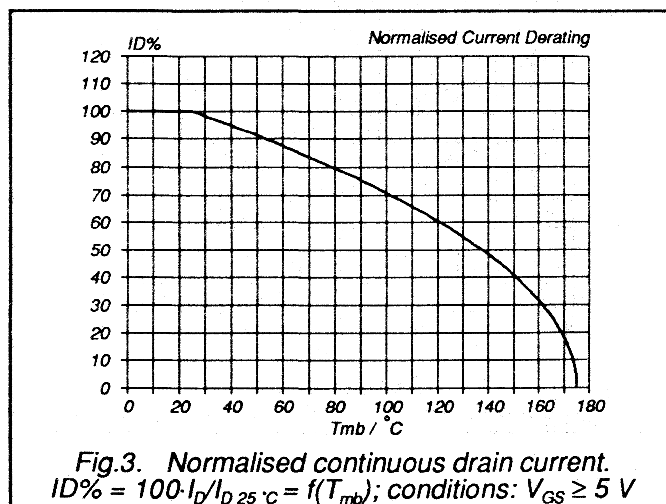


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

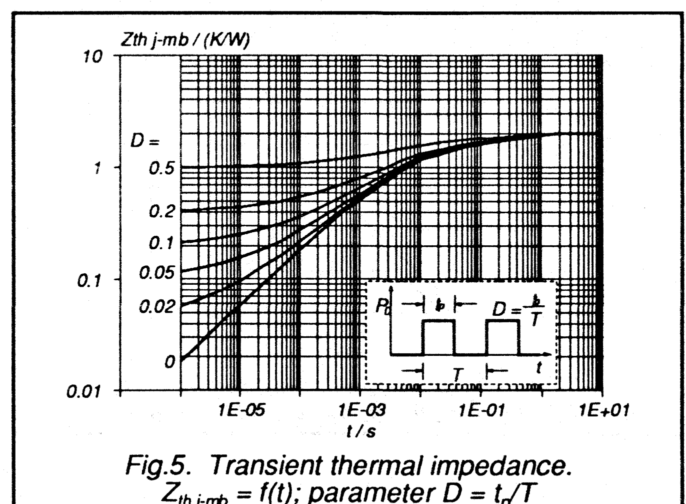


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

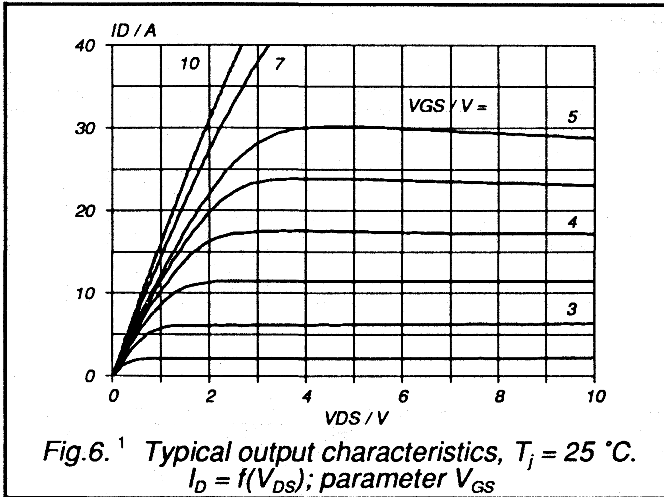


Fig.6. [1] *Typical output characteristics, T_j = 25 °C.*
$I_D = f(V_{DS})$; parameter V_{GS}

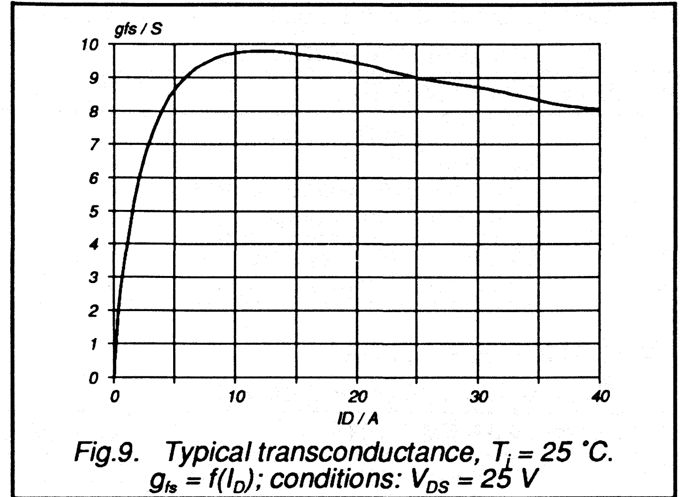


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

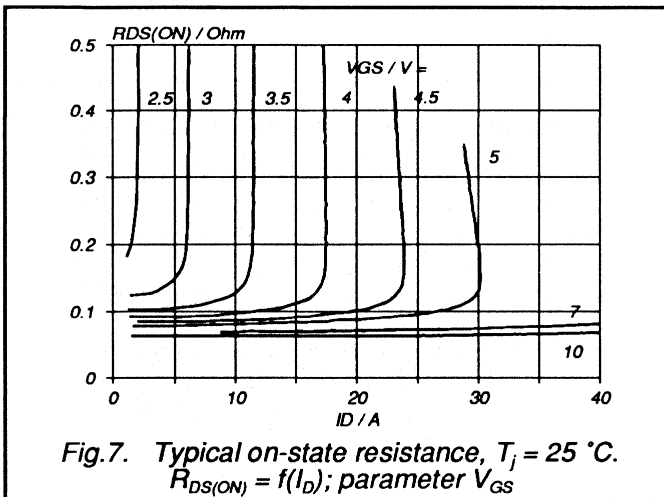


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

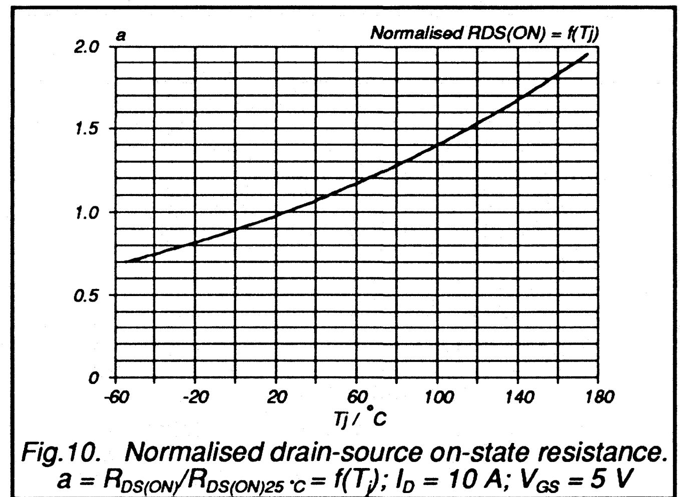


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 10 A; V_{GS} = 5 V

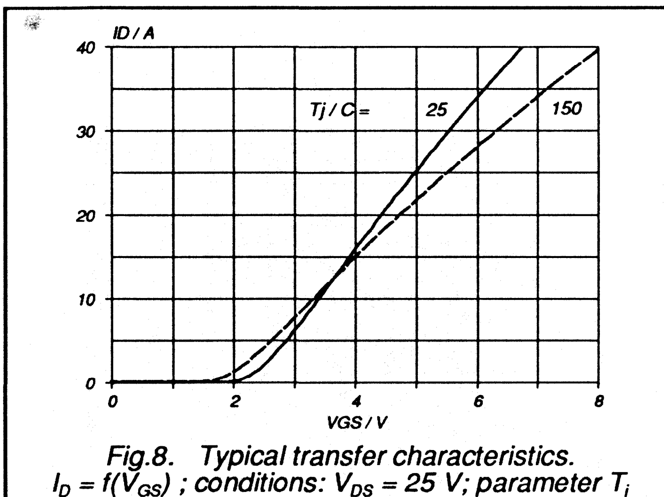


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

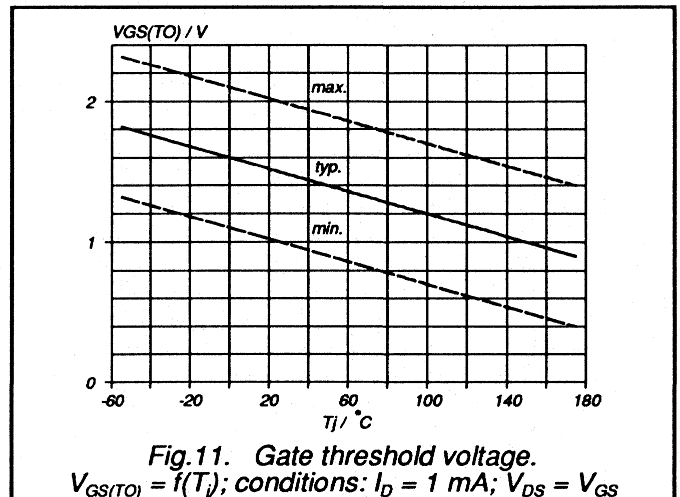


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

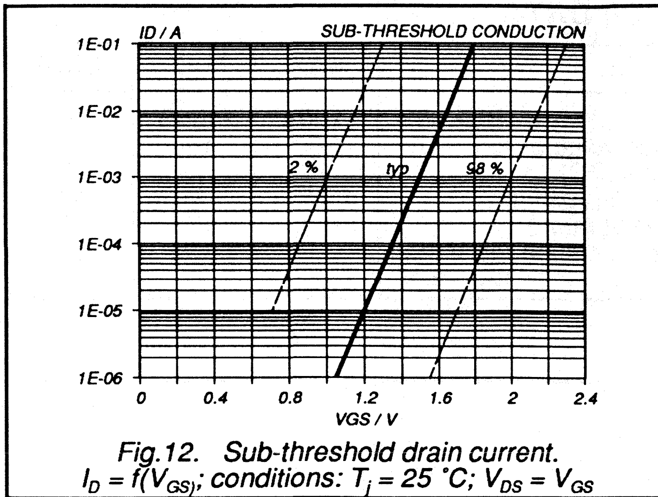


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

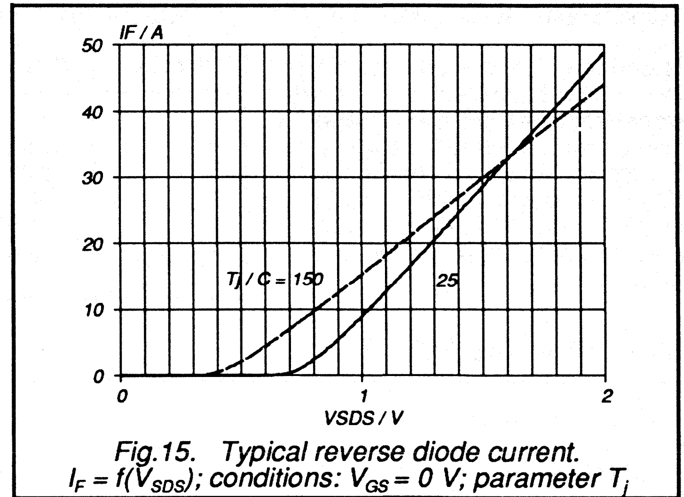


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

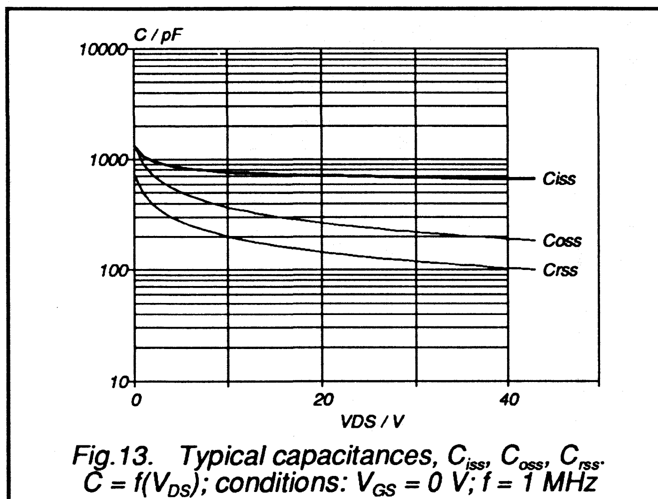


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

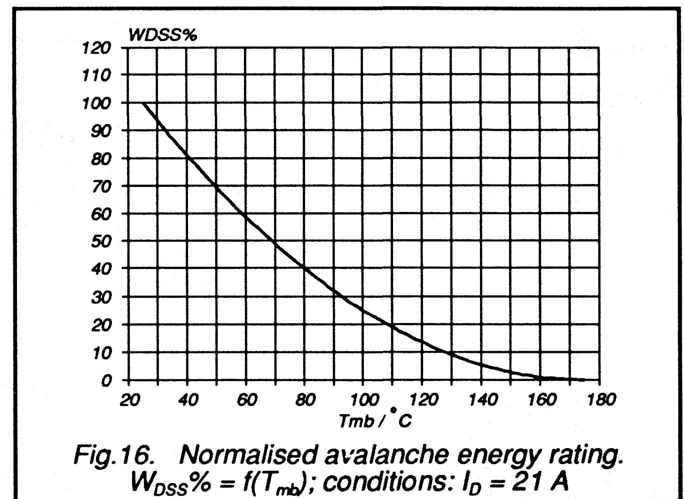


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 21$ A

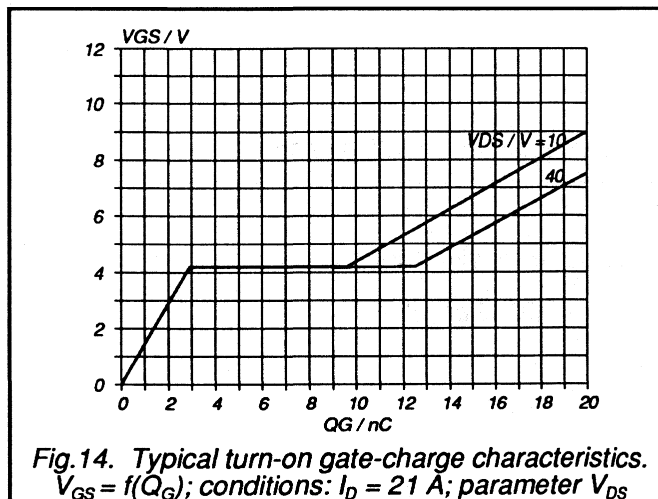


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 21$ A; parameter V_{DS}

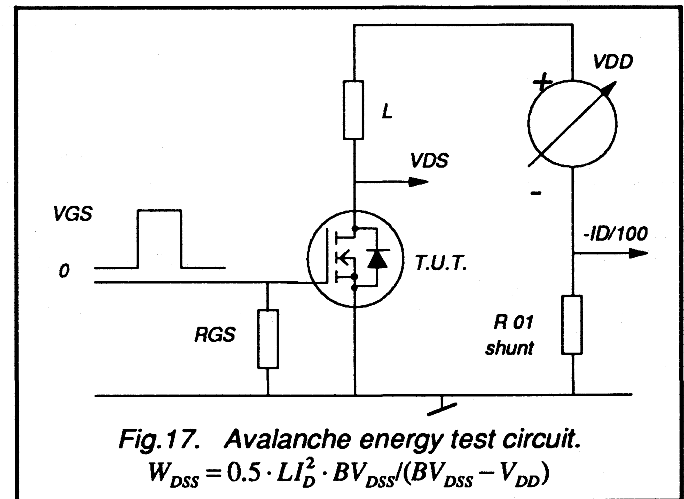


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK553	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	13	12	A
P_{tot}	Total power dissipation	75	75	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.18	0.22	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	13	12	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	9	8.5	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	52	48	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	75		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 6.5 A BUK553-100A	-	0.17	0.18	Ω
		BUK553-100B	-	0.20	0.22	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	6.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	620	825	pF
C_{oss}	Output capacitance		-	180	250	pF
C_{rss}	Feedback capacitance		-	90	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 5 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	20	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\,off}$	Turn-off delay time		-	90	115	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	13	A
I_{DRM}	Pulsed reverse drain current	-	-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ; V_{GS} = 0 V	-	1.2	1.5	V
t_{rr}	Reverse recovery time	I_F = 13 A; -dI_F/dt = 100 A/µs;	-	170	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.3	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 13 A ; V_{DD} ≤ 50 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	70	mJ

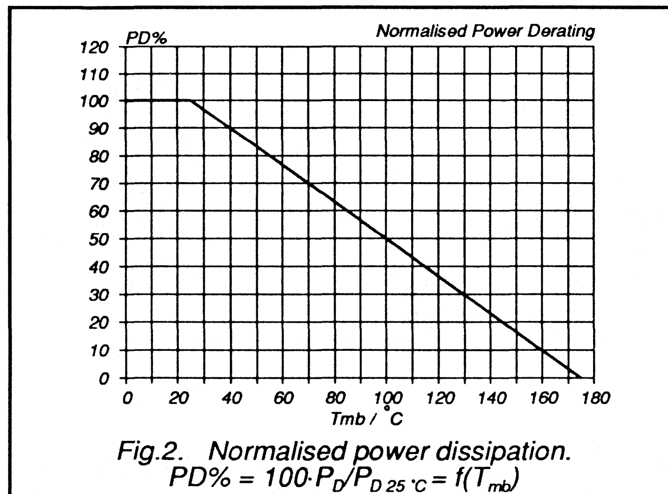


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

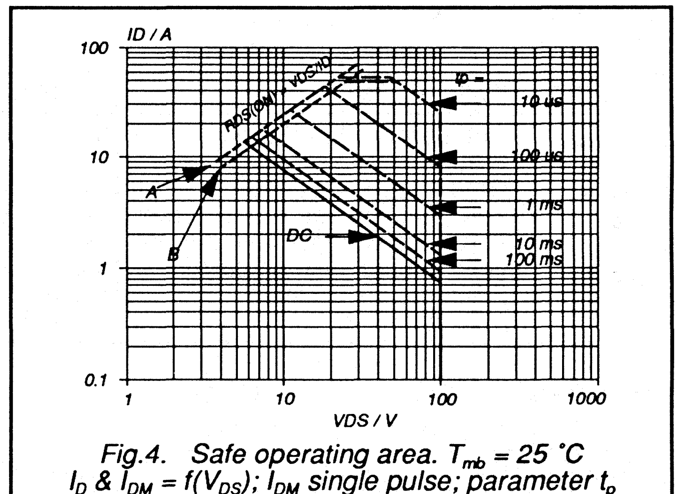


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

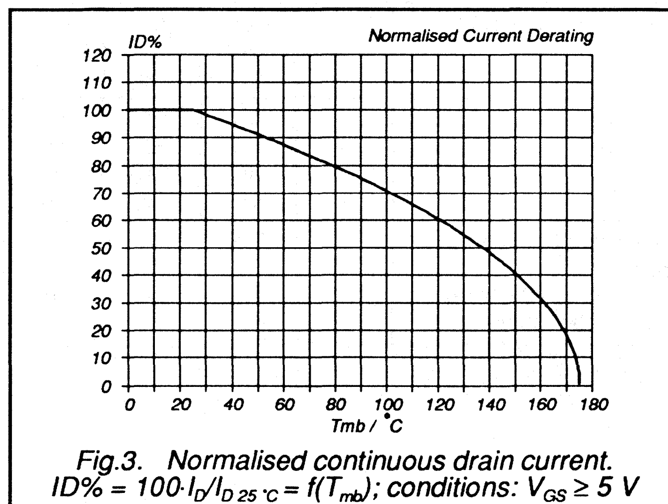


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 5 V

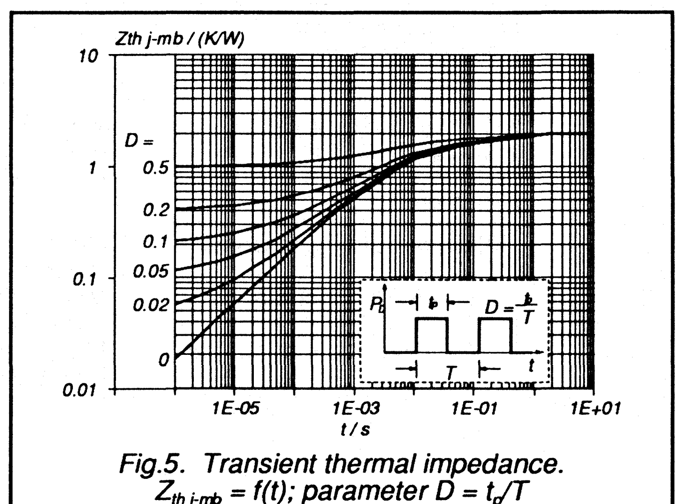


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

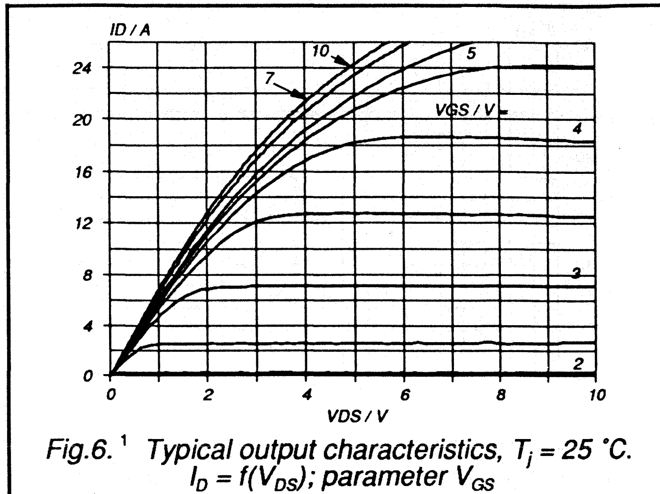


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

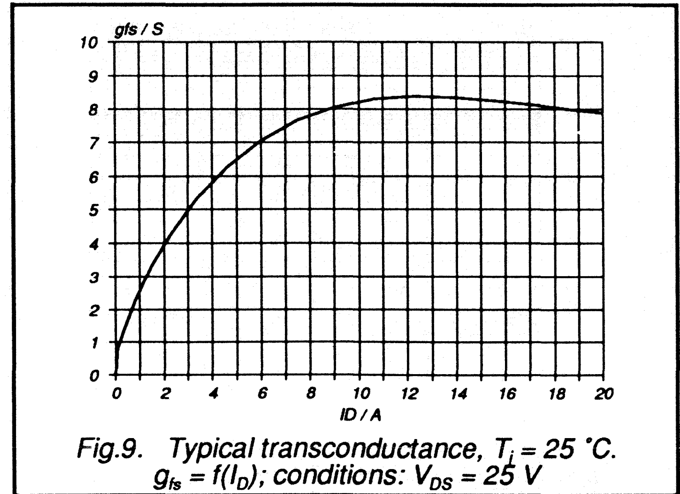


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

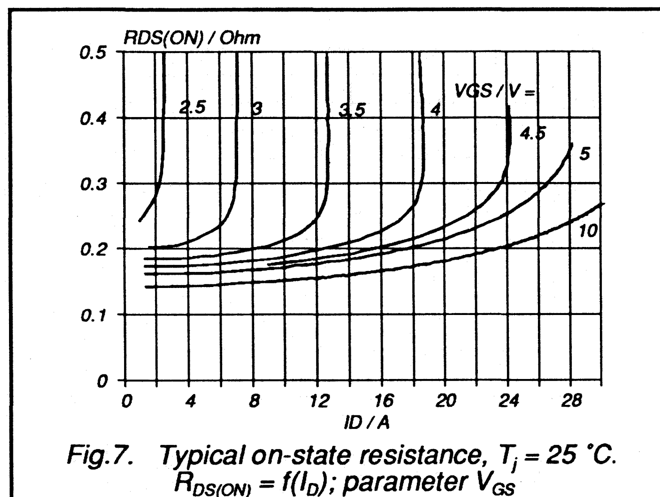


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

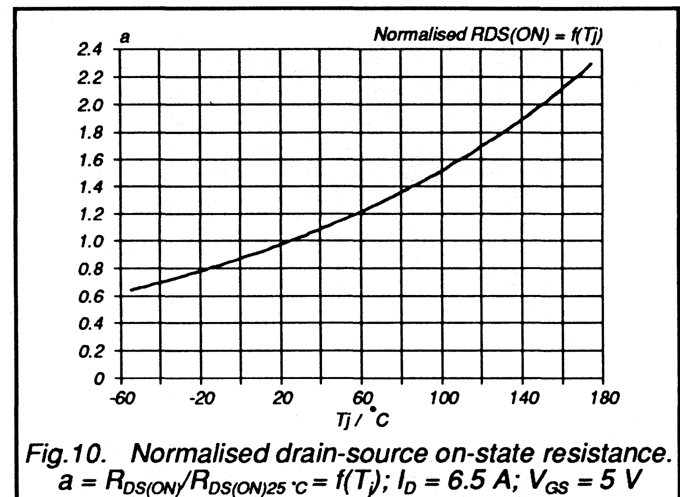


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 5 V

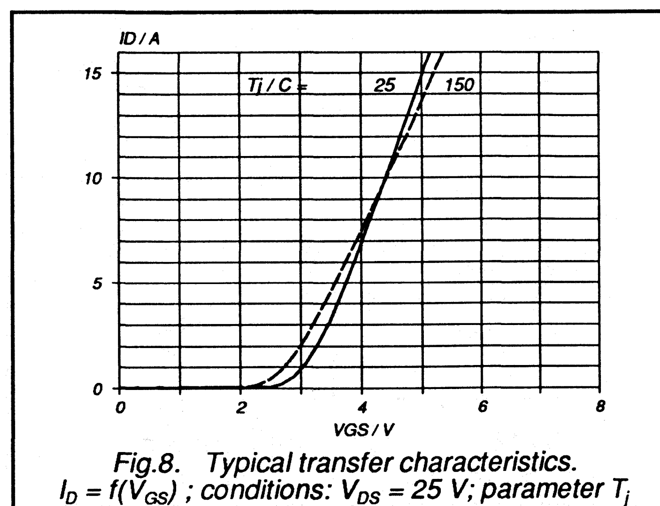


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

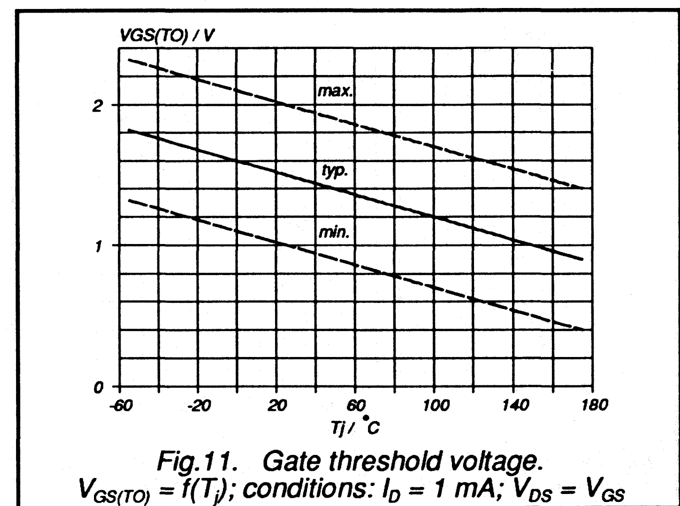


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

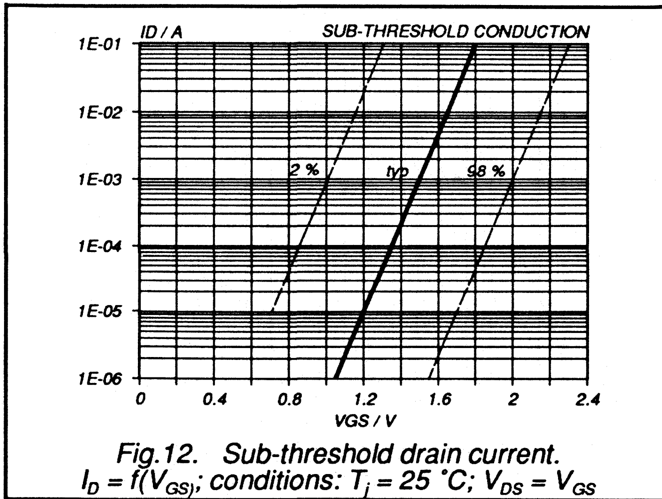


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

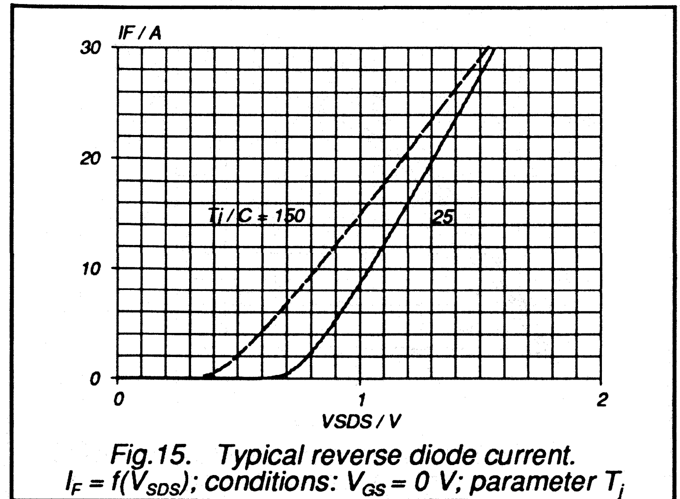


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

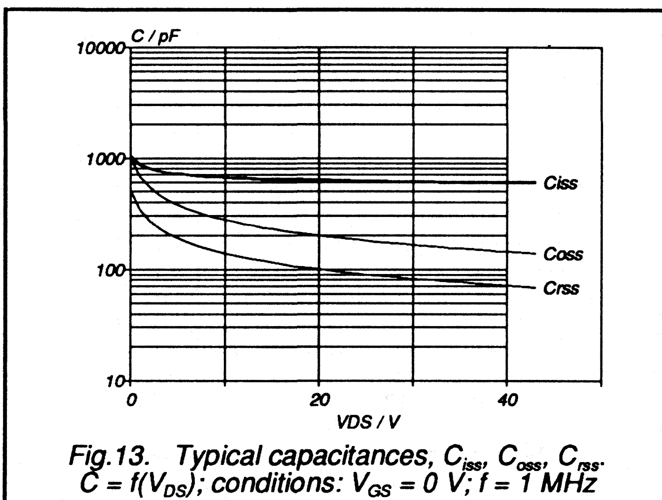


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

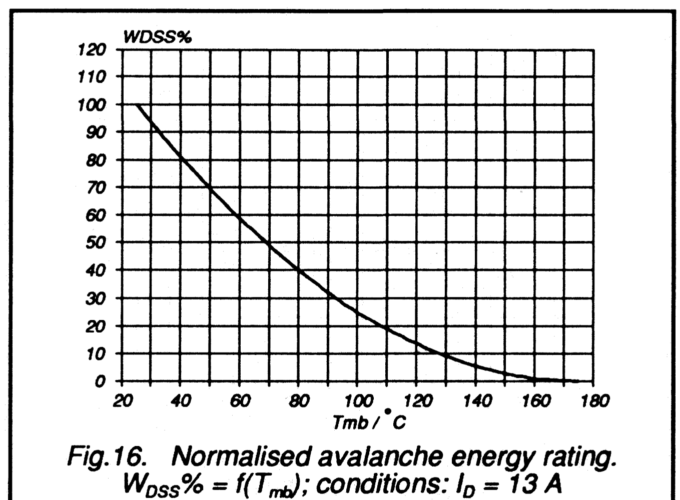


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 13$ A

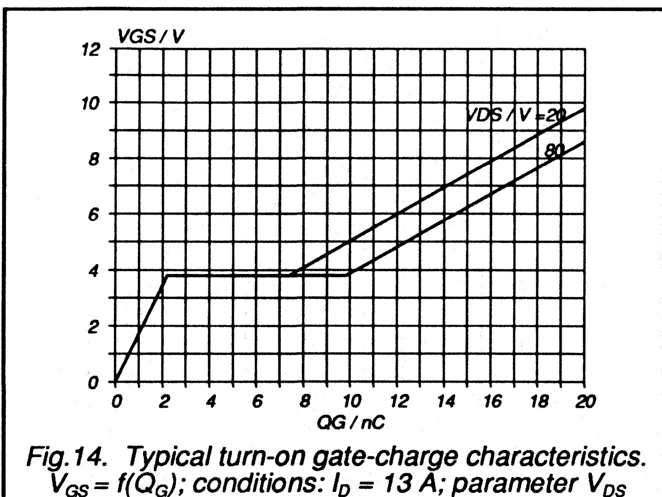


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 13$ A; parameter V_{DS}

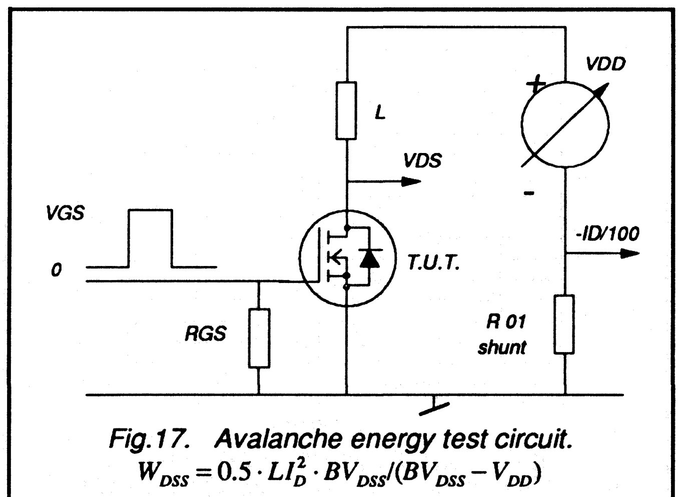


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

PowerMOS transistor
Logic Level FET

BUK554-200A
BUK554-200B

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK554	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	9.2	8.2	A
P_{tot}	Total power dissipation	90	90	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.4	0.5	Ω

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9.2	8.2	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.5	5.8	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	36	33	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	90		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.67 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 3.5 A; **BUK554-200A**	-	0.35	0.4	Ω
		BUK554-200B	-	0.4	0.5	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 3.5 A	3.5	6.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	800	1000	pF
C_{oss}	Output capacitance		-	120	160	pF
C_{rss}	Feedback capacitance		-	65	90	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.9 A;	-	16	30	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	75	110	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	120	180	ns
t_f	Turn-off fall time		-	50	75	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	9.2	A
I_{DRM}	Pulsed reverse drain current	-	-	-	36	A
V_{SD}	Diode forward voltage	I_F = 9.2 A ; V_{GS} = 0 V	-	1.1	1.3	V
t_{rr}	Reverse recovery time	I_F = 9.2 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 100 V	-	0.6	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 9 A ; V_{DD} ≤ 100 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	50	mJ

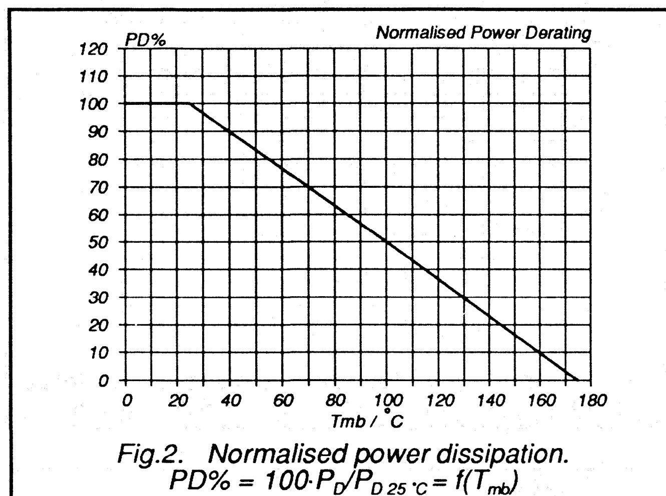


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

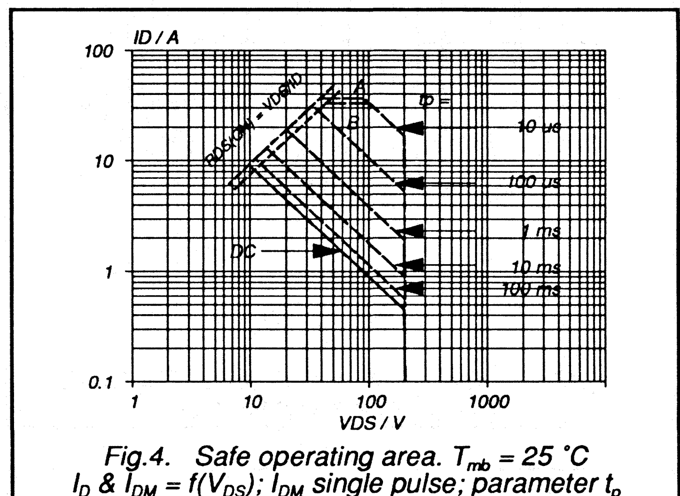


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

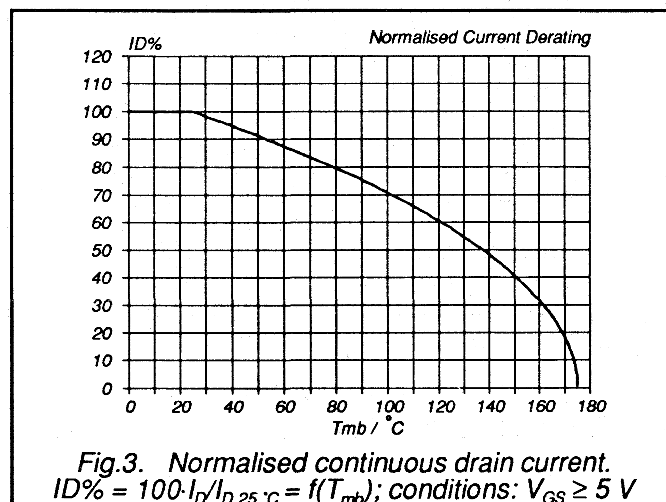


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

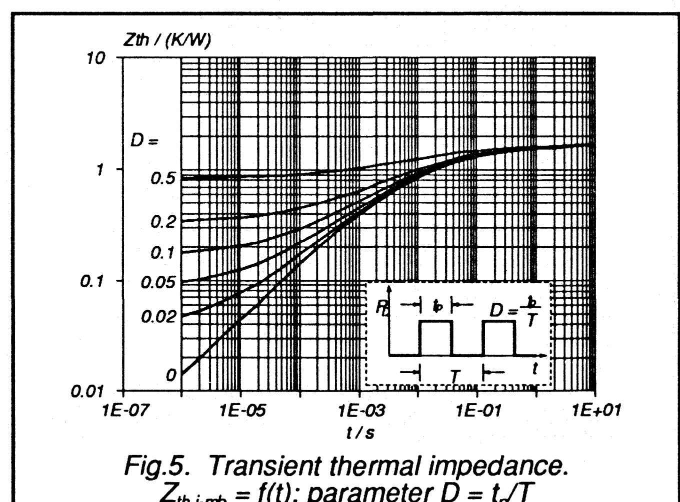


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

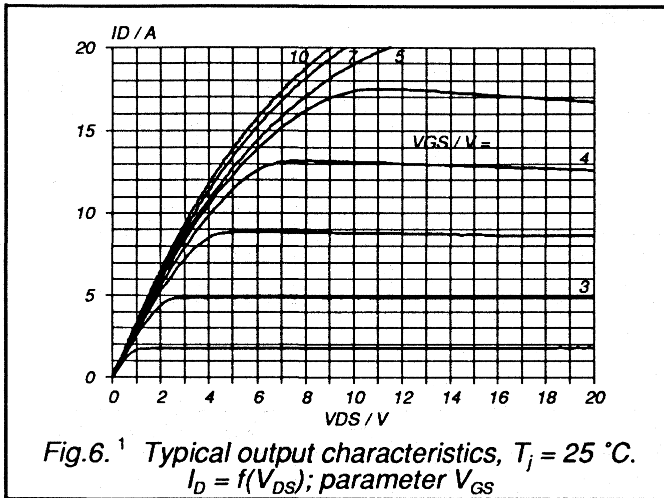


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

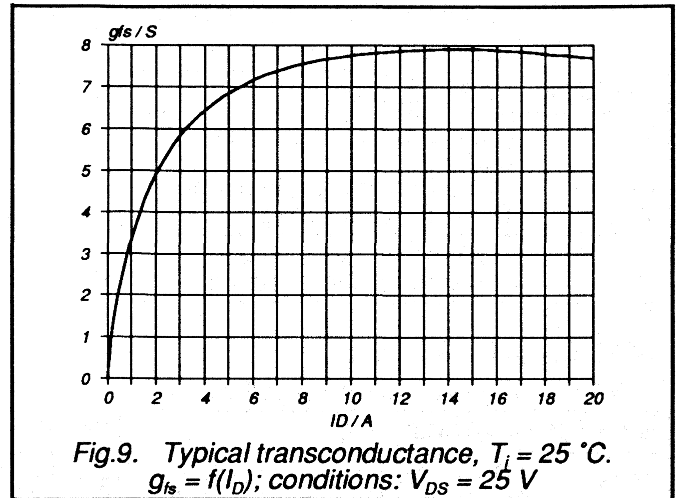


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

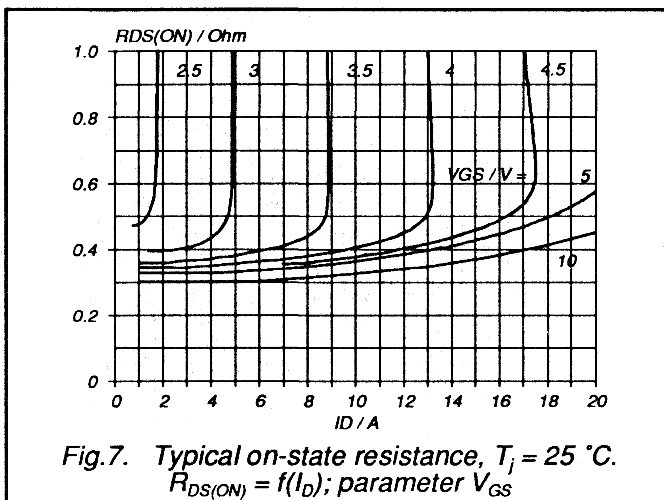


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

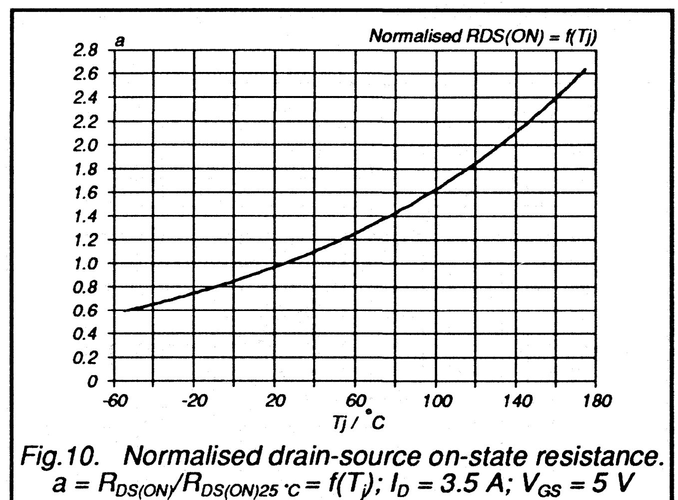


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 3.5$ A; $V_{GS} = 5$ V

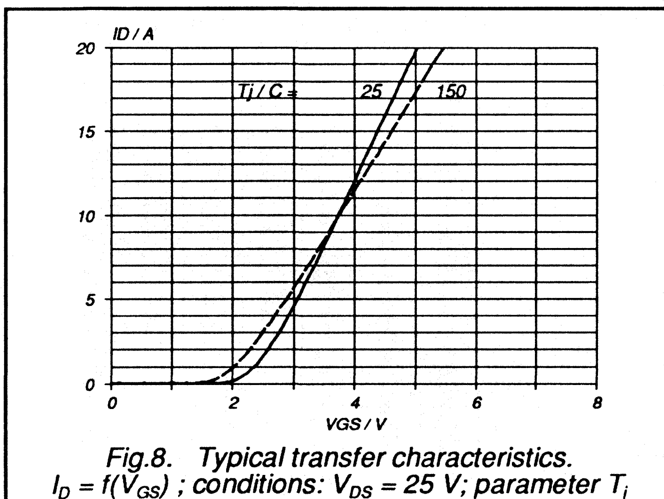


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

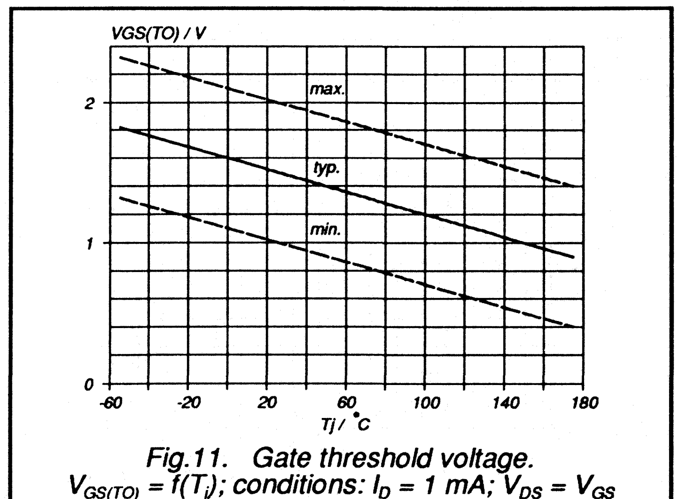


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

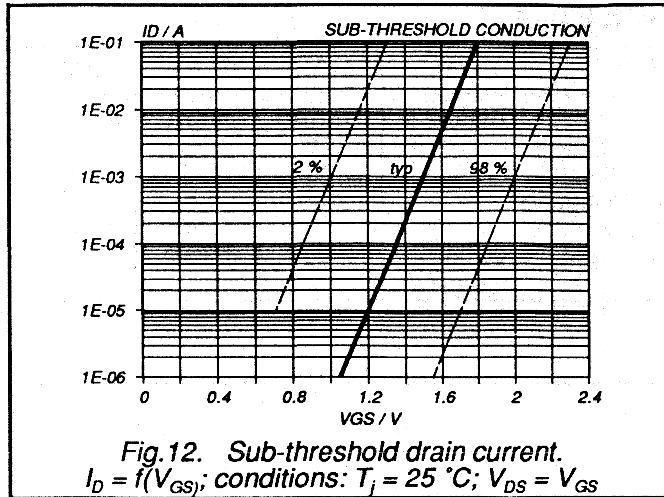


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

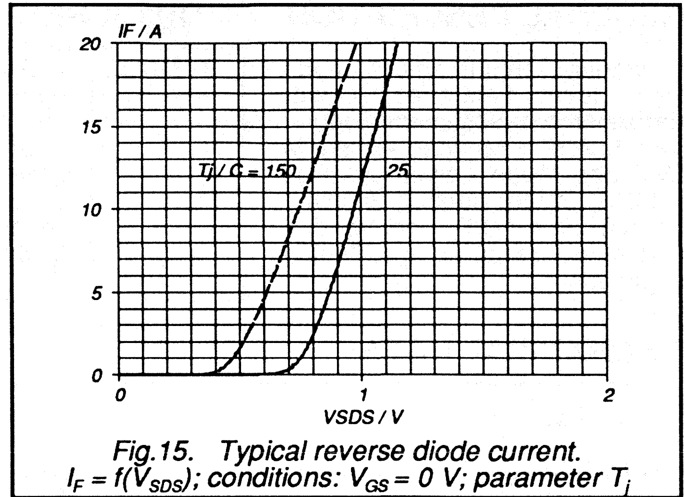


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

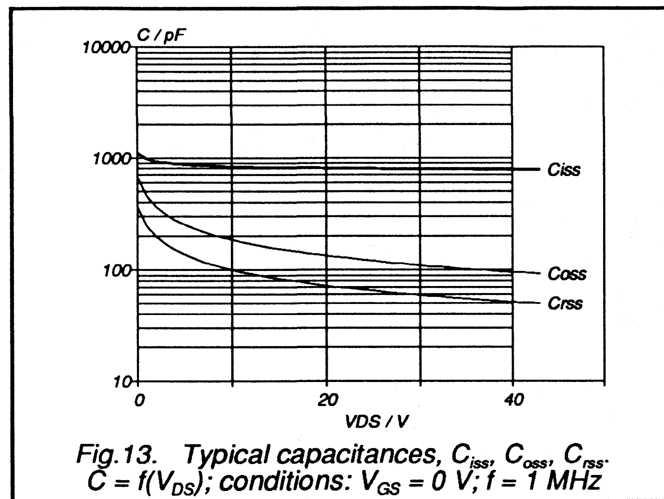


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

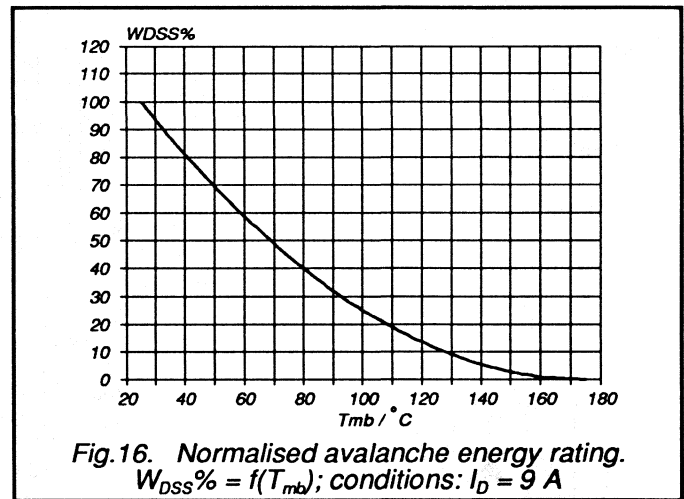


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 9$ A

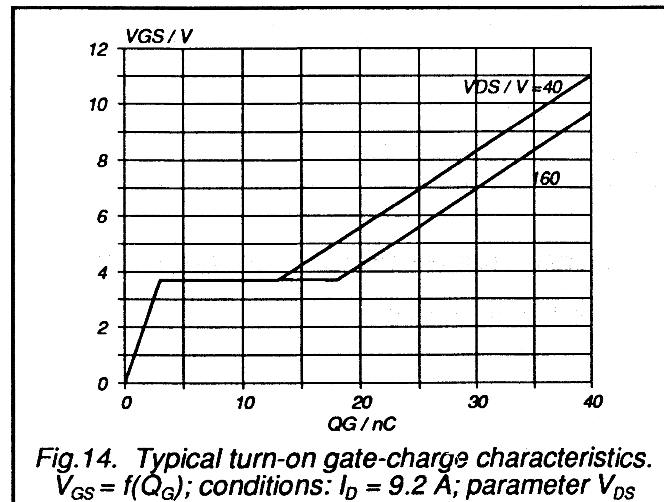


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9.2$ A; parameter V_{DS}

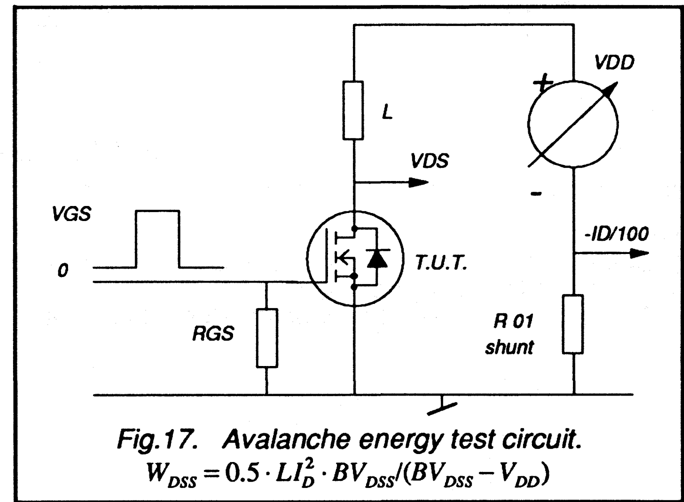


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK555	-50A	-50B	
V_{DS}	Drain-source voltage	50	50	V
I_D	Drain current (DC)	39	35	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance V_{GS} = 5 V	0.042	0.055	Ω

MECHANICAL DATA

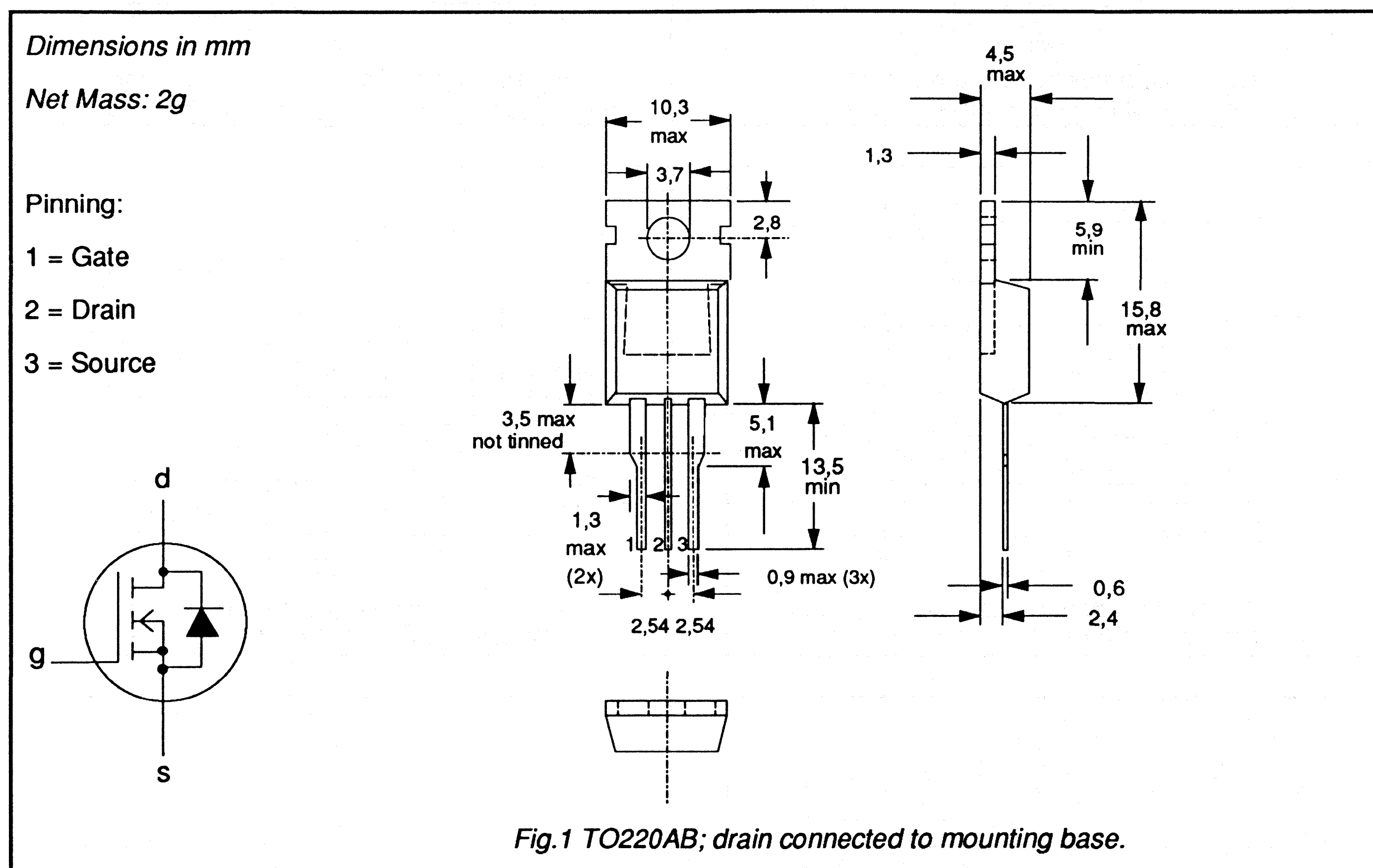


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	50		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	50		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-50A	-50B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	39	35	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	28	25	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	156	140	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	50	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 50 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 20 A **BUK555-50A**	-	0.035	0.042	Ω
		BUK555-50B	-	0.045	0.055	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 20 A	15	20	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1450	1750	pF
C_{oss}	Output capacitance		-	500	600	pF
C_{rss}	Feedback capacitance		-	220	275	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	120	150	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	160	220	ns
t_f	Turn-off fall time		-	110	145	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	39	A
I_{DRM}	Pulsed reverse drain current	-	-	-	156	A
V_{SD}	Diode forward voltage	I_F = 39 A ; V_{GS} = 0 V	-	1.4	2.0	V
t_{rr}	Reverse recovery time	I_F = 39 A; $-dI_F/dt$ = 100 A/µs; V_{GS} = 0 V; V_R = 30 V	-	250	-	ns
Q_{rr}	Reverse recovery charge		-	0.30	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 39 A ; V_{DD} ≤ 25 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	90	mJ

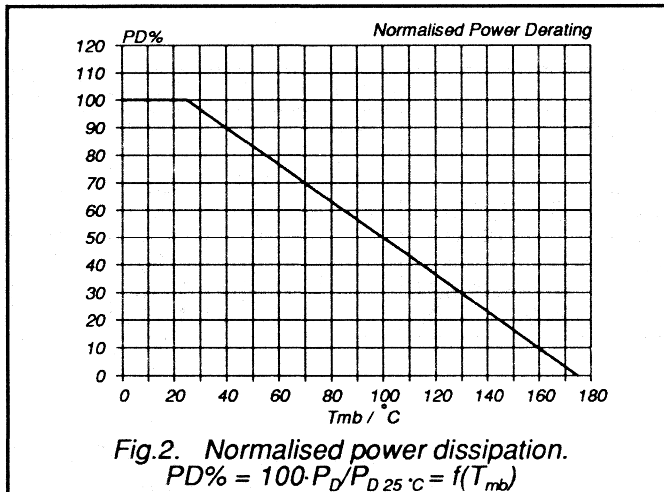


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

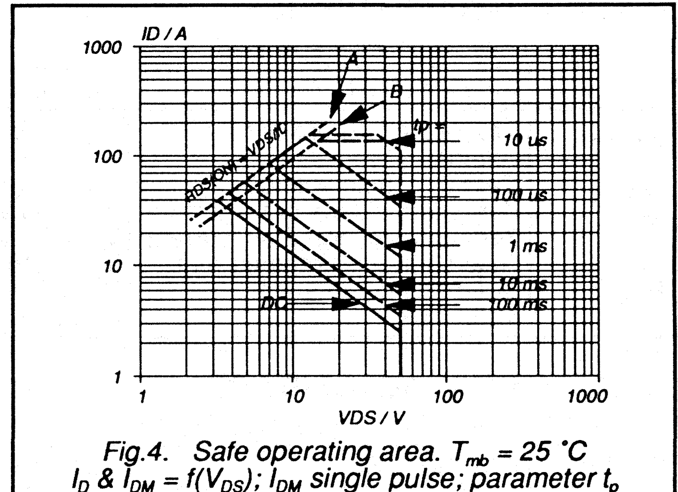


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

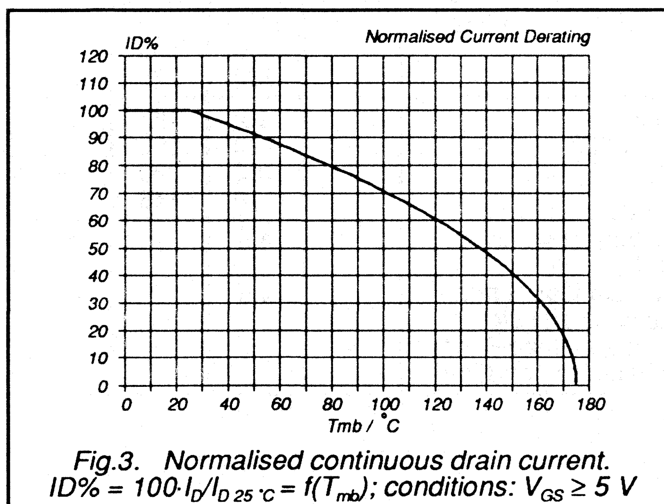


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

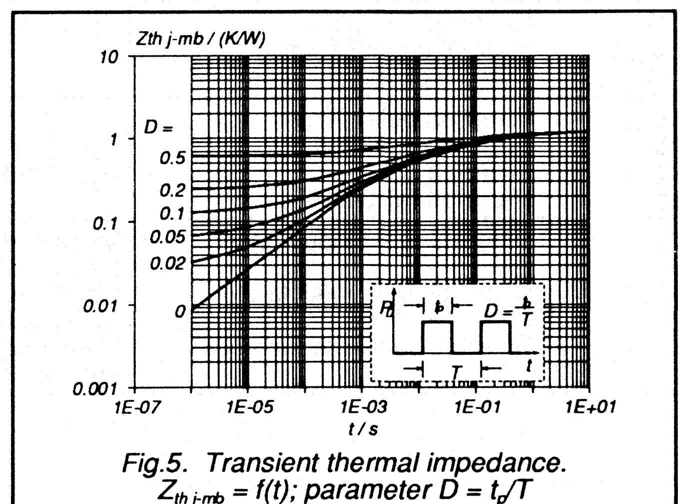


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

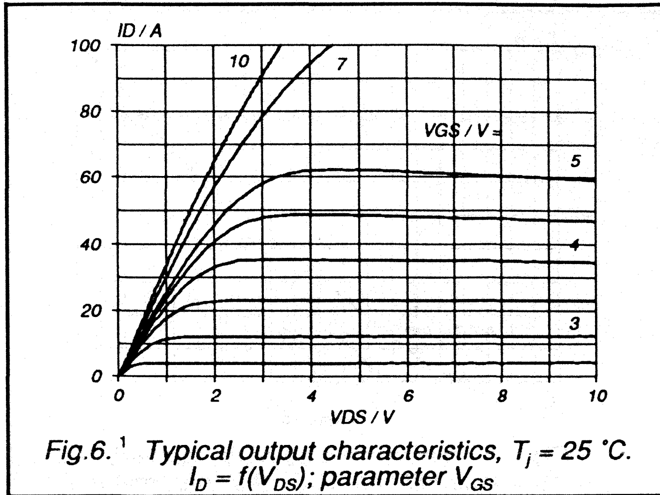


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

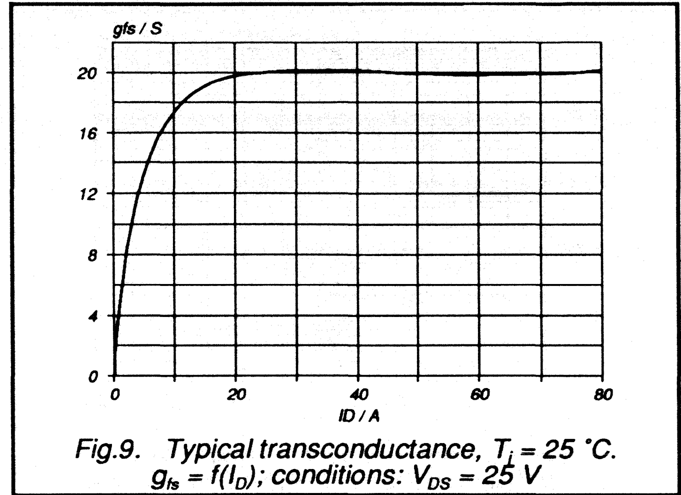


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

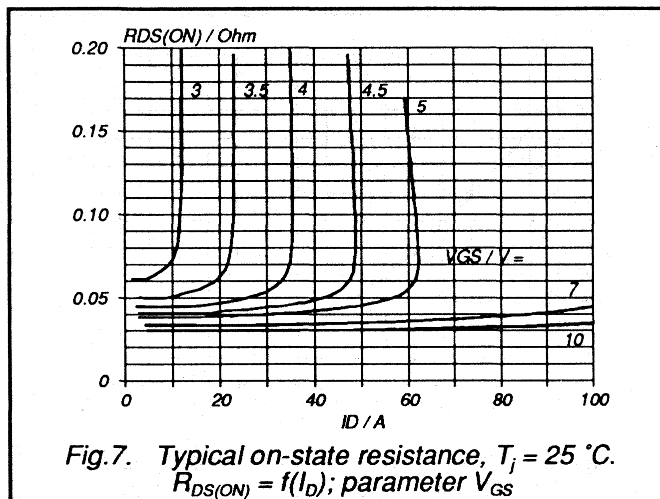


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

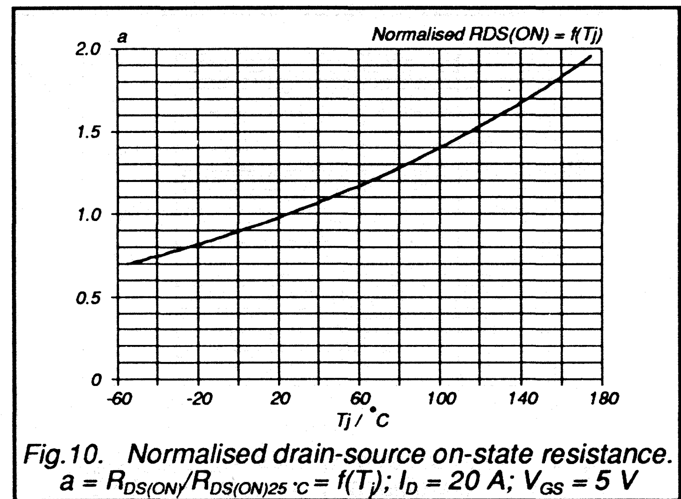


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 20 A; V_{GS} = 5 V

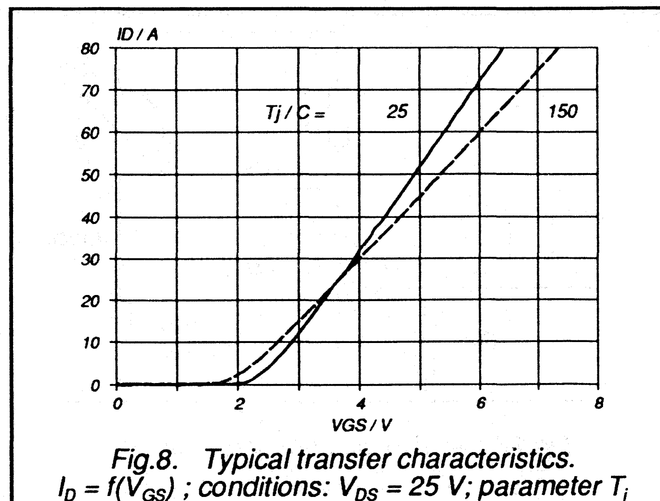


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

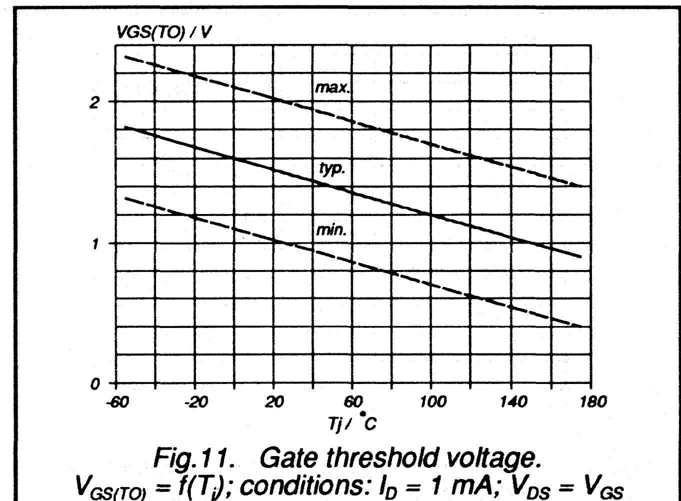


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

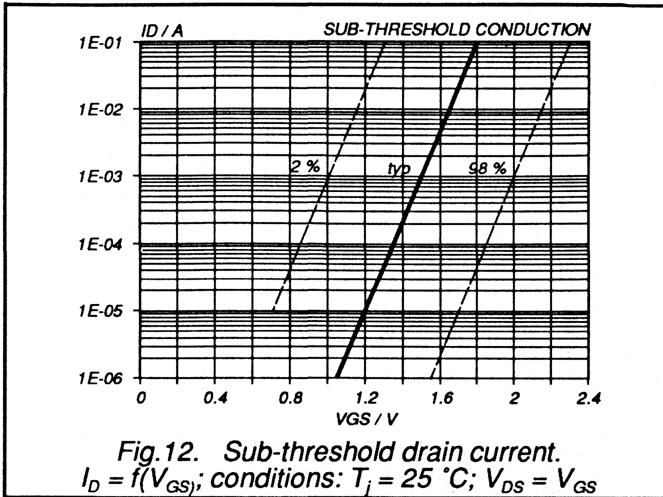


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

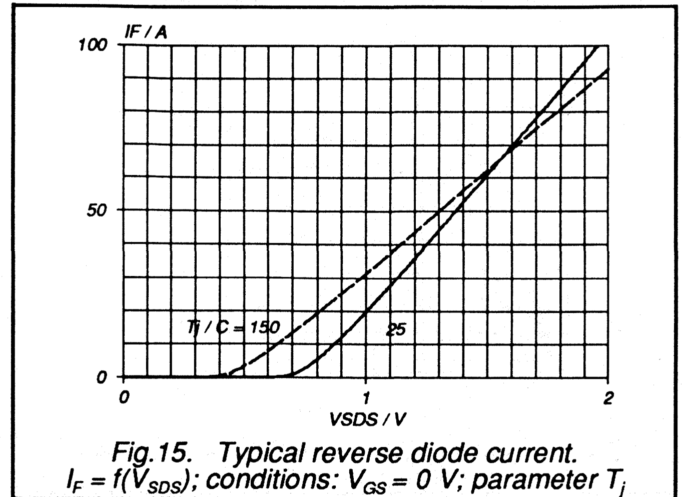


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

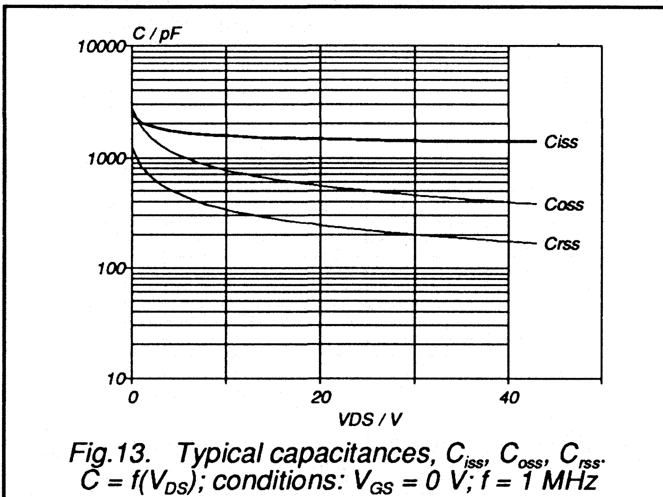


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

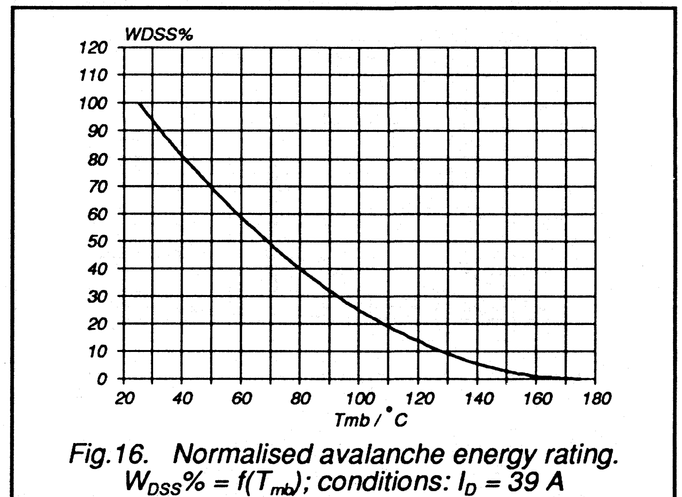


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 39$ A

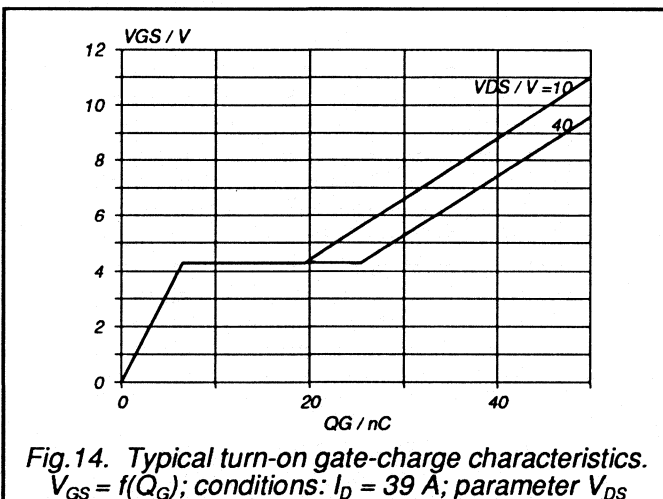


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 39$ A; parameter V_{DS}

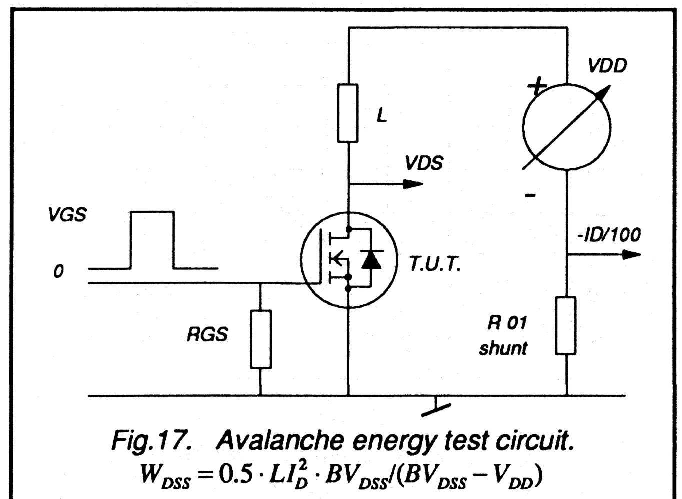


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK555	-100A	-100B	
V_{DS}	Drain-source voltage	100	100	V
I_D	Drain current (DC)	25	22	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 5$ V	0.085	0.11	Ω

MECHANICAL DATA

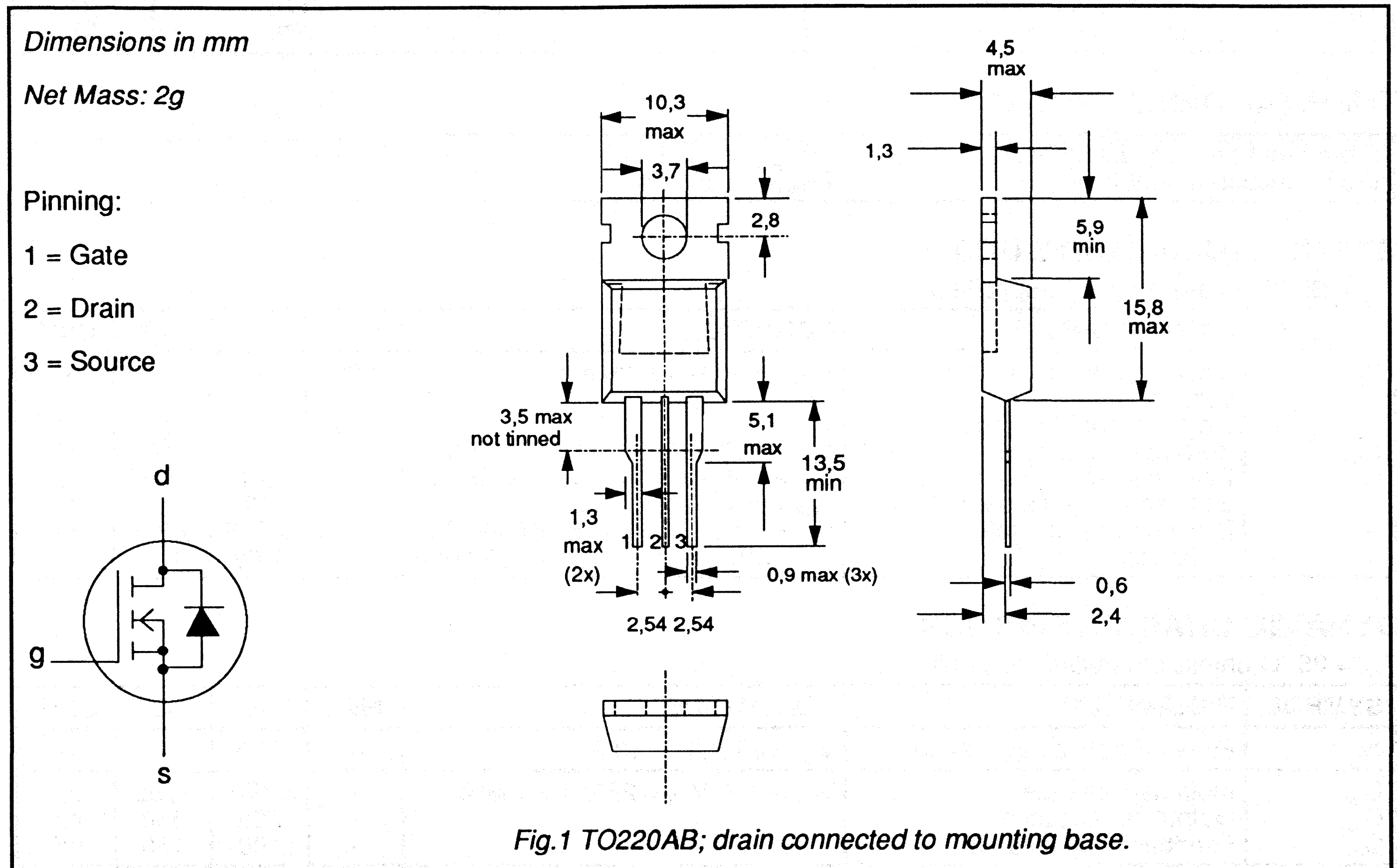


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	100		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	100		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-100A	-100B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	25	22	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	18	15	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	100	88	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		°C
T_j	Junction Temperature	-	-	175		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.2 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	100	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 °C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 100 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 13 A BUK555-100A	-	0.075	0.085	Ω
		BUK555-100B	-	0.09	0.11	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 13 A	10	13.5	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1450	1750	pF
C_{oss}	Output capacitance		-	280	350	pF
C_{rss}	Feedback capacitance		-	100	150	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A;	-	25	40	ns
t_r	Turn-on rise time	V_{GS} = 5 V; R_{GS} = 50 Ω;	-	65	85	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	135	180	ns
t_f	Turn-off fall time		-	80	110	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	25	A
I_{DRM}	Pulsed reverse drain current	-	-	-	100	A
V_{SD}	Diode forward voltage	I_F = 25 A ; V_{GS} = 0 V	-	1.3	1.7	V
t_{rr}	Reverse recovery time	I_F = 25 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 25 A ; $V_{DD} \leq$ 50 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	140	mJ

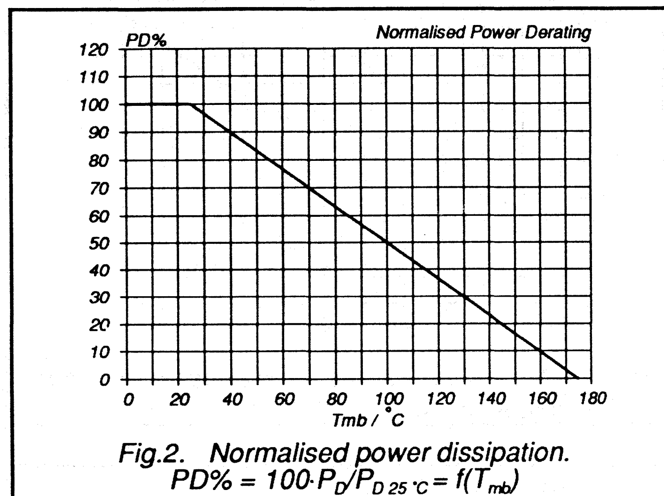


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

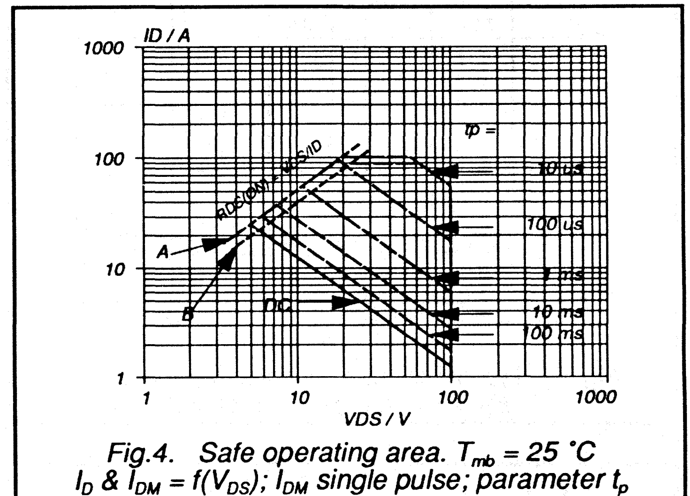


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

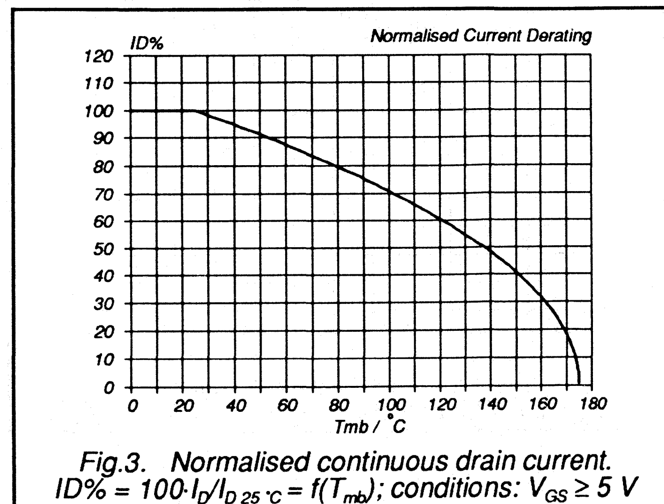


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

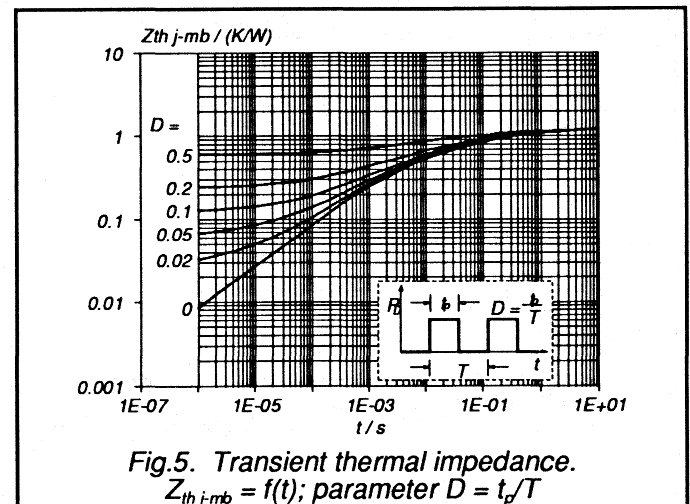


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

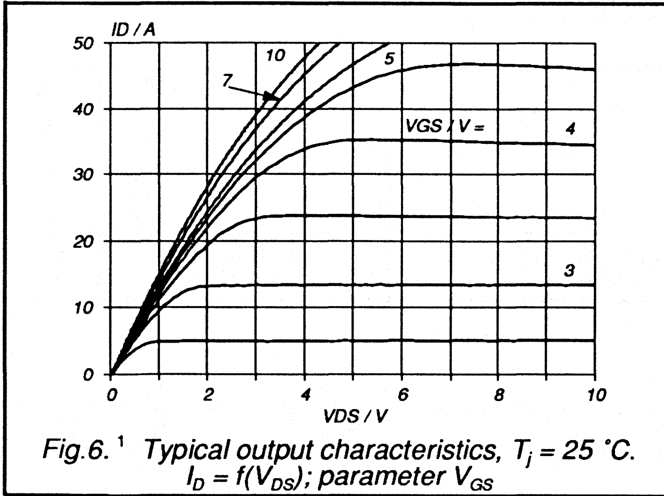


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

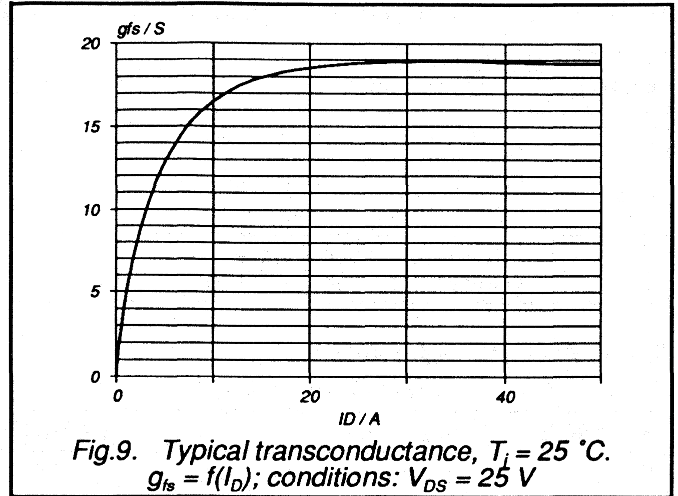


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

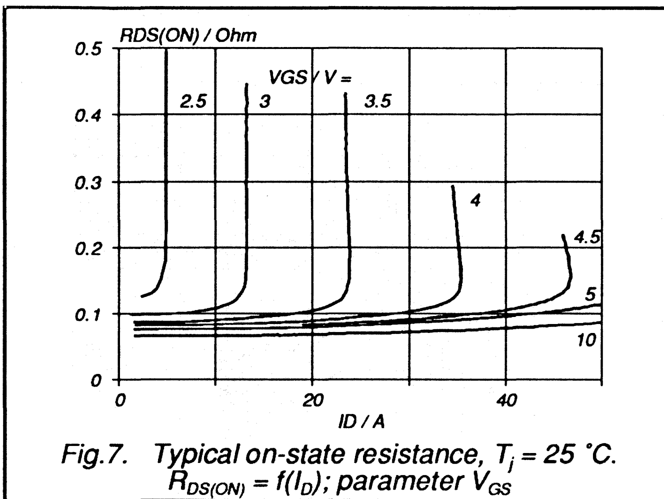


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

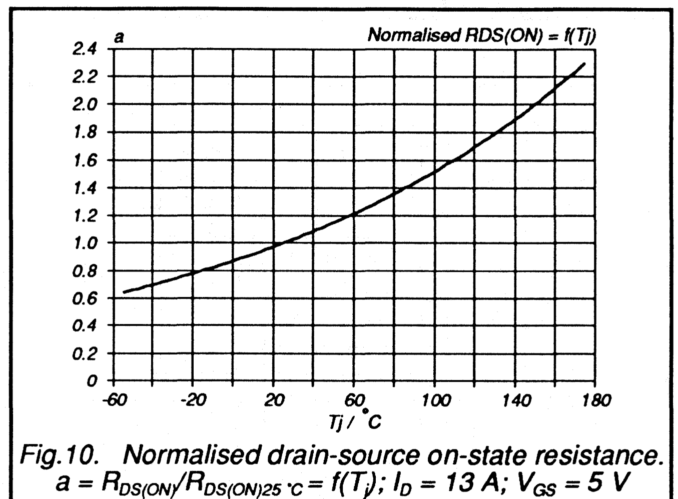


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 13 A; V_{GS} = 5 V

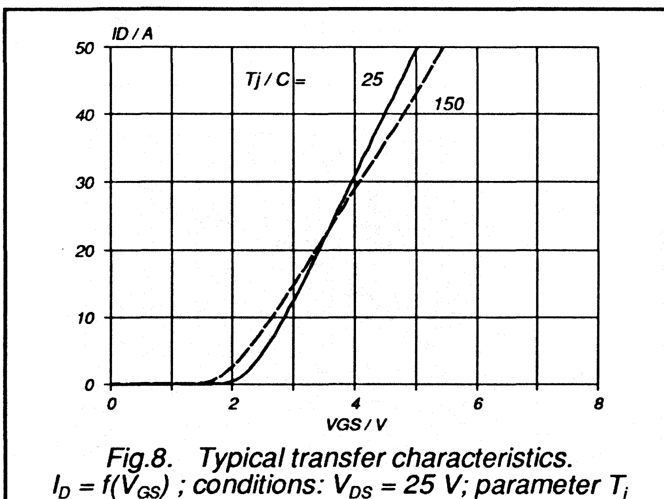


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

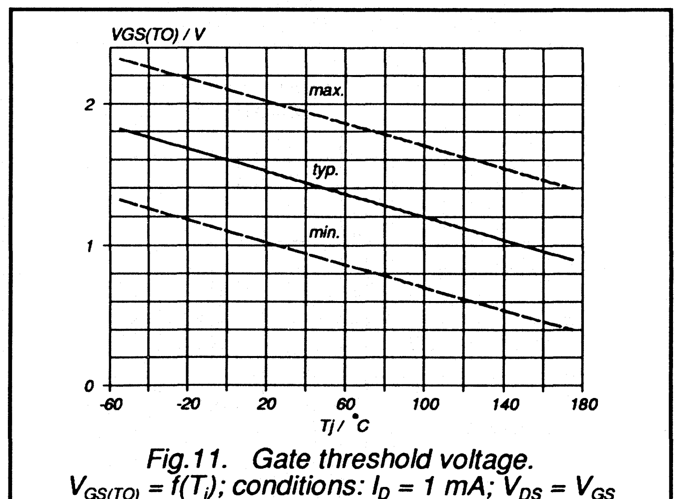


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

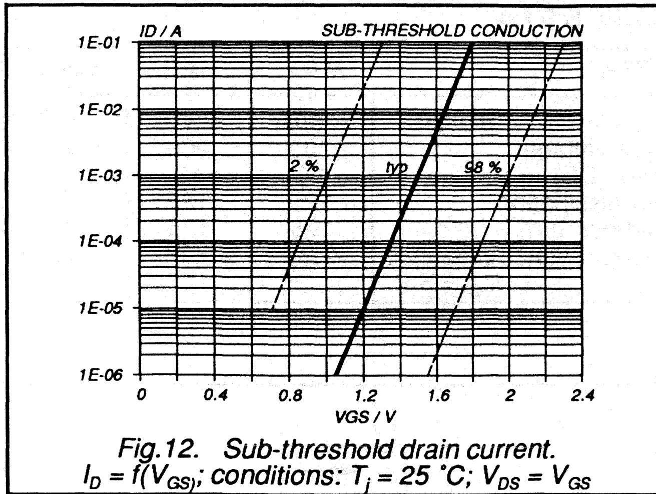


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

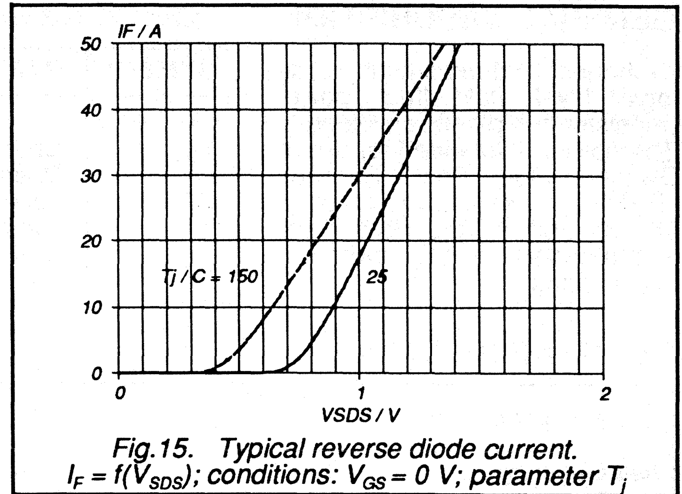


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

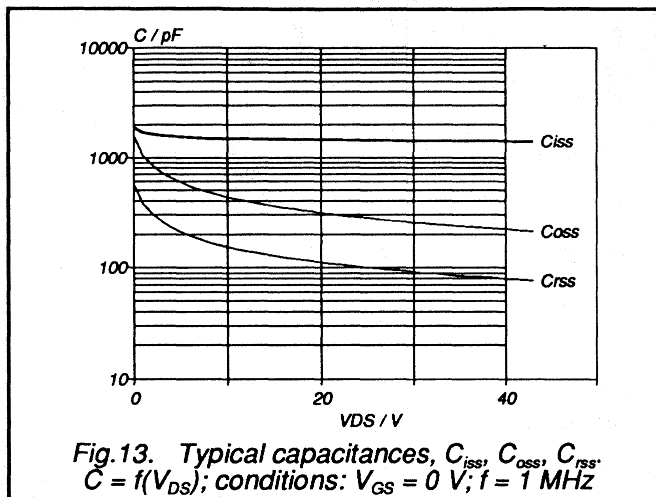


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

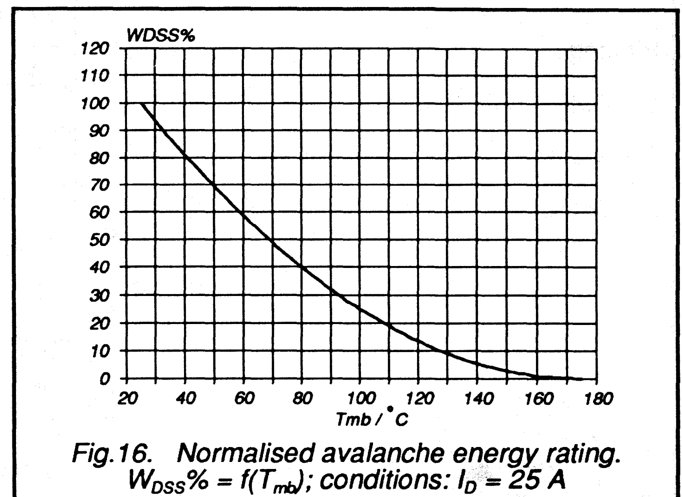


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 25$ A

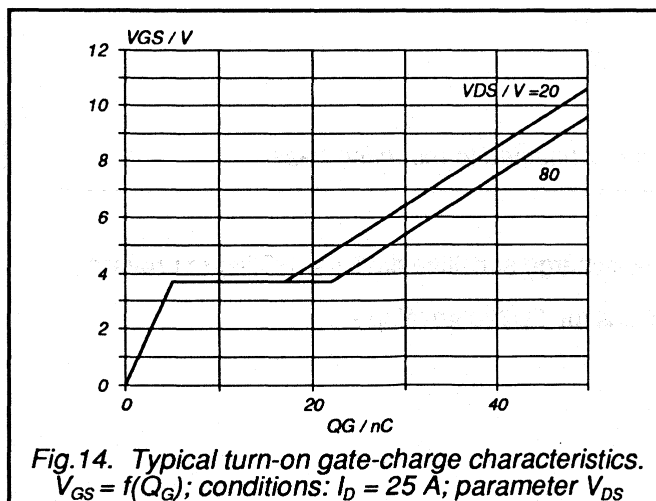


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 25$ A; parameter V_{DS}

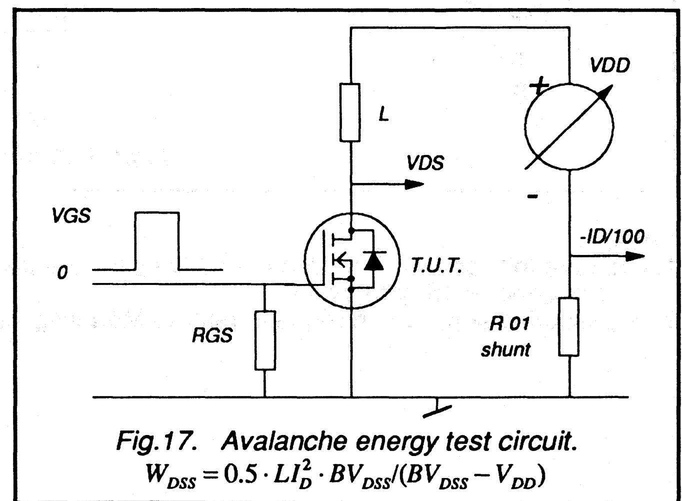


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope. The device is intended for use in Switched Mode Power Supplies (SMPS), motor control, welding, DC/DC and AC/DC converters, and in general purpose switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK555	-200A	-200B	
V_{DS}	Drain-source voltage	200	200	V
I_D	Drain current (DC)	14	13	A
P_{tot}	Total power dissipation	125	125	W
T_j	Junction temperature	175	175	˚C
$R_{DS(ON)}$	Drain-source on-state resistance $V_{GS} = 5$ V	0.23	0.28	Ω

MECHANICAL DATA

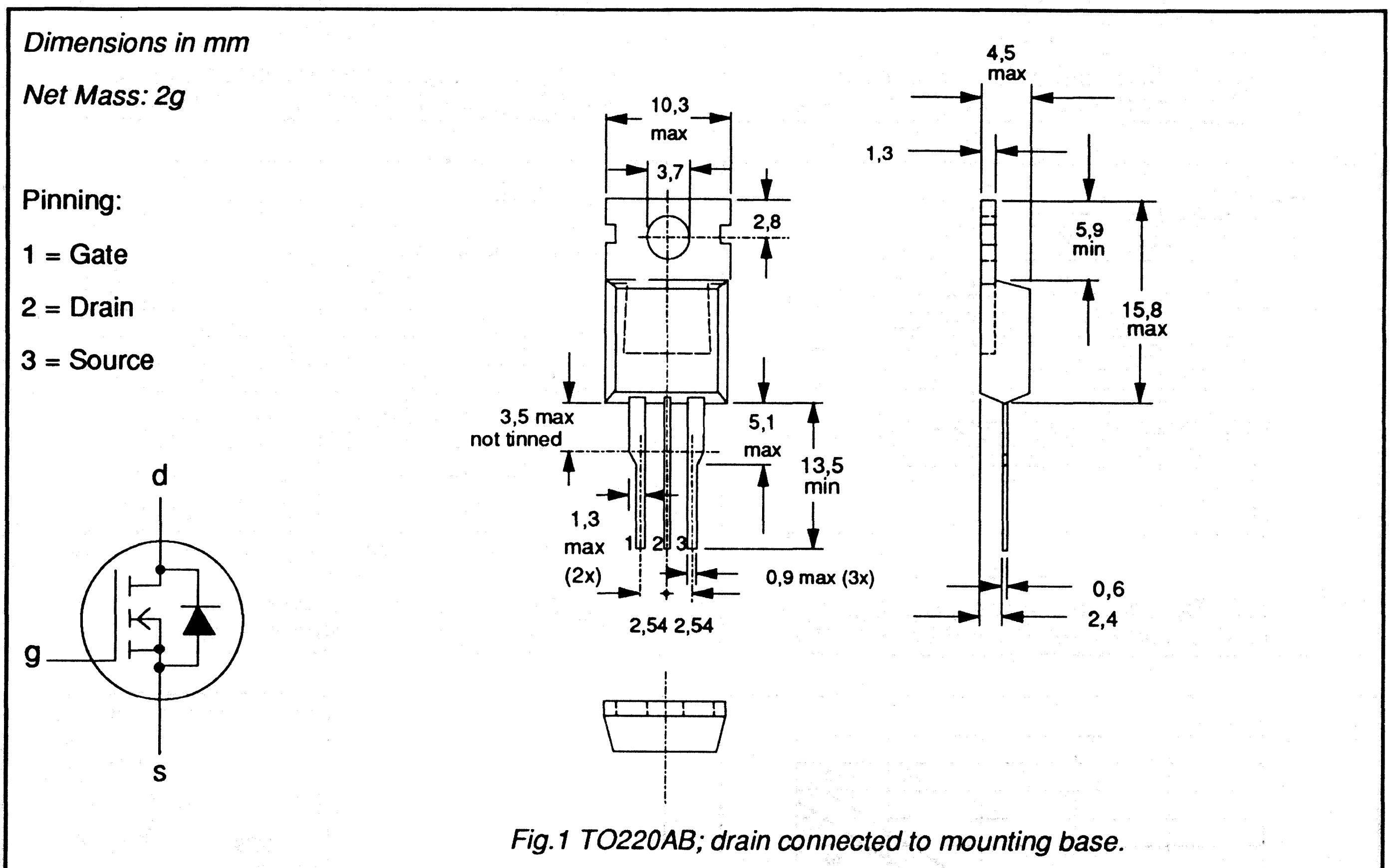


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	200		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	200		V
$\pm V_{GS}$	Gate-source voltage	-	-	15		V
				-200A	-200B	
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	14	13	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	10	9.2	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	56	52	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	125		W
T_{stg}	Storage temperature	-	- 55	175		˚C
T_j	Junction Temperature	-	-	175		˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j-mb}$ = 1.2 K/W
From junction to ambient	$R_{th\,j-a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	200	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	1.0	1.5	2.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j = 25 ˚C	-	1	10	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 200 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 5 V; I_D = 7 A — **BUK555-200A**	-	0.2	0.23	Ω
		BUK555-200B	-	0.24	0.28	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 7 A	12	15	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1600	2000	pF
C_{oss}	Output capacitance		-	180	250	pF
C_{rss}	Feedback capacitance		-	55	80	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 3 A; V_{GS} = 5 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	25	40	ns
t_r	Turn-on rise time		-	45	75	ns
$t_{d\,off}$	Turn-off delay time		-	140	180	ns
t_f	Turn-off fall time		-	40	55	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-	-	-	14	A
I_{DRM}	Pulsed reverse drain current	-	-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ; V_{GS} = 0 V	-	1.0	1.5	V
t_{rr}	Reverse recovery time	I_F = 14 A; $-dI_F/dt$ = 100 A/µs;	-	200	-	ns
Q_{rr}	Reverse recovery charge	V_{GS} = 0 V; V_R = 30 V	-	0.25	-	µC

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 14 A ; V_{DD} ≤ 100 V ; V_{GS} = 5 V ; R_{GS} = 50 Ω	-	-	100	mJ

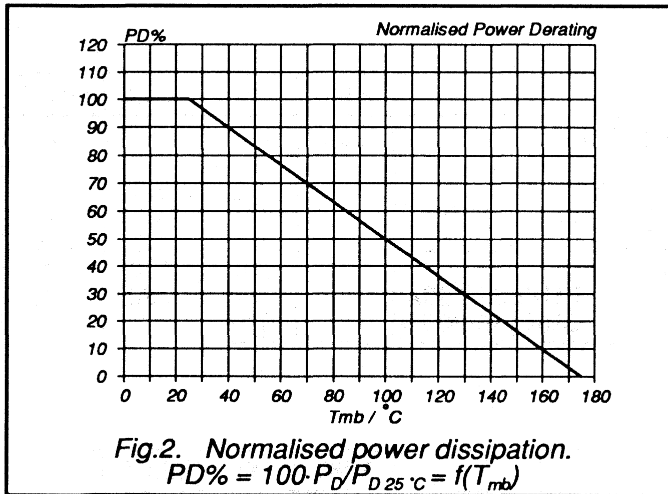


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

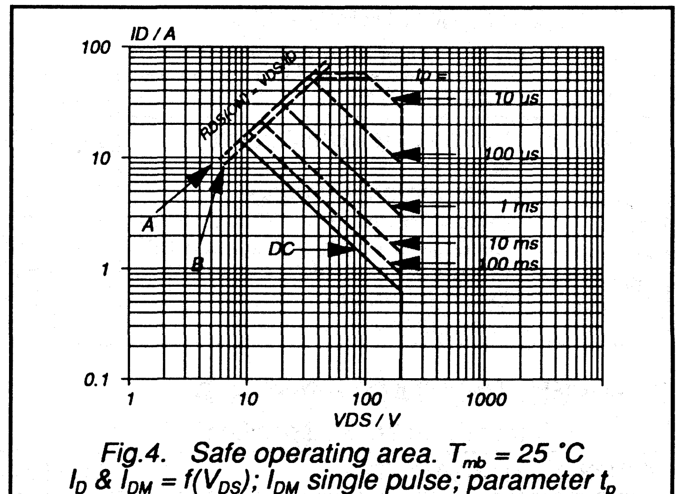


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

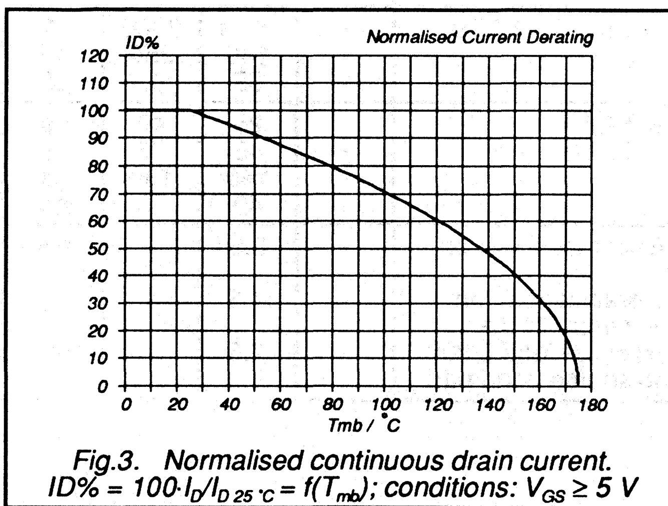


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 5$ V

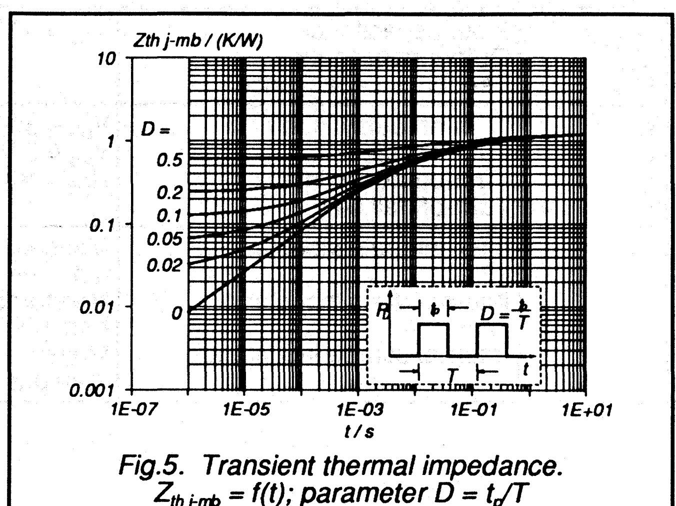


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

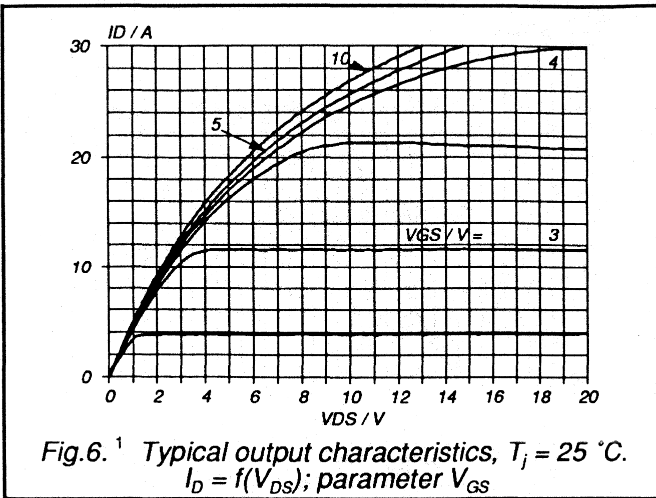


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

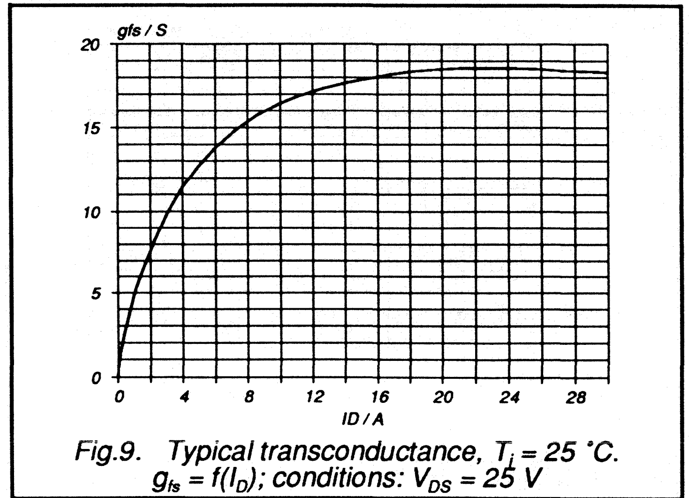


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

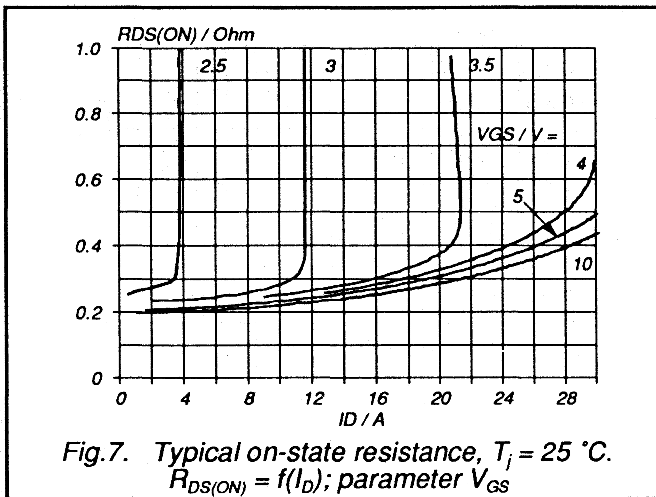


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

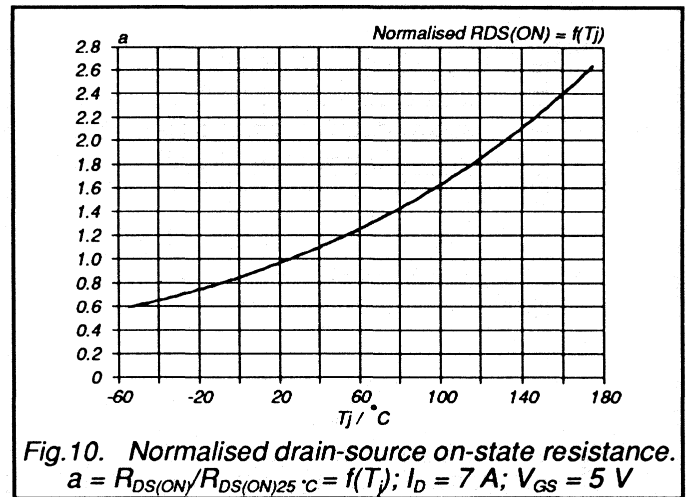


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\ ˚C} = f(T_j)$; I_D = 7 A; V_{GS} = 5 V

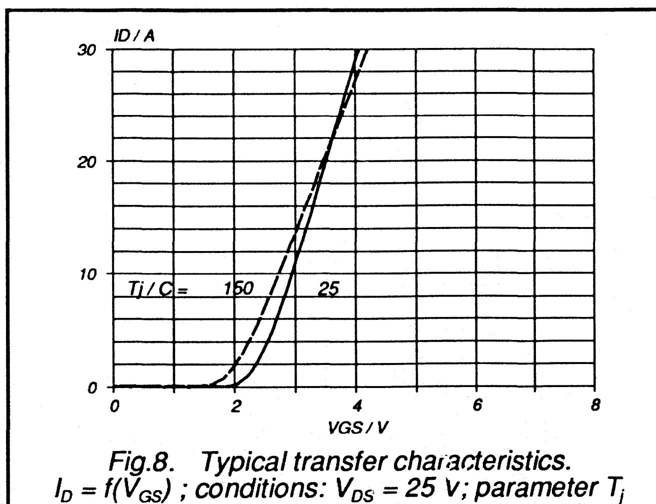


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

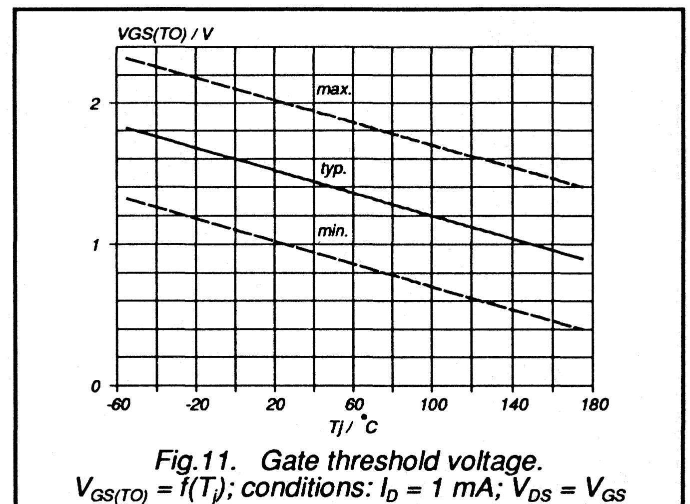


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

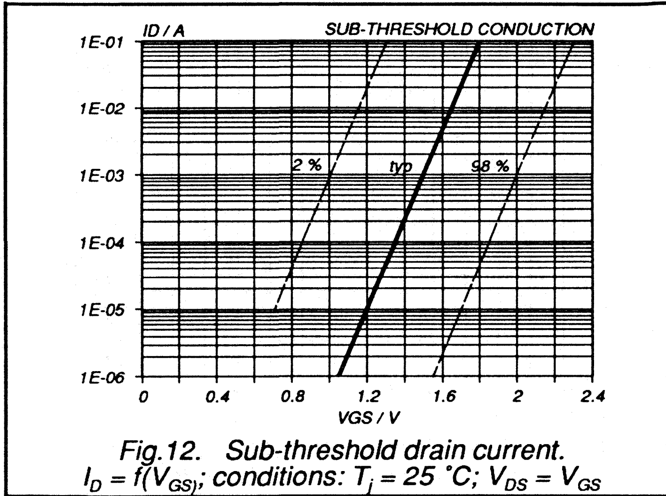


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

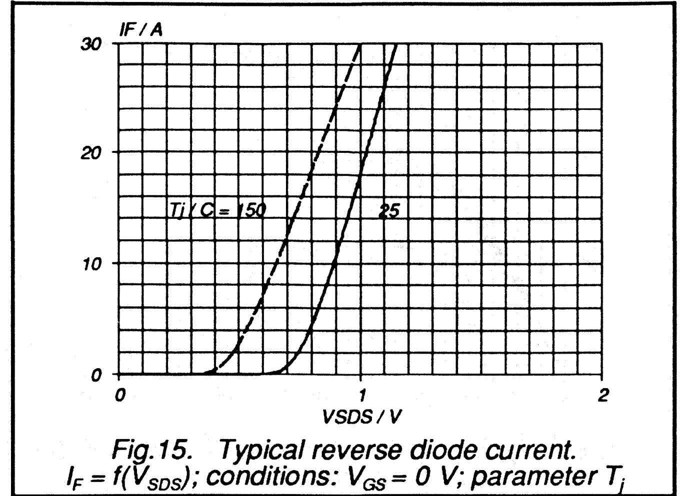


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

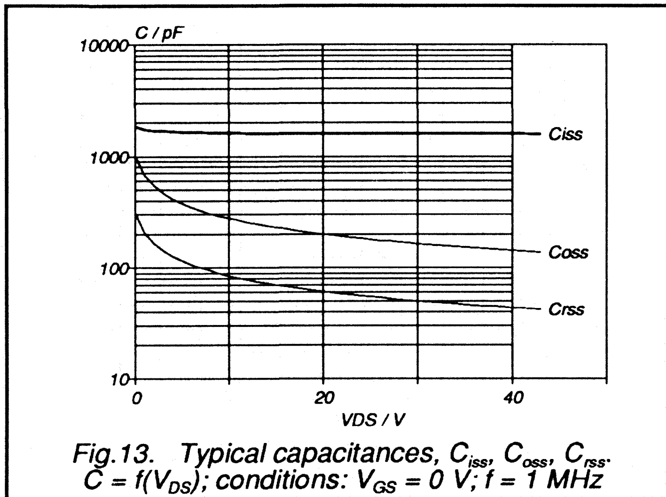


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

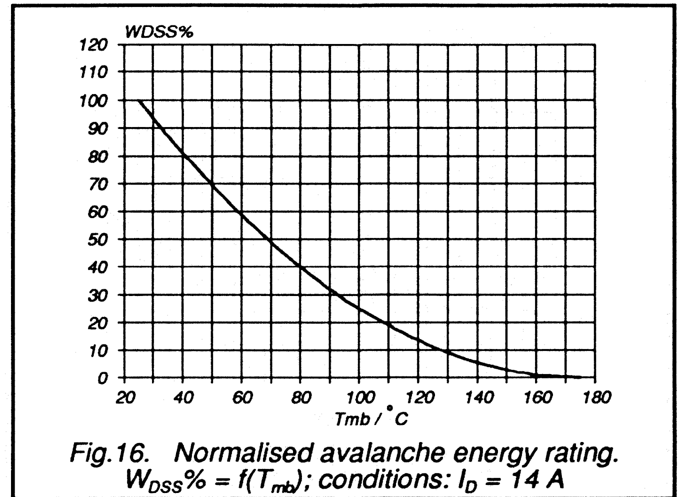


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 14$ A

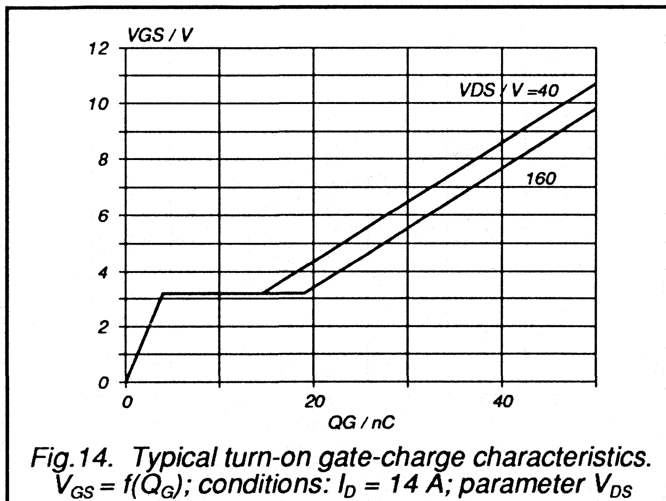


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

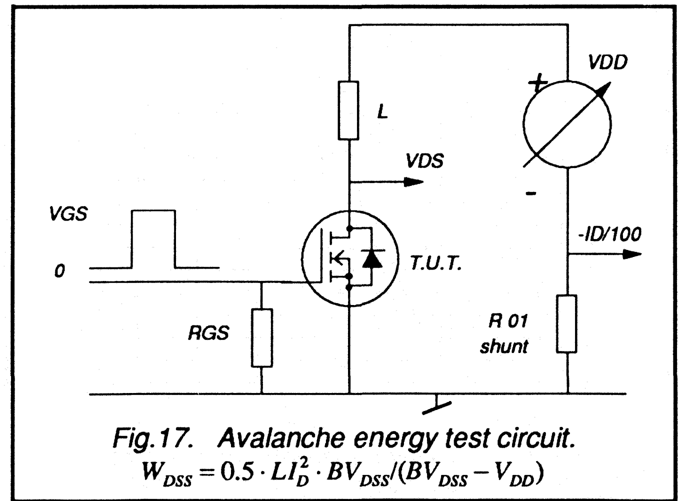


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

PowerMOS transistor
Fast Recovery Diode FET

BUK627-400A
BUK627-400B

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope. FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK627	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	6.9	6.2	A
P_{tot}	Total power dissipation	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.5	0.6	Ω
t_{rr}	Diode reverse recovery time	250	250	ns

MECHANICAL DATA

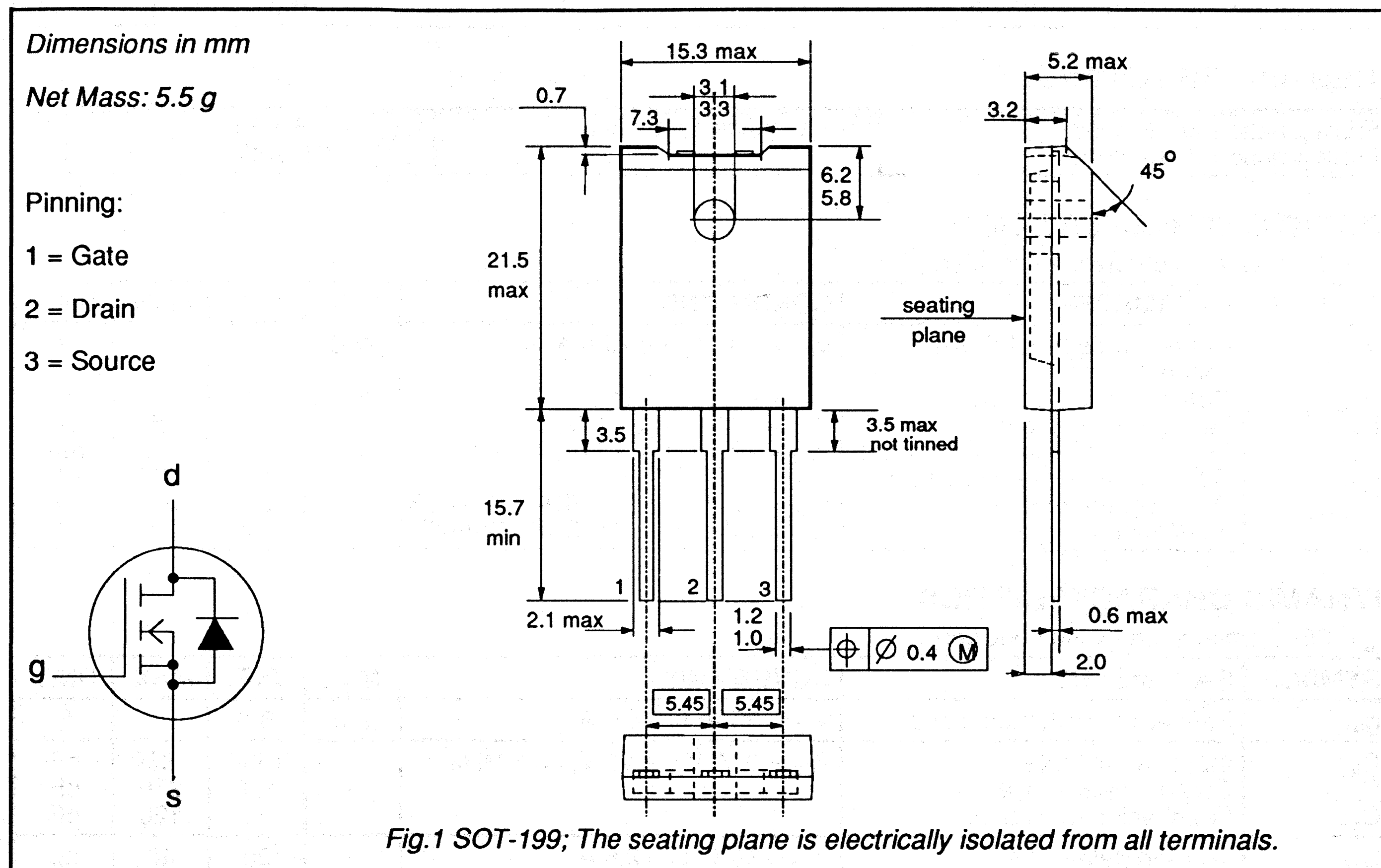


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	6.9	6.2	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	4.3	3.9	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	28	25	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45		W
T_{stg}	Storage temperature	-	- 55	150		˚C
T_j	Junction Temperature	-	-	150		˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\ j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A BUK627-400A	-	0.4	0.5	Ω
		BUK627-400B	-	0.5	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	6.9	A
I_{DRM}	Pulsed reverse drain current	-		-	-	28	A
V_{SD}	Diode forward voltage	I_F = 6.9 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 6.9 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

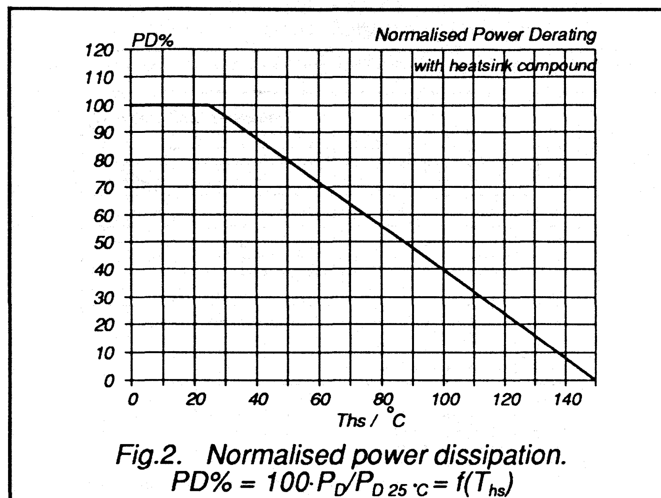


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

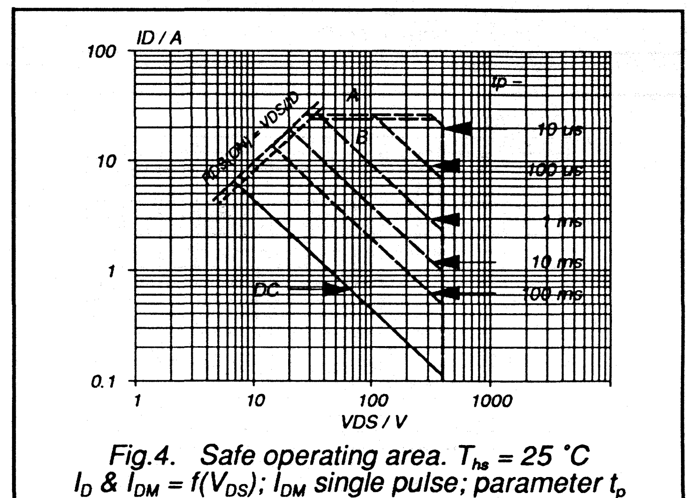


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

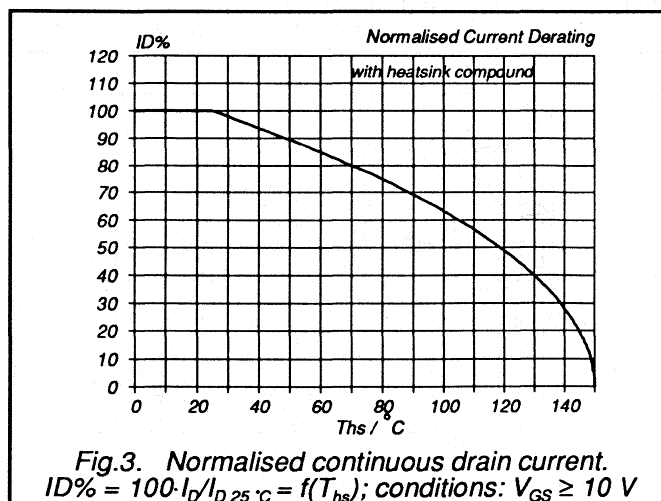


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

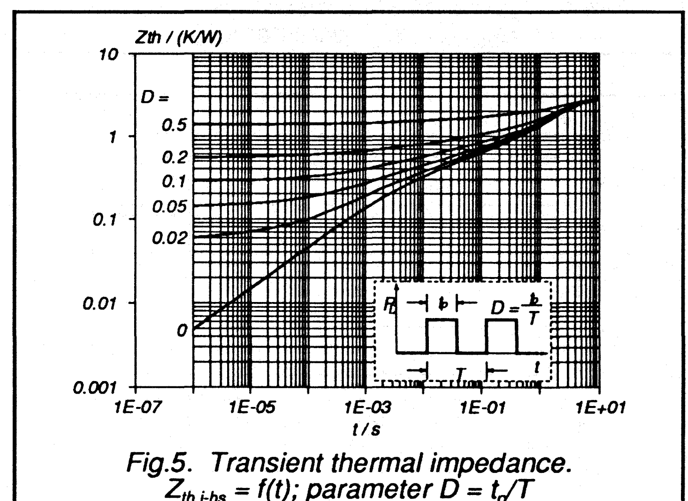


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

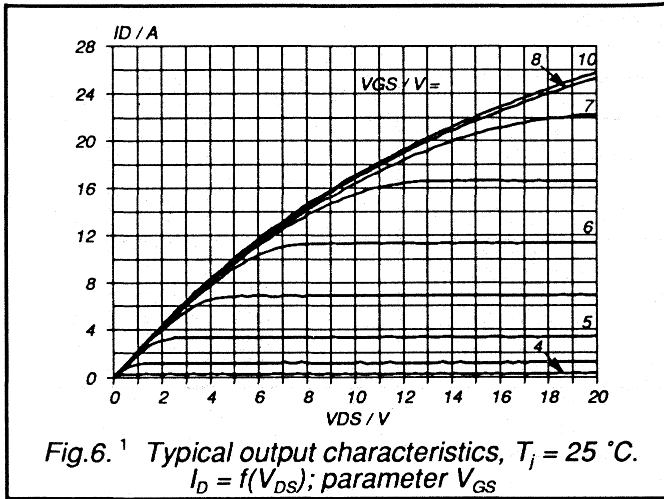


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

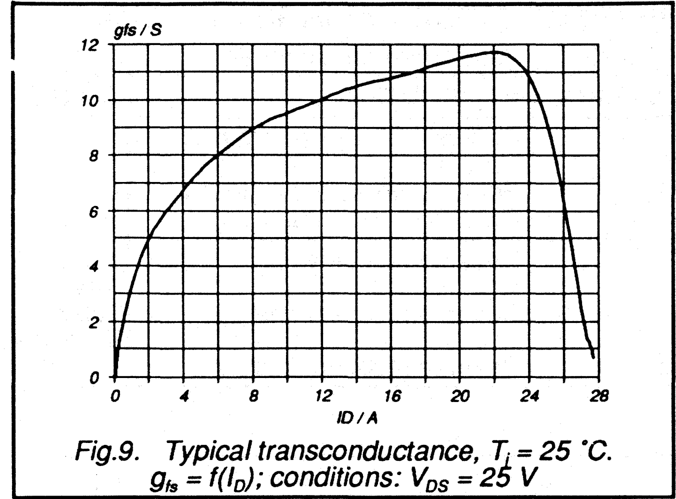


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

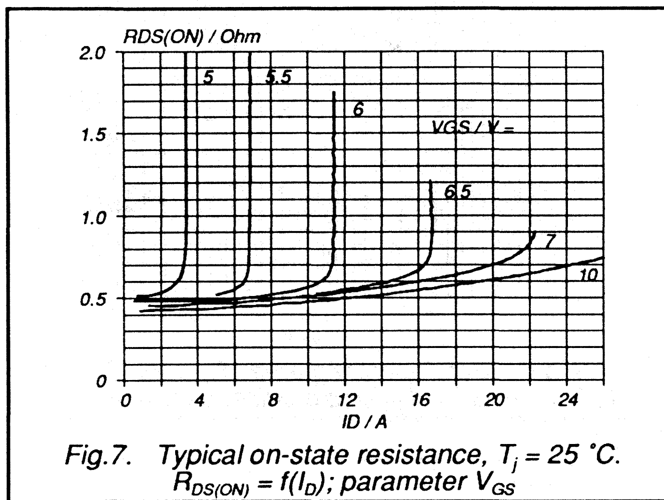


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

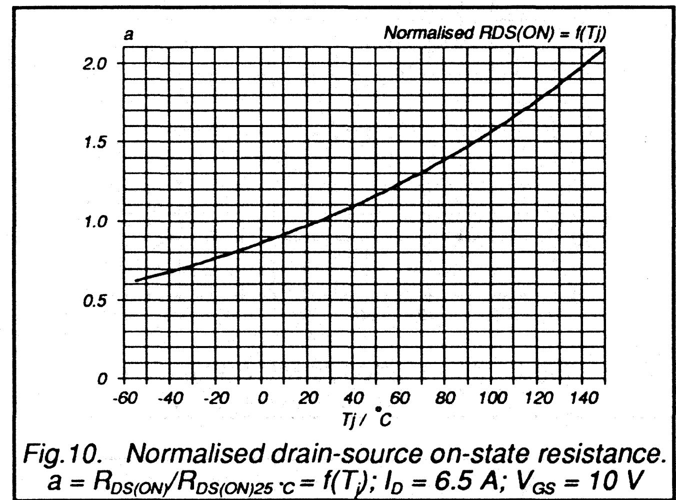


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

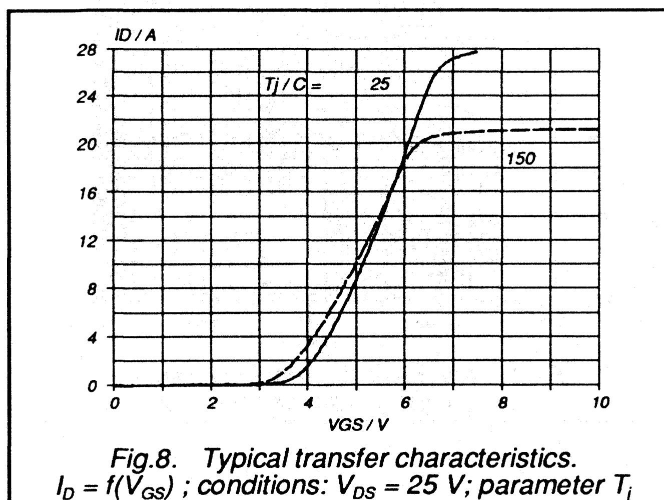


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

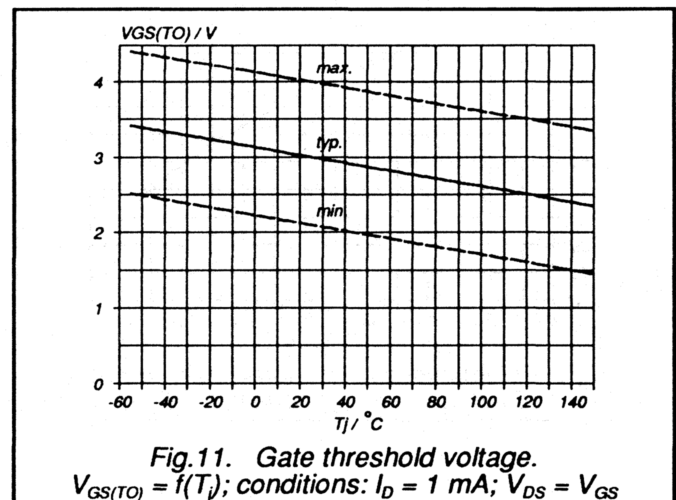


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

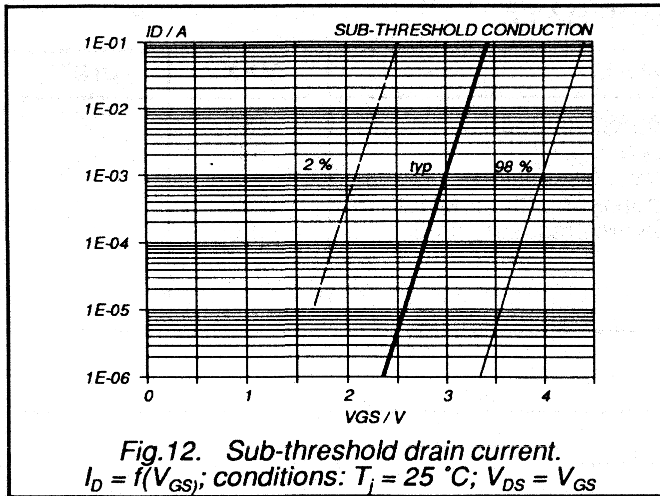


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

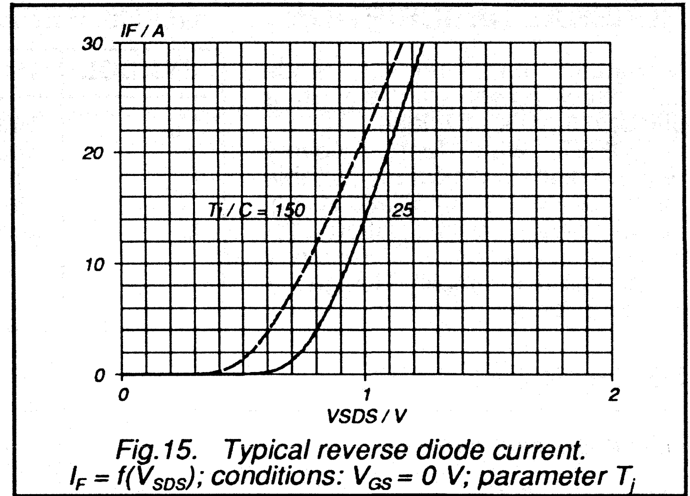


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

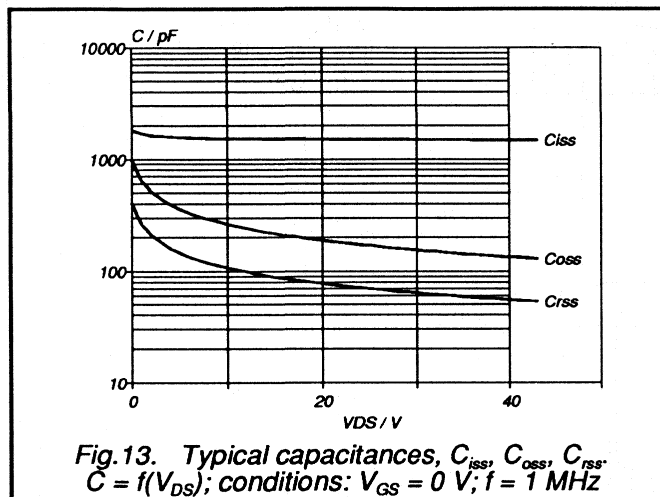


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

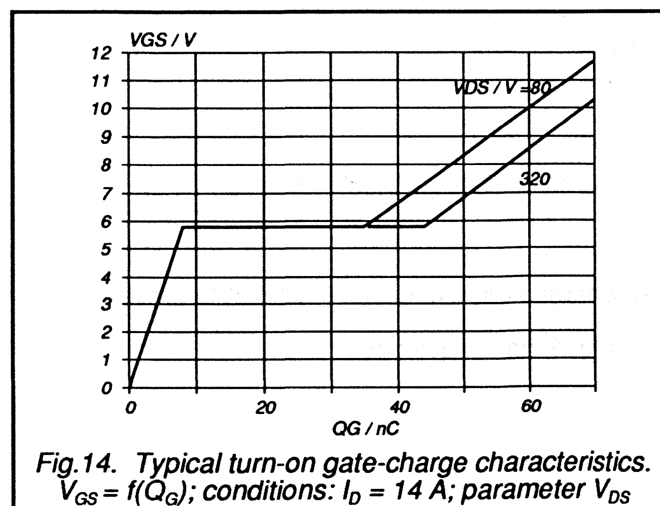


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic full pack envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	5.6	A
P_{tot}	Total power dissipation	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	Ω
t_{rr}	Diode reverse recovery time	250	ns

MECHANICAL DATA

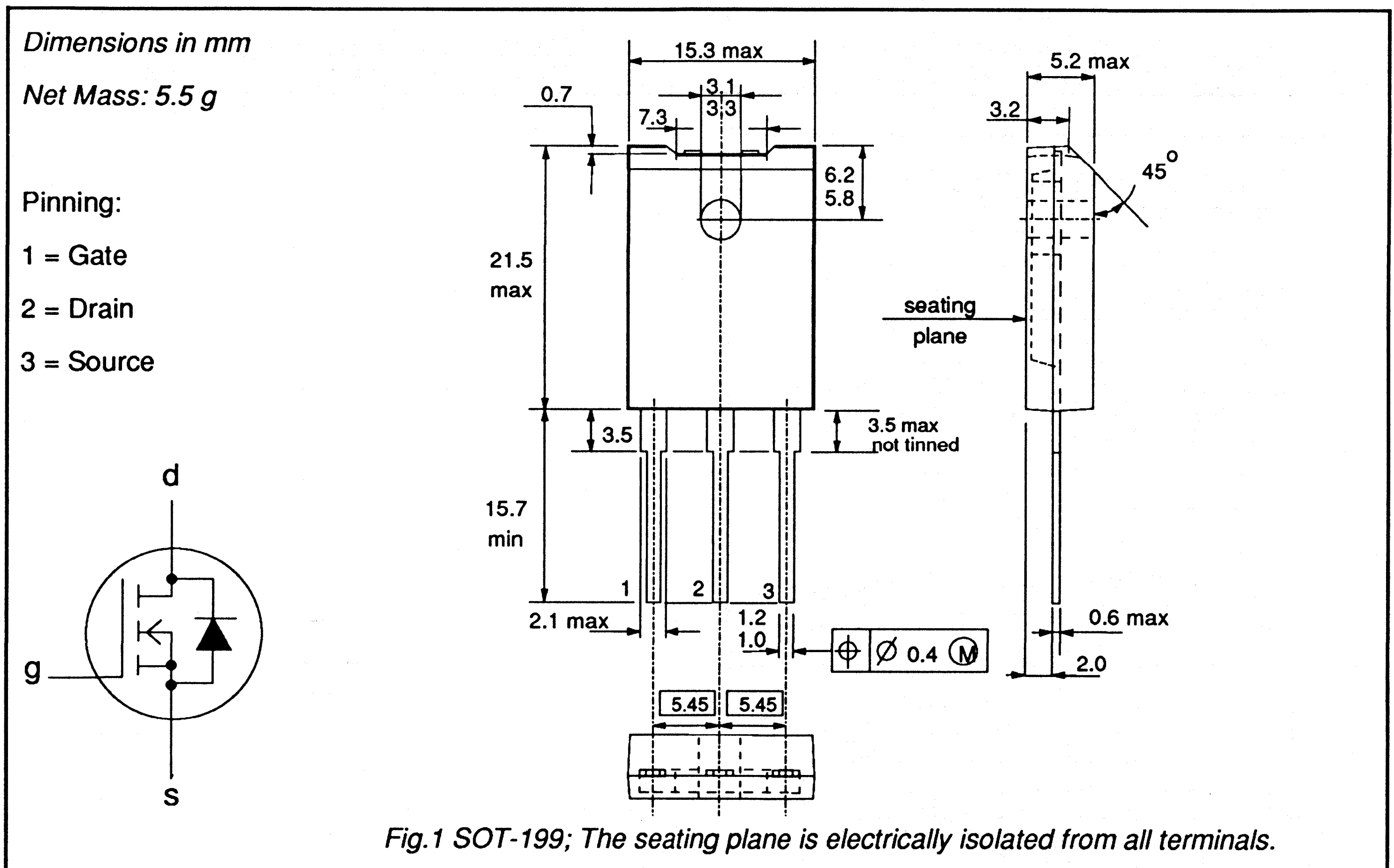


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	5.6	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	3.5	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	22	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\,j\text{-}hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\,j\text{-}a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.6	0.65	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	5.6	A
I_{DRM}	Pulsed reverse drain current	-		-	-	22	A
V_{SD}	Diode forward voltage	I_F = 5.6 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.6 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

AVALANCHE RATING

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; $V_{DD} \leq$ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

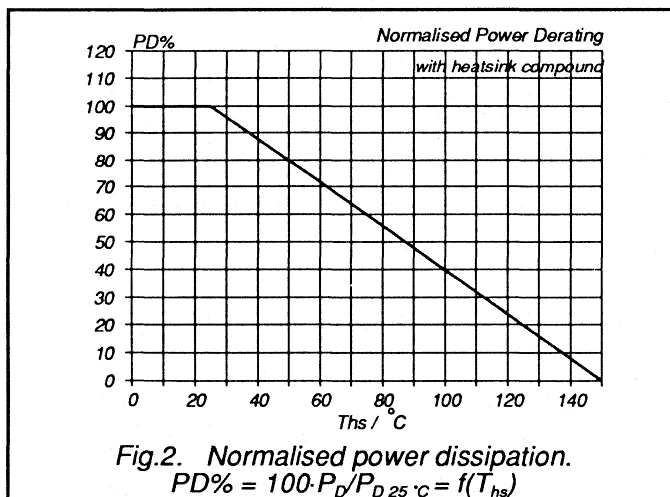


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{hs})$

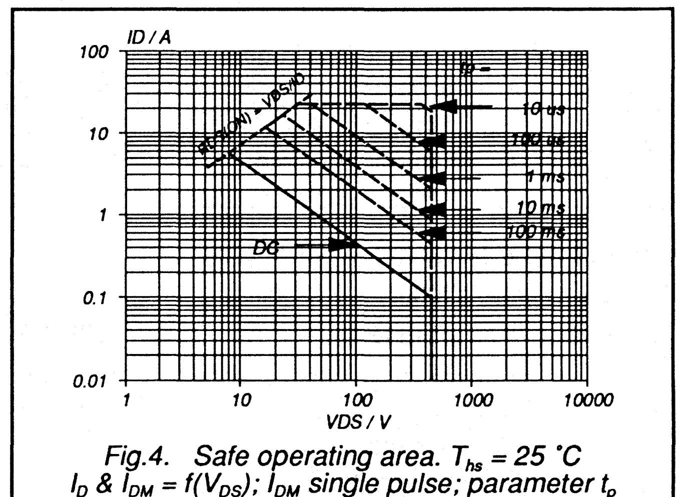


Fig.4. Safe operating area. T_{hs} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

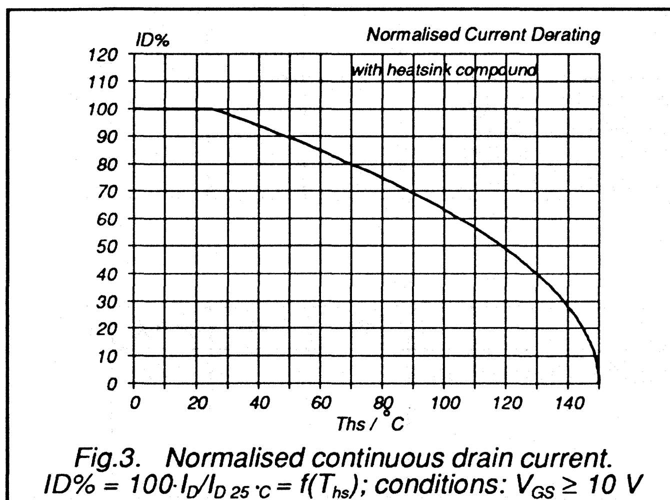


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

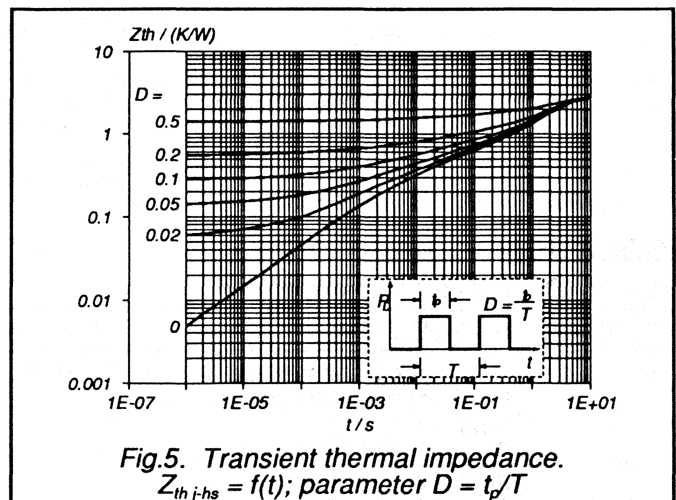


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

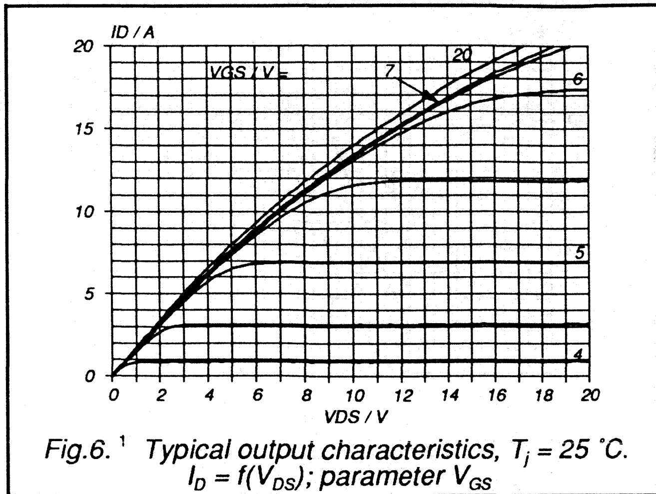


Fig.6. [1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

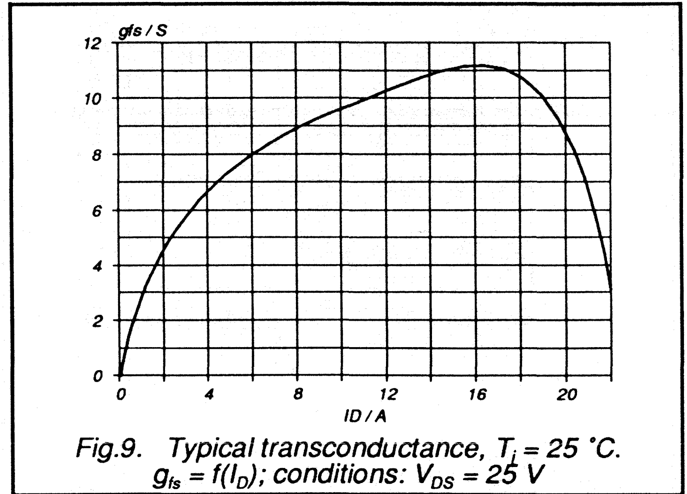


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

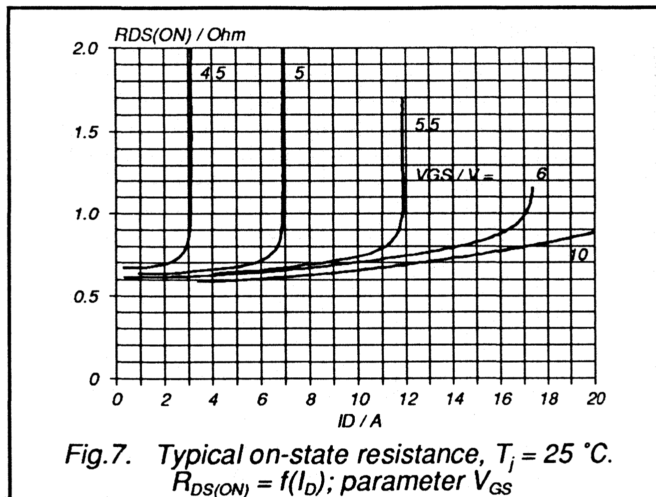


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

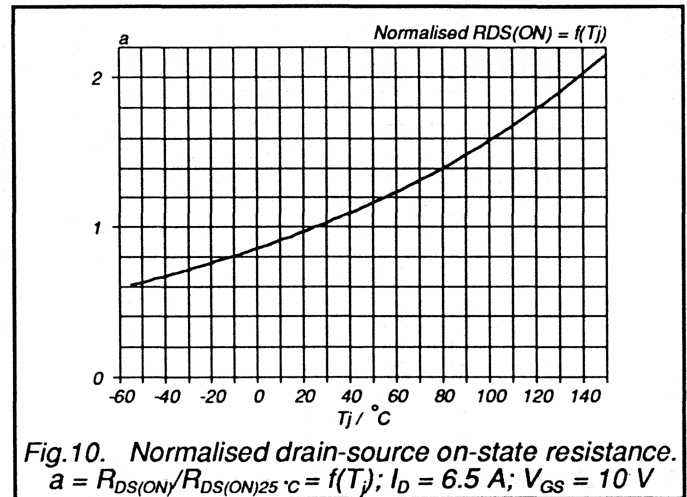


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^{\circ}C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

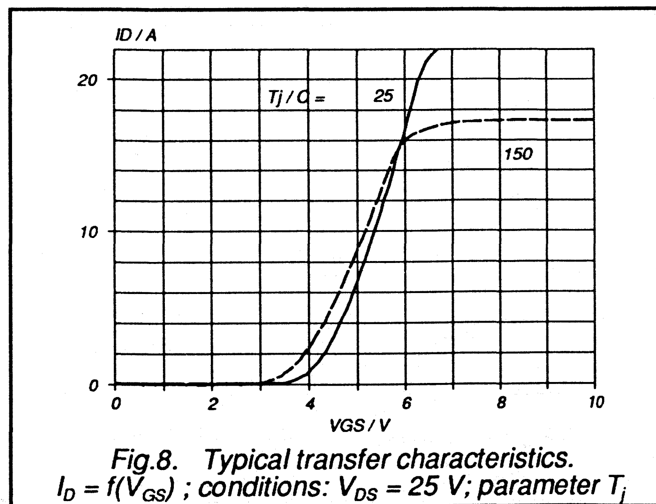


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

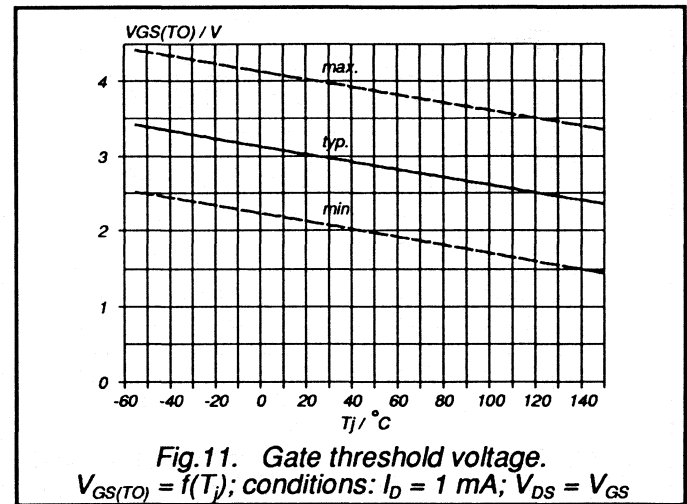


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

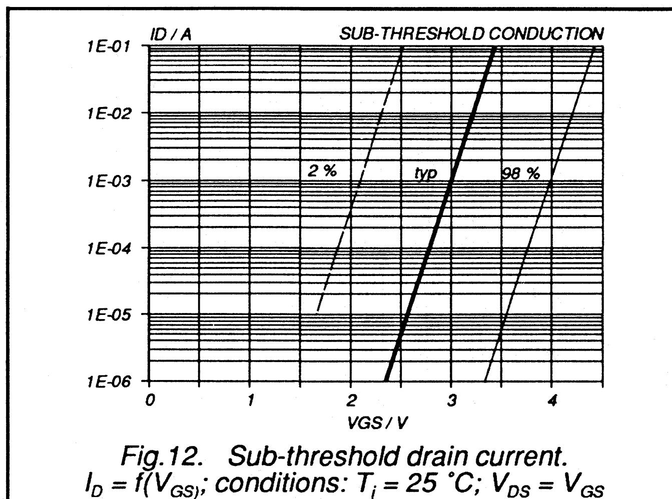


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

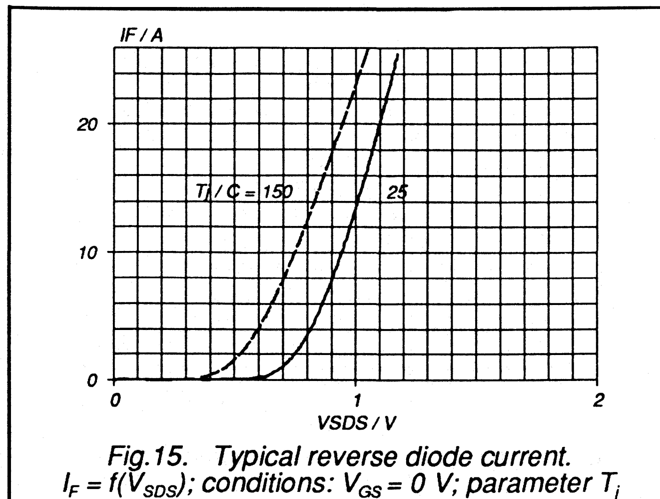


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

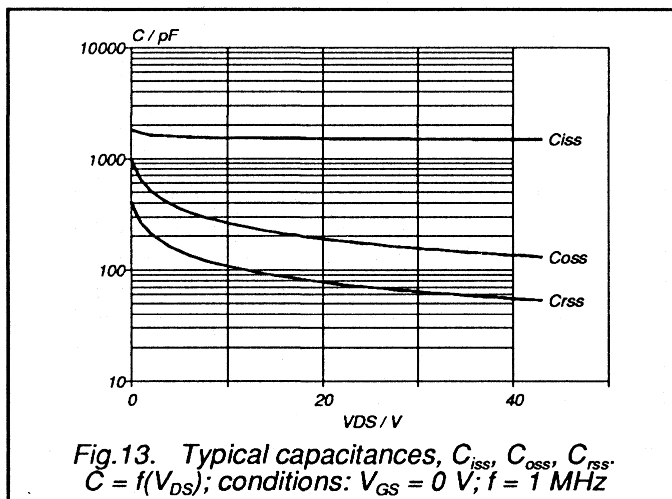


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

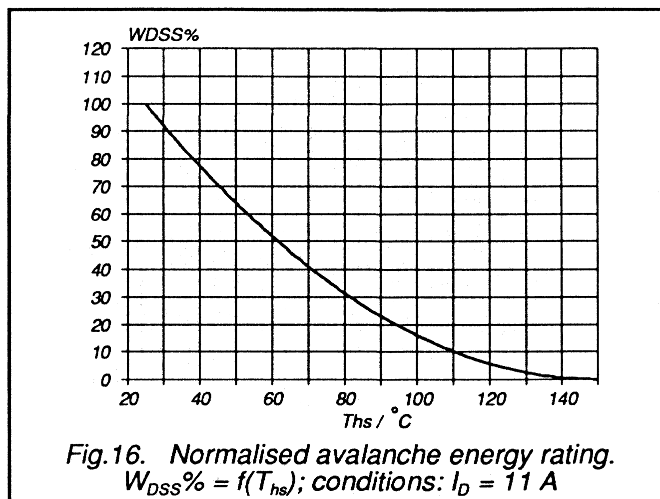


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 11$ A

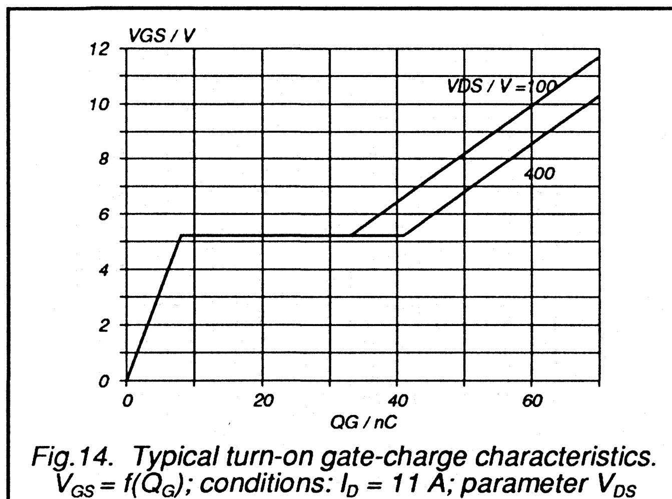


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

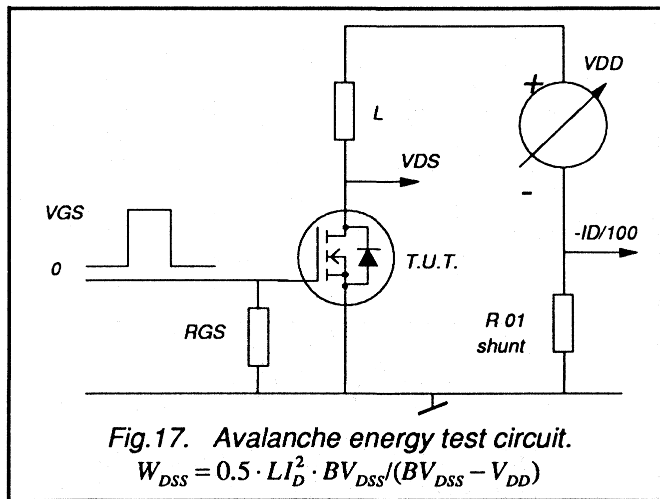


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

PowerMOS transistor
Fast Recovery Diode FET

BUK627-500A
BUK627-500B
BUK627-500C

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK627	-500A	-500B	-500C	
V_{DS}	Drain-source voltage	500	500	500	V
I_D	Drain current (DC)	5.6	4.8	4.5	A
P_{tot}	Total power dissipation	45	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	0.8	0.9	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

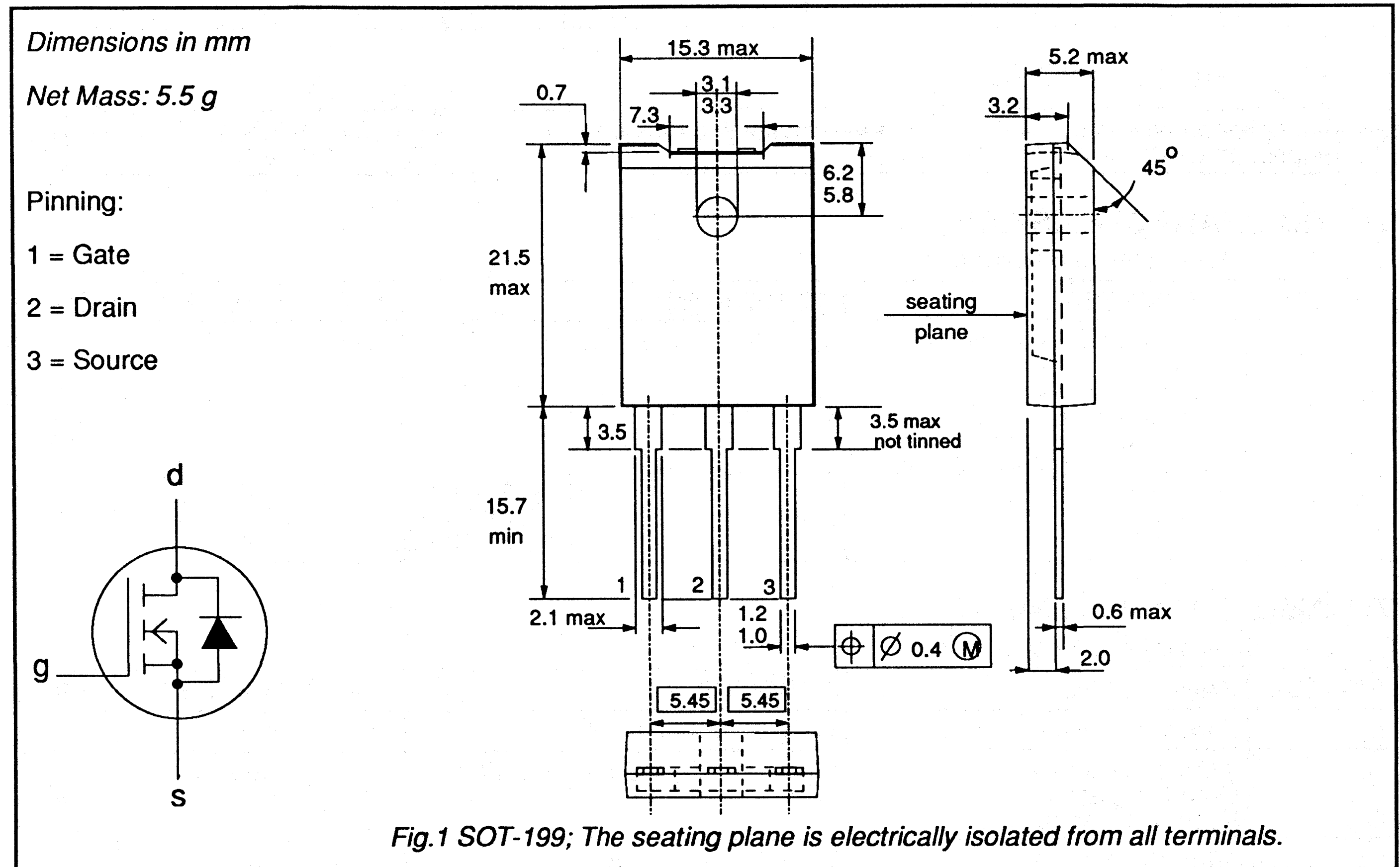


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	500			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-500A	-500B	-500C	
I_D	Drain current (DC)	T_{hs} = 25 ˚C	-	5.6	4.8	4.5	A
I_D	Drain current (DC)	T_{hs} = 100 ˚C	-	3.5	3.0	2.8	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 ˚C	-	22	19.2	18	A
P_{tot}	Total power dissipation	T_{hs} = 25 ˚C	-	45			W
T_{stg}	Storage temperature	-	- 55	150			˚C
T_j	Junction Temperature	-	-	150			˚C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\ j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A; BUK627-500A	-	0.6	0.65	Ω
		BUK627-500B	-	0.7	0.8	Ω
		BUK627-500C	-	0.8	0.9	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	5.6	A
I_{DRM}	Pulsed reverse drain current	-		-	-	22	A
V_{SD}	Diode forward voltage	I_F = 5.6 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.6 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

AVALANCHE RATING

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; V_{DD} ≤ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

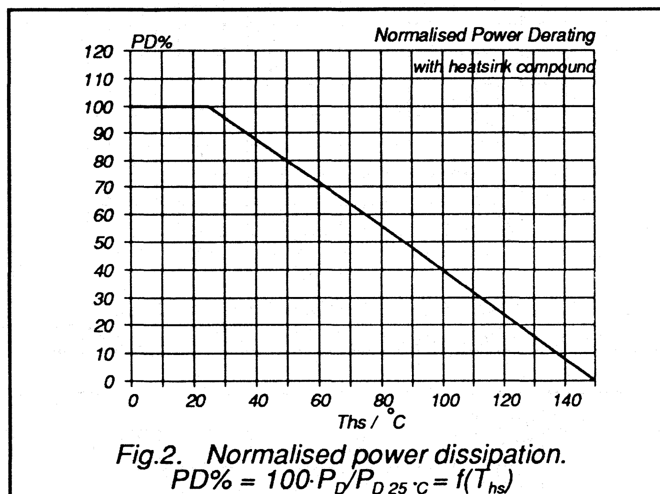


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{hs})$

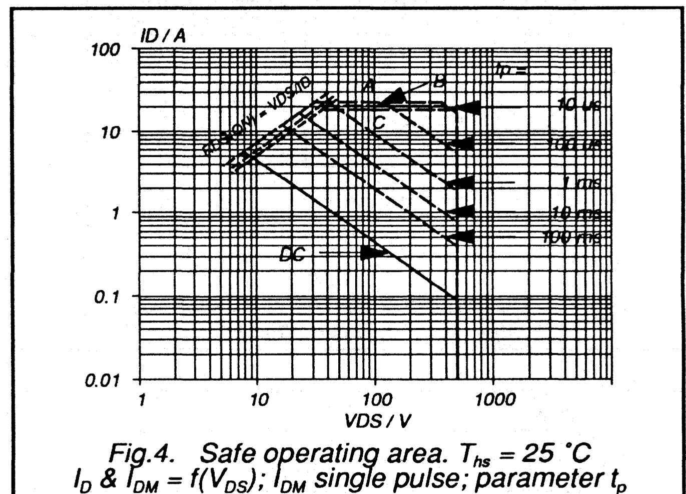


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

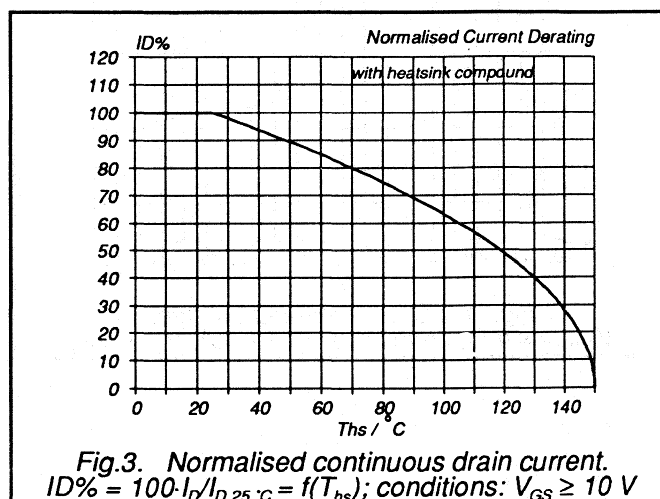


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

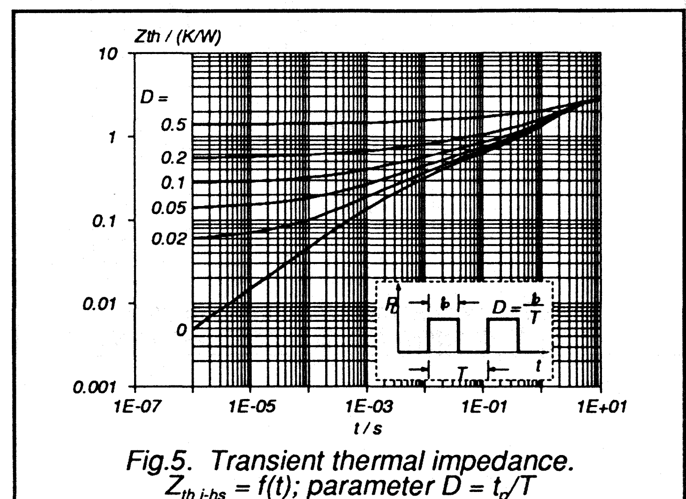


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

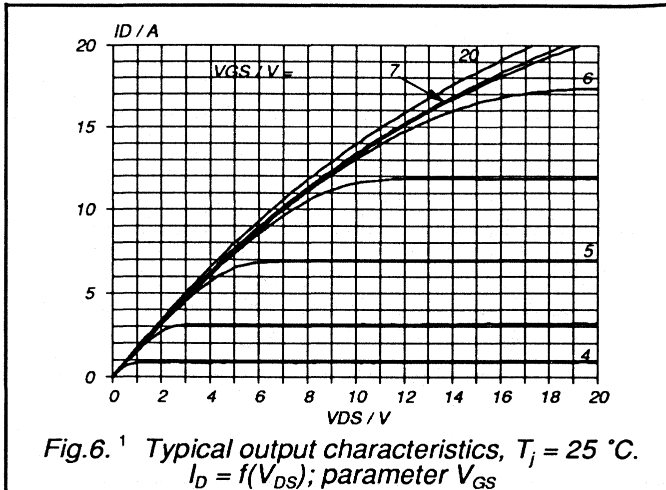


Fig.6. [1] Typical output characteristics, T_j = 25 °C. $I_D = f(V_{DS})$; parameter V_{GS}

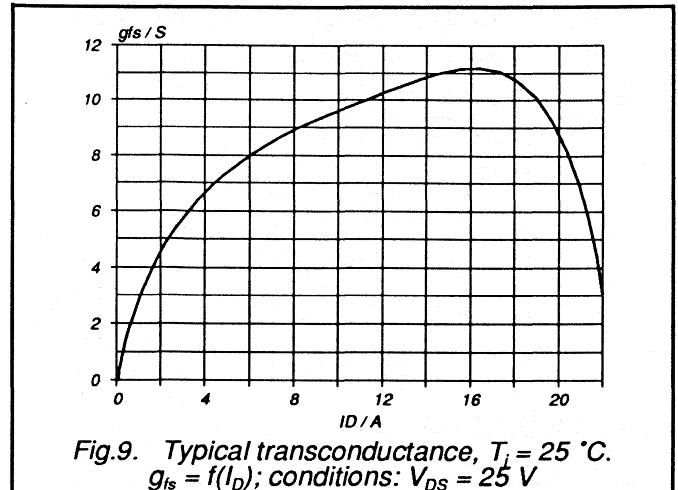


Fig.9. Typical transconductance, T_j = 25 °C. $g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

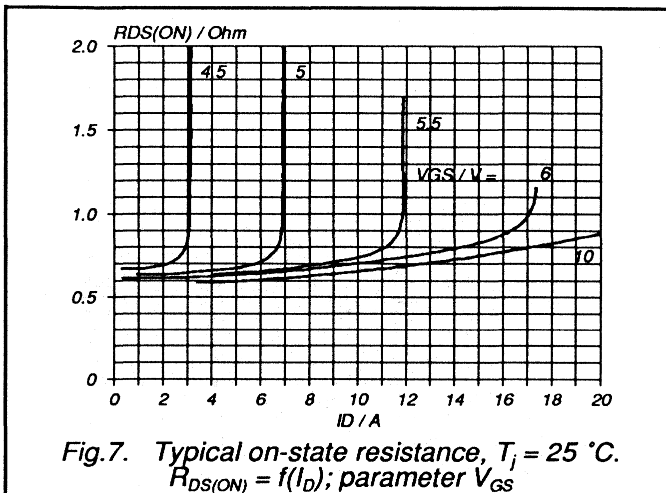


Fig.7. Typical on-state resistance, T_j = 25 °C. $R_{DS(ON)} = f(I_D)$; parameter V_{GS}

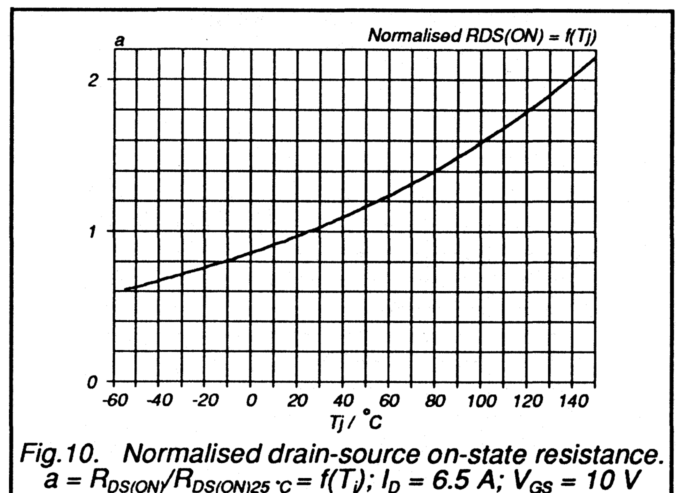


Fig.10. Normalised drain-source on-state resistance. $a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

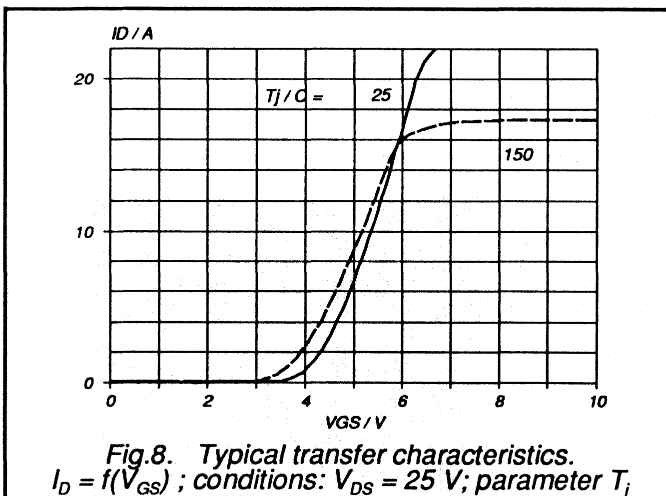


Fig.8. Typical transfer characteristics. $I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

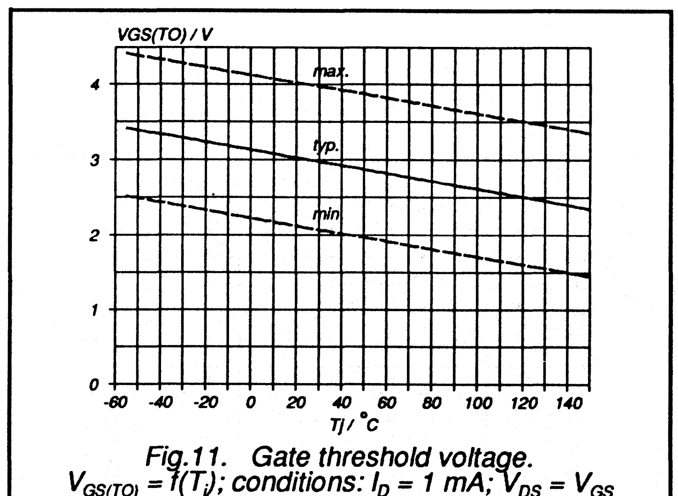


Fig.11. Gate threshold voltage. $V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

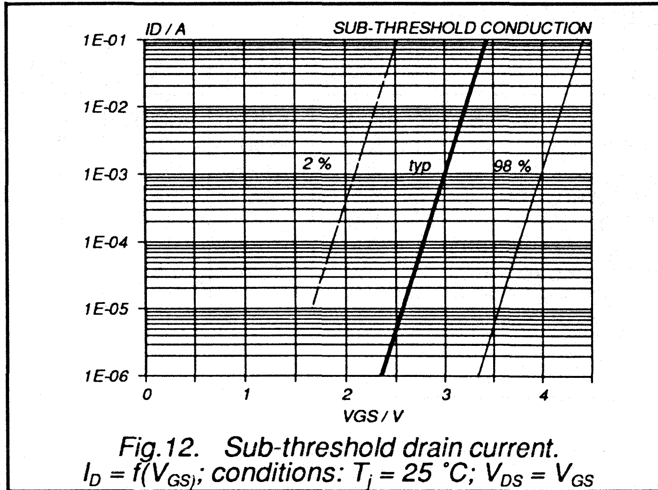


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

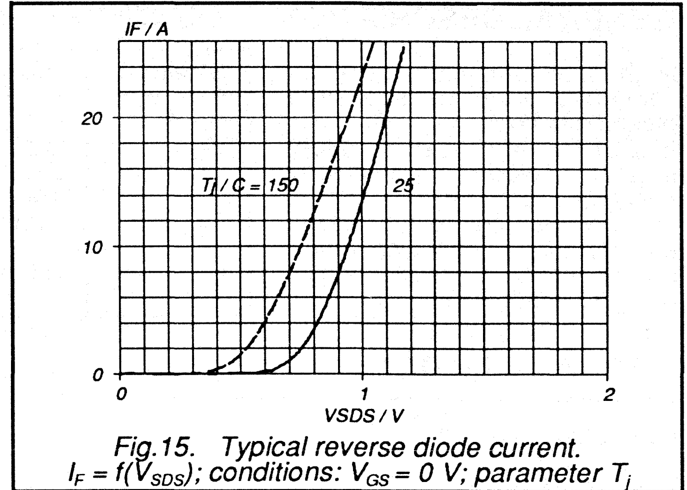


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

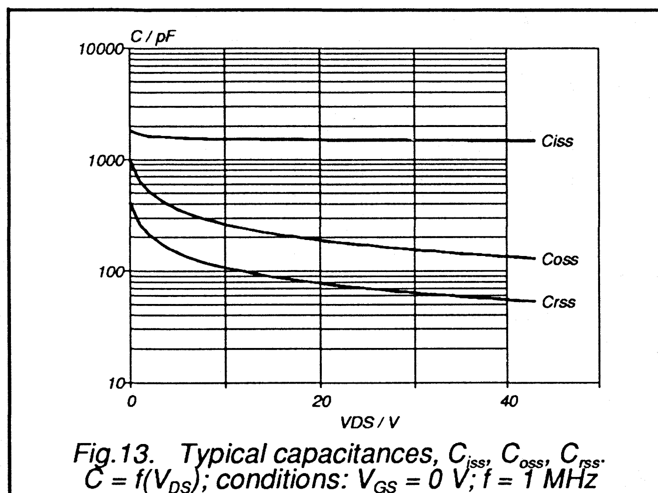


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

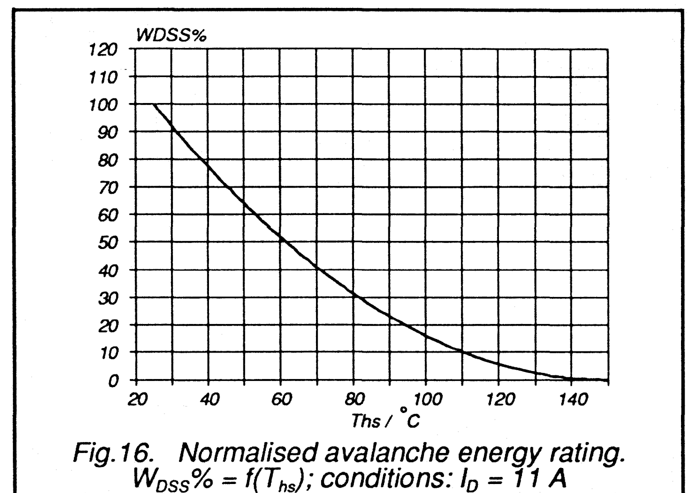


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{hs})$; conditions: $I_D = 11$ A

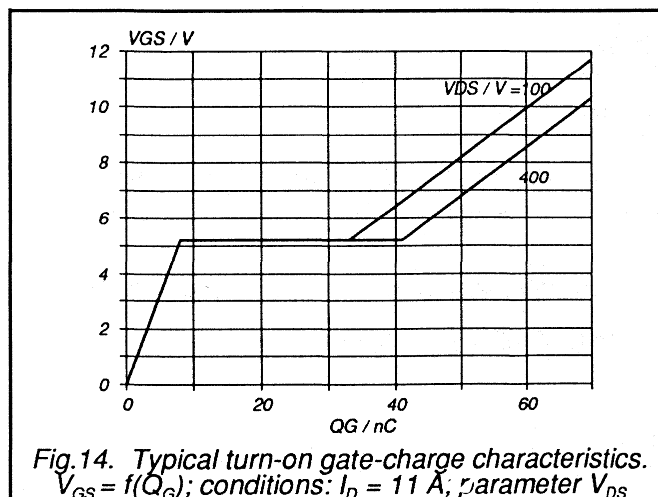


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

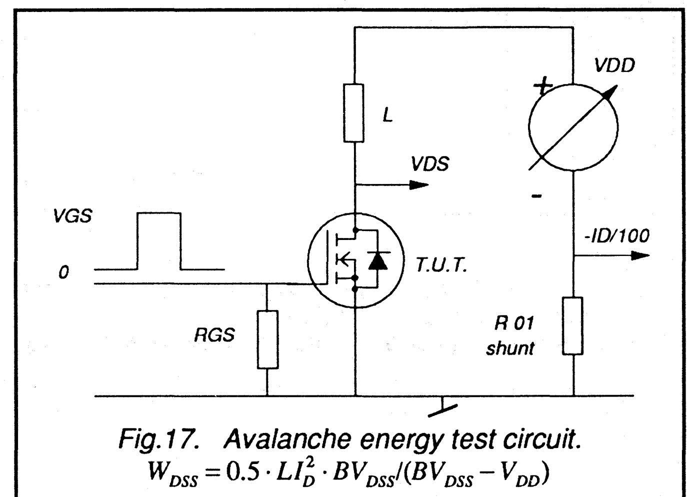


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK627	-600A	-600B	-600C	
V_{DS}	Drain-source voltage	600	600	600	V
I_D	Drain current (DC)	4.3	3.9	3.5	A
P_{tot}	Total power dissipation	45	45	45	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	1.4	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

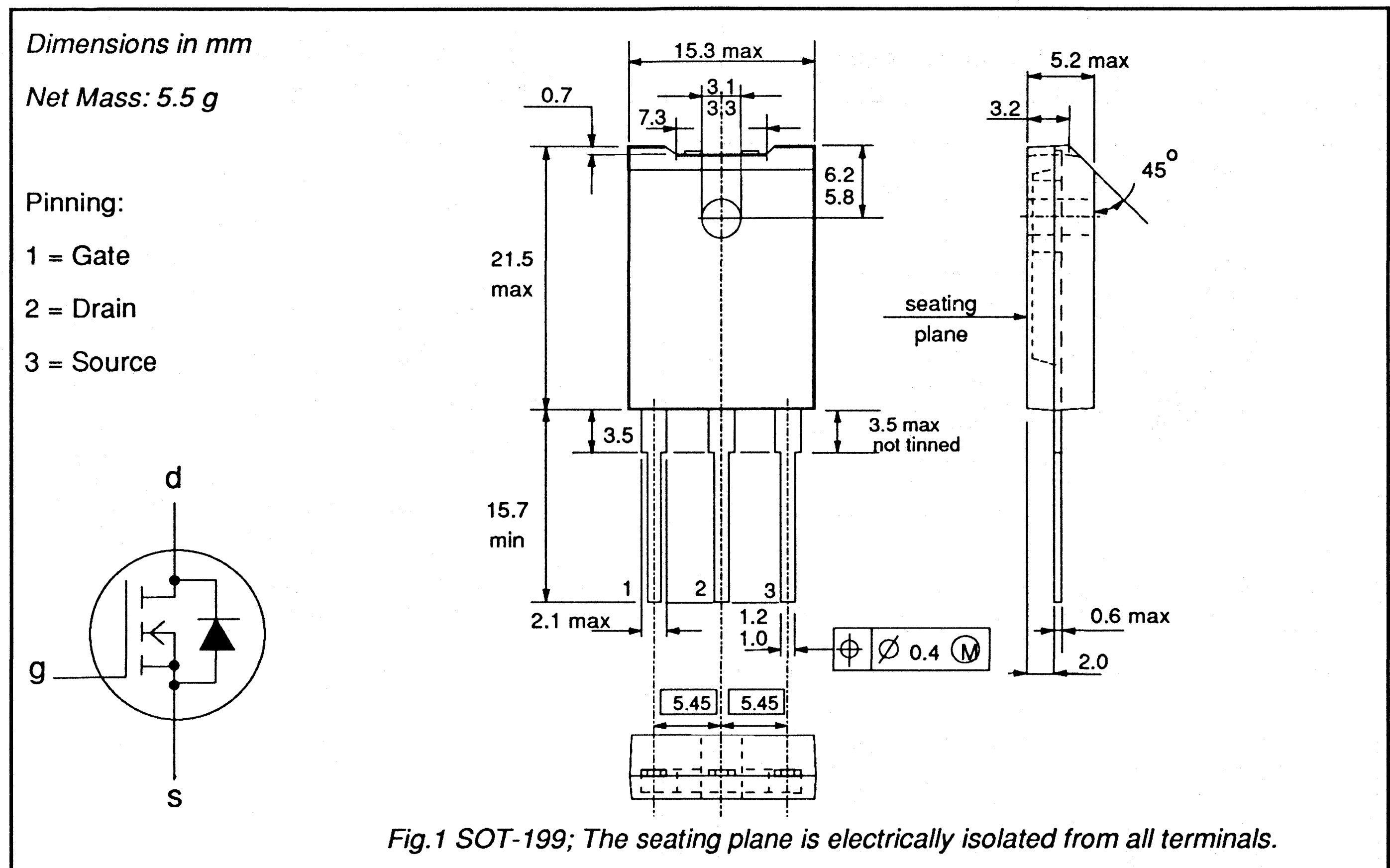


Fig.1 SOT-199; The seating plane is electrically isolated from all terminals.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for F-pack envelopes.

PowerMOS transistor
Fast Recovery Diode FET

BUK627-600A
BUK627-600B
BUK627-600C

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	600			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-600A	-600B	-600C	
I_D	Drain current (DC)	T_{hs} = 25 °C	-	4.3	3.9	3.5	A
I_D	Drain current (DC)	T_{hs} = 100 °C	-	2.7	2.5	2.2	A
I_{DM}	Drain current (pulse peak value)	T_{hs} = 25 °C	-	17.2	15.6	14	A
P_{tot}	Total power dissipation	T_{hs} = 25 °C	-	45			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to heatsink	with heatsink compound	$R_{th\ j-hs}$ = 2.8 K/W
From junction to ambient	-	$R_{th\ j-a}$ = 35 K/W

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK627-600A**	-	0.85	1.0	Ω
		BUK627-600B	-	1.0	1.2	Ω
		BUK627-600C	-	1.2	1.4	Ω

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

ISOLATION

T_{hs} = 25 °C unless otherwise specifiea

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. ≤ 65 % ; clean and dustfree	-	-	2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	4.3	A
I_{DRM}	Pulsed reverse drain current	-		-	-	17.2	A
V_{SD}	Diode forward voltage	I_F = 4.3 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 4.3 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

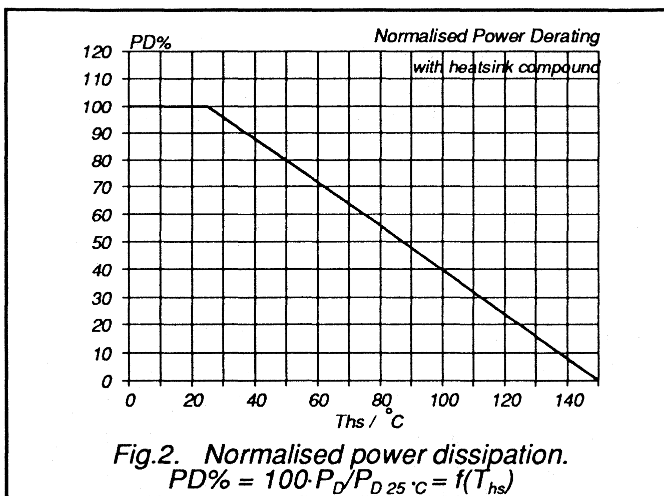


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{hs})$

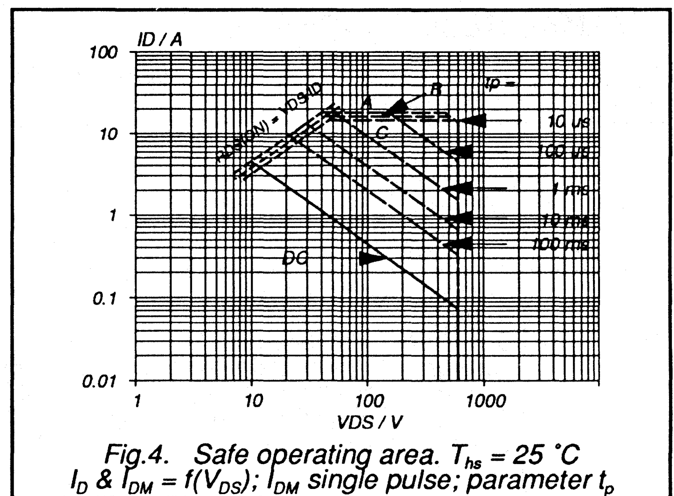


Fig.4. Safe operating area. T_{hs} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

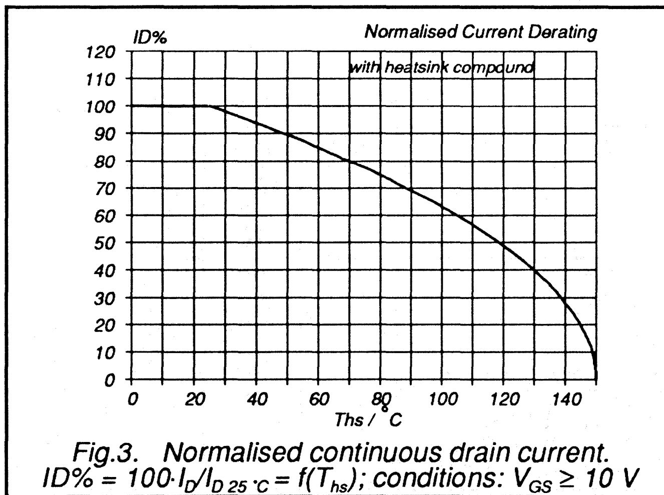


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{hs})$; conditions: $V_{GS} \geq 10$ V

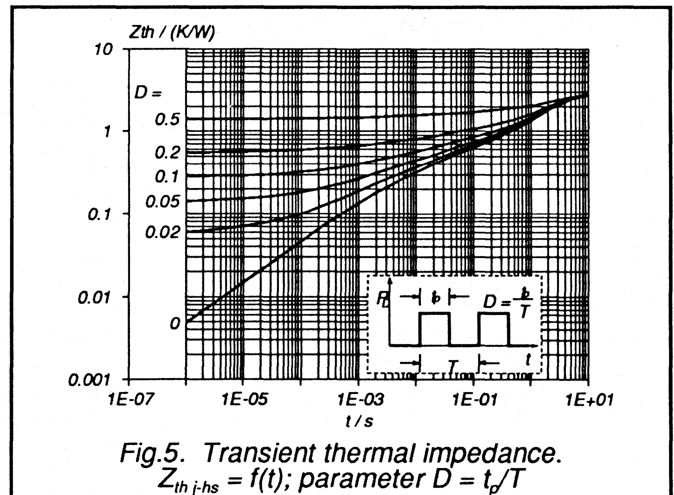


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}hs} = f(t)$; parameter $D = t_p/T$

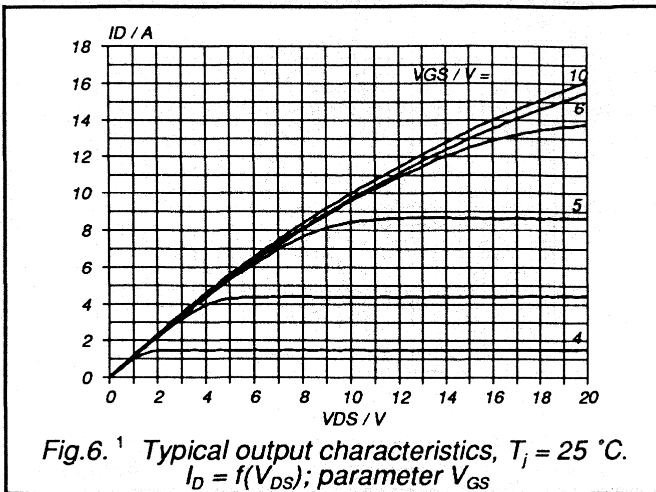


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

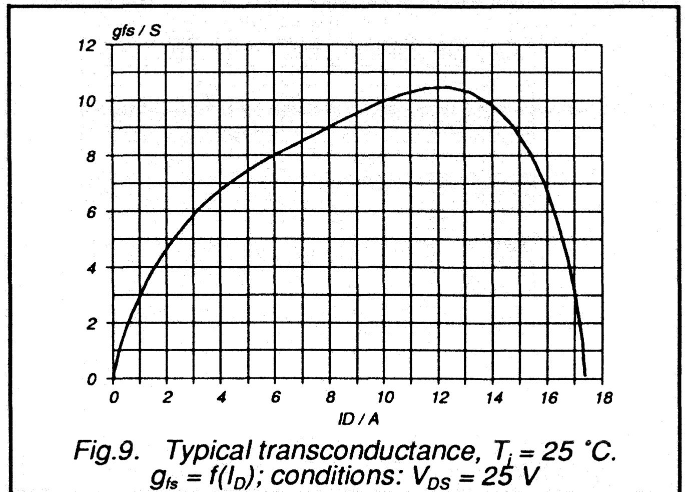


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

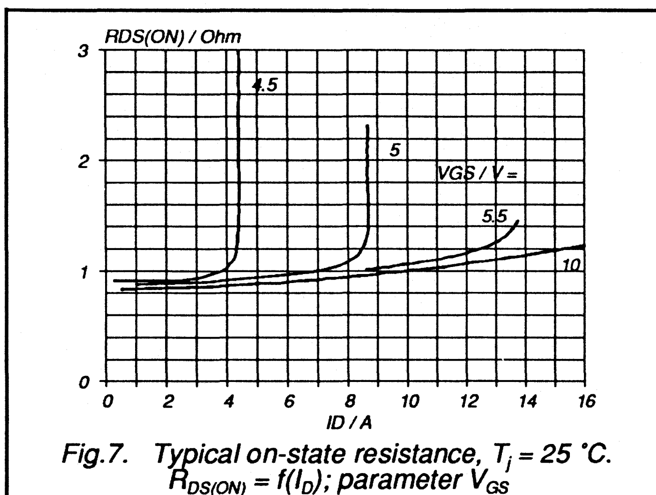


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

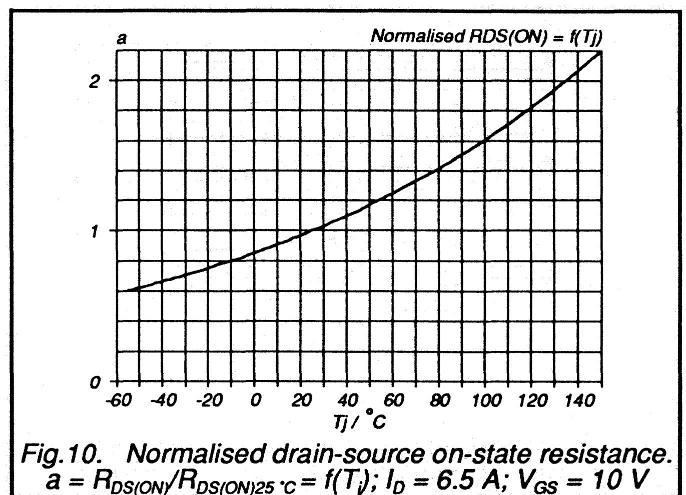


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

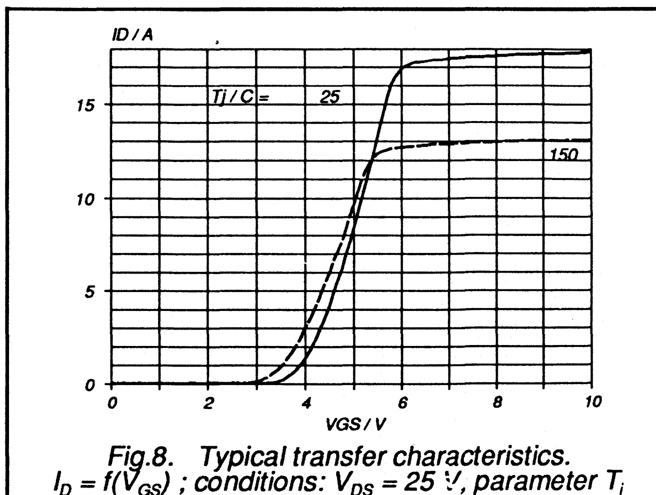


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V, parameter T_j

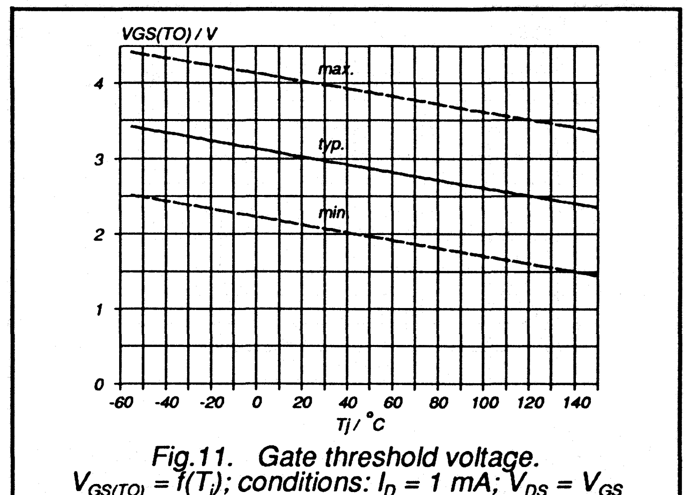


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

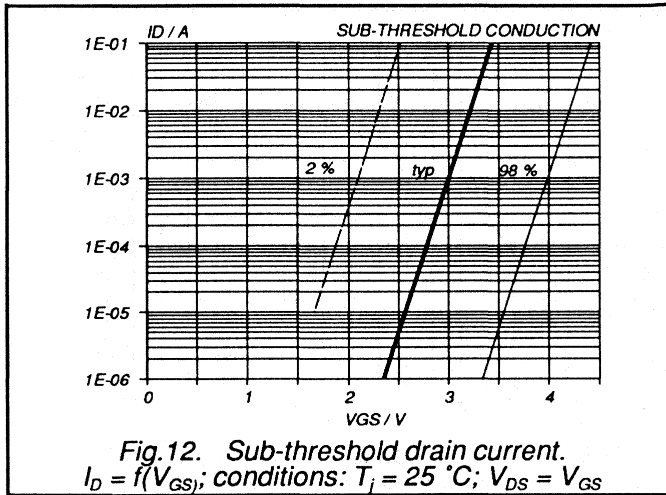


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

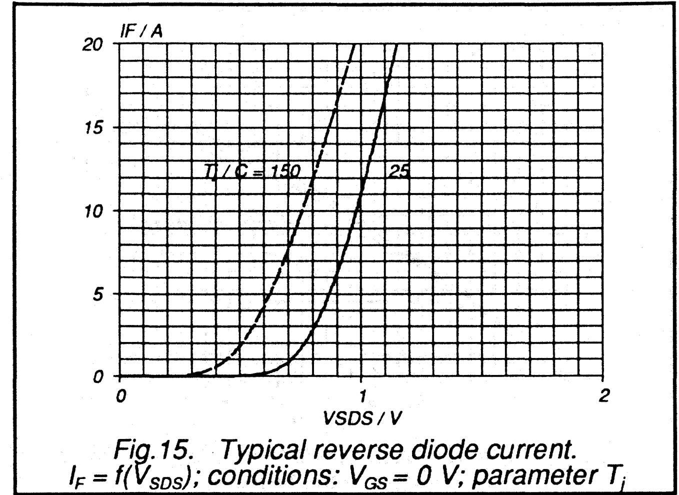


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

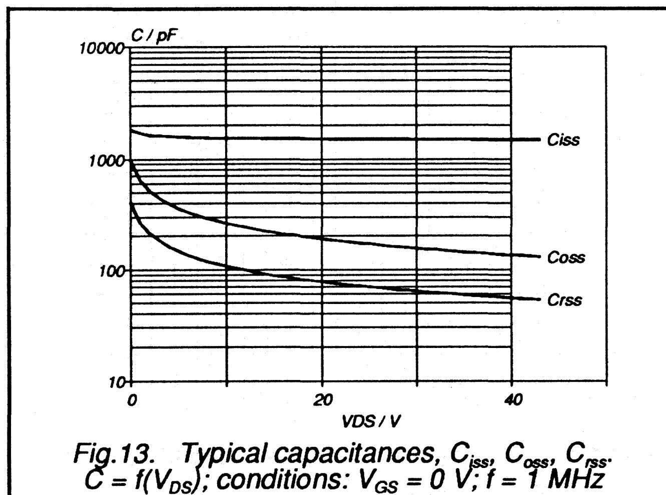


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

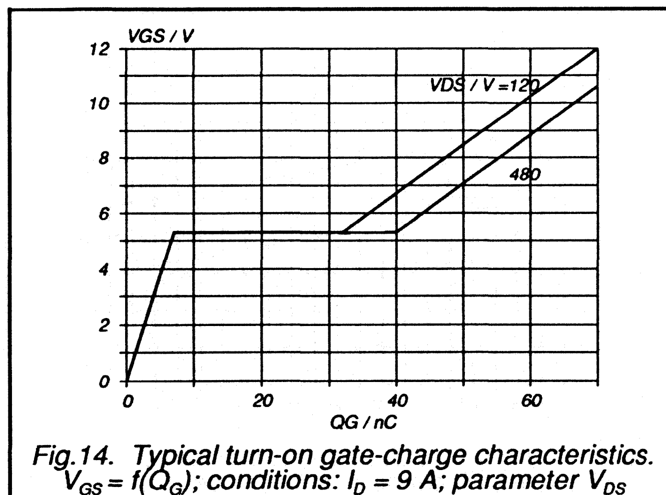


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK637	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	14	12	A
P_{tot}	Total power dissipation	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.5	0.6	Ω
t_{rr}	Diode reverse recovery time	250	250	ns

MECHANICAL DATA

Dimensions in mm

Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

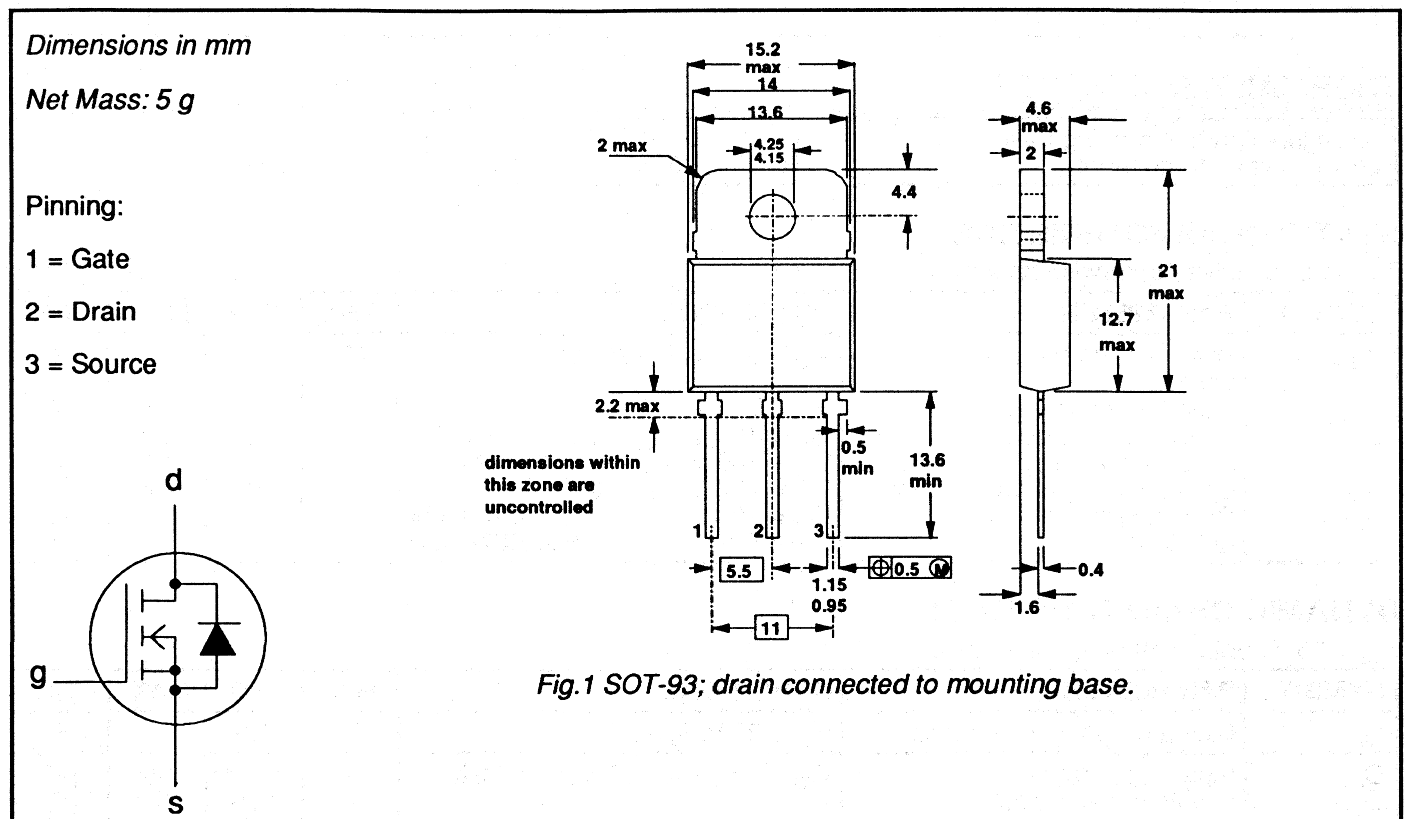


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	14	12	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	8.8	7.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	56	48	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.69 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; **BUK637-400A**	-	0.4	0.5	Ω
		I_D = 6.5 A **BUK637-400B**	-	0.5	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	14	A
I_{DRM}	Pulsed reverse drain current	-		-	-	56	A
V_{SD}	Diode forward voltage	I_F = 14 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 14 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

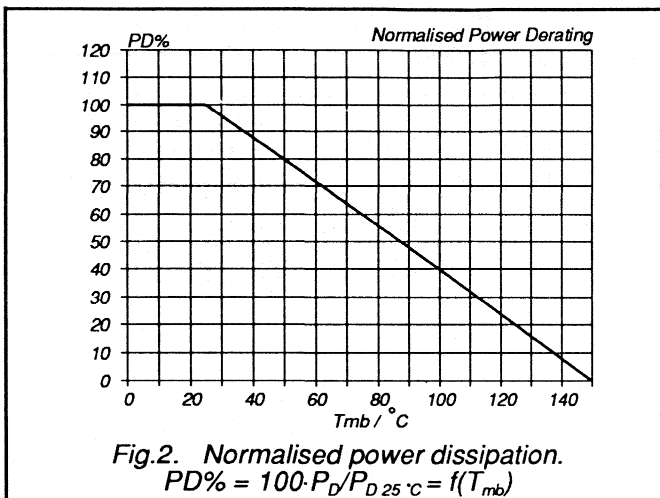


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

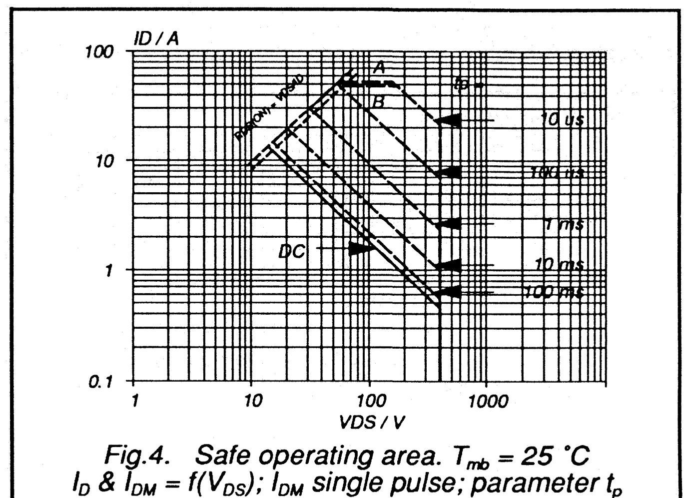


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

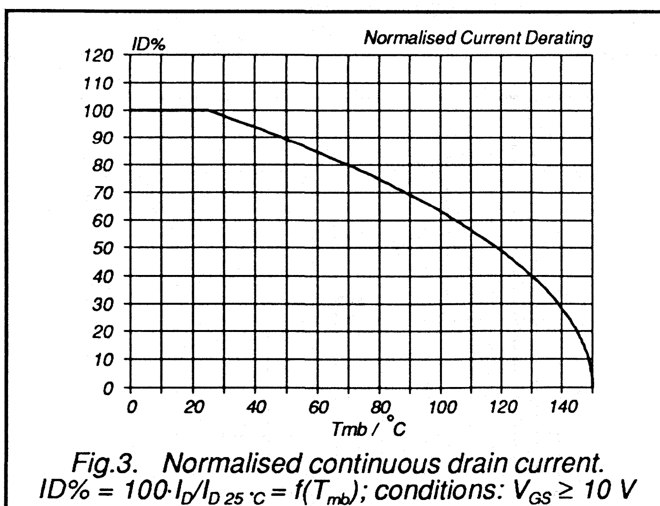


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

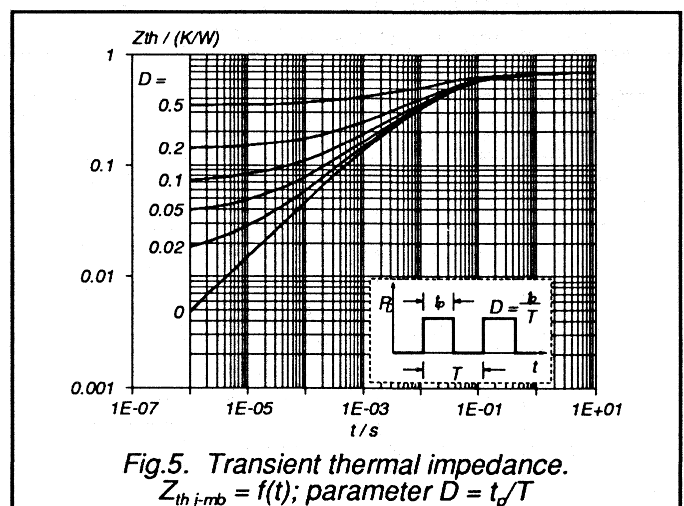


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

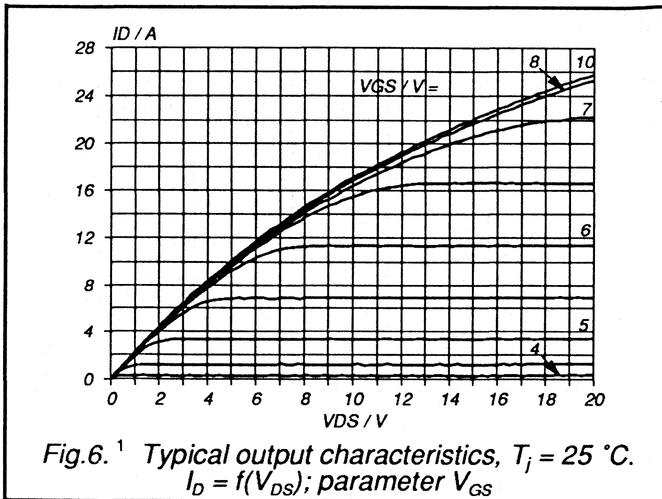


Fig.6. [1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

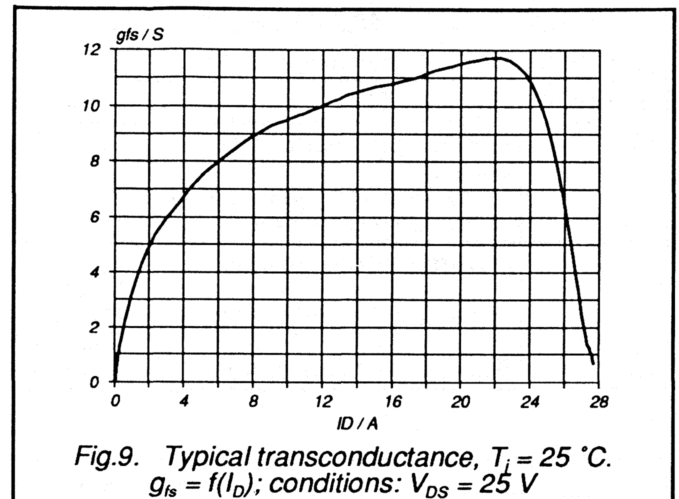


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

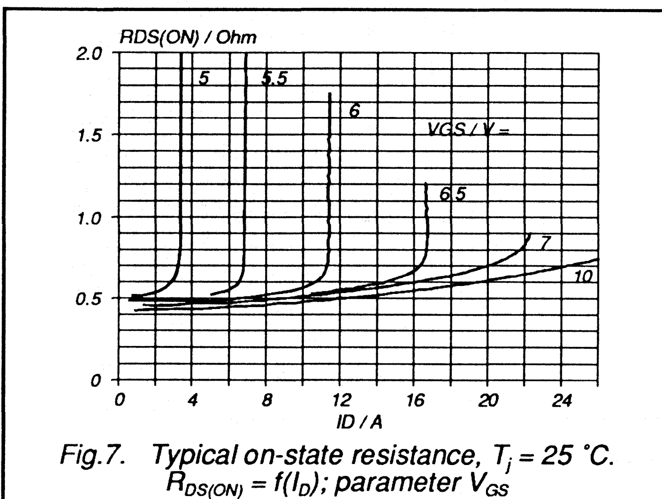


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

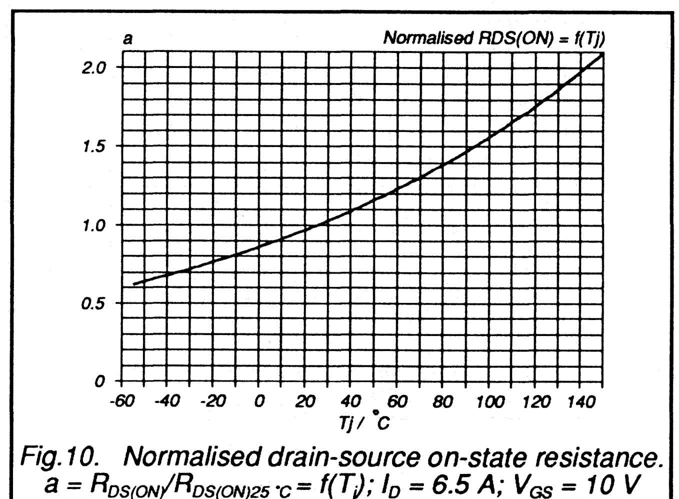


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

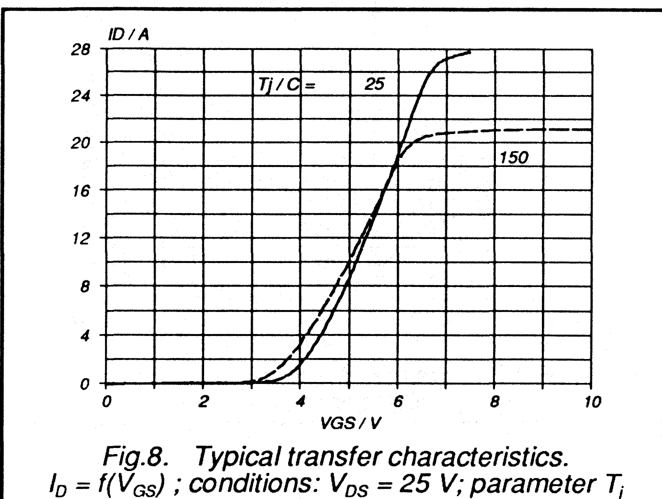


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

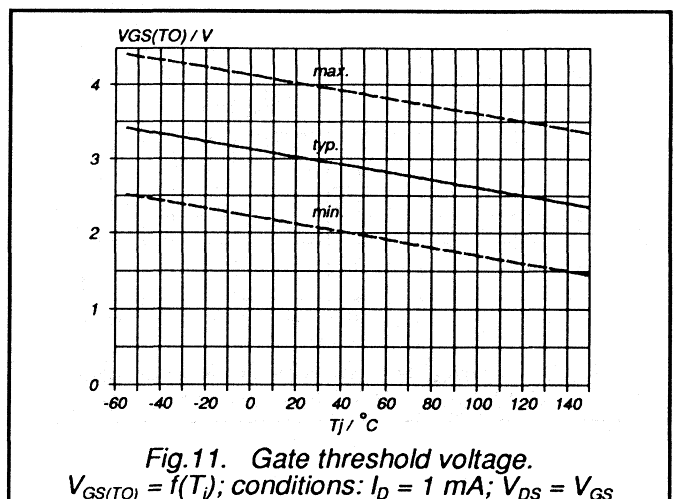


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

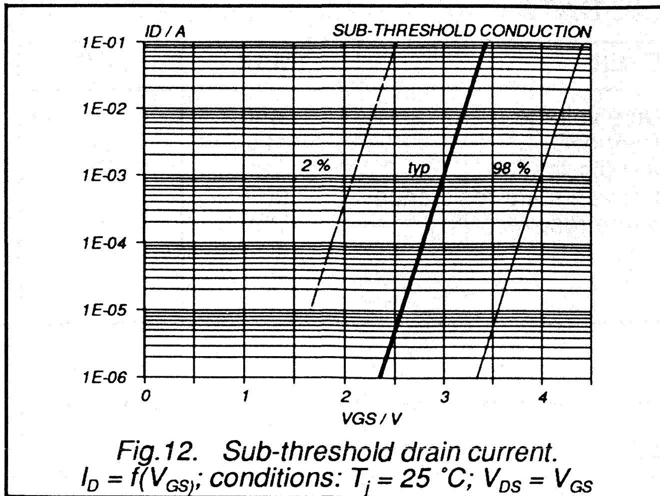


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ ˚C; $V_{DS} = V_{GS}$

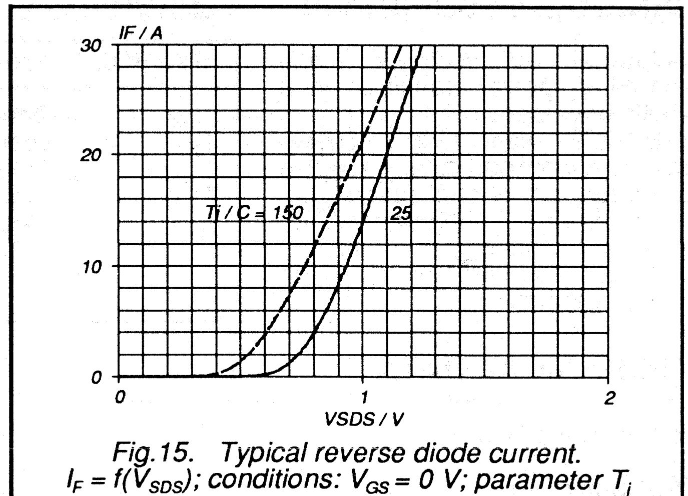


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

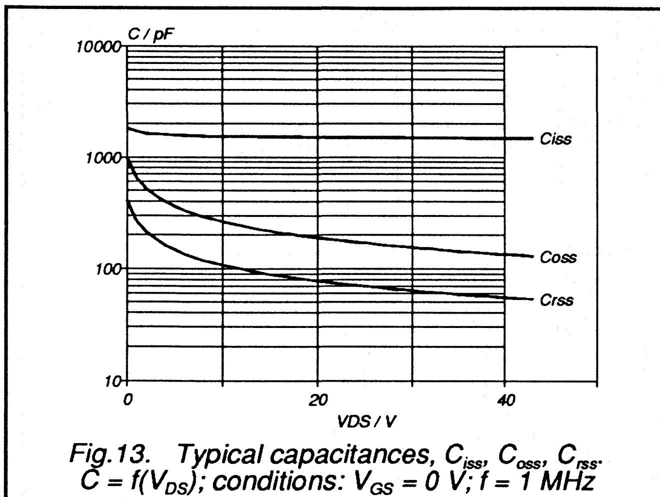


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

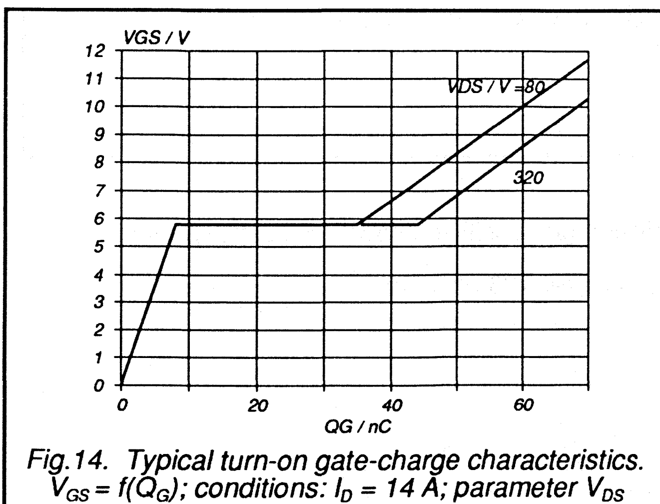


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 14$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	11	A
P_{tot}	Total power dissipation	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	Ω
t_{rr}	Diode reverse recovery time	250	ns

MECHANICAL DATA

Dimensions in mm

Net Mass: 5 g

Pinning:

1 = Gate

2 = Drain

3 = Source

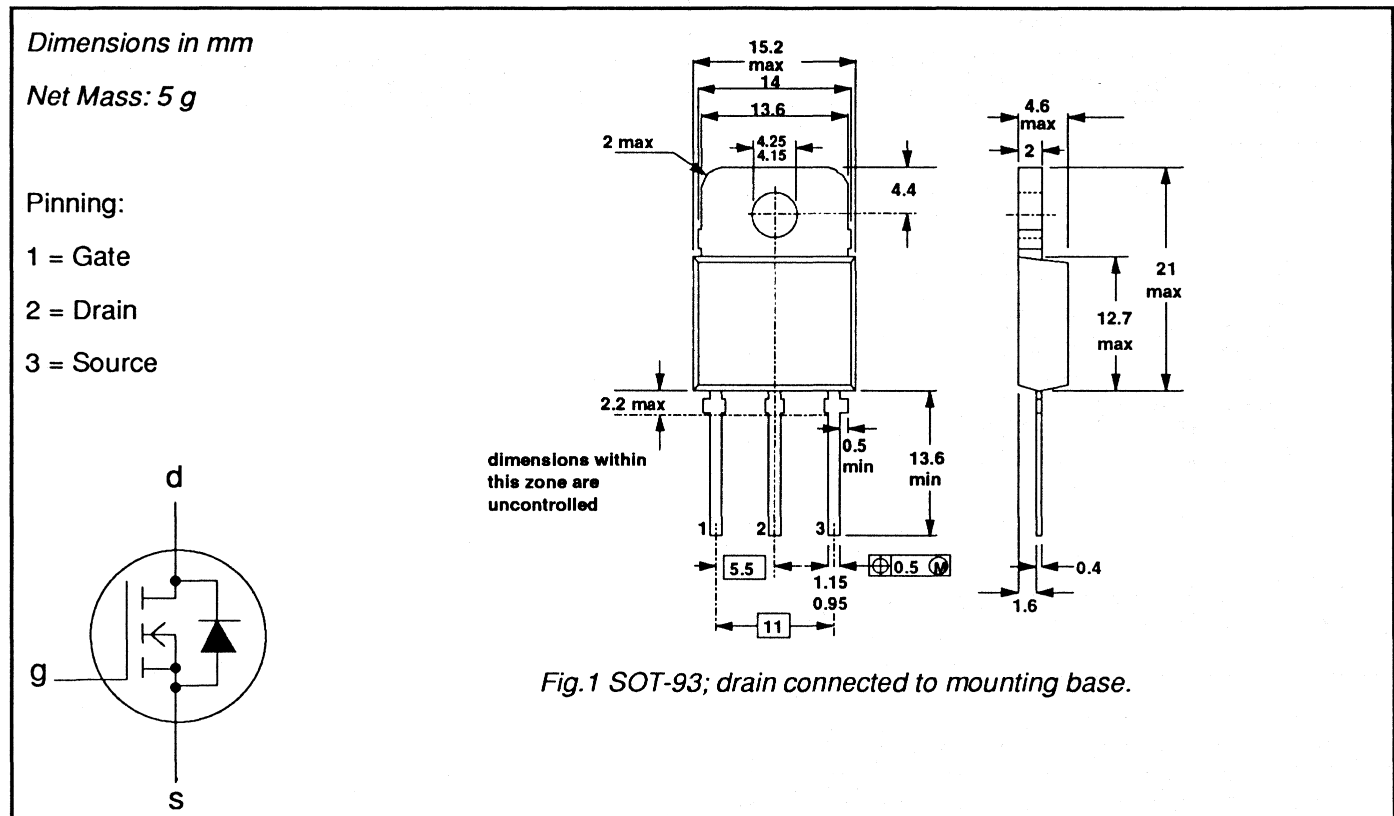


Fig. 1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	11	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	7.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	44	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	180	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j-mb}$ = 0.69 K/W
From junction to ambient	$R_{th\,j-a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.6	0.65	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	11	A
I_{DRM}	Pulsed reverse drain current	-		-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 11 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

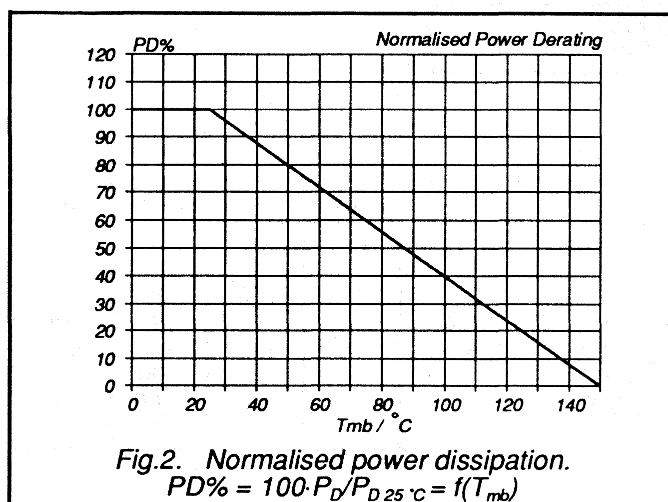


Fig.2. Normalised power dissipation.
PD% = 100·$P_D/P_{D\,25\,°C}$ = f(T_{mb})

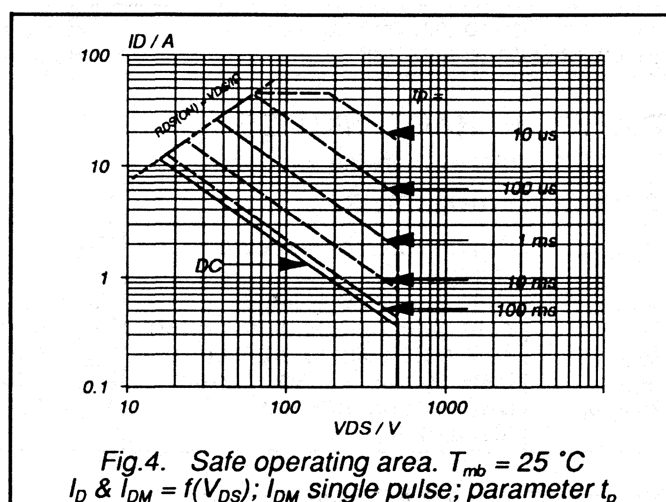


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

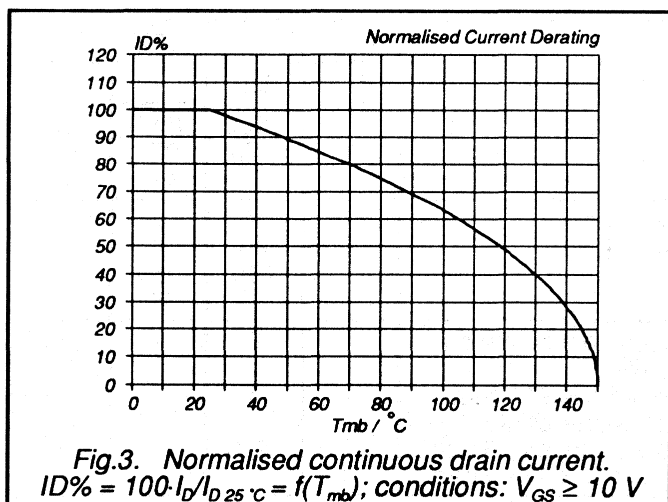


Fig.3. Normalised continuous drain current.
ID% = 100·$I_D/I_{D\,25\,°C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

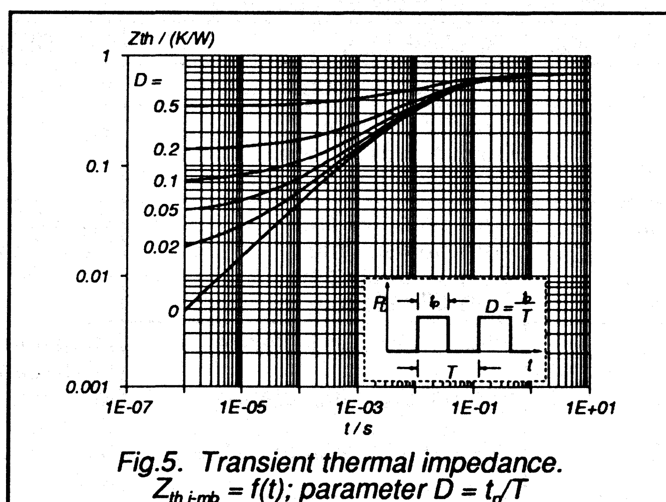


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

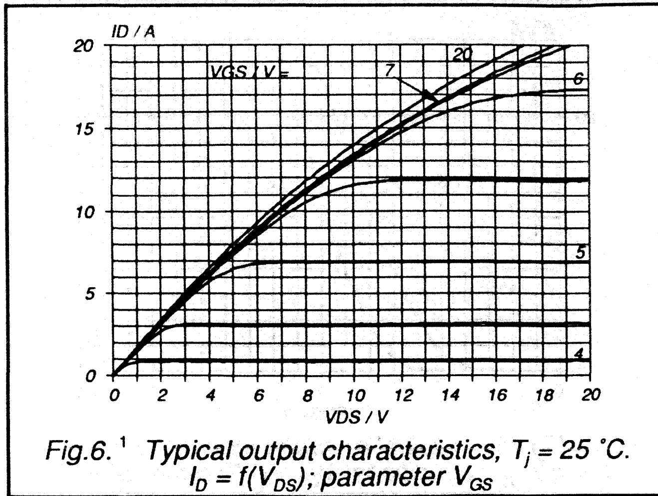


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

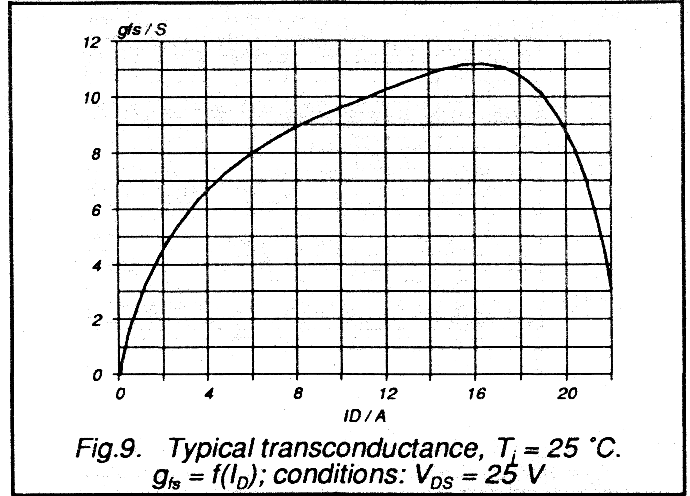


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

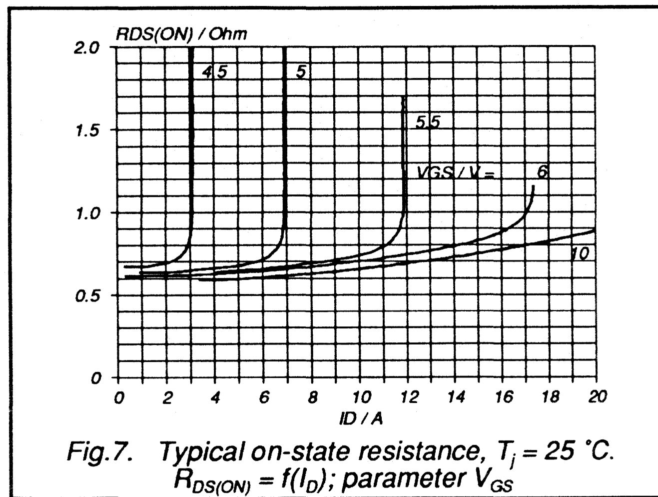


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

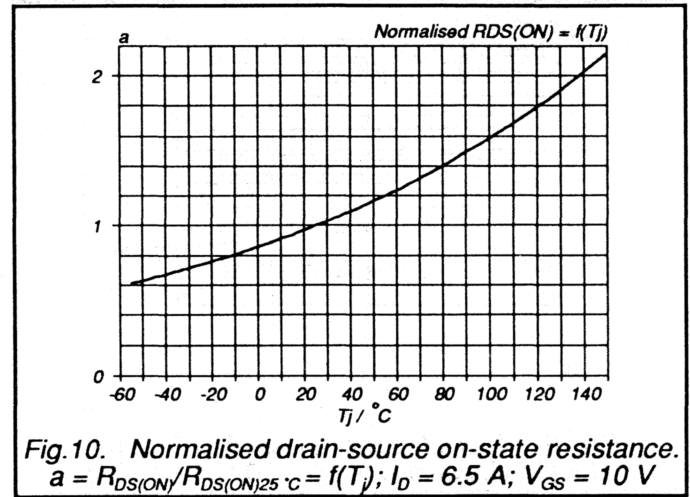


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

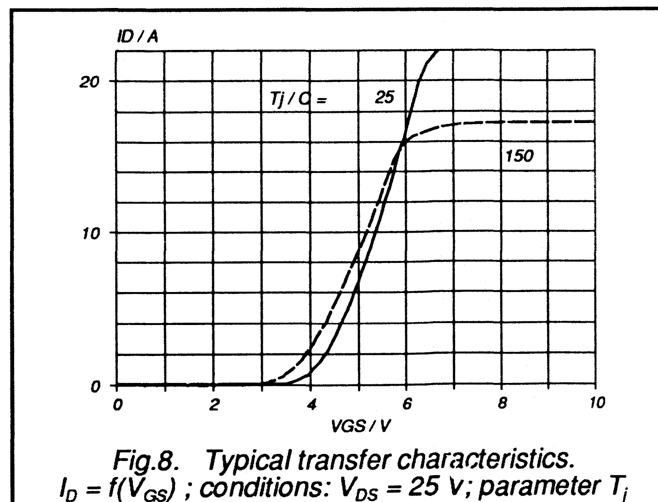


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

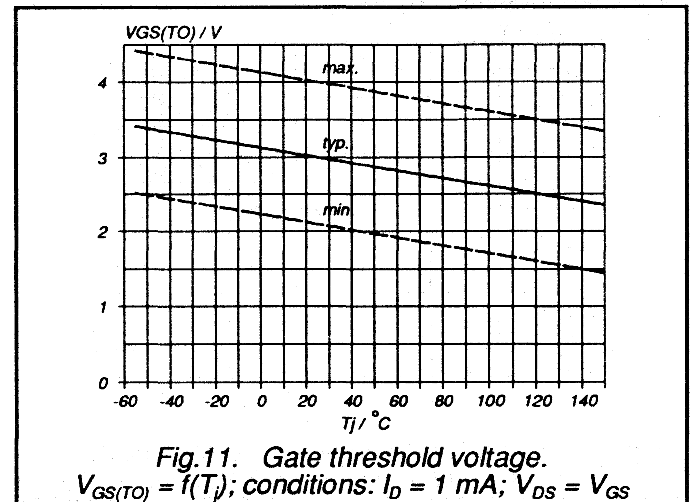


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

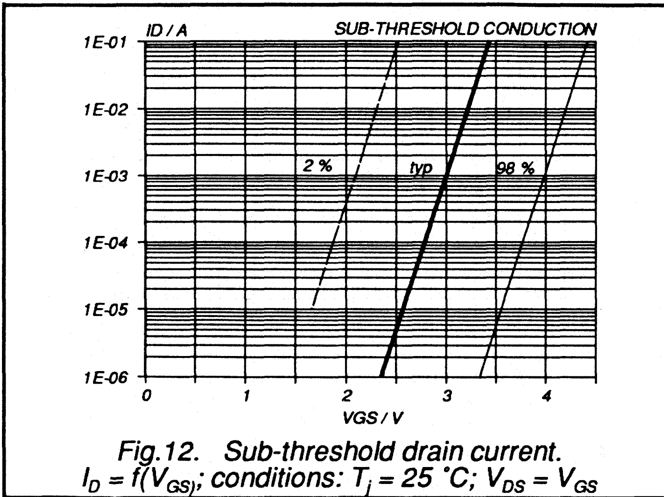


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

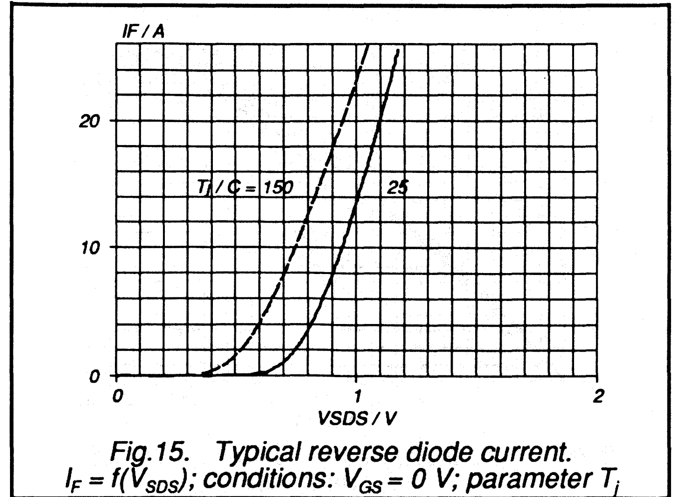


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

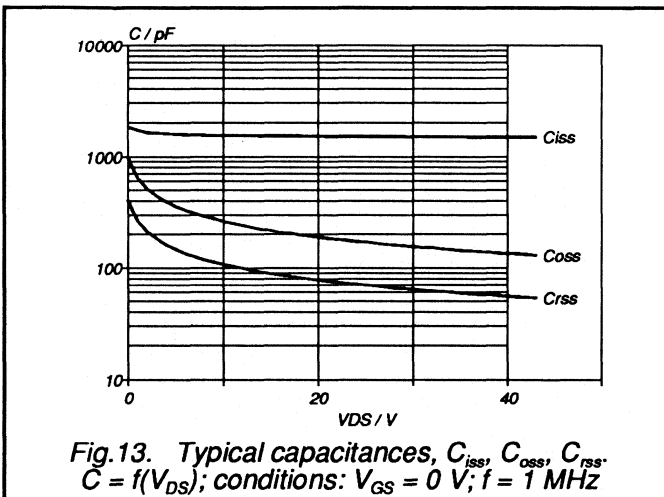


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

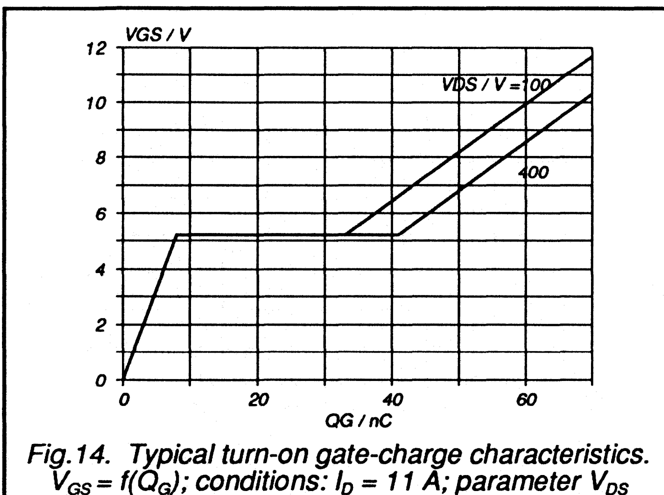


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

PowerMOS transistor
Fast Recovery Diode FET

BUK637-500A
BUK637-500B
BUK637-500C

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK637	-500A	-500B	-500C	
V_{DS}	Drain-source voltage	500	500	500	V
I_D	Drain current (DC)	11	10	9.5	A
P_{tot}	Total power dissipation	180	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	0.8	0.9	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

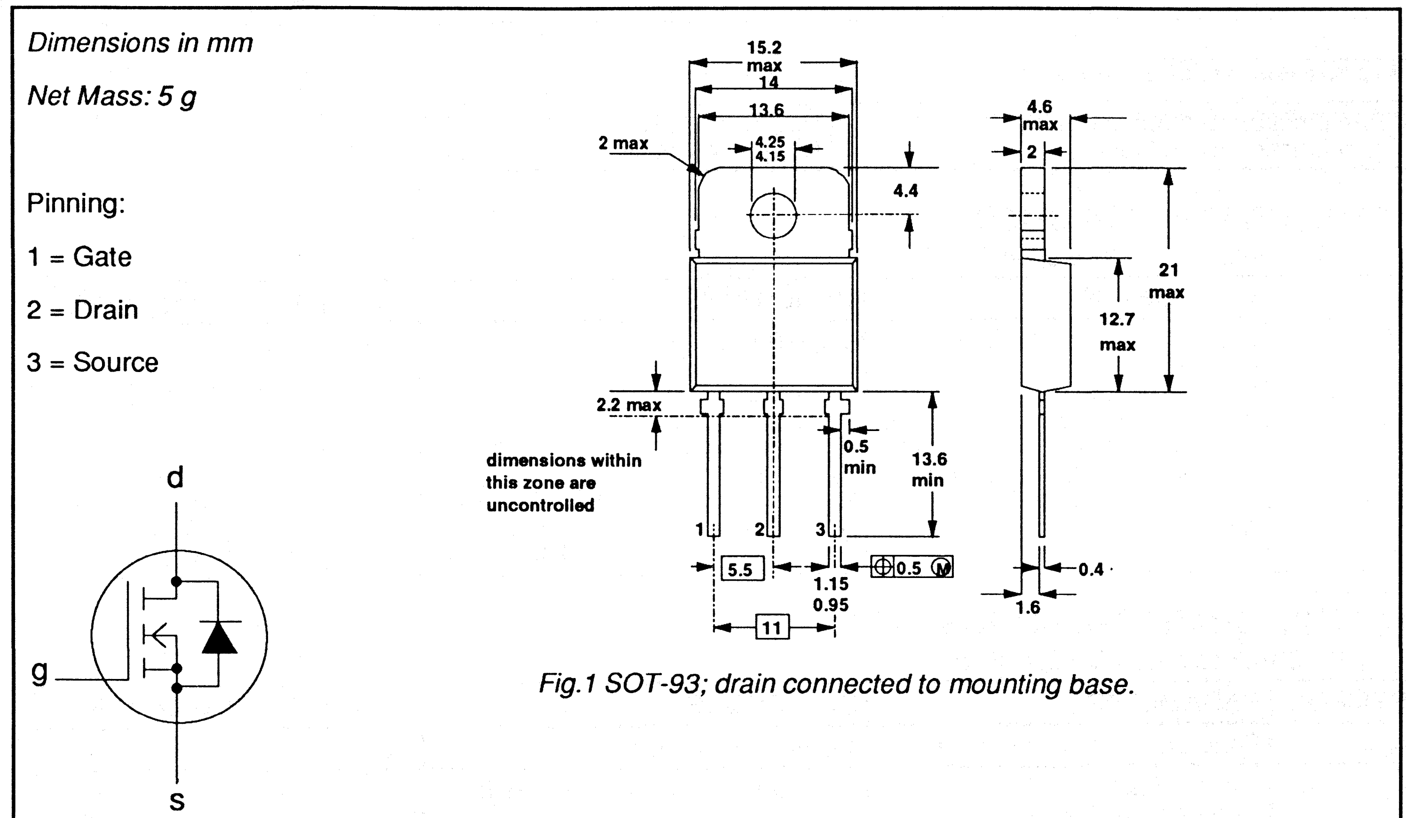


Fig.1 SOT-93; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	500			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-500A	-500B	-500C	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	11	10	9.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	7.0	6.3	6.0	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	44	40	38	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 0.69 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK637-500A**	-	0.6	0.65	Ω
		BUK637-500B	-	0.7	0.8	Ω
		BUK637-500C	-	0.8	0.9	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	11	A
I_{DRM}	Pulsed reverse drain current	-		-	-	44	A
V_{SD}	Diode forward voltage	I_F = 11 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 11 A;	T_j = 25 ˚C	-	180	250	ns
		-dI_F/dt =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

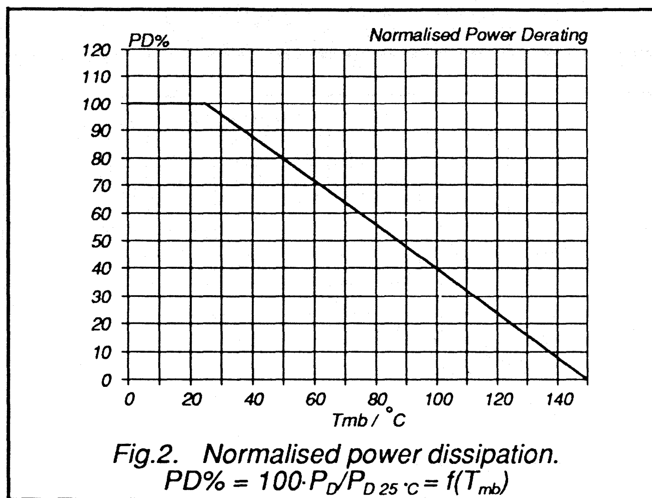


Fig.2. Normalised power dissipation.
PD% = 100·P_D/$P_{D\,25\,˚C}$ = f(T_{mb})

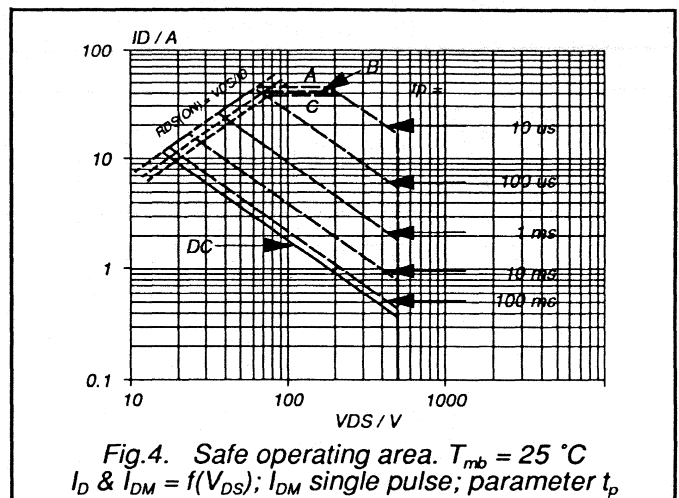


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & I_{DM} = f(V_{DS}); I_{DM} single pulse; parameter t_p

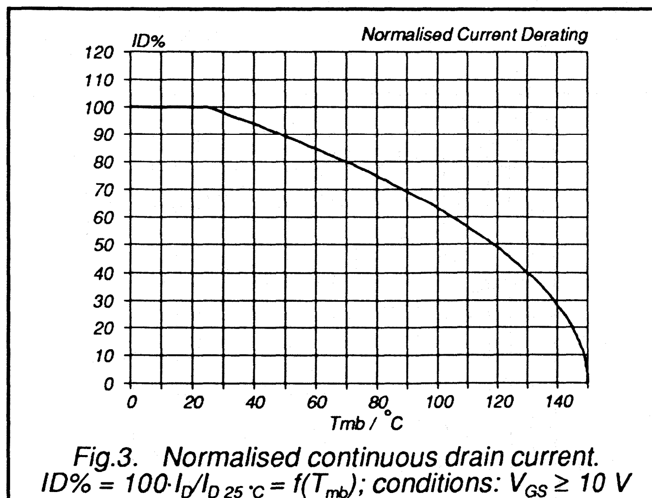


Fig.3. Normalised continuous drain current.
ID% = 100·I_D/$I_{D\,25\,˚C}$ = f(T_{mb}); conditions: V_{GS} ≥ 10 V

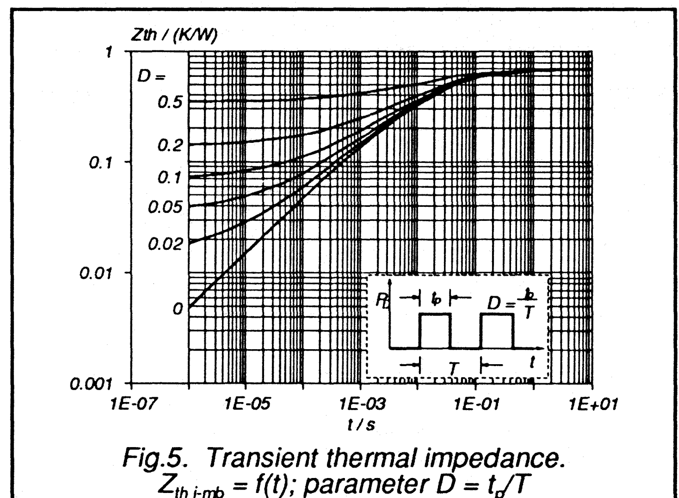


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb}$ = f(t); parameter D = t_p/T

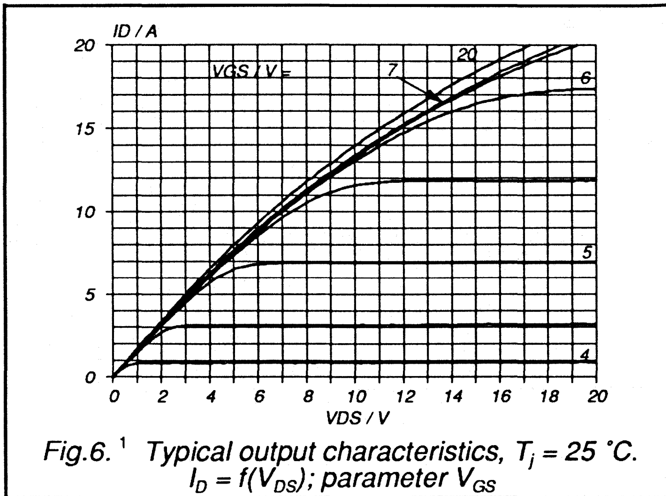


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

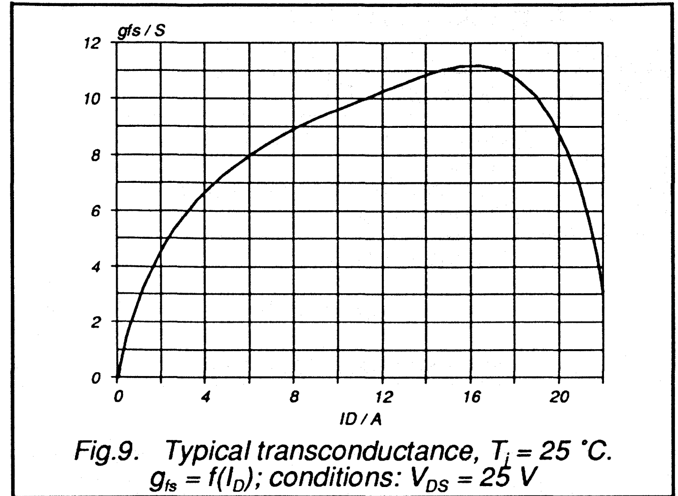


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

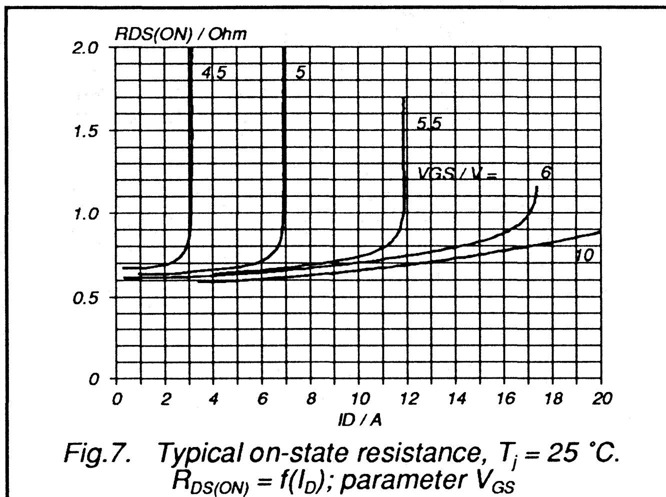


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

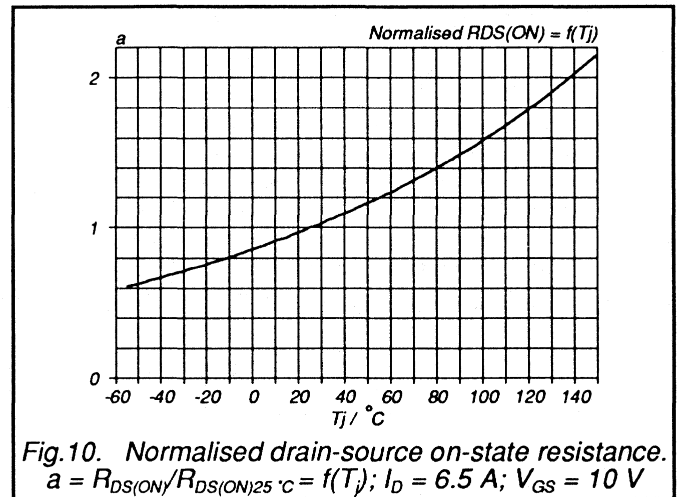


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

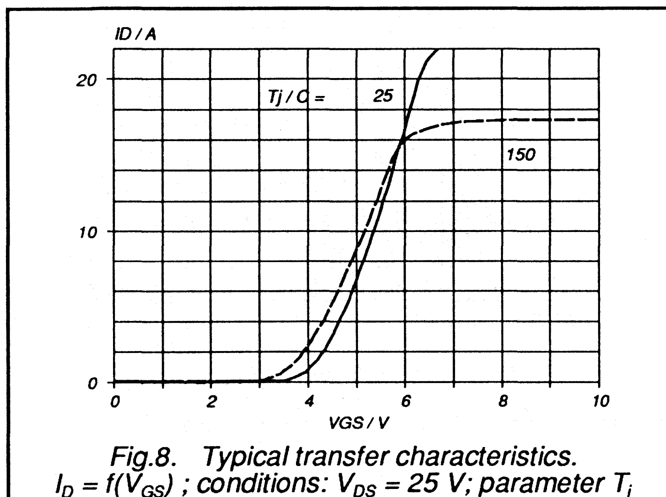


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

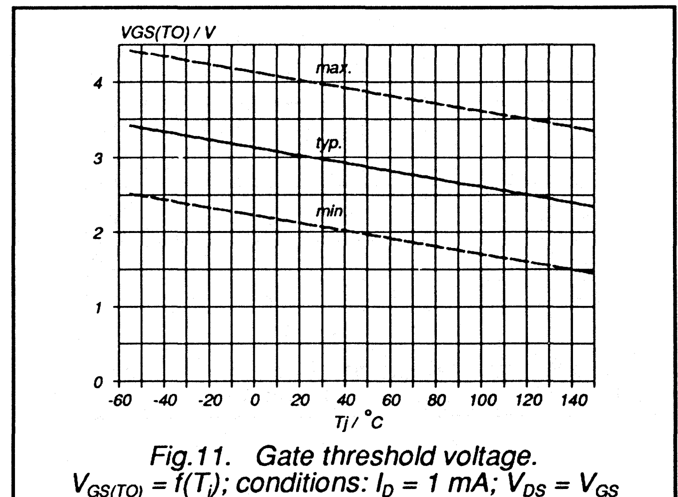


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

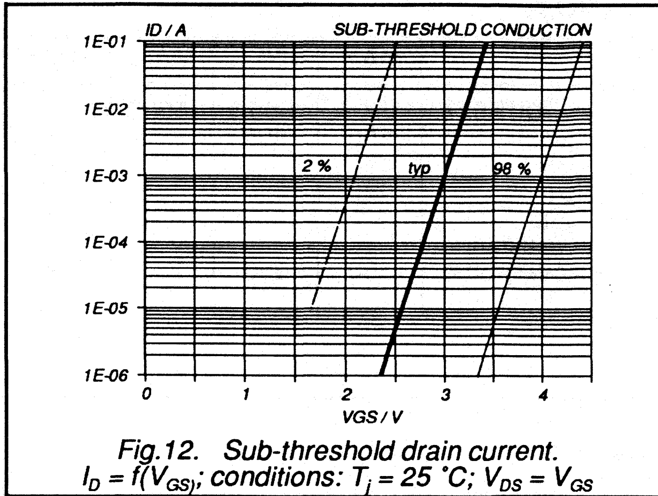


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

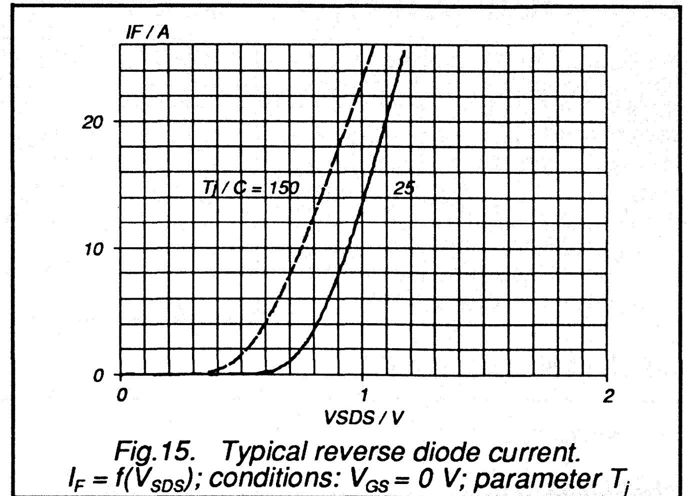


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

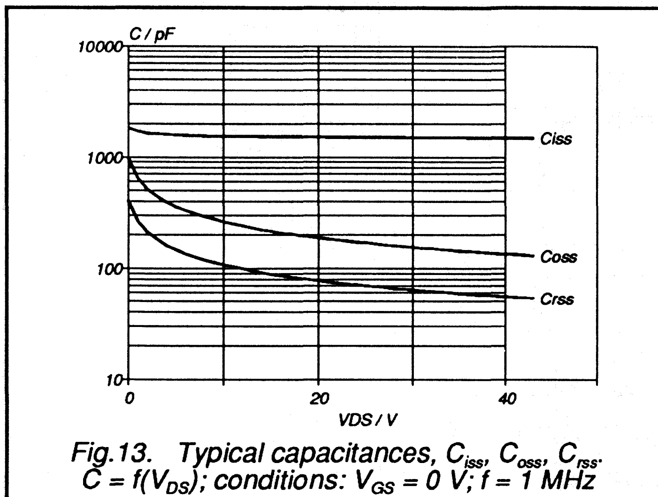


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

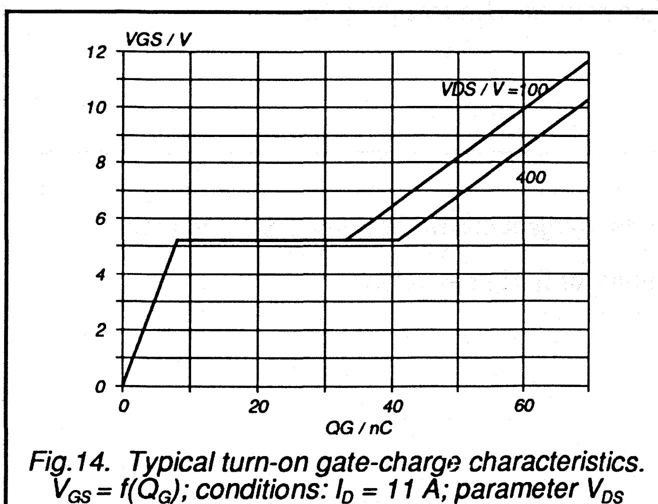


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 11$ A; parameter V_{DS}

PowerMOS transistor
Fast Recovery Diode FET

BUK637-600A
BUK637-600B
BUK637-600C

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK637	-600A	-600B	-600C	
V_{DS}	Drain-source voltage	600	600	600	V
I_D	Drain current (DC)	9	7.8	7	A
P_{tot}	Total power dissipation	180	180	180	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	1.4	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

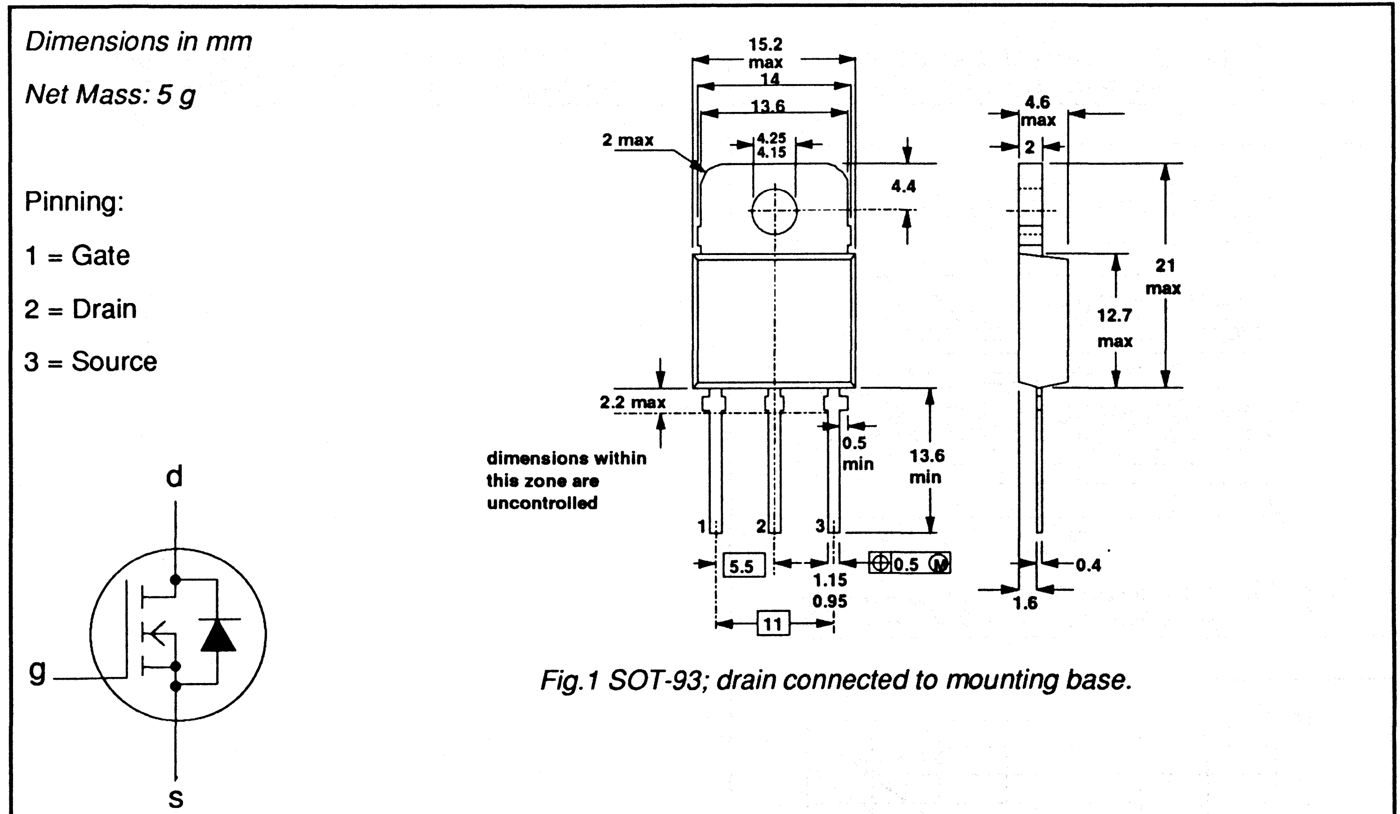


Fig.1 SOT-93; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for SOT93 envelope.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	600			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-600A	-600B	-600C	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	9	7.8	7	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5.7	5.0	4.4	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	36	31	28	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	180			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j-mb}$ = 0.69 K/W
From junction to ambient	$R_{th\ j-a}$ = 45 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A BUK637-600A	-	0.85	1.0	Ω
		BUK637-600B	-	1.0	1.2	Ω
		BUK637-600C	-	1.2	1.4	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	12.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	9	A
I_{DRM}	Pulsed reverse drain current	-		-	-	36	A
V_{SD}	Diode forward voltage	I_F = 9 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 9 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

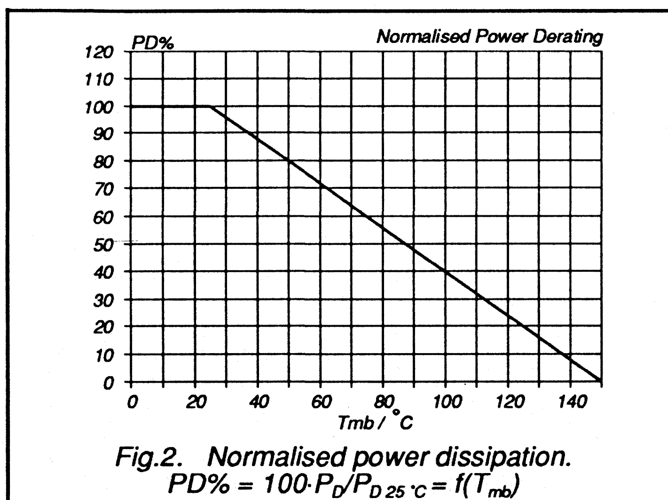


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

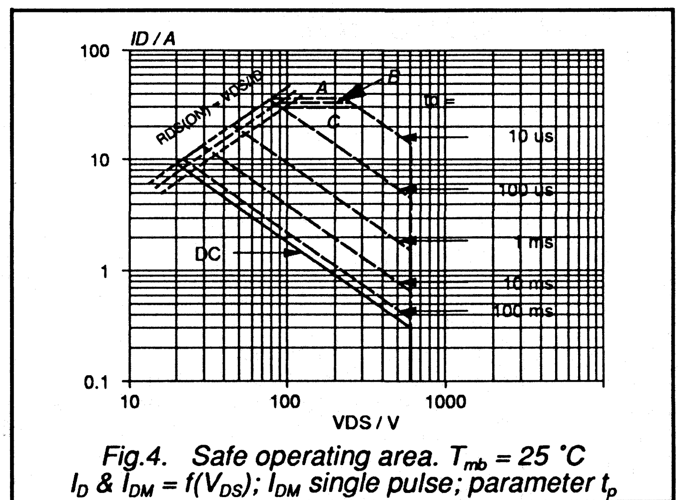


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

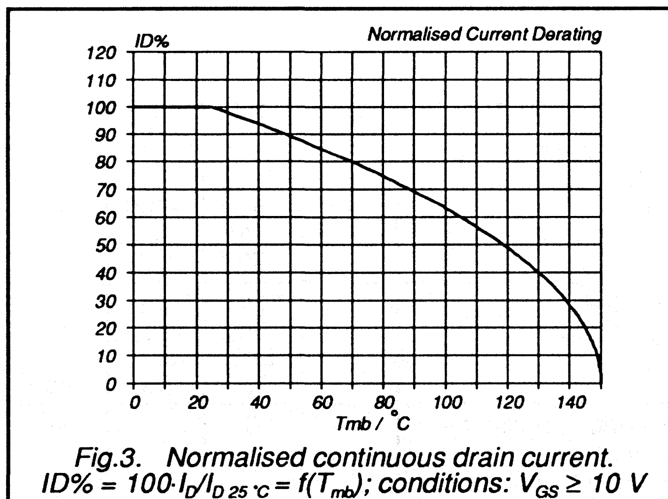


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

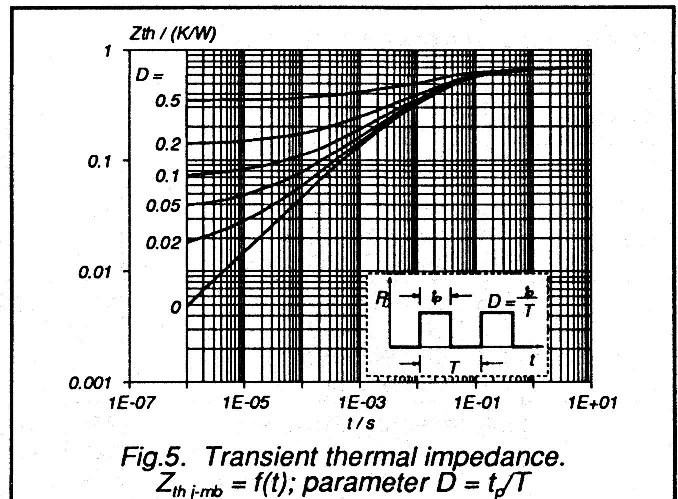


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

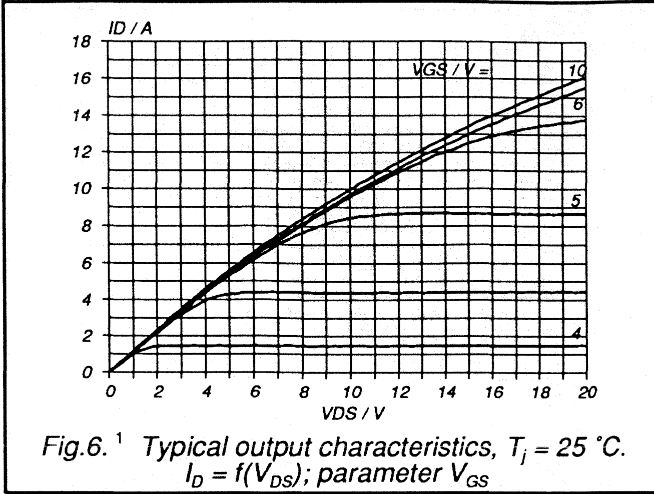


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

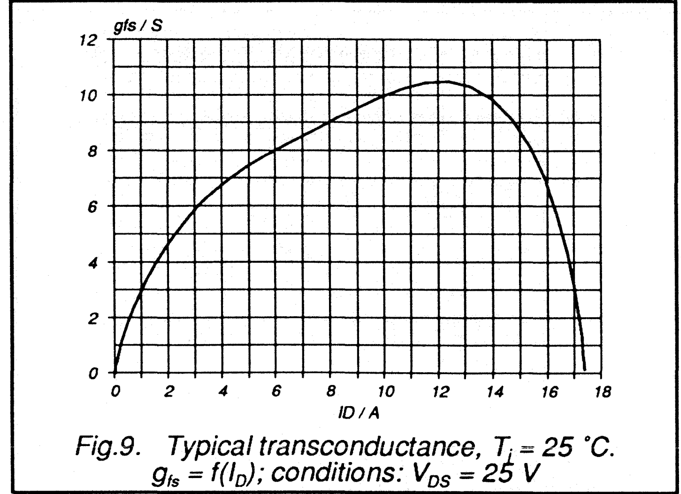


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

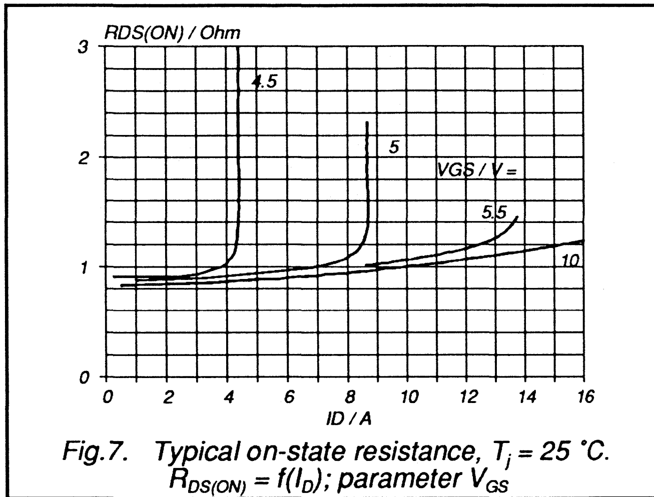


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

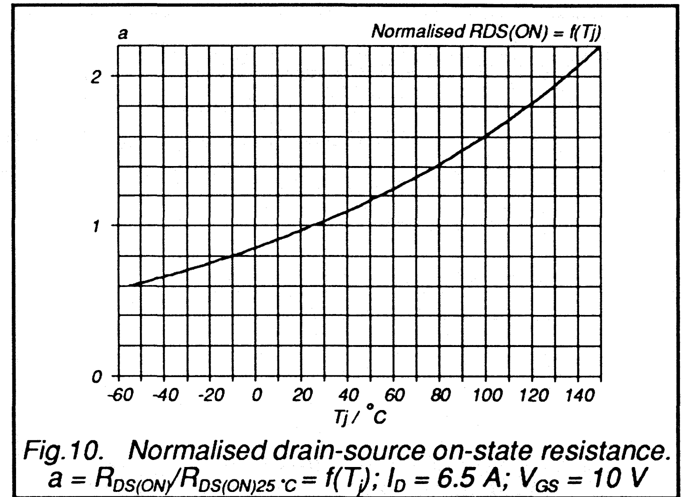


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

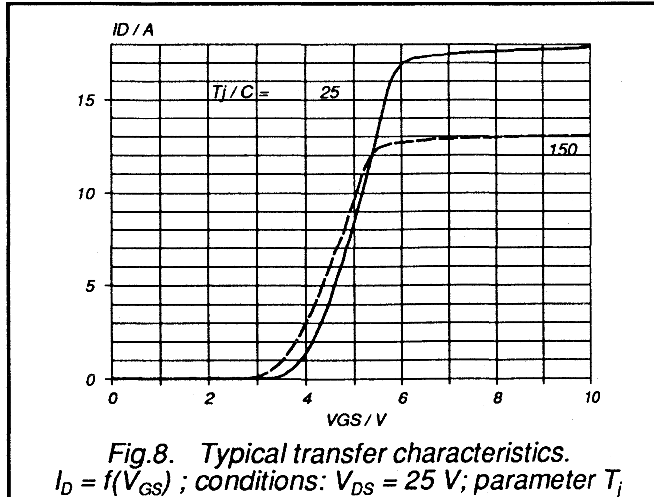


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

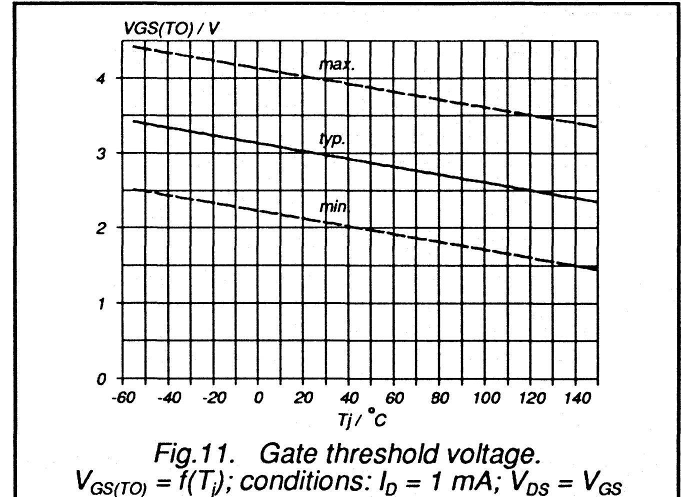


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

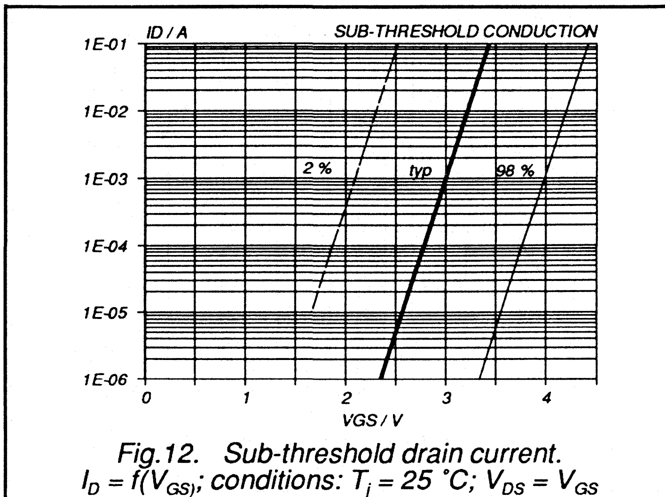


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

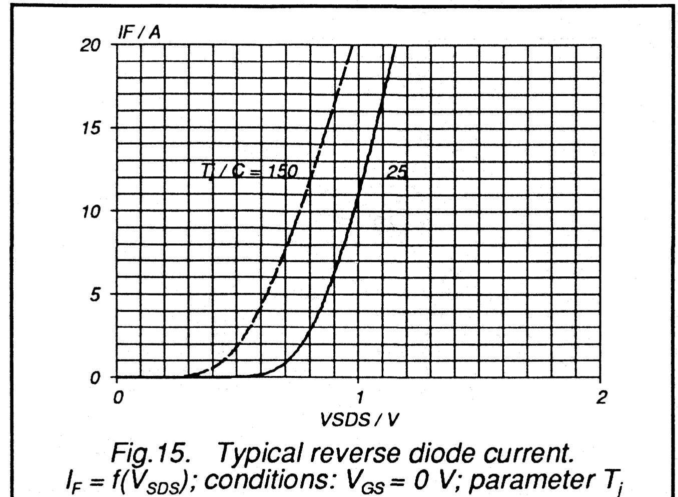


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

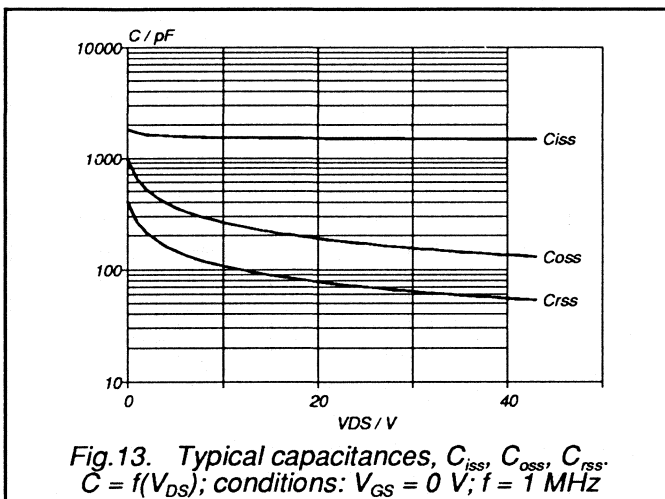


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

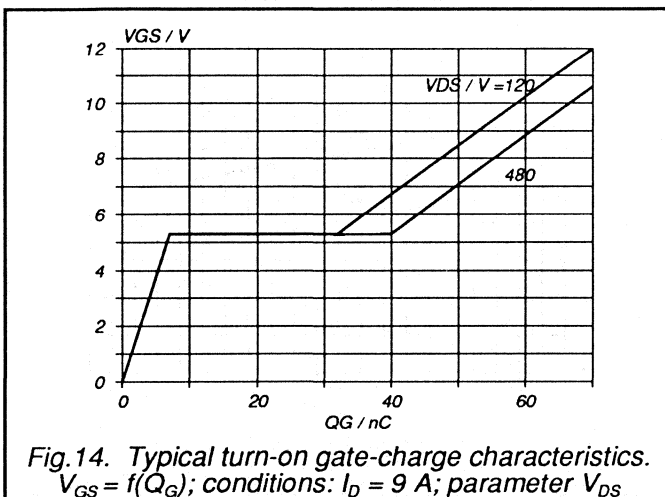


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 9$ A; parameter V_{DS}

PowerMOS transistor
Fast Recovery Diode FET

BUK655-450B

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	5.7	A
P_{tot}	Total power dissipation	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	Ω
t_{rr}	Diode reverse recovery time	250	ns

MECHANICAL DATA

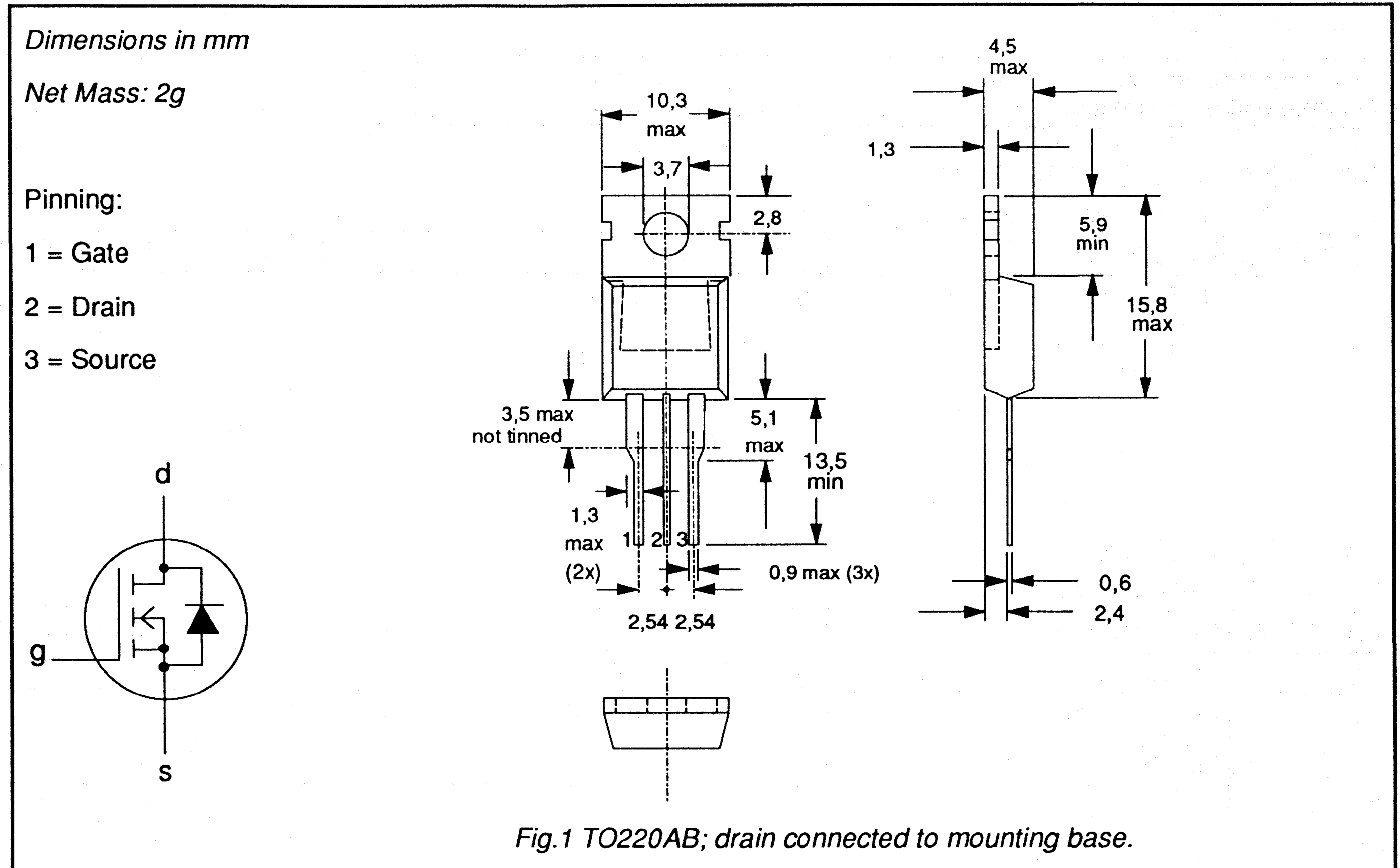


Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 °C	-	5.7	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	3.6	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	23	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100	W
T_{stg}	Storage temperature	-	- 55	150	°C
T_j	Junction Temperature	-	-	150	°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A	-	1.2	1.3	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	2.3	3.1	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	45	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\,off}$	Turn-off delay time		-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	5.7	A
I_{DRM}	Pulsed reverse drain current	-		-	-	23	A
V_{SD}	Diode forward voltage	I_F = 5.7 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.7 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

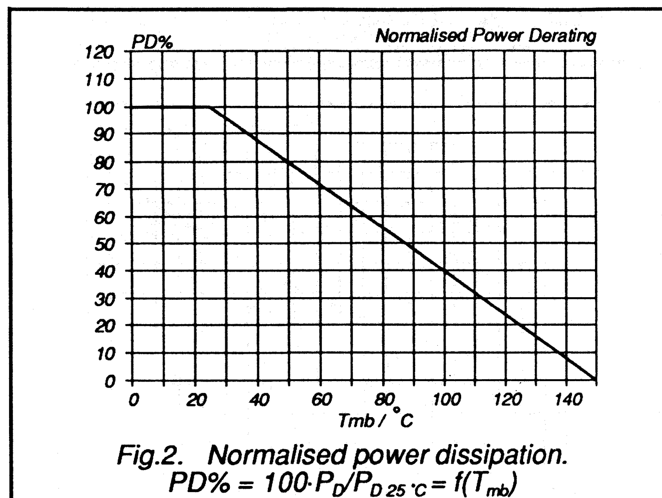


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

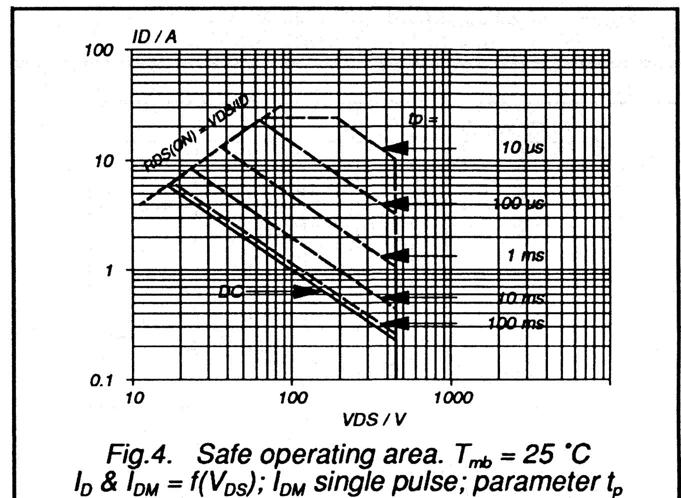


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

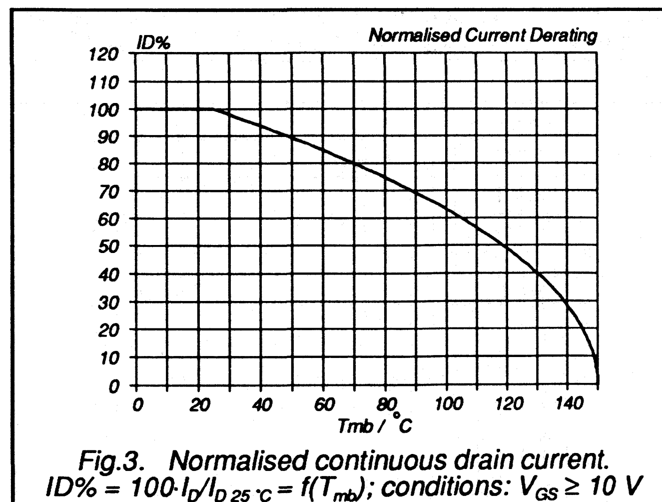


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

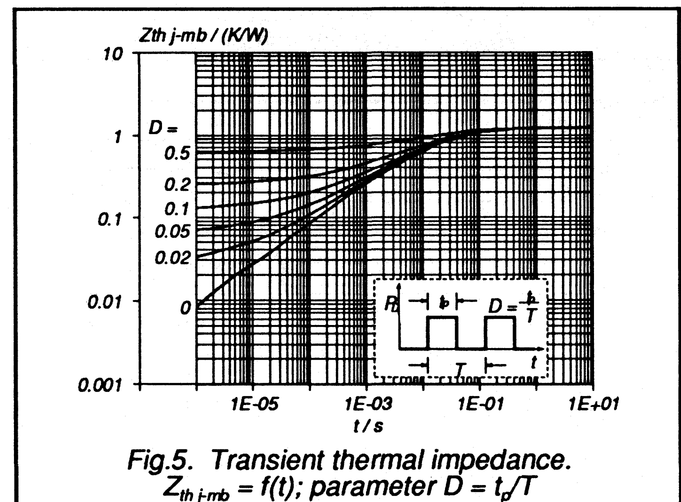


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

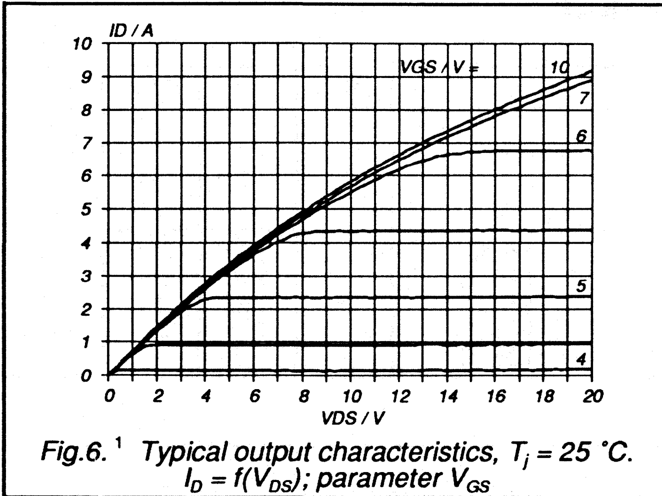


Fig.6.[1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

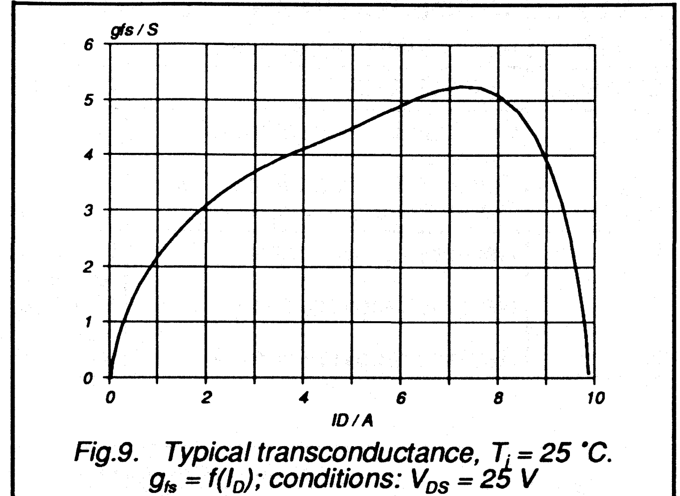


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

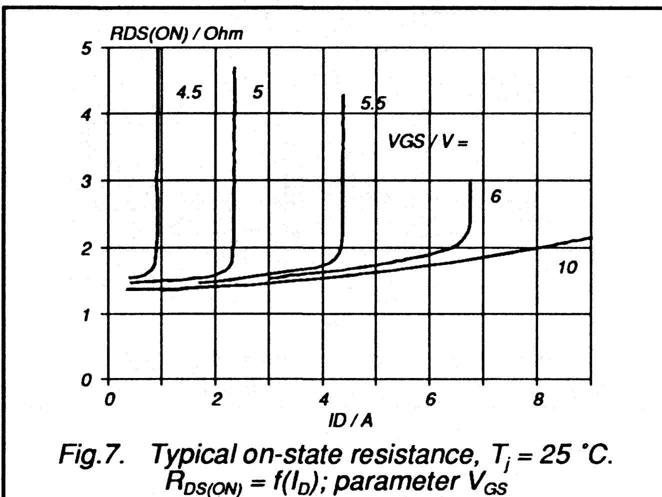


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

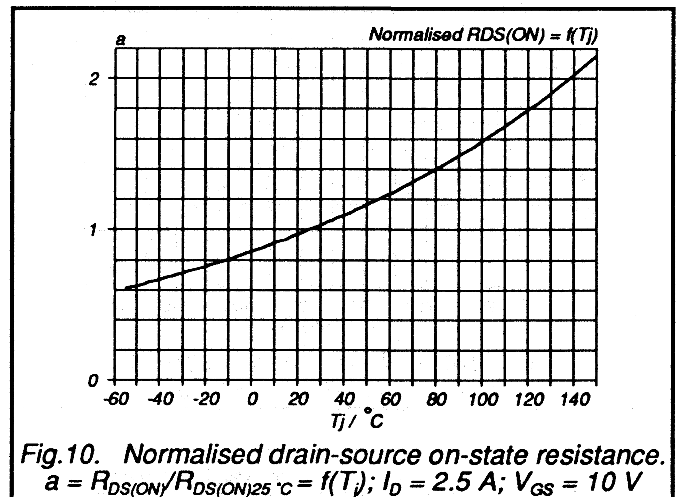


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,^\circ C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

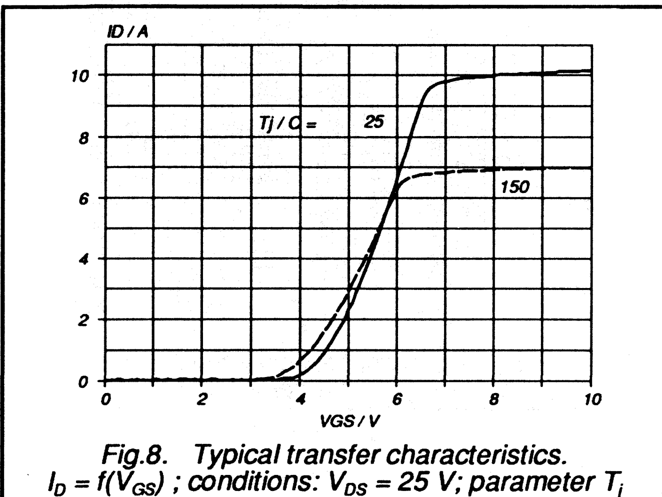


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

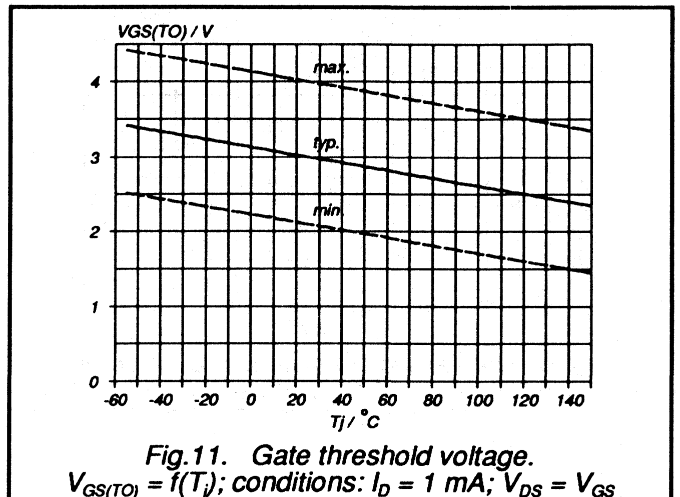


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

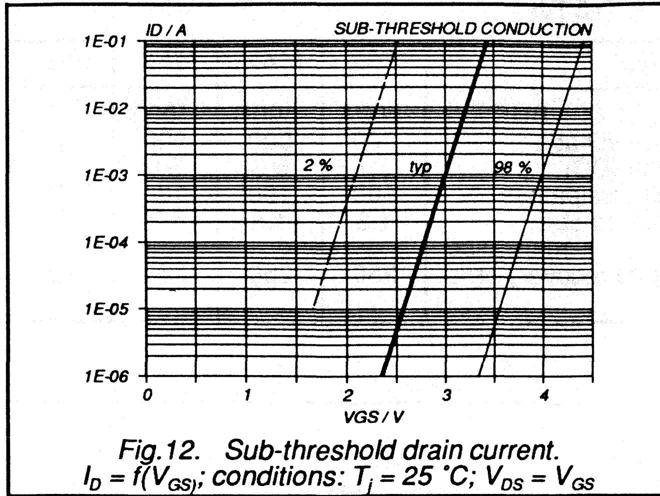


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

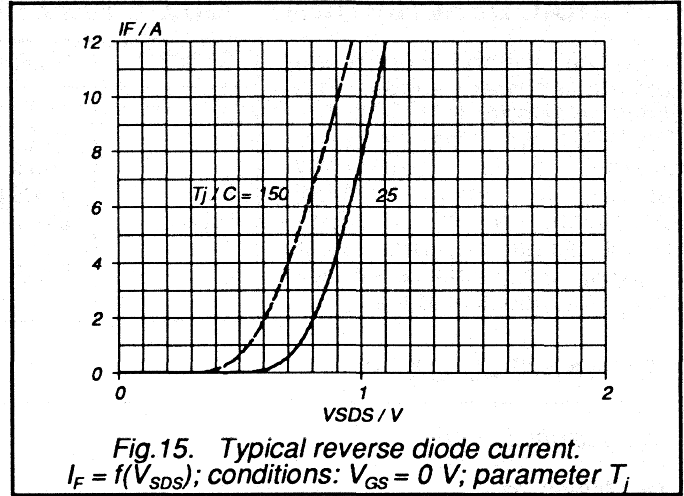


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

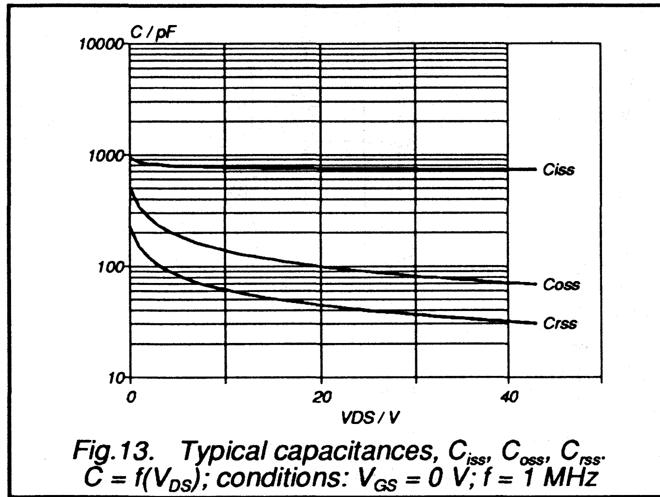


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

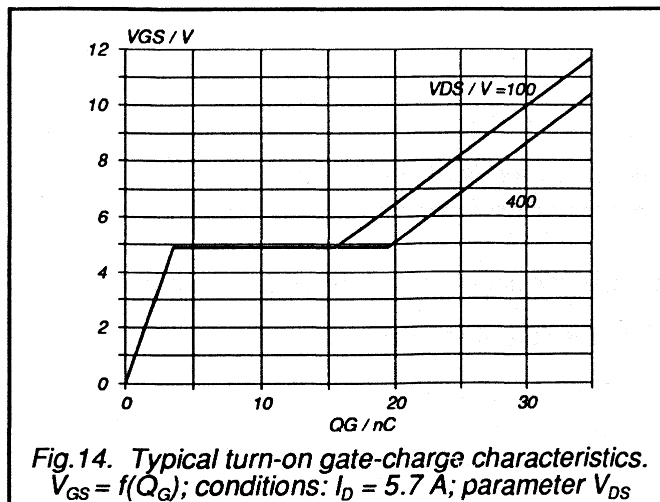


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK655	-500A	-500B	-500C	
V_{DS}	Drain-source voltage	500	500	500	V
I_D	Drain current (DC)	5.7	5.3	5.0	A
P_{tot}	Total power dissipation	100	100	100	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.3	1.5	1.7	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

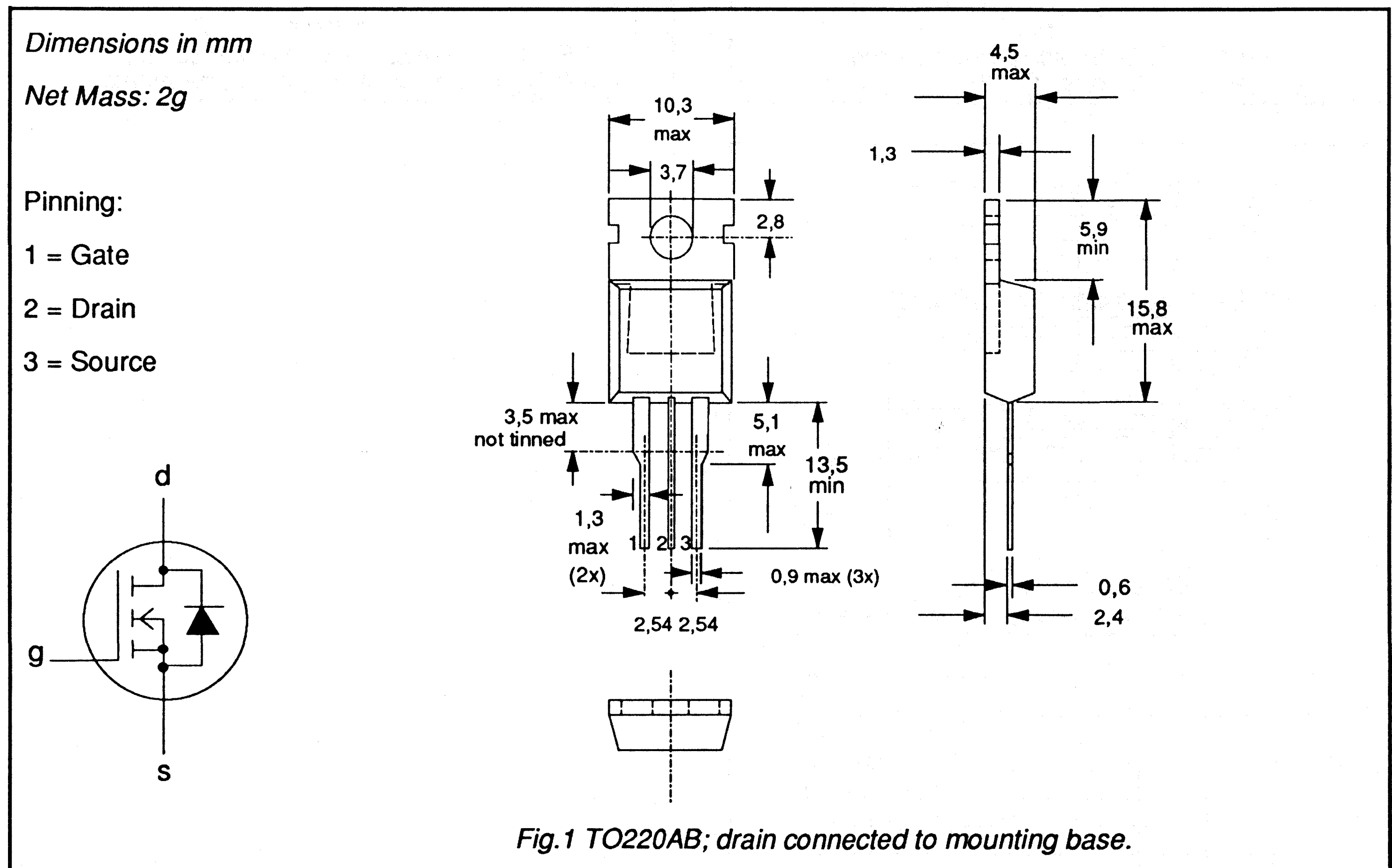


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	500			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-500A	-500B	-500C	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	5.7	5.3	5.0	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	3.6	3.3	3.1	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	23	21	20	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	100			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 1.25 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 2.5 A BUK655-500A	-	1.2	1.3	Ω
		BUK655-500B	-	1.4	1.5	Ω
		BUK655-500C	-	1.6	1.7	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 2.5 A	2.3	3.1	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	750	1000	pF
C_{oss}	Output capacitance		-	90	140	pF
C_{rss}	Feedback capacitance		-	40	70	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.6 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	10	45	ns
t_r	Turn-on rise time		-	45	60	ns
$t_{d\ off}$	Turn-off delay time		-	100	140	ns
t_f	Turn-off fall time		-	40	65	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	5.7	A
I_{DRM}	Pulsed reverse drain current	-		-	-	23	A
V_{SD}	Diode forward voltage	I_F = 5.7 A;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 5.7 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

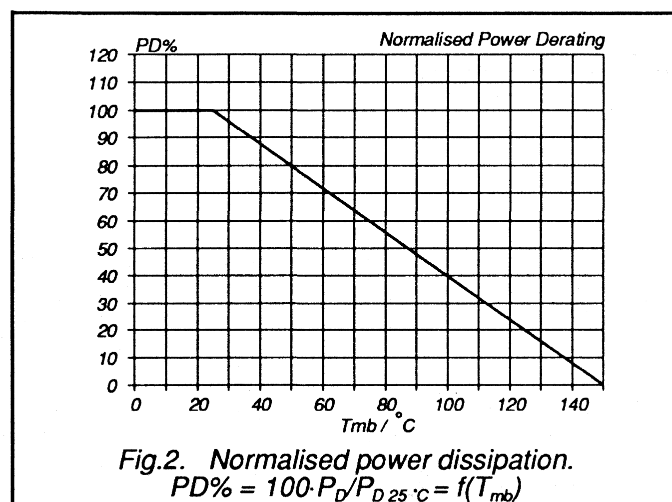


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,^\circ C} = f(T_{mb})$

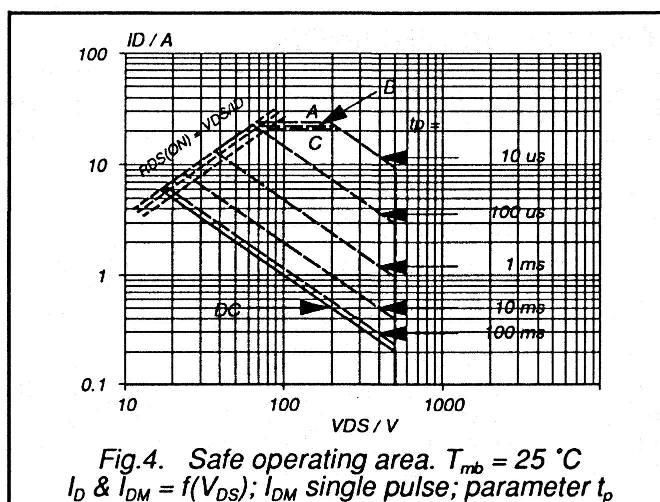


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

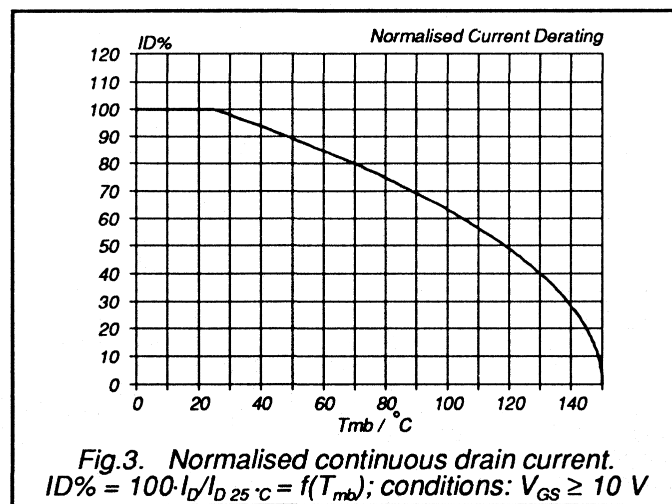


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,^\circ C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

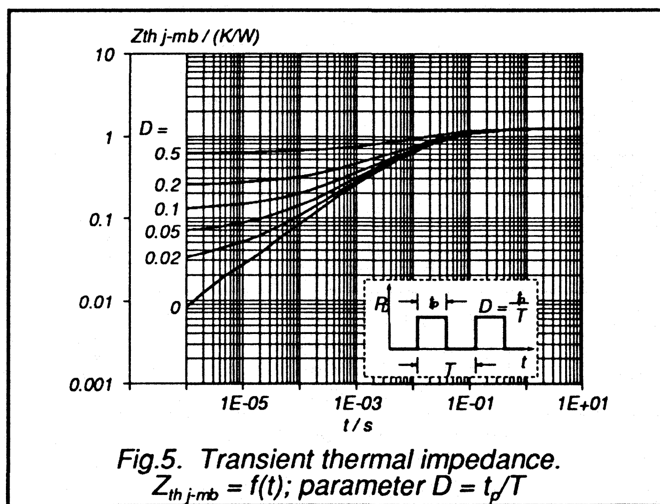


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

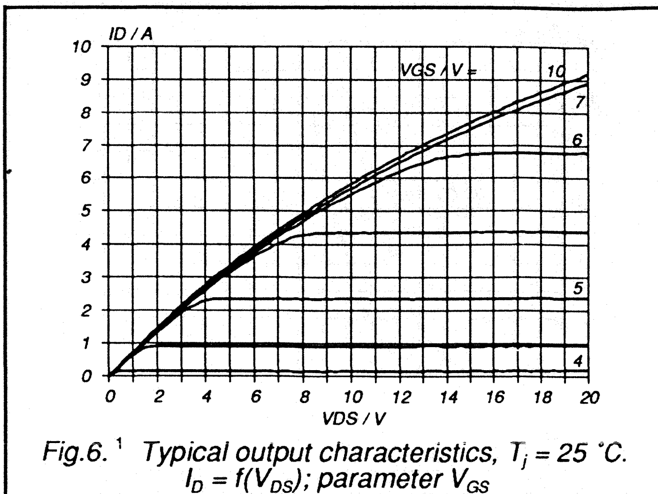


Fig.6. [1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

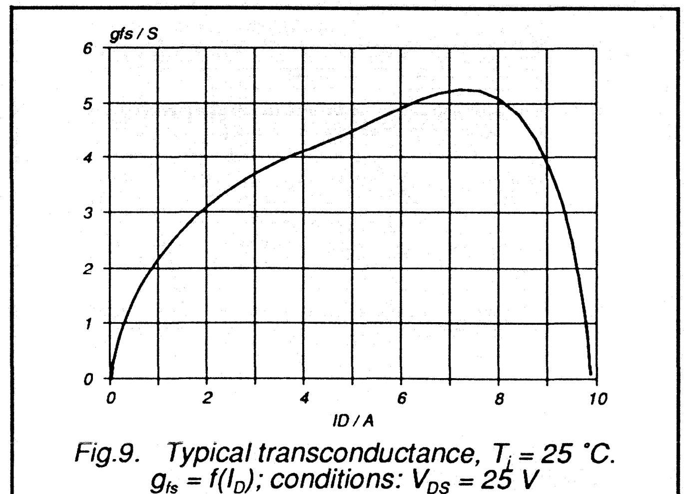


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

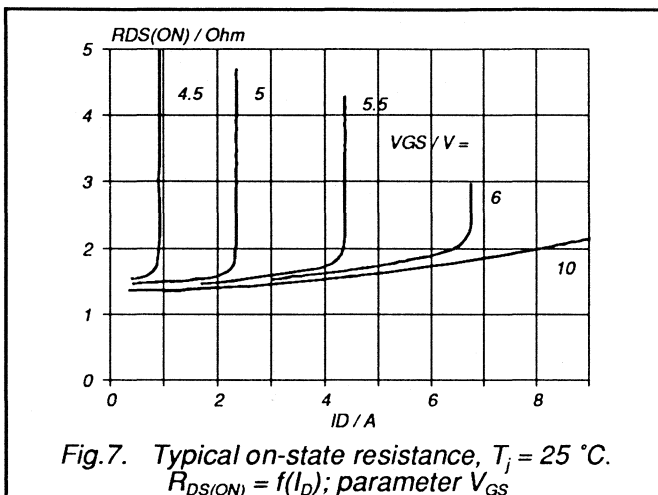


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

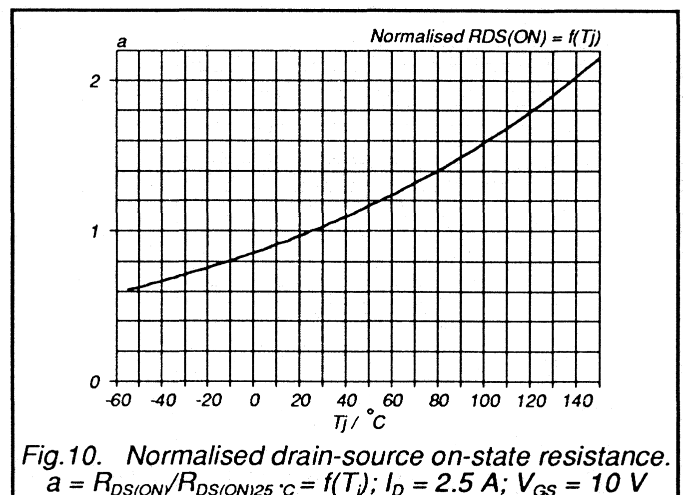


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 2.5 A; V_{GS} = 10 V

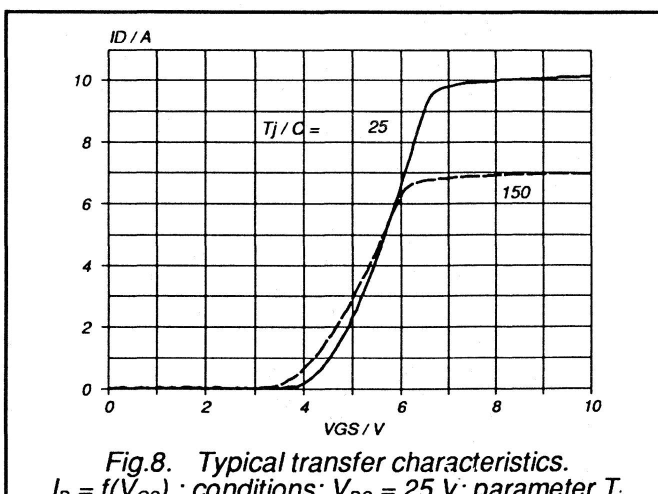


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

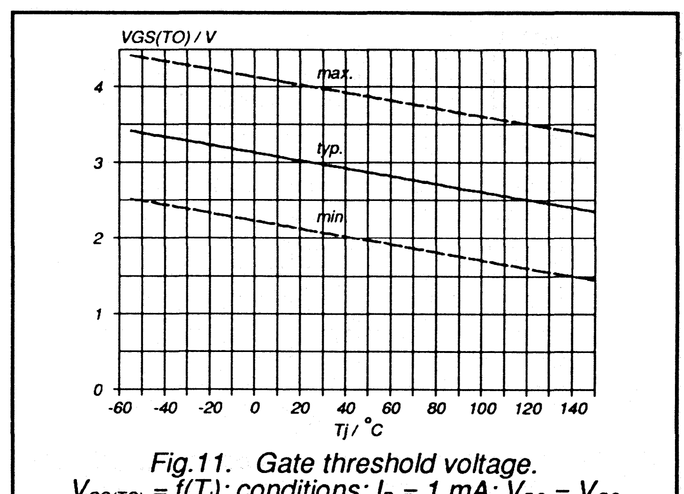


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

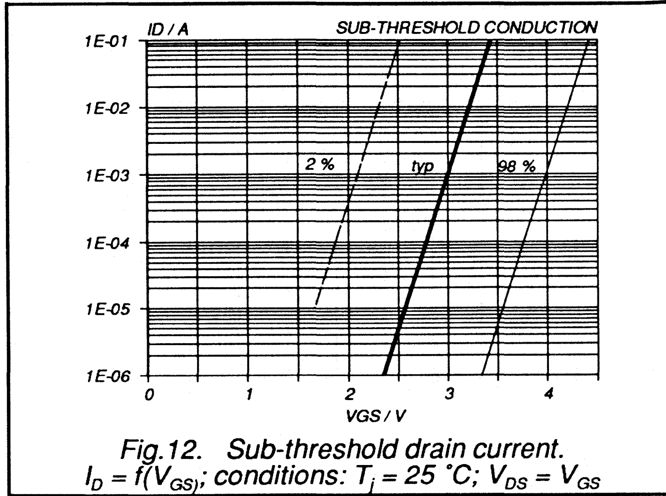


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

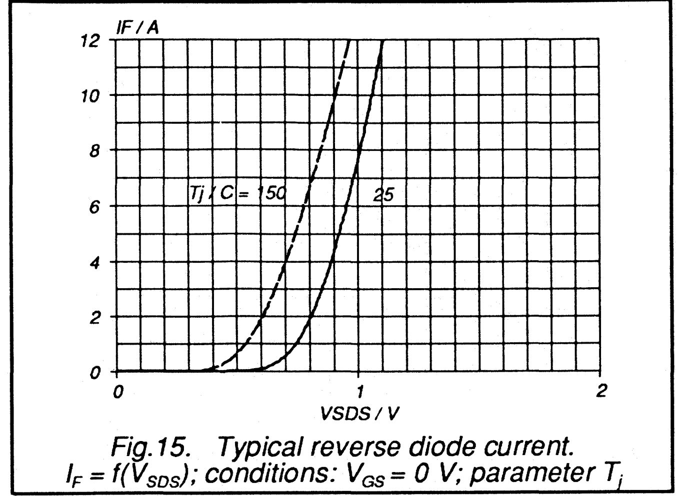


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

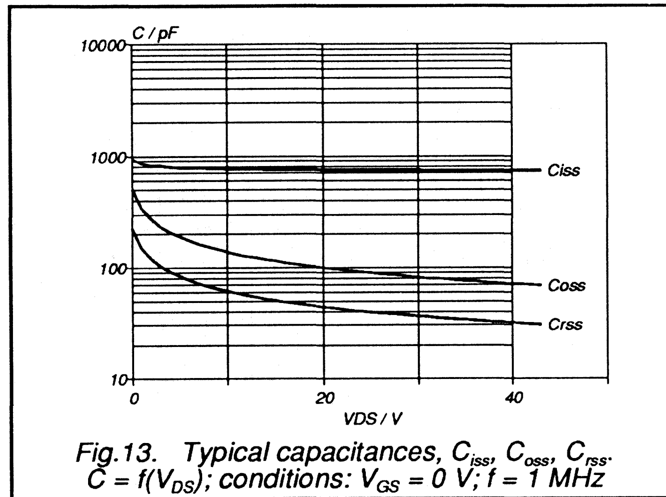


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

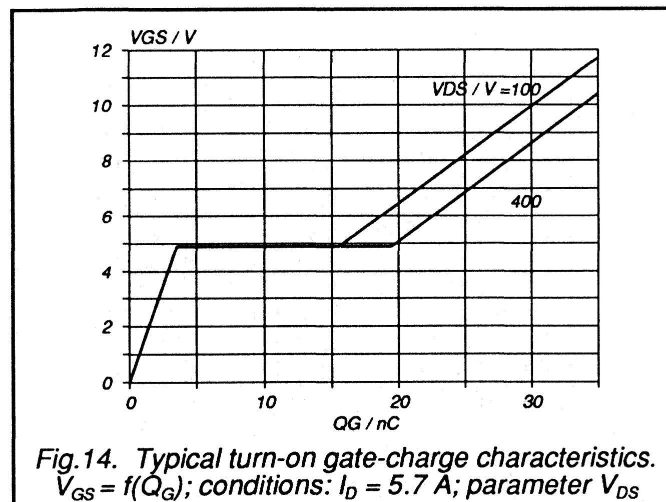


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 5.7$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	UNIT
	BUK657	-400A	-400B	
V_{DS}	Drain-source voltage	400	400	V
I_D	Drain current (DC)	13	11	A
P_{tot}	Total power dissipation	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.5	0.6	Ω
t_{rr}	Diode reverse recovery time	250	250	ns

MECHANICAL DATA

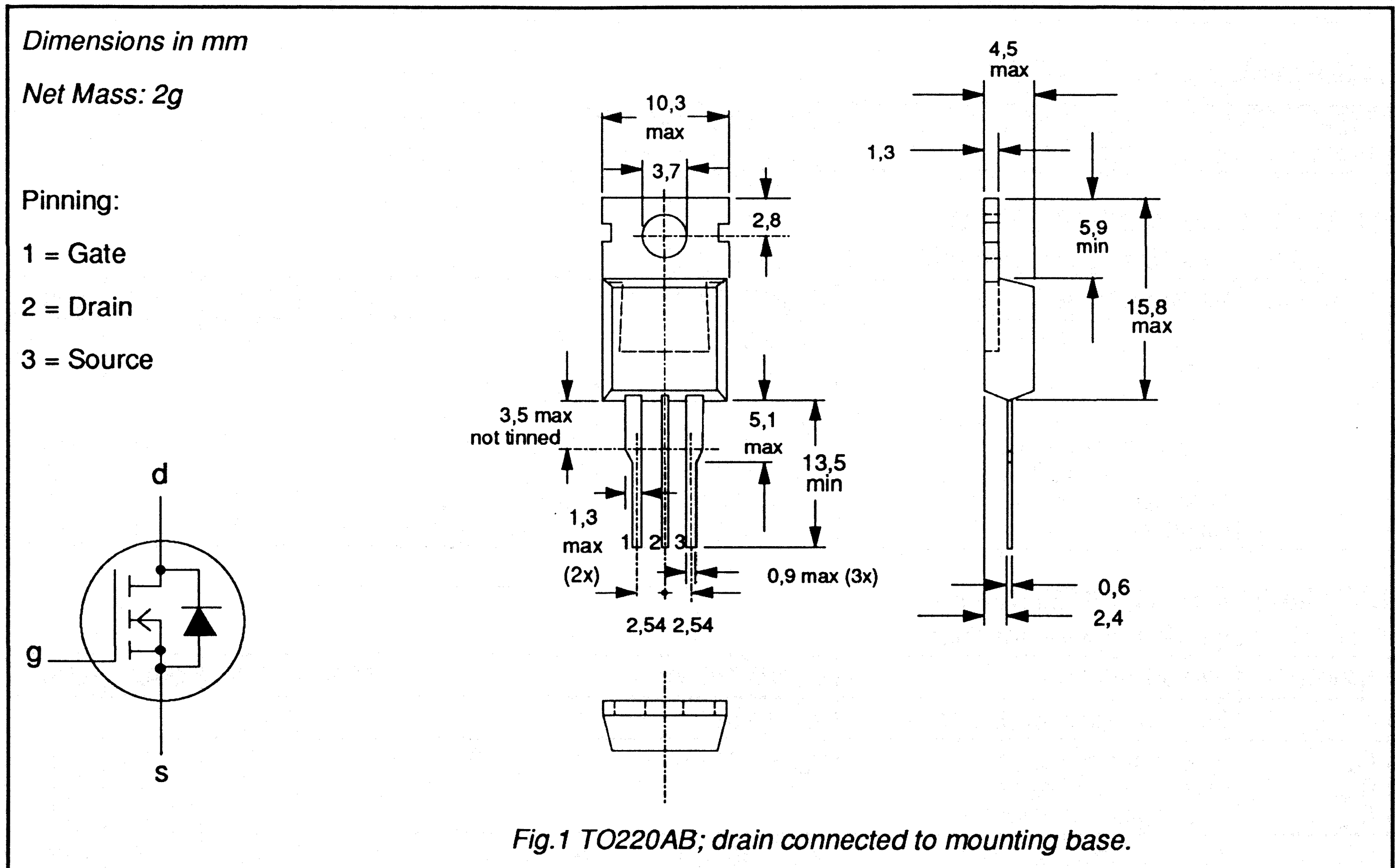


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
V_{DS}	Drain-source voltage	-	-	400		V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	400		V
$\pm V_{GS}$	Gate-source voltage	-	-	30		V
				-400A	-400B	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	13	11	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	8.2	7	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	52	44	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150		W
T_{stg}	Storage temperature	-	- 55	150		°C
T_j	Junction Temperature	-	-	150		°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	400	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 400 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A — **BUK657-400A**	-	0.4	0.5	Ω
		BUK657-400B	-	0.5	0.6	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A; V_{GS} = 10 V; R_{GS} = 50 Ω; R_{gen} = 50 Ω	-	20	40	ns
t_r	Turn-on rise time		-	60	90	ns
$t_{d\ off}$	Turn-off delay time		-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	13	A
I_{DRM}	Pulsed reverse drain current	-		-	-	52	A
V_{SD}	Diode forward voltage	I_F = 13 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 13 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

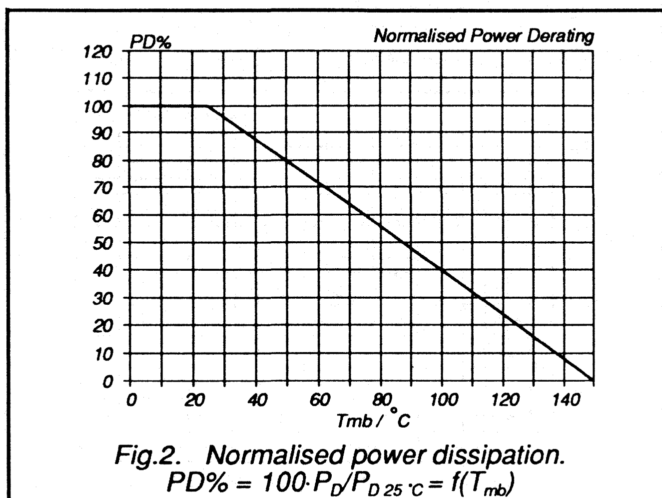


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

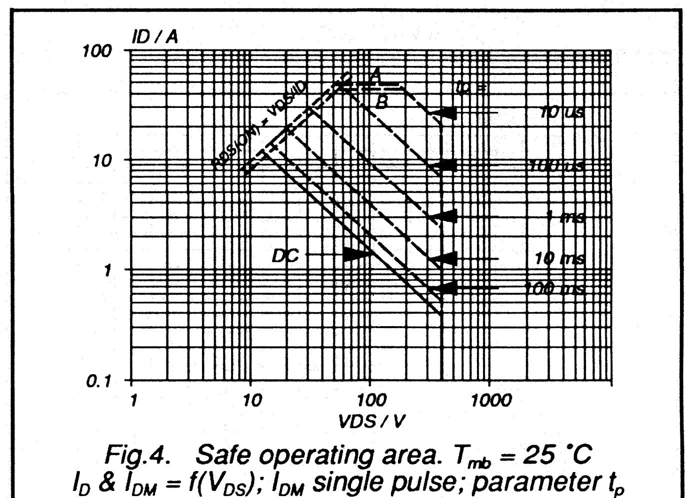


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

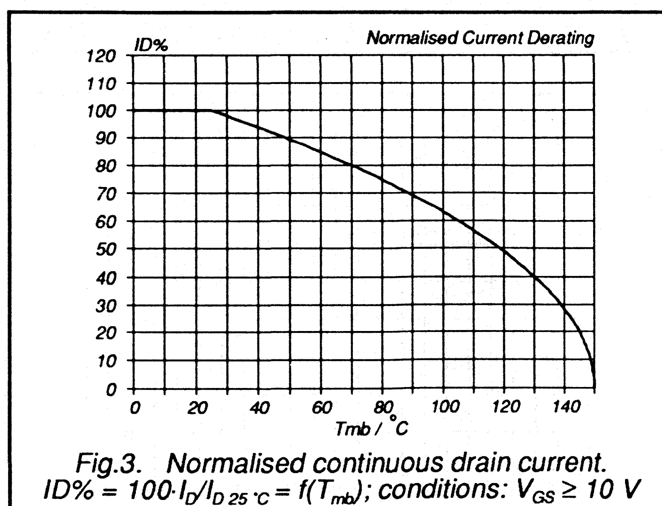


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

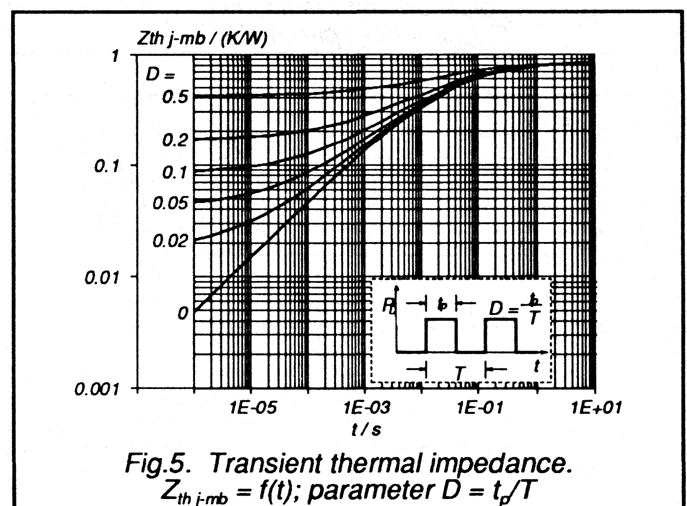


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

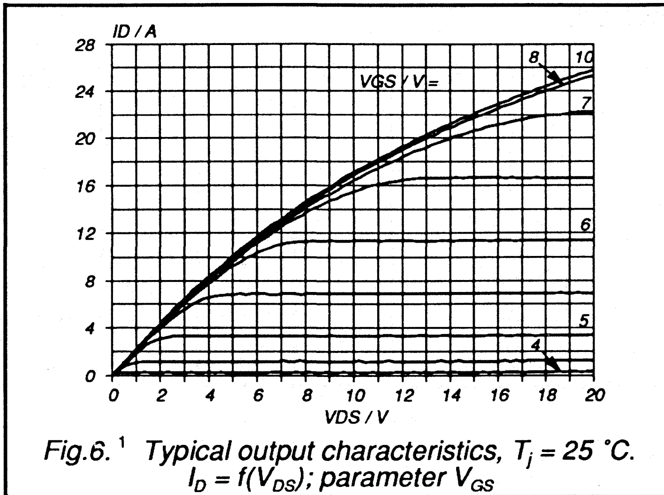


Fig.6. [1] Typical output characteristics, T_j = 25 ˚C.
$I_D = f(V_{DS})$; parameter V_{GS}

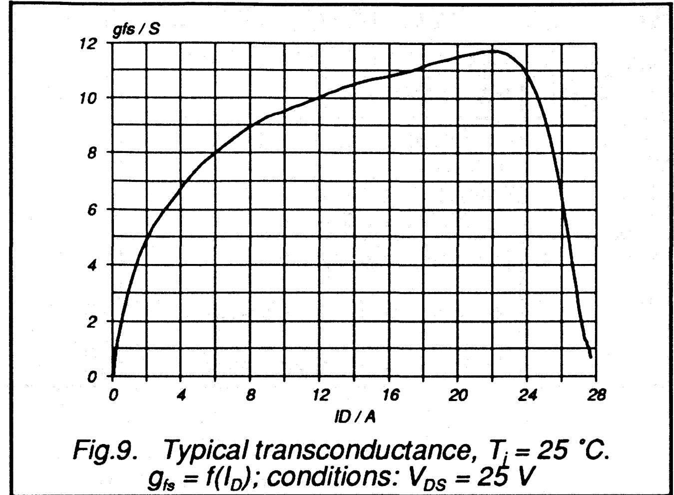


Fig.9. Typical transconductance, T_j = 25 ˚C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

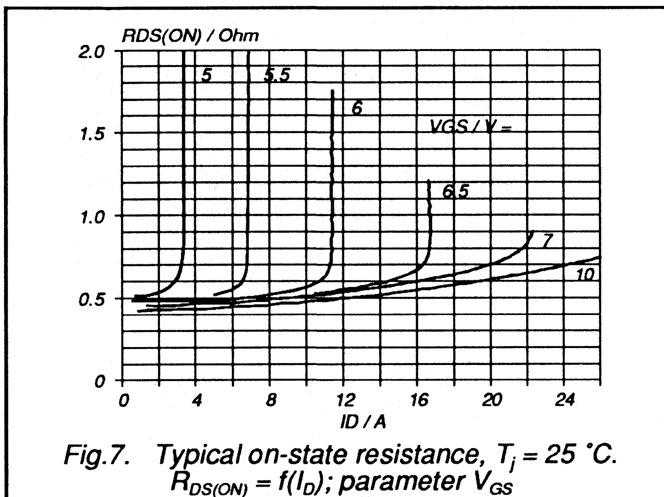


Fig.7. Typical on-state resistance, T_j = 25 ˚C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

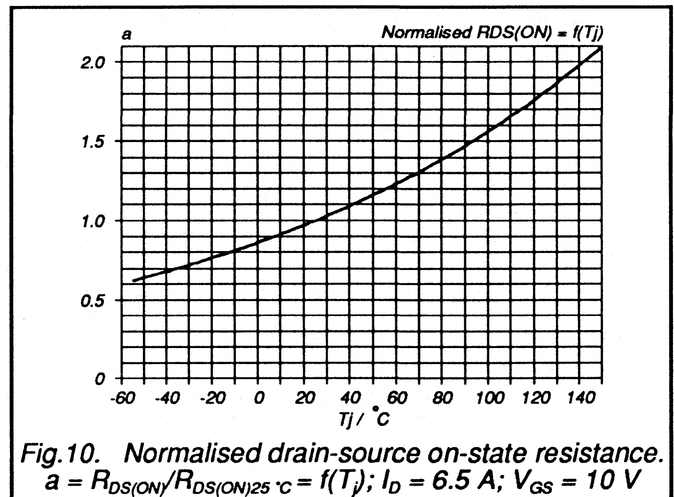


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,˚C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

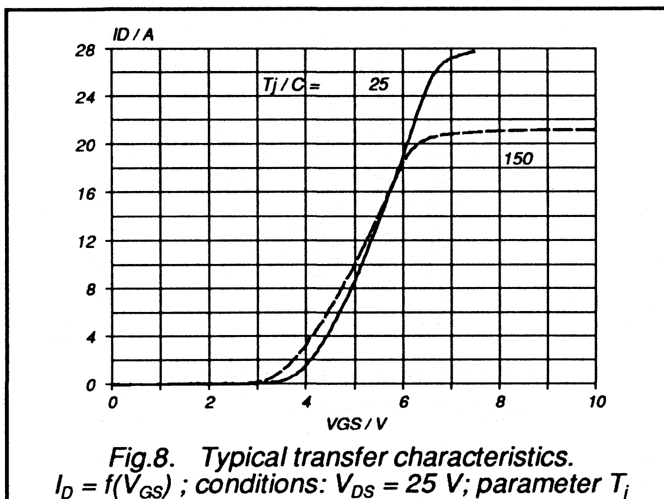


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

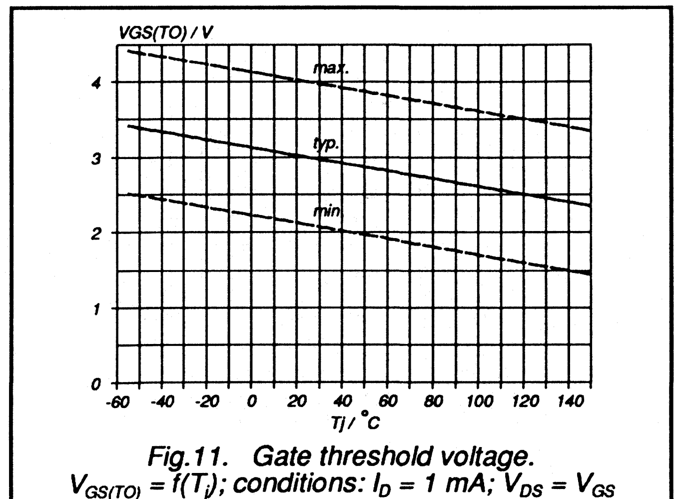


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

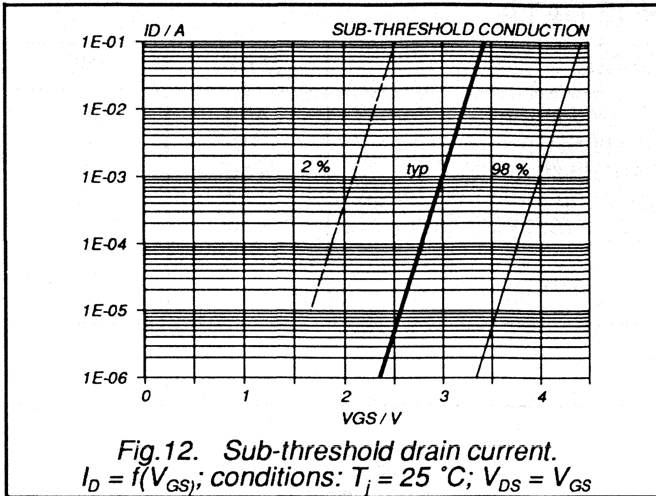


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

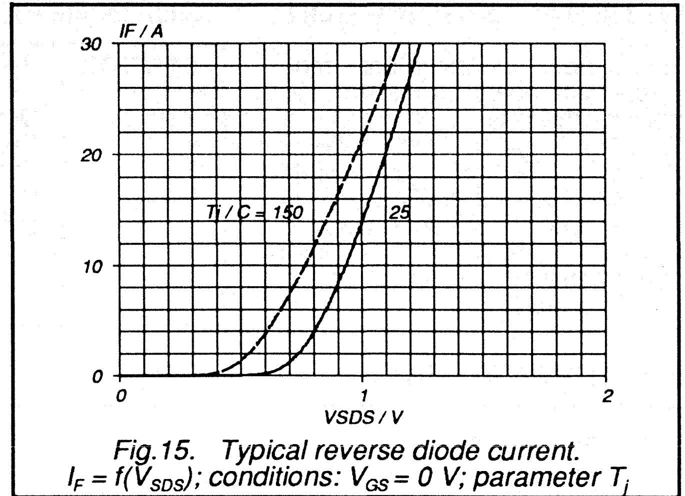


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

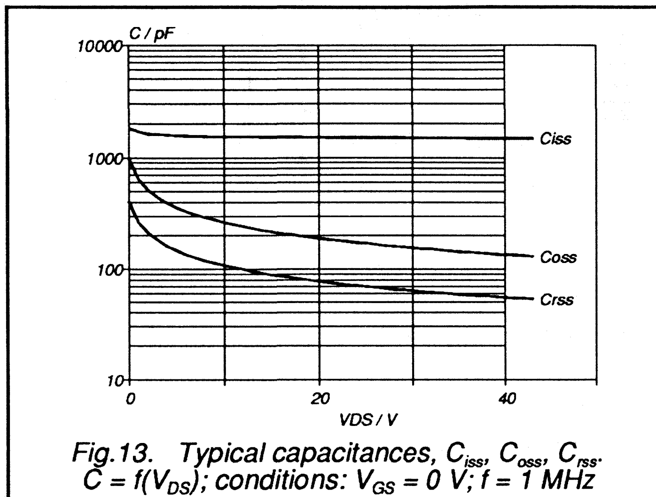


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

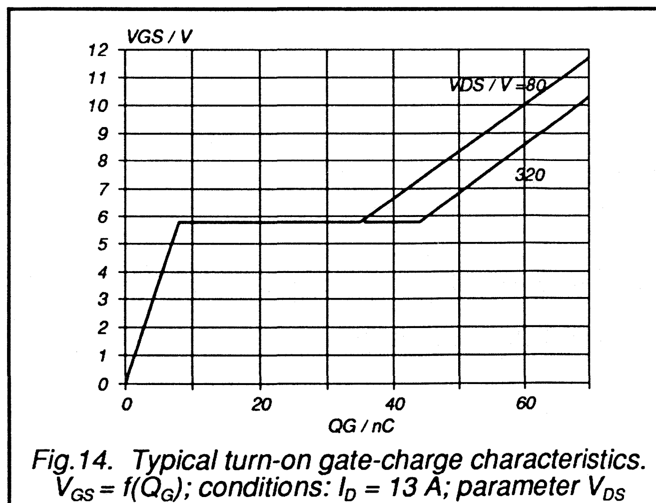


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 13$ A; parameter V_{DS}

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DS}	Drain-source voltage	450	V
I_D	Drain current (DC)	10	A
P_{tot}	Total power dissipation	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	Ω
t_{rr}	Diode reverse recovery time	250	ns

MECHANICAL DATA

Dimensions in mm

Net Mass: 2g

Pinning:

1 = Gate

2 = Drain

3 = Source

Fig.1 TO220AB; drain connected to mounting base.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	Drain-source voltage	-	-	450	V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	450	V
$\pm V_{GS}$	Gate-source voltage	-	-	30	V
I_D	Drain current (DC)	T_{mb} = 25 ˚C	-	10	A
I_D	Drain current (DC)	T_{mb} = 100 ˚C	-	6.3	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 ˚C	-	40	A
P_{tot}	Total power dissipation	T_{mb} = 25 ˚C	-	150	W
T_{stg}	Storage temperature	-	- 55	150	˚C
T_j	Junction Temperature	-	-	150	˚C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\ j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\ j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	450	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j = 25 ˚C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 450 V; V_{GS} = 0 V; T_j =125 ˚C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A	-	0.6	0.65	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\ on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\ off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	10	A
I_{DRM}	Pulsed reverse drain current	-		-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 10 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

AVALANCHE RATING

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; V_{DD} ≤ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

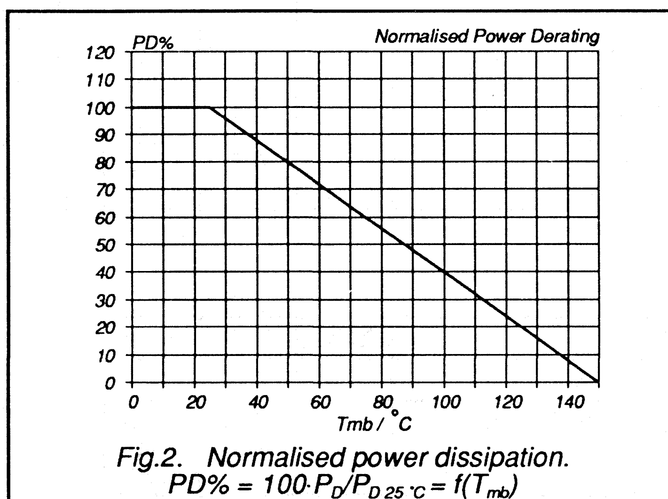


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

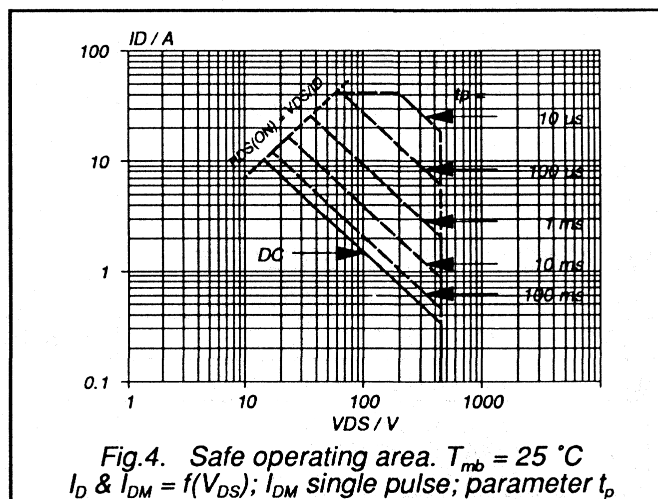


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

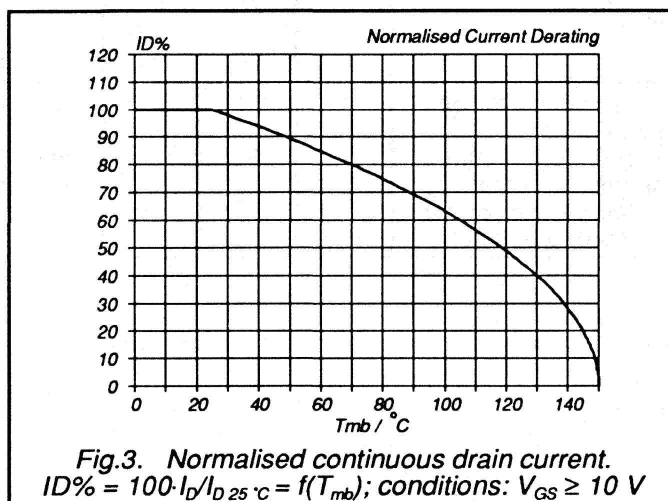


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

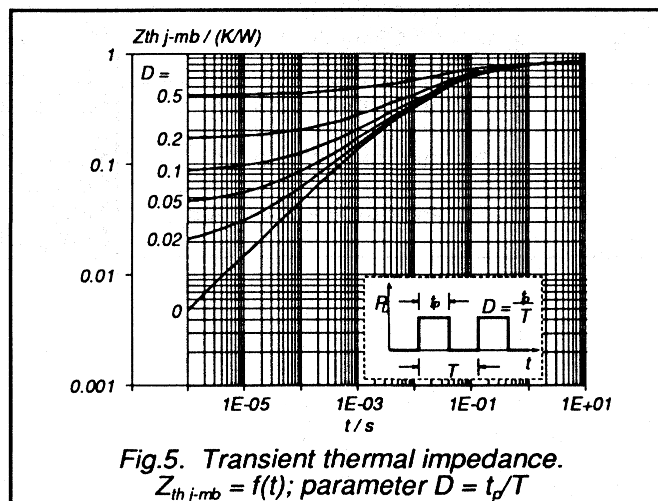


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

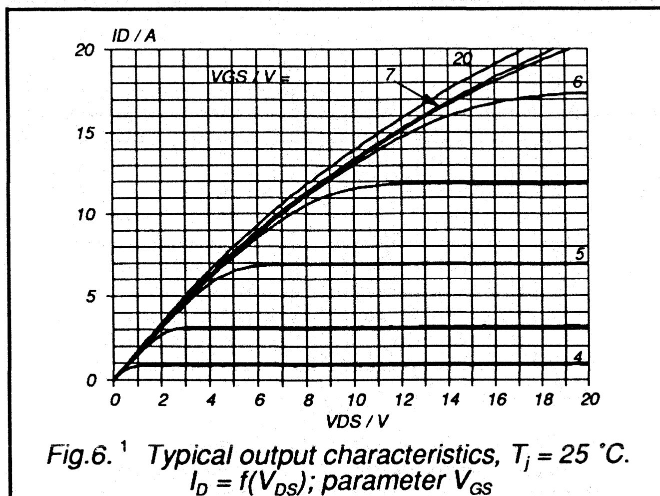


Fig.6.[1] *Typical output characteristics, T_j = 25 °C.*
$I_D = f(V_{DS})$; parameter V_{GS}

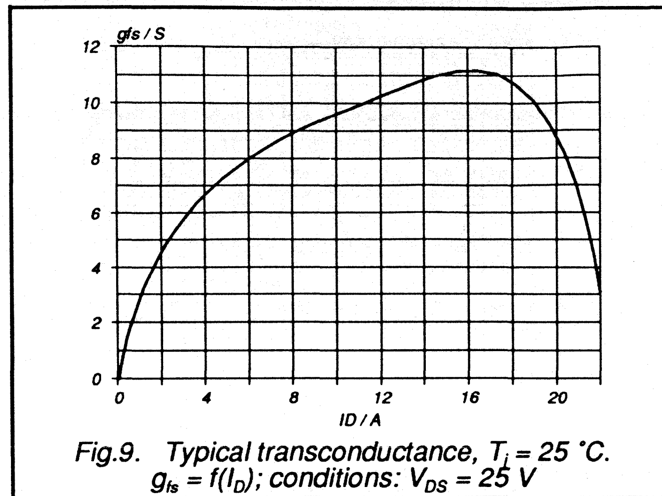


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

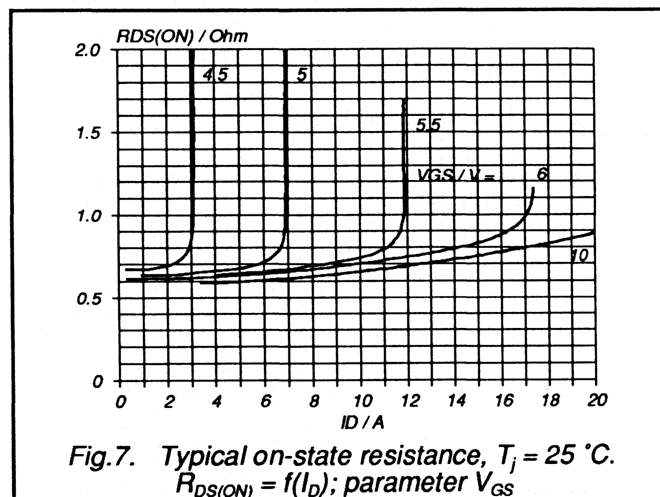


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

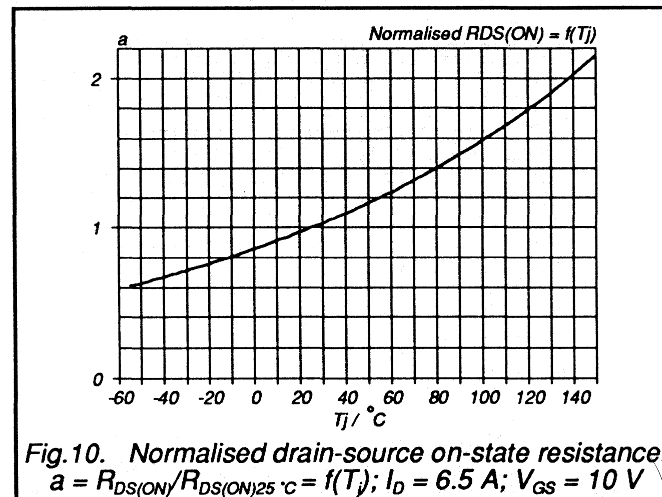


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

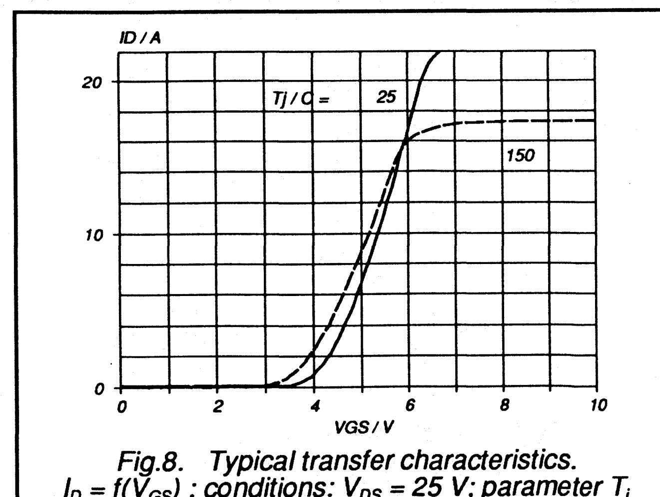


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

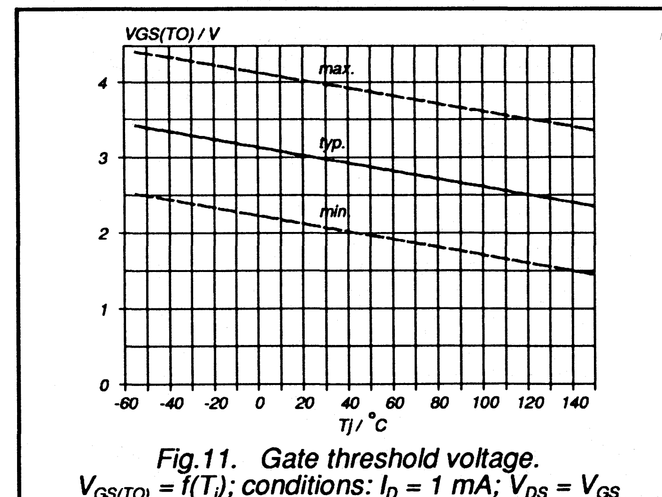


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

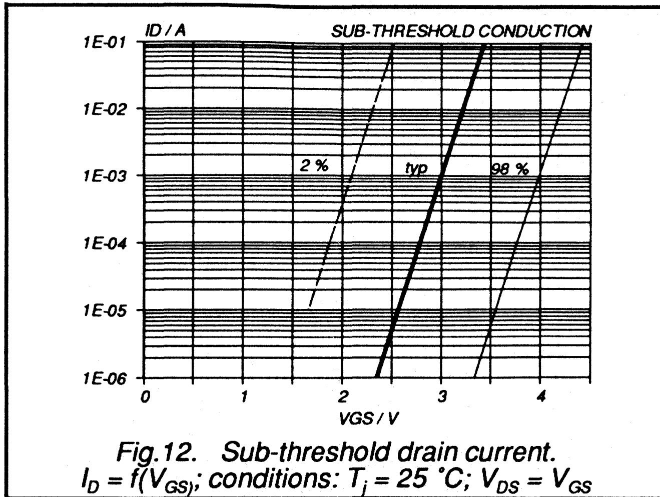


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

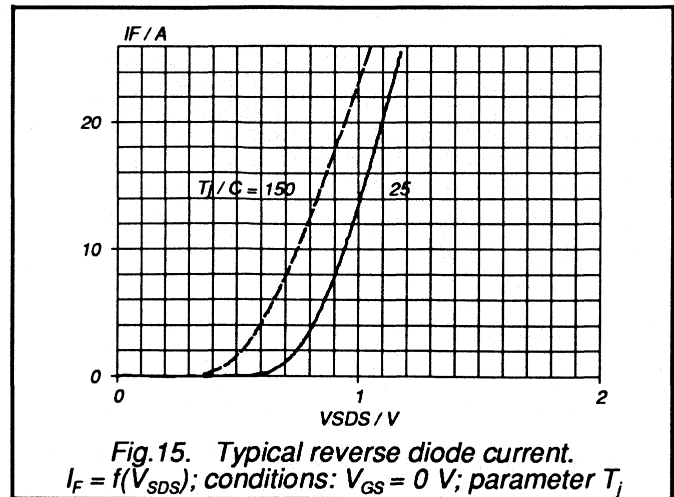


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

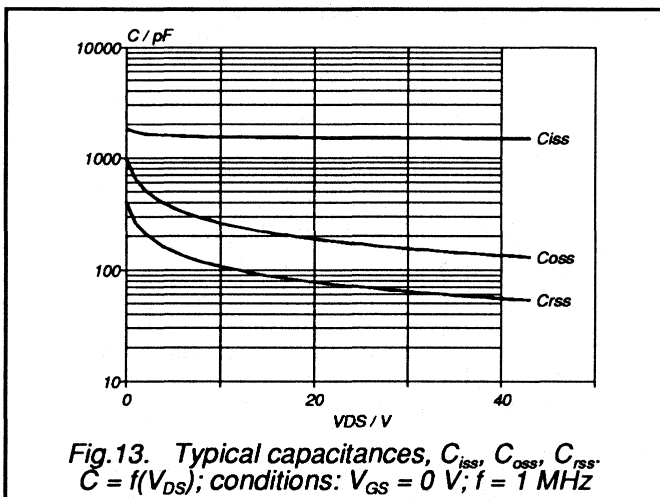


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; f = 1 MHz

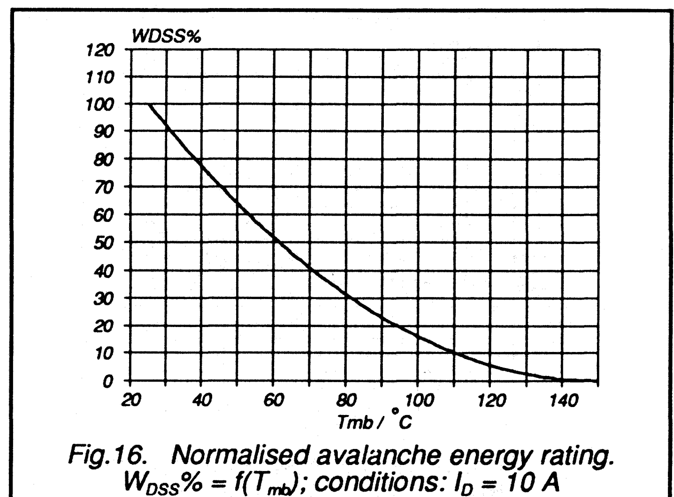


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 10$ A

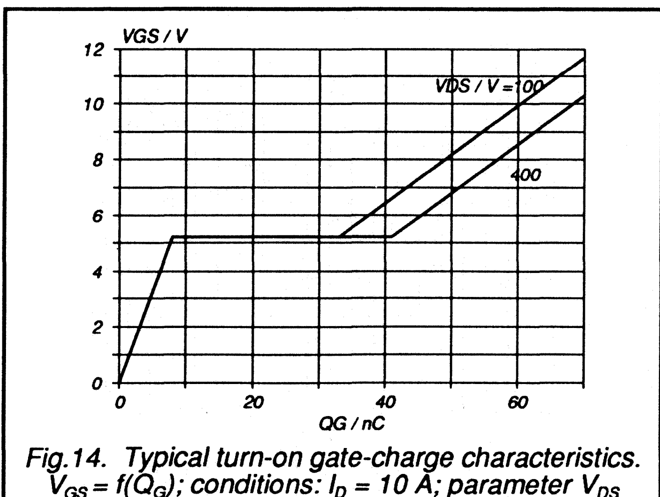


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

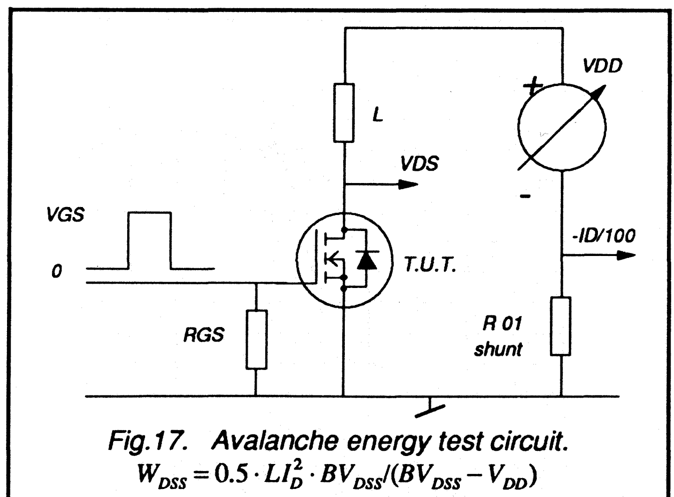


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK657	-500A	-500B	-500C	
V_{DS}	Drain-source voltage	500	500	500	V
I_D	Drain current (DC)	10	9	8.5	A
P_{tot}	Total power dissipation	150	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	0.65	0.8	0.9	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

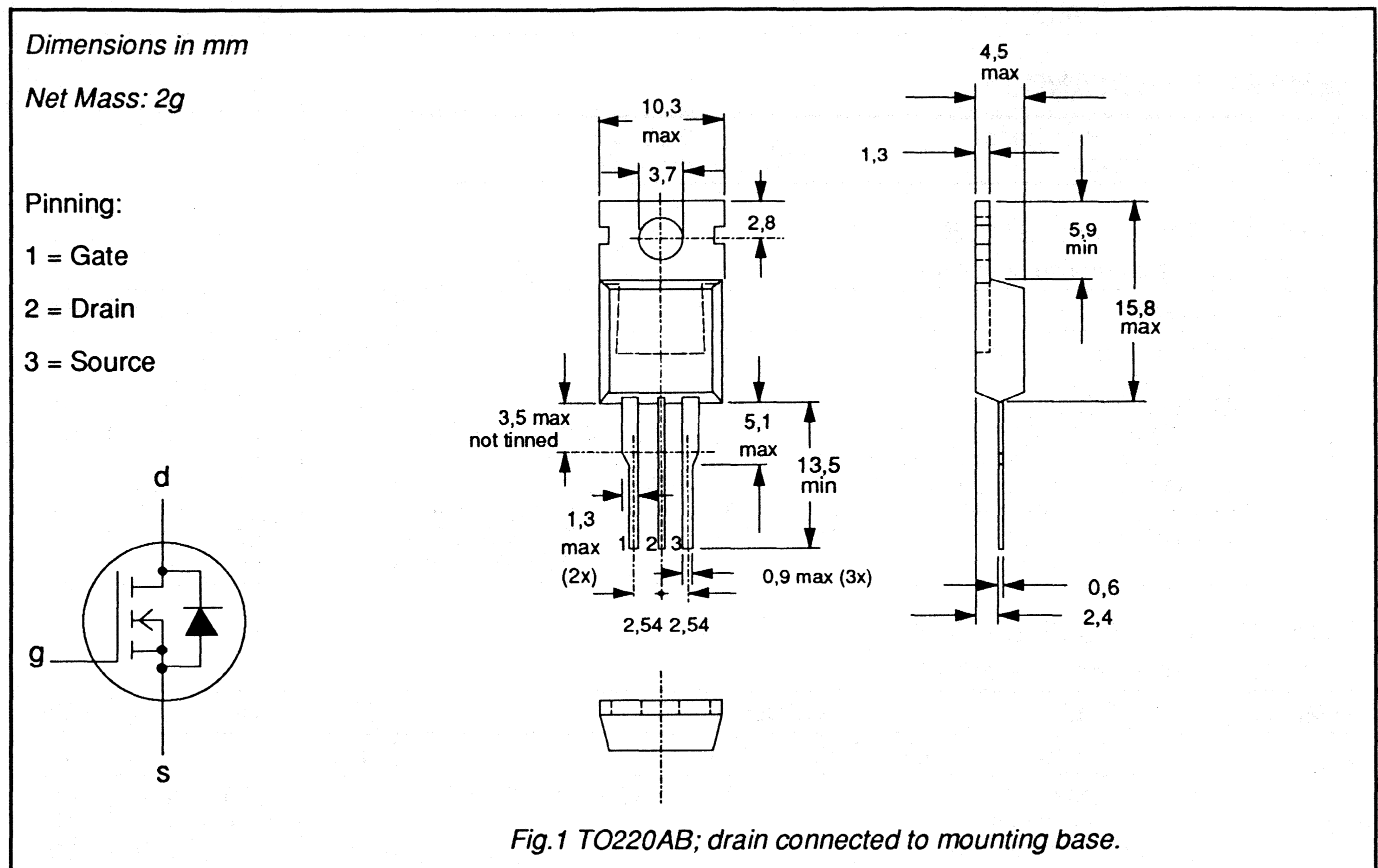


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

PowerMOS transistor
Fast Recovery Diode FET

BUK657-500A
BUK657-500B
BUK657-500C

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	500			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	500			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-500A	-500B	-500C	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	10	9	8.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	6.3	5.7	5.4	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	40	36	34	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	500	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	V_{DS} = V_{GS}; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 500 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK657-500A**	-	0.6	0.65	Ω
		BUK657-500B	-	0.7	0.8	Ω
		BUK657-500C	-	0.8	0.9	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	10	A
I_{DRM}	Pulsed reverse drain current	-		-	-	40	A
V_{SD}	Diode forward voltage	I_F = 10 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 10 A;	T_j = 25 ˚C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 ˚C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 ˚C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 ˚C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 ˚C	-	15	-	A

AVALANCHE RATING

T_{mb} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
W_{DSS}	Drain-source non-repetitive unclamped inductive turn-off energy	I_D = 10 A ; $V_{DD} \leq$ 250 V ; V_{GS} = 10 V ; R_{GS} = 50 Ω	-	-	500	mJ

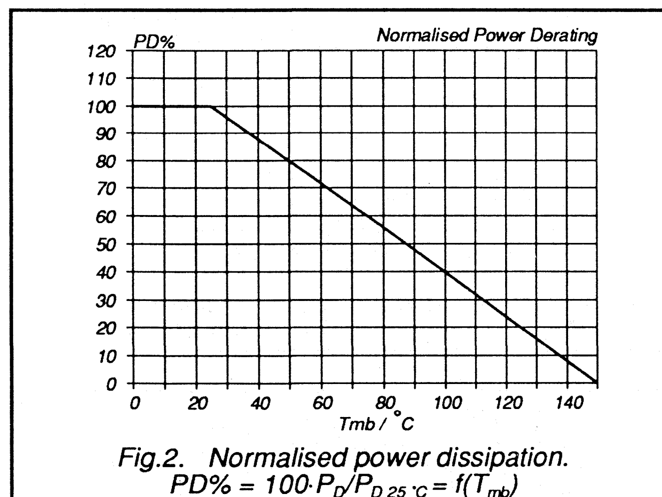


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,˚C} = f(T_{mb})$

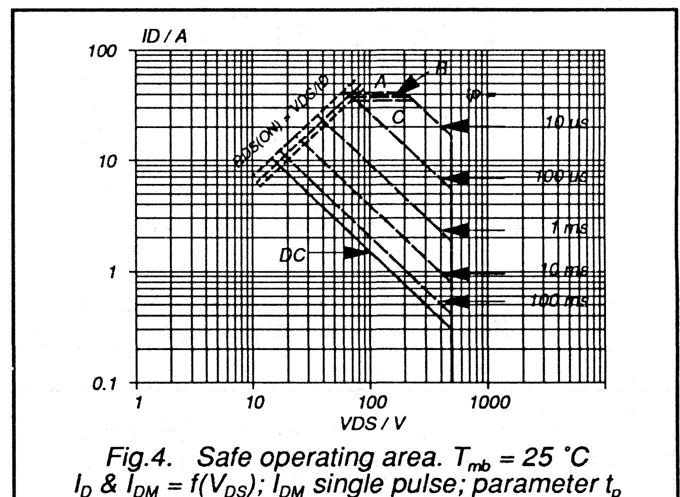


Fig.4. Safe operating area. T_{mb} = 25 ˚C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

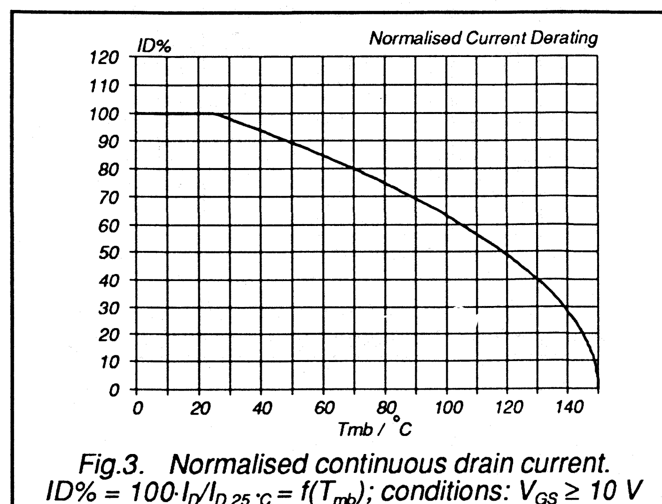


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,˚C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

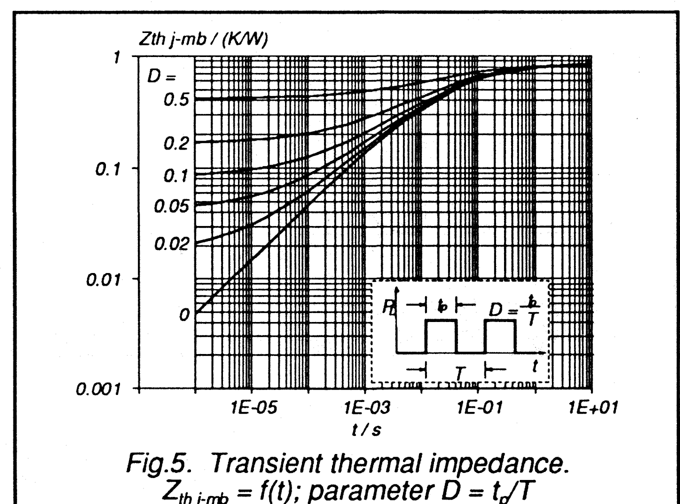


Fig.5. Transient thermal impedance.
$Z_{th\,j\text{-}mb} = f(t)$; parameter $D = t_p/T$

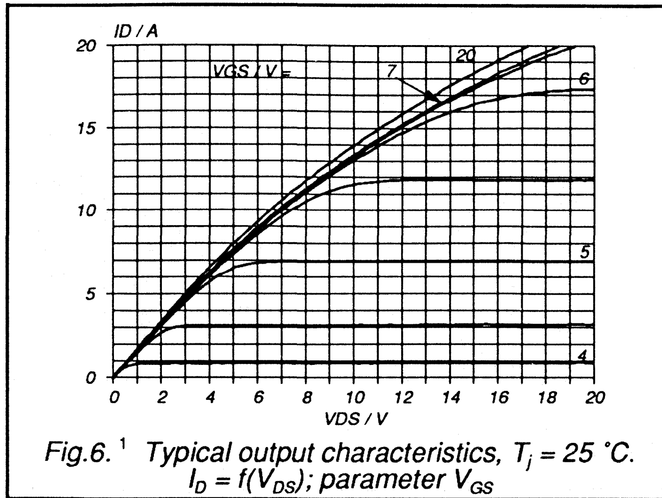


Fig.6.[1] Typical output characteristics, $T_j = 25$ °C.
$I_D = f(V_{DS})$; parameter V_{GS}

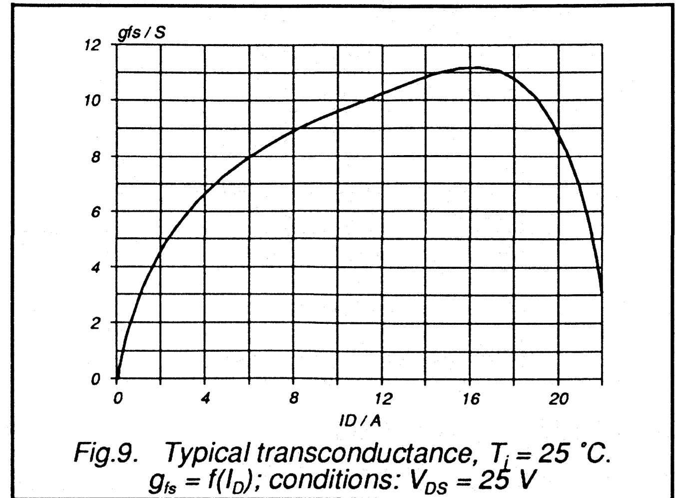


Fig.9. Typical transconductance, $T_j = 25$ °C.
$g_{fs} = f(I_D)$; conditions: $V_{DS} = 25$ V

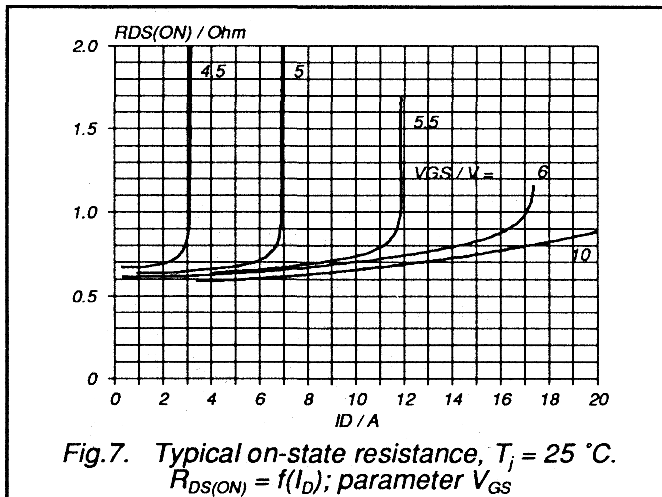


Fig.7. Typical on-state resistance, $T_j = 25$ °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

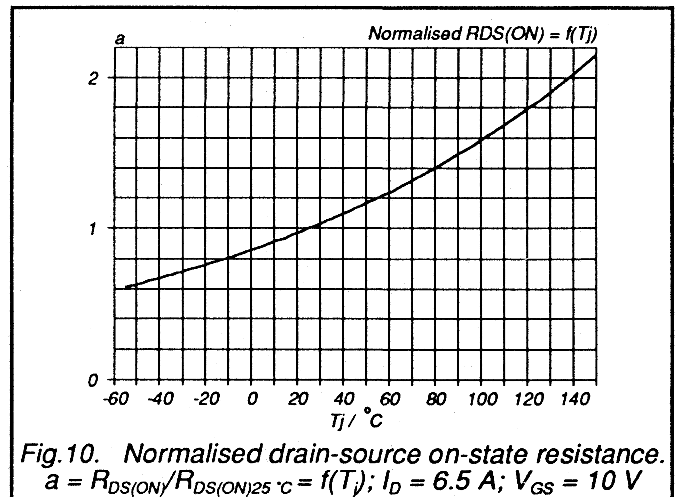


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; $I_D = 6.5$ A; $V_{GS} = 10$ V

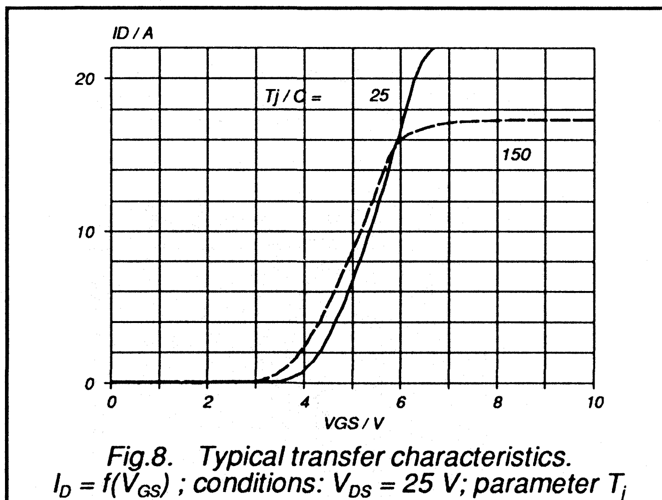


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: $V_{DS} = 25$ V; parameter T_j

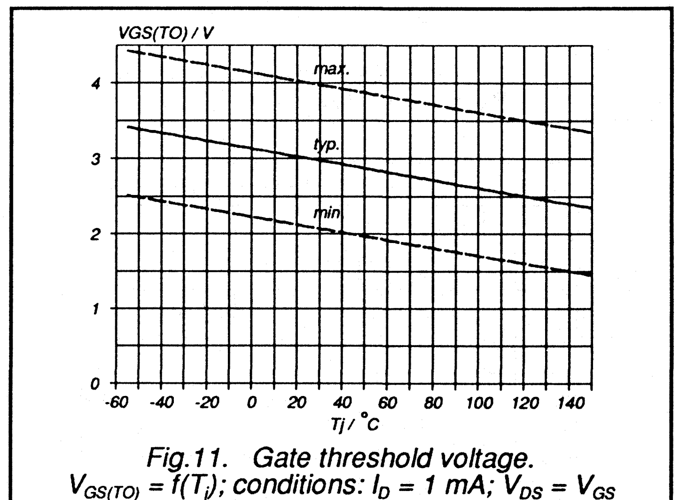


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: $I_D = 1$ mA; $V_{DS} = V_{GS}$

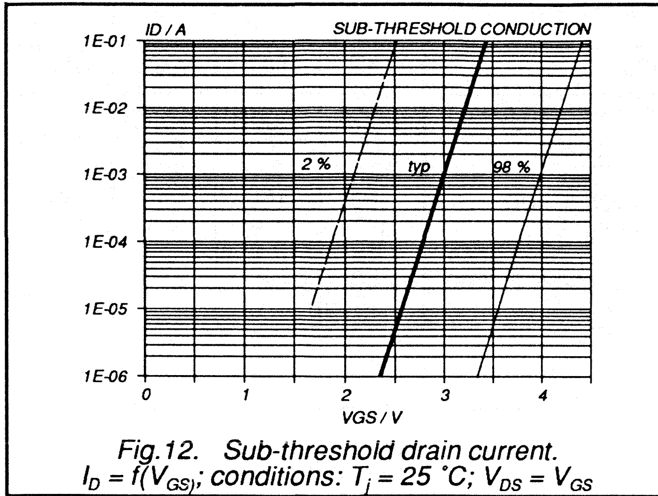


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: $T_j = 25$ °C; $V_{DS} = V_{GS}$

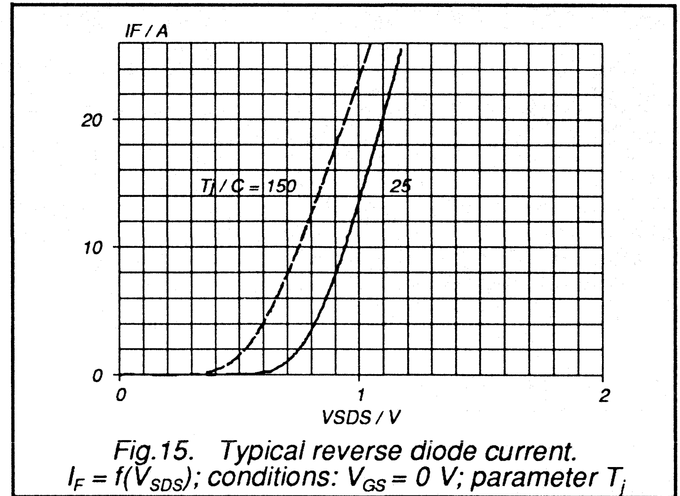


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: $V_{GS} = 0$ V; parameter T_j

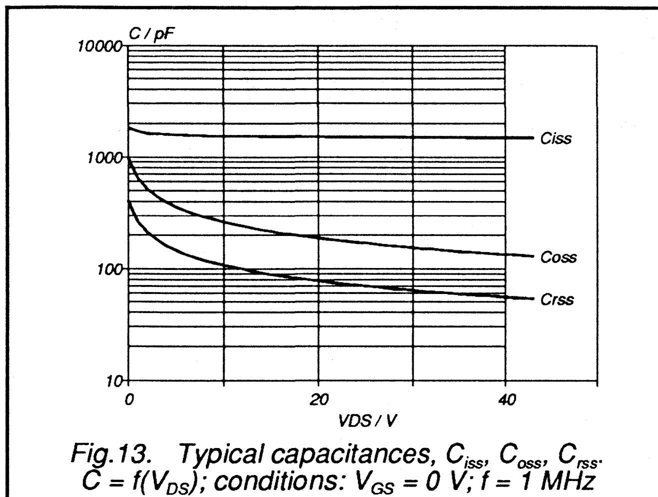


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: $V_{GS} = 0$ V; $f = 1$ MHz

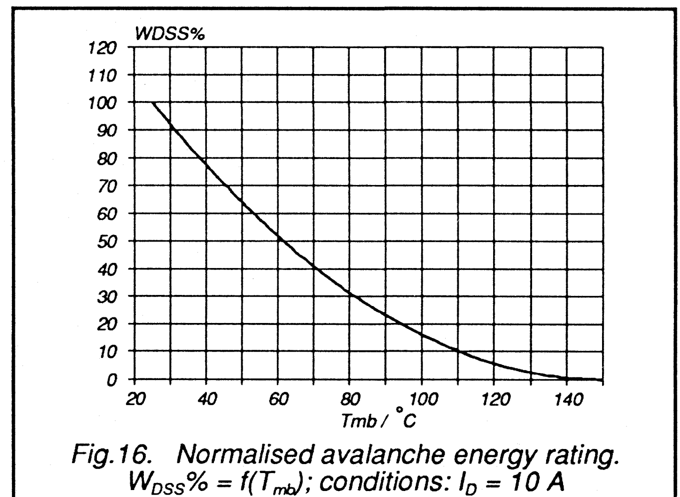


Fig.16. Normalised avalanche energy rating.
$W_{DSS}\% = f(T_{mb})$; conditions: $I_D = 10$ A

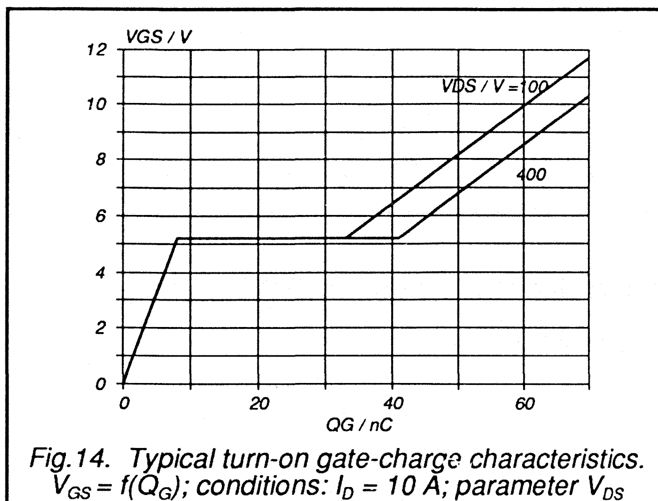


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: $I_D = 10$ A; parameter V_{DS}

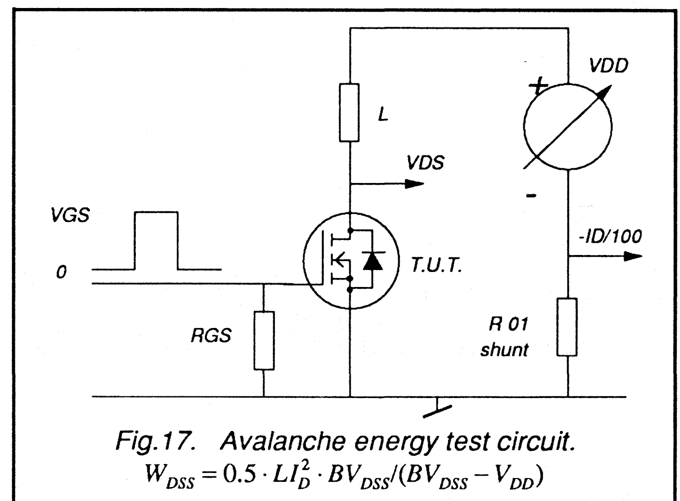


Fig.17. Avalanche energy test circuit.
$W_{DSS} = 0.5 \cdot LI_D^2 \cdot BV_{DSS}/(BV_{DSS} - V_{DD})$

GENERAL DESCRIPTION

N-channel enhancement mode field-effect power transistor in a plastic envelope.
FREDFET with fast recovery reverse diode, particularly suitable for motor control applications, eg. in full bridge configurations for which faster recovery characteristics simplify design for inductive loads.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
	BUK657	-600A	-600B	-600C	
V_{DS}	Drain-source voltage	600	600	600	V
I_D	Drain current (DC)	8	7.1	6.5	A
P_{tot}	Total power dissipation	150	150	150	W
$R_{DS(ON)}$	Drain-source on-state resistance	1.0	1.2	1.4	Ω
t_{rr}	Diode reverse recovery time	250	250	250	ns

MECHANICAL DATA

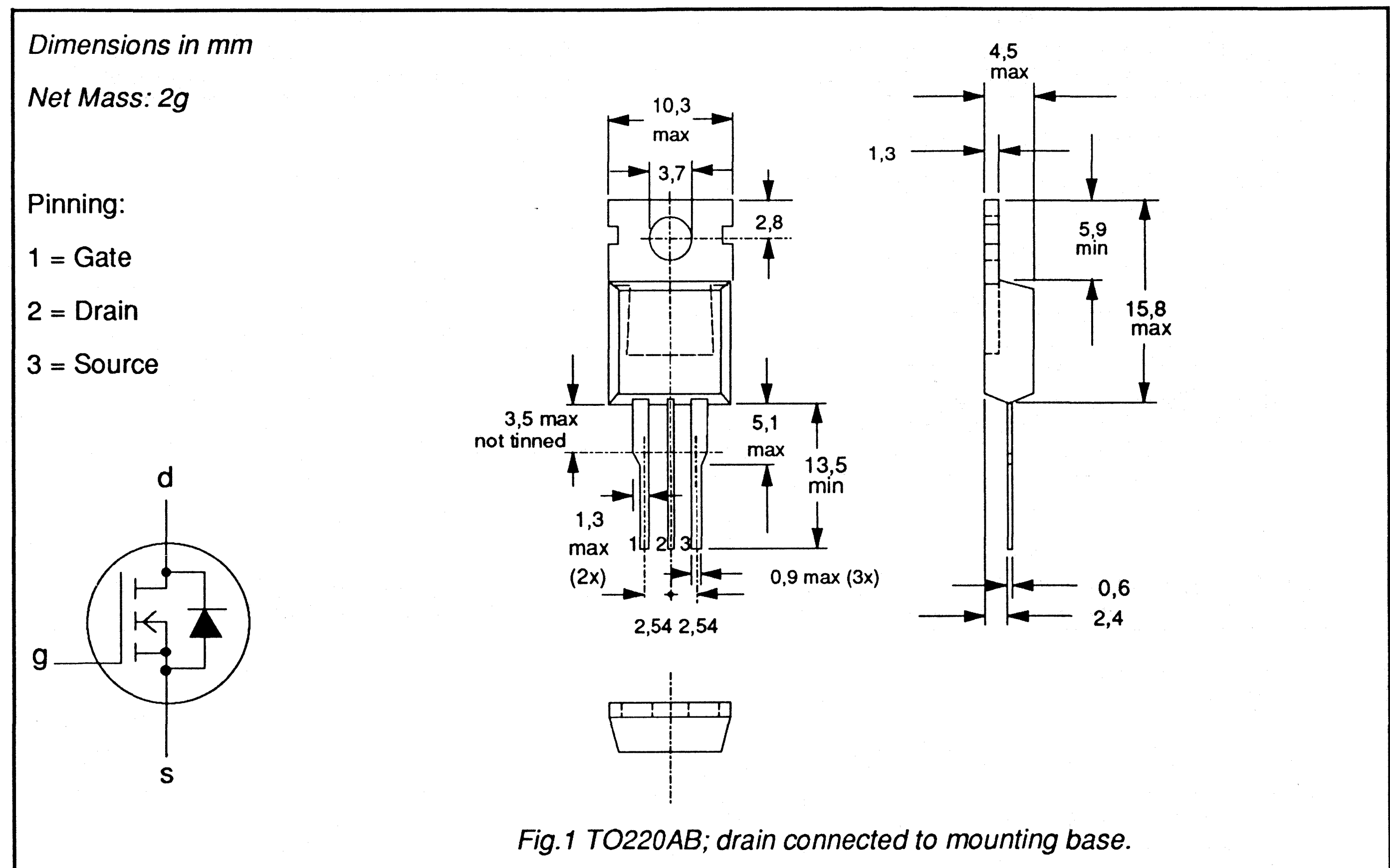


Fig.1 TO220AB; drain connected to mounting base.

Notes
1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Accessories supplied on request: refer to Mounting instructions for TO220 envelopes.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
V_{DS}	Drain-source voltage	-	-	600			V
V_{DGR}	Drain-gate voltage	R_{GS} = 20 kΩ	-	600			V
$\pm V_{GS}$	Gate-source voltage	-	-	30			V
				-600A	-600B	-600C	
I_D	Drain current (DC)	T_{mb} = 25 °C	-	8	7.1	6.5	A
I_D	Drain current (DC)	T_{mb} = 100 °C	-	5	4.5	4.1	A
I_{DM}	Drain current (pulse peak value)	T_{mb} = 25 °C	-	32	28	26	A
P_{tot}	Total power dissipation	T_{mb} = 25 °C	-	150			W
T_{stg}	Storage temperature	-	- 55	150			°C
T_j	Junction Temperature	-	-	150			°C

THERMAL RESISTANCES

From junction to mounting base	$R_{th\,j\text{-}mb}$ = 0.83 K/W
From junction to ambient	$R_{th\,j\text{-}a}$ = 60 K/W

STATIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.25 mA	600	-	-	V
$V_{GS(TO)}$	Gate threshold voltage	$V_{DS} = V_{GS}$; I_D = 1 mA	2.1	3.0	4.0	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j = 25 °C	-	2	20	µA
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V; V_{GS} = 0 V; T_j =125 °C	-	0.1	1.0	mA
I_{GSS}	Gate source leakage current	V_{GS} = ±30 V; V_{DS} = 0 V	-	10	100	nA
$R_{DS(ON)}$	Drain-source on-state resistance	V_{GS} = 10 V; I_D = 6.5 A **BUK657-600A**	-	0.85	1.0	Ω
		BUK657-600B	-	1.0	1.2	Ω
		BUK657-600C	-	1.2	1.4	Ω

DYNAMIC CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
g_{fs}	Forward transconductance	V_{DS} = 25 V; I_D = 6.5 A	5.0	8.0	-	S
C_{iss}	Input capacitance	V_{GS} = 0 V; V_{DS} = 25 V; f = 1 MHz	-	1500	1800	pF
C_{oss}	Output capacitance		-	170	270	pF
C_{rss}	Feedback capacitance		-	70	120	pF
$t_{d\,on}$	Turn-on delay time	V_{DD} = 30 V; I_D = 2.8 A;	-	20	40	ns
t_r	Turn-on rise time	V_{GS} = 10 V; R_{GS} = 50 Ω;	-	60	90	ns
$t_{d\,off}$	Turn-off delay time	R_{gen} = 50 Ω	-	200	250	ns
t_f	Turn-off fall time		-	75	90	ns
L_d	Internal drain inductance	Measured from contact screw on tab to centre of die	-	3.5	-	nH
L_d	Internal drain inductance	Measured from drain lead 6 mm from package to centre of die	-	4.5	-	nH
L_s	Internal source inductance	Measured from source lead 6 mm from package to source bond pad	-	7.5	-	nH

REVERSE DIODE RATINGS AND CHARACTERISTICS

T_{mb} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
I_{DR}	Continuous reverse drain current	-		-	-	8	A
I_{DRM}	Pulsed reverse drain current	-		-	-	32	A
V_{SD}	Diode forward voltage	I_F = 8 A ;	V_{GS} = 0 V	-	1.1	1.5	V
t_{rr}	Reverse recovery time	I_F = 8 A;	T_j = 25 °C	-	180	250	ns
		$-dI_F/dt$ =	T_j = 125 °C	-	220	300	ns
Q_{rr}	Reverse recovery charge	100 A/µs;	T_j = 25 °C	-	0.65	1.2	µC
		V_{GS} = 0 V;	T_j = 125 °C	-	2.6	5.0	µC
I_{rrm}	Reverse recovery current	V_R = 100 V	T_j = 125 °C	-	15	-	A

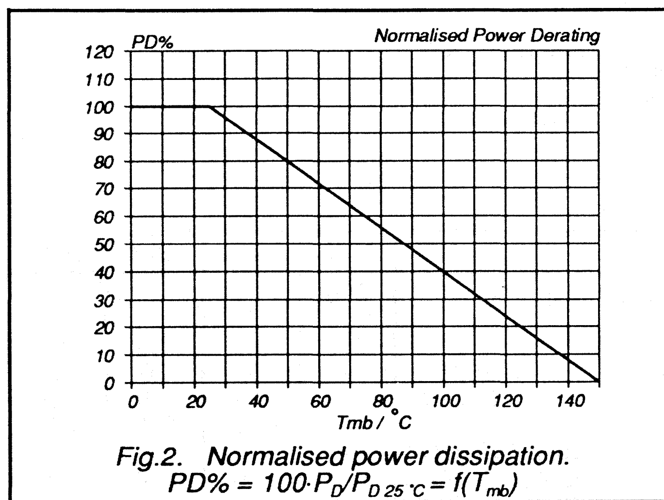


Fig.2. Normalised power dissipation.
$PD\% = 100 \cdot P_D/P_{D\,25\,°C} = f(T_{mb})$

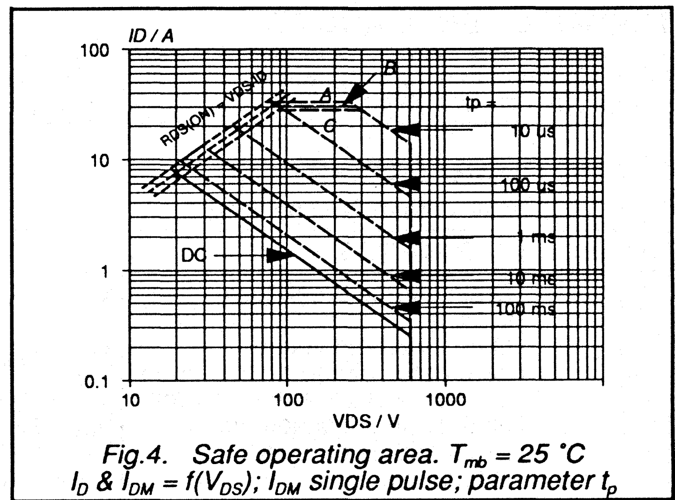


Fig.4. Safe operating area. T_{mb} = 25 °C
I_D & $I_{DM} = f(V_{DS})$; I_{DM} single pulse; parameter t_p

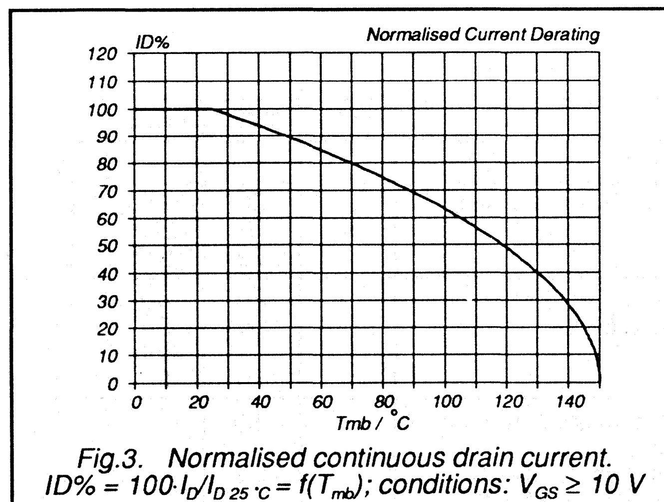


Fig.3. Normalised continuous drain current.
$ID\% = 100 \cdot I_D/I_{D\,25\,°C} = f(T_{mb})$; conditions: $V_{GS} \geq 10$ V

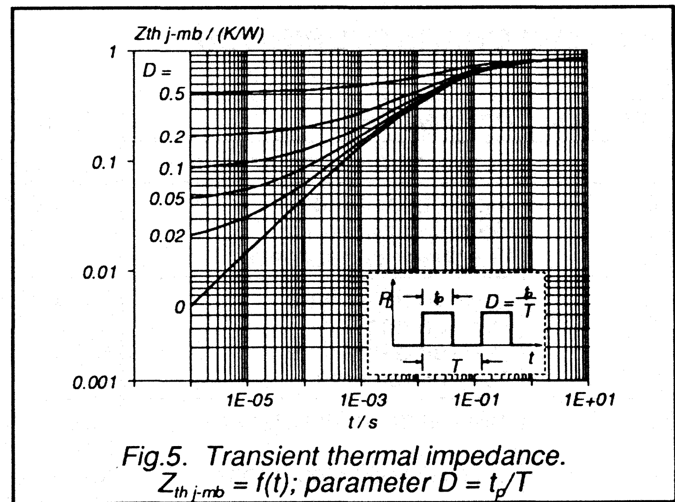


Fig.5. Transient thermal impedance.
$Z_{th\,j-mb} = f(t)$; parameter $D = t_p/T$

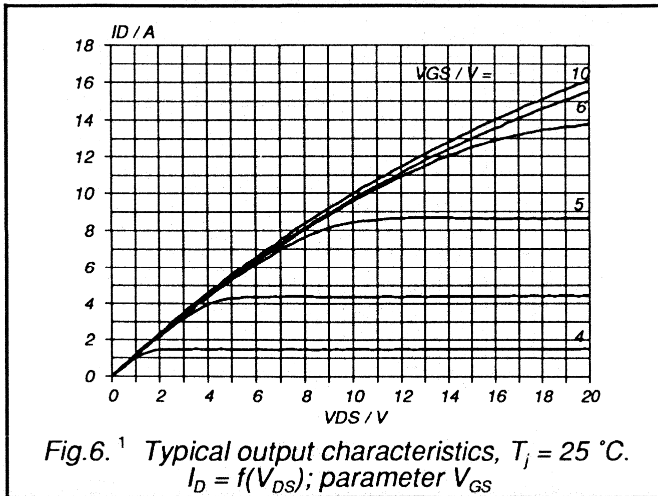


Fig.6.[1] Typical output characteristics, T_j = 25 °C.
$I_D = f(V_{DS})$; parameter V_{GS}

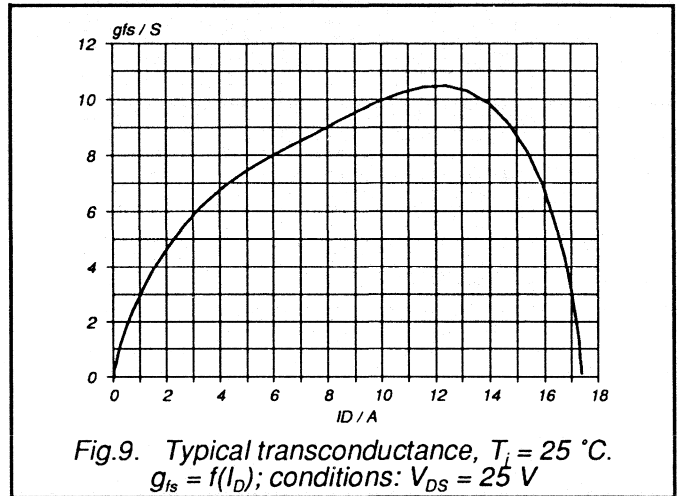


Fig.9. Typical transconductance, T_j = 25 °C.
$g_{fs} = f(I_D)$; conditions: V_{DS} = 25 V

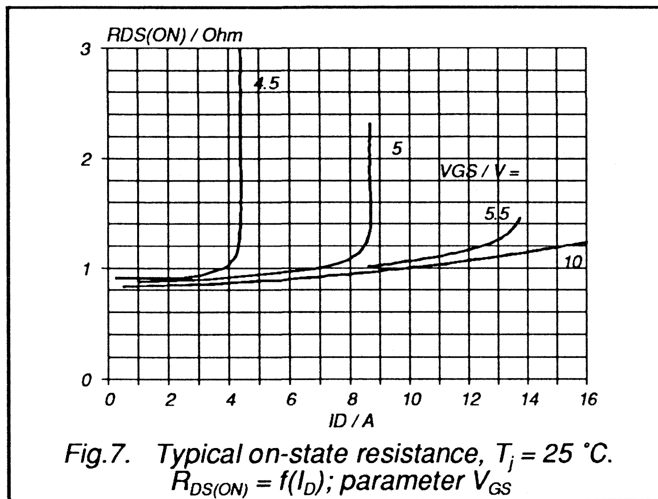


Fig.7. Typical on-state resistance, T_j = 25 °C.
$R_{DS(ON)} = f(I_D)$; parameter V_{GS}

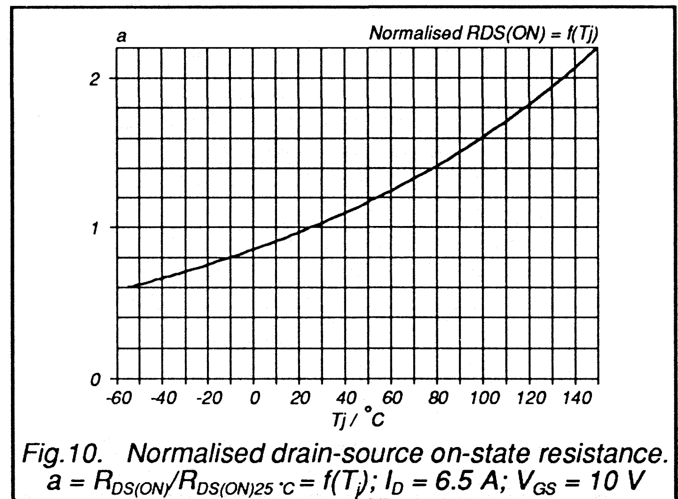


Fig.10. Normalised drain-source on-state resistance.
$a = R_{DS(ON)}/R_{DS(ON)25\,°C} = f(T_j)$; I_D = 6.5 A; V_{GS} = 10 V

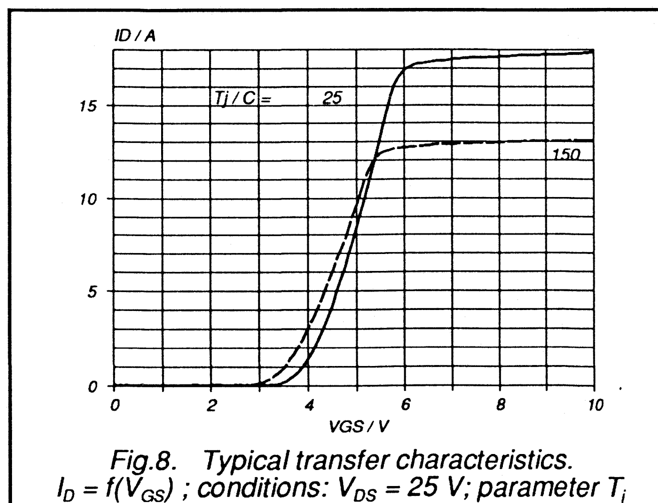


Fig.8. Typical transfer characteristics.
$I_D = f(V_{GS})$; conditions: V_{DS} = 25 V; parameter T_j

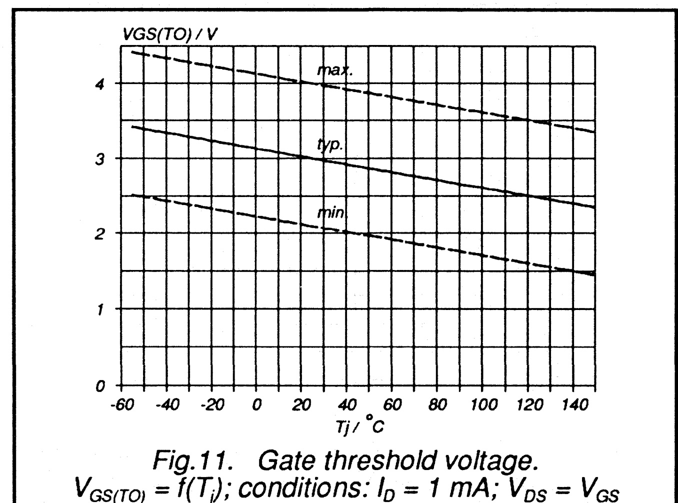


Fig.11. Gate threshold voltage.
$V_{GS(TO)} = f(T_j)$; conditions: I_D = 1 mA; $V_{DS} = V_{GS}$

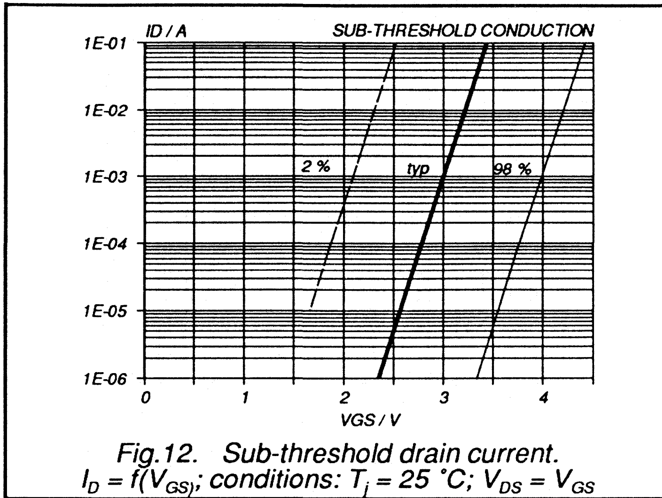


Fig.12. Sub-threshold drain current.
$I_D = f(V_{GS})$; conditions: T_j = 25 °C; $V_{DS} = V_{GS}$

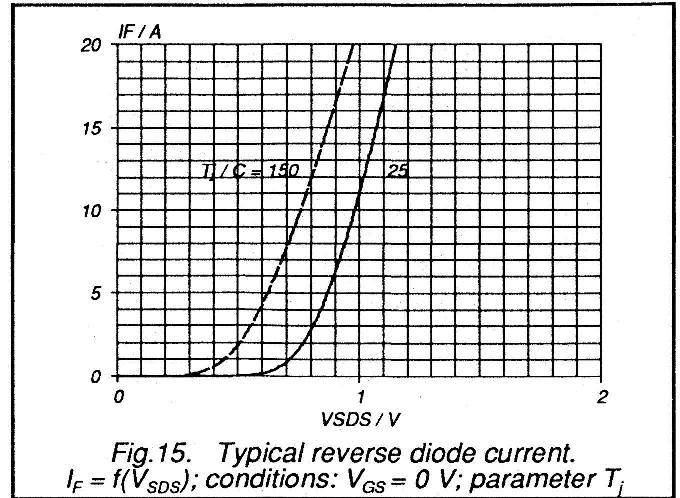


Fig.15. Typical reverse diode current.
$I_F = f(V_{SDS})$; conditions: V_{GS} = 0 V; parameter T_j

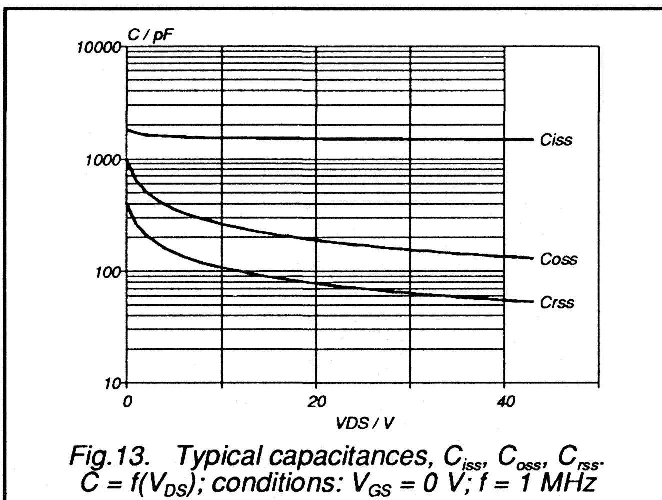


Fig.13. Typical capacitances, C_{iss}, C_{oss}, C_{rss}.
$C = f(V_{DS})$; conditions: V_{GS} = 0 V; f = 1 MHz

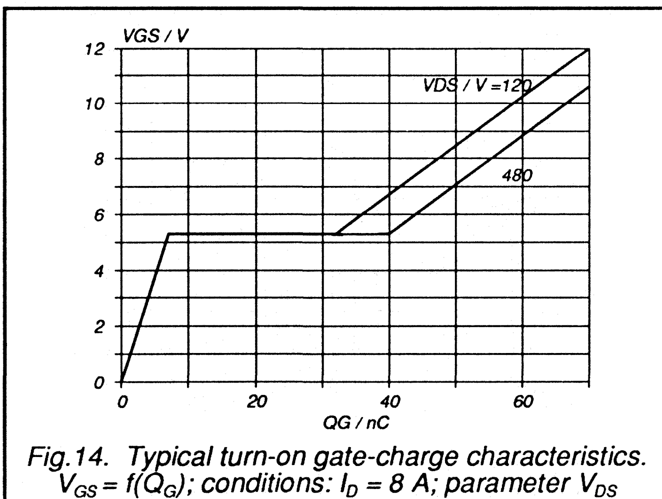


Fig.14. Typical turn-on gate-charge characteristics.
$V_{GS} = f(Q_G)$; conditions: I_D = 8 A; parameter V_{DS}

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