SGS-THOMSON MICROELECTRONICS

STN2N10L

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STN2N10L	100 V	< 0.5 Ω	2 A

- TYPICAL $R_{DS(on)}$ = 0.35 Ω
- AVALANCHE RUGGED TECHNOLOGY
- SOT-223 CAN BE WAVE OR REFLOW SOLDERED
- AVAILABLE IN TAPE AND REEL ON REQUEST
- 150 ^{o}C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

APPLICATIONS
- HARD DISK DRIVERS
- SMALL MOTOR CURRENT SENSE CIRCUITS
- DC-DC CONVERTERS AND POWER SUPPLIES

SOT-223

INTERNAL SCHEMATIC DIAGRAM

SC06140
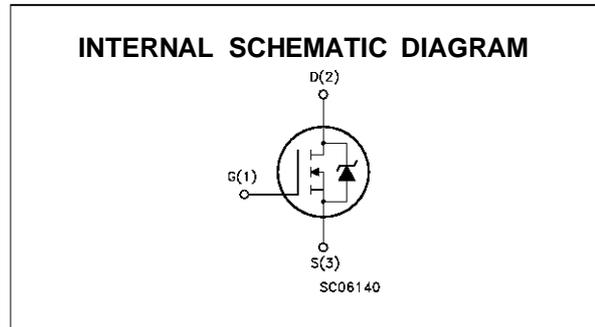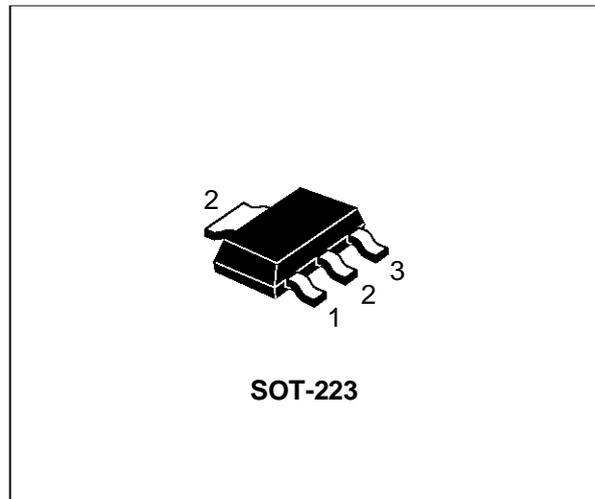
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	100	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	100	V
V_{GS}	Gate-source Voltage	± 15	V
I_D	Drain Current (continuous) at T_c = 25 ^{o}C	2	A
I_D	Drain Current (continuous) at T_c = 100 ^{o}C	1.3	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	8	A
P_{tot}	Total Dissipation at T_c = 25 ^{o}C	2.7	W
	Derating Factor	0.022	W/^{o}C
T_{stg}	Storage Temperature	-65 to 150	^{o}C
T_j	Max. Operating Junction Temperature	150	^{o}C

(•) Pulse width limited by safe operating area

THERMAL DATA

$R_{thj-pcb}$	Thermal Resistance Junction-PC Board	Max	46	^{o}C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient (Surface Mounted)	Max	60	^{o}C/W
T_l	Maximum Lead Temperature For Soldering Purpose		260	^{o}C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, δ < 1%)	2	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 ^{o}C, I_D = I_{AR}, V_{DD} = 25 V)	20	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, δ < 1%)	5	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (T_c = 100 ^{o}C, pulse width limited by T_j max, δ < 1%)	1.3	A

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^{o}C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 μA $\quad$ V_{GS} = 0	100			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 $\quad$ T_c = 125 ^{o}C			10 100	μA μA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = $\pm$ 15 V			$\pm$ 100	nA

ON ($*$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} $\quad$ I_D = 250 μA	1	1.8	2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 5 V $\quad$ I_D = 1 A V_{GS} = 5 V $\quad$ I_D = 1 A $\quad$ T_c = 100°C		0.35	0.5 1	Ω Ω
$I_{D(on)}$	On State Drain Current	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ V_{GS} = 10 V	2			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} ($*$)	Forward Transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$ $\quad$ I_D = 1 A	1	2.5		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V $\quad$ f = 1 MHz $\quad$ V_{GS} = 0 V		340 65 20	450 100 30	pF pF pF

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ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 50$ V $R_G = 4.7$ Ω	$I_D = 4$ A $V_{GS} = 5$ V		6 20	10 30	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 80$ V $R_G = 4.7$ Ω	$I_D = 8$ A $V_{GS} = 5$ V		380		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 80$ V	$I_D = 8$ A $V_{GS} = 5$ V		10 6 3	15	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 80$ V $R_G = 4.7$ Ω	$I_D = 8$ A $V_{GS} = 5$ V		10 10 20	15 15 30	ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				2 8	A A
V_{SD} (∗)	Forward On Voltage	$I_{SD} = 2$ A $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 8$ A $di/dt = 100$ A/µs $V_{DD} = 30$ V $T_j = 150$ °C		90 0.27 6		ns µC A

(∗) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(•) Pulse width limited by safe operating area

Safe Operating Area

Thermal Impedance

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Derating Curve

GC68740

P_{tot} (W)

2

1

0   50   100   150 T_{case} (°C)
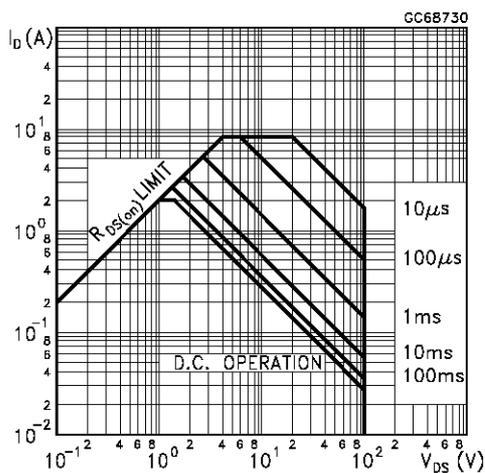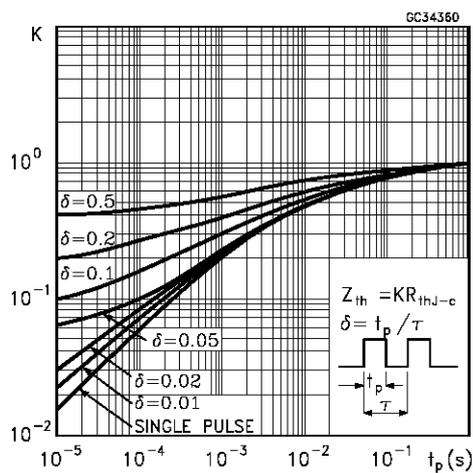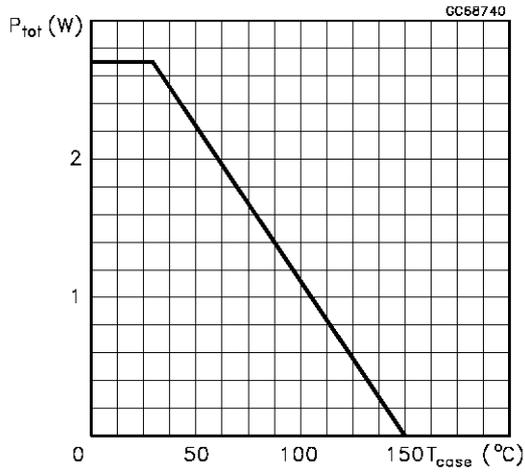
Output Characteristics

GC66780

I_D (A)

8   5V

6   4V

4

2   3V

0   1   2   3   4   5 V_{DS} (V)
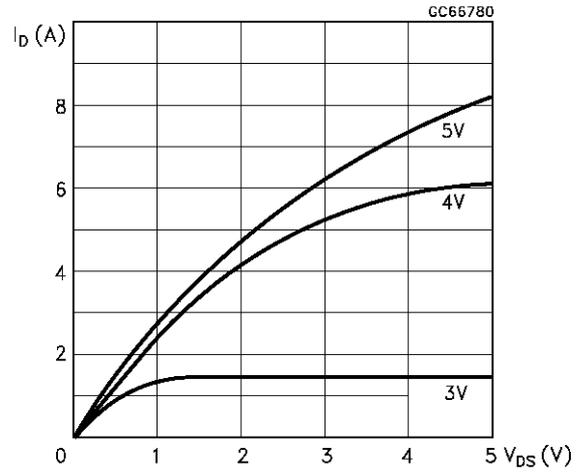
Transfer Characteristics

GC66800

I_D (A)

12

10

8

6

4   V_{DS} = 25V

2

0   1   2   3   4   5   6 V_{GS} (V)

Transconductance

GC66690

g_{fs}(S)

T_J = −50 °C

8

6

4   25 °C

    125 °C V_{DS} = 15V

2

0   1   2   3   4   5 I_D(A)

Static Drain-source On Resistance

GC66710

$R_{DS(on)}$ (Ω)

V_{GS}=5V

0.8

0.6

0.4

0.2

0   2   4   6   8 I_D(A)
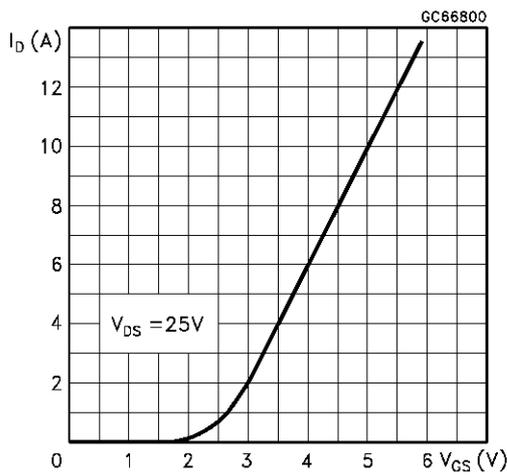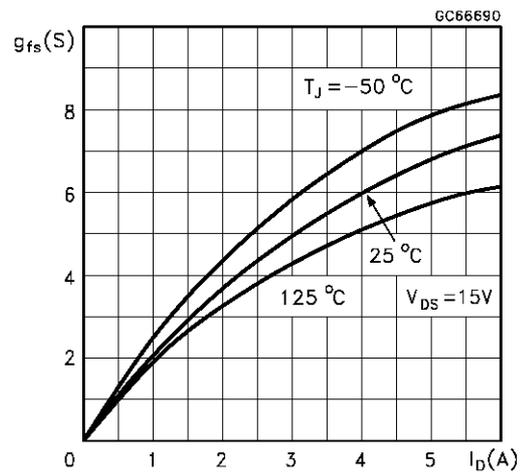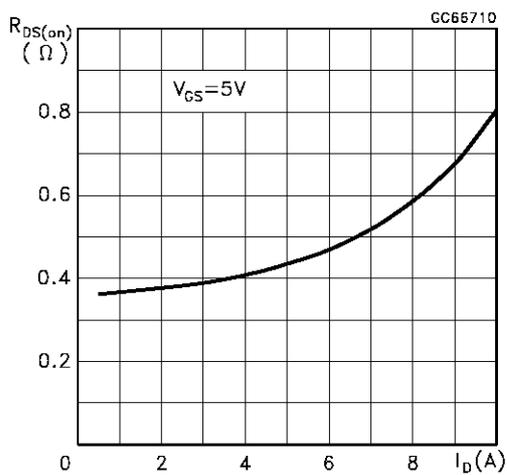
Gate Charge vs Gate-source Voltage

GC68750

V_{GS} (V)

12

8

4   V_{DS}=80V

    I_D =8A

0   4   8   12 Q_g(nC)
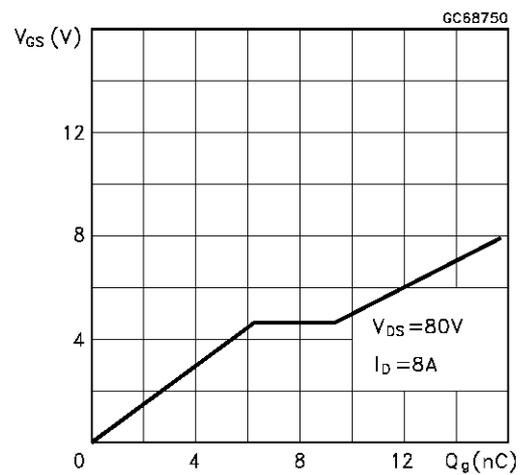
Capacitance Variations
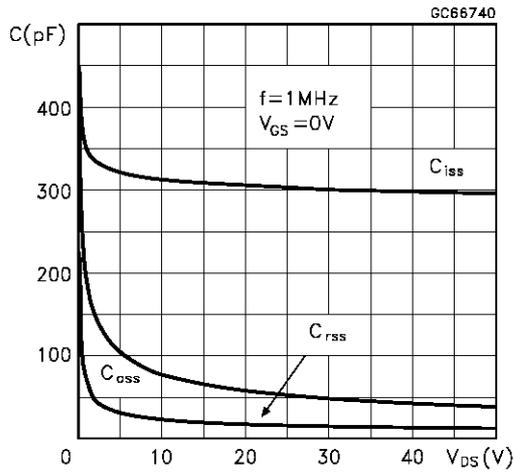
Normalized Gate Threshold Voltage vs Temperature
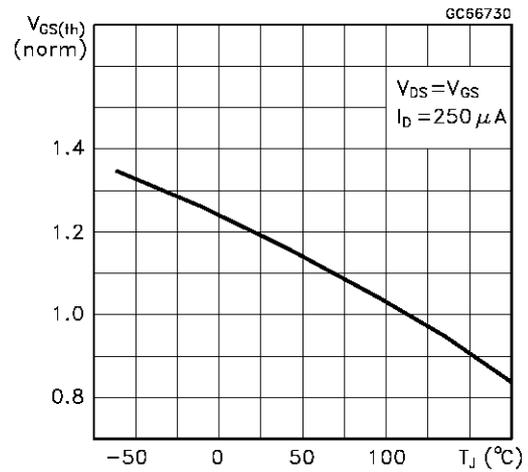
Normalized On Resistance vs Temperature
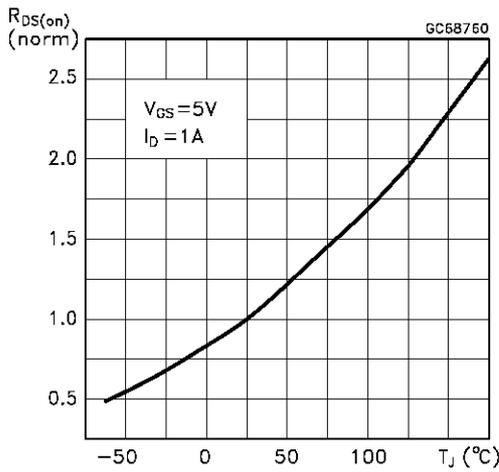
Turn-on Current Slope
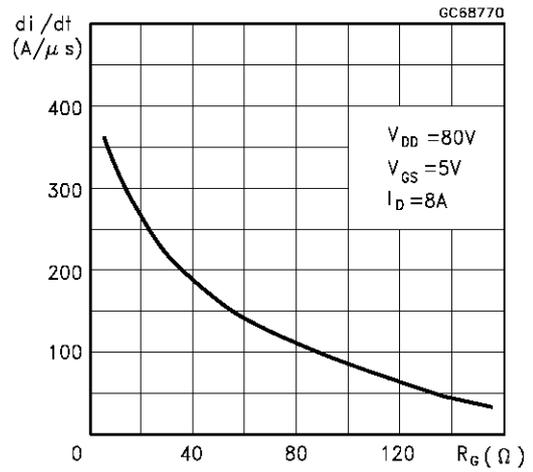

Turn-off Drain-source Voltage Slope

Cross-over Time

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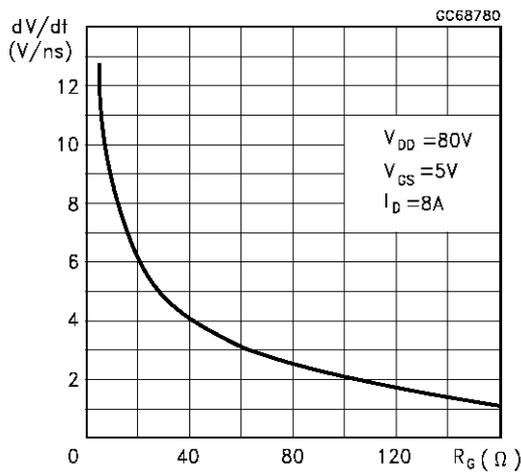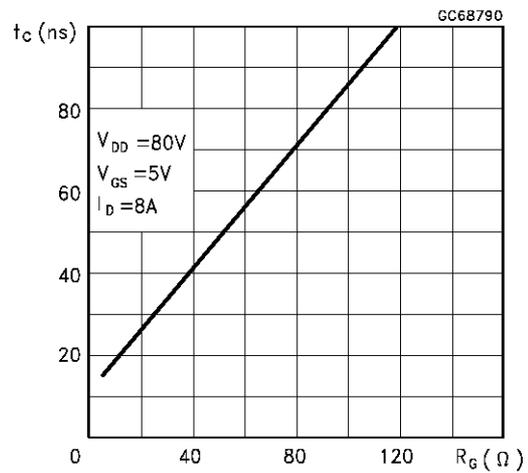
Switching Safe Operating Area

GC64670

$R_G = 50\ \Omega$
$T_J = 150\ ^\circ C$
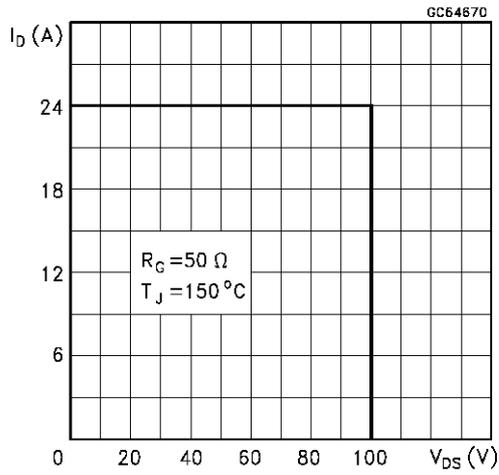
Accidental Overload Area

GC64680

$T_J = 150\ ^\circ C$
$t_P = 20\ \mu s$
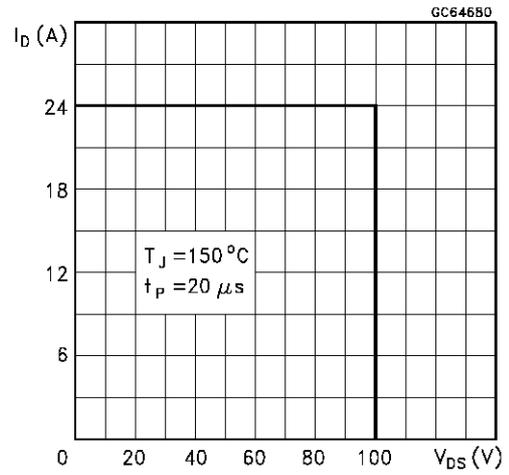
Source-drain Diode Forward Characteristics

GC66720

$T_J = -50\ ^\circ C$

$25\ ^\circ C$

$125\ ^\circ C$
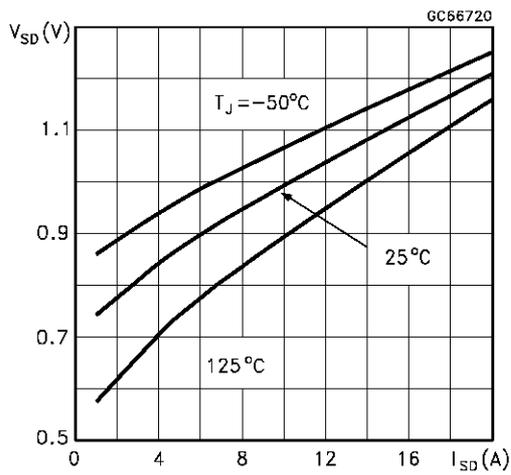
Fig. 1: Unclamped Inductive Load Test Circuit

SC05970

Fig. 2: Unclamped Inductive Waveform

SC07872

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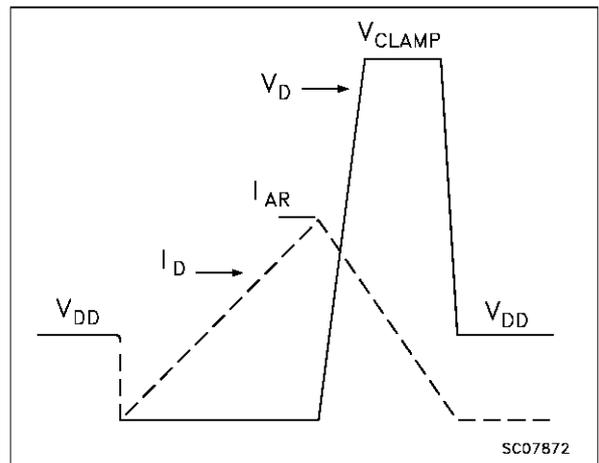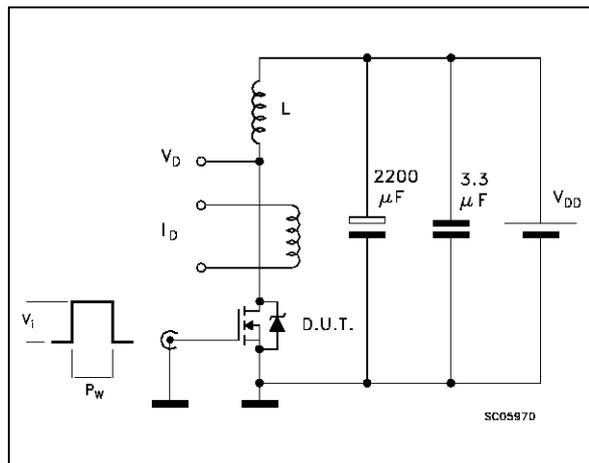
Fig. 3: Switching Times Test Circuits For
Resistive Load
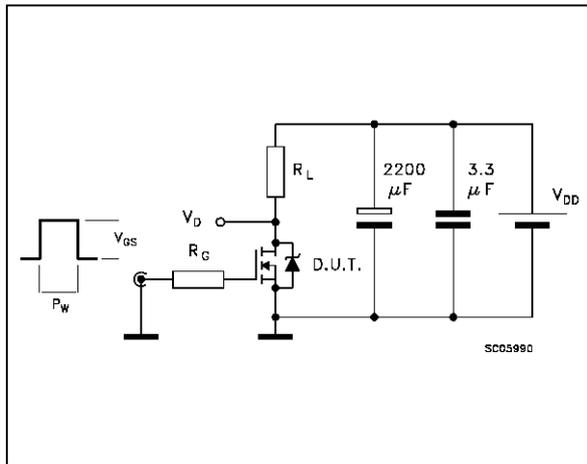
Fig. 4: Gate Charge test Circuit
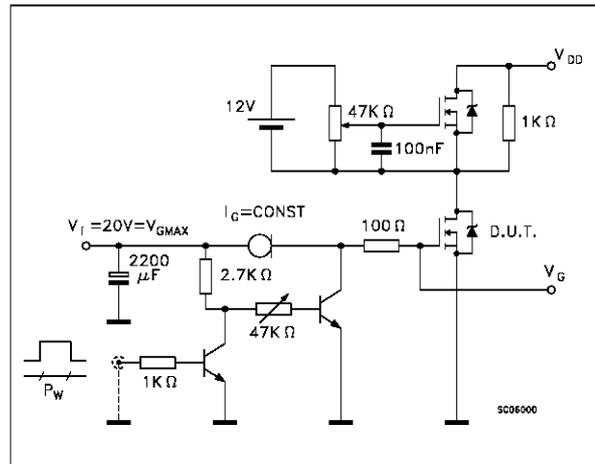
Fig. 5: Test Circuit For Inductive Load Switching
And Diode Recovery Times

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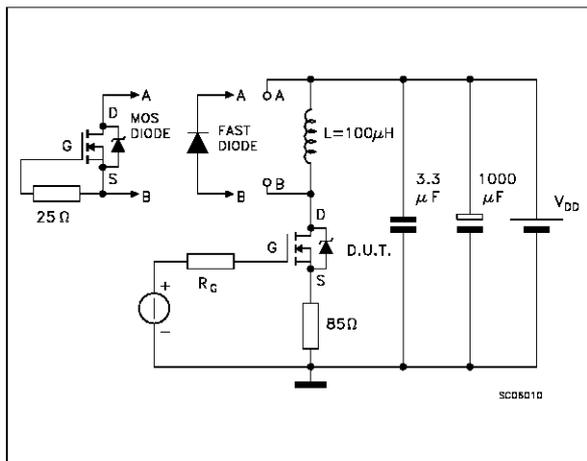
SOT223 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a	2.27	2.3	2.33	89.4	90.6	91.7
b	4.57	4.6	4.63	179.9	181.1	182.3
c	0.2	0.4	0.6	7.9	15.7	23.6
d	0.63	0.65	0.67	24.8	25.6	26.4
e1	1.5	1.6	1.7	59.1	63	66.9
e4			0.32			12.6
f	2.9	3	3.1	114.2	118.1	122.1
g	0.67	0.7	0.73	26.4	27.6	28.7
l1	6.7	7	7.3	263.8	275.6	287.4
l2	3.5	3.5	3.7	137.8	137.8	145.7
L	6.3	6.5	6.7	248	255.9	263.8

P008B

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