SGS-THOMSON MICROELECTRONICS

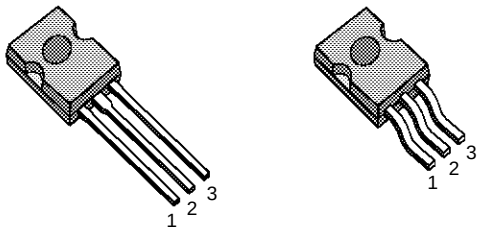
STK14N05
STK14N06

N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

PRELIMINARY DATA

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STK14N05	50 V	< 0.12 Ω	14 A
STK14N06	60 V	< 0.12 Ω	14 A

- TYPICAL $R_{DS(on)}$ = 0.1 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

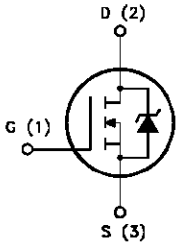


SOT-82 **SOT-194 (option)**

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- REGULATORS
- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STK14N05	STK14N06	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	50	60	V
V_{DGR}	Drain- gate Voltage (R_{GS} = 20 kΩ)	50	60	V
V_{GS}	Gate-source Voltage	± 20		V
I_D	Drain Current (continuous) at T_c = 25 °C	14		A
I_D	Drain Current (continuous) at T_c = 100 °C	10		A
I_{DM}(•)	Drain Current (pulsed)	56		A
P_{tot}	Total Dissipation at T_c = 25 °C	50		W
	Derating Factor	0.33		W/°C
T_{stg}	Storage Temperature	-65 to 175		°C
T_j	Max. Operating Junction Temperature	175		°C

(•) Pulse width limited by safe operating area

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	3.0	$^oC/W$
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	80	$^oC/W$
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.7	$^oC/W$
T_l	Maximum Lead Temperature For Soldering Purpose		275	^oC

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$)	14	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25\ ^oC$, $I_D = I_{AR}$, $V_{DD} = 25$ V)	40	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	10	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_c = 100\ ^oC$, pulse width limited by T_j max, $\delta < 1\%$)	10	A

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\ ^oC$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu A$ $V_{GS} = 0$ for **STK14N05** for **STK14N06**	 50 60			 V V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 $T_c = 125\ ^oC$			250 1000	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20$ V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\ \mu A$	2	2.9	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10$V $I_D = 7$ A $V_{GS} = 10$V $I_D = 7$ A $T_c = 100^oC$		0.1	0.12 0.24	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10$ V	14			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 7$ A	3	6		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25$ V f = 1 MHz $V_{GS} = 0$		330 150 40	450 250 60	pF pF pF

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} = 25 V I_D = 7 A R_G = 50 Ω V_{GS} = 10 V (see test circuit figure)		45 90	65 130	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 40 V I_D = 14 A R_G = 50 Ω V_{GS} = 10 V (see test circuit figure)		210		A/µs
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 40 V I_D = 14 A V_{GS} = 10 V		15 7 5	25	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} = 40 V I_D = 14 A R_{GS} = 50 Ω V_{GS} = 10 V (see test circuit figure)		35 45 85	50 65 120	ns ns ns

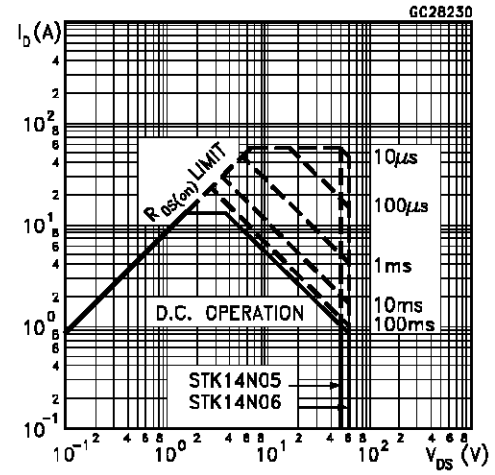
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(•)	Source-drain Current Source-drain Current (pulsed)				14 56	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 14 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 14 A di/dt = 100 A/µs V_{DD} = 25 V T_j = 150 °C		60 0.12 4		ns µC A

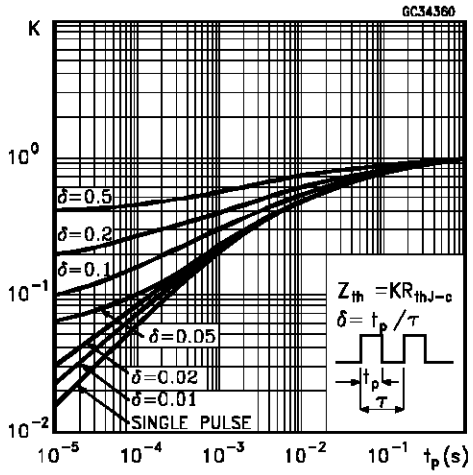
(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

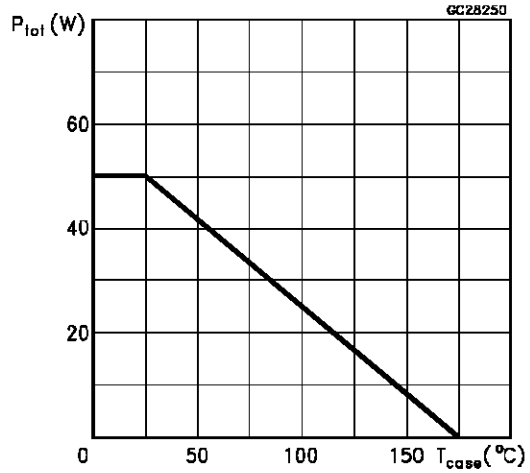
Safe Operating Area



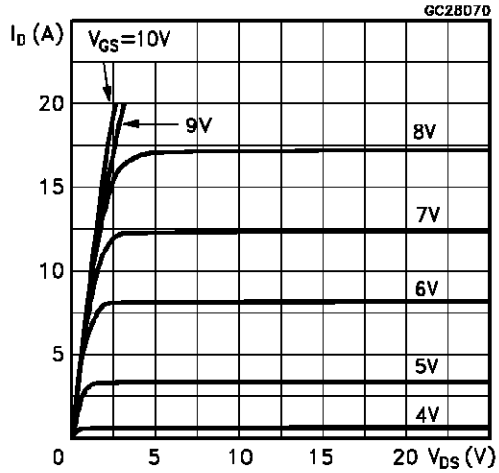
Thermal Impedance



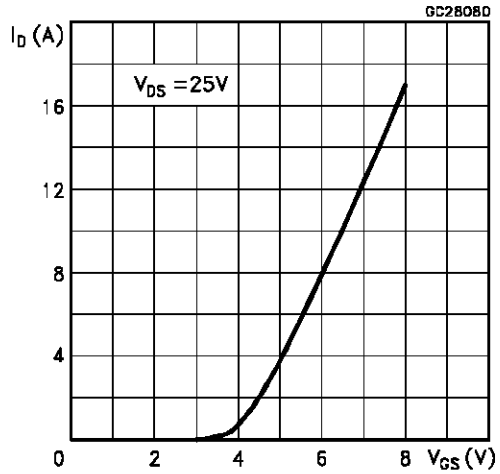
Derating Curve



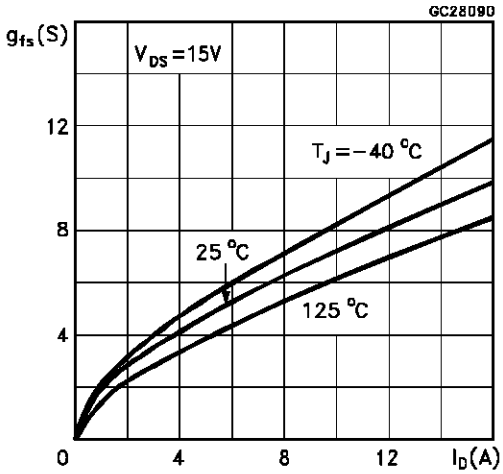
Output Characteristics



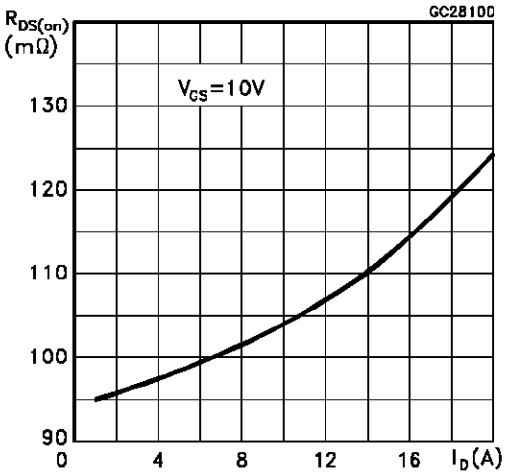
Transfer Characteristics



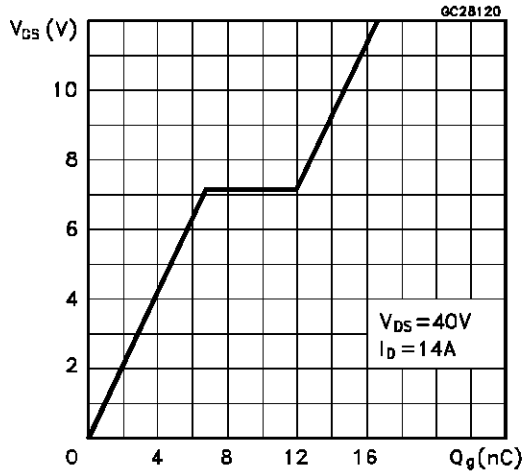
Transconductance



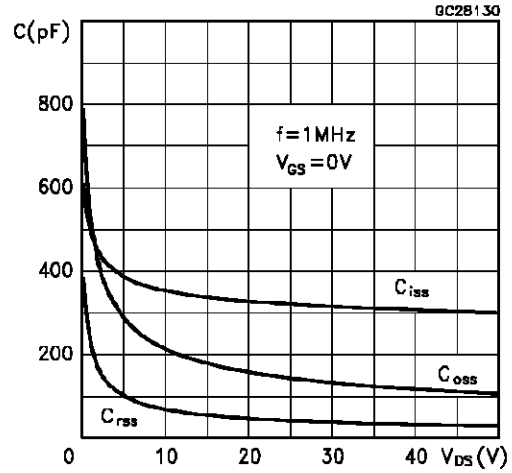
Static Drain-source On Resistance



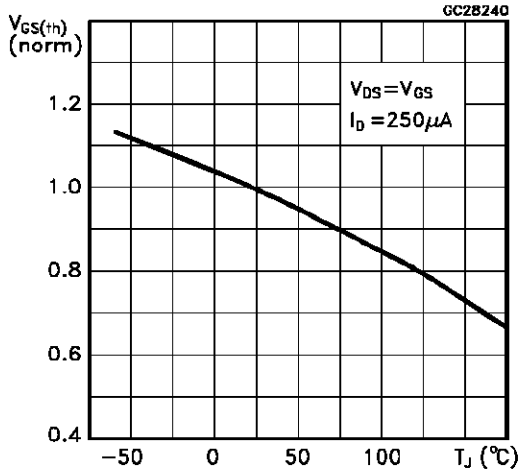
Gate Charge vs Gate-source Voltage



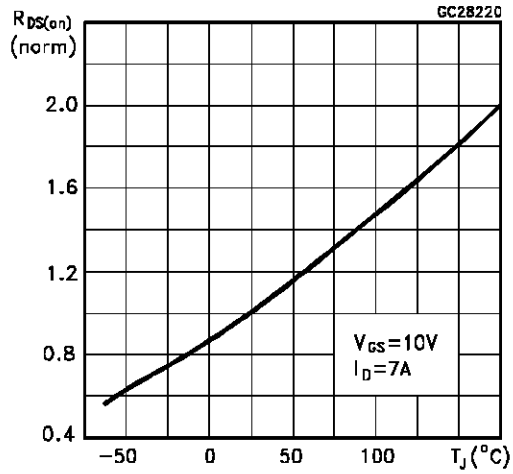
Capacitance Variations



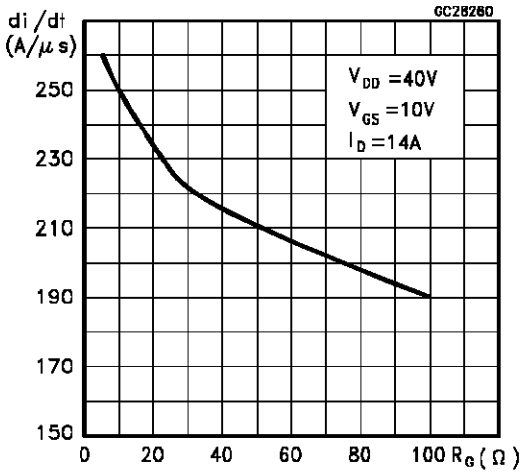
Normalized Gate Threshold Voltage vs Temperature



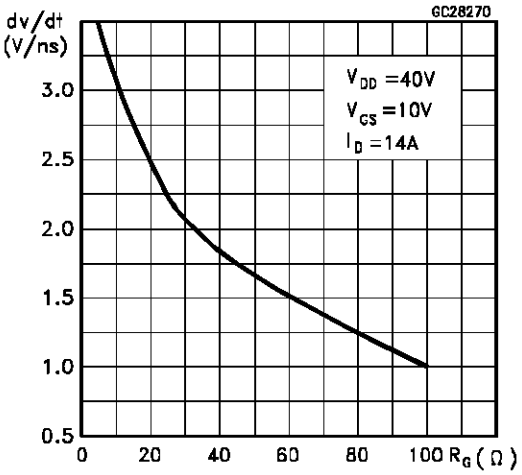
Normalized On Resistance vs Temperature



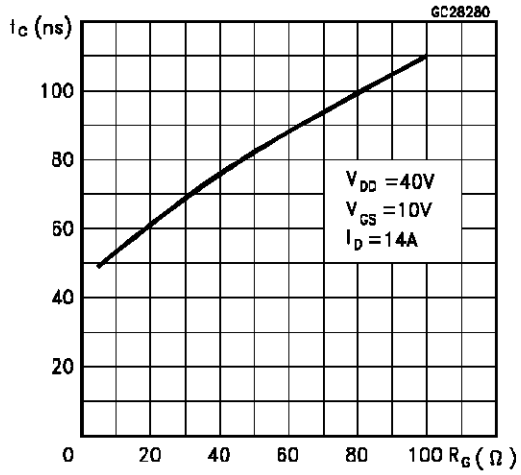
Turn-on Current Slope



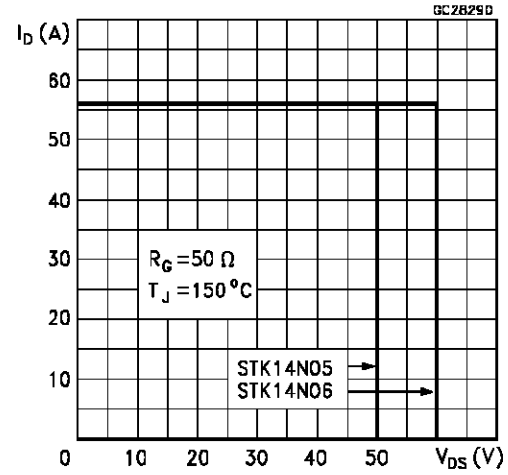
Turn-off Drain-source Voltage Slope



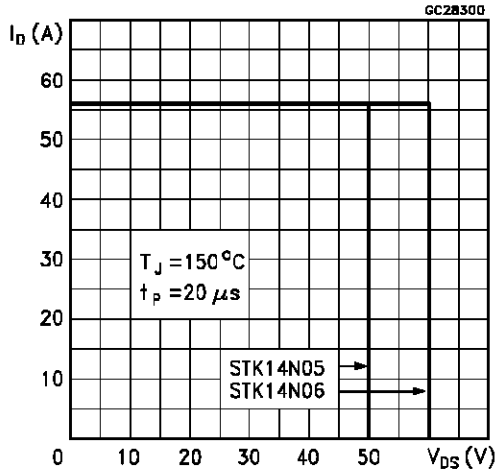
Cross-over Time



Switching Safe Operating Area



Accidental Overload Area



Source-drain Diode Forward Characteristics

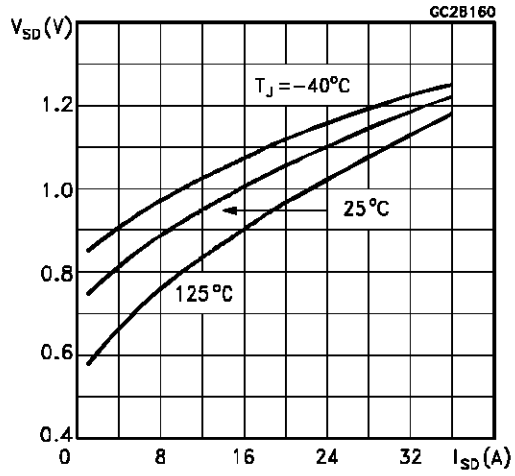


Fig. 1: Unclamped Inductive Load Test Circuits

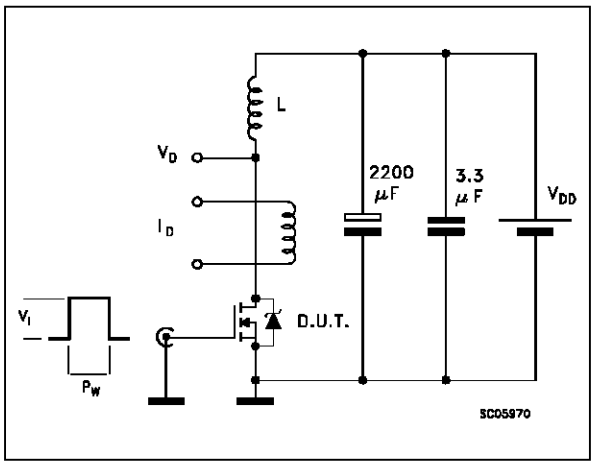


Fig. 2: Unclamped Inductive Waveforms

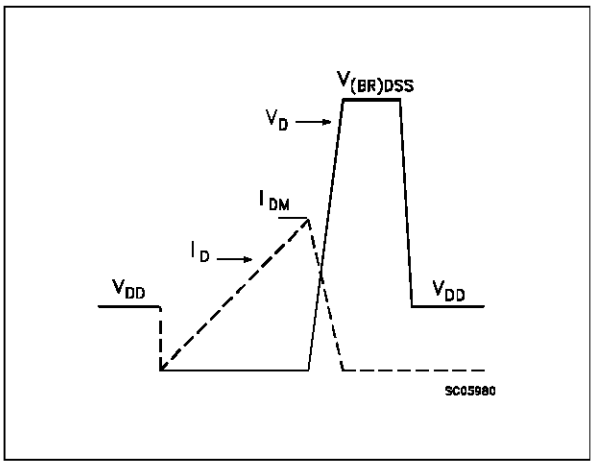


Fig. 3: Switching Times Test Circuits For Resistive Load

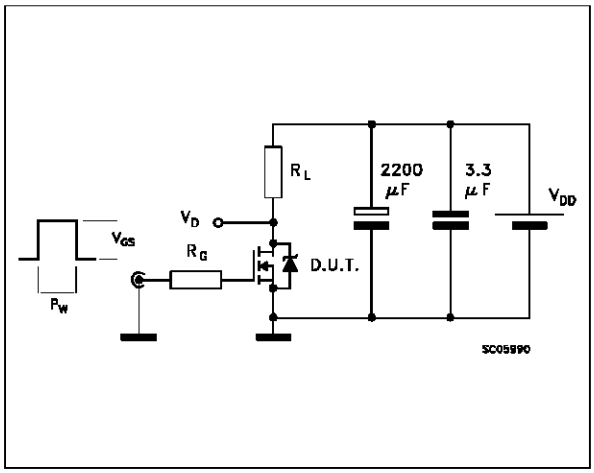


Fig. 4: Gate Charge Test Circuit

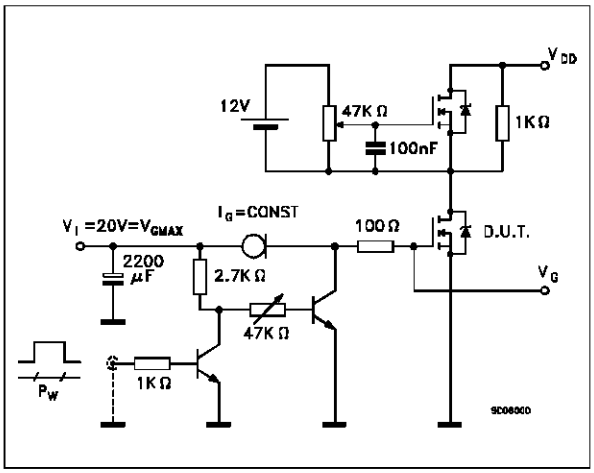
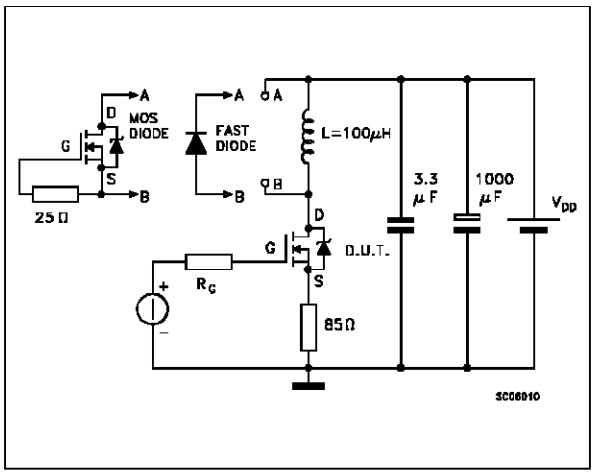
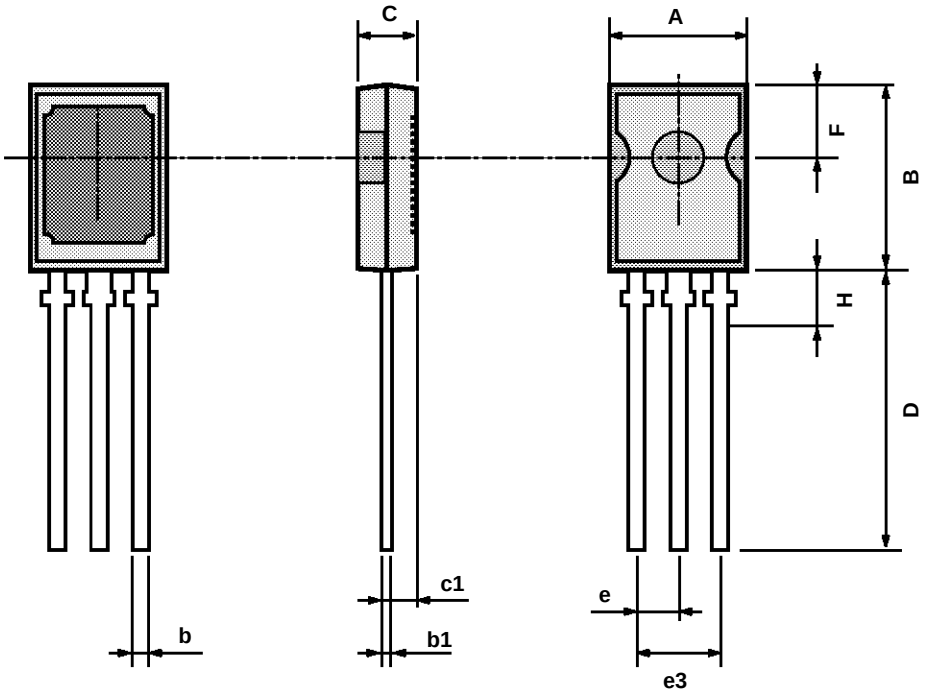


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SOT-82 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		11.3	0.413		0.445
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.04		0.106
c1		1.2			0.047	
D		15.7			0.618	
e		2.2			0.087	
e3		4.4			0.173	
F		3.8			0.150	
H			2.54		0.100	



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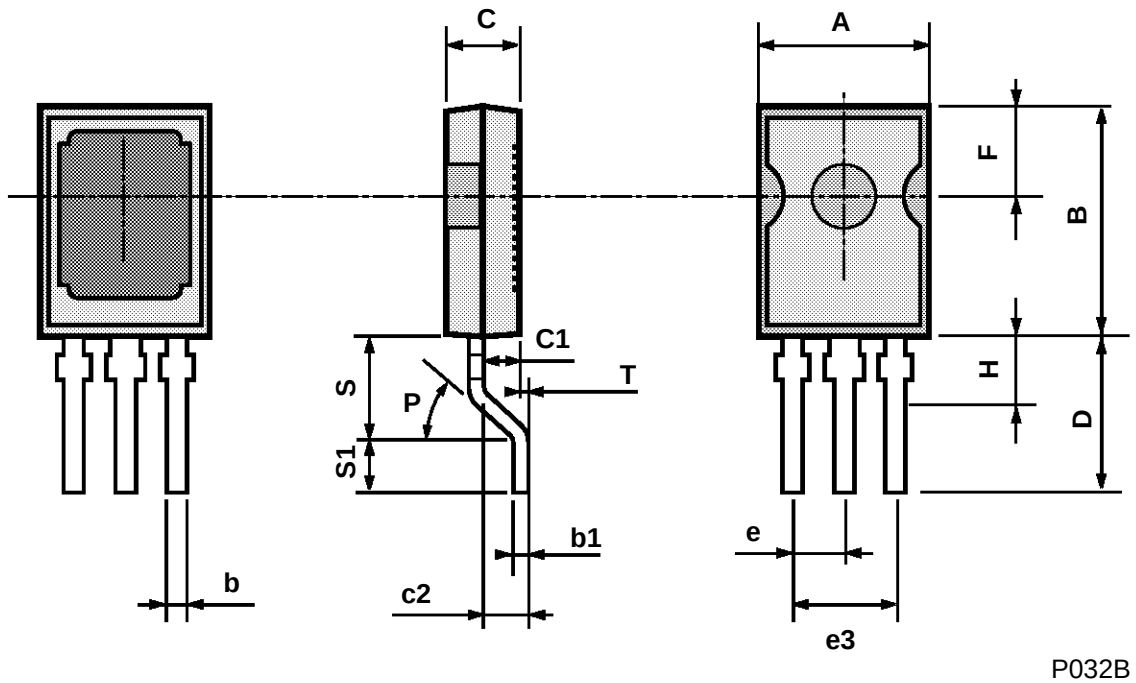
SOT-194 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		11.3	0.413		0.445
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.094		0.106
c1		1.2			0.047	
c2		1.3			0.051	
D		6			0.236	
e		2.2			0.087	
e3		4.4			0.173	
F		3.8			0.150	
H			2.54			0.100
P	45° (typ.)					
S		4			0.157	
S1		2			0.079	
T		0.1			0.004	



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