

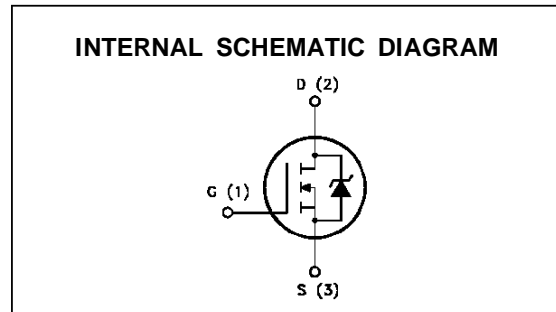
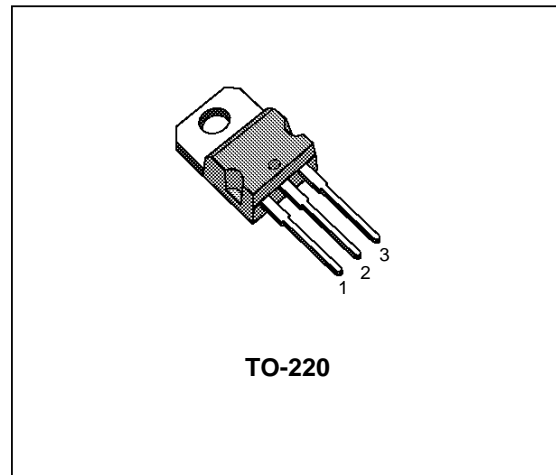
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

TYPE	V _{DSS}	R _{DS(on)}	I _D
MTP6N60	600 V	< 1.2 Ω	6.8 A

- TYPICAL R_{DS(on)} = 1 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- APPLICATION ORIENTED CHARACTERIZATION

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- CHOPPER REGULATORS, CONVERTERS, MOTOR CONTROL, LIGHTING FOR INDUSTRIAL AND CONSUMER ENVIRONMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	600	V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	600	V
V _{GS}	Gate-source Voltage	± 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	6.8	A
I _D	Drain Current (continuous) at T _c = 100 °C	4.2	A
I _{DM} (•)	Drain Current (pulsed)	30	A
P _{tot}	Total Dissipation at T _c = 25 °C	125	W
	Derating Factor	1	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(•) Pulse width limited by safe operating area

MTP6N60

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	1	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	62.5	°C/W
R _{thj-amb}	Thermal Resistance Case-sink	Typ	0.5	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose		300	°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%)	6.8	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 25 V)	460	mJ
E _{AR}	Repetitive Avalanche Energy (pulse width limited by T _j max, δ < 1%)	21	mJ
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _j max, δ < 1%)	4.2	A

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA V _{GS} = 0	600			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 °C			25 250	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 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 = 1 mA	2	3.1	4.5	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 3 A		1	1.2	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} x R _{DS(on)max} V _{GS} = 10 V	6.8			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} x R _{DS(on)max} I _D = 3 A	2	4.8		S
C _{iss}	Input Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		1150	1500	pF
C _{oss}	Output Capacitance			160	240	pF
C _{rss}	Reverse Transfer Capacitance			75	110	pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 300\text{ V}$ $I_D = 3\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		50 140	65 175	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 480\text{ V}$ $I_D = 6\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 5)		240		A/ μ s
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 480\text{ V}$ $I_D = 6\text{ A}$ $V_{GS} = 10\text{ V}$		78 8 41	98	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(voff)}$	Off-voltage Rise Time	$V_{DD} = 480\text{ V}$ $I_D = 6\text{ A}$		100	125	ns
t_f	Fall Time	$R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$		27	34	ns
t_c	Cross-over Time	(see test circuit, figure 5)		145	180	ns

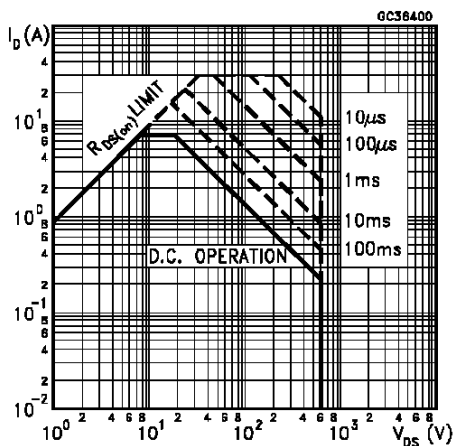
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				3.8 24	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 6\text{ A}$ $V_{GS} = 0$			2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 6\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		750		ns
Q_{rr}	Reverse Recovery Charge			13.5		μ C
I_{RRM}	Reverse Recovery Current			38		A

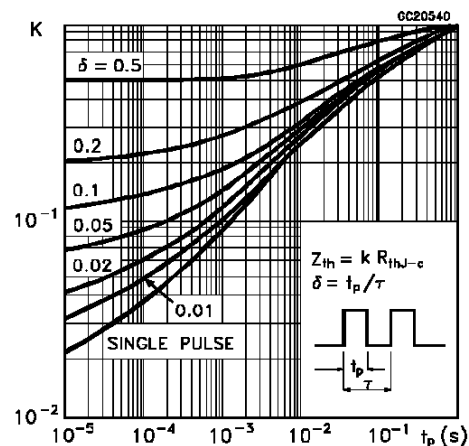
(*) Pulsed: Pulse duration = 300 μ s, duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

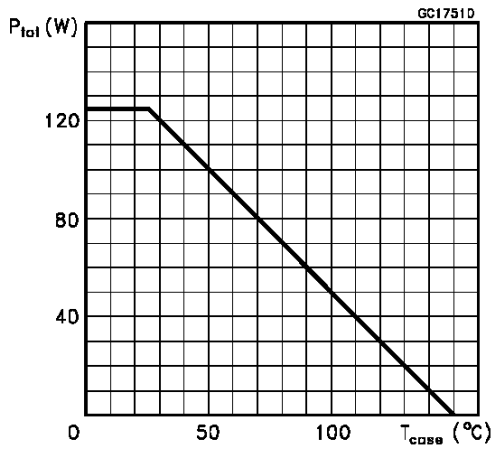
Safe Operating Area



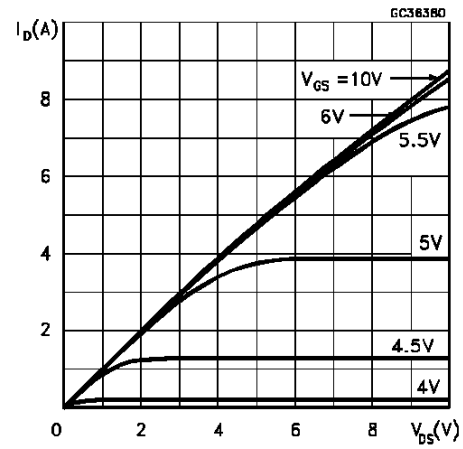
Thermal Impedance



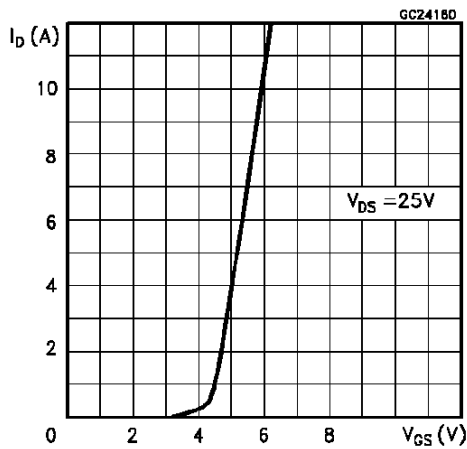
Derating Curve



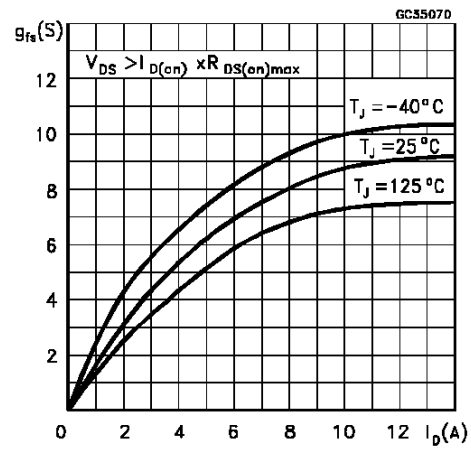
Output Characteristics



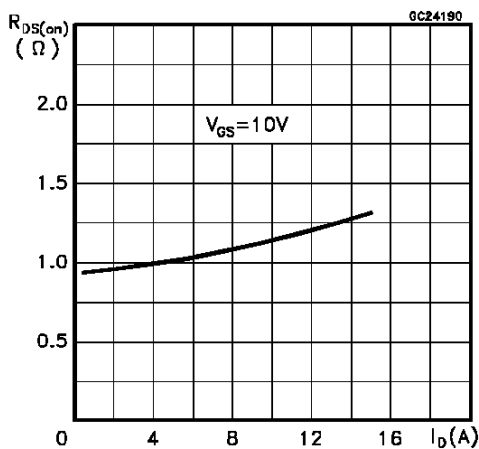
Transfer Characteristics



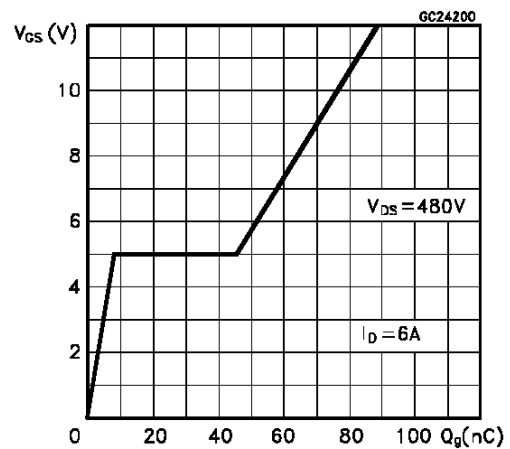
Transconductance



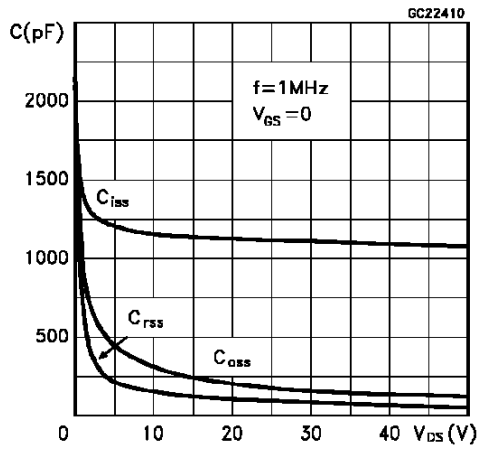
Static Drain-source On Resistance



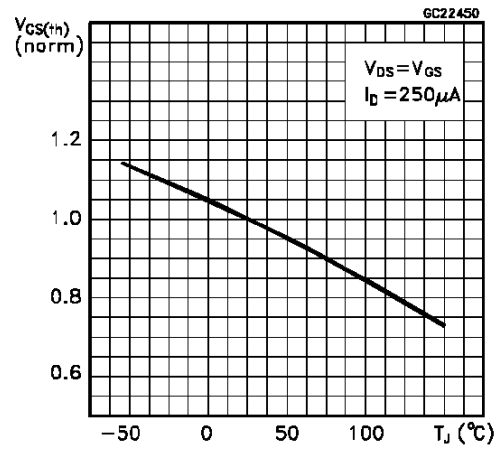
Gate Charge vs Gate-source Voltage



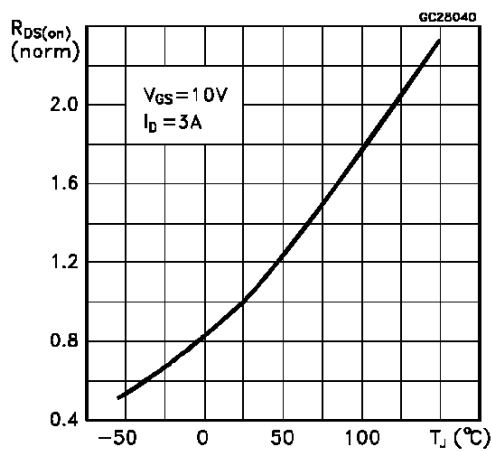
Capacitance Variations



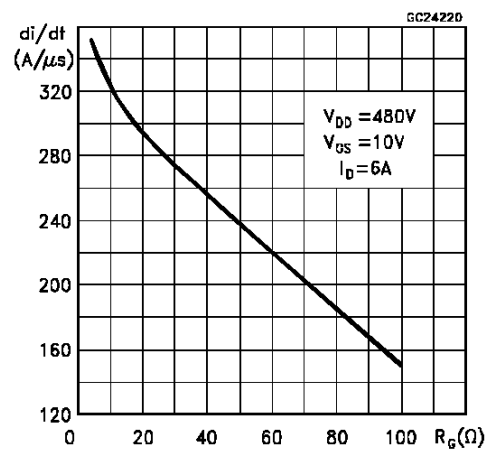
Normalized Gate Threshold Voltage vs Temperature



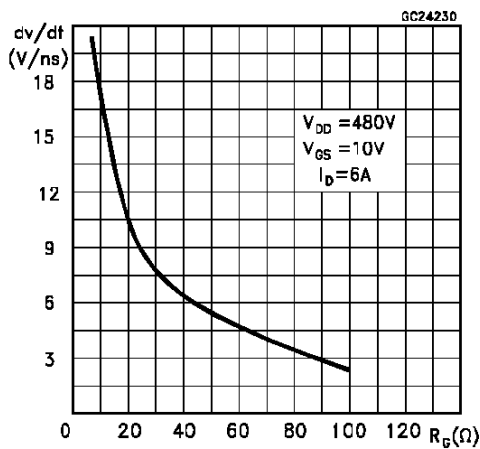
Normalized On Resistance vs Temperature



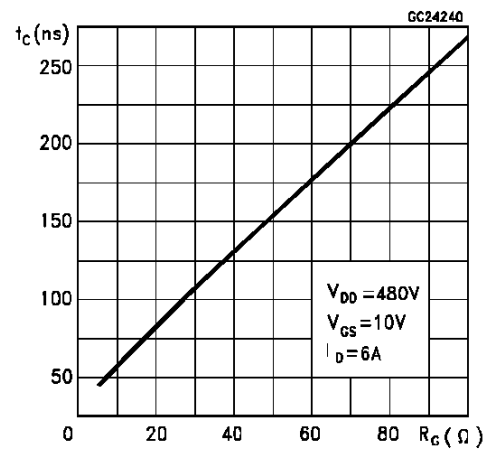
Turn-on Current Slope



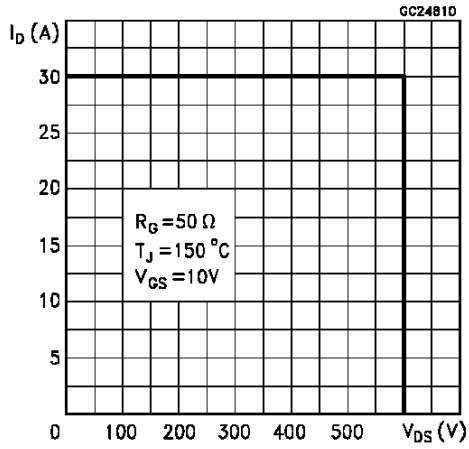
Turn-off Drain-source Voltage Slope



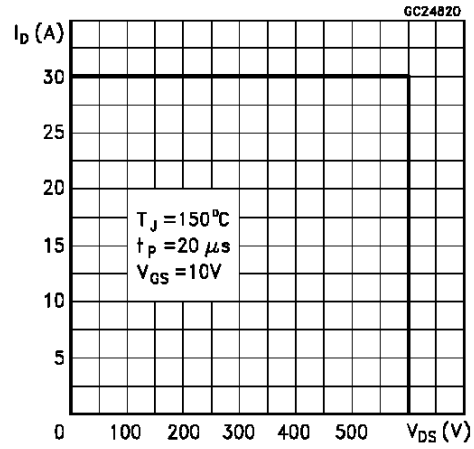
Cross-over Time



Switching Safe Operating Area



Accidental Overload Area



Source-drain Diode Forward Characteristics

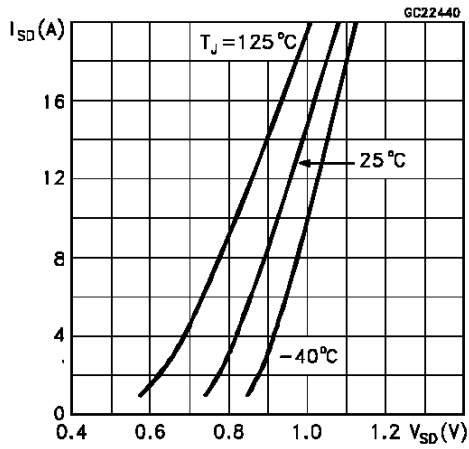


Fig. 1: Unclamped Inductive Load Test Circuits

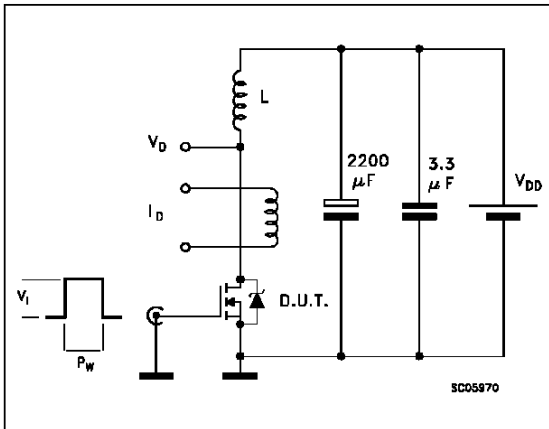


Fig. 2: Unclamped Inductive Waveforms

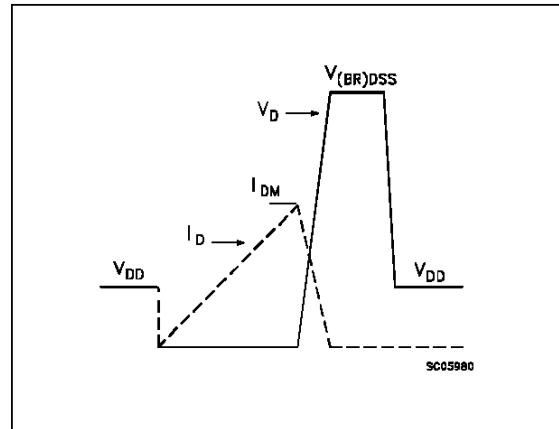


Fig. 3: Switching Times Test Circuits For Resistive Load

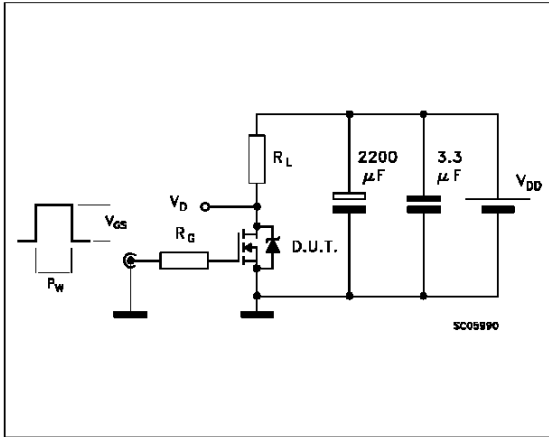


Fig. 4: Gate Charge Test Circuit

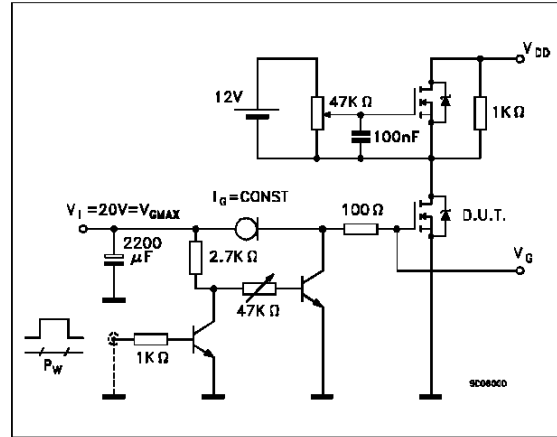
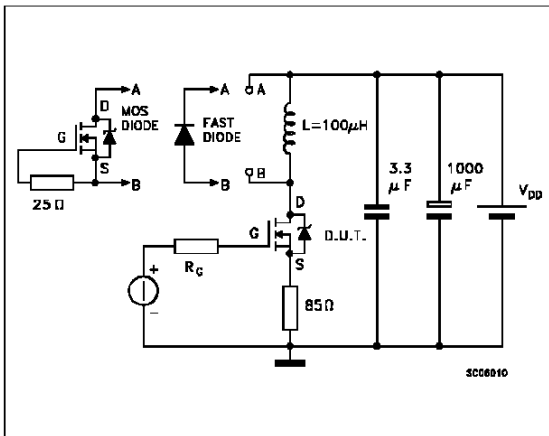
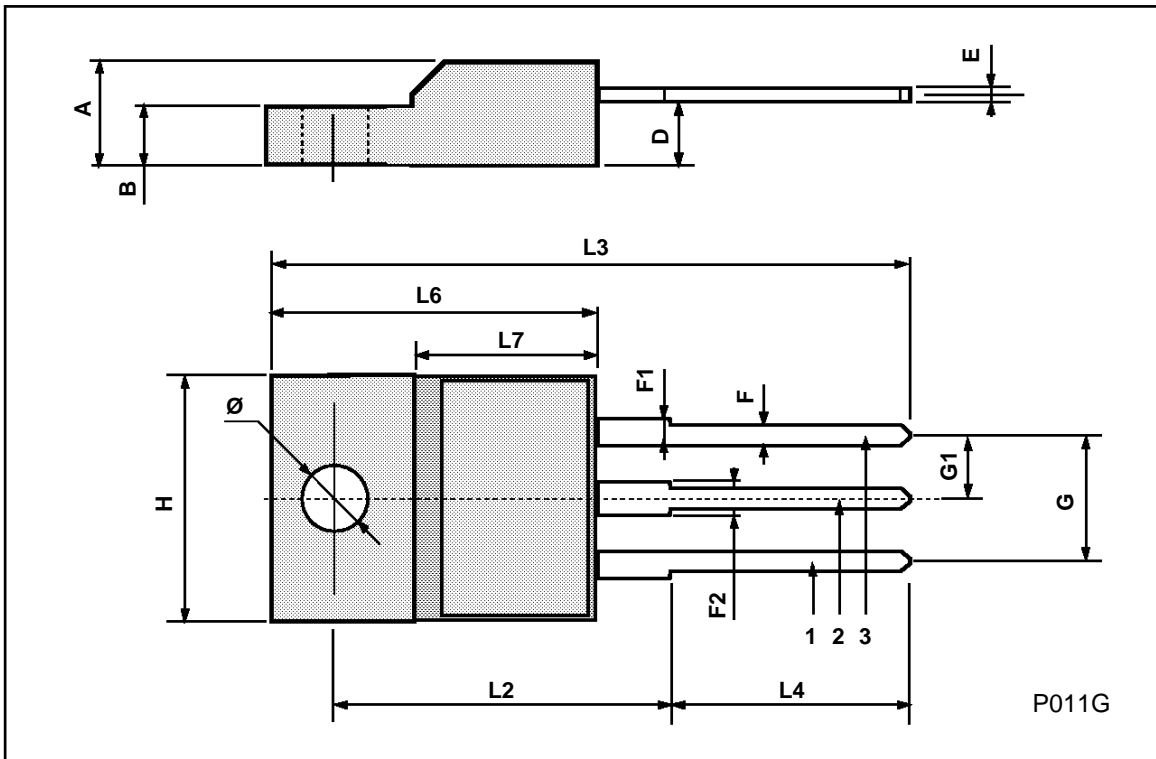


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



ISOWATT220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.4		0.7	0.015		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
∅	3		3.2	0.118		0.126



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