

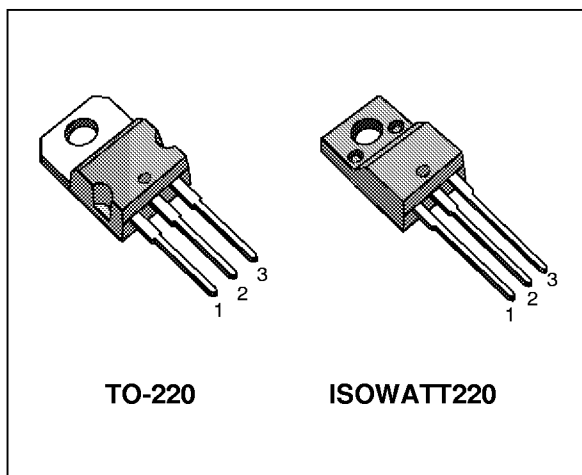
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTORS

TYPE	V _{DSS}	R _{DS(on)}	I _D
IRF840	500 V	< 0.85 Ω	8 A
IRF840FI	500 V	< 0.85 Ω	4.5 A
IRF841	450 V	< 0.85 Ω	8 A
IRF841FI	450 V	< 0.85 Ω	4.5 A

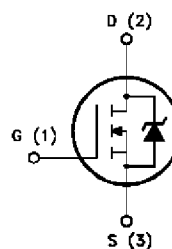
- TYPICAL R_{DS(on)} = 0.74 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C

APPLICATIONS

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



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value				Unit
		IRF				
		840	841	840FI	841FI	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	500	450	500	450	V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	500	450	500	450	V
V _{GS}	Gate-source Voltage	± 20				V
I _D	Drain Current (cont.) at T _C = 25 °C	8	8	4.5	4.5	A
I _D	Drain Current (cont.) at T _C = 100 °C	5.1	5.1	2.8	2.8	A
I _{DM} (●)	Drain Current (pulsed)	32	32	32	32	A
P _{tot}	Total Dissipation at T _C = 25 °C	125		40		W
	Derating Factor	1		0.32		W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	—		2000		
T _{stg}	Storage Temperature	-65 to 150				°C
T _j	Max. Operating Junction Temperature	150				°C

(•) Pulse width limited by safe operating area

THERMAL DATA

			TO-220	ISOWATT220	
$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	3.12	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5		°C/W
R_{thc-s}	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, $\delta < 1\%$)	8	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25\text{ °C}$, $I_D = I_{AR}$, $V_{DD} = 25\text{ V}$)	510	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	13	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_c = 100\text{ °C}$, pulse width limited by T_j max, $\delta < 1\%$)	5.1	A

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ $V_{GS} = 0$ for IRF840/840FI for IRF841/841FI	500 450			V V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ $T_c = 125\text{ °C}$			25 250	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ $I_D = 4.4\text{ A}$		0.74	0.85	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$	8			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 4.4\text{ A}$	4.9	6		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		1100	1500	pF
C_{oss}	Output Capacitance			190	240	pF
C_{rss}	Reverse Transfer Capacitance			80	110	pF

ELECTRICAL CHARACTERISTICS (continued)
SWITCHING RESISTIVE LOAD

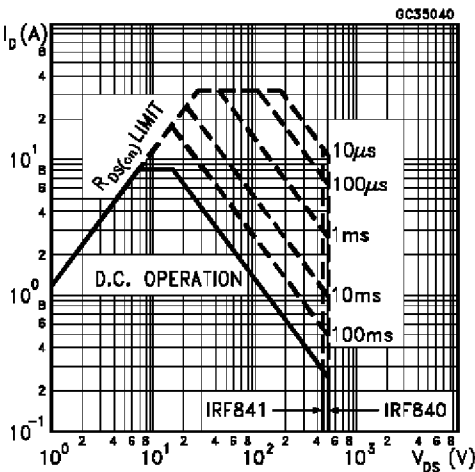
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 200\text{ V}$ $I_D = 4\text{ A}$		40	50	ns
t_r	Rise Time	$R_l = 4.7\ \Omega$		35	43	ns
$t_{d(off)}$	Turn-off Delay Time	(see test circuit)		80	100	ns
t_f	Fall Time			20	25	ns
Q_g	Total Gate Charge	$I_D = 8\text{ A}$ $V_{GS} = 10\text{ V}$		75	95	nC
Q_{gs}	Gate-Source Charge	$V_{DD} = \text{Max Rating} \times 0.8$		9		nC
Q_{gd}	Gate-Drain Charge	(see test circuit)		39		nC

SOURCE DRAIN DIODE

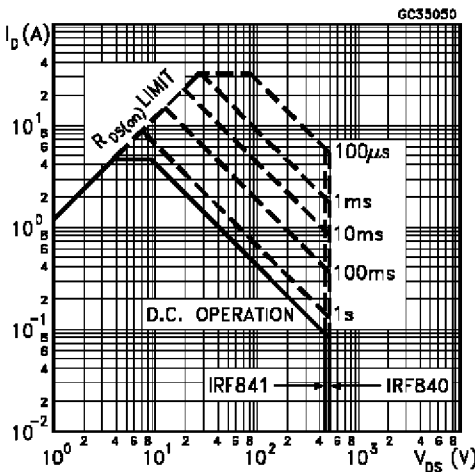
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				8	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				32	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 8\text{ A}$ $V_{GS} = 0$			2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 8\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$		700		ns
Q_{rr}	Reverse Recovery Charge			12		μC

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %
($\bullet$) Pulse width limited by safe operating area

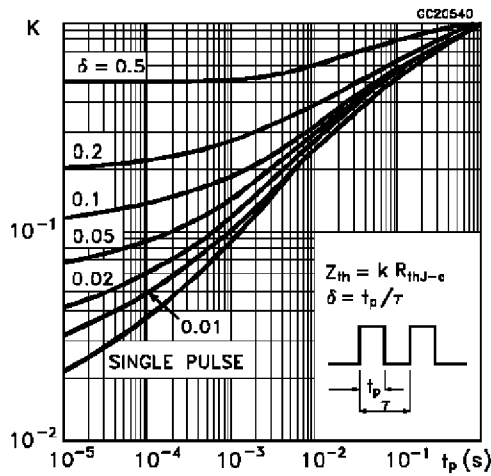
Safe Operating Area for TO-220



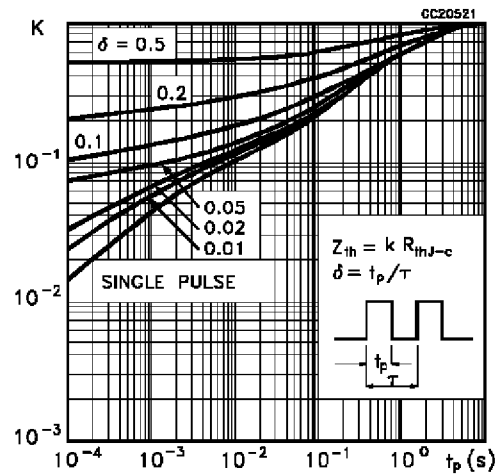
Safe Operating Area for ISOWATT220



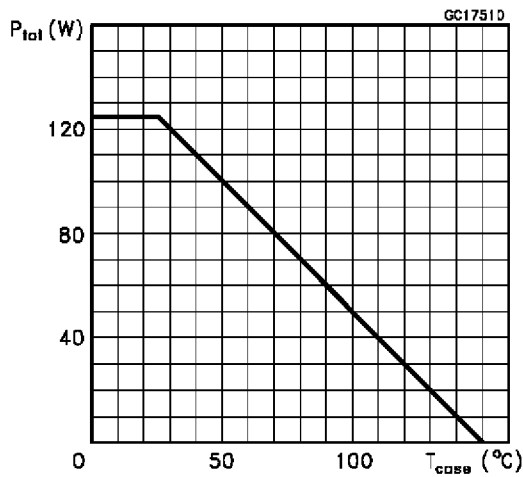
Thermal Impedance for TO-220



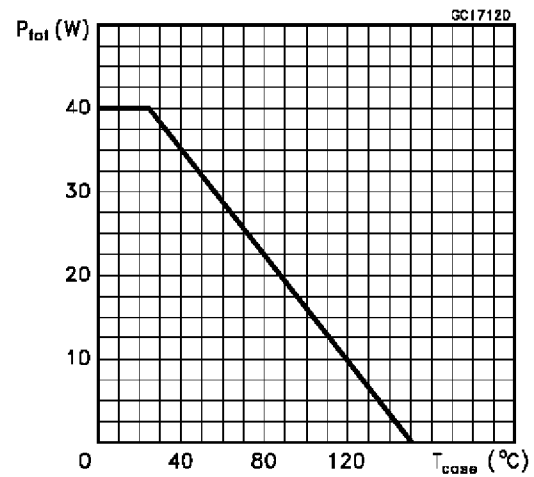
Thermal Impedance for ISOWATT220



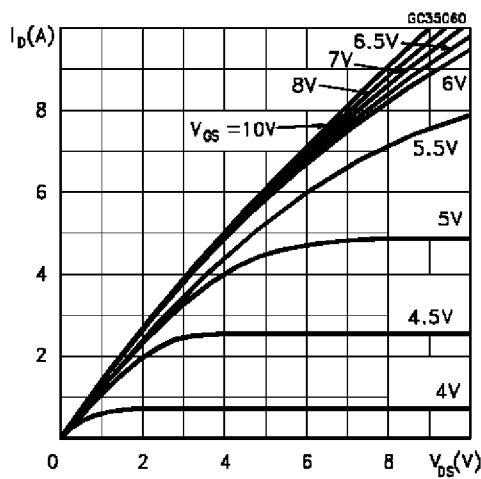
Derating Curve for TO-220



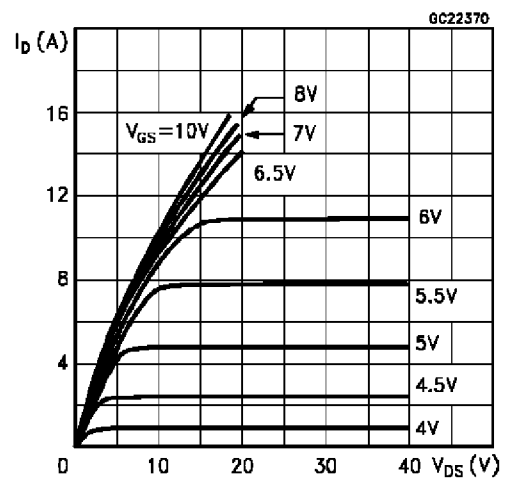
Derating Curve for ISOWATT220



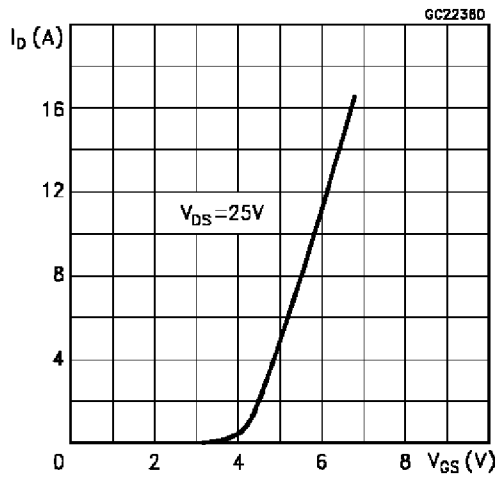
Output Characteristics



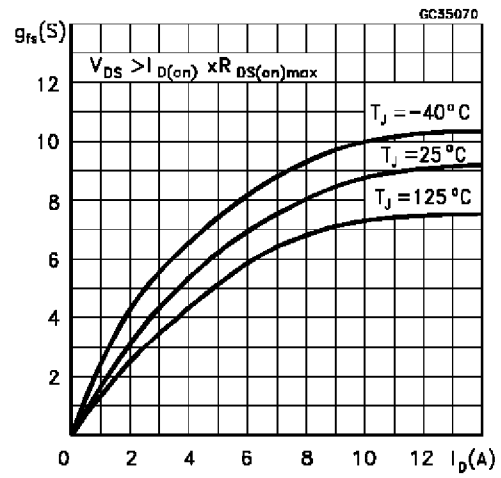
Output Characteristics



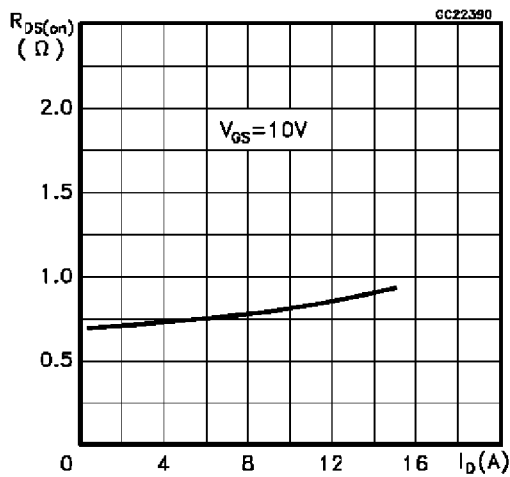
Transfer Characteristics



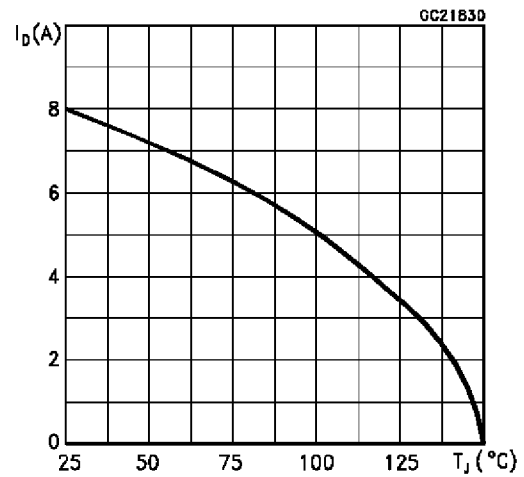
Transconductance



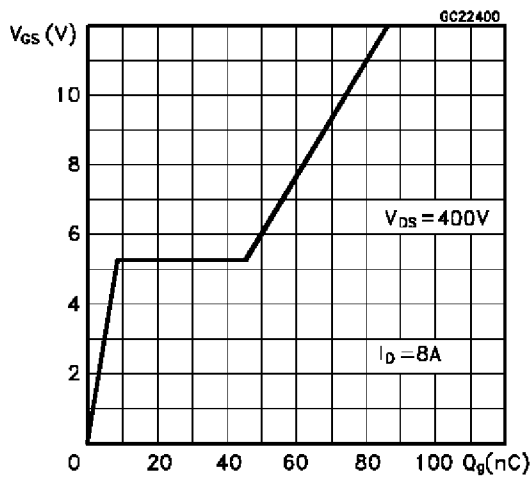
Static Drain-source On Resistance



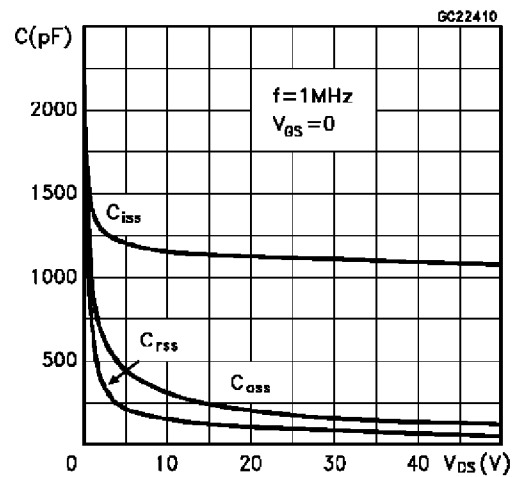
Maximum Drain Current vs Temperature



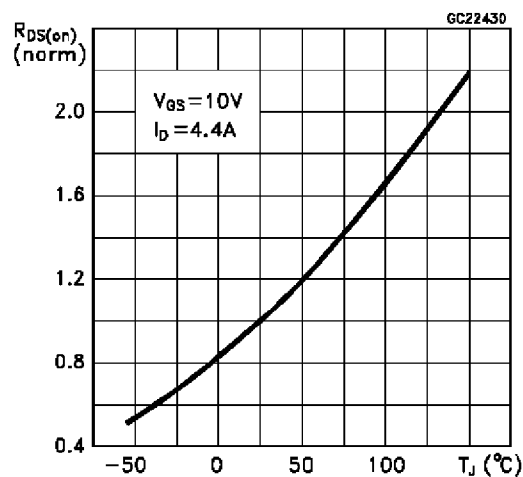
Gate Charge vs Gate-source Voltage



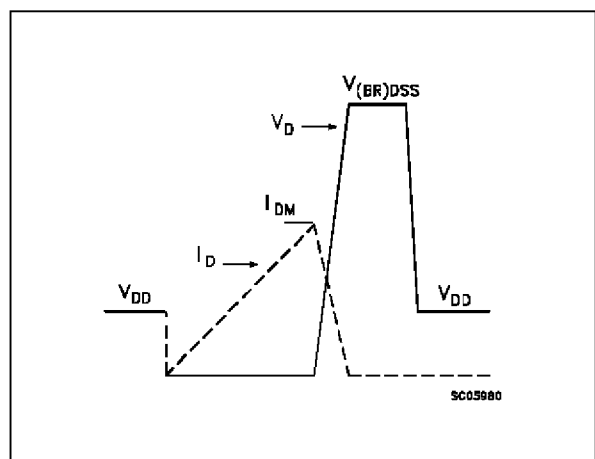
Capacitance Variations



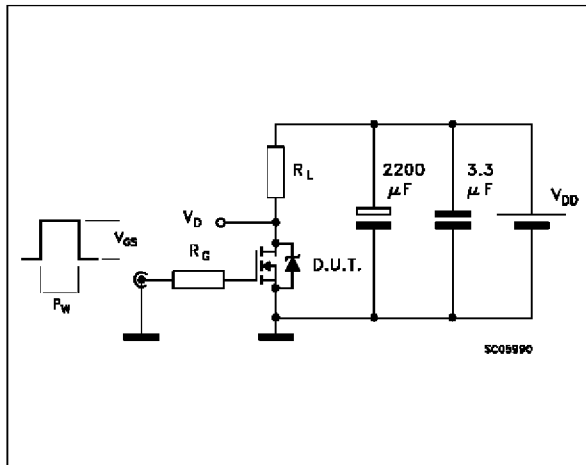
Normalized On Resistance vs Temperature



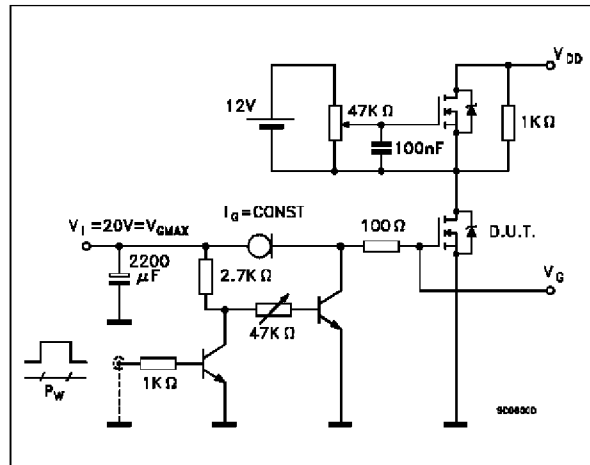
Unclamped Inductive Waveforms



Switching Time Test Circuit

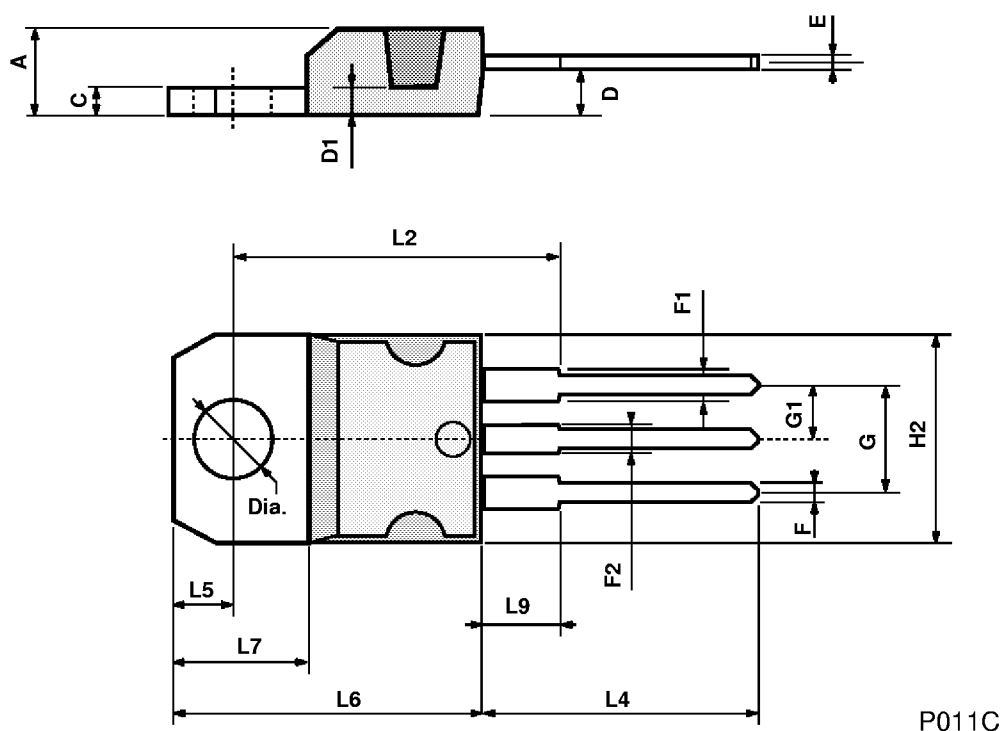


Gate Charge Test Circuit



TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



P011C

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
Ø	3		3.2	0.118		0.126

