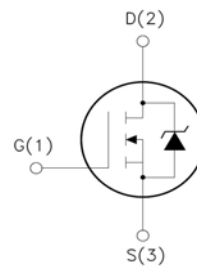
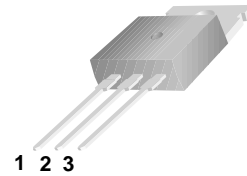


TO-220 

 1.Gate (G)
 2.Drain (D)
 3.Source (S)

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg= 72nC (Typ.).
- BVDSS=60V, I_D=85A
- R_{DS(on)} : 8.5mΩ (Max) @V_G=10V
- 100% Avalanche Tested

Absolute Maximum Ratings* (T_C=25°C Unless otherwise noted)

Symbol	PARAMETER	Value	Unit
V _{DSS}	Drain-Source Voltage	60	V
I _D	Drain Current	T _C =25°C	85
		T _C =100°C	65
V _{GS(TH)}	Gate Threshold Voltage	±25	V
E _{AS}	Single Pulse Avalanche Energy (note1)	100	mJ
I _{AR}	Avalanche Current (note2)	85	A
P _D	Power Dissipation (T _C =25°C)	200	W
T _j	Junction Temperature(MAX)	150	°C
T _{stg}	Storage Temperature	-55~+150	°C
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	PARAMETER	Typ.	MAX.	Unit
R _{θJC}	Thermal Resistance, Junction to Case	-	0.63	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	-	62.5	°C/W

Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	60	-	-	V
Zero Gate Voltage Drain Current(T _C =25°C)	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
Zero Gate Voltage Drain Current(T _C =125°C)	I _{DSS}	V _{DS} =48V, V _{GS} =0V	-	-	10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	-	4	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =40A	-	7.5	8.5	mΩ
Dynamic Characteristics						
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =40A	-	105	-	S
Input Capacitance	C _{iss}	V _{DS} =35V, V _{GS} =0V, F=1.0MHz	-	3091	-	PF
Output Capacitance	C _{oss}		-	292	-	PF
Reverse Transfer Capacitance	C _{rss}		-	219	-	PF
Total Gate Charge	Q _g	V _{DS} =32V, I _D =40A , V _{GS} =10V	-	72	-	nC
Gate-Source Charge	Q _{gs}		-	17	-	nC
Gate-Drain Charge	Q _{gd}		-	26	-	nC
Switching times						
Turn-on Delay Time	t _{d(on)}	V _{DD} =32V, I _D =40A, R _L =15Ω V _{GS} =10V, R _G =2.7Ω	-	13	-	nS
Turn-on Rise Time	t _r		-	75	-	nS
Turn-Off Delay Time	t _{d(off)}		-	46	-	nS
Turn-Off Fall Time	t _f		-	73	-	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I _{SD}		-	-	85	A
Pulsed Source-drain current(Body Diode)	I _{SDM}		-	-	300	A
Forward on voltage ^(Note 1)	V _{SD}	T _J =25°C, I _{SD} =85A, V _{GS} =0V	-	-	1.5	V
Reverse Recovery Time ^(Note 1)	t _{rr}	T _J =25°C, I _F =85A, di/dt=100A/μs	-	36	-	nS
Reverse Recovery Charge ^(Note 1)	Q _{rr}		-	43	-	nC
Forward Turn-on Time	t _{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L _S +L _D)				

Notes 1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting T_J=25°C

Typical Electrical and Thermal Characteristics (curves)

Fig 1: Output Characteristics

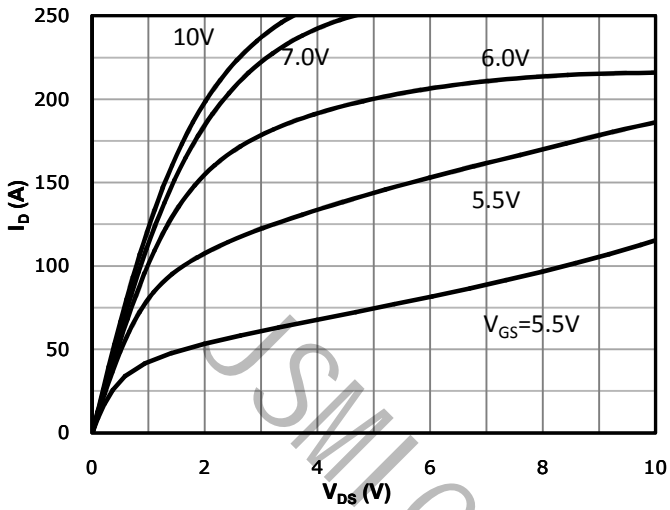


Fig 2: Transfer Characteristics

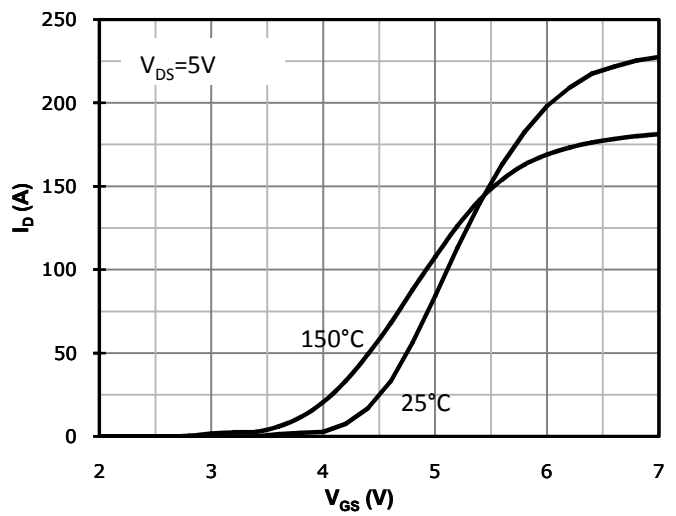


Fig 3: Rds(on) vs Drain Current and Gate Voltage

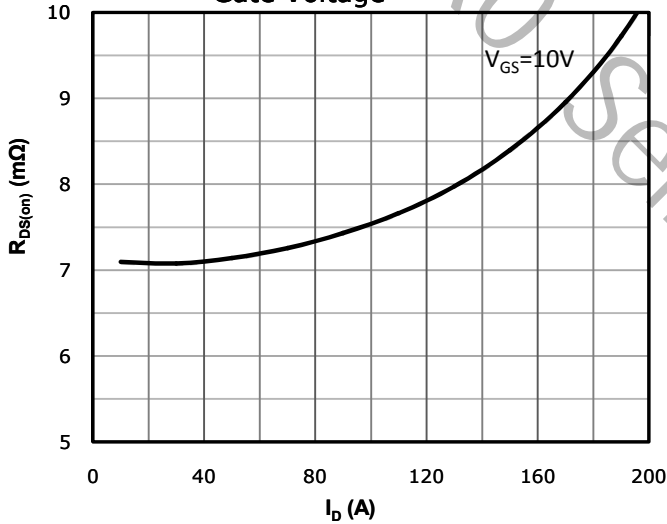


Fig 4: Rds(on) vs Gate Voltage

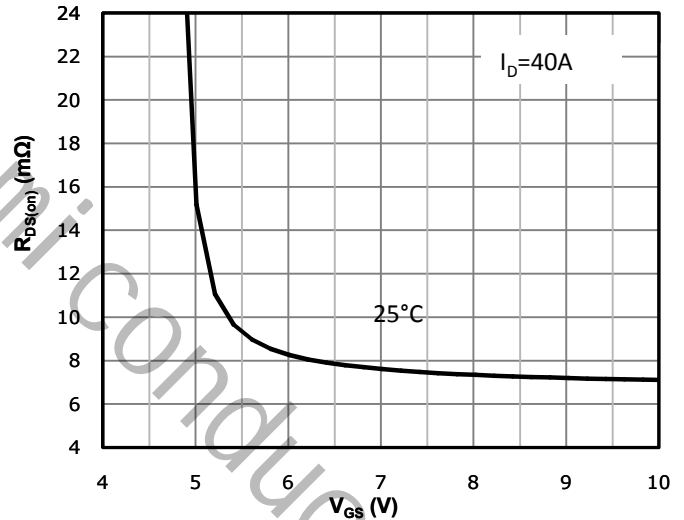


Fig 5: Rds(on) vs. Temperature

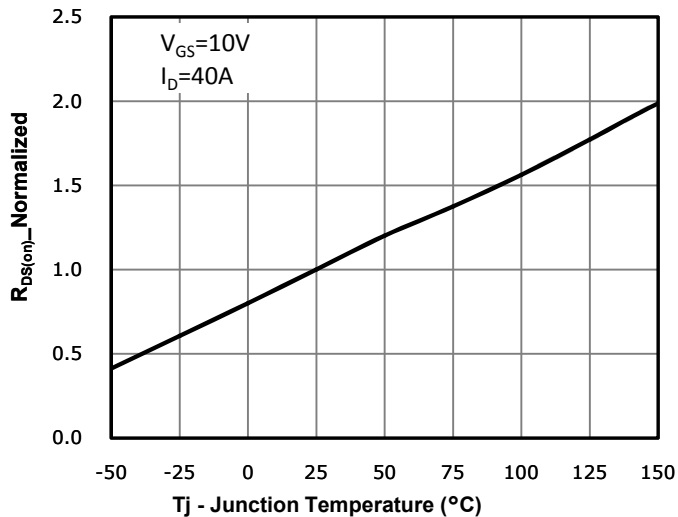


Fig 6: Capacitance Characteristics

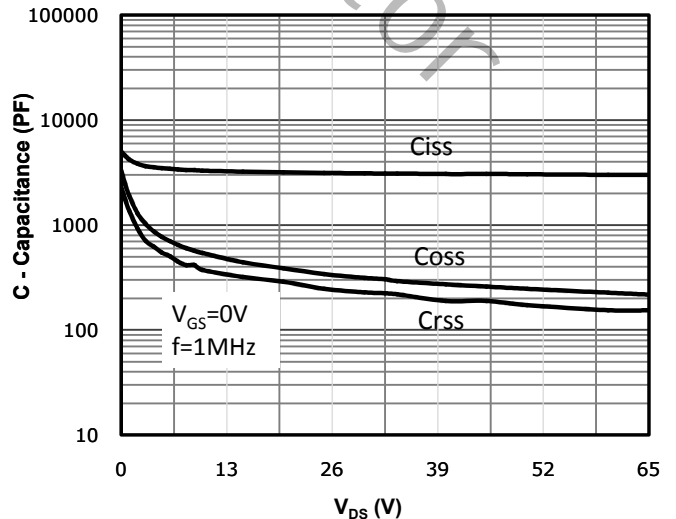


Fig 7: Gate Charge Characteristics

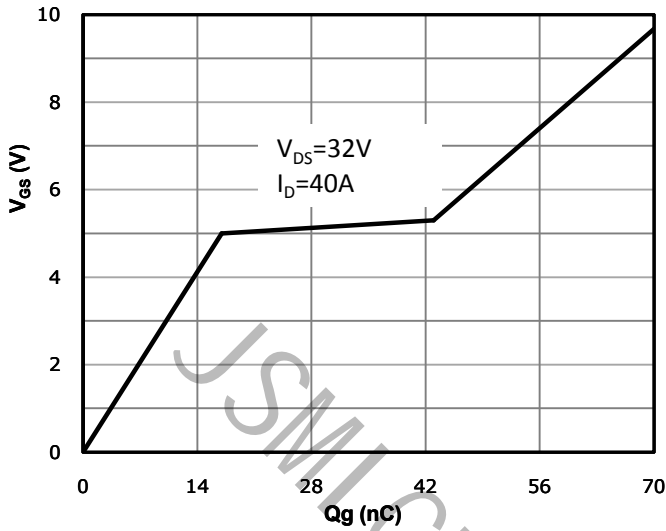


Fig 8: Body-diode Forward Characteristics

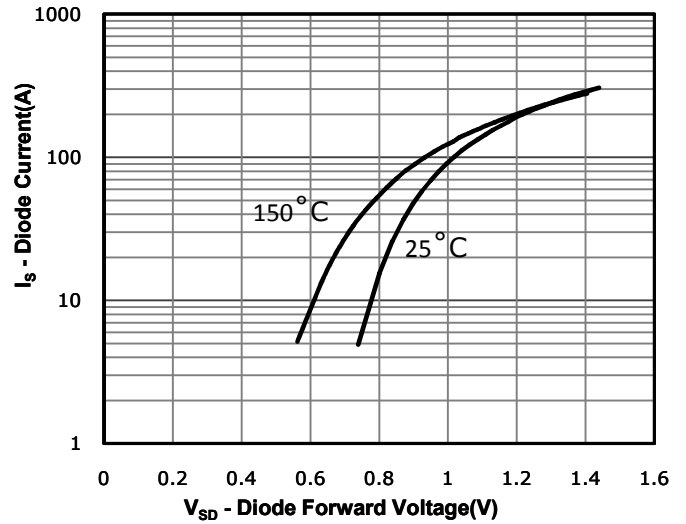


Fig 9: Power Dissipation

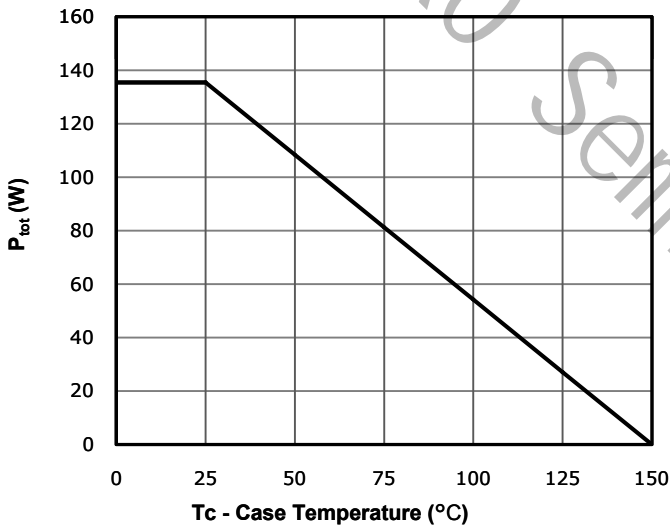


Fig 10: Drain Current Derating

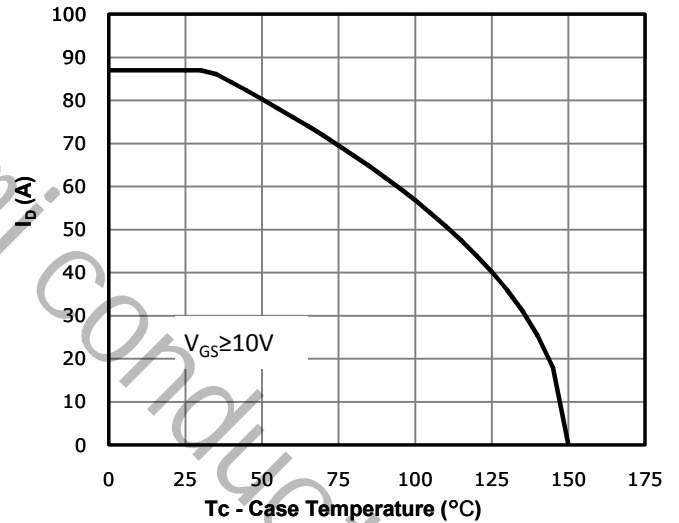


Fig 11: Safe Operating Area

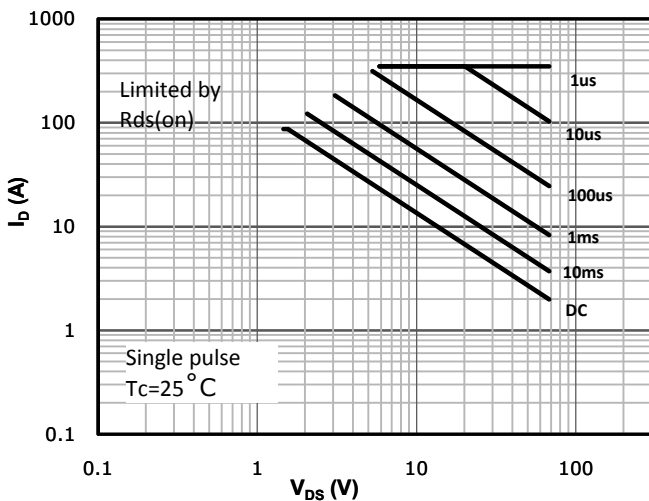
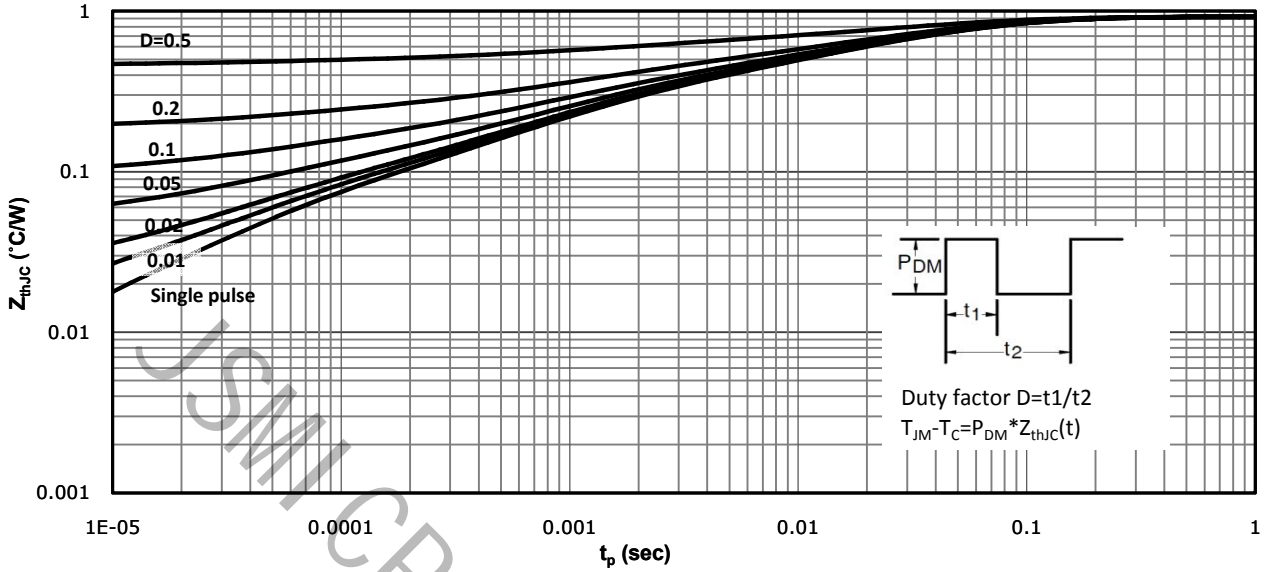
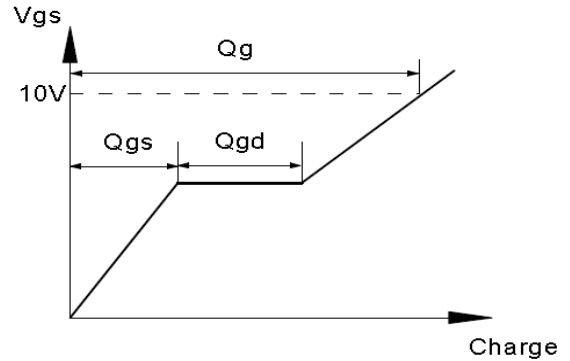
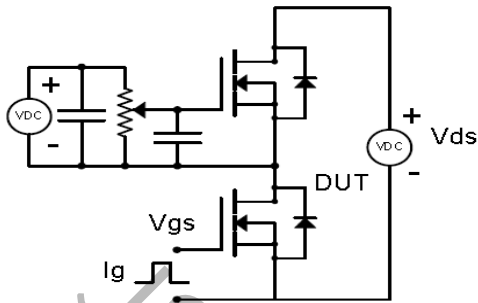


Fig 12: Max. Transient Thermal Impedance

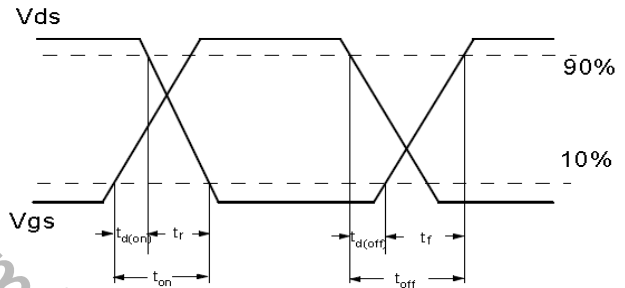
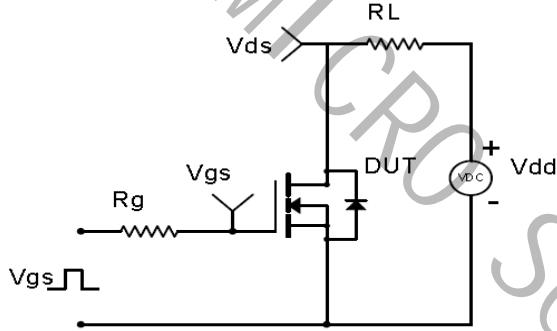


Test Circuit & Waveform

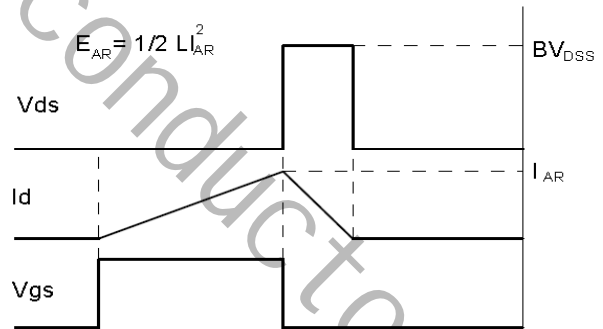
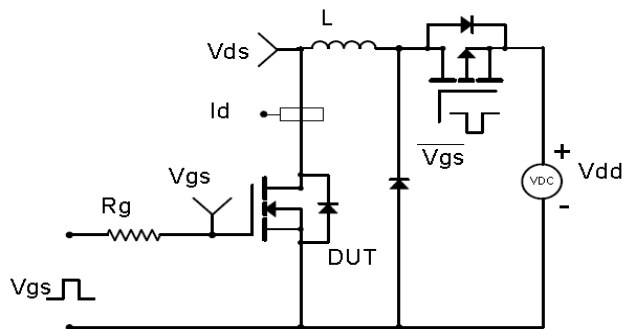
Gate Charge Test Circuit & Waveform



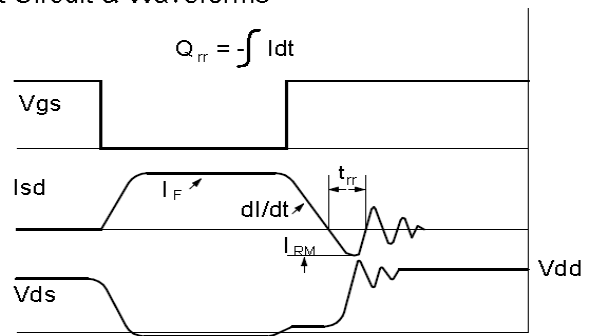
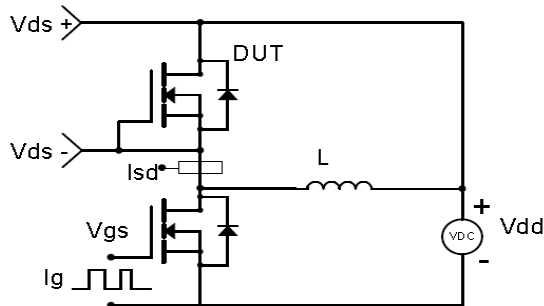
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

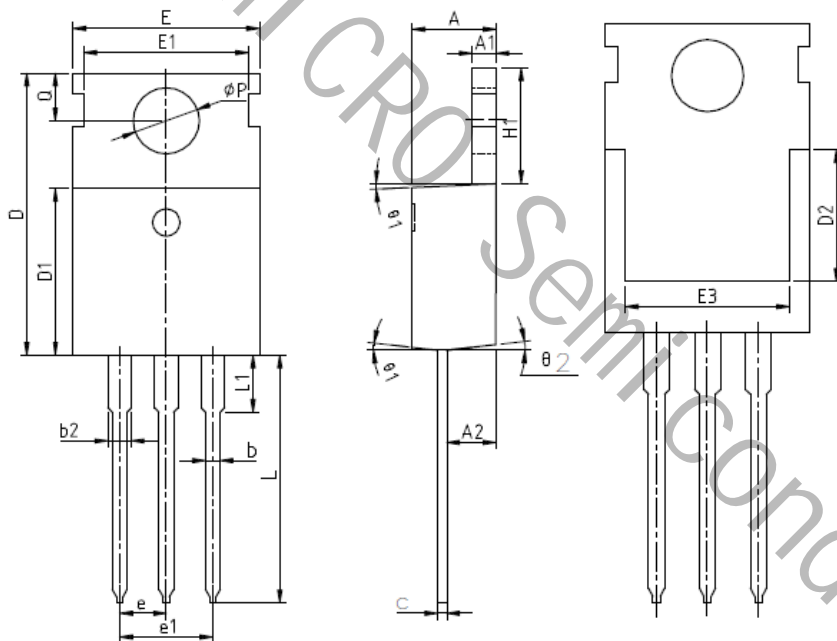


Diode Recovery Test Circuit & Waveforms



Package Dimension

TO-220



SYMBOL	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	9.65	10.00	10.35
E3	7.00	8.00	8.40
e	2.54 BSC		
e1	5.08 BSC		
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
φP	3.45	3.60	3.75
Q	2.60	2.80	3.00
Q1	4°	7°	10°
Q2	0	3°	6°