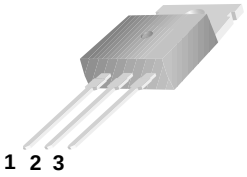
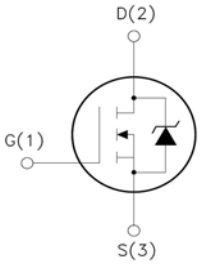
TO-220

RoHS COMPLIANT



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



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

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Absolute Maximum Ratings* (Tc=25℃ Unless otherwise noted)

Symbol	PARAMETER		Value	Unit
V_{DSS}	Drain-Source Voltage		60	V
I_D	Drain Current	T_C=25℃	85	A
		T_C=100℃	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 (Tc=25℃)		200	W
T_j	Junction Temperature(MAX)		150	℃
T_{stg}	Storage Temperature		-55~+150	℃
TL	Maximum lead temperature for soldering purpose,1/8” from case for 5 seconds		300	℃

Thermal Characteristics

Symbol	PARAMETER	Typ.	MAX.	Unit
$R_{\theta JC}$	Thermal Resistance,Junction to Case	-	0.63	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	-	62.5	℃/W

Electrical Characteristics (T_C=25℃ 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(Tc=25℃)	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	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_{lss}	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}	Tj=25℃,I_{SD}=85A,V_{GS}=0V	-	-	1.5	V
Reverse Recovery Time(Note 1)	t_{rr}	Tj=25℃,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 Tj=25℃

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Typical Electrical and Thermal Characteristics (curves)

Fig 1: Output Characteristics

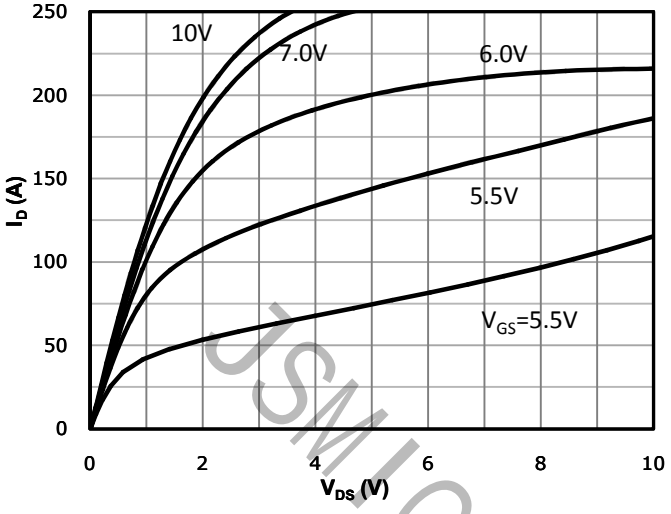

Fig 2: Transfer Characteristics

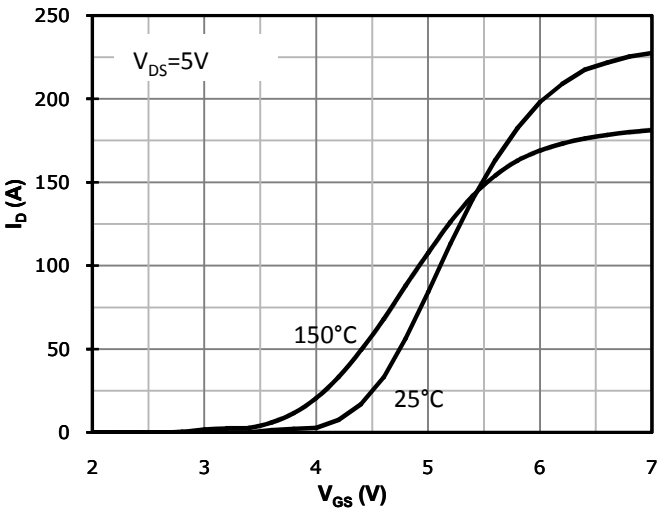

Fig 3: Rds(on) vs Drain Current and Gate Voltage

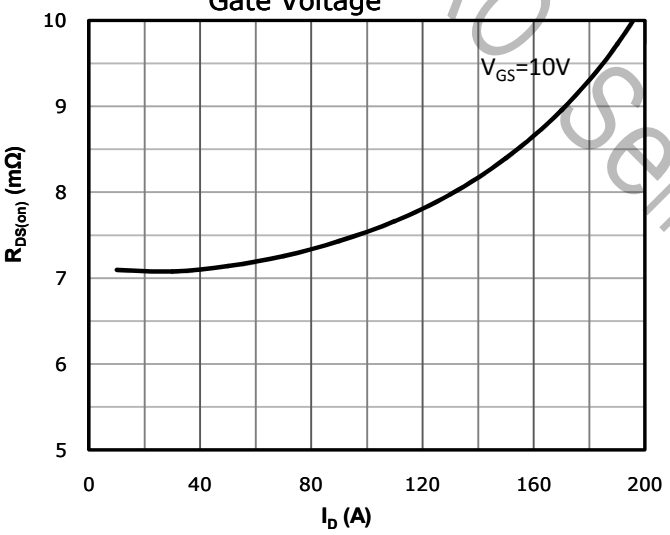

Fig 4: Rds(on) vs Gate Voltage

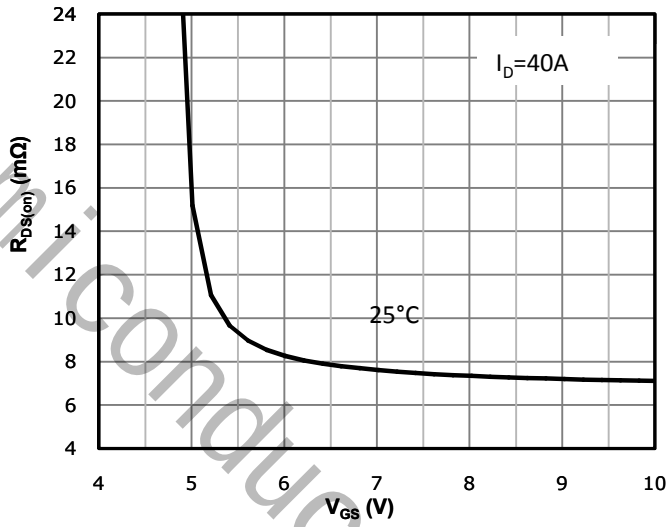

Fig 5: Rds(on) vs. Temperature

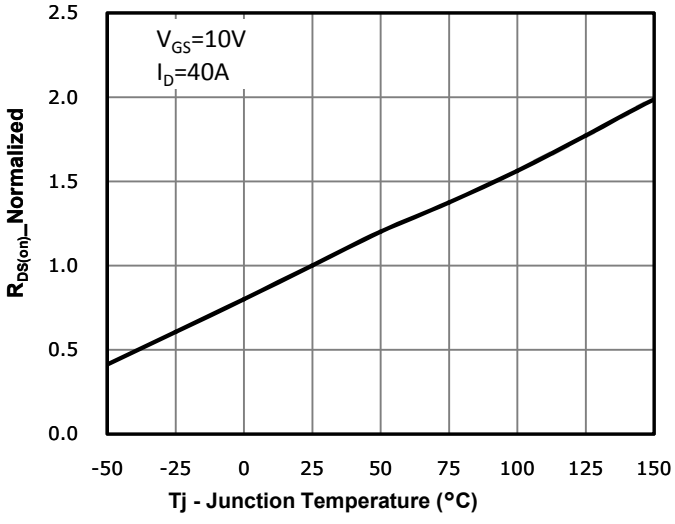

Fig 6: Capacitance Characteristics

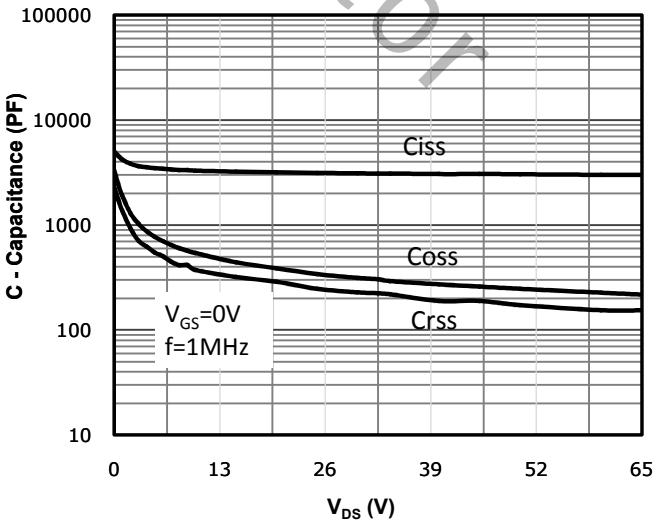

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Fig 7: Gate Charge Characteristics

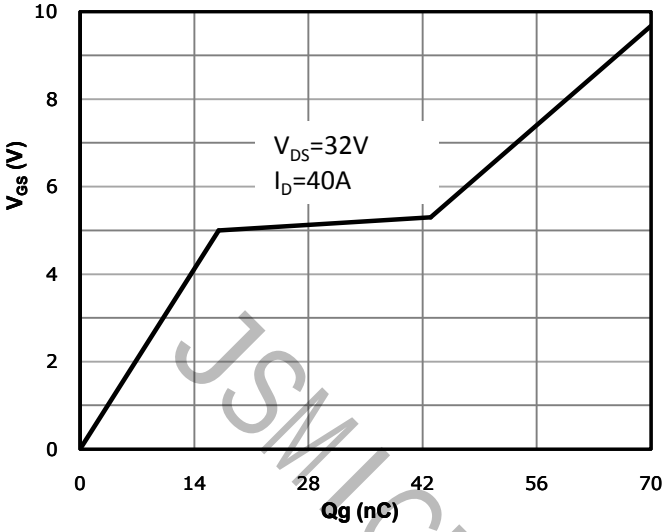

Fig 8: Body-diode Forward Characteristics

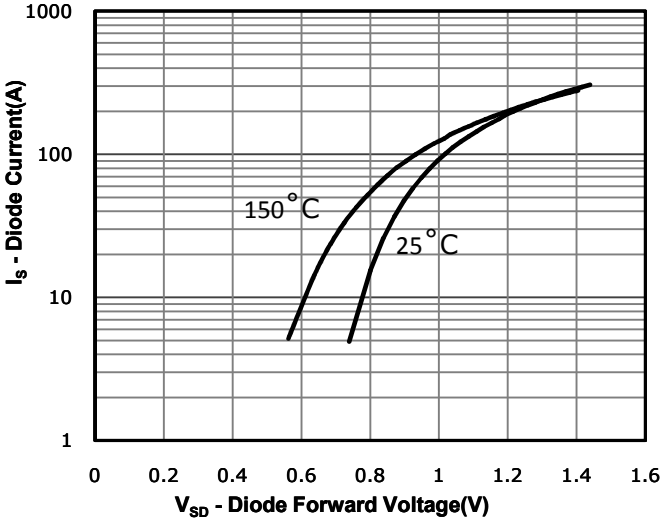

Fig 9: Power Dissipation

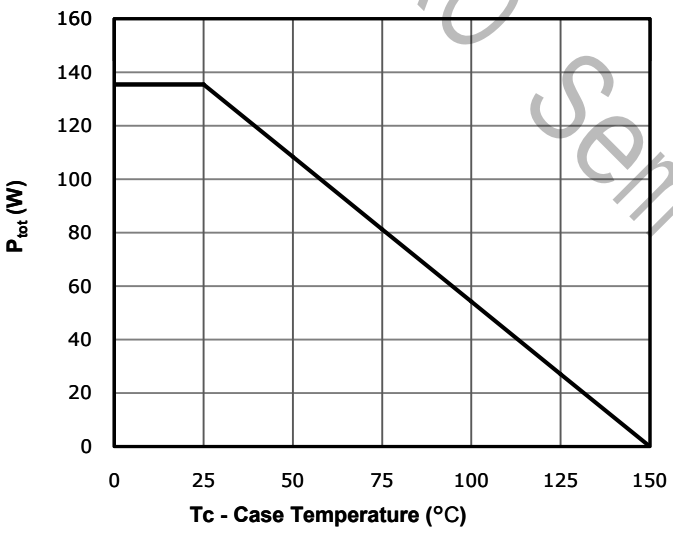

Fig 10: Drain Current Derating

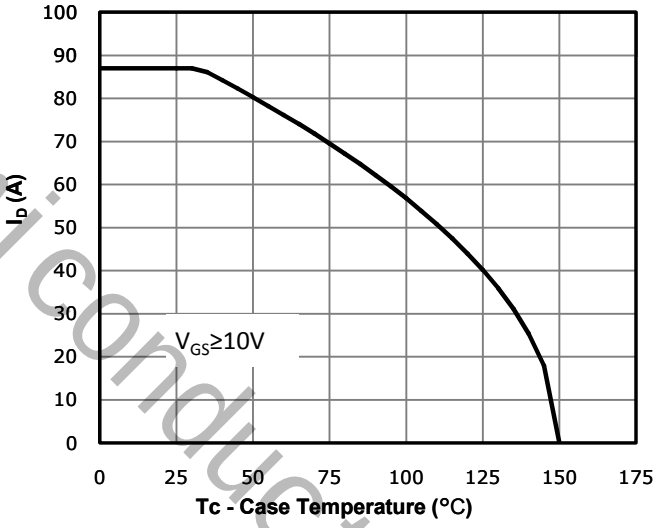

Fig 11: Safe Operating Area

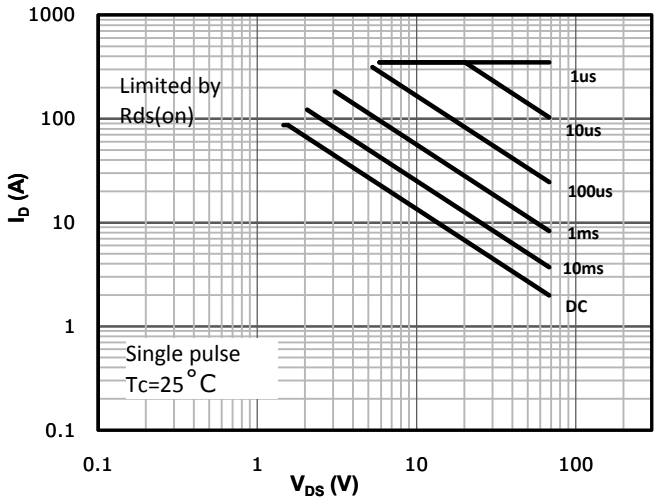

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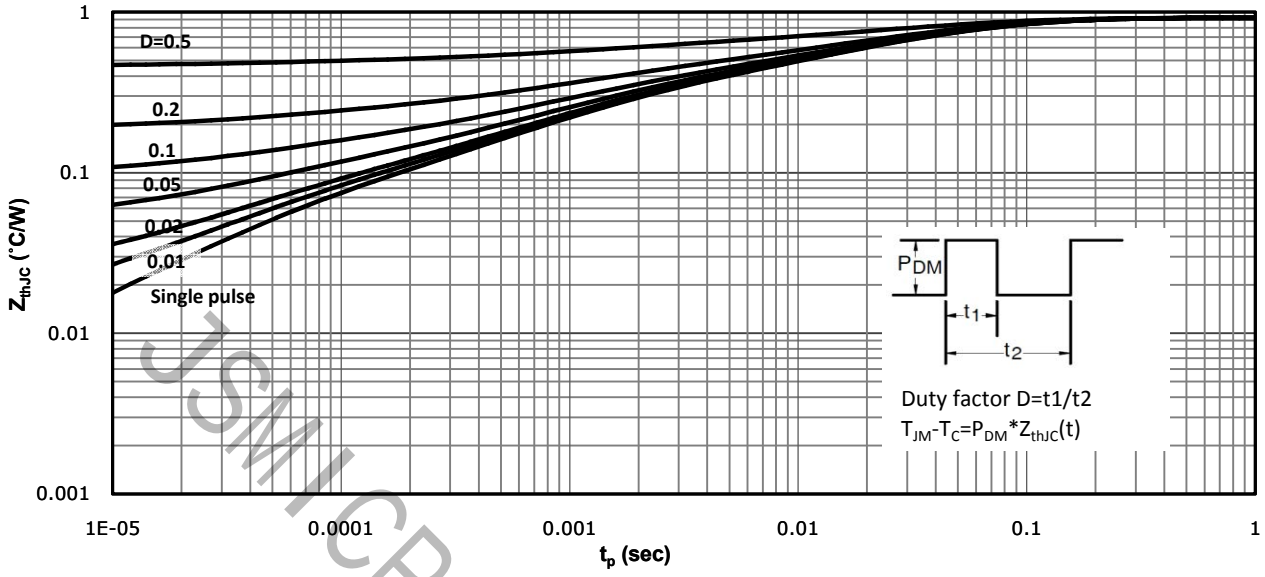
Fig 12: Max. Transient Thermal Impedance



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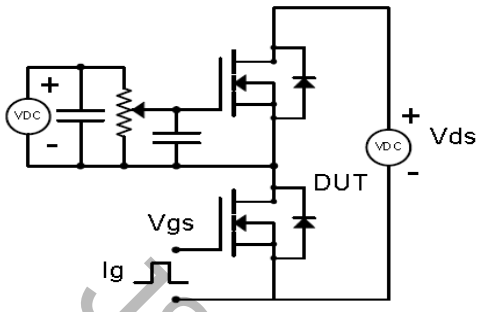
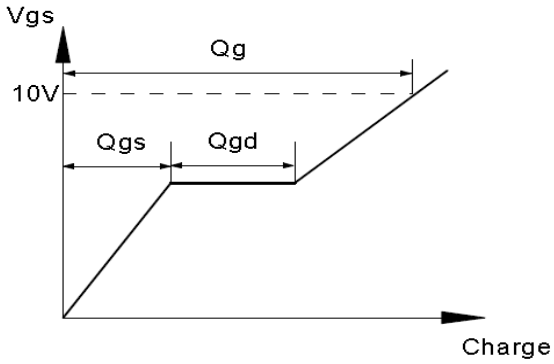
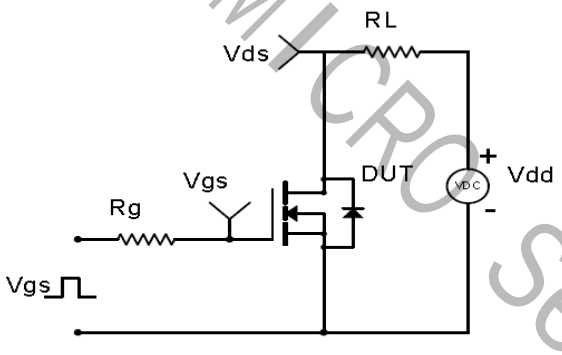
Test Circuit & Waveform

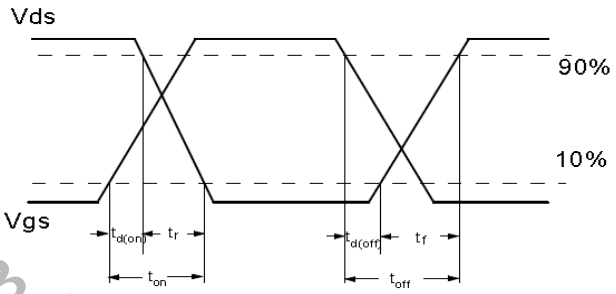
Gate Charge Test Circuit & Waveform



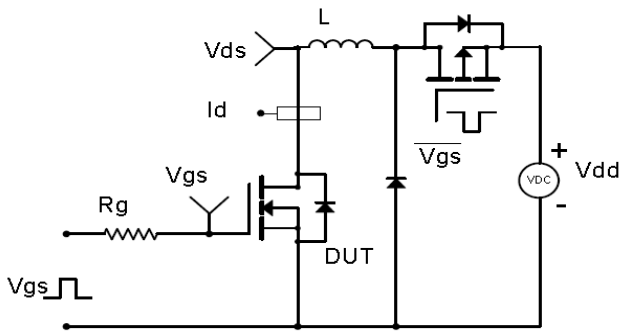


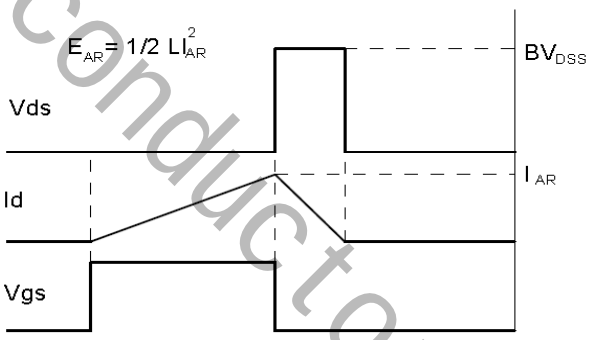
Resistive Switching Test Circuit & Waveforms



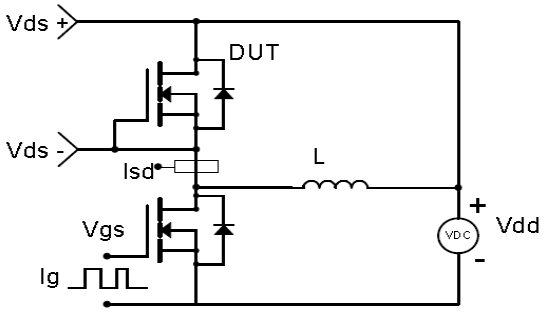


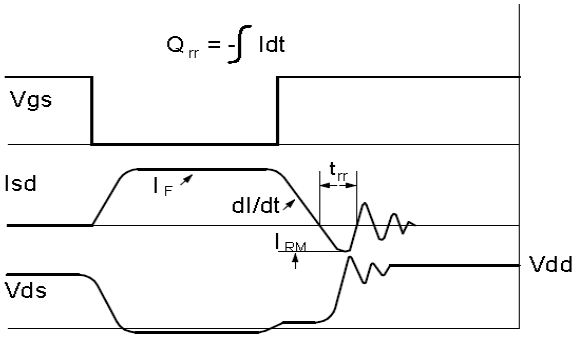
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





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Package Dimension

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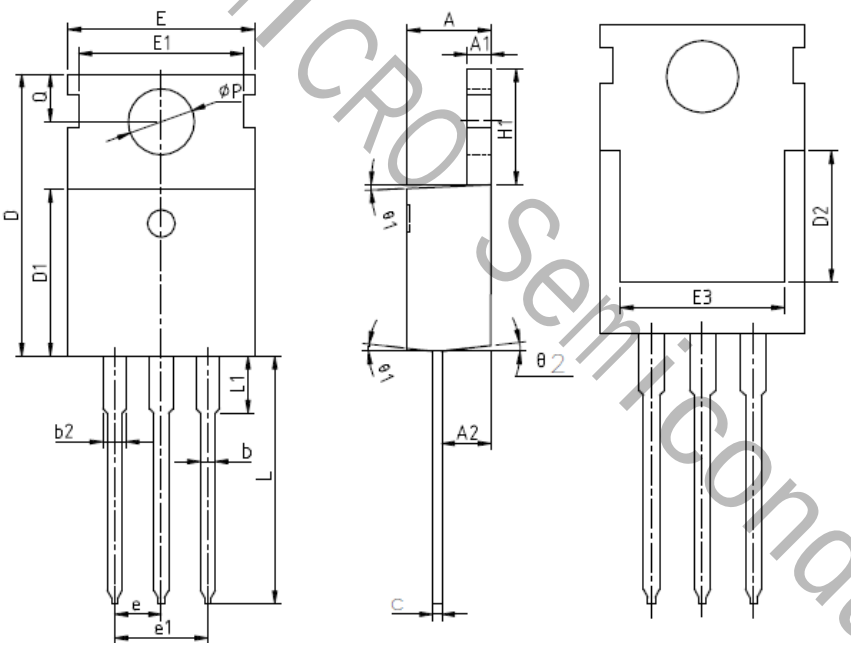

SYMBOL	MIN	NOM	MAX
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b2	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	–	8.70	–
E2	9.65	10.00	10.35
E3	7.00	8.00	8.40
e		2.54 BSC	
e1		5.08 BSC	
H1	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	–	3.10	3.40
ΦP	3.45	3.60	3.75
Q	2.60	2.80	3.00
θ1	4°	7°	10°
θ2	0°	3°	6°

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