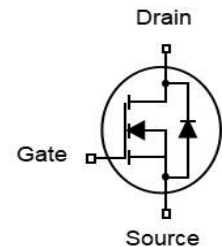


Features

- N-Channel
- Advanced Trench Technology
- Excellent Gate Charge \times $R_{DS(on)}$ (FOM)
- low on -resistance
- RoHS compliant
- Halogen -free
- 100% EAS Tested

V_{DS}	30	V
$R_{DS(on),TYP@ V_{GS}=10V}$	2.5	m Ω
$R_{DS(on),TYP@ V_{GS}=4.5V}$	4.0	m Ω
I_D	155	A

TO-252



Part ID	Package Type	Marking	Packing
ZT020N03D	TO-252	ZT020N03D	2500pcs/reel

Absolute Maximum Ratings $T_A = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage	± 20	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	30	V	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_{DM}	Drain Current-Continuous@ Current-Pulsed (Note 3)	$T_C = 25^\circ\text{C}$ 620	A	
Mounted on Large Heat Sink				
I_D	Drain Current-Continuous (Note 2)	$T_C = 25^\circ\text{C}$	155	A
		$T_C = 100^\circ\text{C}$	100	A
P_D	Maximum Power Dissipation	136	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.9	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	42	$^\circ\text{C/W}$	
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed (Note 1)	347	mJ	

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

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J=25°C (unless otherwise stated)						
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	--	--	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.6	2.5	V
RDS(on)	Drain-Source On-State Resistance	V _{GS} =10V, I _D =30A	--	2.5	3.3	mΩ
RDS(on)	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =20A	--	4.0	5.8	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
Ciss	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	--	3315	--	pF
Coss	Output Capacitance		--	473	--	pF
Crss	Reverse Transfer Capacitance		--	433	--	pF
Rg	Gate Resistance	f=1MHz	--	1.7	--	Ω
Qg	Total Gate Charge	V _{DS} =15V, I _D =30A, V _{GS} =10V	--	66	--	nC
Qgs	Gate-Source Charge		--	9.6	--	nC
Qgd	Gate-Drain Charge		--	13.1	--	nC
Switching Characteristics						
Td(on)	Turn-on Delay Time	V _{DS} =15V, I _D =30A, R _G =3.0Ω, V _{GS} =10V	--	5.1	--	ns
Tr	Turn-on Rise Time		--	24.8	--	ns
Td(off)	Turn-Off Delay Time		--	32.6	--	ns
Tf	Turn-Off Fall Time		--	23.9	--	ns
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
IS	Diode Forward Current		--	--	155	A
VSD	Forward on voltage	I _S =30A, V _{GS} =0V	--	--	1.2	V
Trr	Reverse Recovery Time	T _J =25°C, I _F =20A	--	22	--	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	11	--	nC

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 20V, I_{AS} = 20A, R_G = 25 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics Diagrams

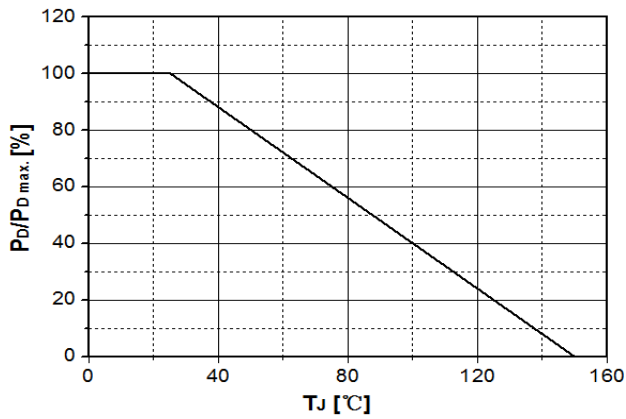


Fig.1 Power Dissipation Derating Curve

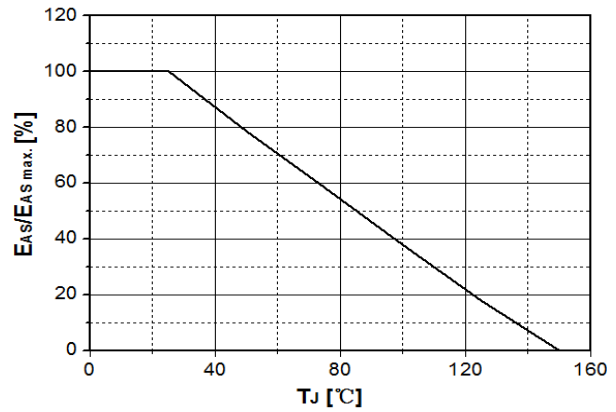


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

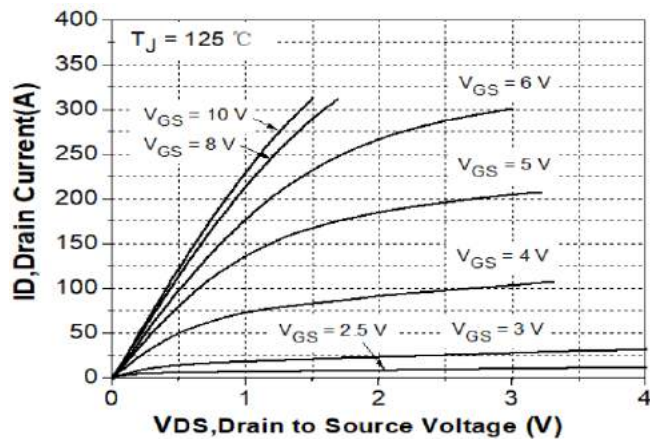


Figure 3: On-Region Characteristics

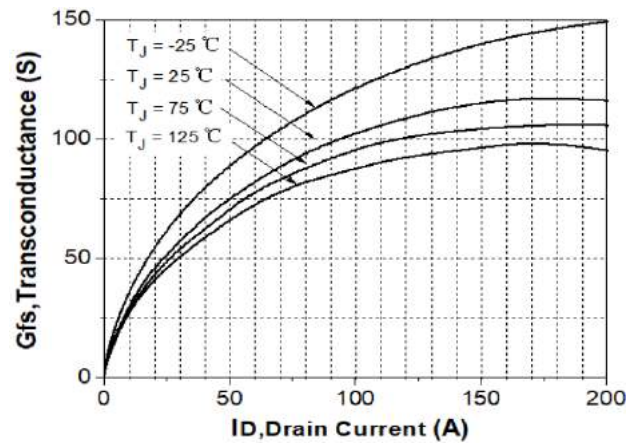


Fig. 4 Transconductance vs. Drain Current

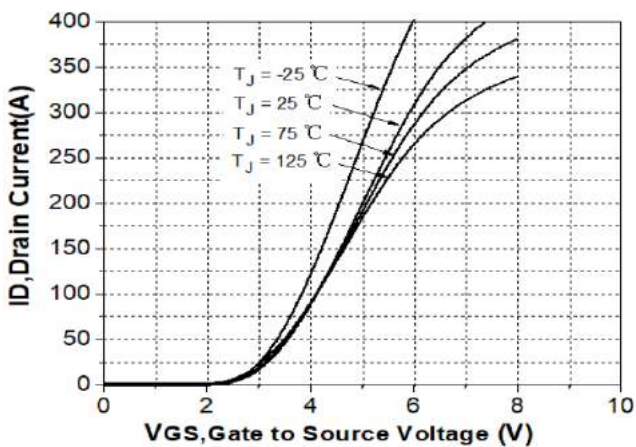


Figure 5: Transfer Characteristics

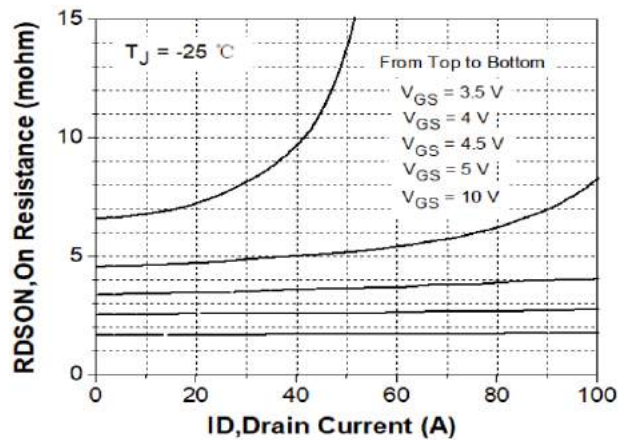


Fig. 6 State Resistance vs. Drain Current @25°C

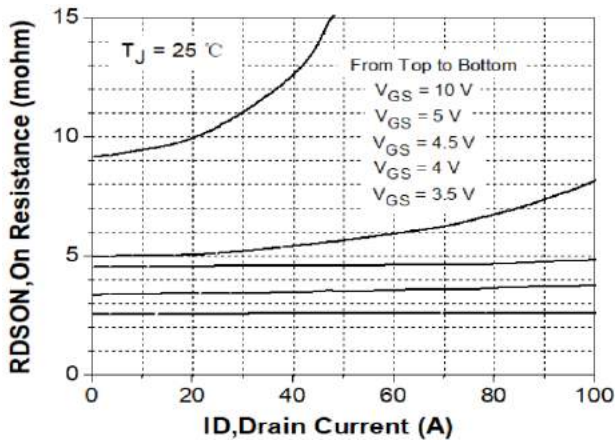


Fig.7 State Resistance vs. Drain Current @25°C

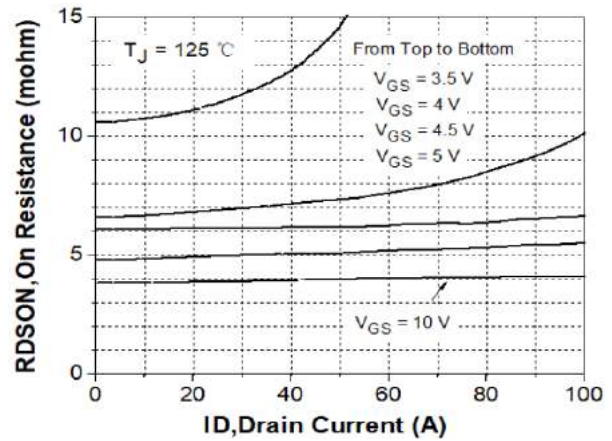


Fig. 8 State Resistance vs. Drain Current @125°C

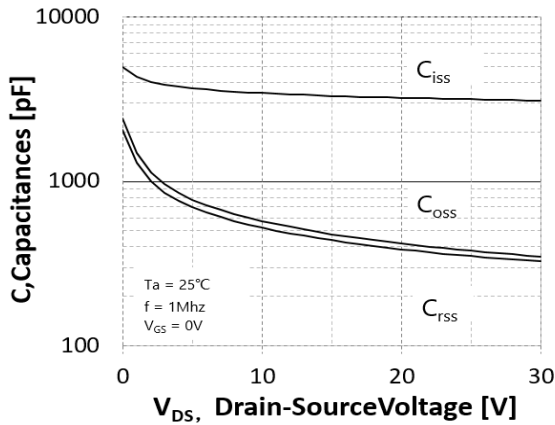


Fig.9 Typical Capacitance vs. Drain Source Voltage

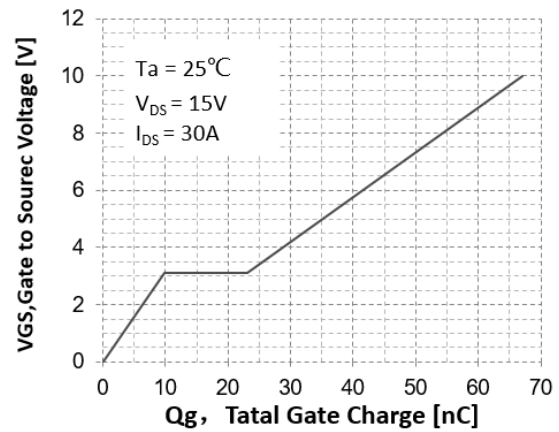


Fig.10 Dynamic Input Characteristics

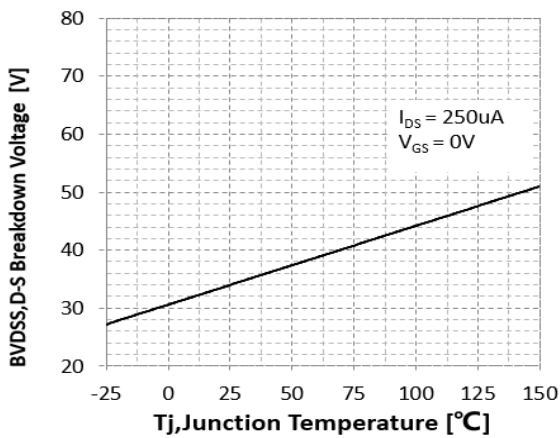


Fig.11 Breakdown Voltage vs. Junction Temperature

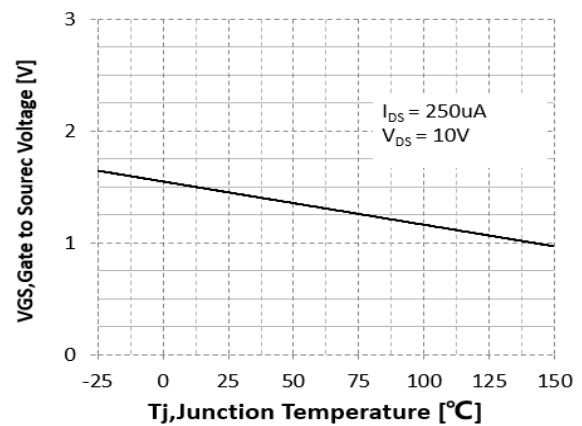


Fig. 12 Gate Threshold Voltages. Junction Temperature

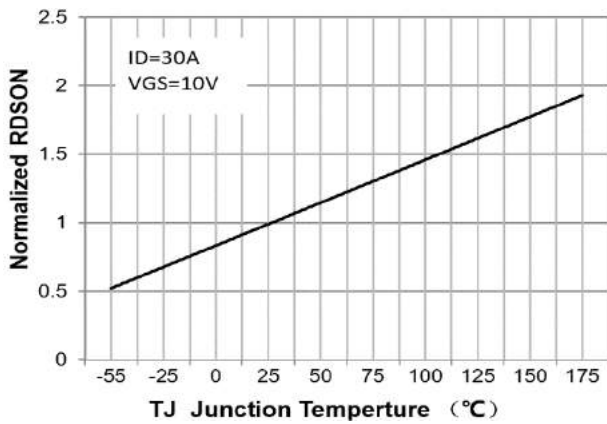


Fig.13 On-Resistance Variation vs. Junction Temperature

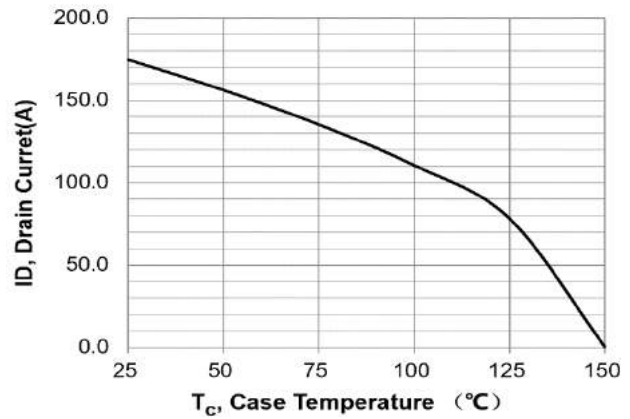


Fig.14 Maximum Drain Current vs Case Temperature

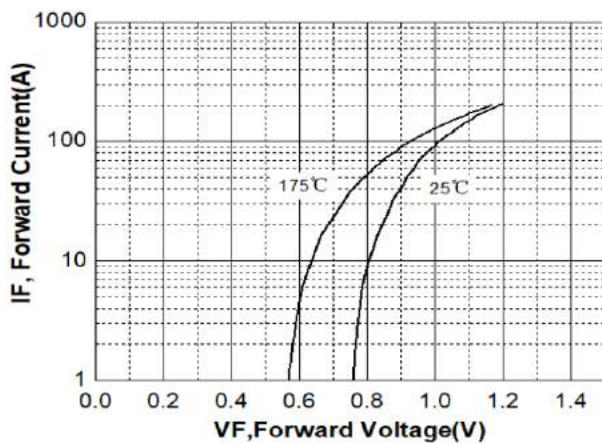


Fig.15 Body Diode Forward Voltage Vs Reverse Drain Current

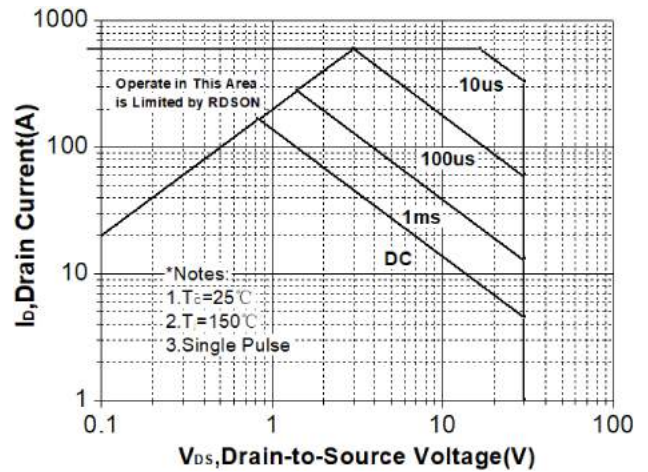


Fig.16 Safe Operating Area

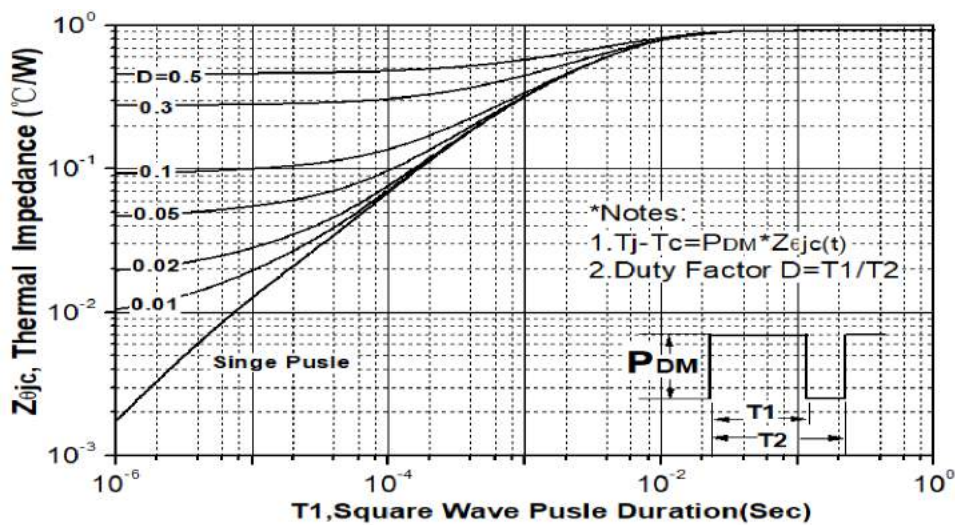
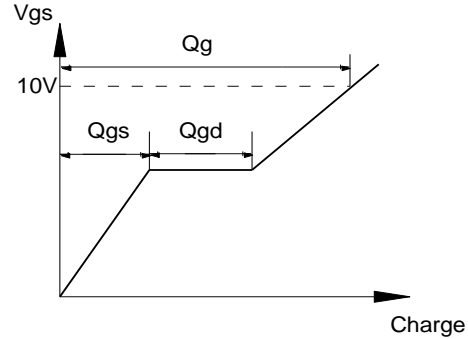
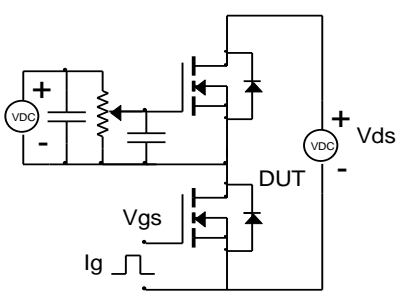


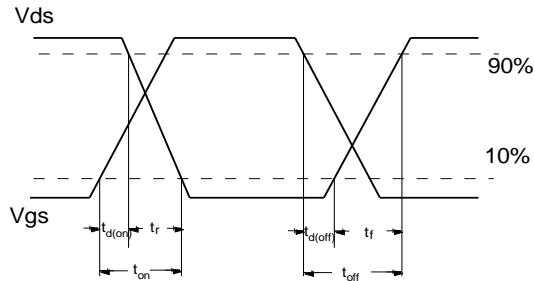
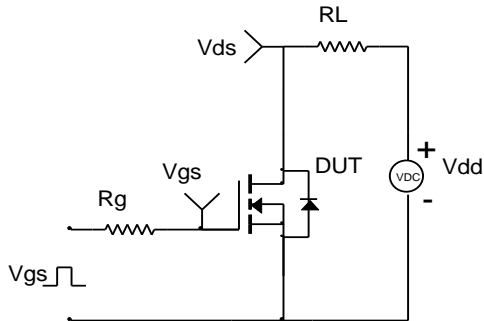
Fig. 17 Transient Thermal Response Curve

Test Circuit and Waveform

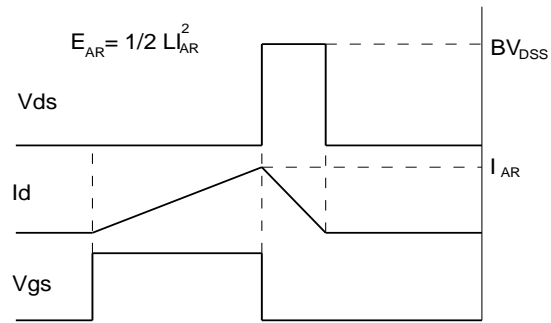
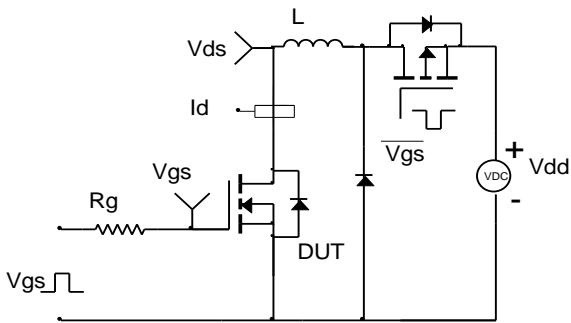
Gate Charge Test Circuit & Waveform



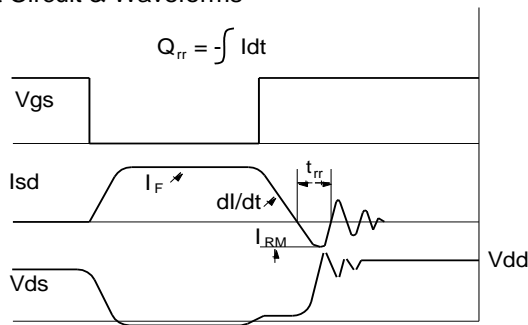
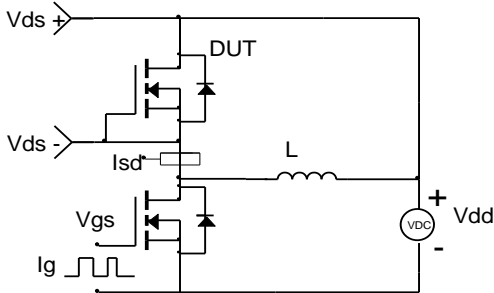
Resistive Switching Test Circuit & Waveforms



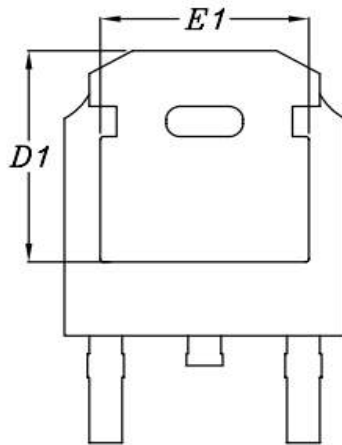
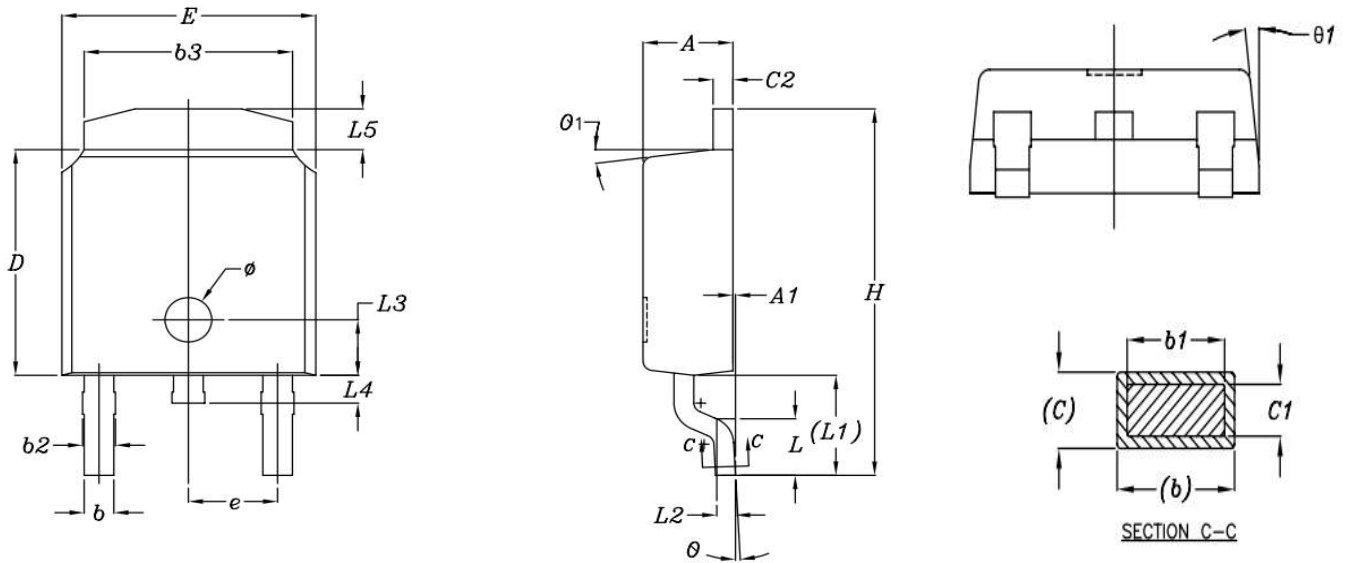
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



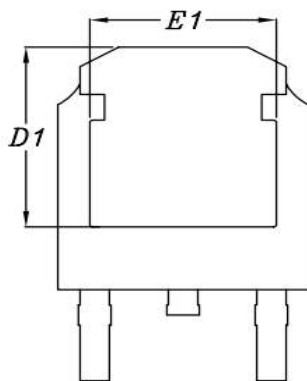
Diode Recovery Test Circuit & Waveforms



TO-252 Package Information



Option(1)
Standard PAD



Option(2)
Large PAD

I T E M	DIMENSIONS			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.18	2.39	0.086	0.094
A1	—	0.13	—	0.005
b	0.70	0.89	0.028	0.035
b1	0.70	0.86	0.028	0.034
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c1	0.41	0.56	0.016	0.022
c2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	—	0.205	—
E	6.35	6.73	0.250	0.265
E1	4.32	—	0.170	—
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L1	2.60	2.90	0.102	0.114
L2	0.51 BSC		0.020 BSC	
L3	1.65	1.95	0.065	0.077
L4	0.60	0.90	0.024	0.035
L5	0.89	1.27	0.035	0.050
∅	1*	5*	1*	5*
∅1	7* REF		7* REF	
∅	1.20 REF		1.20 REF	

Customer Service

Sales and Service:

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