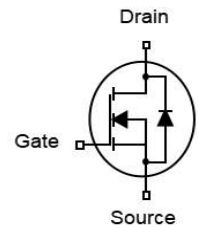


Features

- N-Channel
- Good stability and uniformity
- Excellent package for good heat dissipation
- 100% Avalanche Tested
- 100% EAS Tested

V_{DS}	20	V
$R_{DS(on),TYP@ V_{GS}=10V}$	4.5	m Ω
$R_{DS(on),TYP@ V_{GS}=4.5V}$	4.8	m Ω
I_D	60	A

TO-252



Part ID	Package Type	Marking	Packing
ZT045N02D	TO-252	ZT045N02D	2500pcs/reel

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings (T_c=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage	±12	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	20	V	
T_J	Maximum Junction Temperature	150	°C	
T_{STG}	Storage Temperature Range	-55 to 150	°C	
I_{DM}	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_C = 25^\circ C$ 240	A	
Mounted on Large Heat Sink				
I_D	Drain Current-Continuous	$T_C = 25^\circ C$	60	A
		$T_C = 100^\circ C$	39	A
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	40.26	W
		$T_C = 100^\circ C$	0.54	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.1	°C/W	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	71.4	°C/W	
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed (Note 2)	66	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	20	--	--	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =19.5V, V _{GS} =0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4	0.7	1.0	V
RDS(on)	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =25A	--	4.5	6.0	mΩ
RDS(on)	Drain-Source On-State Resistance	V _{GS} =2.5V, I _D =15A	--	4.8	7.0	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
Ciss	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	--	1890	--	pF
Coss	Output Capacitance		--	286	--	pF
Crss	Reverse Transfer Capacitance		--	280	--	pF
Qg	Total Gate Charge	V _{DS} =10V, I _D =25A, V _{GS} =4.5V	--	23.1	--	nC
Qgs	Gate-Source Charge		--	2.8	--	nC
Qgd	Gate-Drain Charge		--	7.5	--	nC
Switching Characteristics						
Td(on)	Turn-on Delay Time	V _{DS} =10V, I _D =25A, R _G =3Ω, V _{GS} =4.5V	--	6.4	--	ns
Tr	Turn-on Rise Time		--	28.2	--	ns
Td(off)	Turn-Off Delay Time		--	48.4	--	ns
Tf	Turn-Off Fall Time		--	22.4	--	ns
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
ISD	Source-Drain Current (Body Diode)		--	--	60	A
VSD	Forward on voltage ^(Note 3)	I _S =25A, V _{GS} =0V	--	--	1.2	V
Trr	Reverse Recovery Time	T _J =25°C, I _F =25A, V _{GS} =0V	--	6.3	--	ns
Qrr	Reverse Recovery Charge	di/dt=500A/μs	--	0.3	--	nC

Notes :

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.E_{AS} condition: T_J=25°C, V_{DD}=40V, V_G=10V, R_G=25Ω, L=0.5mH.
- 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

Typical Electrical And Thermal Characteristics (Curves)

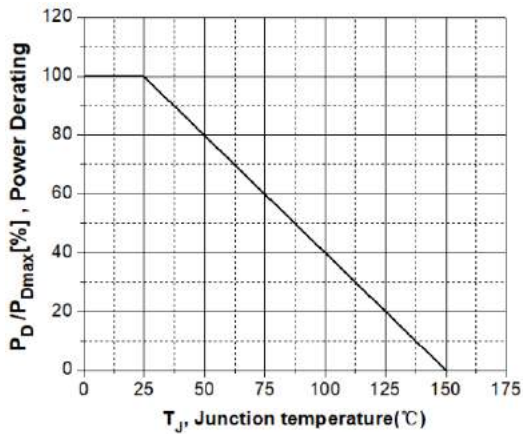


Figure 1: Power Dissipation Derating Curve

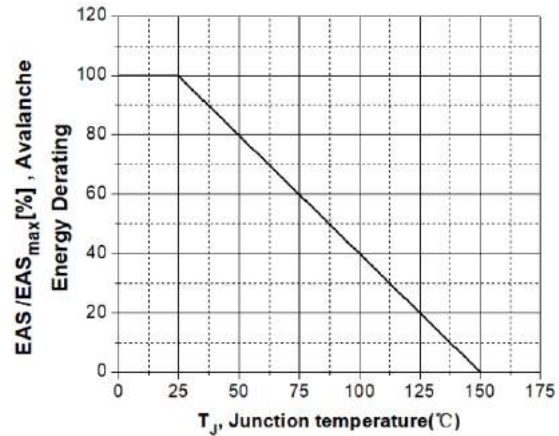


Figure 4: Avalanche Energy Derating Curve vs. Junction Temperature

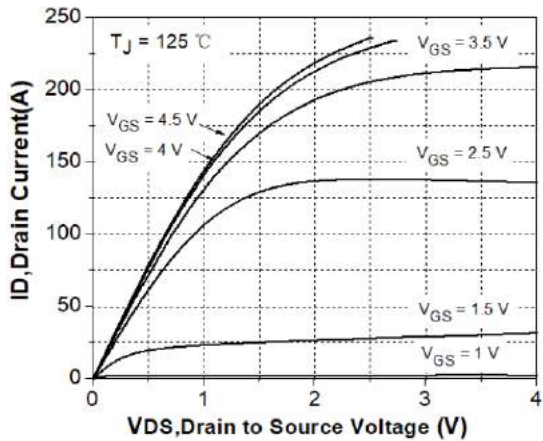


Figure 2: Typical Output Characteristics @Tj=125°C

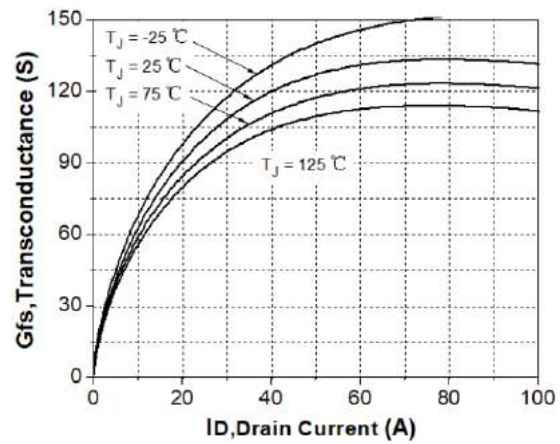


Figure 5: Transconductance vs. Drain Current @Tj= -25/25/75/125°C

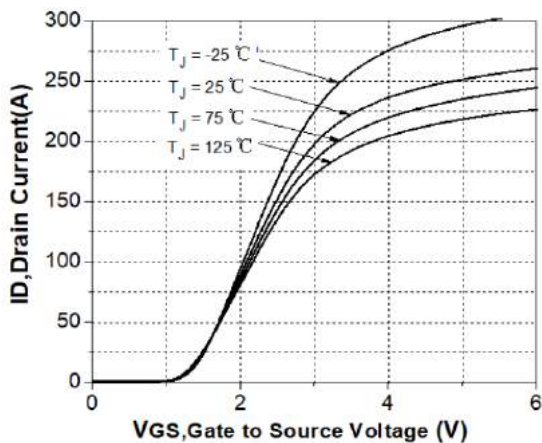


Figure 3: Typical Transfer Characteristics @Tj= -25/25/75/125°C

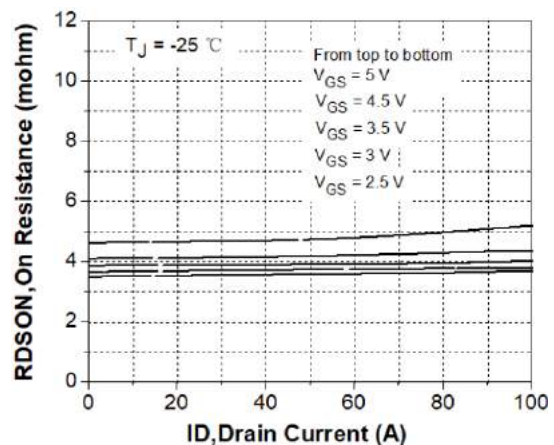


Figure 6: Static Drain - Source On - State Resistance vs. Drain Current @Tj= -25°C

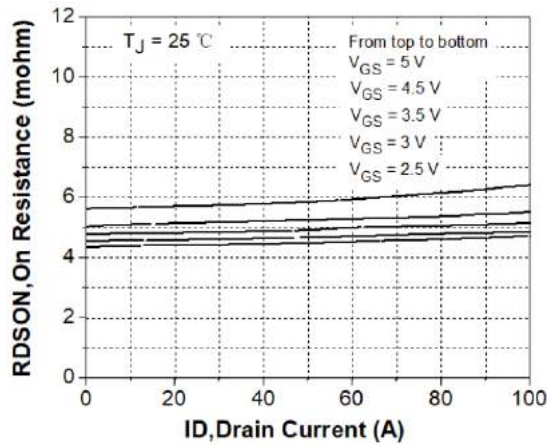


Figure.7:Static Drain - Source On - State Resistance vs. Drain Current @Tj= 25°C

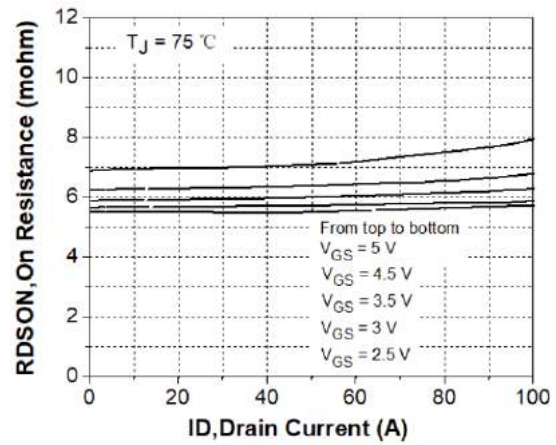


Figure.10 :Static Drain - Source On - State Resistance vs. Drain Current @Tj= 75°C

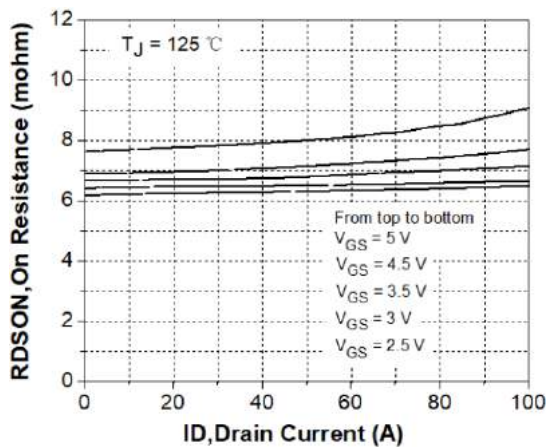


Figure.8:Static Drain - Source On - State Resistance vs. Drain Current @Tj= 125°C

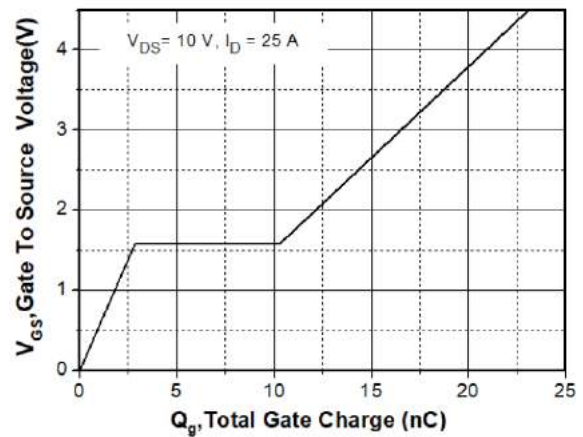


Figure.11:Gate Charge Characteristics

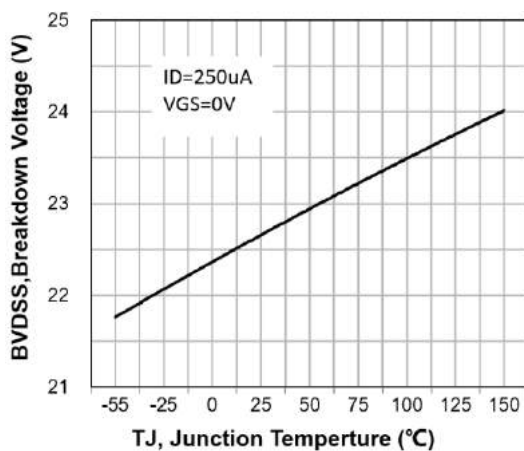


Figure.9 :Breakdown Voltage vs. Junction Temperature

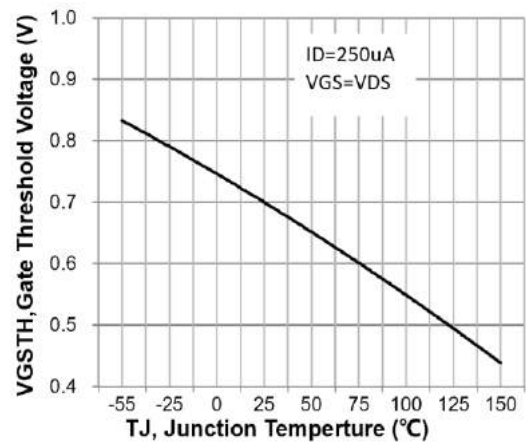


Figure.12:Gate Threshold Voltage vs. Junction Temperature

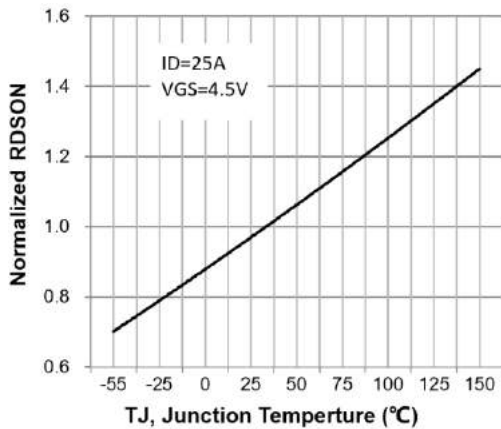


Figure.13: On-Resistance Variation vs. Junction

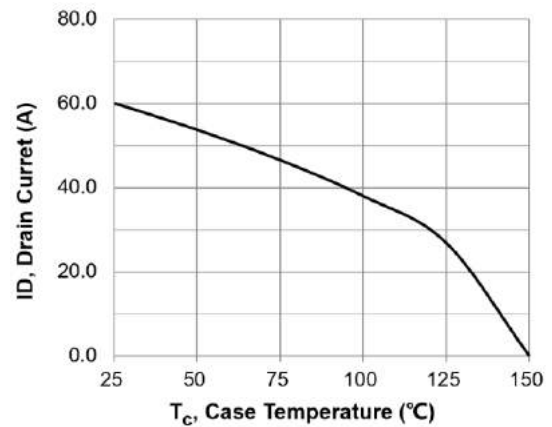


Figure.16: Maximum Drain Current vs. Case Temperature

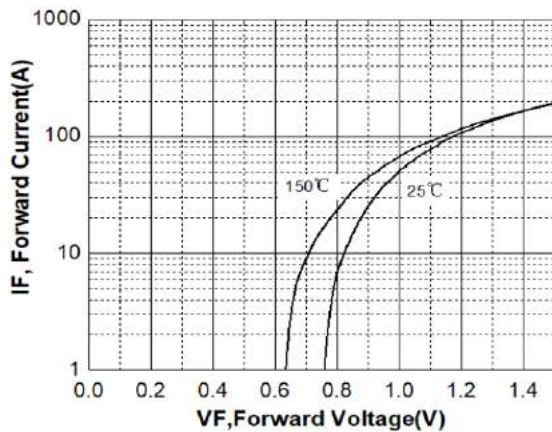


Figure.14: Body Diode Forward Voltage vs. Reverse Drain Current

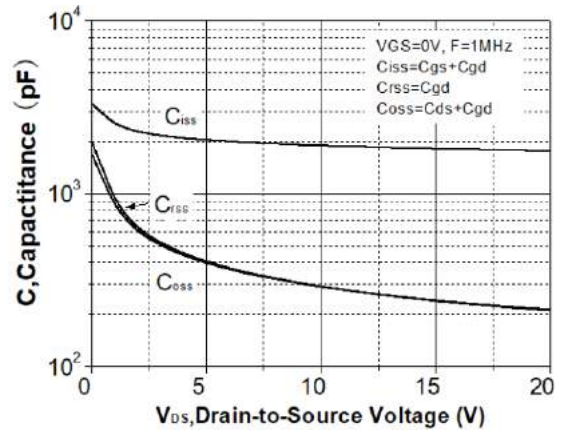


Figure.17: Typical Capacitance Vs. Drain Source Voltage

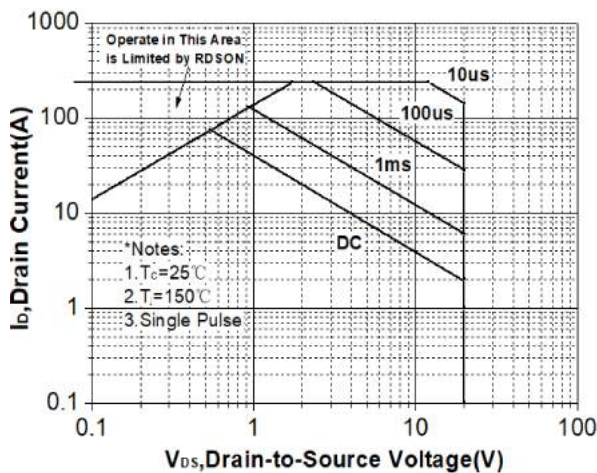


Fig.15 Safe Operating Area

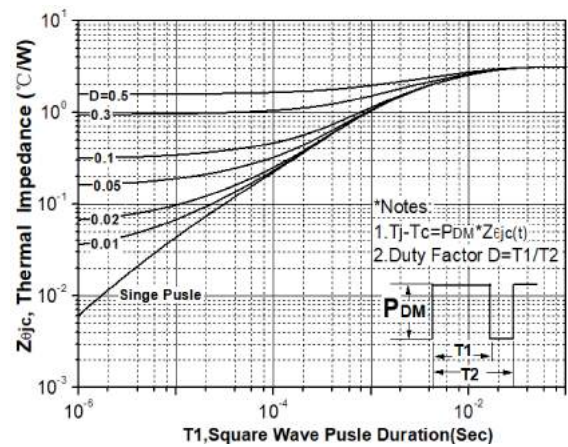
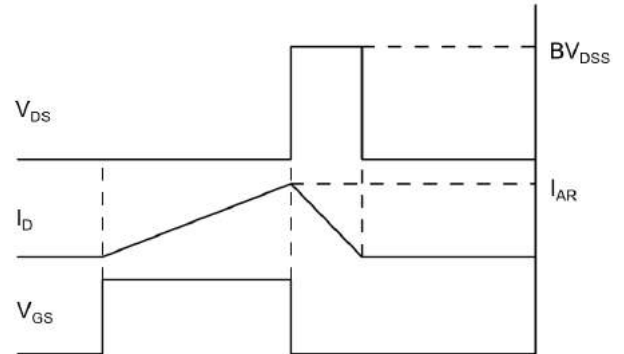
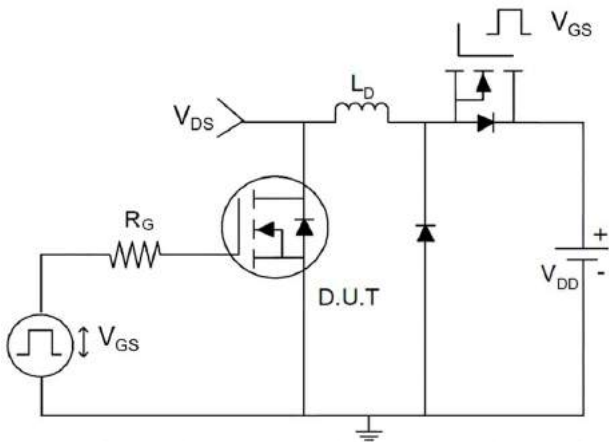


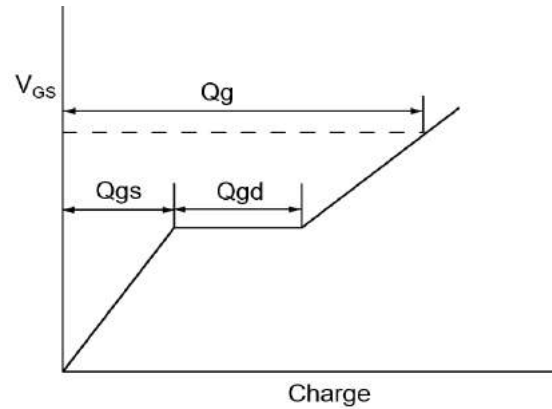
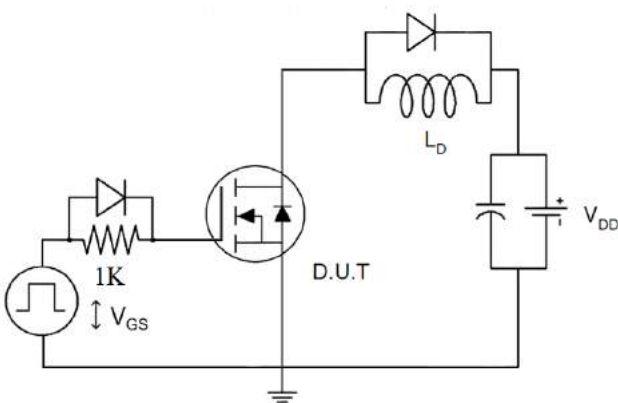
Fig. 18 Transient Thermal Response Curve

Test Circuit

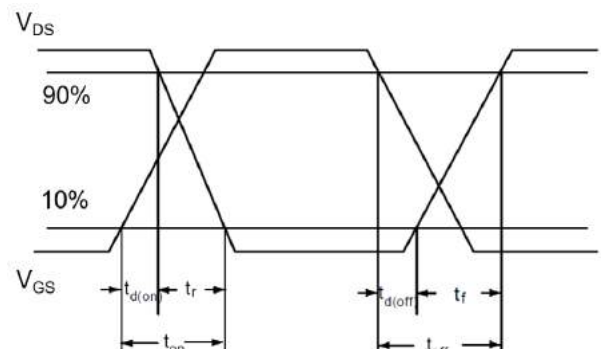
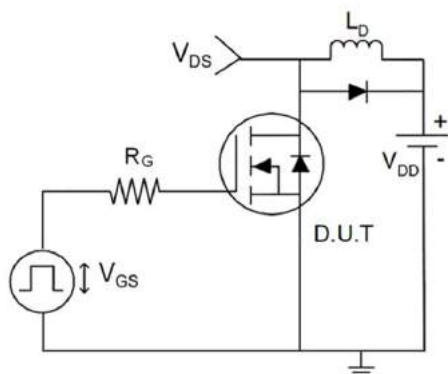
1) E_{AS} Test Circuits



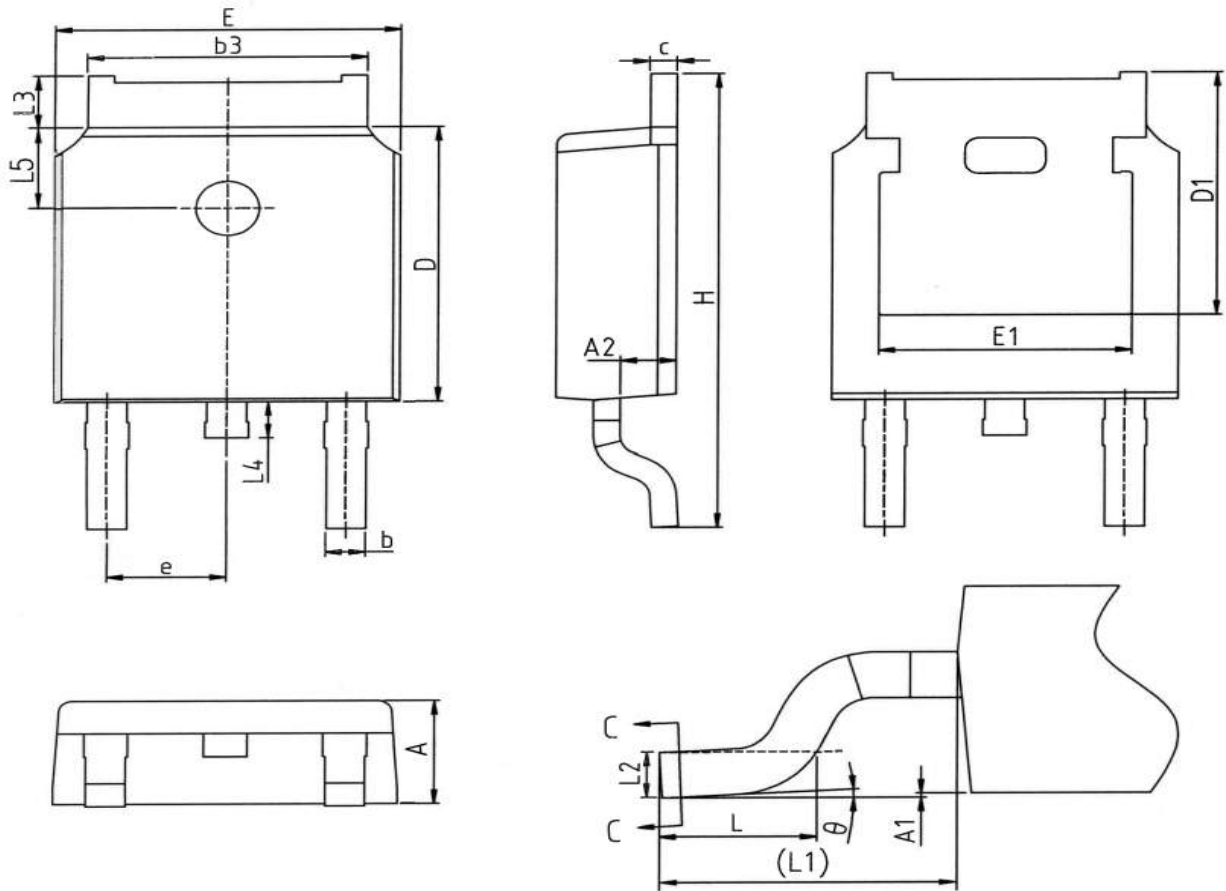
2) Gate Charge Test Circuit



3) Switch Time Test Circuit



TO-252 Package Information



SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.12
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

Customer Service

Sales and Service:

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