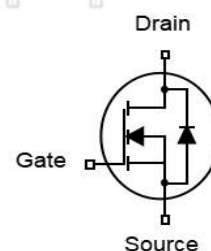


Features

- N-Channel
- Low Crss
- Very low on-resistance RDS(ON)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- 100% EAS Tested

V_{DS}	40	V
$R_{DS(on),TYP@ V_{GS}=10V}$	4.5	mΩ
$R_{DS(on),TYP@ V_{GS}=4.5V}$	6.0	mΩ
I_D	80	A

TO-252



Part ID	Package Type	Marking	Packing
ZT045N04D	TO-252	ZT045N04D	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	40	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)	$T_C = 25^\circ\text{C}$ 320	A	
Mounted on Large Heat Sink				
I_D	Drain Current-Continuous	$T_C = 25^\circ\text{C}$	80	A
		$T_C = 100^\circ\text{C}$	52	A
P_D	Maximum Power Dissipation	77	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.95	°C/W	
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed (Note 2)	104	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	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	--	--	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.4	2.1	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =20A	--	4.5	5.8	mΩ
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =20A	--	6.0	10	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	--	2953	--	pF
C _{oss}	Output Capacitance		--	386	--	pF
C _{rss}	Reverse Transfer Capacitance		--	232	--	pF
R _g	Gate Resistance	f=1MHz	--	1.7	--	Ω
Q _g	Total Gate Charge	V _{DS} =20V, I _D =30A, V _{GS} =10V	--	56	--	nC
Q _{gs}	Gate-Source Charge		--	9	--	nC
Q _{gd}	Gate-Drain Charge		--	11	--	nC
Switching Characteristics						
T _{d(on)}	Turn-on Delay Time	V _{DS} =20V, I _D =30A, R _G =3.0Ω, V _{GS} =10V	--	8	--	ns
T _r	Turn-on Rise Time		--	18	--	ns
T _{d(off)}	Turn-Off Delay Time		--	24	--	ns
T _f	Turn-Off Fall Time		--	14	--	ns
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
I _S	Diode Forward Current		--	--	80	A
V _{SD}	Forward on voltage ^(Note 3)	I _S =20A, V _{GS} =0V	--	--	1.2	V
T _{rr}	Reverse Recovery Time	T _J =25°C, I _F =20A,	--	22	--	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	--	11	--	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J =25°C, V_{DD} =20V, V_G =10V, R_G =25Ω, L=0.5mH.
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N- Channel Typical Characteristics

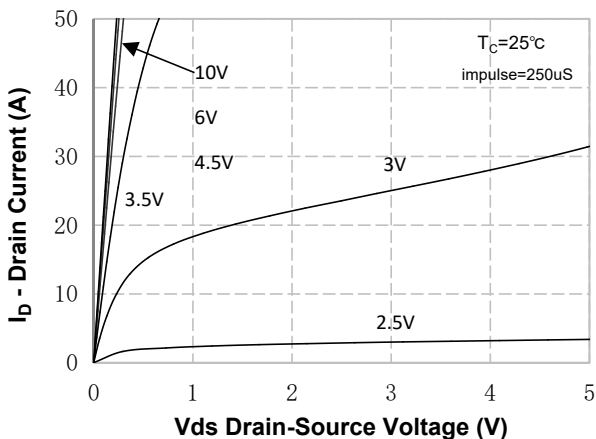


Figure 1. On-Region Characteristics

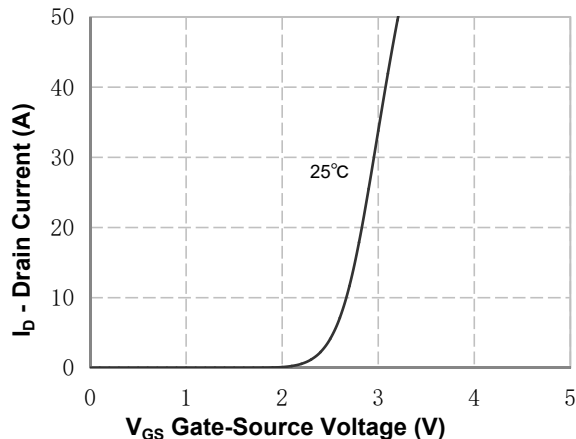


Figure 4. Transfer Characteristics

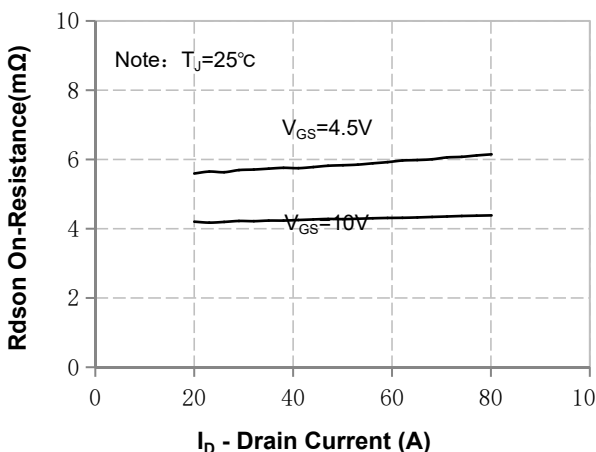


Figure 2. On-Resistance Variation vs Drain Current and Gate Voltage

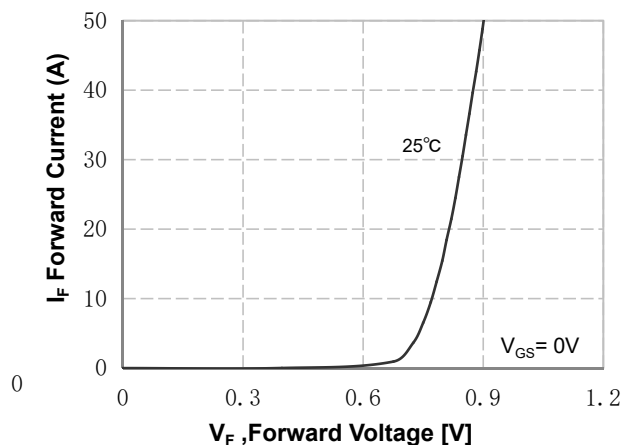


Figure 5. Body Diode Forward Voltage Variation with Source Current

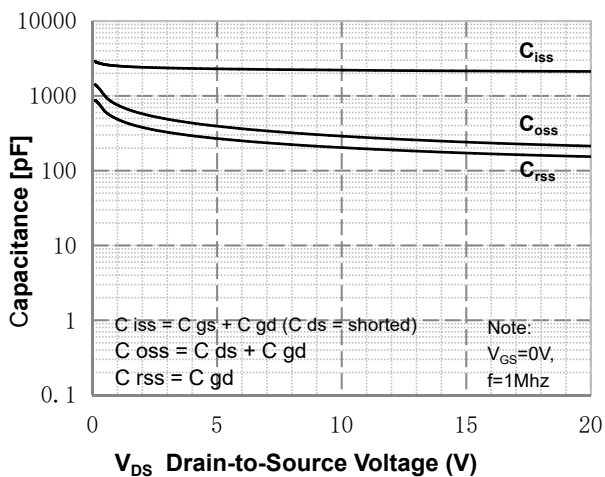


Figure 3. Capacitance Characteristics

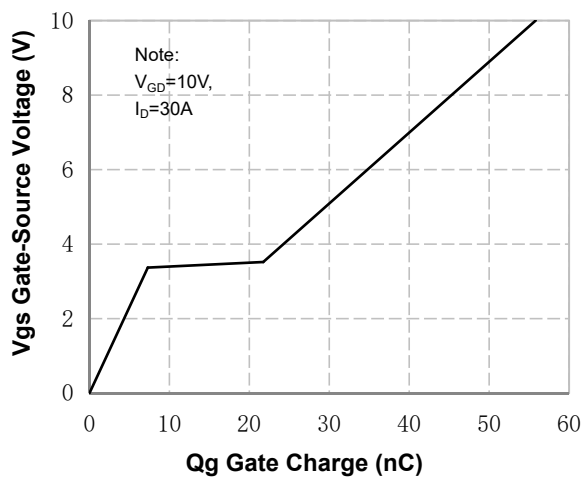


Figure 6. Gate Charge Characteristics

N Channel Typical Characteristics (Continued)

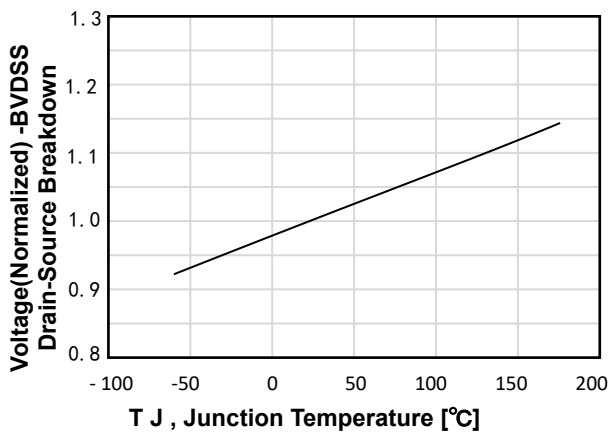


Figure 7. Breakdown Voltage Variation vs Temperature

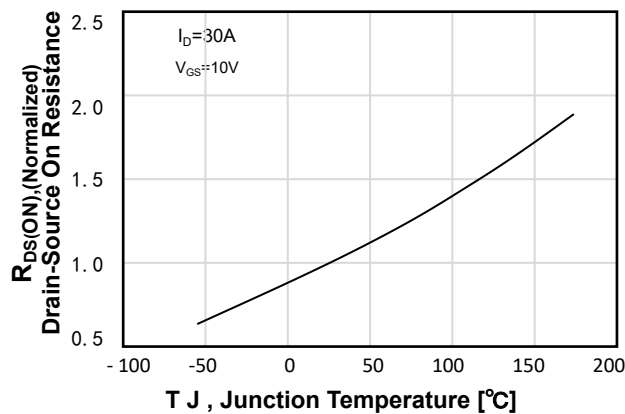


Figure 9. On-Resistance Variation vs Temperature

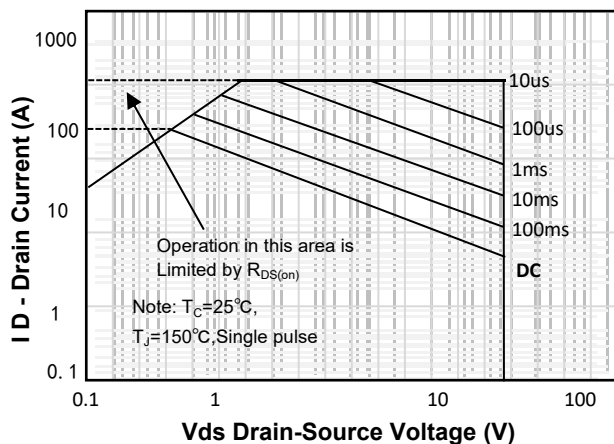


Figure 8. Maximum Safe Operating Area

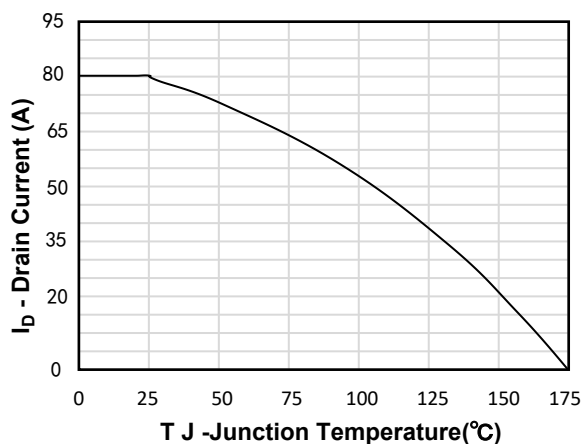


Figure 10. V_DS Drain VS Junction Temperature

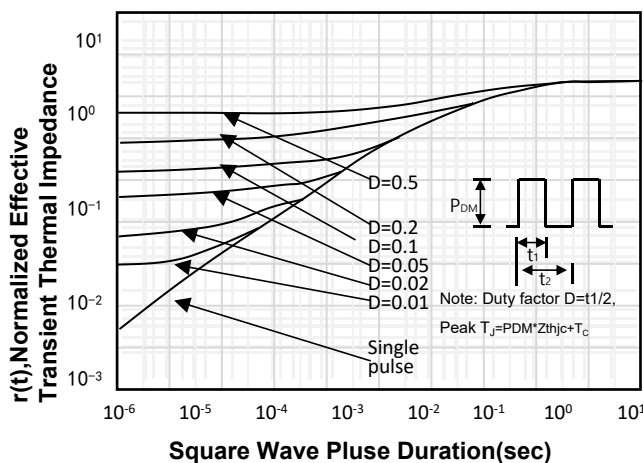
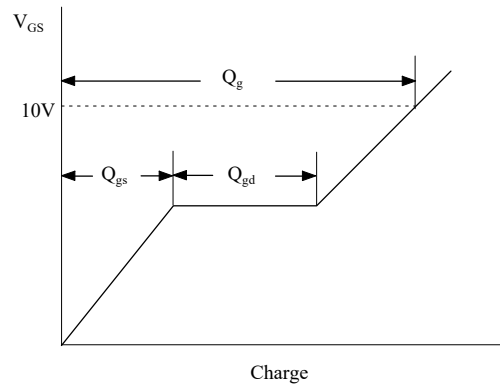
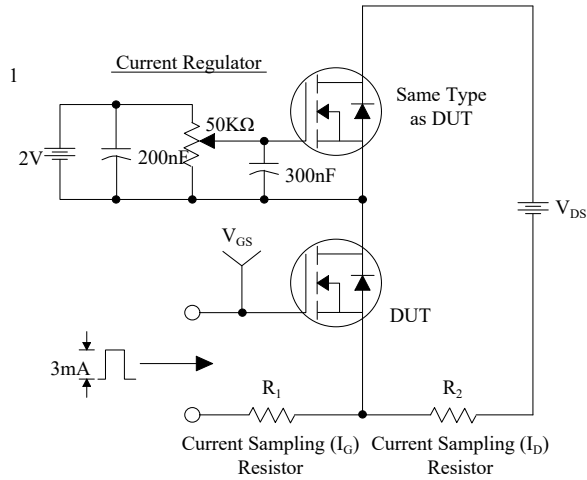
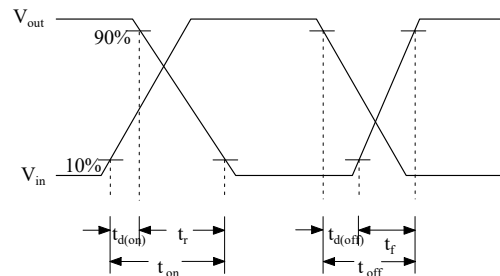
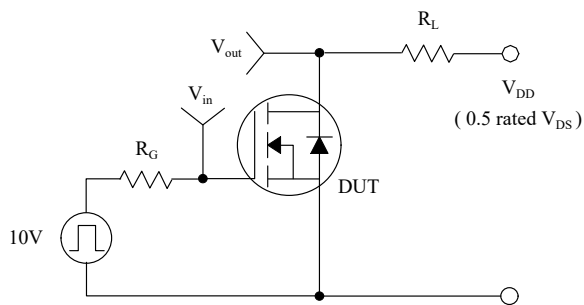


Figure 11. Transient Thermal Response Curve

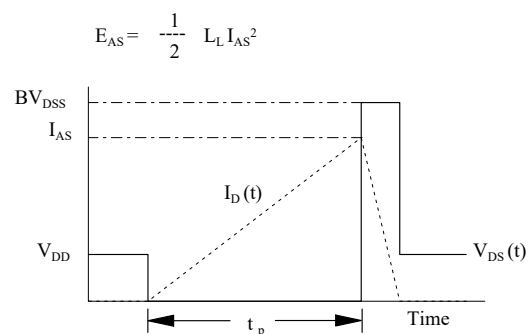
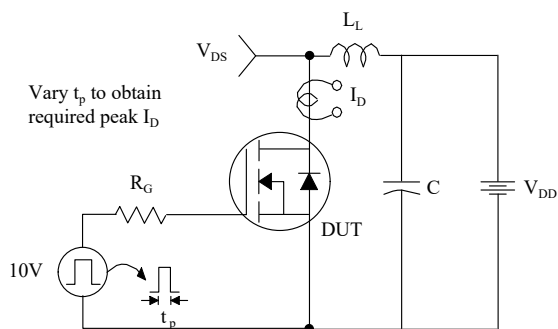
Test Circuit and Waveform



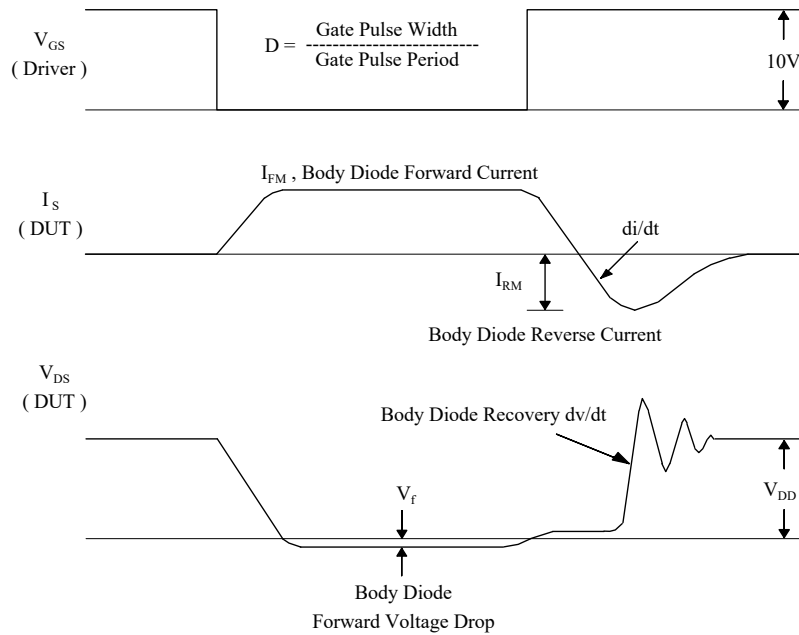
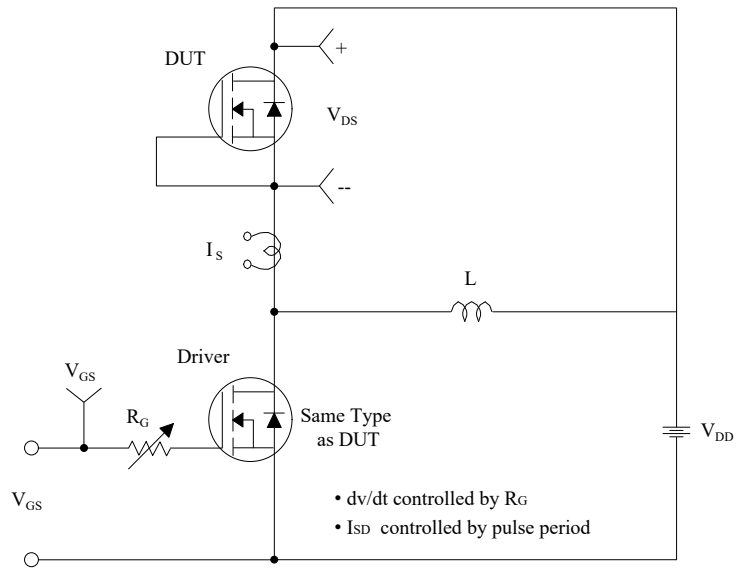
Resistive Switching Test Circuit & Waveforms



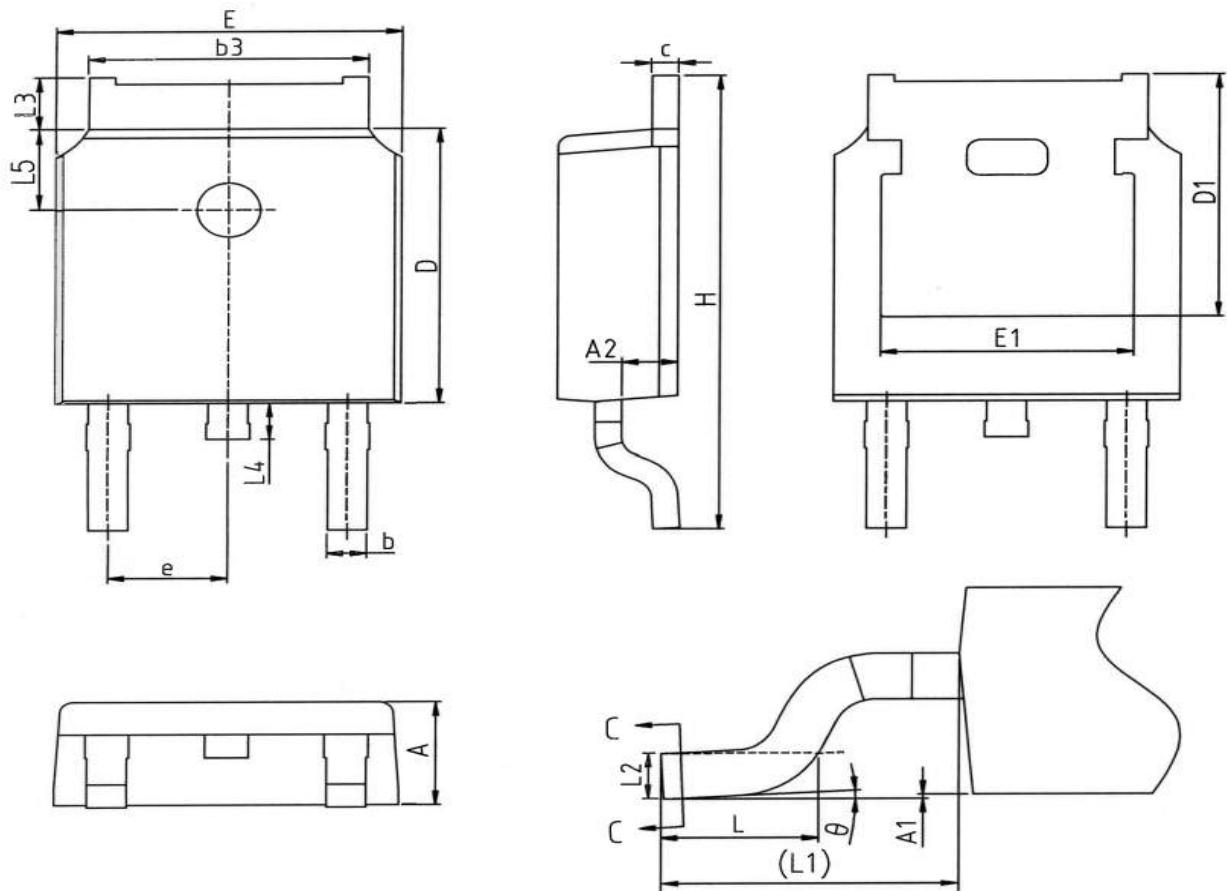
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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:

zj@ztasemi.com