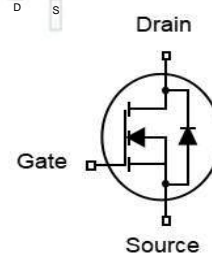


## Features

- N-Channel
- Low FOM  $R_{DS(on)} \times Q_{gd}$
- 100% avalanche tested
- Easy to use/drive
- RoHS compliant
- 100% EAS Tested

$V_{DS}$	60	V
$R_{DS(on),TYP@ V_{GS}=10V}$	25	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	31	m $\Omega$
$I_D$	25	A

### TO-252



Part ID	Package Type	Marking	Packing
ZT25N06D	TO-252	ZT25N06D	2500pcs/reel

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

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (<math>T_c=25^\circ\text{C}</math> Unless Otherwise Noted)</b>				
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	60	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)	$T_c = 25^\circ\text{C}$ 100	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous (Note 2)	$T_c = 25^\circ\text{C}$	25	A
		$T_c = 100^\circ\text{C}$	18	A
$P_D$	Maximum Power Dissipation	38	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.3	$^\circ\text{C}/\text{W}$	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	$^\circ\text{C}/\text{W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 1)	48	mJ	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	--	--	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.8	2.5	V
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	--	25	30	mΩ
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	--	31	40	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	--	1056	--	pF
Coss	Output Capacitance		--	62	--	pF
Crss	Reverse Transfer Capacitance		--	52	--	pF
Rg	Gate Resistance	f=1MHz	--	1.6	--	Ω
Qg	Total Gate Charge	V <sub>DS</sub> =30V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	--	25	--	nC
Qgs	Gate-Source Charge		--	5.5	--	nC
Qgd	Gate-Drain Charge		--	5.1	--	nC
Vplateau	Gate plateau voltage		--	4.0	--	V
<b>Switching Characteristics (Note 2)</b>						
Td(on)	Turn-on Delay Time	V <sub>DS</sub> =30V, I <sub>D</sub> =20A, R <sub>G</sub> =3.0Ω, V <sub>GS</sub> =10V	--	8.2	--	ns
Tr	Turn-on Rise Time		--	8.3	--	ns
Td(off)	Turn-Off Delay Time		--	35	--	ns
Tf	Turn-Off Fall Time		--	5.1	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
IS	Diode Forward Current		--	--	25	A
VSD	Forward on voltage	I <sub>S</sub> =20A, V <sub>GS</sub> =0V	--	--	1.2	V
Trr	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =20A, V <sub>GS</sub> =0V,	--	18	--	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	13	--	uC

Notes:

1. L=0.5mH, V<sub>DD</sub>=30V, Start T<sub>J</sub>=25°C.
2. Limited by maximum junction temperature.
3. Repetitive Rating: Pulse width limited by maximum junction temperature.

Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

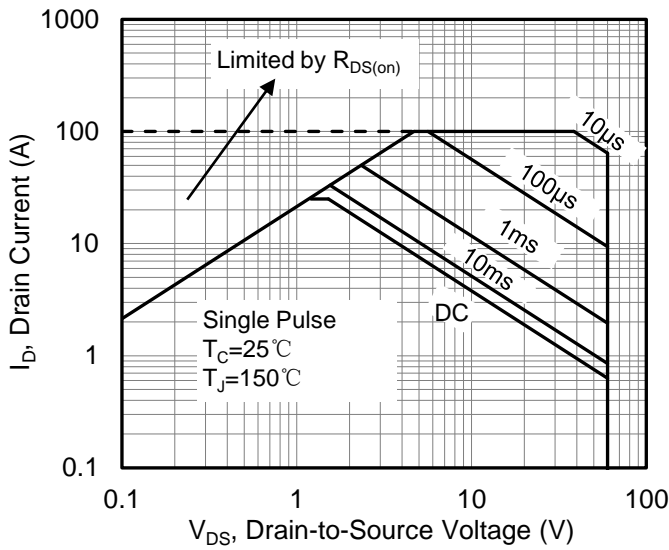


Figure 1. Maximum Safe Operating Area

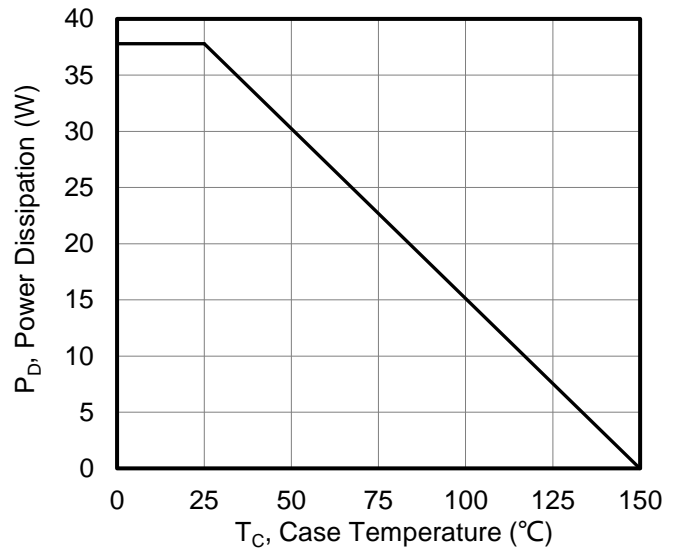


Figure 4. Maximum Power Dissipation vs Case Temperature

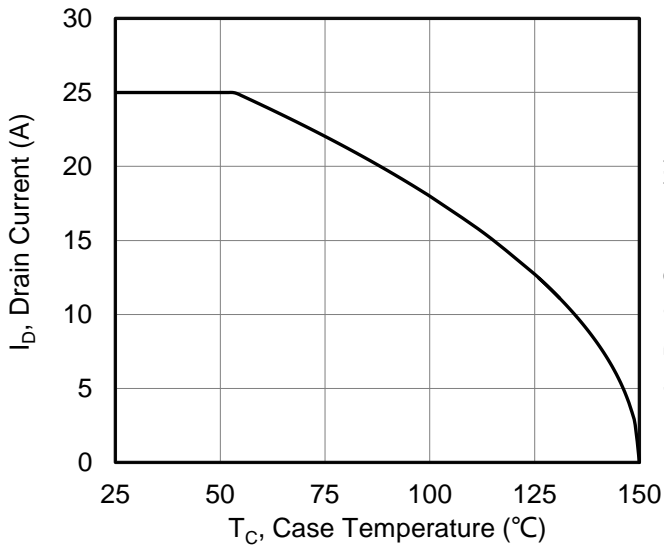


Figure 2. Maximum Continuous Drain Current vs Case Temperature

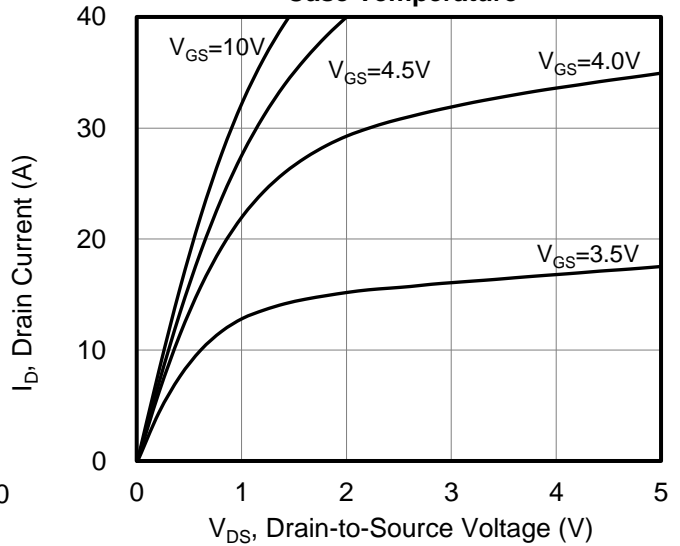


Figure 5. Typical output Characteristics

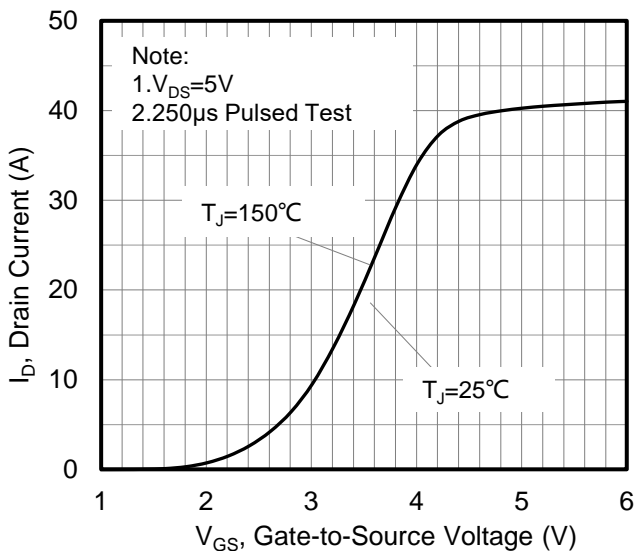


Figure 3. Typical Transfer Characteristics

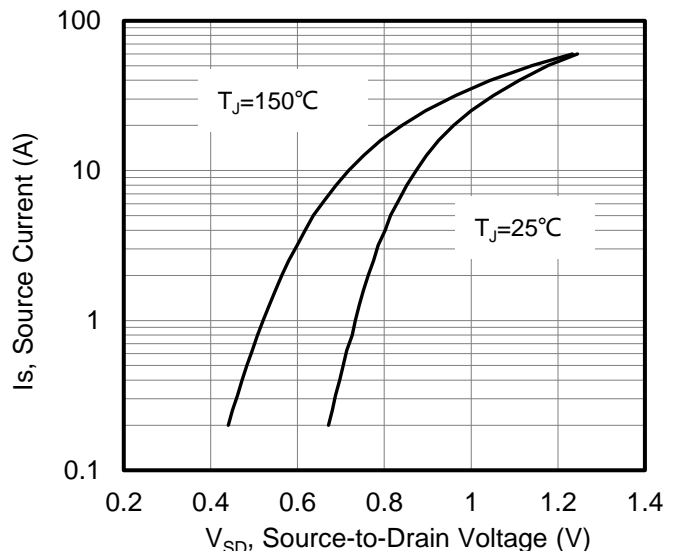
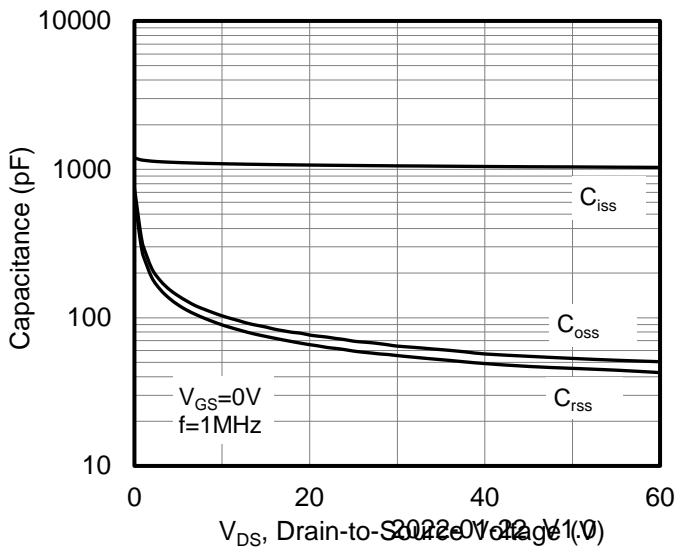
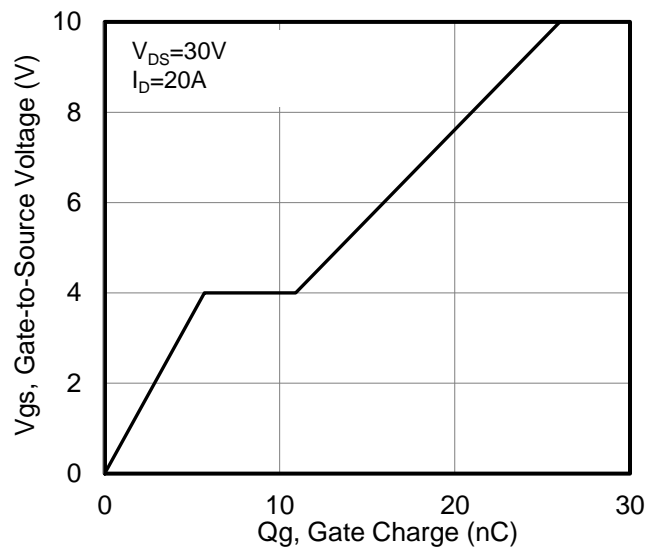


Figure 6. Typical Body Diode Transfer Characteristics

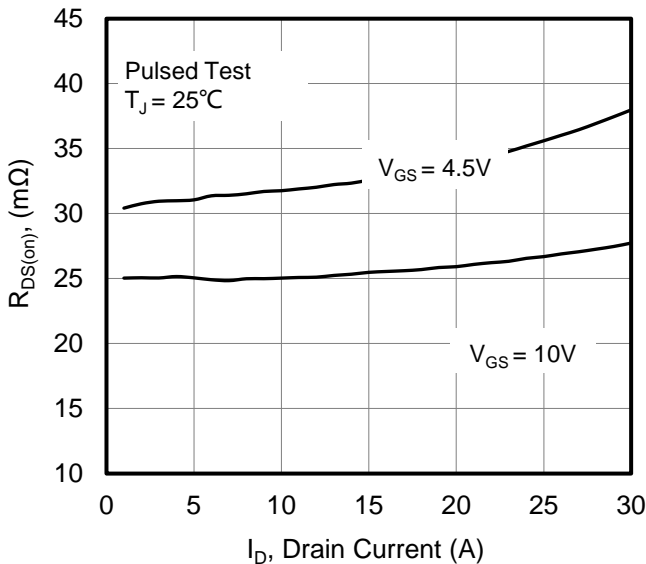
**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted



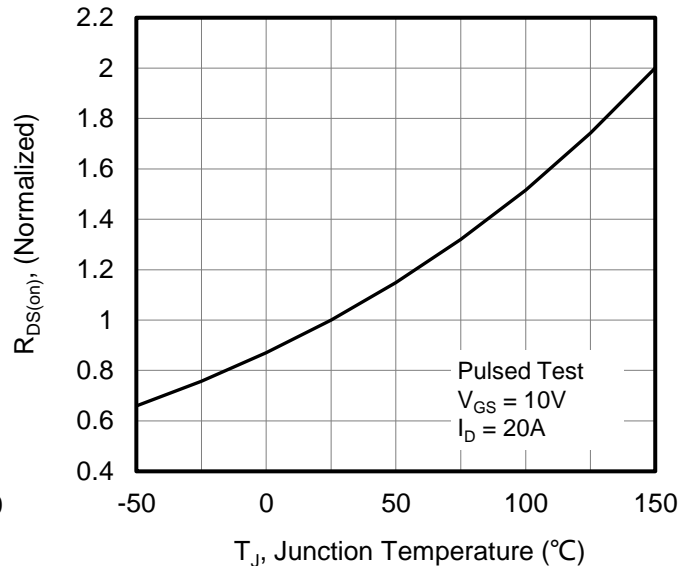
**Figure 7. Capacitance Characteristics**



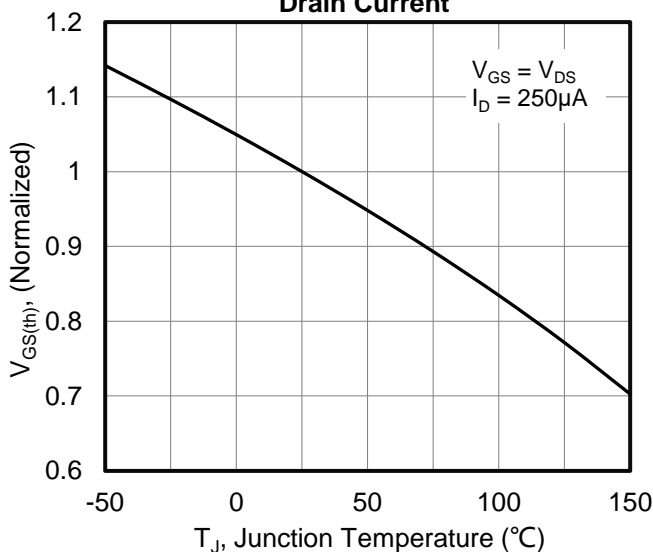
**Figure 10. Typical Gate Charge vs Gate to Source Voltage**



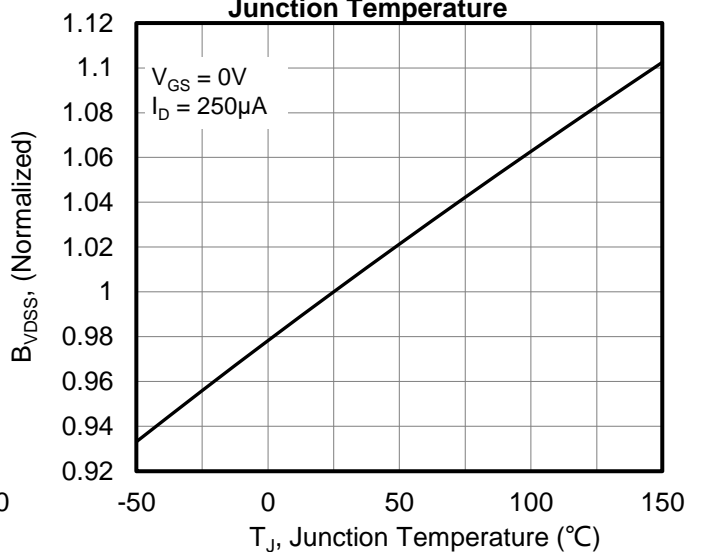
**Figure 8. Drain-to-Source On Resistance vs Drain Current**



**Figure 11. Normalized On Resistance vs Junction Temperature**

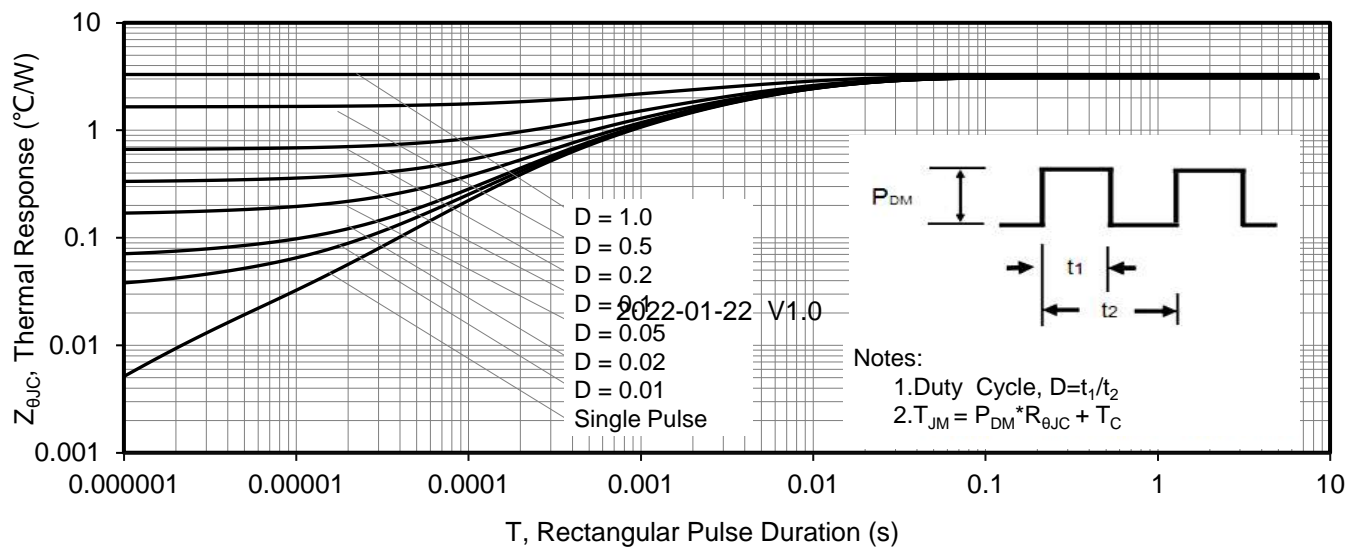


**Figure 9. Normalized Threshold Voltage vs Junction Temperature**



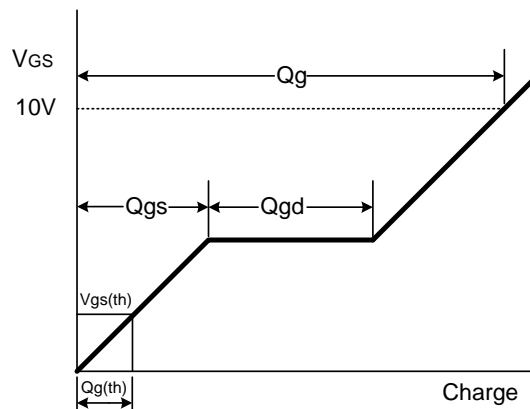
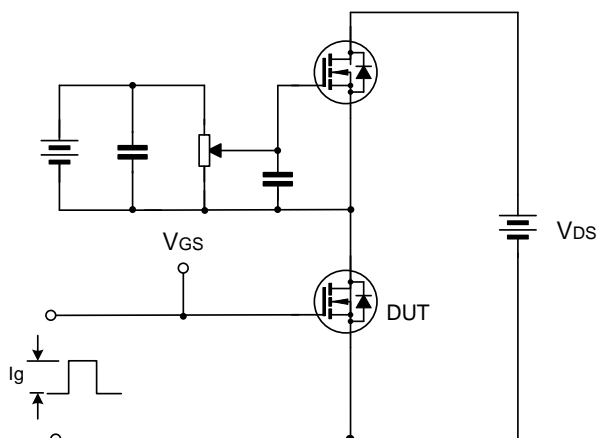
**Figure 12. Normalized Breakdown Voltage vs Junction Temperature**

**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

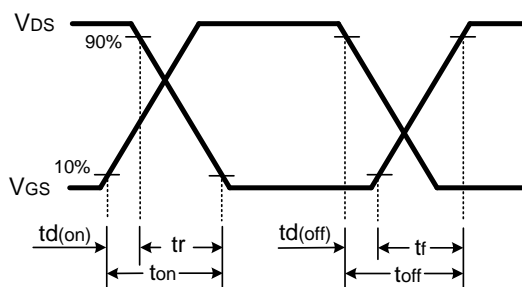
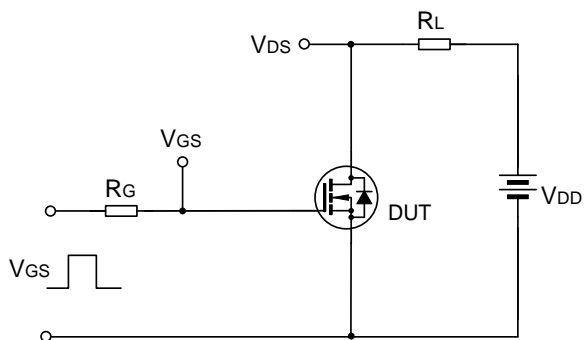


**Figure 13. Maximum Effective Thermal Impedance, Junction to Case**

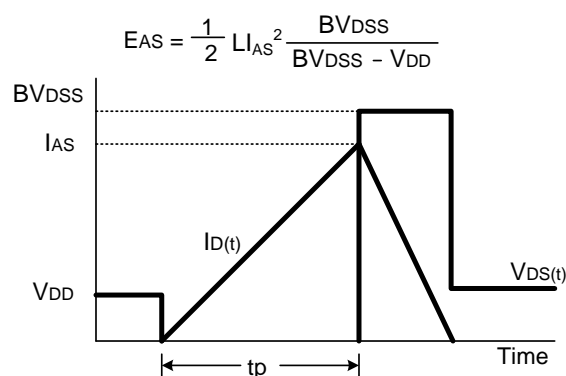
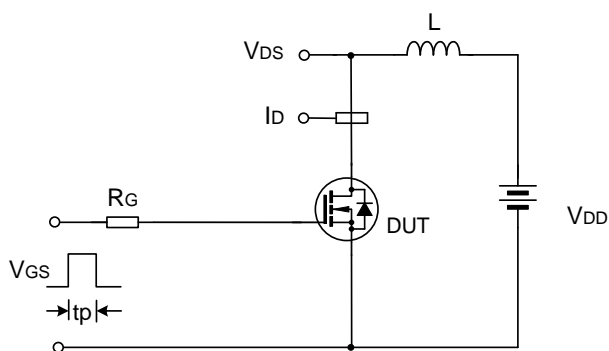
## Test Circuit and Waveform



Gate Charge Test Circuit & Waveform

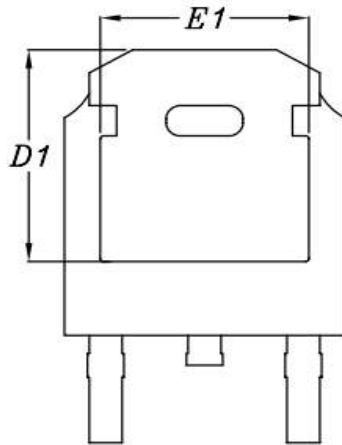
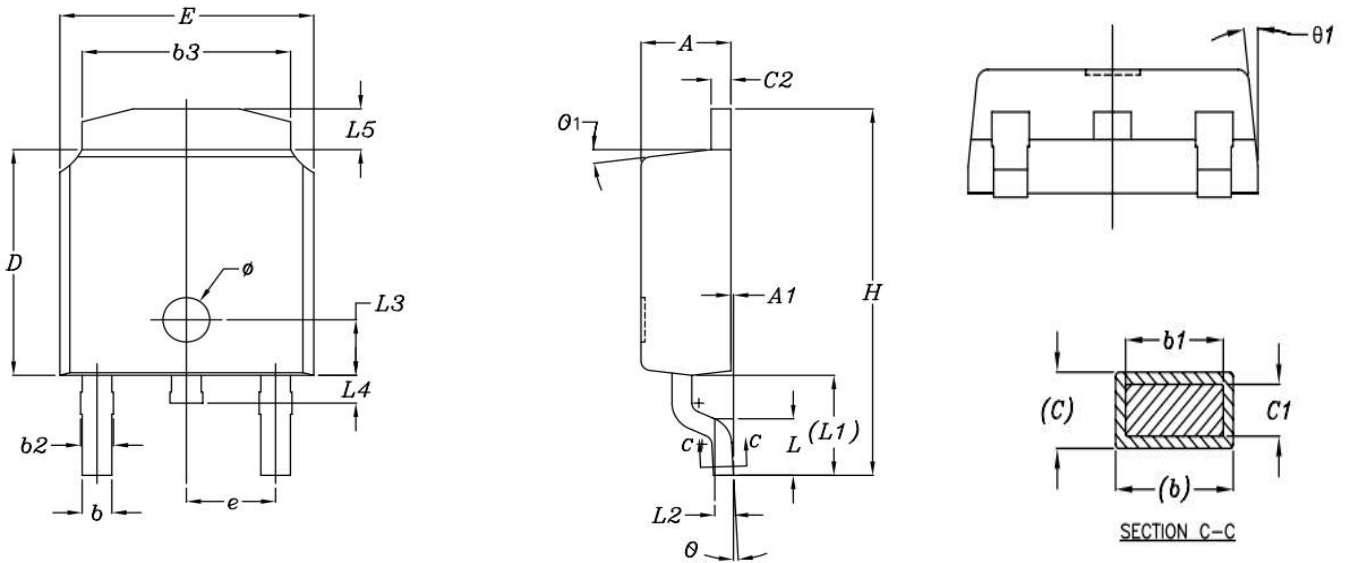


Resistive Switching Test Circuit & Waveforms

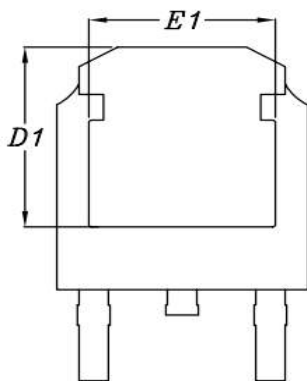


Unclamped Inductive Switching Circuit & Waveforms

## TO-252 Package Information



Option(1)  
Standard PAD



Option(2)  
Large PAD

I T E M	DIMENSIONS			
	MILLMETERS		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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