

Features

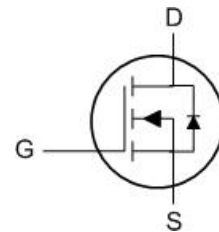
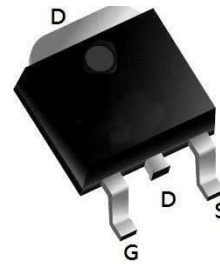
- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$


Product Summary

BVDSS	R _{DS(ON)}	I _D
120V	85mΩ	12A

Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

TO252-3L Pin Configuration

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter	Value	Units
V_{DSS}	Drain-to-Source Voltage	120	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	12
		$T_C = 100^\circ\text{C}$	8.7
I_{DM}^{a1}	Pulsed Drain Current	60	A
E_{AS}^{a2}	Single pulse avalanche energy	22	mJ
V_{GS}	Gate-to-Source Voltage	± 20	V
P_D	Power Dissipation	46	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	260	$^\circ\text{C}$

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.7	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified):

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	120	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS} = 100V, V_{GS}= 0V$	--	--	1	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS} = -20V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS} = +20V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.3	1.8	2.3	V
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=5A$	--	85	105	$m\Omega$
		$V_{GS}=4.5V, I_D=4A$	--	100	130	$m\Omega$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=50V$ $f=1.0MHz$	--	248	--	pF
C_{oss}	Output Capacitance		--	60	--	
C_{rss}	Reverse Transfer Capacitance		--	2.0	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D=10A, R_L=0.75\Omega$ $V_{DS}=50V$ $V_{GS}= 10V$ $R_G= 3\Omega$	--	9	--	ns
t_r	Rise Time		--	18	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	19	--	
t_f	Fall Time		--	16	--	
Q_g	Total Gate Charge	$V_{GS}=10V$	--	3.8	--	nC
Q_{gs}	Gate Source Charge	$V_{DS}=50V$	--	0.9	--	
Q_{gd}	Gate Drain Charge	$I_D=10A$	--	1	--	

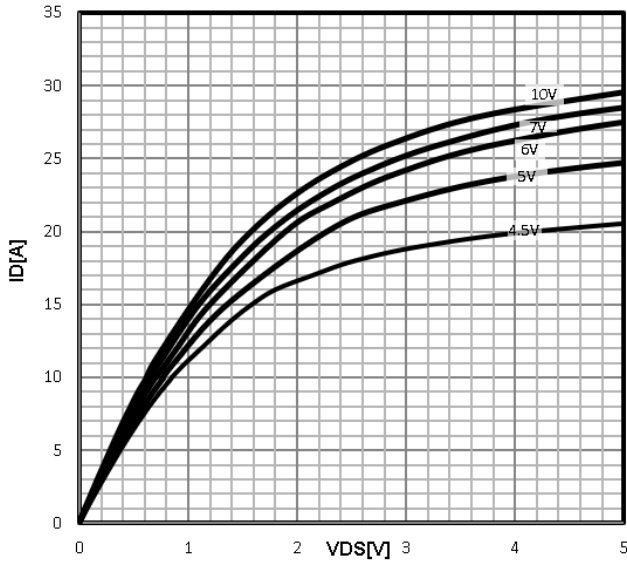
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I_S	Diode Forward Current	$T_C=25^\circ C$	--	--	12	A
V_{SD}	Diode Forward Voltage	$I_S=0.5A, V_{GS}=0V$	--	--	1.2	V
t_{rr}	Reverse Recovery time	$I_S=10A, V_{DD}=50V$ $di/dt=100A/\mu s$	--	24	--	ns
Q_{rr}	Reverse Recovery Charge		--	20	--	nC

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

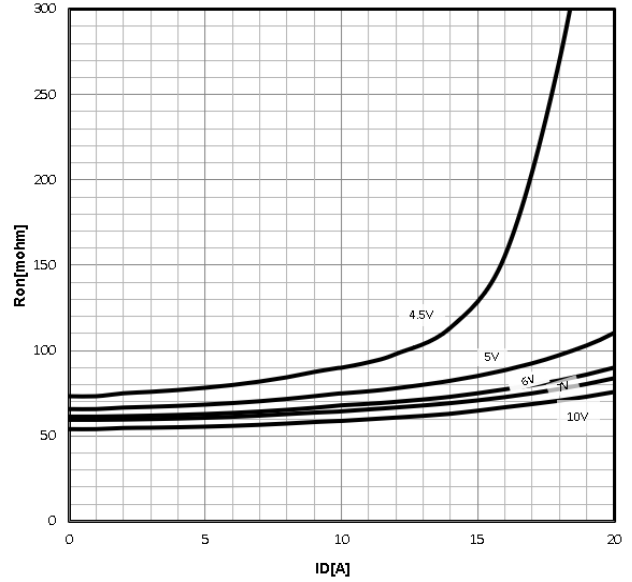
^{a2}: $L=5mH, R_G=25\Omega, \text{Starting } T_J=25^\circ C$

Characteristics Curve:
Typ. output characteristics

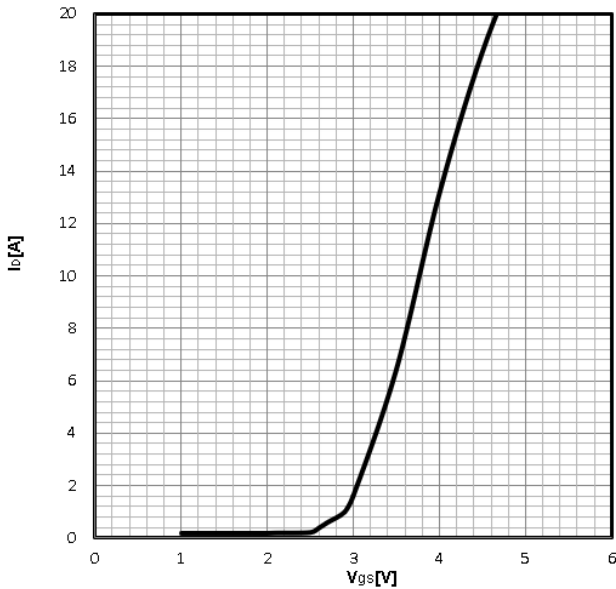
$$I_D = f(V_{DS})$$


Typ. drain-source on resistance

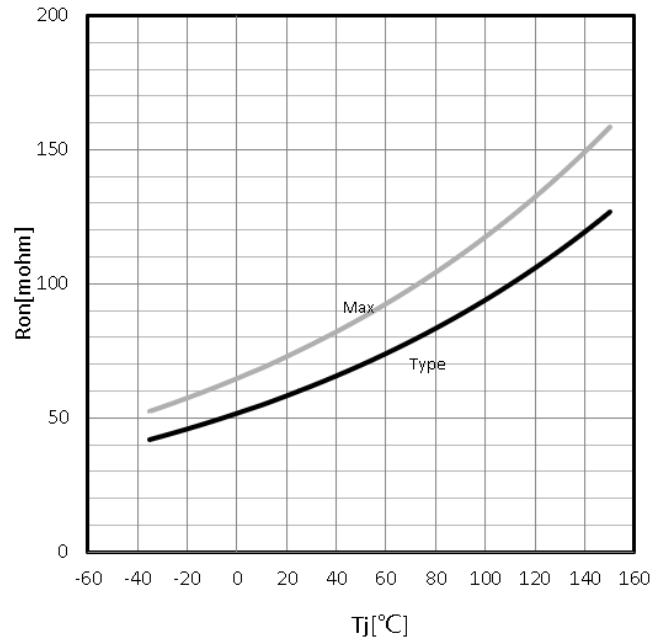
$$R_{DS(on)} = f(I_D)$$


Typ. transfer characteristics

$$I_D = f(V_{GS})$$

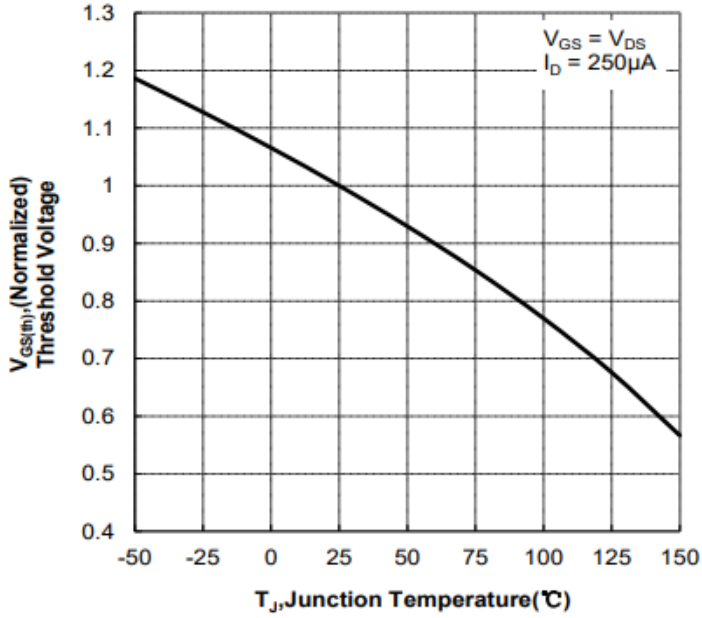

Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = 5A; V_{GS} = 10V$$

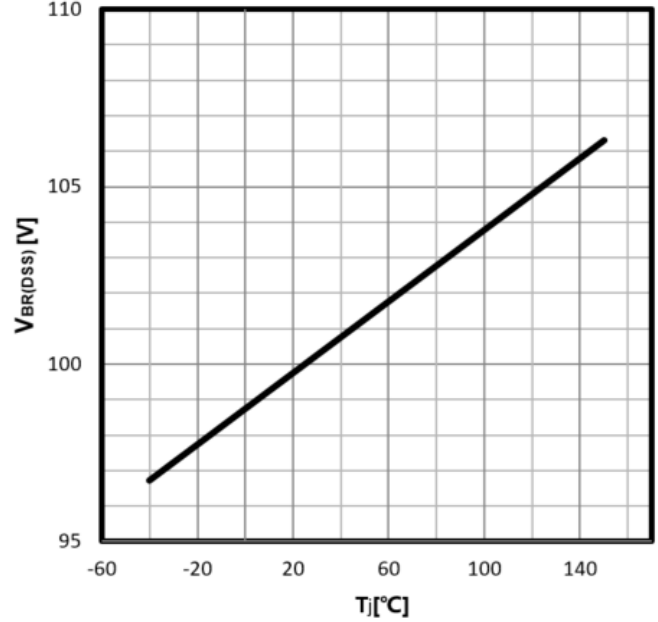


Gate Threshold Voltage

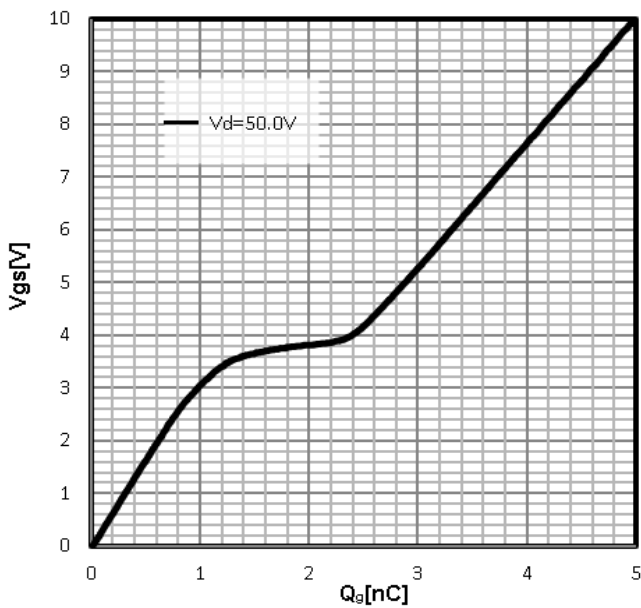
$$V_{TH} = f(T_j); I_D = 250\mu A$$


Drain-source breakdown voltage

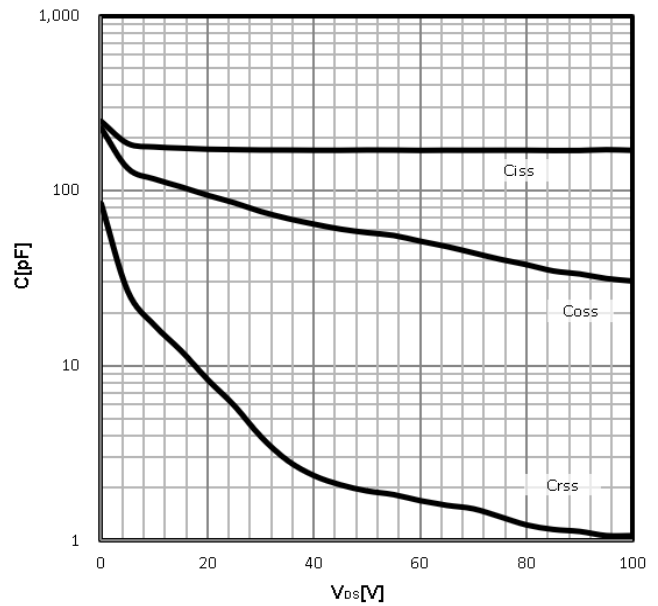
$$V_{BR(DSS)} = f(T_j); I_D = 250\mu A$$


Typ. gate charge

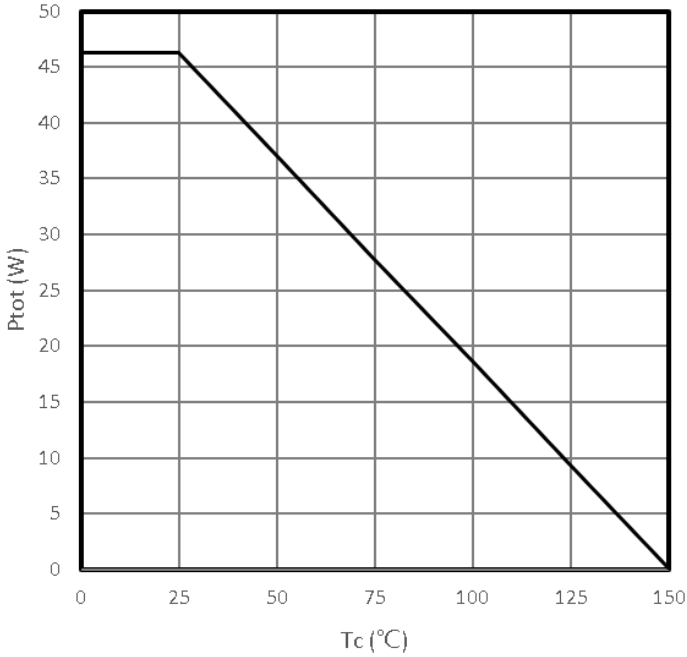
$$V_{GS} = f(Q_g); I_D = 10A$$


Typ. capacitances

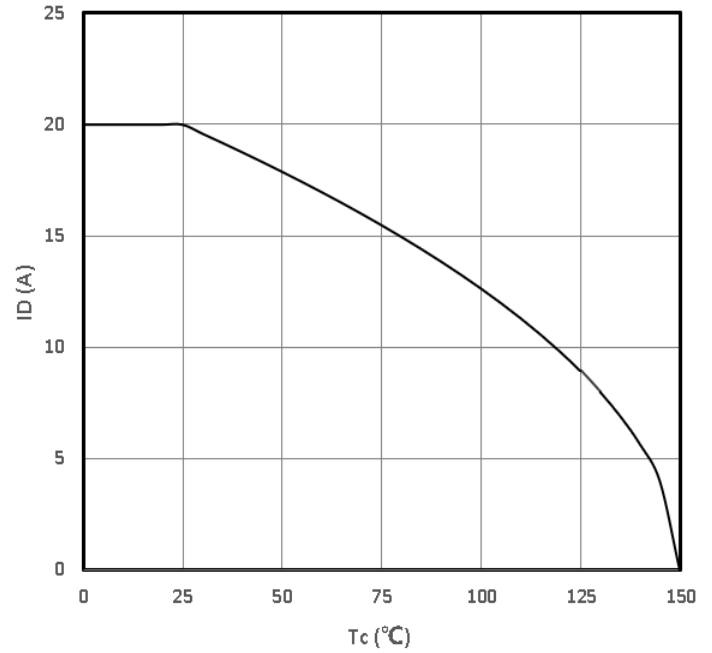
$$C = f(V_{DS}); V_{GS} = 0V; f = 1MHz$$



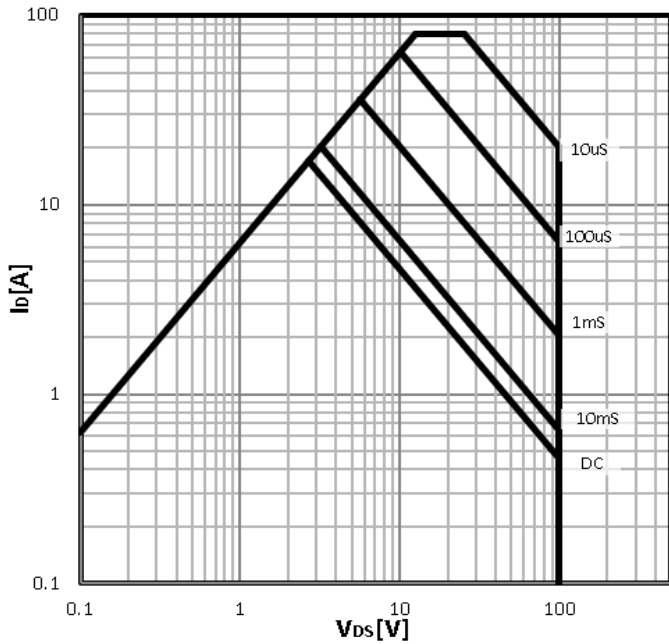
Power Dissipation
 $P_{tot}=f(T_c)$



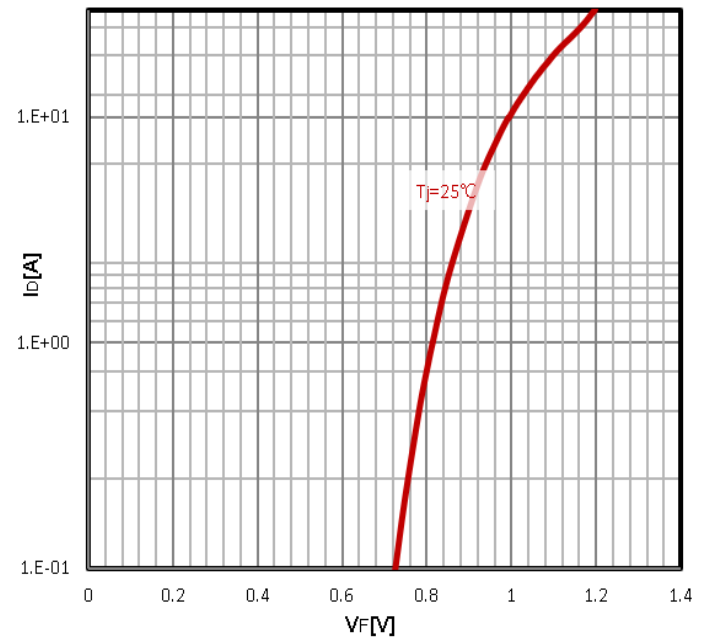
Maximum Drain Current
 $I_D=f(T_c)$



Safe operating area
 $I_D=f(V_{DS})$

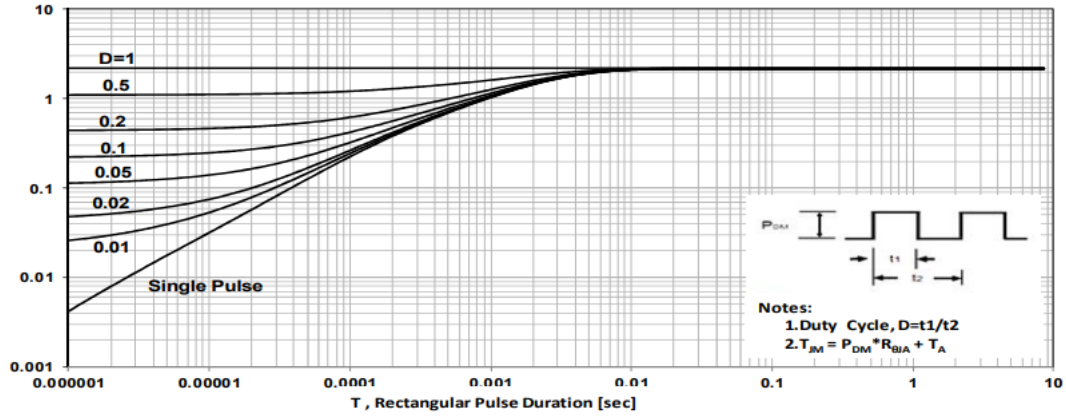


Body Diode Forward Voltage Variation
 $I_F=f(V_{GS})$

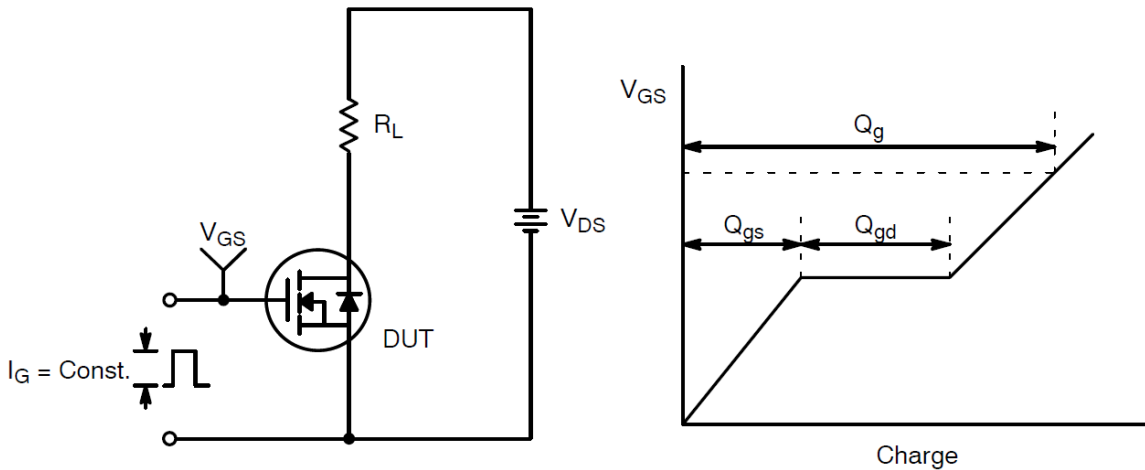


Max. transient thermal impedance

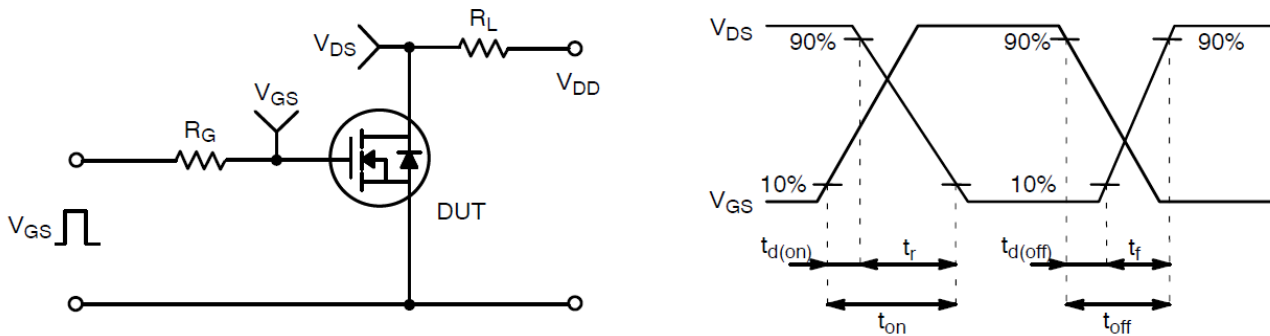
$$Z_{thJC}=f(t_p)$$



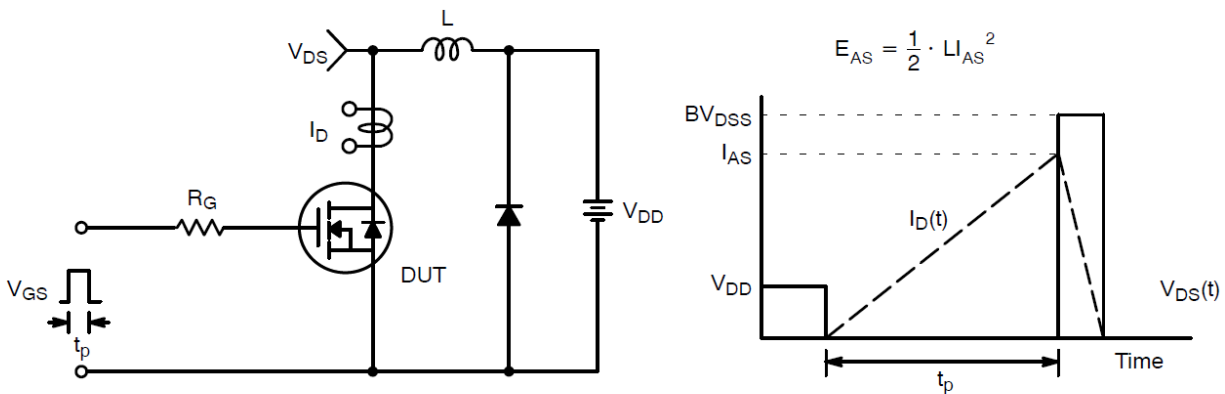
Test Circuit and Waveform:



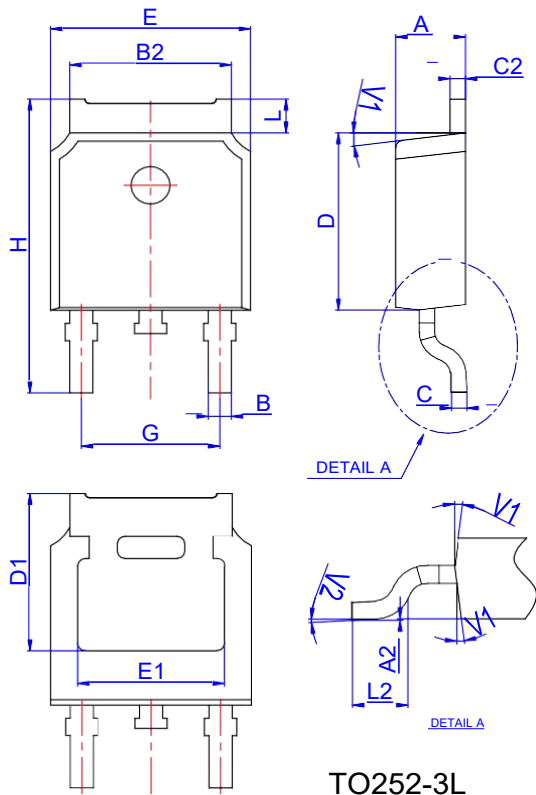
Gate Charge Test Circuit & Waveform



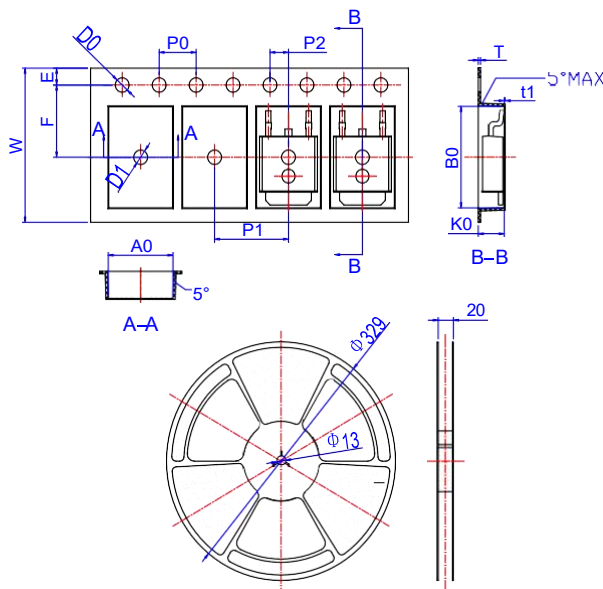
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data TO252-3L


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2		0°	6°	0°		6°

Reel Specification-TO252-3L


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583