

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent Cdv/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary



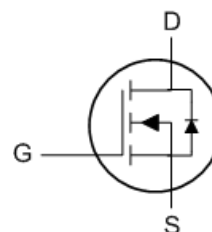
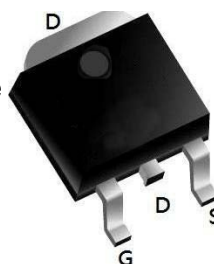
BVDSS	RDSON	ID
200V	225mΩ	9A

Description

The XR9N20 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR9N20 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252-3L Pin Configuration



Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DS}	Drain-to-Source Voltage		200	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	9	A
I_{DM}^{a1}	Pulsed Drain Current		38	A
V_{GS}	Gate-to-Source Voltage		± 20	V
P_D	Power Dissipation		30	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
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	4.17	$^\circ\text{C/W}$

Electrical Characteristics (TA= 25°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 =250μA	200	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} =200V, V _{GS} =0V	--	--	1	μA
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+20V, V _{DS} =0V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-20V, V _{DS} =0V	--	--	-100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	2	3	V
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =2A	--	225	280	mΩ

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 100V f = 1.0MHz	--	922	--	pF
C _{oss}	Output Capacitance		--	23.2	--	
C _{rss}	Reverse Transfer Capacitance		--	27	--	
R _g	Gate resistance	V _{GS} =0V, V _{DS} Open	--	1.35	--	Ω

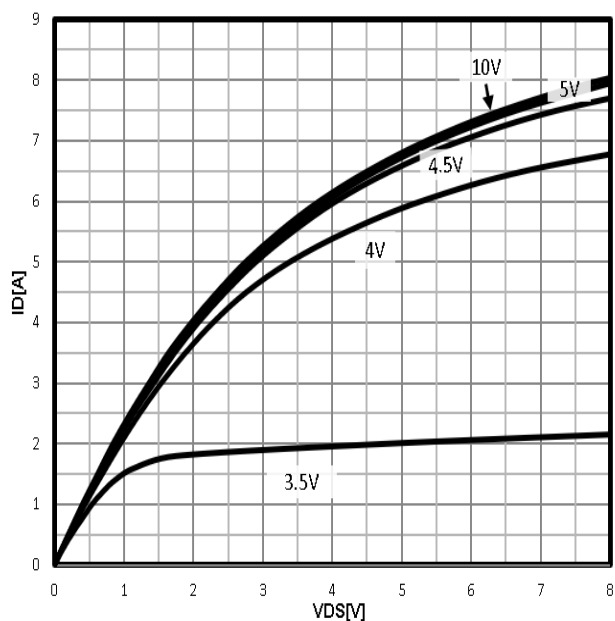
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =2A V _{DS} = 100V V _{GS} = 10V R _G = 4Ω	--	12	--	ns
t _r	Rise Time		--	14	--	
t _{d(OFF)}	Turn-Off Delay Time		--	34	--	
t _f	Fall Time		--	16	--	
Q _g	Total Gate Charge	V _{GS} =10V V _{DS} = 100V I _D =2A	--	22.8	--	nC
Q _{gs}	Gate Source Charge		--	3.5	--	
Q _{gd}	Gate Drain Charge		--	5.8	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Value
			Min.	Typ.	Max.	
I _S	Diode Forward Current	T _C =25 °C	--	--	9	A
V _{SD}	Diode Forward Voltage	I _S =2A, V _{GS} =0V	--	--	1.2	V
t _{rr}	Reverse Recovery time	I _S =2A, V _{DD} =100V dI/dt=100A/μs	--	150	--	ns
Q _{rr}	Reverse Recovery Charge		--	396	--	nC

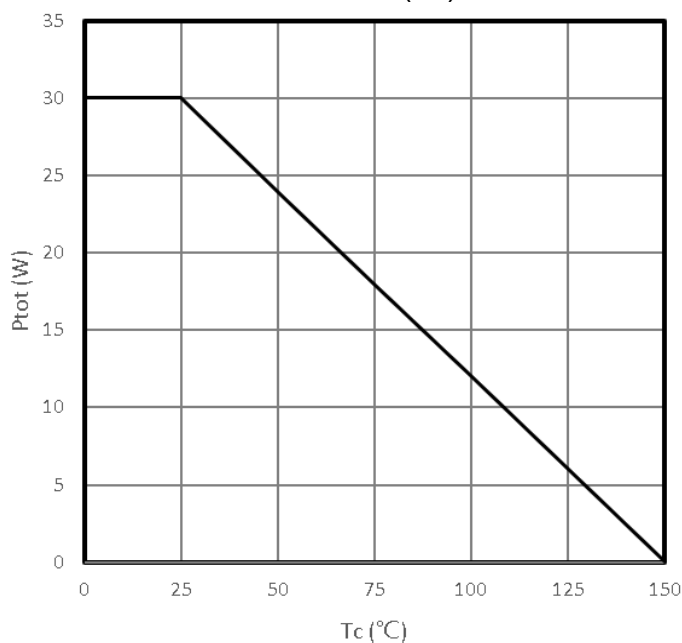
^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

Characteristics Curve:

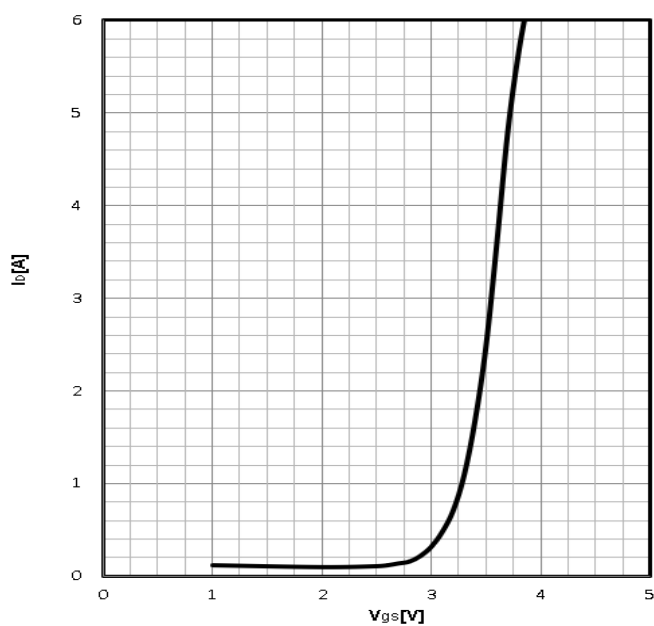
Typ. output characteristics
 $I_D = f(V_{DS})$



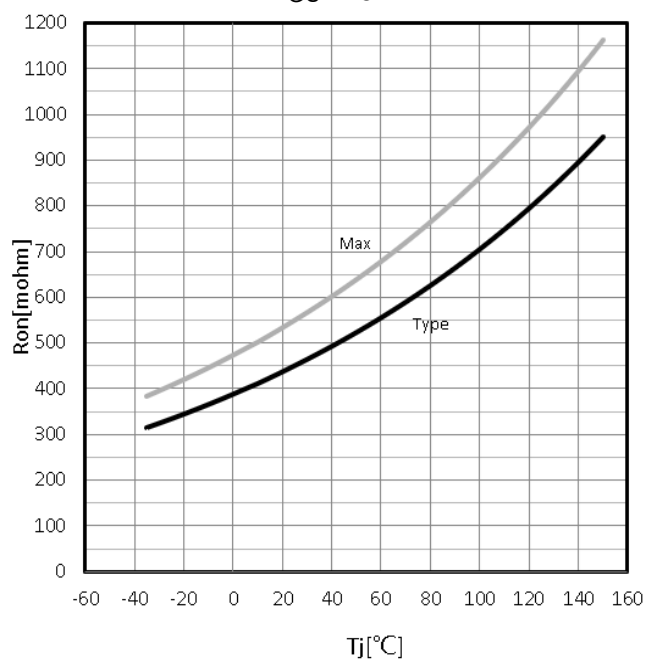
Power Dissipation
 $P_{tot} = f(T_C)$



Typ. transfer characteristics
 $I_D = f(V_{GS})$

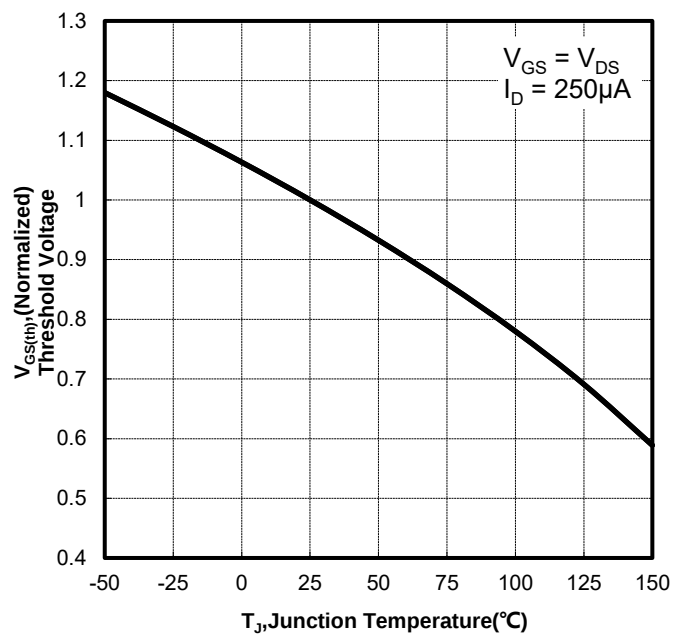


Drain-source on-state resistance
 $R_{DS(on)} = f(T_J); I_D = 2A; V_{GS} = 10V$



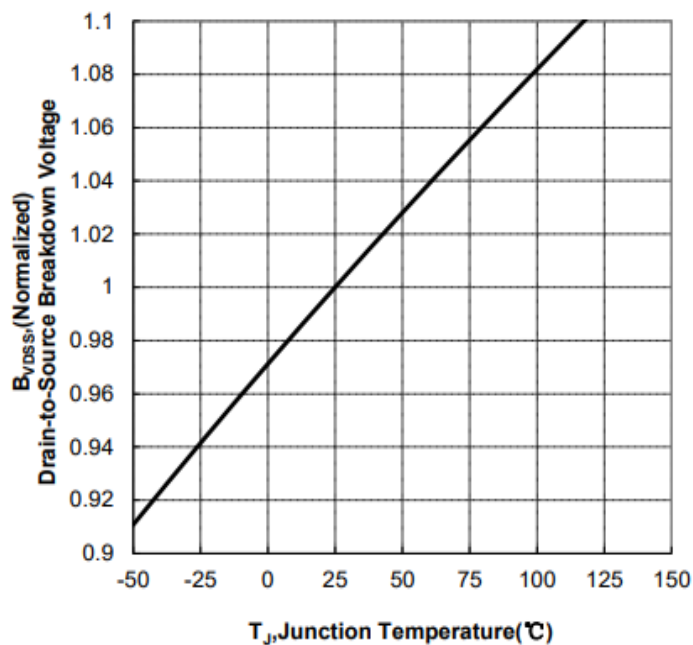
Gate Threshold Voltage

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

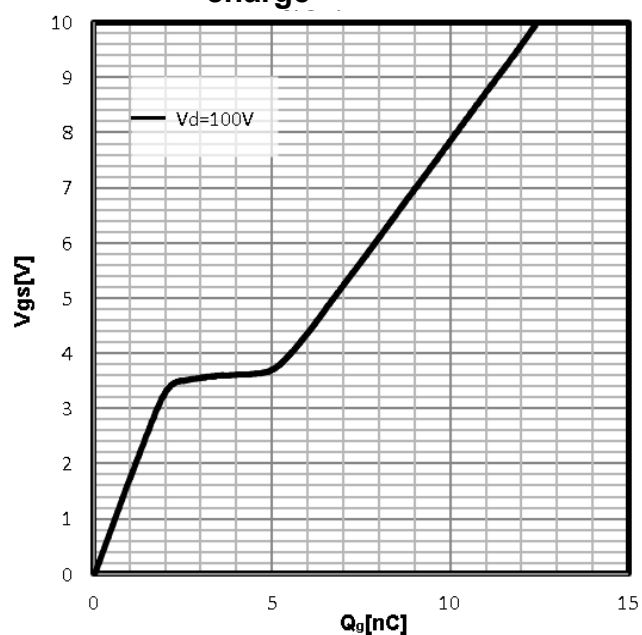


Drain-source breakdown voltage

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

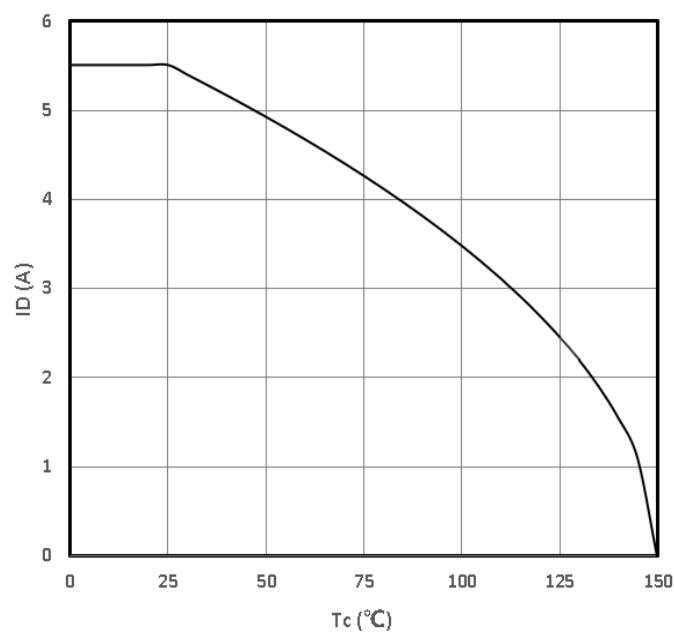


Typ. gate charge



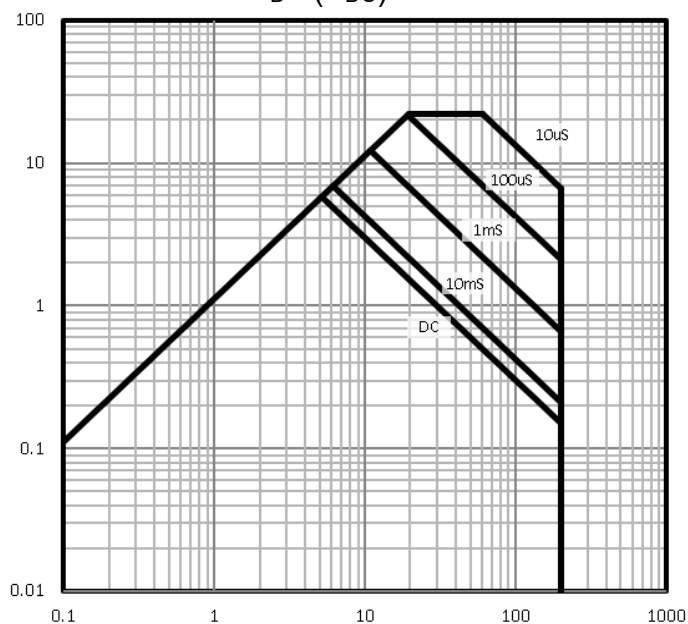
Maximum Drain Current

$$I_D=f(T_C)$$



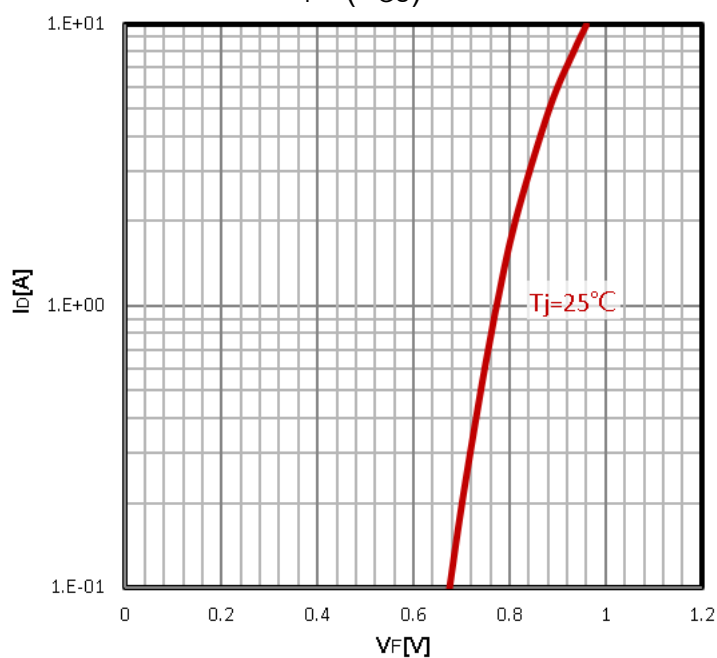
Safe operating area

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



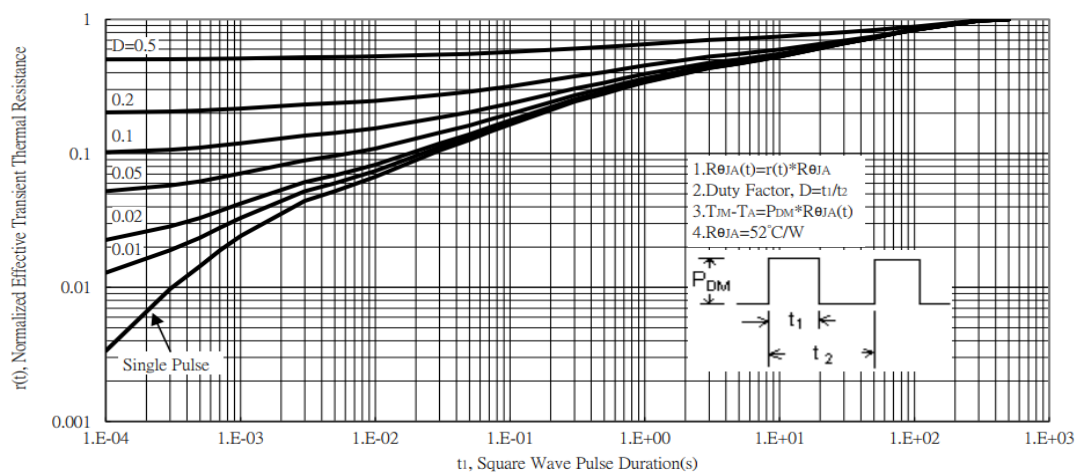
Body Diode Forward Voltage Variation

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

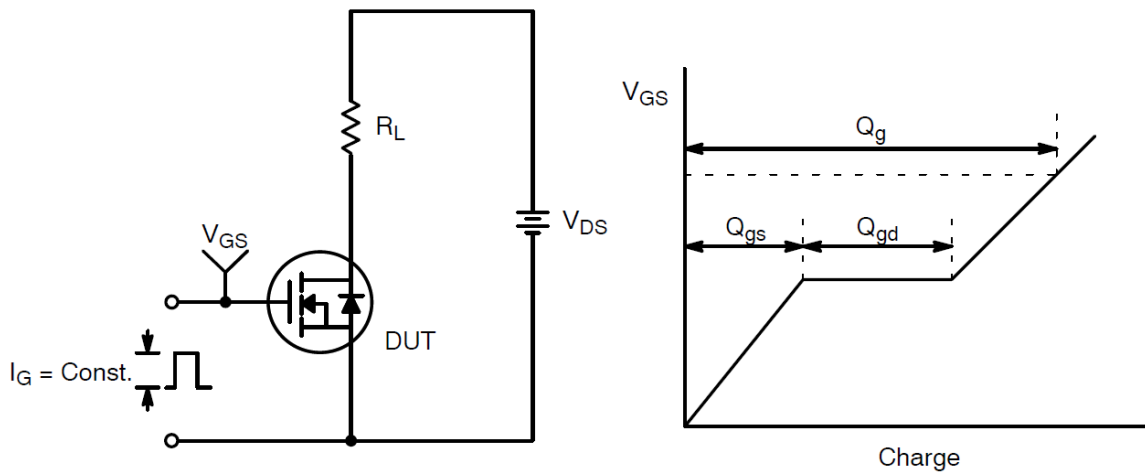


Max. transient thermal impedance

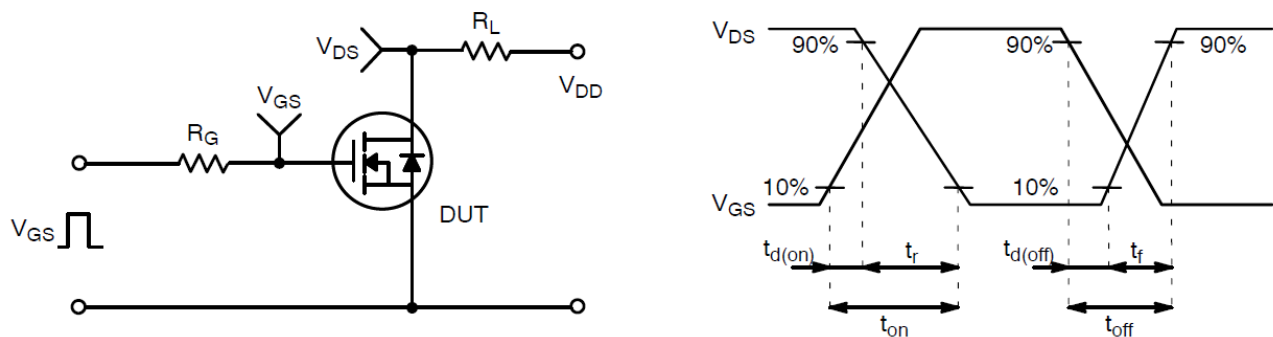
$$Z_{thJC} = f(t_p)$$



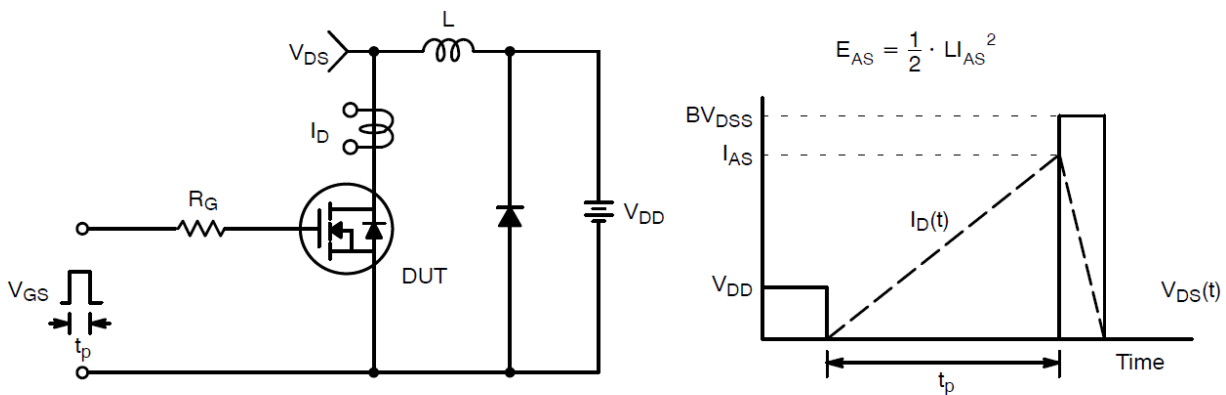
Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform

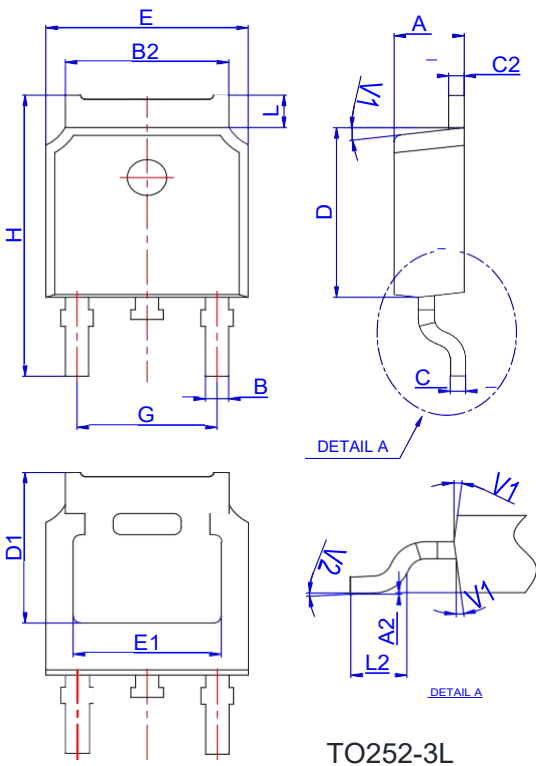


Resistive Switching Test Circuit & Waveforms



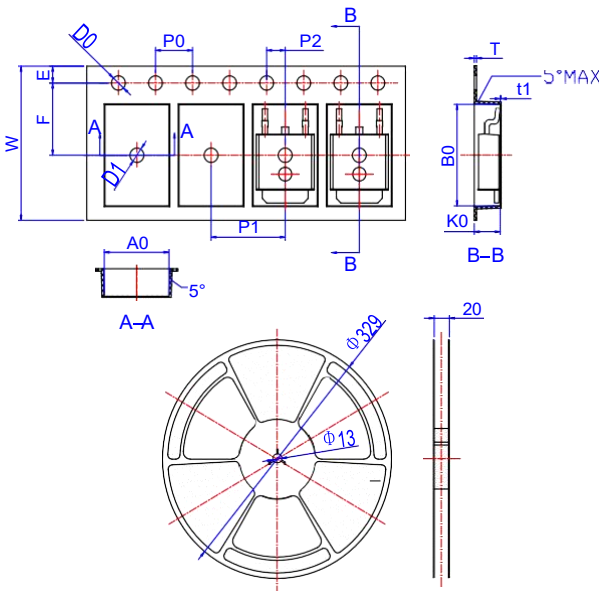
Unclamped Inductive Switching Test Circuit & Waveforms

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 Spectification-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