

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

## Product Summary



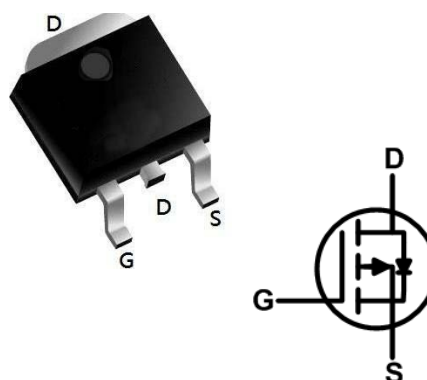
BVDSS	RDSON	ID
-100V	59mΩ	-25A

## Description

The XR25P10 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR25P10 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

## TO252-3L Pin Configuration

Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		$V_{DS}$	-100	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	$I_D$	-25	A
	$T_C = 100^\circ\text{C}$		-11	
Pulsed Drain Current <sup>1</sup>		$I_{DM}$	-72	A
Single Pulse Avalanche Energy <sup>2</sup>		EAS	42	mJ
Total Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	102	W
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient <sup>3</sup>	$R_{\theta JA}$	91	$^\circ\text{C/W}$
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	1.22	$^\circ\text{C/W}$

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

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-100	-	-	V
Gate-body Leakage current		I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T <sub>J</sub> = 25°C	I <sub>DSS</sub>	V <sub>DS</sub> = -100V, V <sub>GS</sub> = 0V	-	-	-1	μA
	T <sub>J</sub> = 100°C			-	-	-20	
Gate-Threshold Voltage		V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.5	-2	-2.5	V
Drain-Source On-Resistance <sup>4</sup>		R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A	-	59	70	mΩ
			V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -6A		120	150	
Forward Transconductance <sup>4</sup>		g <sub>fs</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -10A	-	28	-	S
Dynamic Characteristics <sup>5</sup>							
Input Capacitance		C <sub>iss</sub>	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, f = 1MHz	-	2859	-	pF
Output Capacitance		C <sub>oss</sub>		-	93	-	
Reverse Transfer Capacitance		C <sub>rss</sub>		-	68	-	
Gate Resistance		R <sub>g</sub>	f = 1MHz	-	4.3	-	Ω
Switching Characteristics <sup>5</sup>							
Total Gate Charge		Q <sub>g</sub>	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -50V, I <sub>D</sub> = -10A	-	53	-	nC
Gate-Source Charge		Q <sub>gs</sub>		-	12	-	
Gate-Drain Charge		Q <sub>gd</sub>		-	10	-	
Turn-On Delay Time		t <sub>d(on)</sub>	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -50V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = -10A	-	8	-	ns
Rise Time		t <sub>r</sub>		-	27	-	
Turn-Off Delay Time		t <sub>d(off)</sub>		-	155	-	
Fall Time		t <sub>f</sub>		-	77	-	
Body Diode Reverse Recovery Time		t <sub>rr</sub>	I <sub>F</sub> = -10A, dI/dt= 100A/μs	-	36	-	ns
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>		-	40	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage <sup>4</sup>		V <sub>SD</sub>	I <sub>S</sub> = -10A, V <sub>GS</sub> = 0V	-	-0.9	-1.3	V
Continuous Source Current	T <sub>C</sub> = 25°C	I <sub>S</sub>	-	-	-	25	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .
2. The EAS data shows Max. rating . The test condition is  $V_{DD} = -35V, V_{GS} = -10V, L = 0.5mH, I_{AS} = -23A$
3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test..

### Typical Performance Characteristics

Fig 1: Output Characteristics

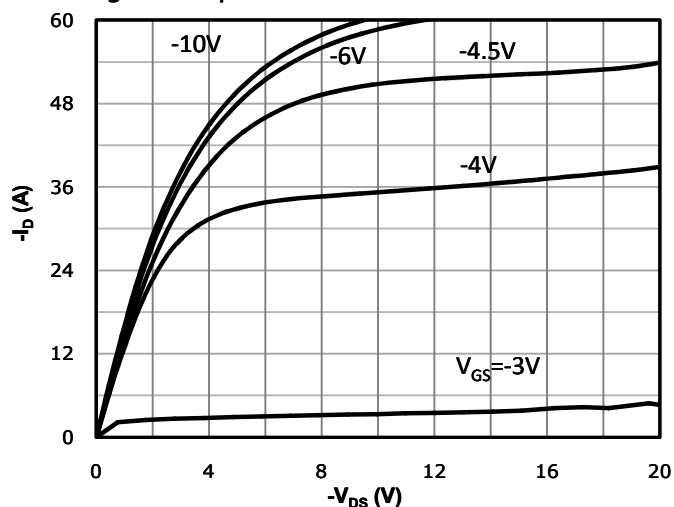


Fig 2: Transfer Characteristics

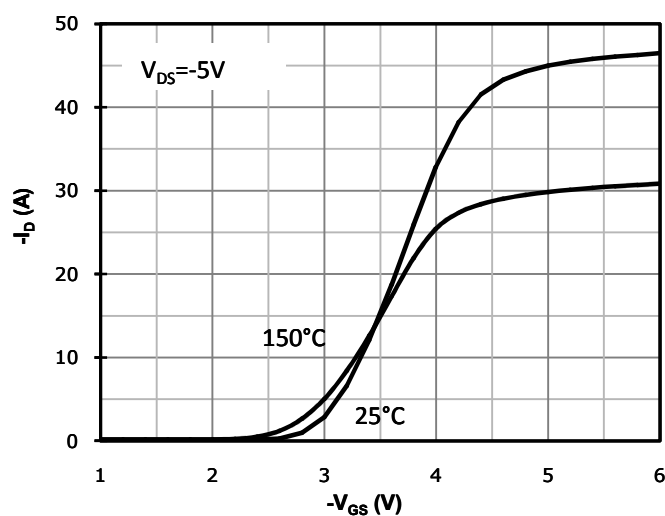


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

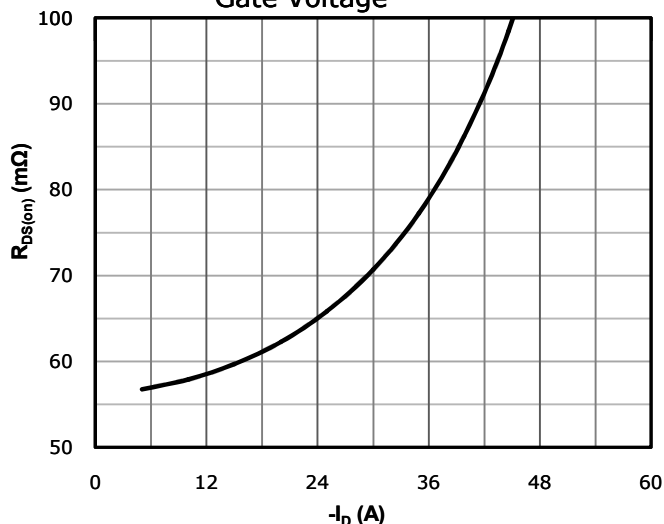


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

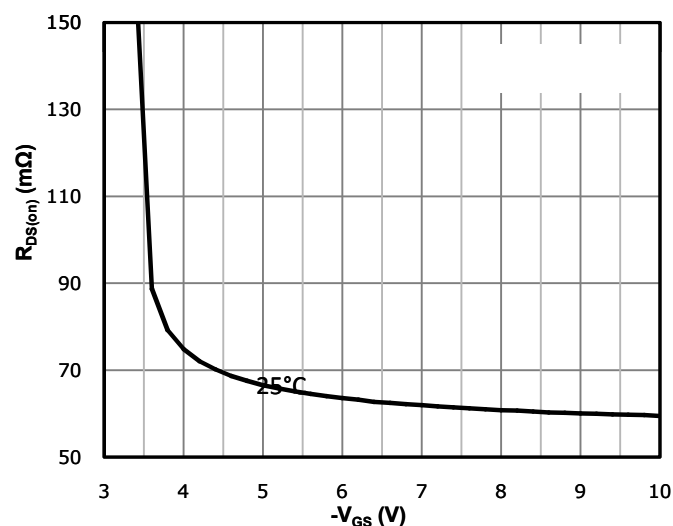


Fig 5:  $R_{DS(on)}$  vs. Temperature

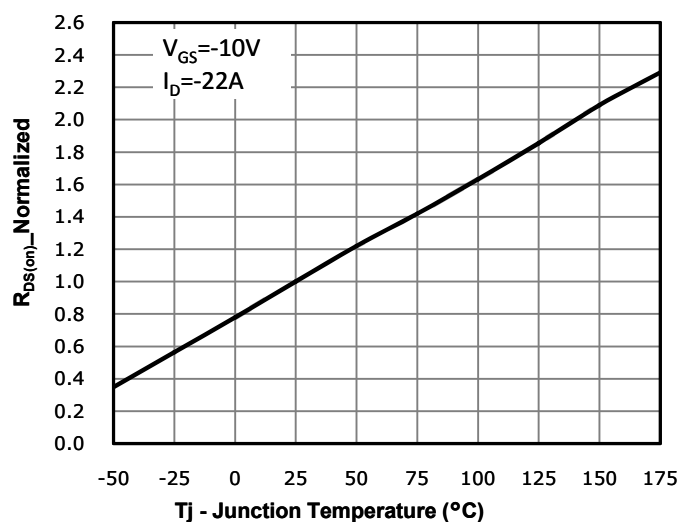


Fig 6: Capacitance Characteristics

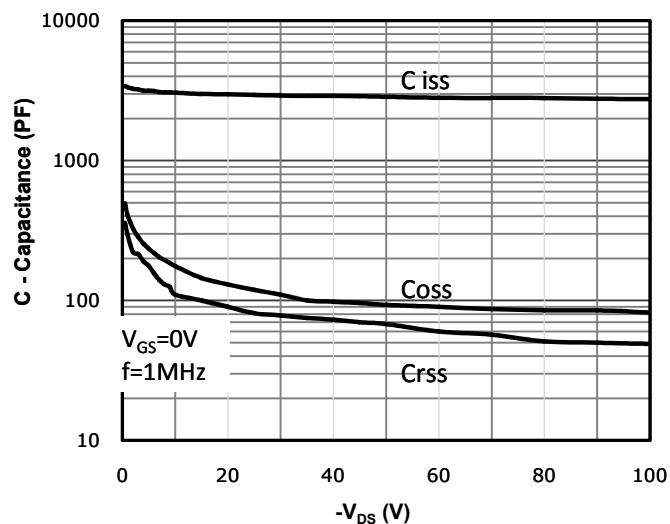


Fig 7: Gate Charge Characteristics

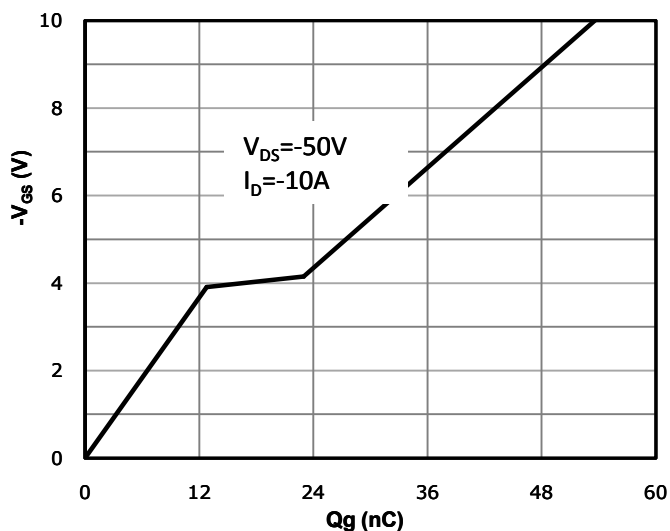


Fig 8: Body-diode Forward Characteristics

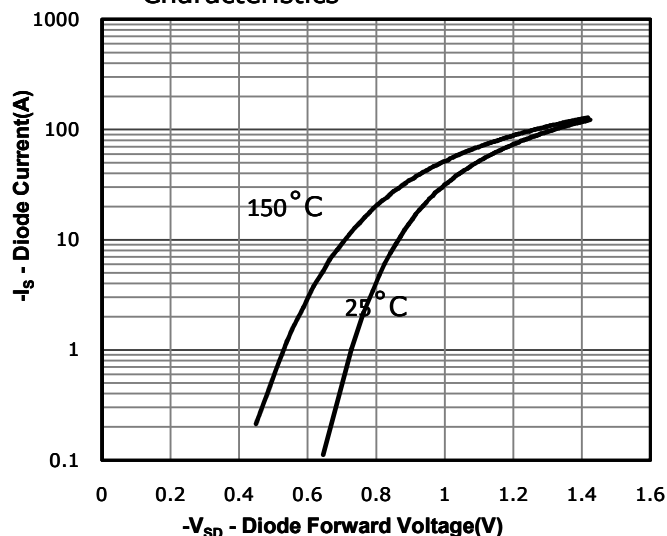


Fig 9: Power Dissipation

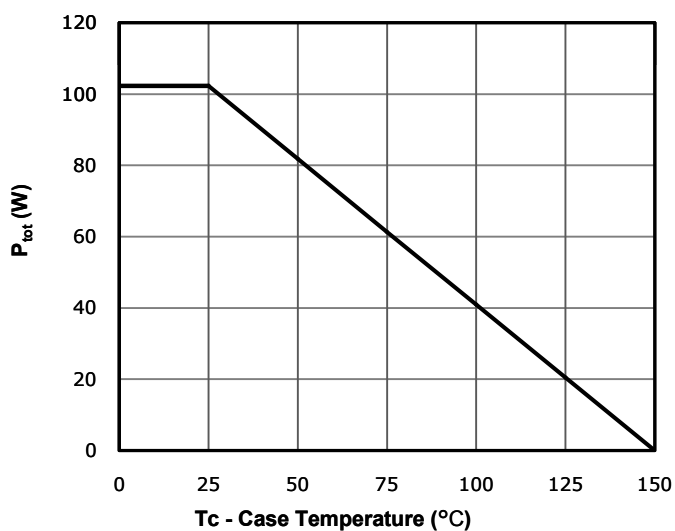


Fig 10: Drain Current Derating

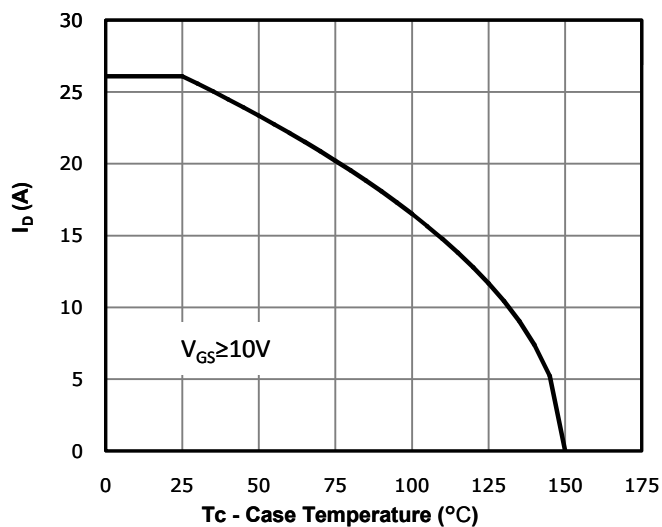


Fig 11: Safe Operating Area

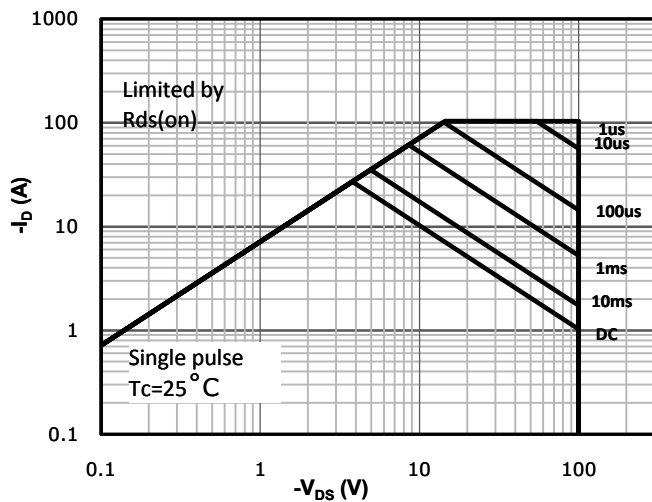
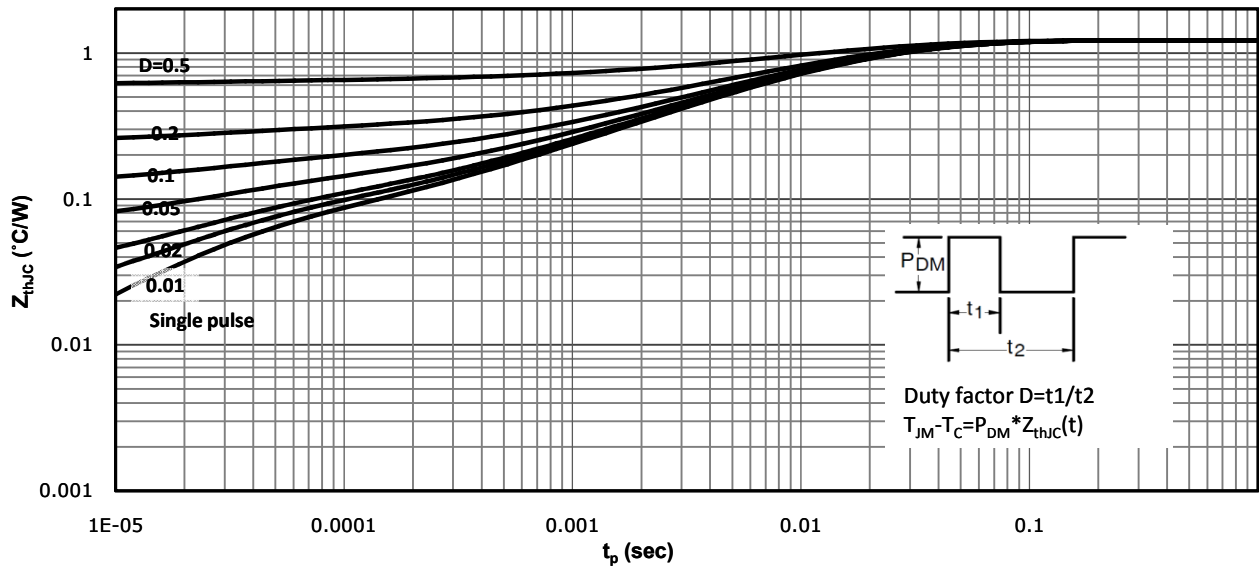
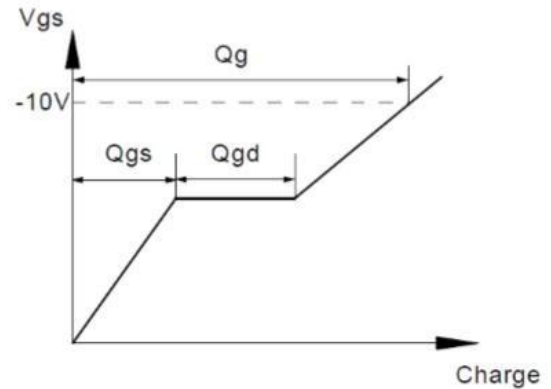
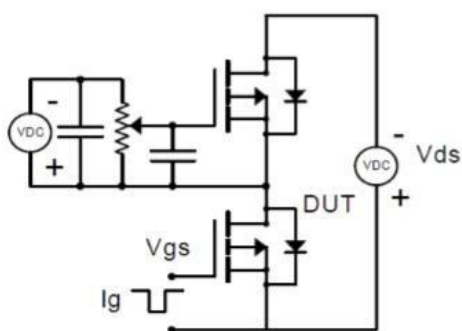


Fig 12: Max. Transient Thermal Impedance

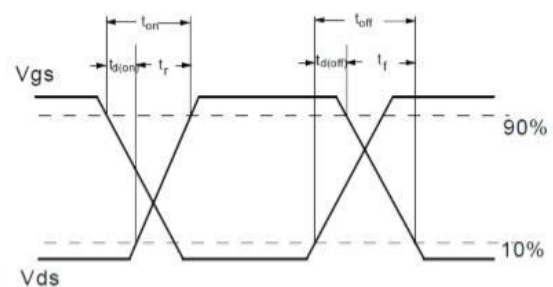
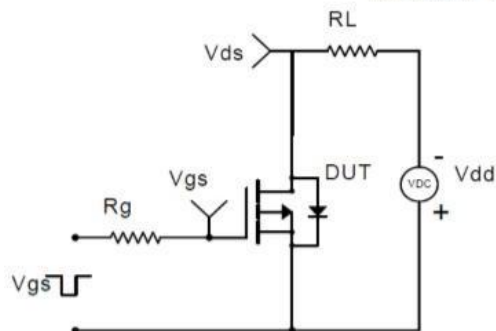


### Test Circuit & Waveform

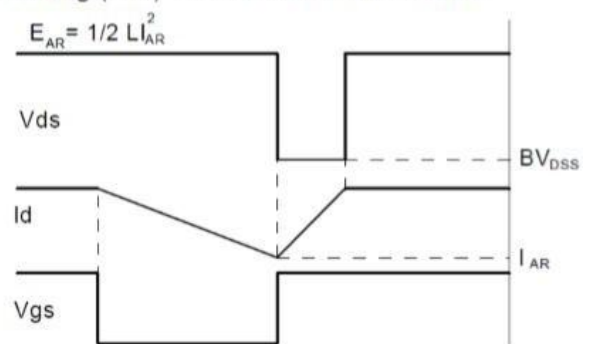
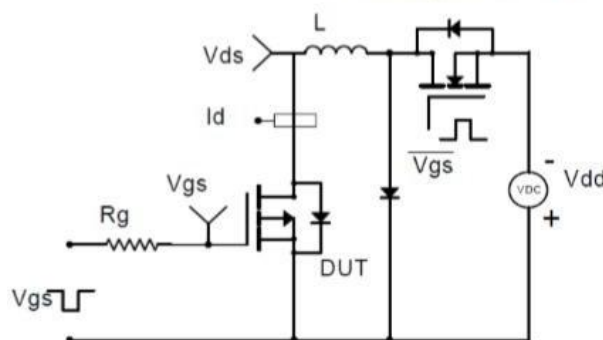
Gate Charge Test Circuit & Waveform



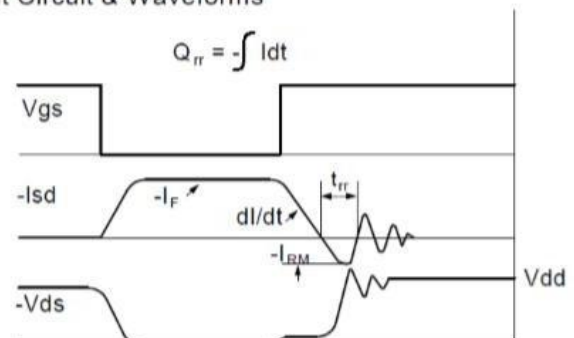
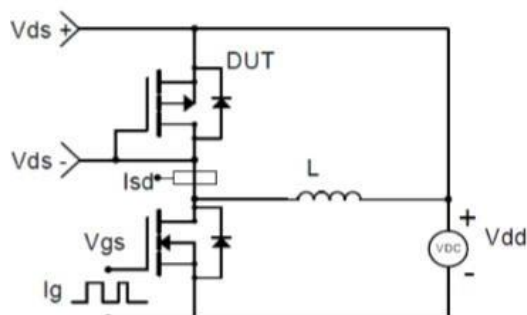
Resistive Switching Test Circuit & Waveforms



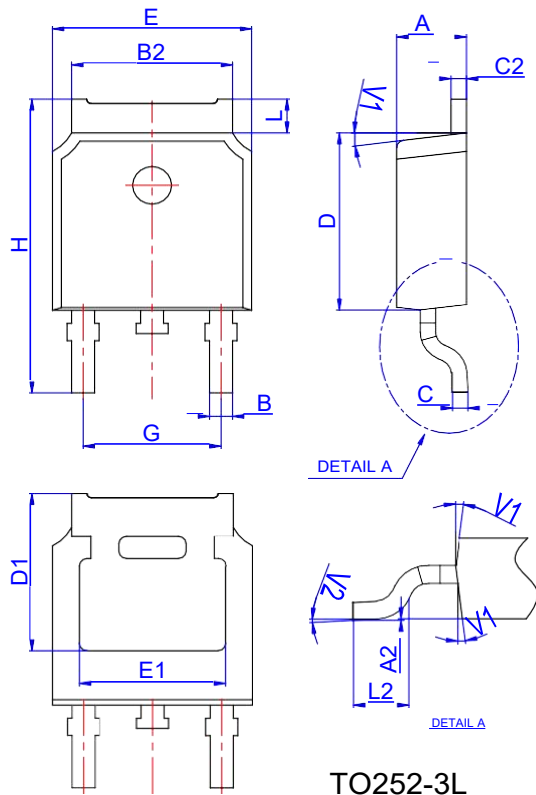
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

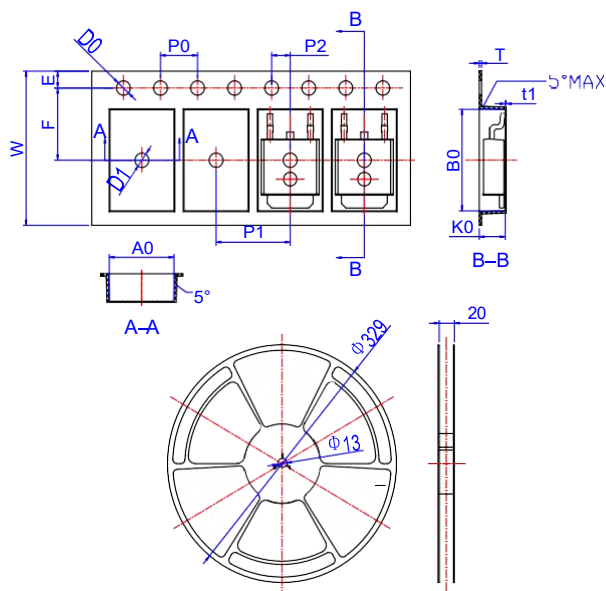


### Package Mechanical Data-TO252-3L



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