

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

Product Summary

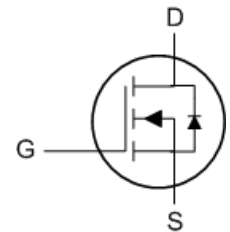
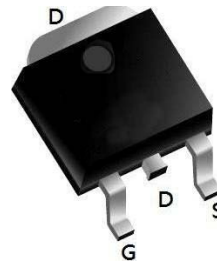


BVDSS	RDSON	ID
30V	2.5mΩ	120 A

Description

The XR120N03A 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 XR120N03A meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252-3L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	120	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	78	A
I_{DM}	Pulsed Drain Current ²	480	A
EAS	Single Pulse Avalanche Energy ³	333	mJ
I_{AS}	Avalanche Current	25	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	88	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	---	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	1.4	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	---	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=20A$	---	2.5	3.1	$m\Omega$
		$V_{GS}=4.5V$, $I_D=15A$	---	3.6	4.2	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1	1.5	2.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$mV/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=1V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=1V$, $V_{GS}=0V$, $T_J=100^\circ\text{C}$	---	---	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=1V$, $I_D=20A$	---	---	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	---	---	Ω
Q_g	Total Gate Charge	$V_{DS}=15V$, $V_{GS}=10V$, $I_D=30A$	---	72	---	nC
Q_{gs}	Gate-Source Charge		---	46	---	
Q_{gd}	Gate-Drain Charge		---	13	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=10V$, $V_{DS}=15V$, $I_D=30A$, $R_L=3\Omega$	---	14	---	ns
T_r	Rise Time		---	18	---	
$T_{d(off)}$	Turn-Off Delay Time		---	40	---	
T_f	Fall Time		---	12	---	
C_{iss}	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	4000	---	pF
C_{oss}	Output Capacitance		---	437	---	
C_{rss}	Reverse Transfer Capacitance		---	396	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	120	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=30A$, $T_J=25^\circ\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=30A$, $di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	48	---	nS
Q_{rr}	Reverse Recovery Charge		---	80	---	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=15V$, $V_G=10V$, $R_G=25\Omega$, $L=0.5\text{mH}$, $I_{AS}=25A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

N- Channel Typical Characteristics

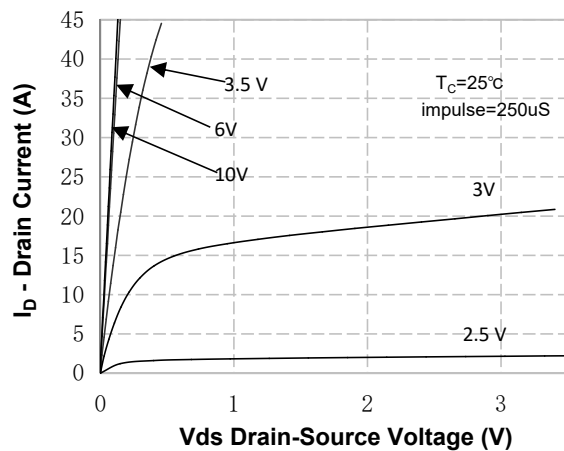


Figure 1. On-Region Characteristics

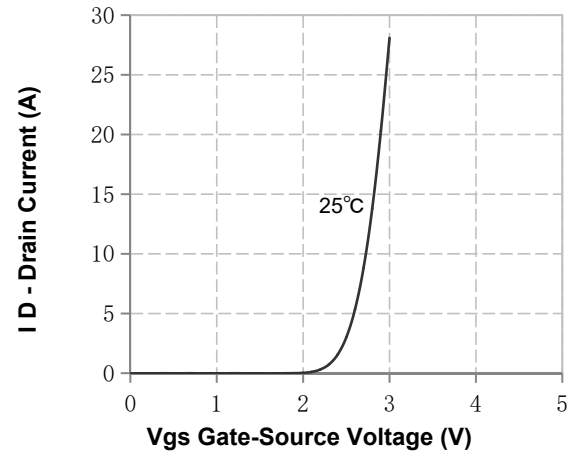


Figure 2. Transfer Characteristics

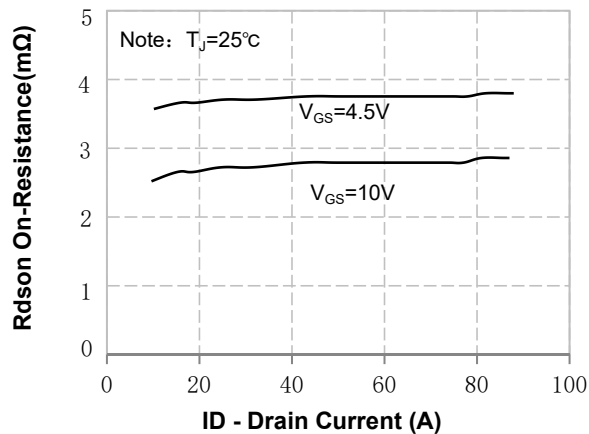


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

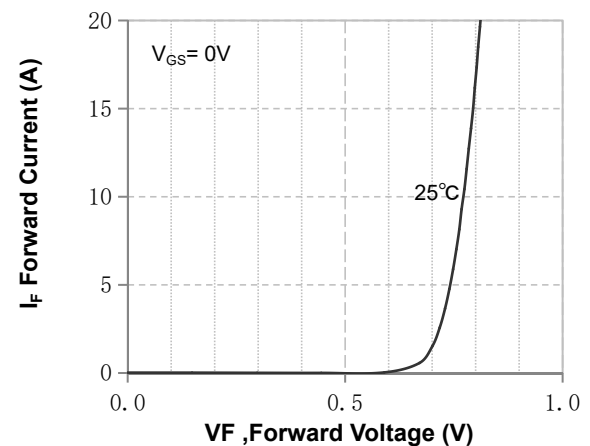


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

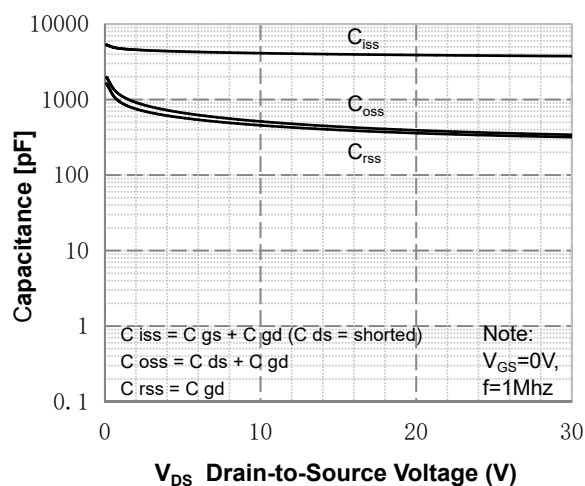


Figure 5. Capacitance Characteristics

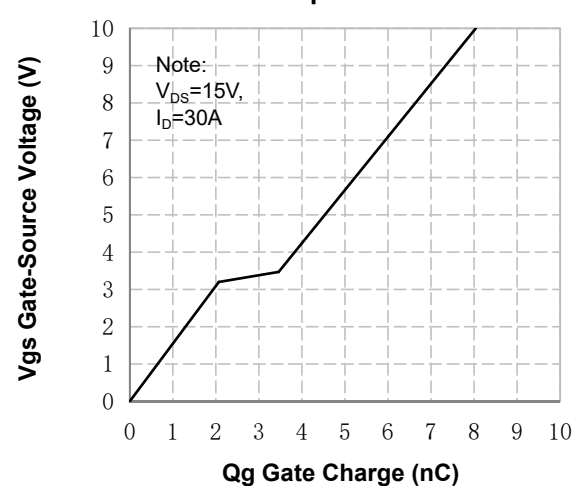


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

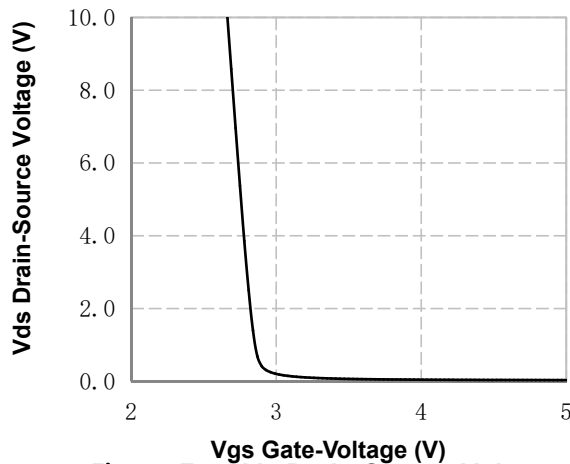


Figure 7. V_{DS} Drain-Source Voltage vs Gate Voltage

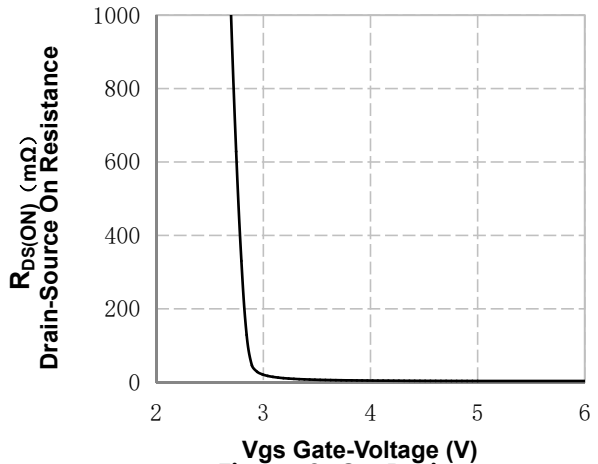


Figure 8. On-Resistance vs Gate Voltage

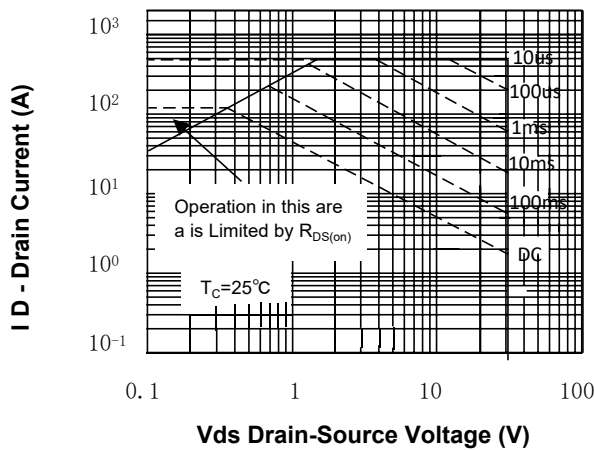


Figure 9. Maximum Safe Operating Area

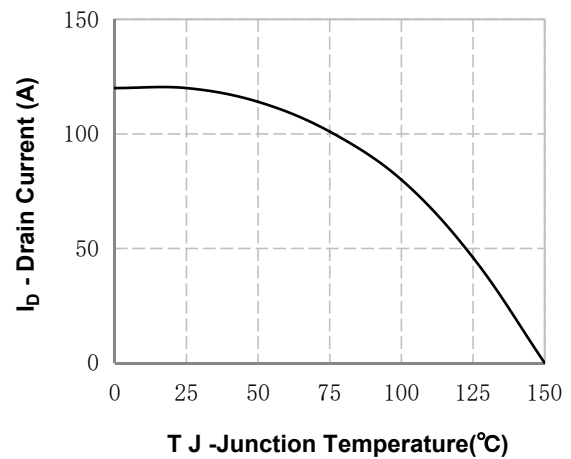


Figure 10. Maximum Continuous Drain Current vs Temperature

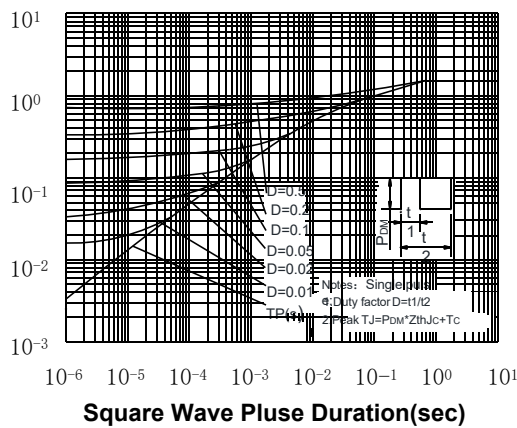
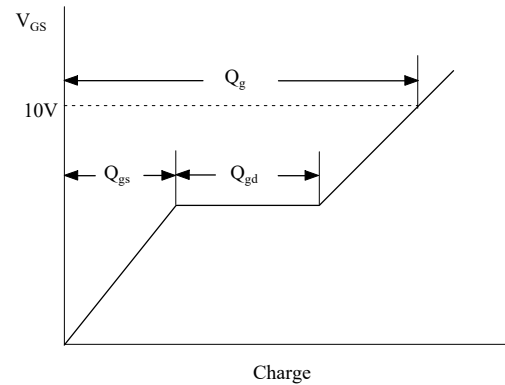
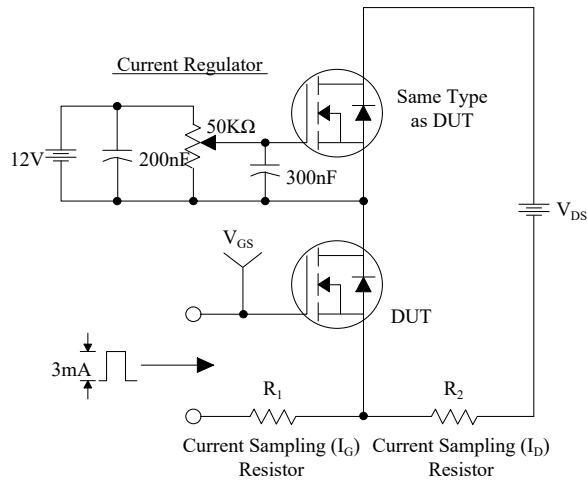
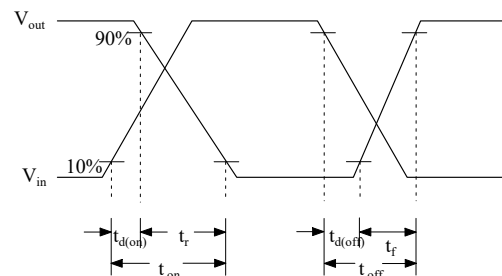
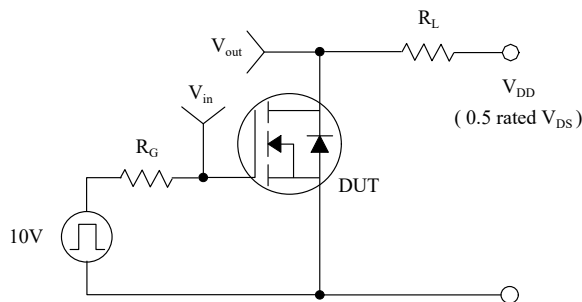


Figure 11. Transient Thermal Response Curve

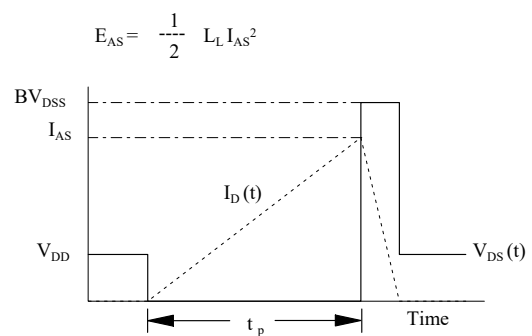
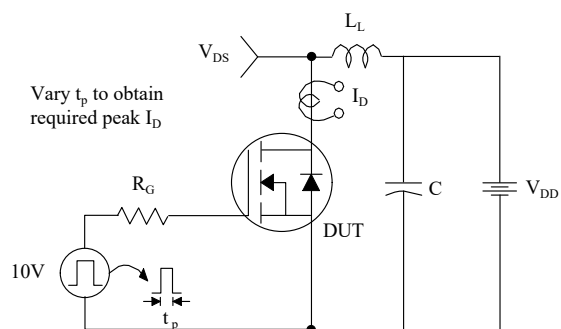
Gate Charge Test Circuit & Waveform



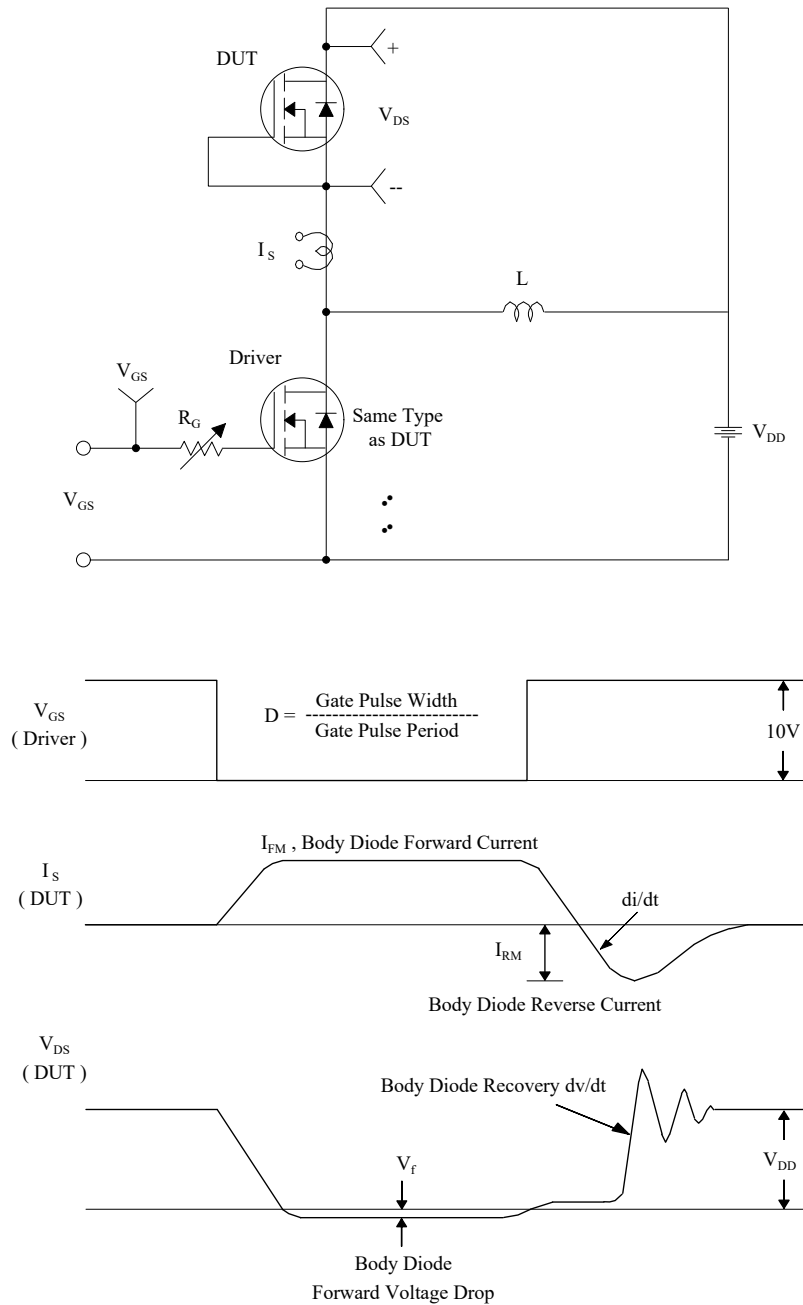
Resistive Switching Test Circuit & Waveforms



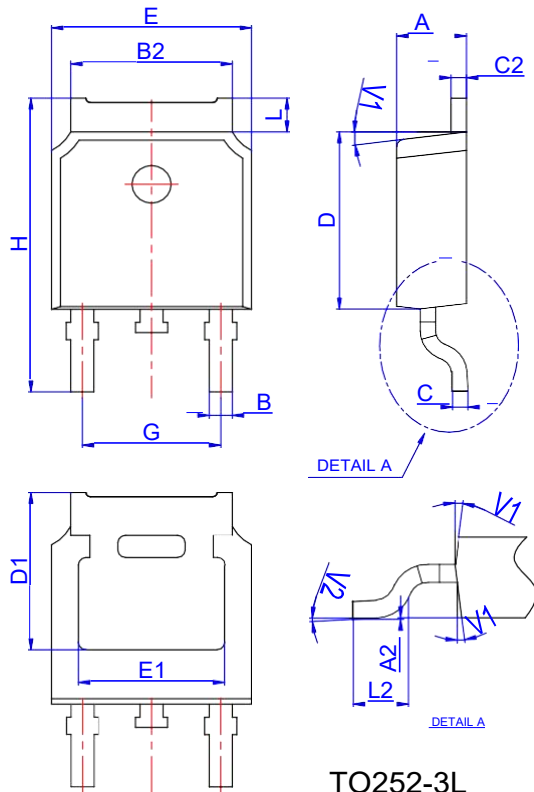
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

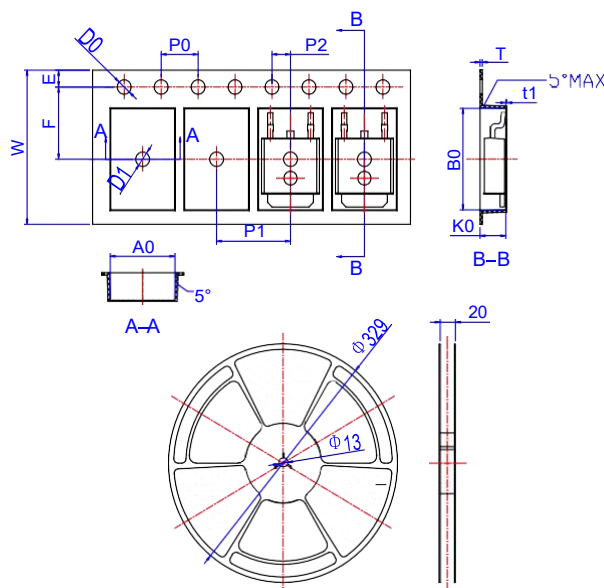


Package Mechanical Data TO252-3L



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