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

Product Summary

Green

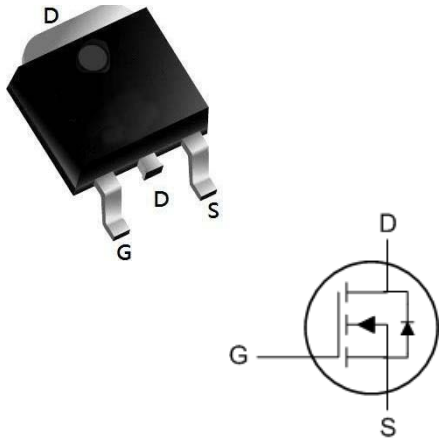
BVDSS	RDSON	ID
40V	4.5 mΩ	90A

Description

The XR90N04 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 XR90N04 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 °C, unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current (T_A=25°C)	90	A
	Continuous Drain Current (T_A=100°C)	44	A
I_{DM}	Pulsed Drain Current(Note1)	280	A
EAS	Single Pulsed Avalanche Energry(Note2)	121	W
P_D	Maximum Power Dissipation(T_A=25°C)	60	W
T_J T_{STG}	Operation Junction and Storage Temperature Range	-50 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	34	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	2.1	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static Characterisitics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=30A,	---	4.5	5.9	mΩ
		V_{GS}=4.5V , I_D=20A,	---	6.6	8.6	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.3	1.8	2.3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	----	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}＝±20V , V_{DS}=0V	---	---	±100	nA
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=20V , V_{GS}=0 to10V , I_D=30A	---	59	---	nC
Q_{gs}	Gate-Source Charge		---	12	---	
Q_{gd}	Gate-Drain Charge		---	12	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=20V, R_{GEN}=3Ω V_{GS}=10V, I_D=30A	---	11	---	ns
T_r	Rise Time		---	32	---	
$T_{d(off)}$	Turn-Off Delay Time		---	52	---	
T_f	Fall Time		---	13	---	
trr	Body Diode Reverse Recovery Time	I_F20A ,T_J=25°C dI/dt=100A/us	---	13	---	ns
Qrr	Body Diode Recerse Recovery Charge		---	7	---	nC
Dynamic Characterisitics						
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f=1MHz	---	3031	---	pF
C_{oss}	Output Capacitance		---	213	---	
C_{rss}	Reverse Transfer Capacitance		---	179	---	
Rg	Gate Resistance	f=1MHz, open drain	---	---	---	Ω

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current(Body Diode)	Tc==25°C	---	---	90	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, Is=3A	---	---	1.2	V
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		---	---	280	A

Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=20V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=22A
3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Output Characteristics

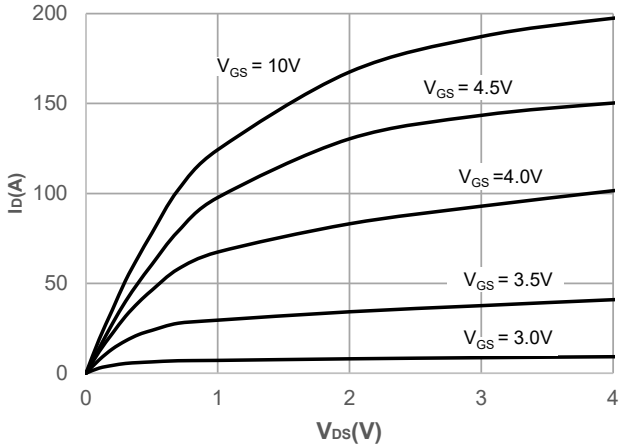


Figure 2: Typical Transfer Characteristics

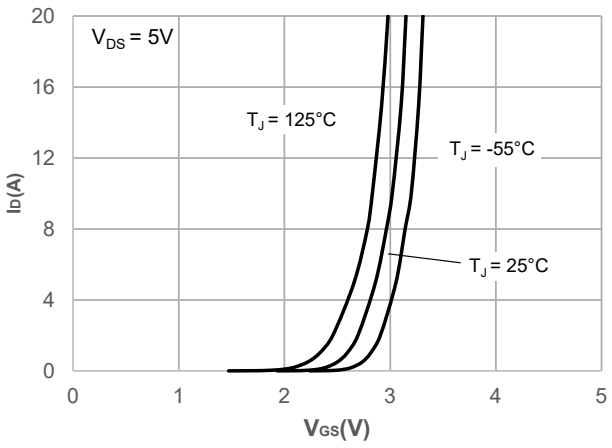


Figure 3: On-resistance vs. Drain Current

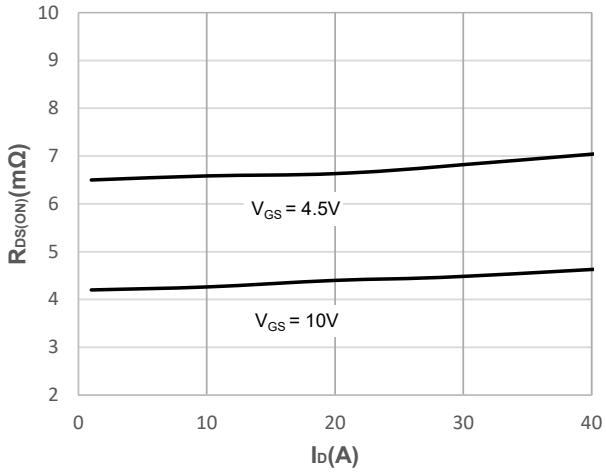


Figure 4: Body Diode Characteristics

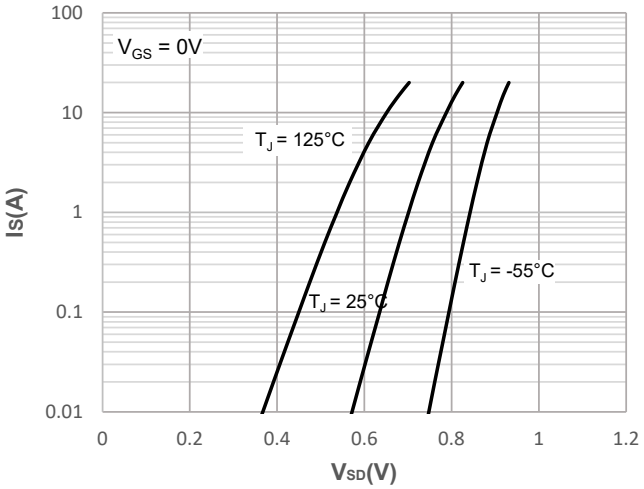


Figure 5: Gate Charge Characteristics

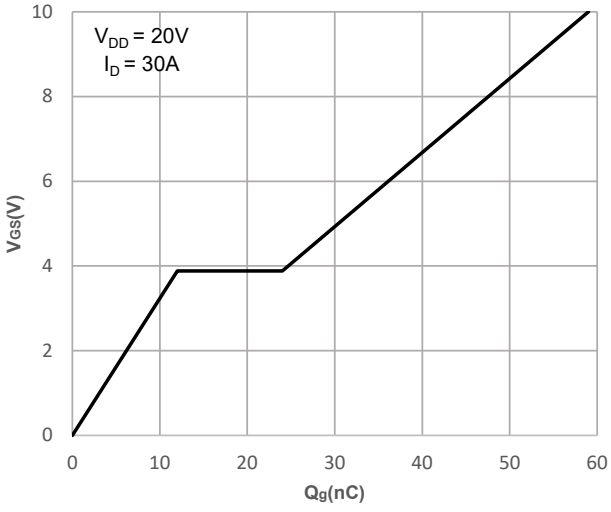
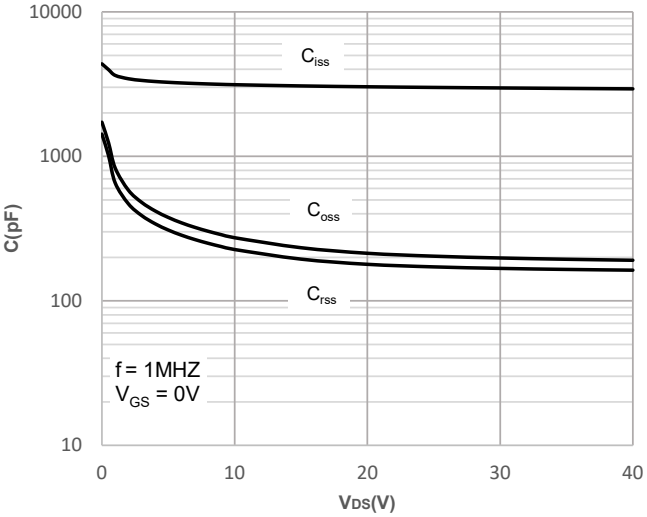


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

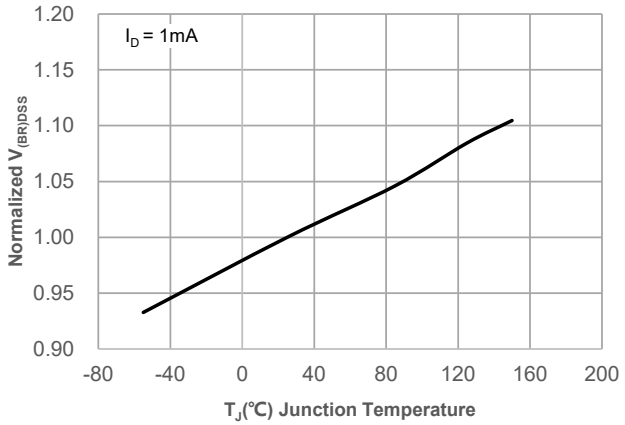


Figure 8: Normalized on Resistance vs. Junction Temperature

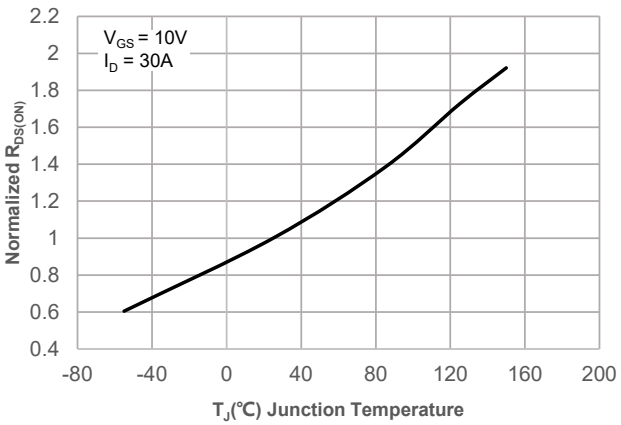


Figure 9: Maximum Safe Operating Area

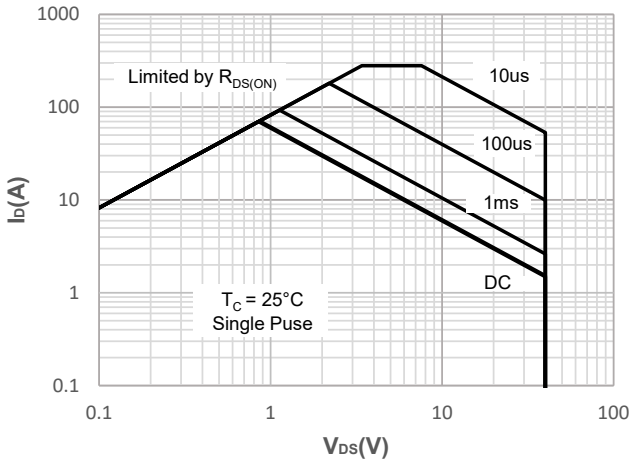


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

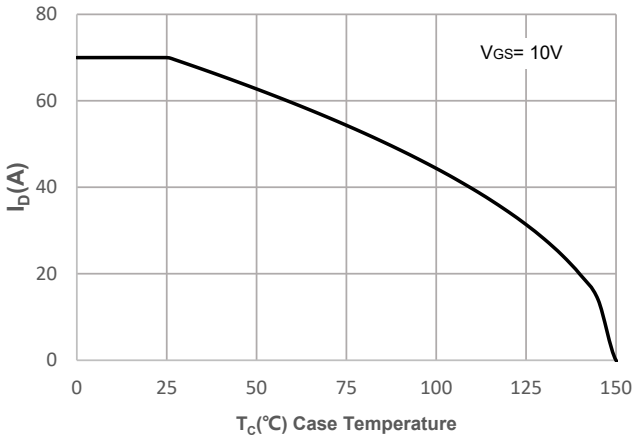


Figure 11: Normalized Maximum Transient Thermal Impedance

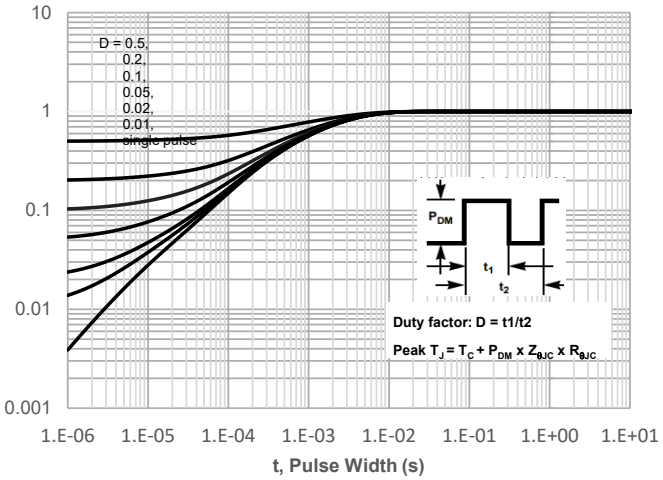
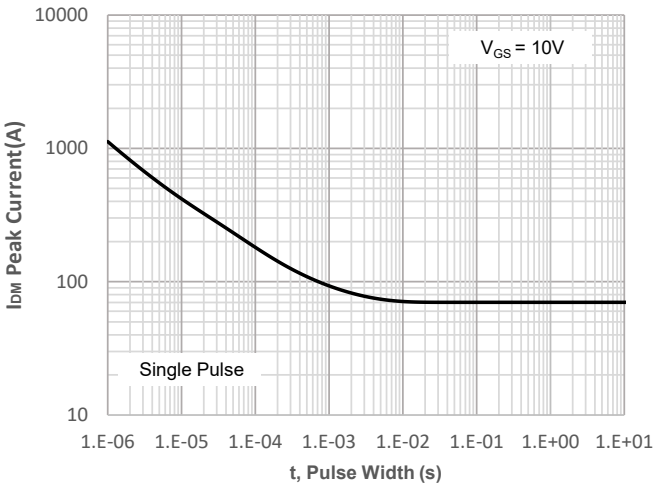


Figure 12: Peak Current Capacity



Test Circuit

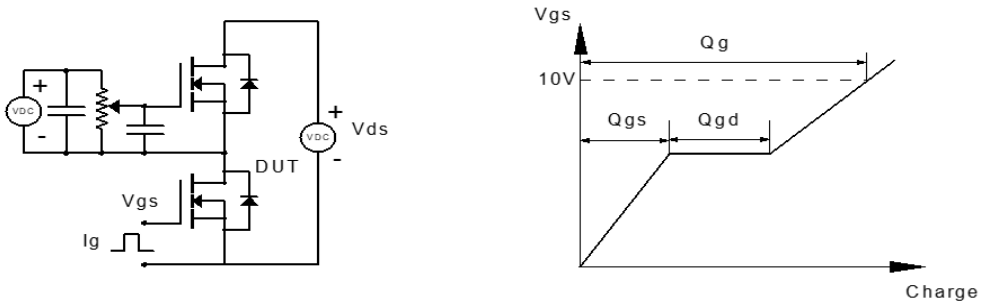


Figure 1: Gate Charge Test Circuit & Waveform

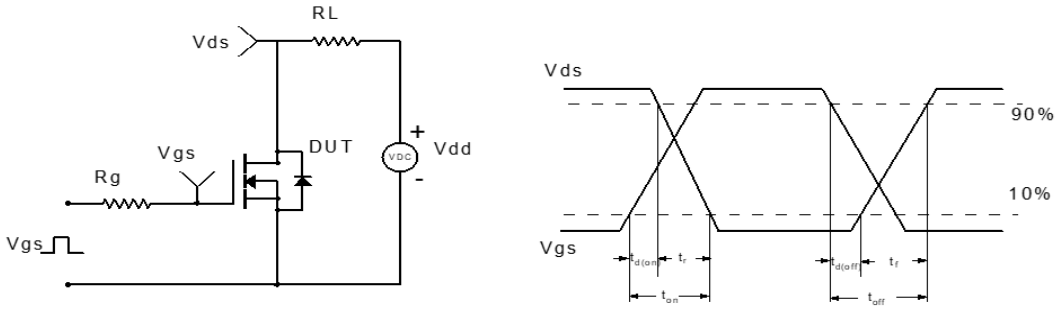


Figure 2: Resistive Switching Test Circuit & Waveform

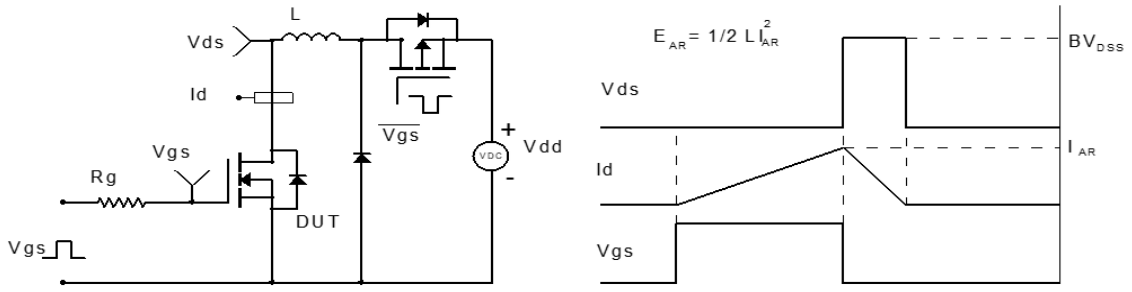


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

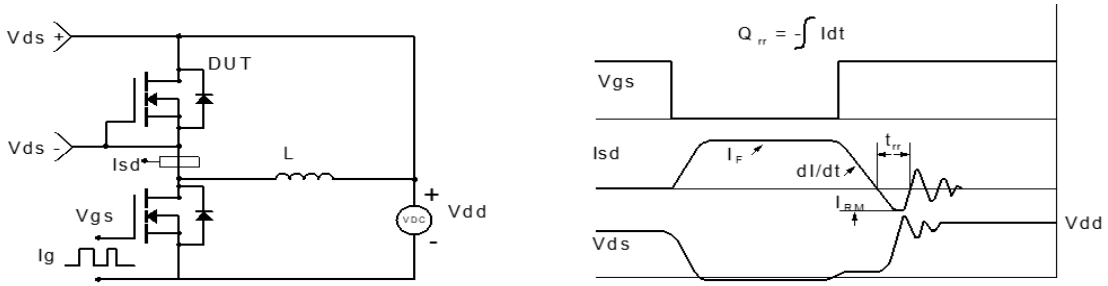
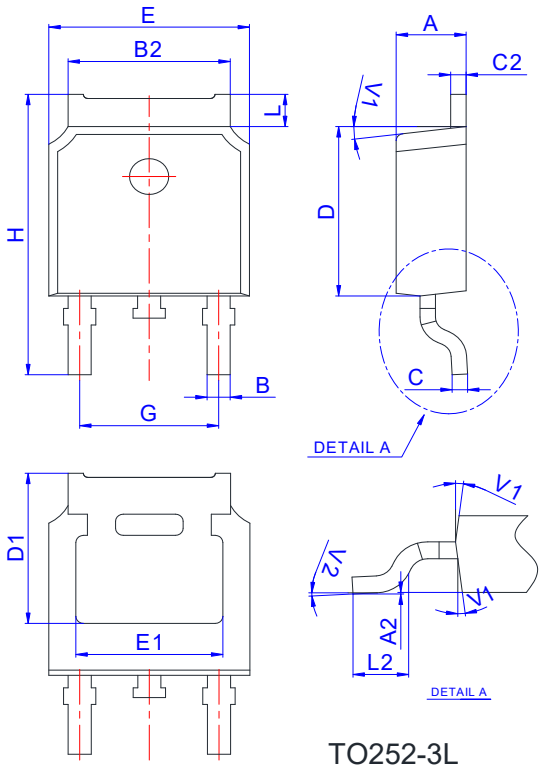


Figure 4: Diode Recovery Test Circuit & Waveform

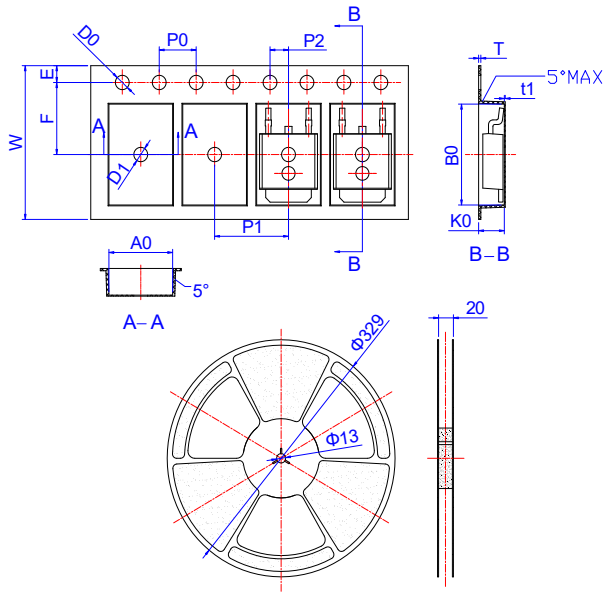
Package Mechanical Data-TO252-3L



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