Product Summary

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

Product Summary

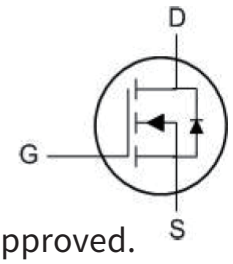
RoHS

BVDSS	RDSON	ID
650V	0.35Ω	11A

Applications

The 650SJ32 use advanced trench gate super junction technology and design to provide excellent RDS(ON) with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications. The 650SJ32 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	WMK/WMM/WMO/WMP/WMN	WML	Unit
V_{DSS}	Drain-source voltage	650		V
I_D	Continuous drain current[1](T_C = 25°C)	11		A
	Continuous drain current1)(T_C = 100°C)	6.5		A
I_{DM}	Pulsed drain current[2]	32		A
V_{GS}	Gate-source voltage	±30		V
E_{AS}	Avalanche energy, single pulse[3]	145		mJ
E_{AR}	Avalanche energy, repetitive[2]	0.21		mJ
I_{AR}	Avalanche current, repetitive[2]	2		A
P_D	Power dissipation (T_C = 25°C)	85	31	W
	- D rate above 25°C	0.68	0.25	W/°C
T_j, T_{stg}	Operating and storage temperature range	-55 to +150		°C
I_S	Continuous diode forward current	11		A
$I_{S,pulse}$	Diode pulse current	35		A
dv/dt	MOSFET dv/dt ruggedness	50		V/ns
	Peak diode recovery voltage slope	15		V/ns

Thermal Data

Symbol	Parameter	WMK/WMM/WMO/WMP/WMN	WML	Unit
$R_{\theta JC}$	Thermal resistance, junction-to-case	1.47	4	°C/W
$R_{\theta A}$	Thermal resistance, junction-to-ambient	62	80	°C/W

Electrical Characteristics (T_J =25 °C unless otherwise specified)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
Static characteristics						
BV_{DSS}	Drain-source breakdown voltage	V_{GS}=0 V, I_D=0.25 mA	650	-	-	V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=0.25mA	2	3	4	V
I_{DSS}	Drain cut-off current	V_{DS}=700 V, V_{GS}=0 V, T_j = 25°C	-	-	1	μA
		V_{DS}=700 V, V_{GS}=0 V, T_j = 125°C	-	50	-	
I_{GSSF}	Gate leakage current, forward	V_{GS}=20 V, V_{DS}=0 V	-	-	100	nA
I_{GSSR}	Gate leakage current, reverse	V_{GS}=-20 V, V_{DS}=0 V	-	-	-100	
$R_{DS(on)}$	Drain-source on-state resistance	V_{GS}=10 V, I_D=2 A	--	0.35	0.39	Ω
Dynamic characteristics						
C_{iss}	Input capacitance	V_{DS}= 100 V, V_{GS}= 0 V,f = 1 MHz	-	710	-	pF
C_{oss}	Output capacitance		-	25	-	
C_{rss}	Reverse transfer capacitance		-	2	-	
$t_{d(on)}$	Turn-on delay time	V_{DD} = 300V, I_D = 5A R_G = 25Ω, V_{GS}=10V	-	20	-	ns
t_r	Rise time		-	16	-	
$t_{d(off)}$	Turn-off delay time		-	61	-	
t_f	Fall time		-	17	-	
Gate charge characteristics						
Q_{gs}	Gate to source charge	V_{DD}=480 V, I_D=5A, V_{GS}=0 to 10 V	-	3.4	-	nC
Q_{gd}	Gate to drain charge		-	10.1	-	
Q_g	Gate charge total		-	20.3	-	
$V_{plateau}$	Gate plateau voltage		-	4.7	-	V
Reverse diode characteristics						
V_{SD}	Diode forward voltage	V_{GS}=0 V, I_F=2A	-	-	1.2	V
t_{rr}	Reverse recovery time	V_R=50 V, I_F=5A, dIF/dt=100 A/μs	-	213	-	ns
Q_{rr}	Reverse recovery charge		-	2.1	-	μC
I_{rrm}	Peak reverse recovery current		-	20	-	A

Notes:

1.Limited by Tj max. Maximum duty cycle D=0.5.

2.Repetitive rating: pulse width limited by maximum junction temperature.

3.IAS = 2.0 A, V_{DD} = 50V, R_G = 25Ω, starting T_j = 25°C.

Typical Electrical and Thermal Characteristics (Curves)

Figure1: On-Region Characteristics

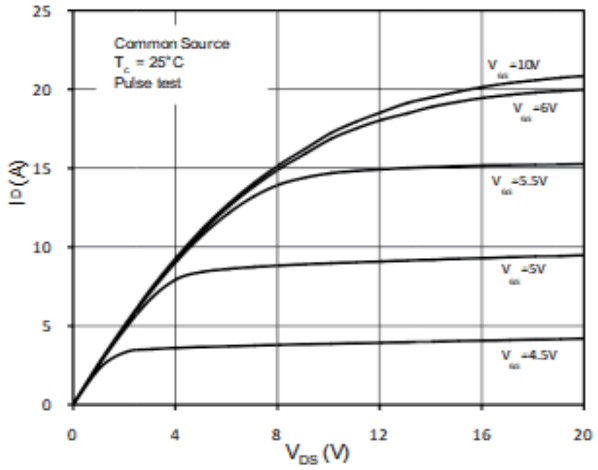


Figure 2: Transfer Characteristics

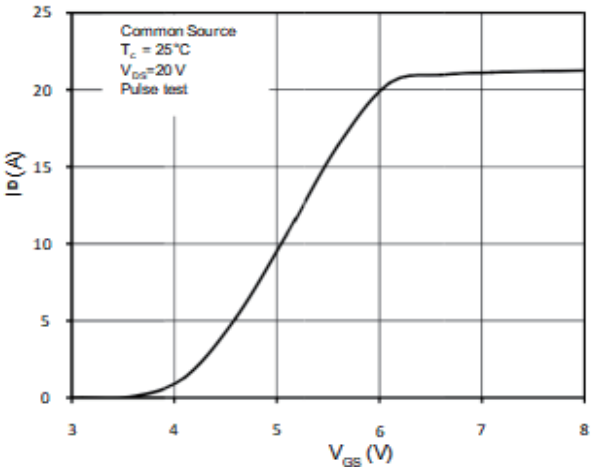


Figure 3:Static Drain-Source On Resistance

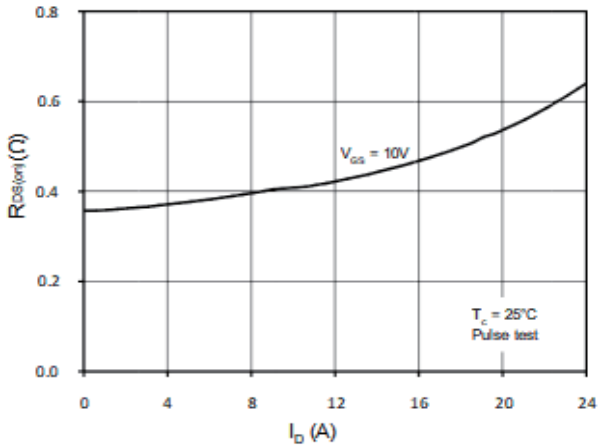


Figure 4: Body Diode Characteristics

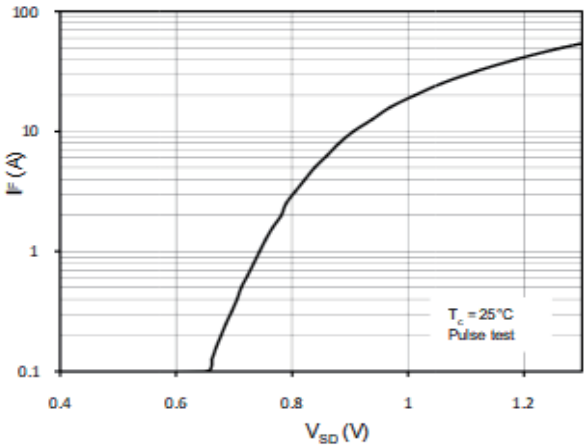


Figure 5: Normalized BVDSS vs. Temperature

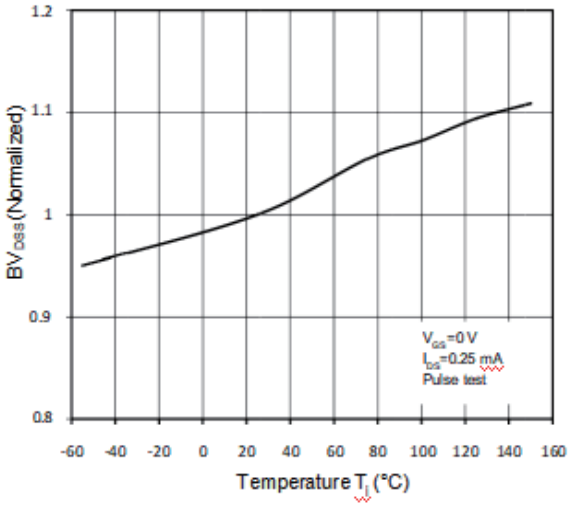
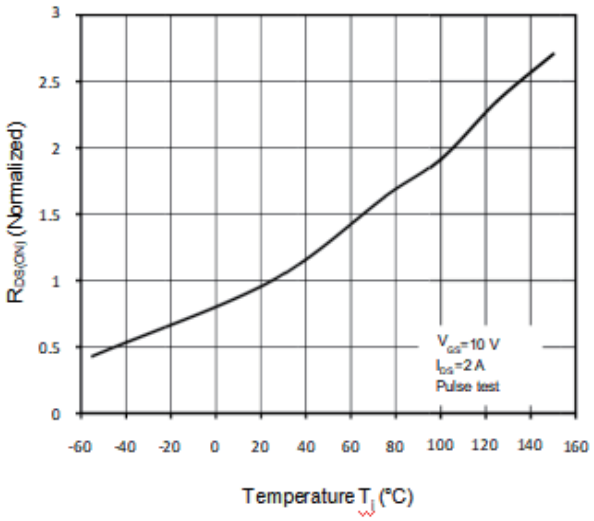


Figure 6:Normalized RDS(on) vs. Temperature



Typical Performance Characteristics

Figure 7:Threshold Voltage vs. Temperat

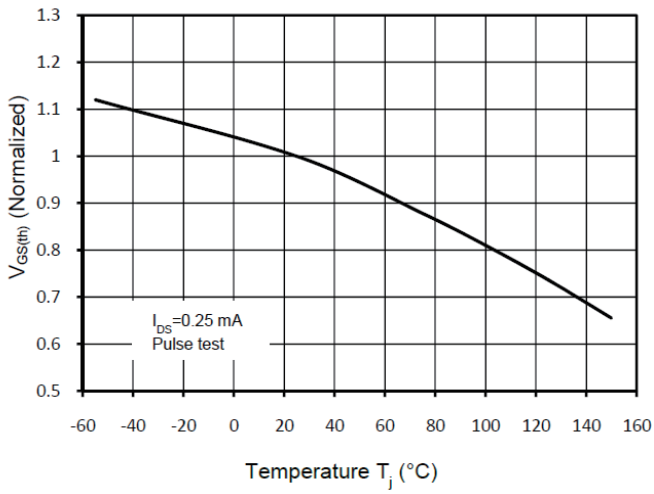


Figure 8: Capacitance Characteristics

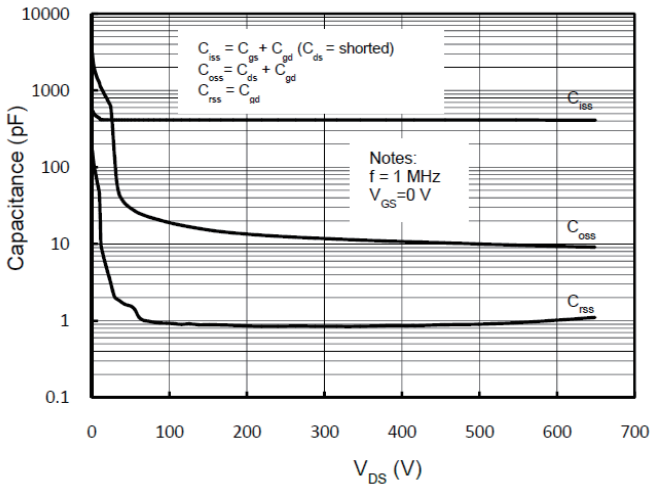


Figure 9: Power Dissipation

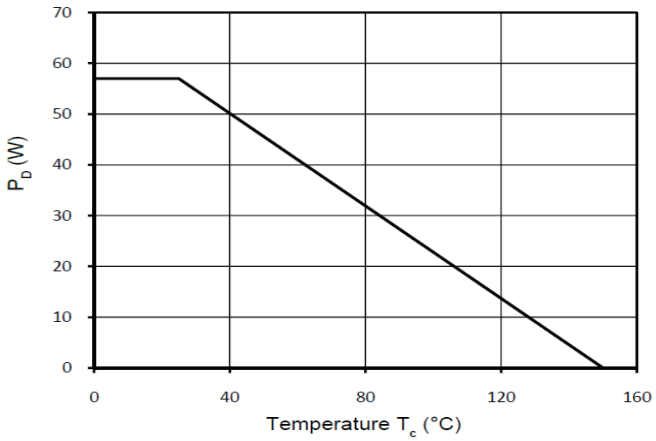


Figure 10: Power Dissipation (TO-220F)

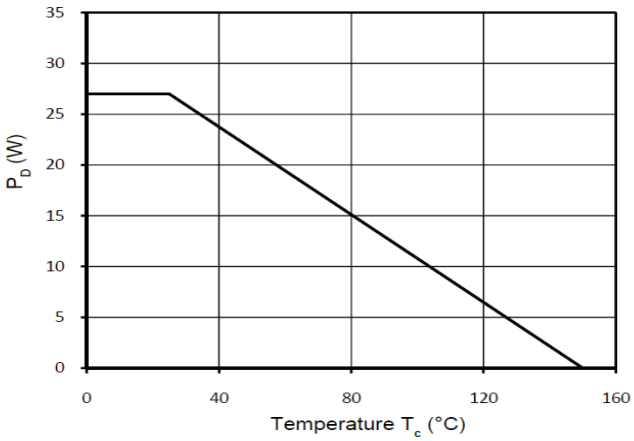


Figure 11: Maximum Safe Operating Area

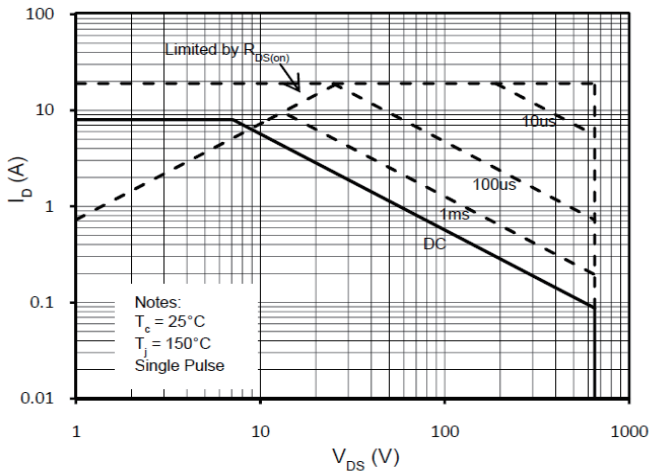
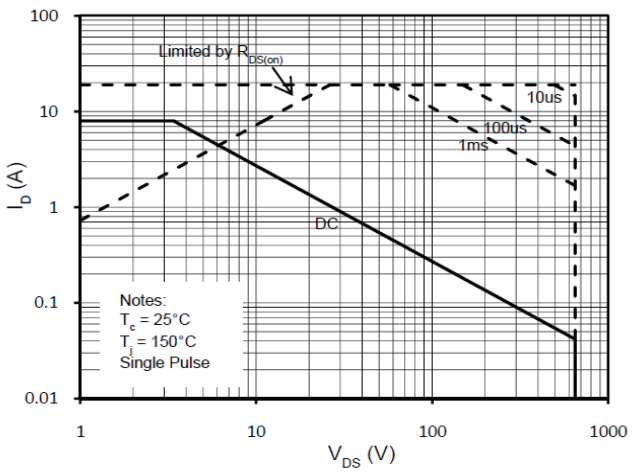


Figure 11:Maximum Safe Operating Area



Typical Performance Characteristics

Figure 13:Transient Thermal Response C

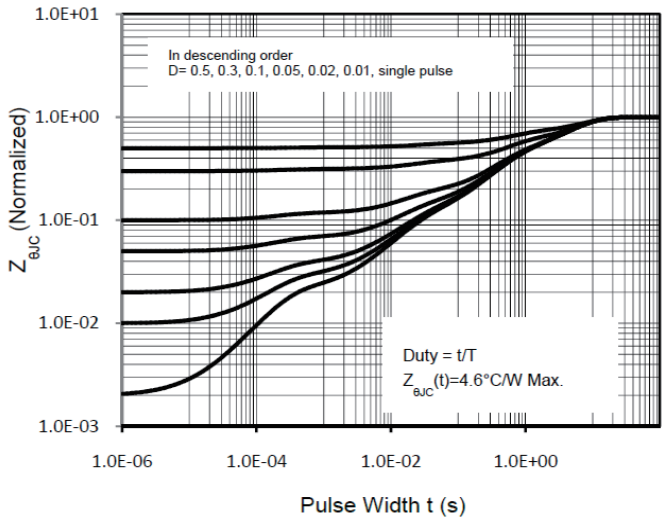


Figure 14: Transient Thermal Response C

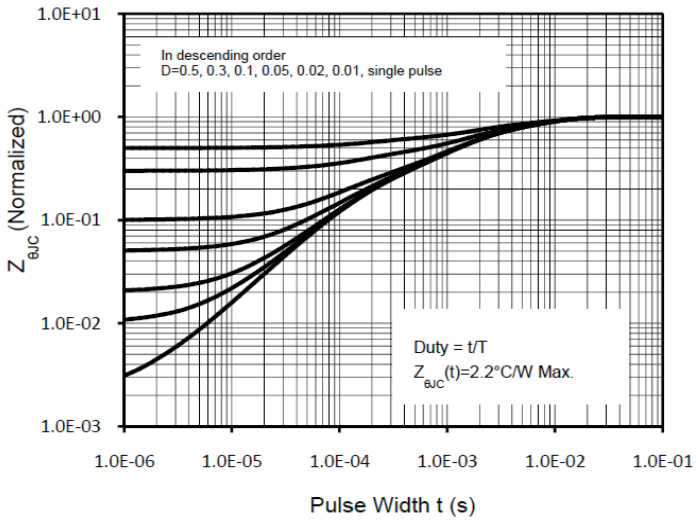
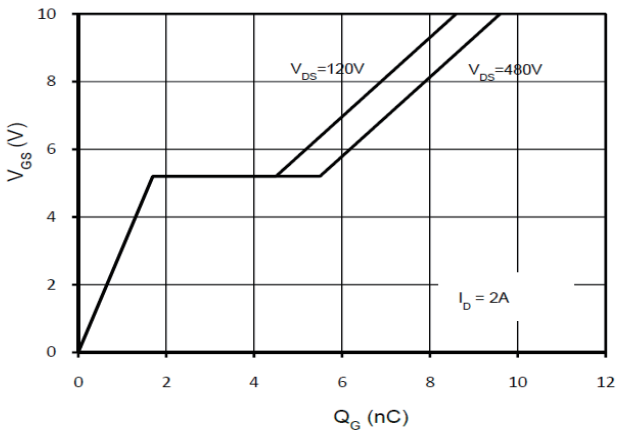
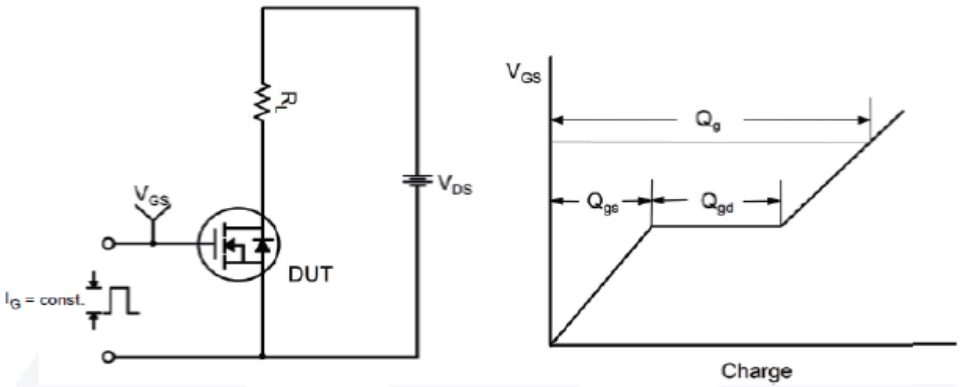


Figure 15: Gate Charge Characteristics

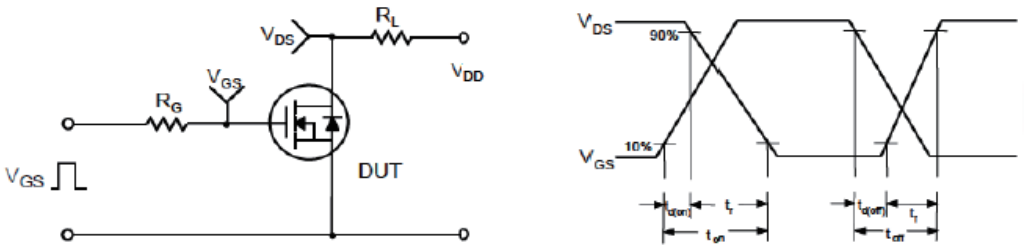


Test circuit

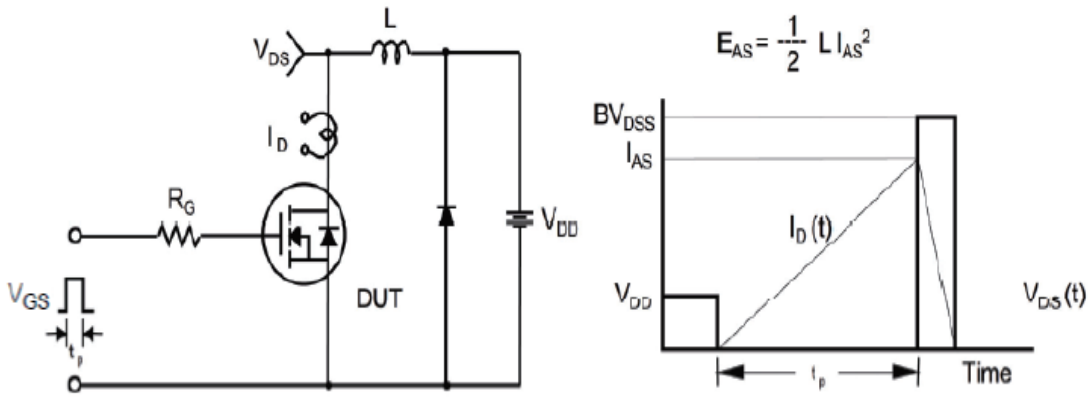
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Package Mechanical Data-TO-252

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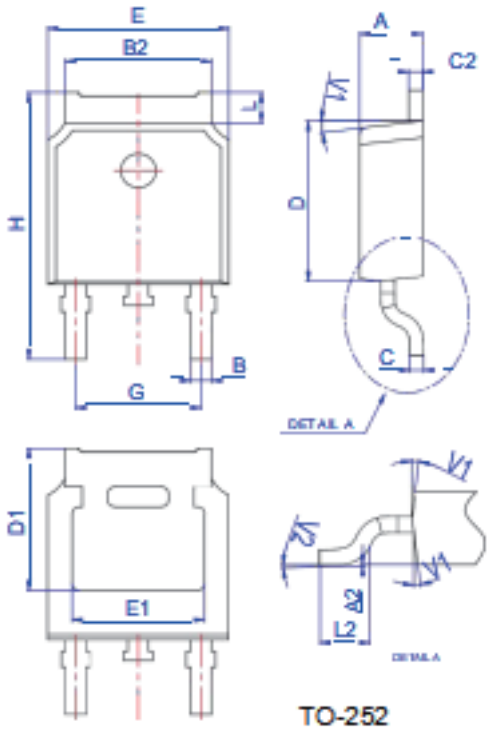
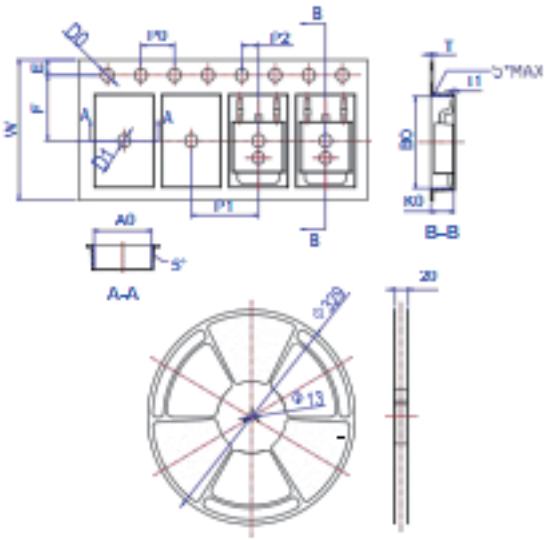


TO-252

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-TO-252-4R



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

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