FAIRCHILD SEMICONDUCTOR™

August 1999
DISTRIBUTION GROUP*

MTD2955V

P-Channel Enhancement Mode Field Effect Transistor

General Description

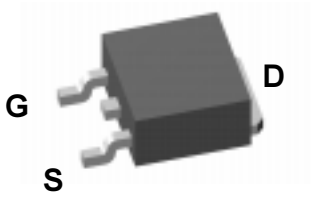
This P-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications.

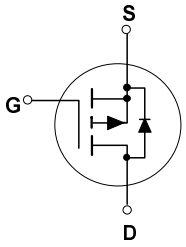
The result is a MOSFET that is easy and safer to drive (even at very high frequencies), and DC/DC power supply designs with higher overall efficiency.

Features

- -12 A, -60 V. $R_{DS(ON)}$ = 0.23 Ω @ V_{GS} = -10 V
- Low gate charge.
- Fast switching speed.
- High performance technology for low $R_{DS(ON)}$.



TO-252



Absolute Maximum Ratings

T_C=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		-60	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Maximum Drain Current -Continuous	(Note 1)	-12	A
	T_C = 100°C	(Note 1)	-8	
	Maximum Drain Current -Pulsed		-42	
P_D	Maximum Power Dissipation @ T_C = 25°C	(Note 1)	60	W
	T_A = 25°C	(Note 1a)	3.9	
	T_A = 25°C	(Note 1b)	1.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to- Case	(Note 1)	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to- Ambient	(Note 1a)	38	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
MTD2955V	MTD2955V	13"	16mm	2500

* Die and manufacturing source subject to change without prior notification.

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Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
DRAIN-SOURCE AVALANCHE RATINGS (Note 2)						
w_{DSS}	Single Pulse Drain-Source Avalanche Energy	V_{DD} = -25 V, I_D = -12 A			216	mJ
I_{AR}	Maximum Drain-Source Avalanche Current				-12	A
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = -250 μA	-60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250 μA, Referenced to 25°C		-60		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -60 V, V_{GS} = 0 V			10	μA
		V_{DS} = -60 V, V_{GS} = 0 V, T_J = 150°C			100	
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V			-100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250 μA	-2	-2.3	-4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = -250 μA, Referenced to 25°C		3.2		mV/°C
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = -10 V, I_D = -6 A,			0.230	Ω
$V_{DS(on)}$	Drain-Source On-Voltage On-Resistance	V_{GS} = -10 V, I_D = -12 A I_D = -6 A, T_J =150°C			2.9 2.5	V
g_{FS}	Forward Transconductance	V_{DS} = -10 V, I_D = -6 A	3.0			S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -25 V, V_{GS} = 0 V, f = 1.0 MHz		560	770	pF
C_{oss}	Output Capacitance			130	280	pF
C_{rss}	Reverse Transfer Capacitance			35	100	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -30 V, I_D = -12 A, V_{GS} = -10 V, R_{GEN} = 9.1 Ω			30	ns
t_r	Turn-On Rise Time				100	ns
$t_{d(off)}$	Turn-Off Delay Time				50	ns
t_f	Turn-Off Fall Time				80	ns
Q_g	Total Gate Charge	V_{DS} = -48 V, I_D = -12 A, V_{GS} = -10 V		18	30	nC
Q_{gs}	Gate-Source Charge			2.4		nC
Q_{gd}	Gate-Drain Charge			4.7		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current (Note 2)				-12	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current (Note 2)				-42	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = -12 A (Note 2)			-3.0	V
t_{rr}	Drain-Source Reverse Recovery Time	I_F = -12 A, di/dt = 100A/μs		115		nS

Notes:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the drain tab. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) $R_{\theta JA}$ = 38°C/W when mounted on a 1 in^2 pad of 2oz copper.



b) $R_{\theta JA}$ = 96°C/W when mounted on a minimum pad.

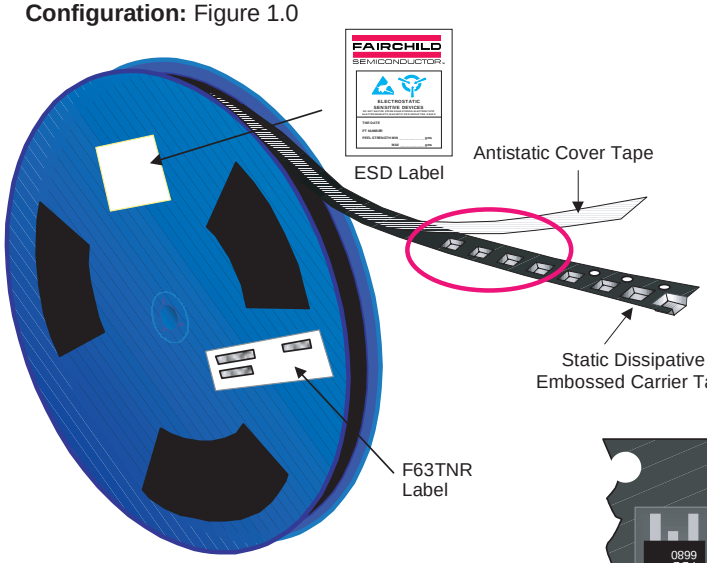
Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

TO-252 Tape and Reel Data and Package Dimensions

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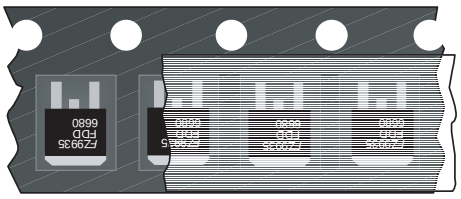
D-PAK (TO-252) Packaging Configuration: Figure 1.0



Packaging Description:

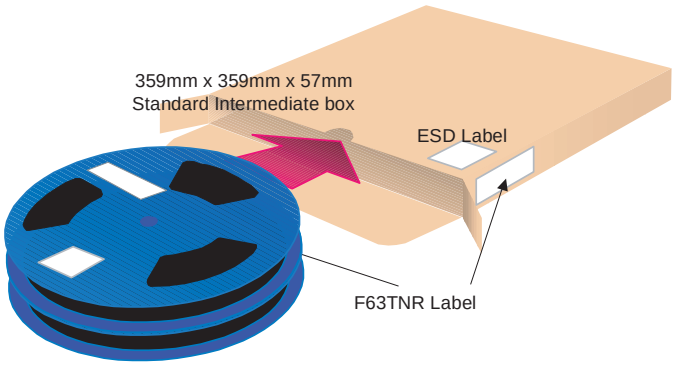
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2500 units per 13" or 330cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). This and some other options are further described in the Packaging Information table.

These full reels are individually barcode labeled and placed inside a standard intermediate box (illustrated in figure 1.0) made of recyclable corrugated brown paper. One box contains two reels maximum. And these boxes are placed inside a barcode labeled shipping box which comes in different sizes depending on the number of parts shipped.

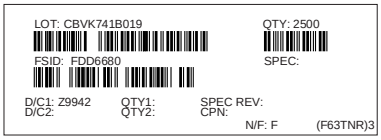


D-PAK (TO-252) Unit Orientation

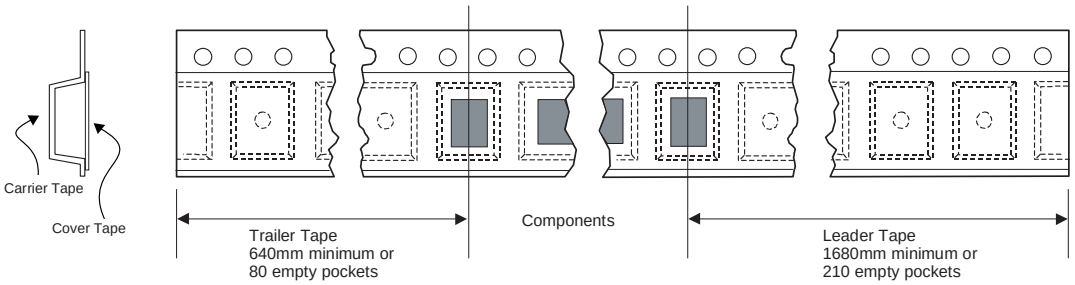
D-PAK (TO-252) Packaging Information	
Packaging Option	Standard (no flow code)
Packaging type	TNR
Qty per Reel/Tube/Bag	2,500
Reel Size	13" Dia
Box Dimension (mm)	359x359x57
Max qty per Box	5,000
Weight per unit (gm)	0.300
Weight per Reel(kg)	1.200
Note/Comments	



F63TNR Label sample



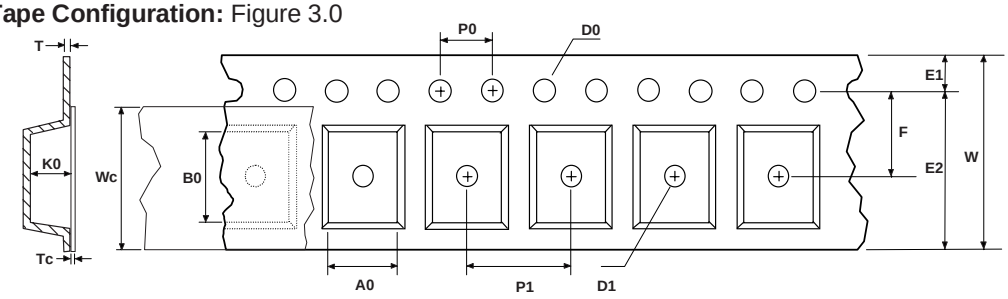
TO-252 (D-PAK) Tape Leader and Trailer Configuration: Figure 2.0



TO-252 Tape and Reel Data and Package Dimensions

D-PAK (TO-252) Embossed Carrier

Tape Configuration: Figure 3.0

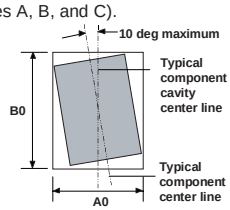


Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
TO252 (24mm)	6.90 +/-0.10	10.50 +/-0.10	16.0 +/-0.3	1.55 +/-0.05	1.5 +/-0.10	1.75 +/-0.10	14.25 min	7.50 +/-0.10	8.0 +/-0.1	4.0 +/-0.1	2.65 +/-0.10	0.30 +/-0.05	13.0 +/-0.3	0.06 +/-0.02

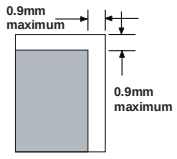
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation



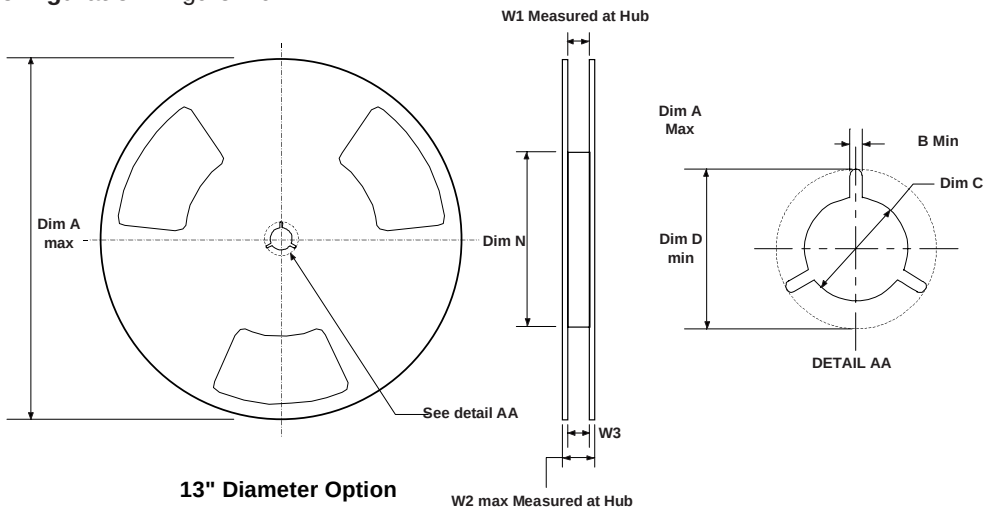
Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

D-PAK (TO-252) Reel

Configuration: Figure 4.0



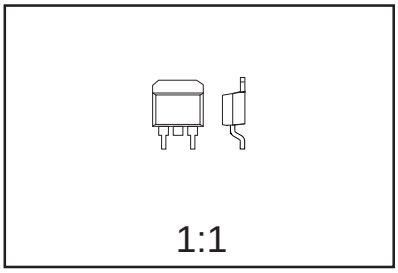
13" Diameter Option

Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
164mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	4.00 100	0.646 +0.078/-0.000 16.4 +2/0	0.882 22.4	0.626 – 0.764 15.9 – 19.4

TO-252 Tape and Reel Data and Package Dimensions

TO-252 (FS PKG Code AA)

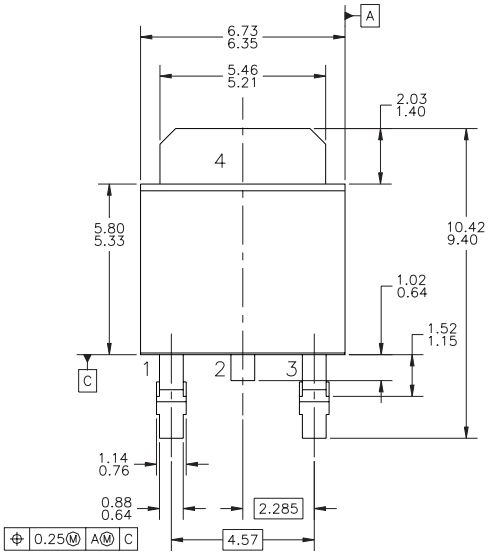


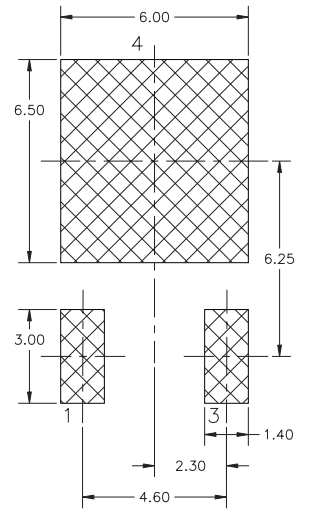


Scale 1:1 on letter size paper

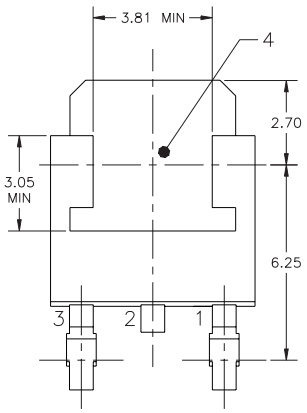
Dimensions shown below are in:
inches [millimeters]

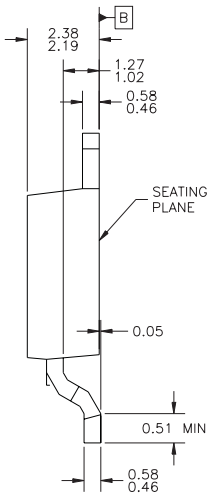
Part Weight per unit (gram): 0.300





LAND PATTERN RECOMMENDATION





NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

B) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE B, VARIATION AB, ITEM 10.268, DATED SEPTEMBER 1988.

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