MOS-TECH Semiconductor Co.,LTD
臺灣茂鈿半導體股份有限公司

MT19N10

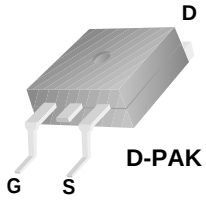
100V N-Channel MOSFET

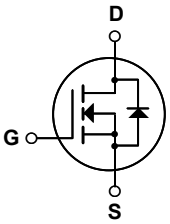
General Description

These N-Channel enhancement mode power field effect transistors are produced using Mos-tech's proprietary, planar stripe, DMOS technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for low voltage applications such as high efficiency switching DC/DC converters, and DC motor control.

Features

- 15.6A, 100V, $R_{DS(on)}$ = 0.1Ω @V_{GS} = 10 V
- Low gate charge (typical 14 nC)
- Low Crss (typical 35 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS Compliant





Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		MT19N10	Units
V_{DSS}	Drain-Source Voltage		100	V
I_D	Drain Current - Continuous (T_C = 25°C)		15.6	A
	- Continuous (T_C = 100°C)		8.5	A
I_{DM}	Drain Current - Pulsed	(Note 1)	62.4	A
V_{GSS}	Gate-Source Voltage		± 20	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	220	mJ
I_{AR}	Avalanche Current	(Note 1)	9.6	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	5.0	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6.0	V/ns
P_D	Power Dissipation (T_A = 25°C) *		2.5	W
	Power Dissipation (T_C = 25°C)		50	W
	- Derate above 25°C		0.4	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	3.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	--	55	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	115	°C/W

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.09	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100 V, V_{GS} = 0 V	--	--	1	μA
		V_{DS} = 80 V, T_C = 125°C	--	--	10	μA
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						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1.0	--	2.9	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 7.8 A V_{GS} = 5 V, I_D = 7.8 A	--	0.074 0.082	0.10 0.11	Ω
g_{FS}	Forward Transconductance	V_{DS} = 30 V, I_D = 7.8 A (Note 4)	--	11	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	620	810	pF
C_{oss}	Output Capacitance		--	120	200	pF
C_{rss}	Reverse Transfer Capacitance		--	31	40	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 19 A, R_G = 25 Ω (Note 4, 5)	--	12	31	ns
t_r	Turn-On Rise Time		--	400	800	ns
$t_{d(off)}$	Turn-Off Delay Time		--	20	50	ns
t_f	Turn-Off Fall Time		--	120	250	ns
Q_g	Total Gate Charge	V_{DS} = 80 V, I_D = 19 A, V_{GS} = 5 V (Note 4, 5)	--	12	14	nC
Q_{gs}	Gate-Source Charge		--	2.5	--	nC
Q_{gd}	Gate-Drain Charge		--	9.0	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	15.6	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	62.4	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 15.6 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 19 A, dI_F / dt = 100 A/μs (Note 4)	--	80	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.195	--	μC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 1.35mH, I_{AS} = 15.6A, V_{DD} = 25V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 19A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

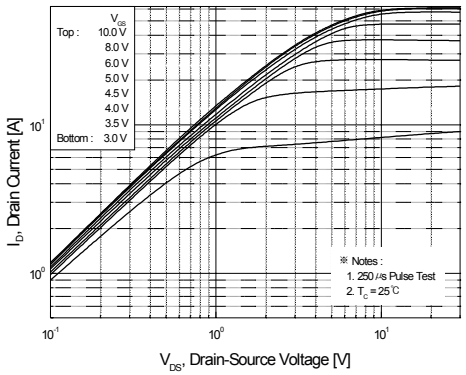


Figure 1. On-Region Characteristics

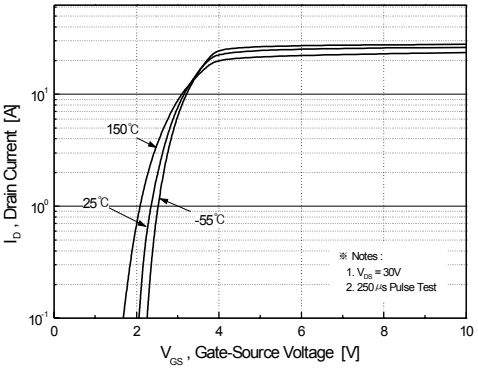


Figure 2. Transfer Characteristics

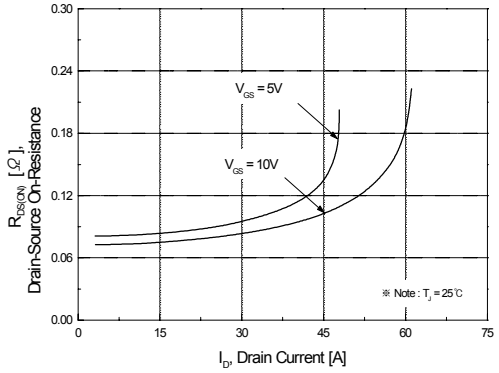


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

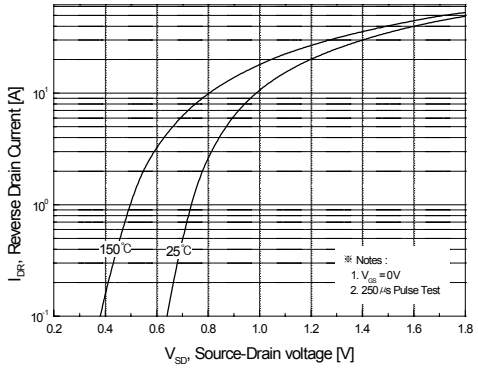


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

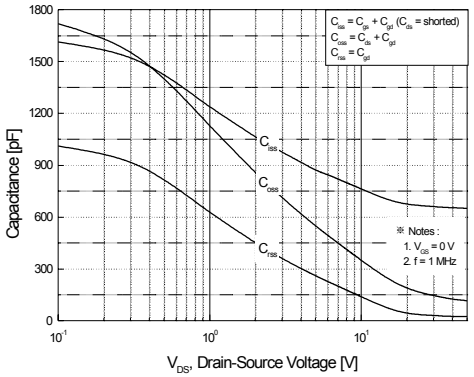


Figure 5. Capacitance Characteristics

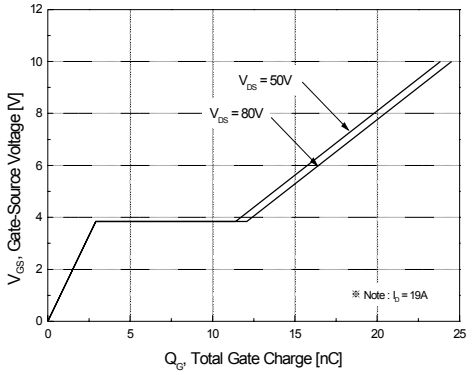


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

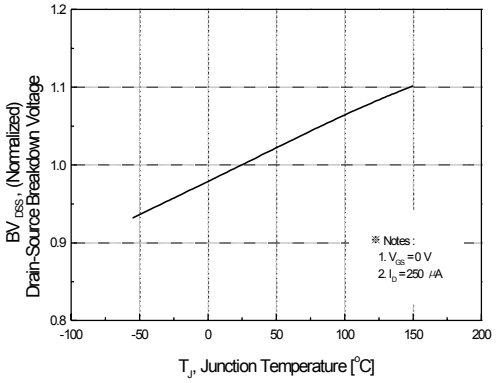


Figure 7. Breakdown Voltage Variation vs. Temperature

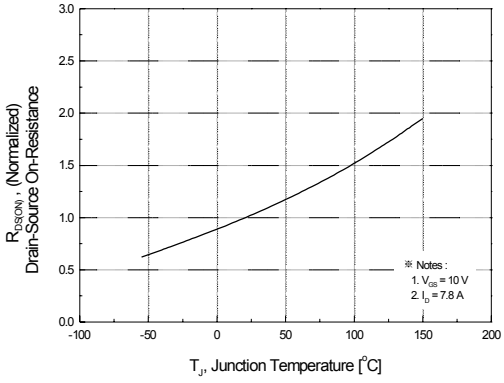


Figure 8. On-Resistance Variation vs. Temperature

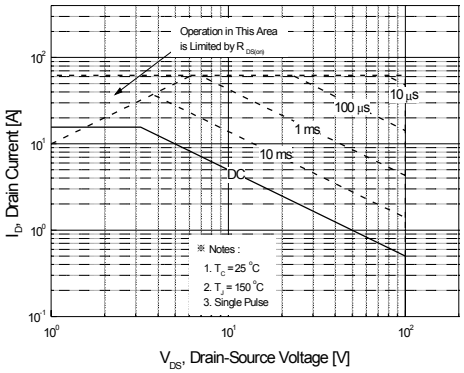


Figure 9. Maximum Safe Operating Area

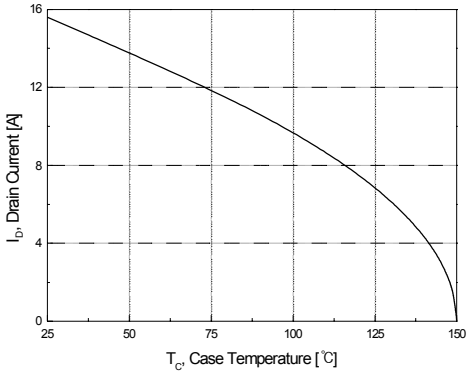


Figure 10. Maximum Drain Current vs. Case Temperature

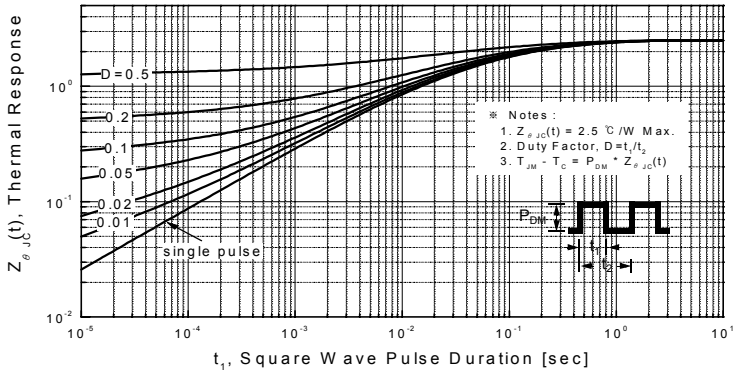
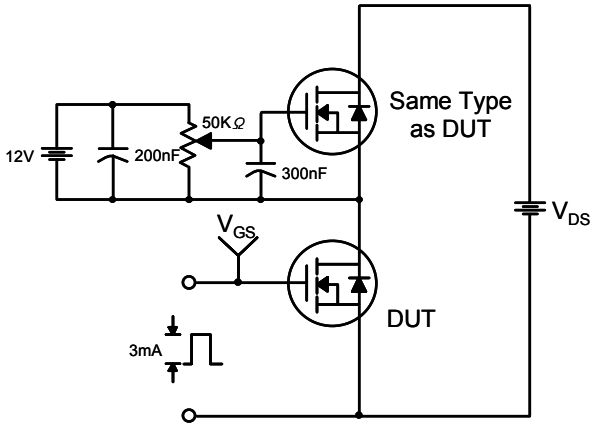
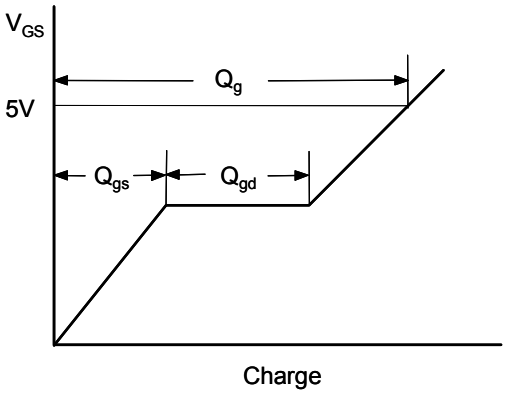


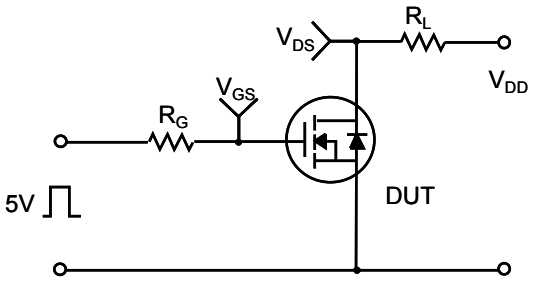
Figure 11. Transient Thermal Response Curve

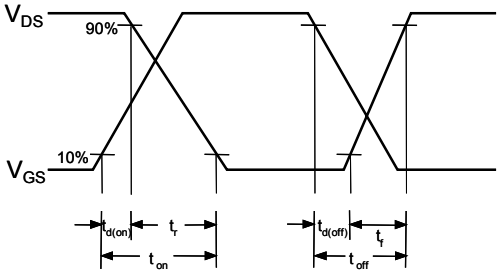
Gate Charge Test Circuit & Waveform



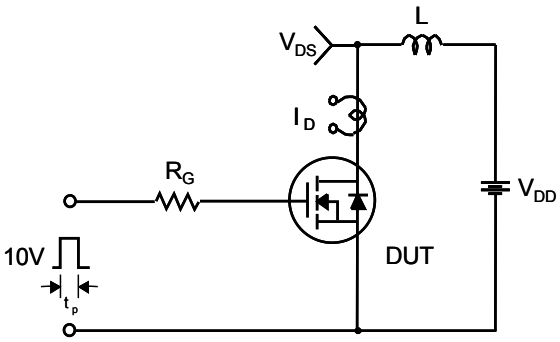


Resistive Switching Test Circuit & Waveforms

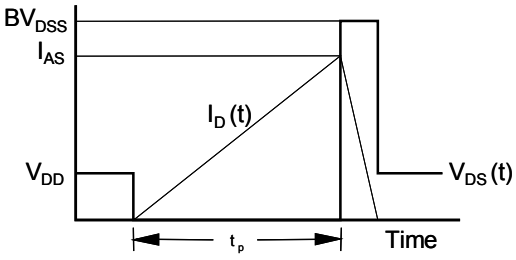




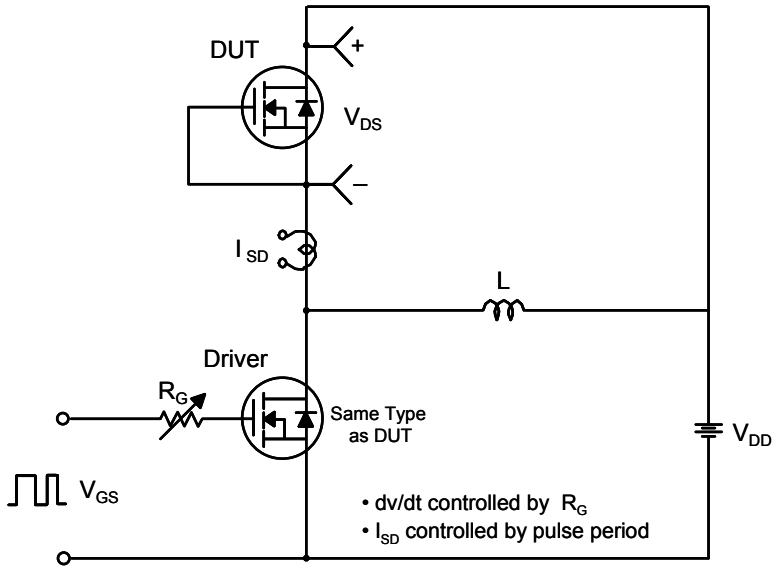
Unclamped Inductive Switching Test Circuit & Waveforms

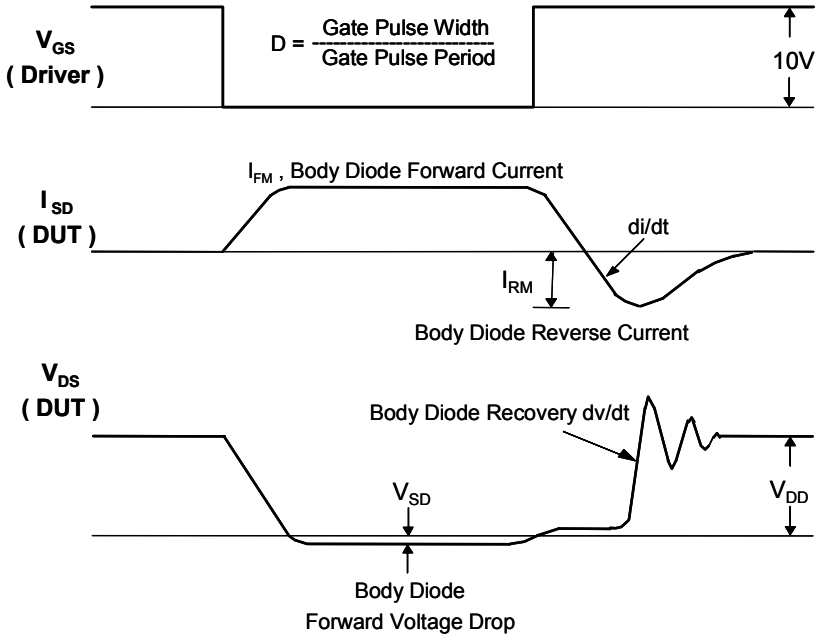


$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



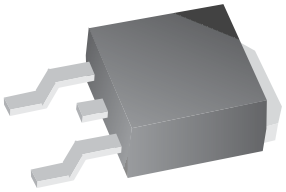
Peak Diode Recovery dv/dt Test Circuit & Waveforms

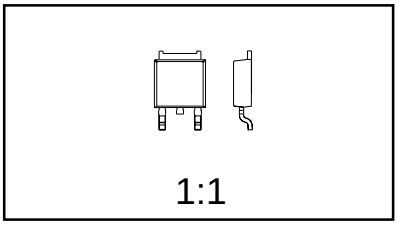




Package Dimensions

TO-252 (DPAK)

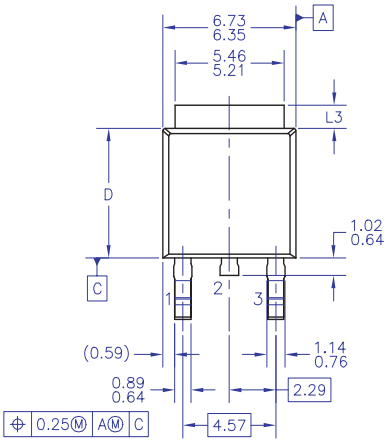


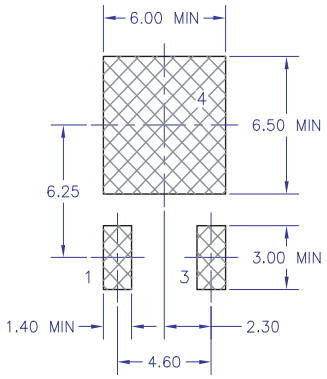


Scale 1:1 on letter size paper

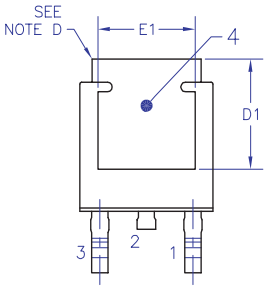
Dimensions shown below are in:
millimeters

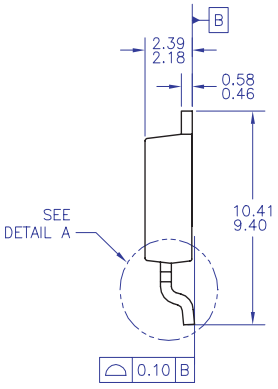
Part Weight per unit (gram): 0.33

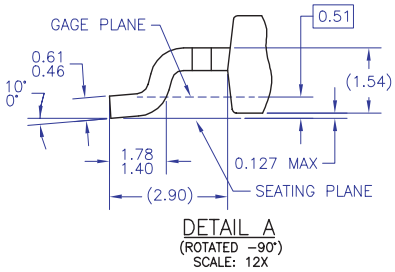




LAND PATTERN RECOMMENDATION







DETAIL A
(ROTATED −90°)
SCALE: 12X

NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

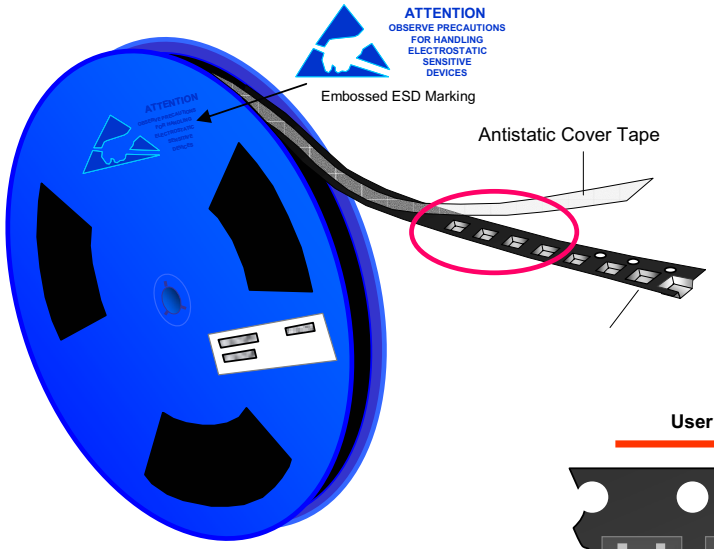
B) THIS PACKAGE CONFORMS TO JEDEC, TO−252, ISSUE C, VARIATION AA & AB, DATED NOV. 1999.

C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M−1994.

D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.

E) DIMENSIONS L3,D,E1&D1 TABLE:

	OPTION AA	OPTION AB
L3	0.89−1.27	1.52−2.03
D	5.97−6.22	5.33−5.59
E1	4.32 MIN	3.81 MIN
D1	5.21 MIN	4.57 MIN

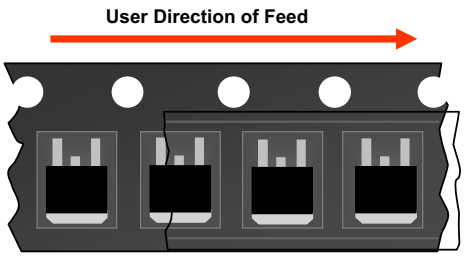


Packaging Description:

TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multi-layered film which comes either in HAA (Heat Activated Adhesive) or PSA (Pressure Sensitive Adhesive). HAA is primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. PSA is composed of transparent polyester backing film, pressure sensitive synthetic polymer (adhesive), and metallized transparent conductive polyester film on the inner face.

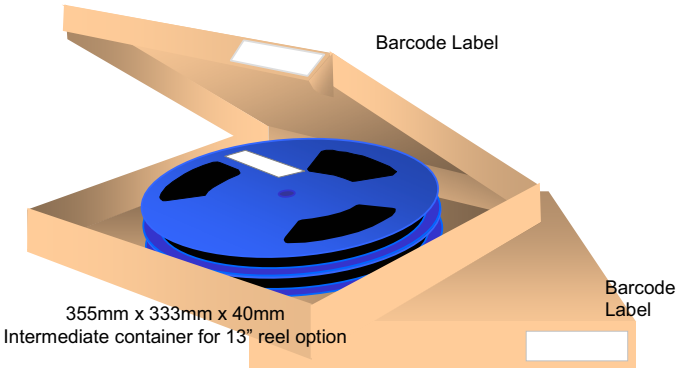
These reeled parts in standard option are shipped with 2500 units per 13" or 330mm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). This and some other options are further described in the Packaging Information table.

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.

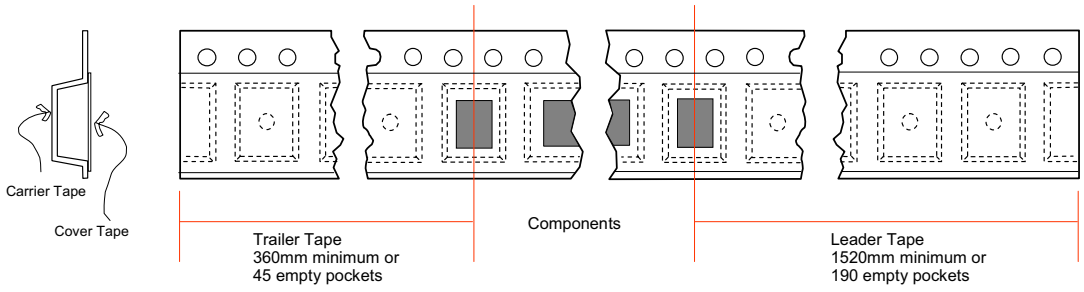


D-PAK (TO-252) Unit Orientation

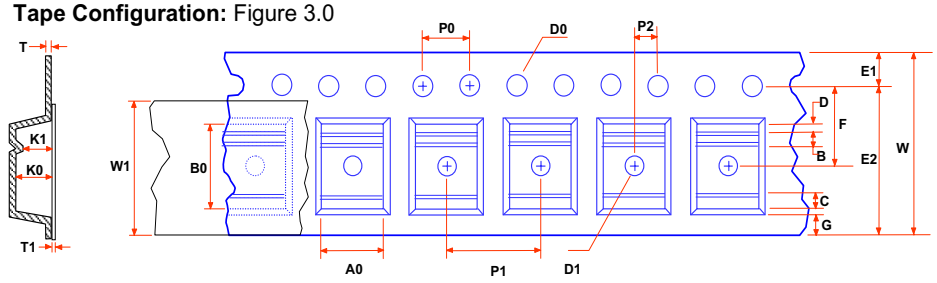
D-PAK (TO-252) Packaging Information		
Packaging Option	Standard (no flow code)	L86Z
Packaging type	TNR	Tube
Qty per Reel/Tube/Bag	2,500	75
Reel Size	13" Dia	-
Box Dimension (mm)	355x333x40	
Max qty per Box	5,000	
Weight per unit (gm)	0.300	0.300
Weight per Reel(kg)	1.200	-
Note/Comments		



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

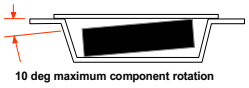


TO-252 (D-PAK) Embossed Carrier Tape Configuration: Figure 3.0

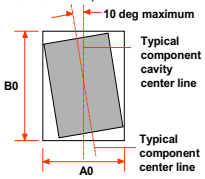


Dimensions are in millimeter																				
Pkg type	A0	B0	B	C	D	W	D0	D1	E1	E2	F	P1	P2	P0	K0	K1	T	G	W1	T1
TO252 DPAK (16mm)	6.90 +/- 0.10	10.50 +/- 0.10	1.20 +/- 0.10	2.0 +/- 0.10	3.0 +/- 0.30	16.0 +/- 0.30	1.55 ± 0.05	1.60 +/- 0.10	1.75 ± 0.10	14.25 min	7.50 +/- 0.10	8.0 +/- 0.10	2.00 ± 0.10	4.00 ± 0.10	2.65 +/- 0.15	1.75 +/- 0.15	0.63 max	0.75 min	13.10 +/- 0.30	0.06 ± 0.02

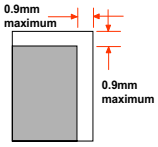
Notes: A0, B0, and K0 dimensions are determined with respect to the IEC/EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

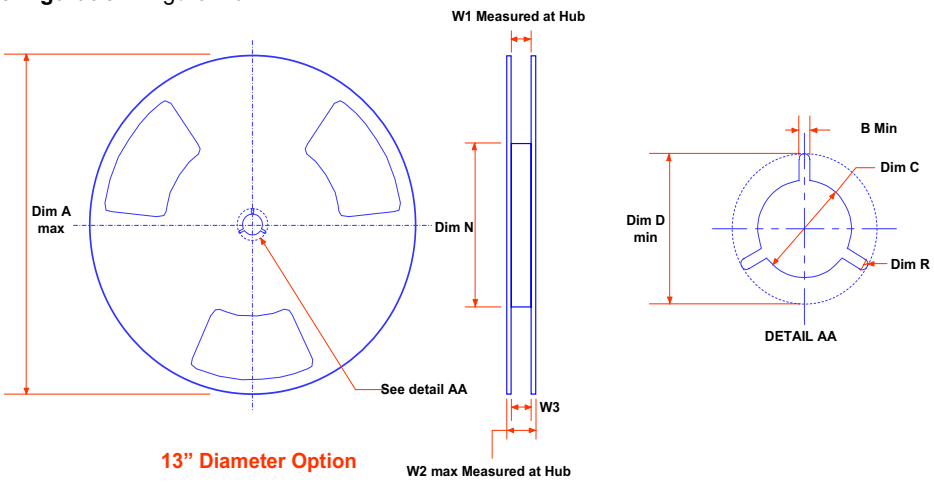


Sketch B (Top View)
Component Rotation



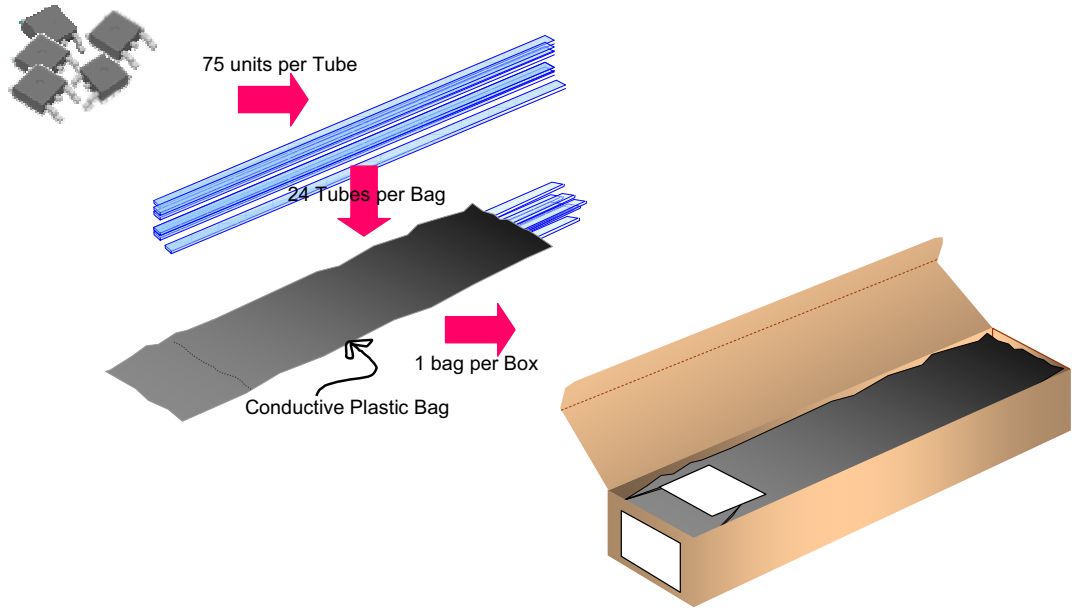
Sketch C (Top View)
Component lateral movement

TO-252 (D-PAK) Reel Configuration: Figure 4.0

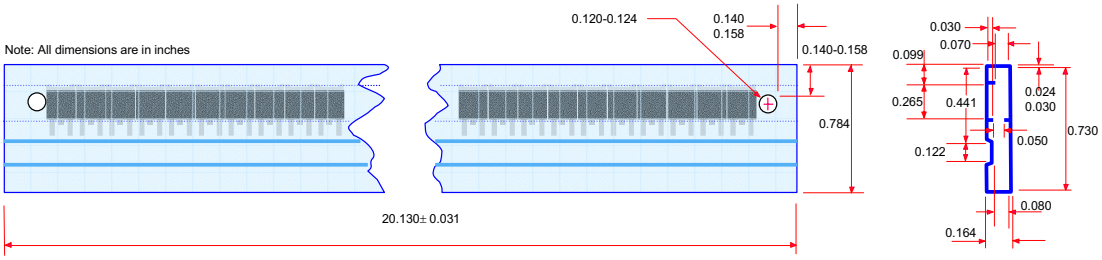


Dimensions are in inches and millimeters										
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim R	Dim W1	Dim W2	Dim W3 (LSL-USL)
16mm	13" Dia	13.00 330	0.059 1.50	0.512 +0.020-0.008 13 +0.50/-0.20	0.795 20.20	4.00 100	0.5B 0.5B	0.646 +0.078-0.00 16.4 +2/-0	0.882 22.4	0.626-0.764 15.9-19.4

TO-252 (DPAK) Tube Packing
Configuration: Figure 5.0



TO-252 (DPAK) Tube
Configuration: Figure 6.0



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