

# MOSFET – N-Channel, POWERTRENCH®

80 V, 100 A, 4.2 mΩ

**FDD86367-F085**

## Features

- Typical  $R_{DS(on)} = 3.3\text{ m}\Omega$  at  $V_{GS} = 10\text{ V}$ ,  $I_D = 80\text{ A}$
- Typical  $Q_{g(tot)} = 68\text{ nC}$  at  $V_{GS} = 10\text{ V}$ ,  $I_D = 80\text{ A}$
- UIS Capability
- AEC-Q101 Qualified and PPAP Capable
- This Device is Pb-Free, Halogen Free/BFR Free and is RoHS Compliant

## Applications

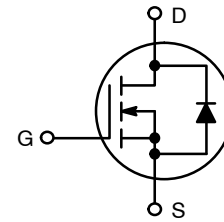
- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12 V Systems

## MOSFET MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

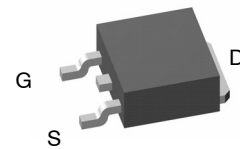
Symbol	Parameter	Ratings	Unit
$V_{DS}$	Drain-to-Source Voltage	80	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $V_{GS} = 10$ ) (Note 1) $T_C = 25^\circ\text{C}$	100	A
	Pulsed Drain Current $T_C = 25^\circ\text{C}$	See Figure 4	
$E_{AS}$	Single Pulse Avalanche Energy (Note 2)	82	mJ
$P_D$	Power Dissipation	227	W
	Derate Above $25^\circ\text{C}$	1.52	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature	$-55$ to $+175$	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.66	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient (Note 3)	52	$^\circ\text{C}/\text{W}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Current is limited by bondwire configuration.
2. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 40\text{ }\mu\text{H}$ ,  $I_{AS} = 64\text{ A}$ ,  $V_{DD} = 80\text{ V}$  during inductor charging and  $V_{DD} = 0\text{ V}$  during time in avalanche.
3.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in<sup>2</sup> pad of 2oz copper.

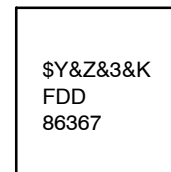


N-Channel



DPAK3 (TO-252 3 LD)  
CASE 369AS

## MARKING DIAGRAM



- FDD86367 = Specific Device Code  
 \$Y = onsemi Logo  
 &Z = Assembly Plant Code  
 &3 = 3-Digit Date Code  
 &K = 2-Digits Lot Run Traceability Code

## ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# FDD86367-F085

## PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Reel Size	Tape Width	Shipping†
FDD86367-F085	FDD86367	DPAK3 (TO-252 3 LD) (Pb-Free)	13"	16 mm	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

B <sub>V</sub> DSS	Drain-to-Source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	80	-	-	V	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> = 80 V, V <sub>GS</sub> = 0 V	T <sub>J</sub> = 25°C	-	-	1	mA
			T <sub>J</sub> = 175°C (Note 4)	-	-	1	mA
I <sub>GSS</sub>	Gate-to-Source Leakage Current	V <sub>GS</sub> = ±20 V	-	-	±100	nA	

### ON CHARACTERISTICS

V <sub>GS(th)</sub>	Gate to Source Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	2	3	4	V	
R <sub>DS(on)</sub>	Drain to Source On Resistance	I <sub>D</sub> = 80 A, V <sub>GS</sub> = 10 V	T <sub>J</sub> = 25°C	-	3.3	4.2	mΩ
			T <sub>J</sub> = 175°C (Note 4)	-	6.6	8.4	mΩ

### DYNAMIC CHARACTERISTICS

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	4840	-	pF	
C <sub>oss</sub>	Output Capacitance		-	814	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	31	-	pF	
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> = 0.5 V, f = 1 MHz	-	2.3	-	Ω	
Q <sub>g(toT)</sub>	Total Gate Charge	V <sub>GS</sub> = 0 to 10 V	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 80 A	-	68	88	nC
Q <sub>g(th)</sub>	Threshold Gate Charge	V <sub>GS</sub> = 0 to 2 V		-	8.8	-	nC
Q <sub>gs</sub>	Gate-to-Source Gate Charge	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 80 A	-	22	-	nC	
Q <sub>gd</sub>	Gate-to-Drain "Miller" Charge		-	14	-	nC	

### SWITCHING CHARACTERISTICS

t <sub>on</sub>	Turn-On Time	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 80 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 6 Ω	-	-	104	ns
t <sub>d(on)</sub>	Turn-On Delay		-	20	-	ns
t <sub>r</sub>	Rise Time		-	49	-	ns
t <sub>d(off)</sub>	Turn-Off Delay		-	36	-	ns
t <sub>f</sub>	Fall Time		-	16	-	ns
t <sub>off</sub>	Turn-Off Time		-	-	80	ns

### DRAIN-SOURCE DIODE CHARACTERISTICS

V <sub>SD</sub>	Source-to-Drain Diode Voltage	I <sub>SD</sub> = 80 A, V <sub>GS</sub> = 0 V	-	-	1.3	V
		I <sub>SD</sub> = 40 A, V <sub>GS</sub> = 0 V	-	-	1.2	V
t <sub>rr</sub>	Reverse-Recovery Time	V <sub>DD</sub> = 64 V, I <sub>F</sub> = 80 A, dI <sub>SD</sub> /dt = 100 A/μs	-	68	102	ns
Q <sub>rr</sub>	Reverse-Recovery Charge		-	66	106	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. The maximum value is specified by design at T<sub>J</sub> = 175°C. Product is not tested to this condition in production.

TYPICAL CHARACTERISTICS

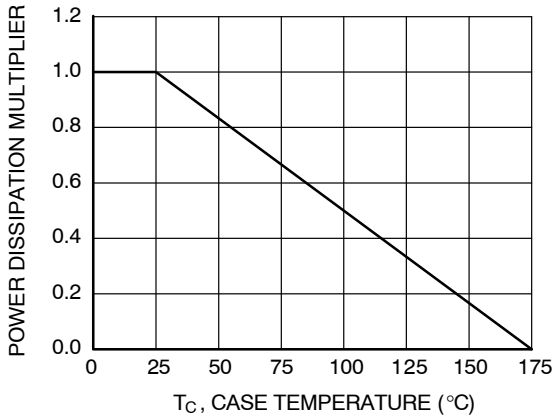


Figure 1. Normalized Power Dissipation vs. Case Temperature

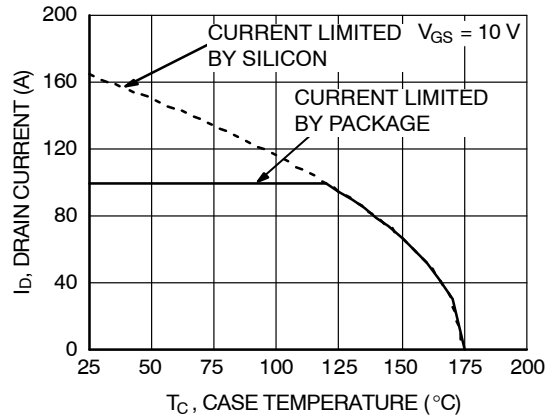


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

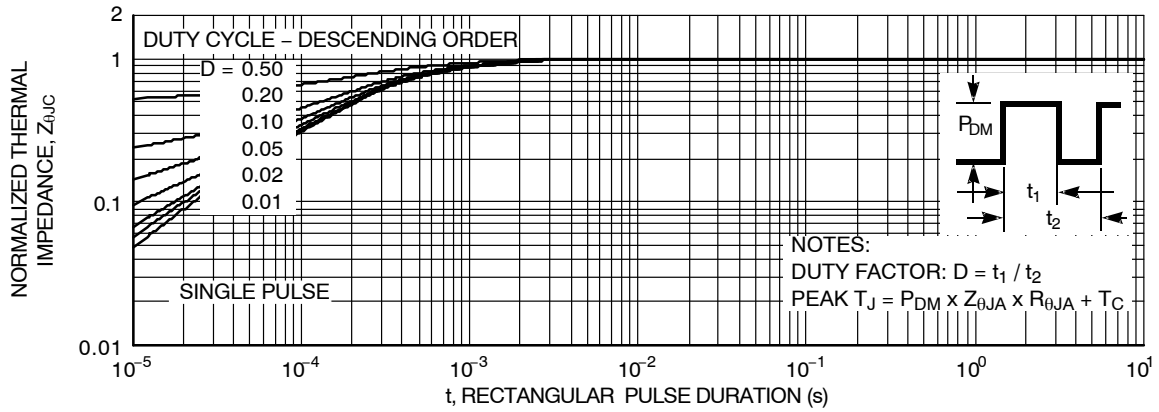


Figure 3. Normalized Maximum Transient Thermal Impedance

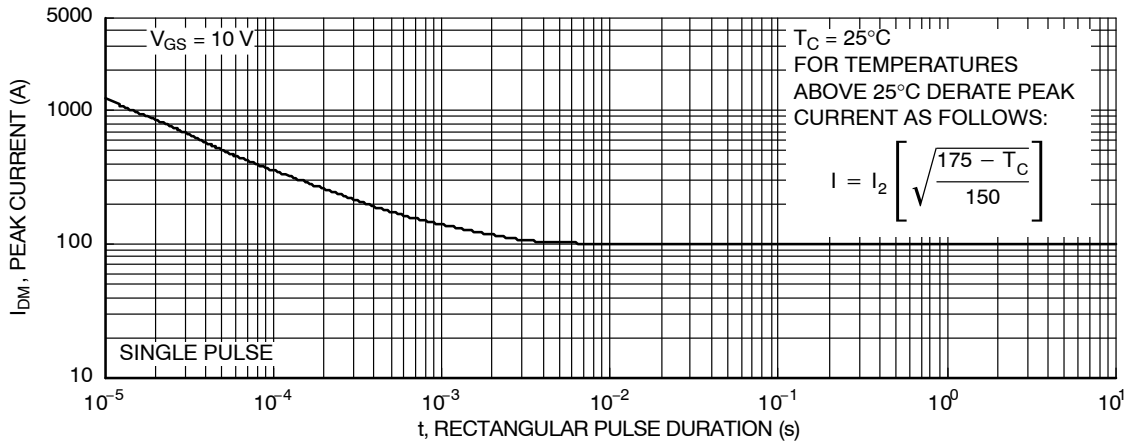


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS (continued)

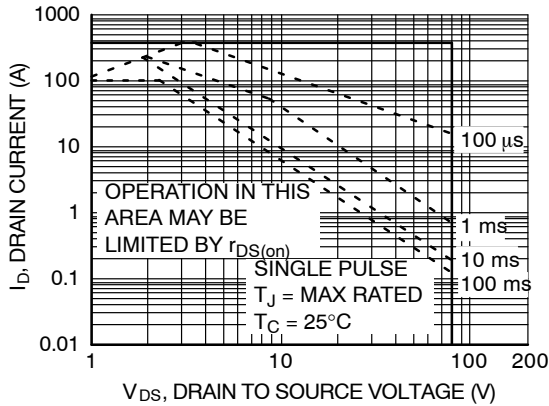
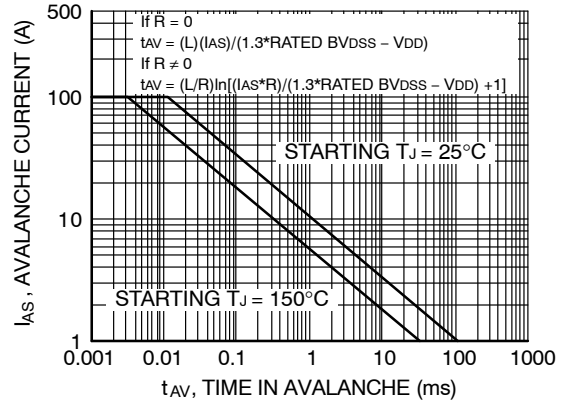


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Application Notes [AN7514](#) and [AN7515](#)

Figure 6. Unclamped Inductive Switching Capability

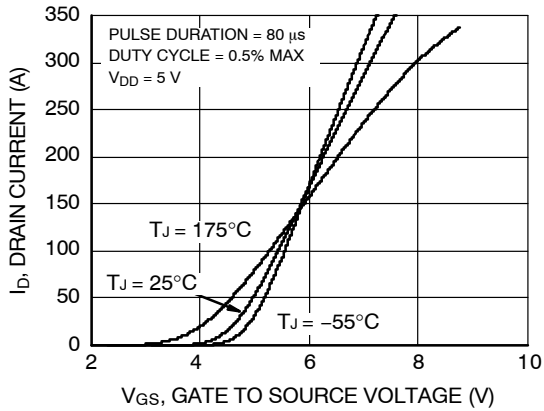


Figure 7. Transfer Characteristics

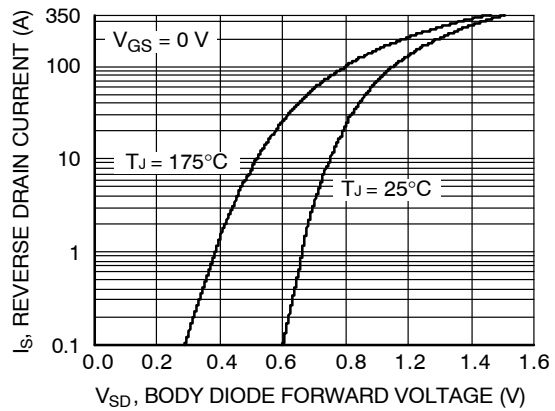


Figure 8. Forward Diode Characteristics

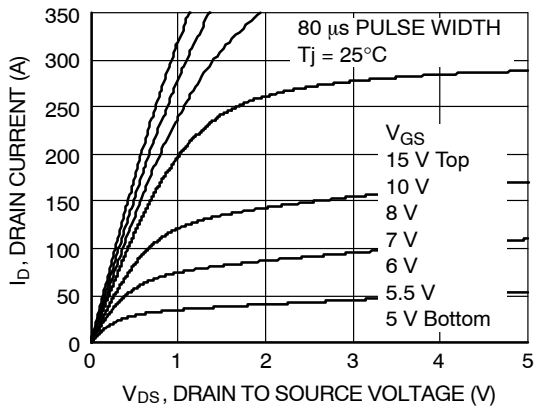


Figure 9. Saturation Characteristics

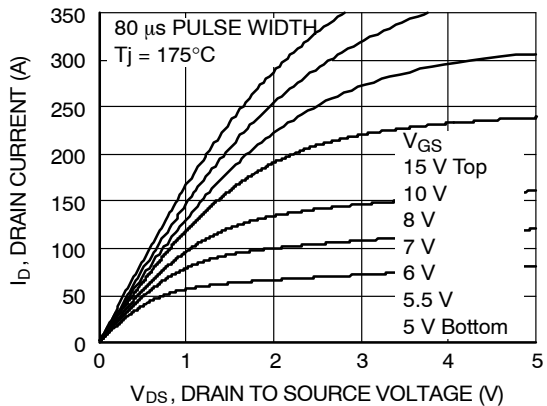


Figure 10. Saturation Characteristics

TYPICAL CHARACTERISTICS (continued)

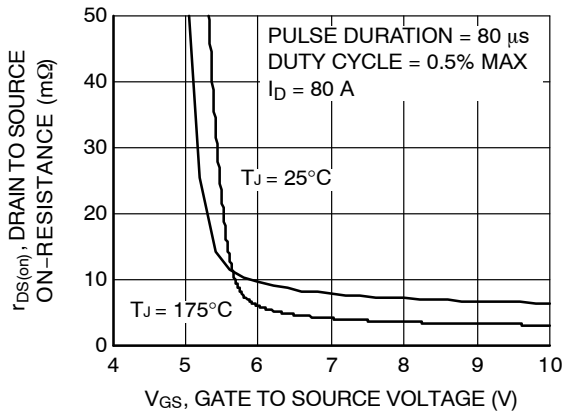


Figure 11.  $R_{DS(on)}$  vs. Gate Voltage

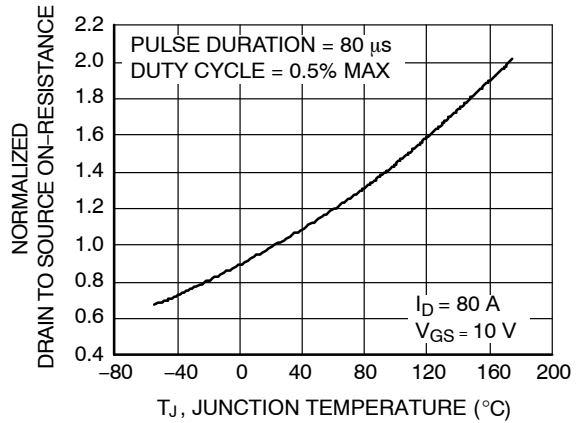


Figure 12. Normalized  $R_{DS(on)}$  vs. Junction Temperature

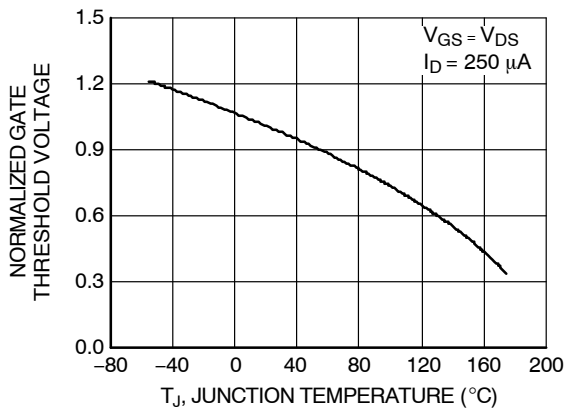


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

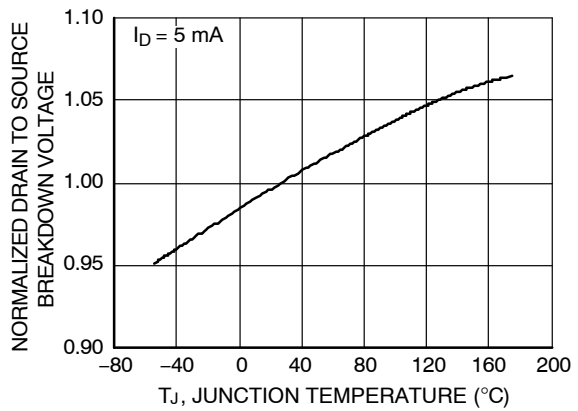


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

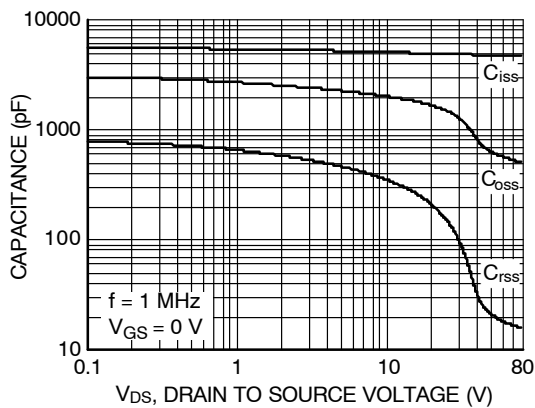


Figure 15. Capacitance vs. Drain to Source Voltage

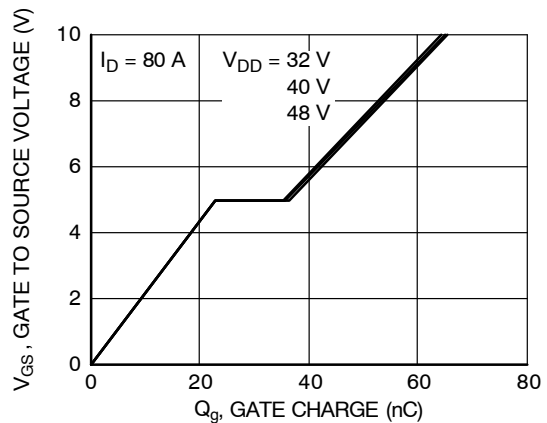
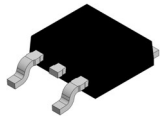


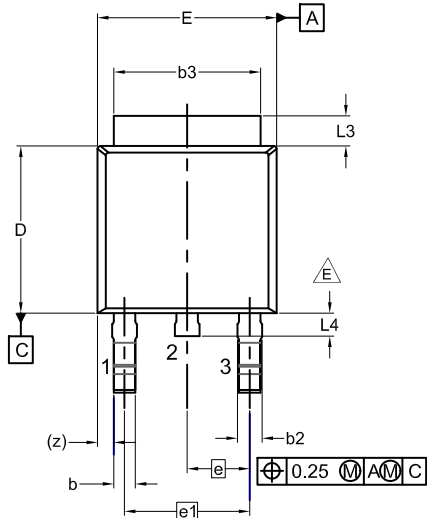
Figure 16. Gate Charge vs. Gate to Source Voltage

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

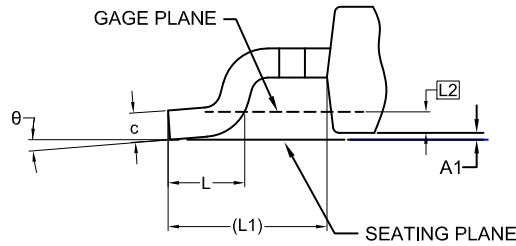


## DPAK3 (TO-252 3 LD) CASE 369AS ISSUE A

DATE 28 SEP 2022

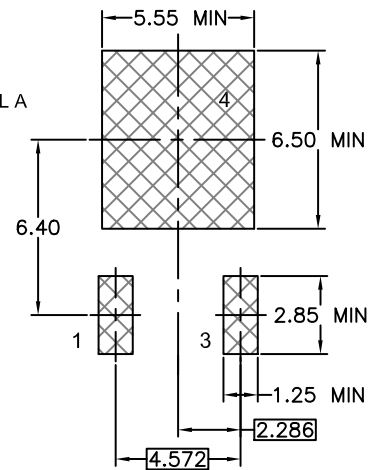
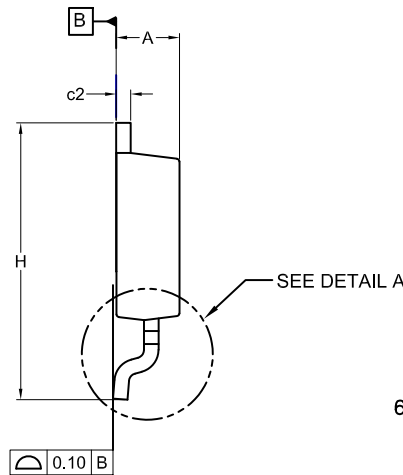
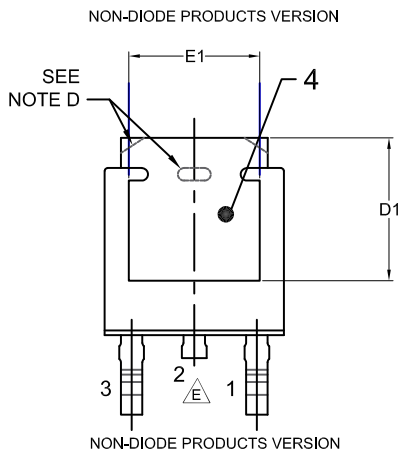


- NOTES: UNLESS OTHERWISE SPECIFIED  
 A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.  
 D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.  
 E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX.  
 F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.  
 G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.



**DETAIL A**  
(ROTATED -90°)  
SCALE: 12X

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.29	2.39
A1	0.00	-	0.127
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	5.21	5.34	5.46
c	0.45	0.53	0.61
c2	0.45	0.52	0.58
D	5.97	6.10	6.22
D1	5.21	-	-
E	6.35	6.54	6.73
E1	4.32	-	-
e	2.286 BSC		
e1	4.572 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	1.08	1.27
L4	-	-	1.02
θ	0°	--	10°



### LAND PATTERN RECOMMENDATION

### GENERIC MARKING DIAGRAM\*



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

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<b>DESCRIPTION:</b>	<b>DPAK3 (TO-252 3 LD)</b>	<b>PAGE 1 OF 1</b>

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