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FDD8447L_F085

N-Channel PowerTrench® MOSFET

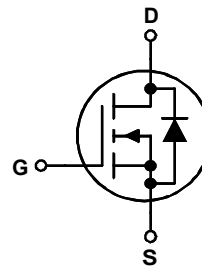
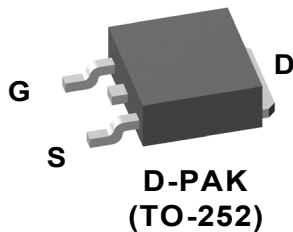
40V, 50A, 11.0mΩ

Features

- Typ $r_{DS(on)}$ = 7.0mΩ at $V_{GS} = 10V$, $I_D = 14A$
- Typ $r_{DS(on)}$ = 8.5mΩ at $V_{GS} = 4.5V$, $I_D = 11A$
- Fast Switching
- Qualified to AEC Q101
- RoHS Compliant

Applications

- Inverter
- Power Supplies
- Automotive Engine Control
- Power Train Management
- Solenoid and Motor Drivers
- Electronic Transmission
- Primary Switch for 12V and 24V Systems



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Ratings	Units
V_{DSS}	Drain to Source Voltage	(Note 1)	40	V
V_{GS}	Gate to Source Voltage		± 20	V
I_D	Drain Current Continuous ($T_C < 80^\circ\text{C}$, $V_{GS} = 10\text{V}$)		50	A
	Pulsed		See Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 2)	40	mJ
P_D	Power Dissipation		65	W
	Dereate above 25°C		0.43	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature		-55 to + 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Test Conditions	Ratings	Units
$R_{\theta JC}$	Maximum Thermal Resistance Junction to Case		2.3	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in ² copper pad area		40	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8447L	FDD8447L_F085	D-PAK(TO-252)	13"	12mm	2500 units

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V}$, $V_{GS} = 0\text{V}$	-	-	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	1.0	1.9	3.0	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = 14\text{A}$, $V_{GS} = 10\text{V}$	-	7.0	8.5	m Ω
		$I_D = 11\text{A}$, $V_{GS} = 4.5\text{V}$	-	8.5	11.0	
		$I_D = 14\text{A}$, $V_{GS} = 10\text{V}$, $T_J = 125^\circ\text{C}$	-	10.4	14.0	
g_{FS}	Forward Transconductance	$I_D = 14\text{A}$, $V_{DS} = 5\text{V}$	-	58	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	-	1970	-	pF	
C_{oss}	Output Capacitance		-	250	-	pF	
C_{rss}	Reverse Transfer Capacitance		-	150	-	pF	
R_g	Gate Resistance	$f = 1\text{MHz}$	-	1.27	-	Ω	
$Q_g(TOT)$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	$V_{DD} = 20\text{V}$ $I_D = 14\text{A}$ $V_{GS} = 10\text{V}$	-	37	52	nC
$Q_g(5)$	Total Gate Charge at 5V	$V_{GS} = 0$ to 5V		-	20	28	nC
Q_{gs}	Gate to Source Gate Charge			-	6	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	7	-	nC

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\ \Omega$	-	12	21	ns
t_r	Rise Time		-	12	21	ns
$t_{d(off)}$	Turn-Off Delay Time		-	38	61	ns
t_f	Fall Time		-	9	18	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 14\text{ A}$	-	0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 14\text{ A}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	22	29	ns
Q_{rr}	Reverse Recovery Charge		-	11	14	nC

Notes:

- 1: Starting $T_J = 25^\circ\text{C}$ to 175°C .
- 2: Starting $T_J = 25^\circ\text{C}$, $L = 0.05\text{ mH}$, $I_{AS} = 40\text{ A}$

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: <http://www.aecouncil.com/>
 All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

Typical Characteristics

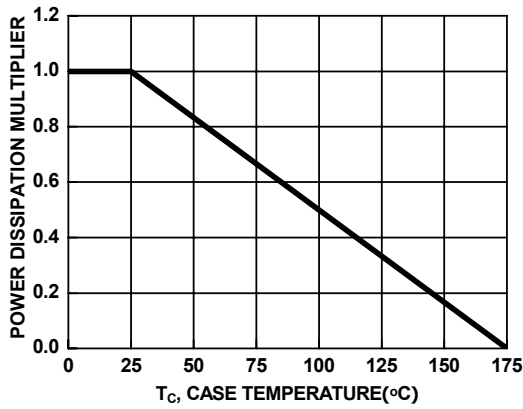


Figure 1. Normalized Power Dissipation vs Case Temperature

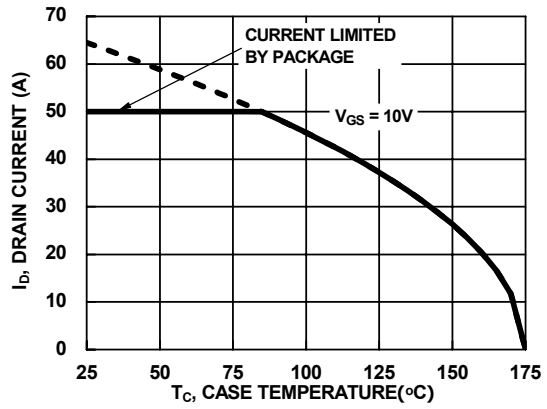


Figure 2. Maximum Continuous Drain Current vs Case Temperature

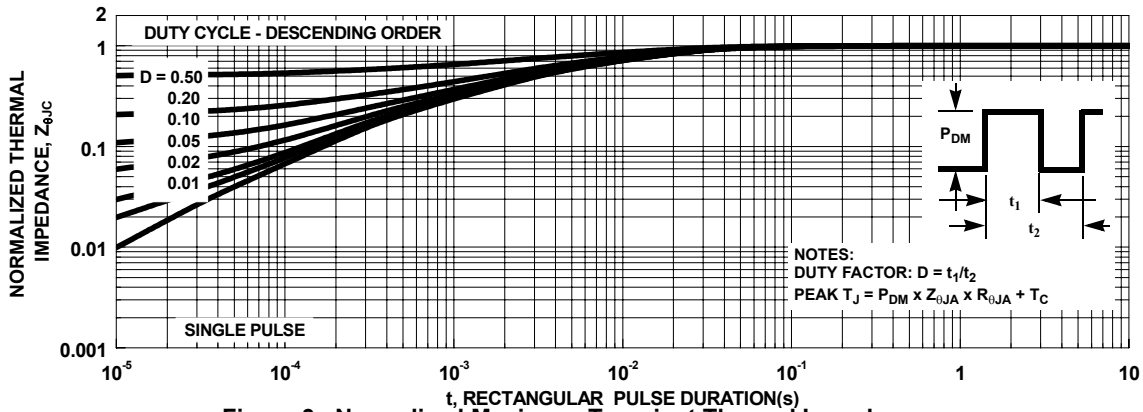


Figure 3. Normalized Maximum Transient Thermal Impedance

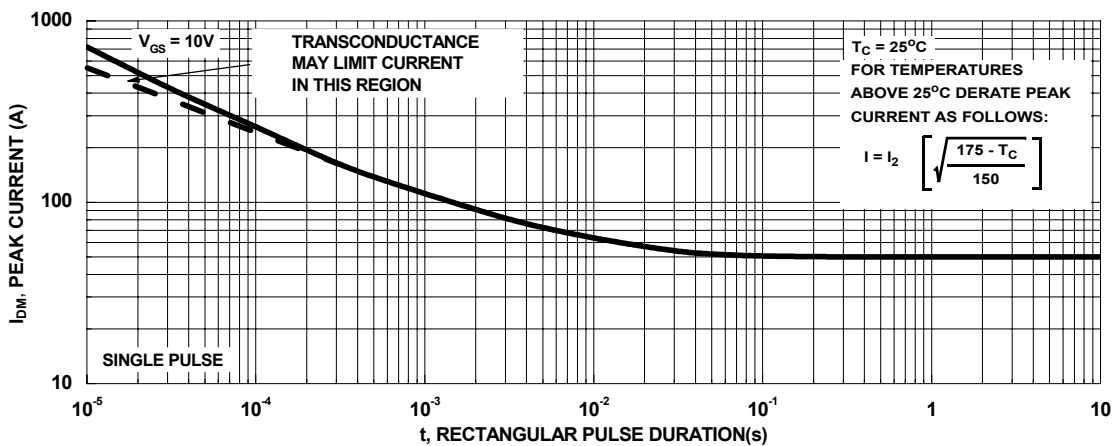


Figure 4. Peak Current Capability

Typical Characteristics

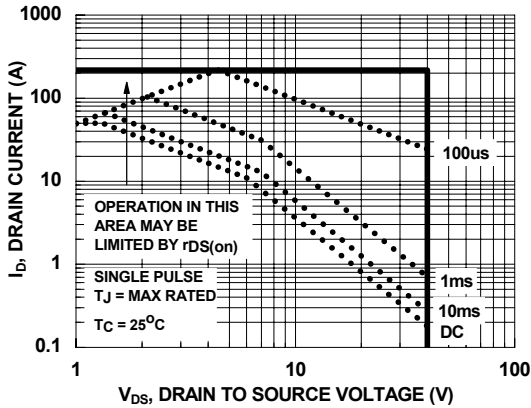
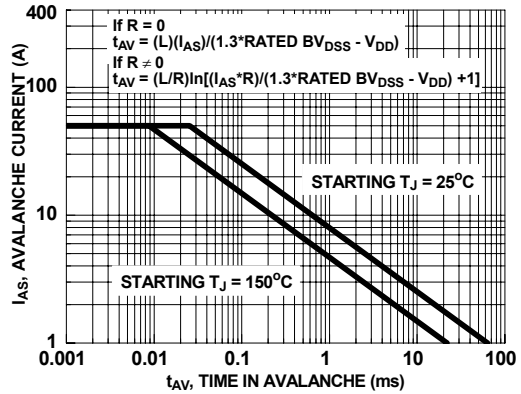


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515
 Figure 6. Unclamped Inductive Switching Capability

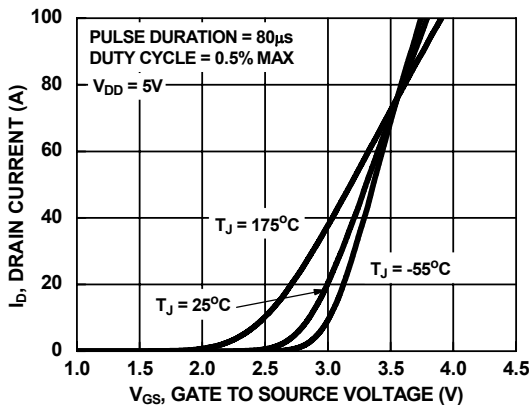


Figure 7. Transfer Characteristics

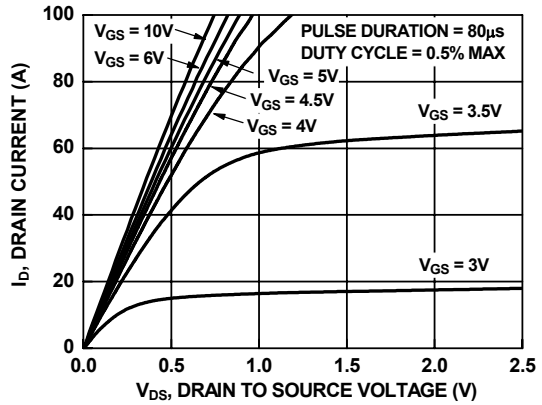


Figure 8. Saturation Characteristics

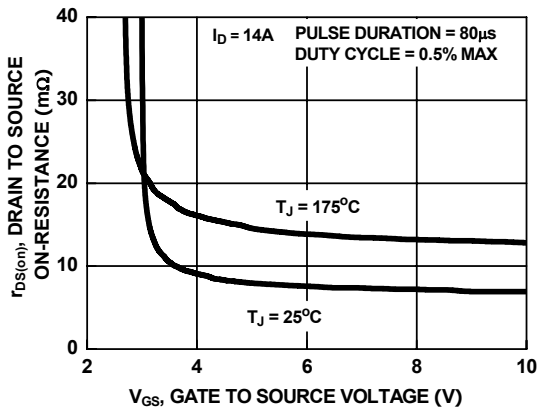


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

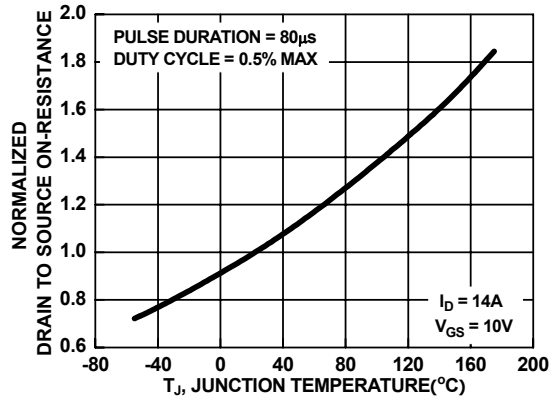


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

Typical Characteristics

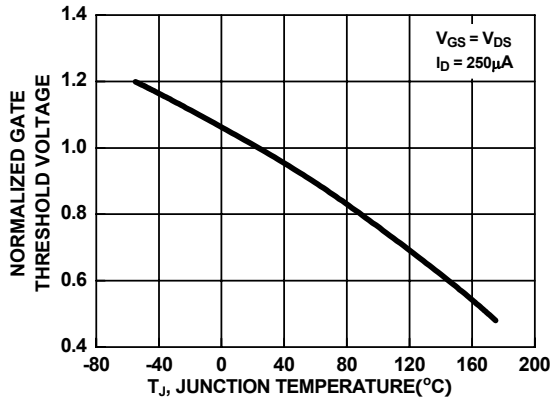


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

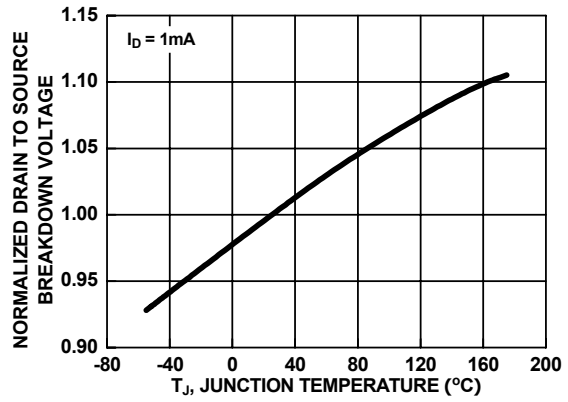


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

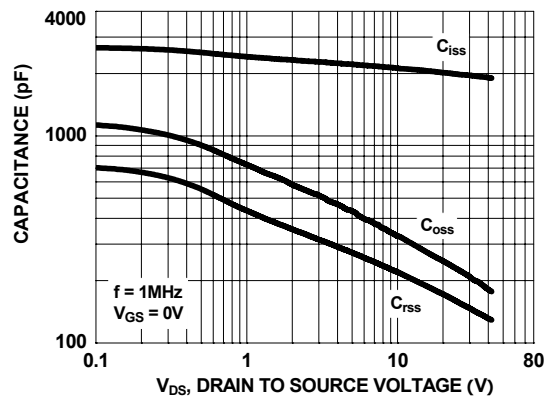


Figure 13. Capacitance vs Drain to Source Voltage

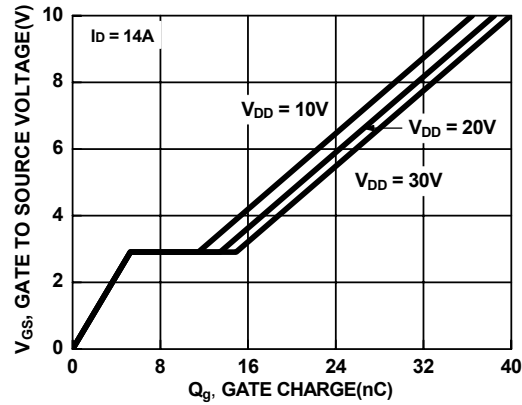
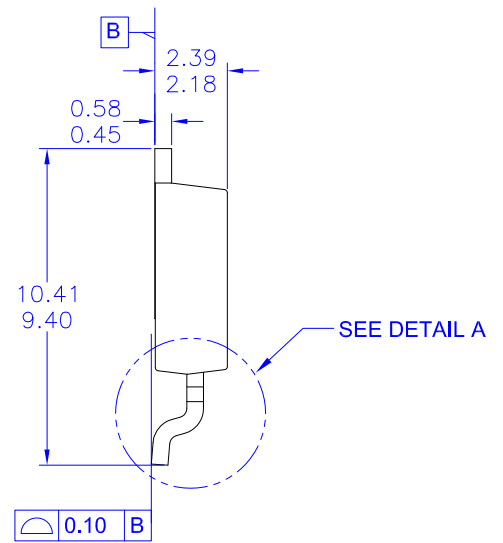
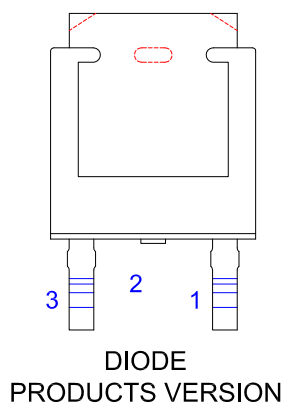
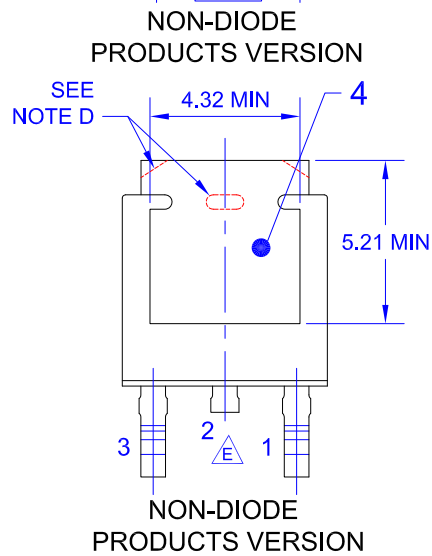
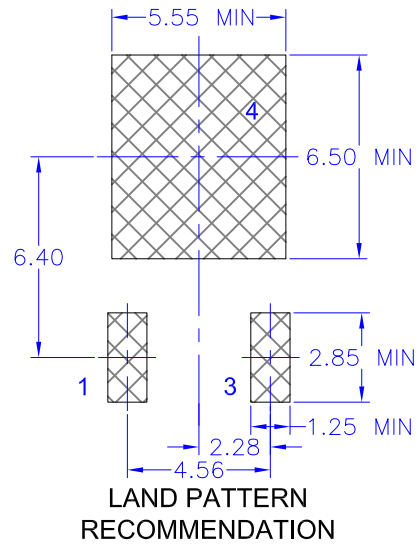
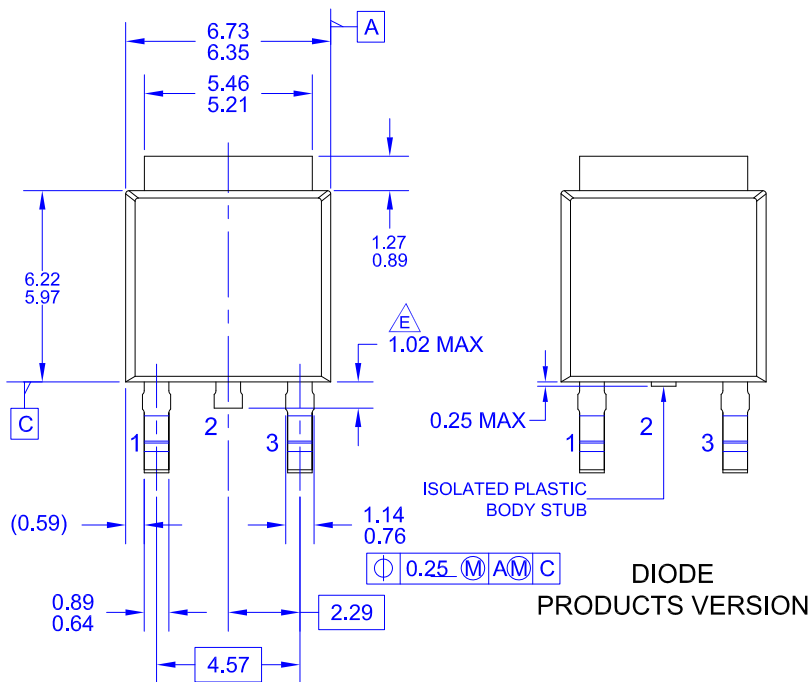
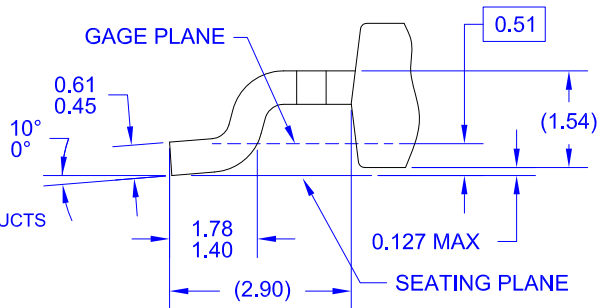


Figure 14. Gate Charge vs Gate to Source Voltage



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) TRIMMED METAL CENTER LEAD IS PRESENT ON FOR NON-DIODE PRODUCTS
- F) DIMENSIONS ARE EXCLUSIVE OF BURS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.
- H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV11



DETAIL A
(ROTATED -90°)
SCALE: 12X



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