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ON Semiconductor®

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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD

March 2015

FDD4243
40V P-Channel PowerTrench® MOSFET
-40V, -14A, 44mΩ

Features

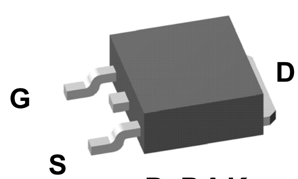
- Max $r_{DS(on)}$ = 44mΩ at V_{GS} = -10V, I_D = -6.7A
- Max $r_{DS(on)}$ = 64mΩ at V_{GS} = -4.5V, I_D = -5.5A
- High performance trench technology for extremely low $r_{DS(on)}$
- RoHS Compliant

General Description

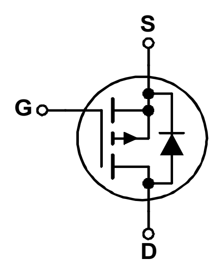
This P-Channel MOSFET has been produced using Fairchild Semiconductor's proprietary PowerTrench® technology to deliver low $r_{DS(on)}$ and optimized Bvdss capability to offer superior performance benefit in the applications.

Application

- Inverter
- Power Supplies



D-PAK
(TO-252)



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	-40	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous (Package limited) T_C= 25°C	-14	A
	-Continuous (Silicon limited) T_C= 25°C (Note 1)	-24	
	-Continuous T_A= 25°C (Note 1a)	-6.7	
	-Pulsed	-60	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	84	mJ
P_D	Power Dissipation T_C= 25°C	42	W
	Power Dissipation (Note 1a)	3	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD4243	FDD4243	D-PAK(TO-252)	13''	16mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C		-32		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -32V, V_{GS} = 0V			-1	μA
		V_{DS} = -32V, V_{GS} = 0V, T_J = 125°C			-100	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, I_D = -250μA	-1.4	-1.6	-3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C		4.7		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = -10V, I_D = -6.7A		36	44	mΩ
		V_{GS} = -4.5V, I_D = -5.5A		48	64	mΩ
		V_{GS} = -10V, I_D = -6.7A, T_J = 125°C		53	69	mΩ
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -6.7A		16		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -20V, V_{GS} = 0V, f = 1MHz		1165	1550	pF
C_{oss}	Output Capacitance			165	220	pF
C_{rss}	Reverse Transfer Capacitance			90	135	pF
R_g	Gate Resistance	f = 1MHz		4		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -20V, I_D = -6.7A, V_{GS} = -10V, R_{GEN} = 6Ω		6	12	ns
t_r	Rise Time			15	26	ns
$t_{d(off)}$	Turn-Off Delay Time			22	35	ns
t_f	Fall Time			7	14	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{DD} = -20V, I_D = -6.7A, V_{GS} = -10V		21	29	nC
Q_{gs}	Gate to Source Gate Charge			3.4		nC
Q_{gd}	Gate to Drain "Miller" Charge			4		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = -6.7A (Note 2)		0.86	1.2	V
t_{rr}	Reverse Recovery Time	I_F = -6.7A, di/dt = 100A/μs		29	43	ns
Q_{rr}	Reverse Recovery Charge			30	44	nC

Notes:

1: $R_{\theta JA}$ is sum of 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 $R_{\theta JC}$ is determined by the user's board design.

a. 40°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 96°C/W when mounted on a minimum pad.

2: Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

3: Starting T_J = 25°C, L = 3mH, I_{AS} = 7.5A, V_{DD} = 40V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

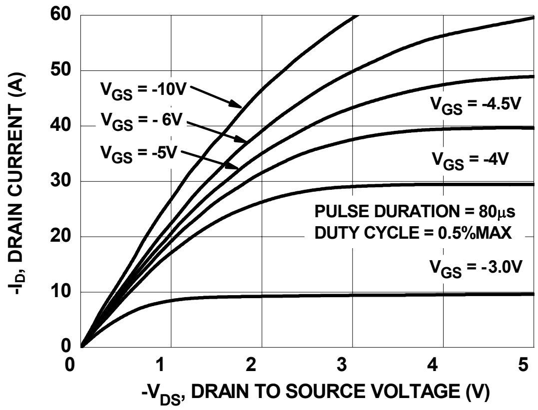


Figure 1. On Region Characteristics

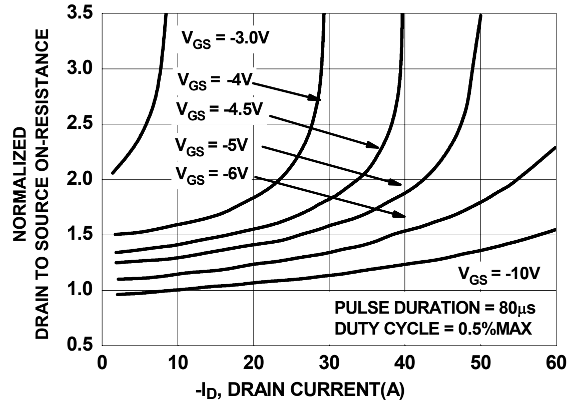


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

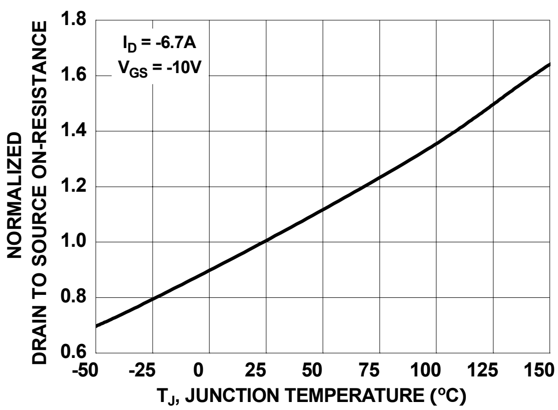


Figure 3. Normalized On Resistance vs Junction Temperature

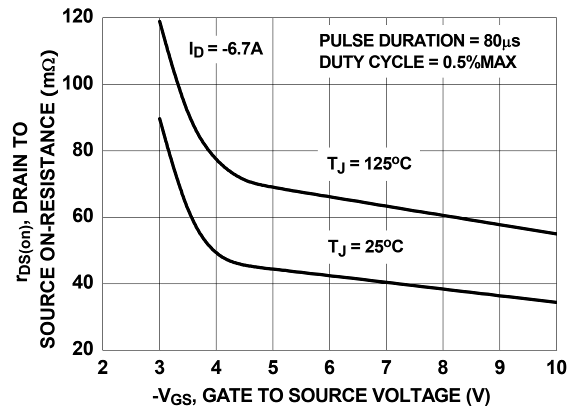


Figure 4. On-Resistance vs Gate to Source Voltage

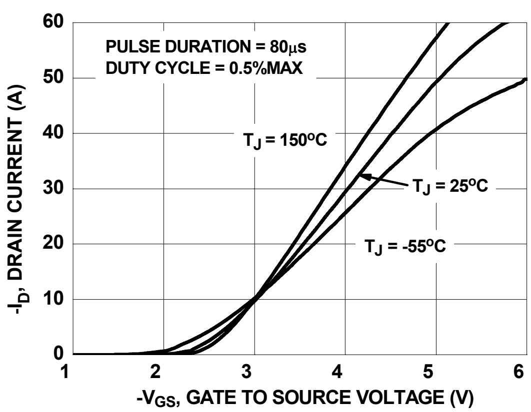


Figure 5. Transfer Characteristics

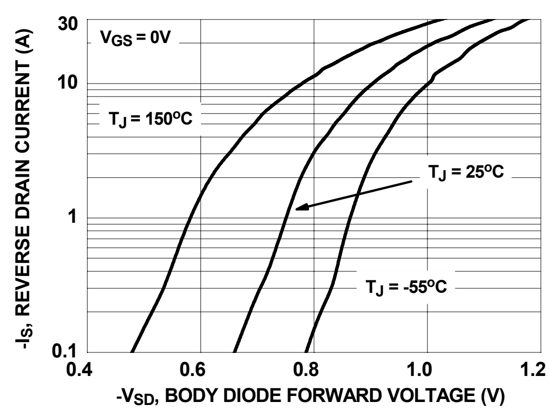


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

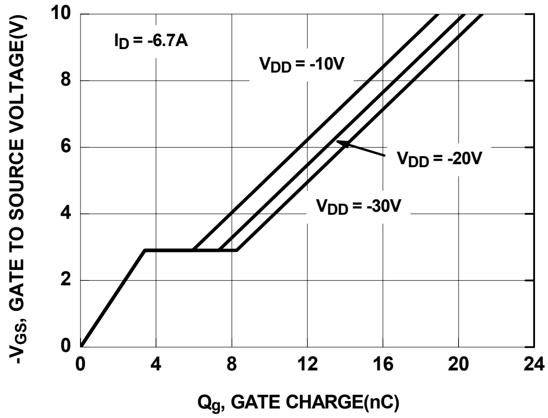


Figure 7. Gate Charge Characteristics

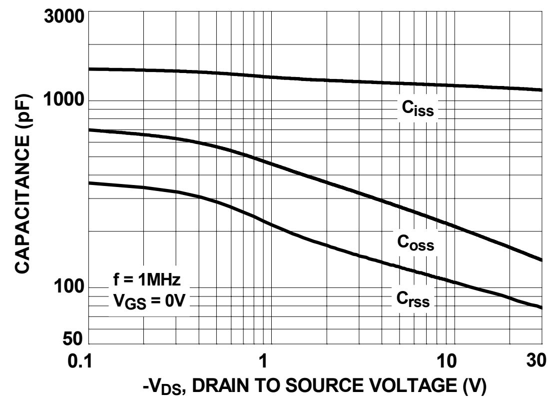


Figure 8. Capacitance vs Drain to Source Voltage

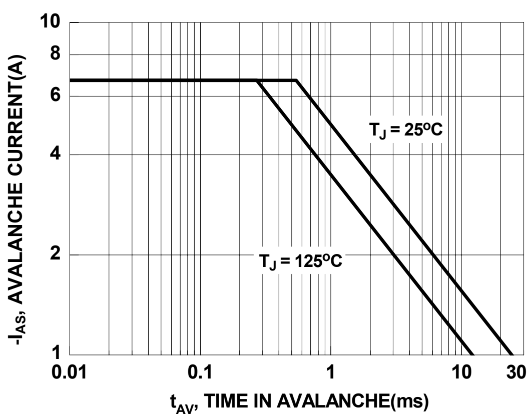


Figure 9. Unclamped Inductive Switching Capability

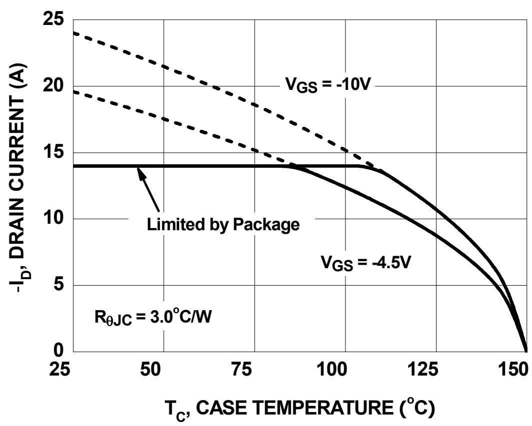


Figure 10. Maximum Continuous Drain Current vs Case Temperature

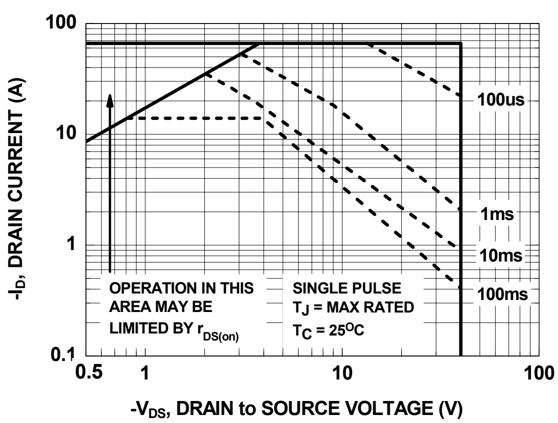


Figure 11. Forward Bias Safe Operating Area

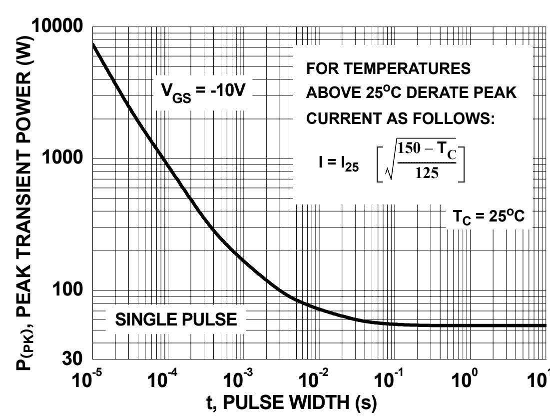


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

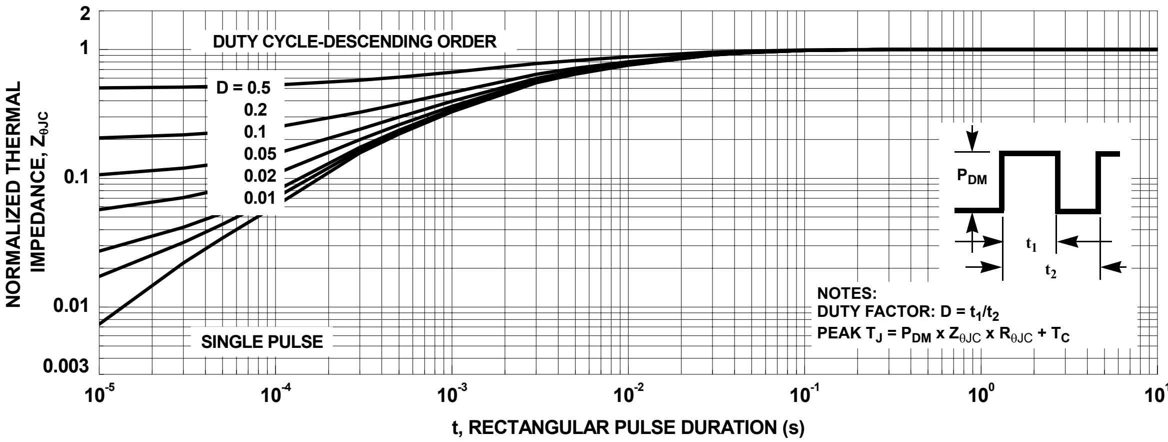
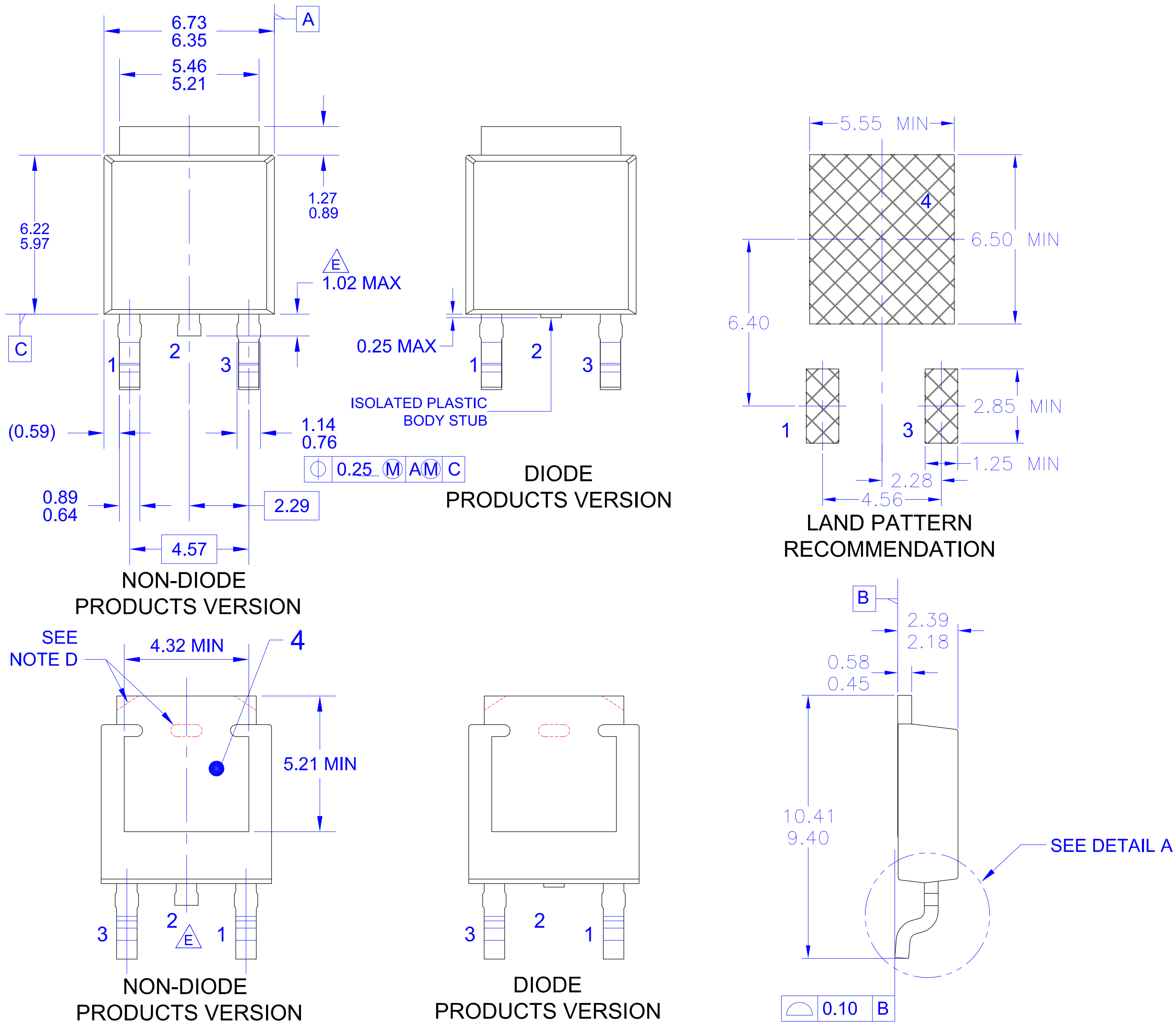


Figure 13. Transient Thermal Response Curve



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.

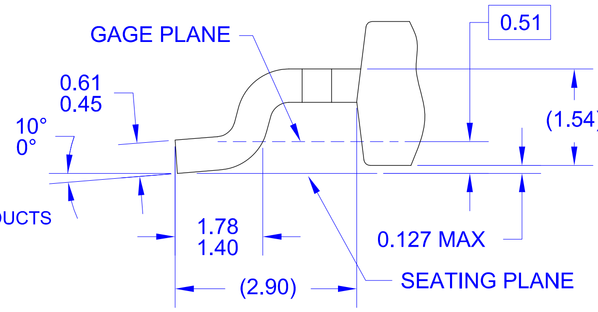
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.

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



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SCALE: 12X

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