



June 2016

# FDMD84100

## Dual N-Channel PowerTrench<sup>®</sup> MOSFET

100 V, 21 A, 20 mΩ

### Features

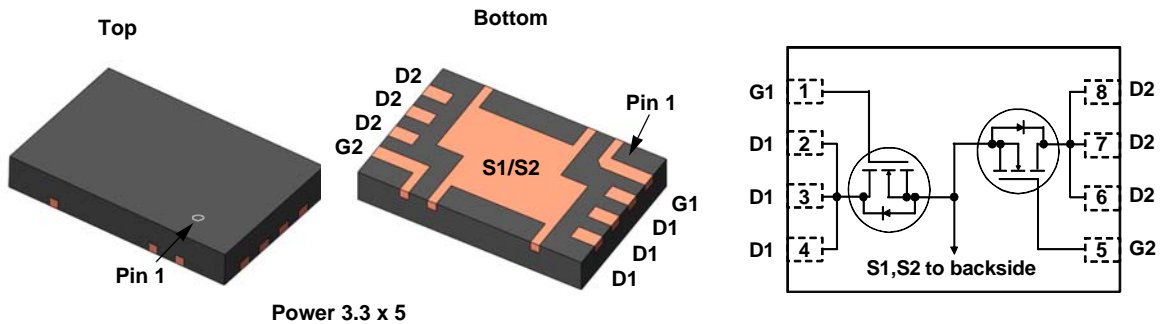
- Max  $r_{DS(on)}$  = 20 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 7\text{ A}$
- Max  $r_{DS(on)}$  = 32 mΩ at  $V_{GS} = 6\text{ V}$ ,  $I_D = 5.5\text{ A}$
- Ideal for flexible layout in secondary side synchronous rectification
- Termination is Lead-free and RoHS Compliant
- 100% UIL tested

### General Description

This package integrates two N-Channel devices connected internally in common-source configuration. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. Provides a very small footprint (3.3 x 5 mm) for higher power density.

### Applications

- Isolated DC-DC Synchronous Rectifiers
- Common Ground Load Switches



### MOSFET Maximum Ratings $T_A = 25\text{ °C}$ unless otherwise noted

Symbol	Parameter	Rated	Units
$V_{DS}$	Drain to Source Voltage	100	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	$T_C = 25\text{ °C}$	21
	-Continuous	$T_A = 25\text{ °C}$ (Note 1a)	7
	-Pulsed	(Note 4)	80
$E_{AS}$	Single Pulse Avalanche Energy	(Note 3)	121
$P_D$	Power Dissipation	$T_C = 25\text{ °C}$	23
	Power Dissipation	$T_A = 25\text{ °C}$ (Note 1a)	2.1
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	5.3	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
84100	FDMD84100	Power 3.3 x 5	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		74		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2	3.1	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		-9		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 7\text{ A}$		16	20	m $\Omega$
		$V_{GS} = 6\text{ V}$ , $I_D = 5.5\text{ A}$		24	32	
		$V_{GS} = 10\text{ V}$ , $I_D = 7\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$		30	38	
$g_{FS}$	Forward Transconductance	$V_{DD} = 5\text{ V}$ , $I_D = 7\text{ A}$		17		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		734	980	pF
$C_{oss}$	Output Capacitance			168	225	pF
$C_{rss}$	Reverse Transfer Capacitance			6.6	15	pF
$R_g$	Gate Resistance		0.1	1.3	3	$\Omega$

### Switching Characteristics

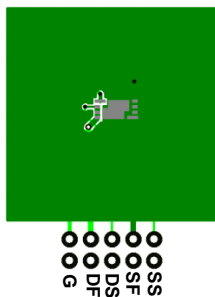
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}$ , $I_D = 7\text{ A}$ $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		8.4	17	ns
$t_r$	Rise Time			2.6	10	ns
$t_{d(off)}$	Turn-Off Delay Time			14	25	ns
$t_f$	Fall Time			2.8	10	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\text{ V to } 10\text{ V}$		11	16
	Total Gate Charge	$V_{GS} = 0\text{ V to } 6\text{ V}$	$V_{DD} = 50\text{ V}$ $I_D = 7\text{ A}$	7.3	11	nC
$Q_{gs}$	Gate to Source Charge			3.4		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.5		nC

### Drain-Source Diode Characteristics

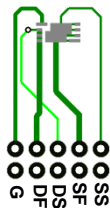
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 7\text{ A}$ (Note 2)		0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 7\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		43	70	ns
$Q_{rr}$	Reverse Recovery Charge			44	71	nC

#### NOTES:

- $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



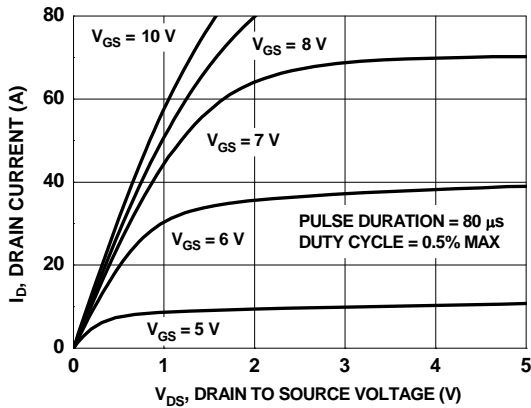
a. 60  $^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



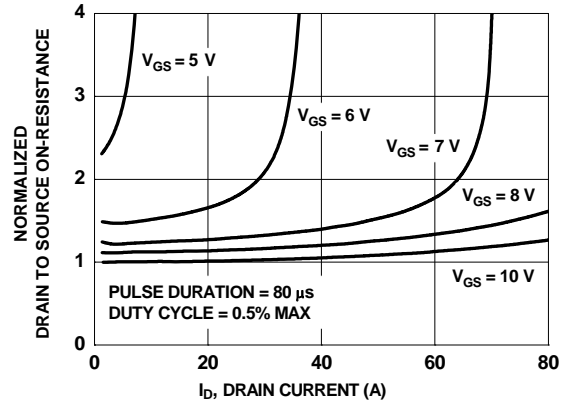
b. 160  $^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

- Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0 %.
- $E_{AS}$  of 121 mJ is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 9\text{ A}$ ,  $V_{DD} = 100\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% tested at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 30\text{ A}$ .
- Pulse Id refers to Figure.11 Forward Bias Safe Operation Area.

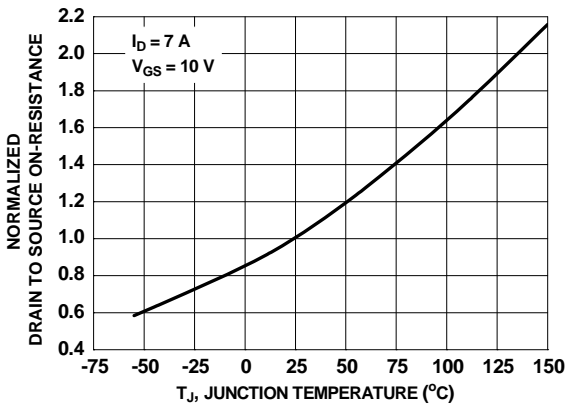
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



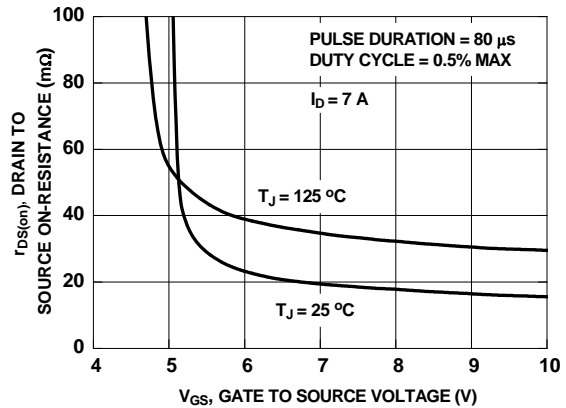
**Figure 1. On-Region Characteristics**



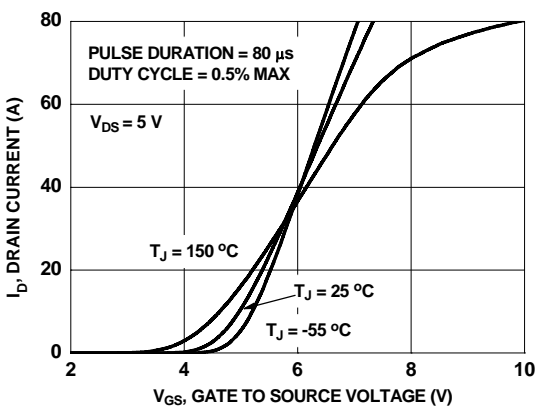
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



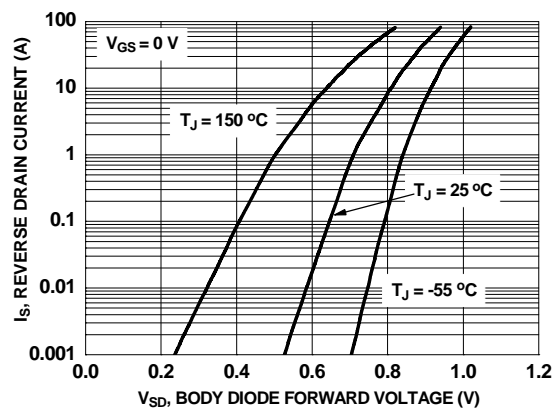
**Figure 3. Normalized On-Resistance vs Junction Temperature**



**Figure 4. On-Resistance vs Gate to Source Voltage**

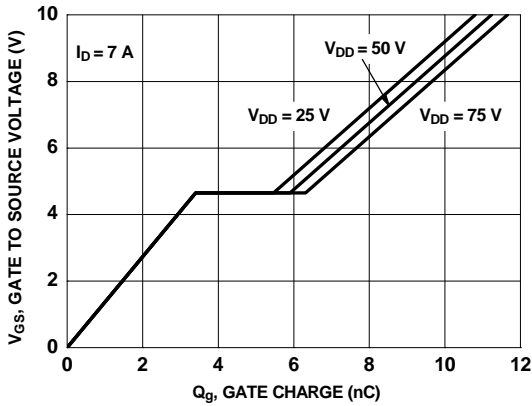


**Figure 5. Transfer Characteristics**

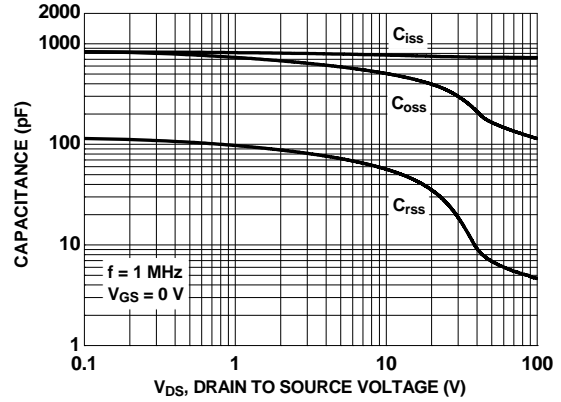


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

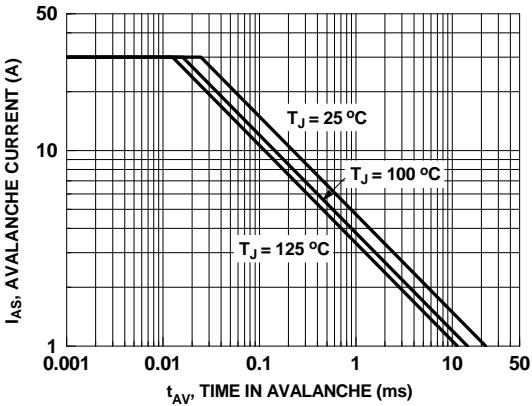
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



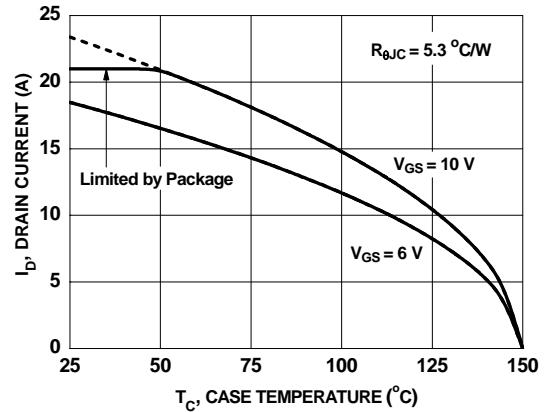
**Figure 7. Gate Charge Characteristics**



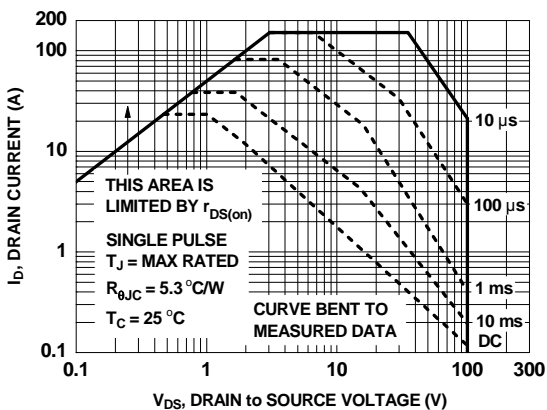
**Figure 8. Capacitance vs Drain to Source Voltage**



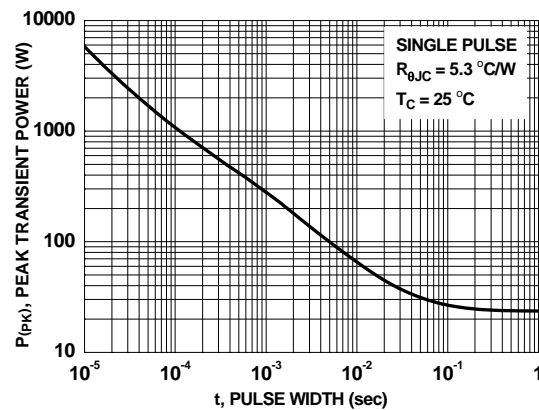
**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

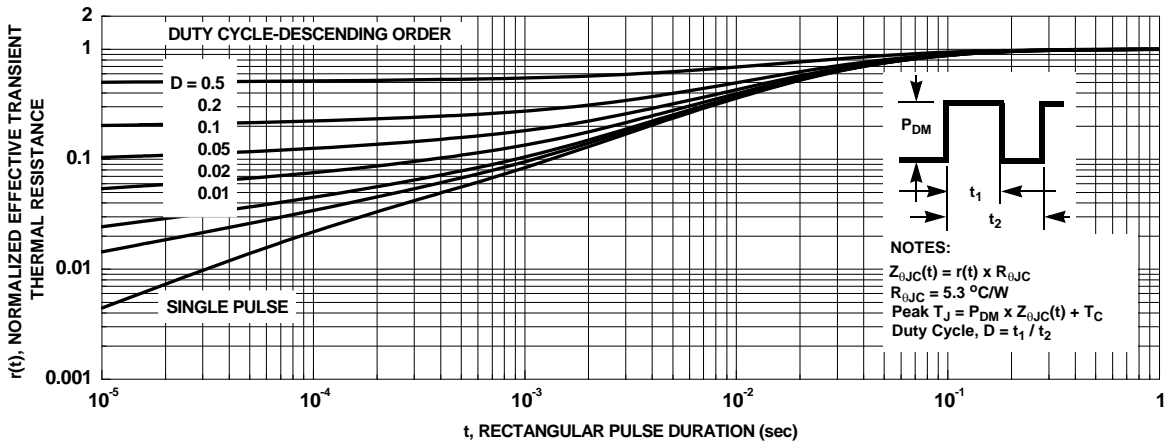


**Figure 11. Forward Bias Safe Operating Area**

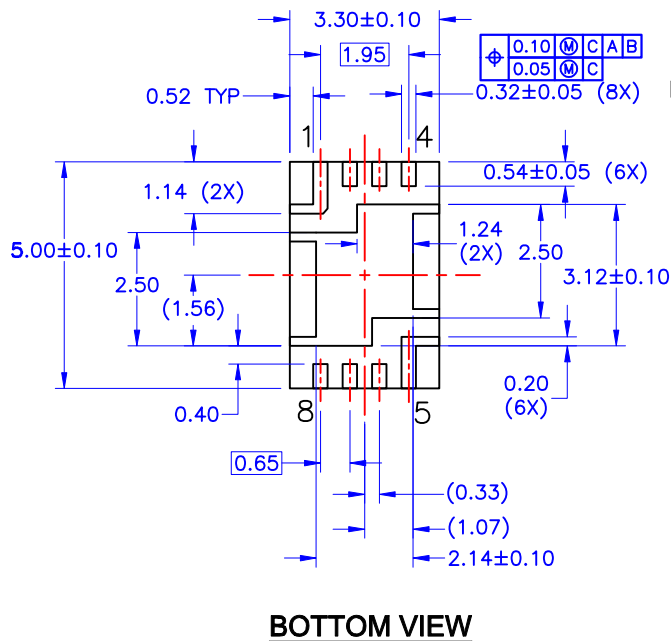
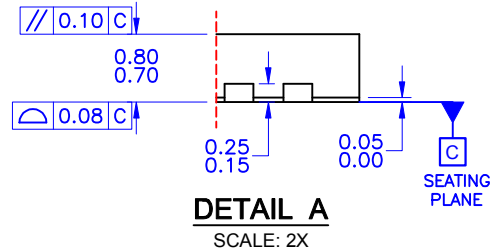
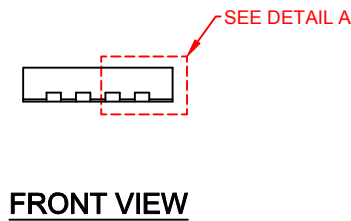
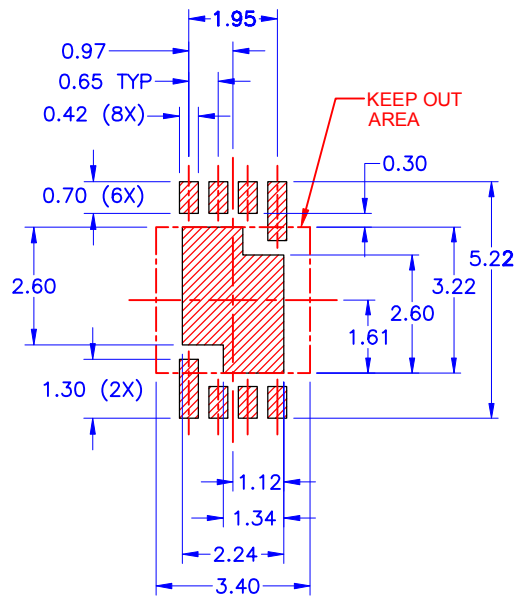
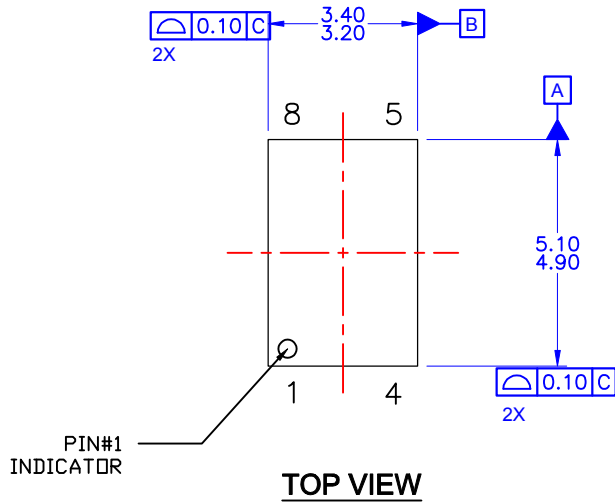


**Figure 12. Single Pulse Maximum Power Dissipation**

**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



**Figure 13. Junction-to-Case Transient Thermal Response Curve**



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO229 DATED 8/2012.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
  - D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
  - E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.
  - F) DRAWING FILE NAME: MKT-PQFN08NREV1.



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