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February 2015

FDMD86100

Dual N-Channel Shielded Gate PowerTrench® MOSFET

100 V, 39 A, 10.5 mΩ

Features

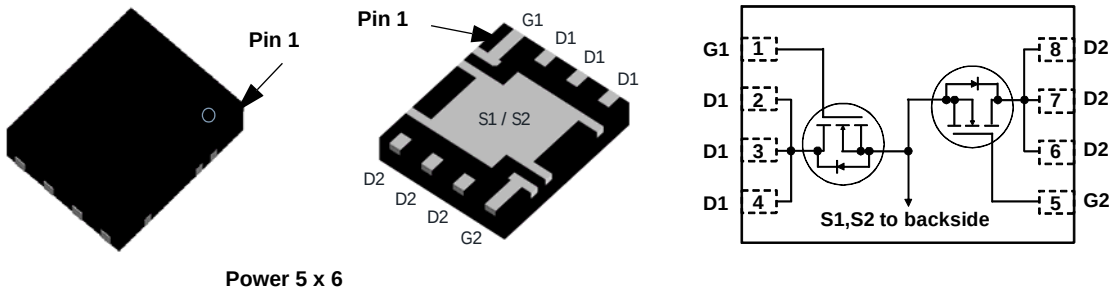
- Common source configuration to eliminate PCB routing
- Large source pad on bottom of package for enhanced thermals
- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 10.5 mΩ at V_{GS} = 10 V, I_D = 10 A
- Max $r_{DS(on)}$ = 17.3 mΩ at V_{GS} = 6 V, I_D = 7.8 A
- Ideal for flexible layout in secondary 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 and incorporates Shielded Gate technology. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. Provides a very small footprint (5 x 6 mm) for higher power density.

Applications

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



Power 5 x 6

MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			100	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current -Continuous	T_C = 25 °C	(Note 5)	39	A
	-Continuous	T_C = 100 °C	(Note 5)	24	
	Drain Current -Continuous	T_A = 25 °C	(Note 1a)	10	
	-Pulsed		(Note 4)	299	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	337	mJ
P_D	Power Dissipation	T_C = 25 °C		33	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.2	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	55	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMD86100	FDMD86100	Power 5 x 6	13 ”	12 mm	3000 units

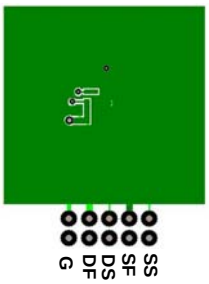
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Electrical Characteristics T_J = 25 °C unless otherwise noted

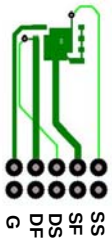
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		7		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.0	3.0	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-10		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 10 A		7.8	10.5	mΩ
		V_{GS} = 6 V, I_D = 7.8 A		12	17.3	
		V_{GS} = 10 V, I_D = 10 A, T_J = 125 °C		14.5	19.5	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 10 A		26		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		1469	2060	pF
C_{oss}	Output Capacitance			321	450	pF
C_{rss}	Reverse Transfer Capacitance			12	20	pF
R_g	Gate Resistance		0.1	1.3	3.3	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 10 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		13	23	ns
t_r	Rise Time			4.3	10	ns
$t_{d(off)}$	Turn-Off Delay Time			18	32	ns
t_f	Fall Time			4.1	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 50 V, I_D = 10 A		21	30	nC
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 6 V, V_{DD} = 50 V, I_D = 10 A		13	18	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 50 V, I_D = 10 A		6.6		nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 50 V, I_D = 10 A		4.1		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 10 A (Note 2)		0.8	1.3	V
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.7	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 10 A, di/dt = 100 A/μs		46	74	ns
Q_{rr}	Reverse Recovery Charge			46	74	nC

NOTES:

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



a. 55 °C/W when mounted on a 1 in^2 pad of 2 oz copper



b.125 °C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.
3. E_{AS} of 337 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 15 A, V_{DD} = 100 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 47 A.
4. Pulsed Id please refer to Fig 11 SOA graph for more details.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics T_J = 25 °C unless otherwise noted

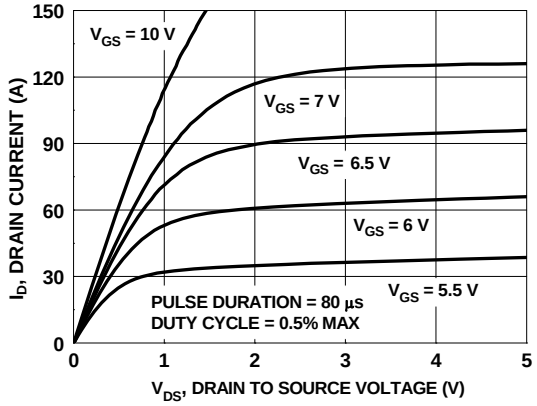


Figure 1. On-Region Characteristics

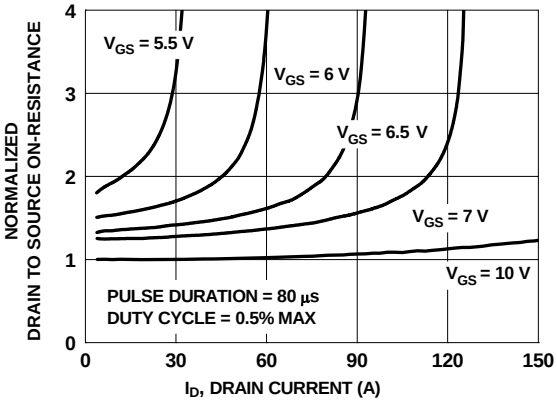


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

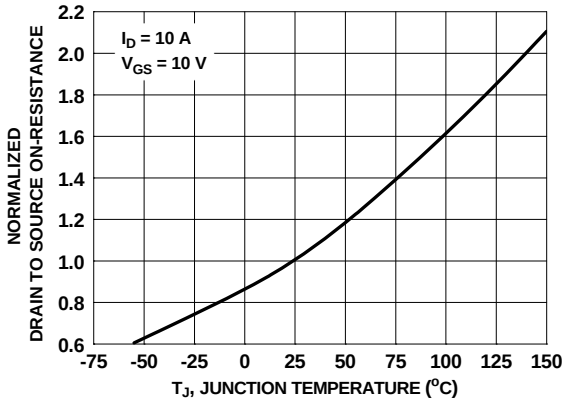


Figure 3. Normalized On-Resistance vs Junction Temperature

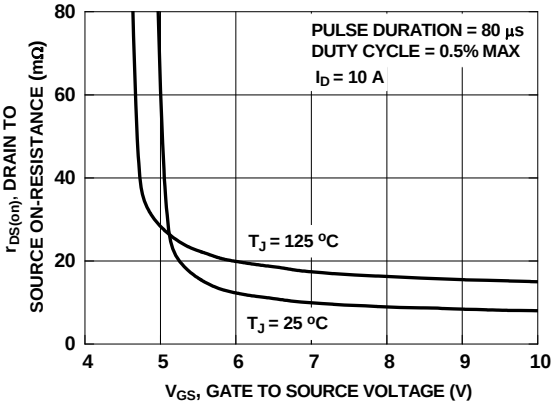


Figure 4. On-Resistance vs Gate to Source Voltage

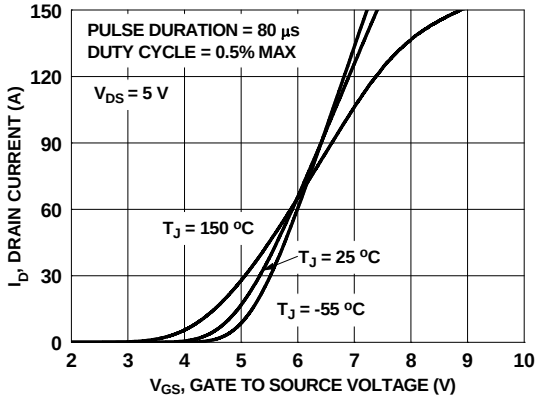


Figure 5. Transfer Characteristics

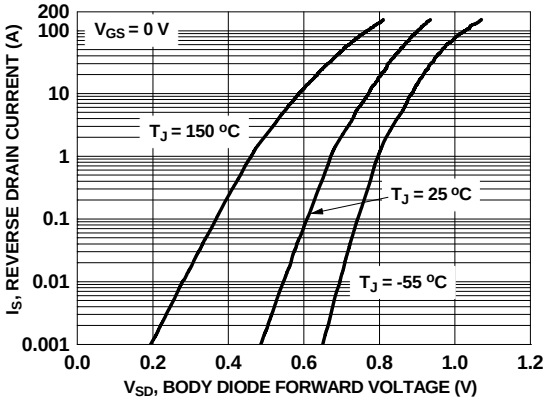


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

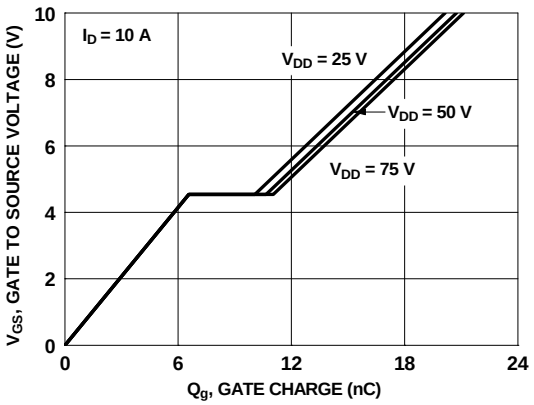


Figure 7. Gate Charge Characteristics

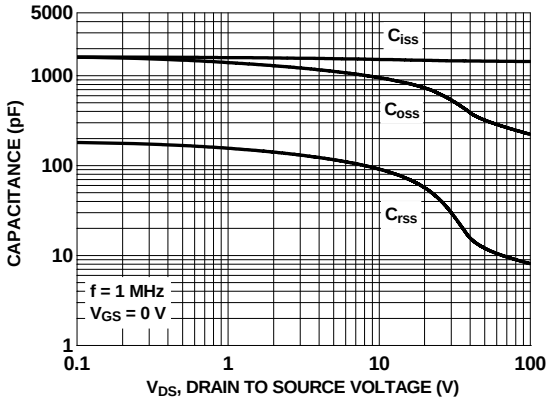


Figure 8. Capacitance vs Drain to Source Voltage

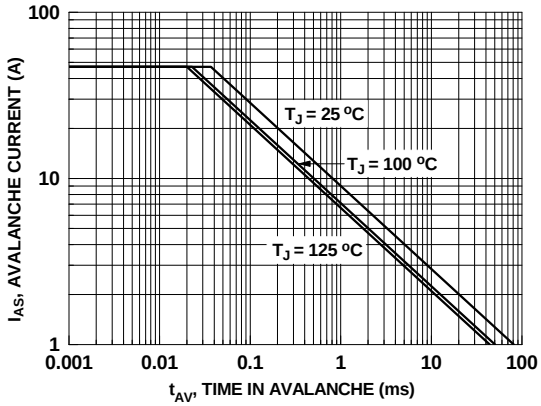


Figure 9. Unclamped Inductive Switching Capability

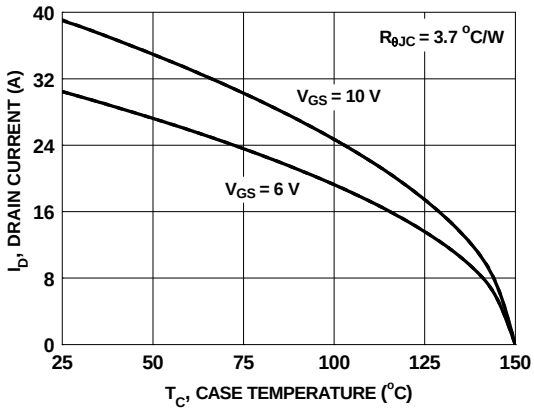


Figure 10. Maximum Continuous Drain Current vs Case Temperature

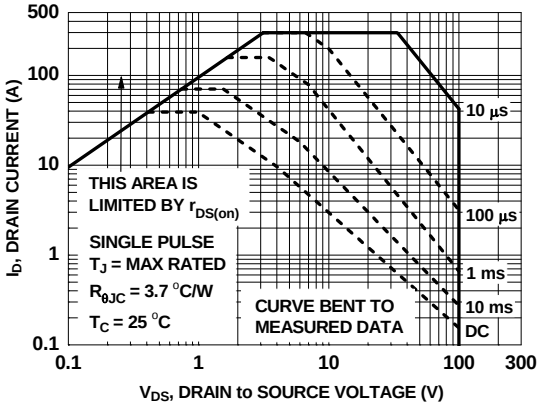


Figure 11. Forward Bias Safe Operating Area

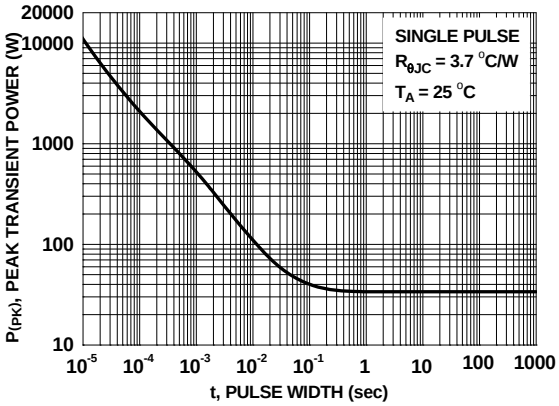


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

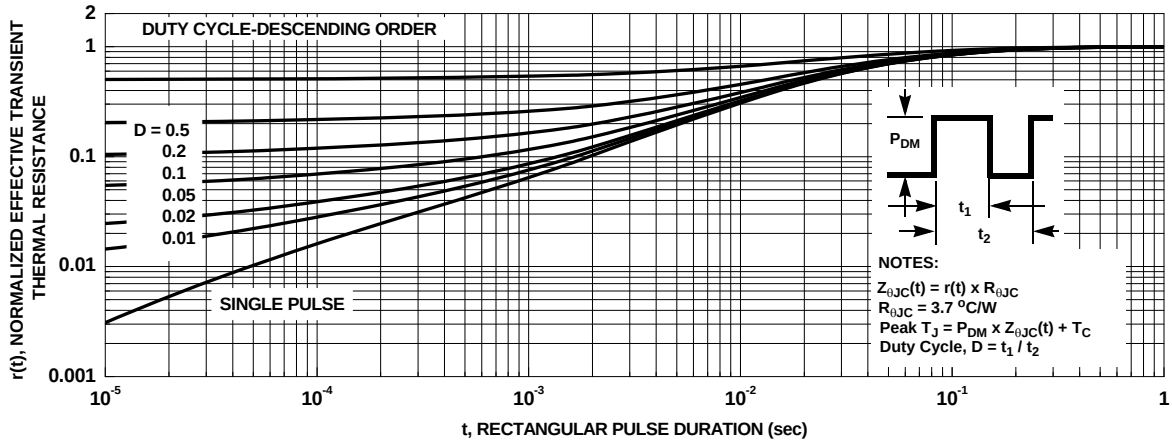
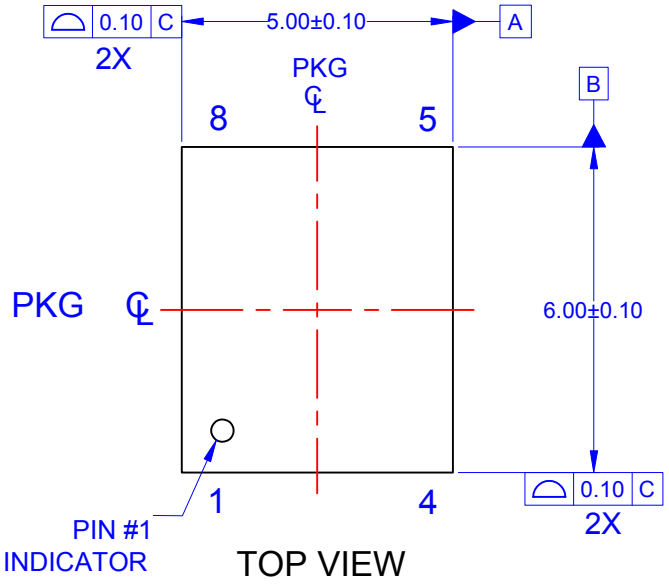
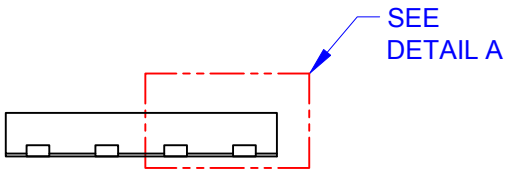


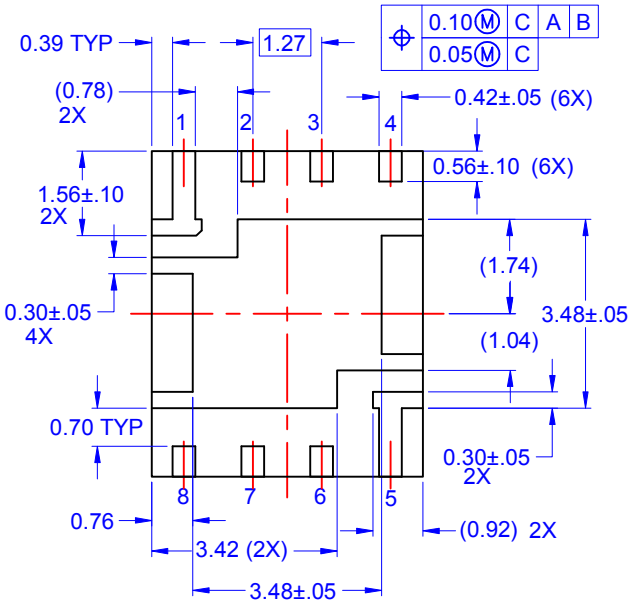
Figure 13. Junction-to-Case Transient Thermal Response Curve



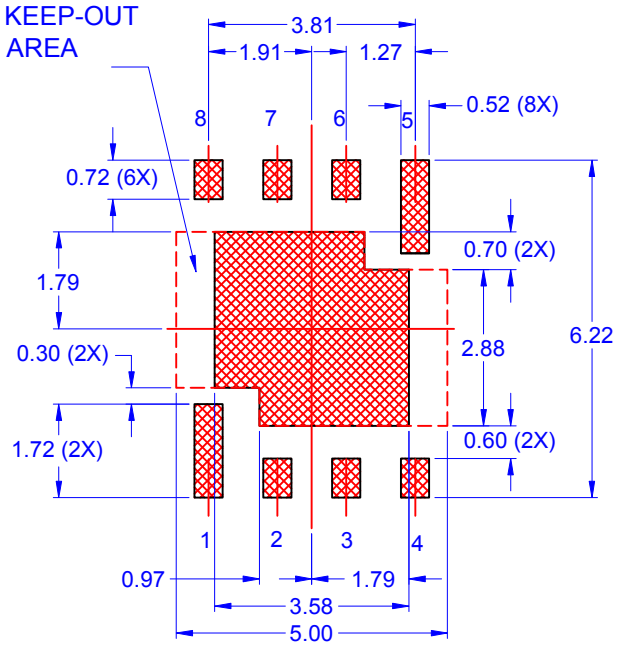
TOP VIEW



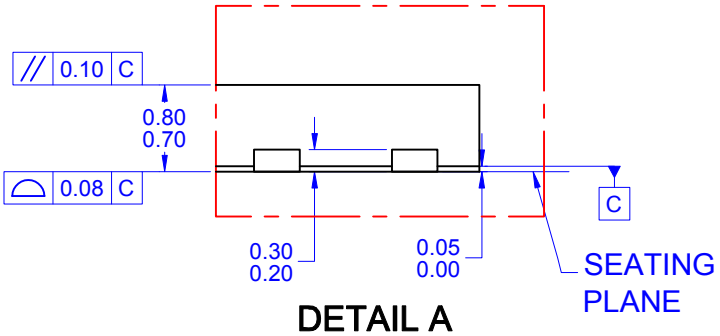
SIDE VIEW



BOTTOM VIEW



RECOMMENDED LAND PATTERN



DETAIL A
(SCALE: 2X)

NOTES:

A) PACKAGE REFERENCE :
TO JEDEC REGISTRATION, MO-240B, VARIATION AA.
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-2009
E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP-OUT AREA
F) DRAWING FILE NAME: PQFN08OREV1

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