FDMS86104 Datasheet

https://www.DiGi-Electronics.com

DiGi Electronics Part Number	FDMS86104-DG
Manufacturer	onsemi
Manufacturer Product Number	FDMS86104
Description	MOSFET N-CH 100V 7A/16A 8PQFN
Detailed Description	N-Channel 100 V 7A (Ta), 16A (Tc) 2.5W (Ta), 73W (Tc) Surface Mount 8-PQFN (5x6)

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RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FDMS86104	onsemi
Series:	Product Status:
PowerTrench®	Active
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
100 V	7A (Ta), 16A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
6V, 10V	24mOhm @ 7A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250μA	16 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±20V	923 pF @ 50 V
FET Feature:	Power Dissipation (Max):
-	2.5W (Ta), 73W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
8-PQFN (5x6)	8-PowerTDFN
Base Product Number:	
FDMS86	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at www.onsemi.com

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

October 2014

FDMS86104

N-Channel Shielded Gate PowerTrench® MOSFET

100 V, 16 A, 24 mΩ

Features

- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 24 mΩ at V_{GS} = 10 V, I_D = 7 A
- Max $r_{DS(on)}$ = 39 mΩ at V_{GS} = 6 V, I_D = 5.5 A
- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

General Description

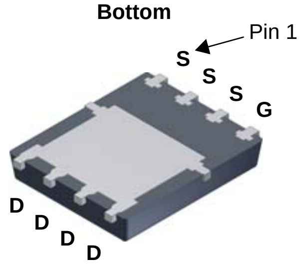
This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that incorporates Shielded Gate technology. This process has been optimized for the on-state resistance and yet maintain superior switching performance.

Application

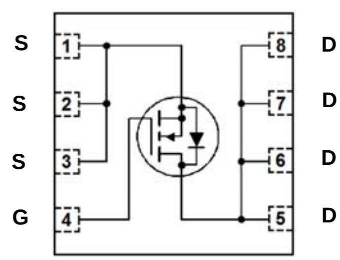
- DC-DC Conversion

Top

Bottom



Power 56



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		16	A
	-Continuous	T_A = 25 °C	(Note 1a)	7	
	-Pulsed			30	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	96	mJ
P_D	Power Dissipation	T_C = 25 °C		73	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS86104	FDMS86104	Power 56	13 ”	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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		66		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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2	2.9	4	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 = 7 A		20	24	mΩ
		V_{GS} = 6 V, I_D = 5.5 A		27	39	
		V_{GS} = 10 V, I_D = 7 A, T_J = 125 °C		33	40	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 7 A		18		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		694	923	pF
C_{oss}	Output Capacitance			178	237	pF
C_{rss}	Reverse Transfer Capacitance			8	13	pF
R_g	Gate Resistance			0.5		Ω

Switching Characteristics

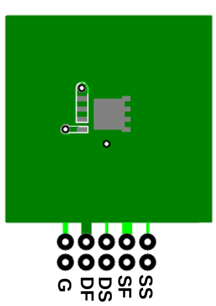
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 7 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		8	16	ns
t_r	Rise Time			3.5	10	ns
$t_{d(off)}$	Turn-Off Delay Time			14.3	26	ns
t_f	Fall Time			3.2	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 50 V, I_D = 7 A		11.7	16	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V		6.7	9	
Q_{gs}	Gate to Source Charge			3.2		nC
Q_{gd}	Gate to Drain “Miller” Charge			3		nC

Drain-Source Diode Characteristics

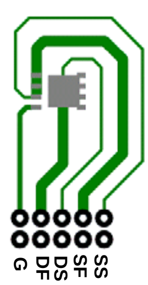
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.7	1.2	V
		V_{GS} = 0 V, I_S = 7 A (Note 2)		0.8	1.3	
t_{rr}	Reverse Recovery Time	I_F = 7 A, di/dt = 100 A/μs		44	70	ns
Q_{rr}	Reverse Recovery Charge			41	65	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^2 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. 50 °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. Starting T_J = 25 °C, L = 3 mH, I_{AS} = 8 A, V_{DD} = 100 V, V_{GS} = 10 V

Typical Characteristics T_J = 25 °C unless otherwise noted

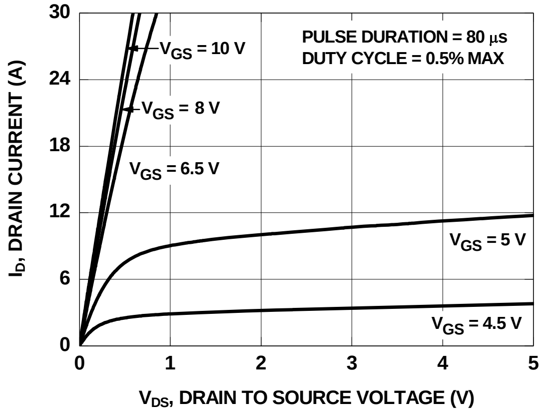


Figure 1. On-Region Characteristics

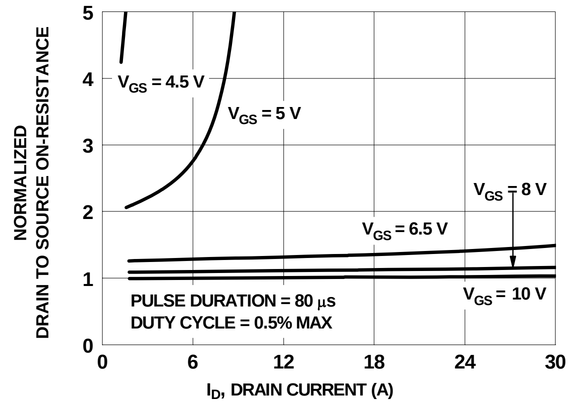


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

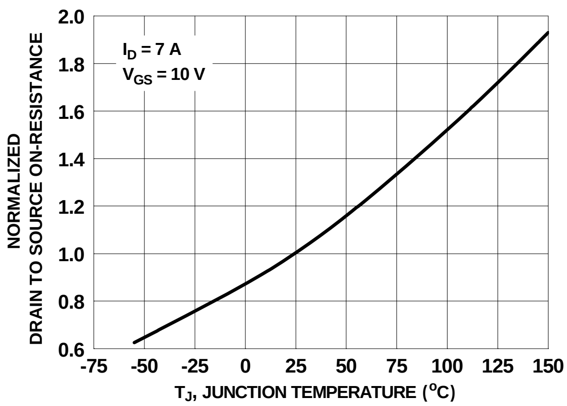


Figure 3. Normalized On-Resistance vs Junction Temperature

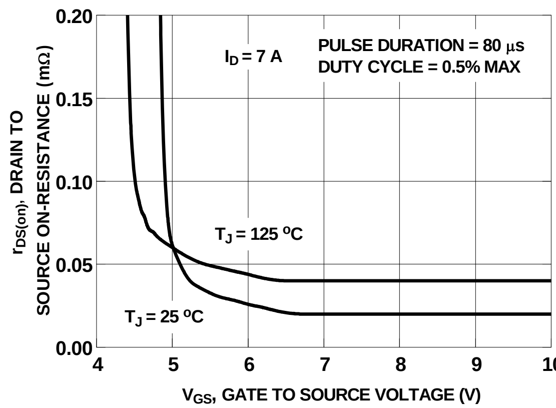


Figure 4. On-Resistance vs Gate to Source Voltage

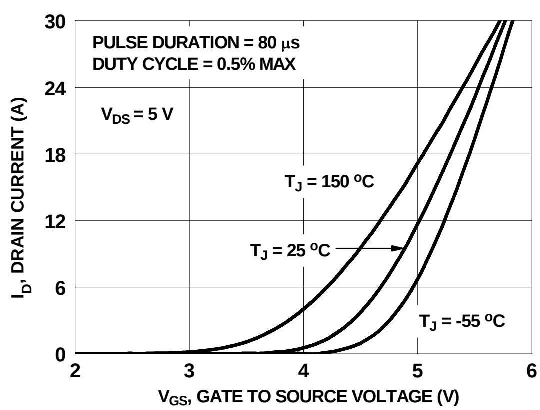


Figure 5. Transfer Characteristics

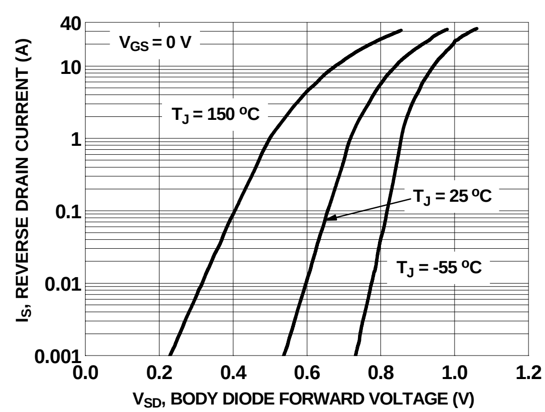


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

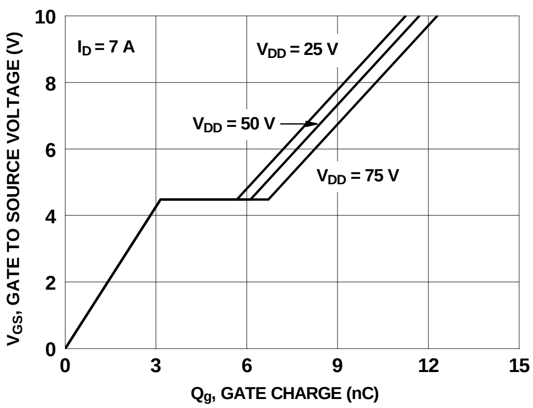


Figure 7. Gate Charge Characteristics

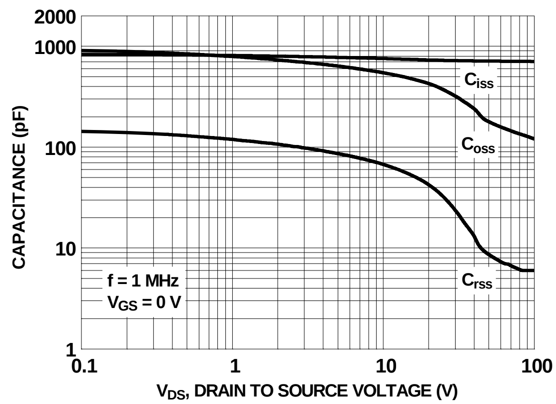


Figure 8. Capacitance vs Drain to Source Voltage

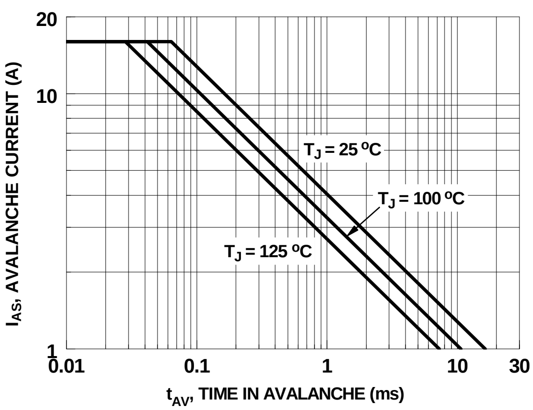


Figure 9. Unclamped Inductive Switching Capability

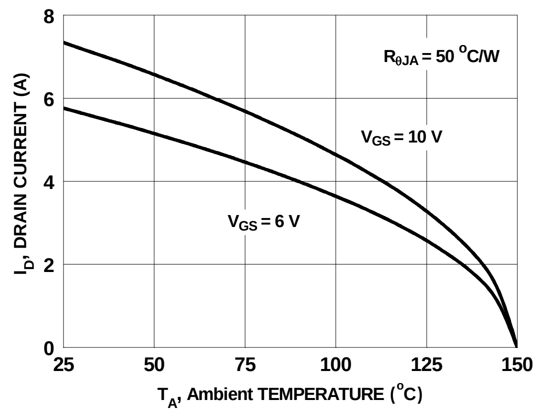


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

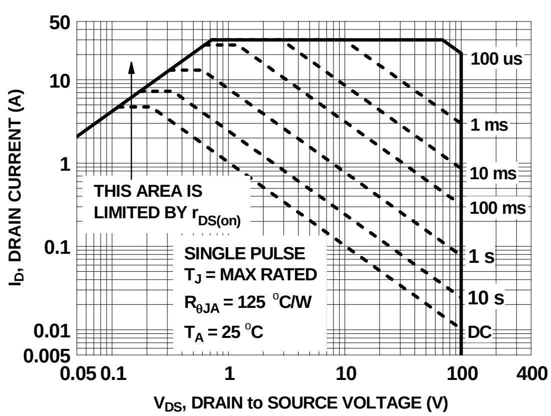


Figure 11. Forward Bias Safe Operating Area

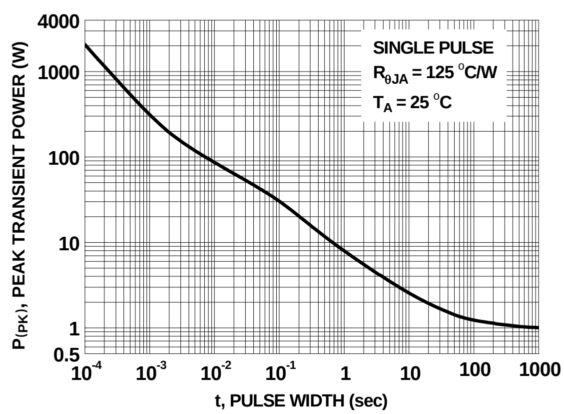


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

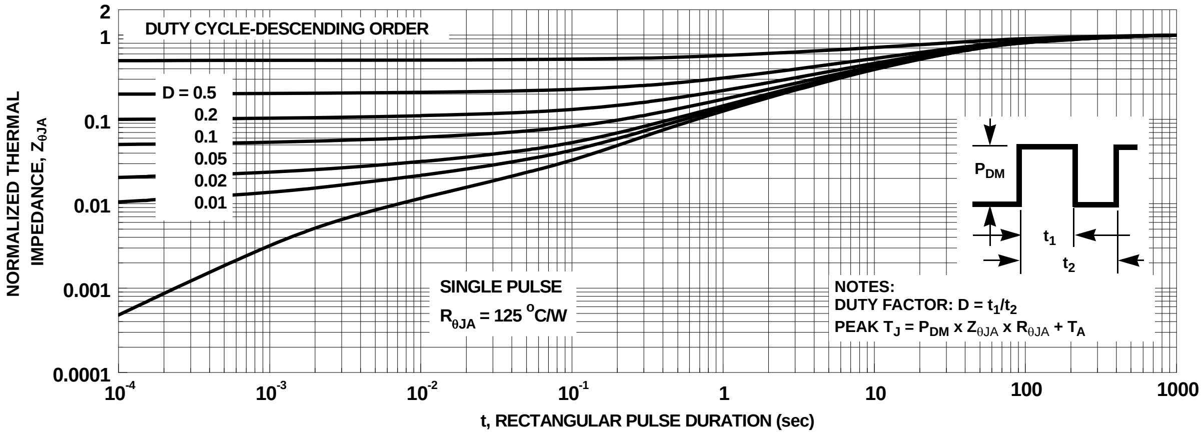


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

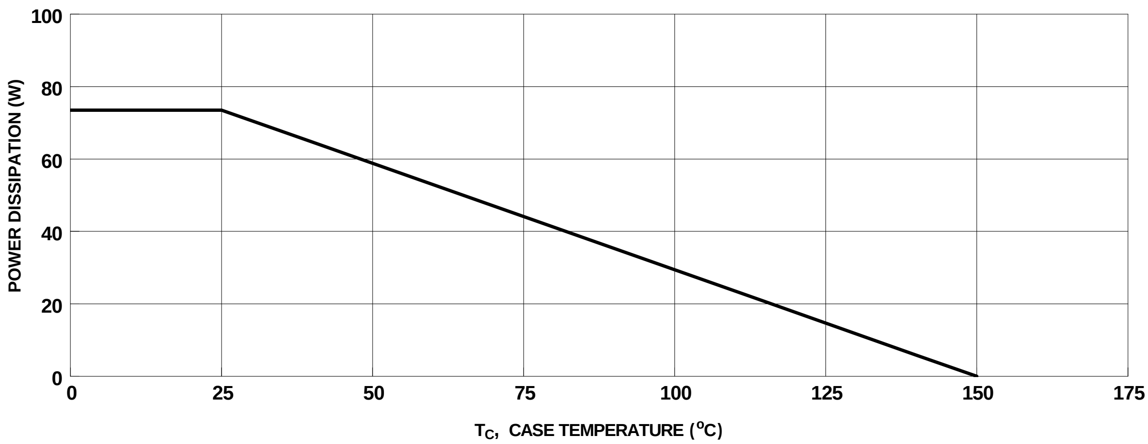
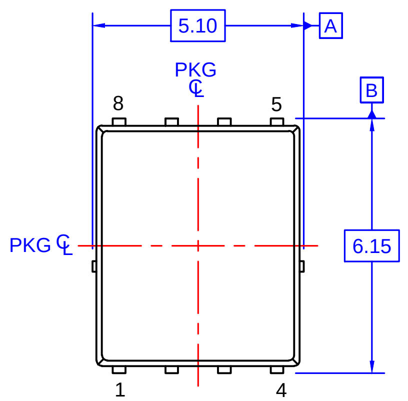
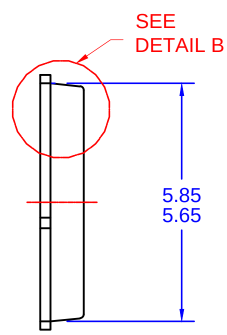


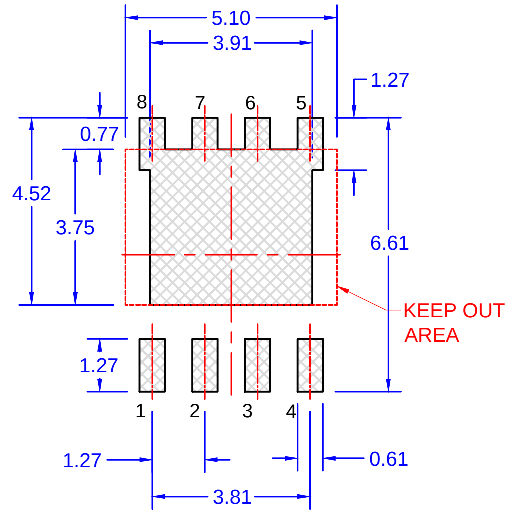
Figure 14. Power Vs Case Temperature

PQFN8 5X6, 1.27P
CASE 483AE
ISSUE A

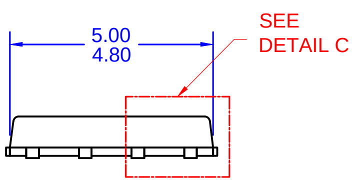


TOP VIEW

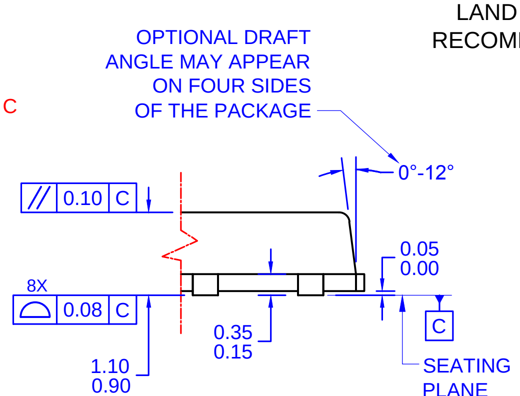




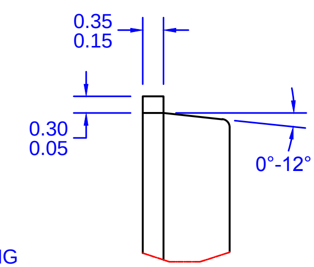
LAND PATTERN
RECOMMENDATION



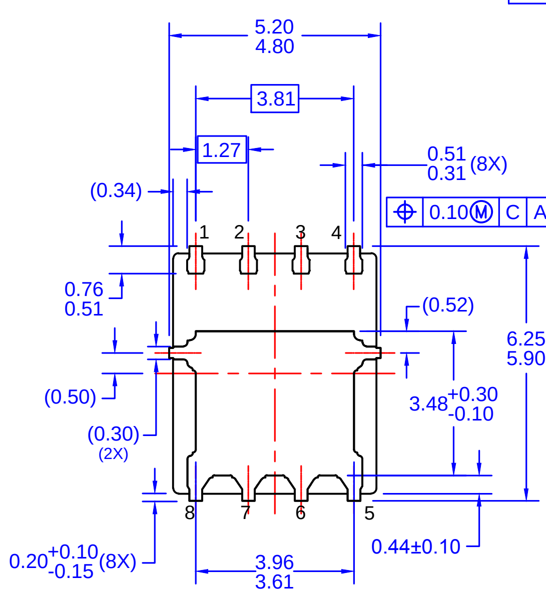
SIDE VIEW



DETAIL C
SCALE: 2:1



DETAIL B
SCALE: 2:1



BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

A. PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA,.
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
E. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

PUBLICATION ORDERING INFORMATION

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