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.

November 2014

FDMS8560S

N-Channel PowerTrench® SyncFET™

25 V, 70 A, 1.8 mΩ

Features

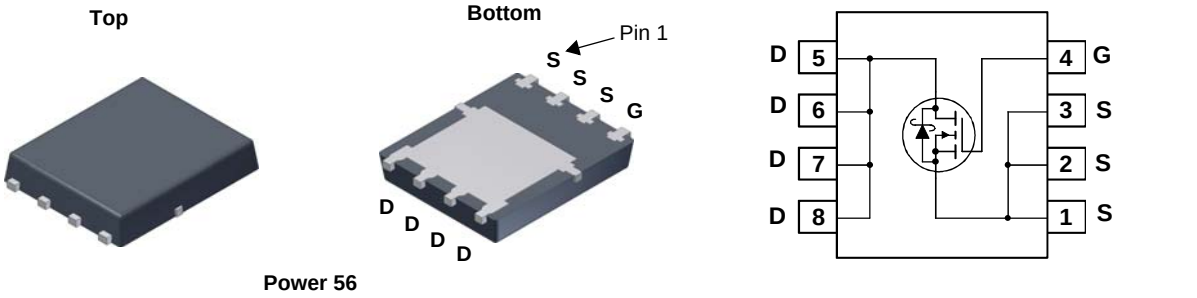
- Max $r_{DS(on)}$ = 1.8 mΩ at V_{GS} = 10 V, I_D = 30 A
- Max $r_{DS(on)}$ = 2.1 mΩ at V_{GS} = 4.5 V, I_D = 28 A
- High performance technology for extremely low $r_{DS(on)}$
- SyncFET™ Schottky Body Diode
- RoHS Compliant

General Description

This N-Channel SyncFET™ is produced using Fairchild Semiconductor's advanced PowerTrench® process. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance by extremely low Junction-to-Ambient thermal resistance. This device has the added benefit of an efficient monolithic Schottky body diode.

Applications

- Synchronous Rectifier for DC/DC Converters
- Telecom Secondary Side Rectification
- High End Server/Workstation Vcore Low Side



Power 56

MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			25	V
V_{GS}	Gate to Source Voltage			12	V
I_D	Drain Current -Continuous (Package limited)	T_C = 25 °C		70	A
	-Continuous	T_A = 25 °C	(Note 1a)	30	
	-Pulsed			150	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	79	mJ
P_D	Power Dissipation	T_C = 25 °C		65	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	T_C = 25 °C		1.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	T_A = 25 °C	(Note 1a)	50	

Package Marking and Ordering Information

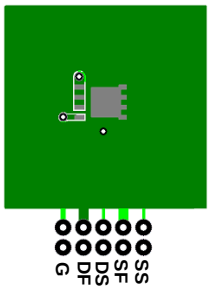
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
05OD	FDMS8560S	Power 56	13''	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

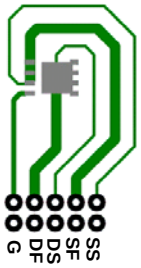
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	25			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25 °C		20		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20 V, V_{GS} = 0 V			500	µA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = +12 V/-8 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 1 mA	1.1	1.4	2.2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25 °C		-3		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 30 A		1.4	1.8	mΩ
		V_{GS} = 4.5 V, I_D = 28 A		1.6	2.1	
		V_{GS} = 10 V, I_D = 30 A, T_J = 125 °C		2.1	2.8	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 30 A		304		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 13 V, V_{GS} = 0 V, f = 1 MHz		4350		pF
C_{oss}	Output Capacitance			1270		pF
C_{rss}	Reverse Transfer Capacitance			138		pF
R_g	Gate Resistance			0.8		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 13 V, I_D = 30 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		13		ns
t_r	Rise Time			6		ns
$t_{d(off)}$	Turn-Off Delay Time			45		ns
t_f	Fall Time			5		ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 13 V, I_D = 30 A		68		nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V; V_{DD} = 13 V, I_D = 30 A		32		nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 13 V, I_D = 30 A		8.2		nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 13 V, I_D = 30 A		9.6		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.6	0.8	V
		V_{GS} = 0 V, I_S = 30 A (Note 2)		0.8	1.2	
t_{rr}	Reverse Recovery Time	I_F = 30 A, di/dt = 300 A/µs		32		ns
Q_{rr}	Reverse Recovery Charge			41		nC

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a FR-4 board using a specified pad of 2 oz copper as shown below. $R_{\theta JC}$ 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. E_{AS} of 79 mJ is based on starting T_J = 25 °C, L = 2.5 mH, I_{AS} = 8 A, V_{DD} = 23 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 33.7 A.

Typical Characteristics T_J = 25 °C unless otherwise noted

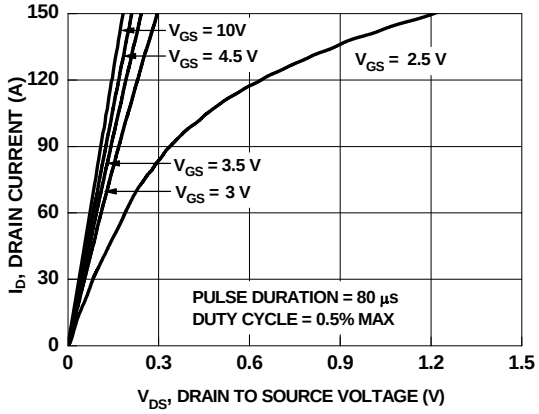


Figure 1. On Region Characteristics

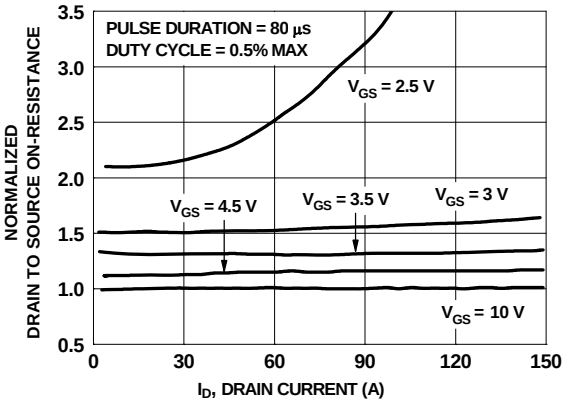


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

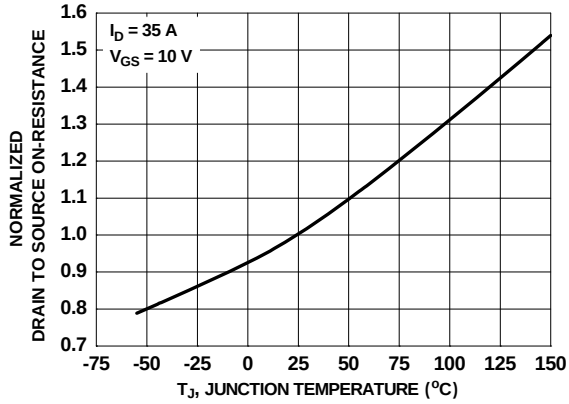


Figure 3. Normalized On Resistance vs Junction Temperature

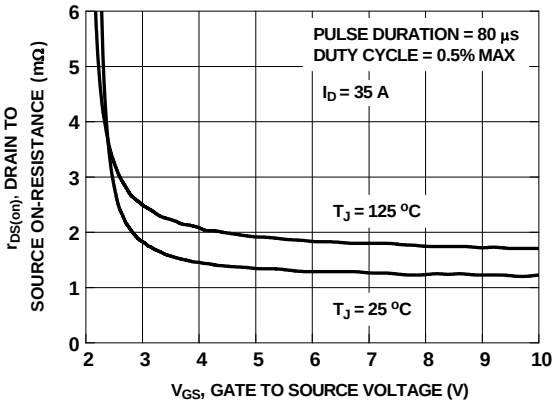


Figure 4. On-Resistance vs Gate to Source Voltage

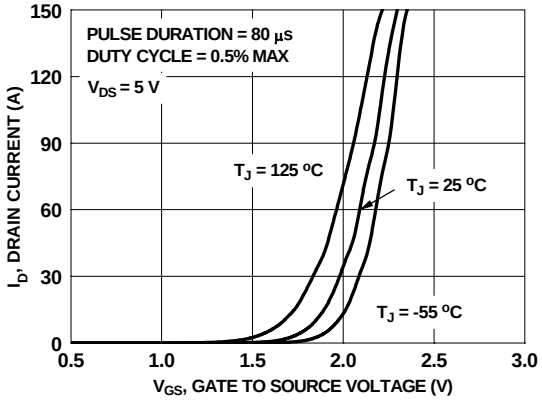


Figure 5. Transfer Characteristics

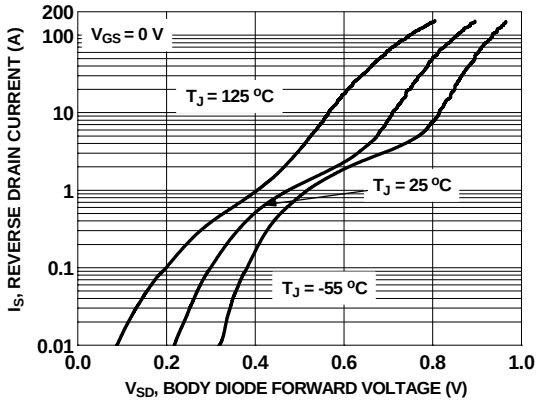


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

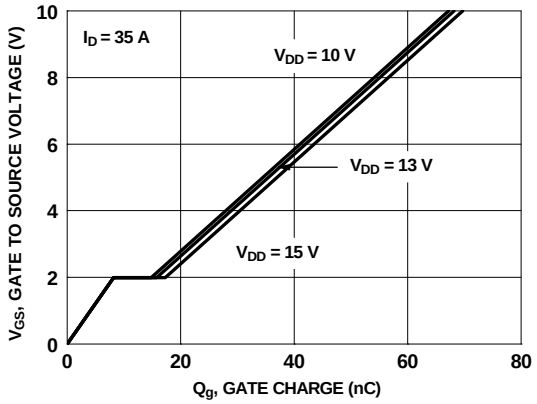


Figure 7. Gate Charge Characteristics

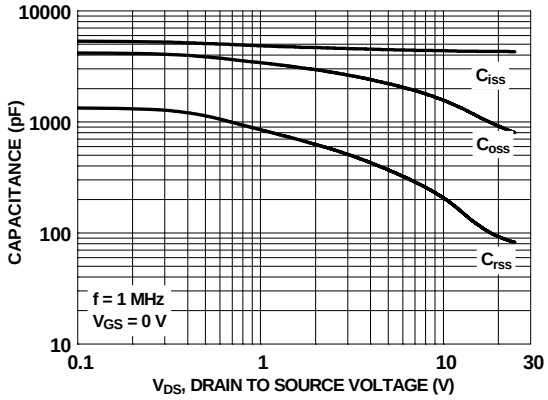


Figure 8. Capacitance vs Drain to Source Voltage

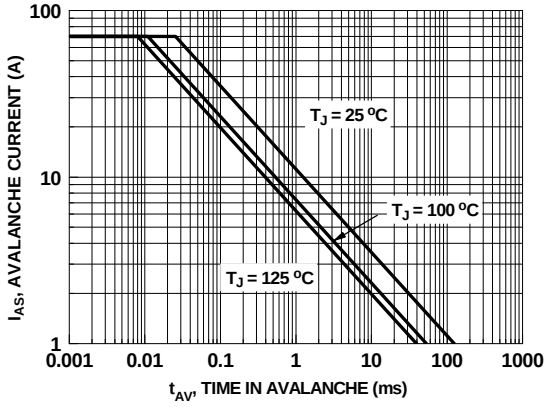


Figure 9. Unclamped Inductive Switching Capability

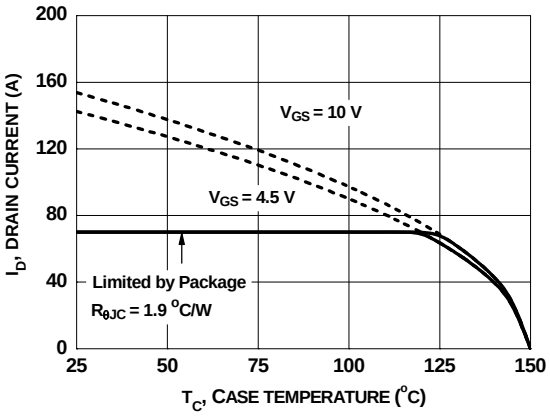


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

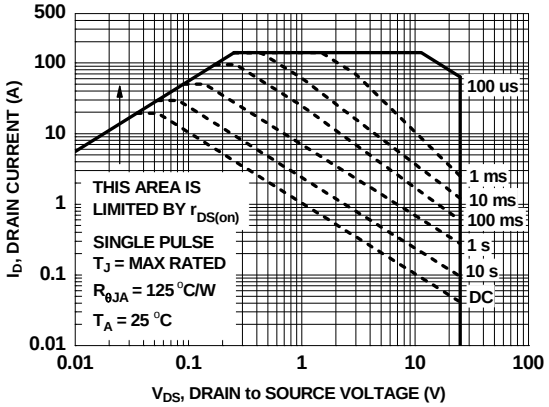


Figure 11. Forward Bias Safe Operating Area

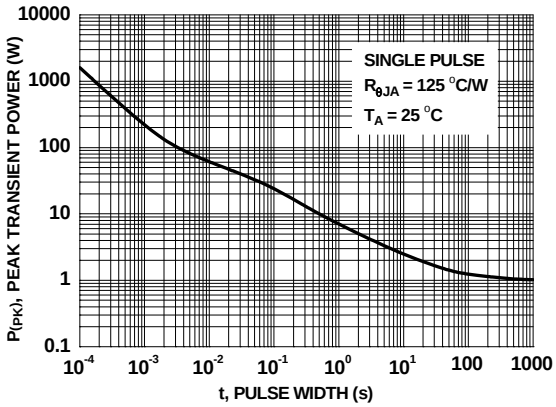


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

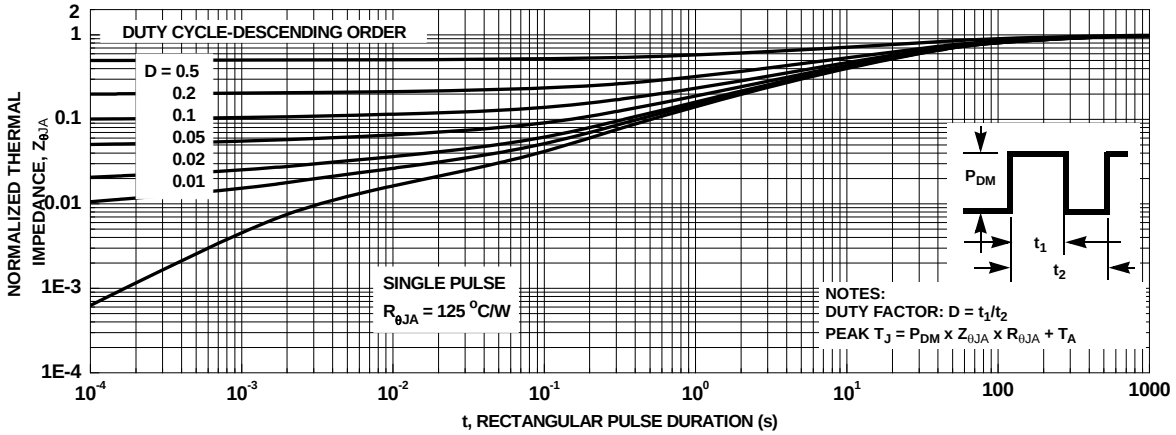


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Typical Characteristics (continued)

SyncFET™ Schottky body diode Characteristics

Fairchild's SyncFET™ process embeds a Schottky diode in parallel with PowerTrench MOSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 14 shows the reverse recovery characteristic of the FDMS8560S.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

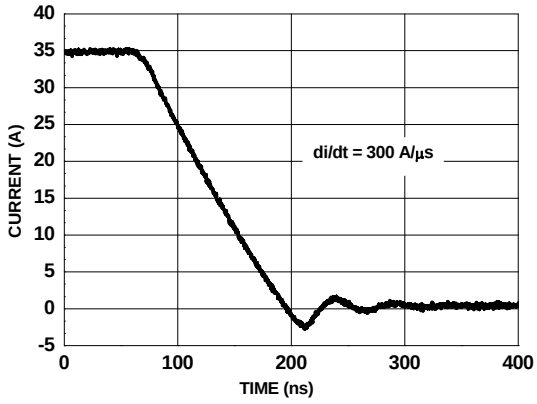


Figure 14. FDMS8560S SyncFET™ body diode reverse recovery characteristic

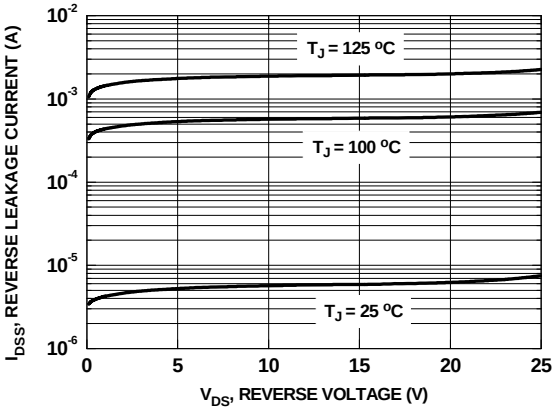
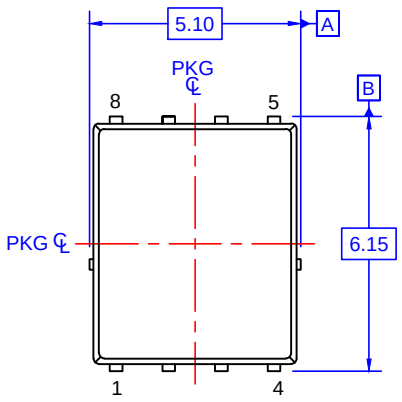
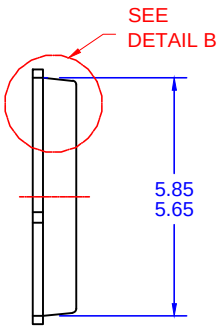


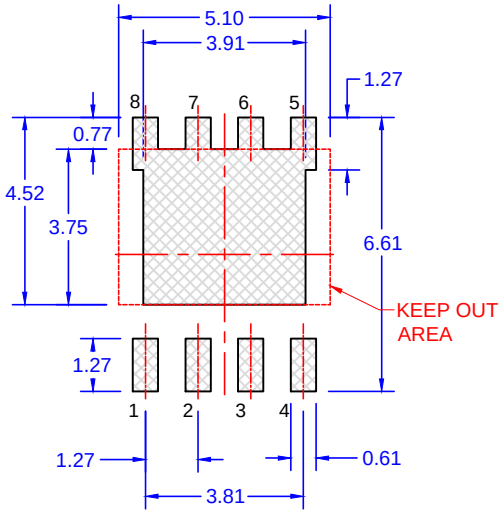
Figure 15. SyncFET™ body diode reverse leakage versus drain-source voltage

PQFN8 5X6, 1.27P
CASE 483AE
ISSUE A

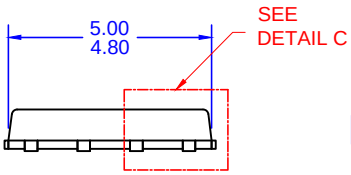


TOP VIEW

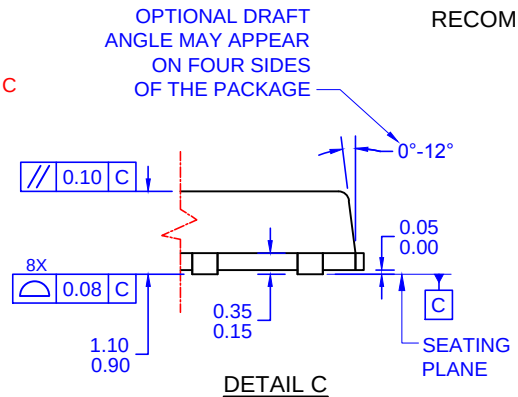




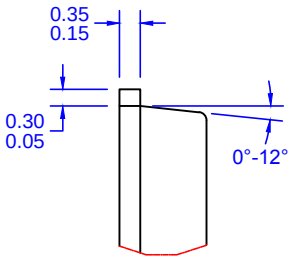
LAND PATTERN
RECOMMENDATION



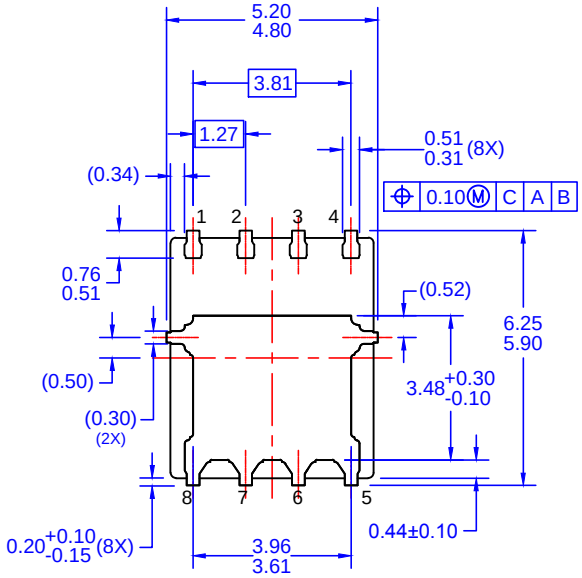
SIDE VIEW



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.

ON Semiconductor

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET ***category:***

Click to view products by ON Semiconductor ***manufacturer:***

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L SBVS138LT1G 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE222 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B