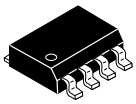
MOSFET – N-Channel, Shielded Gate, POWERTRENCH®

150 V, 7.5 A, 19.8 mΩ

FDS86240



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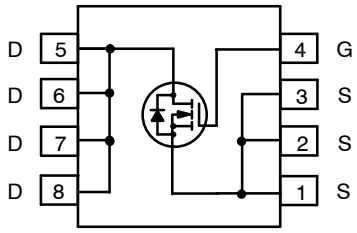


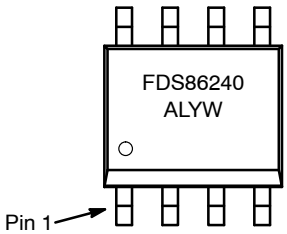
General Description

This N−Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that incorporates Shielded Gate technology. This process has been optimized for $R_{DS(on)}$, switching performance and ruggedness.

Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 19.8 mΩ at V_{GS} = 10 V, I_D = 7.5 A
- Max $R_{DS(on)}$ = 26 mΩ at V_{GS} = 6 V, I_D = 6.4 A
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability in a Widely Used Surface Mount Package
- 100% UIL Tested
- This Device is Pb−Free, Halide Free and is RoHS Compliant

MARKING DIAGRAM



FDS86240 = Specific Device Code
A = Assembly Site
L = Wafer Lot Number
YW = Assembly Start Week

ABSOLUTE MAXIMUM RATINGS

(T_A = 25°C unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	150	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current – Continuous – Pulsed (Note 4)	 7.5 199	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	220	mJ
P_D	Power Dissipation T_C = 25°C (Note 1) T_A = 25°C (Note 1a)	 5.0 2.5	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	25	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	°C/W

ORDERING INFORMATION

Device	Package	Shipping†
FDS86240	SOIC8 (Pb−Free/ Halide Free)	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	150	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	105	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 120 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	2.7	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	–	−11	–	mV/°C
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 7.5 A	–	17.3	19.8	mΩ
		V_{GS} = 6 V, I_D = 6.4 A	–	19.7	26	
		V_{GS} = 10 V, I_D = 7.5 A, T_J = 125°C	–	30.8	35.3	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 7.5 A	–	26	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 75 V, V_{GS} = 0 V, f = 1 MHz	–	1930	2570	pF
C_{oss}	Output Capacitance		–	198	265	
C_{rss}	Reverse Transfer Capacitance		–	8.3	15	
R_G	Gate Resistance		–	0.84	–	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 75 V, I_D = 7.5 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	14	26	ns
t_r	Rise Time		–	4.2	10	
$t_{d(off)}$	Turn–Off Delay Time		–	24	39	
t_f	Fall Time		–	4.9	10	
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 75 V, I_D = 7.5 A	–	28	40	nC
		V_{GS} = 0 V to 5 V, V_{DD} = 75 V, I_D = 7.5 A	–	16	22	
Q_{gs}	Gate to Source Charge	V_{DD} = 75 V, I_D = 7.5 A	–	7.6	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	5.3	–	
DRAIN–SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 7.5 A (Note 2)	–	0.77	1.3	V
		V_{GS} = 0 V, I_S = 2 A (Note 2)	–	0.70	1.2	
t_{rr}	Reverse Recovery Time	I_F = 7.5 A, di/dt = 100 A/μs	–	75	120	ns
Q_{rr}	Reverse Recovery Charge		–	109	175	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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. $R_{\theta JC}$ 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.

2. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%
3. Starting T_J = 25°C, L = 1 mH, I_{AS} = 21 A, V_{DD} = 135 V, V_{GS} = 10 V
4. Pulsed Id please refer to Figure 11 SOA graph for more details.

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

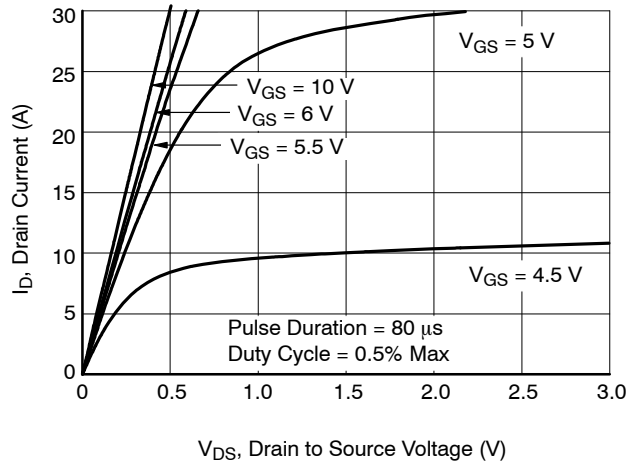


Figure 1. On Region Characteristics

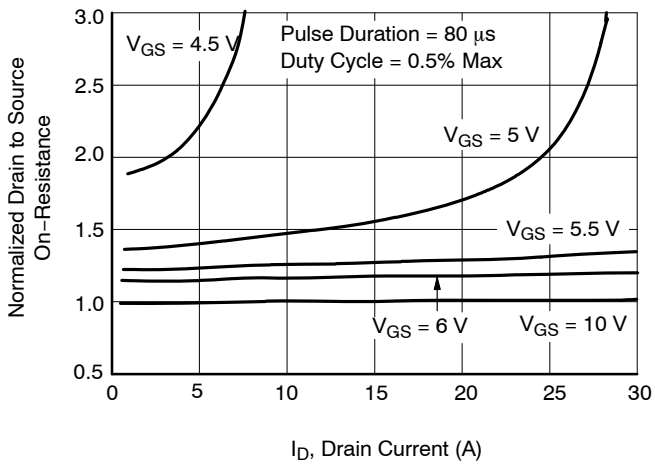


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

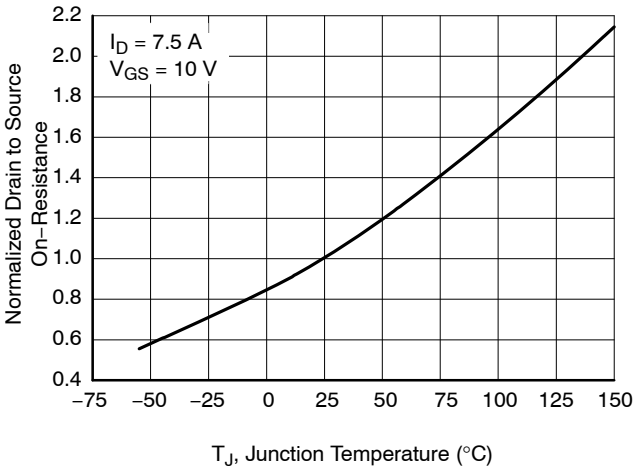


Figure 3. Normalized On Resistance vs. Junction Temperature

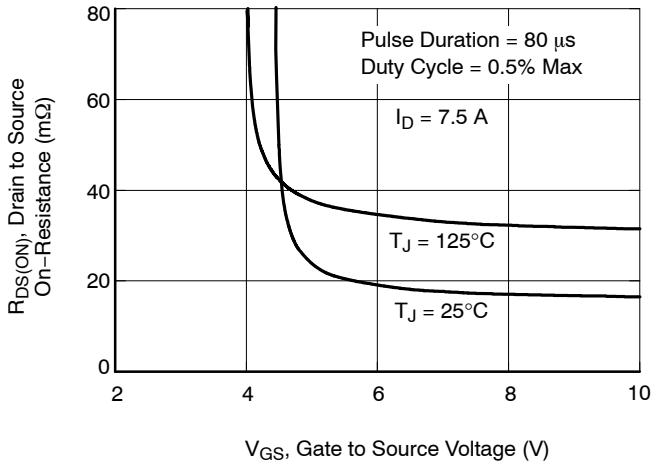


Figure 4. On−Resistance vs. Gate to Source Voltage

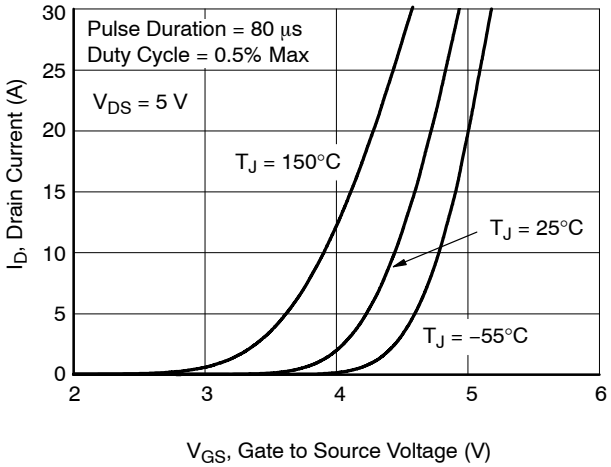


Figure 5. Transfer Characteristics

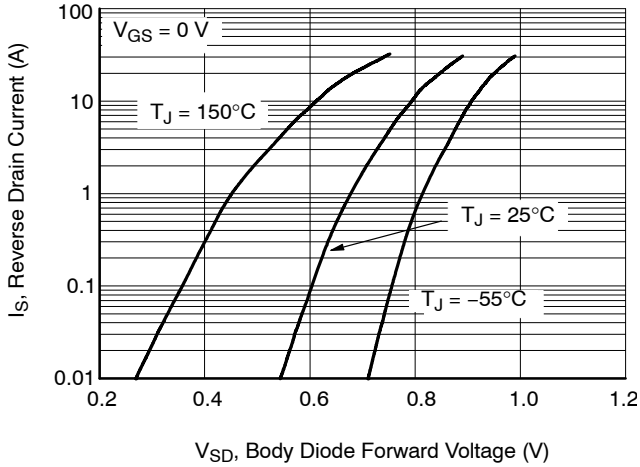


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

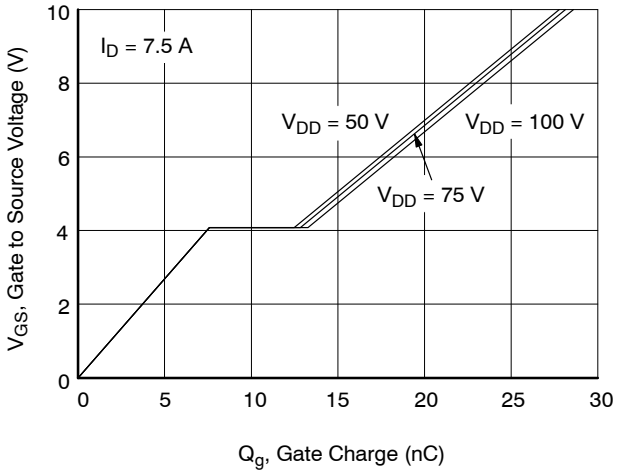


Figure 7. Gate Charge Characteristics

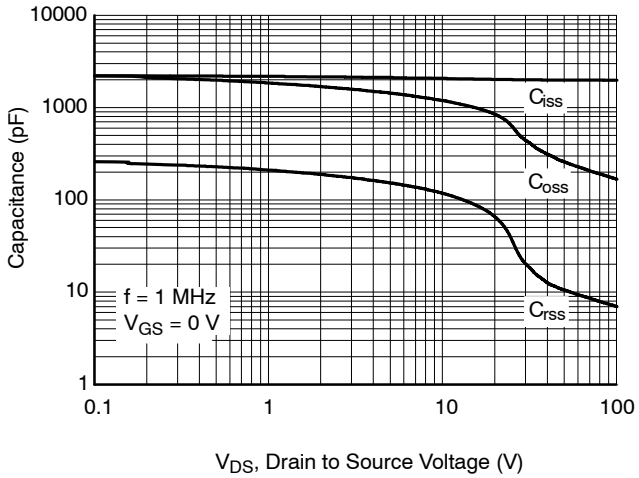


Figure 8. Capacitance vs. Drain to Source Voltage

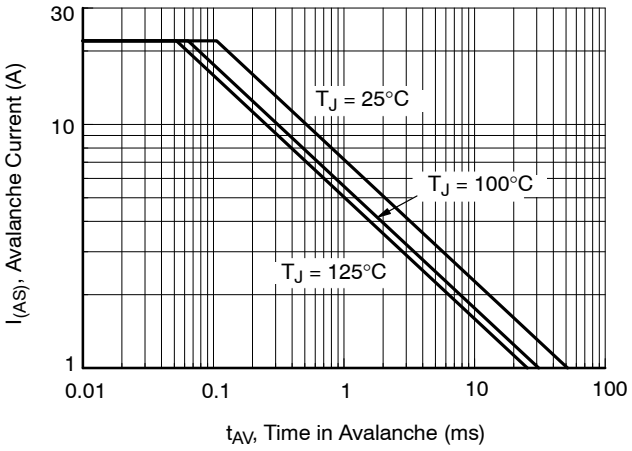


Figure 9. Unclamped Inductive Switching Capability

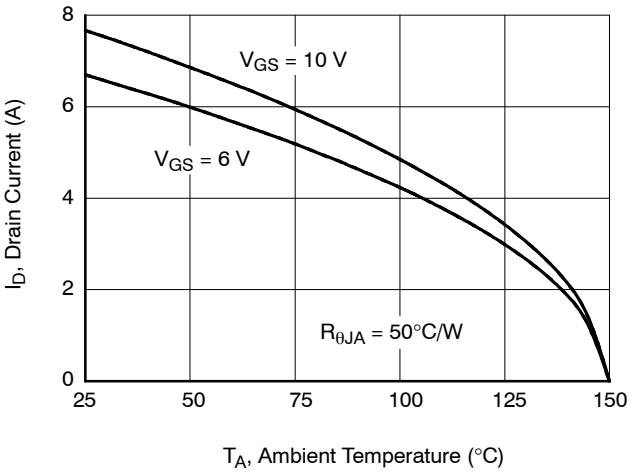


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

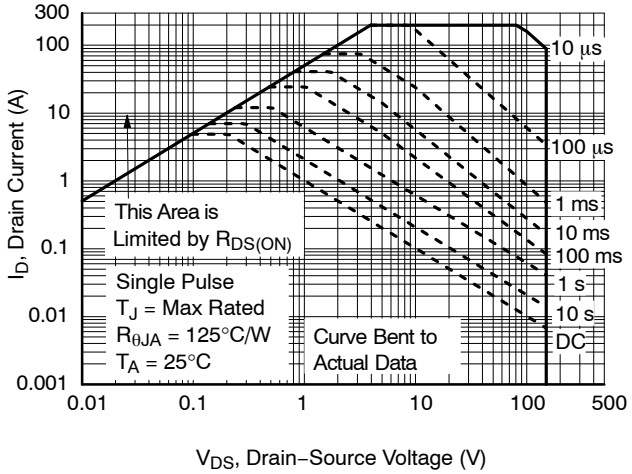


Figure 11. Forward Bias Safe Operating Area

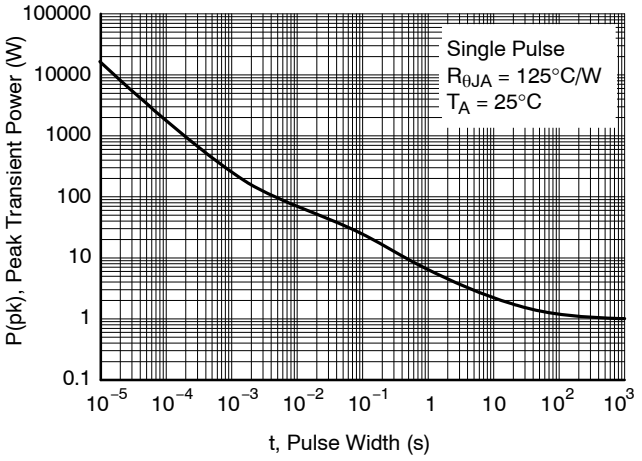


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

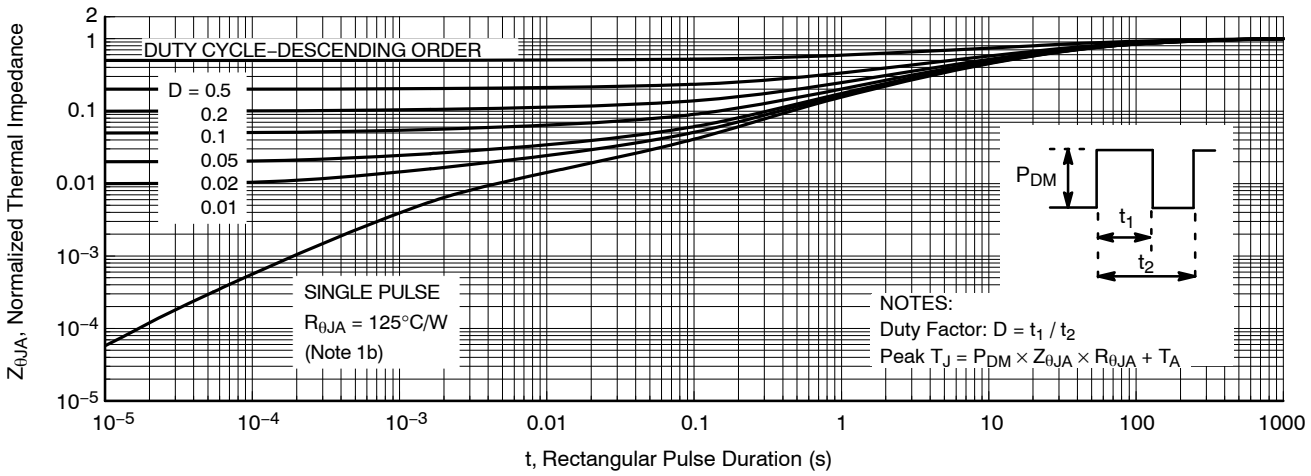


Figure 13. Junction−to−Ambient Transient Thermal Response Curve

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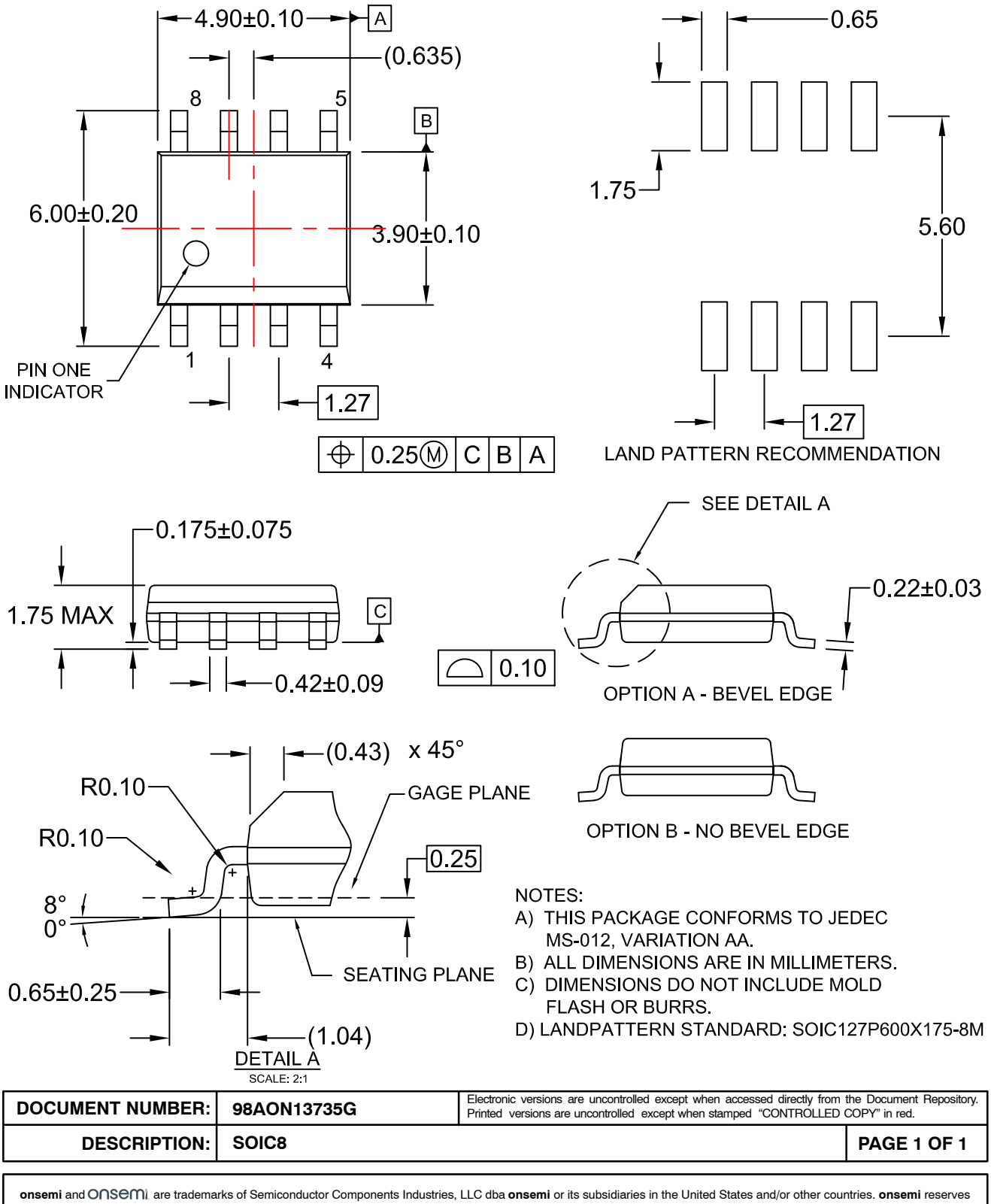

NOTES:
A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M

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