MOSFET – N-Channel, POWERTRENCH®, SyncFET™

FDS8672S

ON Semiconductor®

www.onsemi.com

General Description

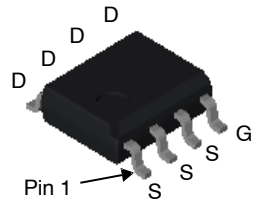
The FDS8672S is designed to replace a single MOSFET and Schottky diode in synchronous DC/DC power supplies. This 30 V MOSFET is designed to maximize power conversion efficiency, providing a low $R_{DS(on)}$ and low gate charge. The FDS8672S includes a patented combination of a MOSFET monolithically integrated with a Schottky diode using ON Semiconductor's monolithic SyncFET technology.

Features

- Max $R_{DS(on)}$ = 4.8 mΩ at V_{GS} = 10 V, I_D = 18 A
- Max $R_{DS(on)}$ = 7.0 mΩ at V_{GS} = 4.5 V, I_D = 15 A
- Includes SyncFET Schottky Body Diode
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$ and Fast Switching
- High Power and Current Handling Capability
- 100% R_g (Gate Resistance) Tested
- This Device is Pb−Free, Halogen Free/BFR Free and is RoHS Compliant

Applications

- Notebook Vcore Low Side Switch
- Synchronous Rectifier for DC/DC Converters
- Point of Load Low Side Switch



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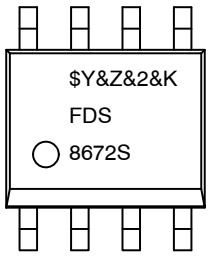
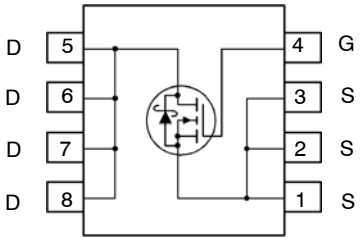
MARKING DIAGRAM



&Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&2	= Numeric Date Code
&K	= Lot Code
FDS8672S	= Specific Device Code

PIN CONFIGURATION



ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

MOSFET MAXIMUM RATINGS (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current –Continuous	18	A
	Drain Current –Pulsed (Note 4)	80	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	216	mJ
P_D	Power Dissipation T_A = 25°C (Note 1a)	2.5	W
	Power Dissipation T_A = 25°C (Note 1b)	1.0	
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	

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 = 1 mA, V_{GS} = 0 V	30			V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25°C		33		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			500	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 = 1 mA	1.0	2.1	3.0	V
$\Delta V_{GS(th)}$ / ΔT_J	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 10 mA, referenced to 25°C		–5		mV/°C
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 18 A		3.8	4.8	mΩ
		V_{GS} = 4.5 V, I_D = 15 A		5.3	7.0	
		V_{GS} = 10 V, I_D = 18 A, T_J = 125°C		5.3	7.8	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 18 A		78		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		2005	2670	pF
C_{oss}	Output Capacitance			985	1310	pF
C_{rss}	Reverse Transfer Capacitance			135	205	pF
R_g	Gate Resistance	f = 1 MHz		0.6	2.0	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 15 V, I_D = 18 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		12	22	ns
t_r	Rise Time			4	10	ns
$t_{d(off)}$	Turn–Off Delay Time			26	42	ns
t_f	Fall Time			3	10	ns

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless Otherwise Noted) (continued)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS							
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V	V_{DD} = 15 V, I_D = 18 A		29	41	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V			15	21	nC
Q_{gs}	Gate to Source Charge				5.5		nC
Q_{gd}	Gate to Drain “Miller” Charge				3.7		nC
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 18 A V_{GS} = 0 V, I_S = 1.8 A			0.8 0.4	1.2 0.7	V
t_{rr}	Reverse Recovery Time	I_F = 18 A, di/dt = 300 A/μs			27	43	ns
Q_{rr}	Reverse Recovery Charge				31	50	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 × 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 1in^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 = 3 mH, I_{AS} = 12 A, V_{DD} = 30 V, V_{GS} = 10 V.
4. Pulse current was measured at 250 μs pulse, refer to Figure x11 Forward Safe Operation Area for detail.

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Shipping†
FDS8672S	FDS8672S	SOIC8	13″	12 mm	2,500 / Tape & Reel

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

TYPICAL CHARACTERISTICS

(T_J = 25°C Unless Otherwise Noted)

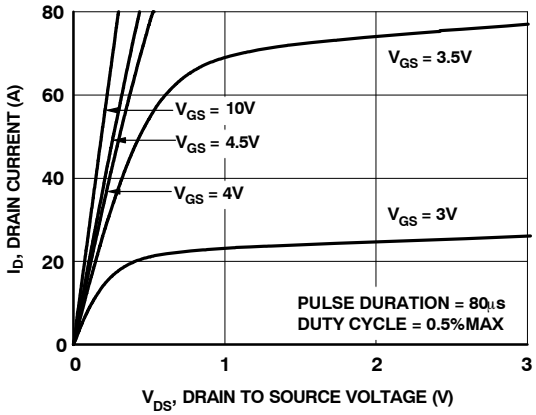


Figure 1. On−Region Characteristics

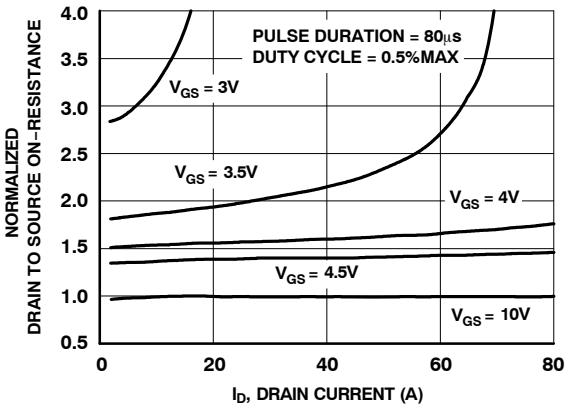


Figure 2. Normalized On−Resistance vs Drain Current and Gate Voltage

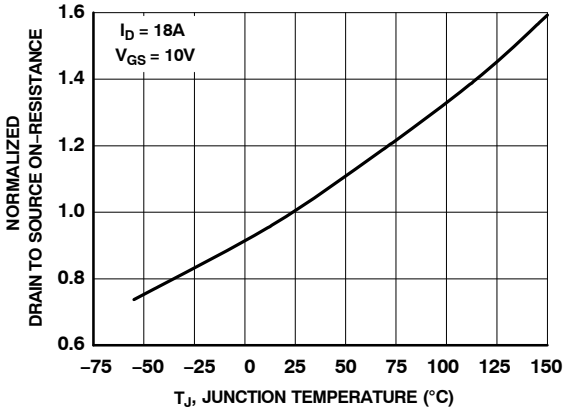


Figure 3. Normalized On Resistance vs Junction Temperature

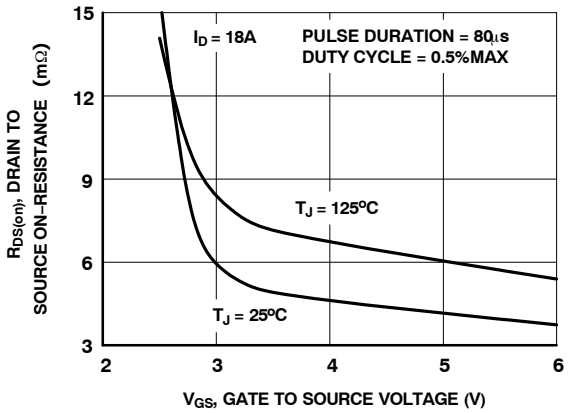


Figure 4. On−Resistance vs Gate to Source Voltage

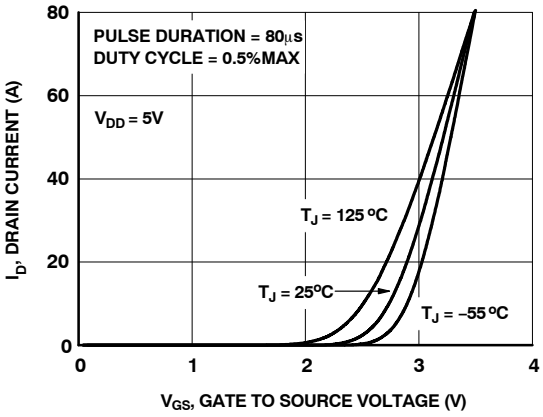


Figure 5. Transfer Characteristics

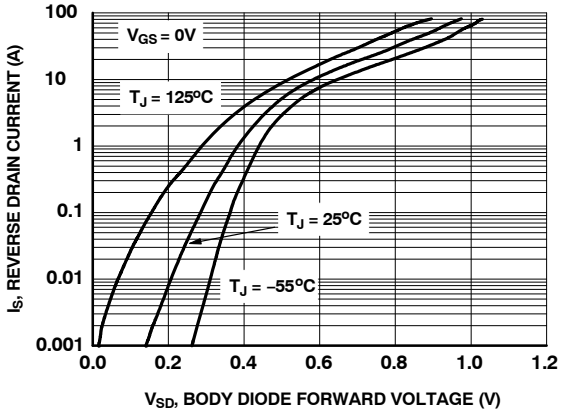


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

TYPICAL CHARACTERISTICS (Continued)

(T_J = 25°C Unless Otherwise Noted)

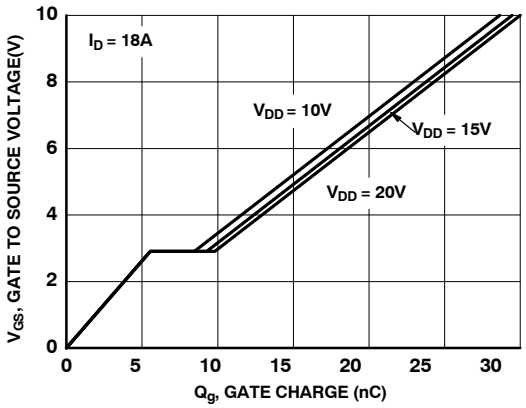


Figure 7. Gate Charge Characteristics

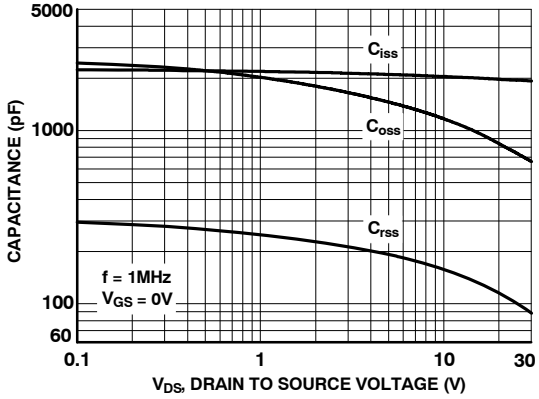


Figure 8. Capacitance vs. Drain to Source Voltage

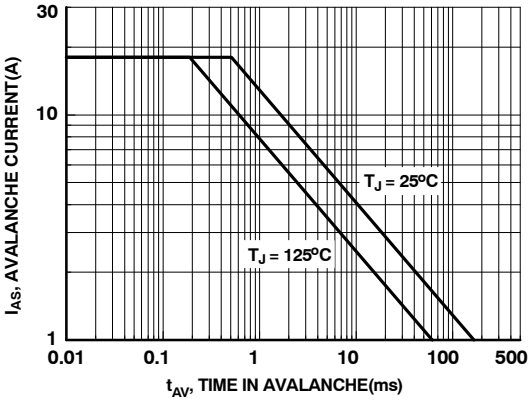


Figure 9. Unclamped Inductive Switching Capability

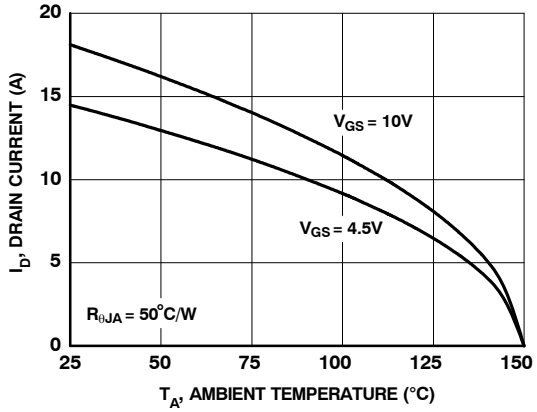


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

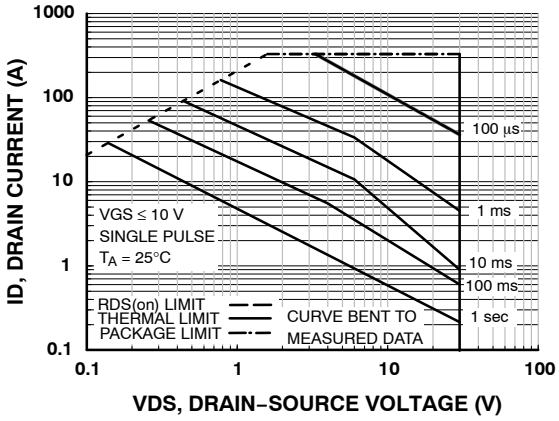


Figure 11. Forward Bias Safe Operating Area

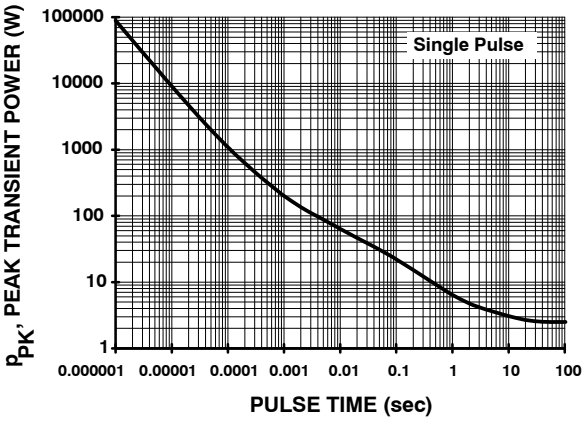


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (Continued)

(T_J = 25°C Unless Otherwise Noted)

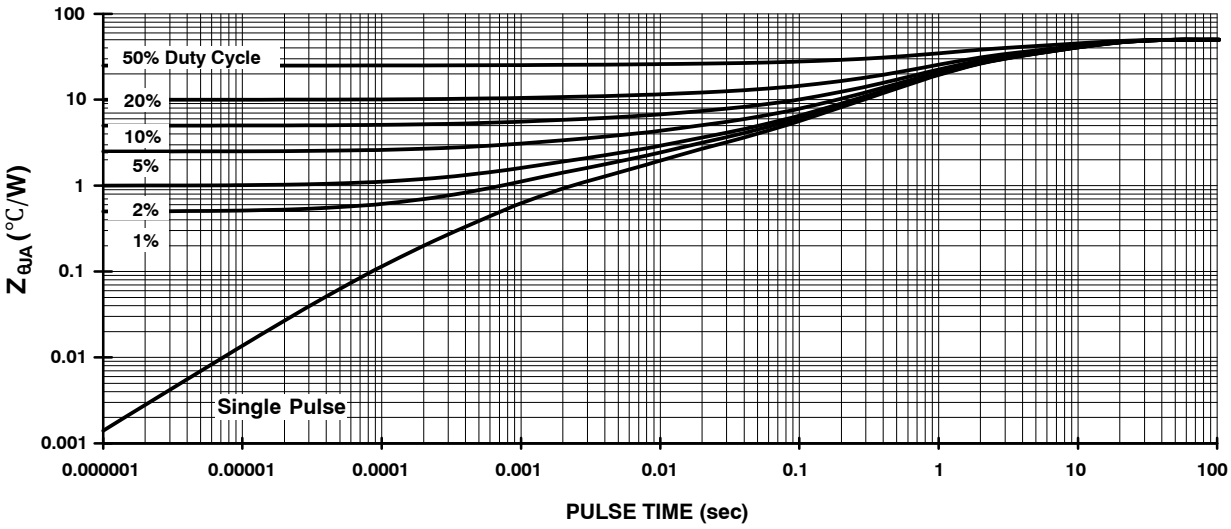


Figure 13. Junction−to−Ambient Transient Thermal Response Curve

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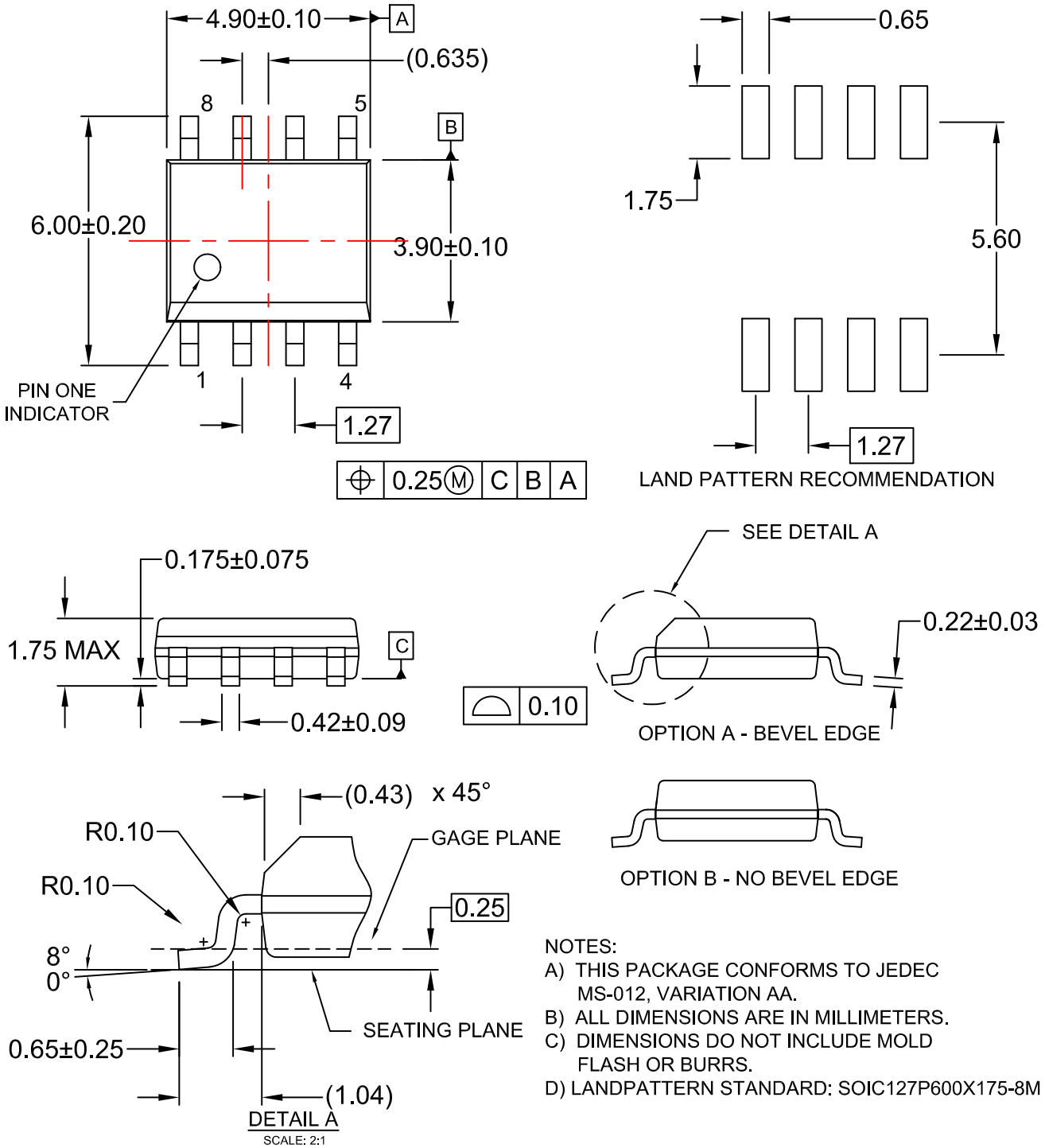

NOTES:
A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M

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