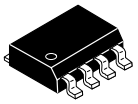
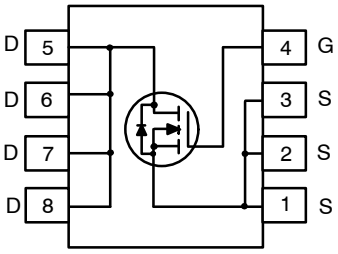
MOSFET – N-Channel, POWERTRENCH®

150 V, 4.5 A, 55 mΩ

FDS86252



SOIC8
CASE 751EB



General Description

This N−Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that has been especially tailored to minimize the on−state resistance and yet maintain superior switching performance.

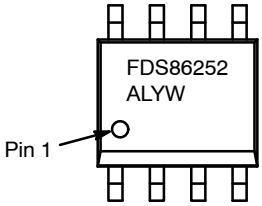
Features

- Max $R_{DS(ON)}$ = 55 mΩ at V_{GS} = 10 V, I_D = 4.5 A
- Max $R_{DS(ON)}$ = 80 mΩ at V_{GS} = 6 V, I_D = 3.7 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
- Pb−Free, Halide Free, and RoHS Compliant

Applications

- DC−DC Conversion

MARKING DIAGRAM



FDS86252 = 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−Source Voltage		150	V
V_{GS}	Gate−Source Voltage		±20	V
I_D	Drain Current	Continuous	4.5	A
		Pulsed	20	
E_{AS}	Single Pulse Avalanche Energy (Note 3)		60	mJ
P_D	Power Dissipation	T_A = 25°C (Note 1)	5.0	W
		T_A = 25°C (Note 1a)	2.5	
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	Value	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	

ORDERING INFORMATION

Device	Package	Shipping
FDS86252	SOIC8 (Pb−Free)	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 Specification Brochure, BRD8011/D.

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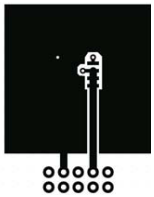
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted.)

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	–	103	–	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	3.4	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 = 4.5 A	–	45	55	mΩ
		V_{GS} = 6 V, I_D = 3.7 A	–	57	80	
		V_{GS} = 10 V, I_D = 4.5 A, T_J = 125°C	–	86	105	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 4.5 A	–	13	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 75 V, V_{GS} = 0 V, f = 1 MHz	–	718	955	pF
C_{oss}	Output Capacitance		–	77	105	pF
C_{rss}	Reverse Transfer Capacitance		–	3.3	5	pF
R_g	Gate Resistance		–	0.6	–	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 75 V, I_D = 4.5 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	9.2	19	ns
t_r	Rise Time		–	1.6	10	ns
$t_{d(off)}$	Turn–Off Delay Time		–	14	24	ns
t_f	Fall Time		–	2.9	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 75 V, I_D = 4.5 A,	–	10.6	15	nC
		V_{GS} = 0 V to 5 V, V_{DD} = 75 V, I_D = 4.5 A,	–	5.2	9	nC
Q_{gs}	Total Gate Charge	V_{DD} = 75 V, I_D = 4.5 A	–	3.5	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	2.3	–	nC
DRAIN–SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 4.5 A (Note 2)	–	0.80	1.3	V
		V_{GS} = 0 V, I_S = 2 A (Note 2)	–	0.76	1.2	
t_{rr}	Reverse Recovery Time	IF = 4.5 A, di/dt = 100 A/μs	–	60	95	ns
Q_{rr}	Reverse Recovery Charge		–	74	118	nC

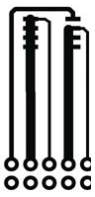
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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; N–ch: L = 1 mH, I_{AS} = 11 A, V_{DD} = 135 V, V_{GS} = 10 V.

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

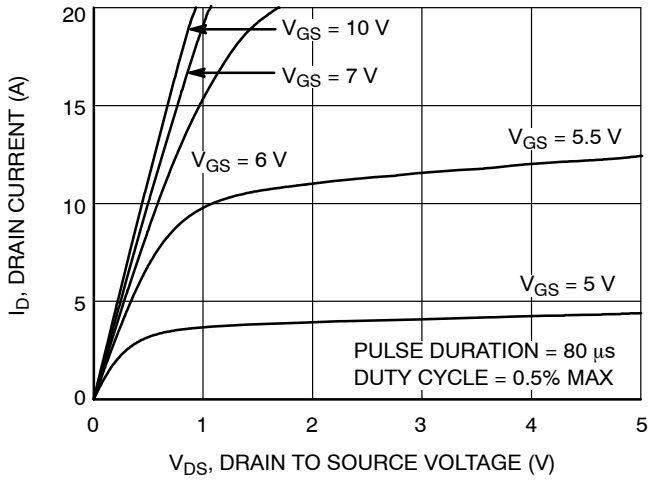


Figure 1. On−Region Characteristic

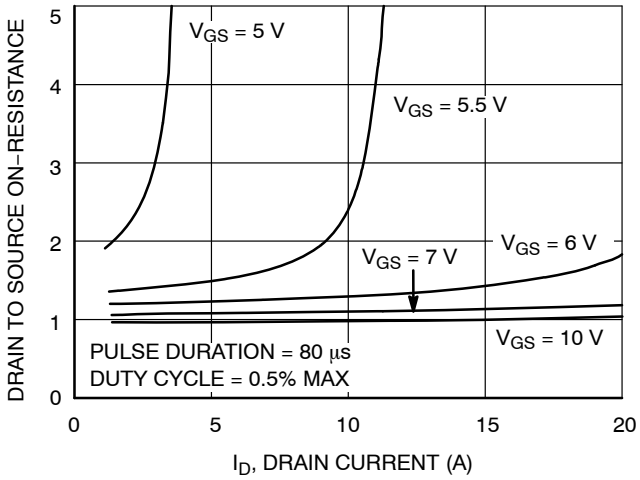


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

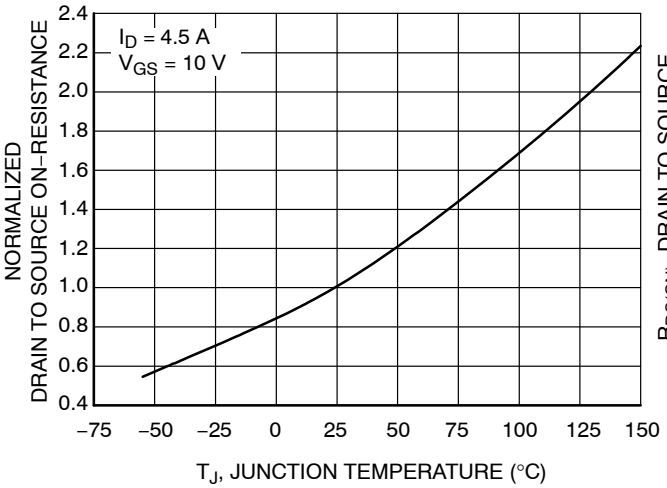


Figure 3. Normalized On−Resistance vs. Junction Temperature

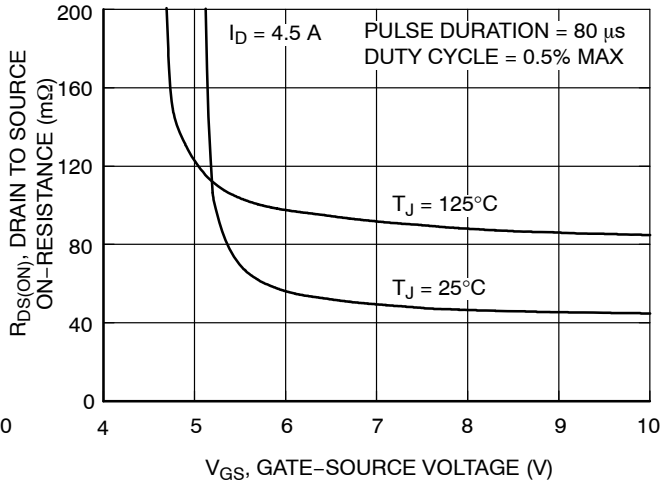


Figure 4. On−Resistance vs. Gate to Source Voltage

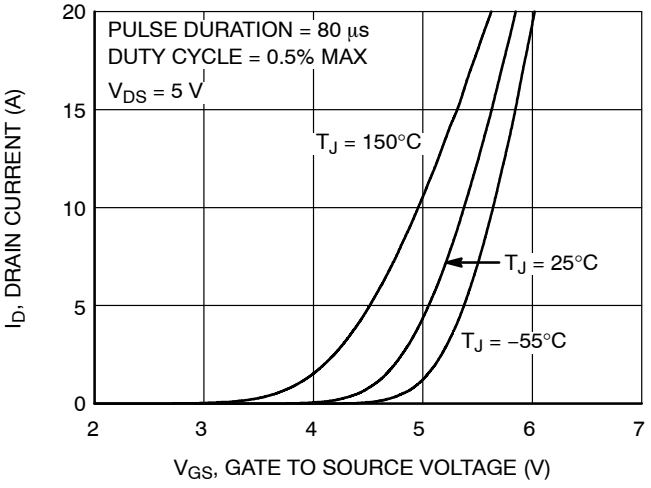


Figure 5. Transfer Characteristics

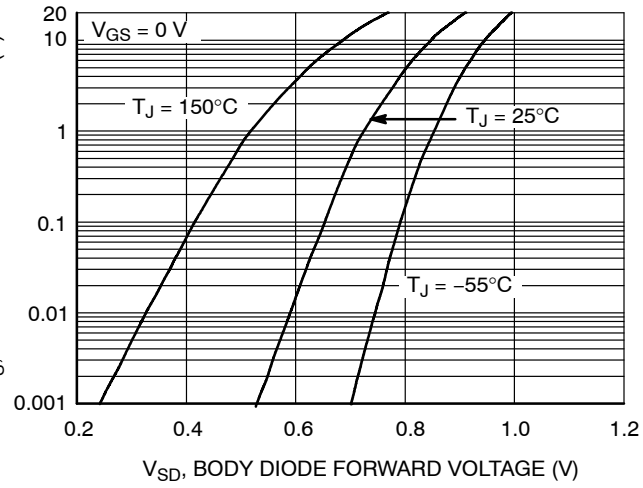


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

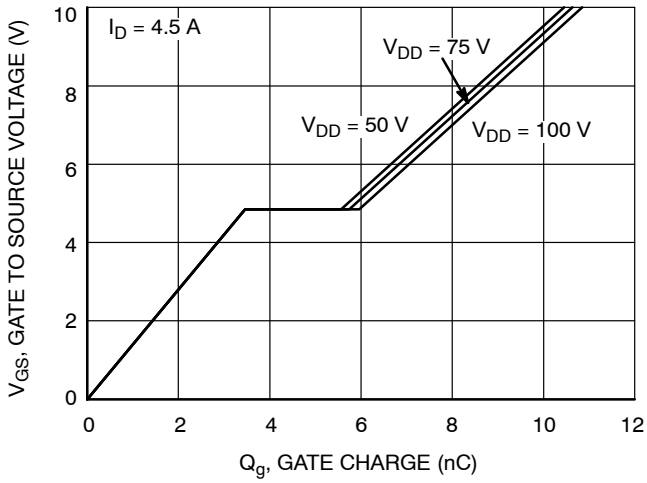


Figure 7. Gate Charge Characteristics

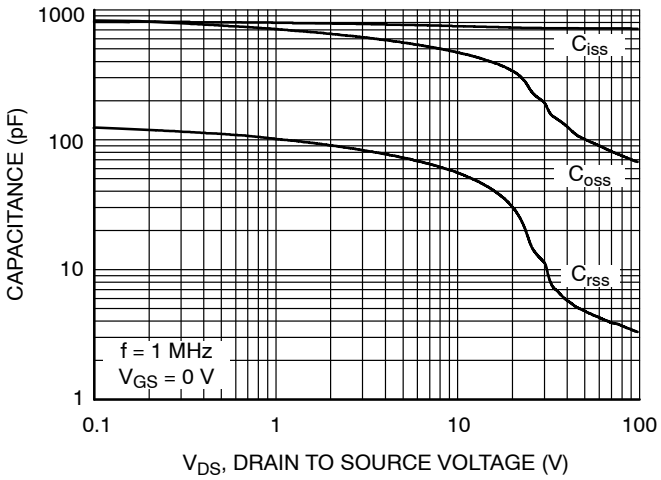


Figure 8. Capacitance vs. Drain to Source Voltage

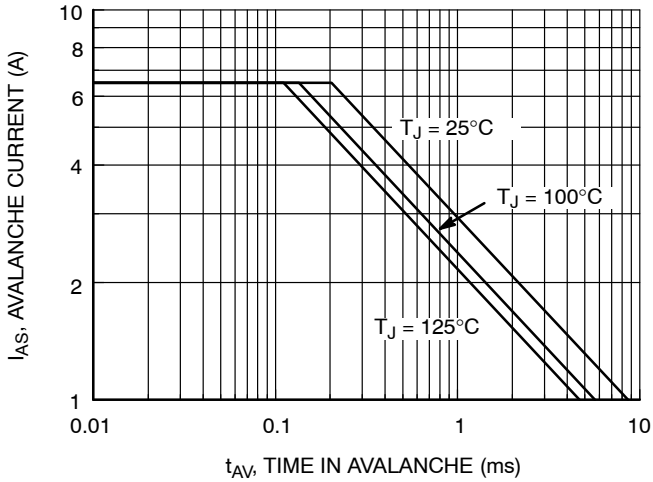


Figure 9. Unclamped Inductive Switching Capability

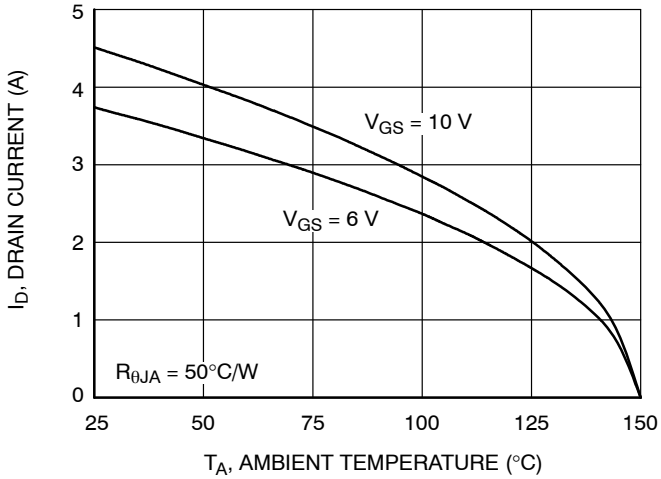


Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature

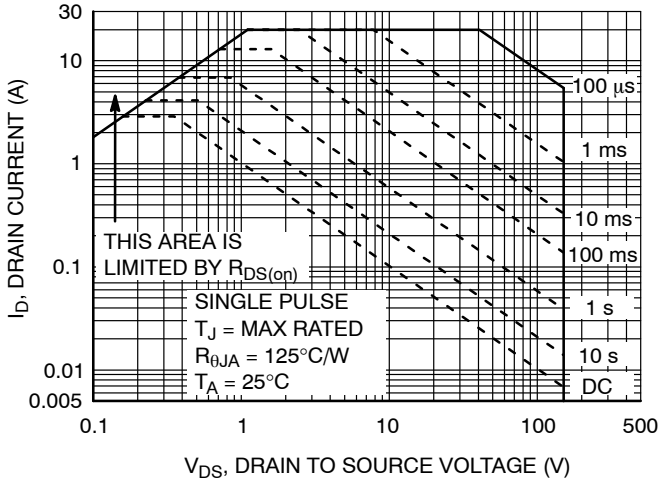


Figure 11. Forward Bias Safe Operating Area

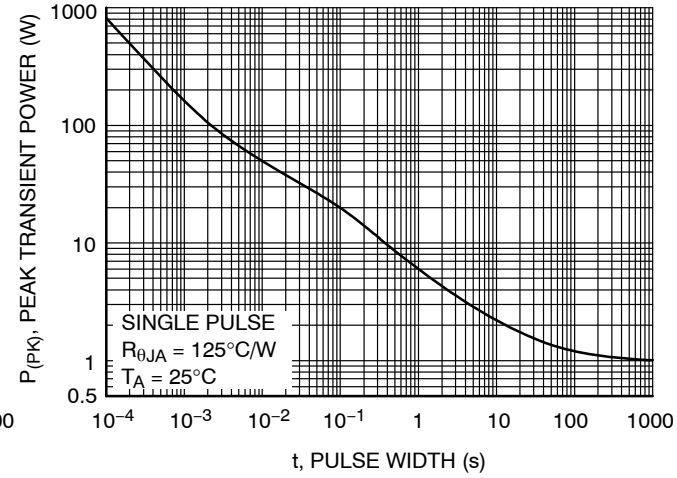


Figure 12. Single Pulse Maximum Power Dissipation

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

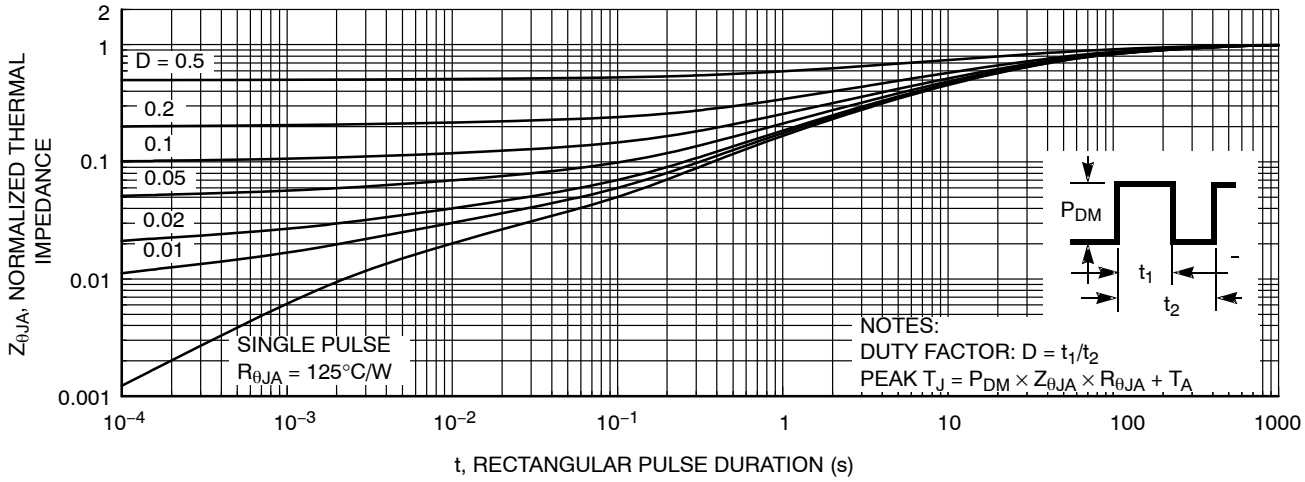


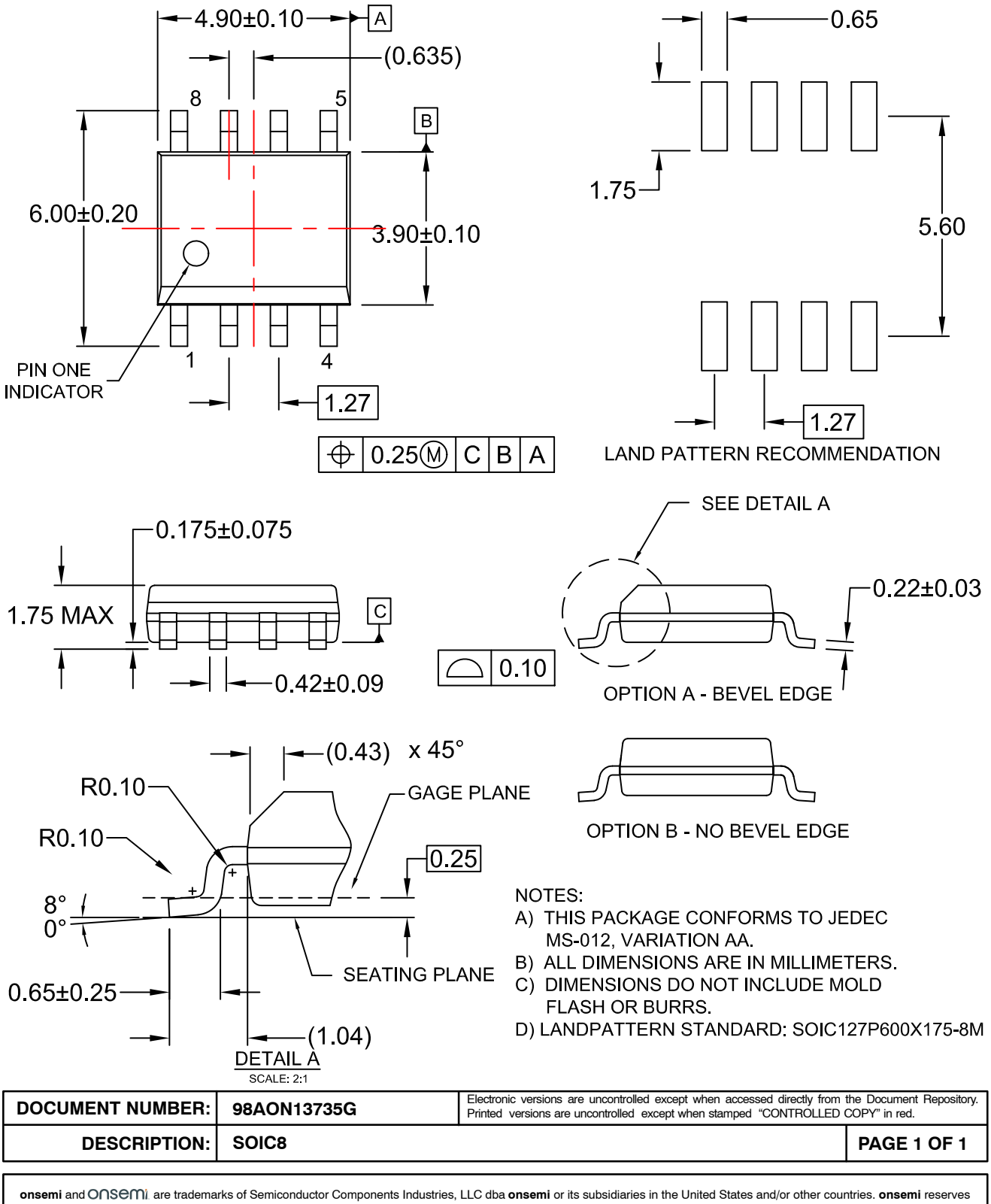
Figure 13. Junction−to−Ambient Transient Thermal Response Curve

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SOIC8
CASE 751EB
ISSUE A

DATE 24 AUG 2017



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C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M

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