



March 2015

# FDS8672S

## N-Channel PowerTrench<sup>®</sup> SyncFET<sup>™</sup> 30V, 18A, 4.8mΩ

### Features

- Max  $r_{DS(on)}$  = 4.8mΩ at  $V_{GS} = 10V$ ,  $I_D = 18A$
- Max  $r_{DS(on)}$  = 7.0mΩ at  $V_{GS} = 4.5V$ ,  $I_D = 15A$
- 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
- Termination is Lead-free and RoHS Compliant

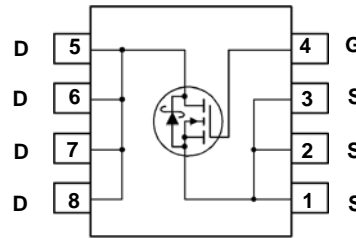
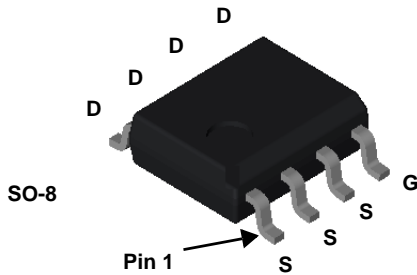


### General Description

The FDS8672S is designed to replace a single MOSFET and Schottky diode in synchronous DC/DC power supplies. This 30V 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 Fairchild's monolithic SyncFET technology.

### Applications

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



### MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	30	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	18	A
	-Pulsed (Note 4)	80	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	216	mJ
$P_D$	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.5	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1b)	1.0	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	25	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS8672S	FDS8672S	SO8	13"	12mm	2500 units

## Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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### Off Characteristics

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 1\text{mA}, V_{GS} = 0\text{V}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 10\text{mA}$ , referenced to $25^\circ\text{C}$		33		mV/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$			500	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 1\text{mA}$	1.0	2.1	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 10\text{mA}$ , referenced to $25^\circ\text{C}$		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 18\text{A}$		3.8	4.8	m $\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 15\text{A}$		5.3	7.0	
		$V_{GS} = 10\text{V}, I_D = 18\text{A}, T_J = 125^\circ\text{C}$		5.3	7.8	
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 18\text{A}$		78		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$		2005	2670	pF
$C_{oss}$	Output Capacitance			985	1310	pF
$C_{riss}$	Reverse Transfer Capacitance			135	205	pF
$R_g$	Gate Resistance	$f = 1\text{MHz}$		0.6	2.0	$\Omega$

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{V}, I_D = 18\text{A},$ $V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$		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
$Q_g$	Total Gate Charge		$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 15\text{V},$ $I_D = 18\text{A}$	29	41
$Q_g$	Total Gate Charge	$V_{GS} = 0\text{V to } 5\text{V}$	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	$V_{GS} = 0\text{V}, I_S = 18\text{A}$		0.8	1.2	V
		$V_{GS} = 0\text{V}, I_S = 1.8\text{A}$		0.4	0.7	
$t_{rr}$	Reverse Recovery Time	$I_F = 18\text{A}, di/dt = 300\text{A}/\mu\text{s}$		27	43	ns
$Q_{rr}$	Reverse Recovery Charge			31	50	nC

#### NOTES:

- $R_{\theta JA}$  is determined with the device mounted on a  $1\text{in}^2$  pad 2 oz copper pad on a  $1.5 \times 1.5\text{in.}$  board of FR-4 material.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



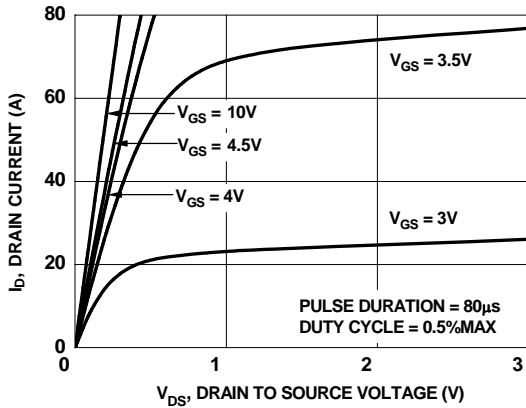
a)  $50^\circ\text{C/W}$  when mounted on a  $1\text{in}^2$  pad of 2 oz copper.



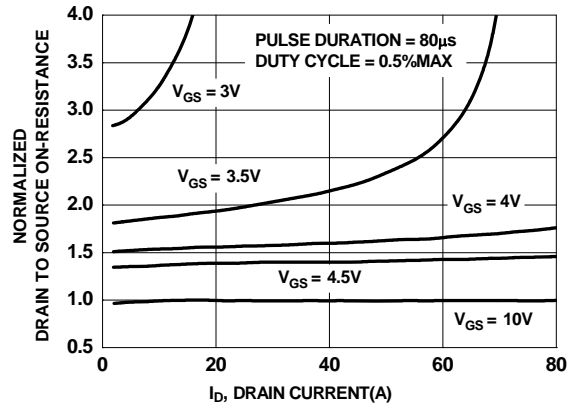
b)  $125^\circ\text{C/W}$  when mounted on a minimum pad.

- Pulse Test: Pulse Width  $< 300\mu\text{s}$ , Duty cycle  $< 2.0\%$ .
- Starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 12\text{A}$ ,  $V_{DD} = 30\text{V}$ ,  $V_{GS} = 10\text{V}$ .
- Pulse current was measured at  $250\mu\text{s}$  pulse, refer to Fig 11 Forward Safe Operation Area for detail.

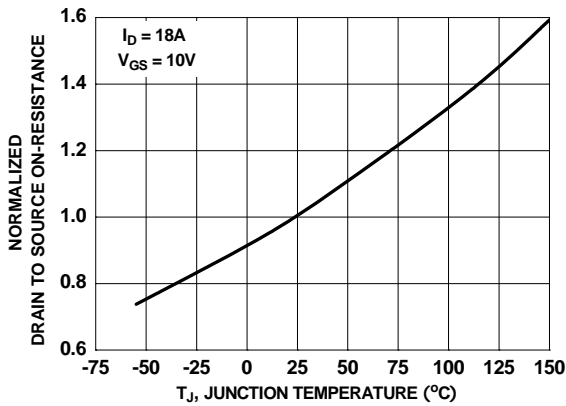
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.



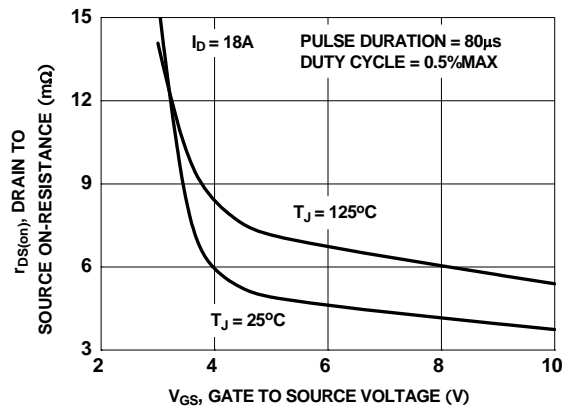
**Figure 1. On-Region Characteristics**



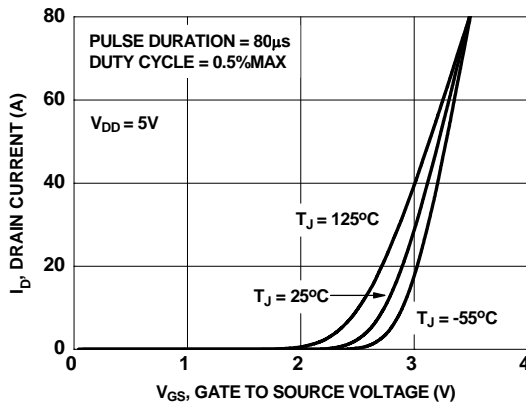
**Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage**



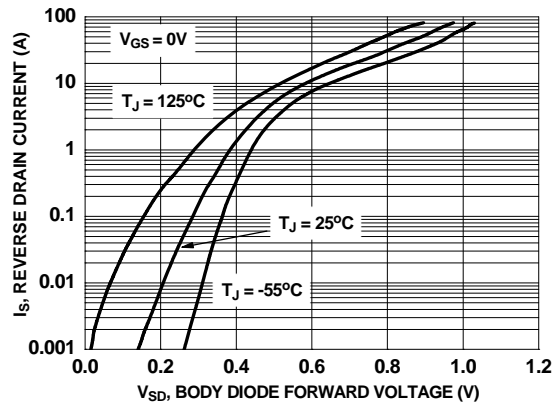
**Figure 3. Normalized On-Resistance vs. Junction Temperature**



**Figure 4. On-Resistance vs. Gate to Source Voltage**

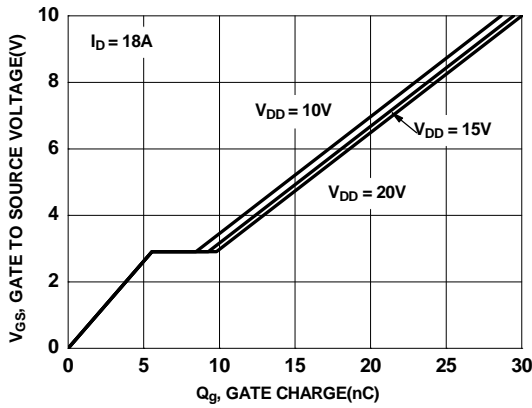


**Figure 5. Transfer Characteristics**

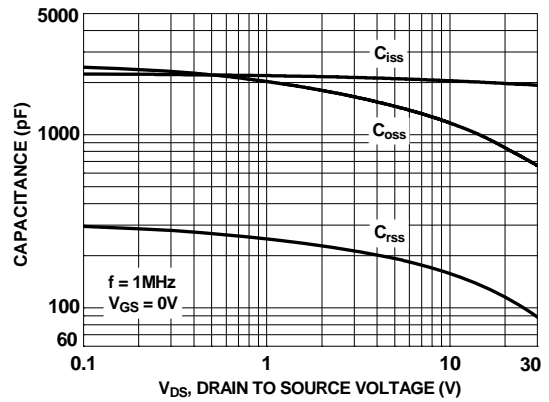


**Figure 6. Source to Drain Diode Forward Voltage vs. Source Current**

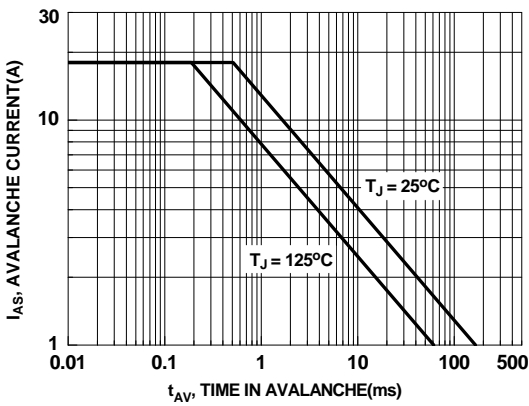
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.



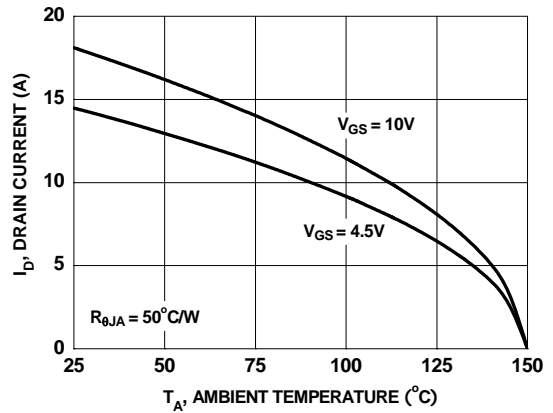
**Figure 7. Gate Charge Characteristics**



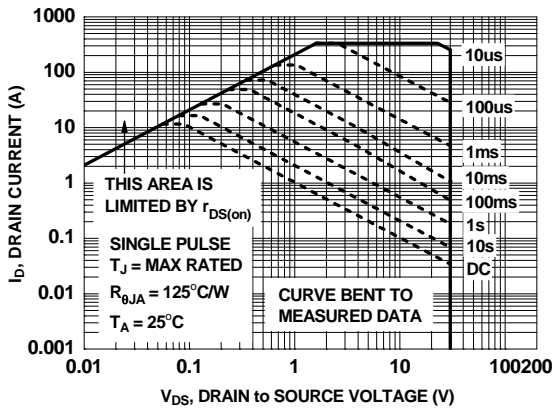
**Figure 8. Capacitance vs. Drain to Source Voltage**



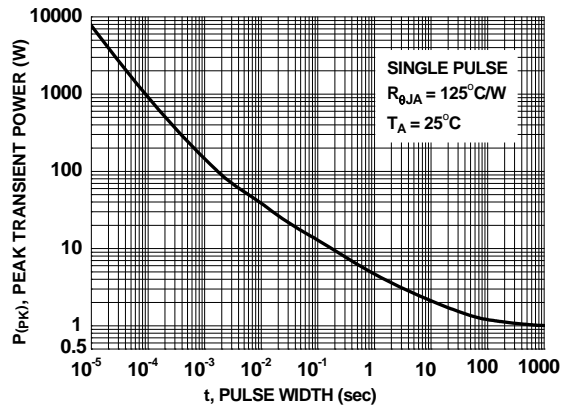
**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Maximum Continuous Drain Current vs. Ambient Temperature**

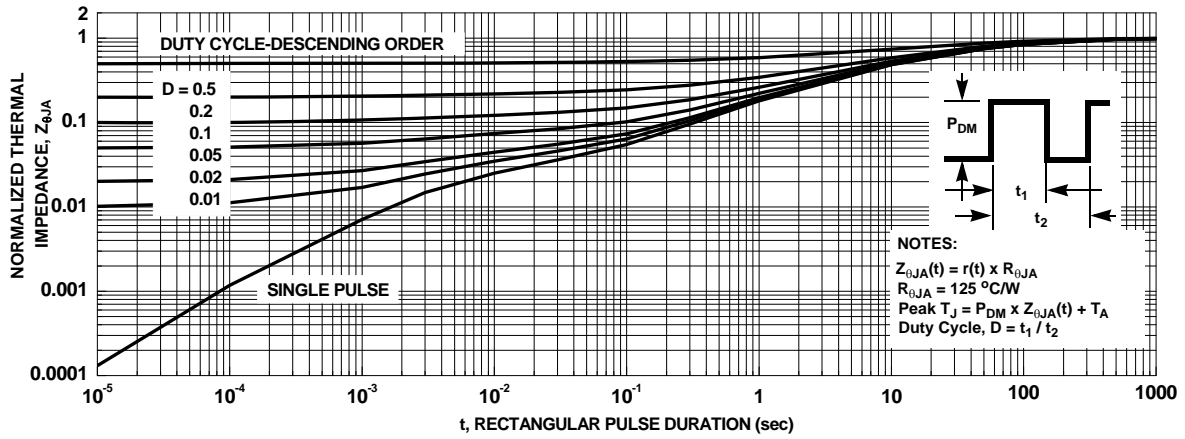


**Figure 11. Forward Bias Safe Operating Area**

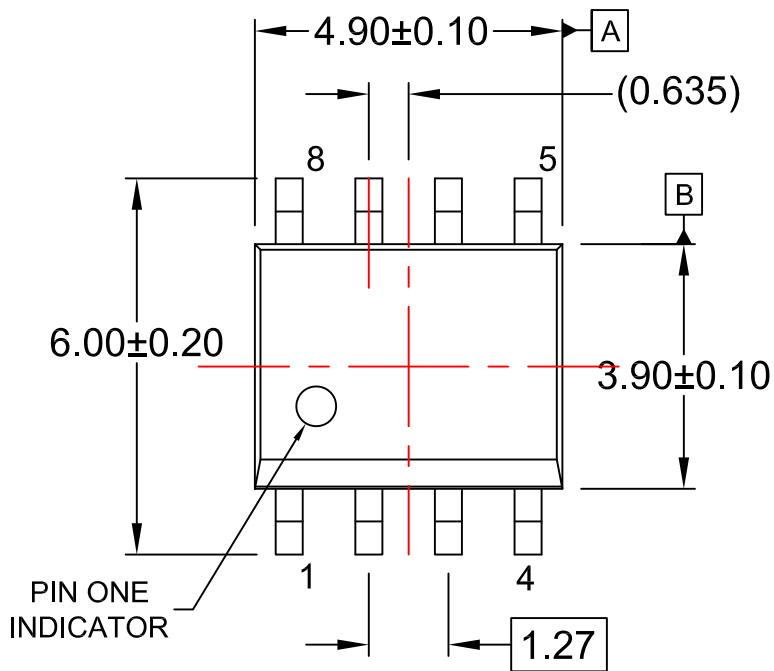


**Figure 12. Single Pulse Maximum Power Dissipation**

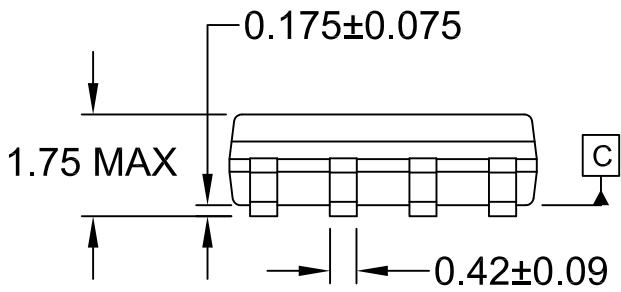
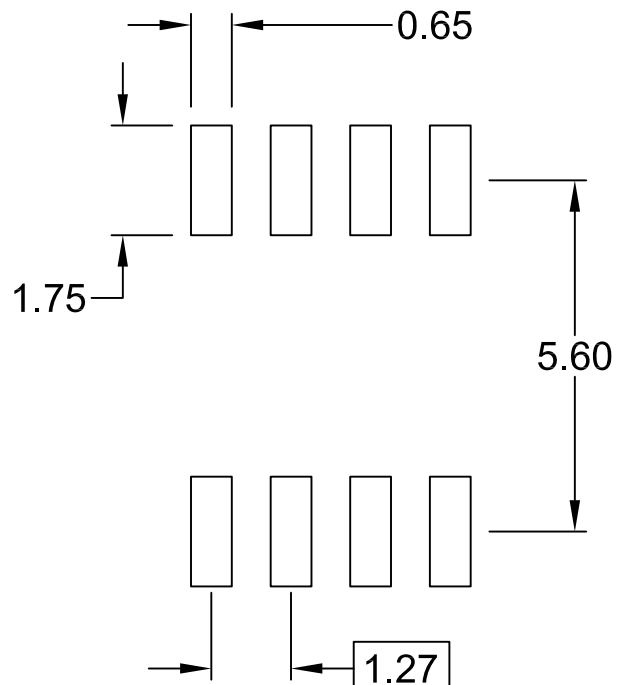
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.



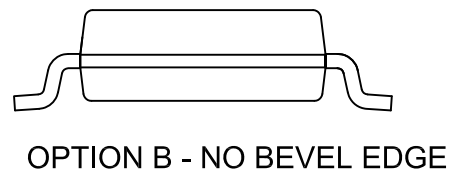
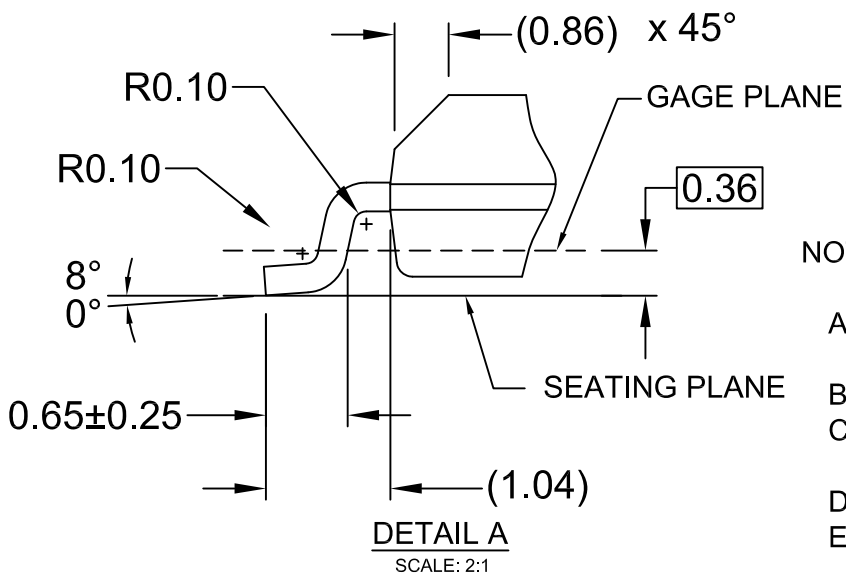
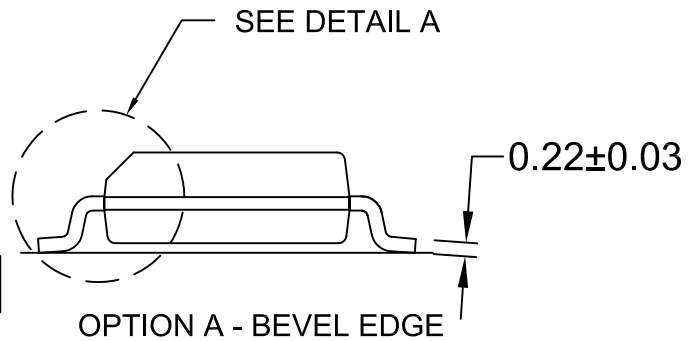
**Figure 13. Junction-to-Ambient Transient Thermal Response Curve**



$\varnothing$	0.25 (M)	C	B	A
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$\frac{1}{2}$	0.10
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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
- E) DRAWING FILENAME: M08Arev16





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