

# MOSFET – N-Channel, POWERTRENCH®

20 V

## FDS6574A

### General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

### Features

- 16 A, 20 V
  - ♦  $R_{DS(ON)} = 6\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$
  - ♦  $R_{DS(ON)} = 7\text{ m}\Omega @ V_{GS} = 2.5\text{ V}$
  - ♦  $R_{DS(ON)} = 9\text{ m}\Omega @ V_{GS} = 1.8\text{ V}$
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(ON)}$
- High Power and Current Handling Capability
- This Device is Pb-Free and are RoHS Compliant

### Applications

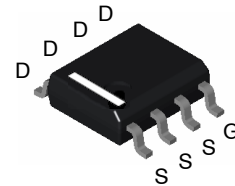
- DC/DC Converter



ON Semiconductor®

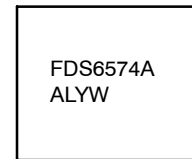
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$V_{DSS}$	$R_{DS(on)}\text{ MAX}$	$I_D\text{ MAX}$
20 V	6 m $\Omega$ @ 4.5 V	16 A
	7 m $\Omega$ @ 2.5 V	
	9 m $\Omega$ @ 1.8 V	



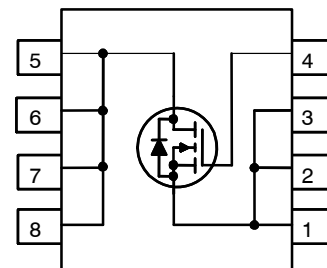
SOIC8  
CASE 751EB

### MARKING DIAGRAM



FDS6574A = Specific Device Code  
A = Assembly Site  
L = Wafer Lot Number  
YW = Assembly Start Week

### PIN CONNECTIONS



### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

# FDS6574A

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted)

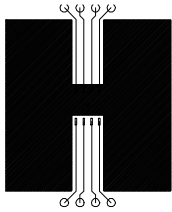
Symbol	Parameter	Ratings	Unit
V <sub>DSS</sub>	Drain-Source Voltage	20	V
V <sub>GSS</sub>	Gate-Source Voltage	±8	V
I <sub>D</sub>	Drain Current	Continuous (Note 1a)	16
		Pulsed	80
P <sub>D</sub>	Power Dissipation for Single Operation	(Note 1a)	2.5
		(Note 1b)	1.2
		(Note 1c)	1.0
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	-55 to +175	°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.

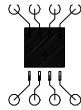
## THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient (Note 1a)	50	°C/W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case (Note 1)	25	°C/W

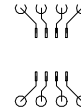
1. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



a. 50°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b. 105°C/W when mounted on a 0.04 in<sup>2</sup> pad of 2 oz copper



c. 125°C/W when mounted on a minimum pad.

Scale 1:1 on letter size paper

# FDS6574A

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

BV <sub>DSS</sub>	Drain–Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	20	–	–	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	–	10	–	mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V	–	–	1	μA
I <sub>GSSF</sub>	Gate–Body Leakage, Forward	V <sub>GS</sub> = 8 V, V <sub>DS</sub> = 0 V	–	–	100	nA
I <sub>GSSR</sub>	Gate–Body Leakage, Reverse	V <sub>GS</sub> = –8 V, V <sub>DS</sub> = 0 V	–	–	–100	nA

### ON CHARACTERISTICS (Note 2)

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.4	0.6	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C	–	–2.7	–	mV/°C
R <sub>DS(on)</sub>	Static Drain–Source On–Resistance	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 16 A	–	4	6	mΩ
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 15 A	–	4.4	7	
		V <sub>GS</sub> = 1.8 V, I <sub>D</sub> = 13 A	–	5	9	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 16 A, T <sub>J</sub> = 125°C	–	5.3	9	
I <sub>D(on)</sub>	On–State Drain Current	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 5 V	40	–	–	A
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 16 A	–	115	–	S

### DYNAMIC CHARACTERISTICS

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0 V, f = 1.0 MHz	–	7657	–	pF
C <sub>oss</sub>	Output Capacitance		–	1432	–	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		–	775	–	pF

### SWITCHING CHARACTERISTICS (Note 2)

t <sub>d(on)</sub>	Turn–On Delay Time	V <sub>DD</sub> = 10 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 4.5 V, R <sub>GEN</sub> = 6 Ω	–	19.5	35	ns
t <sub>r</sub>	Turn–On Rise Time		–	22	36	ns
t <sub>d(off)</sub>	Turn–Off Delay Time		–	173	277	ns
t <sub>f</sub>	Turn–Off Fall Time		–	82	131	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 16 A, V <sub>GS</sub> = 4.5 V	–	75	105	nC
Q <sub>gs</sub>	Gate–Source Charge		–	9	–	nC
Q <sub>gd</sub>	Gate–Drain Charge		–	17	–	nC

### DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I <sub>S</sub>	Maximum Continuous Drain–Source Diode Forward Current	–	–	2.1	A	
V <sub>SD</sub>	Drain–Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 2.1 A (Note 2)	–	0.56	1.2	V

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.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.

TYPICAL CHARACTERISTICS

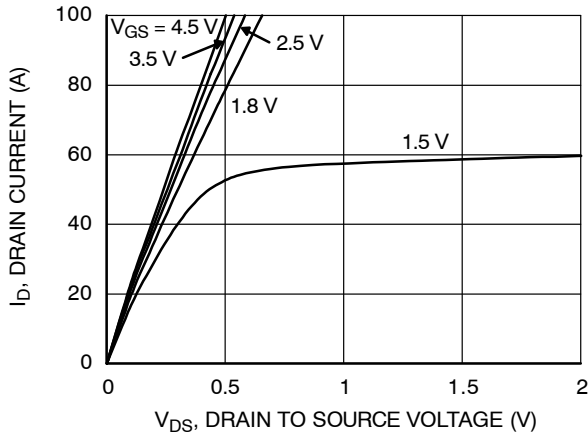


Figure 1. On-Region Characteristics

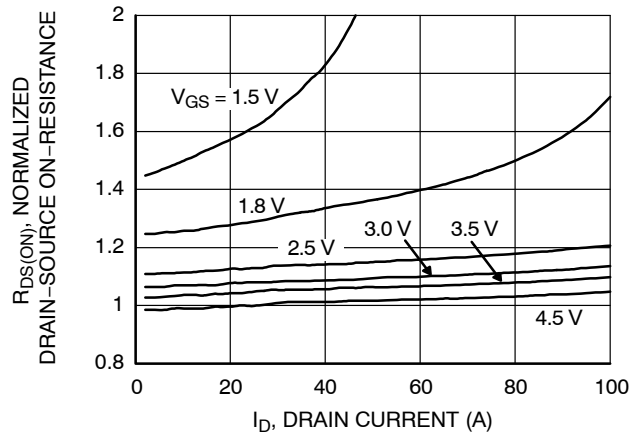


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

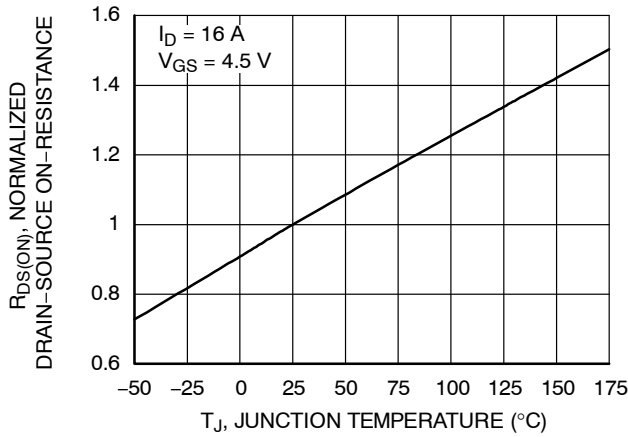


Figure 3. On-Resistance Variation with Temperature

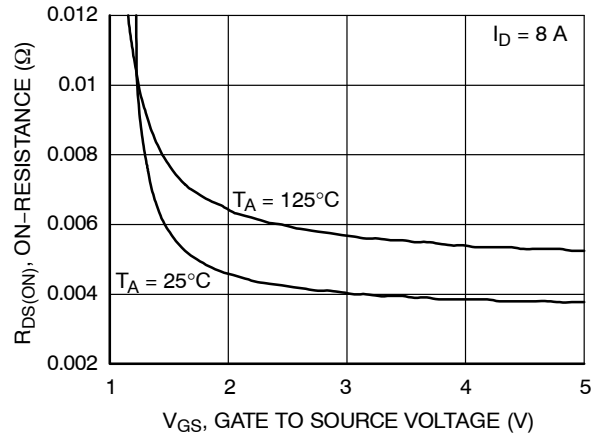


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

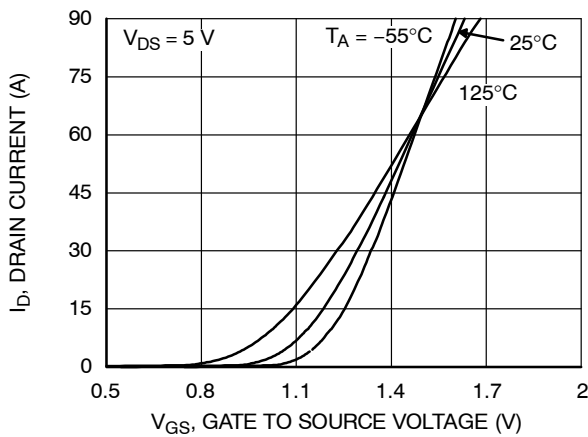


Figure 5. Transfer Characteristics

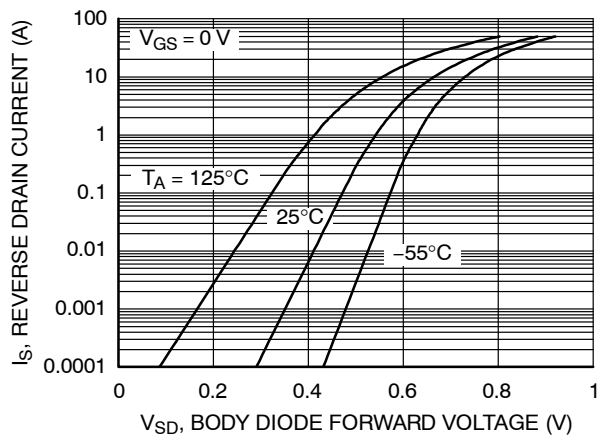


Figure 6. Source to Drain Body Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

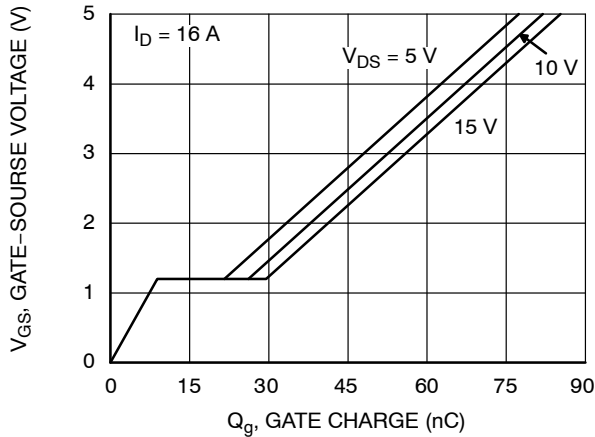


Figure 7. Gate Charge Characteristics

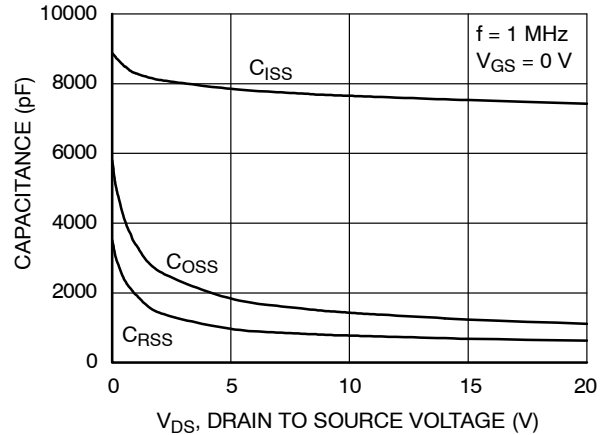


Figure 8. Capacitance Characteristics

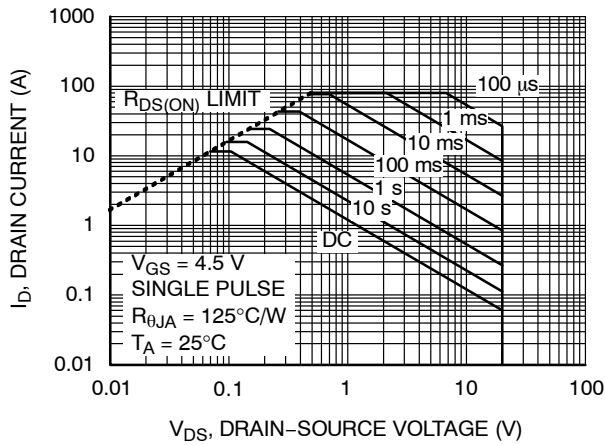


Figure 9. Maximum Safe Operating Area

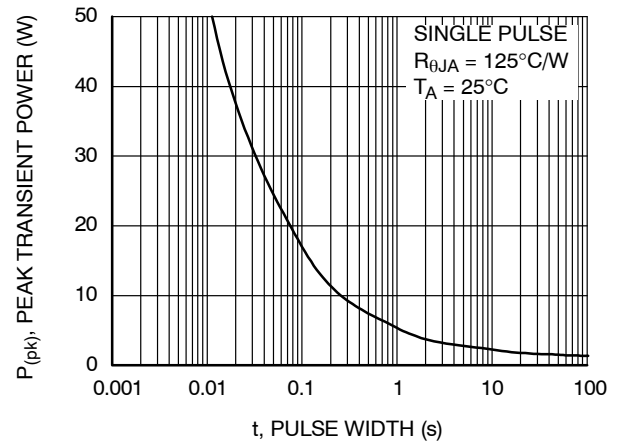


Figure 10. Single Pulse Maximum Power Dissipation

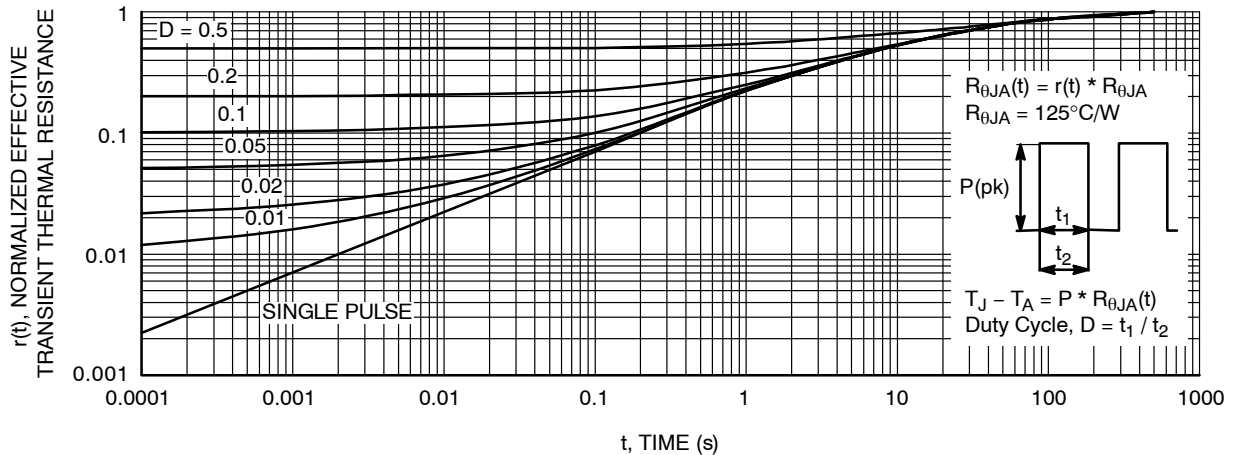


Figure 11. Transient Thermal Response Curve

Thermal characterization performed using the conditions described in Note 1c.  
Transient thermal response will change depending on the circuit board design.

# FDS6574A

## PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package Type	Reel Size	Tape Width	Shipping <sup>†</sup>
FDS6574A	FDS6574A	SOIC8 CASE 751EB (Pb-Free)	13"	12 mm	2500 / Tape & Reel

<sup>†</sup>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.

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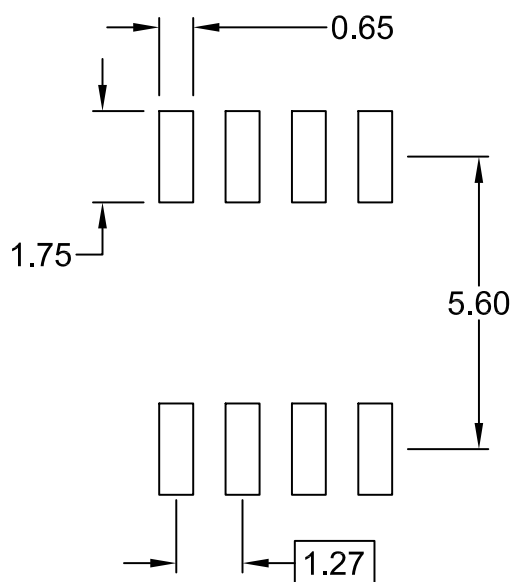
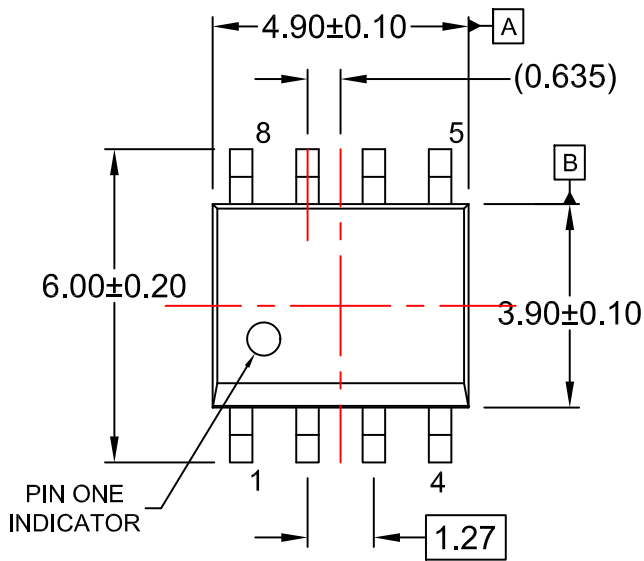
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

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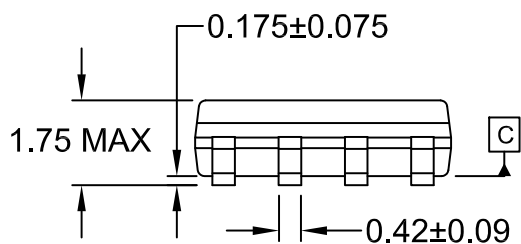


**SOIC8**  
**CASE 751EB**  
**ISSUE A**

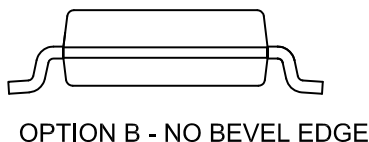
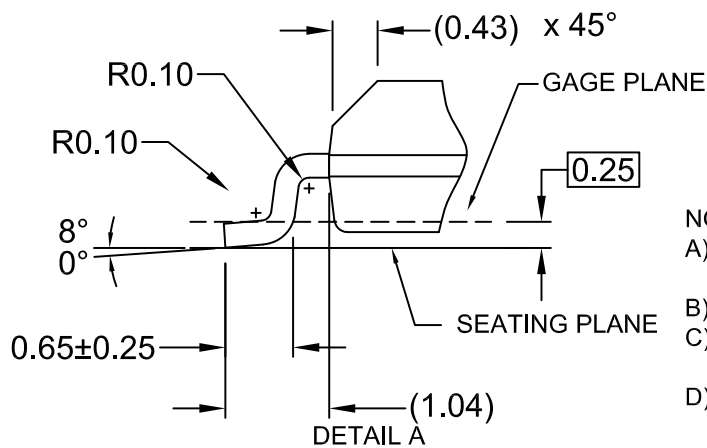
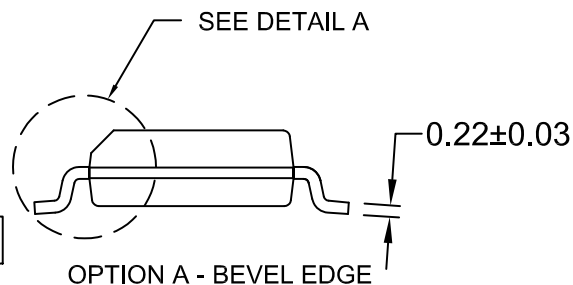
DATE 24 AUG 2017



⊕ 0.25 (M) C B A



⌒ 0.10



- 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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