

MOSFET – P-Channel, POWERTRENCH[®], Specified

2.5 V

FDN342P

General Description

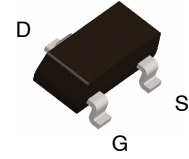
This P-Channel 2.5 V specified MOSFET is produced in a rugged gate version of onsemi's advanced POWERTRENCH process. It has been optimized for power management applications for a wide range of gate drive voltages (2.5 V – 12 V).

Applications

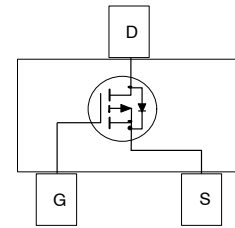
- Load Switch
- Battery Protection
- Power Management

Features

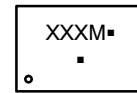
- -2 A, -20 V
 - ♦ $R_{DS(ON)} = 0.08 \Omega @ V_{GS} = -4.5 \text{ V}$
 - ♦ $R_{DS(ON)} = 0.13 \Omega @ V_{GS} = -2.5 \text{ V}$
- Rugged gate rating ($\pm 12 \text{ V}$).
- High Performance Trench Technology for Extremely Low $R_{DS(ON)}$
- Enhanced power SUPERSOT[™] -3 (SOT-23)



SOT-23/SUPERSOT-3
 CASE 527AG



MARKING DIAGRAM



- XXX = Specific Device Code
- M = Month Code
- = Pb-Free Package

ORDERING INFORMATION

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

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ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain–Source Voltage	-20	V
V_{GSS}	Gate–Source Voltage	± 12	V
I_D	Drain Current Continuous (Note 1a) Pulsed	-2 -10	A
P_D	Power Dissipation for Single Operation (Note 1a) (Note 1b)	0.5 0.46	W
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

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
$R_{\theta JA}$	Thermal Resistance, Junction–to–Ambient (Note 1a)	250	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction–to–Case (Note 1)	75	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-20	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C	-	-16	-	$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	μA
I_{GSSF}	Gate–Body Leakage Current, Forward	$V_{GS} = 12\text{ V}, V_{DS} = 0\text{ V}$	-	-	100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = -12\text{ V}, V_{DS} = 0\text{ V}$	-	-	-100	nA

ON CHARACTERISTICS (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.6	-1.05	-1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C	-	3	-	$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}$	-	0.062	0.08	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}, T_J = 125^\circ\text{C}$	-	0.086	0.14	
		$V_{GS} = -2.5\text{ V}, I_D = -1.5\text{ A}$	-	0.099	0.13	
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -4.5\text{ V}, V_{DS} = -5\text{ V}$	-5	-	-	A
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{ V}, I_D = -5\text{ A}$	-	7	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	-	635	-	pF
C_{oss}	Output Capacitance		-	175	-	pF
C_{rss}	Reverse Transfer Capacitance		-	75	-	pF

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ELECTRICAL CHARACTERISTICS (continued)

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (Note 2)						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -10 V, I _D = -1 A, V _{GS} = -4.5 V, R _{GEN} = 6 Ω	-	20	35	ns
t _r	Turn-On Rise Time		-	8	16	ns
t _{d(off)}	Turn-Off Delay Time		-	9	18	ns
t _f	Turn-Off Fall Time		-	19	32	ns
Q _g	Total Gate Charge	V _{DS} = -10 V, I _D = -2 A, V _{GS} = -4.5 V	-	6.3	9	nC
Q _{gs}	Gate-Source Charge		-	1.5	-	nC
Q _{gd}	Gate-Drain Charge		-	1.7	-	nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I _S	Maximum Continuous Drain-Source Diode Forward Current	-	-	-0.42	A		
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -0.42 A (Note 2)		-	-0.7	-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.

NOTES:

- R_{θJA} 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_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



- a) 250°C/W when mounted on
a 0.02 in² pad of 2 oz Cu.



- b) 270°C/W when mounted on
a minimum pad.

Scale 1:1 on letter size paper

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

TYPICAL CHARACTERISTICS

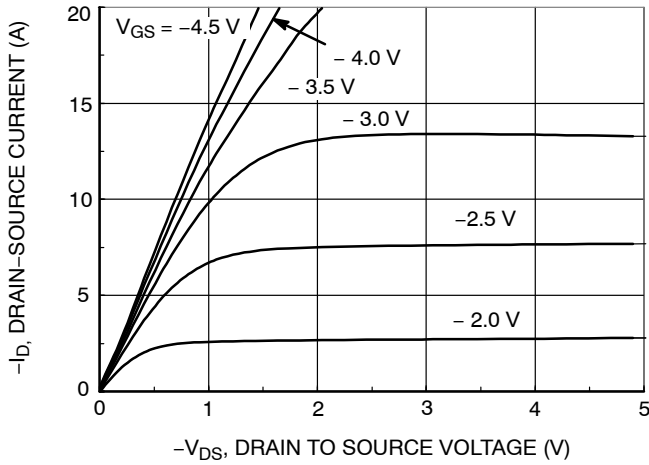


Figure 1. On-Region Characteristics

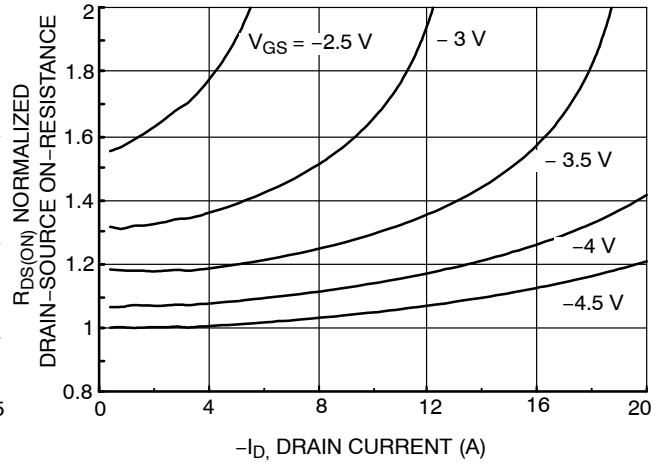


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

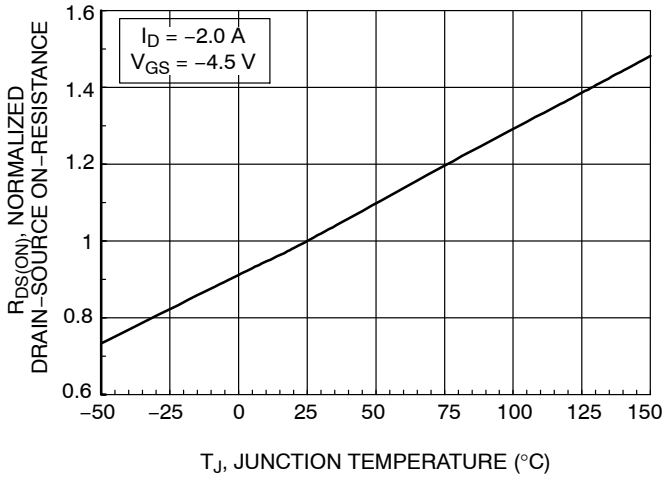


Figure 3. On-Resistance Variation with Temperature

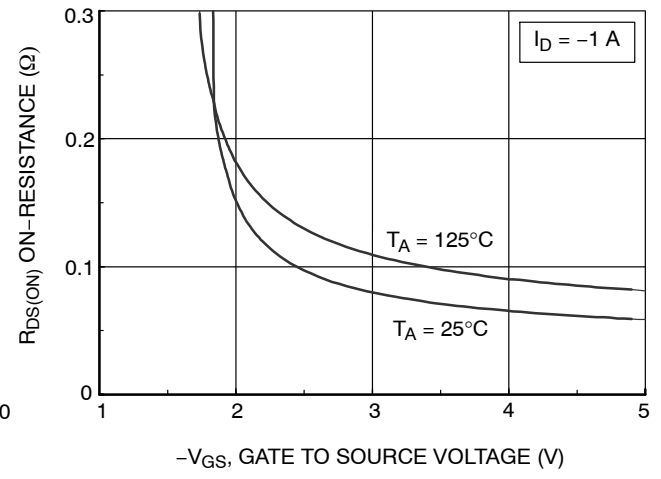


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

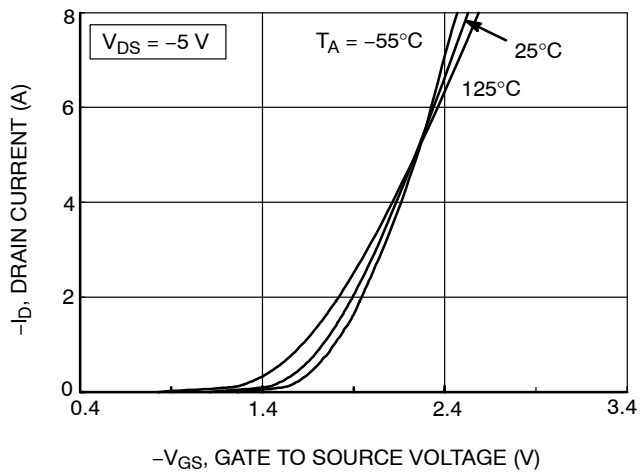


Figure 5. Transfer Characteristics

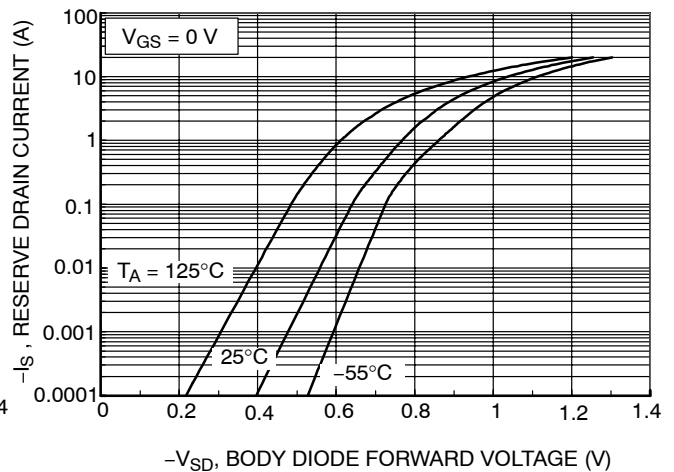


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

TYPICAL CHARACTERISTICS (Continued)

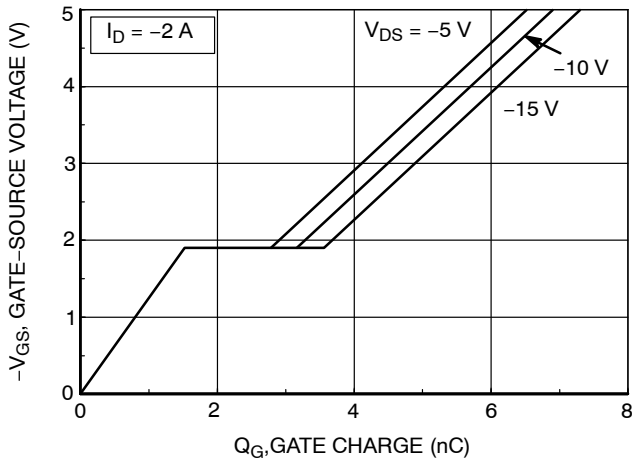


Figure 7. Gate Charge Characteristics

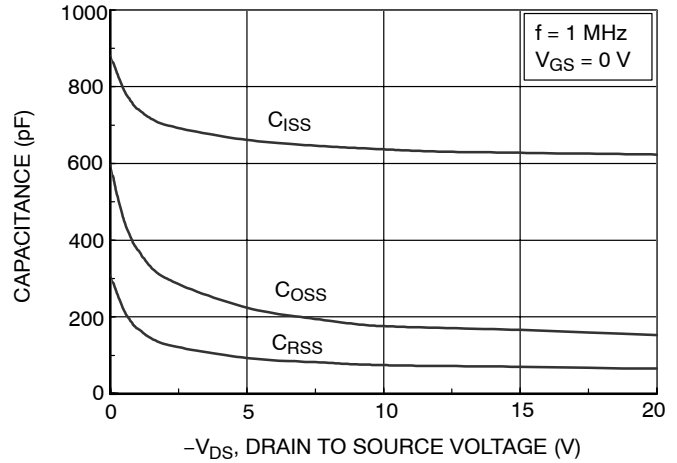


Figure 8. Capacitance Characteristics

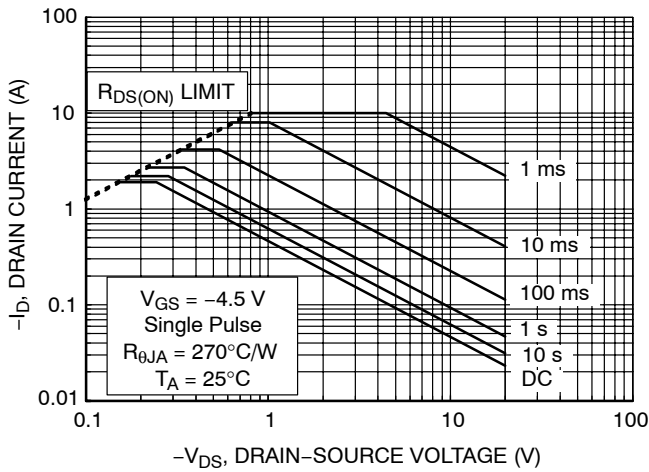


Figure 9. Maximum Safe Operating Area

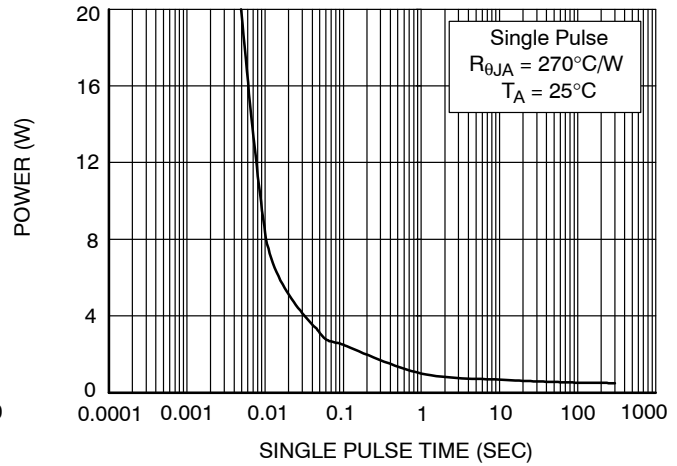


Figure 10. Single Pulse Maximum Power Dissipation

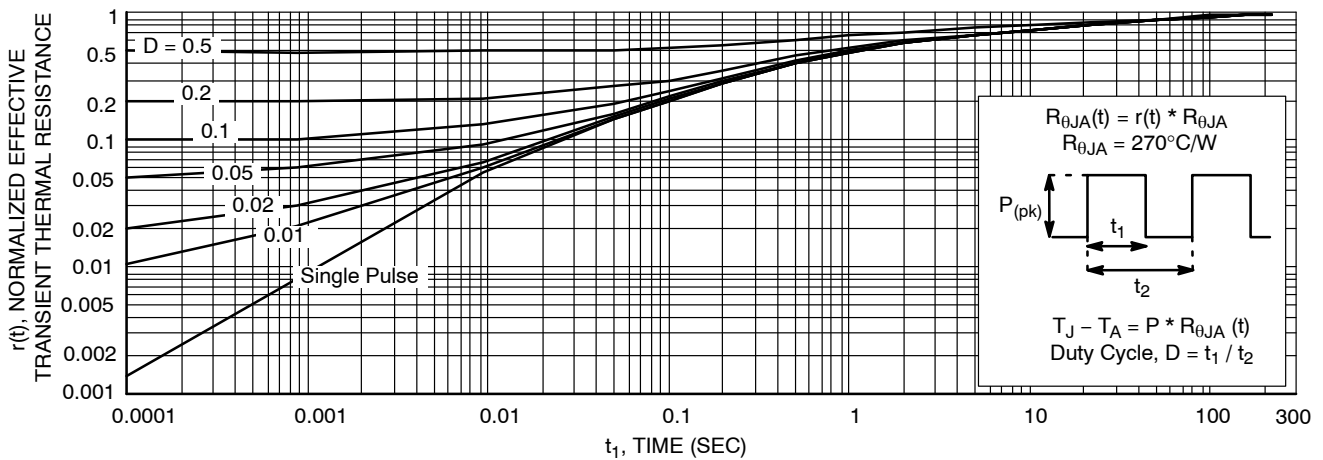


Figure 11. Transient Thermal Response Curve

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

FDN342P

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Reel Size	Tape Width	Shipping [†]
342	FDN342P	7"	8 mm	3000 / Tape & Reel

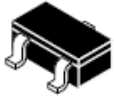
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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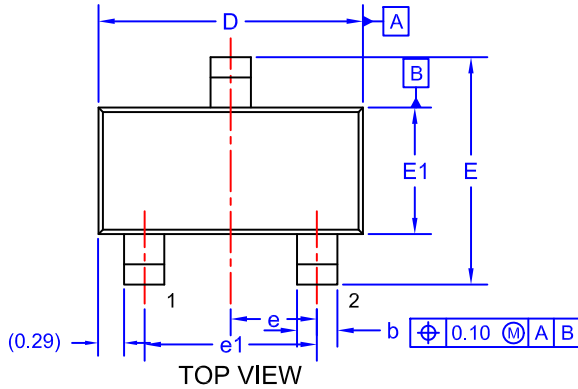
MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS



SOT-23/SUPERSOT™ -23, 3 LEAD, 1.4x2.9
CASE 527AG
ISSUE A

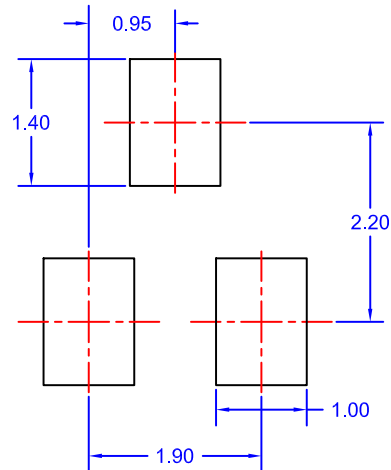
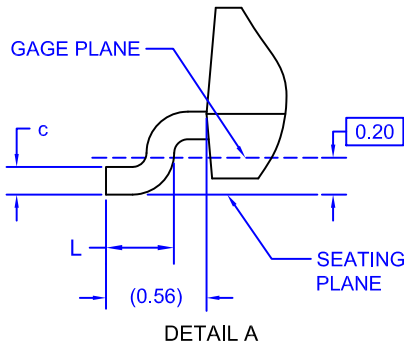
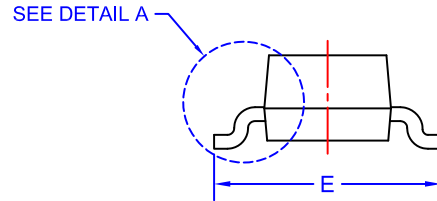
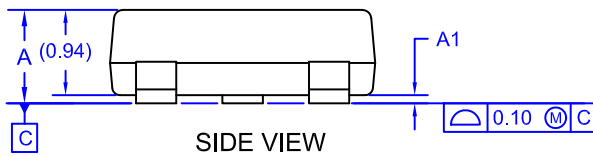
DATE 09 DEC 2019



NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

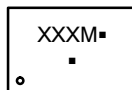
DIM	MIN.	NOM.	MAX.
A	0.85	0.95	1.12
A1	0.00	0.05	0.10
b	0.370	0.435	0.508
c	0.085	0.150	0.180
D	2.80	2.92	3.04
E	2.31	2.51	2.71
E1	1.20	1.40	1.52
e	0.95 BSC		
e1	1.90 BSC		
L	0.33	0.38	0.43



LAND PATTERN RECOMMENDATION*

*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
- M = Month Code
- = Pb-Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	SOT-23/SUPERSOT-23, 3 LEAD, 1.4X2.9	PAGE 1 OF 1

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