

EMG2DXV5, EMG5DXV5

Dual Bias Resistor Transistors

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

This new series of digital transistors is designed to replace a single device and its external resistor bias network. The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space. The device is housed in the SOT-553 package which is designed for low power surface mount applications.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Moisture Sensitivity Level: 1
- Available in 8 mm, 7 inch Tape and Reel
- Lead-Free Solder Plating
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	50	Vdc
Collector-Emitter Voltage	V _{CEO}	50	Vdc
Collector Current	I _C	100	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C Derate above 25°C	P _D	230 (Note 1) 338 (Note 2) 1.8 (Note 1) 2.7 (Note 2)	mW °C/W
Thermal Resistance – Junction-to-Ambient	R _{θJA}	540 (Note 1) 370 (Note 2)	°C/W
Thermal Resistance – Junction-to-Lead	R _{θJL}	264 (Note 1) 287 (Note 2)	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

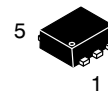
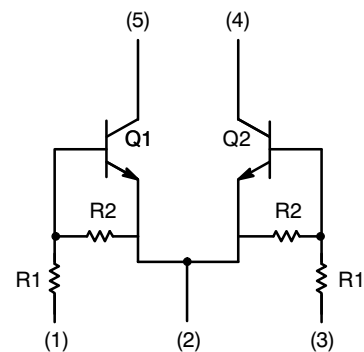
1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 x 1.0 inch Pad



ON Semiconductor®

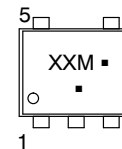
<http://onsemi.com>

NPN SILICON BIAS RESISTOR TRANSISTORS



SOT-553
CASE 463B

MARKING DIAGRAM



XX = UF (EMG5)
UP (EMG2)
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

EMG2DXV5, EMG5DXV5

DEVICE MARKING AND RESISTOR VALUES

Device	Package	Marking	R1 (K)	R2 (K)
EMG2DXV5	SOT-553	UP	47	47
EMG5DXV5	SOT-553	UF	10	47

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS (Q1 & Q2)

Collector-Base Cutoff Current (V _{CB} = 50 V, I _E = 0)	I _{CBO}	-	-	100	nA _{dc}
Collector-Emitter Cutoff Current (V _{CE} = 50 V, I _B = 0)	I _{CEO}	-	-	500	nA _{dc}
Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0)	I _{EBO}	-	-	0.1	mA _{dc}
		-	-	0.2	
Collector-Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	V _{(BR)CBO}	50	-	-	V _{dc}
Collector-Emitter Breakdown Voltage (Note 3) (I _C = 2.0 mA, I _B = 0)	V _{(BR)CEO}	50	-	-	V _{dc}

ON CHARACTERISTICS (Q1 & Q2) (Note 3)

DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA)	EMG2DXV5 EMG5DXV5	h _{FE}	80 80	140 140	- -	
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.3 mA)		V _{CE(sat)}	-	-	0.25	V _{dc}
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ)	EMG2DXV5	V _{OL}	-	-	0.2	V _{dc}
(V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	EMG5DXV5		-	-	0.2	
Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ)		V _{OH}	4.9	-	-	V _{dc}
Input Resistor	EMG2DXV5 EMG5DXV5	R ₁	32.9 7.0	47 10	61.1 13	kΩ
Resistor Ratio	EMG2DXV5 EMG5DXV5	R ₁ /R ₂	0.8 0.17	1.0 0.21	1.2 0.25	

3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

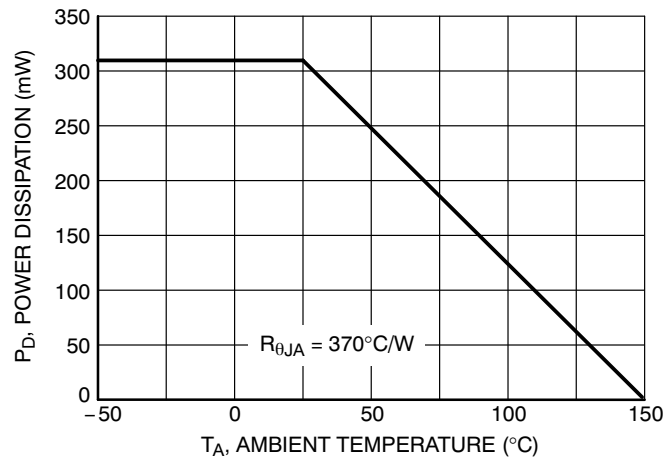


Figure 1. Derating Curve

EMG2DXV5, EMG5DXV5

TYPICAL ELECTRICAL CHARACTERISTICS — EMG2DXV5

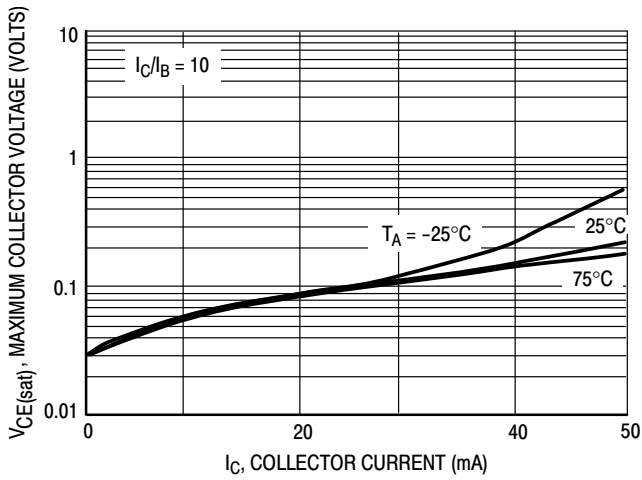


Figure 2. $V_{CE(sat)}$ versus I_C

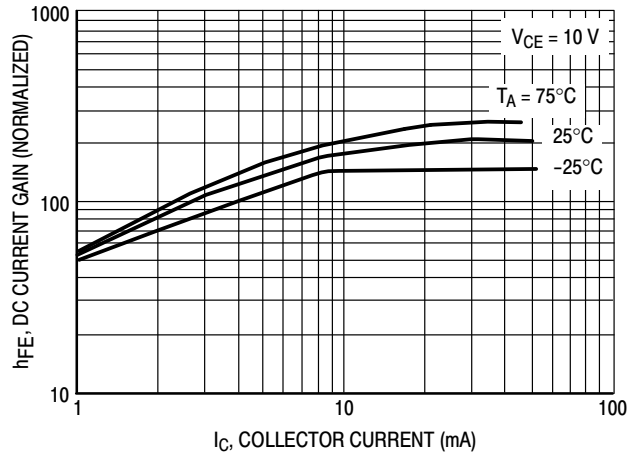


Figure 3. DC Current Gain

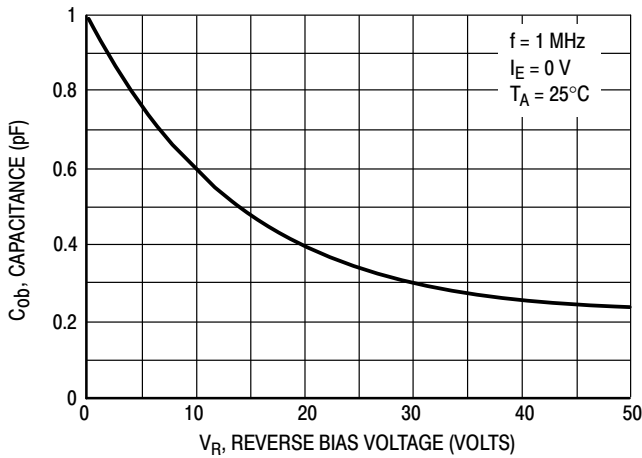


Figure 4. Output Capacitance

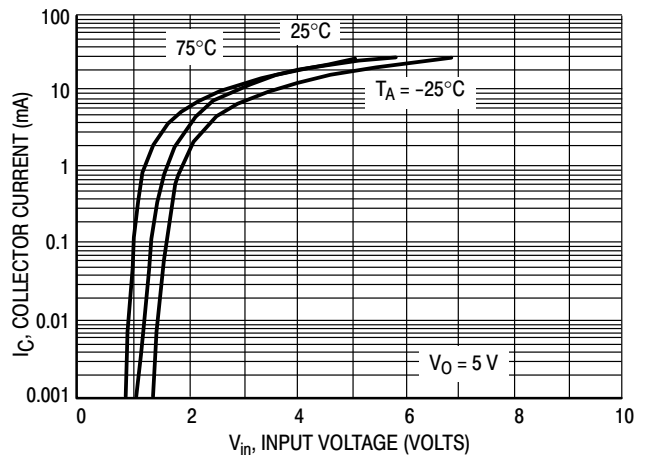


Figure 5. Output Current versus Input Voltage

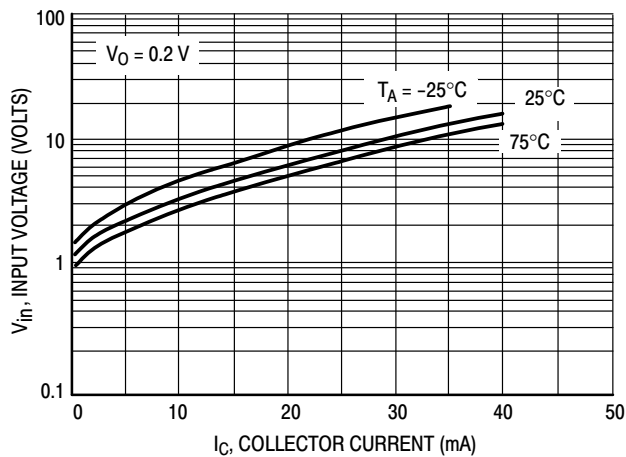


Figure 6. Input Voltage versus Output Current

EMG2DXV5, EMG5DXV5

TYPICAL ELECTRICAL CHARACTERISTICS – EMG5DXV5

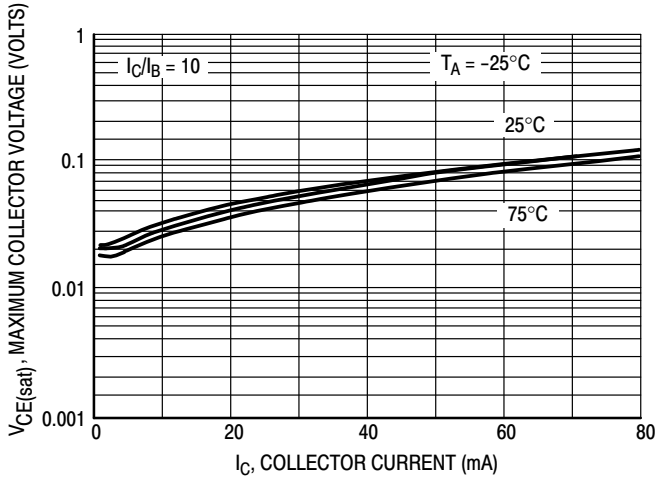


Figure 7. $V_{CE(sat)}$ versus I_C

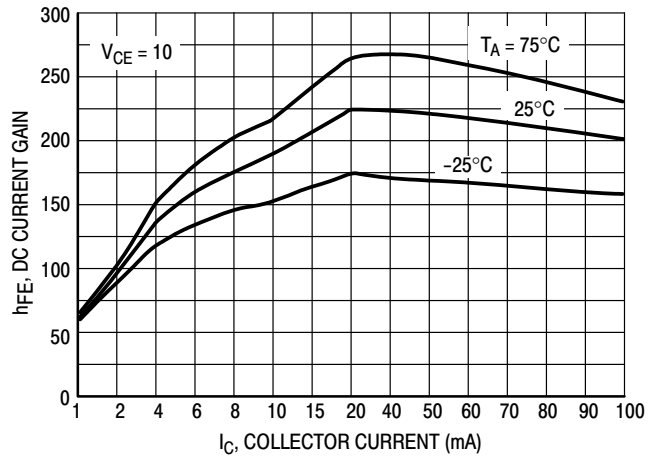


Figure 8. DC Current Gain

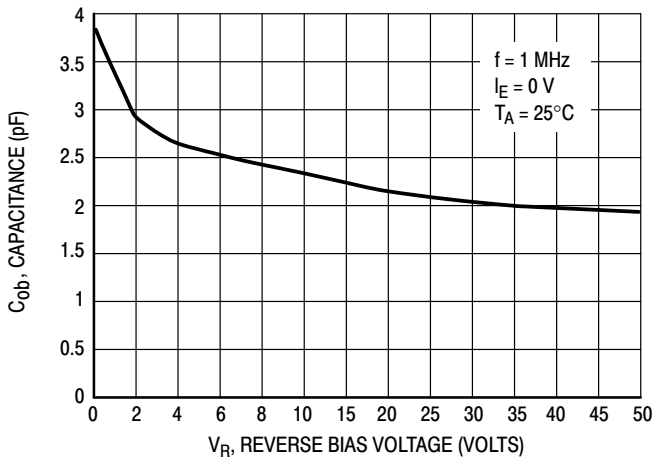


Figure 9. Output Capacitance

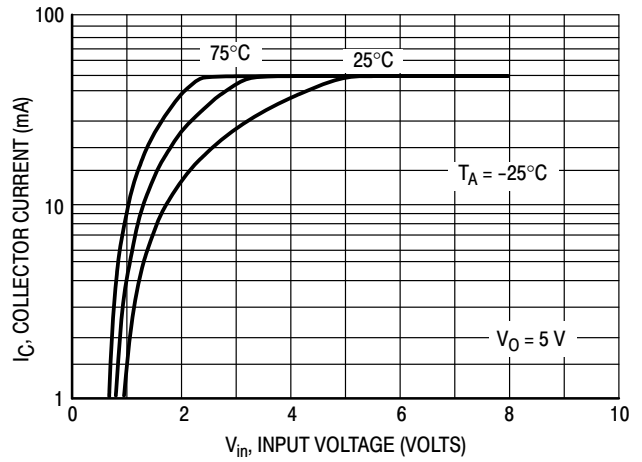


Figure 10. Output Current versus Input Voltage

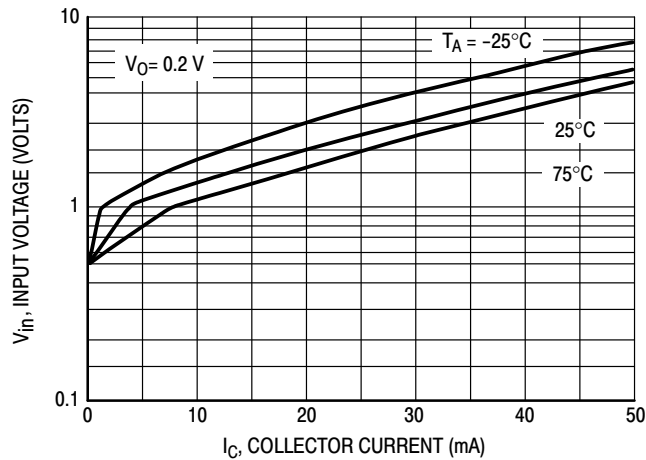


Figure 11. Input Voltage versus Output Current

EMG2DXV5, EMG5DXV5

TYPICAL APPLICATIONS FOR NPN BRTs

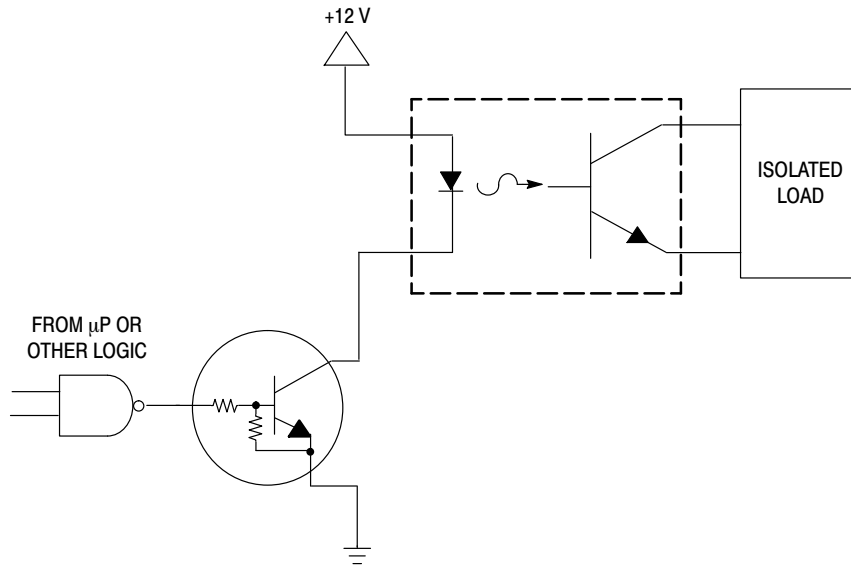


Figure 12. Level Shifter: Connects 12 or 24 Volt Circuits to Logic

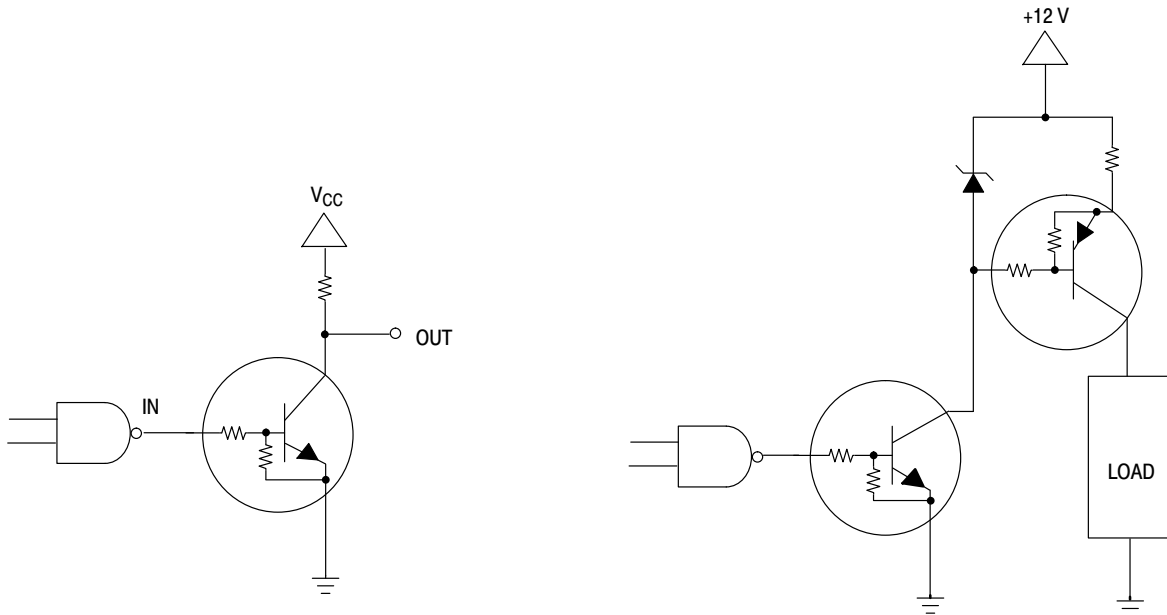


Figure 13. Open Collector Inverter: Inverts the Input Signal

Figure 14. Inexpensive, Unregulated Current Source

EMG2DXV5, EMG5DXV5

DEVICE ORDERING INFORMATION

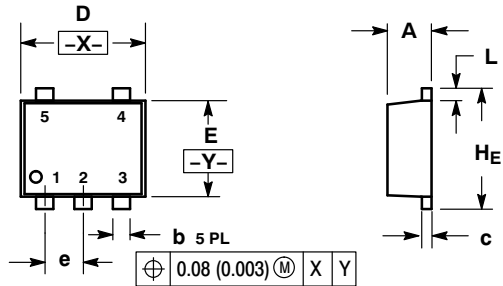
Device	Package	Shipping†
EMG2DXV5T1G	SOT-553 (Pb-Free)	4000 / Tape & Reel
EMG2DXV5T5G	SOT-553 (Pb-Free)	8000 / Tape & Reel
EMG5DXV5T1G	SOT-553 (Pb-Free)	4000 / Tape & Reel
EMG5DXV5T5G	SOT-553 (Pb-Free)	8000 / Tape & Reel

†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.

EMG2DXV5, EMG5DXV5

PACKAGE DIMENSIONS

SOT-553
CASE 463B
ISSUE B

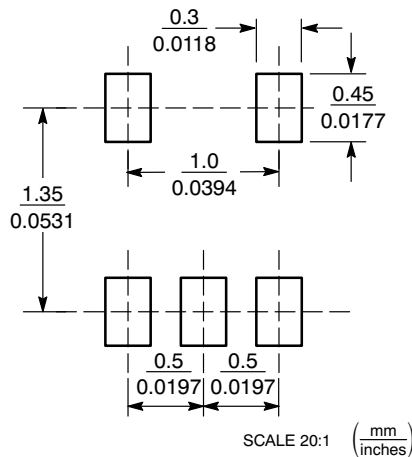


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.50 BSC			0.020 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	1.50	1.60	1.70	0.059	0.063	0.067

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.