

# 1SMA5913BT3 Series

## 1.5 Watt Plastic Surface Mount Zener Voltage Regulators

This complete new line of 1.5 Watt Zener Diodes offers the following advantages.

### Specification Features

- Standard Zener Breakdown Voltage Range – 3.3 V to 68 V
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Slide or Bottom Circuit Board Mounting
- Low Profile Package
- Ideal Replacement for MELF Packages
- Pb-Free Packages are Available

### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded plastic

**FINISH:** All external surfaces are corrosion resistant with readily solderable leads

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 260°C for 10 seconds

**POLARITY:** Cathode indicated by molded polarity notch or cathode band

**FLAMMABILITY RATING:** UL 94 V-0 @ 0.125 in

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Power Dissipation @ $T_L = 75^\circ\text{C}$ , Measured Zero Lead Length (Note 1.) Derate above $75^\circ\text{C}$	$P_D$	1.5 20	Watts mW/ $^\circ\text{C}$
Thermal Resistance – Junction-to-Lead	$R_{\theta JL}$	50	$^\circ\text{C}/\text{W}$
DC Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2.) Derate above $25^\circ\text{C}$	$P_D$	0.5 4.0	Watts mW/ $^\circ\text{C}$
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	250	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

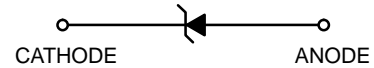
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. 1" square copper pad, FR-4 board
2. FR-4 Board, using ON Semiconductor minimum recommended footprint



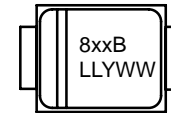
ON Semiconductor®

<http://onsemi.com>



SMA  
CASE 403D  
PLASTIC

### MARKING DIAGRAM



8xxB = Specific Device Code  
(See Table Next Page)  
LL = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device*	Package	Shipping†
1SMA59xxBT3	SMA	5000/Tape & Reel
1SMA59xxBT3G	SMA (Pb-Free)	5000/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.

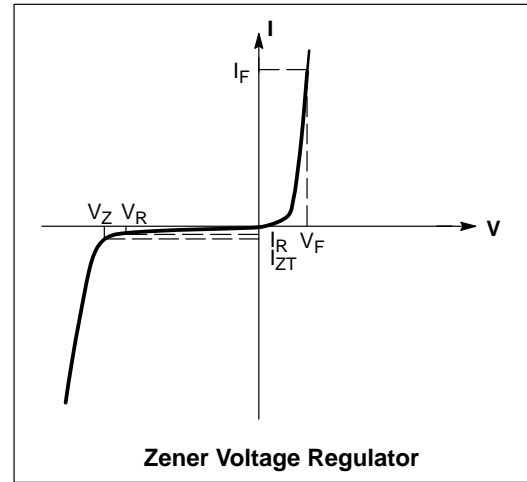
Individual devices are listed on page 2 of this data sheet.

\*The "T3" suffix refers to a 13 inch reel.

# 1SMA5913BT3 Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 1.5\text{ V Max.}$  @  $I_F = 200\text{ mA}$  for all types)

Symbol	Parameter
$V_Z$	Reverse Zener Voltage @ $I_{ZT}$
$I_{ZT}$	Reverse Current
$Z_{ZT}$	Maximum Zener Impedance @ $I_{ZT}$
$I_{ZK}$	Reverse Current
$Z_{ZK}$	Maximum Zener Impedance @ $I_{ZK}$
$I_R$	Reverse Leakage Current @ $V_R$
$V_R$	Reverse Voltage
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$
$I_{ZM}$	Maximum DC Zener Current



**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 1.5\text{ V Max.}$  @  $I_F = 200\text{ mA}$  for all types)

Device (Note 1)	Device Marking	Zener Voltage (Note 2)				Zener Impedance			Leakage Current		$I_{ZM}$ mA(dc)
		$V_Z$ (Volts)			@ $I_{ZT}$	$Z_{ZT}$ @ $I_{ZT}$	$Z_{ZK}$ @ $I_{ZK}$	$I_R$ @ $V_R$			
		Min	Nom	Max	mA	$\Omega$	$\Omega$	mA	$\mu\text{A}$	Volts	
1SMA5913BT3	813B	3.13	3.3	3.47	113.6	10	500	1.0	50	1.0	455
1SMA5914BT3	814B	3.42	3.6	3.78	104.2	9.0	500	1.0	35.5	1.0	417
1SMA5915BT3	815B	3.70	3.9	4.10	96.1	7.5	500	1.0	12.5	1.0	385
1SMA5916BT3	816B	4.08	4.3	4.52	87.2	6.0	500	1.0	2.5	1.0	349
1SMA5917BT3	817B	4.46	4.7	4.94	79.8	5.0	500	1.0	2.5	1.5	319
1SMA5918BT3	818B	4.84	5.1	5.36	73.5	4.0	350	1.0	2.5	2.0	294
1SMA5919BT3	819B	5.32	5.6	5.88	66.9	2.0	250	1.0	2.5	3.0	268
1SMA5920BT3	820B	5.89	6.2	6.51	60.5	2.0	200	1.0	2.5	4.0	242
1SMA5921BT3	821B	6.46	6.8	7.14	55.1	2.5	200	1.0	2.5	5.2	221
1SMA5922BT3	822B	7.12	7.5	7.88	50	3.0	400	0.5	2.5	6.0	200
1SMA5923BT3	823B	7.79	8.2	8.61	45.7	3.5	400	0.5	2.5	6.5	183
1SMA5924BT3, G*	824B	8.64	9.1	9.56	41.2	4.0	500	0.5	2.5	7.0	165
1SMA5925BT3	825B	9.5	10	10.5	37.5	4.5	500	0.25	2.5	8.0	150
1SMA5926BT3	826B	10.45	11	11.55	34.1	5.5	550	0.25	0.5	8.4	136
1SMA5927BT3, G*	827B	11.4	12	12.6	31.2	6.5	550	0.25	0.5	9.1	125
1SMA5928BT3	828B	12.35	13	13.65	28.8	7.0	550	0.25	0.5	9.9	115
1SMA5929BT3, G*	829B	14.25	15	15.75	25	9.0	600	0.25	0.5	11.4	100
1SMA5930BT3	830B	15.2	16	16.8	23.4	10	600	0.25	0.5	12.2	94
1SMA5931BT3	831B	17.1	18	18.9	20.8	12	650	0.25	0.5	13.7	83
1SMA5932BT3	832B	19	20	21	18.7	14	650	0.25	0.5	15.2	75
1SMA5933BT3	833B	20.9	22	23.1	17	17.5	650	0.25	0.5	16.7	68
1SMA5934BT3	834B	22.8	24	25.2	15.6	19	700	0.25	0.5	18.2	63
1SMA5935BT3	835B	25.65	27	28.35	13.9	23	700	0.25	0.5	20.6	56
1SMA5936BT3	836B	28.5	30	31.5	12.5	26	750	0.25	0.5	22.8	50
1SMA5937BT3	837B	31.35	33	34.65	11.4	33	800	0.25	0.5	25.1	45
1SMA5938BT3	838B	34.2	36	37.8	10.4	38	850	0.25	0.5	27.4	42
1SMA5939BT3	839B	37.05	39	40.95	9.6	45	900	0.25	0.5	29.7	38
1SMA5940BT3, G*	840B	40.85	43	45.15	8.7	53	950	0.25	0.5	32.7	35
1SMA5941BT3	841B	44.65	47	49.35	8.0	67	1000	0.25	0.5	35.8	32
1SMA5942BT3	842B	48.45	51	53.55	7.3	70	1100	0.25	0.5	38.8	29
1SMA5943BT3, G*	843B	53.2	56	58.8	6.7	86	1300	0.25	0.5	42.6	27
1SMA5944BT3	844B	58.9	62	65.1	6.0	100	1500	0.25	0.5	47.1	24
1SMA5945BT3	845B	64.6	68	71.4	5.5	120	1700	0.25	0.5	51.7	22

1. Tolerance and Voltage Regulation Designation – The type number listed indicates a tolerance of  $\pm 5\%$ .
  2.  $V_Z$  limits are to be guaranteed at thermal equilibrium.
- \* The "G" suffix indicates Pb-Free package available.

# 1SMA5913BT3 Series

## Rating and Typical Characteristic Curves ( $T_A = 25^\circ\text{C}$ )

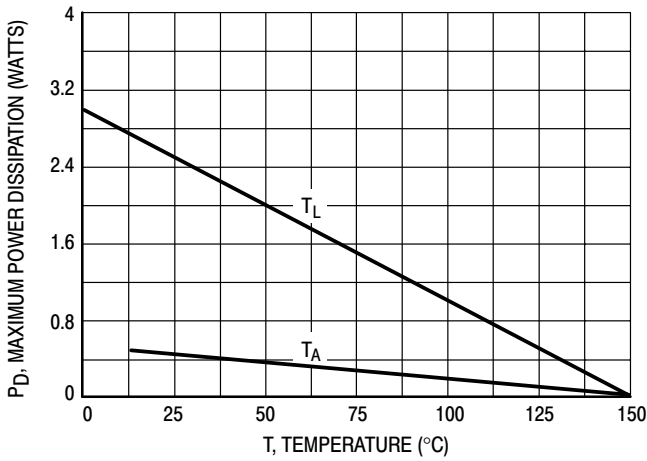


Figure 1. Steady State Power Derating

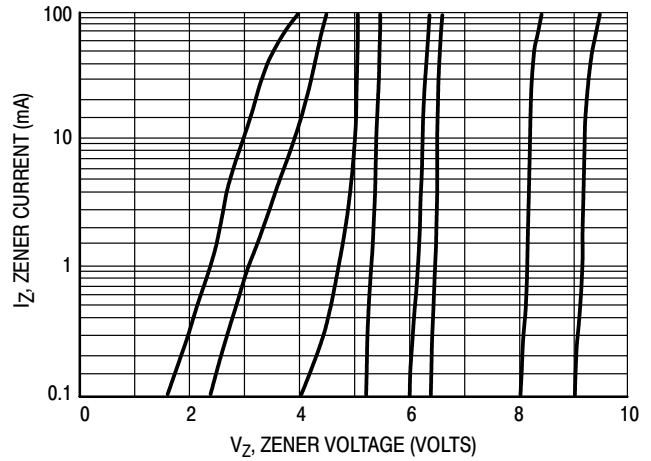


Figure 2.  $V_Z - 3.3$  thru 10 Volts

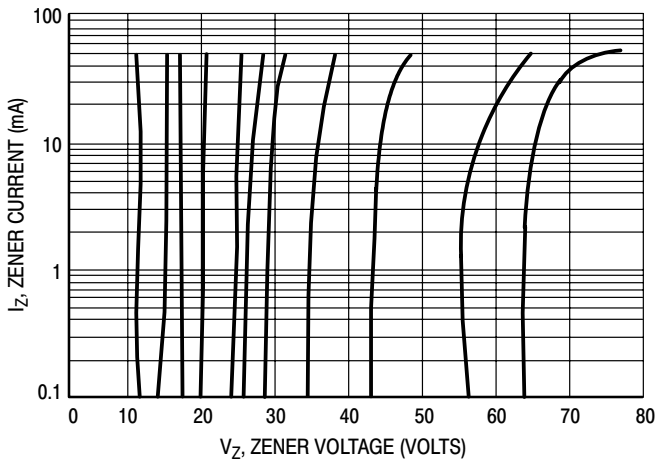


Figure 3.  $V_Z = 12$  thru 68 Volts

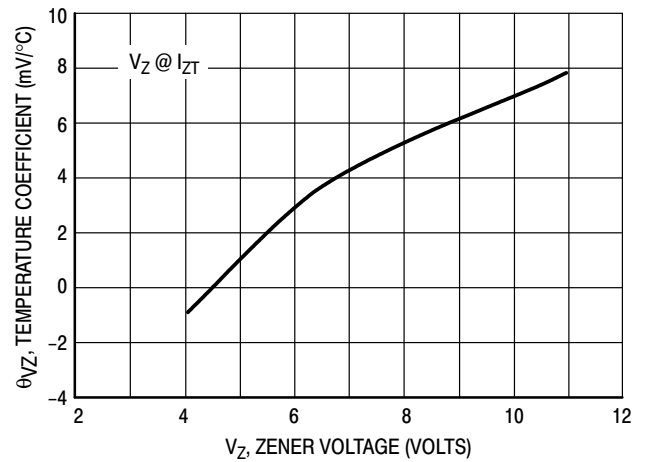


Figure 4. Zener Voltage - 3.3 to 12 Volts

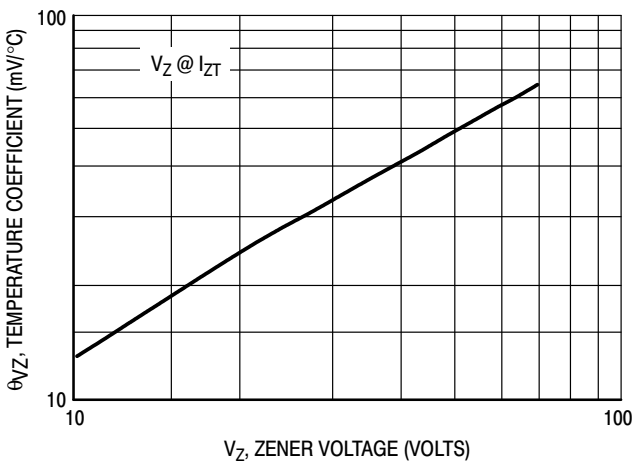


Figure 5. Zener Voltage - 14 to 68 Volts

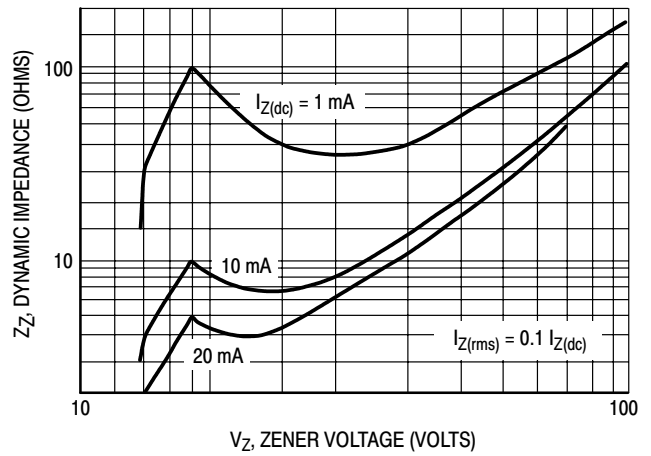


Figure 6. Effect of Zener Voltage

# 1SMA5913BT3 Series

## Rating and Typical Characteristic Curves ( $T_A = 25^\circ\text{C}$ )

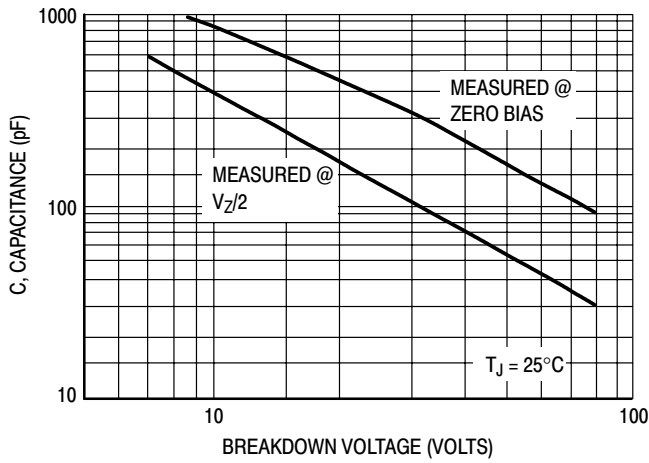


Figure 7. Capacitance Curve

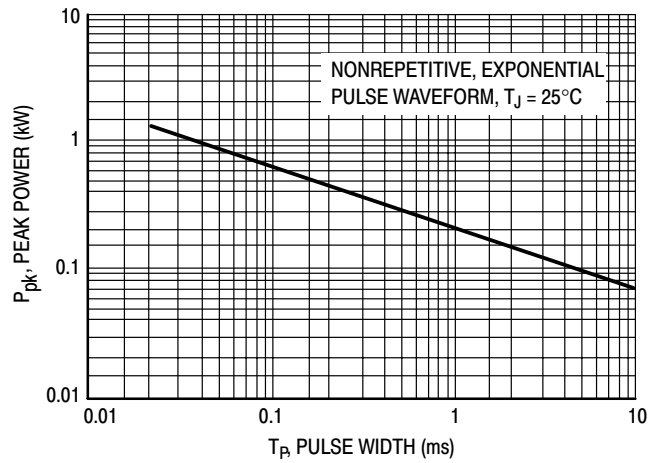


Figure 8. Typical Pulse Rating Curve

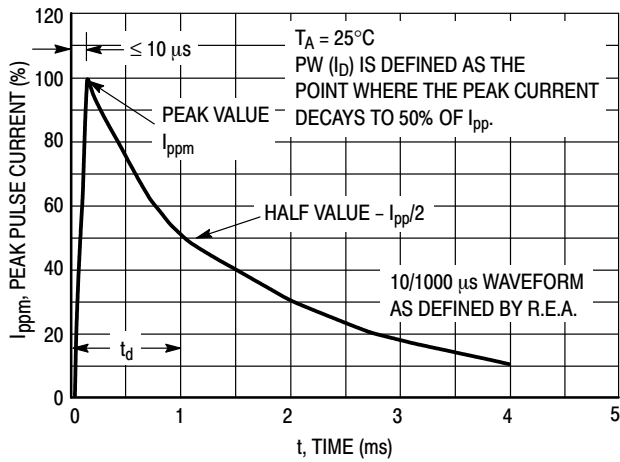


Figure 9. Pulse Waveform

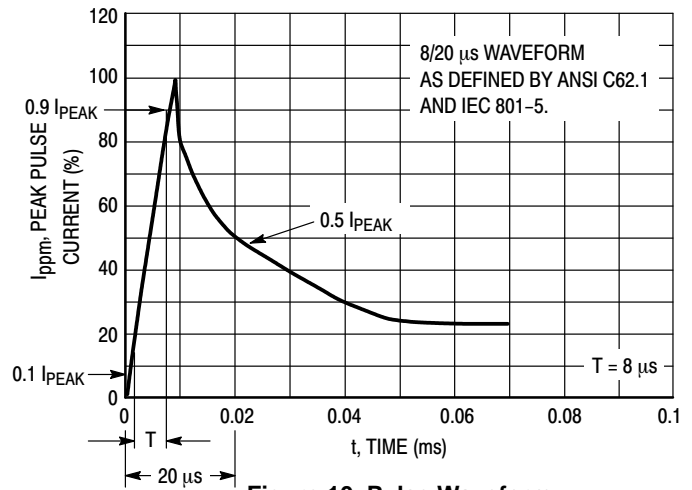
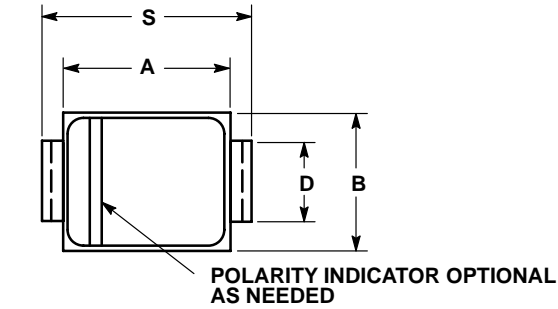


Figure 10. Pulse Waveform

# 1SMA5913BT3 Series

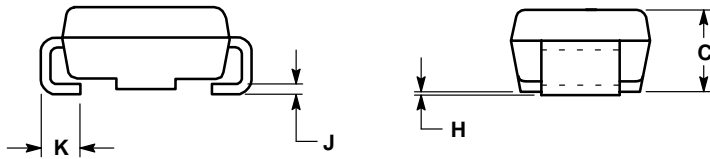
## OUTLINE DIMENSIONS

SMA  
CASE 403D-02  
ISSUE A

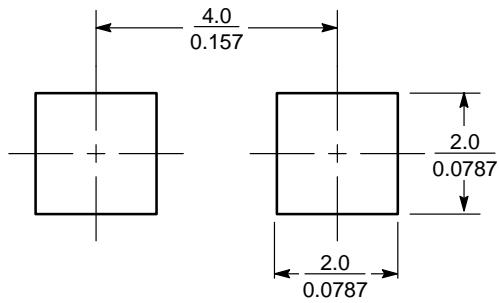


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 403D-01 OBSOLETE, NEW STANDARD IS 403D-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.180	4.06	4.57
B	0.090	0.115	2.29	2.92
C	0.075	0.095	1.91	2.41
D	0.050	0.064	1.27	1.63
H	0.002	0.006	0.05	0.15
J	0.006	0.016	0.15	0.41
K	0.030	0.060	0.76	1.52
S	0.190	0.220	4.83	5.59



### SOLDERING FOOTPRINT\*



SCALE 8:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

# 1SMA5913BT3 Series

**ON Semiconductor** and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). 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](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Japan:** ON Semiconductor, Japan Customer Focus Center

2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051

**Phone:** 81-3-5773-3850

**ON Semiconductor Website:** <http://onsemi.com>

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.