

1SMB5913BT3 Series

3 Watt Plastic Surface Mount Zener Voltage Regulators

This complete new line of 3 Watt Zener diodes offers the following advantages.

Specification Features:

- Zener Voltage Range – 3.3 V to 200 V
- ESD Rating of Class 3 (>16 KV) per Human Body Model
- Flat Handling Surface for Accurate Placement
- Package Design for Top Side or Bottom Circuit Board Mounting

Mechanical Characteristics:

CASE: Void-free, transfer-molded plastic

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

MAXIMUM LEAD TEMPERATURE FOR SOLDERING PURPOSES:
260°C for 10 Seconds

LEADS: Modified L-Bend providing more contact area to bond pads

POLARITY: Cathode indicated by polarity band

FLAMMABILITY RATING: UL94 V-0

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Maximum Steady State Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured at Zero Lead Length Derate Above 75°C	P_D	3.0	W
Thermal Resistance from Junction to Lead	$R_{\theta JL}$	40 25	$\text{mW}/^\circ\text{C}$ $^\circ\text{C}/\text{W}$
Maximum Steady State Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1.) Derate Above 25°C	P_D	550	mW
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	4.4 226	$\text{mW}/^\circ\text{C}$ $^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C}$

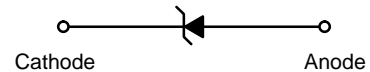
- FR-4 board, within 1" to device, using ON Semiconductor minimum recommended footprint, as shown in case 403A outline dimensions spec.



ON Semiconductor™

<http://onsemi.com>

**PLASTIC SURFACE MOUNT
ZENER VOLTAGE
REGULATOR DIODES
3.3–200 VOLTS
3 WATT DC POWER**



**SMB
CASE 403A
PLASTIC**

MARKING DIAGRAM



Y = Year
WW = Work Week
9xxB = Specific Device Code
(See Table Page 3)

ORDERING INFORMATION

Device †	Package	Shipping
1SMB59xxBT3	SMB	2500/Tape & Reel

Devices listed in **bold, italic** are ON Semiconductor **Preferred** devices. **Preferred** devices are recommended choices for future use and best overall value.

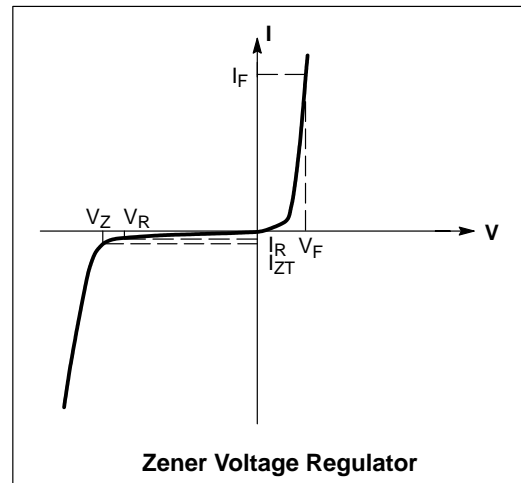
†The "T3" suffix refers to a 13 inch reel.

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ELECTRICAL CHARACTERISTICS

($T_L = 30^\circ\text{C}$ unless otherwise noted,
 $V_F = 1.5\text{ V Max.}$ @ $I_F = 200\text{ mA(dc)}$ 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



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ELECTRICAL CHARACTERISTICS ($T_L = 30^\circ\text{C}$ unless otherwise noted, $V_F = 1.5\text{ V Max.}$ @ $I_F = 200\text{ mA(dc)}$ for all types)

Device (Note 2.)	Device Marking	Zener Voltage (Note 3.)				Zener Impedance (Note 4.)			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	Ω	Ω	mA	μA	Volts	
1SMB5913BT3	913B	3.13	3.3	3.47	113.6	10	500	1	100	1	454
1SMB5914BT3	914B	3.42	3.6	3.78	104.2	9	500	1	75	1	416
1SMB5915BT3	915B	3.70	3.9	4.10	96.1	7.5	500	1	25	1	384
1SMB5916BT3	916B	4.08	4.3	4.52	87.2	6	500	1	5	1	348
1SMB5917BT3	917B	4.46	4.7	4.94	79.8	5	500	1	5	1.5	319
1SMB5918BT3	918B	4.84	5.1	5.36	73.5	4	350	1	5	2	294
1SMB5919BT3	919B	5.32	5.6	5.88	66.9	2	250	1	5	3	267
1SMB5920BT3	920B	5.89	6.2	6.51	60.5	2	200	1	5	4	241
1SMB5921BT3	921B	6.46	6.8	7.14	55.1	2.5	200	1	5	5.2	220
1SMB5922BT3	922B	7.12	7.5	7.88	50	3	400	0.5	5	6	200
1SMB5923BT3	923B	7.79	8.2	8.61	45.7	3.5	400	0.5	5	6.5	182
1SMB5924BT3	924B	8.64	9.1	9.56	41.2	4	500	0.5	5	7	164
1SMB5925BT3	925B	9.5	10	10.5	37.5	4.5	500	0.25	5	8	150
1SMB5926BT3	926B	10.45	11	11.55	34.1	5.5	550	0.25	1	8.4	136
1SMB5927BT3	927B	11.4	12	12.6	31.2	6.5	550	0.25	1	9.1	125
1SMB5928BT3	928B	12.35	13	13.65	28.8	7	550	0.25	1	9.9	115
1SMB5929BT3	929B	14.25	15	15.75	25	9	600	0.25	1	11.4	100
1SMB5930BT3	930B	15.2	16	16.8	23.4	10	600	0.25	1	12.2	93
1SMB5931BT3	931B	17.1	18	18.9	20.8	12	650	0.25	1	13.7	83
1SMB5932BT3	932B	19	20	21	18.7	14	650	0.25	1	15.2	75
1SMB5933BT3	933B	20.9	22	23.1	17	17.5	650	0.25	1	16.7	68
1SMB5934BT3	934B	22.8	24	25.2	15.6	19	700	0.25	1	18.2	62
1SMB5935BT3	935B	25.65	27	28.35	13.9	23	700	0.25	1	20.6	55
1SMB5936BT3	936B	28.5	30	31.5	12.5	28	750	0.25	1	22.8	50
1SMB5937BT3	937B	31.35	33	34.65	11.4	33	800	0.25	1	25.1	45
1SMB5938BT3	938B	34.2	36	37.8	10.4	38	850	0.25	1	27.4	41
1SMB5939BT3	939B	37.05	39	40.95	9.6	45	900	0.25	1	29.7	38
1SMB5940BT3	940B	40.85	43	45.15	8.7	53	950	0.25	1	32.7	34
1SMB5941BT3	941B	44.65	47	49.35	8	67	1000	0.25	1	35.8	31
1SMB5942BT3	942B	48.45	51	53.55	7.3	70	1100	0.25	1	38.8	29
1SMB5943BT3	943B	53.2	56	58.8	6.7	86	1300	0.25	1	42.6	26
1SMB5944BT3	944B	58.9	62	65.1	6	100	1500	0.25	1	47.1	24
1SMB5945BT3	945B	64.6	68	71.4	5.5	120	1700	0.25	1	51.7	22
1SMB5946BT3	946B	71.25	75	78.75	5	140	2000	0.25	1	56	20
1SMB5947BT3	947B	77.9	82	86.1	4.6	160	2500	0.25	1	62.2	18
1SMB5948BT3	948B	86.45	91	95.55	4.1	200	3000	0.25	1	69.2	16
1SMB5949BT3	949B	95	100	105	3.7	250	3100	0.25	1	76	15
1SMB5950BT3	950B	104.5	110	115.5	3.4	300	4000	0.25	1	83.6	13
1SMB5951BT3	951B	114	120	126	3.1	380	4500	0.25	1	91.2	12
1SMB5952BT3	952B	123.5	130	136.5	2.9	450	5000	0.25	1	98.8	11
1SMB5953BT3	953B	142.5	150	157.5	2.5	600	6000	0.25	1	114	10
1SMB5954BT3	954B	152	160	168	2.3	700	6500	0.25	1	121.6	9
1SMB5955BT3	955B	171	180	189	2.1	900	7000	0.25	1	136.8	8
1SMB5956BT3	956B	190	200	210	1.9	1200	8000	0.25	1	152	7

2. TOLERANCE AND TYPE NUMBER DESIGNATION

The type numbers listed indicate a tolerance of $\pm 5\%$.

3. ZENER VOLTAGE (V_Z) MEASUREMENT

Nominal Zener voltage is measured with the device junction in thermal equilibrium with ambient temperature at 25°C .

4. ZENER IMPEDANCE (Z_Z) DERIVATION Z_{ZT} and Z_{ZK} are measured by dividing the ac voltage drop across the device by the ac current applied. The specified limits are for $I_{Z(ac)} = 0.1 I_{Z(dc)}$ with the ac frequency = 60 Hz.

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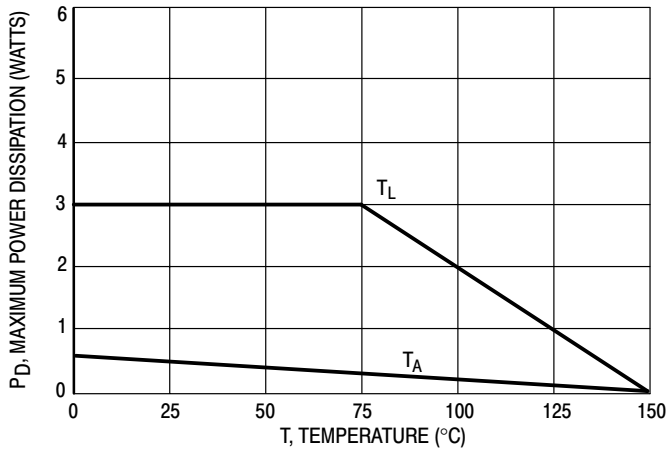


Figure 1. Steady State Power Derating

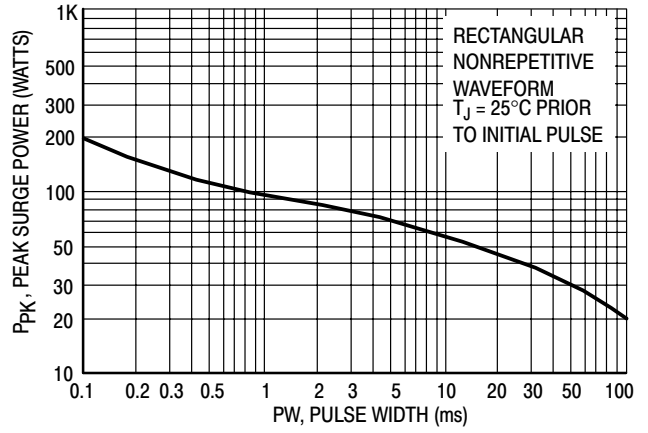


Figure 2. Maximum Surge Power

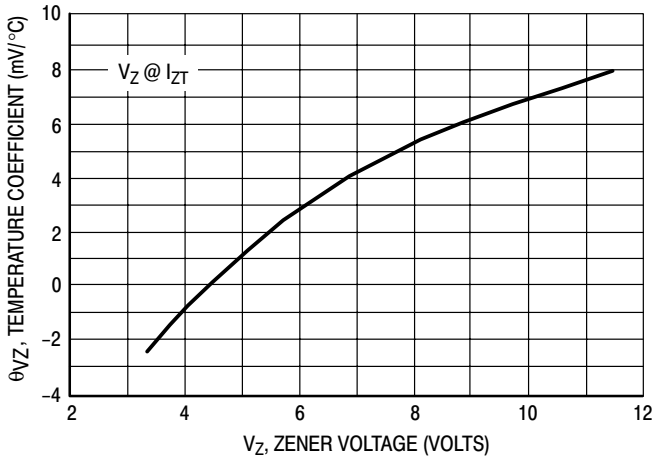


Figure 3. Zener Voltage — To 12 Volts

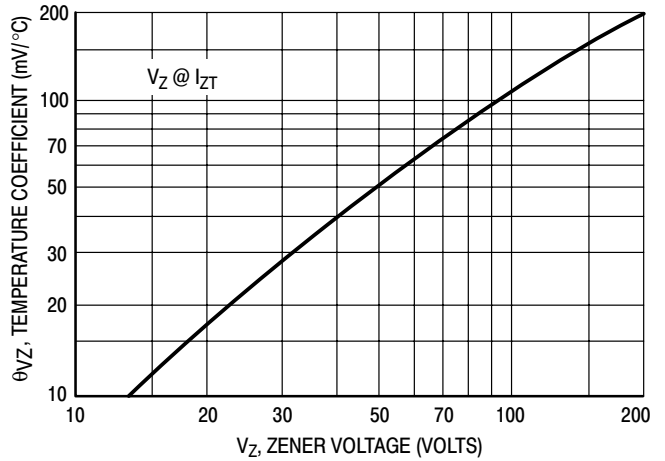


Figure 4. Zener Voltage — 14 To 200 Volts

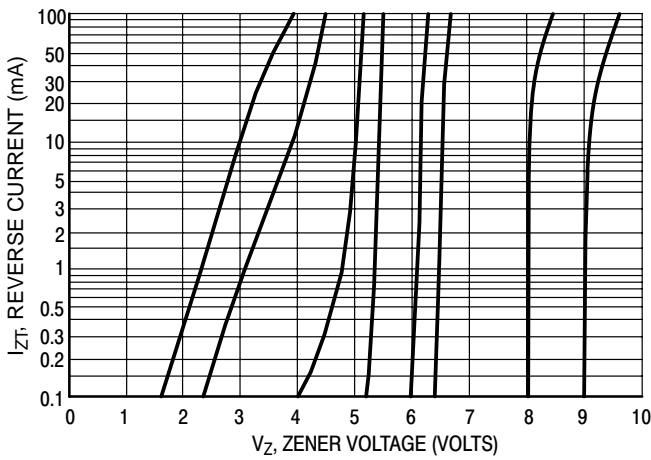


Figure 5. $V_Z = 3.3$ thru 10 Volts

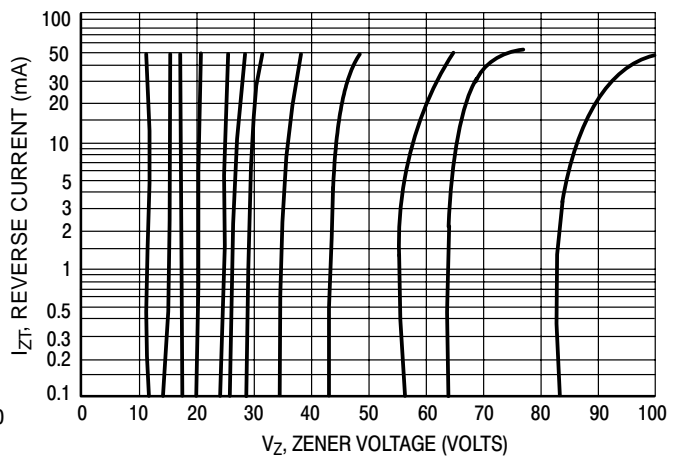


Figure 6. $V_Z = 12$ thru 82 Volts

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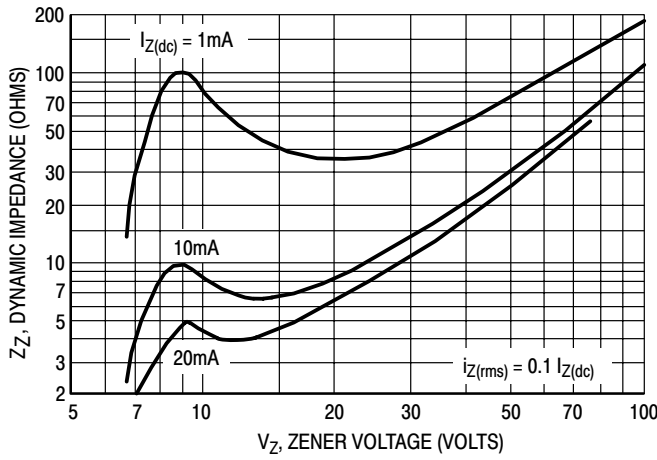


Figure 7. Effect of Zener Voltage

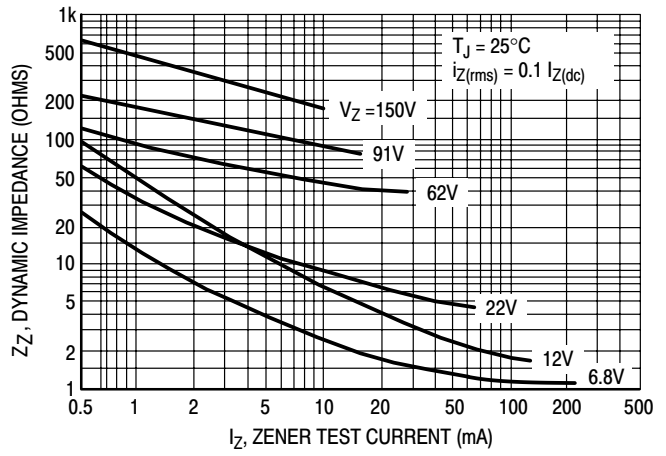


Figure 8. Effect of Zener Current

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

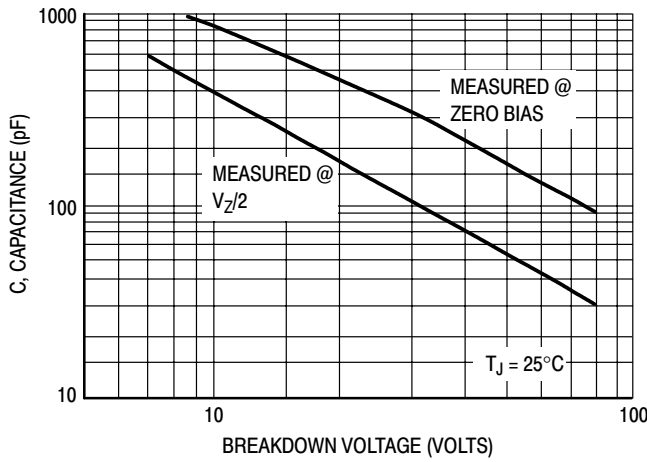


Figure 9. Capacitance Curve

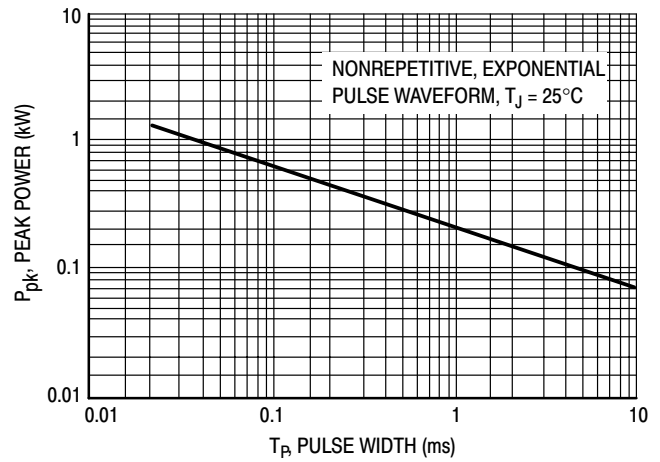


Figure 10. Typical Pulse Rating Curve

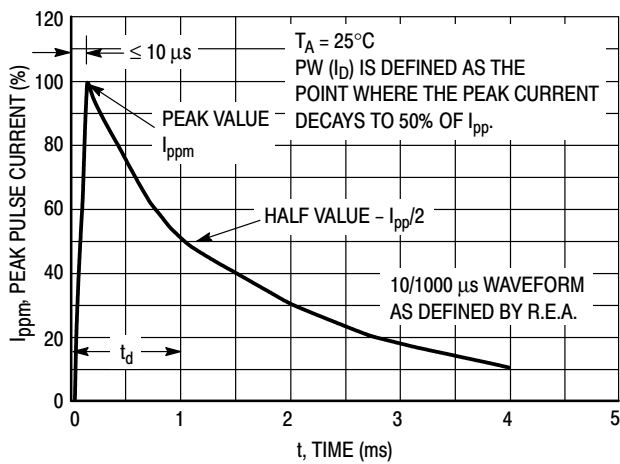


Figure 11. Pulse Waveform

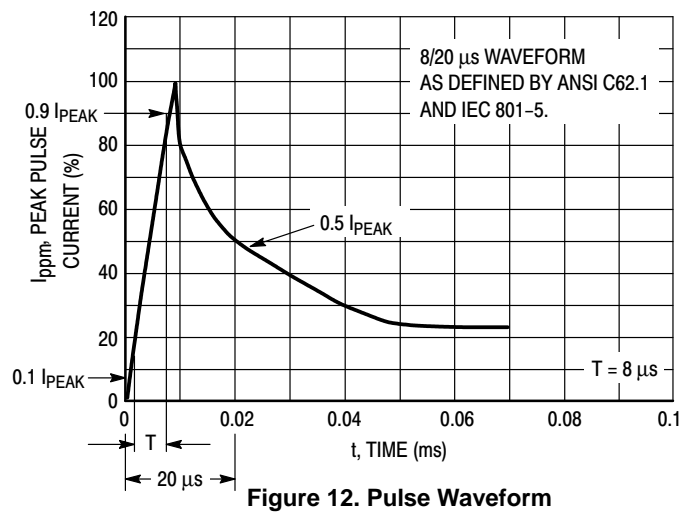


Figure 12. Pulse Waveform

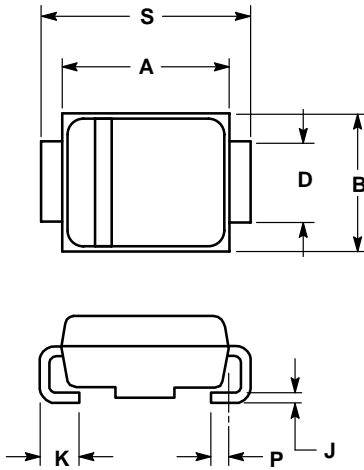
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OUTLINE DIMENSIONS

Zener Voltage Regulator Diodes – Surface Mounted

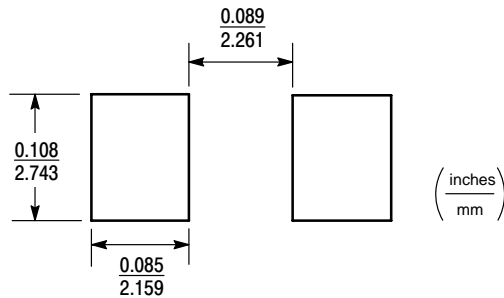
3 Watt DC Power

SMB
DO-214AA
CASE 403A-03
ISSUE D



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.160	0.180	4.06	4.57
B	0.130	0.150	3.30	3.81
C	0.075	0.095	1.90	2.41
D	0.077	0.083	1.96	2.11
H	0.0020	0.0060	0.051	0.152
J	0.006	0.012	0.15	0.30
K	0.030	0.050	0.76	1.27
P	0.020 REF		0.51 REF	
S	0.205	0.220	5.21	5.59



SMB Footprint

Notes

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ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 1-303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong & Singapore:
001-800-4422-3781

Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031
Phone: 81-3-5740-2700
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