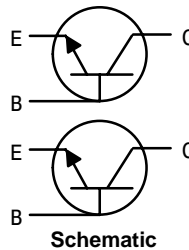


Plastic Power Transistors SO-8 for Surface Mount Applications

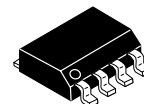
- Collector–Emitter Sustaining Voltage — $V_{CEO(sus)}$
= 30 Vdc (Min) @ $I_C = 10$ mAdc
- High DC Current Gain —
 $h_{FE} = 85$ (Min) @ $I_C = 0.8$ Adc
= 60 (Min) @ $I_C = 3.0$ Adc
- Low Collector–Emitter Saturation Voltage —
 $V_{CE(sat)} = 0.18$ Vdc (Max) @ $I_C = 1.2$ Adc
= 0.45 Vdc (Max) @ $I_C = 3.0$ Adc
- Miniature SO-8 Surface Mount Package – Saves Board Space



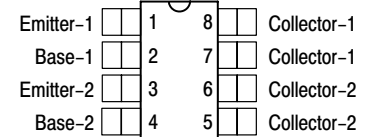
MMDJ3N03BJT

ON Semiconductor Preferred Device

**DUAL BIPOLAR
POWER TRANSISTOR
NPN SILICON
30 VOLTS
3 AMPERES**



**CASE 751-07, Style 16
(SO-8)**



Top View
Pinout

MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CB}	45	Vdc
Collector–Emitter Voltage	V_{CEO}	30	Vdc
Emitter–Base Voltage	V_{EB}	± 6.0	Vdc
Collector Current — Continuous — Peak	I_C	3.0 5.0	Adc
Base Current — Continuous	I_B	1.0	Adc
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 board material with one die operating.	$R_{\theta JA}$	100	$^\circ\text{C/W}$
Thermal Resistance – Junction to Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 board material with one die operating.		185	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 board material with one die operating. Derate above 25°C	P_D	1.25 10	Watts $\text{mW}/^\circ\text{C}$
Maximum Temperature for Soldering	T_L	260	$^\circ\text{C}$

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

MMDJ3N03BJT

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

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

OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ($I_C = 10\text{ mAdc}$, $I_B = 0\text{ Adc}$)	$V_{CEO(sus)}$	30	—	—	Vdc
Emitter–Base Voltage ($I_E = 50\text{ }\mu\text{Adc}$, $I_C = 0\text{ Adc}$)	V_{EBO}	6.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 25\text{ Vdc}$, $R_{BE} = 200\text{ }\Omega$) ($V_{CE} = 25\text{ Vdc}$, $R_{BE} = 200\text{ }\Omega$, $T_J = 125^\circ\text{C}$)	I_{CER}	— —	— —	20 200	μAdc
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$)	I_{EBO}	—	—	10	μAdc

ON CHARACTERISTICS⁽¹⁾

Collector–Emitter Saturation Voltage ($I_C = 0.8\text{ Adc}$, $I_B = 20\text{ mAdc}$) ($I_C = 1.2\text{ Adc}$, $I_B = 20\text{ mAdc}$) ($I_C = 3.0\text{ Adc}$, $I_B = 0.3\text{ Adc}$)	$V_{CE(sat)}$	— — —	0.105 — —	0.15 0.18 0.45	Vdc
Base–Emitter Saturation Voltage ($I_C = 3.0\text{ Adc}$, $I_B = 0.3\text{ Adc}$)	$V_{BE(sat)}$	—	—	1.25	Vdc
Base–Emitter On Voltage ($I_C = 1.2\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$)	$V_{BE(on)}$	—	—	1.10	Vdc
DC Current Gain ($I_C = 0.8\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1.2\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 3.0\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	85 80 60	195 — —	— — —	—

DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0\text{ Adc}$, $f = 1.0\text{ MHz}$)	C_{ob}	—	85	135	pF
Input Capacitance ($V_{EB} = 8.0\text{ Vdc}$)	C_{ib}	—	200	—	pF
Current–Gain — Bandwidth Product ⁽²⁾ ($I_C = 500\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $F_{test} = 1.0\text{ MHz}$)	f_T	—	72	—	MHz

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

(2) $f_T = |h_{FE}| \cdot f_{test}$

MMDJ3N03BJT

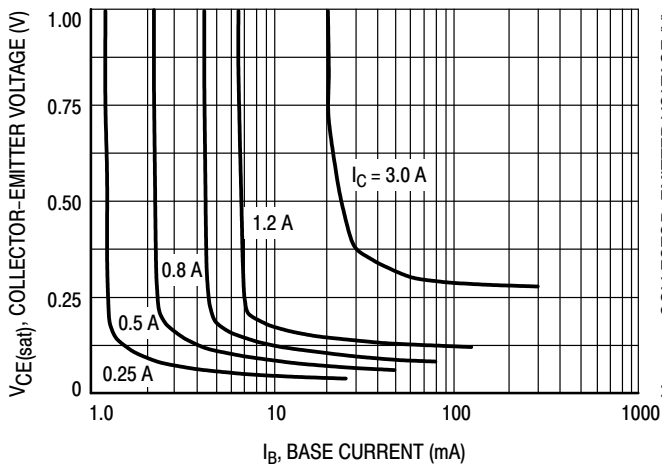


Figure 1. Collector Saturation Region

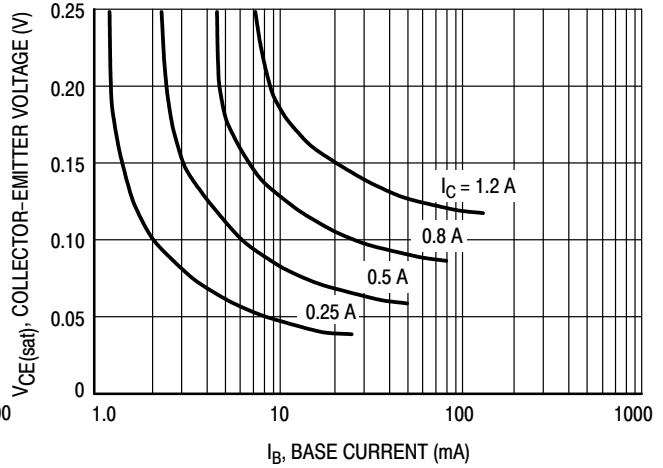


Figure 2. Collector Saturation Region

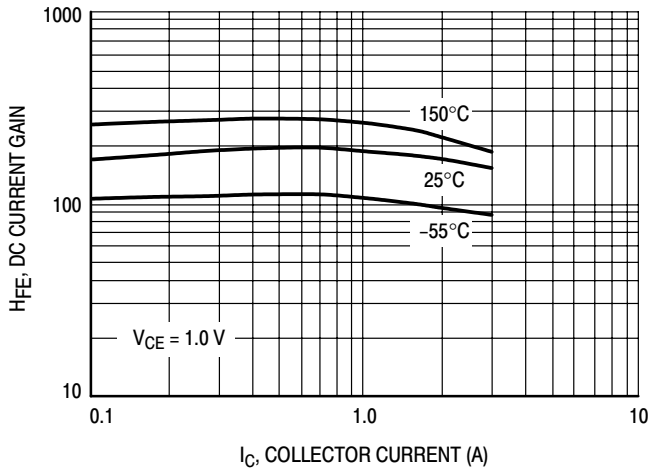


Figure 3. DC Current Gain

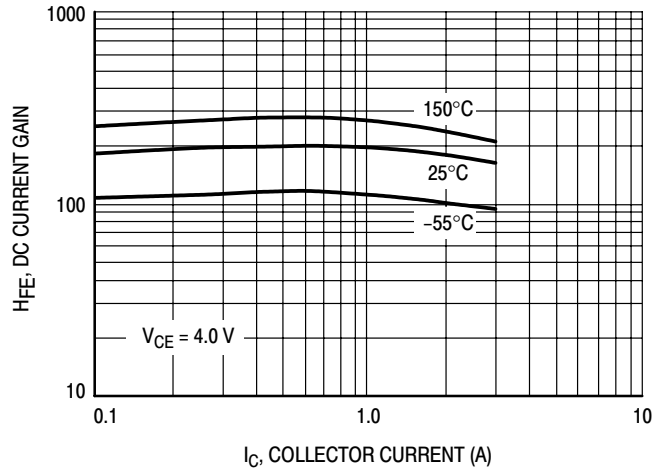


Figure 4. DC Current Gain

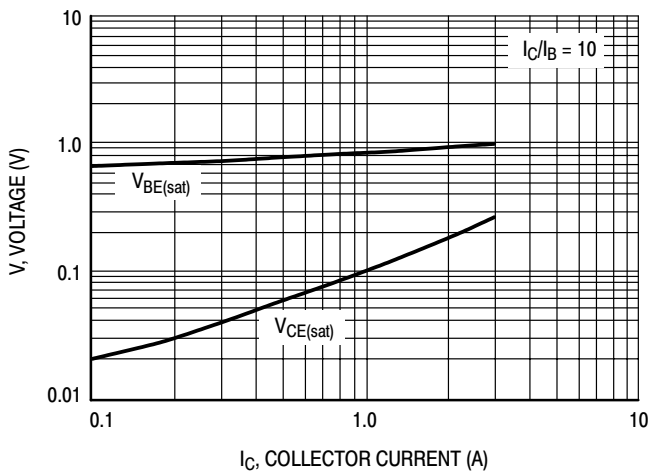


Figure 5. "On" Voltages

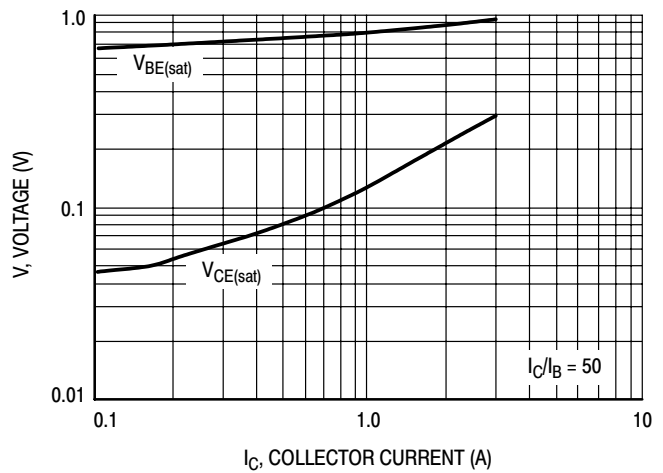


Figure 6. "On" Voltages

MMDJ3N03BJT

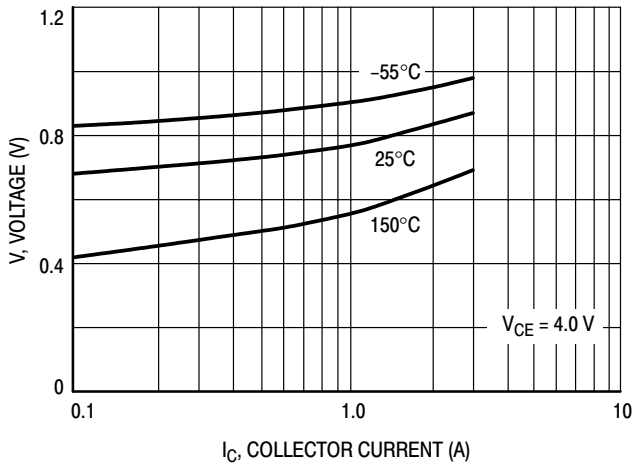


Figure 7. $V_{BE(on)}$ Voltage

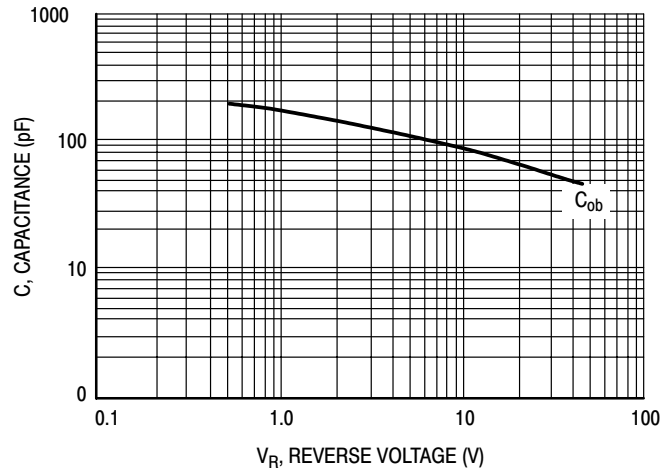


Figure 8. Capacitance

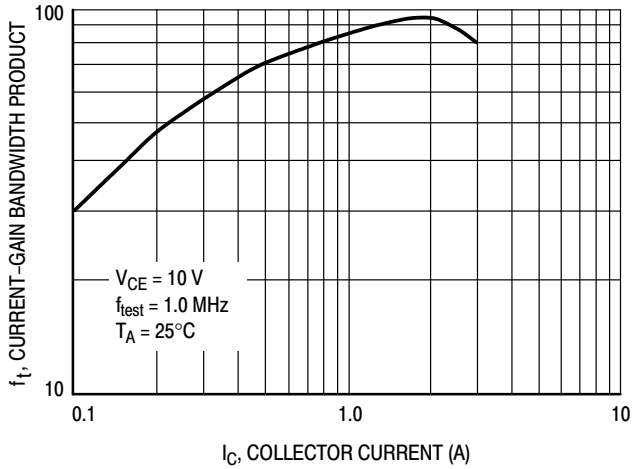


Figure 9. Current-Gain Bandwidth Product

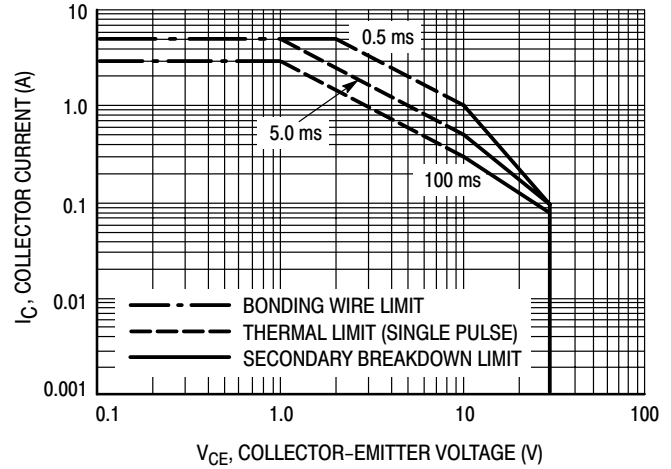


Figure 10. Active Region Safe Operating Area

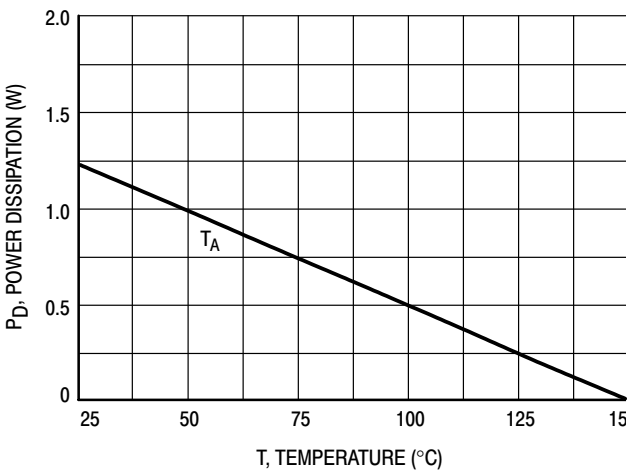


Figure 11. Power Derating

There are two limitations on the power handling ability of a transistor: average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 10 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Secondary breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 12. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

MMDJ3N03BJT

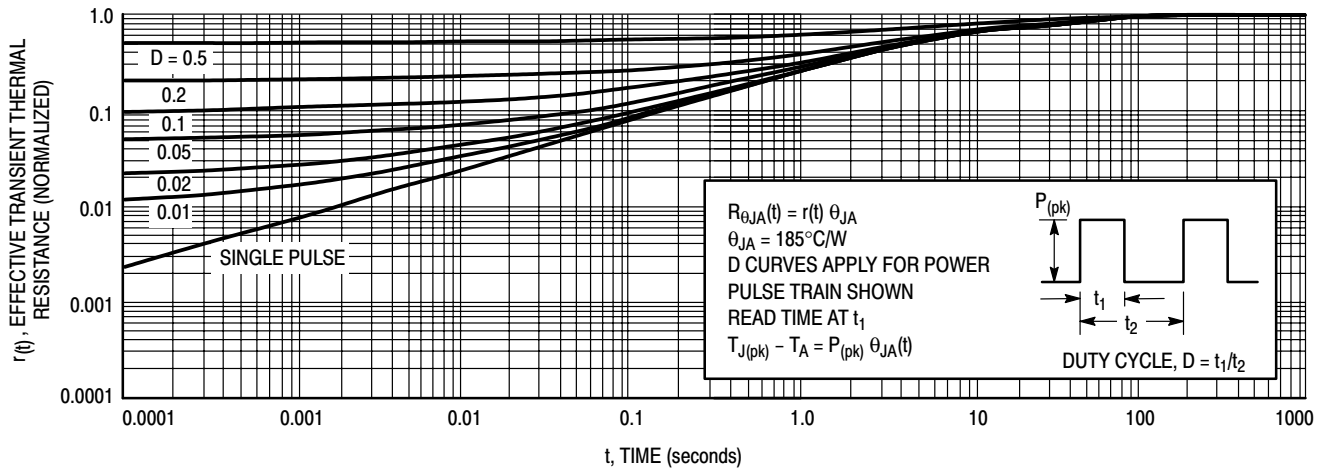
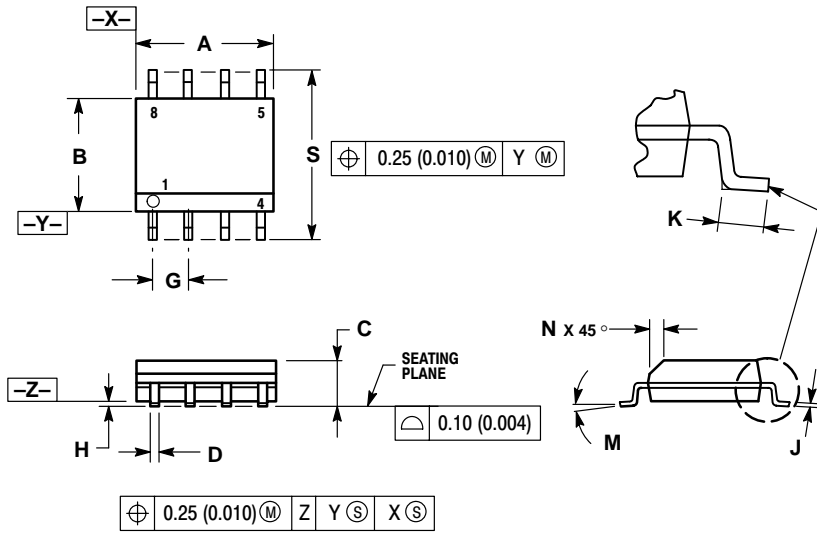


Figure 12. Thermal Response

MMDJ3N03BJT

PACKAGE DIMENSIONS SOIC-8 NB CASE 751-07 ISSUE W



NOTES:


1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 ^o	8 ^o	0 ^o	8 ^o
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

STYLE 16:

1. EMITTER, DIE #1
2. BASE, DIE #1
3. EMITTER, DIE #2
4. BASE, DIE #2
5. COLLECTOR, DIE #2
6. COLLECTOR, DIE #2
7. COLLECTOR, DIE #1
8. COLLECTOR, DIE #1

Notes

ON Semiconductor and  are 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.

PUBLICATION ORDERING INFORMATION

NORTH AMERICA 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: ONlit@hibbertco.com
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

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

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (Mon-Fri 2:30pm to 7:00pm CET)
Email: ONlit-german@hibbertco.com
French Phone: (+1) 303-308-7141 (Mon-Fri 2:00pm to 7:00pm CET)
Email: ONlit-french@hibbertco.com
English Phone: (+1) 303-308-7142 (Mon-Fri 12:00pm to 5:00pm GMT)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, UK, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com
Toll-Free from Mexico: Dial 01-800-288-2872 for Access –
then Dial 866-297-9322

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
Email: r14525@onsemi.com

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

For additional information, please contact your local Sales Representative.