

BD241C (NPN), BD242B (PNP), BD242C (PNP)



ON Semiconductor®

<http://onsemi.com>

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

Features

- Collector–Emitter Saturation Voltage –
 $V_{CE} = 1.2 \text{ Vdc (Max) @ } I_C = 3.0 \text{ Adc}$
- Collector–Emitter Sustaining Voltage –
 $V_{CEO(sus)} = 100 \text{ Vdc (Min) BD241C, BD242C}$
- High Current Gain – Bandwidth Product
 $f_T = 3.0 \text{ MHz (Min) @ } I_C = 500 \text{ mAdc}$
- Compact TO–220 AB Package
- Epoxy Meets UL94 V–0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
Machine Model, C > 400 V
- Pb–Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	BD242B	BD241C BD242C	Unit
Collector–Emitter Voltage	V_{CEO}	80	100	Vdc
Collector–Emitter Voltage	V_{CES}	90	115	Vdc
Emitter–Base Voltage	V_{EB}	5.0		Vdc
Collector Current Continuous Peak	I_C	3.0 5.0		Adc
Base Current	I_B	1.0		Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	40 0.32		W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150		°C

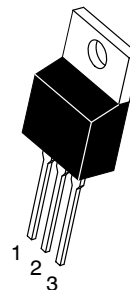
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	3.125	°C/W

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.

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

**POWER TRANSISTORS
COMPLEMENTARY
SILICON
3 AMP
80–100 VOLTS
40 WATTS**



TO–220AB
CASE 221A–09
STYLE 1

MARKING DIAGRAM



BD24xx = Device Code
xx = 1C, 2B, or 2C
A = Assembly Location
Y = Year
WW = Work Week
G = Pb–Free Package

ORDERING INFORMATION

Device	Package	Shipping
BD241C	TO–220AB	50 Units/Rail
BD241CG	TO–220AB (Pb–Free)	50 Units/Rail
BD242B	TO–220AB	50 Units/Rail
BD242BG	TO–220AB (Pb–Free)	50 Units/Rail
BD242C	TO–220AB	50 Units/Rail
BD242CG	TO–220AB (Pb–Free)	50 Units/Rail

BD241C (NPN), BD242B (PNP), BD242C (PNP)

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 30\text{ mA}$, $I_B = 0$)	V_{CE0}	80		Vdc
BD242B BD241C, BD242C		100		
Collector Cutoff Current ($V_{CE} = 50\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$)	I_{CEO}		0.3	mA
BD242B BD241C, BD242C				
Collector Cutoff Current ($V_{CE} = 80\text{ Vdc}$, $V_{EB} = 0$) ($V_{CE} = 100\text{ Vdc}$, $V_{EB} = 0$)	I_{CES}		200	μA
BD242B BD241C, BD242C				
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}		1.0	mA
ON CHARACTERISTICS (Note 1)				
DC Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	h_{FE}	25		
		10		
Collector-Emitter Saturation Voltage ($I_C = 3.0\text{ A}$, $I_B = 0.6\text{ A}$)	$V_{CE(sat)}$		1.2	Vdc
Base-Emitter On Voltage ($I_C = 3.0\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	$V_{BE(on)}$		1.8	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain - Bandwidth Product (Note 2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$)	f_T	3.0		MHz
Small-Signal Current Gain ($I_C = 0.5\text{ A}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	20		

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
2. $f_T = |h_{fe}| \cdot f_{test}$.

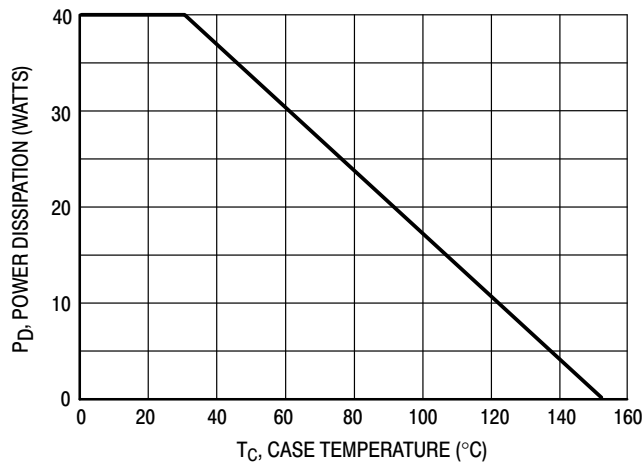


Figure 1. Power Derating

BD241C (NPN), BD242B (PNP), BD242C (PNP)

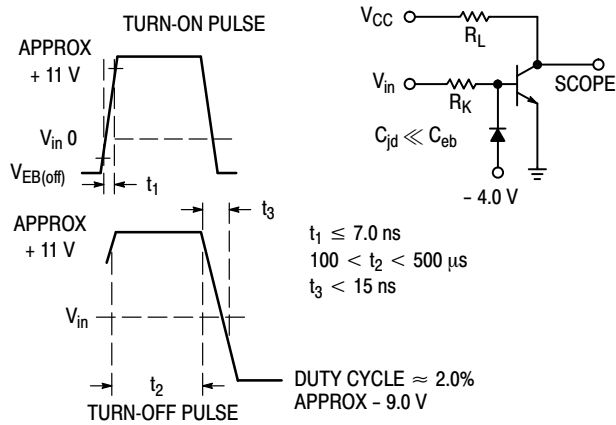


Figure 2. Switching Time Equivalent Circuit

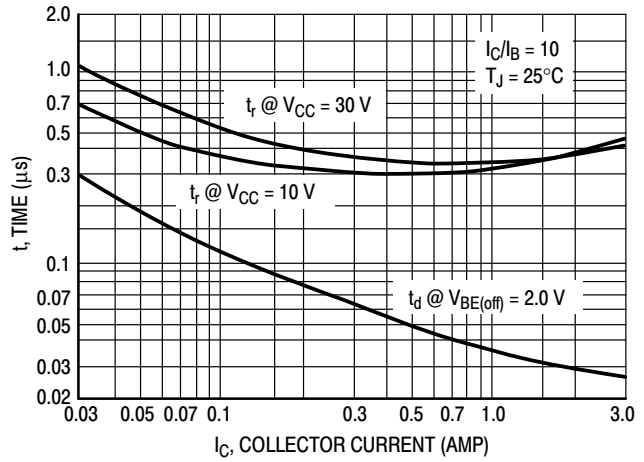


Figure 3. Turn-On Time

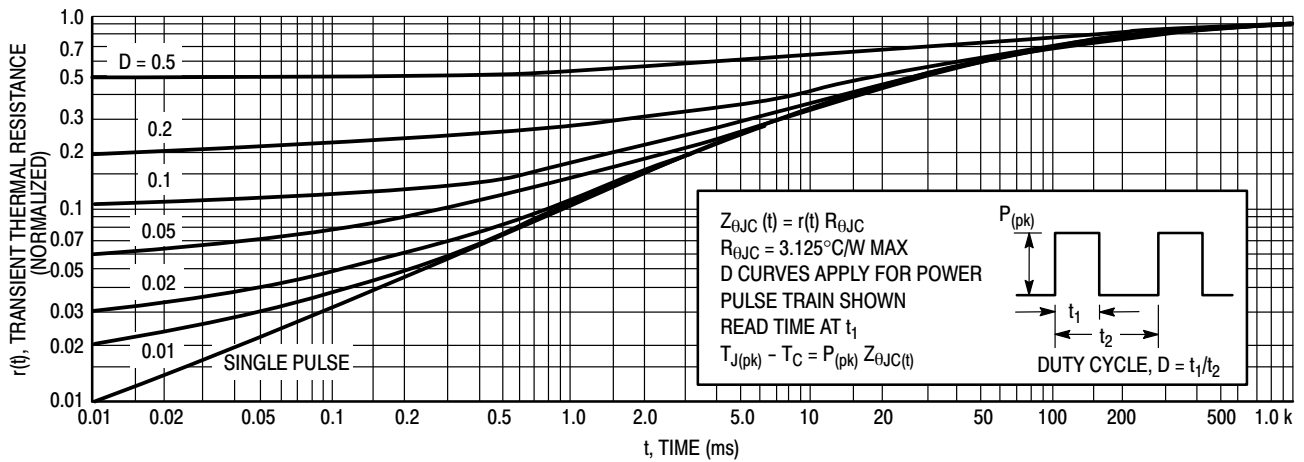


Figure 4. Thermal Response

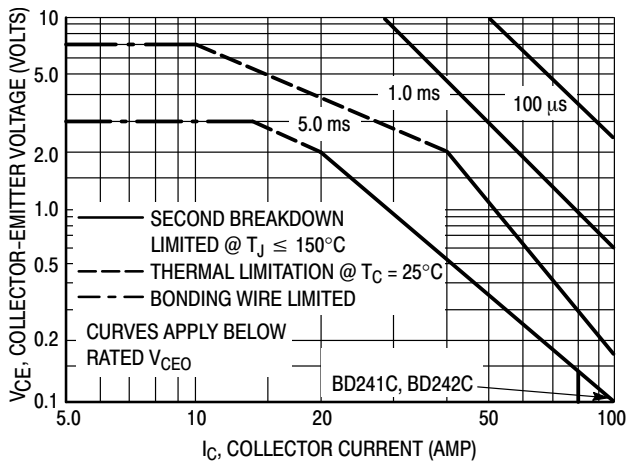


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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 5 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second 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 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

BD241C (NPN), BD242B (PNP), BD242C (PNP)

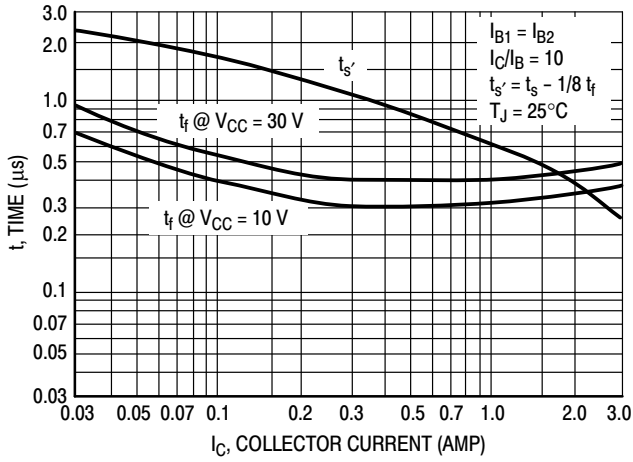


Figure 6. Turn-Off Time

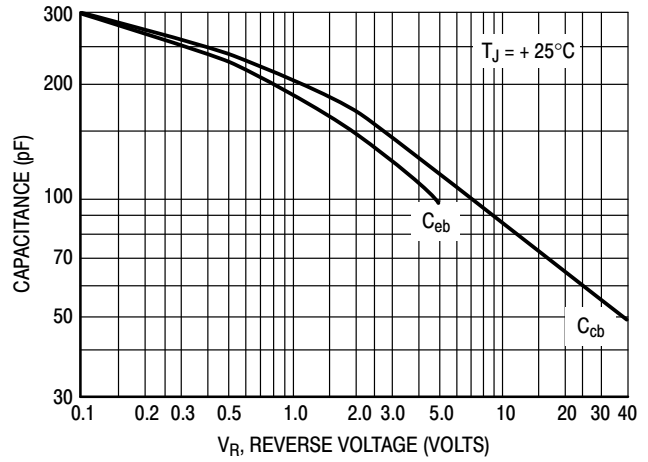


Figure 7. Capacitance

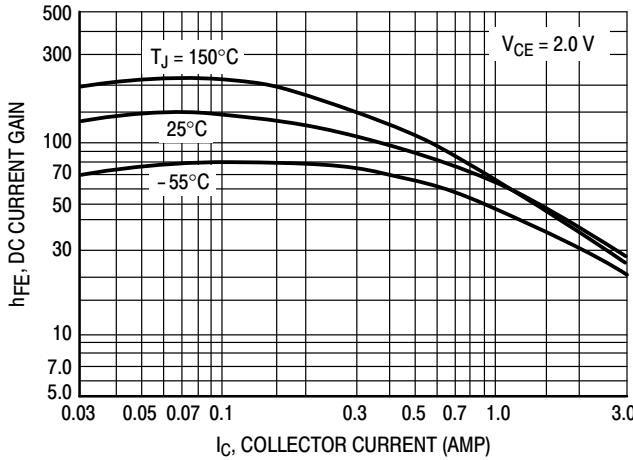


Figure 8. DC Current Gain

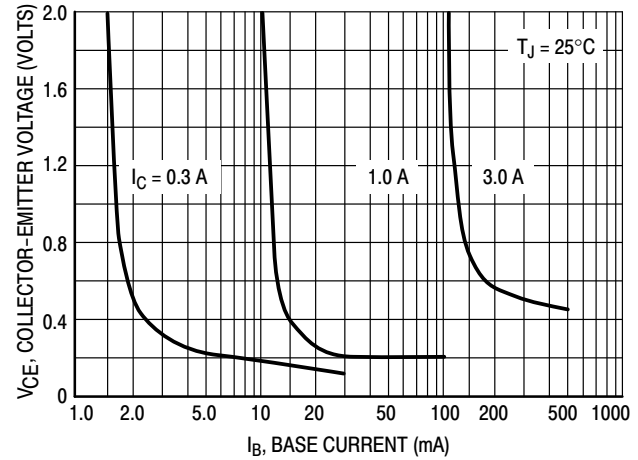


Figure 9. Collector Saturation Region

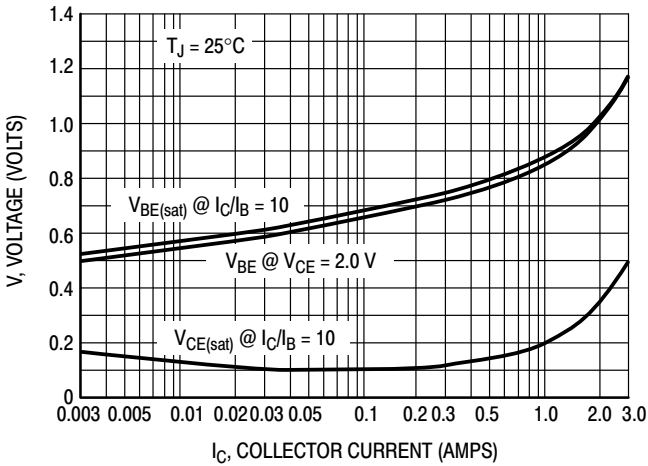


Figure 10. "On" Voltages

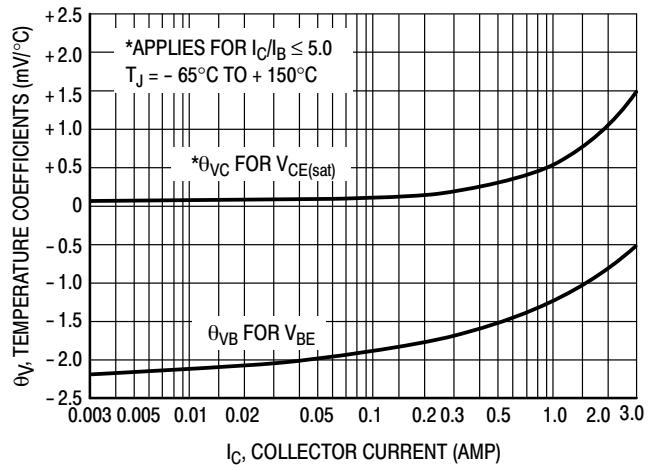


Figure 11. Temperature Coefficients

BD241C (NPN), BD242B (PNP), BD242C (PNP)

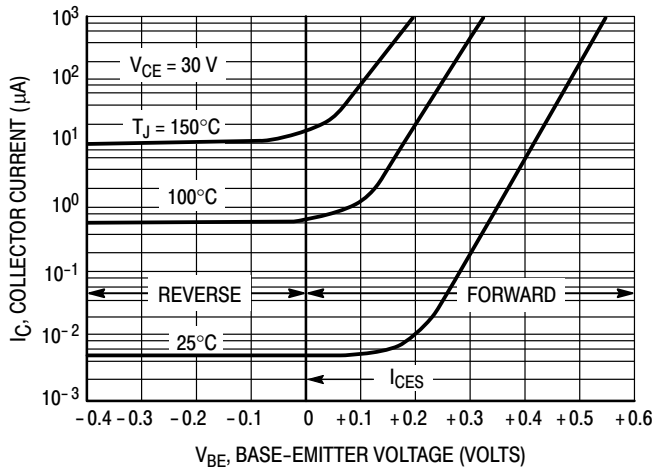


Figure 12. Collector Cut-Off Region

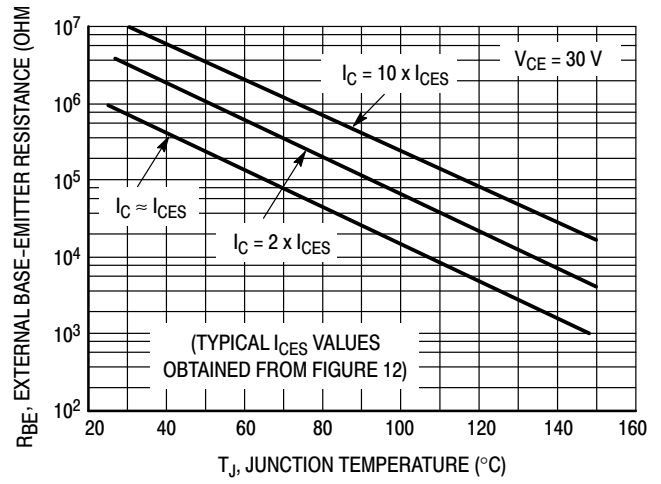
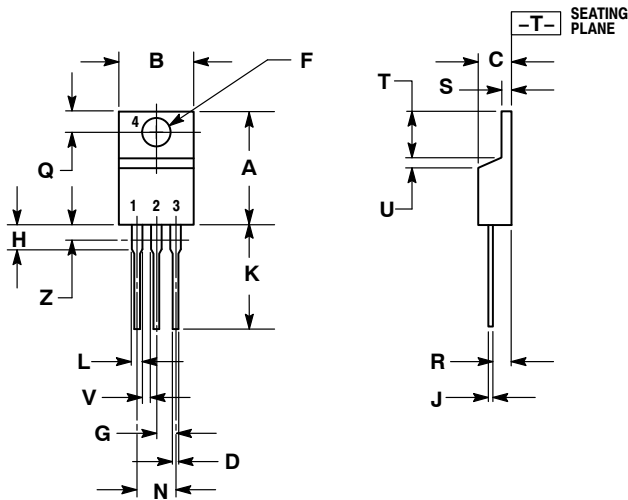


Figure 13. Effects of Base-Emitter Resistance

BD241C (NPN), BD242B (PNP), BD242C (PNP)

PACKAGE DIMENSIONS

TO-220 CASE 221A-09 ISSUE AG



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 1:

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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

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