

MJL4281A (NPN) MJL4302A (PNP)

Complementary NPN-PNP Silicon Power Bipolar Transistors

The MJL4281A and MJL4302A are power transistors for high power audio.

Features

- 350 V Collector–Emitter Sustaining Voltage
- Gain Complementary:
 - Gain Linearity from 100 mA to 5 A
 - High Gain – 80 to 240
 - $h_{FE} = 50$ (min) @ $I_C = 8$ A
- Low Harmonic Distortion
- High Safe Operation Area – 1.0 A/100 V @ 1 Second
- High f_T
- Pb–Free Packages are Available*

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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	350	Vdc
Collector–Base Voltage	V_{CBO}	350	Vdc
Emitter–Base Voltage	V_{EBO}	5.0	Vdc
Collector–Emitter Voltage – 1.5 V	V_{CEX}	350	Vdc
Collector Current – Continuous – Peak (Note 1)	I_C	15 30	Adc
Base Current – Continuous	I_B	1.5	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	230 1.84	W $^\circ\text{C/W}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	0.54	$^\circ\text{C/W}$

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.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

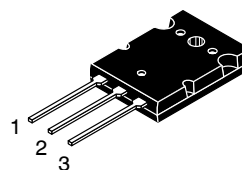
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

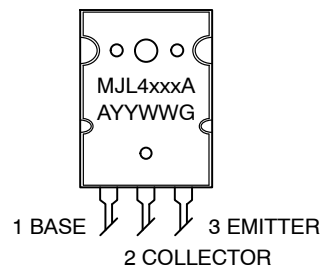
<http://onsemi.com>

**15 AMPERES
COMPLEMENTARY SILICON
POWER TRANSISTORS
350 VOLTS, 230 WATTS**



TO-264
CASE 340G
STYLE 2

MARKING DIAGRAM



xxx = 281 or 302
A = Assembly Location
YY = Year
WW = Work Week
G = Pb–Free Package

ORDERING INFORMATION

Device	Package	Shipping
MJL4281A	TO-264	25 Units/Rail
MJL4281AG	TO-264 (Pb–Free)	25 Units/Rail
MJL4302A	TO-264	25 Units/Rail
MJL4302AG	TO-264 (Pb–Free)	25 Units/Rail

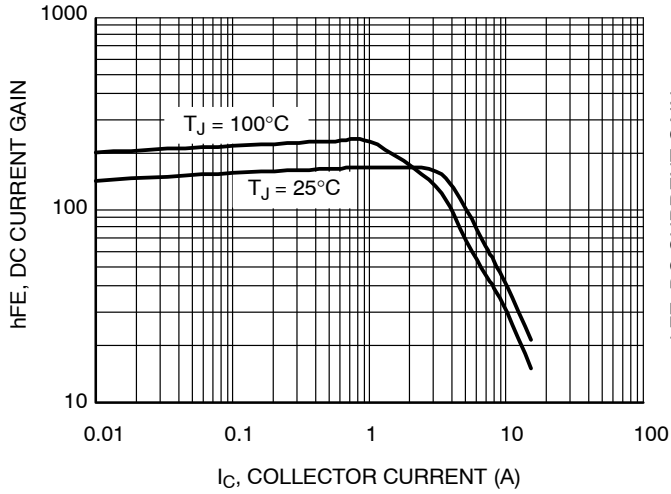
MJL4281A (NPN) MJL4302A (PNP)

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

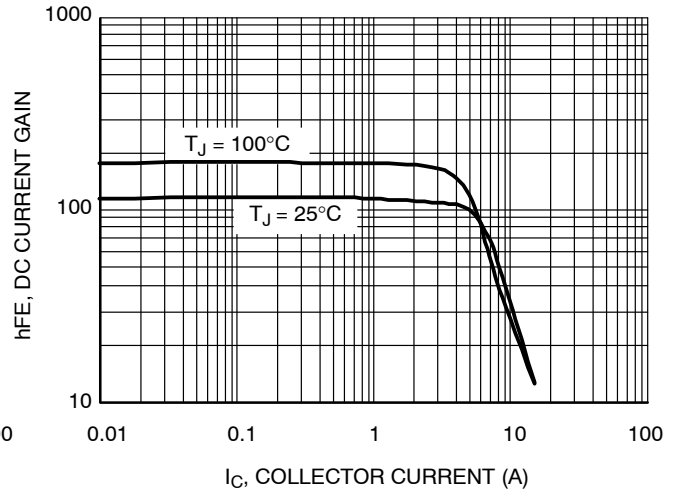
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector Emitter Sustaining Voltage (I _C = 50 mA, I _B = 0)	V _{CE(sus)}	350		Vdc
Collector Cut-off Current (V _{CE} = 200 V, I _B = 0)	I _{CEO}		100	μAdc
Collector Cutoff Current (V _{CB} = 350 Vdc, I _E = 0)	I _{CBO}	–	50	μAdc
Emitter Cutoff Current (V _{EB} = 5.0 Vdc, I _C = 0)	I _{EBO}	–	5.0	μAdc
SECOND BREAKDOWN				
Second Breakdown Collector with Base Forward Biased (V _{CE} = 50 Vdc, t = 1.0 s (non-repetitive) (V _{CE} = 100 Vdc, t = 1.0 s (non-repetitive)	I _{S/b}	4.5 1.0	– –	Adc
ON CHARACTERISTICS				
DC Current Gain (I _C = 100 mAdc, V _{CE} = 5.0 Vdc) (I _C = 1.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 3.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 5.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 8.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 15 Adc, V _{CE} = 5.0 Vdc)	h _{FE}	80 80 80 80 50 10	250 250 250 250 – –	–
Collector–Emitter Saturation Voltage (I _C = 8.0 Adc, I _B = 0.8 Adc)	V _{CE(sat)}	–	1.0	Vdc
Emitter–Base Saturation Voltage (I _C = 8.0 Adc, I _B = 0.8 A)	V _{BE(sat)}	–	1.4	Vdc
Base–Emitter ON Voltage (I _C = 8.0 Adc, V _{CE} = 5.0 Vdc)	V _{BE(on)}	–	1.5	Vdc
DYNAMIC CHARACTERISTICS				
Current–Gain – Bandwidth Product (I _C = 1.0 Adc, V _{CE} = 5.0 Vdc, f _{test} = 1.0 MHz)	f _T	35	–	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1.0 MHz)	C _{ob}	–	600	pF

MJL4281A (NPN) MJL4302A (PNP)

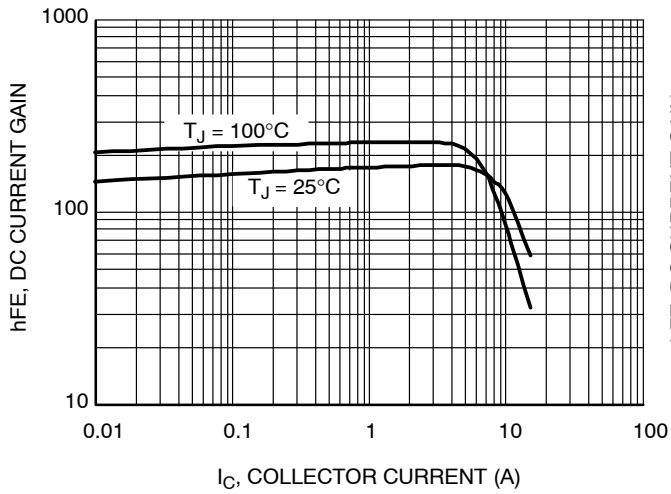
TYPICAL CHARACTERISTICS



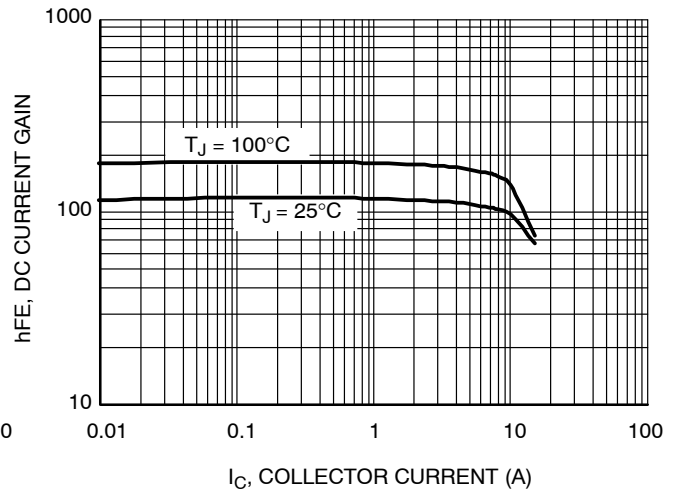
**Figure 1. DC Current Gain, $V_{CE} = 5V$,
NPN MJL4281A**



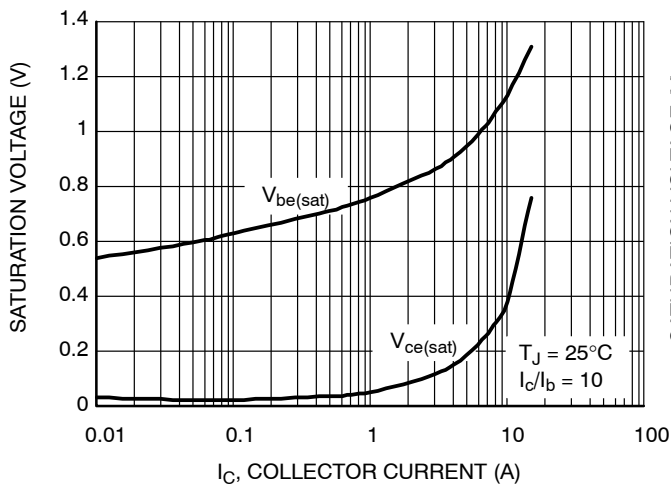
**Figure 2. DC Current Gain, $V_{CE} = 5V$,
PNP MJL4302A**



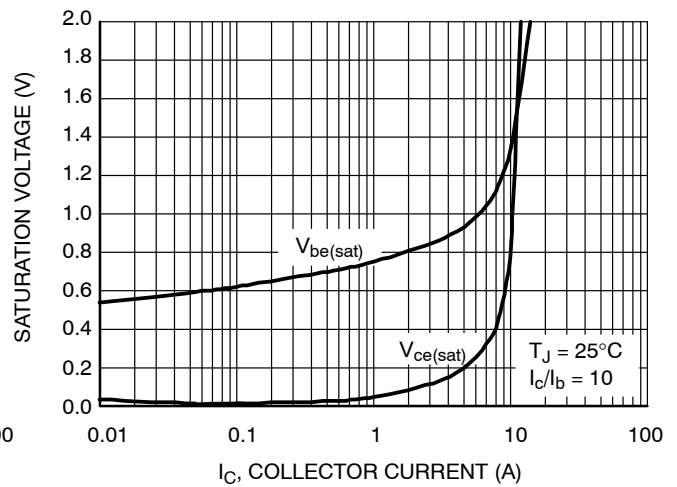
**Figure 3. DC Current Gain, $V_{CE} = 20V$,
NPN MJL4281A**



**Figure 4. DC Current Gain, $V_{CE} = 20V$,
PNP MJL4302A**



**Figure 5. Typical Saturation Voltage,
NPN MJL4281A**



**Figure 6. Typical Saturation Voltage,
PNP MJL4302A**

MJL4281A (NPN) MJL4302A (PNP)

TYPICAL CHARACTERISTICS

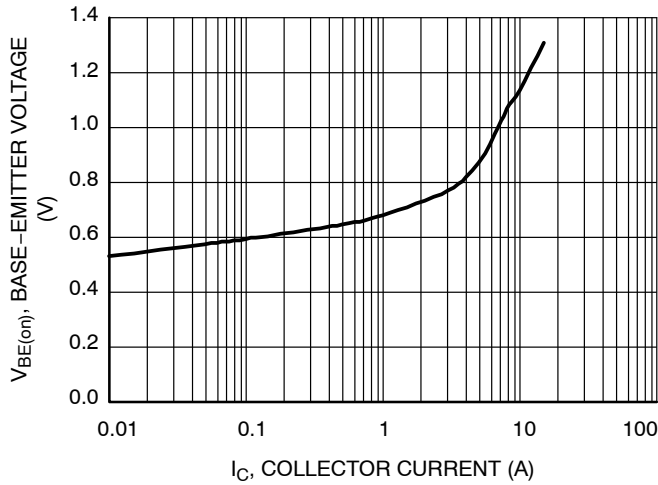


Figure 7. Typical Base-Emitter Voltages, NPN MJL4281A

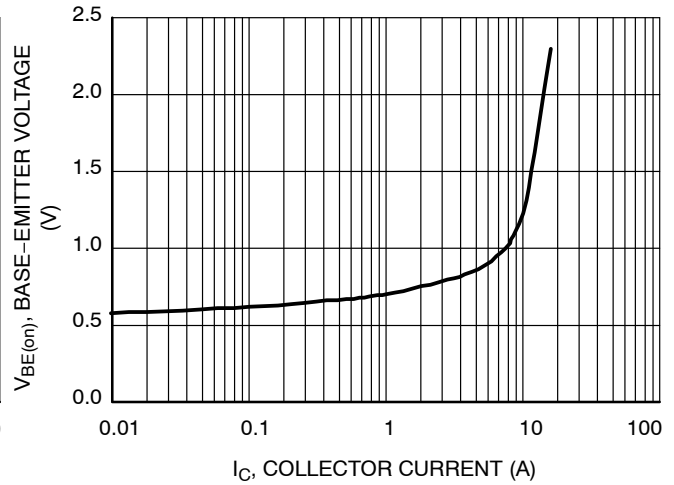


Figure 8. Typical Base-Emitter Voltages, PNP MJL4302A

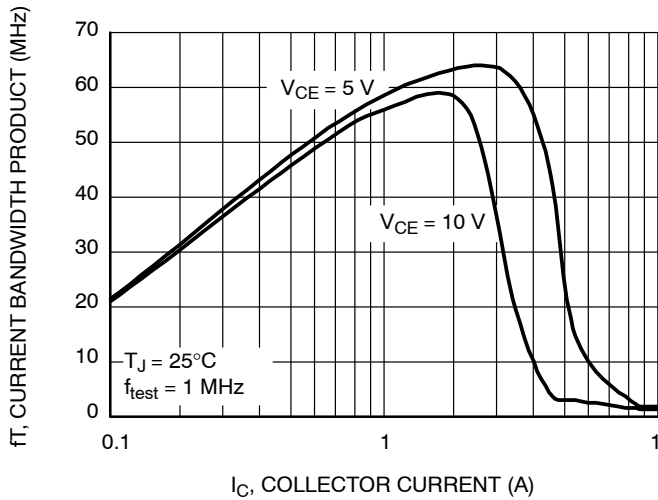


Figure 9. Typical Current Gain Bandwidth Product, NPN MJL4281A

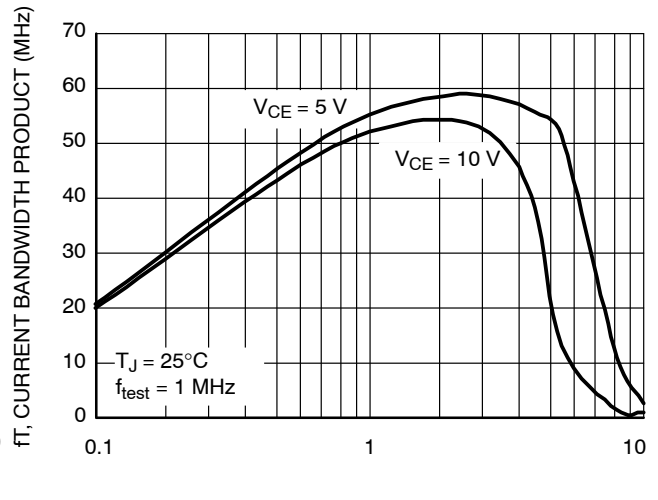


Figure 10. Typical Current Gain Bandwidth Product, PNP MJL4302A

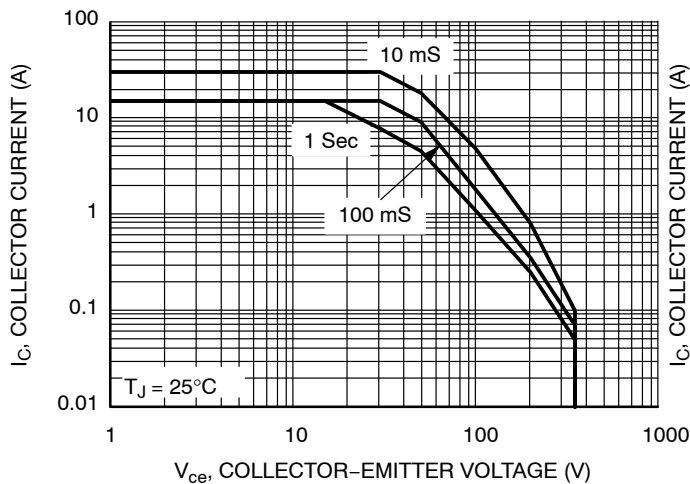


Figure 11. Active Region Safe Operating Area, NPN MJL4281A

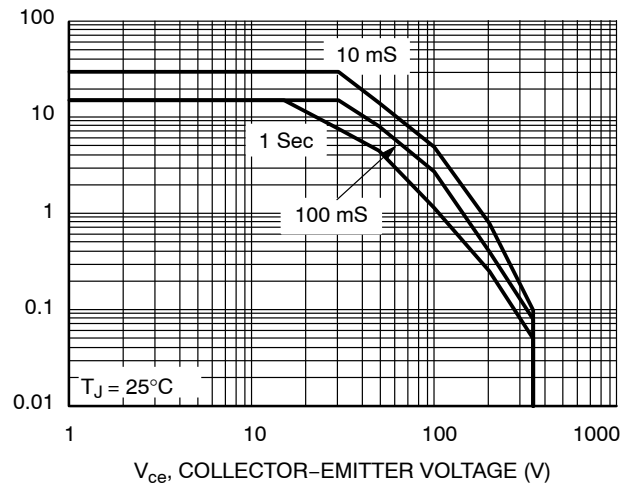
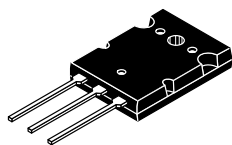


Figure 12. Active Region Safe Operating Area, PNP MJL4302A

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

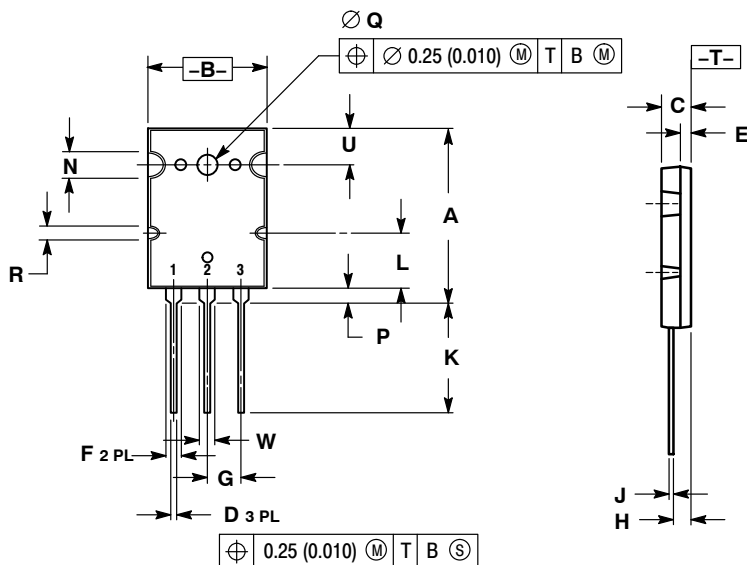
ON Semiconductor®



TO-3BPL (TO-264)
CASE 340G-02
ISSUE J

DATE 17 DEC 2004

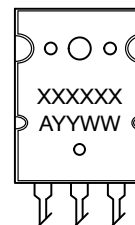
SCALE 1:2



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MIN	MAX	MIN	MAX
A	28.0	29.0	1.102	1.142
B	19.3	20.3	0.760	0.800
C	4.7	5.3	0.185	0.209
D	0.93	1.48	0.037	0.058
E	1.9	2.1	0.075	0.083
F	2.2	2.4	0.087	0.102
G	5.45 BSC		0.215 BSC	
H	2.6	3.0	0.102	0.118
J	0.43	0.78	0.017	0.031
K	17.6	18.8	0.693	0.740
L	11.2 REF		0.411 REF	
N	4.35 REF		0.172 REF	
P	2.2	2.6	0.087	0.102
Q	3.1	3.5	0.122	0.137
R	2.25 REF		0.089 REF	
U	6.3 REF		0.248 REF	
W	2.8	3.2	0.110	0.125

GENERIC MARKING DIAGRAM*



XXXXXX = Specific Device Code
A = Location Code
YY = Year
WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

- STYLE 1:
PIN 1. GATE
2. DRAIN
3. SOURCE
- STYLE 2:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
- STYLE 3:
PIN 1. GATE
2. SOURCE
3. DRAIN
- STYLE 4:
PIN 1. DRAIN
2. SOURCE
3. GATE
- STYLE 5:
PIN 1. GATE
2. COLLECTOR
3. EMITTER

DOCUMENT NUMBER:	98ASB42780B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-3BPL (TO-264)	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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:

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative