



Is Now Part of



**ON Semiconductor®**

To learn more about ON Semiconductor, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (\_), the underscore (\_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (\_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at [www.onsemi.com](http://www.onsemi.com). Please email any questions regarding the system integration to [Fairchild\\_questions@onsemi.com](mailto:Fairchild_questions@onsemi.com).

ON Semiconductor and the ON Semiconductor logo 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](http://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.

# KA3525A

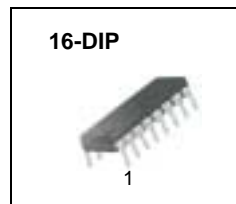
## SMPS Controller

### Features

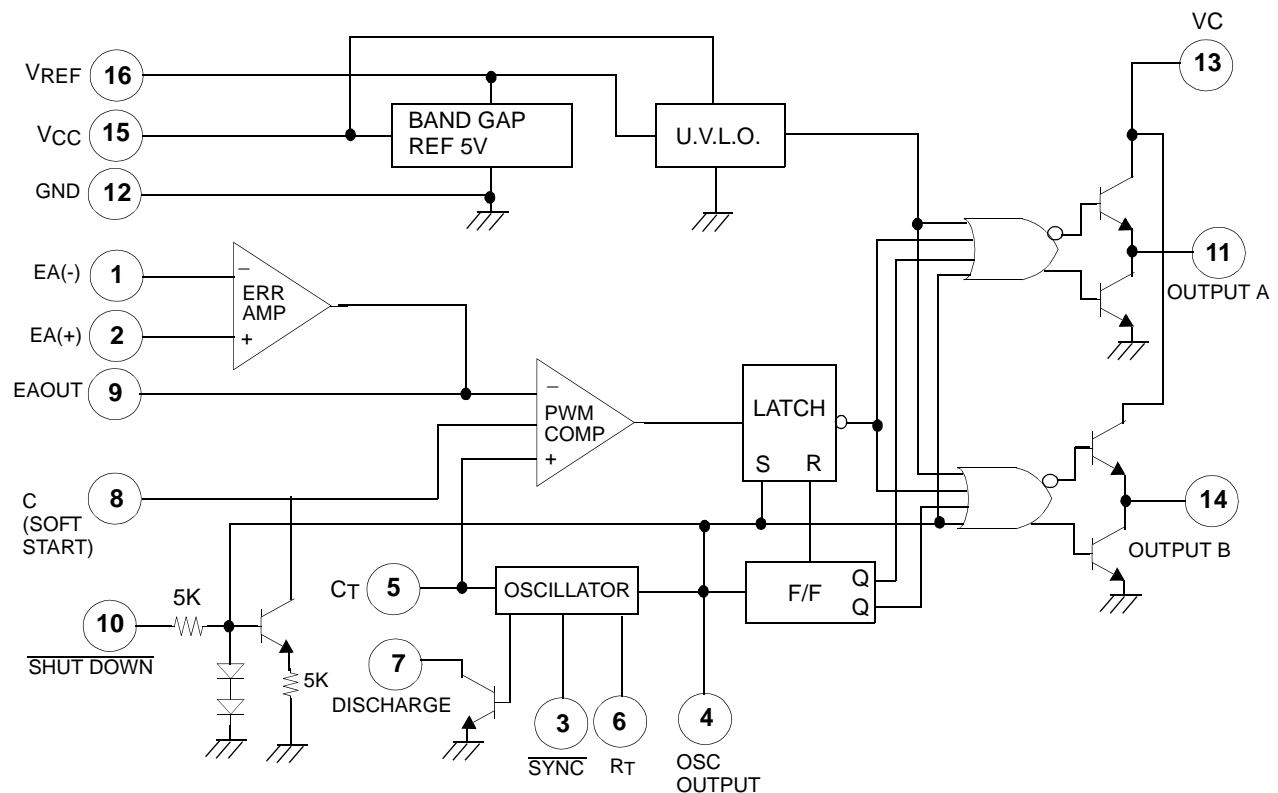
- 5V ±1% Reference
- Oscillator Sync Terminal
- Internal Soft Start
- Deadtime Control
- Under Voltage Lockout

### Description

The KA3525A is a monolithic integrated circuit that includes all of the control circuits necessary for a pulse width modulating regulator. There are a voltage reference, an error amplifier, a pulse width modulator, an oscillator, an under voltage lockout, a soft start circuit, and the output driver in the chip.



### Internal Block Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	VCC	40	V
Collector Supply Voltage	VC	40	V
Output Current, Sink or Source	IO	500	mA
Reference Output Current	IREF	50	mA
Oscillator Charging Current	I <sub>CHG(OSC)</sub>	5	mA
Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>D</sub>	1000	m/W
Operating Temperature	TOPR	0 ~ +70	°C
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°C
Lead Temperature (Soldering, 10sec)	T <sub>LEAD</sub>	+300	°C

## Electrical Characteristics

(VCC = 20V, T<sub>A</sub> = 0 to +70°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Reference Output Voltage	VREF	T <sub>J</sub> = 25°C	5.0	5.1	5.2	V
Line Regulation	ΔVREF	VCC = 8 to 35V	-	9	20	mV
Load Regulation	ΔVREF	IREF = 0 to 20mA	-	20	50	mV
Short Circuit Output Current	ISC	VREF = 0, T <sub>J</sub> = 25°C	-	80	100	mA
Total Output Variation (Note1)	ΔVREF	Line, Load and Temperature	4.95	-	5.25	V
Temperature Stability (Note1)	ST <sub>T</sub>	-	-	20	50	mV
Long Term Stability (Note1)	ST	T <sub>J</sub> = 125°C, 1KHS	-	20	50	mV
<b>OSCILLATOR SECTION</b>						
Initial Accuracy (Note1, 2)	ACCUR	T <sub>J</sub> = 25°C	-	±3	±6	%
Frequency Change With Voltage	Δf/ΔVCC	VCC = 8 to 35V (Note1, 2)	-	±0.8	±2	%
Maximum Frequency	f(MAX)	R <sub>T</sub> = 2kΩ, C <sub>T</sub> = 470pF	400	430	-	kHz
Minimum Frequency	f(MIN)	R <sub>T</sub> = 200kΩ, C <sub>T</sub> = 0.1uF	-	60	120	Hz
Clock Amplitude (Note1, 2)	V(CLK)	-	3	4	-	V
Clock Width (Note1, 2)	t <sub>W</sub> (CLK)	T <sub>J</sub> = 25°C	0.3	0.6	1	μs
Sync Threshold	V <sub>TH</sub> (SYNC)	-	1.2	2	2.8	V
Sync Input Current	I <sub>I</sub> (SYNC)	Sync = 3.5V	-	1.3	2.5	mA

**Electrical Characteristics** (Continued)

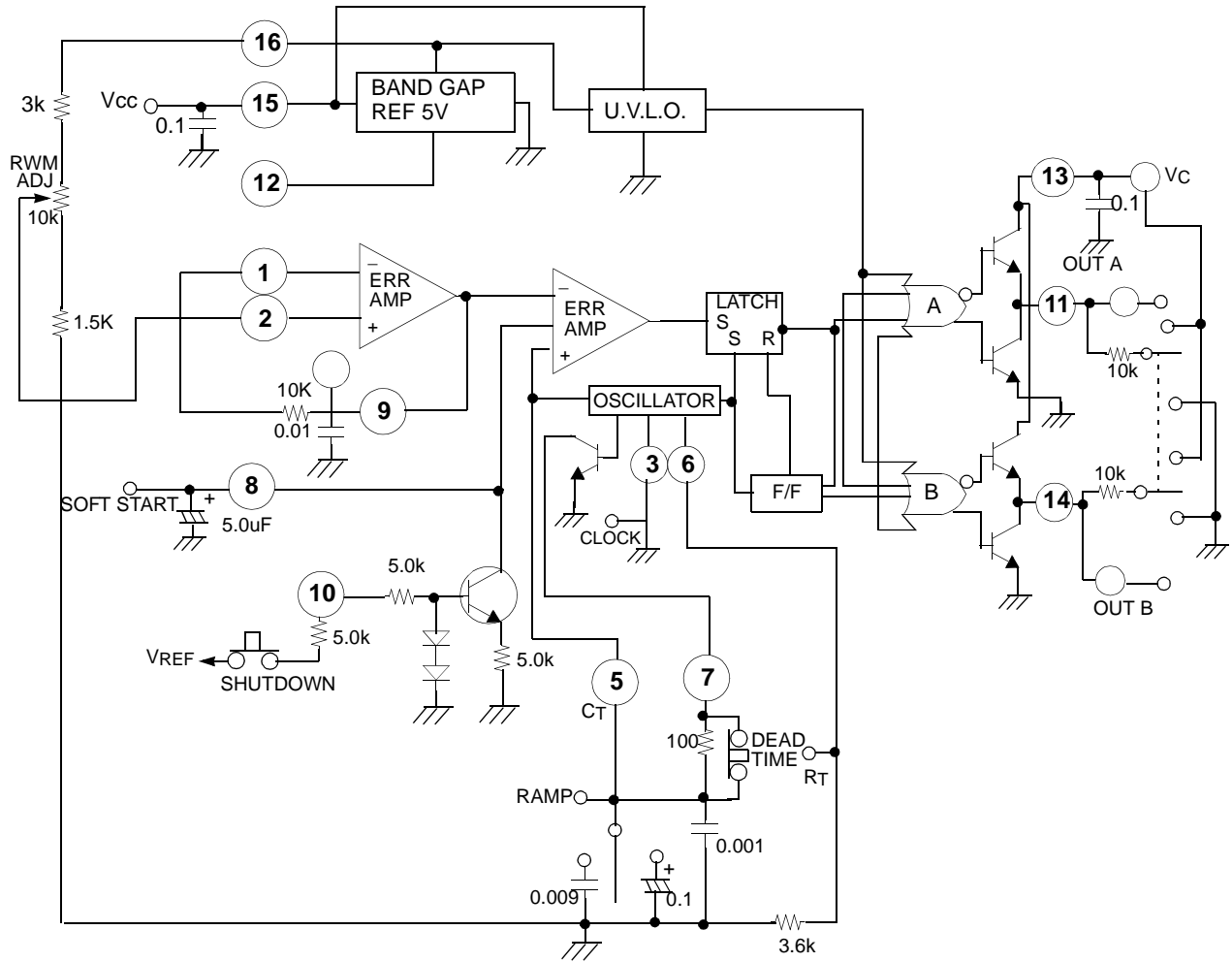
(VCC = 20V, TA = 0 to +70°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>ERROR AMPLIFIER SECTION (V<sub>CM</sub> = 5.1V)</b>						
Input Offset Voltage	V <sub>IO</sub>	-	-	1.5	10	mV
Input Bias Current	I <sub>BIAS</sub>	-	-	1	10	μA
Input Offset Current	I <sub>IO</sub>	-	-	0.1	1	μA
Open Loop Voltage Gain	G <sub>VO</sub>	R <sub>L</sub> ≥ 10MΩ	60	80	-	dB
Common Mode Rejection Ratio	CMRR	V <sub>CM</sub> = 1.5 to 5.2V	60	90	-	dB
Power Supply Rejection Ratio	PSRR	V <sub>CC</sub> = 8 to 3.5V	50	60	-	dB
<b>PWM COMPARATOR SECTION</b>						
Minimum Duty Cycle	D(MIN)	-	-	-	0	%
Maximum Duty Cycle	D(MAX)	-	45	49	-	%
Input Threshold Voltage (Note2)	V <sub>TH1</sub>	Zero Duty Cycle	0.7	0.9	-	V
Input Threshold Voltage (Note2)	V <sub>TH2</sub>	Max Duty Cycle	-	3.2	3.6	V
<b>SOFT-START SECTION</b>						
Soft Start Current	I <sub>SOFT</sub>	V <sub>SD</sub> = 0V, V <sub>SS</sub> = 0V	25	51	80	μA
Soft Start Low Level Voltage	V <sub>SL</sub>	V <sub>SD</sub> = 25V	-	0.3	0.7	V
Shutdown Threshold Voltage	V <sub>TH(SD)</sub>	-	0.9	1.3	1.7	V
Shutdown Input Current	I <sub>N(SD)</sub>	V <sub>SD</sub> = 2.5V	-	0.3	1	mA
<b>OUTPUT SECTION</b>						
Low Output Voltage I	V <sub>OL I</sub>	I <sub>SINK</sub> = 20mA	-	0.1	0.4	V
Low Output Voltage II	V <sub>OL II</sub>	I <sub>SINK</sub> = 100mA	-	0.05	2	V
High Output Voltage I	V <sub>CH I</sub>	I <sub>SOURCE</sub> = 20mA	18	19	-	V
High Output Voltage II	V <sub>CH II</sub>	I <sub>SOURCE</sub> = 100mA	17	18	-	V
Under Voltage Lockout	V <sub>UV</sub>	V <sub>8</sub> and V <sub>9</sub> = High	6	7	8	V
Collector Leakage Current	I <sub>LKG</sub>	V <sub>CC</sub> = 35V	-	80	200	μA
Rise Time (Note1)	t <sub>R</sub>	C <sub>L</sub> = 1μF, T <sub>J</sub> = 25°C	-	80	600	ns
Fall Time (Note1)	t <sub>F</sub>	C <sub>L</sub> = 1μF, T <sub>J</sub> = 25°C	-	70	300	ns
<b>STANDBY CURRENT</b>						
Supply Current	I <sub>CC</sub>	V <sub>CC</sub> = 35V	-	12	20	mA

**Note :**

1. These parameters, although guaranteed over the recommended operating conditions, are not 100% tested in production
2. Tested at f<sub>OSC</sub>=40kHz (R<sub>T</sub>=3.6K, C<sub>T</sub>=0.01μF, R<sub>I</sub> = 0Ω)

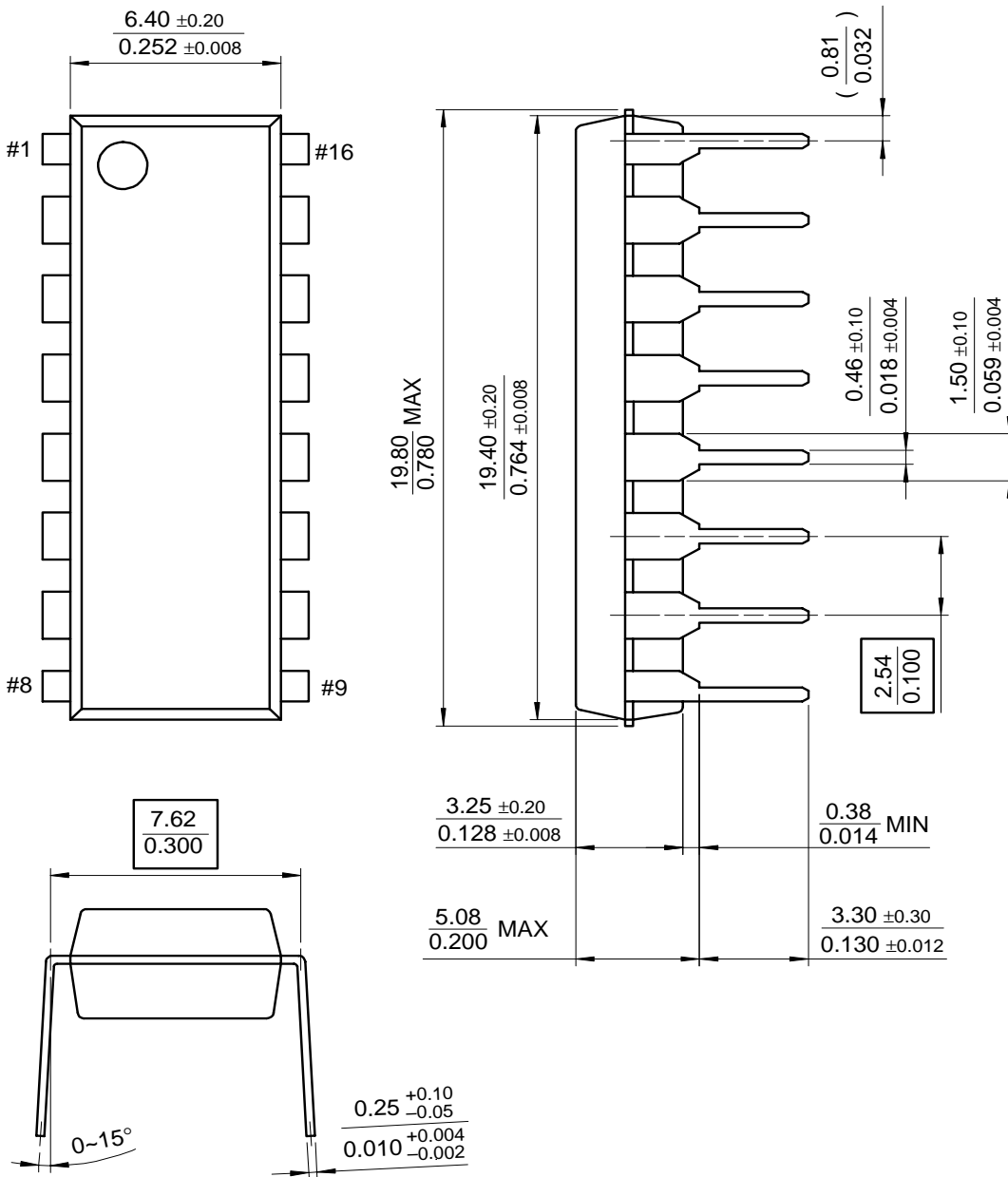
# Test Circuit



# Mechanical Dimensions

## Package

### 16-DIP



## Ordering Information

Product Number	Package	Operating Temperature
KA3525A	16-DIP	0 ~ +70°C

### DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

### LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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](http://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:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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  
**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](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local  
Sales Representative