

Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
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. Please email any questions regarding the system integration to 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. 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.

KA7500B

SMPS Controller

Features

- Internal Regulator Provides a Stable 5V Reference Supply Trimmed to 5%
- Uncommitted Output TR for 200mA Sink or Source Current
- Output Control For Push-Pull or Single Ended Operation
- Variable Duty Cycle By Dead Time Control (Pin 4) Complete PWM Control Circuit
- On-Chip Oscillator With Master or Slave Operation
- Internal Circuit Prohibits Double Pulse at Either Output

Description

The KA7500B is used for the control circuit of the PWM switching regulator. The KA7500B consists of 5V reference voltage circuit, two error amplifiers, a flip flop, an output control circuit, a PWM comparator, a dead time comparator and an oscillator. This device can be operated in the switching frequency of 1kHz to 300kHz.

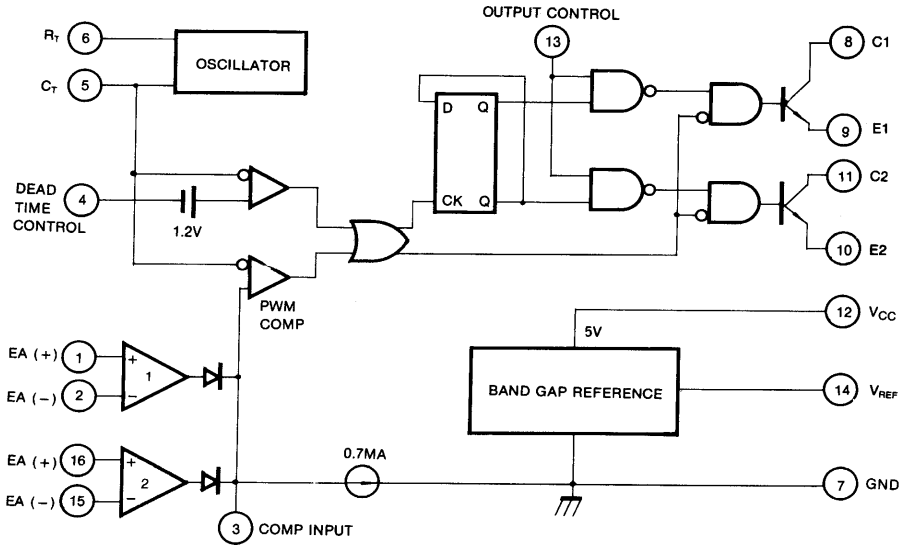
16-DIP



16-SOP



Internal Block Diagram



Rev. 1.0.0

©2002 Fairchild Semiconductor Corporation

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	42	V
Collector Supply Voltage	V_C	42	V
Output Current	I_O	250	mA
Amplifier Input Voltage	V_{IN}	V_{CC} +0.3	V
Power Dissipation (T_A = 25°C)	P_D	1 (KA7500B) 0.9 (KA7500BD)	W
Operating Temperature Range	T_{OPR}	0 ~ +70	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Electrical Characteristics

(V_{CC} = 20V, f = 10kHz, T_A = 0°C to +70°C, unless otherwise specified)

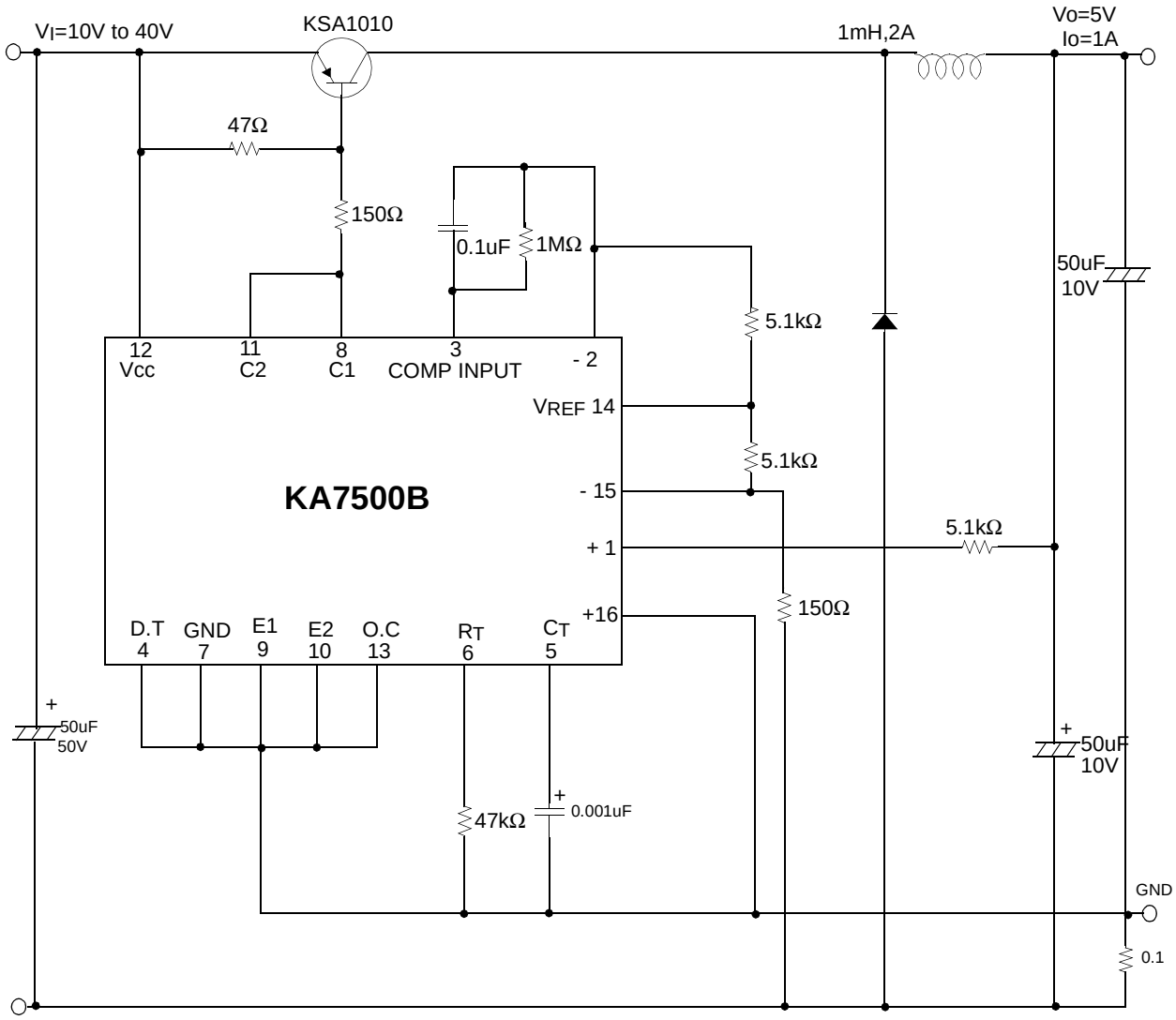
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Reference Output Voltage	V_{REF}	I_{REF} = 1mA	4.75	5.0	5.25	V
Line Regulation	ΔV_{REF}	V_{CC} = 7V to 40V	-	2.0	25	mV
Temperature Coefficient of V_{REF}	$\Delta V_{REF}/\Delta T$	T_A = 0°C to 70°C	-	0.01	0.03	%/°C
Load Regulation	ΔV_{REF}	I_{REF} = 1mA to 10mA	-	1.0	15	mV
Short-Circuit Output Current	I_{SC}	V_{REF} = 0V	10	35	50	mA
OSCILLATOR SECTION						
Oscillation Frequency	f	C_T = 0.01μF, R_T = 12kΩ	-	10	-	kHz
Frequency Change with Temperature	$\Delta f/\Delta T$	C_T = 0.01μF, R_T = 12kΩ	-	-	2	%
DEAD TIME CONTROL SECTION						
Input Bias Current	I_{BIAS}	V_{CC} = 15V, 0V≤V_4≤5.25V	-	-2.0	-10	μA
Maximum Duty Cycle	$D_{(MAX)}$	V_{CC} = 15V, V_4 = 0V O.C Pin = V_{REF}	45	-	-	%
Input Threshold Voltage	V_{ITH}	Zero Duty Cycle	-	3.0	3.3	V
		Max. Duty Cycle	0	-	-	
ERROR AMP SECTION						
Input Offset Voltage	V_{IO}	V_3 = 2.5V	-	2.0	10	mV
Input Offset Current	I_{IO}	V_3 = 2.5V	-	25	250	mA
Input Bias Current	I_{BIAS}	V_3 = 2.5V	-	0.2	1.0	μA
Common Mode Input Voltage	V_{CM}	7V ≤ V_{CC} ≤ 40V	-0.3	-	V_{CC}	V
Open-Loop Voltage Gain	G_{VO}	0.5V ≤ V_3 ≤3 .5V	70	95	-	dB
Unit-Gain Bandwidth (Note1)	BW	-	-	650	-	kHz
PWM COMPARATOR SECTION						
Input Threshold Voltage	V_{ITH}	Zero Duty Cycle	-	4	4.5	V
Input Sink Current	I_{SINK}	V_3=0.7V	-0.3	-0.7	-	mV
OUTPUT SECTION						
Output Saturation Voltage Common Emitter	$V_{CE(SAT)}$	V_E = 0, I_C = 200mA	-	1.1	1.3	V
Common Collector	$V_{CC(SAT)}$	V_C = 15V, I_E = -200mA	-	1.5	2.5	
Collector Off-State Current	$I_{C(OFF)}$	V_{CC} = 40V, V_{CE} = 40V	-	2	100	μA
Emitter Off-State Current	$I_{E(OFF)}$	V_{CC} = V_C = 40V, V_E = 0	-	-	-100	
TOTAL DEVICE						
Supply Current	I_{CC}	Pin 6 = V_{REF}, V_{CC} = 15V	-	6	10	mA
OUTPUT SWITCHING CHARACTERISTICS						
Rise Time	t_R	-	-	-	-	-
Common Emitter	-	-	-	100	200	ns
Common Collector	-	-	-	100	200	
Fall Time	t_F	-	-	-	-	-
Common Emitter	-	-	-	25	100	ns
Common Collector	-	-	-	40	100	

Note:

1. This parameter, although guaranteed, is not 100% tested in production.

Typical Application

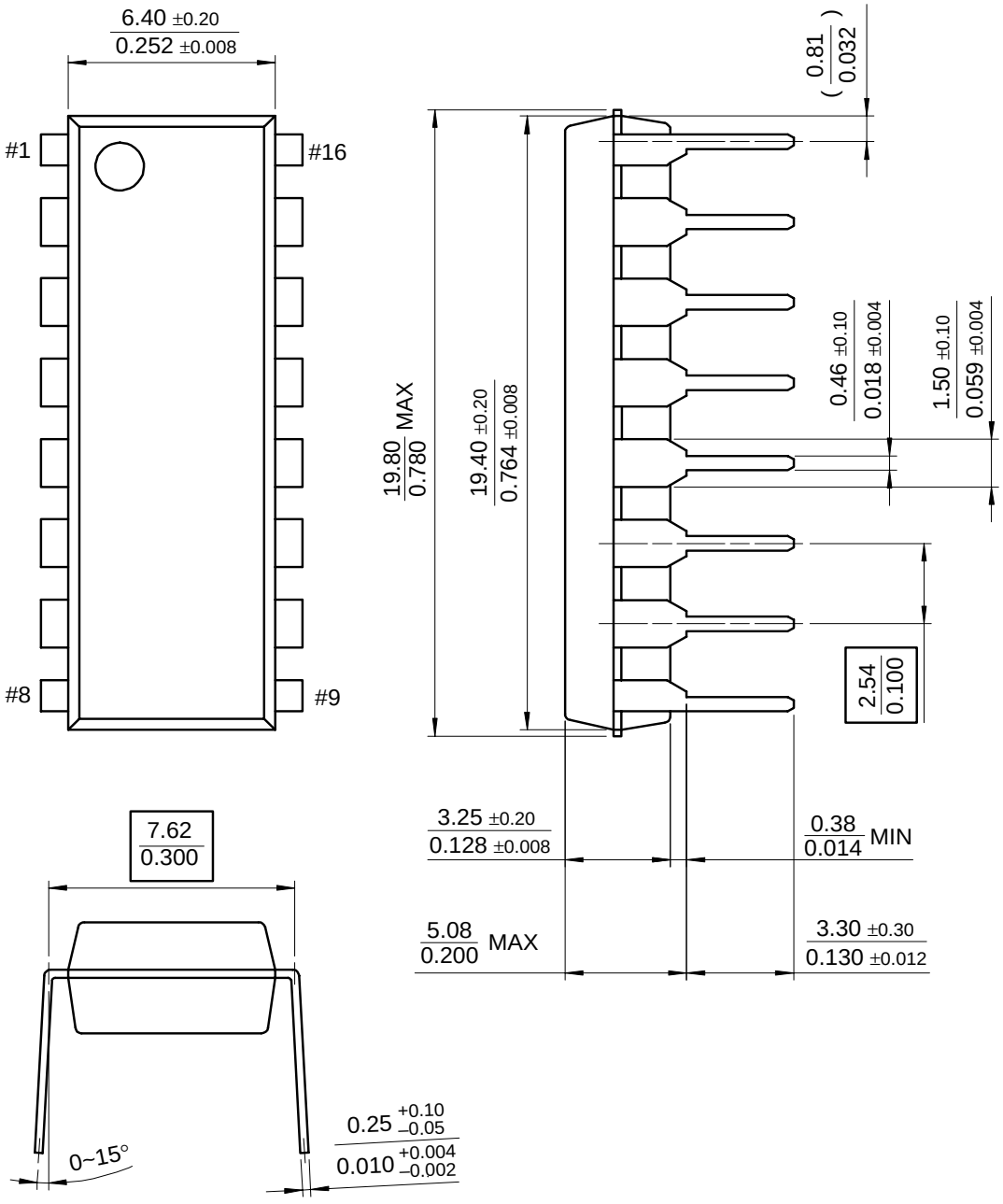
Pulse Width Modulated Step-down Converter



Mechanical Dimensions

Package

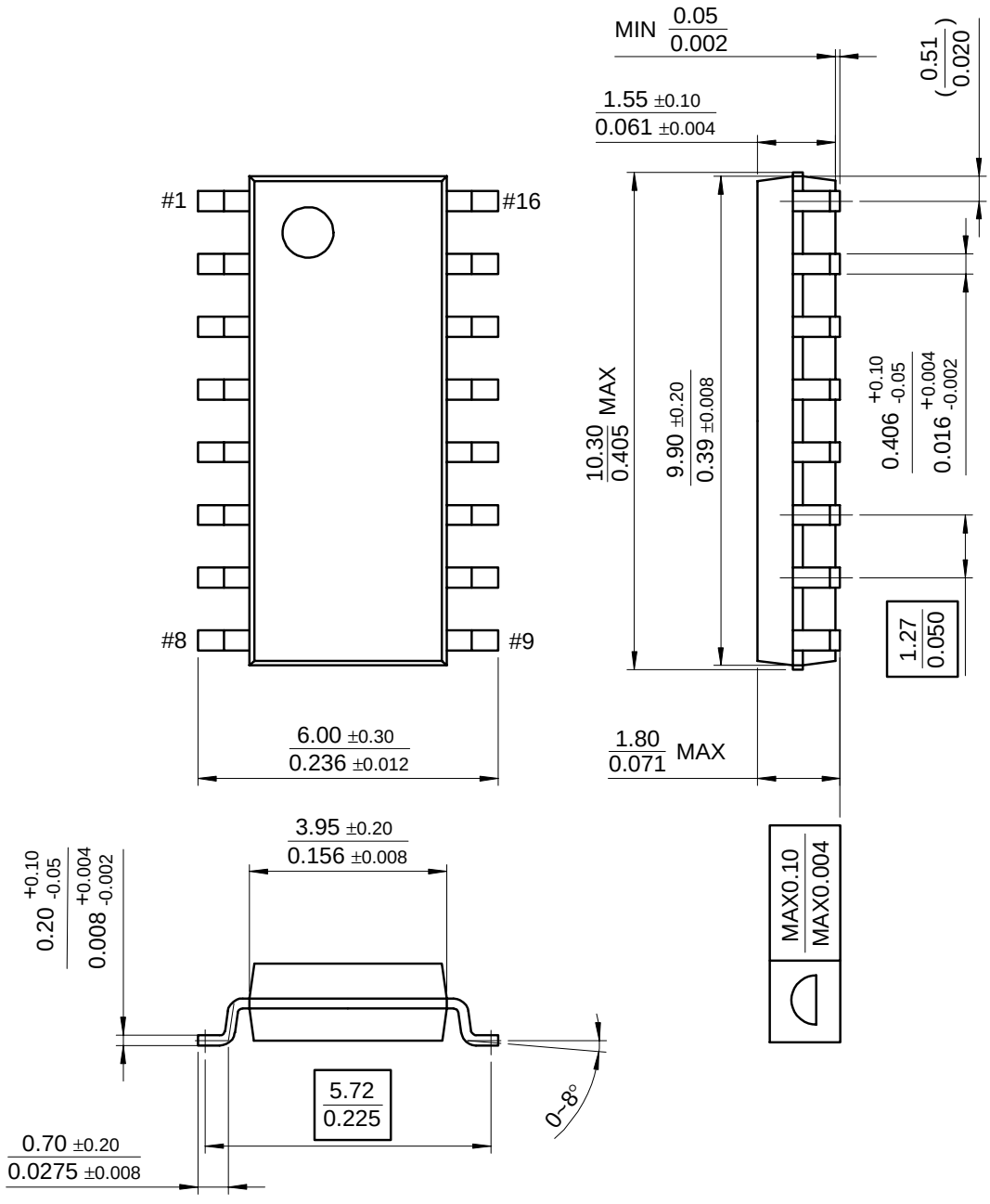
16-DIP



Mechanical Dimensions (Continued)

Package

16-SOP



Ordering Information

Product Number	Package	Operating Temperature
KA7500B	16-DIP	0 ~ +70°C
KA7500BD	16-SOP	

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.

9/10/02 0.0m 001
Stock#DSxxxxxxxx
© 2002 Fairchild Semiconductor Corporation

ON Semiconductor and ON 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:
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

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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

onsemi:
KA7500B