

# KA7500B

## SMPS Controller

### Features

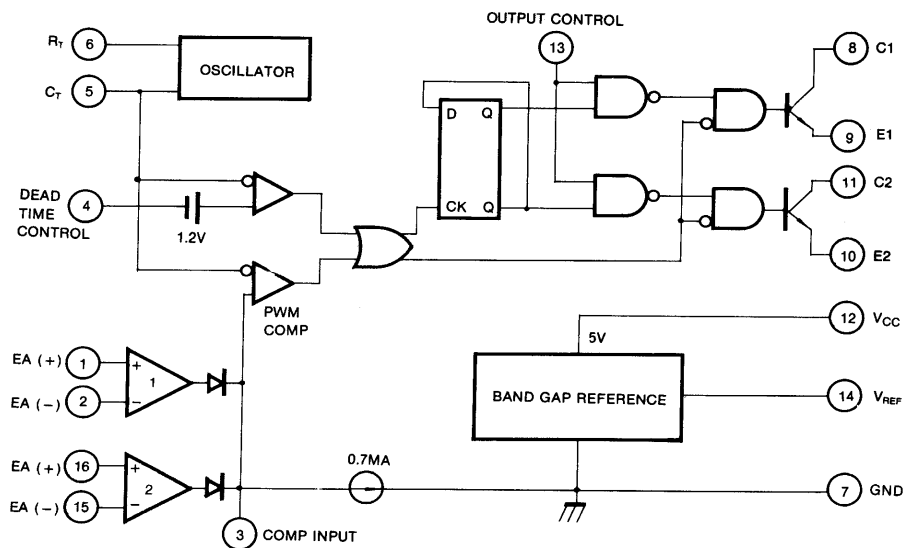
- Internal Regulator Provides a Stable 5V Reference Supply Trimmed to 5%
- Uncommitted Output TR for 200mA Sink or Source Current
- Output Control For Push-Pull or Single Ended Operation
- Variable Duty Cycle By Dead Time Control (Pin 4) Complete PWM Control Circuit
- On-Chip Oscillator With Master or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



### Internal Block Diagram



## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	42	V
Collector Supply Voltage	V <sub>C</sub>	42	V
Output Current	I <sub>O</sub>	250	mA
Amplifier Input Voltage	V <sub>IN</sub>	V <sub>CC</sub> +0.3	V
Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>D</sub>	1 (KA7500B) 0.9 (KA7500BD)	W
Operating Temperature Range	T <sub>OPR</sub>	0 ~ +70	°C
Storage Temperature Range	T <sub>STG</sub>	-65 ~ +150	°C

## Electrical Characteristics

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

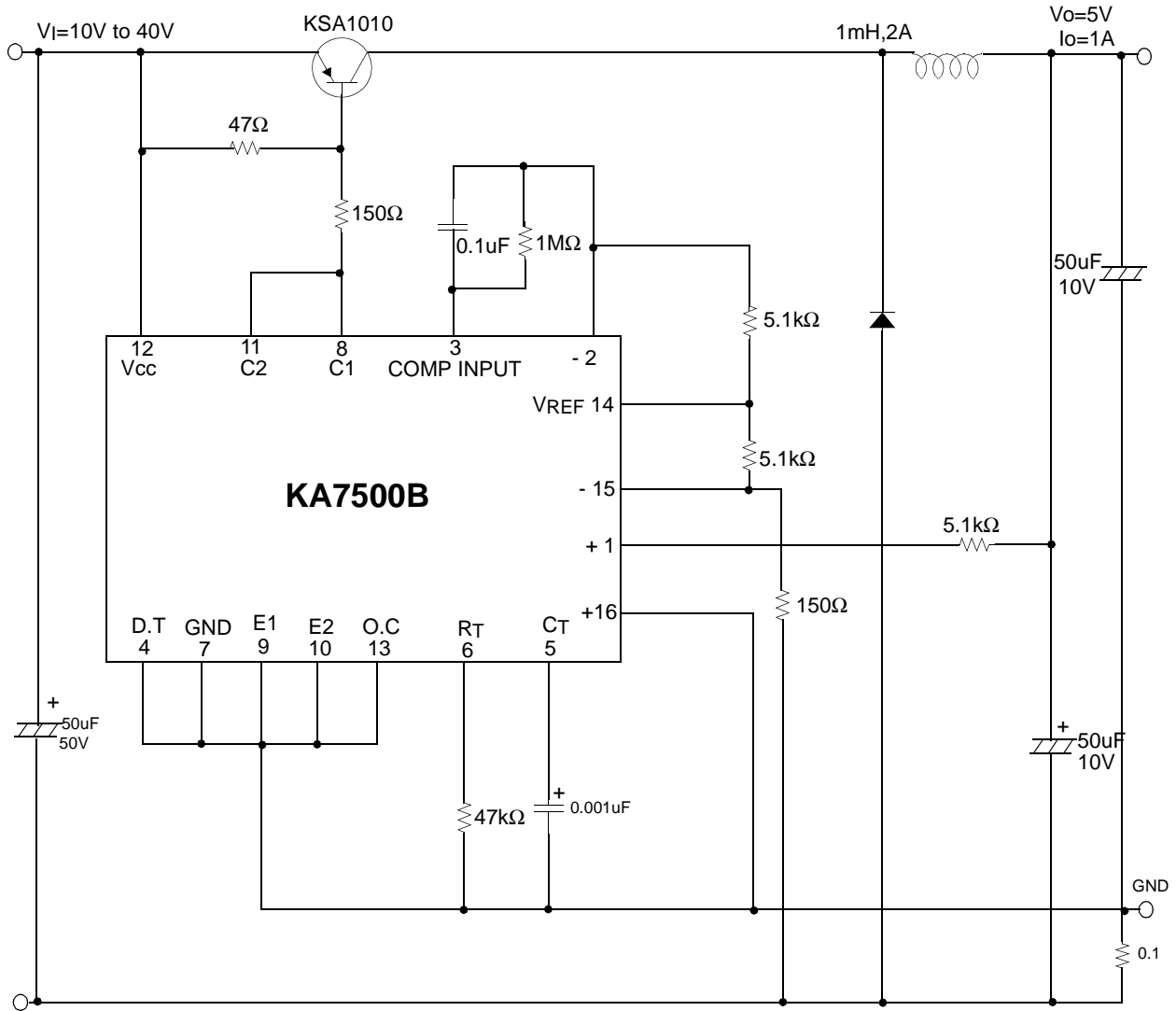
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Reference Output Voltage	$V_{REF}$	$I_{REF} = 1mA$	4.75	5.0	5.25	V
Line Regulation	$\Delta V_{REF}$	$V_{CC} = 7V$ to $40V$	-	2.0	25	mV
Temperature Coefficient of $V_{REF}$	$\Delta V_{REF}/\Delta T$	$T_A = 0^{\circ}C$ to $70^{\circ}C$	-	0.01	0.03	%/ $^{\circ}C$
Load Regulation	$\Delta V_{REF}$	$I_{REF} = 1mA$ to $10mA$	-	1.0	15	mV
Short-Circuit Output Current	$I_{SC}$	$V_{REF} = 0V$	10	35	50	mA
<b>OSCILLATOR SECTION</b>						
Oscillation Frequency	f	$C_T = 0.01\mu F$ , $R_T = 12k\Omega$	-	10	-	kHz
Frequency Change with Temperature	$\Delta f/\Delta T$	$C_T = 0.01\mu F$ , $R_T = 12k\Omega$	-	-	2	%
<b>DEAD TIME CONTROL SECTION</b>						
Input Bias Current	$I_{BIAS}$	$V_{CC} = 15V$ , $0V \leq V_4 \leq 5.25V$	-	-2.0	-10	$\mu A$
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	-	-	
<b>ERROR AMP SECTION</b>						
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	$\mu A$
Common Mode Input Voltage	$V_{CM}$	$7V \leq V_{CC} \leq 40V$	-0.3	-	$V_{CC}$	V
Open-Loop Voltage Gain	$G_{VO}$	$0.5V \leq V_3 \leq 3.5V$	70	95	-	dB
Unit-Gain Bandwidth (Note1)	BW	-	-	650	-	kHz
<b>PWM COMPARATOR SECTION</b>						
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
<b>OUTPUT SECTION</b>						
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	$\mu A$
Emitter Off-State Current	$I_E(OFF)$	$V_{CC} = V_C = 40V$ , $V_E = 0$	-	-	-100	
<b>TOTAL DEVICE</b>						
Supply Current	$I_{CC}$	Pin 6 = $V_{REF}$ , $V_{CC} = 15V$	-	6	10	mA
<b>OUTPUT SWITCHING CHARACTERISTICS</b>						
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

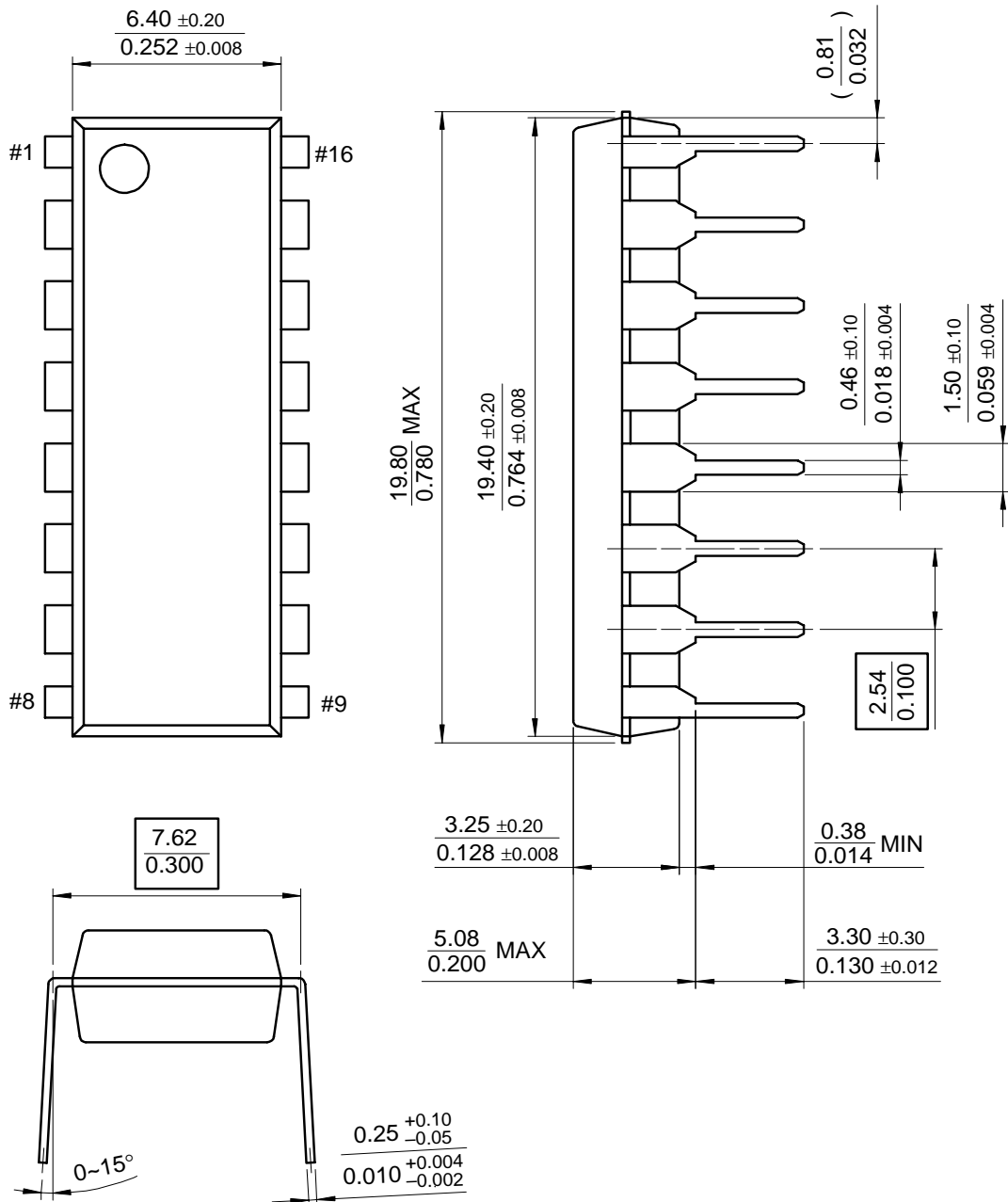
## Pulse Width Modulated Step-down Converter



# Mechanical Dimensions

## Package

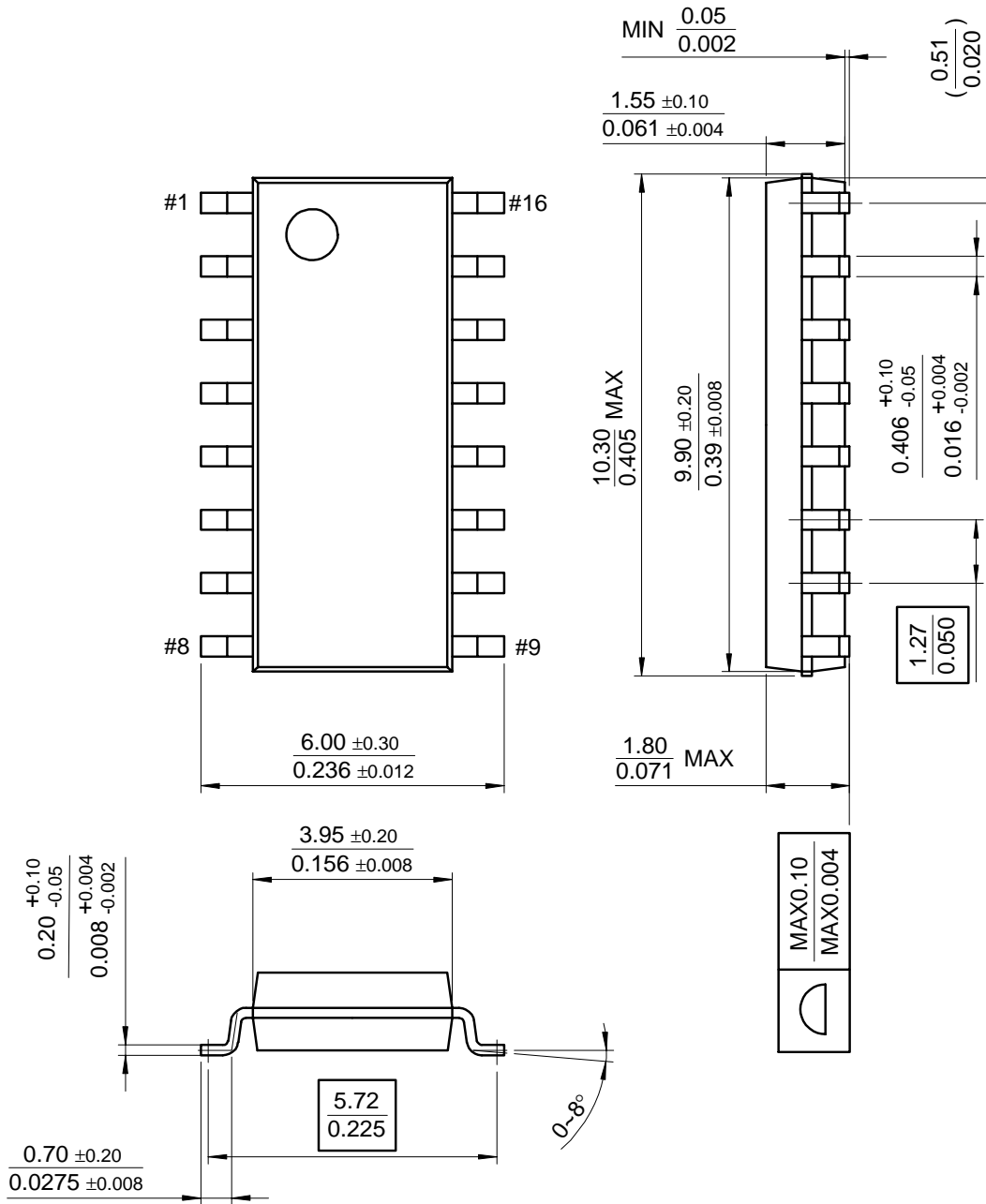
### 16-DIP



Mechanical Dimensions (Continued)

Package

16-SOP



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## Ordering Information

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

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