

# KA7500B

## SMPS Controller

### Features

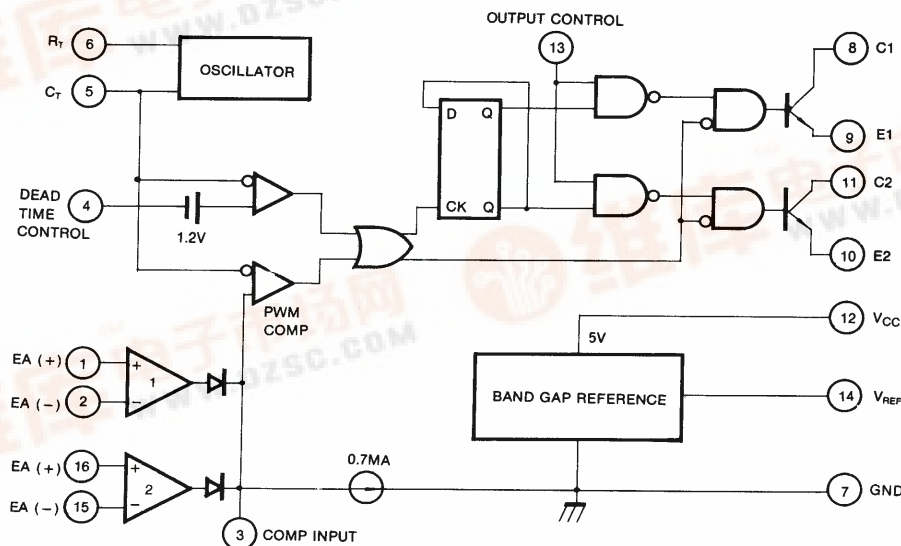
- Internal Regulator Provides a Stable 5V Reference Supply Trimmed to 5%
- Uncommitted Output TR for 200mA Sink or Source Current
- Output Control For Push-Pull or Single Ended Operation
- Variable Duty Cycle By Dead Time Control (Pin 4) Complete PWM Control Circuit
- On-Chip Oscillator With Master or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



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**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

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## Electrical Characteristics

(VCC = 20V, f = 10kHz, TA = 0°C to +70°C, unless otherwise specified)

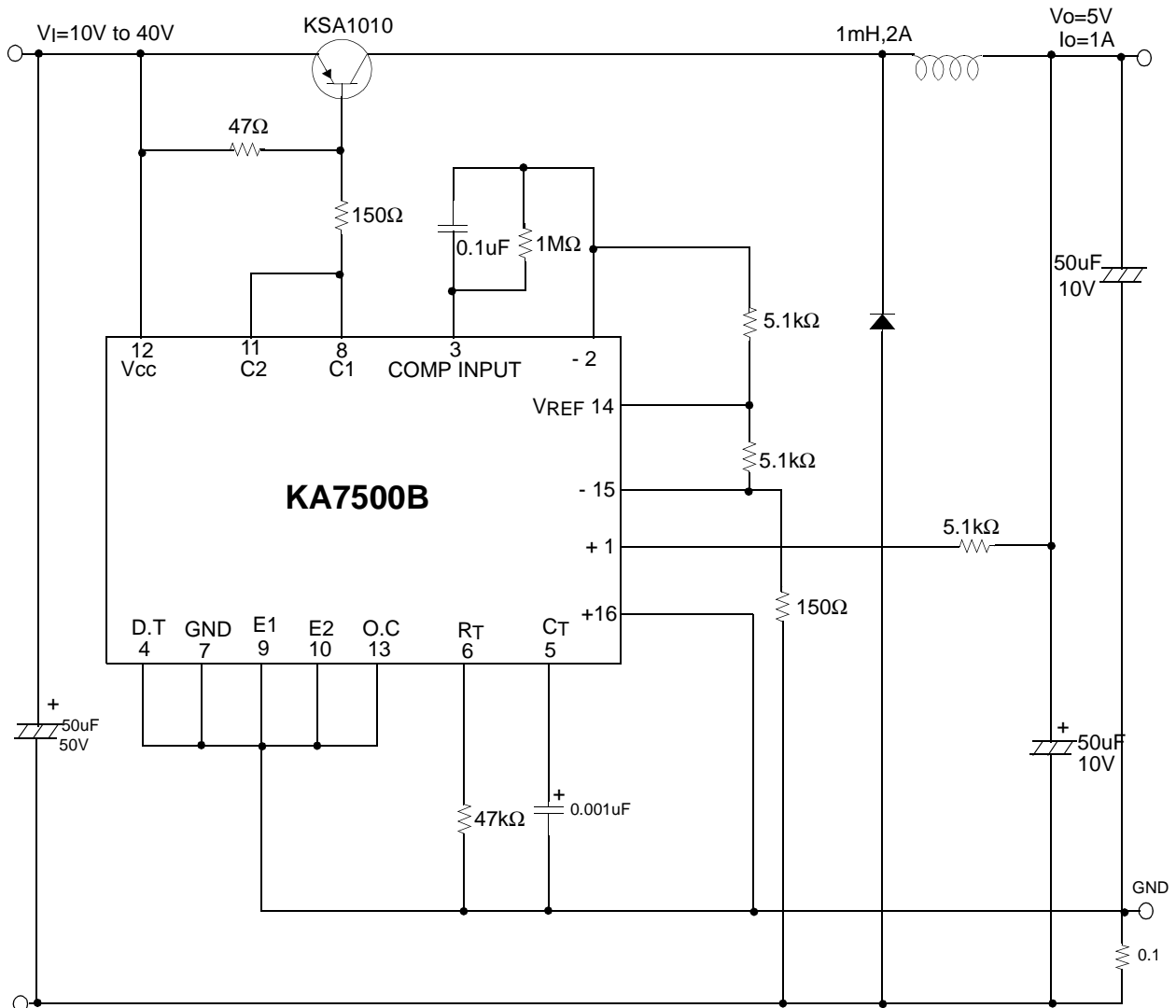
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Reference Output Voltage	VREF	IREF = 1mA	4.75	5.0	5.25	V
Line Regulation	ΔVREF	VCC = 7V to 40V	-	2.0	25	mV
Temperature Coefficient of VREF	ΔVREF/ΔT	TA = 0°C to 70°C	-	0.01	0.03	%/°C
Load Regulation	ΔVREF	IREF = 1mA to 10mA	-	1.0	15	mV
Short-Circuit Output Current	ISC	VREF = 0V	10	35	50	mA
<b>OSCILLATOR SECTION</b>						
Oscillation Frequency	f	CT = 0.01μF, RT = 12kΩ	-	10	-	kHz
Frequency Change with Temperature	Δf/ΔT	CT = 0.01μF, RT = 12kΩ	-	-	2	%
<b>DEAD TIME CONTROL SECTION</b>						
Input Bias Current	IBIAS	VCC = 15V, 0V ≤ V4 ≤ 5.25V	-	-2.0	-10	μA
Maximum Duty Cycle	D(MAX)	VCC = 15V, V4 = 0V O.C Pin = VREF	45	-	-	%
Input Threshold Voltage	VITH	Zero Duty Cycle	-	3.0	3.3	V
		Max. Duty Cycle	0	-	-	
<b>ERROR AMP SECTION</b>						
Input Offset Voltage	VIO	V3 = 2.5V	-	2.0	10	mV
Input Offset Current	IIO	V3 = 2.5V	-	25	250	mA
Input Bias Current	IBIAS	V3 = 2.5V	-	0.2	1.0	μA
Common Mode Input Voltage	VCM	7V ≤ VCC ≤ 40V	-0.3	-	VCC	V
Open-Loop Voltage Gain	GVO	0.5V ≤ V3 ≤ 3.5V	70	95	-	dB
Unit-Gain Bandwidth (Note1)	BW	-	-	650	-	kHz
<b>PWM COMPARATOR SECTION</b>						
Input Threshold Voltage	VITH	Zero Duty Cycle	-	4	4.5	V
Input Sink Current	ISINK	V3=0.7V	-0.3	-0.7	-	mV
<b>OUTPUT SECTION</b>						
Output Saturation Voltage Common Emitter	VCE(SAT)	VE = 0, IC = 200mA	-	1.1	1.3	V
Common Collector	VCC(SAT)	VC = 15V, IE = -200mA	-	1.5	2.5	
Collector Off-State Current	IC(OFF)	VCC = 40V, VCE = 40V	-	2	100	μA
Emitter Off-State Current	IE(OFF)	VCC = VC = 40V, VE = 0	-	-	-100	
<b>TOTAL DEVICE</b>						
Supply Current	ICC	Pin 6 = VREF, VCC = 15V	-	6	10	mA
<b>OUTPUT SWITCHING CHARACTERISTICS</b>						
Rise Time	tR	-	-	-	-	-
Common Emitter	-	-	-	100	200	ns
Common Collector	-	-	-	100	200	
Fall Time	tF	-	-	-	-	-
Common Emitter	-	-	-	25	100	ns
Common Collector	-	-	-	40	100	

### Note:

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

## Typical Application

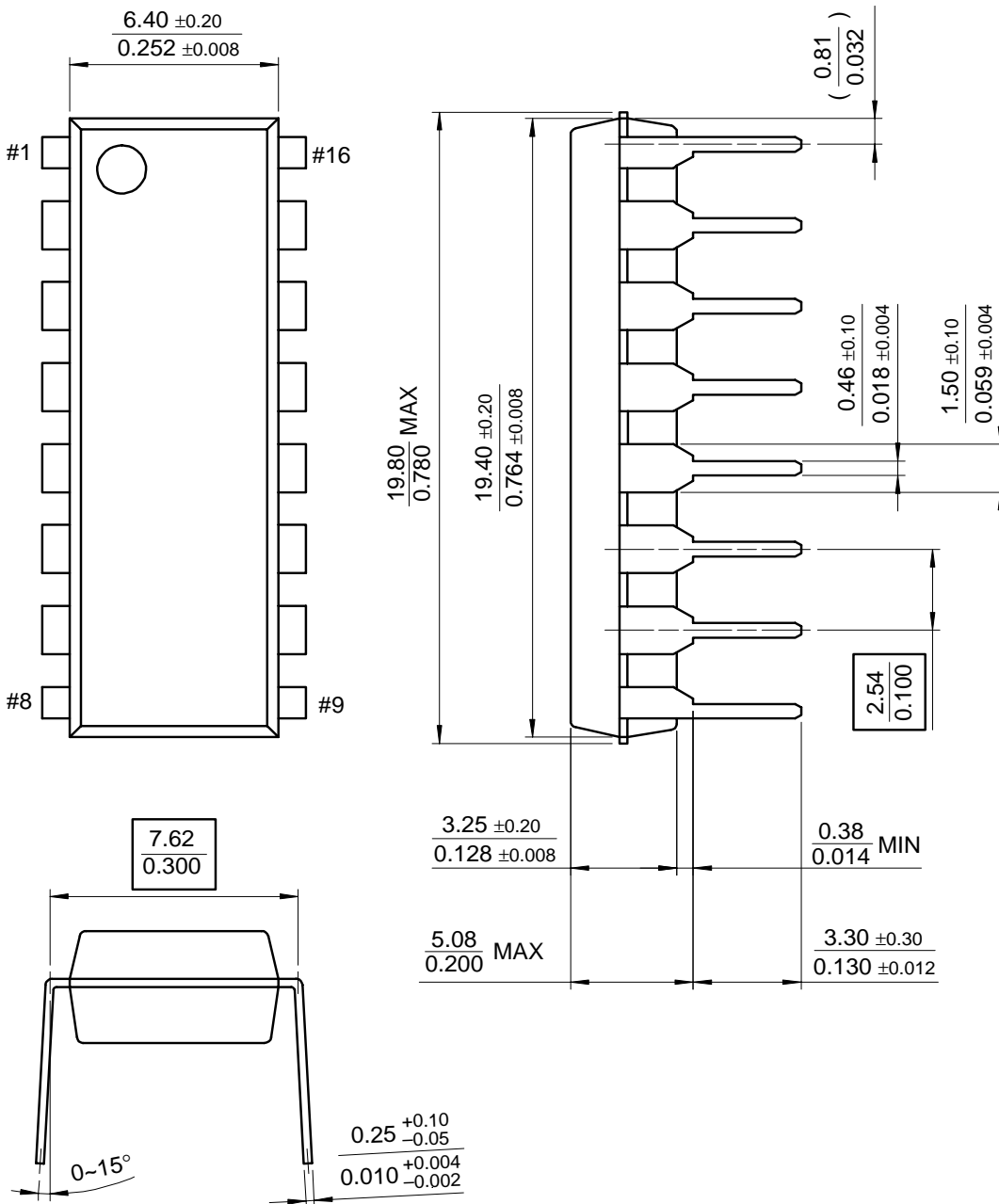
### Pulse Width Modulated Step-down Converter



## Mechanical Dimensions

### Package

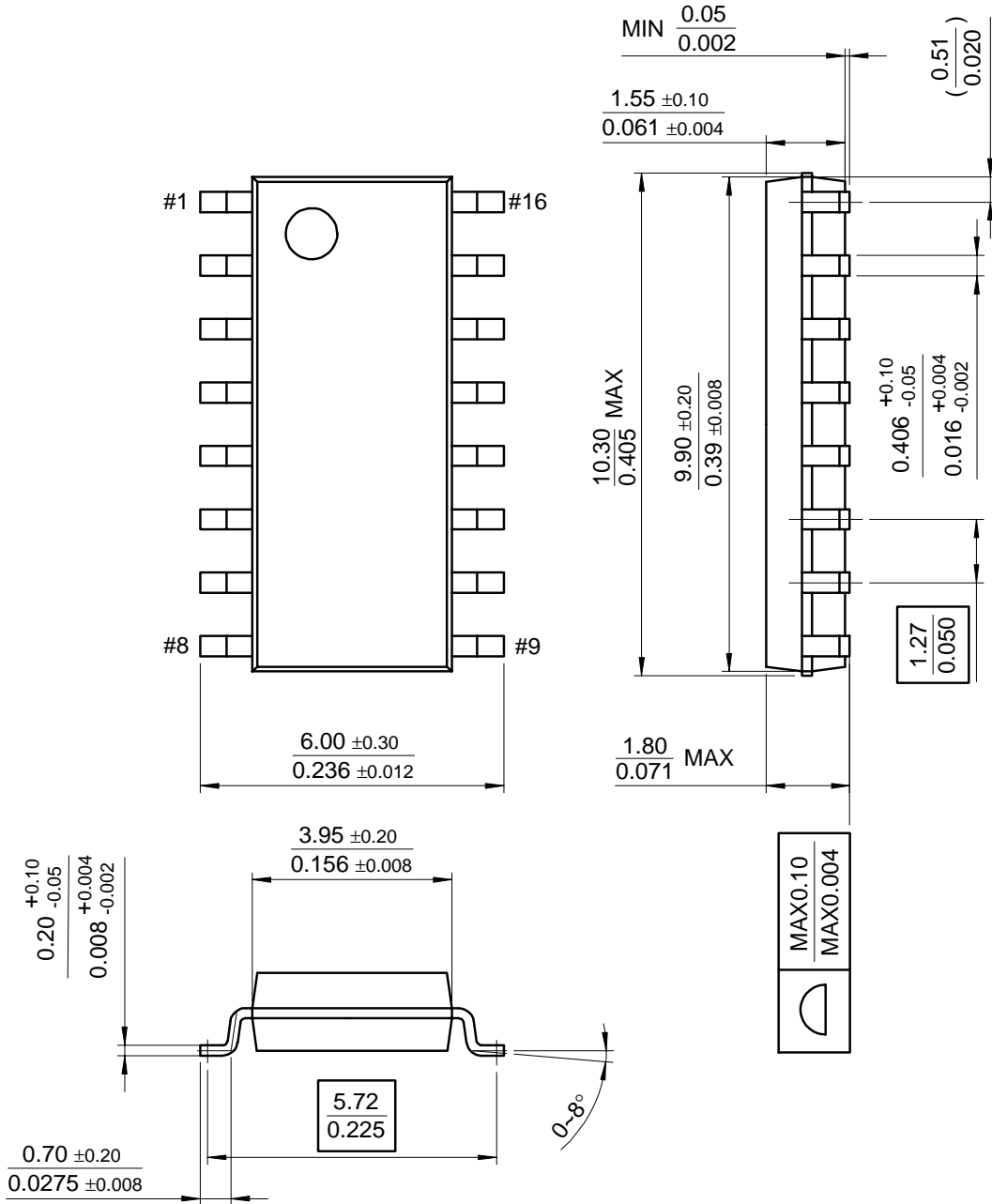
## 16-DIP



# 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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