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# KA7500B

## SMPS Controller

### Features

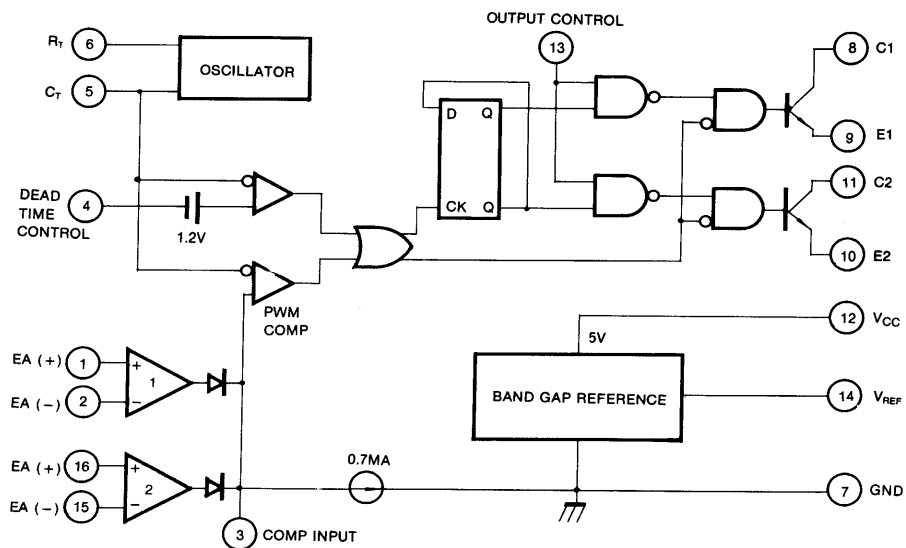
- Internal Regulator Provides a Stable 5V Reference Supply Trimmed to 5%
- Uncommitted Output TR for 200mA Sink or Source Current
- Output Control For Push-Pull or Single Ended Operation
- Variable Duty Cycle By Dead Time Control (Pin 4) Complete PWM Control Circuit
- On-Chip Oscillator With Master or 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<sub>CC</sub> = 20V, f = 10kHz, T<sub>A</sub> = 0°C to +70°C, unless otherwise specified)

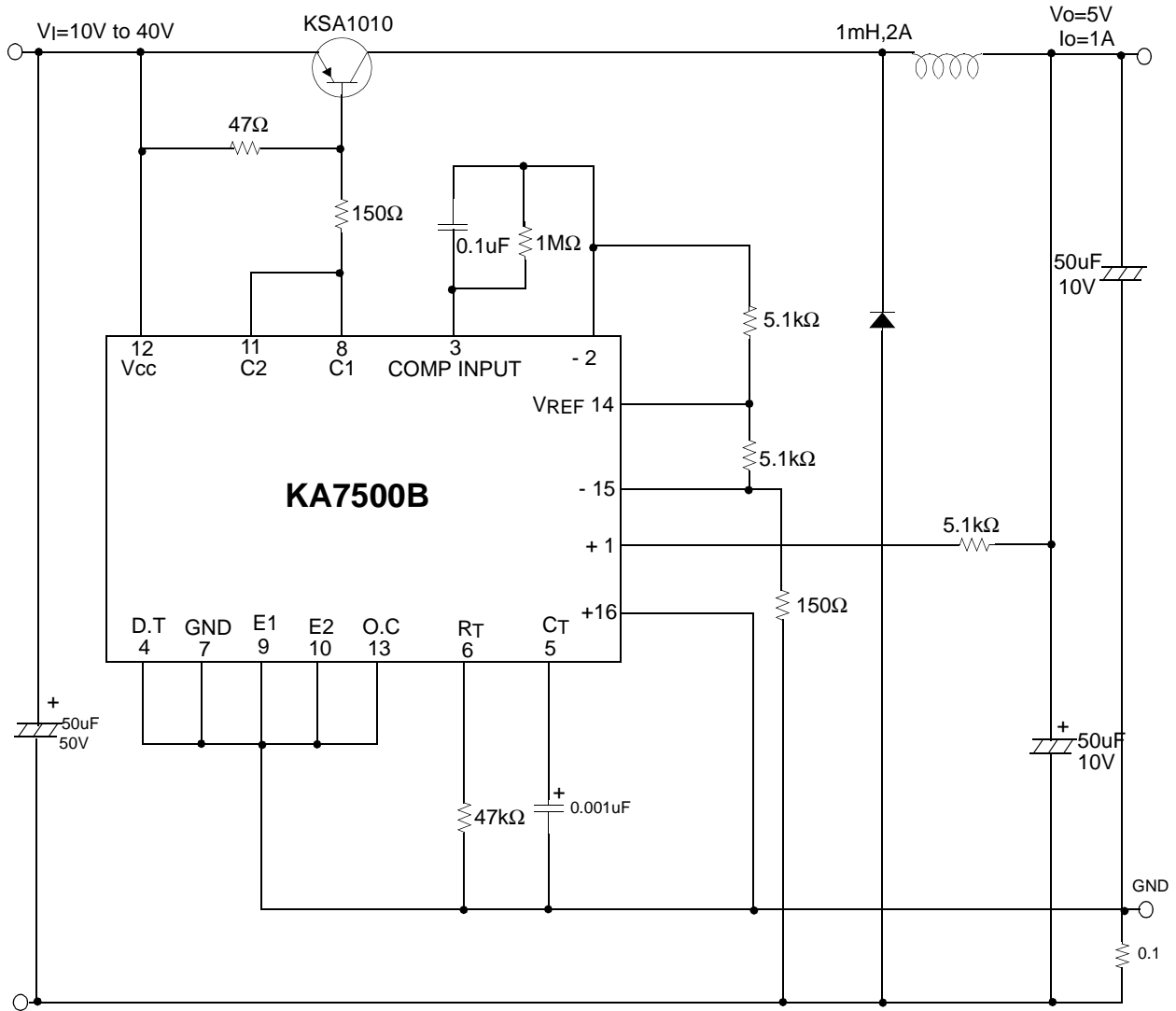
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Reference Output Voltage	V <sub>REF</sub>	I <sub>REF</sub> = 1mA	4.75	5.0	5.25	V
Line Regulation	ΔV <sub>REF</sub>	V <sub>CC</sub> = 7V to 40V	-	2.0	25	mV
Temperature Coefficient of V <sub>REF</sub>	ΔV <sub>REF</sub> /ΔT	T <sub>A</sub> = 0°C to 70°C	-	0.01	0.03	%/°C
Load Regulation	ΔV <sub>REF</sub>	I <sub>REF</sub> = 1mA to 10mA	-	1.0	15	mV
Short-Circuit Output Current	I <sub>SC</sub>	V <sub>REF</sub> = 0V	10	35	50	mA
<b>OSCILLATOR SECTION</b>						
Oscillation Frequency	f	C <sub>T</sub> = 0.01μF, R <sub>T</sub> = 12kΩ	-	10	-	kHz
Frequency Change with Temperature	Δf/ΔT	C <sub>T</sub> = 0.01μF, R <sub>T</sub> = 12kΩ	-	-	2	%
<b>DEAD TIME CONTROL SECTION</b>						
Input Bias Current	I <sub>BIAS</sub>	V <sub>CC</sub> = 15V, 0V ≤ V <sub>4</sub> ≤ 5.25V	-	-2.0	-10	μA
Maximum Duty Cycle	D(MAX)	V <sub>CC</sub> = 15V, V <sub>4</sub> = 0V O.C Pin = V <sub>REF</sub>	45	-	-	%
Input Threshold Voltage	V <sub>I TH</sub>	Zero Duty Cycle	-	3.0	3.3	V
		Max. Duty Cycle	0	-	-	
<b>ERROR AMP SECTION</b>						
Input Offset Voltage	V <sub>IO</sub>	V <sub>3</sub> = 2.5V	-	2.0	10	mV
Input Offset Current	I <sub>IO</sub>	V <sub>3</sub> = 2.5V	-	25	250	mA
Input Bias Current	I <sub>BIAS</sub>	V <sub>3</sub> = 2.5V	-	0.2	1.0	μA
Common Mode Input Voltage	V <sub>CM</sub>	7V ≤ V <sub>CC</sub> ≤ 40V	-0.3	-	V <sub>CC</sub>	V
Open-Loop Voltage Gain	G <sub>VO</sub>	0.5V ≤ V <sub>3</sub> ≤ 3.5V	70	95	-	dB
Unit-Gain Bandwidth (Note1)	BW	-	-	650	-	kHz
<b>PWM COMPARATOR SECTION</b>						
Input Threshold Voltage	V <sub>I TH</sub>	Zero Duty Cycle	-	4	4.5	V
Input Sink Current	I <sub>SINK</sub>	V <sub>3</sub> = 0.7V	-0.3	-0.7	-	mV
<b>OUTPUT SECTION</b>						
Output Saturation Voltage Common Emitter	V <sub>CE(SAT)</sub>	V <sub>E</sub> = 0, I <sub>C</sub> = 200mA	-	1.1	1.3	V
	V <sub>CC(SAT)</sub>	V <sub>C</sub> = 15V, I <sub>E</sub> = -200mA	-	1.5	2.5	
Collector Off-State Current	I <sub>C(OFF)</sub>	V <sub>CC</sub> = 40V, V <sub>CE</sub> = 40V	-	2	100	μA
Emitter Off-State Current	I <sub>E(OFF)</sub>	V <sub>CC</sub> = V <sub>C</sub> = 40V, V <sub>E</sub> = 0	-	-	-100	
<b>TOTAL DEVICE</b>						
Supply Current	I <sub>CC</sub>	Pin 6 = V <sub>REF</sub> , V <sub>CC</sub> = 15V	-	6	10	mA
<b>OUTPUT SWITCHING CHARACTERISTICS</b>						
Rise Time	t <sub>R</sub>	-	-	-	-	-
Common Emitter	-	-	-	100	200	ns
Common Collector	-	-	-	100	200	
Fall Time	t <sub>F</sub>	-	-	-	-	-
Common Emitter	-	-	-	25	100	ns
Common Collector	-	-	-	40	100	

### Note:

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

# Typical Application

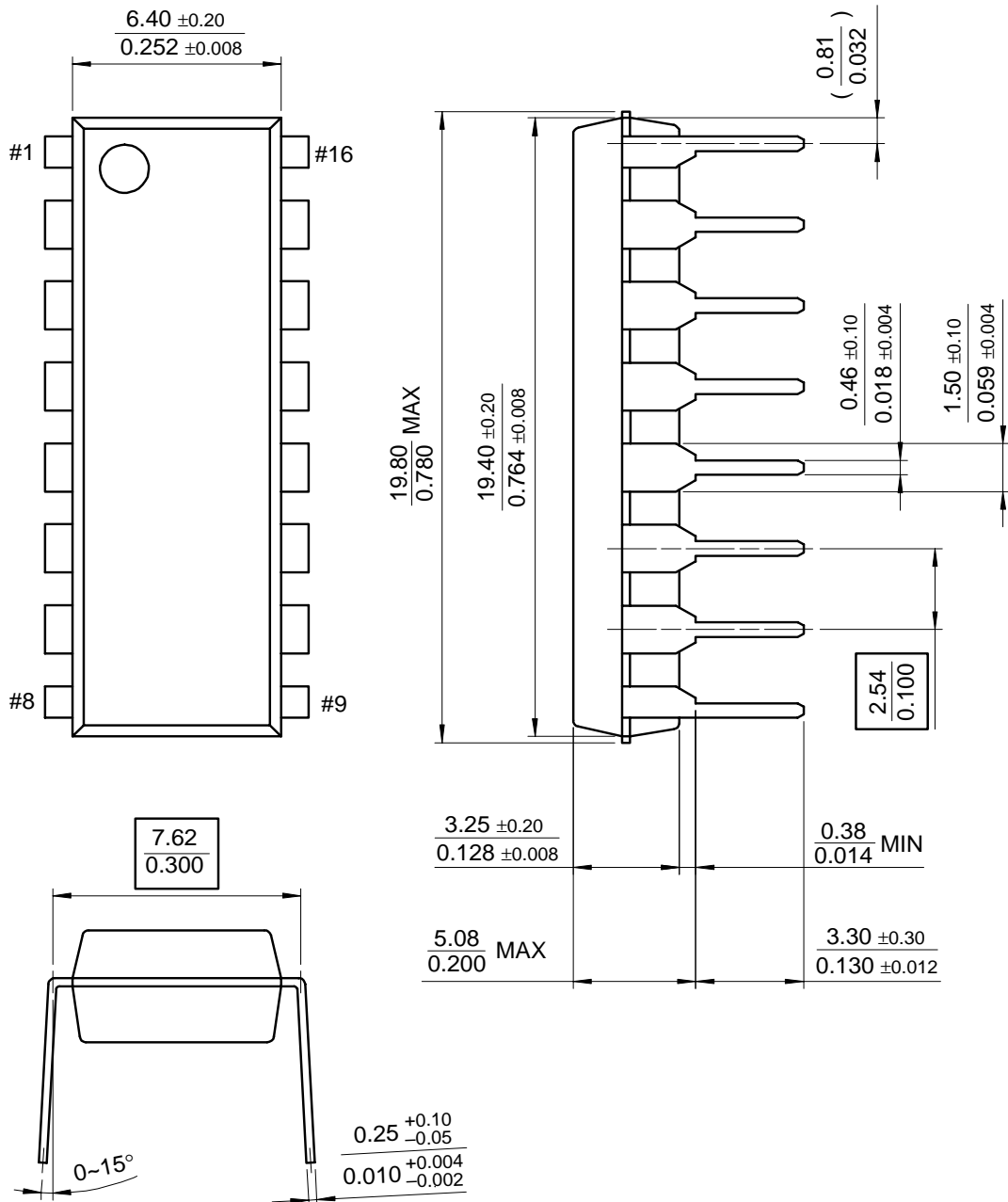
## Pulse Width Modulated Step-down Converter



# Mechanical Dimensions

## Package

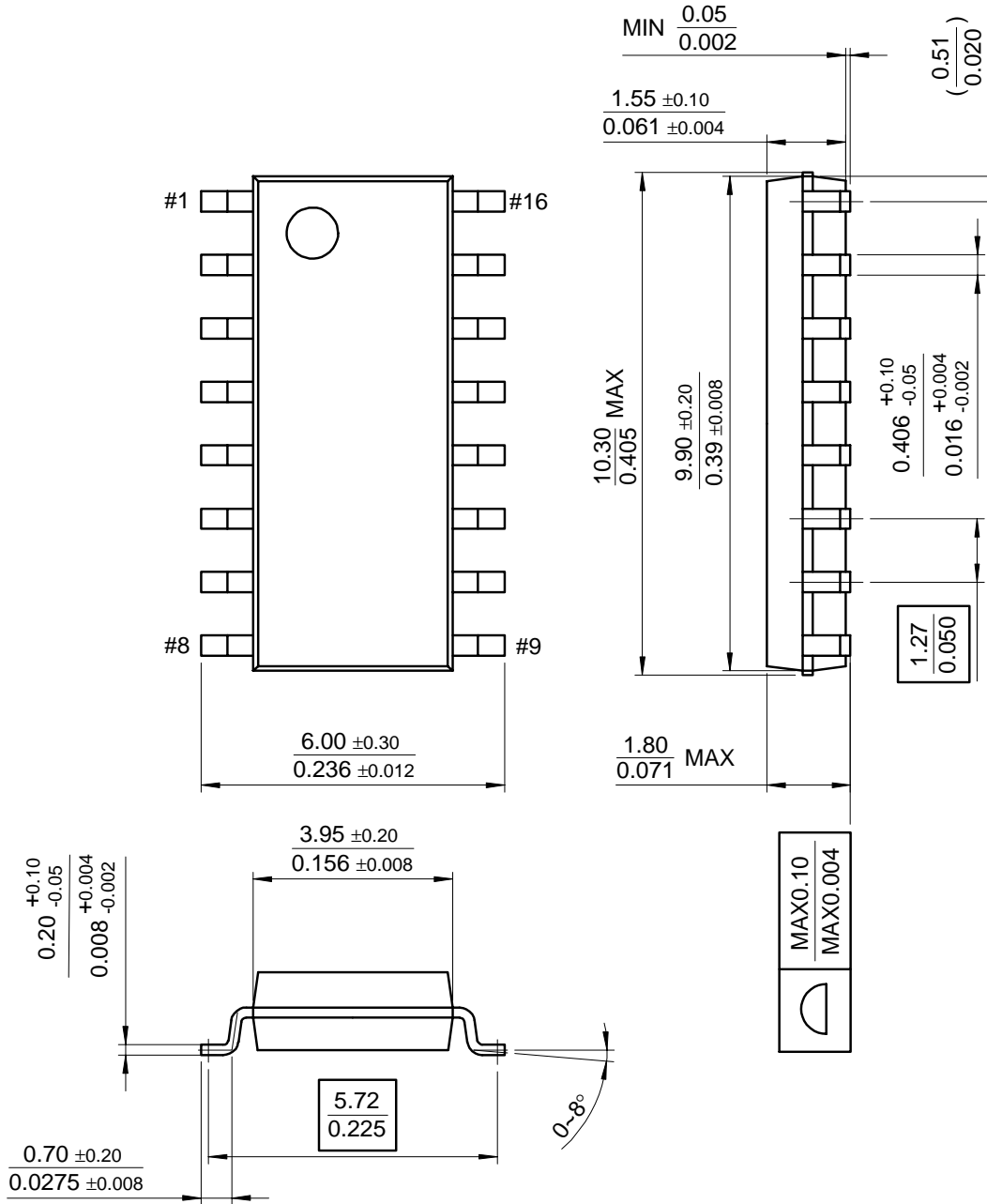
### 16-DIP



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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