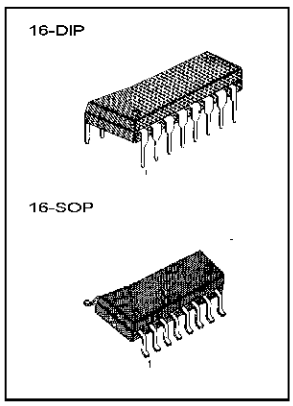
VOLTAGE-MODE PWM CONTROLLER

The KA7500B is used for the control circuit of the pulse width modulation switching regulator. The KA7500B consists of 5V reference voltage circuit, two error amplifiers, 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 1 KHz to 300 KHz.



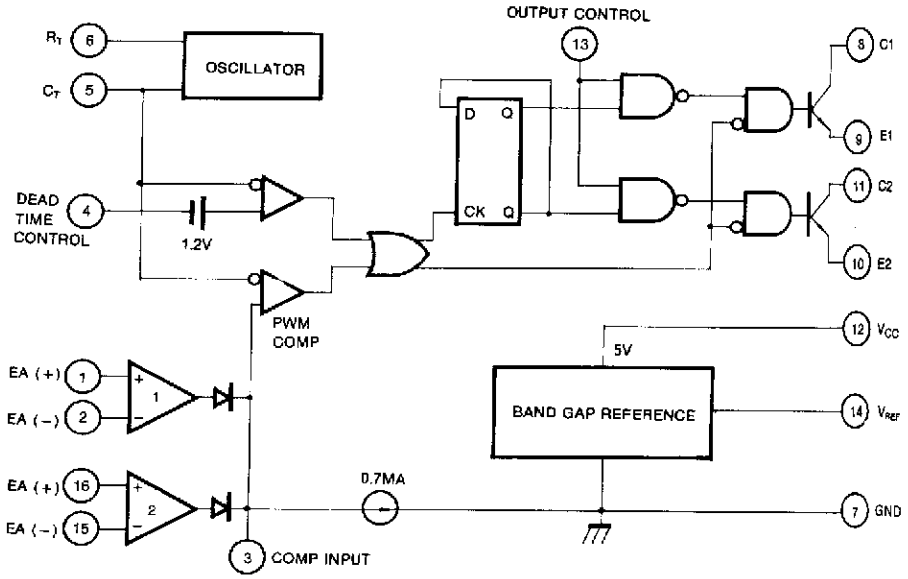
FEATURES

- Internal regulator provides a stable 5V reference supply trimmed to 1 %
- 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) Comlete PWM control circuit
- On-chip oscillator with master or slave operation
- Internal circuit prohibits double pulse at either output

ORDERING INFORMATION

Device	Package	Operating Temperature
KA7500B	16 DIP	0 ~ + 70℃
KA7500BD	16 SOP	0 ~ + 70℃

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	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℃)	P_D	1 (KA7500B) 0.9 (KA7500BD)	W
Operating Temperature Range	T_{OPR}	0 ~ +70	℃
Storage Temperature Range	T_{STG}	-65 ~ + 150	℃

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Test 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℃ to 70℃		0.01	0.03	%/℃
Load Regulation	ΔV_{REF}	I_{REF} = 1mA to 10mA		1.0	15	mV
Short-Circuit Output Currnet	I_{SC}	V_{REF} = 0	10	35	50	mA
OSCILLATOR SECTION						
Oscillation Frequency	f	C_T = 0.01 μF, R_T = 12KΩ		10		KHz
Frequency Change with Temperature	$\Delta f/\Delta T$	C_T = 0.01 μF, R_T = 12KΩ			2	%
DEAD TIME CONTROL SECTION						
Input Bias Currnet	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	BW			650		KHz

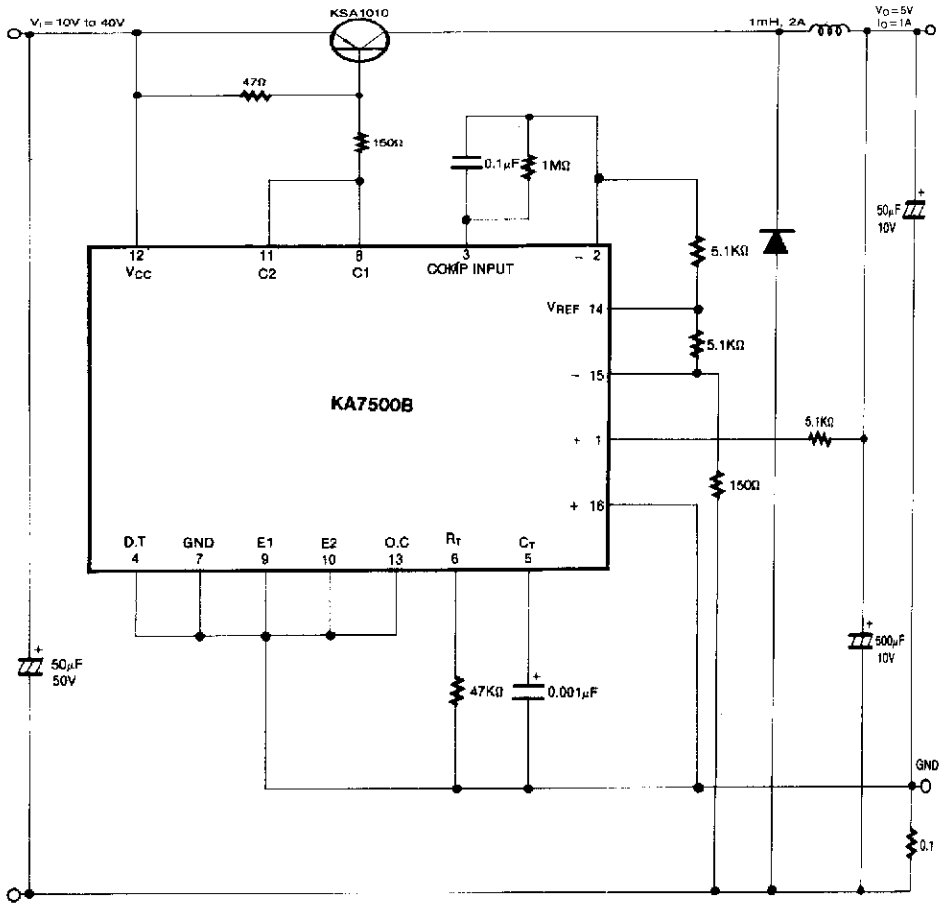
ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
PWM COMPARATOR SECTION						
Input Threshold Voltage	V_{ITH}	Zero Duty Cycle		4	4.5	V
Input Sink Currnet	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 Currnet	$I_{C(OFF)}$	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 CHARACTERISTIC						
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	

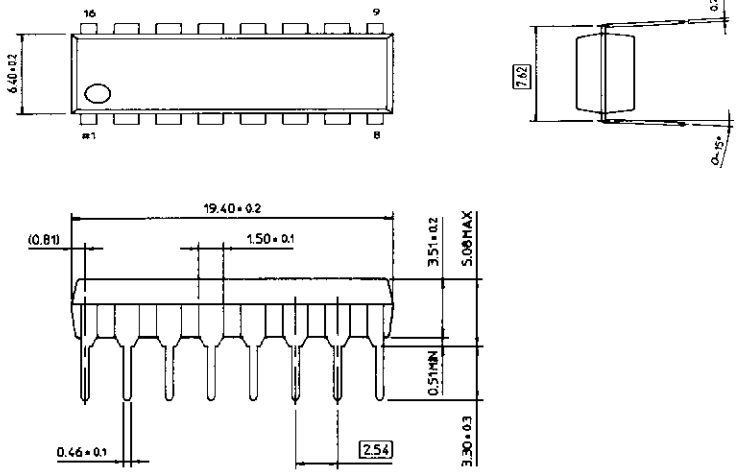
TYPICAL APPLICATION

PLUSE WIDTH MODULATED STEP-DOWN CONVERTER



Dimensions in Milimeters

16-DIP-300A



16-DIP-300B