General Description

The KA7500 incorporate on a single monolithic chip all the functions required in the construction of a pulse-width-modulation control circuit.Designed primarily for power supply control,these devices offer the systems engineer a flexibility to tailor the power supply control circuitry to one's application.

The KA7500 contain an error amplifier,an on-chip adjustable oscillator,a dead-time control comparator,a pulse-steering control flip-flop,a 5-volt regulator (1%precision)and output control circuits.The error amplifier exhibits a common-mode voltage range from -0.3V to VCC-2V.The dead-time control comparator has a fixed offset that provides approximately 5%ead time when externally altered.The on-chip oscillator may be bypassed by terminating RT(pin 6)to the reference output and providing a sawtooth input to CT (pin 5),or it may be used to drive the common circuits in synchronous multiple-rail power supplies.The uncommited output transistors provide either common-emitter or emitter-follower output capability.Each device provides for push-pull or single-ended output operation,which may be selected through the output-control function.The architecture of these devices prohibits the possibility of either output being pulsed twice during push-pull operation.

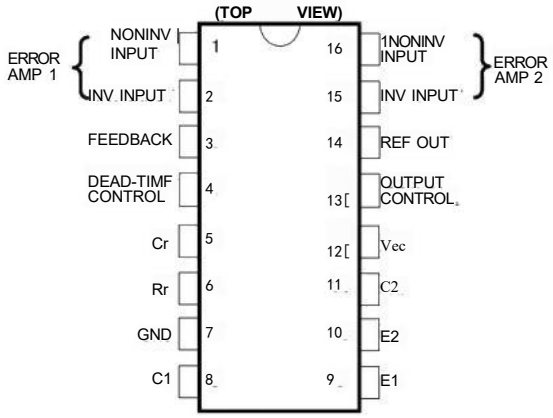
FEATURES

- Complete PWM power control circuitry
- Uncommitted outputs for 200-mA sink or source current
- OUTPUT CONTROL selects single-ended or push-pull operation
- Intemal circuitry prohibits double pulse at either output
- Variable dead-time provides control over the total range
- Intemal regulator provides a stable 5V reference supply,1%
- Circuit architecture allows easy synchronization

ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
KA7500N	DIP-16	KA7500	TUBE	1000pcs/box
KA7500M/TR	SOP-16	KA7500	REEL	2500pcs/reel
KA7500MT/TR	TSSOP-16	KA7500	REEL	2500pcs/reel

PIN CONFIGURATION



DIP/SOP/TSSOP

ABSOLUTE MAXIMUM RATINGS OVER THE OPERATING FREE-AIR TEMPERATURE RANGE

(unless otherwise specified)

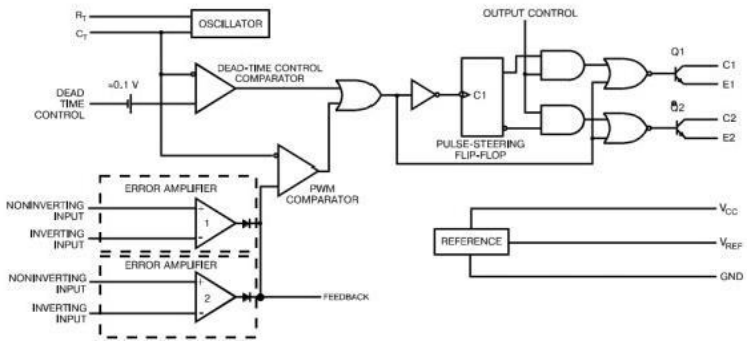
RATING	VALUE	UNIT
Supply voltage,VCC	41	V
Amplifier input voltage	VCC+0.3	
Collector output voltage	41	
Collector output current	250	mA
Operating free-air temperature range	-40 to 85	℃
Storage temperature range	-65 to150	
Lead temperature(soldering,1.6 mm from the case for 10 seconds)	**245**	

Note: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.Operating Ratings indicate conditions for which the device is intended to be functional,but specific performance is not ensured.

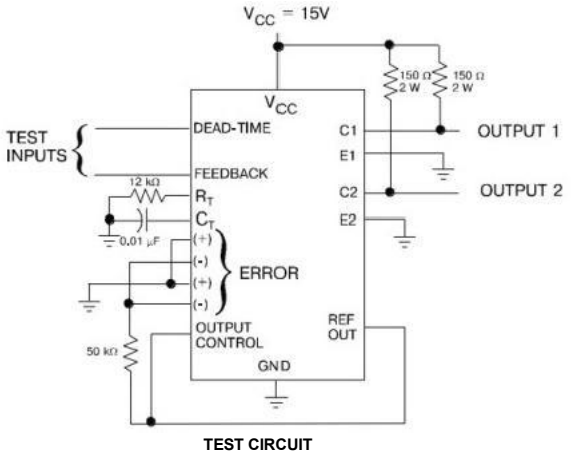
RECOMMENDED OPERATING CONDITIONS

PARAMETER	VALUE		UNIT
	MIN	MAX	
Supply voltage,VCC	7	40	V
Amplifier input voltage,Vi	-0.3	VCC-2	
Collector output voltage,VO		40	
Collector output current (each transistor)		200	mA
Current into feedback terminal		0.3	
Timing capacitor,CT	0.0047	10	μF
Timing resistor,RT	1.8	500	kΩ
Oscillator frequency	1	200	kHz
Operating free-air temperature,TA	-40	85	℃

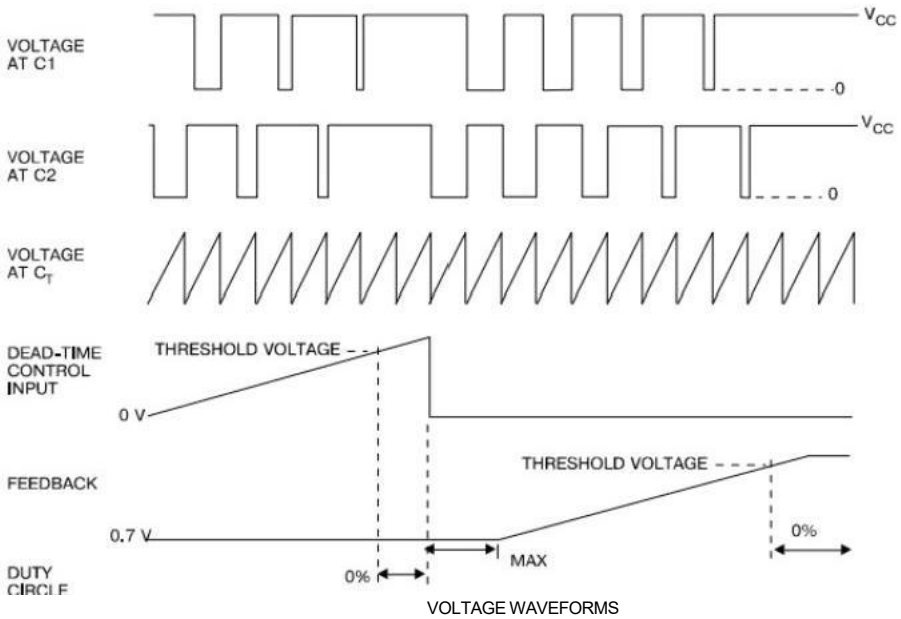
FUNCTIONAL BLOCK DIAGRAM



PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

figure:1.operat onal test c rcu t and waveforms

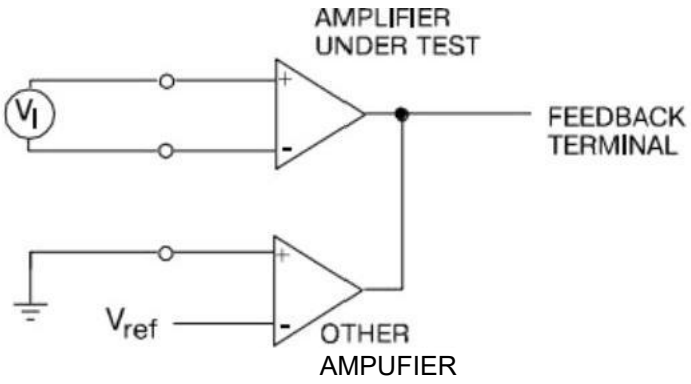
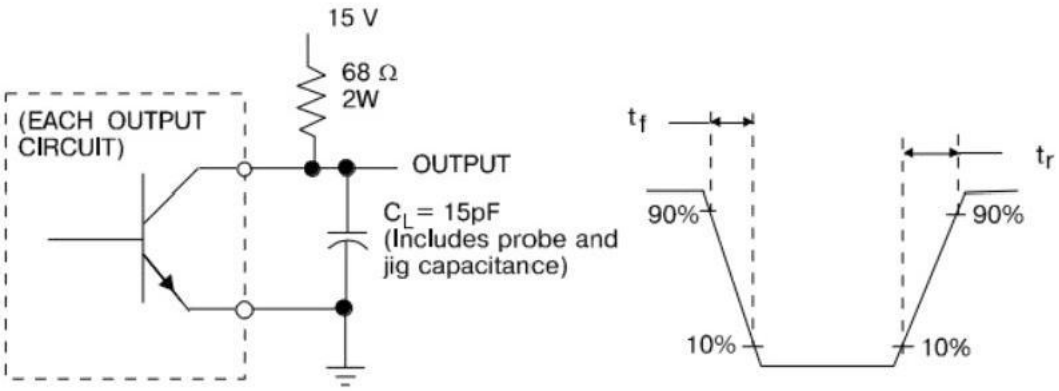


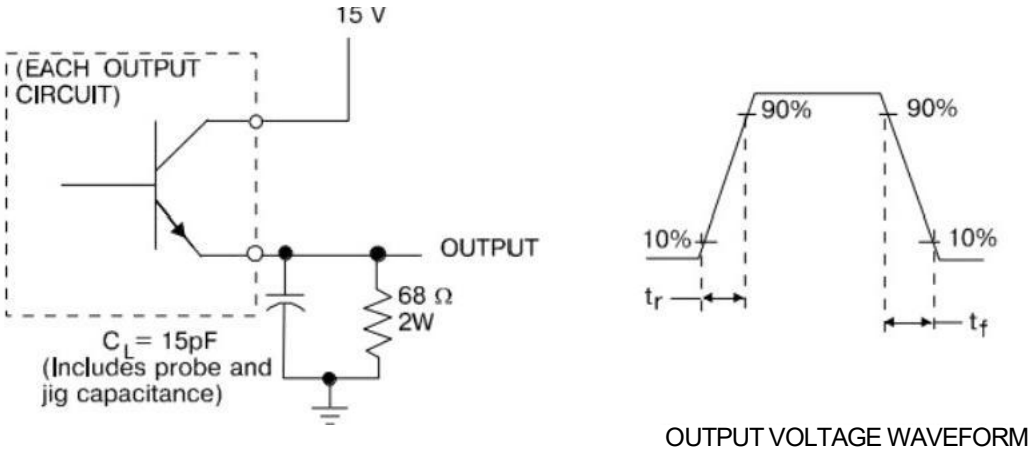
figure:2.amplifier characteristics



TEST CIRCUIT

OUTPUT VOLTAGE WAVEFORM

figure:3.common-emitter configuration



TEST CIRCUIT

OUTPUT VOLTAGE WAVEFORM

figure:4.enitter-follower configuration

ELECTRICAL CHARACTERISTICS OVER RECOMMENDED OPERATING FREE-AIR TEMPERATURE RANGE(VCC=15V,f=10 kHz,unless otherwise specified).

Reference section

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP	MAX	
Output voltage (Vref)	Io =1mA	**4.9**	5	5.1	V
	IO=1mA,TA=25℃****	4.95	5	5.05	
Line regulation	VCC =7V to 40V		2	25	mV
Load regulation	Io =1mA to 10mA		1	15	
Short-circuit output current***	Vref =0	10	35	50	mA

Oscillator section (see Figure 1)

PARAMETER	TEST CONDITIONS*	VALUE			UNIT
		MIN	TYP	MAX	
Frequency	CT=0.01μF,RT=12kQ, TA=25℃	9.2	10	10.8	kHz
Frequency	CT=0.01μF,RT=12kΩ	9.0		12	
Frequency change with temperature*****	CT=0.01μF,RT=12kΩ, △TA =MIN to MAX			2	

ELECTRICAL CHARACTERISTICS OVER RECOMMENDED OPERATING FREE-AIR TEMPERATURE RANGE (VCC=15V,f=10 kHz,unless otherwise specified)

Amplifier section (see Figure 2)

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP	MAX	
Input offset voltage	VO (pin 3)=2.5V		2	10	mV
Input offset current	VO(pin 3)=2.5V		25	250	nA
Input bias current	VO (pin 3)=2.5V		0.2	1	μA
Common-mode input voltage range	VCC=7V to 40V	-0.3 to VCC-2			V
Open-loop voltage amplification	△VO=3V,RL=2kQ, VO =0.5 to 3.5V	70	95		dB
Unity-gain bandwidth			650		kHz

Output section

PARAMETER		TEST CONDITIONS	VALUE			UNIT
			MIN	TYP	MAX	
Collector off-state current		VCE=40V,VCC=40V		2	100	μA
Emitter off-state current		VCC=VC=40V,VE=0			-100	
Collector-emitter saturation voltage	Common-emitter	VE=0,IC =200mA		1.1	1.3	V
	Emitter-follower	VC=15V,IE=-200mA		1.5	2.5	
Output control input current		VI=Vref			3.5	**mA**

Dead-time control-section (see Figure 1)

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP	MAX	
Input bias current (pin 4)	VI=0 to 5.25V		-2	-10	μA
Maximum duty cycle,each output	VI(pin 4)=0;O.C.=Vref	**45**			%
Input threshold voltage (pin 4)	Zero duty cycle		3	3.3	V
	Maximum duty cycle	0			

PWM comparator section (see Figure 1)

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP	MAX	
Input threshold voltage (pin 3)	Zero duty cycle		4	4.5	V
Input sink current (pin 3)	V(pin 3)=0.7V	0.3	0.7		mA

Total device

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP**	MAX	
Standby supply current	**Pin 6 at Vref,VCC =15V**		6	10	**mA**

Switching characteristics, TA =25℃

PARAMETER	TEST CONDITIONS	VALUE			UNIT
		MIN	TYP	MAX	
Output voltage rise time	Common-emitter configuration, See Figure 3		100	200	NS
Output voltage fall time			25	100	
Output voltage rise time	Emitter-follower configuration, See Figure 4		100	200	
Output voltage fall time			25	100	

*For the conditions shown as MIN or MAX,use the appropriate value specified under recommended operating conditions.

*All typical values except for the parameter changes with the temperature are at TA=25°C.

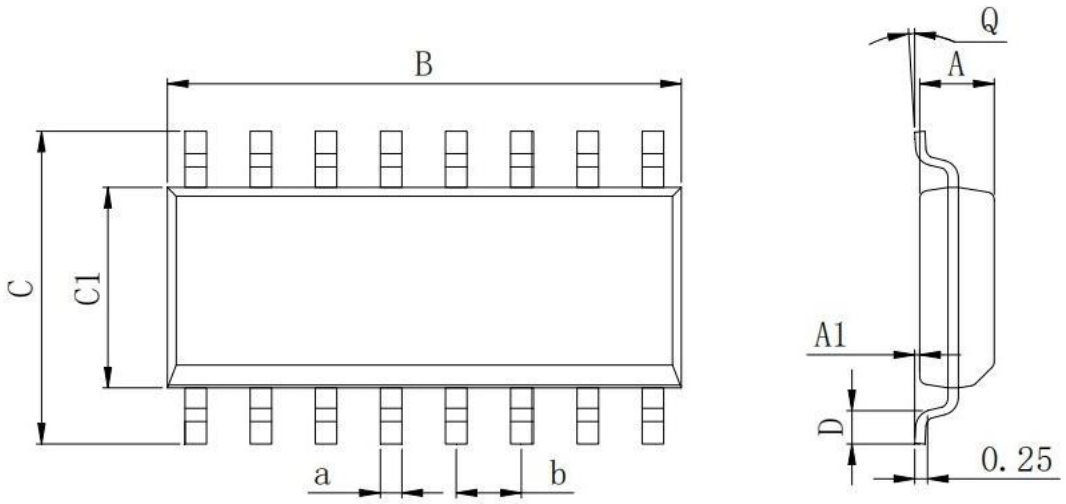
***Duration of the short-circuit should not exceed 1 second.

****This is guaranteed where the marking code on the package surface is "A".

*****The temperature coefficient of timing capacitor and timing resistor is not taken into account.

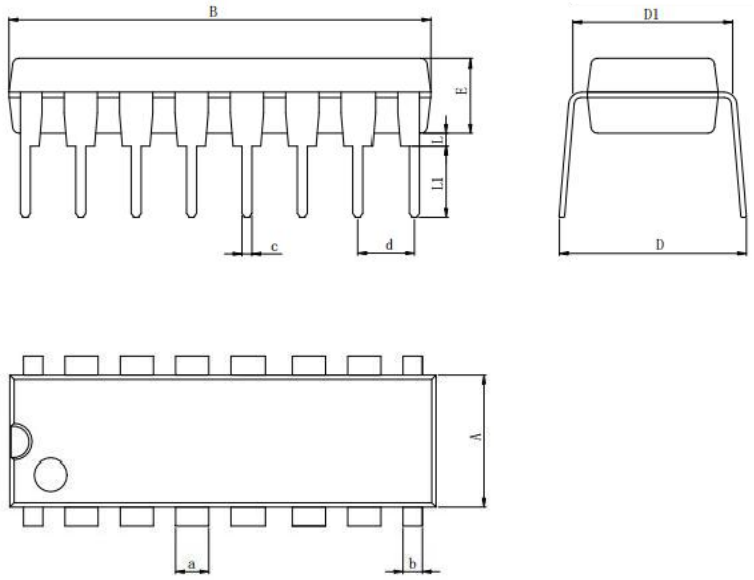
PACKAGE INFORMATION

SOP-16



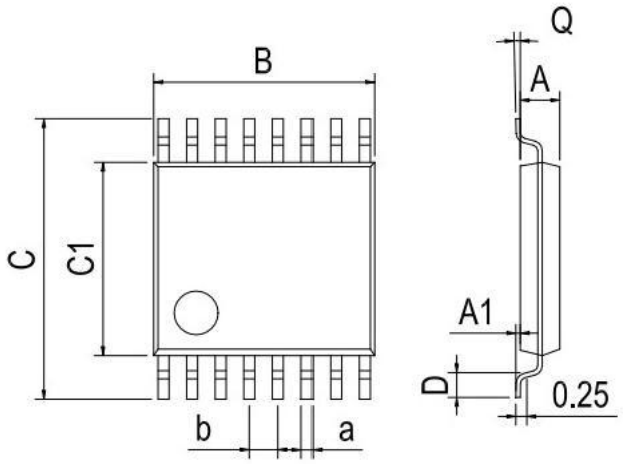
Dimensions In Millimeters(SOP-16)									
Symbol:	**A**	A1	B	C	**C1**	**D**	**Q**	**a**	**b**
Min:	1.35	0.05	9.80	5.80	**3.80**	**0.40**	**0°**	**0.35**	**1.27 BSC**
Max:	1.55	0.20	10.0	6.20	**4.00**	**0.80**	**8°**	**0.45**	

DIP-16



Dimensions In Millimeters(DIP-16)											
Symbol:	**A**	B	D	D1	E	L	L1	**a**	**b**	**C**	**d**
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	**1.50**	**0.85**	**0.40**	**2.54 BSC**
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	**1.55**	**0.90**	**0.50**	

TSSOP-16



Dimensions In Millimeters(TSSOP-16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	