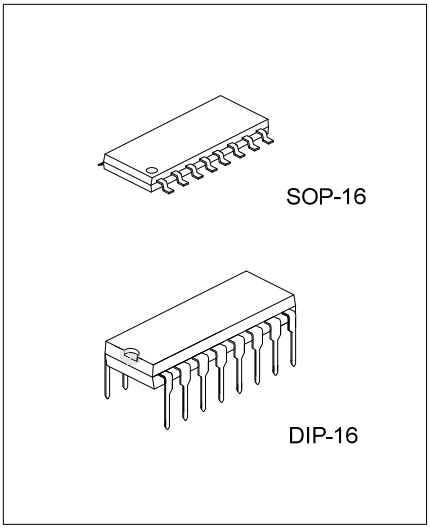
TL494

LINEAR INTEGRATED CIRCUIT

VOLTAGE MODE PWM CONTROL CIRCUIT



Lead Free:TL494L
Halogen Free:TL494G

■ DESCRIPTION

The UTC **TL494** incorporates all the functions required in the construction of a pulse-width modulation switching circuit. Designed primarily for switching power supply control or DC-DC convectors, it offers the systems engineer the flexibility to tailor control circuitry to its own application.

■ FEATURES

*Complete PWM power control circuitry
*Uncommitted outputs for 200mA sink or source current
*Output control selects single ended or push pull operation
*Internal circuitry prohibits double pulses over total range
*Easy synchronization

■ ORDERING INFORMATION

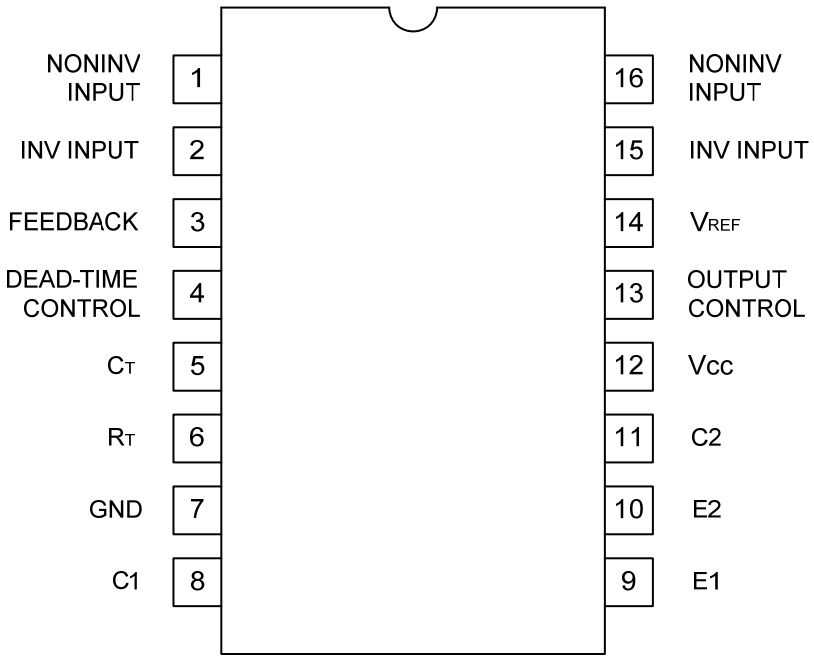
Ordering Number			Package	Packing
Normal	Lead Free Plating	Halogen Free		
TL494-D16-T	TL494L-D16-T	TL494G-D16-T	DIP-16	Tube
TL494-S16-R	TL494L-S16-R	TL494G-S16-R	SOP-16	Tape Reel

TL494L-D16-T
(1)Packing Type
(2)Package Type
(3)Lead Plating

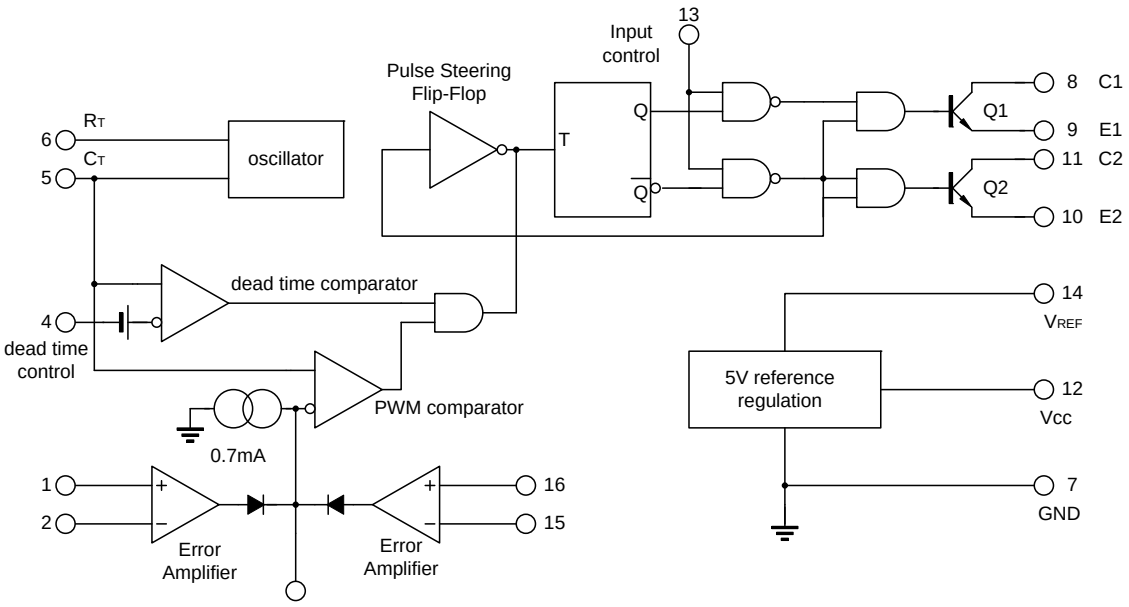
(1) R: Tape Reel, T: Tube
(2) D16: DIP-16, S16: SOP-16
(3) G:Halogen Free, L: Lead Free Plating, Blank: Pb/Sn

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■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Unless otherwise noted all is over operating free air temperature range)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage(Note 3)		V_{CC}	41	V
Amplifier Input Voltage		V_{IN}	V_{CC}+0.3	V
Collector Output Voltage		V_{OUT}	41	V
Collector Output Current		I_{CO}	250	mA
Continuous Total Dissipation	Ta=25°C	P_D	1000	mW
	Derate at Ta＞25°C		9.2	mW/°C
Junction Temperature		T_J	125	°C
Operating Temperature		T_{OPR}	-25 ~ +85	°C
Storage Temperature		T_{STG}	-40 ~ +150	°C

Note 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. All voltage values, except differential voltages are with respect to the network ground terminal.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS		UNIT
		MIN	MAX	
Supply Voltage	V_{CC}	7	40	V
Amplifier Input Voltage	V_{IN}	-0.3	Vcc-2	V
Collector Output Voltage	V_{OUT}		40	V
Collector Output Current(each Transistor)	Ic		200	mA
Current into Feedback	I_f		0.3	mA
Timing Capacitor	C_T	0.47	10000	nF
Timing Resistor	R_T	1.8	500	kΩ
Oscillator Frequency	fosc	1	300	kHz
Operating Free-Air Temperature	Ta	0	70	°C

■ ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range, V_{CC}=15V, f=1kHz, Unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Section							
Output Voltage		V_{OUT}	I_{OUT}=1mA	4.75	5	5.25	V
Input Regulation		V_{IN}	V_{CC}=7V ~ 40V		2	25	mV
Output Regulation		V_{OUT}	I_{OUT}=1 ~ 10mA		1	15	mV
Output Voltage Change with Temperature			ΔTa=MIN ~ MAX(note 2)		0.2	1	%
Short-Circuit Output Current		$I_{O(SC)}$	V_{REF}=0		35		mA
Oscillator Section							
Frequency		F	C_T=0.01μF, R_T=12kΩ		10		kHz
Standard Deviation of Frequency			All Values of V_{CC} C_T, R_T, T_A constant		10		%
Frequency Change with Voltage			V_{CC}=7V ~ 40V,Ta=25°C		0.1		%
Frequency Change with Temperature			C_T=0.01μF, R_T=12kΩ, ΔTa=MIN ~ MAX			12	%
Amplifier Section							
Input Offset Voltage	Error	$V_{I(OFF)}$	V_{OUT} (pin 3)=2.5V		2	10	mV
Input Offset Current		$I_{I(OFF)}$	V_{OUT} (pin 3)=2.5V		25	250	nA
Input Bias Current		$I_{I(BIAS)}$	V_{OUT} (pin 3)=2.5V		0.2	1	μA
Common-Mode Input Voltage Range	Error		V_{CC}=7V ~ 40 V	-0.3 ~ Vcc-2			V
Open-Loop Voltage Amplification			ΔV_{OUT}=3V, V_{OUT}=0.5V ~ 3.5V	70	95		dB
Unity-Gain Bandwidth		GB_W			800		kHz
Common-Mode Rejection Ratio	Error	CMRR	V_{CC}=40V,T_A=25°C	65	80		dB
Output Sink Current(pin 3)		$I_{O(SINK)}$	V_{ID}=-15mV ~ -5V V(pin 3)=0.5V	0.3	0.7		mA
Output source Current(pin 3)		$I_{O(SOURCE)}$	V_{ID}=15mV ~ -5V, V(pin 3)=3.5V	-2			mA
Output Section							
Collector off-state current		$I_{C(OFF)}$	V_{CE}=40V, V_{CC}=40V		2	100	μA
Emitter off-state Current		$I_{E(OFF)}$	V_{CC}=V_C=40V, V_E=0			-100	μA
Collector -emitter Saturation Voltage	Common-emitter		V_E=0, I_C=200mA		1.1	1.3	V
	Emitter-Follower		V_C=15V, I_E=-200mA		1.5	2.5	
Output Control Input Current			V_{IN}=V_{REF}			3.5	mA
Dead Time Control Section							
Input bias (pin 4)		$I_{I(BIAS)}$	V_{IN}=0 ~ 5.25V		-2	-10	μA
Maximum duty cycle, each output			V_{IN}(pin 40)=0	45			%
Input threshold Voltage(pin 4)		V_{THR}	Zero duty Cycle		3	3.3	V
			Maximum duty cycle	0			
PWM comparator Section							
Input Threshold Voltage(pin 3)		V_{THR}	Zero Duty cycle		4	4.5	V
Input Sink Current (pin 3)		$I_{I(SINK)}$	V(pin 3)= 0.7V	0.3	0.7		mA
Total Device							
Standby Supply Current	V_{CC} =15V	I_{ST-BY}	pin 6 at V_{REF}, all other Inputs and outputs open		6	10	mA
	V_{CC} =40V				9	15	
Average supply current			V(pin 4)=2V		7.5		mA
Switching Characteristics, Ta=25°C							
Output Voltage Rise Time		t_R	Common-emitter configuration		100	200	ns
Output Voltage Fall Time		t_F			25	100	ns
Output Voltage Rise Time		t_R	Emitter-follower configuration		100	200	ns
Output Voltage Fall Time		t_F			40	100	ns

Note 1:All typical Values except for temperature coefficient are at Ta=25°C.

Note 2:For conditions shown as MIN or MAX, use appropriate value under recommended operating conditions.

Note 3:Duration of the short-circuit should not exceed one second.

Note 4:Standard deviation is a measure of the statistical distribution the mean as derived from the formula:

$$\sigma = \sqrt{\frac{\sum_{n=1}^{N} (Xn-\bar{X})^2}{N-1}}$$

■ TEST CIRCUIT

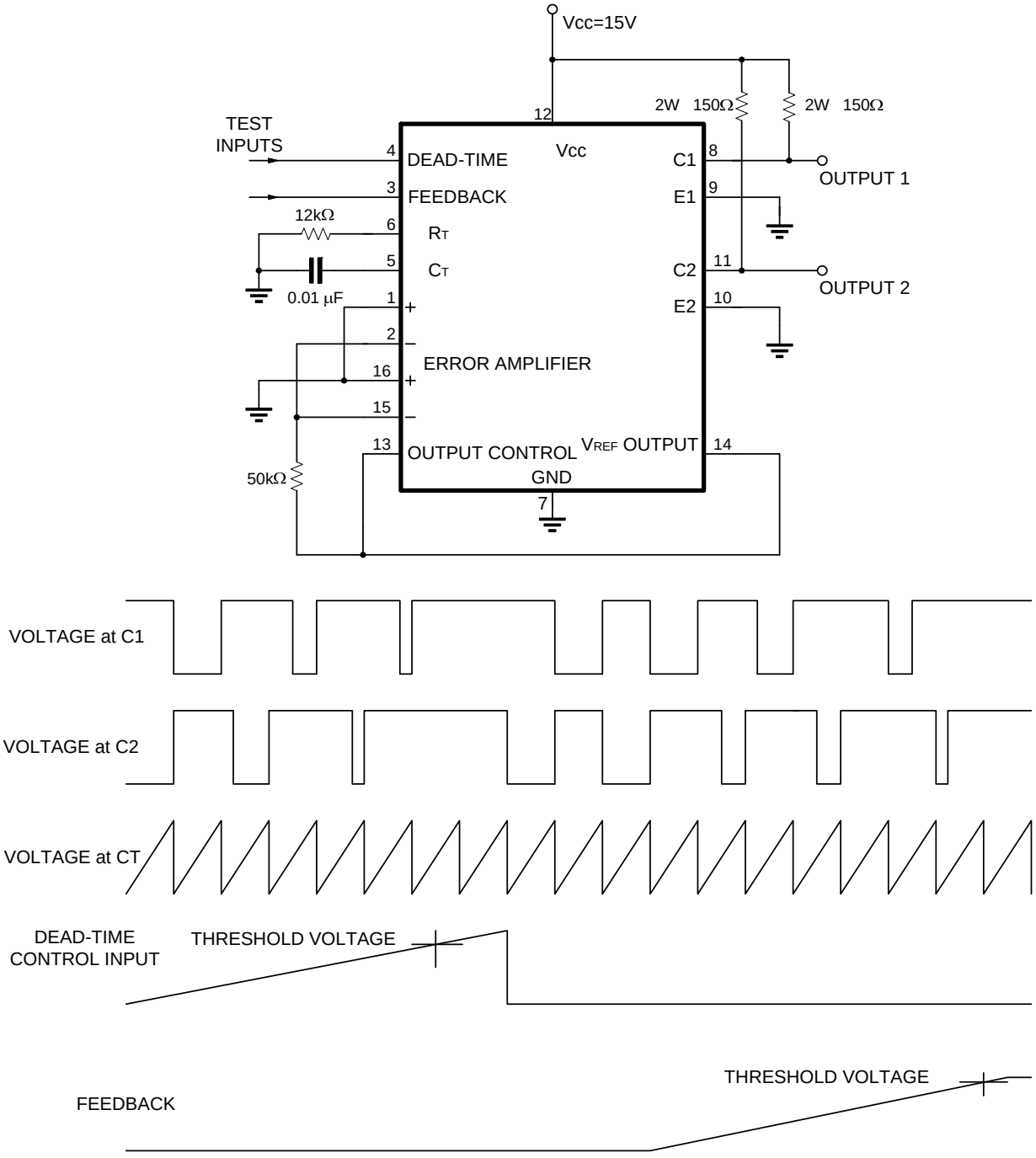


FIG 1. OPERATIONAL TEST CIRCUIT AND WAVEFORMS

■ TEST CIRCUIT(Cont.)

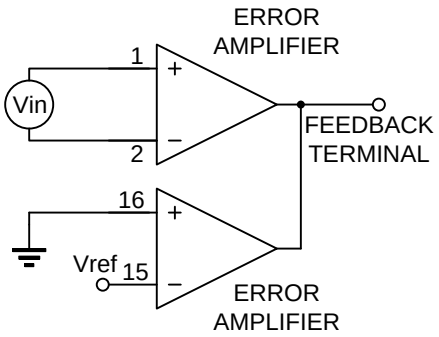


FIG 2. AMPLIFIER CHARACTERISTICS

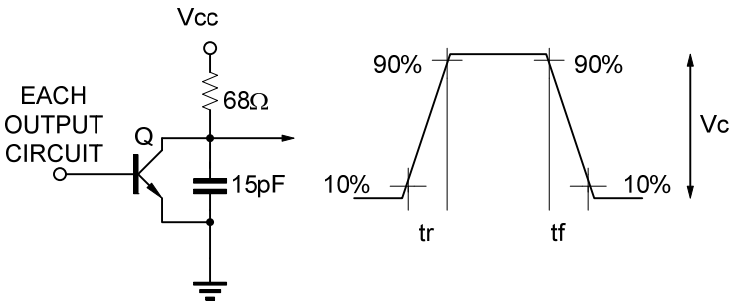


FIG. 3 COMMON-EMITTER CONFIGURATION

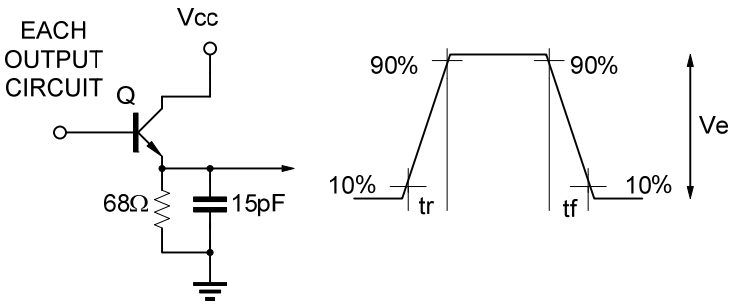
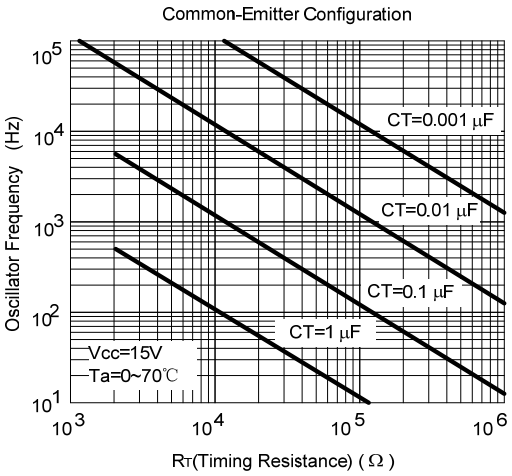
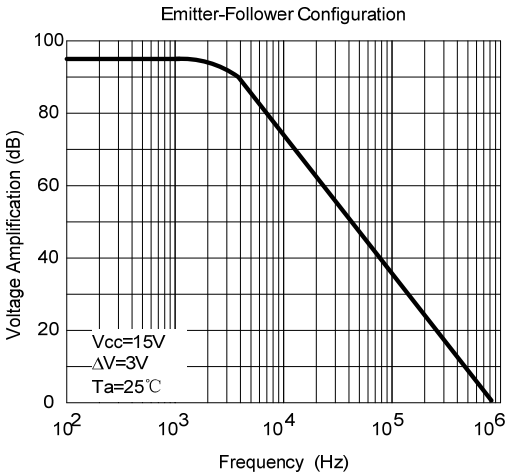


FIG. 4 EMITTER -FOLLOWER CONFIGURATION

■ TYPICAL PERFORMANCE CHARACTERISTICS





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