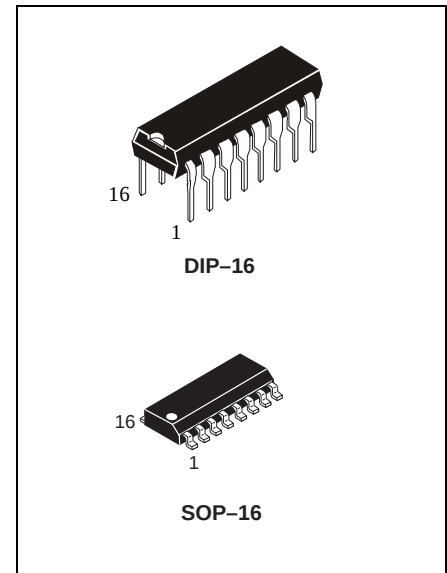


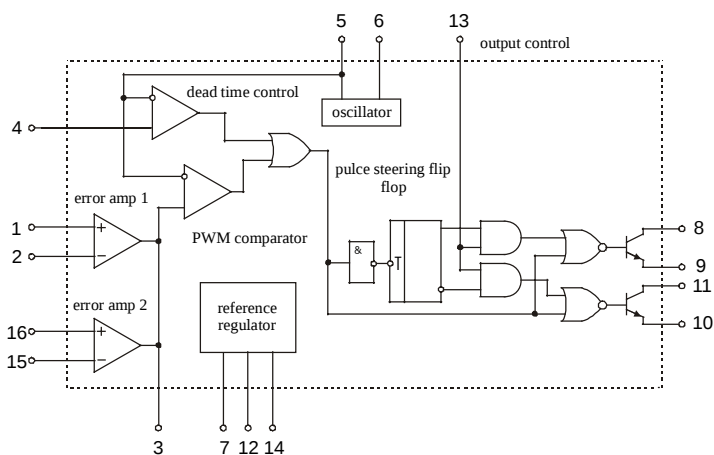
SWITCHMODE Pulse Width Modulation Control Circuit

The TL494 is a fixed frequency, pulse width modulation control circuit designed primarily for SWITCHMODE power supply control.

- Complete Pulse Width Modulation Control Circuitry
- On-Chip Oscillator with Master or Slave Operation
- On-Chip Error Amplifiers
- On-Chip 5.0 V Reference
- Adjustable Deadtime Control
- Uncommitted Output Transistors Rated to 500 mA Source or Sink
- Output Control for Push-Pull or Single-Ended Operation
- Undervoltage Lockout



LOGIC DIAGRAM



Pin 7 = GND
Pin 12 = V_{CC}

PIN ASSIGNMENT

noninv. input	1	16	noninv. input
inv. input	2	15	inv. input
feedback	3	14	ref. output
dead time control	TL494		output control
C _T	5	12	V _{CC}
R _T	6	11	collector 2
gnd	7	10	emitter 2
collector 1	8	9	emitter 1

MAXIMUM AND RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Recommended operating conditions		Maximum ratings		Unit
		Min	Max	Min	Max	
V _{CC}	Supply Voltage	7	40		41	V
V _I	Amplifier Input Voltage	-0.3	V _{CC} -2		V _{CC} +0.3	V
V _O	Collector Output Voltage		40		41	V
I _{OC}	Collector Output Current (Each Transistor)		200		250	mA
T	Storage Temperature Range			-65	150	°C
T	Operating Free-Air Temperature Range	-20	85			°C

ELECTRICAL CHARACTERISTICS (T_A = -20 ... +85°C, f = 10kHz)

Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
V _{ref}	Output voltage	I ₀ =1.0mA V _{CC} =15V	4.75	5.25	-20...+85	V
U _{regin}	Input regulation	V _{CC} =7... 40V I ₀ =1.0mA	-	25	25	mV
U _{regout}	Output regulation	I ₀ =1... 10 mA V _{CC} =15V	-	15	25	mV
ΔV _{ref}	Output voltage change with temperature	I ₀ =1mA V _{CC} =15V	-	1.0	-20...+85	%
I _{SC}	Short circuit output current	V _{ref} =0 t _{sc} < 1s V _{CC} =15 V	-	50		mA
f _{osc}	Frequency	C=0.01μF, R=12kΩ V _{CC} =15V V ₍₀₃₎ =0.7V	6.0	14		kHz
σf _{osc}	Standard Deviation of Frequency *	V _{CC} =15V V ₍₀₃₎ =0.7V	-	15		%
σf _{osc(ΔV)}	Frequency Change with Voltage	V _{CC} =7...40 V V ₍₀₃₎ =0.7V	-	10	25	%
σf _{osc(ΔT)}	Frequency Change with Temperature	C=0.01μF, R _T =12kΩ V _{CC} =15V V ₍₀₃₎ =0.7V	-	2.0	-20...+85	%
I _{IB(2T)}	Input bias current (pin 4)	V _I =0...5.25V V _{CC} =15V V ₍₀₃₎ =0.7V	-	-10		μA
DCmax	Maximum duty cycle (each output)	V _{I(04)} =0V V _{CC} =15V V ₍₀₃₎ =0.7V	45	-		%
V _{THD1}	Input threshold voltage (pin 4) (Zero Duty Cycle)	DCmax=0 V _{CC} =15V V ₍₀₃₎ =0.7V	-	3,3		V

V_{THD2}	Input threshold voltage (pin 4) (Maximum Duty Cycle)	Dcmax $V_{CC}=15V$ $V_{(03)}=0.7V$	0	-		V
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Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
t_{rc}	Output voltage rise time (Common-Emitter)	$V_{CC}=15V$ $V_{(03)}=2.0V$	-	200	-20...+85	ns
t_{fc}	Output voltage fall time (Common-Emitter)	$V_{CC}=15V$ $V_{(03)}=2.0V$	-	100		ns
t_{rf}	Output voltage rise time (Emitter-Follower)	$V_{CC}=V_C=15V$ $V_{(03)}=2.0V$	-	200		ns
t_{ff}	Output voltage fall time (Emitter-Follower)	$V_{CC}=V_C=15V$ $V_{(03)}=2.0V$	-	100	-20...+85	ns
V_{THP}	Input threshold voltage (pin 3)	DCmax=0 $V_{CC}=15V$	-	4.5		V
I_I	Input sink current (pin 3)	$V_{CC}=15V$ $V_{(03)}=0.7V$	0.3	-		mA
V_{IO}	Input offset voltage	$V_{CC}=15V$ $V_{O(03)}=2.5V$	-	10		mV
I_{IO}	Input offset current	$V_{CC}=15V$ $V_{O(03)}=2.5V$	-	250		nA
I_{IB}	Input bias current	$V_{CC}=15V$ $V_{O(03)}=2.5V$	-	1		μA
V_{ICRL}	Low Input common mode voltage range	$V_{CC}=7...40V$	-0.3	-		V
V_{ICRH}	High Input common mode voltage range	$V_{CC}=7...40V$	$V_{CC} - 2$	-		V
A_{VOL}	Open loop voltage amplification	$\Delta V_0=3V$ $V_{CC}=15V$ $V_0=0.5...3.5V$	70	-		dB
f_b	Unity-gain bandwidth	$V_{CC}=15V$	100	-		kHz
CMRR	Common mode rejection ratio	$V_{CC}=40V$	65	-		dB
I_{OL}	Output sink current (pin 3)	$V_{CC}=15V$ $V_{O(03)}=0.7V$	0.3	-	-20...+85	mA
I_{OH}	Output source current (pin 3)	$V_{CC}=15V$ $V_{O(03)}=3.5V$	-2.0			mA
$I_{C(off)}$	Collector off-state current	$V_{CE}=V_{CC}=40V$	-	100		μA

$I_{E(off)}$	Emitter off-state current	$V_{CC}=V_C=40V$ $V_E=0V$	-	-100		μA
$V_{SAT(C)}$	Collector - Emitter saturation voltage (Common-Emitter)	$V_{CC}=15V$ $V_E=0V$ $V_{0(03)}=3.0V$ $I_C=200mA$	-	1.3		V
$V_{SAT(E)}$	Collector - Emitter saturation voltage (Emitter-follower)	$V_{CC}=V_C=15V$ $I_E=200mA$ $V_{0(03)}=3.0V$	-	2.5	25	V
				2.9	-20...+85	
I_{OCH}	Output control input current	$V_{CC}=15V$ $V_{0(03)}=0.7V$	-	3.5	25	mA
I_{CC15}	Standby Supply Current at V_{CC} 15V	$V_{CC}=15V$	-	10		mA

Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
I_{CC40}	Standby Supply Current at V_{CC} 40V	$V_{CC}=40V$	-	15	25	mA
I_{CCA}	Average Supply Current	$V_{CC}=15V$ $V_{0(03)}=0.7V$ $V_{0(04)}=2.0V$	-	17	-20...+85	mA

Standard deviation is a measure of the statistical distribution about the mean as derived from the formula

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