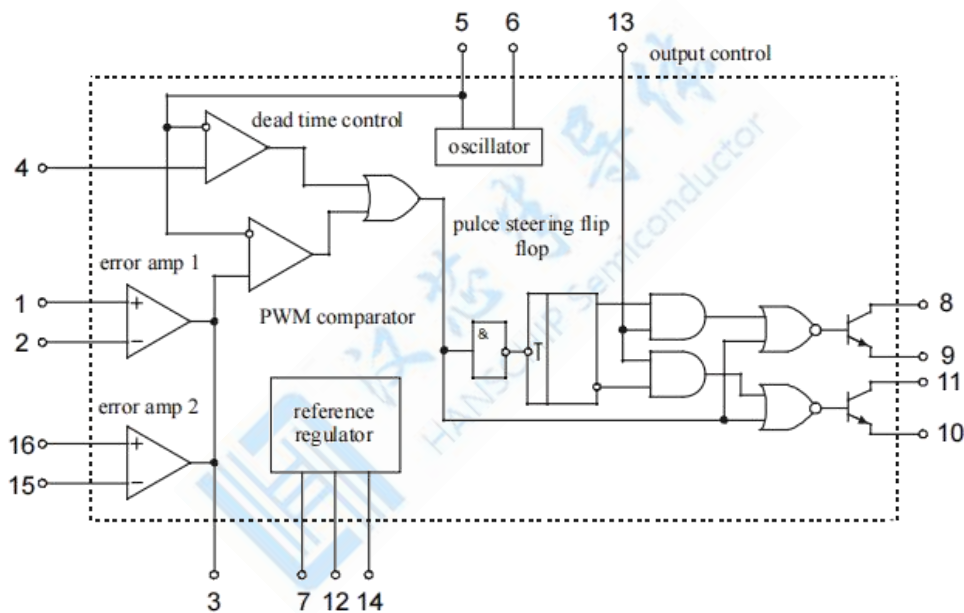


## SWITCHMODE Pulse Width Modulation Control Circuit

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



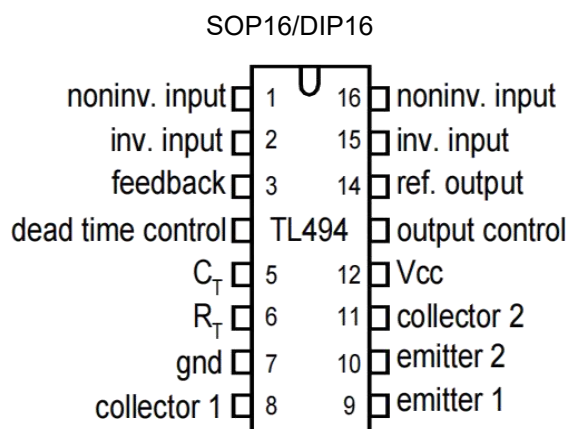
Pin 7 = GND

Pin 12 = Vcc

### ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
TL494IPG	DIP16	TL494	TUBE	1000pcs/reel
TL494IDRG	SOP16	TL494	REEL	2500pcs/reel

## PIN ASSIGNMENT



## MAXIMUM AND RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Recommended operating conditions		Maximum ratings		Unit
		Min	Max	Min	Max	
VCC	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
IOC	Collector Output Current(Each Transistor)		200		250	mA
STR	Storage Temperature Range			-65	150	°C
Ta	Operating Free-Air Temperature Range	-40	85			°C

## ELECTRICAL CHARACTERISTICS (TA= -40 ...+85°C, f=10kHz)

Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
Vref	Output voltage	$I_o=1.0mA V_{CC}=15V$	4.75	5.25	-40...+85	V
Uregin	Input regulation	$V_{CC}=7...40V I_o=1.0mA$	-	25	25	mV
Uregout	Output regulation	$I_o=1...10mA V_{CC}=15V$	-	15	25	mV
Vref	Output voltage change with temperature	$I_o=1mA V_{CC}=15V$	-	1.0	-40...+85	%
ISC	Short circuit output current	$V_{ref}=0 t_{sc}<1s V_{CC}=15V$	-	50		mA
fosc	Frequency	$C=0.01F, R_T=12k V_{CC}=15V V_{(03)}=0.7V$	6.0	14		kHz
fosc	Standard Deviation of Frequency *	$V_{CC}=15V V_{(03)}=0.7V$	-	15		%
fosc(ΔV)	Frequency Change with Voltage	$V_{CC}=7...40V V_{(03)}=0.7V$	-	10	25	%
fosc(ΔT)	Frequency Change with Temperature	$C=0.01F, R_T=12k V_{CC}=15V V_{(03)}=0.7V$	-	2.0	-40...+85	%
IIB(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	-		%
VTHD1	Input threshold voltage (pin 4) (Zero Duty Cycle)	$DC_{max}=0V V_{CC}=15V V_{(03)}=0.7V$	-	3,3		V
VTHD2	Input threshold voltage (pin 4) (Maximum Duty Cycle)	$DC_{max} V_{CC}=15V V_{(03)}=0.7V$	0	-		V

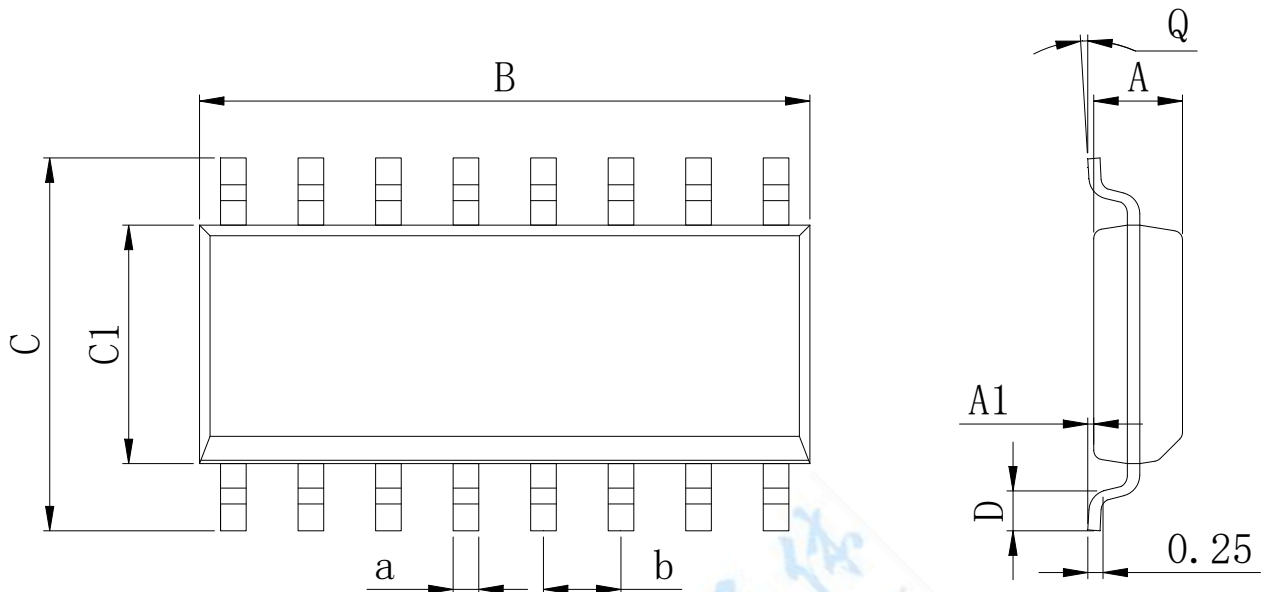
Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
t <sub>rc</sub>	Output voltage risetime (Common- Emitter)	V <sub>CC</sub> =15V V <sub>O(03)</sub> =2.0V	-	200	-40...+85	ns
t <sub>fc</sub>	Output voltage falltime (Common- Emitter)	V <sub>CC</sub> =15V V <sub>O(03)</sub> =2.0V	-	100		ns
t <sub>rf</sub>	Output voltage risetime (Emitter- Follower)	V <sub>CC</sub> =V <sub>C</sub> =15V V <sub>O(03)</sub> =2.0V	-	200		ns
t <sub>ff</sub>	Output voltage falltime (Emitter- Follower)	V <sub>CC</sub> =V <sub>C</sub> =15V V <sub>O(03)</sub> =2.0V	-	100	-40...+85	ns
V <sub>THP</sub>	Input thresholdvoltage (pin 3)	DCmax=0V V <sub>CC</sub> =15V	-	4.5		V
I <sub>I</sub>	Input sink current(pin 3)	V <sub>CC</sub> =15V V <sub>O(03)</sub> =0.7V	0.3	-		mA
V <sub>IO</sub>	Input offset voltage	V <sub>CC</sub> =15V V <sub>O(03)</sub> =2.5V	-	10		mV
I <sub>IO</sub>	Input offset current	V <sub>CC</sub> =15V V <sub>O(03)</sub> =2.5V	-	250		nA
I <sub>IB</sub>	Input bias current	V <sub>CC</sub> =15V V <sub>O(03)</sub> =2.5V	-	1		μA
V <sub>ICRL</sub>	Low Input commonmode voltage range	V <sub>CC</sub> =7...40V	-0.3	-		V
V <sub>ICRH</sub>	High Input commonmode voltage range	V <sub>CC</sub> =7...40V	V <sub>CC</sub> -2	-		V
A <sub>VOL</sub>	Open loop voltage amplification	V <sub>O</sub> =3V V <sub>CC</sub> =15V V <sub>O</sub> =0.5...3.5V	70	-		dB
f <sub>b</sub>	Unity-gainbandwidth	V <sub>CC</sub> =15V	100	-		kHz
CMRR	Common moderejection ratio	V <sub>CC</sub> =40V	65	-	25	dB
I <sub>OL</sub>	Output sink current(pin 3)	V <sub>CC</sub> =15V V <sub>O(03)</sub> =0.7V	0.3	-	-40...+85	mA
I <sub>OH</sub>	Output sourcecurrent (pin 3)	V <sub>CC</sub> =15V V <sub>O(03)</sub> =3.5V	-2.0			mA
I <sub>C(off)</sub>	Collector off-statecurrent	V <sub>CE</sub> =V <sub>CC</sub> =40V	-	100		μA
I <sub>E(off)</sub>	Emitter off-statecurrent	V <sub>CC</sub> =V <sub>C</sub> =40V V <sub>E</sub> =0V	-	-100		μA
V <sub>SAT(C)</sub>	Collector - Emittersaturation voltage (Common-Emitter)	V <sub>CC</sub> =15V V <sub>E</sub> =0V V <sub>O(03)</sub> =3.0V I <sub>C</sub> =200mA	-	1.3		V
V <sub>SAT(E)</sub>	Collector - Emittersaturation voltage(Emitter-follower)	V <sub>CC</sub> =V <sub>C</sub> =15V I <sub>E</sub> = -200mA V <sub>O(03)</sub> =3.0V	-	2.5	25	V
				2.9	-40...+85	
I <sub>OCH</sub>	Output control inputcurrent	V <sub>CC</sub> =15V V <sub>O(03)</sub> =0.7V	-	3.5	25	mA
I <sub>CC15</sub>	Standby Supply Current at V <sub>CC</sub> 15V	V <sub>CC</sub> =15V	-	10		mA

Symbol	Parameter	Test Conditions	Value		Temperature, °C	Unit
			Min	Max		
I <sub>CC40</sub>	Standby Supply Current at V <sub>CC</sub> 40V	V <sub>CC</sub> =40V	-	15	25	mA
I <sub>CCA</sub>	Average SupplyCurrent	V <sub>CC</sub> =15V V <sub>O(03)</sub> =0.7V V <sub>O(04)</sub> =2.0V	-	17	-40...+85	mA

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

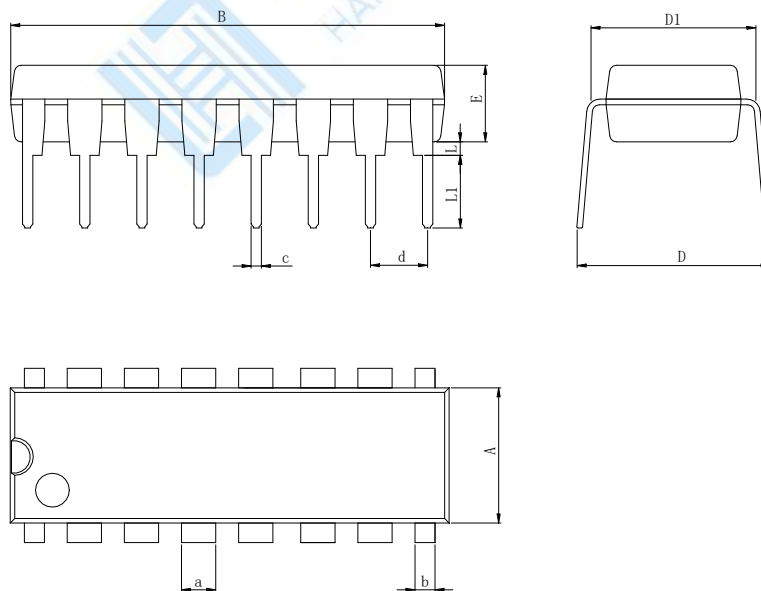
**Physical Dimensions**

SOP16


**Dimensions In Millimeters(SOP16)**

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	

DIP16


**Dimensions In Millimeters(DIP16)**

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	300	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

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