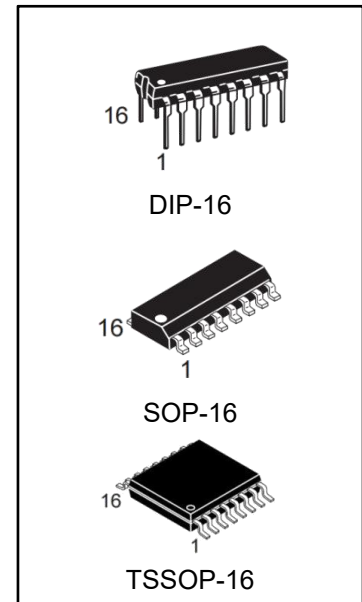


SWITCHMODE PULSE WIDTH MODULATION CONTROL CIRCUIT

Features

- 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



Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
TL494CN	DIP-16	TL494C	TUBE	1000pcs/box
TL494CM/TR	SOP-16	TL494C	REEL	2500pcs/reel
TL494CMT/TR	TSSOP-16	TL494C	REEL	2500pcs/reel
TL494IN	DIP-16	TL494I	TUBE	1000pcs/box
TL494IM/TR	SOP-16	TL494I	REEL	2500pcs/reel
TL494IMT/TR	TSSOP-16	TL494I	REEL	2500pcs/reel

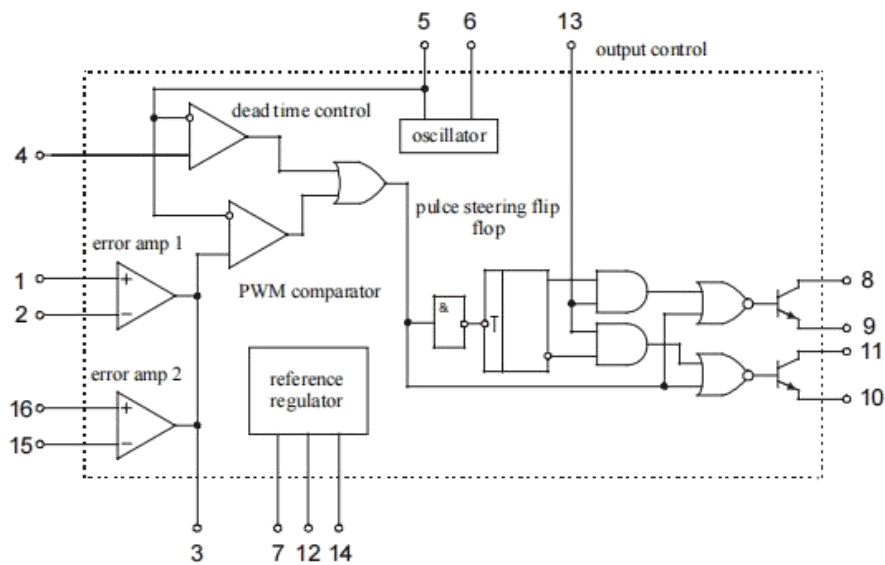
DESCRIPTION

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

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

LOGIC DIAGRAM



Pin 7 = GND
Pin 12 = V_{CC}

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 _{STG}	Storage Temperature Range				-65	150	°C
T _A	Operating Free-Air Temperature Range	TL494C	0	70			°C
		TL494I	-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 ₀ =1.0mA, V _{CC} =15V	4.75	5.25	-40~+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
Vref	Output voltage change with temperature	I ₀ =1mA, V _{CC} =15V	-	1.0	-40~+85	%
ISC	Short circuit output current	V _{ref} =0, t _{sc} < 1s V _{CC} =15V	-	50		mA
f _{osc}	Frequency	C=0.01uF, R=12k V _{CC} =15V, V ₍₀₃₎ =0.7V	6.0	14		kHz
f _{osc}	Standard Deviation of Frequency *	V _{CC} =15V, V ₍₀₃₎ =0.7V	-	15		%
f _{osc} (ΔV)	Frequency Change with Voltage	V _{CC} =7~40V, V ₍₀₃₎ =0.7V	-	10	25	%
f _{osc} (ΔT)	Frequency Change with Temperature	C=0.01uF, R _T =12k V _{CC} =15V, V ₍₀₃₎ =0.7V	-	2.0		%
I _I (2T)	Input bias current (pin 4)	V _I =0...5.25V, V _{CC} =15V V ₍₀₃₎ =0.7V	-	-10		A
DC _{max}	Maximum duty cycle (each output)	V _I (04)=0V, V _{CC} =15V V ₍₀₃₎ =0.7V	45	-	-40~+85	%
V _{THD1}	Input threshold voltage (pin 4) (Zero Duty Cycle)	DC _{max} =0, V _{CC} =15V V ₍₀₃₎ =0.7V	-	3,3		V
V _{THD2}	Input threshold voltage (pin 4) (Maximum Duty Cycle)	DC _{max} V _{CC} =15V, V ₍₀₃₎ =0.7V	0	-		V
t _{rc}	Output voltage risetime (Common- Emitter)	V _{CC} =15V, V ₍₀₃₎ =2.0V	-	200	-40~+85	ns
t _{fc}	Output voltage falltime (Common- Emitter)	V _{CC} =15V, V ₍₀₃₎ =2.0V	-	100		ns
t _{rf}	Output voltage risetime (Emitter- Follower)	V _{CC} =V _C =15V, V ₍₀₃₎ =2.0V	-	200		ns
t _{ff}	Output voltage falltime (Emitter- Follower)	V _{CC} =V _C =15V, V ₍₀₃₎ =2.0V	-	100		ns
V _{THP}	Input threshold voltage (pin 3)	DC _{max} =0, V _{CC} =15V	-	4.5	-40~+85	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

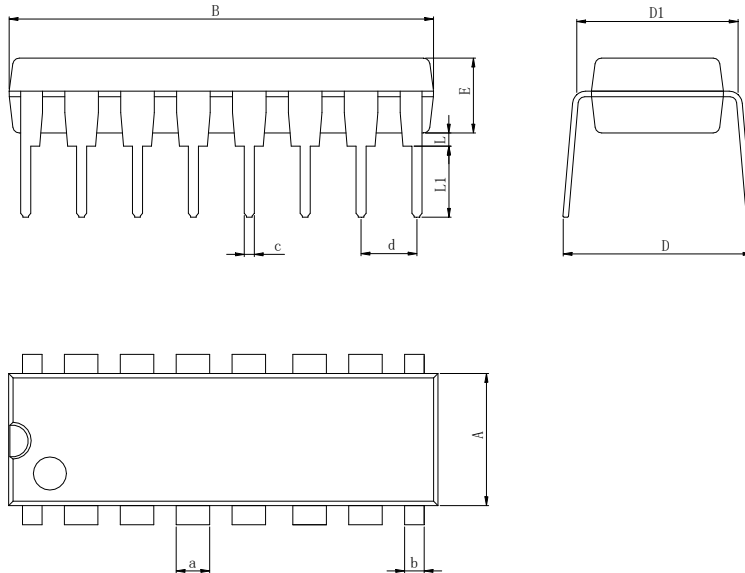
IIO	Input offset current	V _{CC} =15V, V _{O(03)} =2.5V	-	250		nA
IIB	Input bias current	V _{CC} =15V, V _{O(03)} =2.5V	-	1		A
VICRL	Low Input common mode voltage range	V _{CC} =7~40V	-0.3	-		V
VICRH	High Input common mode voltage range	V _{CC} =7~40V	V _{CC} -2	-		V
AVOL	Open loop voltage amplification	V _O =3V, V _{CC} =15V V _O =0.5~3.5V	70	-		dB
f _b	Unity-gainbandwidth	V _{CC} =15V	100	-		kHz
CMRR	Common mode rejection ratio	V _{CC} =40V	65	-	25	dB
IOL	Output sink current(pin 3)	V _{CC} =15V, V _{O(03)} =0.7V	0.3	-	-40~+85	mA
IOH	Output sourcecurrent (pin 3)	V _{CC} =15V, V _{O(03)} =3.5V	-2.0			mA
IC(off)	Collector off-state current	V _{CE} =V _{CC} =40V	-	100		A
IE(off)	Emitter off-state current	V _{CC} =V _C =40V, V _E =0V	-	-100		A
VSAT(C)	Collector - Emitter saturation voltage (Common-Emitter)	V _{CC} =15V, V _E =0V V _{O(03)} =3.0V, I _C =200mA	-	1.3		V
VSAT(E)	Collector - Emitter saturation voltage (Emitter-follower)	V _{CC} =V _C =15V I _E = -200mA, V _{O(03)} =3.0V			-20~+85	V
IOCH	Output control input current	V _{CC} =15V V _{O(03)} =0.7V	-	3.5	25	mA
ICC15	Standby Supply Current at VCC 15V	V _{CC} =15V	-	10		mA
ICC40	Standby Supply Current at VCC 40V	V _{CC} =40V	-	15	25	mA
ICCA	Average Supply Current	V _{CC} =15V V _{O(03)} =0.7V V _{O(04)} =2.0V	-	15	-40~+85	mA

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

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

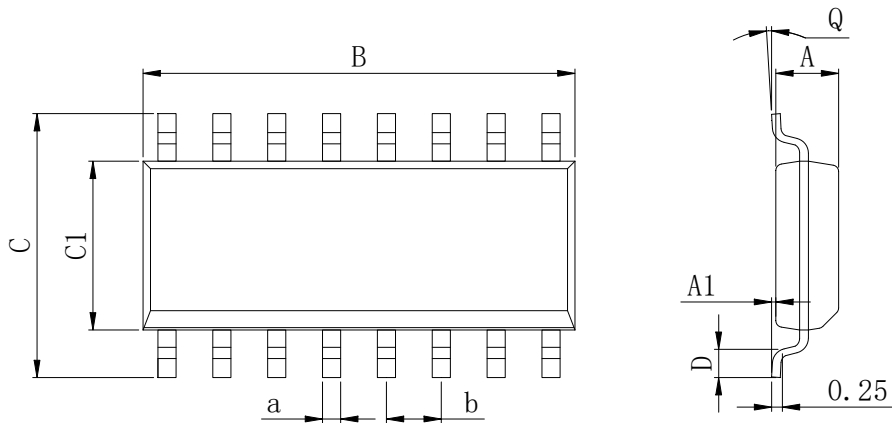
PHYSICAL DIMENSIONS

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	3.00	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	

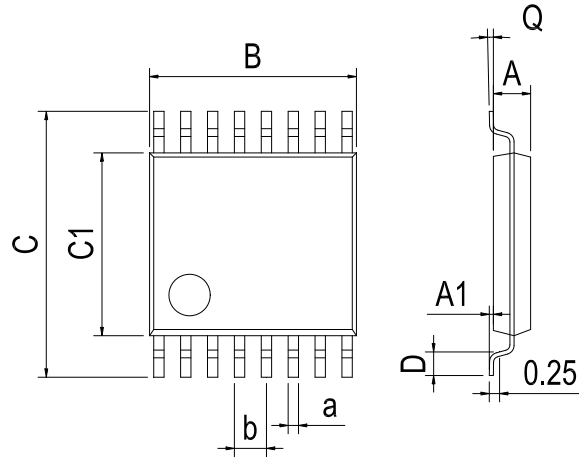
SOP16



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	

PHYSICAL DIMENSIONS

TSSOP16



Dimensions In Millimeters(TSSOP16)									
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	

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