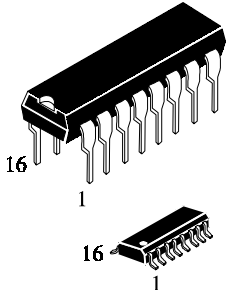


**IL494**

**PWM Control Circuit**

The IL494 incorporates 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, the IL494 contains an on-chip 5-volt regulator, two error amplifiers, adjustable oscillator, dead-time control comparator, pulse-steering flip-flop, and output-control circuitry. The uncommitted output transistors provide either common-emitter or emitter-follower output capability. Push-pull or single-ended output operation may be selected through the output-control function. The architecture of the IL494 prohibits the possibility of either output being pulsed twice during push-pull operation.

- Complete PWM Power Control Circuitry
- Uncommitted Outputs for 200 mA Sink or Source
- Output Control Selects Single-Ended or Push-Pull Operation
- Internal Circuitry Prohibits Double Pulse at Either Output
- Internal Regulator Provides a Stable 5 V Reference Supply
- Variable Dead-Time Provides Control Over Total Range



**N SUFFIX PLASTIC**

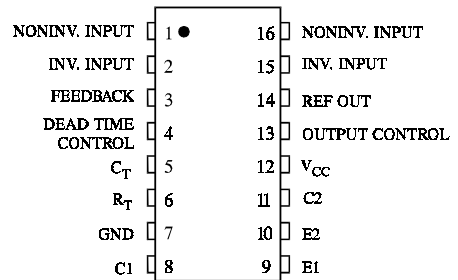
**D SUFFIX SOIC**

**ORDERING INFORMATION**  
 IL494N Plastic  
 IL494D SOIC  
 T<sub>A</sub> = -20°C to 85°C  
 for all packages

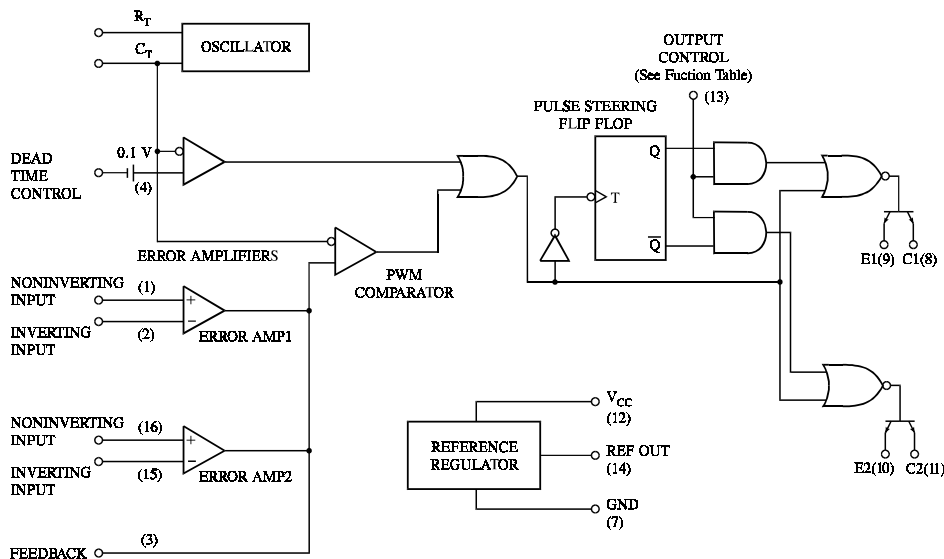
**FUNCTION TABLE**

Output Control	Output Function
Grounded	Single-ended or Parallel Output
At V <sub>ref</sub>	Normal Push-Pull Operation

**PIN ASSIGNMENT**



**LOGIC DIAGRAM**



**MAXIMUM RATINGS**

<b>Symbol</b>	<b>Parameter</b>	<b>Value</b>	<b>Unit</b>
V <sub>CC</sub>	Supply Voltage	41	V
V <sub>I</sub>	Amplifier Input Voltage	V <sub>CC</sub> +0.3	V
V <sub>O</sub>	Collector Output Voltage	41	V
	Collector Output Current	250	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C

**RECOMMENDED OPERATING CONDITIONS**

<b>Symbol</b>	<b>Parameter</b>	<b>Min</b>	<b>Max</b>	<b>Unit</b>
V <sub>CC</sub>	Supply Voltage	7	40	V
V <sub>I</sub>	Amplifier Input Voltage	-0.3	V <sub>CC</sub> - 2	V
V <sub>O</sub>	Collector Output Voltage		40	V
	Collector Output Current (Each Transistor)		200	mA
	Current Into Feed back Terminal		0.3	mA
C <sub>T</sub>	Timing Capacitor	0.47	10.000	nF
R <sub>T</sub>	Timing Resistor	1.8	500	KΩ
	Oscillator Frequency	1	300	KHz
T <sub>A</sub>	Operating Free-Air Temperature	-20	+85	°C

**ELECTRICAL CHARACTERISTICS** (Temperature -20 ~ 85°C, V<sub>CC</sub> = 15 V, f=10 kHz)

Symbol	Parameter	Test Conditions	Min	Max	Unit
<b>Reference Section</b>					
V <sub>ref</sub>	Output Voltage	I <sub>O</sub> =1 mA	4.75	5.25	V
V <sub>regin</sub>	Output regulation	V <sub>CC</sub> =7 V to 40 V, T <sub>A</sub> =25°C		25	mV
V <sub>regout</sub>	Input regulation	I <sub>O</sub> =1 to 10 mA, T <sub>A</sub> =25°C		15	mV
ΔV <sub>ref</sub>	Output Voltage change with temperature	T <sub>A</sub> = -20°C to 85°C		1	%
I <sub>SC</sub>	Short-circuit output current (Note 1)	V <sub>ref</sub> =0		50	mA
<b>Oscillator Section</b>					
f <sub>OSC</sub>	Frequency	C <sub>T</sub> =0.01 μF, R <sub>T</sub> =12 kΩ	6	14	KHz
δf <sub>OSC</sub>	Standard deviation of frequency (Note 2)	All values of V <sub>CC</sub> , C <sub>T</sub> , R <sub>T</sub> , T <sub>A</sub> Constant		15	%
δf <sub>OSC(ΔV)</sub>	Frequency change with voltage	V <sub>CC</sub> = 7 V to 40 V, T <sub>A</sub> =25°C		10	%
δf <sub>OSC(ΔT)</sub>	Frequency change with temperature	C <sub>T</sub> =0.01 μF, R <sub>T</sub> =12 kΩ T <sub>A</sub> = -20°C to 85°C		2	%
<b>Dead Time Control Section</b>					
I <sub>IB(2T)</sub>	Input bias current (pin 4)	V <sub>I</sub> = 0 to 5.25 V		-10	μA
DC <sub>max</sub>	Maximum duty cycle, each output	V <sub>I(pin 4)</sub> =0 V	45		%
V <sub>THD</sub>	Input threshold voltage (pin 4)	Zero duty cycle		3.3	V
		Maximum duty cycle	0		
<b>Error Amp Section</b>					
V <sub>IO</sub>	Input offset voltage	V <sub>O(pin 3)</sub> =2.5 V		10	mV
I <sub>IO</sub>	Input offset current	V <sub>O(pin 3)</sub> =2.5 V		250	nA
I <sub>IB</sub>	Input bias current	V <sub>O(pin 3)</sub> =2.5 V		1	μA
	Common-mode input voltage range	V <sub>CC</sub> = 7 V to 40 V	LOW	-0.3	V
			HIGH	V <sub>CC</sub> - 2	
A <sub>vol</sub>	Open-loop voltage amplification	ΔV <sub>O</sub> =3 V, V <sub>O</sub> =0.5 to 3.5 V	70		dB
f <sub>b</sub>	Unity-gain bandwidth		100		kHz
CMRR	Common-mode rejection ratio	V <sub>CC</sub> =40 V, T <sub>A</sub> =25°C	65		dB
I <sub>O</sub>	Output sink current (pin 3)	V <sub>ID</sub> =-15 mV to -5 V, V <sub>O(pin 3)</sub> =0.7 V	0.3		mA
I <sub>O+</sub>	Output source current (pin 3)	V <sub>ID</sub> =15 mV to 5 V, V <sub>O(pin 3)</sub> =3.5 V	-2		mA

**ELECTRICAL CHARACTERISTICS**(Temperature -20 ~ 85°C, V<sub>CC</sub> = 15 V, f=10 kHz)

Symbol	Parameter		Test Conditions	Min	Max	Unit	
<b>PWM Comparator Section</b>							
V <sub>THP</sub>	Input threshold voltage (pin 3)		Zero duty cycle		4.5	V	
I <sub>I</sub>	Input sink current (pin 3)		V <sub>O(pin 3)</sub> =0.7 V	0.3		mA	
<b>Switching Characteristics</b>							
t <sub>rc</sub>	Output voltage rise time		Common-emitter configuration		200	ns	
t <sub>fc</sub>	Output voltage fall time		Common-emitter configuration		100	ns	
t <sub>rf</sub>	Output voltage rise time		Emitter-follower configuration		200	ns	
t <sub>ff</sub>	Output voltage fall time		Emitter-follower configuration		100	ns	
<b>Output Section</b>							
I <sub>C(off)</sub>	Collector off-state current		V <sub>CE</sub> =40 V, V <sub>CC</sub> =40 V		100	μA	
I <sub>E(off)</sub>	Emitter off-state current		V <sub>CC</sub> =V <sub>C</sub> =40 V, V <sub>E</sub> =0		-100	μA	
V <sub>SAT</sub>	Collector-emitter	Common-emitter	V <sub>E</sub> =0, I <sub>C</sub> =200 mA		1.3	V	
	saturation voltage	Emitter-follower	V <sub>C</sub> =15 V, I <sub>E</sub> =-200 mA		2.5		
I <sub>OCH</sub>	Output control input current		V <sub>I</sub> =V <sub>ref</sub>		3.5	mA	
<b>Total Device</b>							
I <sub>CC</sub>	Standby supply current		All other inputs & outputs open	V <sub>CC</sub> =15 V		10	mA
				V <sub>CC</sub> =40 V		15	
I <sub>CCA</sub>	Average supply current		V <sub>(pin 4)</sub> =2 V		17	mA	

**Notes:** 1. Duration of the short circuit should not exceed one second.

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

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