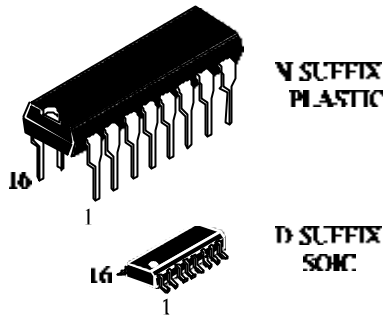


PWM Control Circuit

The SL494 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 SL494 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



V SUFFIX PLASTIC

D SUFFIX SOIC

ORDERING INFORMATION

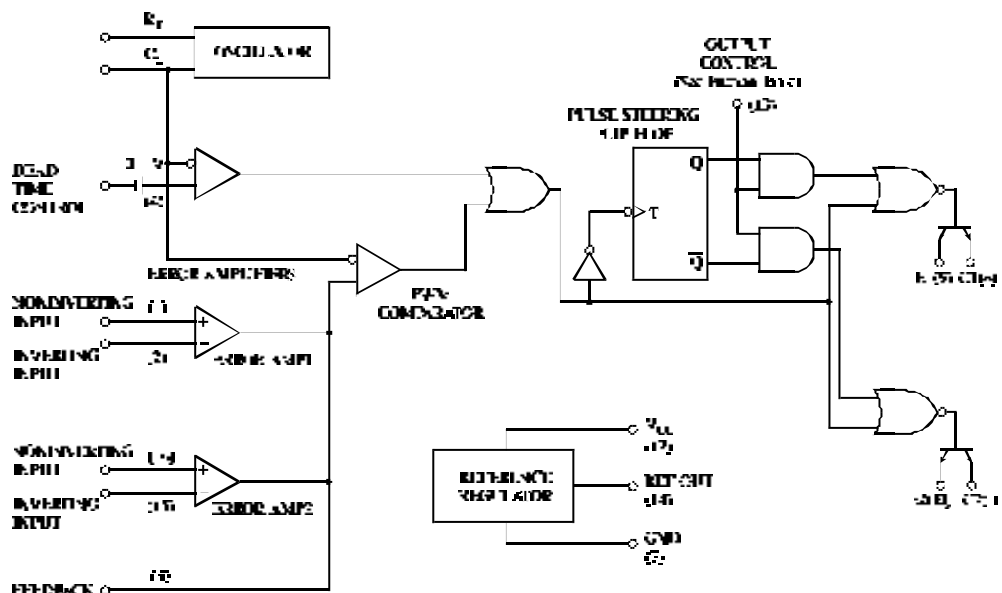
SL494N Plastic
 SL494D SOIC
 $T_A = -20^\circ\text{C}$ to 85°C
 for all packages

FUNCTION TABLE

Output Control	Output Function
Grounded	Single-ended or Parallel Output
At V_{ref}	Normal Push-Pull Operation

NONINVERTING INPUT	1	16	NONINVERTING INPUT
INVERTING INPUT	2	15	INVERTING INPUT
FEEDBACK	3	14	REF. OUT
DEAD TIME CONTROL	4	13	OUTPUT CONTROL
C_T	5	12	V_{CC}
R_T	6	11	C_1
GND	7	10	E_2
C_1	8	9	E_1

LOGIC DIAGRAM



MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	41	V
V _I	Amplifier Input Voltage	V _{CC} + 0.3	V
V _O	Collector Output Voltage	41	V
	Collector Output Current	250	mA
T _{stg}	Storage Temperature	-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	Supply Voltage	7	40	V
V _I	Amplifier Input Voltage	-0.3	V _{CC} - 2	V
V _O	Collector Output Voltage		40	V
	Collector Output Current (Each Transistor)		200	mA
	Current Into Feed back Terminal		0.3	mA
C _T	Timing Capacitor	0.47	10.000	nF
R _T	Timing Resistor	1.8	500	KΩ
	Oscillator Frequency	1	300	KHz
T _A	Operating Free-Air Temperature	-20	+85	°C

ELECTRICAL CHARACTERISTICS (Temperature -20 ~ 85°C, $V_{CC} = 15$ V, $f=10$ kHz)

Symbol	Parameter	Test Conditions	Min	Max	Unit
Reference Section					
V_{ref}	Output Voltage	$I_O=1$ mA	4.75	5.25	V
V_{regin}	Output regulation	$V_{CC}=7$ V to 40 V, $T_A=25^\circ\text{C}$		25	mV
V_{regout}	Input regulation	$I_O=1$ to 10 mA, $T_A=25^\circ\text{C}$		15	mV
ΔV_{ref}	Output Voltage change with temperature	$T_A = -20^\circ\text{C}$ to 85°C		1	%
I_{SC}	Short-circuit output current (Note 1)	$V_{ref}=0$		50	mA
Oscillator Section					
f_{OSC}	Frequency	$C_T=0.01$ μF , $R_T=12$ k Ω	6	14	KHz
δf_{OSC}	Standard deviation of frequency (Note 2)	All values of V_{CC} , C_T , R_T , T_A Constant		15	%
$\delta f_{OSC(\Delta V)}$	Frequency change with voltage	$V_{CC}= 7$ V to 40 V, $T_A=25^\circ\text{C}$		10	%
$\delta f_{OSC(\Delta T)}$	Frequency change with temperature	$C_T=0.01$ μF , $R_T=12$ k Ω $T_A = -20^\circ\text{C}$ to 85°C		2	%
Dead Time Control Section					
$I_{IB(2T)}$	Input bias current (pin 4)	$V_I= 0$ to 5.25 V		-10	μA
DC_{max}	Maximum duty cycle, each output	$V_{I(\text{pin } 4)}=0$ V	45		%
V_{THD}	Input threshold voltage (pin 4)	Zero duty cycle		3.3	V
		Maximum duty cycle	0		
Error Amp Section					
V_{IO}	Input offset voltage	$V_{O(\text{pin } 3)}=2.5$ V		10	mV
I_{IO}	Input offset current	$V_{O(\text{pin } 3)}=2.5$ V		250	nA
I_{IB}	Input bias current	$V_{O(\text{pin } 3)}=2.5$ V		1	μA
	Common-mode input voltage range	$V_{CC}= 7$ V to 40 V	LOW	-0.3	V
			HIGH	$V_{CC} - 2$	
A_{vol}	Open-loop voltage amplification	$\Delta V_O=3$ V, $V_O=0.5$ to 3.5 V	70		dB
f_b	Unity-gain bandwidth		100		kHz
CMRR	Common-mode rejection ratio	$V_{CC}=40$ V, $T_A=25^\circ\text{C}$	65		dB
I_O	Output sink current (pin 3)	$V_{ID}=-15$ mV to -5 V, $V_{O(\text{pin } 3)}=0.7$ V	0.3		mA
I_{O+}	Output source current (pin 3)	$V_{ID}=15$ mV to 5 V, $V_{O(\text{pin } 3)}=3.5$ V	-2		mA



ELECTRICAL CHARACTERISTICS (Temperature -20 ~ 85°C, V_{CC} = 15 V, f=10 kHz)

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

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