GDTL494

VOLTAGE MODE PWM CONTROL CIRCUIT

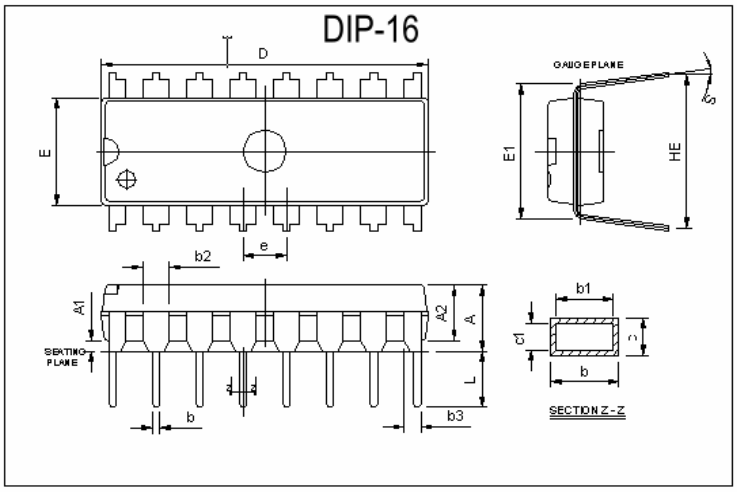
Description

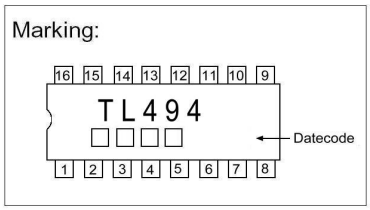
The GDTL494 incorporates all the functions required in the construction of a pulse-width modulation switching circuit. Designed Primarily for switching power supply control or DC-DC convectors, it offers the systems engineer the flexibility to tailor control circuitry to its own application.

Features

*Complete PWM power control circuitry
*Uncommitted outputs for 200 mA sink or source current
*Output control selects single ended or push pull operation
*Internal circuitry prohibits double pulses over total range.
*Easy synchronization.

Package Dimensions





REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	5.334	c1	0.203	0.279
A1	0.381	-	D	18.92	19.69
A2	3.175	3.429	E	6.096	6.604
b	0.406	0.508	E1	7.493	8.001
b1	0.356	0.508	e	2.413	2.667
b2	1.270	1.778	HE	8.509	9.525
b3	0.762	1.143	L	3.175	3.683
c	0.203	0.356	S	0°	15°

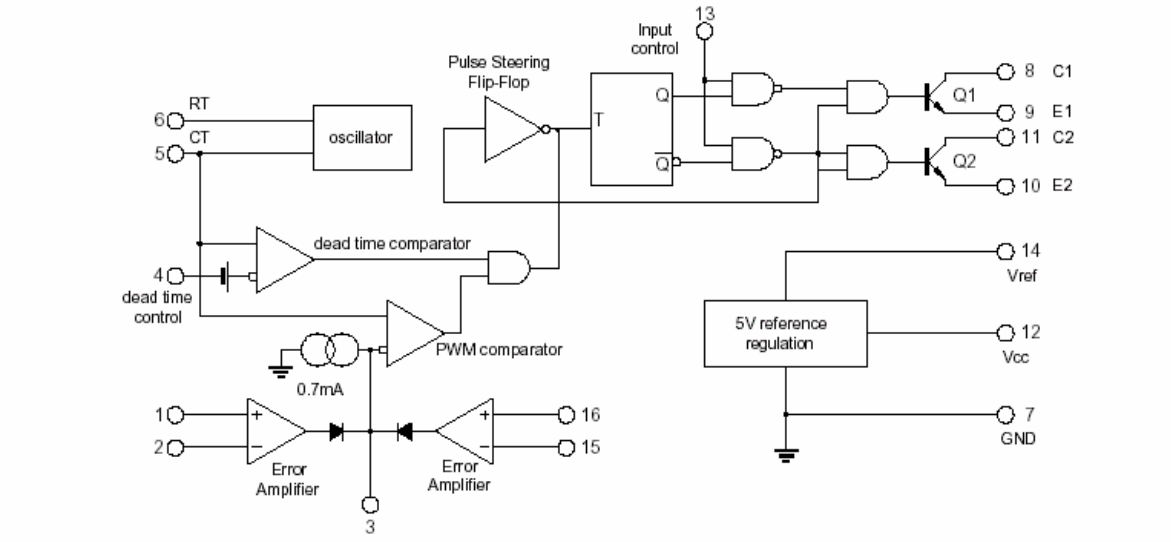
Absolute Maximum Ratings (Unless otherwise noted all is over operating free air temperature range)

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage (note1)	Vcc	41	V
Amplifier Input Voltage	Vi	Vcc+0.3	V
Collector output Voltage	Vo	41	V
Collector output Current	Ico	250	mA
Continuous Total Dissipation at (or for below) 25℃ free air Temperature(note 2)	P_D	1000	mW
Operating Temperature Range	Topr	0 TO 70	℃
Storage Temperature Range	Tstg	-65 TO 150	℃
Lead Temperature 1.6mm from Case for 60 Sec.	Tcase	300	℃

Note1: All voltage values, except differential voltages are with respect to the network ground terminal.

Note2:For operation above 25℃ free-air temperature, the dissipation derates with 9.2mW/℃.

BLOCK DIAGRAM



Recommended Operating Conditions

Parameter	Symbol	VALUE		Unit
		MIN	MAX	
Supply Voltage	Vcc	7	40	V
Amplifier Input Voltage	Vi	-0.3	Vcc-2	V
Collector Output Voltage	Vo		40	V
Collector Output Current(each Transistor)	Ic		200	mA
Current into Feedback	If		0.3	mA
Timing Capacitor	C_T	0.47	10000	nF
Timing Resistor	R_T	1.8	500	kΩ
Oscillator Frequency	fosc	1	300	kHz
Operating Free-Air Temperature	Ta	0	70	℃

Electrical Characteristics (Over recommended operating free-air temperature range, Vcc=15V, f=1kHz, Unless otherwise specified)

Parameter		Test Conditions	Min	Typ.	Max.	Unit
Reference Section						
Output Voltage		Io=1mA	4.75	5	5.25	V
Input Regulation		Vcc = 7to 40 V		2	25	mV
Output Regulation		Io=1 to 10mA		1	15	mV
Output Voltage Change with Temperature		ΔT_A=MIN to MAX(note2)		0.2	1	%
Short-Circuit Output Current		Vref=0		35		mA
Oscillator Section						
Frequency		C_T=0.01μf,RT=120kΩ		10		kHz
Standard Deviation of Frequency		All Values of Vcc C_T,R_T,T_A constant		10		%
Frequency Change with Voltage		Vcc=7v to 40v , Ta = 25℃		0.1		%
Frequency Change with Temperature		C_T=0.01μf,R_T=12 kΩ, ΔT_A=MIN to MAX			12	%
Amplifier Section						
Input Offset Voltage	Error	Vo(pin 3)=2.5v		2	10	mV
Input Offset Current		Vo(pin 3)=2.5v		25	250	nA
Input Bias Current		Vo(pin 3)=2.5v		0.2	1	μA
Common-Mode Input Voltage Range	Error	Vcc=7V to 40V	-0.3 to Vcc-2			V

Open-Loop Voltage Amplification		ΔVo=3v,Vo=0.5V to 3.5V	70	95		dB
Unity-Gain Bandwidth				800		kHz
Common-Mode Rejection Ratio	Error	Vcc=40V,TA=25℃	65	80		dB
Output Sink Current(pin 3)		V_{ID}=-15mV to –5V V(pin 3)=0.5V	0.3	0.7		mA
Output source Current(pin 3)		V_{ID}=15Mv to –5V V(pin 3)=3.5V	-2			mA
Output Section						
Collector off-state current		V_{CE}=40V,Vcc=40v		2	100	μA
Emitter off-state current		Vcc=Vc=40V,V_E=0			-100	μA
Collector-Emitter saturation Voltage	Common-Emitter	V_E=0,Ic=200mA		1.1	1.3	V
	Emitter-Follower	Vc=15V,I_E=-200mA		1.5	2.5	
Output Control Input Current		Vi=Vref			3.5	mA
Dead Time Control Section						
Input bias(pin 4)		Vi=0 to 5.25 V		-2	-10	μA
Maximum duty cycle, each output		VI(pin 4)=0	45			%
Input threshold Voltage (pin 4)		Zero duty cycle		3	3.3	V
		Maximum duty cycle	0			
PWM comparator Section						
Input Threshold Voltage(pin 3)		Zero Duty cycle		4	4.5	V
Input Sink current (pin 3)		V(pin 3)=0.7V	0.3	0.7		mA
Total Device						
Standby supply current	Vcc=15V	Pin 6 at Vref,all other Input s and outputs open		6	10	mA
	Vcc=40V			9	15	
Average supply current		V pin 4 =2V		7.5		mA
Switching Characteristics, Ta = 25℃						
Output Voltage Rise Time		Common-emitter configuration		100	200	ns
Output Voltage Fall Time				25	100	ns
Output Voltage Rise Time		Emitter-follower configuration		100	200	ns
Output Voltage Fall Time				40	100	ns

Note 1：All typical values except for temperature coefficient are at Ta=25℃.

Note 2：For conditions shown as MIN or MAX, use appropriate value under recommended operating conditions.

Note 3：Duration of the short -circuit should not exceed one second.

Note 4：Standard deviation is a measure of the statistical distribution the mean as derived from the formula:

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

TEST CIRCUIT

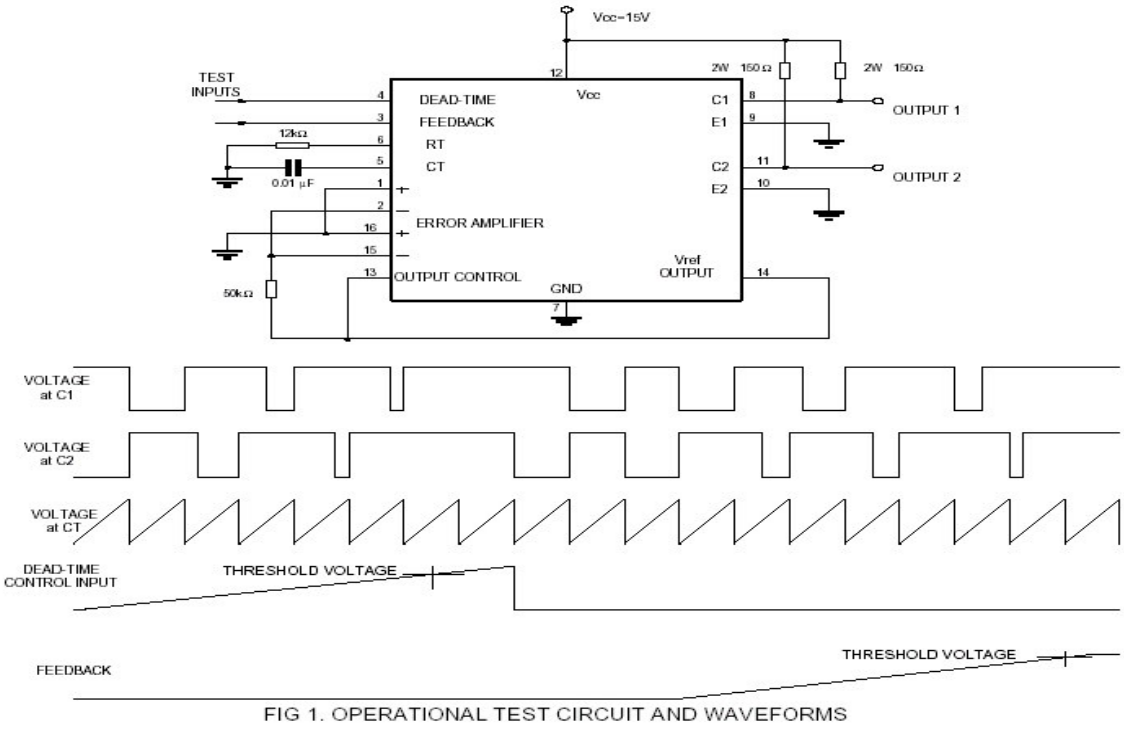


FIG 1. OPERATIONAL TEST CIRCUIT AND WAVEFORMS

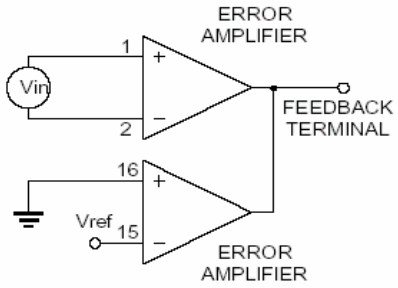


FIG 2. AMPLIFIER CHARACTERISTICS

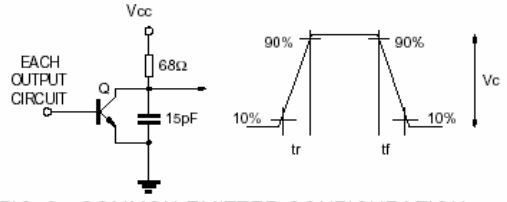


FIG. 3 COMMON-EMITTER CONFIGURATION

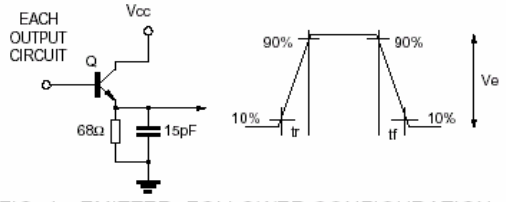
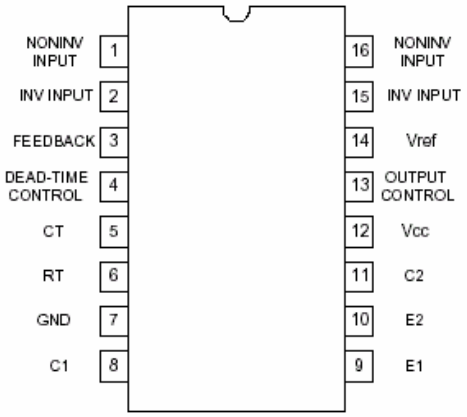


FIG. 4 EMITTER -FOLLOWER CONFIGURATION

PIN CONFIGURATIONS



TYPICAL PERFORMANCE CHARACTERISTICS

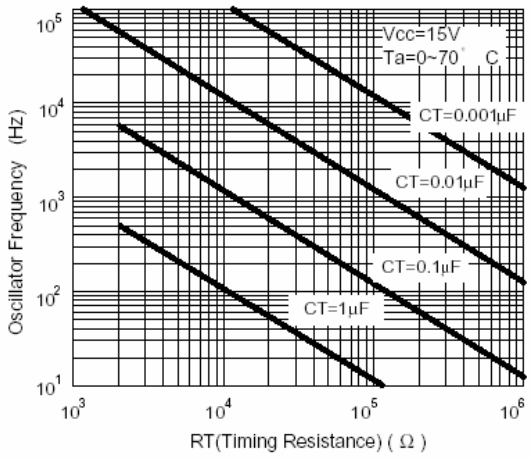


FIG 5. Oscillator Frequency and Frequency Variation Vs Timing Resistance

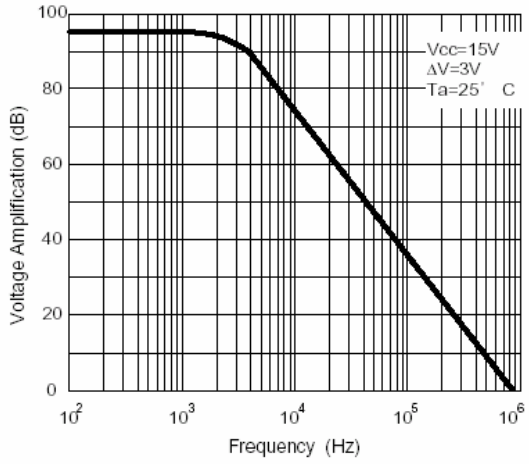


Fig.6 Amplifier Voltage Amplification

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