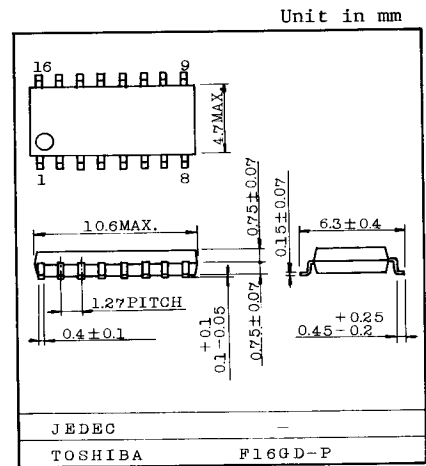


○ GENERAL USE SWITCHING REGULATOR (494 TYPE)

The TA76494F is an IC for 494 type switching regulator, with 5V reference voltage, built-in error amplifier, saw tooth wave generating circuit, dead time adjusting comparater, flip-flop, and output buffer.

- Wide same phase range of the error amplifier
- Built-in 100mA output buffer
- Dead time is adjustable
- Built-in low supply voltage protective circuit



MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	25	V
Error Amplifier Input Voltage	V_{ICM}	$V_{CC} + 0.3$	V
Output Voltage	V_{CER}	25	V
Output Current	I_C	100	mA
Power Consumption	P_D	400	mW
Operating Temperature	T_{opr}	-30 ~ 75	°C
Storage Temperature	T_{stg}	-55 ~ 150	°C

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	7	-	25	V
Output Voltage	V_{CER}	-0.3	-	25	V
Output Current (per one stage of output unit)	I_C	-	-	100	mA
Error Amplifier Sink Current	I_{OAMP}	-	-	-0.3	mA
Timing Capacitor	C_T	0.47	-	10000	nF
Timing Resistor	R_T	1.8	-	500	kΩ
Oscillation Frequency	f_{OSC}	1	-	300	kHz
Operating Temperature	T_{opr}	-20	-	70	°C

TA76494F

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{CC}=15V$, $f_{OSC}=10kHz$)

REFERENCE VOLTAGE UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{ref}	$I_{ref}=1mA$, $T_a=25^{\circ}C$	4.75	5.00	5.25	V
Input Stability	$Reg\ IN$	$7V \leq V_{CC} \leq 25V$, $I_{ref} = 1mA$, $T_a = 25^{\circ}C$	-	8	25	mV
Load stability	$Reg\ L$	$1mA \leq I_{ref} \leq 10mA$, $T_a=25^{\circ}C$	-	1	15	mV
Output Voltage Temp. Change	$T_c\ V_{ref}$	$-20^{\circ}C \leq T_a \leq 75^{\circ}C$, $I_{ref} = 1mA$	-	0.01	0.03	%/ $^{\circ}C$
Output Short-Circuit Current	I_S	$V_{ref}=0$	-	50	-	mA

OSCILLATION UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency Set Value	f_{osc}	$C_T=0.001\mu F$, $R_T=30k\Omega$	-	40	-	kHz
Oscillation Frequency Setting Accuracy	f_{DIV}	$C_T=0.001\mu F$, $R_T=30k\Omega$	-	3.0	-	%
Frequency Input Stability	Δf_{VIN}	$7V \leq V_{CC} \leq 40V$, $T_a = 25^{\circ}C$	-	0.1	-	%
Frequency Temp. Change	Δf_{Ta}	$0^{\circ}C \leq T_a \leq 70^{\circ}C$	-	1	2	%

PAUSE PERIOD ADJUSTING UNIT

CHARACTERISTIC	SYMBOL	TEST CONDITON	MIN.	TYP.	MAX.	UNIT
Input Bias Current	I_{IND}	$0 \leq V_{IN} \leq 5.25V$ PIN 4	-	-2	-10	A
Max. Duty (Each Output Stage)	$D_y\ MAX$	$V_{in}=0$, $C_T=0.1\mu F$, $R_T=12k\Omega$	45	48	-	%
Input Threshold Voltage 1	V_{TH-1}	Output pulse 0% duty	-	2.8	3.3	V
Input Threshold Voltage 2	V_{TH-2}	Output pulse max. duty	0	-	-	V

ERROR AMPLIFIER I, II

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	V_O PIN 3 = 2.5V	-	2	10	mV
Input Offset Current	I_{IO}	V_O PIN 3 = 2.5V	-	5.0	250	nA
Input Bias Current	I_{IB}	V_O PIN 3 = 2.5V	-	0.1	1	A
Common Mode Input Voltage Range	$CMVIN$	$7V \leq V_{CC} \leq 25V$	0.3	-	$V_{CC}-2$	V
Open loop Gain	G_v	V_O PIN 3 = 0.5~3.5V, $R_L=2k\Omega$	70	95	-	dB
Unity Gain Frequency	f_o	V_O PIN 3 = 0.5~3.5V, $R_L=2k\Omega$	-	350	-	kHz
Common Mode Rejection Ratio	$CMRR$	$V_{CC} = 25V$	65	90	-	dB
Output Sink Current	I_{SINK}	V_O PIN 3 = 0.7V	0.3	0.7	-	mA
Output Source Current	I_{SOURCE}	V_O PIN 3 = 3.5V	-2	-10	-	mA

PWM COMPARATOR

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Threshold Voltage	V_{TH}	Zero duty cycle	-	4	4.5	V
Input Sink Current	I_I	V_O PIN 3 = 0.7V	0.3	0.7	-	mA

OUTPUT UNIT

001701 UNIT

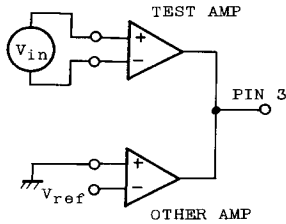
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current		I_{CER}	$V_{CE}=25V$, $V_{CC}=25V$ Emitter grounded	-	-	100	μA
Emitter Cut-off Current		$I_{E(OFF)}$	$V_{CC}=V_C=25V$, $V_E=0V$ Emitter follower	-	-	-100	μA
Emitter Saturation Voltage (Emitter grounded)		$V_{SAT(C)}$	$I_C = 50mA$, $V_E = 0V$	-	0.95	1.3	V
Collector Saturation Voltage (Emitter follower)		$V_{SAT(E)}$	$I_E=-50mA$, $V_C = 15V$	-	1.6	2.5	V
Output Voltage Rise Time (Emitter grounded)		$t_r\ 1$		-	100	200	ns
Output Voltage Fall Time (Emitter follower)		$t_f\ 1$		-	25	100	
Output Voltage Rise Time (Emitter follower)		$t_r\ 2$		-	100	200	ns
Output Voltage Fall Time (Emitter grounded)		$t_f\ 2$		-	40	100	
Output Control Input Operating Current	"L" State	I_{OCL}	$V_{OC} \leq 0.4V$	-	10	-	μA
	"H" State	I_{OCH}	$V_{OC} = V_{ref}$	-	0.2	3.5	mA

CURRENT CONSUMPTION (TOTAL)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Standby Current	$I_{CC(S \cdot B)}$	$V_{CC} = 15V$, Other terminal opened	-	8	12.5	mA
Bias Current	$I_{CC \text{ total}}$	$V_{PIN 4} = 2V$, $C_T = 0.01\mu F$ $R_T = 12k\Omega$, $V_{CC} = 15V$	-	10	-	mA

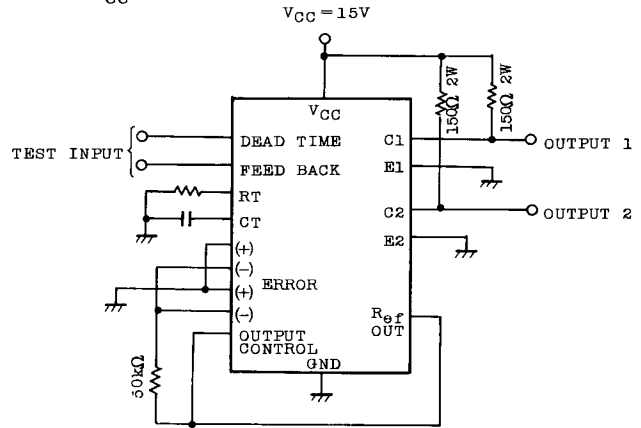
TEST CIRCUIT 1

(Error Amplifier)



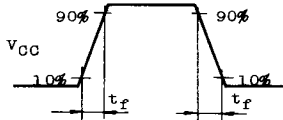
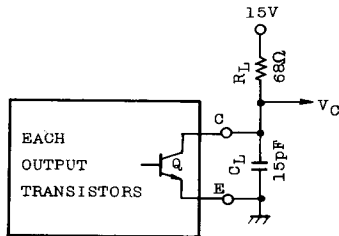
TEST CIRCUIT 2

(Pause time adjusting unit, feedback circuit and I_{CC} total)



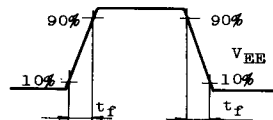
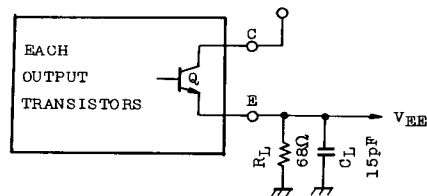
TEST CIRCUIT 3

(Test with the output unit and emitter grounded)

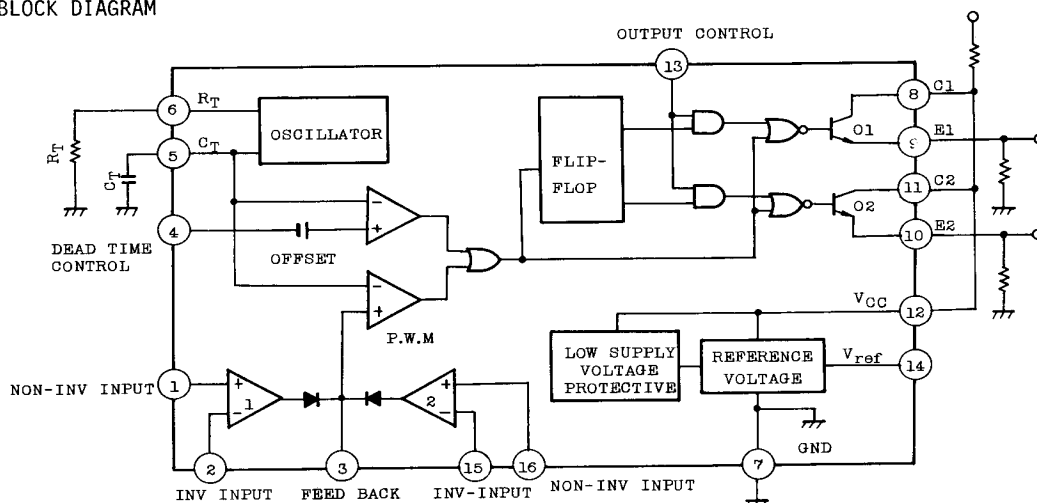


TEST CIRCUIT 4

(Test with the output unit and emitter followed)



BLOCK DIAGRAM



(Note) PIN 13 BECOMES SINGLE MODE AT "L" AND PUSH-PULL MODE AT "H".

OPERATING WAVEFORM

C_T TERMINAL
VOLTAGE

3-PIN TERMINAL
VOLTAGE

DEAD TIME
CONTROL INPUT

FLIP-FLOP
CLOCK INPUT

FLIP-FLOP Q

FLIP-FLOP $\bar{Q}$

OUTPUT Q1
EMITTER

OUTPUT Q2
EMITTER

OUTPUT
CONTROL INPUT

