

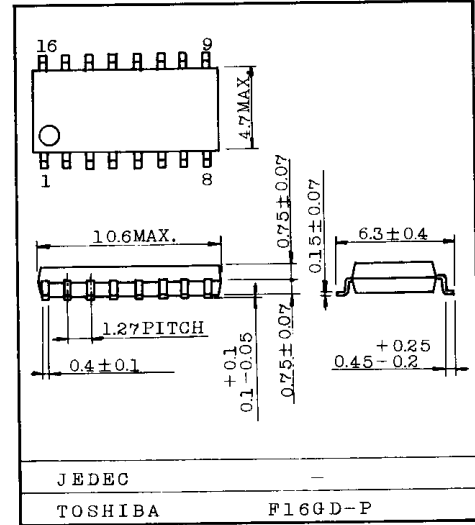


○ GENERAL USE SWITCHING REGULATOR (494 TYPE)

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

Unit in mm



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 | $Tc V_{ref}$ | $-20^{\circ}C \leq T_a \leq 75^{\circ}C$, $I_{ref} = 1mA$ | - | 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) | $Dy MAX$ | $V_{in}=0$, $C_T=0.1\mu F$, $R_T=12k\Omega$ | 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_{α} | 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

| 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 |

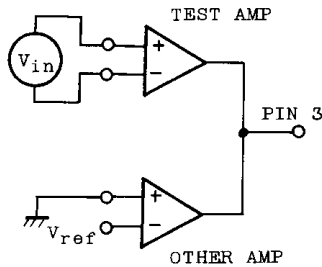
CURRENT CONSUMPTION (TOTAL)

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

TA76494F

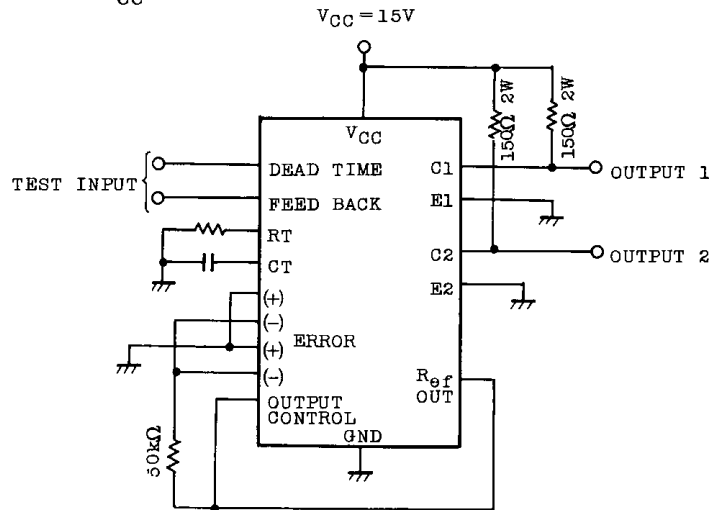
TEST CIRCUIT 1

(Error Amplifier)



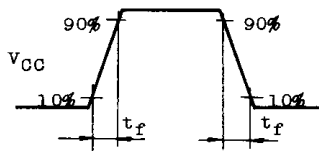
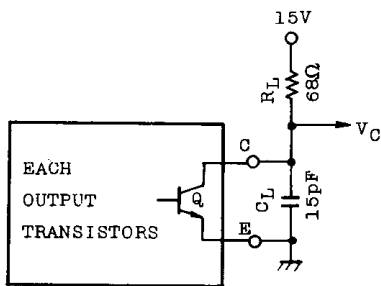
TEST CIRCUIT 2

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



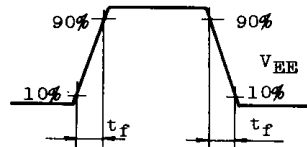
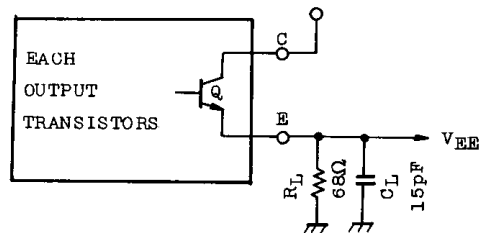
TEST CIRCUIT 3

(Test with the output unit and emitter grounded)

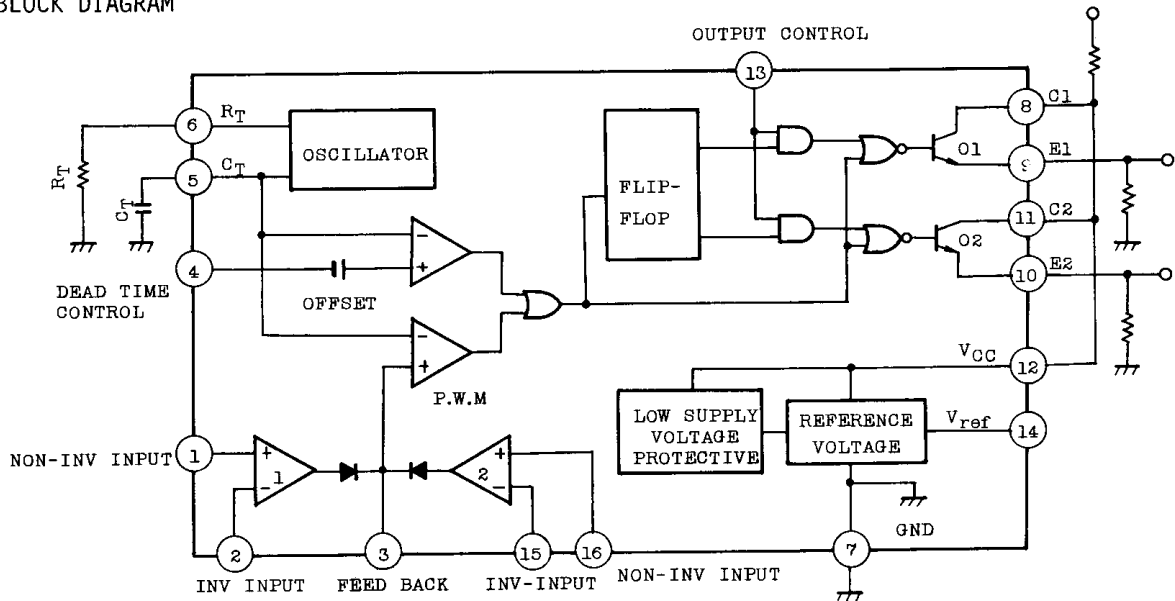


TEST CIRCUIT 4

(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

