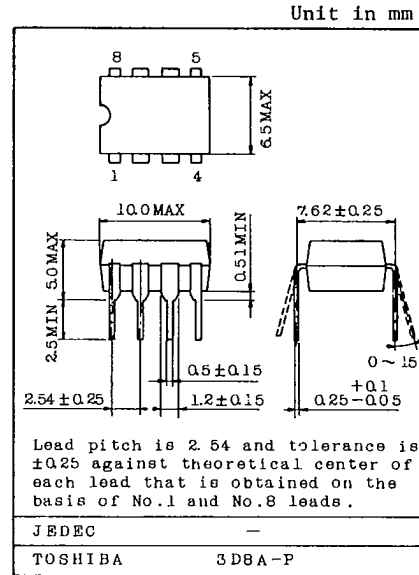


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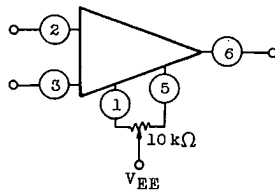
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SINGLE OPERATIONAL AMPLIFIER
 OPERATIONAL AMPLIFIER
 DC AMPLIFIER

- High Gain : $G_V=1 \times 10^5$ (Typ.)
- Low Power Dissipation : $P_D=50\text{mW}$ (Typ.)
- High Common Mode Input Voltage : $CMV_{IN}=\pm 13\text{V}$ (Typ.)
- High Differential Input Voltage: $DV_{IN}=30$ (Typ.)
- Low Input Offset Voltage : $V_{IO}=1\text{mV}$ (Typ.)
- No Frequency Compensation
- Absence of Latch-up
- Offset Null Capability
- Short Circuit Protection

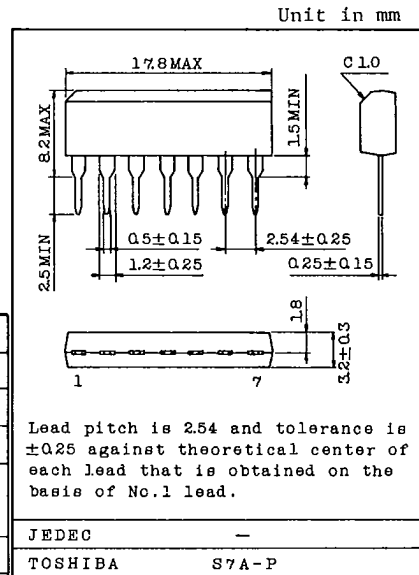


VOLTAGE OFFSET NULL CIRCUIT



MAXIMUM RATINGS ($T_a=25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	RATING	UNIT	
Supply Voltage	V_{CC}, V_{EE}	± 18	V	
Differential Input Voltage	DV_{IN}	± 30	V	
Input Voltage	V_{IN}	$V_{CC} \sim V_{EE}$	V	
Power Dissipation	TA7504P TA7504S	P_D	300	mW
			400	
Operating Temperature	T_{opr}	$-30 \sim 75$	$^\circ\text{C}$	
Storage Temperature	T_{stg}	$-55 \sim 125$	$^\circ\text{C}$	

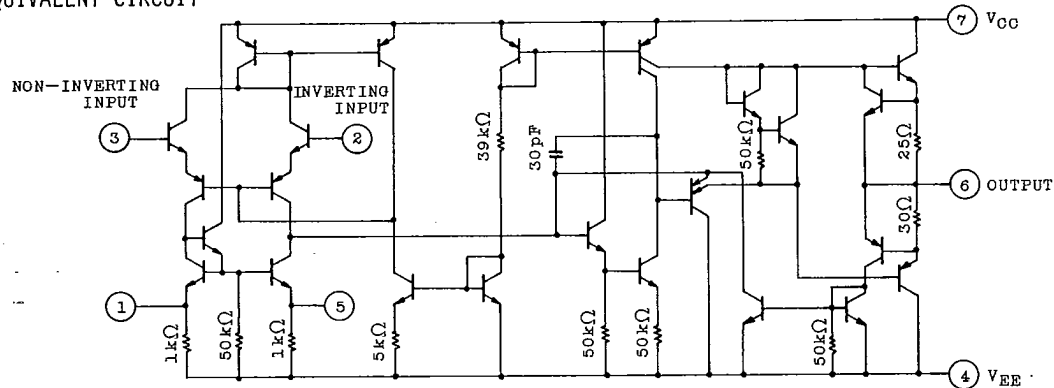


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ELECTRICAL CHARACTERISTICS ($V_{CC}=15V$, $V_{EE}=-15V$, $T_a=25^{\circ}C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	1	$R_g \leq 10k\Omega$	-	1	5	mV
Input Offset Current	I_{IO}	2	-	-	30	200	nA
Input Bias Current	I_I	2	-	-	200	500	nA
Common Mode Input Voltage	CMV_{IN}	3	-	± 12	± 13	-	V
Maximum Output Voltage	VOM	4	$R_L \leq 10k\Omega$	± 12	± 14	-	V
	VOMR		$R_L \geq 2k\Omega$	± 10	± 13	-	V
Maximum Output Voltage Swing	V_{Op-p}	5	$R_L=10k\Omega$, $f=1kHz$	24	28	-	V
Output Short Circuit Current	I_{OS}	4	-	-	± 20	-	mA
Input Impedance	Z_{IN}	-	$f=1kHz$	0.3	1	-	$M\Omega$
Output Impedance	Z_{OUT}	-	$f=1kHz$	-	60	-	Ω
Voltage Gain	G_v	-	$R_L=2k\Omega$, $V_{OUT}=\pm 10V$ $f=10kHz$	20	100	-	$\times 10^3$
Common Mode Input Signal Rejection Ratio	CMRR	3	$CMV_{IN}=\pm 10V$, $f=100Hz$	70	90	-	dB
Supply Voltage Rejection Ratio	SVRR	1	$R_g \leq 10k\Omega$	-	30	150	$\mu V/V$
Power Dissipation	P_D	6	-	-	50	85	mW
Temperature Coefficient of Input Offset Voltage	$\Delta V_{IO}/\Delta T$	1	$R_g \leq 10k\Omega$, $T_a=-30 \sim 75^{\circ}C$	-	5	50	$\mu V/^{\circ}C$
Slew Rate	SR	7	$R_L=2k\Omega$	-	0.5	-	V/ μs
Rise Time	t_r	8	$C_L=100pF$, $R_L=2k\Omega$	-	0.3	-	μs
Over Short	e_{over}			-	5	-	%
Input Noise Voltage	e_{np-p}	9	$R_g=10k\Omega$, $f=0 \sim 100Hz$	-	6	-	μV

EQUIVALENT CIRCUIT

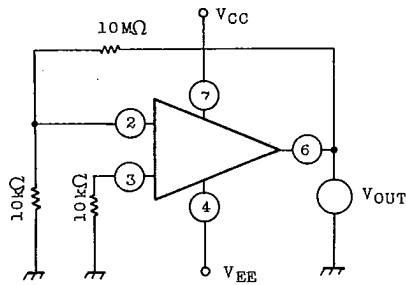


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TEST CIRCUIT

(1) V_{IO} , $\Delta V_{IO}/\Delta T$, SVRR



$$V_{IO} = V_{OUT} / 1000$$

$$SVRR = \frac{V_{OUT1} - V_{OUT2}}{1000 \times 5}$$

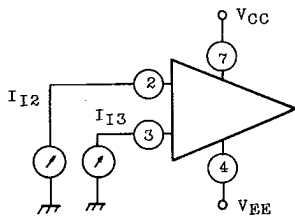
V_{OUT1} ; (V_{CC} , $-V_{EE} = 17.5(V)$)

V_{OUT2} ; (V_{CC} , $-V_{EE} = 12.5(V)$)

$$\Delta V_{IO} / \Delta T = |V_{IO}(25^{\circ}C) - V_{IO}(-30^{\circ}C)| / 55$$

$$\Delta V_{IO} / \Delta T = |V_{IO}(25^{\circ}C) - V_{IO}(75^{\circ}C)| / 50$$

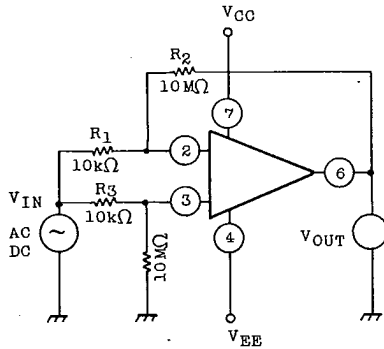
(2) I_I , I_{IO}



$$I_{IO} = |I_{I2} - I_{I3}|$$

$$I_I = \frac{I_{I2} + I_{I3}}{2}$$

(3) CMV_{IN} , CMRR



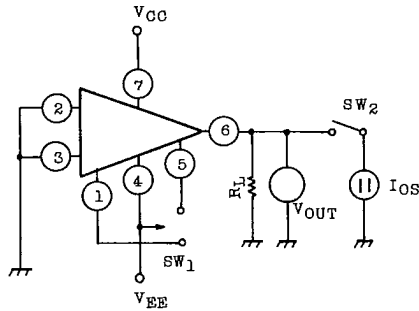
CMV_{IN} : $V_{OUT} = \pm 10(V_{DC})$, V_{IN} MEASURED

CMRR : $V_{IN} = 7.07(V_{rms})$, V_{OUT} MEASURED

$$CMRR = 20 \log \frac{V_{IN}}{\frac{V_{OUT}}{1000}} = 20 \log \frac{7070}{V_{OUT}} \text{ (dB)}$$

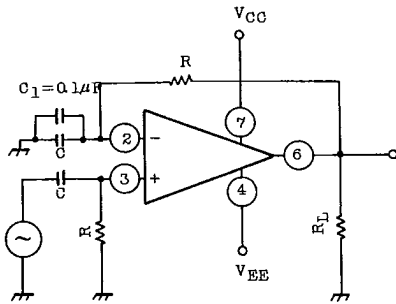
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(4) V_{OM} , V_{OMR} , I_{OS}



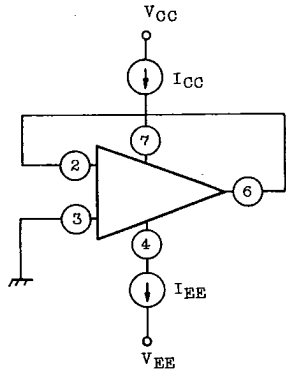
V_{OM}, V_{OMR} : SW2 : OPEN CIRCUIT
 SW1 : TERMINAL 1 OR 5
 I_{OS} : SW2 : SHORT CIRCUIT
 SW1 : TERMINAL 1 OR 5

(5) G_V , V_{Op-p}



C : DC COUPLE
 C_I : HF BYPASS
 $\omega \gg 1/RC$
 $G_V = V_{OUT}/V_{IN}$

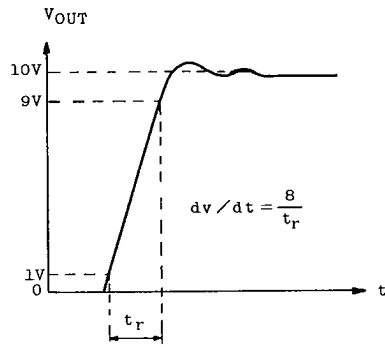
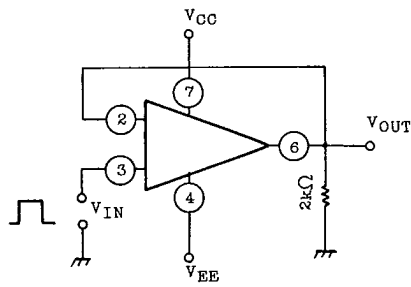
(6) P_D



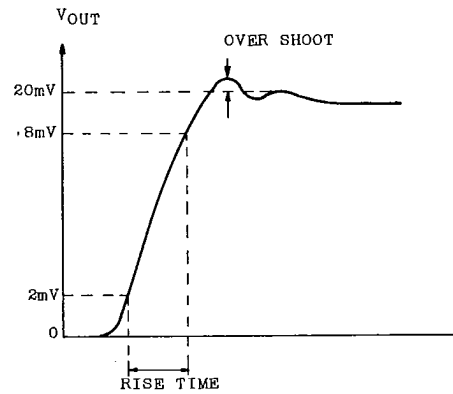
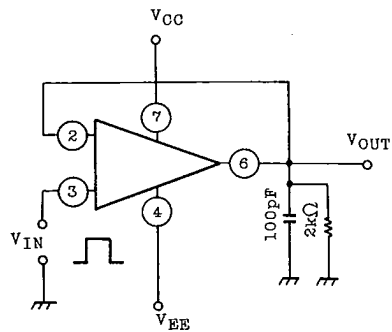
$$P_D = (V_{CC} - V_{EE}) I_{CC}$$

$$= (V_{CC} - V_{EE}) I_{EE}$$

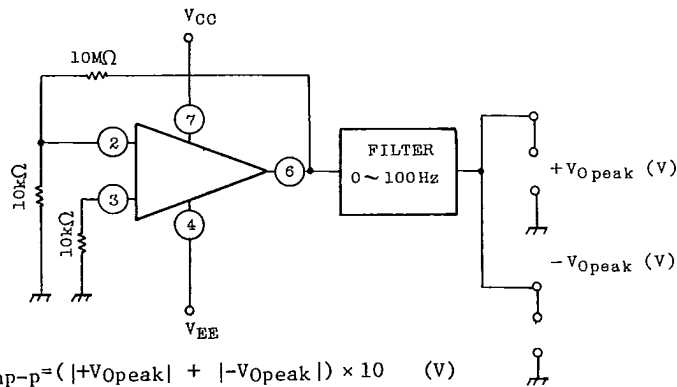
(7) SR



(8) RESPONSE TIME



(9) e_{np-p}



$$e_{np-p} = (|+V_{Opeak}| + |-V_{Opeak}|) \times 10 \quad (V)$$

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