

M5221L, P, FP/M5T082P**DUAL J-FET INPUT OPERATIONAL AMPLIFIERS****DESCRIPTION**

The M5221/M5T082P are semiconductor integrated circuits designed as high-performance dual operational amplifiers which adopt J-FETs in the input stage.

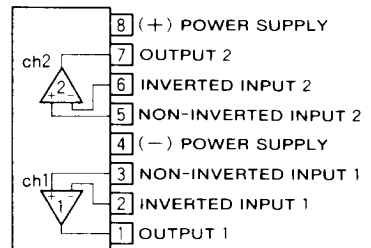
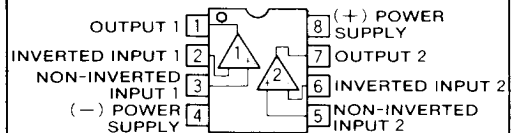
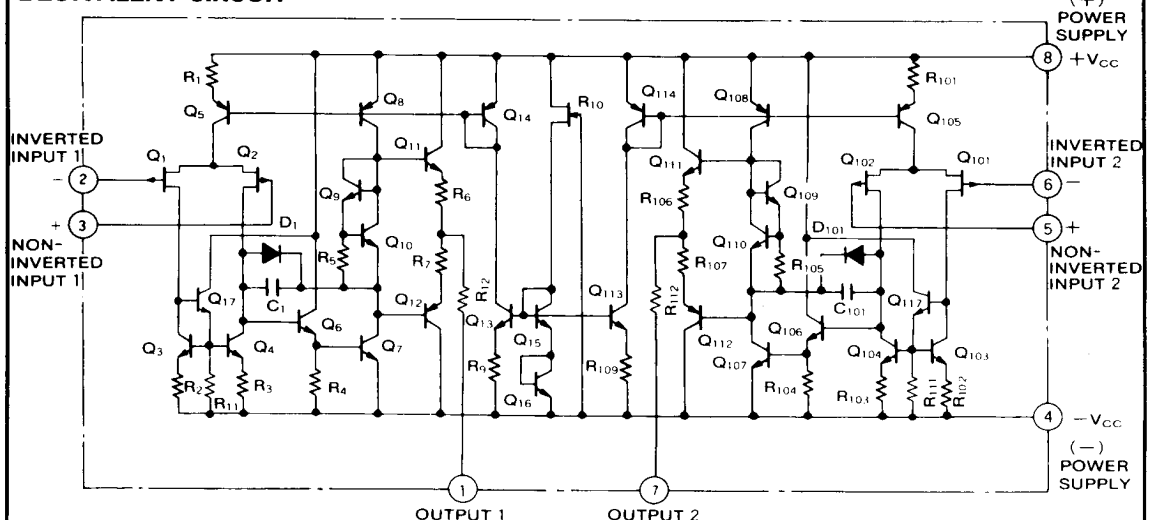
The devices come in an 8-pin SIP, DIP or FP and contain two circuits for yielding a high input impedance, high slew rate, low bias current and other excellent characteristics. They can be widely used as a general-purpose operational amplifiers in stereo equipment, tape decks, digital audio disc players and other similar products as well as in VCRs, video disc players and video related players.

FEATURES

- High input impedance due to J-FET input
..... $R_i = 1000\text{M}\Omega$ (typ.)
- High slew rate $SR = 13\text{V}/\mu\text{s}$ (typ.)
- High gain, low distortion $G_{VO} = 106\text{dB}$, $THD = 0.007\%$
($G_V = 40\text{dB}$ @ $f = 1\text{kHz}$) (typ.)
- High load current, high power dissipation
..... $I_{LP} = \pm 50\text{mA}$, $P_d = 800\text{mW}$ (SIP)
..... $P_d = 625\text{mW}$ (DIP)
..... $P_d = 440\text{mW}$ (FP)

APPLICATION

General-purpose operational amplifier in stereo equipment, tape decks and digital audio disc players, VCRs and video disc players.

PIN CONFIGURATION (TOP VIEW)**SIP****Outline 8P5 (M5221L)****DIP, MINI FLAT****Outline 8P4 (M5221P)
8P2S (M5221FP)****EQUIVALENT CIRCUIT**

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DUAL J-FET INPUT OPERATIONAL AMPLIFIERS

ABSOLUTE MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$, unless otherwise noted)

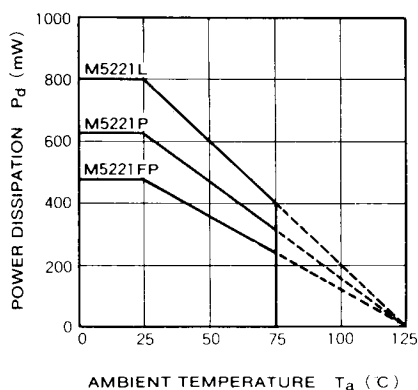
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		± 18	V
I_{LP}	Load current		± 50	mA
V_{id}	Differential input voltage		± 30	V
V_{ic}	Common input voltage		± 15	V
P_d	Power dissipation		800(SIP)/625(DIP)/440(FP)	mW
K_{θ}	Thermal derating	$T_a \geq 25^{\circ}\text{C}$	8(SIP)/6.25(DIP)/4.4(FP)	mW/ $^{\circ}\text{C}$
T_{opr}	Operating temperature		$-20 \sim +75$	$^{\circ}\text{C}$
T_{stg}	Storage temperature		$-55 \sim +125$	$^{\circ}\text{C}$

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

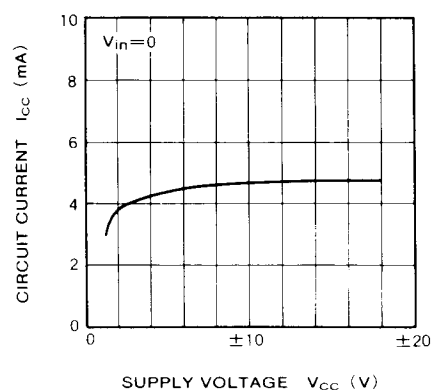
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit current	$V_{in}=0$		3.0	6.0	mA
V_{IO}	Input offset voltage	$R_S \leq 10\text{k}\Omega$		5.0	15.0	mV
I_{IO}	Input offset current			5	200	pA
I_{IB}	Input bias current			30	400	pA
R_{in}	Input resistance			10^3		M Ω
G_{VO}	Open loop voltage gain	$R_L \geq 2\text{k}\Omega$, $V_O = \pm 10\text{V}$	86	106		dB
V_{OM}	Maximum output voltage	$R_L \geq 10\text{k}\Omega$	± 12	± 14		V
		$R_L \geq 2\text{k}\Omega$	± 10	± 13		
V_{CM}	Common input voltage width		± 10	± 12		V
CMRR	Common mode rejection ratio	$R_S \leq 10\text{k}\Omega$	70	76		dB
SVRR	Supply voltage rejection ratio	$R_S \leq 10\text{k}\Omega$		30	150	$\mu\text{V/V}$
P_d	Power dissipation			90	180	mW
SR	Slew rate	$G_v=0\text{dB}$, $R_L=2\text{k}\Omega$		13		V/ μs
f_T	Gaing bandwidth product			3		MHz
V_{NI}	Input-referred noise voltage	$R_S=100\Omega$, BW=10Hz $\sim$ 30kHz		2.2		μVrms

TYPICAL CHARACTERISTICS

THERMAL DERATING
(MAXIMUM RATING)



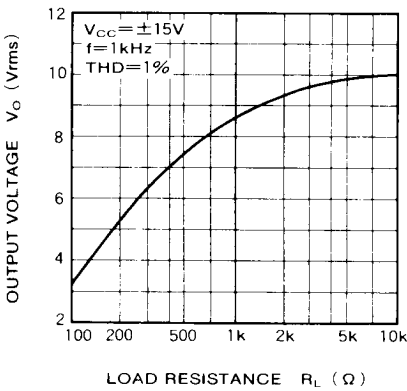
CIRCUIT CURRENT VS.
SUPPLY VOLTAGE



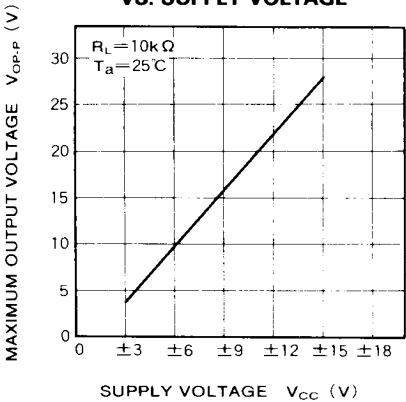
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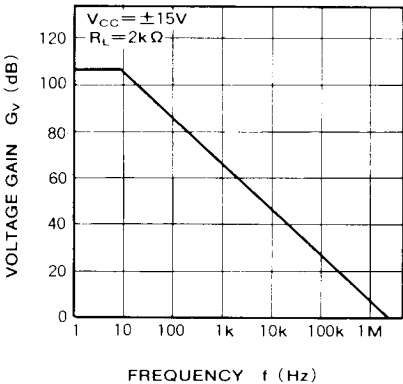
OUTPUT VOLTAGE VS. LOAD RESISTANCE



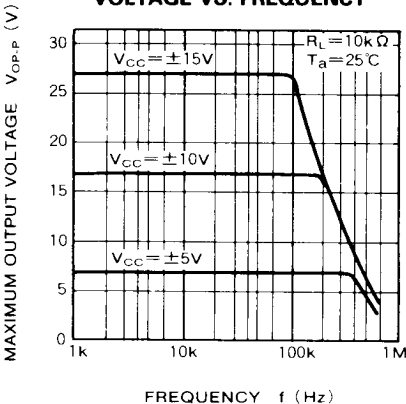
MAXIMUM OUTPUT VOLTAGE VS. SUPPLY VOLTAGE



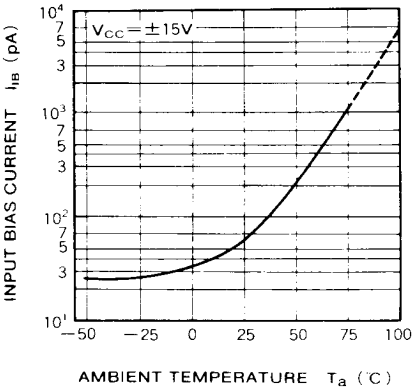
VOLTAGE GAIN VS. FREQUENCY RESPONSE



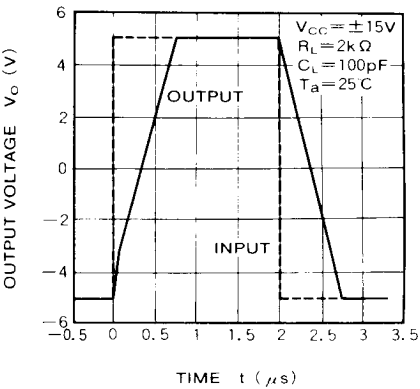
MAXIMUM OUTPUT VOLTAGE VS. FREQUENCY



INPUT BIAS CURRENT VS. AMBIENT TEMPERATURE



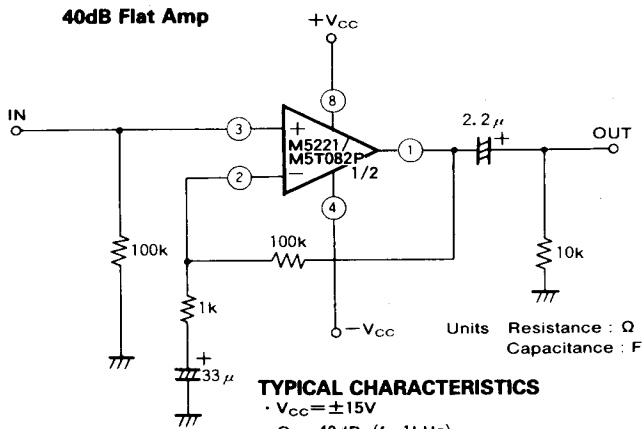
SLEW RATE (SR) CHARACTERISTICS



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APPLICATION CIRCUIT



TYPICAL CHARACTERISTICS

- $V_{CC} = \pm 15V$
- $G_v = 40dB$ ($f = 1kHz$)
- $V_O = 9.5V_{rms}$ ($f = 1kHz$, $THD = 0.1\%$)
- $THD = 0.007\%$ ($f = 1kHz$, $V_O = 7V_{rms}$)

TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE

