M51162P

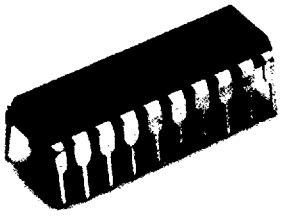
RECORDING/PLAYBACK PREAMPLIFIER FOR STEREO CASSETTE TAPE RECORDER

DESCRIPTION

The M51162P is a recording and playback preamplifier for stereo cassette tape recorders. The IC built-in recording/playback mode selector switches and 2 channels of preamplifiers with an ALC circuit. This configuration realizes compact designs and a system with good channel balance.

FEATURES

- Built-in microphone and equalizer amplifiers with electronic switches.
- Built-in line amplifiers with ALC.
- Low noise ..... 1 μVrms (R_g = 1k Ω)
- Low distortion ratio ..... 0.2% (V_o = 1Vrms)

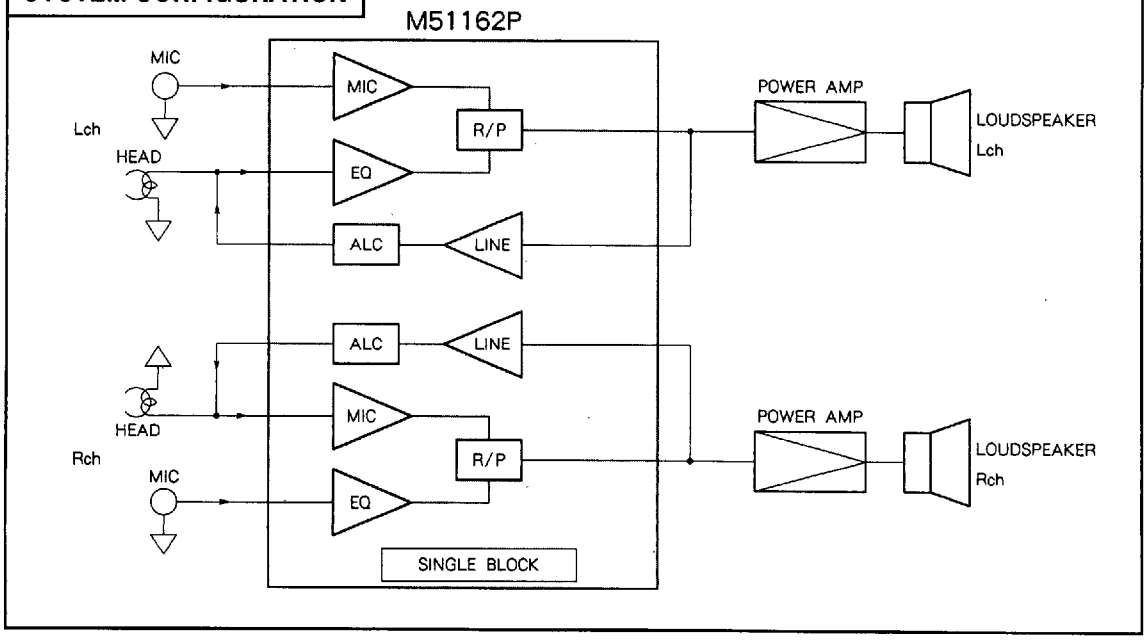


Outline 20P4
2.54mm pitch 300mil DIP
(6.3mm × 24.0mm × 3.3mm)

RECOMMENDED OPERATING CONDITIONS

Supply voltage range ..... V_{CC} = 3.5~12V
Rated supply voltage ..... V_{CC} = 9V

SYSTEM CONFIGURATION



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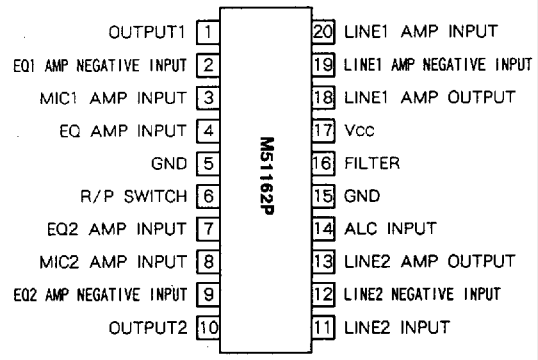
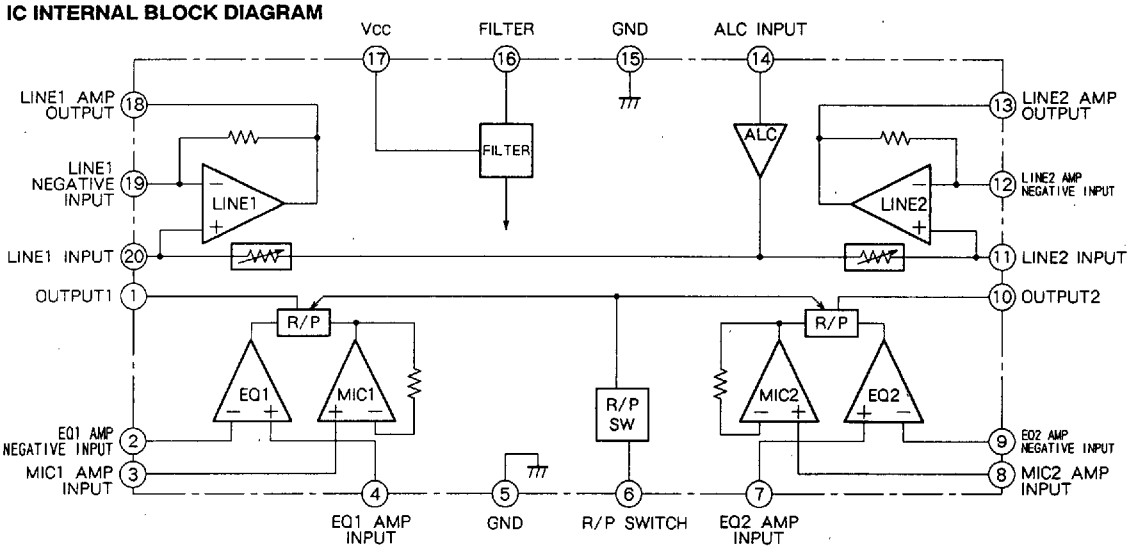
PIN CONFIGURATION



Outline 20P4

IC INTERNAL BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	18	V
I_{CC}	Circuit current	100	mA
P_d	Power dissipation	1000	mW
K_θ	Thermal derating ($T_a \geqq 25$℃)	10	mW/℃
T_{opr}	Operating temperature	−20 ~ + 75	℃
T_{stg}	Storage temperature	−40 ~ +125	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃, V_{CC} = 9V, f = 1kHz, unless otherwise noted)

Symbol	Parameter		Test conditions	Limits			Unit
				Min	Typ	Max	
I_{CCO}		Quiescent circuit current	Playback mode	5	10	15	mA
G_{VM1}	MIC amplifier CH-1	Voltage gain	V_{OM} = 1Vrms	23	24.5	26	dB
V_{OM1}		Maximum output voltage	THD = 3%	1.5	2.5	–	Vrms
THD_{M1}		Total harmonic distortion	V_{OM} = 1Vrms	–	0.2	0.5	%
Z_{iM1}		Input impedance	M_1 voltage when input = 10mVrms	5	7.5	10	kΩ
N_{iM1}		Equivalent input noise voltage	R_g = 1kΩ, 30~20kHz BPF	–	1	2	μVrms
G_{VP1}	EQ amplifier CH-1	Voltage gain	V_{OP} = 1Vrms	35	38	41	dB
V_{OP1}		Maximum output voltage	THD = 3%	1.5	2.5	–	Vrms
THD_{P1}		Total harmonic distortion	V_{OP} = 1Vrms	–	0.2	0.5	%
Z_{iP1}		Input impedance	P_1 voltage when input = 10mVrms	40	56	75	kΩ
N_{iP1}		Equivalent input noise voltage	R_g = 1kΩ, 30~20kHz BPF	–	1	2	μVrms
G_{VL1}	Line-recording amplifier CH-1	Voltage gain	V_{OL} = 1Vrms	37	40	43	dB
V_{OL1}		Maximum output voltage	THD = 3%	1.9	2.5	–	Vrms
THD_{L1}		Total harmonic distortion	V_{OL} = 1Vrms	–	0.2	0.5	%
Z_{iL1}		Input impedance	L_1 voltage when input = 10mVrms	20	33	45	kΩ
N_{iL1}		Equivalent input noise voltage	R_g = 1kΩ, 30~20kHz BPF	–	1	3	μVrms
ALC_A	ALC circuit	ALC range	From the point ALC is activated until output is 3dB up.	40	46	–	dB
ALC_{THD}		ALC distortion	Input distortion, from the point ALC is activated until input reaches + 20dB.	–	–	1.5	%
ALC_B		ALC balance	The difference in CH-1/CH-2 ALC output level, from the point ALC is activated until input reaches + 20dB.	–	–	3	dB

Note. Electrical characteristics for channel 2 are the same as channel 1.

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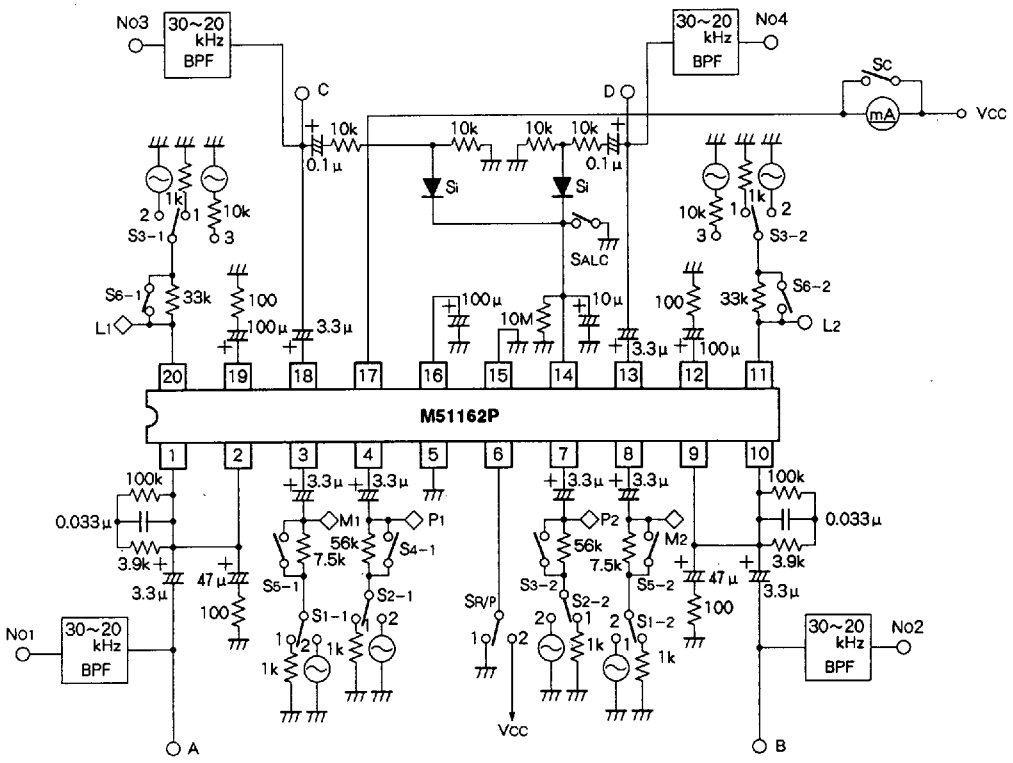
TEST CIRCUIT



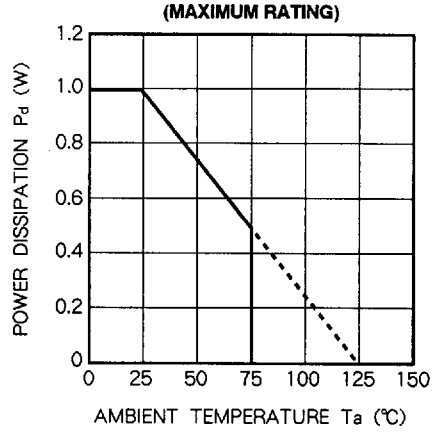
Units Resistance : Ω
Capacitance : F

TEST METHODS

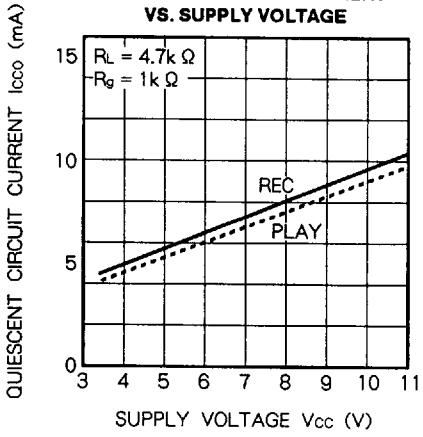
	Parameter	Switch conditions									Test point									
	Symbols	$S_{R/P}$	S_C	$S_{1-1,2}$	$S_{2-1,2}$	$S_{3-1,2}$	$S_{4-1,2}$	$S_{5-1,2}$	$S_{6-1,2}$	S_{ALC}	A	B	C	D	$P_{1,2}$	$M_{1,2}$	$L_{1,2}$	mA	$No_{1,2}$	$No_{3,4}$
	I_{CCO}	1	OFF	1	1	1	ON	ON	ON	OFF								○		
MIC amplifier	$G_{VM1,2}$	2	ON	2	1	1	ON	ON	ON	OFF	○	○								
	$V_{OM1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑	○	○								
	$THD_{M1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑	○	○								
	$Z_{IM1,2}$	↑	↑	↑	↑	↑	↑	OFF	↑	↑						○				
	$N_{IM1,2}$	↑	↑	↑	↑	↑	↑	ON	↑	↑									○	
EQ amplifier	$G_{VP1,2}$	1	ON	1	2	1	ON	ON	ON	OFF	○	○								
	$V_{OP1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑	○	○								
	$THD_{P1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑	○	○								
	$Z_{IP1,2}$	↑	↑	↑	↑	↑	OFF	↑	↑	↑					○					
	$N_{IP1,2}$	↑	↑	↑	↑	↑	ON	↑	↑	↑									○	
Line-recording amplifier	$G_{VL1,2}$	2	ON	2	1	2	ON	ON	ON	OFF			○	○						
	$V_{OL1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑			○	○						
	$THD_{L1,2}$	↑	↑	↑	↑	↑	↑	↑	↑	↑			○	○						
	$Z_{IL1,2}$	↑	↑	↑	↑	↑	↑	↑	OFF	↑							○			
	$N_{IL1,2}$	↑	↑	↑	↑	↑	↑	↑	ON	↑										○
ALC circuit	ALC_A	2	ON	2	1	3	ON	ON	ON	ON			○	○						
	ALC_{THD}	↑	↑	↑	↑	↑	↑	↑	↑	↑			○	○						
	ALC_B	↑	↑	↑	↑	↑	↑	↑	↑	↑			○	○						

TYPICAL CHARACTERISTICS

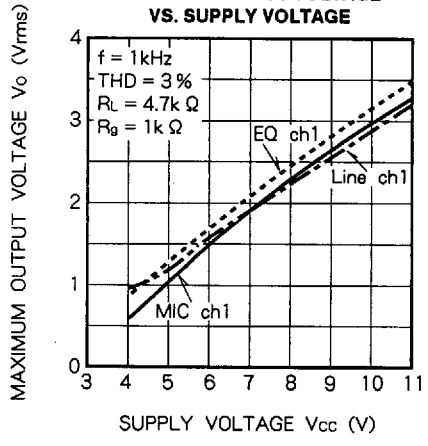
THERMAL DERATING
(MAXIMUM RATING)



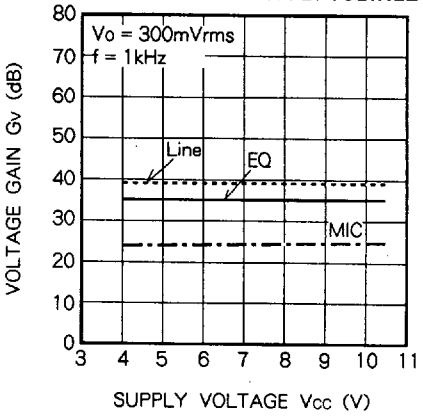
QUIESCENT CIRCUIT CURRENT
VS. SUPPLY VOLTAGE



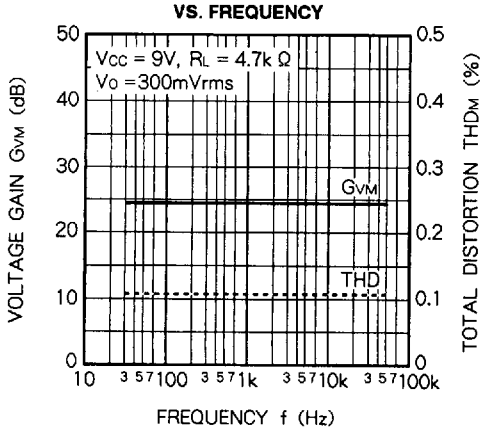
MAXIMUM OUTPUT VOLTAGE
VS. SUPPLY VOLTAGE



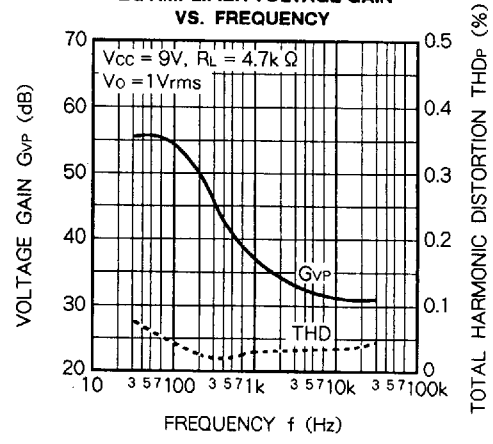
VOLTAGE GAIN VS. SUPPLY VOLTAGE



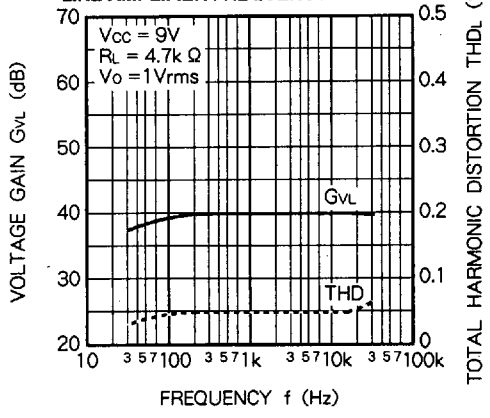
MIC AMPLIFIER VOLTAGE GAIN
VS. FREQUENCY



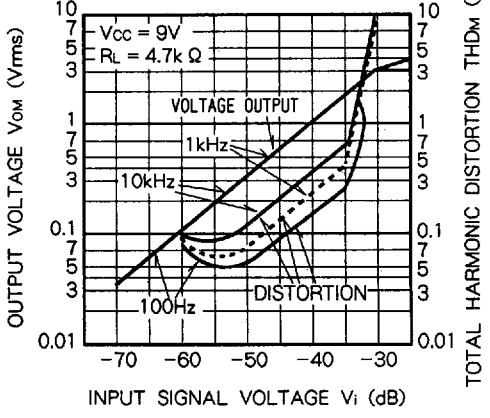
EQ AMPLIFIER VOLTAGE GAIN
VS. FREQUENCY



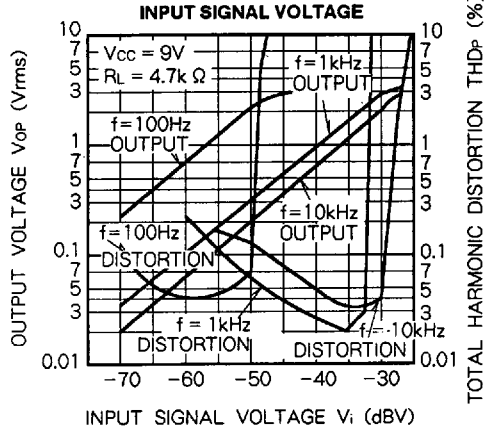
LINE AMPLIFIER FREQUENCY RESPONSE



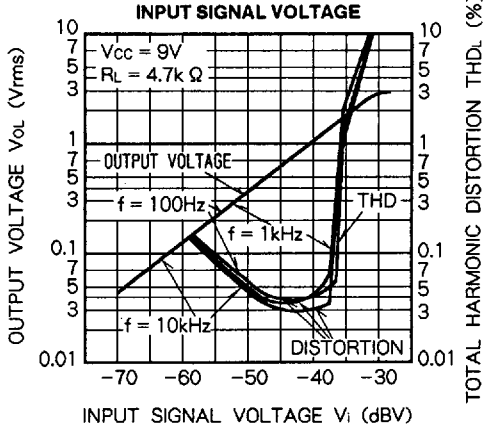
MIC OUTPUT VOLTAGE,TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



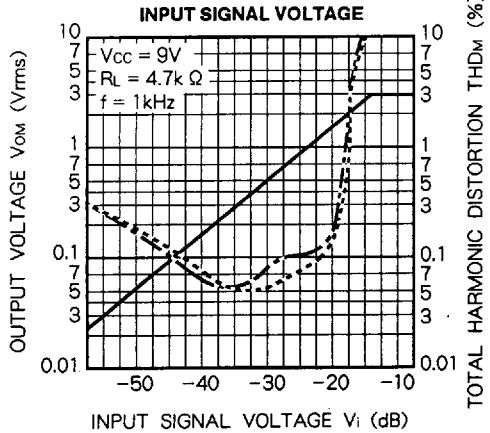
EQ OUTPUT VOLTAGE,TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



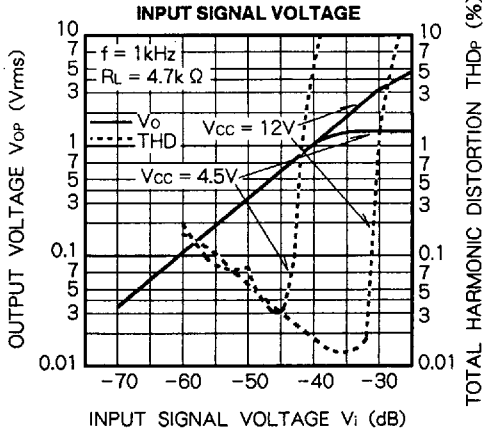
LINE OUTPUT VOLTAGE,TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



MIC OUTPUT VOLTAGE,TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



EQ OUTPUT VOLTAGE,TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



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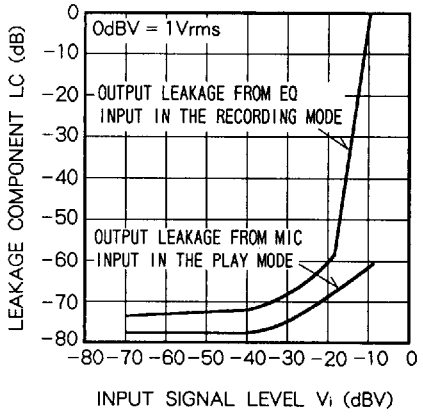
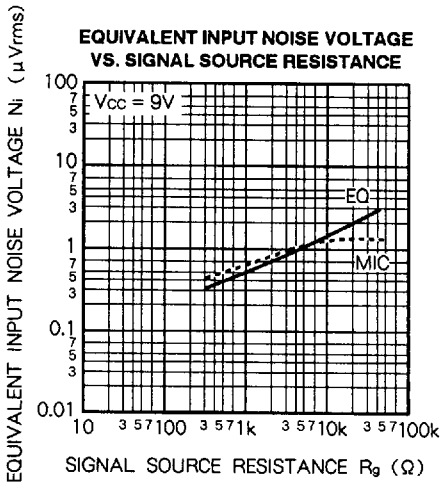
LEAKAGE COMPONENTS VS. INPUT SIGNAL LEVEL CHARACTERISTICS



EQUIVALENT INPUT NOISE VOLTAGE VS. SIGNAL SOURCE RESISTANCE



FUNCTION AND TERMINAL DESCRIPTION

1. EQ amplifier

Normally connected to the input from the magnetic head, this amplifier functions to set equalization for proper playback of the tape being used.

- EQ amp input pins, pin ④ and pin ⑦. Input impedance, 56kΩ typ.
  Negative feedback pins, pin ② and pin ⑨.
  Output pins, pin ① and pin ⑩. (EQ/MIC output is switched by electronic switch.)

2. MIC amplifier

Functions to amplify the input signal from the microphone connection. The circuitry of this amplifier is the same as the EQ amp, and gain is fixed at 24dB.

- MIC amp input pins, pin ③ and pin ⑧. Input impedance 7.5kΩ typ.
  Output pins, pin ① and pin ⑩.

3. Line amplifier

Functions to further amplify the signal received from the EQ, MIC and other amplifiers. Can also be used as the recording amplifier.

- Line amp input pins, pin ⑪ and pin ⑳. Input impedance 33kΩ typ.
  Negative feedback pins, pin ⑫ and pin ⑲
  Output pins, pin ⑬ and pin ⑱

4. ALC circuit

Functions to automatically control the level of the input signal by using a built-in variable resistor.

- ALC circuit input pin, pin ⑭
  Variable resistor pins, pin ⑪ and pin ⑳
  In the playback mode, ALC operations are automatically disabled.

5. R/P switch

Switching between the recording and playback mode is accomplished through a DC voltage signal.

- R/P switch control pin, pin ⑥
  Recording mode : Control voltage, more than 2.2V, more than 100μA current.

Playback mode : Grounded

6. Filter

pin ⑯

7. Power supply

pin ⑰

8. Ground

pin ⑤ and ⑮