

M51167BFP

SINGLE CHIP PREAMPLIFIER FOR DUAL CASSETTE RECORDER

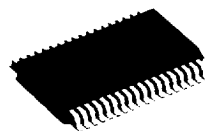
DESCRIPTION

The M51167BFP is an IC designed for radio CD/cassette tape players.

The IC, in addition to recording and playback preamplifiers (2 ch) for dual cassette, has equalizer selector, music selector, and ALC (automatic level controller) and is, with a single chip, capable of processing audio signals of cassette deck.

FEATURES

- Built-in electronic switch for double cassette.
- Built-in equalizer switch for both modes.
- Low noise EQ amplifier..... 1.3 μ Vrms (typ)
- Two built-in Rec amplifiers with ALC circuit for noise reduction system
- Built-in filter circuits for prevention of malfunctioning caused by tape pop up noise at music blank.
- Capable of setting timing for music blank by means of external CR combination.



Outline 36P2R-A

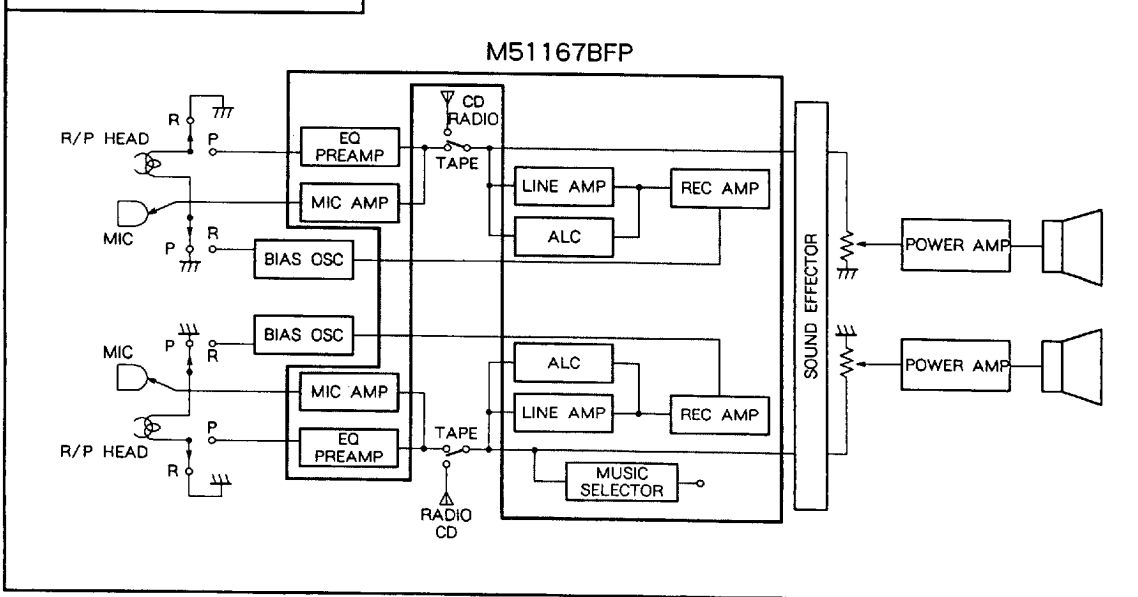
0.8mm pitch 450mil SSOP
(8.4mm × 15.0mm × 2.0mm)

RECOMMENDED OPERATING CONDITIONS

Supply voltage range.....V_{cc} = 5.5 to 12V

Rated supply voltage.....V_{cc} = 9V

SYSTEM CONFIGURATION

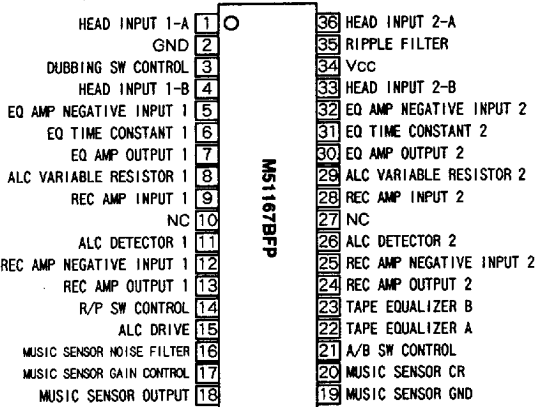


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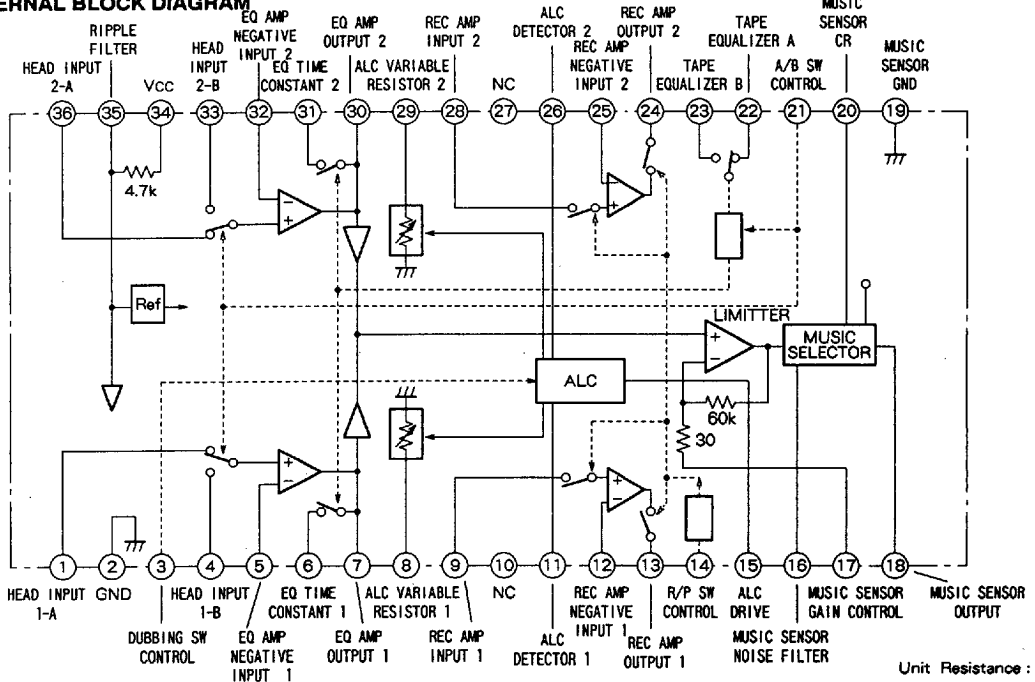
PIN CONFIGURATION (TOP VIEW)



Outline 36P2R-A

NC: NO CONNECTION

IC INTERNAL BLOCK DIAGRAM



Unit Resistance : Ω

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

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	Quiescent	+ 16	V
Pa	Power dissipation		560	mW
Ke	Thermal derating	Ta ≥ 25°C	5.6	mW/°C
Topr	Operating temperature		-20 to +75	°C
Tstg	Storage temperature		-40 to +125	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vcc = 9V, f = 1kHz, unless otherwise noted)

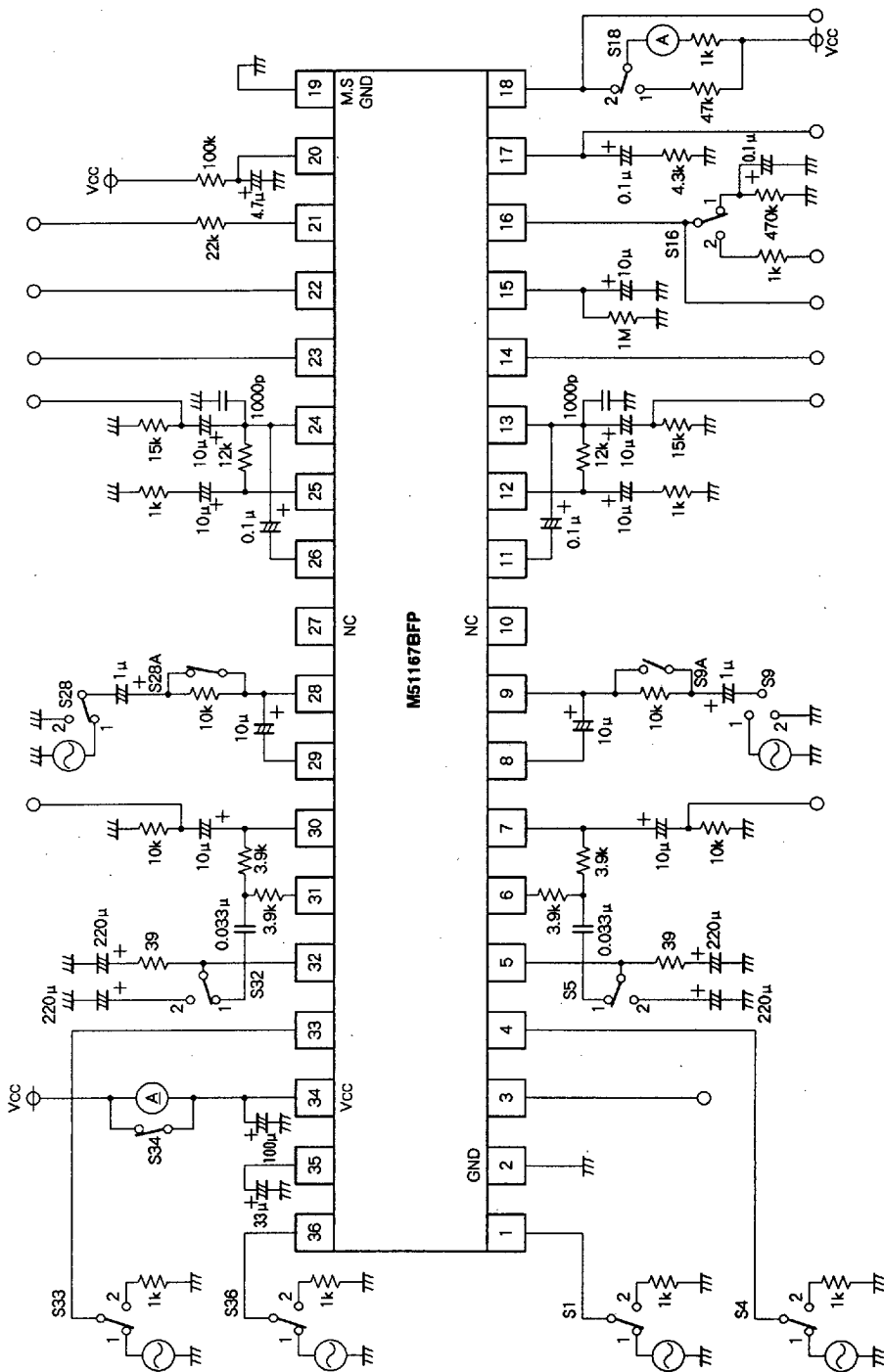
Symbol	Parameter	Test Conditions	Limits			Unit
			Min	Typ	Max	
Icco	Quiescent circuit current	Quiescence	10	20	30	mA
GvoEQ	Open loop voltage gain	Vi = 0.05mVrms	68	80	-	dB
GvcEQ	Closed loop voltage gain	Vo = 0.5Vrms	40.0	43.0	46.0	dB
THDEQ	Total harmonic distortion	Vo = 0.5Vrms	-	0.05	0.4	%
Vomax	Maximum output voltage	THD = 3%	1.15	1.50	-	Vrms
Ni	Equivalent input noise voltage	BW = 20Hz to 20kHz, Rg = 1kΩ	-	1.3	1.9	μVrms
SepEQ	Channel separation	Vo = 0.5Vrms, BW = 20Hz to 20kHz	40	65	-	dB
GvcRec	Closed loop voltage gain	Vo = 0.5Vrms	21.0	22.2	23.4	dB
THDRec	Total harmonic distortion	Vo = 0.5Vrms	-	0.01	0.1	%
VomaxR	Maximum output voltage	THD = 3%	1.9	2.4	-	Vrms
NoRec	Output noise voltage	BW = 20Hz to 20kHz, Rg = 10kΩ	-	35	70	μVrms
SepRec	Channel separation	Vo = 0.5Vrms, BW = 20Hz to 20kHz	50	75	-	dB
VoALC	ALC output voltage	From the ALC inset point until input reaches +10dB	350	450	550	mVrms
THDALC	ALC distortion	Until input reaches +10dB	-	0.5	1.5	%
AALC	ALC range	Until output is 1dB UP	25	30	-	dB
VoL	M.S. output voltage	M.S. Output voltage when output is Low	0.0	0.007	0.4	V
BVo	M.S. input current	Pin ⑩ input current	-	-	2.0	μA
SVo	M.S. level	EQ output voltage when M.S. output changes to Low from High	-19.5	-23.5	-27.5	dBV
VR/P	R/P mode control voltage	High : Rec mode Low : PB mode	3.5 0.0	-	5.0 1.0	V
VA/B	A/B mode control voltage	High : A mode Low : B mode	3.5 0.0	-	5.0 1.0	V
VEQ	EQ SW control voltage	High : SW ON Low : SW OFF	3.5 0.0	-	5.0 1.0	V
VDA	Dubbing mode control voltage	High : Dubbing ON Low : Dubbing OFF	3.5 0.0	-	5.0 1.0	V

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TEST CIRCUIT



Units Resistance : Ω
Capacitance : F

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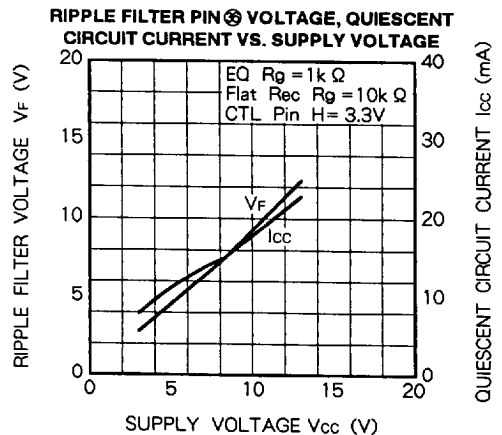
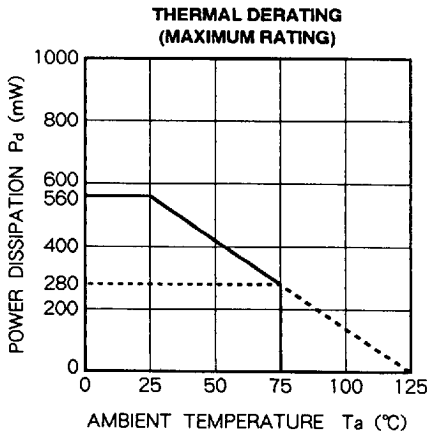
TEST METHODS

control voltage H = 5V
L = 0V

Symbol	Switch conditions						Control voltage					Input point	Output point	Test method	
	S4 (S33)	S5 (S32)	S9 (S28)	S9A (S28A)	S16	S18	S34	3	14	21	22				23
Icc	2	1	2	OFF	1	1	OFF	H	H	H	H	H		34	
GvoEQ	1	2	2	OFF	1	1	ON	L	L	L	L	L	4	7	$Gvo = 20 \log (Vo/Vi)$
GvcEQ	1	1	2	OFF	1	1	ON	L	L	L	L	L	4	7	$Gvc = 20 \log (Vo/Vi)$
THDEQ	1	1	2	OFF	1	1	ON	L	L	L	L	L	4	7	$Vo = 0.5Vrms$
VomaxE	1	1	2	OFF	1	1	ON	L	L	L	L	L	4	7	THD = 3%
Ni	2	1	2	OFF	1	1	ON	L	L	L	L	L		7	BW = 20Hz to 20kHz
SepEQ	※	1	2	OFF	1	1	ON	L	L	L	L	L	4	30	$Vo(7) = 0.5Vrms$ BW = 20Hz to 20kHz
GvcRec	2	1	1	ON	1	1	ON	H	H	L	L	L	9	13	$Gvc = 20 \log (Vo/Vi)$
THDRec	2	1	1	ON	1	1	ON	H	H	L	L	L	9	13	$Vo = 0.5Vrms$
VomaxR	2	1	1	ON	1	1	ON	H	H	L	L	L	9	13	THD = 3%
NoRec	2	1	2	OFF	1	1	ON	H	H	L	L	L		13	BW = 20Hz to 20kHz
SepRec	2	1	※	ON	1	1	ON	H	H	L	L	L	9	24	$Vo(13) = 0.5Vrms$ BW = 20Hz to 20kHz
VoALC	2	1	1	OFF	1	1	ON	L	H	L	L	L	9	13	Note 1
THDALC	2	1	1	OFF	1	1	ON	L	H	L	L	L	9	13	Note 2
AALC	2	1	1	OFF	1	1	ON	L	H	L	L	L	9	13	Note 3
Vo L	2	1	2	OFF	2	1	ON	L	L	L	L	L		18	Note 4
BVo	2	1	2	OFF	2	2	ON	L	L	L	L	L		18	Note 5
SVo	1	1	2	OFF	1	1	ON	L	L	L	L	L	4	7,18	Note 6
VR/P	2	1	1	ON	1	1	ON	H	※	L	L	L	9	13	Note 7
VA/B	1	1	2	OFF	1	1	ON	L	L	※	L	L	4	7	Note 8
VEQ	1	1	2	OFF	1	1	ON	L	L	L	L	※	4	7	Note 9
VDA	2	1	1	OFF	1	1	ON	※	H	L	L	L	9	13	Note 10

- Note 1. Measure output voltage from the ALC inset point until input reaches +10dB.
- 3. Input voltage range measured from the output voltage of the starting point to the point where the output voltage becomes 1dB higher.
- 4. Measure voltage of pin ⑩ after preset pulse enters pin ⑩ at ⑩ msec.
- 5. Measure current of pin ⑩ after preset pulse enters pin ⑩ at ⑩ msec.
- 6. Measure output voltage of pin ⑦ when input voltage of pin ④ increases and output of pin ⑥ changes to Low from High.
- 7. When voltage of pin ④ is 4V, output is operating state and voltage of pin ④ is 1V, output is noise voltage level.
- 8. When voltage of pin ② is 1V, output is operating state and voltage of pin ② is 4V, output is noise voltage level.
- 9. The difference between voltage of pin ② is 4V and 1V is 6dB.
- 10. When voltage of pin ③ is 4V, ALC is operating state and voltage of pin ③ is 1V, ALC is not operating.

TYPICAL CHARACTERISTICS

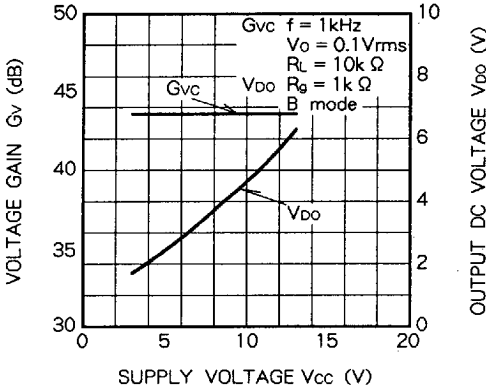


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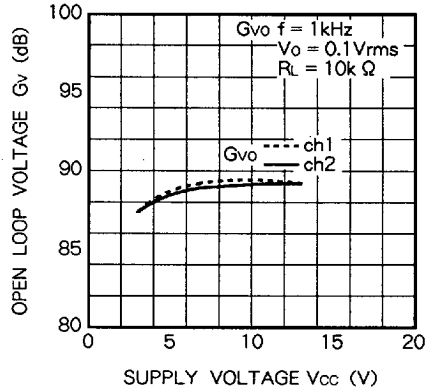


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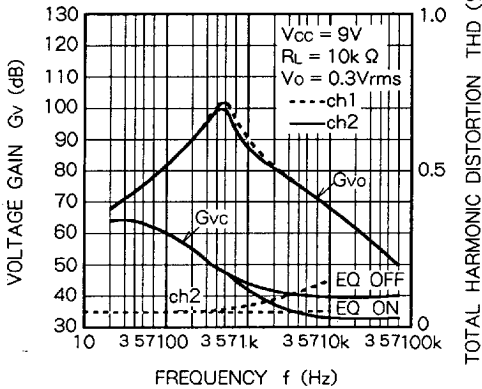
EQ AMPLIFIER CLOSED LOOP VOLTAGE GAIN, OUTPUT DC VOLTAGE VS. SUPPLY VOLTAGE



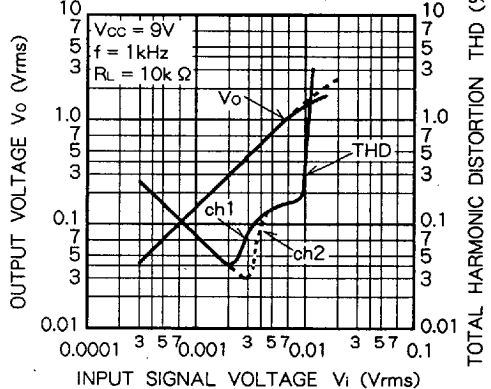
EQ AMPLIFIER OPEN LOOP VOLTAGE GAIN VS. SUPPLY VOLTAGE



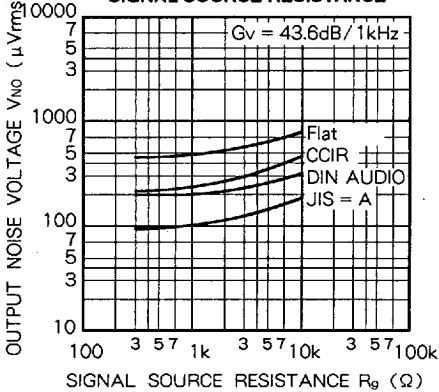
EQ AMPLIFIER VOLTAGE GAIN, TOTAL HARMONIC DISTORTION VS. FREQUENCY



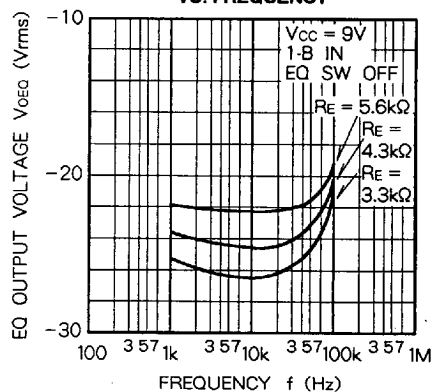
EQ AMPLIFIER OUTPUT VOLTAGE, TOTAL HARMONIC DISTORTION VS. INPUT SIGNAL VOLTAGE



OUTPUT NOISE VOLTAGE VS. SIGNAL SOURCE RESISTANCE



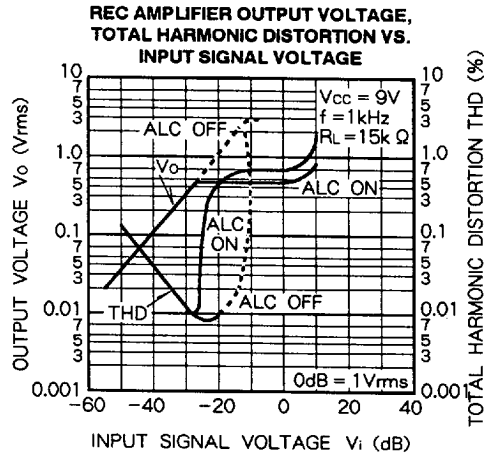
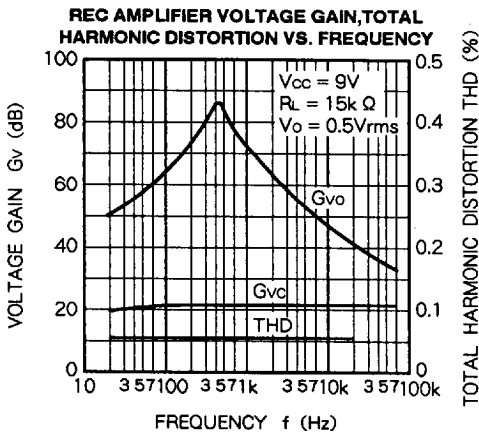
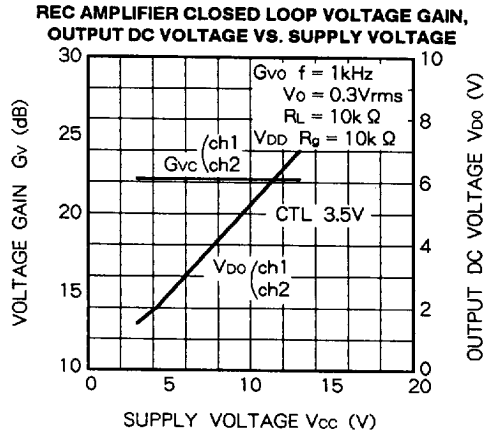
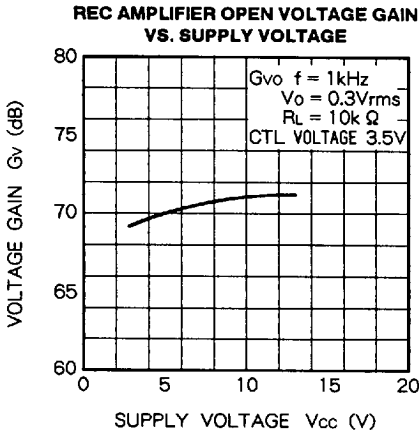
M.S. LEVEL (EQ OUTPUT VOLTAGE) VS. FREQUENCY



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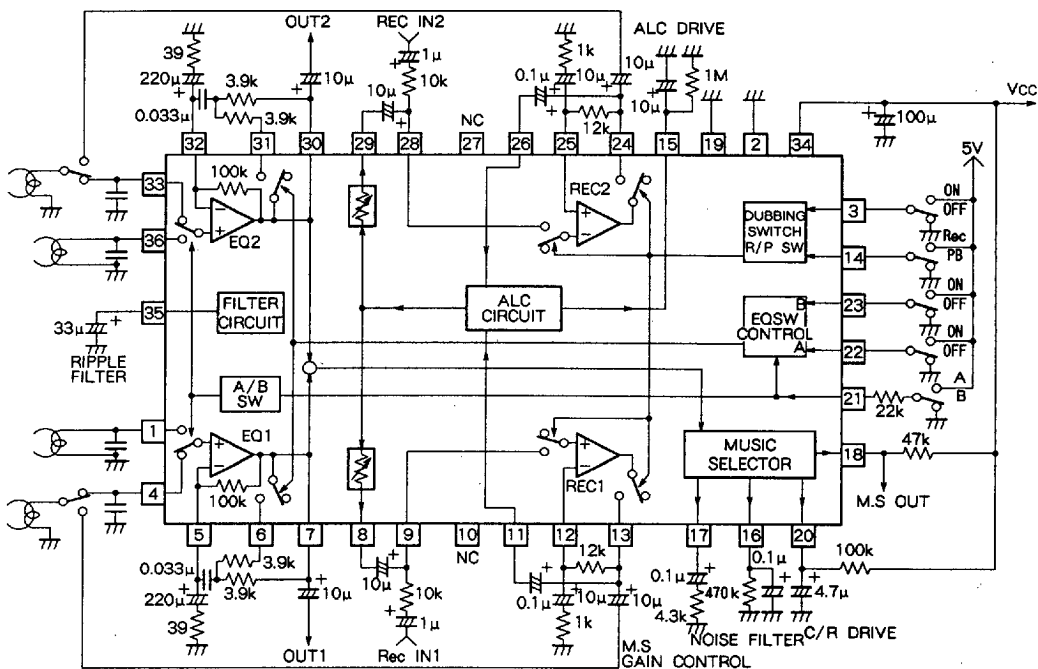


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SINGLE CHIP PREAMPLIFIER FOR DUAL CASSETTE RECORDER

APPLICATION EXAMPLE



Units Resistance : Ω
Capacitance : F

OPERATIONAL CHECK LIST

Pin③ (Dubbing control)	H	H	L	L
Pin⑭ (Rec/RB control)	H	L	H	L
EQ amplifier	○	○	○	○
Rec amplifier	○	×	○	×
ALC circuit	OFF	OFF	ON	OFF

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