M51523AL
DUAL ELECTRONIC VOLUME

DESCRIPTION

The M51523AL is an electronic volume control IC of dual channel configuration. The IC varies attenuation of the right and left channels and the balance between them. The M51523AL also has a built-in temperature-compensated reference voltage supply operating on a DC voltage, making the device useful as a control voltage souce.

FEATURES

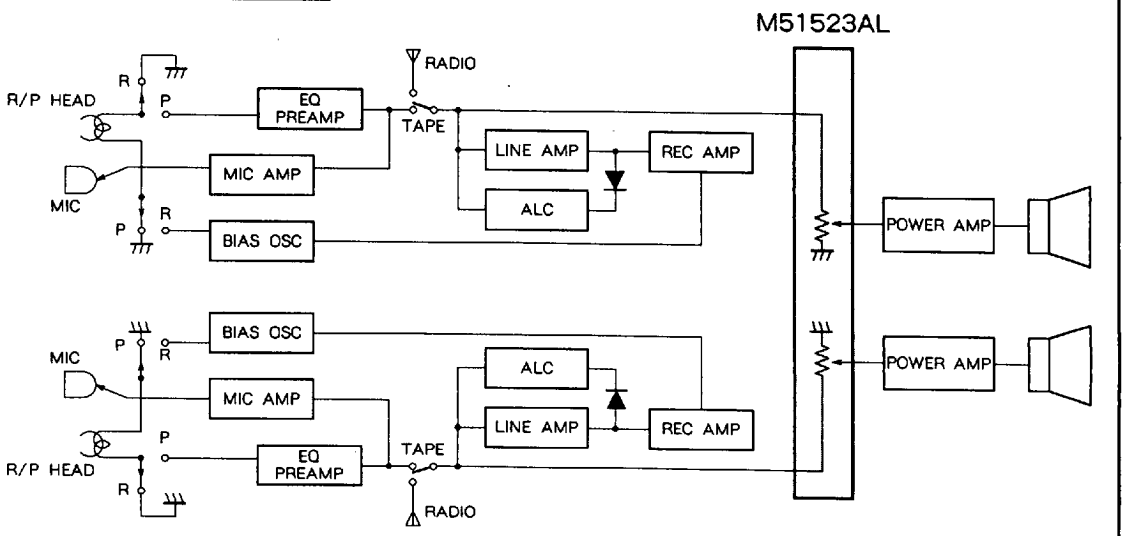
- High attenuation ..... 92dB (typ)
  (f = 1kHz, V_i = 150mV, IHF-A network)
- Low distortion ratio ..... 0.015% (typ)
  (f = 1kHz, V_i = 150mV, at maximum volume)
- Low noise ..... 3.6 μVrms (typ)
  (IHF-A network at minimum volume)
- Built-in stabilized power supply circuit makes device strong to fluctuations in supply voltage.
- Good temperature characteristics.
- Built-in balance circuit

Outline 14P5A
1.27mm pitch 325mil ZIP
(2.8mm × 19.0mm × 6.3mm)

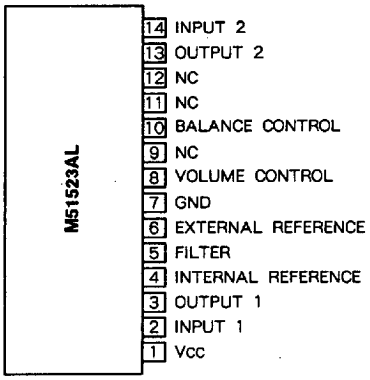
RECOMMENDED OPERATING CONDITIONS

Supply voltage range ..... V_{CC} = 8 to 16V
Rated supply voltage 12V

SYSTEM CONFIGURATION



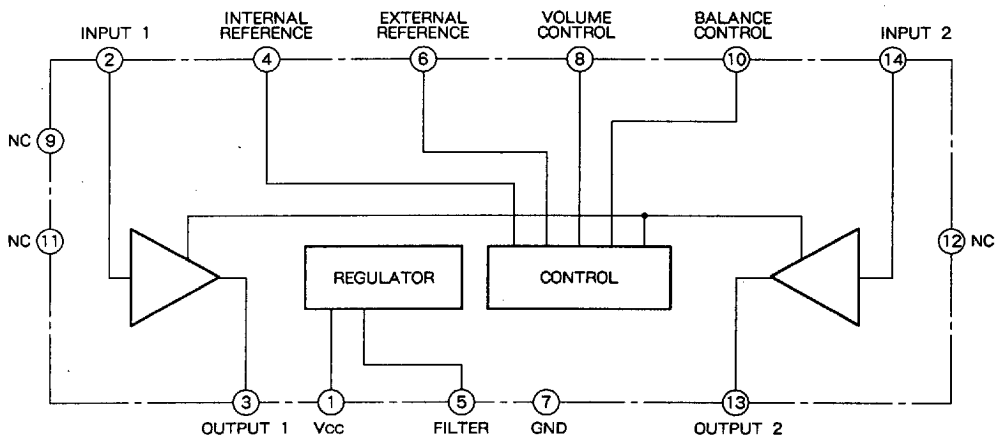
PIN CONFIGURATION (TOP VIEW)



Outline 14P5A

NC : NO CONNECTION

IC INTERNAL BLOCK DIAGRAM



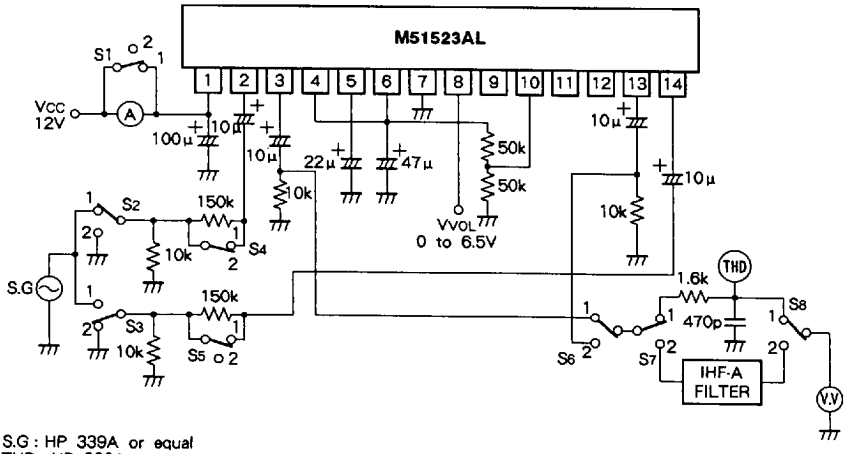
ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Paramater	Conditions	Ratings	Unit
Vcc	Supply voltage	Quiescent	18	V
Icc	Circuit current		30	mA
Pd	Power dissipation		550	mW
Kθ	Thermal derating	Ta ≧ 25℃	5.5	mW/℃
Topr	Operating temperature		−20 to + 75	℃
Tstg	Storage temperature		−40 to +125	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃, Vcc = 12V, f = 1kHz, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
Icco	Quiescent circuit current	VVOL = 0V, Vi = 0	7	12	20	mA
ATT	Attenuation level	VVOL = 0V, Vi = 150mVrms IHF-A network	83	92	−	dB
C.B	Channel balance	VVOL = 2.8V, Vi = 1Vrms	− 3	0	3	dB
THD	Total harmonic distortion	VVOL = 6.5V, Vi = 150mVrms	−	0.015	0.1	%
Ri	Input resistance	VVOL = 6.5V, Vi = 1Vrms	50	150	−	kΩ
Vi(max)	Maximum input voltage	THD = 1 %	1.0	1.5	−	Vrms
No	Output noise voltage	Vi = 0, IHF-A network	−	3.6	10	μVrms
No(r)	Residual output noise voltage	Vi = 150mVrms, IHF-A network	−	3.6	10	μVrms

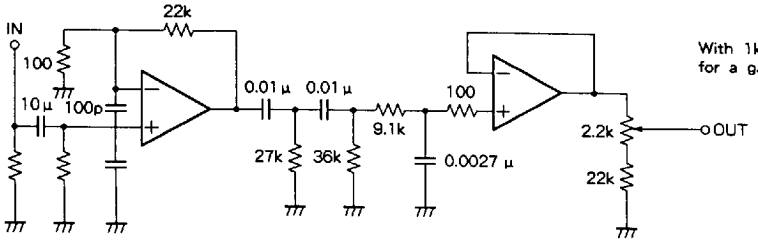
TEST CIRCUIT



Note 1. S.G : HP 339A or equal
THD : HP 339A or equal
V.V : Kikusui Model 1635 or equal
2. A low noise power supply (VCC,VEE) should be used(< 2μV).

Units Resistance : Ω
Capacitance : F

● When the specified IHF-A filter is not used, see the following circuit for correct modifications.
Note that output is increased by a factor of 100X.



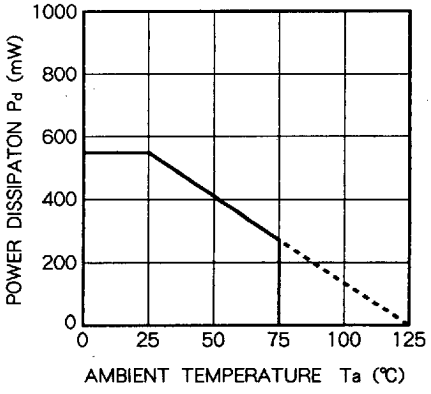
With 1kHz at input, adjust for a gain at output of 40dB.

TEST METHODS (Ta = 25℃, Vcc = 12V, f = 1kHz, unless otherwise noted)

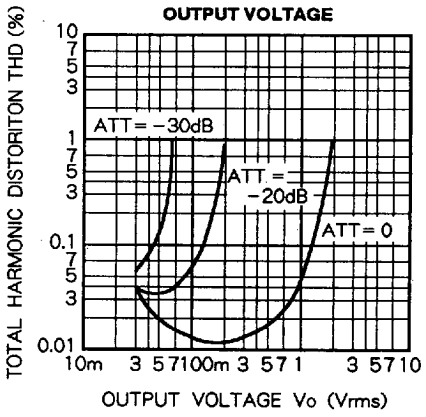
Symbol	Switch codition								Method
	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	
Icco	2	2	2	1	1	–	1	1	Measure with ammeter.
ATT	1	1	1	1	1	1 2	1	1	Varying V_{VOL} from 0 to 6.5V, calculate using ATT = 20 log(V_O/V_i)(dB)
C.B	1	1	1	1	1	1 2	1	1	Channel balance at 2.8V volume level
THD	1	1	1	1	1	1 2	1	1	At f = 1kHz, V_O = 1Vrms, and maximum volume, measure with distortion meter.
R_i	1	1	1	1→2 1	1 1→2	1 2	1	1	Measure output when S_4 = 1 as V_{O1}, when S_4 = 2 as V_{O2} calculate using R_i = 150/(V_{O1}/V_{O2} – 1)(kΩ)
$V_{i(max)}$	1	1	1	1	1	1 2	1	1	At f = 1kHz, the input voltage when the output distortion rateis 1% at maximum volume.
No	1	2	2	1	1	1 2	2	2	Minimum volume level, R_g = 10kΩ, IHF-A filter
No(r)	1	1	1	1	1	1 2	2	2	Minimum volume level, R_g = 10kΩ, IHF-A filter

TYPICAL CHARACTERISTICS

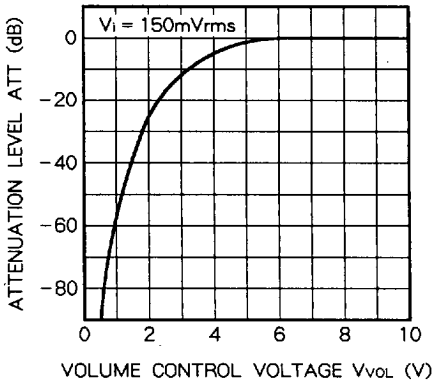
THERMAL DERATING
(MAXIMUM RATING)



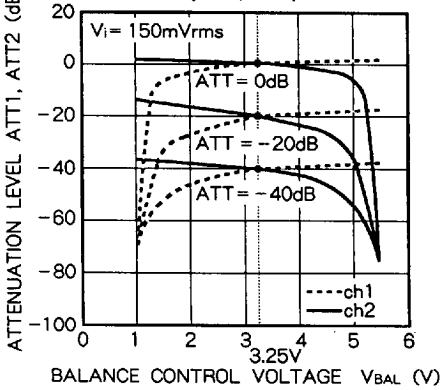
TOTAL HARMONIC DISTORTION VS.
OUTPUT VOLTAGE



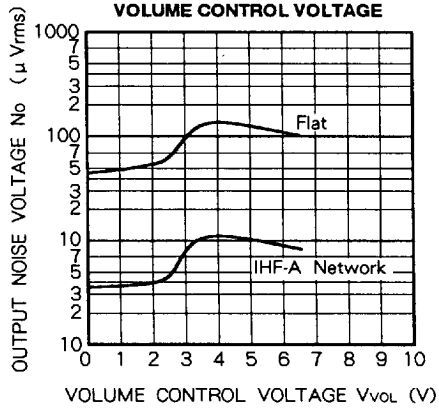
ATTENUATION LEVEL VS. VOLUME CONTROL VOLTAGE



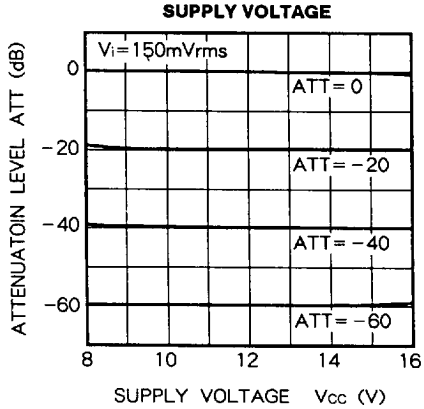
ATTENUATION LEVEL VS. BALANCE CONTROL VOLTAGE (CH-1, CH-2)



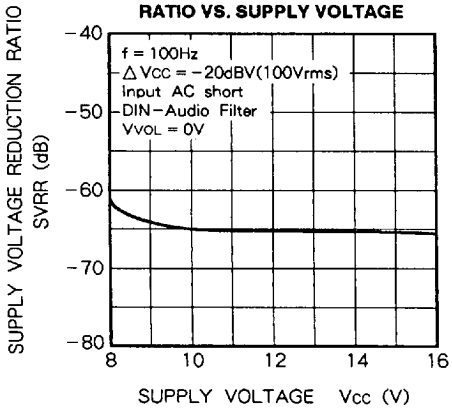
OUTPUT NOISE VOLTAGE VS. VOLUME CONTROL VOLTAGE



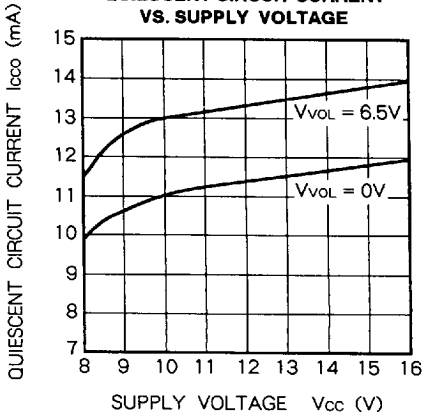
ATTENUATION LEVEL VS. SUPPLY VOLTAGE



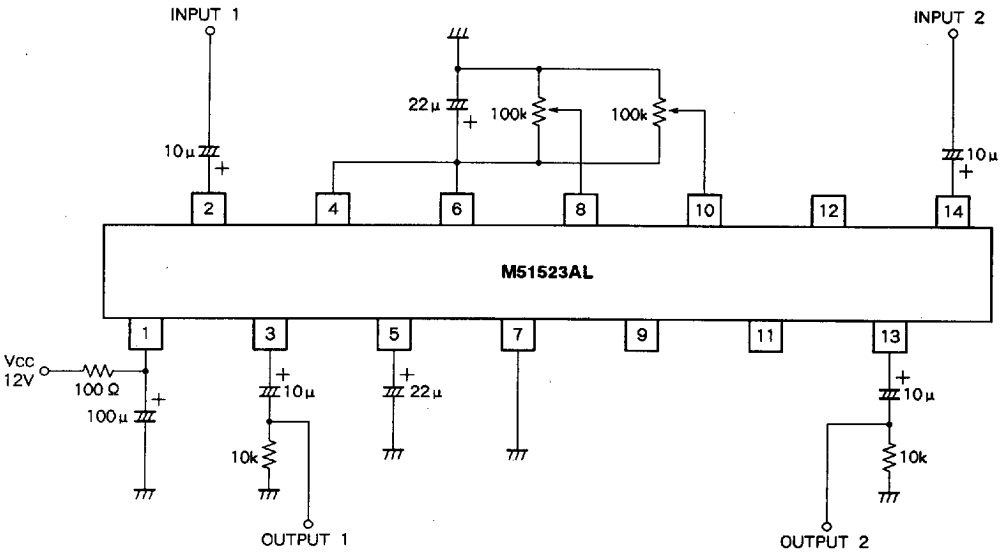
SUPPLY VOLTAGE REDUCTION RATIO VS. SUPPLY VOLTAGE



QUIESCENT CIRCUIT CURRENT VS. SUPPLY VOLTAGE



APPLICATION EXAMPLE



Units Resistance : Ω
Capacitance : F