M51133P

STEREO ELECTRIC VOLUME/BALANCE CONTROL

DESCRIPTION

The M51133P is a semiconductor integrated circuit consisting of dual electronic volume, balance circuit for use in Hi-Fi audio, and by DC voltage control system, it is very easy to design the PCB board layout.

FEATURES

- Low distortion ..... 0.006%(typ.)
- Low noise ..... 5μVrms(typ.)(JIS-A)
- High attenuation ..... 100dB(typ.)(JIS-A)

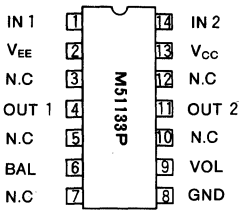
APPLICATION

Hi-Fi stereo equipment

RECOMMENDED OPERATING CONDITIONS

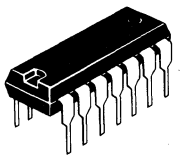
Rated supply voltage ..... ±15V
Supply voltage range ..... ±12V~±16V

PIN CONFIGURATION (TOP VIEW)



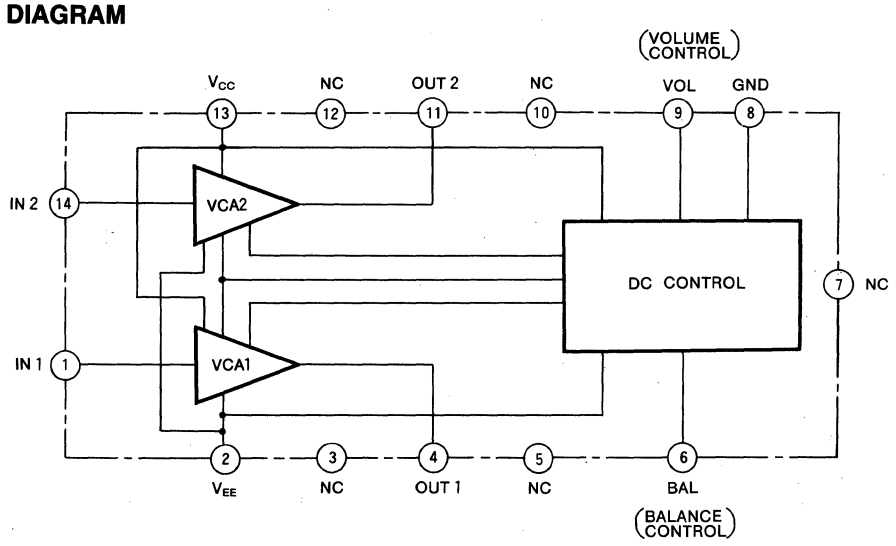
Outline 14P4

NC : NO CONNECTION



14-pin molded plastic DIL

BLOCK DIAGRAM



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

Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage	Quiescent	±16	V
Pd	Power dissipation	$T_a \leqq 25℃$	1.2	W
K_θ	Thermal derating	$T_a \geqq 25℃$	12	mW/℃
T_{opr}	Operating temperature		−20～+65	℃
T_{stg}	Storage temperature		−40～+125	℃

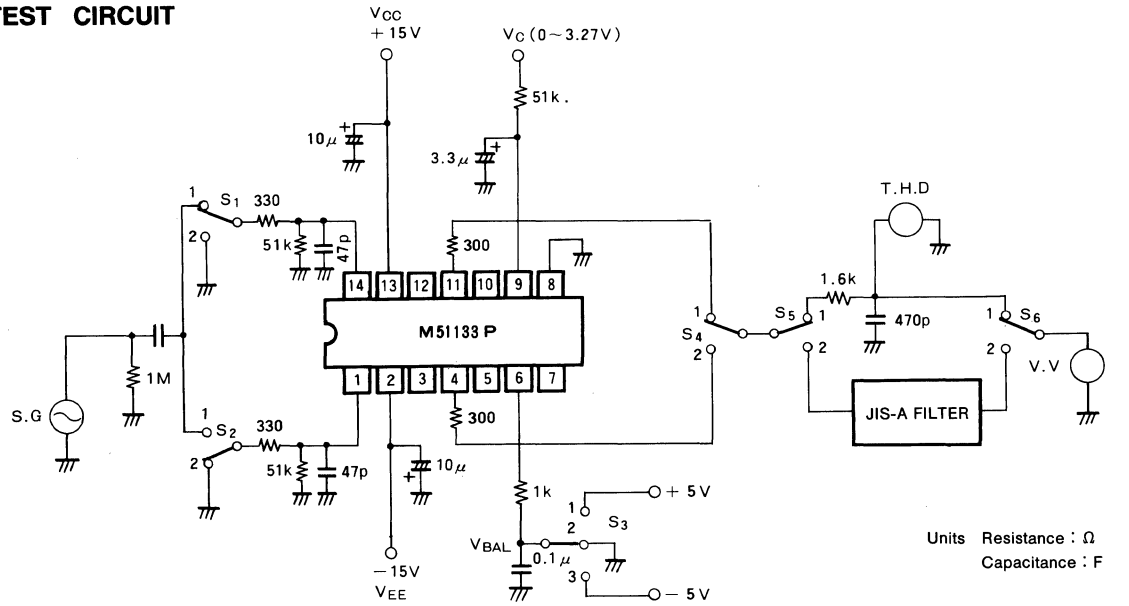
ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=15.0V, V_{EE}=−15.0V, f=1kHz)

Symbol	Parameter	Test conditions	Conditions	Measuring equipments	Limits			Unit
					Min	Typ	Max	
I_{CC}	Circuit current	V_i=0	A	DCA1		17.2	24	mA
I_{EE}		V_i=0	A	DCA2		16.2	24	mA
ATT_0	Attenuation	V_i=1Vrms, V_C=3.27V	B	V.V	−1	0	1	dB
ATT_{-20dB}		V_i=1Vrms, V_C=1.66V	B	V.V	−26	−21	−17	dB
$ATT_{-\infty}$		V_i=1Vrms, V_C=0V, f=10kHz	B	V.V		55	110	μVrms
THD	Total harmonic distortion	V_i=1Vrms, V_C=3.27V	B	T.H.D		0.006	0.02	%
N_O	Output noise voltage	V_i=0, V_C=3.27V, JIS-A filter	C	V.V		15	30	μVrms
$N_{O(r)}$		V_i=1Vrms, V_C=0V, JIS-A filter	C	V.V		5	10	μVrms

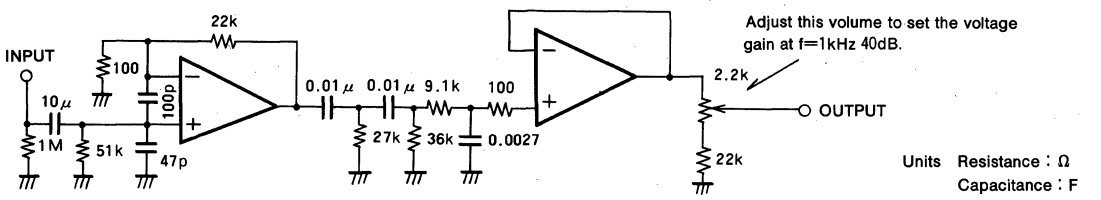
SWITCH CONDITIONS

	S_1	S_2	S_3	S_4	S_5	S_6
A	2	2	2	1	1	1
B	1	1	2	½	1	1
C	2	2	2	½	2	2

TEST CIRCUIT

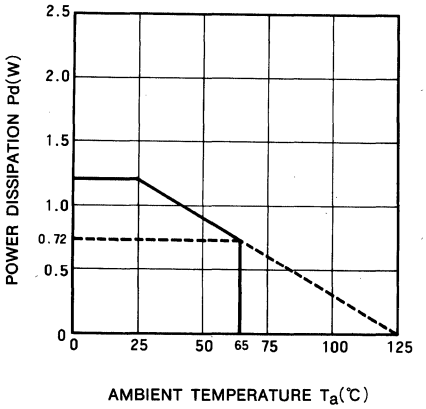


Note : Low-ripple-noise Power Supply recommended for V_{CC} and V_{EE}.(under 2μVrms)
The circuit on next page can be substituted for JIS-A (FILTER). (Note; Gain 40dB)

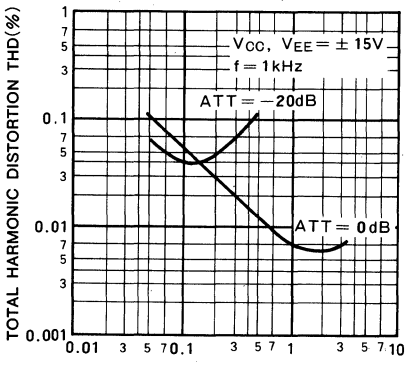


TYPICAL CHARACTERISTIC

THERMAL DERATING (MAXIMUM RATING)



TOTAL HARMONIC DISTORTION VS OUTPUT VOLTAGE



TEST METHODS

1. Circuit current (I_{CC}, I_{EE})

Set SG output voltage (Vi) 0Vrms, and I_{CC} and I_{EE} are measured by DCA 1 and DCA 2 with switch condition A.

2. Attenuation

ATT_0 Set SG output voltage (Vi) 1Vrms, the frequency 1kHz, the control voltage V_C 3.27V, and read off output voltage V_O on vacuum-tube voltmeter. ATT_0 is determined by formula (1)

ATT_{-20} Set SG output voltage (Vi) 1Vrms, the frequency 1kHz, the control voltage V_C 1.66V, and read off output voltage V_O on vacuum-tube voltmeter. ATT_{-20} is determined by formula (2)

$ATT_{-\infty}$ Set SG output voltage (Vi) 3.5Vrms, the frequency 1kHz, the control voltage V_C 0V, and read off output voltage V_O on vacuum-tube voltmeter. AT this V_O is $ATT_{-\infty}$.

3. Total harmonic distortion (THD)

Set SG output voltage (Vi) 1Vrms, the frequency 1kHz, the control voltage V_C 3.27V, and measure output total harmonic distortion with distortion meter.

4. Output noise voltage (No, $No_{(r)}$)

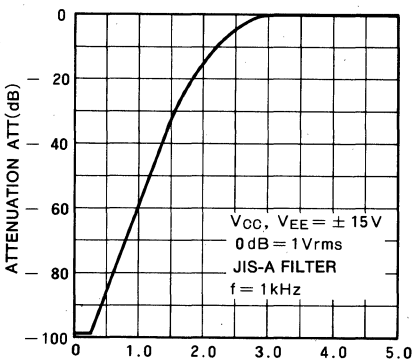
Set the control voltage V_C 3.27V, and measure output voltage on vacuum-tube voltmeter with switch condition C.

This value is "No".

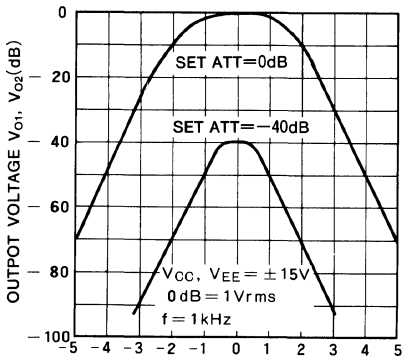
Set Vi 1Vrms, the control voltage V_C 0V, and measure output voltage on vacuum-tube voltmeter with switch condition C.

This value is "$No_{(r)}$"

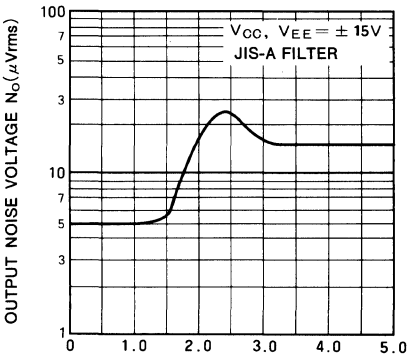
ATTENUATION VS VOLUME CONTROL VOLTAGE



BALANCE CHARACTERISTICS

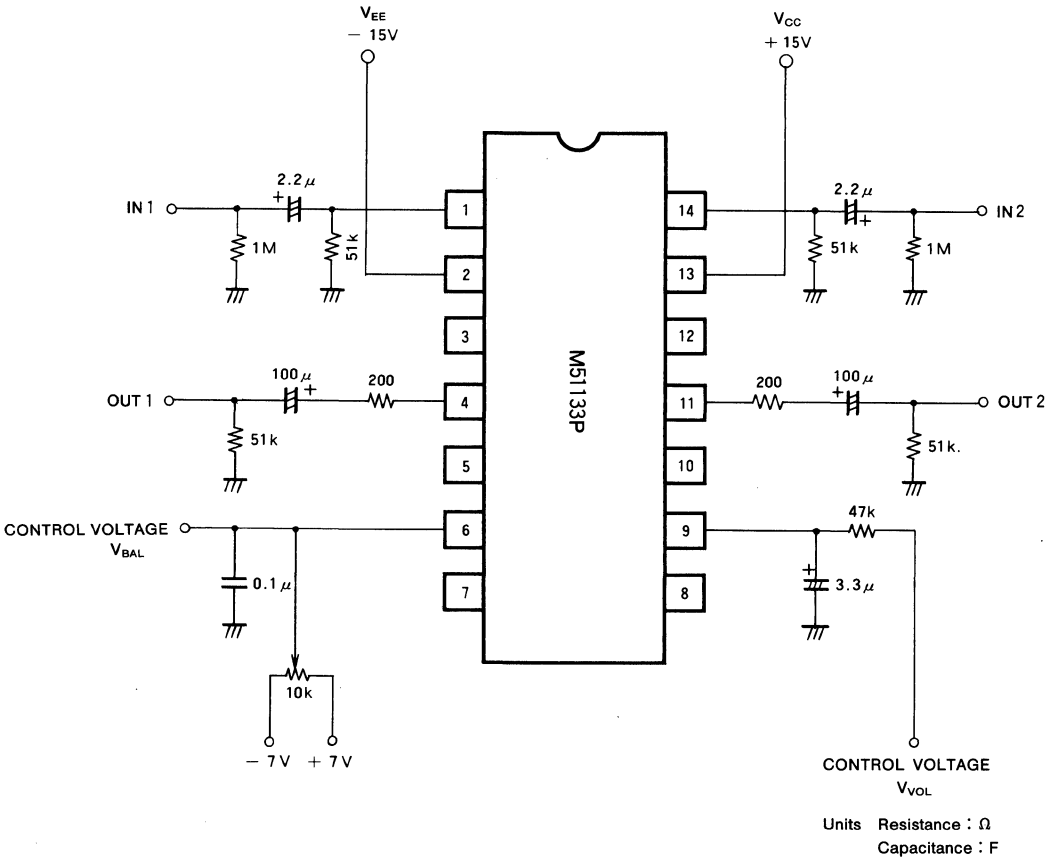


OUTPUT NOISE VOLTAGE VS VOLUME CONTROL VOLTAGE



APPLICATION CIRCUIT

ELECTRONIC VOLUME FOR HI-FI STEREO EQUIPMENTS



Units Resistance : Ω
Capacitance : F