

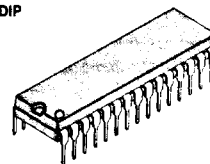
DUAL PRE-POWER AMPLIFIER, VOLUME CONTROLLER AND DC MOTOR SPEED CONTROLLER

The KA22136 is a monolithic integrated circuit designed for use in low voltage and low power applications. It has all functions including dual audio pre-power amplifier, electronic volume controller and DC motor speed controller in a single chip. It is suitable for portable tape recorders, headphones, cassette tape recorders or radios by batteries.

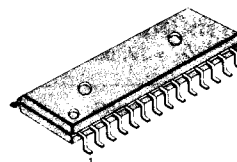
FEATURES

- Low current consumption in a operating voltage range.
- Operating supply voltage range: $V_{CC} = 2.1V \sim 5V$
- Only a few components in composing headphone cassette tape recorder.
- Dual audio pre-power amplifier, electronic volume controller and DC motor speed controller in a single chip.
- Reduced input and output coupling capacitors because of $\frac{1}{2} V_{CC}$ AMP adaption on chip as AC GND.

28 SDIP



28 SOP



ORDERING INFORMATION

Device	Package	Operating Temperature
KA22136	28SDIP	- 20°C ~ + 65°C
KA22136D	28SOP	

BLOCK DIAGRAM

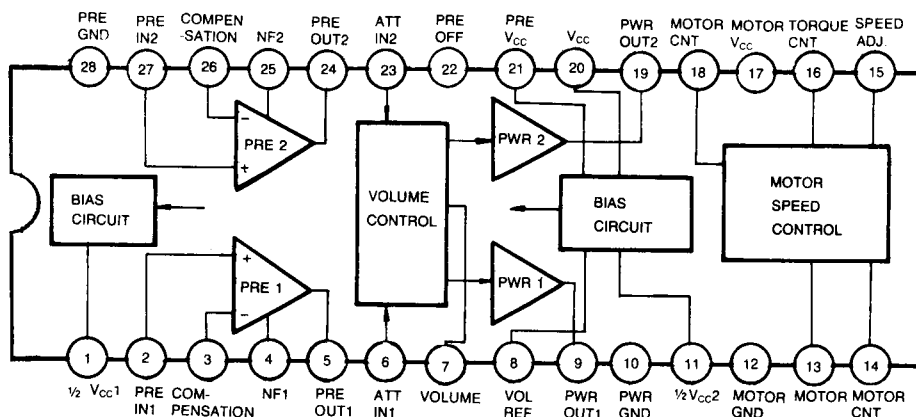


Fig. 1

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	7.5	V
Power Dissipation	P_D	450	mW
Operating Temperature	T_{OPR}	-20 ~ +70	°C
Storage Temperature	T_{STG}	-40 ~ +125	°C

ELECTRICAL CHARACTERISTICS(Ta = 25°C, $V_{CC} = 3V$, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Quiescent circuit current	I_{CCQ}	$V_{CC} = 3V, V_I = 0, I_M = 0$		18	25	mA

PRE AMPLIFIER SECTION ($V_{CC} = 3V, f = 1KHz, R_{L1} = 10K\Omega$, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Open Loop Voltage Gain	G_{VO}	$V_O = -10dBm, R_L = \infty$		72		dB
Closed Loop Voltage Gain	G_{VC1}	$V_O = -10dBm$	40	42	44	dB
Output Voltage	V_O	THD = 10%	0.45	0.6		V
Total Harmonic Distortion	THD ₁	$V_O = 400mV$		0.05	0.5	%
Output Noise Voltage	V_{NO1}	$V_I = 0, R_G = 2.2K\Omega$, BPF (30 ~ 20KHz)		150	300	μV
Input Resistance	R_I	$V_O = 10dBm$	18	22		K Ω
Cross Talk	CT ₁	$R_G = 2.2K\Omega, V_O = -10dBm$	30			dB
Output Voltage In Pre OFF	$V_{O(OFF)}$	$V_I = 100mV$ Pre OFF (pin 22) = V_{CC}			-50	dB

POWER AMPLIFIER SECTION (Ta = 25°C, $V_{CC} = 3V, f = 1KHz, R_{L2} = 16\Omega$, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Closed Loop Voltage Gain	G_{VC2}	$P_O = 5mW$	26	28	30	dB
Voltage Gain Difference	ΔG_V	$V_{CONT} = \text{Max}$		0	3	dB
Output Power 1	P_{O1}	THD = 10%, $R_L = 32\Omega$	20	28		mW
Output Power 2	P_{O2}	THD = 10%, $R_L = 16\Omega$	30			mW
Total Harmonic Distortion	THD ₂	$P_O = 5mW$		0.2	2.0	%
Pre + Power Output Noise Voltage	V_{NO2}	$V_I = 0, R_G = 2.2K\Omega, V_{CONT} = \text{Max}$		6	10	mV
Output Noise Voltage	V_{NO3}	$R_G = 2.2K\Omega, V_{CONT} = \text{Min}$		0.25	1.0	mV
Cross Talk	CT ₂	$P_O = 5mW$	20	30		dB
Ripple Rejection Ratio	RR	$V_{CC} = 3V, 100Hz, 100mVp-p$	34	40		dB

ATTENUATOR SECTION ($T_a = 25^\circ\text{C}$, $V_{CC} = 3\text{V}$, $f = 1\text{KHz}$, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Maximum Input Voltage	$V_i (\text{MAX})$		0.2			V
Maximum Attenuation	$V_{\text{ATT}} (\text{MAX})$	$V_{\text{CONT}} = \text{Min}$	66			dB
Attenuation Error	$V_{\text{ATT}} (\text{ERR})$	$V_{\text{CONT}} = \text{Max}$		0		dB
Input Impedance	Z_i		15	20		$\text{K}\Omega$

MOTOR SPEED CONTROLLER ($T_a = 25^\circ\text{C}$, $V_{CC} = 3\text{V}$, $I_M = 100\text{mA}$, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Circuit Current	I_{CCD}			3.0	5.0	mA
Starting Current	I_{ST}		500			mA
Reference Voltage	V_{REF}	V (pin 15, 16)	0.72	0.80	0.87	V
Reference Voltage Regulation 1	ΔV_{REF1}	* $V_{CC} = 2.1 \sim 5.0\text{V}$		0.05		%/V
Reference Voltage Regulation 2	ΔV_{REF2}	$I_M = 25 \sim 250\text{mA}$		0.01		%/mA
Reference Voltage Regulation 3	ΔV_{REF3}	$T_a = -10 \sim 50^\circ\text{C}$		0.01		%/°C
Current Coefficient	K		32	38	43	
Current Coefficient Regulation 1	ΔK_1	$V_{CC} = 2.1 \sim 5.0\text{V}$		0.50		%/V
Current Coefficient Regulation 2	ΔK_2	$I_M = 25 \sim 250\text{mA}$		0.05		%/mA
Current Coefficient Regulation 3	ΔK_3	$T_a = -10 \sim 50^\circ\text{C}$		0.02		%/°C
Saturation Voltage	V_{SAT}	$I_M = 200\text{mA}$, Pin14 = V_{CC}			0.6	V
Leakage Current	I_{LKG}	Pin 18 = V_{CC}		50	200	μA

*Voltage across Pin 13, 17

TEST CIRCUIT

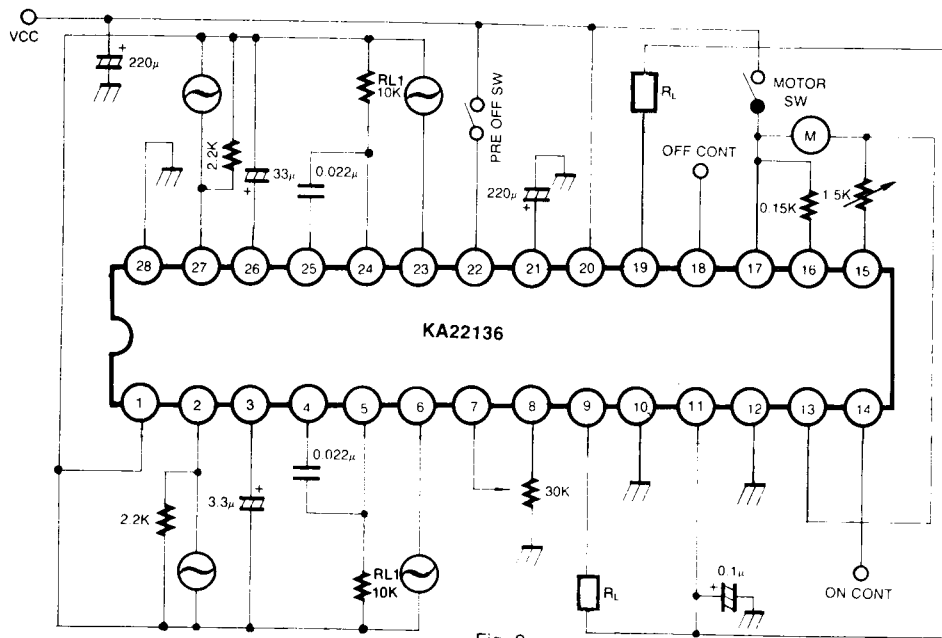


Fig. 2

APPLICATION CIRCUIT

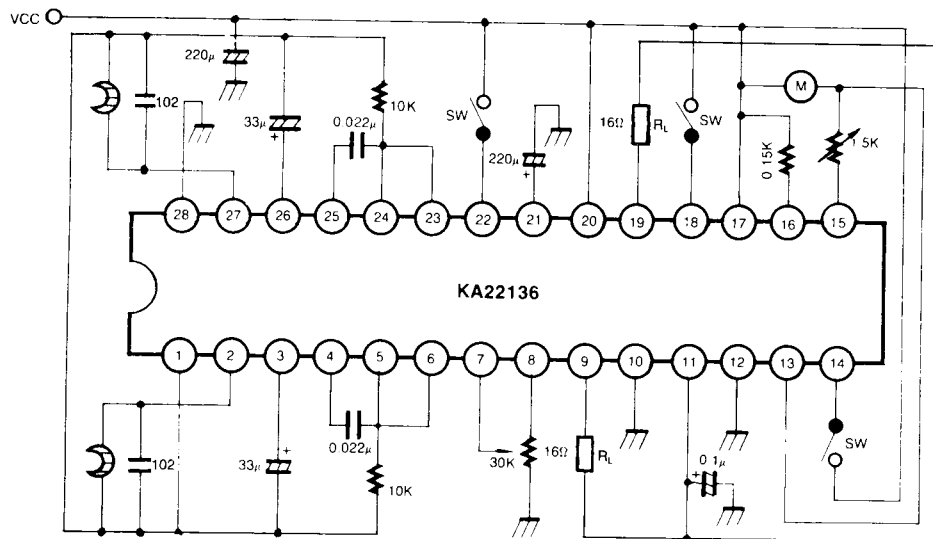


Fig. 3