

# AN7338K

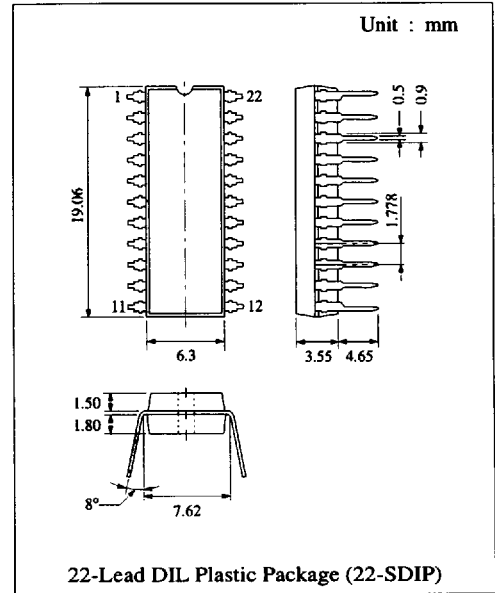
## Preset IC For Portable Cassette Recorder

### ■ Description

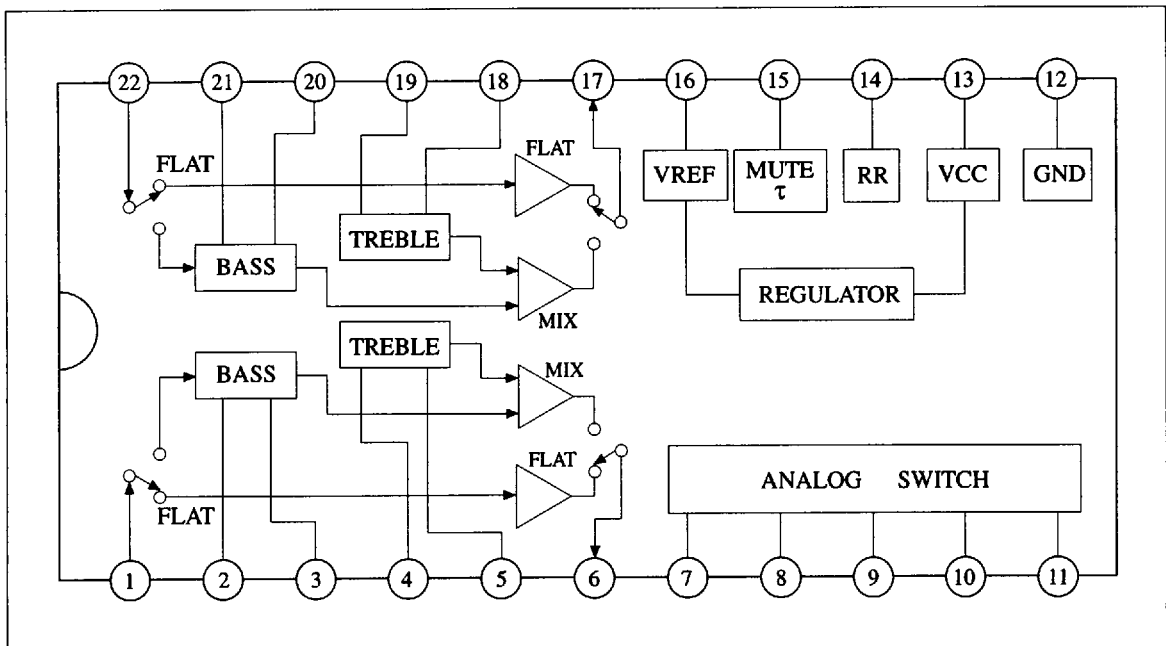
The AN7338K is a monolithic IC developed for portable cassette recorder. It is placed in the stage between pre-amplifier and power amplifier and is operating as a preset graphic equaliser with 5 preset modes : Rock, Pops, Flat, Classic and Jazz. The boosting frequencies are 100Hz and 7kHz. There is a built-in LED indicator for every mode and FLAT will be the initial mode when power up.

### ■ Features

- Few external components.
- Selection modes : Rock, Pops, Flat, Classic and Jazz.
- Built-in switches can be controlled by microprocessor.
- Internal LED driver indicator for every mode.



### ■ Block Diagram



### ■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	14	V
Supply Current	I <sub>CC</sub>	50	mA
Power Dissipation	P <sub>D</sub>	700	mW
Operating Ambient Temperature	Topr	-25 ~ +75	°C
Storage Temperature	Tstg	-55 ~ +150	°C

Operating Supply Voltage Range: V<sub>CC</sub> = 3.6V ~ 12.0V

### ■ Electrical Characteristics (V<sub>CC</sub>=6V, f=1kHz, Flat mode\*1: Switch E is ON, Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Quiescent Current	I <sub>cq1</sub>	No input	10.5	15.0	19.5	mA
Channel Balance	CB	V <sub>inL</sub> = 0.1V, V <sub>inR</sub> = 0.1V	-1	0	1	dB
Reference Voltage	V <sub>ref</sub>	No input	2.4	3.4	4.3	V
Ripple Rejection	RR	V <sub>r</sub> = 0.1V, f <sub>r</sub> = 100Hz	35	40		dB
Channel Separation	CS	V <sub>in</sub> = 0.1V, Measure V <sub>out</sub>	35	40		dB
Output Noise *2	V <sub>no</sub>	V <sub>in</sub> = 0V, R <sub>g</sub> = 2.2kΩ		10	20	μV
THD ( 1 kHz ) *2	THD1	V <sub>in</sub> = 0.1V		0.1	0.3	%
Gain ( 100 Hz )	Gv1	V <sub>in</sub> = 0.1V	-2.0	-0.5	2.0	dB
Gain ( 7 kHz )	Gv2	V <sub>in</sub> = 0.1V	-2.0	0.5	2.0	dB
V <sub>b,max</sub>	V <sub>bm</sub>	THD = 1%, R <sub>L</sub> = 10kΩ	0.6	1.0	1.4	V <sub>rms</sub>
Channel ( Classic )		Switch A is ON				
Quiescent Current	I <sub>cq2</sub>	No input	11.5	16.0	20.5	mA
Gain ( 100 Hz )	Gv3	V <sub>in</sub> = 0.1V	2	4	6	dB
Gain ( 7 kHz )	Gv4	V <sub>in</sub> = 0.1V	2	4	6	dB
Channel ( Rock )		Switch B is ON				
Quiescent Current	I <sub>cq3</sub>	No input	10.5	14.5	19.0	mA
Gain ( 100 Hz )	Gv5	V <sub>in</sub> = 0.1V	6	8	10	dB
Gain ( 7 kHz )	Gv6	V <sub>in</sub> = 0.1V	6	8	10	dB
Channel ( Jazz )		Switch C is ON				
Quiescent Current	I <sub>cq4</sub>	No input	10.5	14.5	19.0	mA
Gain ( 100 Hz )	Gv7	V <sub>in</sub> = 0.1V	6	8	10	dB
Gain ( 7 kHz )	Gv8	V <sub>in</sub> = 0.1V	2	4	6	dB
Channel ( Pops )		Switch D is ON				
Quiescent Current	I <sub>cq5</sub>	No input	10.5	14.5	19.5	mA
Gain ( 100 Hz )	Gv9	V <sub>in</sub> = 0.1V	2	4	6	dB
Gain ( 7 kHz )	Gv10	V <sub>in</sub> = 0.1V	6	8	10	dB

\*1 Switch E, as shown in Test Circuit, is ON.

\*2 DIN AUDIO filter used.

■ Electrical Characteristics (Continue) ( $V_{CC}=6V$ ,  $f=1kHz$ , Flat mode\*1:Switch E is ON,  $T_a=25^{\circ}C$ )

Item	Symbol	Condition	min.	typ.	max.	Unit
Channel ( Classic )		Switch A is ON				
THD ( 1 kHz ) *2	THD2	$V_{in} = 0.1V$		0.25	0.3	%
Channel ( Rock )		Switch B is ON				
THD ( 1 kHz ) *2	THD3	$V_{in} = 0.1V$		0.25	0.3	%
Channel ( Jazz )		Switch C is ON				
THD ( 1 kHz ) *2	THD4	$V_{in} = 0.1V$		0.25	0.3	%
Channel ( Pops )		Switch D is ON				
THD ( 1 kHz ) *2	THD5	$V_{in} = 0.1V$		0.25	0.3	%

\*1 Switch E, as shown in Test Circuit, is ON.

\*2 DIN AUDIO filter used.

### Test Circuit

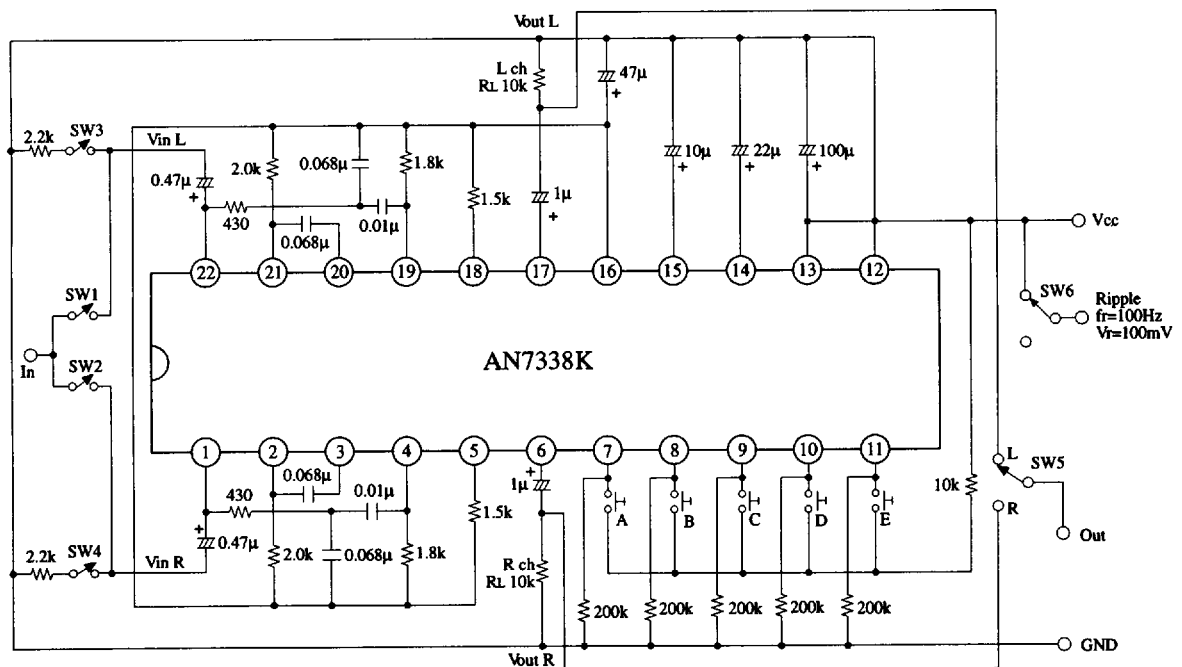
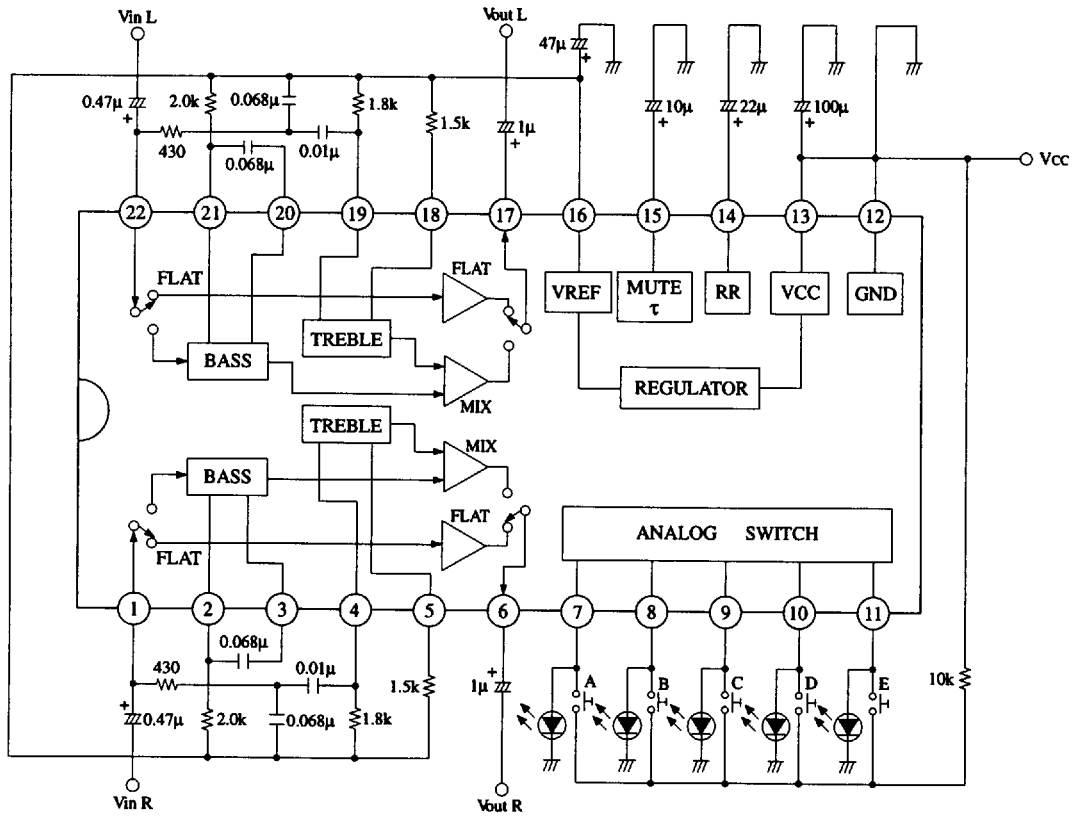


Table 1

Mode	Switch	Pin No.
Classic	A	7
Rock	B	8
Jazz	C	9
Pops	D	10
Flat	E	11

\* Individual mode can be activated by pressing the respective switch as shown in Table 1.

■ Application Circuit



■ Pin

Pin No	Pin Name	Pin No	Pin Name
1	R-Ch Input	12	GND
2	R-Ch Negative Feedback 1	13	Vcc
3	R-Ch Bass	14	Ripple Rejection
4	R-Ch Treble	15	Mute τ
5	R-Ch Negative Feedback 2	16	Reference Voltage
6	R-Ch Output	17	L-Ch output
7	Classic	18	L-Ch Negative Feedback 2
8	Rock	19	L-Ch Treble
9	Jazz	20	L-Ch Bass
10	Pops	21	L-Ch Negative Feedback 1
11	Flat	22	L-Ch Input

■ Pin Descriptions

Pin No.	Pin Name	DC Bias Voltage	Equivalent Circuit	Description
1, 22	Bass Input for CH 1 & CH 2	3.40		<p>These are the inputs to the IC. These inputs can be from PRE or VOL. block, through a 0.47µF cap.</p> <p>I/P impedance ≈ 5.8kΩ</p>
4, 19	Treble Input for CH 1 & CH 2	3.40		<p>The output signal of previous stage will go through a filtering network before input to this pin.</p> <p>Impedance ≈ decided by the filter network.</p> <p>NB : Peak frequency can be changed by varying capacitor value.</p>
5, 18	Negative Feedback pin for Treble	3.40		<p>Gv can be changed by varying Rin externally.</p>
2, 21 3, 20	Negative Feedback pin & Pass filter pin	3.40		<p>Cf and Rin forms a low pass filter and its cutoff frequency can be changed by varying Cf.</p> <p>Gv can be changed by varying Rin externally.</p>

■ Pin Descriptions (Continue)

Pin No.	Pin Name	DC Bias Voltage	Equivalent Circuit	Description
6, 17	Output pin for CH 1 & CH 2	3.40		<p>Pushpull output pin for connecting to the next stage through a coupling capacitor.  <math>Z_{out} \approx 75\Omega</math></p>
7 8 9 10 11	Analog Switch	2.45 or 0		<p>Switch pin for Rock, Pops, Jazz, Classic &amp; Flat with initial mode set at flat mode.            Each pin has a LED indicator internally.            Selected mode has a bias of 2.45V &amp; other pins have a bias of 0V.</p>
12	GND	0		
13	Vcc	6.00		
14	Ripple Rejection	5.00		<p>To connect with a capacitor to minimize ripple generated from Vcc source.</p>

## ■ Pin Descriptions (Continue)

Pin No.	Pin Name	DC Bias Voltage	Equivalent Circuit	Description
15	Mute $\tau$	1.60		<p>To connect with a capacitor to mute pop noise. The time constant of the mute pulse may be changed by varying <math>C_{sd}</math>.</p>
16	Reference Voltage	3.40		<p>Provide a fixed DC bias, which is slightly above <math>1/2 V_{cc}</math> to allow for bigger dynamic range.</p>

■ **Supplementary Explanation**

● **Application Notes**

• **Preset Graphic Equaliser**

This IC provides 5 preset modes by means of 5 push button switches, with built-in LED indicator. The boosting frequencies are 100Hz and 7kHz.

*A) Rock*

By pressing this switch, both 100Hz and 7kHz signal are boosted by 8dB.

*B) Pops*

This preset mode will boost 100Hz signal by 4dB and 7kHz signal by 8dB.

*C) Flat*

This is the initial preset mode, ie. when Vcc is turn ON, this mode will be ON automatically. There is a built-in buffer for this mode to pass the signal directly to output without processing.

*D) Classic*

This mode will boost both 100Hz and 7kHz signal by 4dB.

*E) Jazz*

This preset mode will boost 100Hz signal by 8dB and 7kHz signal by 4dB.

**Frequency Response curve**

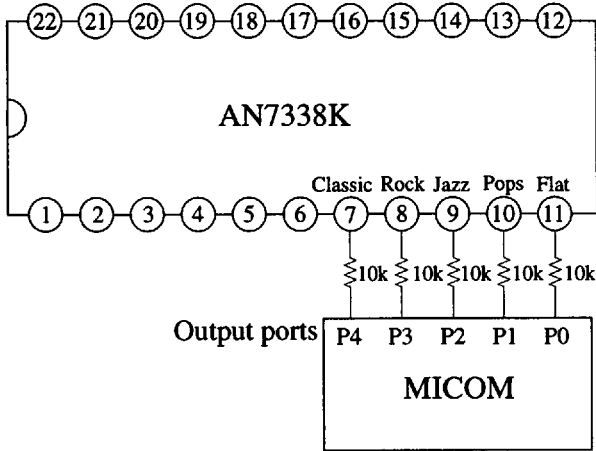
Mode \ Freq.	100Hz	7kHz	Response Curve
ROCK	+8dB	+8dB	
POPS	+4dB	+8dB	
FLAT	-	-	
CLASSIC	+4dB	4dB	
JAZZ	+8dB	+4dB	



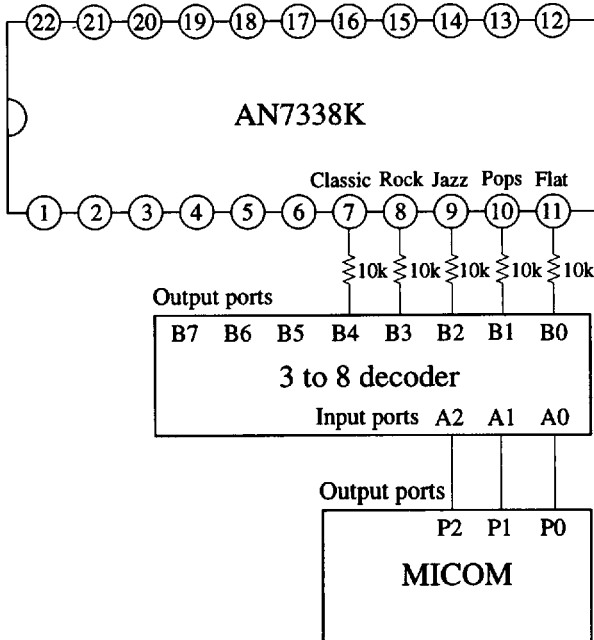
■ Supplementary Explanation (Continue)

● Application Circuit

- Interfacing with Micro-computer



MICOM O/P					SELECTED MODE
P4	P3	P2	P1	P0	
L	L	L	L	H	FLAT
L	L	L	H	L	POPS
L	L	H	L	L	JAZZ
L	H	L	L	L	ROCK
H	L	L	L	L	CLASSIC



MICOM O/P			DECODER O/P					SELECTED MODE
P2	P1	P0	B4	B3	B2	B1	B0	
L	L	L	L	L	L	L	H	FLAT
L	L	H	L	L	L	L	L	POPS
L	H	L	L	L	H	L	L	JAZZ
L	H	H	L	H	L	H	L	ROCK
H	L	L	H	L	L	L	L	CLASSIC

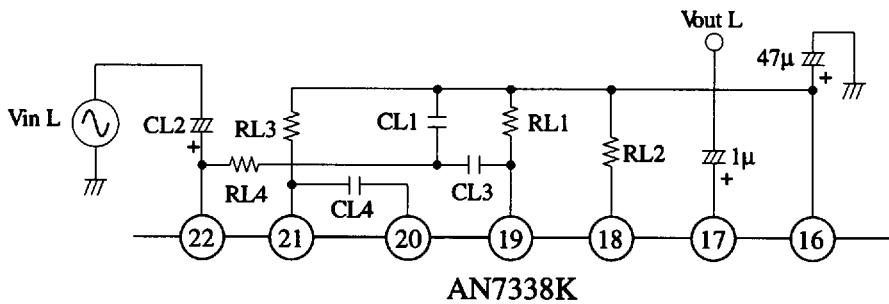
■ Supplementary Explanation (Continue)

● Application Notes

- This IC has two peak frequencies (100Hz & 7kHz) which can be adjusted by varying external component value.  
Below is a table of Gain, frequency shift vs external component value.

	Peak Frequency (100Hz)		Peak Frequency (7kHz)		Low Frequency Gain		High Frequency Gain	
	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
RL1	----	----	↓	↑	----	----	↑	↓
RL2	----	----	----	----	----	----	↓	↑
RL3	----	----	----	----	↓	↑	----	----
RL4	----	----	↓	↑	----	----	↓	↑
CL1	----	----	↓	↑	----	----	↓	↑
CL2	----	----	----	----	↑	↓	----	----
CL3	----	----	↓	↑	----	----	↑	↓
CL4	↓	↑	----	----	----	----	----	----

↑ Increase component value and ↓ Decrease component value



- If the previous stage has high output impedance ( $Z_{out}$ ), this may cause the output drop at high frequency. In this situation, the following circuit is recommended to improve the high frequency performance.

