

AN7233SH

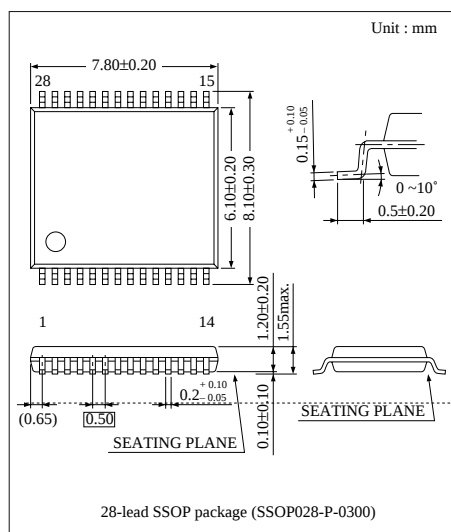
FM/AM Tuner for 1.5V Headphone Stereo

■ Overview

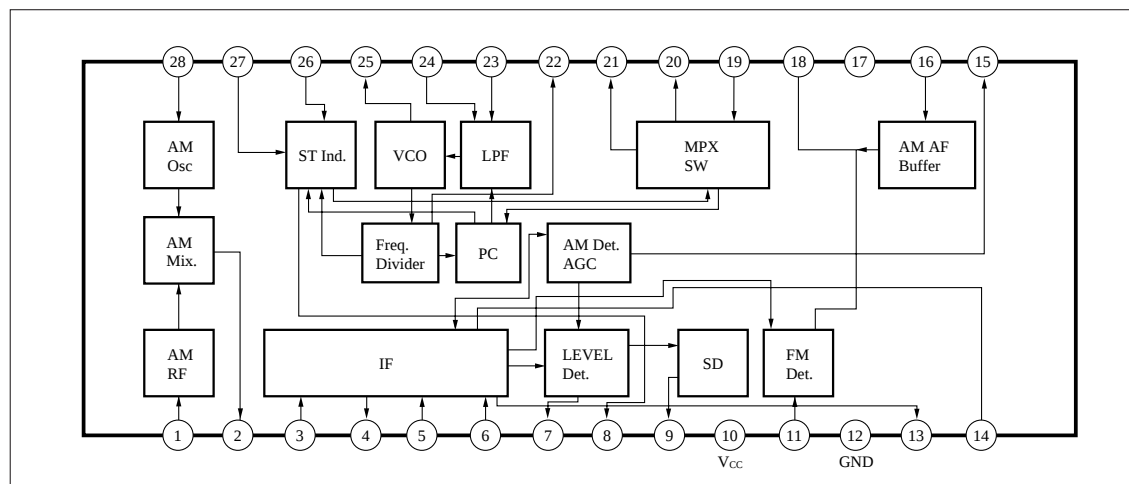
The AN7233SH is an IC for tuner of 1.5V headphone stereo. It incorporates AM tuner + FM IF + FM detector + FM MPX and has been provided with the station detection function and IF count output function required to support DTS, and the AM IF output function required to support AM stereo. It is included in the 28-lead SSOP package with 0.5mm pitch.

■ Features

- Low voltage operation : $V_{CC}=1.0V$ or more
- AM tuner/FM IF + FM detection + FM MPX : one chip
- DTS supported
- AM stereo support possible
- Adjustable sensitivity for station detection
- Small package



■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{CC}	7.0	V
Supply Current	I _{CC}	10	mA
Power Dissipation	P _D	70	mW
Operating Ambient Temperature	T _{opr}	-20 ~ + 75	°C
Storage Temperature	T _{stg}	-55 ~ + 125	°C

■ Recommended Operating Range (Ta=25°C)

Parameter	Symbol	Range
Operating Supply Voltage Range	V _{CC}	1.0V ~ 2.0V

■ Electrical Characteristics (V_{CC}=1.2V, Ta= 25°C±2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
FM						
Total Circuit Current	I _{tot (FM)}	No signals (under VCO operating)	5.5	7.5	9.5	mA
Output Voltage	V _{O (FM)}		26	44	61	mV
Limiting Sensitivity	V _{i (lim)}	V _i for V _O = -3dB	38	45	48	dBμ
S/N Ratio	S/N (FM)		55	—	—	dB
THD	THD (FM)		—	—	1.4	%
LED ON Sensitivity	V _{i (FMLED1)}	V _{CC} =1.1V, No modulation REQ OFF	48	55	61	dBμ
LED Decreased Voltage ON Sensitivity	V _{i (FMLED2)}	V _{CC} =1.0V, No modulation REQ OFF	48	58	69	dBμ
IF Buffer Output 1	V _{OIF1 (FM)}	V _{IN} = 80dBμ, No modulation	—	48	86	mVrms
IF Buffer Output 2	V _{OIF2 (FM)}	V _{CC} =1.0V, V _{IN} = 80dBμ, No modulation	19	—	—	mVrms
AM						
Total Circuit Current	I _{tot (AM)}		3.0	5.0	7.0	mA
Output Voltage	V _{O (AM)}		21	31	41	mV
Weak Input Detection Output Voltage	V _{O (AMMIN)}	V _{IN} = 26dBμ	12	24	—	mV
S/N Ratio	S/N (AM)		36	—	—	dBμ
THD	THD (AM)		—	—	5.0	%
LED ON Sensitivity	V _{i (AMLED)}	V _{CC} =1.1 V, No modulation REQ OFF	16	23	30	dB
IF Buffer Output 1	V _{OIF1 (AM)}	V _{CC} =1.1V, V _{IN} = 45dBμ, No modulation	29	43	57	mVrms
IF Buffer Output 2	V _{OIF2 (AM)}	V _{CC} =1.0V, V _{IN} = 45dBμ, No modulation	15	—	—	mVrms
AM IF Output Voltage	V _{O (AM IF)}	V _{IN} = 50dBμ, No modulation	15	30	60	mVrms
MPX						
Channel Balance	CB	Monaural Df= 75kHz	-2	0	2	dB
Separation	Sep.	MPX Portion only L + R= 30%	22	35	—	dB
THD (Stereo)	THD (STEREO)	L + R= 90%, Pilot= 10%	—	—	5.0	%
Stereo LED ON Level	V _{P (ON)}	Pilot only	—	4.8	7.0	%
Stereo LED OFF Level	V _{P (OFF)}	Pilot only	0.8	1.9	—	%

Note) FM : f = 10.7MHz, Df = 22.5kHz, f_m = 1kHz, V_{IN} = 80dBμ, AM : f = 1MHz, Mod. = 30%, f_m = 1kHz, V_{IN} = 50dBμ
 MPX : f = 10.7MHz, Df = 75kHz (L+ R90%, Pilot90%), f_m = 1kHz, V_{IN} = 80dBμ

Pin No.	Pin Name	Pin No.	Pin Name
1	AM RF Amp. Input	15	AM Detection Pin
2	AM Mixer Output	16	AM AF Amp. Input Pin
3	Supply Pin for IF Input Portion/AMOSC Section	17	Oscillation Prevention Capacitor Pin
4	AM AGC	18	FM/AM Detection Output Pin
5	AM IF Amp. Input	19	MPX Input Pin
6	FM IF Amp. Input	20	Rch Output Pin
7	SD LED ON Level Adjustment	21	Lch Output Pin
8	Stereo LED Drive/AMIF Output Pin	22	AM/FM Changeover/19kHz Output Pin
9	SD LED Drive Pin	23	Loop Filter Pin 1 for PLL
10	Supply Pin	24	Loop Filter Pin 2 for PLL
11	Phase-Shifter Pin for FM Detection	25	CR Connecting Pin for VCO
12	GND Pin	26	Low Pass Filter Pin 1 for Pilot Detection
13	Output for FM/AM IF Count	27	Low Pass Filter Pin 2 for Forced MONO/Pilot Detection
14	IF Count Control Pin	28	AM Local Oscillation Coil Pin

■ Application Circuit

The diagram illustrates the application circuit for the RLO2U8-M integrated circuit. The circuit is organized around a central IC with pins 1 through 28. Key components and sections include:

- Tuning Electric Current:** Connected to pins 1, 2, 3, and 4. It includes a variable capacitor (V1), a KV1281 diode, and various resistors and capacitors.
- Freq. Counter:** Connected to pins 22, 23, and 24. It includes a 0.22µF capacitor and a 1kΩ resistor.
- AM Section:** Connected to pins 25, 26, and 27. It includes a MONO switch, a 10kΩ resistor, a 1µF capacitor, and a 680pF capacitor.
- MPX Filter and Audio Analyzer:** Connected to pins 15, 16, and 17. It includes a STEREO SG section, a 24kΩ resistor, and a 0.047µF capacitor.
- AM AF Buffer:** Connected to pins 18, 19, and 20. It includes a 0.33µF capacitor, a 82pF capacitor, and a 0.022µF capacitor.
- AM Det. AGC:** Connected to pins 21, 22, and 23. It includes a 1kΩ resistor and a 0.1µF capacitor.
- VCO and LPF:** Connected to pins 24, 25, and 26. It includes a 1kΩ resistor and a 0.1µF capacitor.
- AM Mix. and AM RF:** Connected to pins 27 and 28. It includes a 10kΩ resistor and a 1µF capacitor.
- IF Section:** Connected to pins 1, 2, 3, 4, 5, and 6. It includes various capacitors (4.7µF, 10pF, 100pF, 1nH) and inductors.
- LEVEL Det.:** Connected to pins 7, 8, and 9. It includes a 1kΩ resistor and a 0.01µF capacitor.
- SD and FM Det.:** Connected to pins 10, 11, and 12. It includes a 220kΩ resistor, a 3.3kΩ resistor, a 270pF capacitor, and a 39pF capacitor.
- REQ Section:** Connected to pins 13 and 14. It includes a REQ switch, a 0.01µF capacitor, and a 100kΩ resistor.
- Bottom Section:** Connected to pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28. It includes various components like resistors (510kΩ, 30kΩ, 1.8kΩ, 4.3kΩ, 100kΩ), capacitors (0.033µF, 0.022µF, 0.01µF), and transistors (2SC1359, 2SC1359A).

The circuit also shows connections for a 3V supply and an RF Voltage Meter.