

SINGLE-CHIP BROADCAST FM RADIO TUNER

Rev. 1.1–Jun. 2009

General Description

The RDA7088 is a single-chip broadcast FM stereo radio tuner with fully integrated synthesizer, IF selectivity and MPX decoder. The tuner uses the CMOS process, require the least external component. The package size is SOP16 and is completely adjustment-free. All these make it very suitable for portable devices.

The RDA7088 has a powerful low-IF digital audio processor, this make it have optimum sound quality with varying reception conditions.

The RDA7088 can be tuned to the worldwide frequency band.

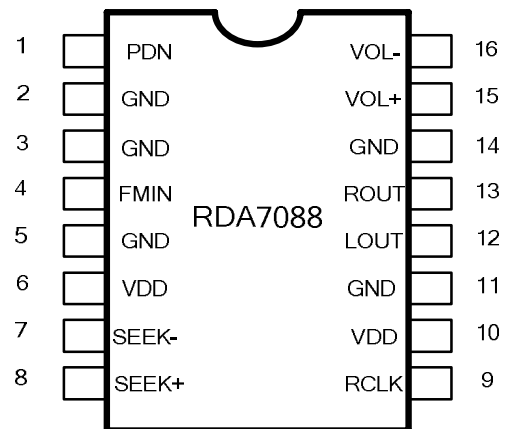


Figure 1-1. RDA7088 Top View

1.1 Features

- CMOS single-chip fully-integrated FM tuner
- Low power consumption
 - Total current consumption lower than 17mA at 3.0V power supply
- Support worldwide frequency band
 - 76-108 MHz
- Default Frequency
 - 107.9MHz
- Full band seek time
 - < 5s
- Autonomous search tuning
- Support 32.768KHz crystal oscillator
- Digital auto gain control (AGC)
- Volume control
- Line-level analog output voltage
- Directly support 32Ω resistance loading
- Integrated LDO regulator

- 1.8 to 3.6 V operation voltage

- SOP16 pin package

1.2 Applications

- Cellular handsets
- MP3, MP4 players
- Portable radios
- PDAs, Notebook

2 Receiver Characteristics

VDD = 1.8 to 3.6 V, T_A = -25 to 85 °C, unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------------|---|--------------|-----|------|-----|--------|
| General specifications | | | | | | |
| F _{in} | FM Input Frequency | | 76 | | 108 | MHz |
| V _{rf} | Sensitivity ^{1,2,3} | (S+N)/N=26dB | | 1.6 | 2 | μV EMF |
| α _{am} | AM Suppression ^{1,2} | m=0.3 | 40 | - | - | dB |
| V _{AFL} ; V _{AFR} | Left and Right Audio Frequency Output Voltage (Pins LOUT and ROUT) | | | | 200 | mV |
| (S+N)/N | Maximum Signal Plus Noise to Noise Ratio ^{1,2,3,5} | | 58 | 60 | - | dB |
| α _{SCS} | Stereo Channel Separation | | 35 | - | - | dB |
| THD | Audio Total Harmonic Distortion ^{1,3,6} | | | 0.05 | 0.1 | % |
| R _L | Audio Output Loading Resistance | Single-ended | 32 | - | - | Ω |
| I _{power up} | | | | | | |
| I _{power down} | | | - | - | 10 | μA |

3 Pins Description

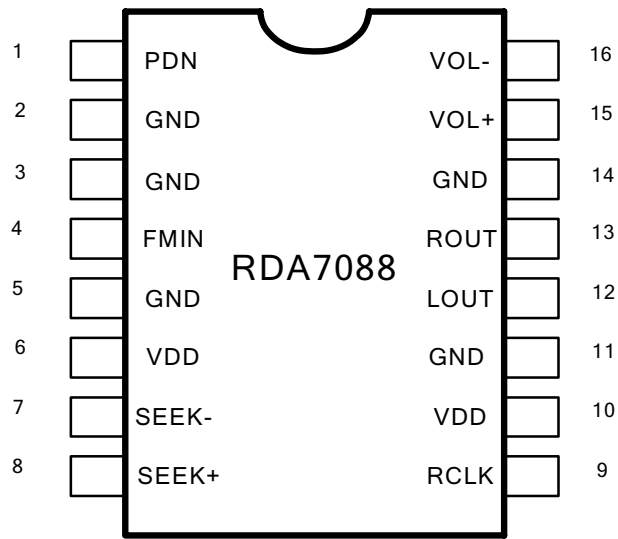


Figure 3-1. RDA7088 Top View

Table 3-1 RDA7088 Pins Description

| SYMBOL | PIN | DESCRIPTION |
|-------------|-------------|--|
| GND | 2,3,5,11,14 | Ground. Connect to ground plane on PCB |
| FM_IN | 4 | FM single input |
| RCLK | 9 | 32.768KHz reference clock input |
| VDD | 6,10 | Power supply |
| LOUT,ROUT | 12,13 | Right/Left audio output |
| SEEK-,SEEK+ | 7,8 | seek up,seek down |
| VOL+,VOL- | 15,16 | Volume control |
| PN | 1 | Powerup/powerdown Enable |

4 Application Diagram

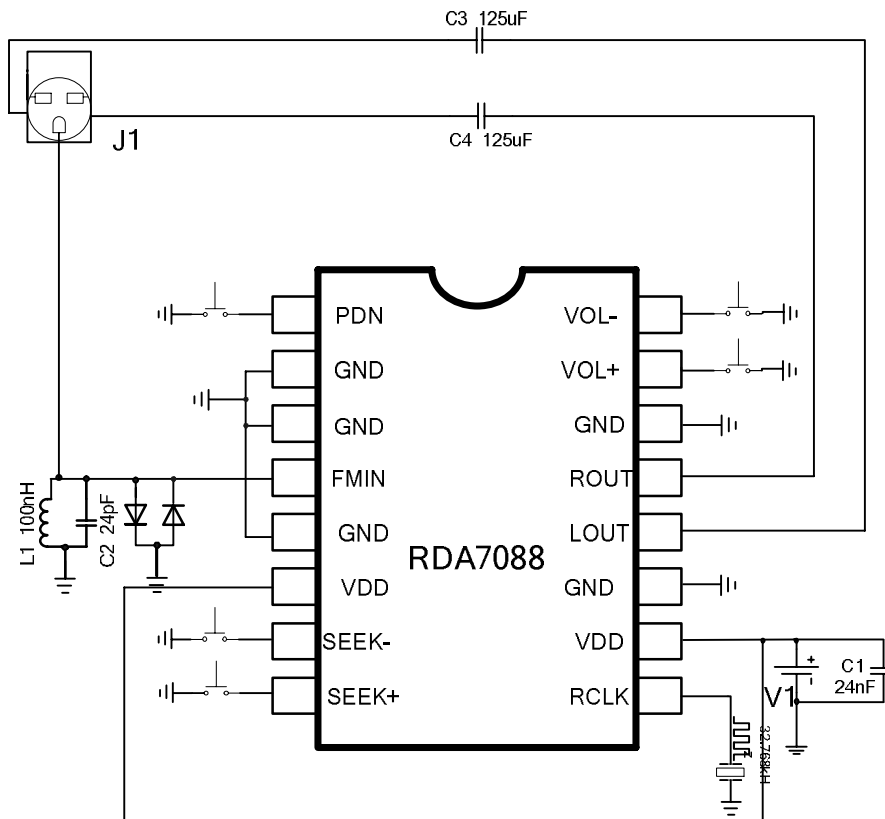


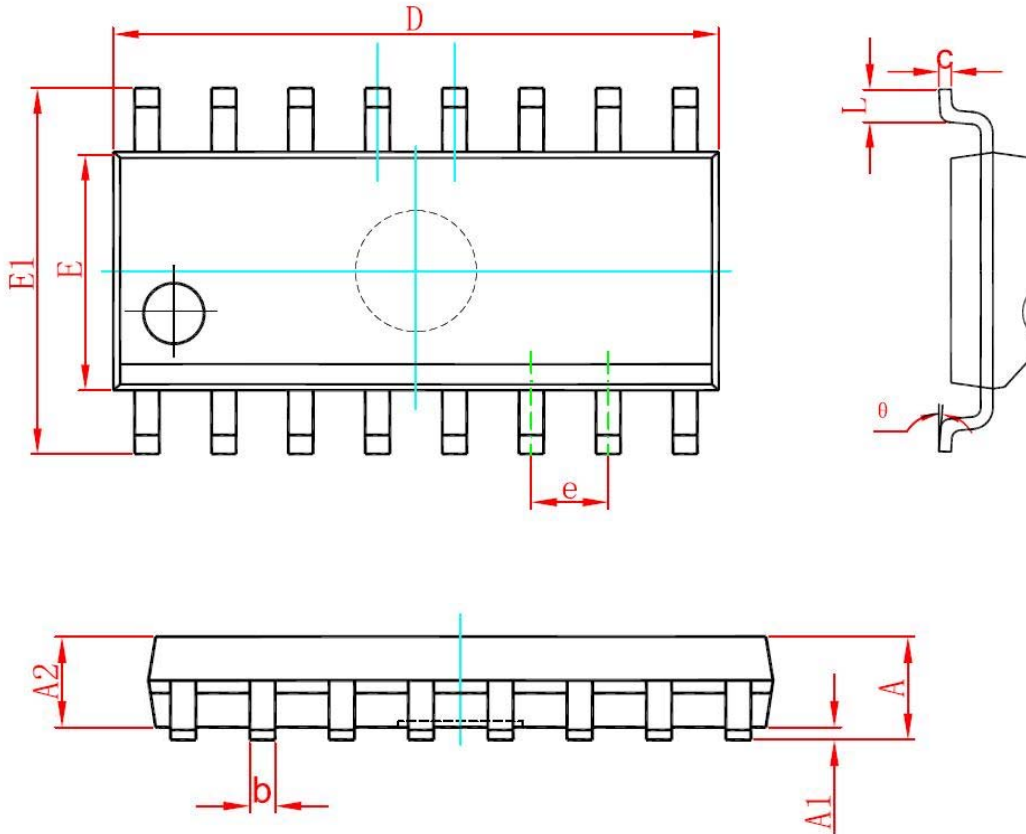
Figure 4-2. RDA7088 FM Tuner Application Diagram

Table 4-3 Bill of Materials:

| COMPONENT | VALUE | DESCRIPTION | SUPPLIER |
|-----------|------------|---------------------------------|----------|
| U1 | RDA7088 | Broadcast FM Radio Tuner | RDA |
| J1 | | Common 32Ω Resistance Headphone | |
| L1/C2 | 100nH/24pF | LC Chock for LNA Input | Murata |
| C4,C5 | 125μF | Audio AC Couple Capacitors | Murata |
| C1 | 24nF | Power Supply Bypass Capacitor | Murata |

5 Package Physical Dimension

Figure 5-1 illustrates the package details for the RDA7088. The package is lead-free and RoHS-compliant.



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 9.800 | 10.200 | 0.386 | 0.402 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| Θ | 1° | 7° | 1° | 7° |
| L | 0.400 | 1.270 | 0.016 | 0.050 |

Figure 5-1. 16 PIN SOP

PCB Land Pattern

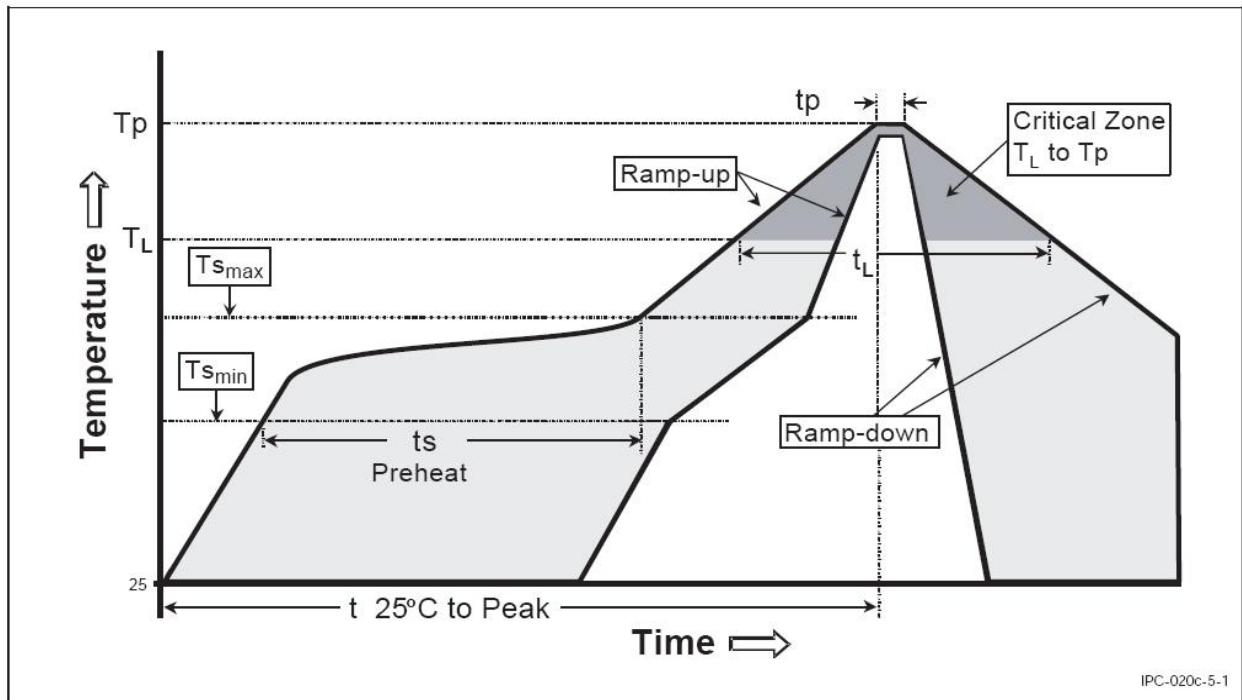


Figure 5-4. Classification Reflow Profile

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|--|------------------------------------|------------------------------------|
| Average Ramp-Up Rate (T_{smax} to T_p) | 3 °C/second max. | 3 °C/second max. |
| Preheat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (t_{smin} to t_{smax}) | 100 °C 100 °C 60-120 seconds | 150 °C 200 °C 60-180 seconds |
| Time maintained above: -Temperature (T_L) -Time (t_L) | 183 °C 60-150seconds | 217°C 60-150 seconds |
| Peak /Classification Temperature(T_p) | See Table-II | See Table-III |
| Time within 5 °C of actual Peak Temperature (t_p) | 10-30 seconds | 20-40 seconds |
| Ramp-Down Rate | 6 °C/second max. | 6 °C/seconds max. |
| Time 25 °C to Peak Temperature | 6 minutes max. | 8 minutes max. |

Table-I Classification Reflow Profiles

| Package Thickness | Volume mm³ <350 | Volume mm³ ≥350 |
|--------------------------|--|---------------------------------------|
| <2.5mm | 240 + 0/-5 °C | 225 + 0/-5 °C |
| ≥2.5mm | 225 + 0/-5 °C | 225 + 0/-5 °C |

Table – II SnPb Eutectic Process – Package Peak Reflow Temperatures

| Package Thickness | Volume mm³ <350 | Volume mm³ 350-2000 | Volume mm³ >2000 |
|---|--|---|---|
| <1.6mm | 260 + 0 °C * | 260 + 0 °C * | 260 + 0 °C * |
| 1.6mm – 2.5mm | 260 + 0 °C * | 250 + 0 °C * | 245 + 0 °C * |
| ≥2.5mm | 250 + 0 °C * | 245 + 0 °C * | 245 + 0 °C * |
| *Tolerance : The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature(this mean Peak reflow temperature + 0 °C. For example 260+ 0 °C) at the rated MSL Level. | | | |

Table – III Pb-free Process – Package Classification Reflow Temperatures

Note 1: All temperature refer topside of the package. Measured on the package body surface.

Note 2: The profiling tolerance is + 0 °C, - X °C (based on machine variation capability)whatever

is required to control the profile process but at no time will it exceed - 5 °C. The producer assures process compatibility at the peak reflow profile temperatures defined in Table –III.

Note 3: Package volume excludes external terminals(balls, bumps, lands, leads) and/or non integral heat sinks.

Note 4: The maximum component temperature reached during reflow depends on package the thickness and volume. The use of convection reflow processes reduces the thermal gradients between packages. However, thermal gradients due to differences in thermal mass of SMD package may sill exist.

Note 5: Components intended for use in a “lead-free” assembly process **shall** be evaluated using the “lead free” classification temperatures and profiles defined in Table-I II III whether or not lead free.

RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE), and are therefore considered RoHS compliant.

ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

Change List

| REV | DATE | AUTHER | CHANGE DESCRIPTION |
|------|------------|-----------------------------|-------------------------|
| V1.0 | 2009-05-26 | ChunZhao,YananLiu,XiaoqiYou | Original Draft. |
| V1.1 | 2009-06-03 | ChunZhao,YananLiu,XiaoqiYou | Change Package to SOP16 |

