



NXP FM + RDS stereo radio IC TEA5990 for portable applications

Set a new standard in radio performance, integration, and footprint

The TEA5990 uses a full-CMOS design to deliver top performance at the lowest overall cost, along with the industry's best sensitivity. It uses a new command interface that simplifies software development and system integration, and requires only 15 mm² of PCB space.

Key features

- ▶ Industry-leading FM and RDS sensitivity
- ▶ Command-based interface for simpler software design and system integration
- ▶ Single-ended antenna input optimized for headphone wire
- ▶ Low supply voltage (2.4 to 3.6 V)
- ▶ Wide tuning range (70 to 108 MHz, including 70-MHz China band)
- ▶ Fast search tuning and internal auto store up to 32 channels
- ▶ Extensive RDS features
- ▶ Flexible interfaces: I²C-bus, SPI bus
- ▶ Digital volume and balance control
- ▶ Power-saving modes
- ▶ Small size (4 x 4 mm HVQFN, 2.56 x 2.56 mm WL-CSP)

Key benefits

- ▶ Can be implemented with no external components
- ▶ Better performance: channel separation, sensitivity, selectivity, and sound
- ▶ Easy hardware and software integration
- ▶ Free demo board with reference design
- ▶ Complete design in less than 15 mm²

The NXP FM + RDS stereo radio IC TEA5990 is the follow-on to the popular TEA5760 and TEA5766. As NXP's first full-CMOS radio IC, it sets a new standard in radio performance, with better channel separation, industry-leading sensitivity, very high selectivity, and superb sound. Also, a new command-based interface simplifies software development and makes system integration easier.

The IC is available in an HVQFN or WL-CSP package. A complete radio can be implemented without external components. Adding two small decoupling capacitors to the design improves sound quality. Even with the two extra capacitors, the design is very small, requiring less than 15 mm² of PCB space. Adding components to the FM antenna path can enhance sound quality even further.

The TEA5990 requires no alignment and uses a low supply voltage (2.4 to 3.6 V). The single-ended antenna input is optimized for headphone wire.

The radio offers a wide tuning range (70 to 108 MHz, including the 70-MHz China band) and uses a tuning grid of 50, 100, and 200 kHz. It has fast Auto Search with an internal Auto Store of up to 32 channels, and it supports dynamic adjacent channel suppression, for better reception quality.

There are extensive RDS features, including AF switching and inaudible AF-updates, and the RDS decoder has a data buffer for up to 22 RDS groups.

The radio includes stereo noise canceling (SNC). The mono-stereo blending is signal dependent and programmable. A Softmute feature, which is FM-signal dependent, reduces the audio level according to a programmable mute function. Volume and balance are controlled digitally.

TEA5990 specifications

Package (size)	WL-CSP / UK (2.56 x 2.56 x 0.6 mm) or HVQFN24 (4.0 x 4.0 x 1.0 mm)
Required number of external components	None (Adding two decoupling capacitors improves sound quality, as does adding components to the FM antenna path.)
Required PCB area	< 15 mm ²
Current consumption (typical)	< 21 mA
Channel separation	55 dB
Ultimate S/N (mono type)	60 dB
FM sensitivity (at 26 dB S/N)	1.4 μV_{EMF} With direct measurement and no matching circuitry
RDS sensitivity (> 95%, 2000 blocks)	14 μV_{EMF} With direct measurement and no matching circuitry
Audio THD (mono)	0.2%
Typical supply voltage	2.7 V
Reference clock frequency	32.768 kHz \pm 1024 Hz
Interface bus	I ² C-bus, SPI

To make design-in more flexible, the TEA5990 supports the I²C-bus and the SPI bus (3- or 4-wire format). A digitally controlled algorithm supports seamless co-existence with GSM, Bluetooth, Wi-Fi, and WiMAX.

To save power, there is a standby mode for fast restart and a power-down mode for low-power operation.

All of NXP's FM radio ICs are built on more than 25 years of experience in silicon radio and more than 80 years in radio-receiver technologies. We have more than 60 patent families, 35 of them US-granted, for FM/AM reception.

We back each product with free, easy-to-use demo kits and offer a dedicated staff of technical-support engineers. We even offer dual-sourcing, for a dependable supply.

TEA5990 block diagram

