

NXP Digital Single-Tuner TEF664x

High-end, DSP-based AM/FM single tuner with support for digital radio

Designed for single-tuner AM/FM & Digital Radio applications, these highly integrated RFCMOS-based solutions combine a low-IF AM/FM tuner and DSP processing on a single chip. The scalable tuner family let designers reduce component count and avoid spending time on complex system integration, without compromising performance.

Key features

- ▶ All-in-one digital receiver with tuner and software-defined radio processing
- ▶ Easy to control with high-level user interface
- ▶ FM receiver: 65 to 108 MHz, covering OIRT, Japan, Europe, and the US
- ▶ AM receiver: LW, MW, and full SW bands
- ▶ Baseband I²S output for support of HD Radio and DRM with external digital radio co-processor supported by TEF6642 and TEF6646
- ▶ Fully integrated tuning system combining low phase noise and fast tuning times
- ▶ FM LNA with AGC
- ▶ FM mixer for frequency conversion to complex, low-IF signal
- ▶ AM front-end LNA and AGC with active and passive antenna applications
- ▶ High dynamic range SDIF ADC
- ▶ Digital IF signal processing with decimation, shift to baseband, AGC control, I/Q correction, PACS, FM multipath suppression, and demodulation

- ▶ Signal quality detection, FM stereo decoding, blanking, and weak signal processing
- ▶ Advanced RDS and RBDS demodulation and decoding with versatile output configuration
- ▶ One synchronous I²S audio input and audio output in master mode supported by TEF6642 & TEF6646
- ▶ Digital audio processing with volume scaling (-12 to +6 dB)
- ▶ HD Radio blending (TEF6642 and TEF6646)
- ▶ One stereo audio DAC
- ▶ Single 3.3 V supply voltage
- ▶ Fast mode I²C-bus (400 kHz)
- ▶ Built-in 1.2 V regulator control circuit
- ▶ Qualified in accordance with AEC-Q100

Applications

- ▶ Single-tuner AM/FM receiver for automotive applications supporting analog AM/FM and HD/DRM reception
- ▶ High-end consumer audio systems



The NXP TEF6640, TEF6642, TEF6644, and TEF6646 are single-chip radio ICs containing an AM/FM radio tuner and software-defined radio signal processing.

Like NXP's other RFCMOS-based solutions, they create a fully scalable family that supports standard and advanced radio features, and can be used in combination with co-processors to support digital radio.

The TEF6644 and TEF6646 are premium versions equipped with the full feature set. The TEF6640 and TEF6642 include a standard feature set.

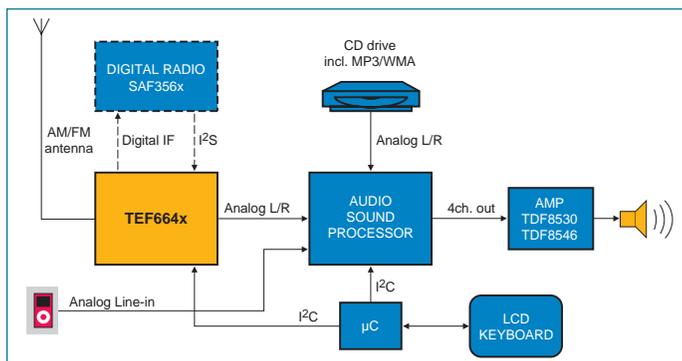
The radio receiver includes the AM/FM front ends, tuning synthesizer, channel filtering, FM multipath improvement, demodulation, FM stereo decoding, weak signal processing, noise blanking, and Radio Data System (RDS) reception.

The ICs take full advantage of CMOS technology to perform a maximum amount of digital signal processing.

The output signals of the radio processing block are provided in digital format on the host I²S output (only TEF6642 and TEF6646) and in analog format on the audio DAC outputs.

When used in combination with an NXP terrestrial digital radio coprocessor, such as the SAF356x, the TEF6642 and the TEF6646 support the digital standards HD Radio and Digital Radio Mondiale (DRM).

Block Diagram on AM/FM Car Radio with optional Digital Radio



Selection guide

| | | TEF6640 Lite | TEF6642 Lite DR | TEF6644 Premium | TEF6646 Premium DR |
|------------------------------|-----------------------------------------|-----------------|--------------------|--------------------|-----------------------|
| System | Supply | 3.3 V | 3.3 V | 3.3 V | 3.3 V |
| | Advanced radio features | - | - | √ | √ |
| | HD / DRM support | - | √ | - | √ |
| R(B)DS | Demodulator / decoder | √ / √ | √ / √ | √ / √ | √ / √ |
| AM - Standard Radio Features | LW / MW / SW | √ | √ | √ | √ |
| | IF & Audio Noise Blanking | √ | √ | √ | √ |
| | Weak signal processing | √ | √ | √ | √ |
| AM - Advanced Radio Features | Adjacent and co-channel detection | - | - | √ | √ |
| | Softmute on modulation | - | - | √ | √ |
| | Low cut control features | - | - | √ | √ |
| FM - Standard Radio Features | Japan / EU / US / OIRT bands | √ | √ | √ | √ |
| | Noise blanker | √ | √ | √ | √ |
| | PACS | √ | √ | √ | √ |
| | Basic weak signal processing | √ | √ | √ | √ |
| FM - Advanced Radio Features | Enhanced multi-path suppression (EMS) | - | - | √ | √ |
| | Click noise suppression (CNS) | - | - | √ | √ |
| | Pause and fast quality change detection | - | - | √ | √ |
| | High blend and low cut control features | - | - | √ | √ |
| Key code features | Channel equalizing (CEQ) | - | - | (√) | (√) |
| | AM PACS | - | - | (√) | (√) |
| General | Package | HTQFP64 | HTQFP64 | HTQFP64 | HTQFP64 |
| | AEC-Q100 | √ | √ | √ | √ |
| | Tamb | -40 to 85 °C | -40 to 85 °C | -40 to 85 °C | -40 to 85 °C |