



## NXP FM stereo ICs with RDS and AM options TEA57xx for portable applications

# Ultra-small, full-featured FM radio ICs

These ultra-small FM radios ICs lead the industry and offer features like RDS and AM reception. Available in both HVQFN and WL-CSP packages, they deliver proven performance in the smallest possible IC size.

### Key features

- ▶ Smallest FM radio ICs
- ▶ Low current consumption
- ▶ Excellent channel separation
- ▶ Best-in-class signal-to-noise ratio (S/N)
- ▶ Low audio THD
- ▶ Simple integration
- ▶ Best-in-class sensitivity performance
- ▶ Dedicated engineering support

With the increasing availability of very small FM radio ICs, traditional and interactive radio functions are finding their way into new areas, bringing a new level of enjoyment to a range of portable applications. Worldwide more than 30% of all mobile phones now integrate FM radio functions, and radio capabilities are gaining ground in MP3 players, PDAs, and portable CD players.

Philips is already the world's number-one supplier of FM radio ICs and has shipped more than 350 million units. We offer the world's smallest FM stereo radio, best-in-class sensitivity

performance, were first to introduce RDS features for portable applications, and have options for AM radio functions.

### The current family includes the following ICs:

- ▶ TEA5767 – the world's most popular FM radio solution (hundreds of millions pieces shipped)
- ▶ TEA5761 – the world's smallest FM stereo radio IC (only 3.5 x 3.5 mm)
- ▶ TEA5764 – the world's first FM radio IC to integrate popular RDS features
- ▶ TEA5777 – the world's first and only FM/AM radio IC for portable applications with high integration and no need for DC/DC converter.

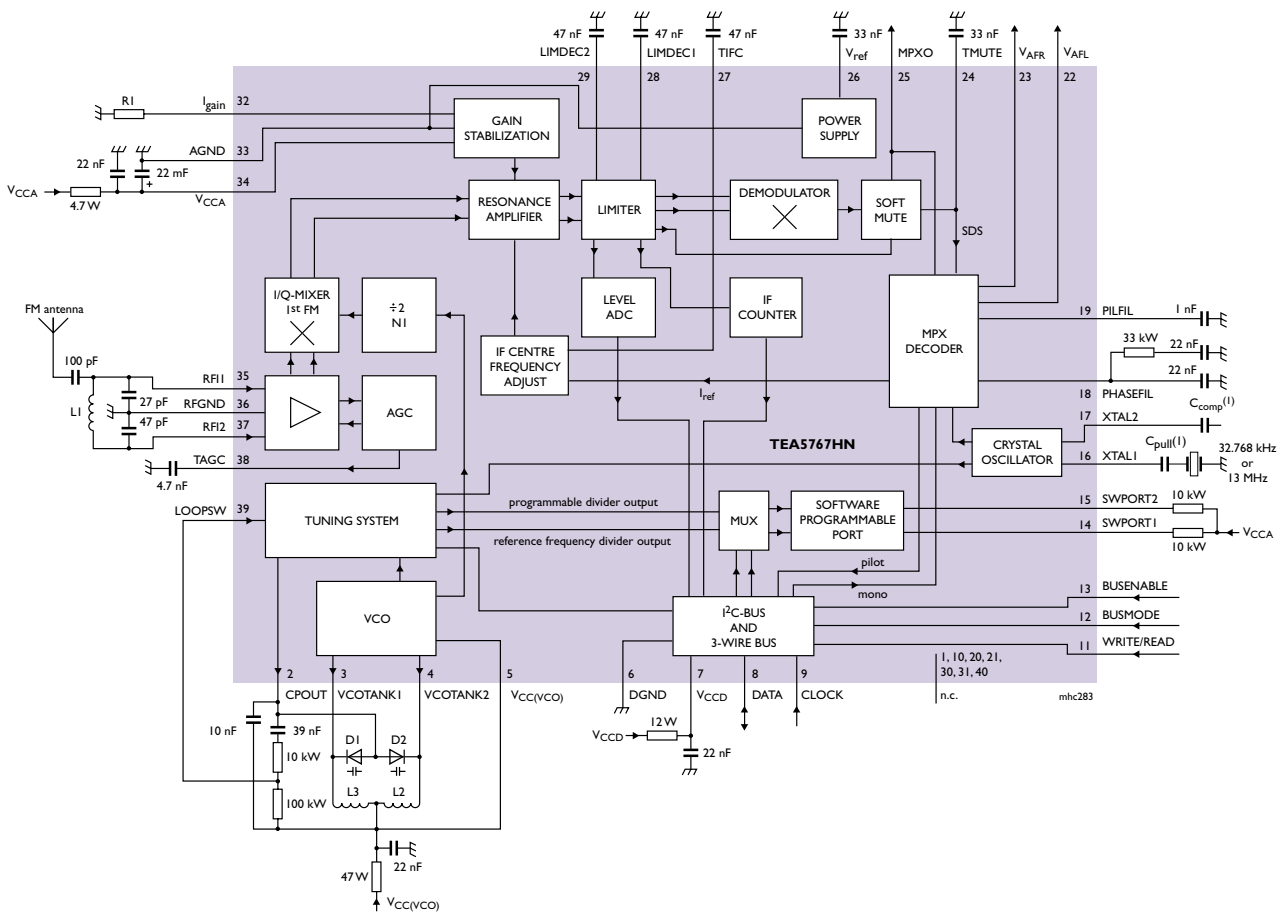
In 2006, new generation devices that offer even higher performance in an even smaller format will join the portfolio:

- ▶ TEA5760 – follow-on to the TEA5761 (3.0 x 2.8 mm)
- ▶ TEA5766 – follow-on to the TEA5764 (3.3 x 3.3 mm)

All our FM radio ICs build on more than 25 years in silicon radio and more than 80 years in radio-receiver technologies. Also, we have more than 60 patent families (35 US-granted) for FM/AM reception. We back each product with free, easy-to-use demo kits and a dedicated staff of technical-support engineers, and even offer high-volume production with internal dual-sourcing.

### Wafer Level – Chip Scale Packaging (WL-CSP)

By applying meticulous design principles and circuit layout know-how, Philips offers FM radio ICs in Wafer Level – Chip Scale Packaging (WL-CSP). The technique uses a naked die with solder-bumped contact pads, allowing the die to be soldered directly onto a PCB without under-fill material. The IC is suitable for four-layer PCBs with a 0.5-mm pitch and has an ultra-thin total height of only 600 µm after soldering.

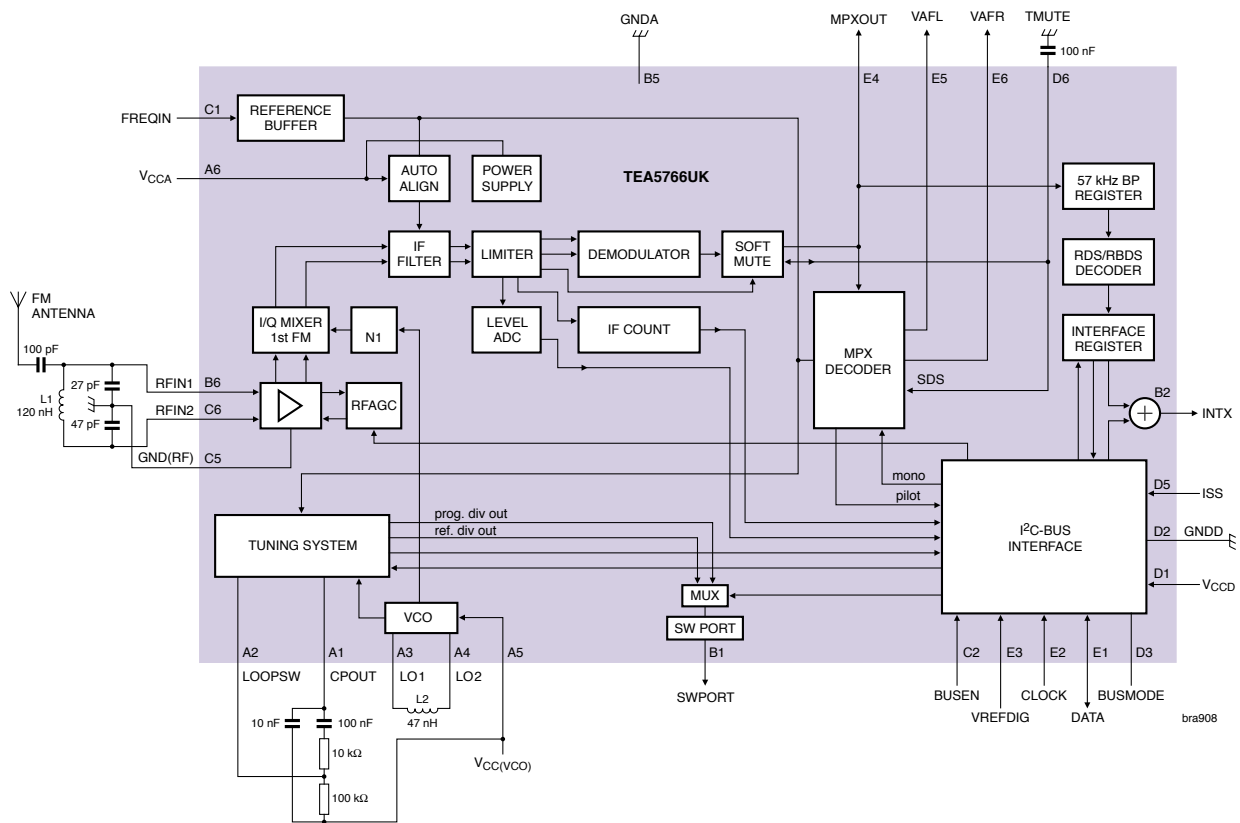


TEA5767 block diagram

### FM stereo radio IC TEA5767

The world's most popular FM radio solution (hundreds of millions pieces shipped)

The TEA5767 covers all stereo FM bands worldwide (76-108 MHz) with a single layout, and best-in-class power consumption. It requires only 25 external components and only 150 mm<sup>2</sup> of PCB space. It uses the phone's own clock crystal and needs no alignment during manufacturing. This IC was the first to make radio a popular feature in portable applications.



TEA5766 block diagram

### FM/RDS stereo radio IC TEA5764

The world's first to integrate popular RDS features

The TEA5764 is the world's first FM stereo radio IC for portable applications to integrate the Radio Data System (RDS), a well-known feature from car radios. RDS lets users immediately recognize and tune stations without complex presetting or searching. It also enables automatic switching to the best reception frequency for a given station while traveling.

Depending on the local radio broadcaster's support, the phone display can automatically show the name of the station, the artist, and the song title, and can even display news flashes and traffic information.

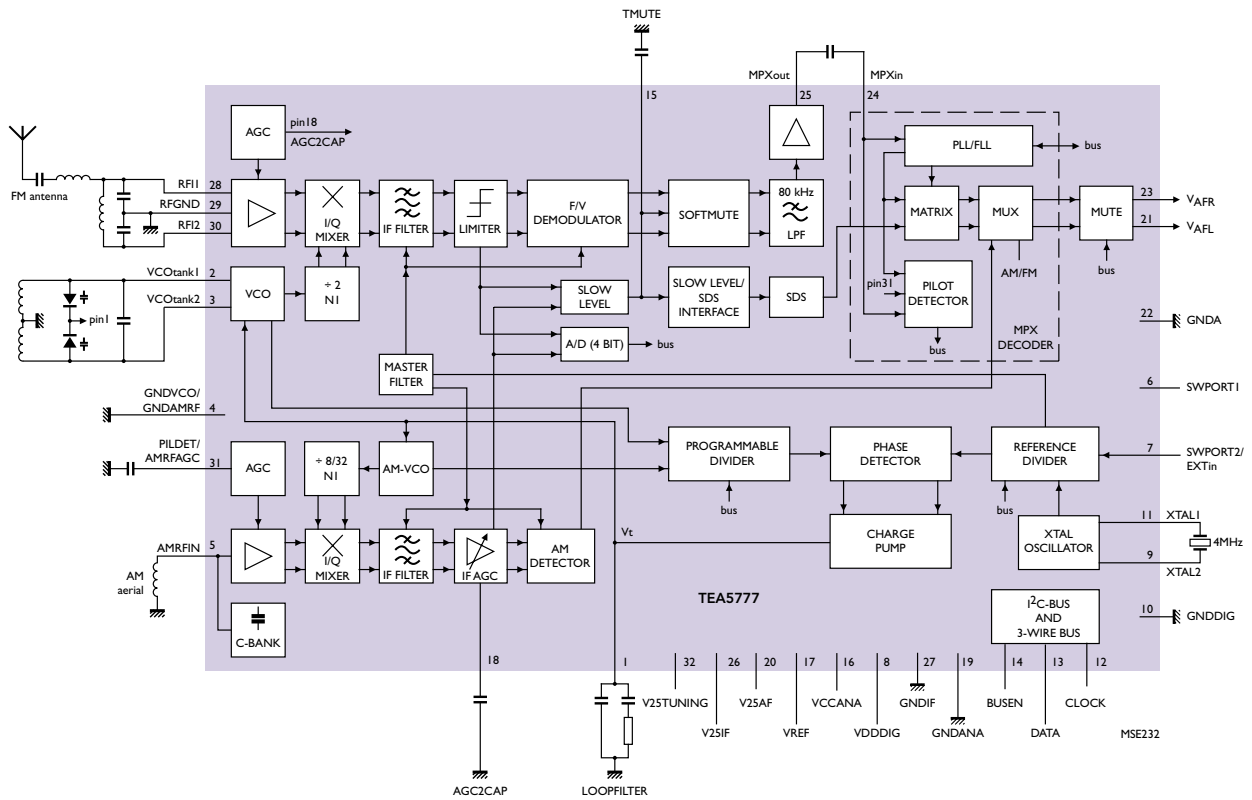
RDS also enables new, interactive service models, where radio listeners can participate in games, contents, and opinion polls or order a ringtone or an MP3 download of the song being broadcast.

The TEA5764 combines high-quality stereo FM radio with the full RDS demodulation and decoding function, requires only 22 external components for operation, and uses only 70 mm<sup>2</sup> of PCB space. The WL-CSP version of the IC, which measures only 4.0 x 4.0 mm, is fully pin-compatible with the TEA5761, for easy upgrades. Also available in HVQFN package.

### FM/RDS stereo radio IC TEA5766

New generation technology for an even smaller footprint (3.3 x 3.3mm)

The TEA5766 is the follow-on to the TEA5764. It offers higher integration, fewer external components, improved performance and industry's best sensitivity and S/N performance at a lower overall cost. TEA5766 will be pin-to-pin compatible with TEA5760.



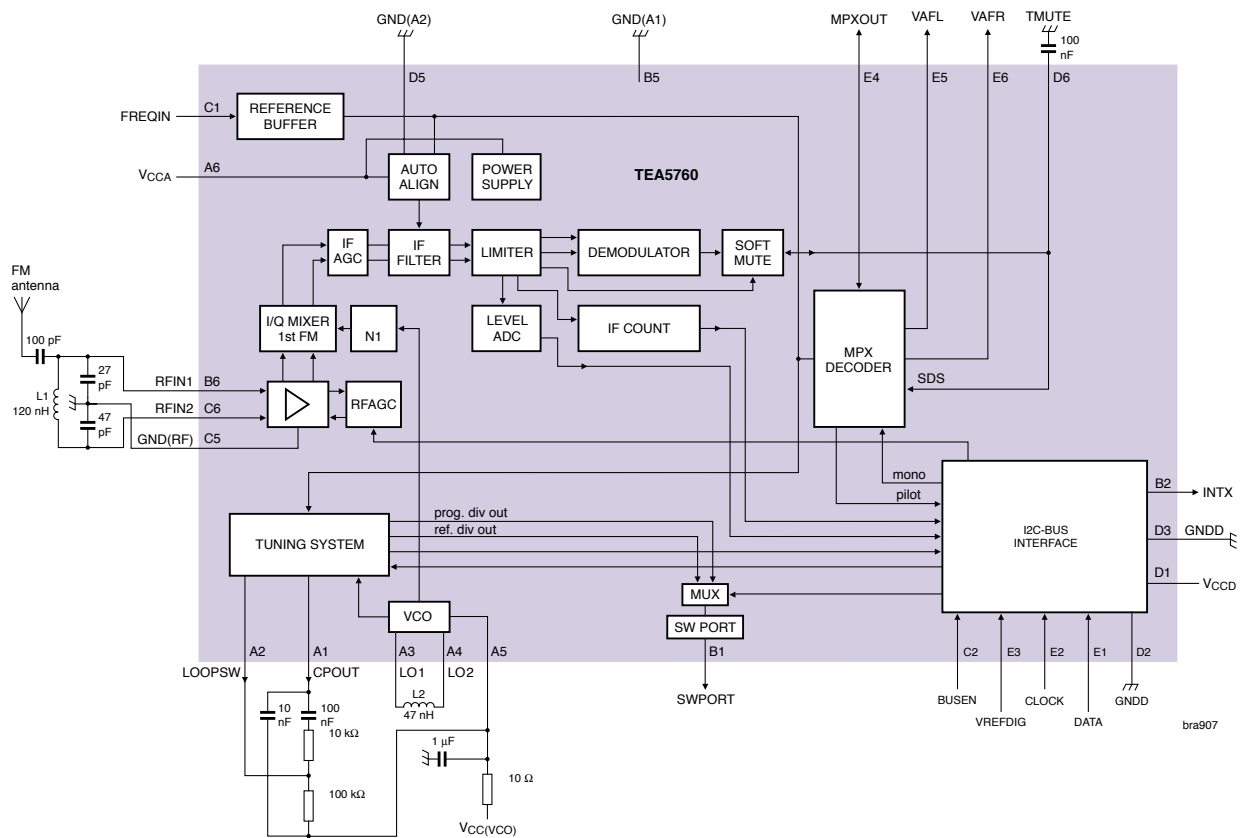
TEA5777 block diagram

### FM/AM stereo radio IC TEA5777

The world's first and only FM/AM radio IC for portable applications

AM radio is remarkably popular throughout the world – it's used extensively for sports and talk radio in the US, for wide-area coverage in vast countries like India, and for specific user groups in places like Japan. The TEA5777, the first FM stereo radio IC to also offer AM reception, effectively doubles the amount of content available to consumers.

The AM receiver functions have been carefully added to minimize overhead and reduce footprint. For example, the IC runs at a very low voltage (2.7 V), thus eliminating the need for large and expensive DC/DC converters. The final implementation requires a PCB footprint of only 200 mm<sup>2</sup>.



TEA5760 block diagram

### FM stereo radio IC TEA5761

The world's smallest FM stereo radio IC

With a package size of only 3.5 x 3.5 mm and a PCB footprint of only 50 mm<sup>2</sup>, the TEA5761 is the world's smallest FM stereo radio IC. It integrates the Voltage Controlled Oscillator (VCO) and requires only 14 external components for operation. TEA5761 is pin-to-pin compatible with TEA5764.

### FM stereo radio IC TEA5760

New generation technology for an even smaller footprint (3.0 x 2.8 mm)

The TEA5760 is the follow-on to the TEA5761. It uses new generation technology to increase integration and shrink the footprint even more. Available in a WL-CSP package that measures only 3.0 x 2.8 mm, it requires only 11 external components and uses only 35 mm<sup>2</sup> of PCB space. It also delivers improved performance at a lower overall cost and industry's best sensitivity and S/N performance. TEA5760 will be pin-to-pin compatible with TEA5766.

## Product selection table

Parameter	TEA5767 FM stereo	TEA5761 FM stereo	TEA5760 FM stereo	TEA5764 FM stereo + RDS	TEA5766 FM stereo + RDS	TEA5777 FM stereo + AM
Package (size)	HVQFN40 (6.0 × 6.0 mm)	WL-CSP / UK (3.5 × 3.5 mm)	WL-CSP / UK (3.0 × 2.8 mm)	HVQFN40 (6.0 × 6.0 mm) or WL-CSP / UK (4.0 × 4.0 mm)	WL-CSP / UK (3.3 × 3.3 mm)	HVQFN48 (7.0 × 7.0 mm)
Required no. of external components	25	14	11	20	11	25
Required PCB area	140 mm <sup>2</sup>	45 mm <sup>2</sup>	35 mm <sup>2</sup>	70 mm <sup>2</sup>	36 mm <sup>2</sup>	200 mm <sup>2</sup>
Power Consumption	36 mW	37.8 mW	37.8 mW	37.8 mW	40.5 mW	43.5 mW FM 31.5 mW AM
Current consumption	12 mA	14 mA	14 mA	14 mA	15 mA	14.5 mA FM 10.5 mA AM
Channel Separation	30	32	40	33	40	40
Ultimate S/N (mono, typ)	60 dB	57 dB	57 dB	57 dB	57 dB	60 dB (FM)
FM sensitivity (at 26 dB S/N)	2.0 µV, EMF	2.0 µV, EMF	1.7 µV, EMF	2.0 µV, EMF	1.8 µV, EMF	2.7 µV, EMF
Audio THD (mono, max)	1%	1%	1%	0.9%	0.5%	1.5% (FM) 1% (AM)
Typical supply voltage	3.0 V	2.7 V	2.7 V	2.7 V	2.7 V	3.0 V
Clock frequency	32.768 kHz or 13 MHz	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	4 MHz or 13 MHz
Interface bus	I <sup>2</sup> C or 3 wire	I <sup>2</sup> C	I <sup>2</sup> C	I <sup>2</sup> C	I <sup>2</sup> C	I <sup>2</sup> C or 3 wire
Source code	No	Yes	Yes	Yes	Yes	Yes
Availability	Now	Now	Now	Now	Q4/2006	Now

[www.nxp.com](http://www.nxp.com)



NXP Semiconductors is in the process of being established as a separate legal entity in various countries worldwide. This process will be finalized in the course of 2006.

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