AM/FM car radio chipset includes data decoder, DSP, embedded ARM7 core

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Lexington, Mass. and Geneva, Switzerland—Car radios are changing with the times, and IC maker STMicroelectronics (STM) is in step with the worldwide movement. STM is sampling a digital AM/FM radio receiver chipset for automotive applications that’s really quite versatile, and ready for a variety of modulation types.

The system is the first member of a digital tuner family that can cover mid-end to high-end car IF-sampling radio designs. What’s more, DSP (digital signal processing) is implemented in the chipset to enhance reception quality. DSP can be used to reduce interference and multi-path from mountains and buildings.

Jointly developed by STM and Bosch subsidiary Blaupunkt, the digital receiver also integrates audio signal processing and so-called RDS (radio data system) decoding.

Partitioned Silicon

The chipset includes two TDA7528 RF front-end ICs and one STA3005 DSP as a back-end IC. The combo tunes all current analog radio services worldwide (AM, FM, and the US weather band), as well as recently introduced worldwide digital broadcast techniques such as Digital Audio Broadcasting, Digital Radio Mondiale and HD radio). For these systems, STM’s chipset provides interfaces to external decoders.

Significantly, the TDA7528 silicon includes a dual-input front-end. The combination of two independently-operating front-ends (with the STA3005 at the back-end) makes DDA (Digital Directional Antenna) operation possible. DDA lets a radio simultaneously receive two freely-selectable frequencies, along with any combination of demodulation types.

Diversity Reception

The TDA7528 silicon also includes an integrated fractional tuning PLL (phase-locked loop) with two VCOs (voltage-controlled oscillators), supporting diversity reception.

The chip also integrates an IF tank, and the IF amplifier includes AGC (automatic gain control). Four inputs support connection of up to four ceramic IF filters. The IC is also electronically adjustable, and communicates across an I2C/SPI controlled link. This supports calibration during production, too.

The TDA7528’s mixer also has separate input and output stages for AM bands up to 30-MHz (narrowband services), as well as FM bands above 30-MHz (for broadband signals). As an option, the AM path can be operated with an on-chip pre-amplifier and lowpass filter to reduce interfering
signals on IF and image frequencies.

**Two Inputs**

The chip's FM mixer has two inputs. The more sensitive lower-noise input is intended for use with a low-gain, passive pre-selector. The second input is intended for use with an active preamp.

Next up is the system's STA3005 digital audio processor. It's powered by STM's proprietary DSP core, which is just what's needed for in-vehicle sound processing and equalization. Additionally, an embedded 32-bit **Advanced RISC Machines ARM7 TDMI** microcontroller supervises all internal peripherals, reducing the workload and software complexity of the associated car radio's main microprocessor. The ARM7 also supports RDS management.

**Fixed-Point DSP**

The ARM sub-system runs a fixed-point core, supported by 14-kbytes of data **RAM**, 38-kbytes of program **RAM**, and 26-kbytes of **ROM**. The ARM is also supported with **JTAG/ETM7** hooks for realtime debug.

Also supporting digital diversity and DDA antennas, the STA3005 packs two 5-bit IF **A/D** (analog-to-digital) converters, as well as an IF processor. You also get an audio filter processor. For stereo, the chip packs two 16-bit **A/Ds** with an input multiplexer. The IC also includes two 24-bit **DACs** (digital-to-analog) converters, implementing 5-bit volume control.

The STA3005s peripherals include a **DMA** (direct memory access) controller, a **UART**, and 32 bidirectional general purpose I/O lines.

**Flat-Pack packaging**

The TDA7528 and STA3005 come in **LQFP64** (10 x 10) and **TQFP144** (20 x 20) **ECOPACK** packages, respectively. Samples of the chipset are available now. Volume production is scheduled for the second quarter of next year.

Click [here](#) for a TDA7528 datasheet (in Adobe Acrobat .PDF format).

Click [here](#) for an STA3005 datasheet.


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