The R&S®SCx8000 family of UHF transmitters for TV: a new dimension in compactness

The R&S®SCx8000 is the most compact and efficient low- to medium-power TV transmitter on the market. It was developed specifically with an eye toward digital TV standards like ATSC, ATSC Mobile DTV, DVB-T, DVB-H, and MediaFLO™, but is also well suited for analog TV. In addition to offering innovative redundancy concepts, its large-scale integration design reduces infrastructure, leasing, and installation costs, and its high efficiency saves energy. All this makes it the ideal transmitter for broadcasting and mobile radio network operators who want to build or expand networks cost-effectively.

Most compact transmitter in its power class

The R&S®SCx8000 TV transmitter (FIG 1) achieves its compact design by integrating components that have so far been required as external devices. The new R&S®SX801 exciter, for example, allows the transmitter to be controlled and monitored directly from the instrument display without any additional components (see also page 58 of this issue). The base amplifier also includes an exciter switch and a signal splitter. In systems with two amplifiers, an expansion amplifier with an internal power combiner is added. Both the base and the expansion amplifier come with an integrated standalone cooling system, each featuring two fans mounted on the rear of the amplifier (FIG 2). The ultracompact system with one amplifier requires only four 19" height units. This makes it possible to install multiple transmitters in a single rack, or even into unused space in existing racks. Due to its compact design, the transmitter can also be installed in outdoor racks that are available from Rohde&Schwarz (see cover page).

FIG 1 The R&S®SCx8000 TV transmitter configured as R&S®SCV8301EA with the R&S®SX801 exciter and the R&S®VH8301C1 base amplifier.

FIG 2 The integrated cooling system features two fans (the R&S®SCx8000 transmitter configured as R&S®SCV8302EA with the R&S®SX801 exciter, the R&S®VH8301C1 base amplifier, and the R&S®VH8301C2 expansion amplifier).

New redundancy concepts increase availability and save space

The new backup exciter system design allows complete RF redundancy of the exciters in minimal space. The master exciter serves as the signal source and the backup exciter as the transmitter control unit. If the master exciter fails, the backup exciter automatically takes over signal transmission. This design not only opens up more space, but because of the reduced number of components, it also increases system availability and reduces the number of spare parts.

An intelligent power supply concept ensures reliable power supply for the amplifiers. Each amplifier contains two power supplies as standard, each supplying one half of the transistors in the amplifier output stage. The power for the remaining amplifier components is provided by both power supplies redundantly, helping to reduce the risk of interruptions during transmission. An optional third power supply can be integrated for a full 2+1 power supply redundancy, ensuring uninterrupted transmission without power loss even if one of the two power supplies fails.

Efficiency in power and operation

With an efficiency of up to 22 %, the new family of transmitters significantly decreases energy costs over the lifetime of the system and is therefore considered the benchmark in its power class. The power output stage of the R&S®SCx8000 comes equipped with the set & go feature, a broadband precorrection for the customer´s preferred digital standard. This eliminates the need for manual precorrection on-site and allows the transmitter to be put into operation faster. If the output power is reduced at a later time (up to 6 dB) or the frequency changed, the system automatically loads the appropriate precorrection curves, thus ensuring an MER of at least 33 dB.

The R&S®SCx8000 base amplifier provides output power levels of up to 300 W for DVB-T, DVB-H, and MediaFLO™, up to 450 W for ATSC and ATSC Mobile DTV, and up to 700 W for ATV. Adding the expansion amplifier and its integrated combiner provides up to 600 W for DVB-T, DVB-H, and MediaFLO™, up to 900 W for ATSC and ATSC Mobile DTV, and up to 1400 W for ATV.

Analog to digital in no time

The transmitters offer intelligent concepts for network operators planning the transition from analog to digital transmission. A combined ATV/DTV coder board in the R&S®SX801 with the respective physical interfaces allows both analog and digital input signals to be delivered. The desired input signal and the corresponding analog or digital modulation standard can be selected at any time, either locally or remotely.

The MPEG decoder option allows digital input signals to be fed as transport streams. These streams are converted into analog signals by the FPGA in the exciter, and then modulated and transmitted as analog signals. If digital transmission is desired at a later date, switchover from analog to digital transmission can be made easily and without any hardware modifications, even remotely. This is a definite advantage during the transition phase to digital.

In spite of its compact design, the exciter can be expanded to include various options, including a GPS receiver for synchronization in single-frequency networks or a DVB-T/DVB-H receiver for monitoring or retransmitter purposes.

The transmitter is described in detail on the Rohde&Schwarz website.

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