

Applications & Cases

Front-end modules

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At home in all networks



BENEFITS	FRONT-END MODULES
<ul style="list-style-type: none">• Shorter design times• Fewer components• Space requirement reduced by up to 95%• Lower power dissipation• Higher reliability than discrete solutions• Cost reduction at equipment level	
	

EPCOS offers innovative filters for mobile phone systems of all generations and all mobile radio standards. "We are the only manufacturer of SAW components worldwide to offer filters for all frequency ranges of the new UMTS system - from base stations to handsets", says Joachim Niestroj, Executive Vice President of the Mobile Communications Business Unit. IF filters from EPCOS manufactured in highly reliable ceramic packages are thus found in the UMTS base stations of almost all leading manufacturers. "The transceiver units of the UMTS base stations must separate channels precisely to permit high user densities and high data rates at the same time. And that is just what the first-class RF characteristics of our filters ensure", explains Niestroj. SAW filters for 2 GHz that measure only $2 \times 1.4 \times 0.74$ mm are currently being designed into UMTS handsets. The tiny footprints of these SAW filters are a key selling point because minimum volume is essential if manufacturers are to make multimode UMTS/GSM handsets no larger than second-generation mobile phones.

For CDMA phones too, EPCOS offers several winning products. Housed in an extremely miniaturized package with a footprint of only 3.8×3.8 mm, the world's smallest SAW duplexers have gone into volume production at EPCOS:

- Type B7630 is designed for the AMPS frequency band
- Type B7631 for the K-PCS frequency band
- With type B7634, EPCOS additionally offers a highly miniaturized duplexer in integrated FBAR technology for the PCS frequency band

"The B7634 has a footprint of only 5×5 mm", adds Niestroj. These duplexers permit a larger scale of integration in mobiles with improved performance at the same time.

EPCOS is the first manufacturer to offer a 2 GHz SAW filter measuring only $2 \times 1.6 \times 0.74$ mm for the transmit path of CDMA phones. As well as being 40% smaller than earlier solutions, it dispenses with two control switches, making its circuit design simpler than that of the long-used split-band concept. This filter could not have been implemented without

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a new, patented design method and substantially more precise photolithography, because its electrical properties largely depend on the accuracy of design and production.

Integration of the front end based on low-temperature co-fired ceramic (LTCC) technology is essential to further miniaturization. All passive components plus several semiconductors can thus be combined in a single component. Depending on model, the front-end module (FEM) saves up to 95% of the space required by a discrete solution. The new WLAN FEM R012 for applications to IEEE 802.11 b/g in the 2.4 to 2.5 GHz range is a typical representative of this passive integration. All transmit and receive filters, switches, the power amplifier and the power monitoring unit are integrated in a module measuring only $5.4 \times 4 \times 1.4$ mm. The new quad-band FEM D1016 for GSM systems also stands out with its compact dimensions. Despite integration of four SAW filters, it takes up only $8.2 \times 5.5 \times 1.8$ mm.



"We are the only manufacturer of SAW components worldwide to offer filters for all UMTS applications"

JOACHIM NIESTROJ

Executive Vice President,
Mobile Communications
Business Unit

Joachim Niestroj sums up the benefits of the LTCC FEMs for mobile phone systems: "We take considerable pressure off customers. As well as saving board space, these modules have a much shorter parts list with all the benefits - reduced logistics expense and lower handling, placement and test costs. What's more, fail-safe reliability of these modules is increased, because they act like a single component. Substantially lower development costs also reduce time to market for our customers' new products."