

High-Performance GaAs MMIC Devices with Integrated Logic
for PDC Full Packet Cellular Phones

CXG1134EN, CXG1125ER CXG1135ER, CXG1140ER

The second generation PDC cellular phone systems downloads image data and internet applications three times faster than conventional cellular phones, and its simultaneous transmission/reception technology, which allows it to transmit while receiving, is attracting wide spread attention.

To respond to a wide range of user needs, Sony has now developed the CXG1134EN, CXG1125ER, CXG1135ER, and CXG1140ER MMICs that are optimal for full-packet communication, support dual-band (800 MHz/1.5 GHz) operation, and also add duplex mode functionality.

These devices will prove useful in the evolution of the portable communication terminal.

- Wide band, low insertion loss, low distortion (CXG1134EN, CXG1125ER, and CXG1135ER)
- High gain, low noise figure (CXG1140ER)
- Low LO input power operation (CXG1140ER)
- 1 CMOS level control input (CXG1134EN)
- 6 CMOS level control inputs (CXG1125ER and CXG1135ER)
- 2 CMOS level control inputs (CXG1140ER)
- Miniature package (CXG1134EN, CXG1125ER, CXG1135ER, and CXG1140ER)

■ SPDT Switch (CXG1134EN)

The CXG1134EN is an SPDT*¹ antenna switch MMIC for wireless communication systems. It is optimal for switching between full packet mode and TDMA mode. This device uses Sony's unique JFET structure to achieve low insertion loss and low distortion. In addition to use in PDC products, it is also optimal as a general-purpose RF switch for CDMA, W-CDMA, and similar systems.

■ 6×4 Antenna Switch (CXG1125ER and CXG1135ER)

The CXG1125ER and CXG1135ER are dual band high power antenna switch MMICs for use in 800 MHz/1.5 GHz PDC phones. These products add support for duplex mode, which is not supported by conventional antenna switches, and can implement simultaneous transmission and reception in full packet mode. These ICs are appropriate for connecting the two transmitters and three receivers to the four antennas provided in a full packet mode cellular phone. In particular, the CXG1125ER is optimal in a 2 in/2 out duplexer (800 MHz CD band) structure, and the CXG1135ER is optimal in a 1 in/2 out duplexer (800 MHz D band) structure. These devices use Sony's unique JFET structure to achieve low insertion loss and low voltage operation.

■ Low-Noise Amplifier/Mixer (CXG1140ER)

The CXG1140ER is a reception IC formed from three low-noise amplifiers (800 MHz CD band, 800 MHz A band, and 1.5 GHz band) and two mixers (all 800 MHz bands and the 1.5 GHz band). This IC was developed based on the basic performance of the previously released CXG1130AER,

but with a focus on reducing the mounting area including that required for external components. The number of external components was reduced significantly, and the pin layout was changed to make the use of a 2-in-2 type easy in the inter-stage filter between the low-noise amplifier and the mixer as well. In the future, Sony also plans to develop reception ICs appropriate for 1 in/2 out type inter-stage filters.

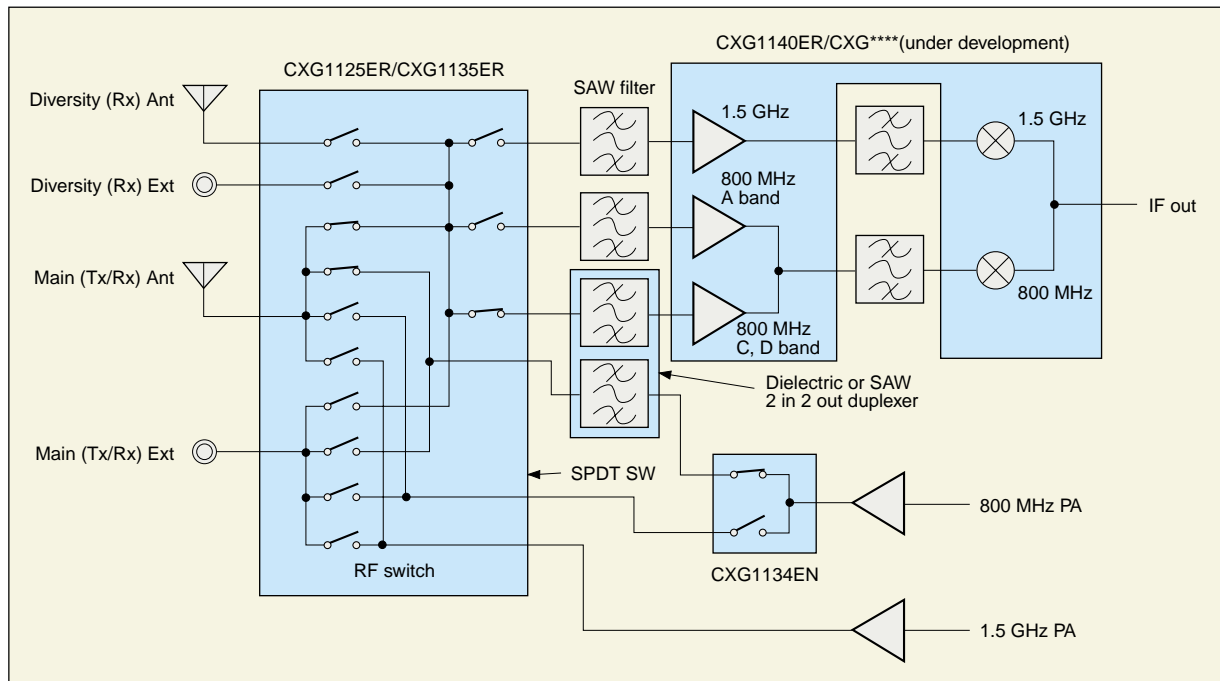
■ Miniature Molded Package

The CXG1134EN is provided in a 10-pin VSON miniature molded package with a size of 2.5 × 2.7 mm. The CXG1125ER, CXG1135ER, and CXG1140ER are provided in a 24-pin VQFN miniature molded package with a size of 4.0 × 4.0 mm. These products can contribute to reduced mounting areas and miniaturization in cellular phones.

*1 SPDT: Single Pole Dual Throw

V O I C E

Developing these products required daily individual efforts to achieve the best possible characteristics in each product. The products introduced here combine a crystallization of Sony's GaAs MMIC technologies, new ideas, and accumulated results of repeated trial and error experimentation to improve their characteristics as much as possible. I am confident that our customers will be fully satisfied with these products. I strongly recommend that you look into this line for your next cellur phone product.



■ Figure 1 CXG1134EN, CXG1125ER, CXG1135ER, and CXG1140ER Application Circuit

■ Table 1 CXG1134EN Representative Electrical Characteristics

	Symbol	CXG1134EN	
		Condition	Typ.
Insertion loss	IL	900 MHz	0.25 dB
Isolation	ISO	900 MHz	32 dB
High frequency	2fo	*1	-75
	3fo	*1	-75

*1: Pin = 30 dBm, 900 MHz, V_{DD} = 3 V, 0/3 V control

■ Table 2 CXG1125ER and CXG1135ER Representative Electrical Characteristics

	Symbol	CXG1125ER		CXG1135ER	
		Condition	Typ.	Condition	Typ.
Insertion loss	IL	*2	0.5 dB	*2	0.5 dB
Isolation	ISO	*2	37 dB	*2	37 dB
High frequency	2fo	*2	-75 dBc	*2	-75 dBc
	3fo	*2	-72 dBc	*2	-70 dBc
ACP	±50 kHz	*2	-67 dBc	*2	-67 dBc
	±100 kHz	*2	-74 dBc	*2	-73 dBc

*2: Pin = 29.5 dBm, 940 MHz to 958 MHz, V_{DD} = 3 V, 0/3 V control

■ Table 3 CXG1140ER Representative Electrical Characteristics

1) 800 MHz and 1.5 GHz Low-Noise Amplifiers

	Symbol	800 MHz		1.5 GHz	
		Condition	Typ.	Condition	Typ.
Power gain	G _p	*3	16.5	*5	16
Noise figure	NF	*3	1.5	*5	1.75
Input IP3	IIP3	*3, *4	-7.5	*4, *5	-5

*3: 810 MHz, V_{DD} = 2.8 V, 0/2.8 V control

*4: P_{RF} = -30 dBm

*5: 1490 MHz, V_{DD} = 2.8 V, 0/2.8 V control

2) 800 MHz and 1.5 GHz Band Mixers

	Symbol	810 MHz		1490 MHz	
		Condition	Typ.	Condition	Typ.
Conversion gain	G _c	*6	10	*8	10.5
Noise figure	NF	*6	4	*8	4.5
Input IP3	IIP3	*6, *7	2.5	*7, *8	1.5

*6: 810 MHz, V_{DD} = 2.8 V, 0/2.8 V control, P_{LO} = -15 dBm

*7: f_{RF}OFFSET = 100 kHz, P_{RF} = -25 dBm

*8: 1490 MHz, V_{DD} = 2.8 V, 0/2.8 V control, P_{LO} = -15 dBm