

Ultra-linear Mixer with Integrated IF Amp and LO Buffer

Description

CMY212 is a general purpose down-converter device designed for multiple applications such as cellular and PCS mobile phones, ISM bands, GPS receivers, L-band satellite terminals, WLAN and pagers. Due to its excellent intermodulation characteristics and its high conversion gain, CMY212 is particularly suited for CDMA receiver applications.

The device combines an ultra-linear mixer with LO - driver and a single stage IF-amplifier in a very small SCT598 package. The mixer section of CMY212 combines low conversion losses and excellent intermodulation characteristics with low requirements of LO - and DC-power. The internal level controlled LO-Buffer enables a good performance over a wide LO level range. The input and output matching of the IF amplifier can be adapted externally within a frequency range from 45 to 250 MHz.

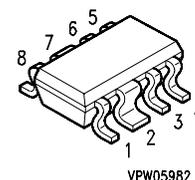
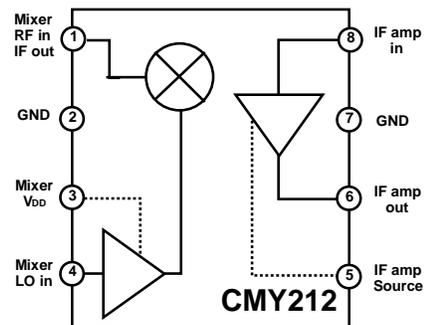
Features

- Typical overall performance at cellular frequencies (for $P_{LO} = -4\text{dBm}$ operation conditions: 3V, 11 mA; $f_{RF} = 881\text{ MHz}$; $f_{LO} = 966\text{ MHz}$):
 - Gain 10 dB
 - Input IP3 9 dBm
 - Noise figure 8 dB
- RF-frequency range 0.5 - 2.5 GHz
- Operating voltage range: 2.6 to 5V
- Small SCT598 plastic package

Applications

- Down Converter for Multiple Wireless Applications
- Cellular and PCS Mobile Phones
- Particularly Suited for CDMA Receivers
- ISM and WLAN Receivers
- GPS Receivers

Package Outline and Pin Configuration, SCT598



CMY212 Datasheet

Maximum Ratings

| Parameter | Port | Symbol | Value | | Unit |
|----------------------------------|------|-------------|-------|-------|------|
| | | | min | max | |
| Supply Voltage | 3,6 | V_{DD} | 0 | 5 | V |
| DC-Voltage at LO Input | 4 | V_6 | -3 | 0,5 | V |
| DC-Voltage at Mixer RF-IF Port | 1 | V_8 | - 0,5 | + 0,5 | V |
| Power into Mixer RF Port | 1 | P_{RF} | | 10 | dBm |
| Power into LO Input | 4 | $P_{in,LO}$ | -10 | 10 | dBm |
| Channel Temperature | | T_{Ch} | | 150 | °C |
| Operating Temperature | | T_{op} | -30 | 85 | °C |
| Storage Temperature | | T_{stg} | -55 | 150 | °C |
| Thermal Resistance* | | | | | |
| Channel to Soldering Point (GND) | | R_{thChS} | | 260 | K/W |

CMY212 Datasheet

Electrical Characteristics

| Parameter, | Comment | min | typ | max | Unit |
|----------------------|----------------|-----|-----|-----|------|
| RF - frequency range | external match | 0.5 | - | 2.5 | GHz |
| LO - Frequency range | external match | 0.5 | - | 2.5 | GHz |
| IF Frequency range | external match | 45 | | 250 | MHz |

Typical performance at cellular frequencies*:

$T_a = 25^\circ\text{C}$; $V_{DD} = 3\text{V}$; $f_{RF} = 881\text{MHz}$; $f_{LO} = 966\text{MHz}$; $P_{LO} = -4\text{dBm}$; $f_{IF} = 85\text{MHz}$,
 $Z_S = Z_L = 50\ \Omega$; unless otherwise specified

| Parameter, Test Conditions | Symbol | Min | typ | max | Unit |
|--|---------------|-----|-----|-----|------|
| Total operating Current (Mixer + IF amplifier) | I_{op} | - | 11 | - | mA |
| Conversion Gain | G_c | - | 10 | - | dB |
| SSB Noise Figure | F_{ssb} | - | 8 | - | dB |
| RF Input -/ IF Output return loss (external matching required) | RFIrl / IFOrl | - | 10 | - | dB |
| 3rd Order Input Intercept Point | IIP3 | - | 10 | - | dBm |

Test conditions at PCS frequencies:

$T_a = 25^\circ\text{C}$; $V_{DD} = 3\text{V}$; $f_{RF} = 1960\text{MHz}$; $f_{LO} = 1750\text{MHz}$; $P_{LO} = -4\text{dBm}$; $f_{IF} = 210\text{MHz}$,
 $Z_S = Z_L = 50\ \Omega$; unless otherwise specified

| Parameter, Test Conditions | Symbol | Min | Typ | max | Unit |
|--|---------------|-----|------|-----|------|
| Total operating Current (Mixer + IF amplifier) | I_{op} | - | 12 | 14 | mA |
| Conversion Gain | G_c | 8.5 | 9.5 | - | dB |
| SSB Noise Figure | F_{ssb} | - | 8.5 | - | dB |
| RF Input -/ IF output return loss (external matching required) | RFIrl / IFOrl | - | 10 | - | dB |
| 3rd Order Input Intercept Point | IIP3 | 10 | 11.5 | - | dBm |

* IMPORTANT NOTE:

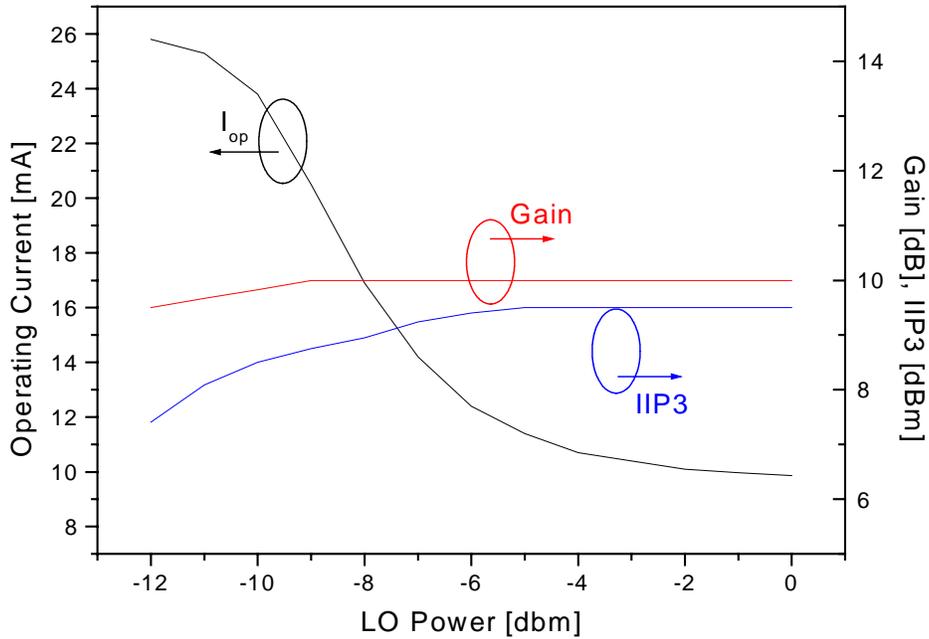
During production, the RF performance at PCS frequencies is screened. The passed devices also achieve the specified RF performance at cellular frequencies.

CMY212 Datasheet

Electrical Characteristics (cont)

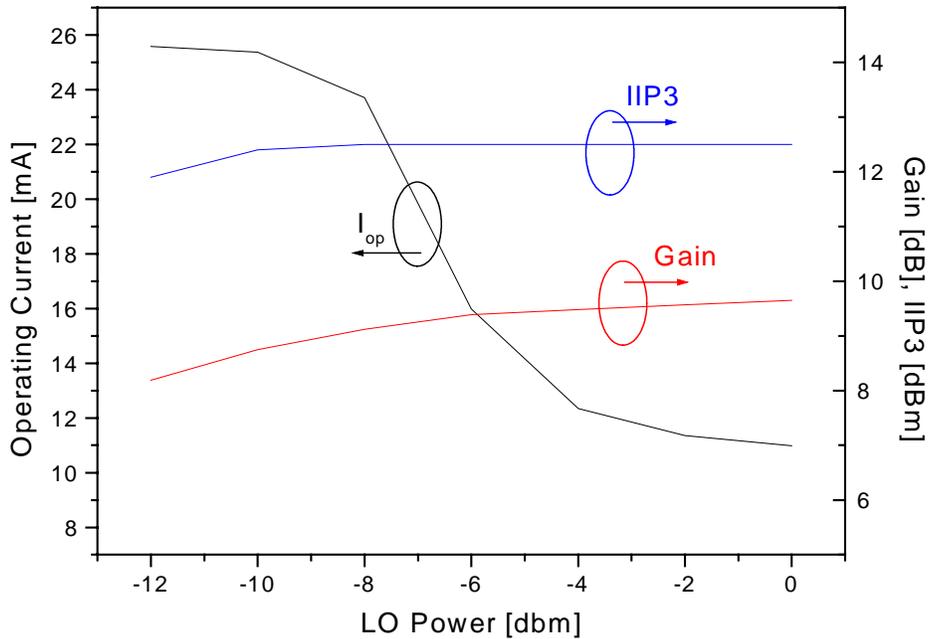
Typical device behavior at cellular frequencies:

$T_a = 25^\circ\text{C}$; $V_{DD} = 3\text{V}$; $f_{RF} = 881\text{MHz}$; $f_{LO} = 966\text{MHz}$; $f_{IF} = 85\text{MHz}$;
 $Z_S = Z_L = 50\ \Omega$; unless otherwise specified



Typical device behavior at PCS frequencies:

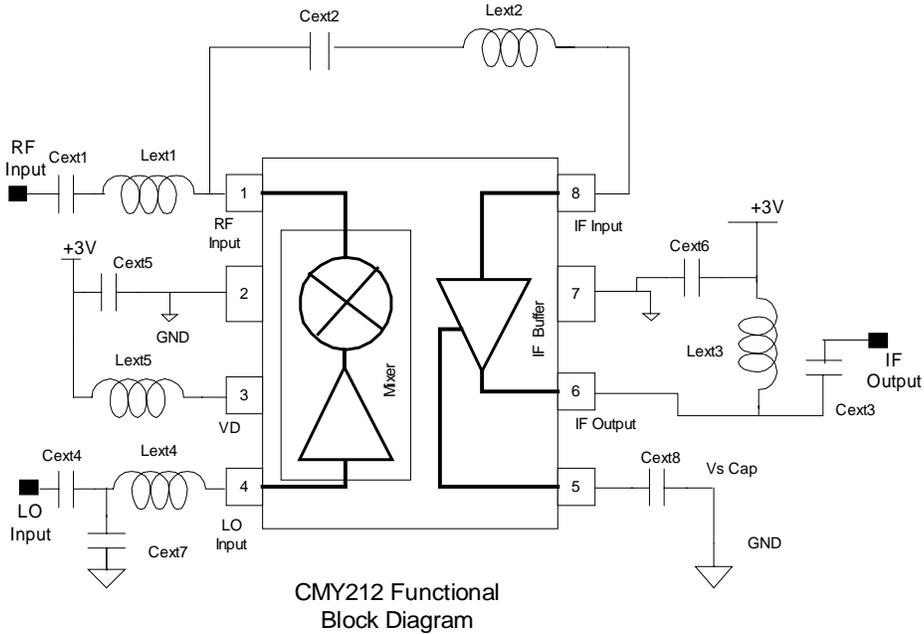
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CMY212 Datasheet

Applications Information

Test Circuit:



External components for cellular frequencies

$$f_{RF} = 875\text{MHz}; f_{LO} = 960\text{MHz}; f_{IF} = 85\text{MHz}$$

| Capacitors | (Murata 0402) | Inductors | (Toko) |
|------------|---------------|-----------|---------------|
| Cext1 | 2 pF | Lext1 | 18 nH LL1005 |
| Cext2 | 1 nF | Lext2 | 270 nH LL1608 |
| Cext3 | 20 pF | Lext3 | 220 nH LL1608 |
| Cext4 | 100 pF | Lext4 | 12 nH LL1005 |
| Cext5 | 1 nF | Lext5 | 15 nH LL1005 |
| Cext6 | 1 nF | | |
| Cext7 | 3.3 pF | | |
| Cext8 | 100 nF | Lext8 | 22 nH LL1005 |

External components for PCS frequencies

$$f_{RF} = 1960\text{MHz}; f_{LO} = 1750\text{MHz}; f_{IF} = 210\text{MHz}$$

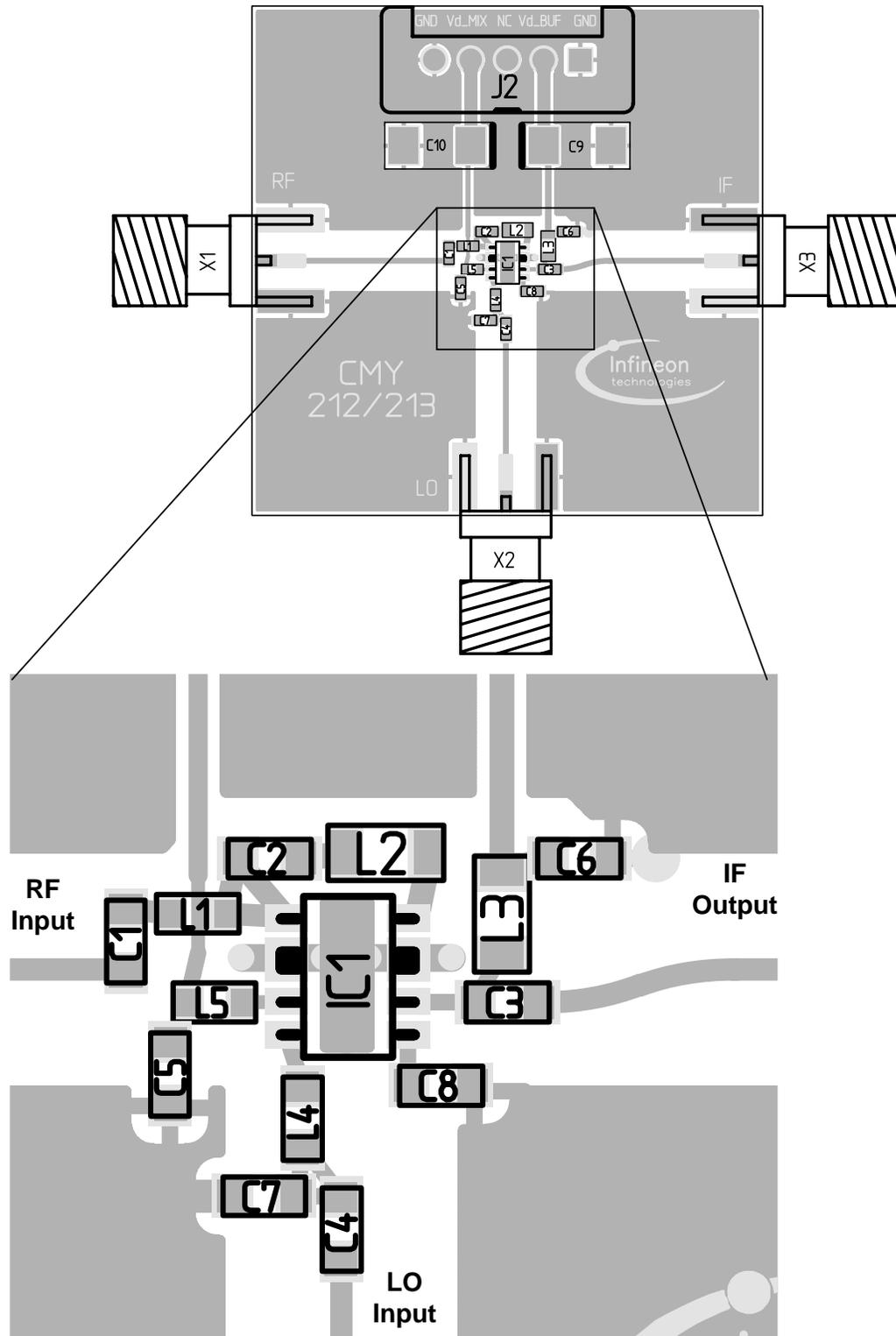
| Capacitors | (Murata 0402) | Inductors | (Toko) |
|------------|---------------|-----------|---------------|
| Cext1 | 1 pF | Lext1 | 5.6 nH LL1005 |
| Cext2 | 1 nF | Lext2 | 68 nH LL1608 |
| Cext3 | 8 pF | Lext3 | 68 nH LL1608 |
| Cext4 | 22 pF | Lext4 | 4.7 nH LL1005 |
| Cext5 | 1 nF | Lext5 | 4.7 nH LL1005 |
| Cext6 | 1 nF | | |
| Cext7 | 3 pF | | |
| Cext8 | 100 nF | | |

CMY212 Datasheet

Applications Information (cont)

PCB Layout:

Size: 35 x 35 mm²



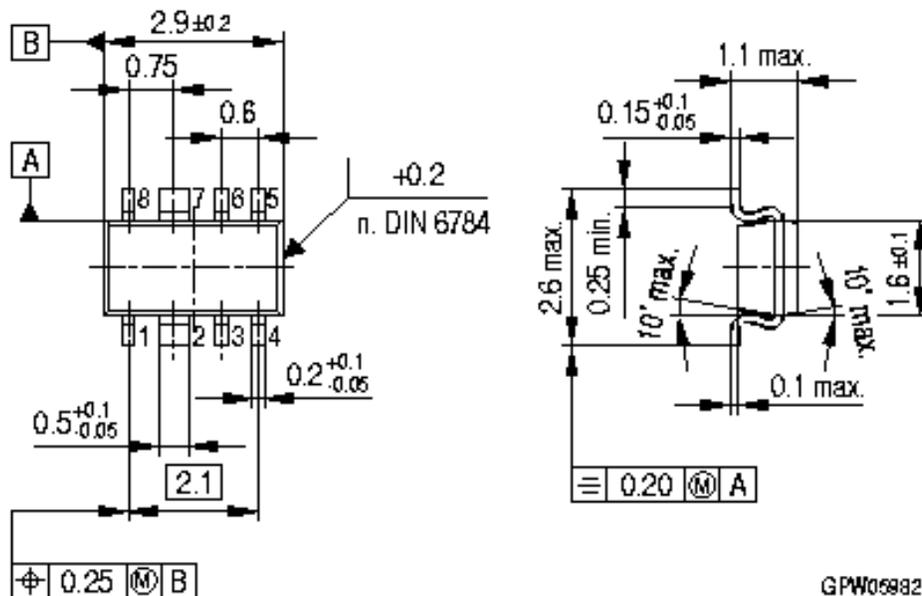
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General description and notes

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Semiconductor Device Outline SCT598-8-1



CMY212 Datasheet

Ordering Information

| Type | Marking | Ordering code (tape and reel) | Package ¹⁾ |
|---------------|------------|----------------------------------|-----------------------|
| CMY212 | M5s | Q62702-M0026 | SCT598-8-1 |

Additional Information

This part is compliant with RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

The part is rated Moisture Sensitivity Level 1 at 260°C per JEDEC standard IPC/JEDEC J-STD-020.

ESD: **E**lectro**s**tatic **d**ischarge sensitive device. Observe handling Precautions.

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