Ultra-linear Mixer with Integrated IF Amp and LO Buffer

Description

CMY213 is a general purpose down-converter device designed for receiver applications such as cellular and PCS mobile phones, ISM bands, GPS receivers, L-band satellite terminals, WLAN and pagers. It is particularly suited for CDMA receiver applications due to its excellent intermodulation characteristics and its high conversion gain.

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 CMY213 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.

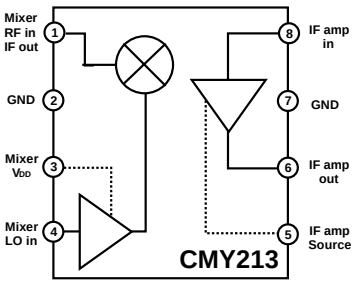
Features

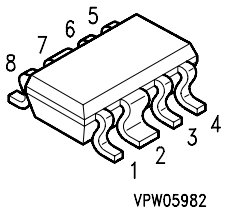
- Typical overall performance at cellular frequencies (for P_{LO} = -5dBm operation conditions: 3V, 8 mA; f_{RF} = 850 MHz; f_{LO} = 740 MHz):
  - Gain: 9.5 dB
  - Input IP3: 10 dBm
  - Noise figure: 8 dB
- RF-frequency range 0.5 - 2.5 GHz
- Operating voltage range: 2.6 to 5V
- Small SCT598 plastic package

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





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

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°C; V_{DD}= 3V, f_{RF} = 850MHz; f_{LO} = 740MHz; P_{LO} = -5dBm; f_{IF} = 110MHz,
Z_S= Z_L = 50 Ohm; unless otherwise specified

Parameter, Test Conditions	Symbol	min	typ	max	Unit
Total operating Current (Mixer + IF amplifier)	I_{op}	-	8.0	9.5	mA
Conversion Gain	G_c	8.0	9.5	-	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	8	10	-	dBm
LO-RF Isolation	Iso	-	10	-	DB

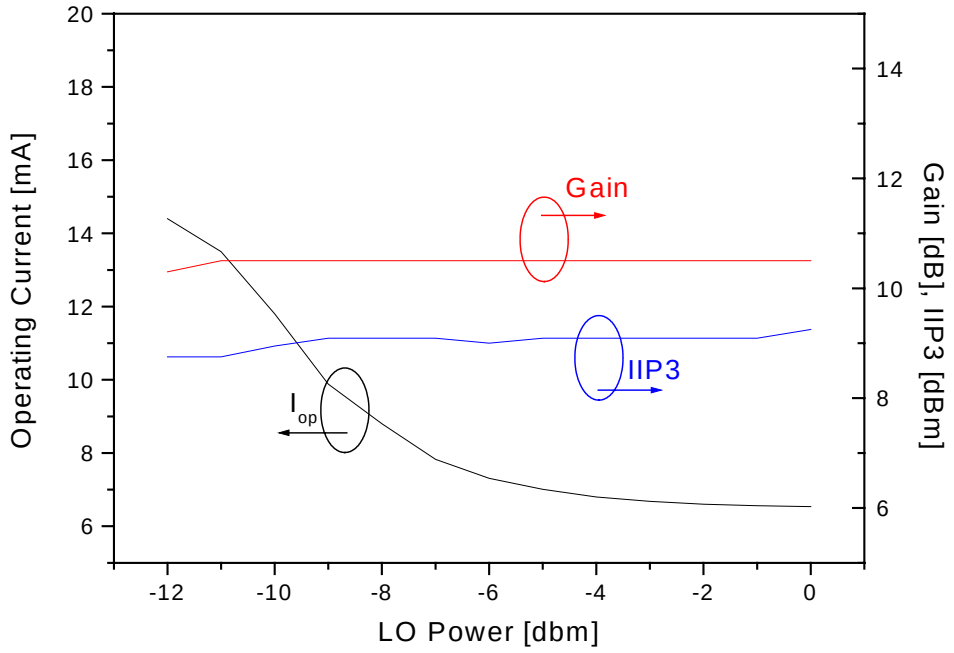
Test conditions at PCS frequencies:
T_a = 25°C; V_{DD}= 3V, f_{RF} = 1960MHz; f_{LO} = 1750MHz; P_{LO} = -5dBm; f_{IF} = 210MHz,
Z_S= Z_L = 50 Ohm; unless otherwise specified

Parameter, Test Conditions	Symbol	min	typ	max	Unit
Total operating Current (Mixer + IF amplifier)	I_{op}	-	8.0	9.5	mA
Conversion Gain	G_c	7	8.5	-	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	12	-	dBm
LO-RF Isolation	Iso	-	6	-	dB

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

Typical device behavior at cellular frequencies:

T_a = 25°C; V_{DD}= 3V, f_{RF} = 850MHz; f_{LO} = 740MHz; f_{IF} = 110MHz,
Z_S= Z_L = 50 Ohm; unless otherwise specified



Typical device behavior at PCS frequencies:

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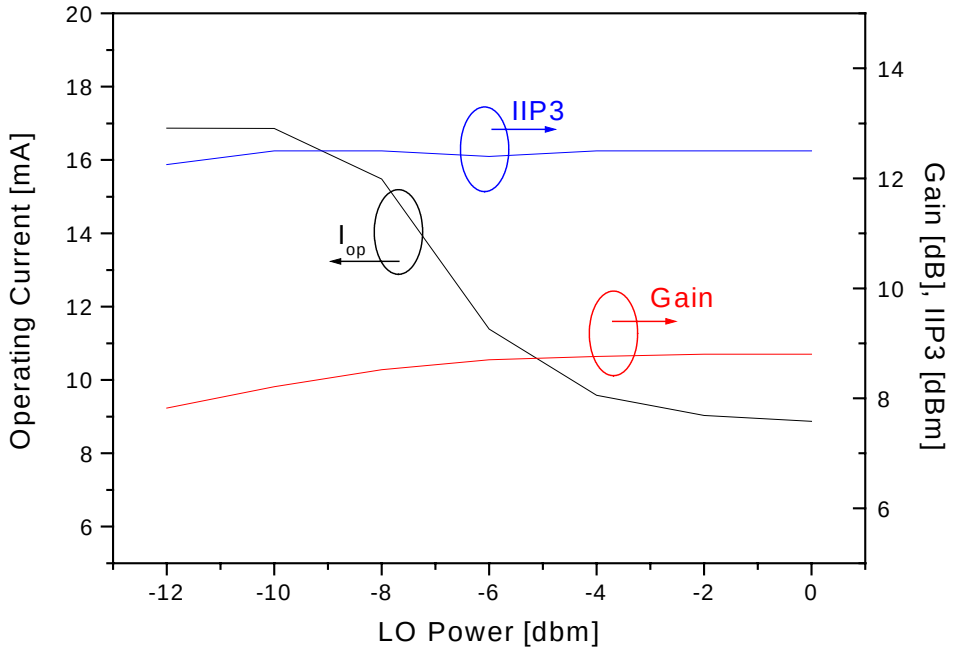
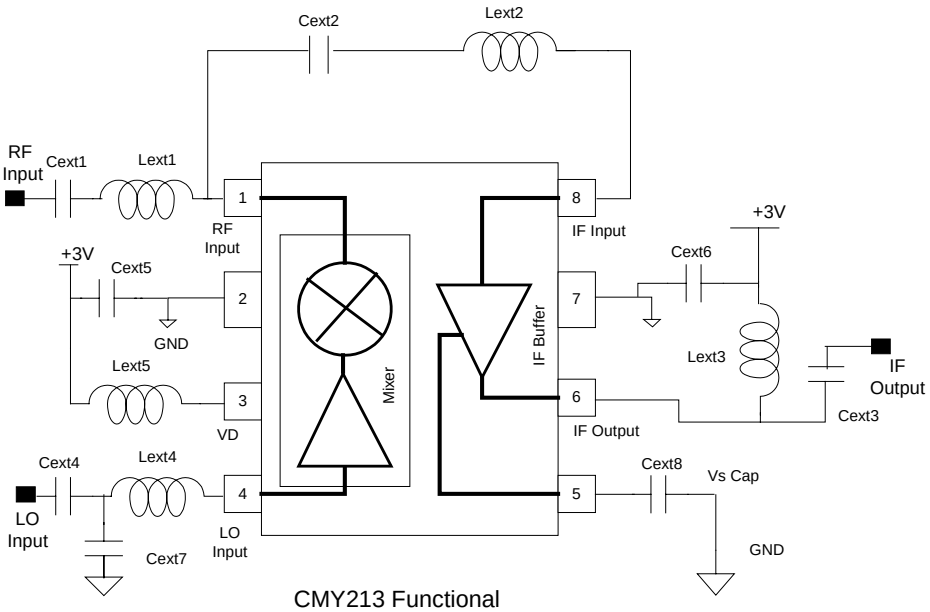


Applications Information

Test circuit / application example



CMY213 Functional Block Diagram

External components for cellular frequencies

f_{RF} = 850MHz; f_{LO} = 740MHz; f_{IF} = 110MHz

Capacitors	(Murata 0402)	Inductors	(Toko)
Cext1	1.5 pF	Lext1	27 nH *LL1005*
Cext2	1 nF	Lext2	180 nH *LL1608*
Cext3	18 pF	Lext3	150 nH *LL1608*
Cext4	100 pF	Lext4	27 nH *LL1005*
Cext5	1 nF	Lext5	27 nH *LL1005*
Cext6	1 nF		
Cext7	3 pF		
Cext8	100 nF		

External components for PCS frequencies

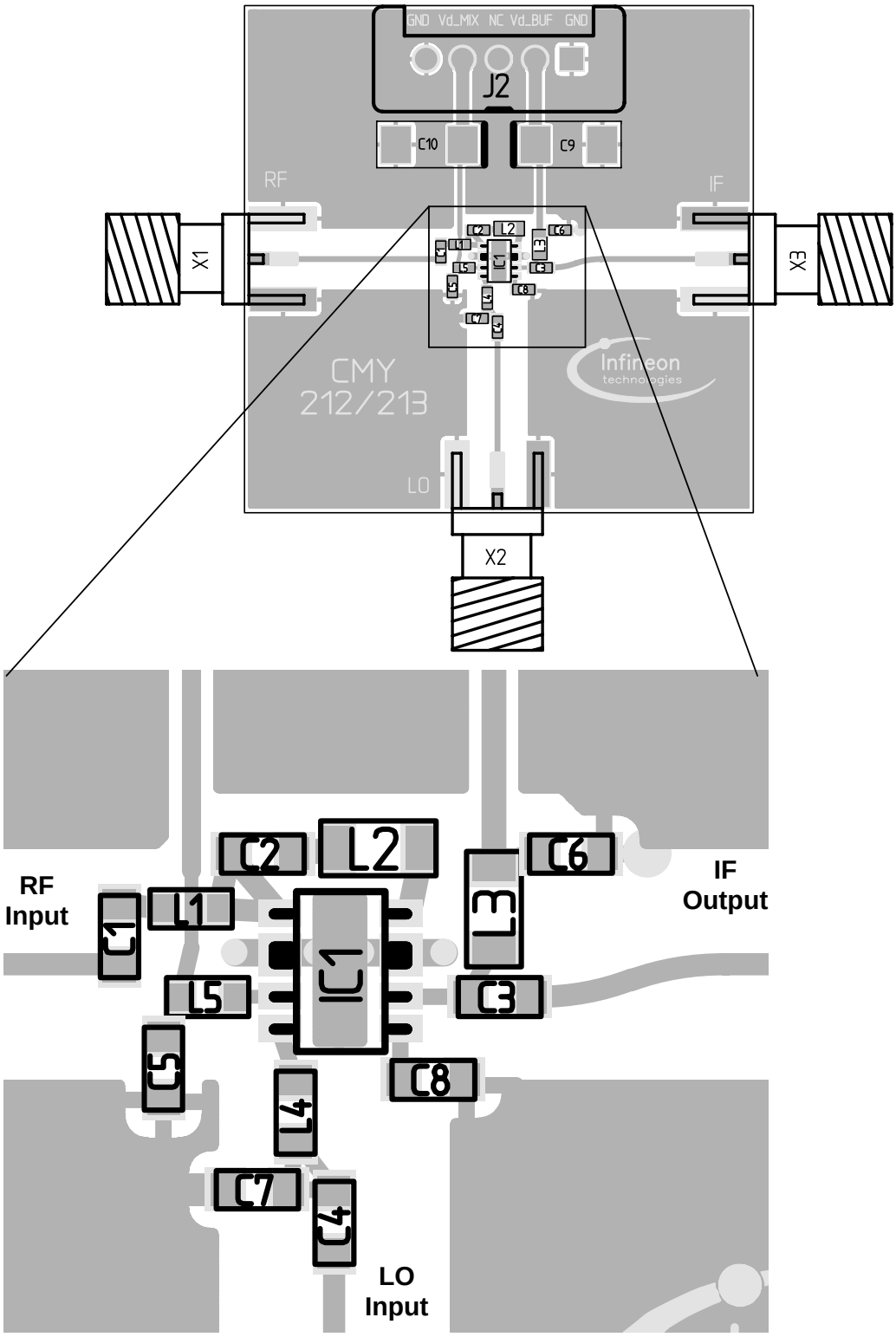
f_{RF} = 1960MHz; f_{LO} = 1750MHz; f_{IF} = 210MHz

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		

Applications Information (cont)

PCB-Layout

Size: 35 x 35 mm²



General description and notes

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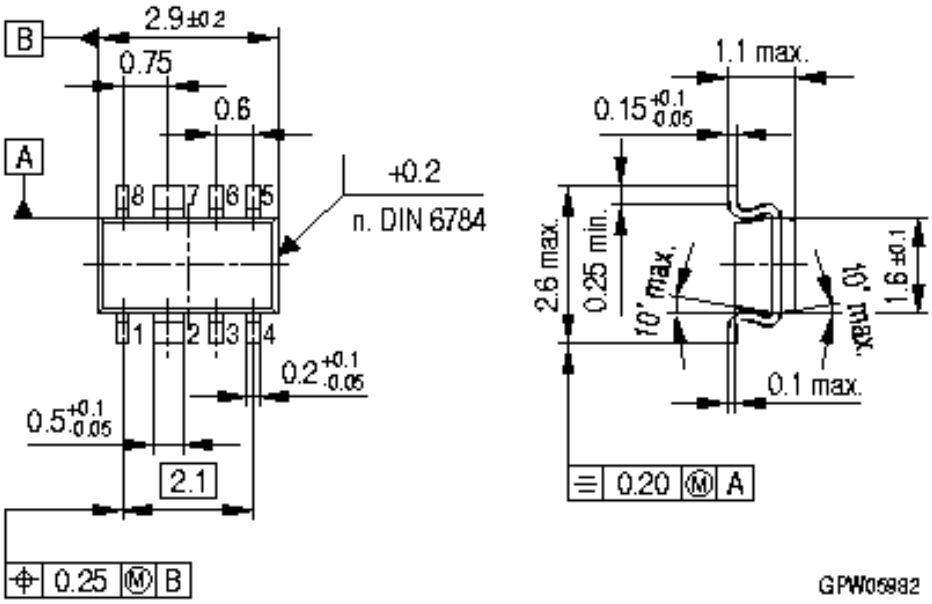
Semiconductor Device Outline SCT598-8-1



Ordering Information

Type	Marking	Ordering code (tape and reel)	Package [1)]
CMY213	213	CMY213	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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