SJM PREWELL
PM210
Ultra-linear Mixer

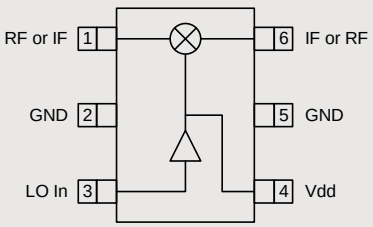
Features

- Very High Input IP3 of 29.9 dBm
- Low Conversion Loss of 6.1 dB
  (RF Freq_435MHz LO Freq_385MHz
  LO Power_0 dBm)
- Low LO Power of -10 ~ 10dBm typical
- Wide RF / IF Frequency Range
  0.1 to > 1.5 GHz / 40 ~250 MHz
- Single-Ended Ports
- RF- and IF-Port Impedance 50 ohms
- Operating Voltage Range 3 to 6 V
- Very Low Current Consumption of
  8 mA typical RoHS
- All Gold Metallization

Applications

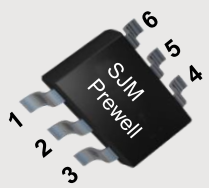
- Up – or Down - Converters
- Mobile Phones Receivers
- Two way radio Receivers
- Mobile Phones Base Stations

Functional Block Diagram



Pin Configuration

Pin No.	Symbol	Pin No.	Symbol
1	RF or IF	6	IF or RF
2	GND	5	GND
3	Lo In	4	Vdd



SOT23-6L Package

Description

The PM210 is an all port, single-ended, general purpose up- and down-converter.

It combines small conversion losses and excellent intermodulation characteristics with a low demand of LO- and DC-power.

The internal level controlled LO-buffer enables good performance over a wide range of LO level inputs.

The mixer configuration allows RF or IF feed to either pin 1 or 6 and thus requires a frequency separation circuit on the pc board.

PRELIMINARY

Electrical Characteristics

Parameter	Comment	min	typ	max	Unit
RF - Frequency range	external match	0.1	-	1.5	GHz
LO - Frequency range	external match	0.1	-	1.5	GHz
IF Frequency range	external match	40		250	MHz

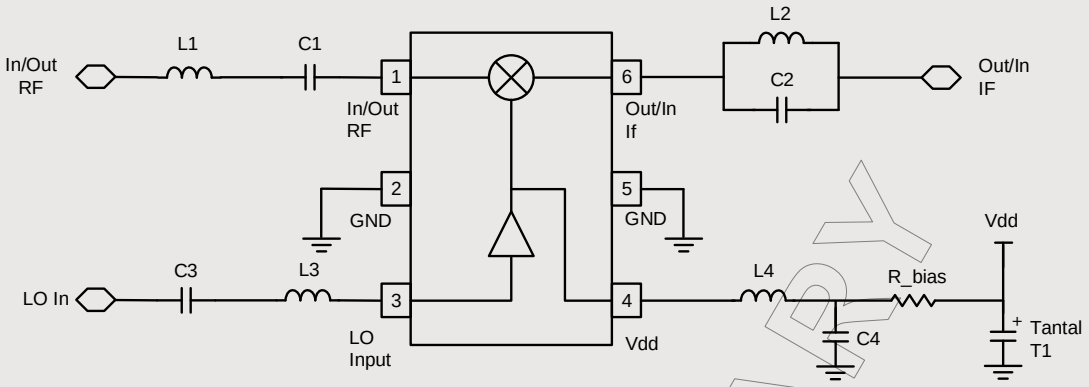
1) Test Conditions : T=25°C, Supply Voltage=3V
2) Thermal Resistance _ Rth ≤ 40 ℃/W

Absolute Maximum Ratings

Parameter	Port	Symbol	Value min	Value max	Unit
Supply Voltage	4	V_{DD}	0	6	V
Power into RF-IF Ports	1 , 6	$P_{in,RF}$		23	dBm
Power into LO Input	3	$P_{in,LO}$		20	dBm
Channel Temperature		T_{Ch}		150	°C
Storage Temperature		T_{stg}	-55	150	°C

1) Stresses above the maximum values listed may cause permanent damage to the device.
2) MTTF is more than 100 years.
3) ESD : Electrostatic discharge sensitive device. Observe handling Precautions.

Applications Information Test circuit / application example
RF_435MHz / LO_361.65MHz / IF_73.35MHz_Application Circuit



PRELIMINARY

Lumped element values

Capacitors	Value	Inductors	Value
C1	12pF	L1	10nH
C2	11pF	L2	10nH
C3	82pF	L3	12nH
C4	82pF	L4	180nH
R_Bias	0Ω (Vdd=3V)	T1(Tantal)	10uF

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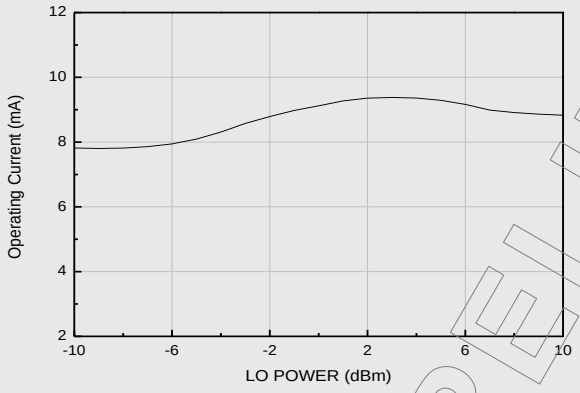
Typical performance at cellular frequencies

(RF_435MHz / LO_361.65MHz / IF_73.35MHz / Ta = 25°C / VDD= 3V / LO_0dBm)

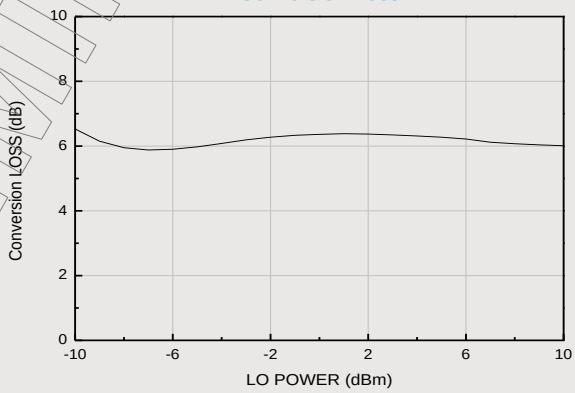
Parameter / Test conditions	Symbol	min	Typ	max	Unit
Operating Current	I_{op}	-	9	-	mA
Conversion Loss	L_C	-	6.4	-	dB
SSB Noise Figure	F_{ssb}	-	6.7	-	dB
2Tone 3rd Order IMD $P_{RF1} = P_{RF2} =$ -3dBm f_{RF1} = 434.5MHz ; f_{RF2} = 435.5MHz ; f_{LO} = 73.35MHz	$dIM3$	-	65	-	dBc
3rd Order Input Intercept Point	$IP3_{in}$	-	29	-	dBm
P_{-1dB} Input Power	P_{-1dB}		19.4		dBm
LO Leakage at RF/IF-Port (1,6)	$P_{LO1,6}$	-	-21.6	-	dBm

1) ZS= ZL = 50 Ohm; unless otherwise specified

Operating Current



Conversion Loss

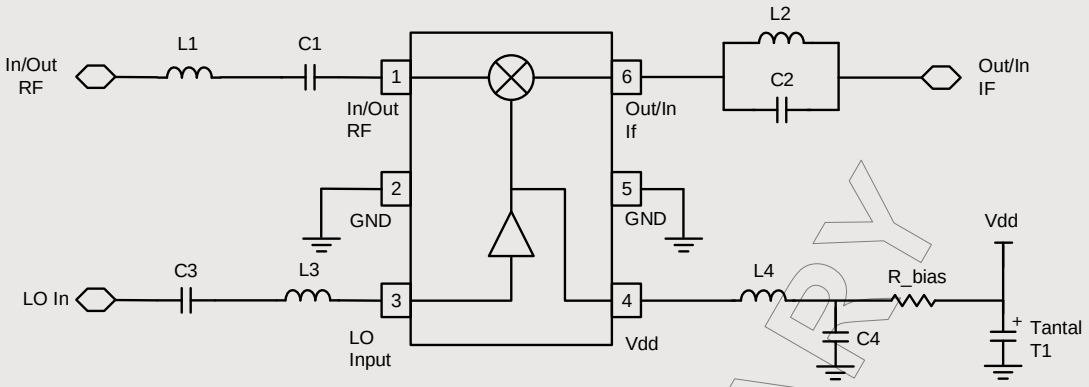


IIP3



PRELIMINARY

Applications Information Test circuit / application example
RF_360MHz / LO_286.65MHz / IF_73.35MHz_Application Circuit



PRELIMINARY

Lumped element values

Capacitors	Value	Inductors	Value
C1	15pF	L1	10nH
C2	10pF	L2	15nH
C3	82pF	L3	12nH
C4	82pF	L4	180nH
R_Bias	0Ω (Vdd=3V)	T1(Tantal)	10uF

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Ultra-linear Mixer

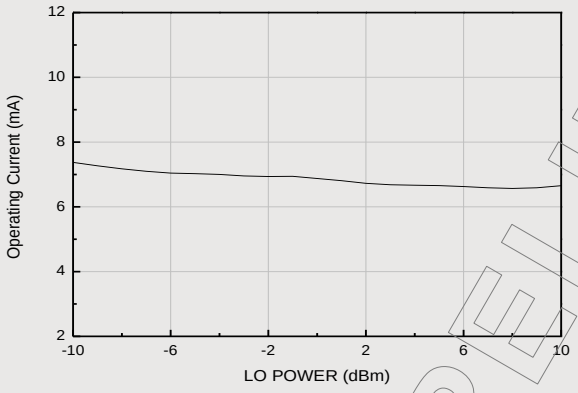
Typical performance at cellular frequencies

(RF_360MHz / LO_286.65MHz / IF_73.35MHz / Ta = 25°C / VDD= 3V / LO_0dBm)

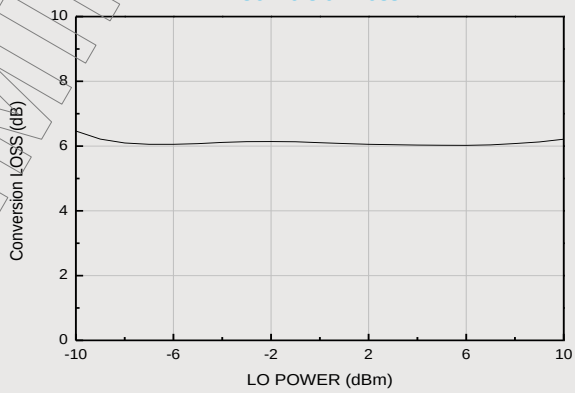
Parameter / Test conditions	Symbol	min	Typ	max	Unit
Operating Current	I_{op}	-	6.9	-	mA
Conversion Loss	L_C	-	6.1	-	dB
SSB Noise Figure	F_{ssb}	-	6.4	-	dB
2Tone 3rd Order IMD $P_{RF1} = P_{RF2} =$ -3dBm f_{RF1} = 359.5MHz ; f_{RF2} = 360.5MHz ; f_{LO} = 73.35MHz	$dIM3$	-	64	-	dBc
3rd Order Input Intercept Point	$IP3_{in}$	-	28.8	-	dBm
P_{-1dB} Input Power	P_{-1dB}		17.3		dBm
LO Leakage at RF/IF-Port (1,6)	$P_{LO1,6}$	-	-23.6	-	dBm

1) ZS= ZL = 50 Ohm; unless otherwise specified

Operating Current



Conversion Loss

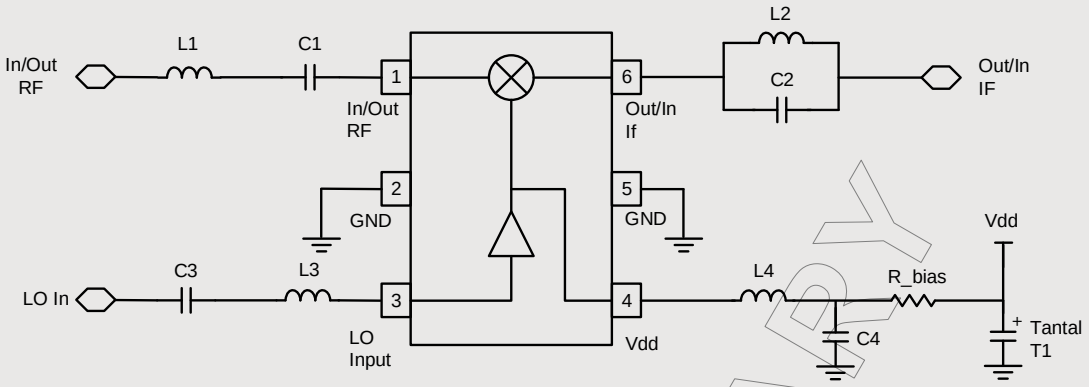


IIP3



PRELIMINARY

Applications Information Test circuit / application example
RF_156MHz / LO_201MHz / IF_45MHz_Application Circuit



PRELIMINARY

Lumped element values

Capacitors	Value	Inductors	Value
C1	27pF	L1	39nH
C2	27pF	L2	39nH
C3	1nF	L3	0Ω
C4	100nF	L4	270nH
R_Bias	0Ω (Vdd=3V)	T1(Tantal)	10uF

SJM PREWELL

PM210

Ultra-linear Mixer

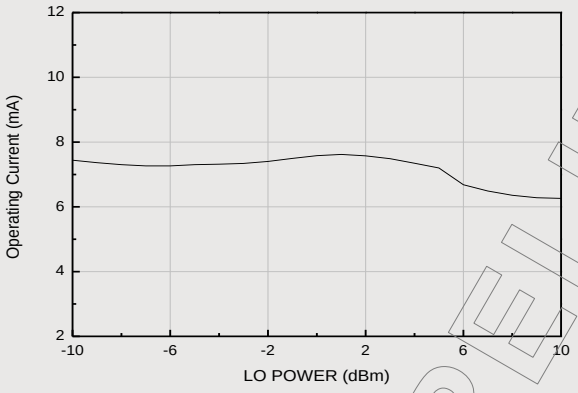
Typical performance at cellular frequencies
(RF_156MHz / LO_201MHz / IF_45MHz / Ta = 25°C / VDD= 3V / LO_0dBm)

Parameter / Test conditions	Symbol	min	Typ	max	Unit
Operating Current	I_{op}	-	7.6	-	mA
Conversion Loss	L_C	-	6.4	-	dB
SSB Noise Figure	F_{ssb}	-	6.7	-	dB
2Tone 3rd Order IMD $P_{RF1} = P_{RF2} =$ -3dBm $f_{RF1} = 155.5MHz$; $f_{RF2} = 156.5MHz$; $f_{LO} = 45MHz$	$dIM3$	-	65	-	dBc
3rd Order Input Intercept Point	$IP3_{in}$	-	29.9	-	dBm
P_{-1dB} Input Power	P_{-1dB}		18.2		dBm
LO Leakage at RF/IF-Port (1,6)	$P_{LO1,6}$	-	-26.15	-	dBm

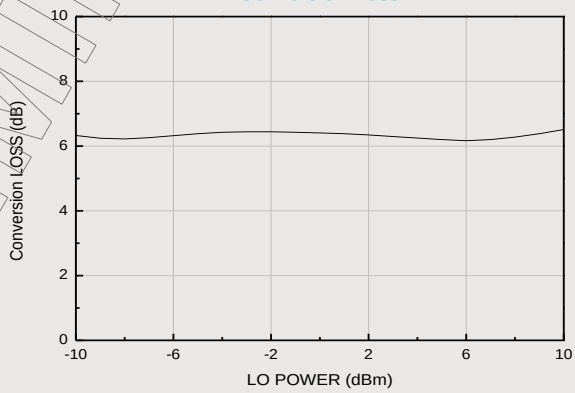
1) ZS= ZL = 50 Ohm; unless otherwise specified

PRELIMINARY

Operating Current



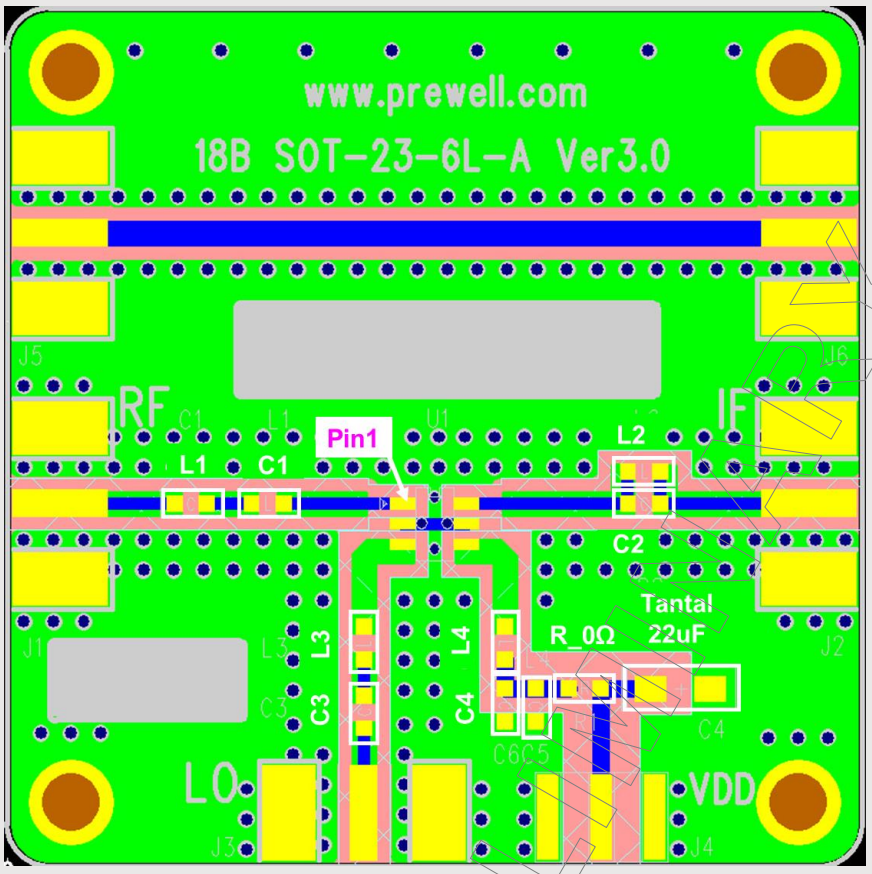
Conversion Loss



IIP3



Evaluation Board Layout (40x40 mm)

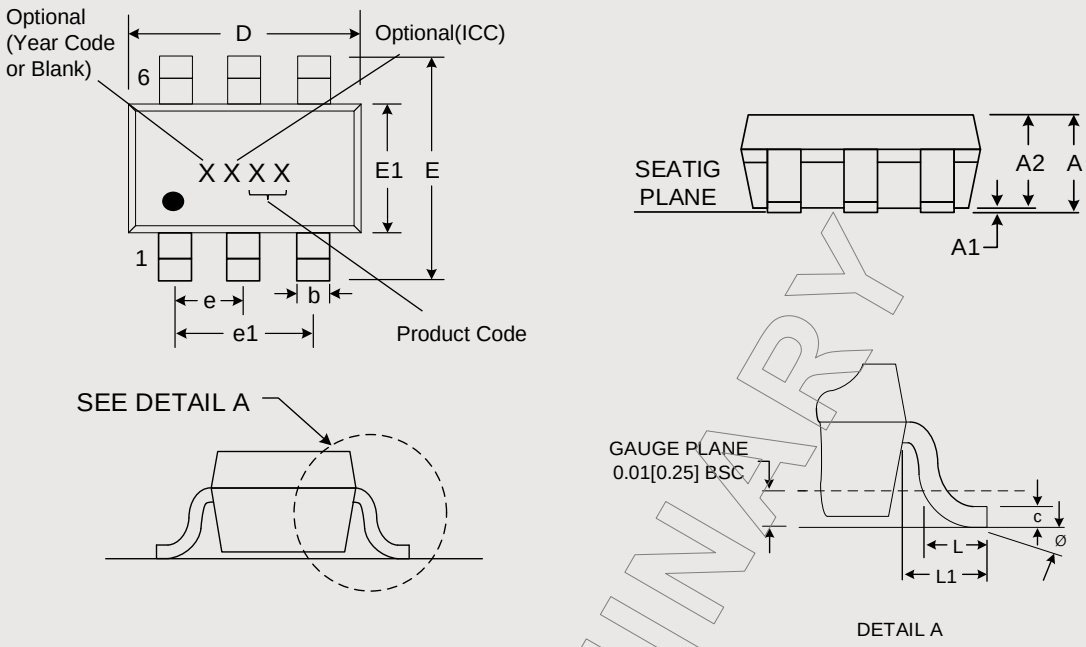


PRELIMINARY

Mounting Instructions

1. Use a large ground pad area with many plated through-holes as shown.
2. We recommend 1 oz copper minimum.
3. Measurement for our data sheet was made on 0.8mm thick FR-4 Board.
4. RF trace width depends on the board material and construction.
5. Add mounting screws near the part to fasten the board to a heatsink.
6. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.

Lead-free /RoHS Compliant / Green SOT23-6L Package Outline



SYM.	DIMENSIONS IN INCHES			DIMENSIONS IN MM		
	Min.	NOM.	Max.	Min.	NOM.	Max.
A	0.045	0.051	0.057	1.15	1.30	1.45
A1	0.000	-	0.006	0.00	-	0.15
A2	0.035	0.045	0.051	0.90	1.15	1.30
b	0.012	0.016	0.020	0.30	0.40	0.50
c	0.003	0.006	0.009	0.08	0.15	0.22
D	0.108	0.114	0.120	2.75	2.9	3.05
E1	0.057	0.063	0.069	1.45	1.60	1.75
E	0.102	0.110	0.118	2.60	2.80	3.00
e		0.037			0.95	
e1		0.075			1.90	
L	0.012	0.018	0.024	0.30	0.45	0.60
L1	0.018	0.024	0.030	0.45	0.60	0.75
Ø	0°	-	8°	0°	-	8°

PRELIMINARY

Notes:

1. DIMENSION D DOES NOT INCLUDE MOLE FLASH, PROTRUSIONS OR GATE BURRS, DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS.
2. BASED FROM JEDEC MO-178 VARIATION AB.