

PE4122

Product Description

The PE4122 is a high linearity, passive Quad MOSFET Mixer for PCS & 3G Base Station Receivers, exhibiting high dynamic range performance over a broad LO drive range up to +20 dBm. This mixer integrates passive matching networks to provide single-ended interfaces for the RF and LO ports, eliminating the need for external RF baluns or matching networks. The PE4122 is optimized for frequency down-conversion using low-side LO injection for PCS & 3G Base Station applications, and is also suitable for use in up-conversion applications.

The PE4122 is manufactured in Peregrine's patented Ultra-Thin Silicon (UTSi®) CMOS process, offering the performance of GaAs with the economy and integration of conventional CMOS.

High Linearity Quad MOSFET Mixer For PCS & 3G BTS

Features

- Integrated, single-ended RF & LO interfaces
- High linearity: IIP3 >+ 30 dBm, 1.8 – 2.0 GHz (+17 dBm LO)
- Low-conversion loss: 7.4 dB (+17 dBm LO)
- High isolation: typical LO-IF at 38 dB, LO-RF at 34 dB
- Designed for low-side LO injection

Figure 1. Functional Schematic Diagram

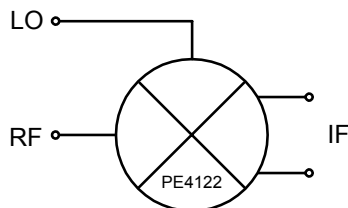


Figure 2. Package Type

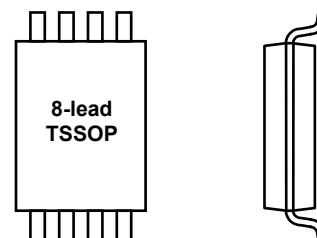


Table 1. Electrical Specifications @ +25 °C ($Z_S = Z_L = 50 \Omega$)

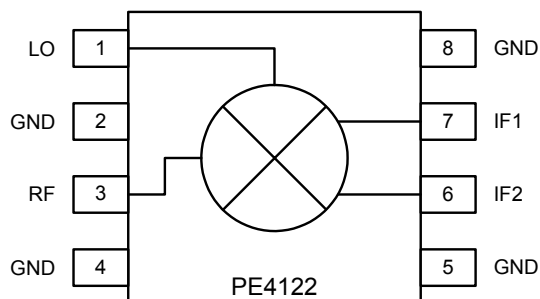
Parameter	Minimum	Typical	Maximum	Units
Frequency Range:				
LO	1540	--	1740	MHz
RF	1800	--	2000	MHz
IF*	--	260	--	MHz
Conversion Loss**		7.4	7.8	dB
Isolation:				
LO-RF	28	34		dB
LO-IF	34	38		dB
Input IP3				
1.8 GHz	28	30		dBm
1.9 GHz	31	33		dBm
2.0 GHz	28	30		dBm
Input 1 dB Compression		20		dBm

*An IF frequency of 260MHz is a nominal frequency. The IF frequency can be specified by the user as long as the RF and LO frequencies are within the specified maximum and minimum.

**Conversion Loss includes loss of IF transformer (M/A COM ETK4-2T, nominal loss 0.7dB at 260MHz).

Test conditions unless otherwise noted: LO = 260MHz, LO input drive = 17dBm, RF input drive = 0dBm.

Figure 3. Pin Configuration



Electrostatic Discharge (ESD) Precautions

When handling this UTSi device, observe the same precautions that you would use with other ESD-sensitive devices. Although this device contains circuitry to protect it from damage due to ESD, precautions should be taken to avoid exceeding the rating specified in Table 3.

Latch-Up Avoidance

Unlike conventional CMOS devices, UTSi CMOS devices are immune to latch-up.

Table 2. Pin Descriptions

Pin No.	Pin Name	Description
1	LO	LO Input
2	GND	Ground connection for Mixer. Traces should be physically short and connect immediately to ground plane for best performance.
3	RF	RF Input
4	GND	Ground.
5	GND	Ground.
6	IF2	IF differential output
7	IF1	IF differential output
8	GND	Ground.

Table 3. Absolute Maximum Ratings

Symbol	Parameter/Conditions	Min	Max	Units
T_{ST}	Storage temperature range	-65	150	°C
T_{OP}	Operating temperature range	-40	85	°C
P_{LO}	LO input power		20	dBm
P_{RF}	RF input power		16	dBm
V_{ESD}	ESD Sensitive Device		250	V

Figure 4. Evaluation Board Schematic Diagram

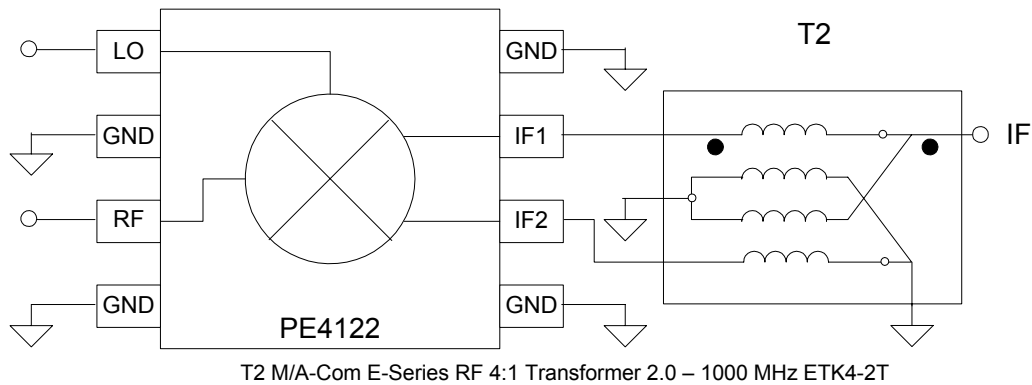


Figure 5. Evaluation Board Layout

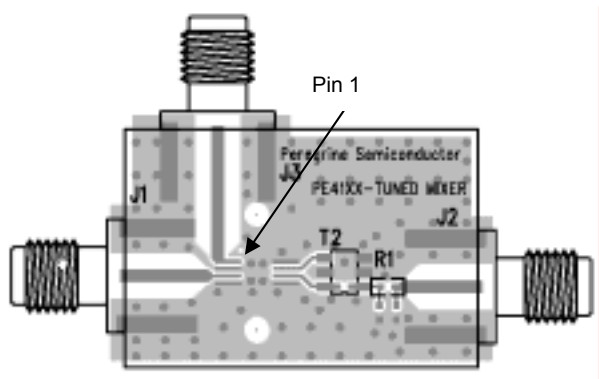
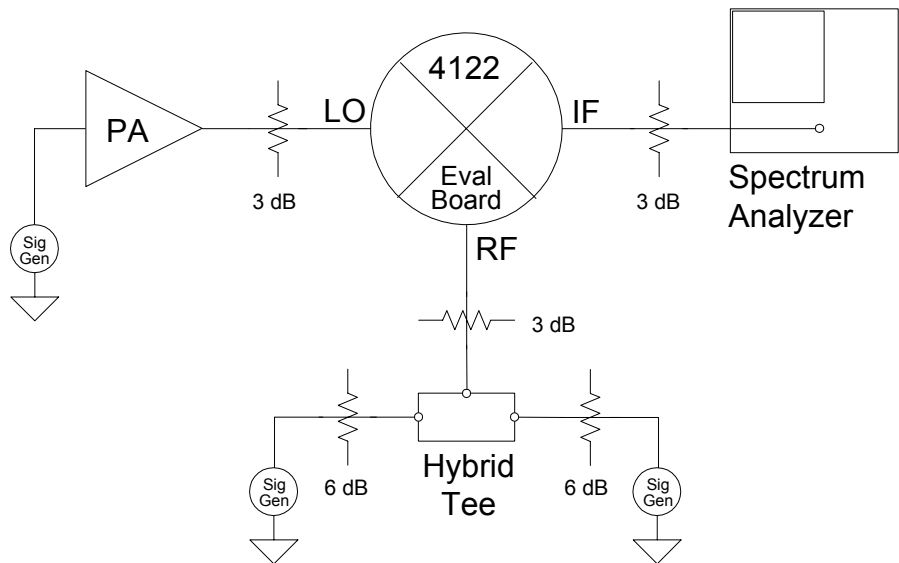


Table 4. Bill of Materials

Reference	Value / Description
T2	M/A Com ETK4-2T
U1 (Not Labeled)	PE4122 Mixer
R1	0Ω
J1, J2, J3	SMA Connector

Figure 6. Evaluation Board Testing Block Diagram, 2-Tone Setup



Typical Performance Data (LO=17dBm, RF=0dBm, IF=260MHz)

Figure 7. Conversion Loss vs. Frequency

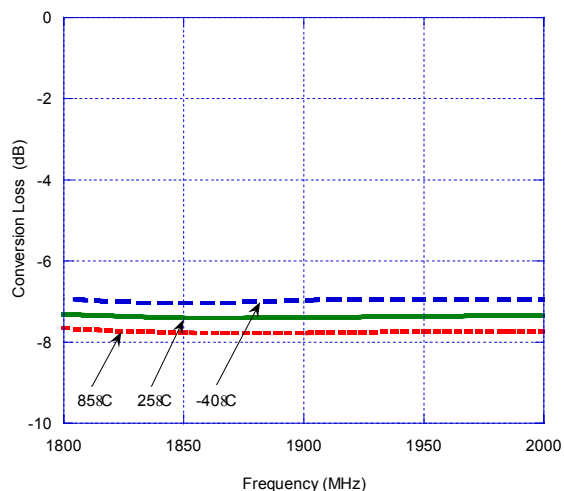


Figure 8. Input 1dB Compression vs. Frequency

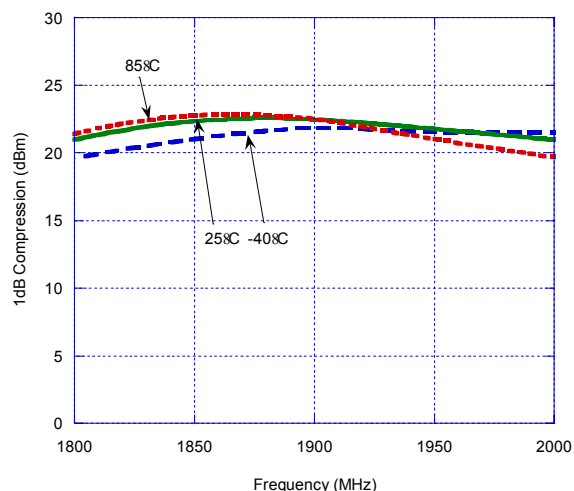


Figure 9. Input IP3 vs. Frequency

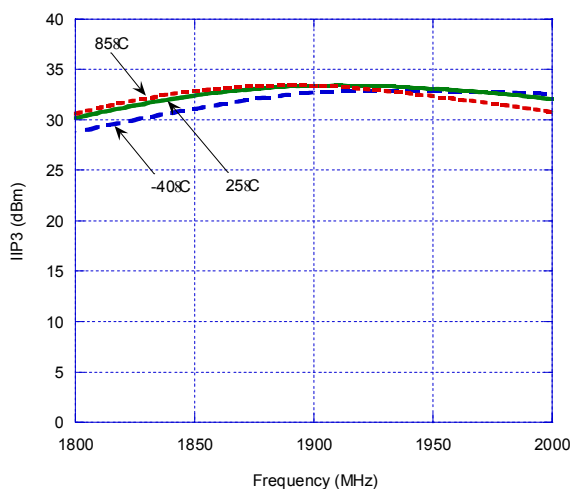
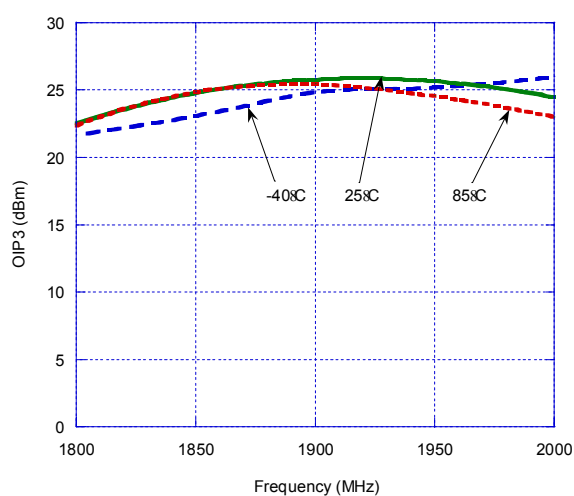


Figure 10. Output IP3 vs. Frequency



Typical Performance Data (LO=17dBm, RF=0dBm, IF=260MHz)

Figure 11. LO-IF Isolation vs. Temperature

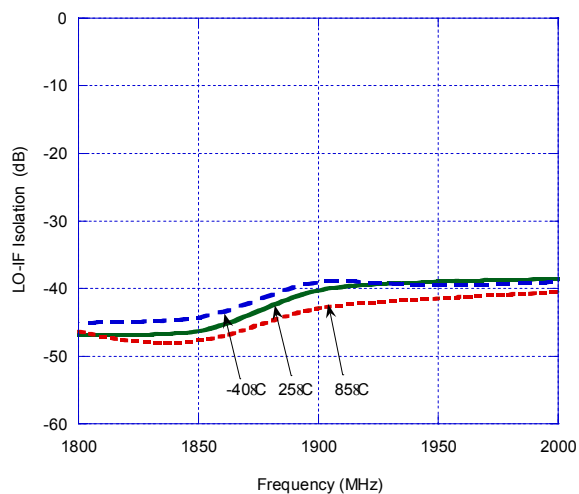


Figure 12. LO-RF Isolation vs. Temperature

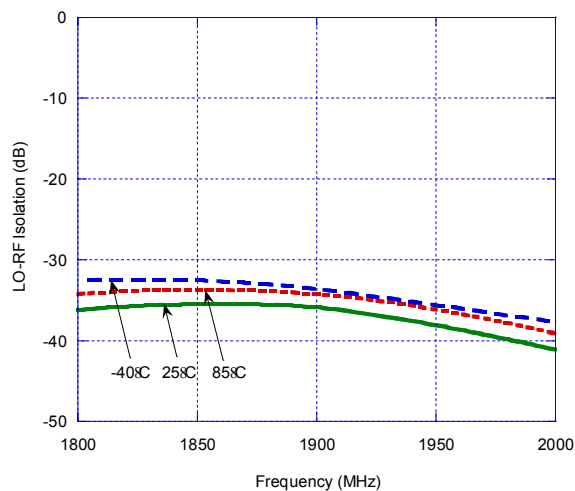


Figure 13. LO Port Return Loss @ 25°C

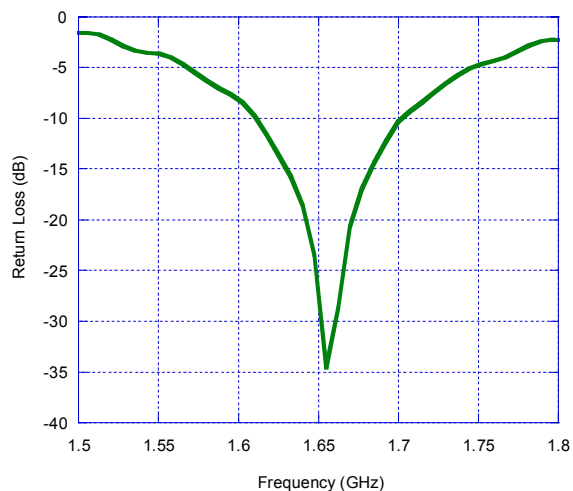
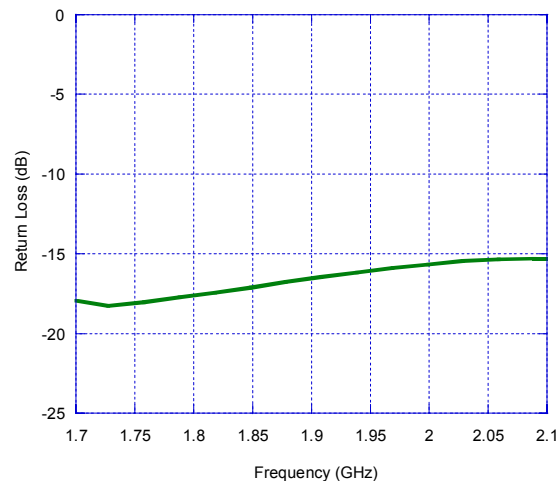


Figure 14. RF Port Return Loss @ 25°C



Typical Performance Data @ +25 °C (RF=0dBm, IF=260MHz)

Figure 15. Conversion Loss across LO Power

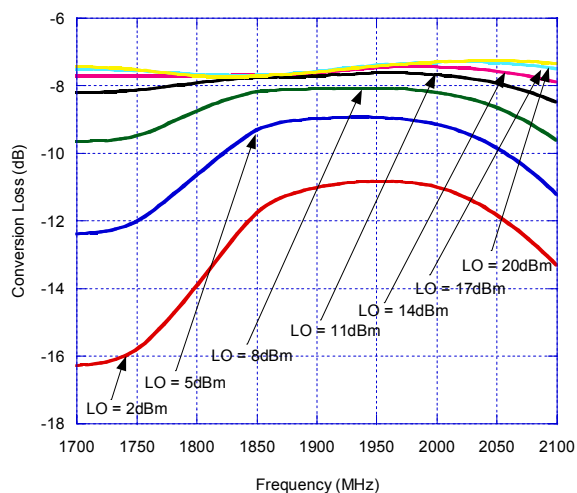


Figure 16. Input IP3 across LO Power

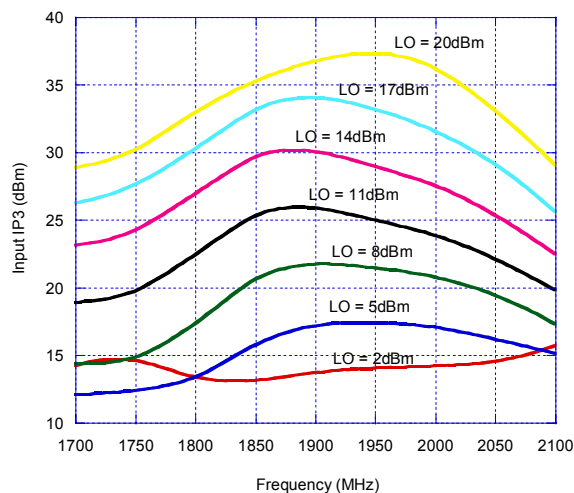


Table 5. Spurious Response

mF _{RF}	mF _{RF} + nF _{LO}				
	nF _{LO}				
	0	1	2	3	4
0	---	-33.09	-6.83	-11.49	-8.86
1	-27.64	-5.01	-39.91	-34.08	-58.33
2	-49.53	-50.27	-58.81	-70.85	-81.69
3	-82.93	-83.92	-88.39	-93.79	-86.81
4	>110	>110	>110	>110	>110

Normalized to dB below P_{IF}

(RF=1900MHz @ 0dBm, LO = 1640MHz @ 17dBm)

Table 6. Spurious Response

mF _{RF}	mF _{RF} - nF _{LO}				
	nF _{LO}				
	0	1	2	3	4
0	---	-33.09	-6.83	-11.49	-8.86
1	-27.64	0.00	-28.79	-18.38	-33.83
2	-49.53	-62.22	-53.59	-69.13	-65.66
3	-82.93	-75.81	-72.79	-73.00	-71.97
4	>110	>110	>110	-95.65	-93.44

Normalized to dB below P_{IF}

(RF=1900MHz @ 0dBm, LO = 1640MHz @ 17dBm)

Figure 17. Package Drawing

8-lead TSSOP

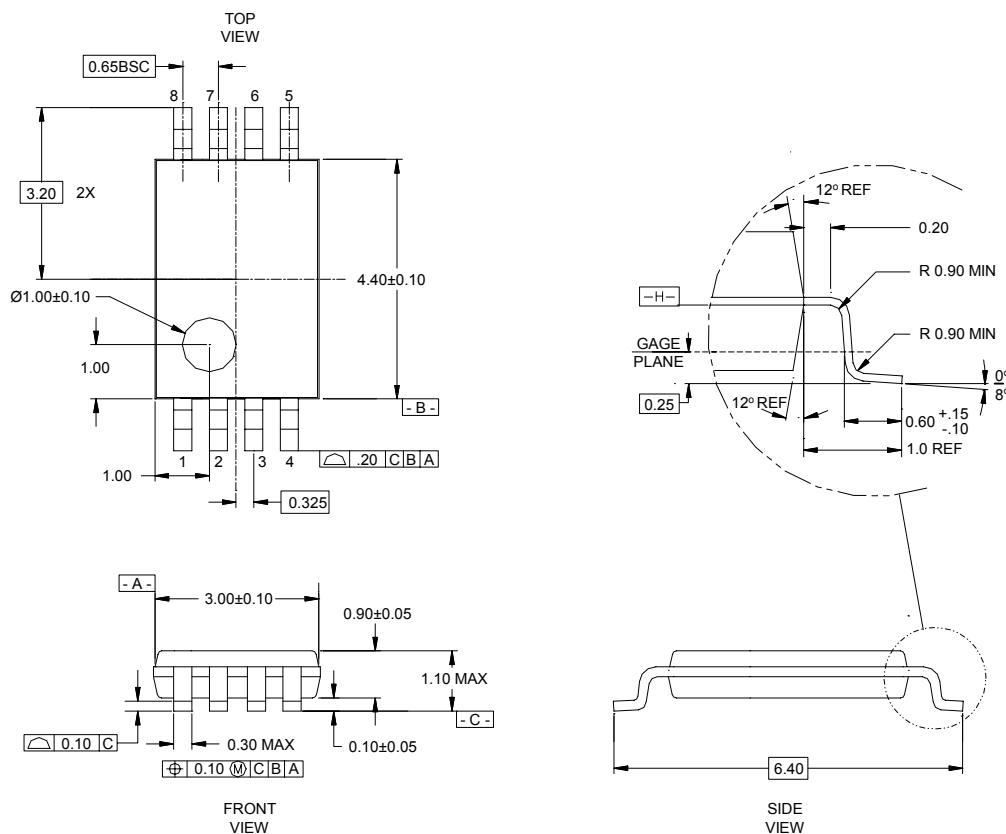


Table 7. Ordering Information

Order Code	Part Marking	Description	Package	Shipping Method
4122-21	4122	PE4122-08TSSOP-100A	8-lead TSSOP	100 units / Tube
4122-22	4122	PE4122-08TSSOP-2000C	8-lead TSSOP	2000 units / T&R
4122-00	4122-EK	PE4122-08TSSOP-EK	Evaluation Board	1 / Box

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Data Sheet Identification

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