Document Number: MBC13917350QSG
Rev. 0, 11/2010

MBC13917 Evaluation Board Quick Start — 350–370 MHz

INTRODUCTION

This evaluation board design demonstrates one possible design at 2.7 V that satisfies competing requirements for NF, IP3, gain, return losses and reverse isolation with unconditional stability. By changing any of the requirements, the performance for a particular parameter can be improved to meet a particular spec requirement.

This circuit was designed to provide 2 dB NF and 27 dB S21 gain.

This application is applicable to a range of designs, including TETRA land mobile and base station transceivers.

Component C4 has the greatest impact on return losses, NF and gain by moving the input and output on the Smith chart.

Component L1 can be increased in value to improve S11 with a 0.2 dB tradeoff in NF.

Gain, OIP3 and P1dB output can be increased by decreasing the resistor value at the output without impacting NF or return loses.

NOTE: Tables 1 and 2 list measured parameters on three typical evaluation boards and are meant as a guide to the RF performance possible for this application circuit. Variations in matching component performance may result in variation in evaluation board performance results.

Table 1. Evaluation Board Measurements (350–370 MHz, V_{CC} = 2.7 V, Frequency Spacing = 200 kHz)

Serial #	f (MHz)	Input Power (dBm)	Output Power (dBm)	Power Gain (dB)	Output IP3 (dBm)	Input IP3 (dBm)	Output P_{1dB} (dBm)	Input P_{1dB} (dBm)	NF (dB)	I_{CC} (mA)
1	350	–40	–11.98	28.02	9.9	–18.1	1.02	–27	2.08	5.18
1	370	–40	–11.20	28.80	11.1	–17.7	2.8	–26	2.13	5.18
2	350	–40	–12.16	27.84	9.54	–18.3	1.34	–26.5	2.07	5.19
2	370	–40	–11.33	28.67	10.7	–18.0	1.97	–26.7	2.13	5.19
3	350	–40	–12.6	27.4	9.1	–18.3	0.4	–27	2.1	5.21
3	370	–40	–11.57	28.43	10.4	–18.0	1.93	–26.5	2.2	5.21

Table 2. S-Parameters (350–370 MHz, V_{CC} = 2.7 V)

Serial #	f (MHz)	S11 (dB)	S21 (dB)	S12 (dB)	S22 (dB)
1	350	–8.37	27.70	–47.1	–9.71
1	370	–12.52	28.51	–47.0	–12.33
2	350	–7.73	27.49	–47.5	–9.74
2	370	–11.53	28.41	–46.9	–13.04
3	350	–7.59	27.04	–47.1	–8.43
3	370	–11.12	28.15	–47.1	–13.01

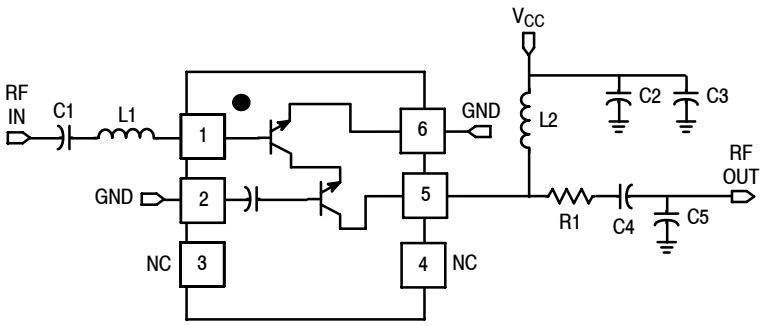

Figure 1. MBC13917 350–370 MHz Schematic

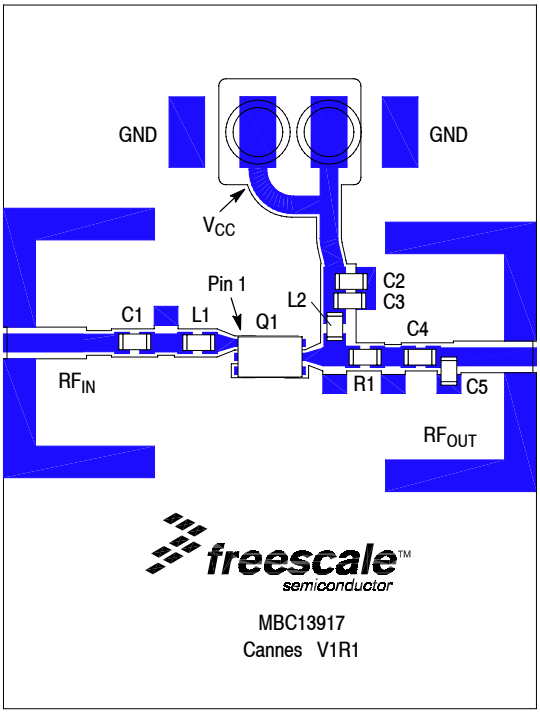

Figure 2. MBC13917 350–370 MHz Evaluation Circuit Component Layout

Table 3. Evaluation Circuit Component Designations and Values

Component	Value	Case	Manufacturer	Comments
C1	47 pF	402	Murata	DC Block, Input match
C2	100 pF	402	Murata	RF bypass
C3	0.1 μF	402	Murata	Low freq bypass to improve IP3
C4	2.4 pF	402	Murata	DC Block, Output match
C5	3 pF	402	Murata	Output match
L1	39 nH	402	Murata	Input match
L2	47 nH	402	Murata	DC Feedthrough, Output match
R1	24 Ω	402	KOA	Lower gain, improve IP3, P1dB
Q1	MBC13917	MLP6	Freescale	SiGe cascode amp

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Rev. 0, 11/2010