

# MBC13917 Evaluation Board Quick Start — 900 MHz

## INTRODUCTION

This evaluation board design demonstrates one possible design at 2.7 V that satisfies competing requirements for NF, IP3, P1dB, 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 NF < 1.3 dB, S21 gain > 23 dB and S11, S22 better than -10 dB at 900 MHz with unconditional stability from 100 MHz to 10 GHz.

L1 is set to 6.8 nH to tradeoff NF, S21, S11 and IP3. Raising L1 will improve S21, S11 and IP3 at the expense of NF.

L2 is set to 10 nH to achieve high gain and S22 performance.

Emitter inductance can be added to Pin 6 of the device as an option for greater linearity.

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** (900 MHz,  $V_{CC} = 2.7$  V, Frequency Spacing = 200 kHz)

Serial #	Input Power (dBm)	Output Power (dBm)	Power Gain (dB)	Output IP3 (dBm)	Input IP3 (dBm)	Output P <sub>1dB</sub> (dBm)	Input P <sub>1dB</sub> (dBm)	NF (dB)	I <sub>CC</sub> (mA)
1	-30.00	-6.00	24.00	12.70	-11.3	3.60	-20.40	1.21	5.27
2	-30.00	-5.68	24.32	12.62	-11.7	3.82	-20.50	1.18	5.18
3	-30.00	-5.99	24.01	11.91	-12.1	3.21	-20.80	1.18	5.03
4	-30.00	-5.79	24.21	11.91	-12.3	2.91	-21.30	1.18	5.12

**Table 2. S-Parameters** (900 MHz,  $V_{CC} = 2.7$  V)

Serial #	S11 (dB)	S21 (dB)	S12 (dB)	S22 (dB)
1	-9.84	23.87	-40.1	-22.9
2	-10.18	24.3	-40.2	-20.7
3	-10.24	24	-40.4	-27.7
4	-10.23	24.32	-40.9	-22.2

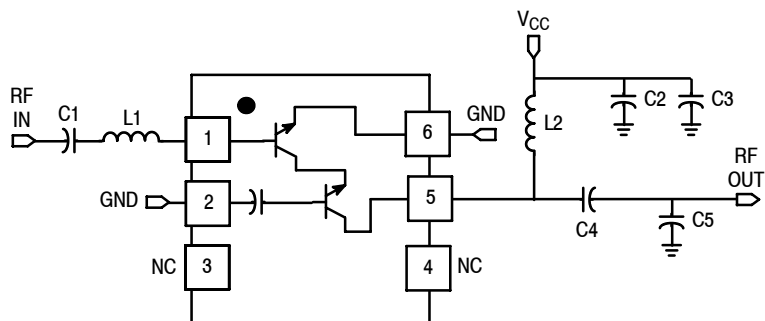


Figure 1. MBC13917 900 MHz Schematic

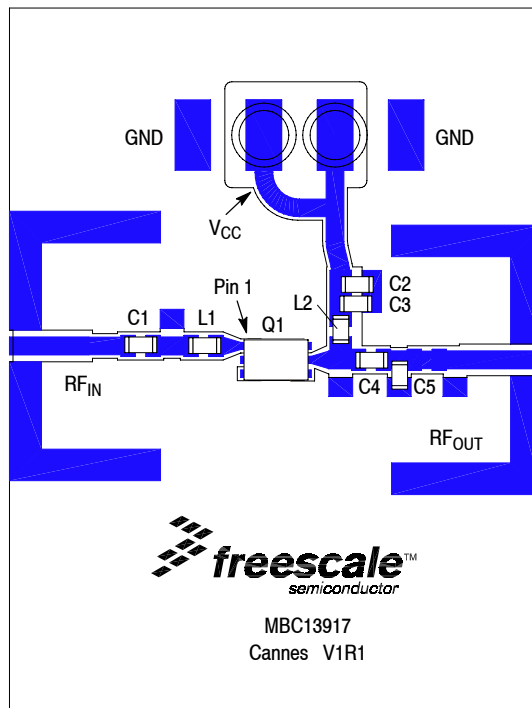


Figure 2. MBC13917 900 MHz Evaluation Circuit Component Layout

Table 3. Evaluation Circuit Component Designations and Values

Component	Value	Case	Manufacturer	Comments
C1	47 pF	402	Murata	DC Block
C2	47 pF	402	Murata	RF bypass
C3	0.1 $\mu$ F	402	Murata	Low freq bypass to improve IP3
C4	2 pF	402	Murata	DC Block, Output match
C5	3 pF	402	Murata	Output match, S22 improvement
L1	6.8 nH	402	Murata	Input match
L2	10 nH	402	Murata	Output match DC feed
Q1	MBC13917	MLP6	Freescale	SiGe cascode amp

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