

The MRFIC Line

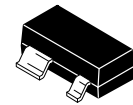
General Purpose RF Cascode Amplifier

The MRFIC0916 is a cost-effective, high isolation cascode silicon monolithic amplifier in the industry standard SOT-143 surface mount package designed for general purpose RF applications. On chip bias circuitry sets the bias point while matching is accomplished off chip affording the maximum in application flexibility.

- Usable Frequency Range = 100 to 2500 MHz
- 18.5 dB typical gain at 850 MHz, $V_{CC} = 2.7$ Volts
- 2.3 dBm typical Output Power at 1 dB Gain Compression at 850 MHz, $V_{CC} = 2.7$ Volts
- 44 dB Typical Reverse Isolation at 850 MHz
- 5.6 mA Max Bias Current at $V_{CC} = 2.7$ Volts
- 2.7 to 5 Volt Supply
- Available in Tape and Reel by Adding T1 Suffix to Part Number.
T1 Suffix = 3,000 Units per 8 mm, 7 inch Reel.
- Device Marking = 16

MRFIC0916

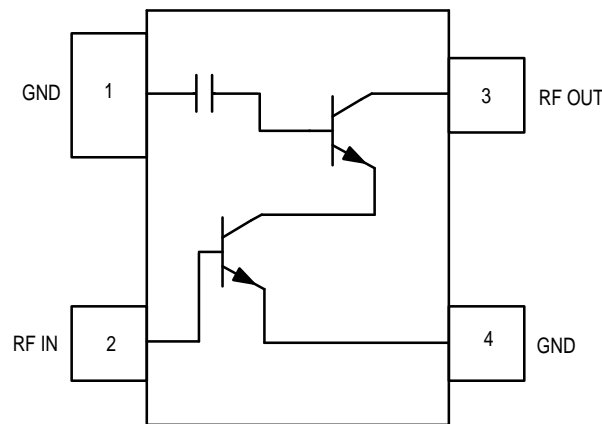
**SILICON GENERAL PURPOSE
RF CASCODE AMPLIFIER**



**CASE 318A-05
(SOT-143)**

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Limit	Unit
Supply Voltage	V_{CC}	6	Vdc
RF Input Power	P_{RF}	10	dBm
Power Dissipation	P_{DIS}	100	mW
Supply Current	I_{CC}	20	mA
Thermal Resistance, Junction to Case	$R_{\theta JC}$	250	$^\circ\text{C/W}$
Storage Temperature Range	T_{stg}	- 65 to +150	$^\circ\text{C}$
Operating Case Temperature	T_C	- 35 to +100	$^\circ\text{C}$



Pin Connections and Functional Block Diagram

RECOMMENDED OPERATING RANGES

Parameter	Symbol	Value	Unit
RF Frequency	f_{RF}	100 to 2500	MHz
Supply Voltage	V_{CC}	2.7 to 5	Vdc

ELECTRICAL CHARACTERISTICS ($V_{CC} = 2.7\text{ V}$, $T_A = 25^\circ\text{C}$, $f_{RF} = 850\text{ MHz}$, Tested in Circuit Shown in Figure 1)

Characteristic	Min	Typ	Max	Unit
Small Signal Gain	16.5	18.5	20.5	dB
Noise Figure	—	1.9	—	dB
Power Output at 1dB Gain Compression	0	2.3	—	dBm
Output 3rd Order Intercept Point	—	11	—	dBm
Reverse Isolation	—	44	—	dB
Supply Current	3.8	4.7	5.6	mA

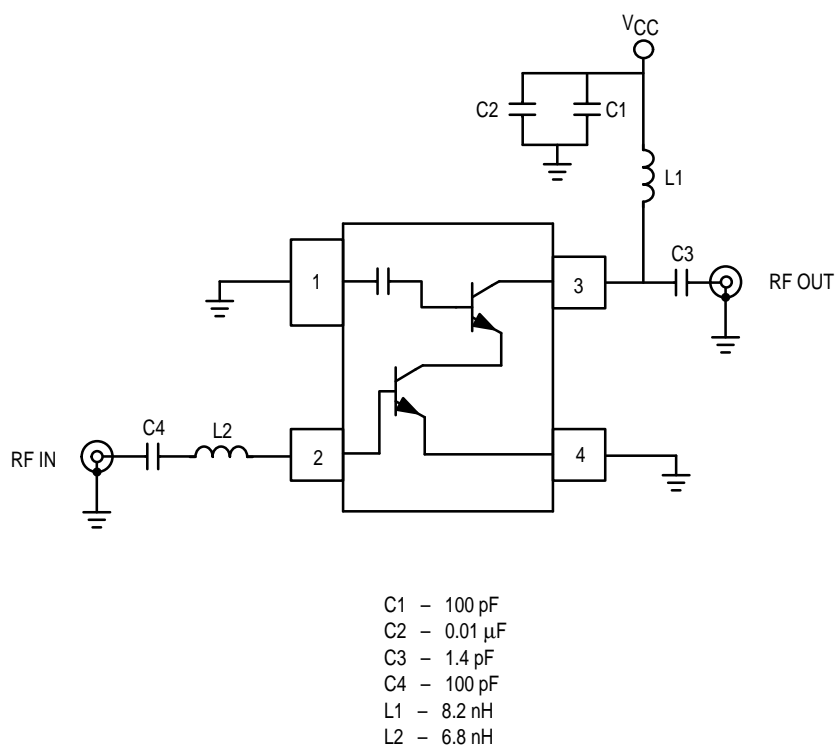


Figure 1. 850 MHz Applications Circuit Configuration

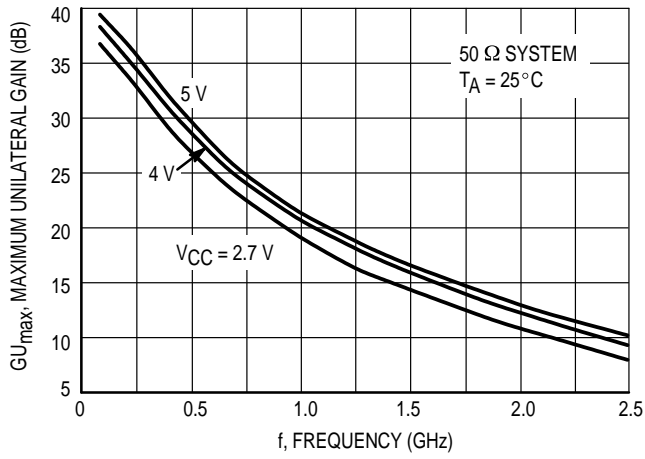


Figure 2. GU_{max} versus Frequency

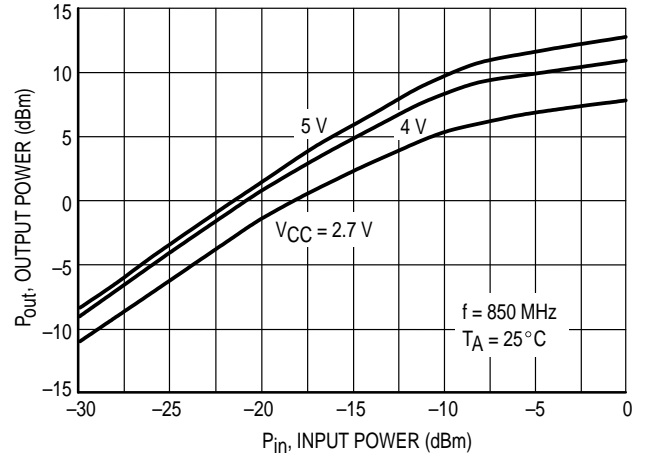


Figure 3. Output Power versus Input Power

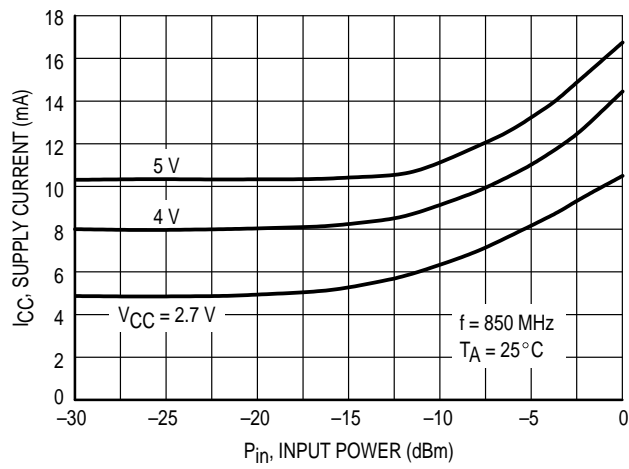


Figure 4. Supply Current versus Input Power

f (MHz)	S11		S21		S12		S22	
	S11	$\angle \phi$	S21	$\angle \phi$	S12	$\angle \phi$	S22	$\angle \phi$
100	0.806	-17.01	12.03	162.32	0.001	-0.14	0.956	-4.69
200	0.765	-33.28	11.18	145.74	0.001	71.58	0.948	-8.69
300	0.713	-47.99	10.18	130.99	0.002	69.67	0.945	-13.23
400	0.652	-61.35	9.06	118.01	0.003	64.61	0.930	-17.35
500	0.574	-70.94	8.06	106.50	0.003	62.93	0.904	-20.85
600	0.533	-81.00	7.09	96.50	0.003	61.94	0.891	-24.71
700	0.493	-89.33	6.36	87.60	0.003	63.16	0.875	-28.18
800	0.469	-97.65	5.62	79.57	0.003	66.33	0.857	-31.89
900	0.432	-103.64	5.16	72.38	0.002	80.79	0.845	-35.21
1000	0.409	-110.68	4.70	65.39	0.002	100.33	0.831	-38.86
1100	0.396	-116.17	4.29	58.75	0.002	127.72	0.815	-42.52
1200	0.383	-122.20	3.91	52.55	0.003	152.57	0.799	-45.77
1300	0.373	-126.00	3.66	46.34	0.004	164.39	0.789	-49.49
1400	0.369	-131.29	3.38	40.61	0.006	169.63	0.776	-53.23
1500	0.366	-134.46	3.14	35.29	0.008	172.81	0.762	-56.86
1600	0.366	-140.07	2.93	29.63	0.011	172.47	0.751	-60.74
1700	0.364	-143.07	2.75	23.86	0.013	172.79	0.738	-64.66
1800	0.368	-147.48	2.58	18.42	0.016	171.54	0.727	-68.29
1900	0.377	-148.91	2.42	13.15	0.020	170.15	0.719	-72.29
2000	0.381	-153.42	2.27	7.58	0.023	167.89	0.707	-76.58
2100	0.394	-155.23	2.15	2.46	0.027	165.86	0.695	-80.50
2200	0.396	-158.91	2.03	-3.00	0.032	163.46	0.685	-84.85
2300	0.416	-160.43	1.90	-8.32	0.037	161.00	0.672	-88.93
2400	0.424	-162.98	1.81	-13.30	0.042	158.00	0.662	-93.38
2500	0.434	-166.35	1.68	-18.45	0.047	155.58	0.654	-97.89

Table 1. Scattering Parameters ($V_{CC} = 2.7\text{ V}$, $50\ \Omega$ System)

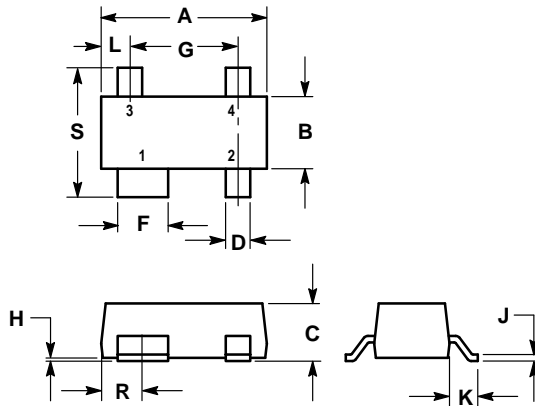
f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	S ₁₁	∠φ	S ₂₁	∠φ	S ₁₂	∠φ	S ₂₂	∠φ
100	0.744	-17.43	16.979	160.38	0.001	-2.89	0.955	-4.40
200	0.691	-33.58	15.442	142.46	0.001	83.36	0.950	-8.33
300	0.627	-47.53	13.633	127.28	0.002	76.39	0.946	-12.79
400	0.558	-59.50	11.851	114.52	0.002	70.12	0.931	-16.75
500	0.482	-67.02	10.284	103.51	0.002	67.02	0.907	-20.11
600	0.440	-75.50	8.957	94.12	0.002	66.00	0.895	-23.85
700	0.401	-81.87	7.930	85.95	0.002	68.71	0.880	-27.22
800	0.377	-88.89	7.003	78.57	0.002	73.50	0.863	-30.83
900	0.348	-93.11	6.348	71.96	0.002	90.55	0.852	-34.06
1000	0.328	-98.88	5.747	65.59	0.002	113.74	0.838	-37.62
1100	0.317	-103.27	5.223	59.57	0.002	146.45	0.822	-41.18
1200	0.306	-108.54	4.765	53.98	0.003	165.49	0.808	-44.34
1300	0.301	-111.30	4.425	48.39	0.004	175.51	0.798	-47.95
1400	0.297	-116.30	4.082	43.18	0.006	177.46	0.785	-51.59
1500	0.298	-118.89	3.790	38.32	0.008	179.45	0.771	-55.11
1600	0.298	-124.58	3.531	33.13	0.011	178.69	0.760	-58.88
1700	0.301	-127.19	3.300	28.02	0.014	178.02	0.748	-62.66
1800	0.305	-131.73	3.093	23.10	0.016	176.25	0.737	-66.16
1900	0.319	-133.16	2.901	18.34	0.020	174.44	0.729	-70.03
2000	0.324	-137.94	2.724	13.33	0.023	172.03	0.717	-74.16
2100	0.339	-140.09	2.575	8.67	0.027	169.82	0.706	-77.92
2200	0.342	-143.98	2.434	3.79	0.032	166.99	0.696	-82.07
2300	0.367	-146.00	2.278	-0.98	0.036	164.37	0.684	-86.04
2400	0.375	-148.75	2.166	-5.56	0.042	161.35	0.674	-90.25
2500	0.387	-152.75	2.020	-10.12	0.046	158.69	0.666	-94.64

Table 2. Scattering Parameters (V_{CC} = 4 V, 50 Ω System)

f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	S ₁₁	∠φ	S ₂₁	∠φ	S ₁₂	∠φ	S ₂₂	∠φ
100	0.707	-17.56	20.04	159.03	0.001	-7.95	0.954	-4.25
200	0.648	-33.40	17.93	140.29	0.001	86.24	0.950	-8.15
300	0.579	-46.60	15.53	124.94	0.002	78.79	0.946	-12.54
400	0.509	-57.44	13.31	112.38	0.002	72.27	0.931	-16.42
500	0.438	-63.51	11.40	101.70	0.002	69.34	0.908	-19.68
600	0.397	-70.90	9.87	92.70	0.002	69.55	0.896	-23.35
700	0.363	-76.05	8.69	84.92	0.002	71.59	0.882	-26.64
800	0.340	-82.18	7.67	77.89	0.002	79.44	0.865	-30.20
900	0.316	-85.44	6.91	71.60	0.002	95.59	0.855	-33.36
1000	0.298	-90.52	6.24	65.56	0.001	121.55	0.841	-36.86
1100	0.290	-94.44	5.67	59.82	0.002	152.13	0.826	-40.37
1200	0.280	-99.17	5.17	54.53	0.003	169.84	0.811	-43.48
1300	0.277	-101.65	4.79	49.25	0.005	177.80	0.802	-47.02
1400	0.274	-106.49	4.42	44.27	0.006	-179.84	0.790	-50.59
1500	0.278	-109.07	4.10	39.65	0.008	-179.19	0.776	-54.04
1600	0.276	-114.88	3.82	34.68	0.011	-179.68	0.765	-57.73
1700	0.281	-117.46	3.56	29.88	0.013	179.47	0.753	-61.43
1800	0.285	-122.11	3.34	25.21	0.016	177.73	0.742	-64.85
1900	0.300	-123.94	3.14	20.70	0.019	175.80	0.734	-68.66
2000	0.305	-128.93	2.95	15.91	0.023	173.47	0.723	-72.71
2100	0.322	-131.48	2.78	11.50	0.027	171.04	0.712	-76.37
2200	0.324	-135.50	2.63	6.84	0.031	168.25	0.703	-80.42
2300	0.351	-138.04	2.47	2.33	0.036	165.47	0.691	-84.31
2400	0.358	-140.88	2.34	-2.05	0.041	162.71	0.681	-88.42
2500	0.371	-145.28	2.19	-6.40	0.046	160.19	0.674	-92.74

Table 3. Scattering Parameters (V_{CC} = 5 V, 50 Ω System)


PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.84	1.14	0.033	0.045
D	0.39	0.50	0.015	0.020
F	0.79	0.93	0.031	0.037
G	1.78	2.03	0.070	0.080
H	0.013	0.10	0.0005	0.004
J	0.08	0.15	0.003	0.006
K	0.46	0.60	0.018	0.024
L	0.445	0.60	0.0175	0.024
R	0.72	0.83	0.028	0.033
S	2.11	2.48	0.083	0.098

**CASE 318A-05
ISSUE R**

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