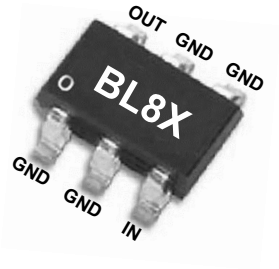
BL082

5-4000 MHz Wideband Low Nosie Amplifier

Device Features

- This can be operated at Vd of 3.3V and 5V
- N.F = 0.88 dB @ 900MHz at Demo board
- 31.6 dBm Output IP3 at 5dBm/tone at 2350MHz
- 20.9 dB Gain at 900MHz
- 19.5 dBm P1dB at 2140 MHz
- Green/RoHS2 Compliant SOT363 SMT Package

Part Marking (X:Wafer number)



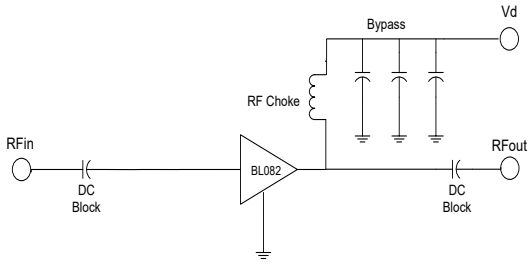
Product Description

BeRex's BL082 is a high performance LNA, based on GaAs material with E-pHEMT process and packaged in a RoHS2-compliant with SOT-363 Surface mount package. It is designed for use where low noise and high linearity are required and features low noise and high OIP3 with low current at wideband frequency. It requires a few external matching components. All devices are 100% RF/DC tested and classified as HBM ESD Class 0.

Applications

- Base station Infrastructure/RFID
- Commercial/Industrial/Military wireless system

Applications Circuit



*External matching circuit : refer to the page 4 to 16

Typical Performance[1]

Parameter	Frequency						Unit
Vd = 5.0V	900	1900	2140	2350	2650	3500	MHz
Gain	20.9	17.1	16.2	15.6	14.6	12.5	dB
S11	-26	-29	-20	-28	-26	-19.3	dB
S22	-27	-18	-17	-16	-13	-15.2	dB
OIP3[2]	28	30.3	30.6	31.6	31.4	29.9	dBm
P1dB	18.8	19.2	19.5	19.3	19	18.6	dBm
N.F	0.88	1	1.08	1.14	1.14	1.3	dB

Parameter	Frequency						Unit
Vd = 3.3V	900	1900	2140	2350	2650	3500	MHz
Gain	20.7	17	16	15.3	14.5	12.4	dB
S11	-27	-30	-22	-30	-25	-20.6	dB
S22	-26	-20	-19	-19	-16.5	-24.5	dB
OIP3[3]	26.3	28.3	28.5	28.9	28.9	29.6	dBm
P1dB	15.6	15.9	16.2	16.3	16.2	15.5	dBm
N.F	0.85	0.97	1.04	1.09	1.09	1.2	dB

[1] Device performance _ measured on BeRex's evaluation board at 25°C, 50 Ω system.

[2] OIP3 _ measured on two tones with a output power 5 dBm/ tone , F2—F1 = 1 MHz.

[3] OIP3 _ measured on two tones with a output power 3 dBm/ tone , F2—F1 = 1 MHz.

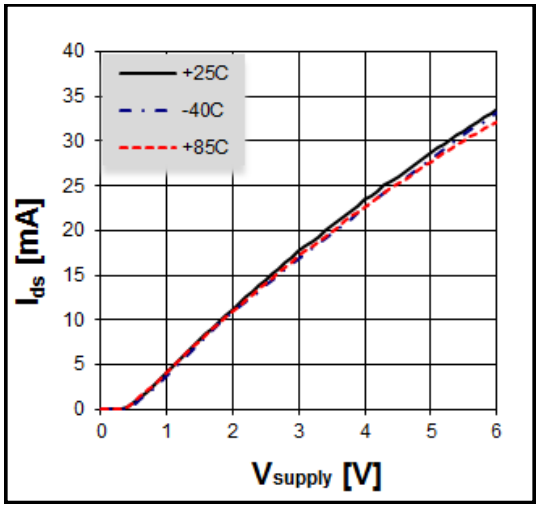
	Min.	Typical	Max.	Unit
Bandwidth	5		4000	MHz
I_d @ (Vd = 5.0V)	15	27	35	mA
I_d @ (Vd = 3.3V)	12	18	24	
dG/dT		-0.006		dB/°C
R_{TH}		95		°C/W

Absolute Maximum Ratings

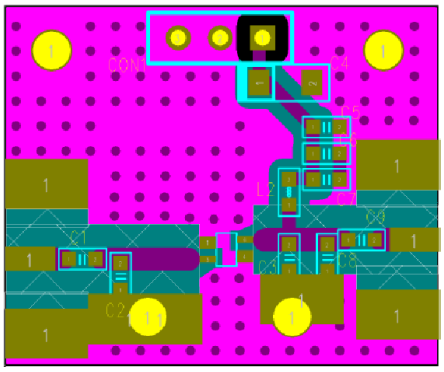
Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+165	°C
Operating Voltage	+6.0	V
Supply Current	160	mA
Input RF Power	24	dBm

Operation of this device above any of these parameters may result in permanent damage.

V-I Characteristics



BeRex SOT363 Evaluation Board

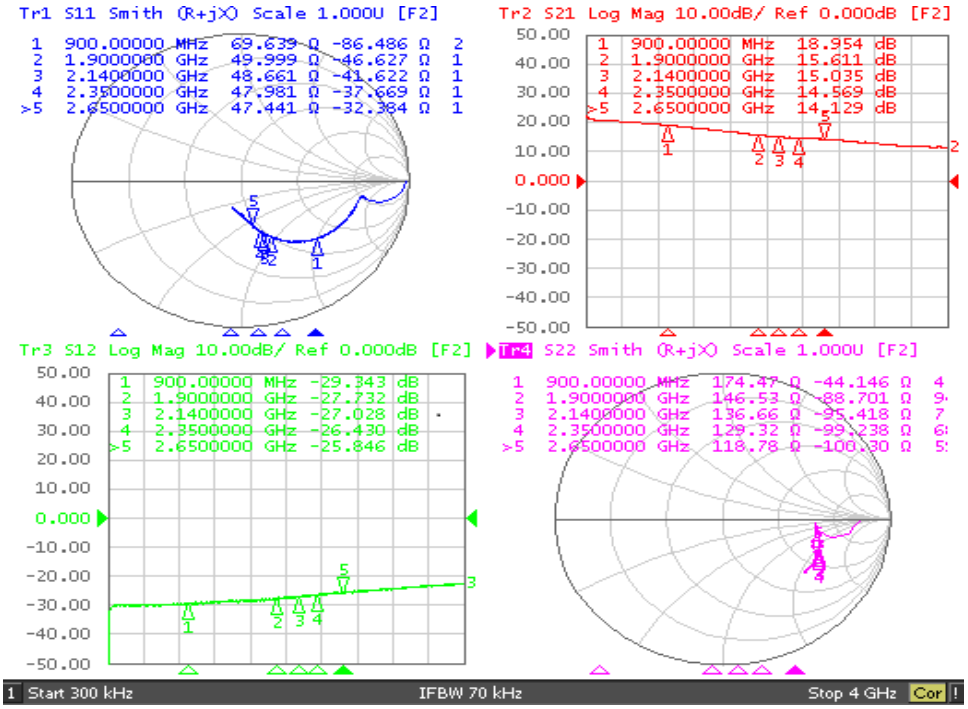


*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4 PCB

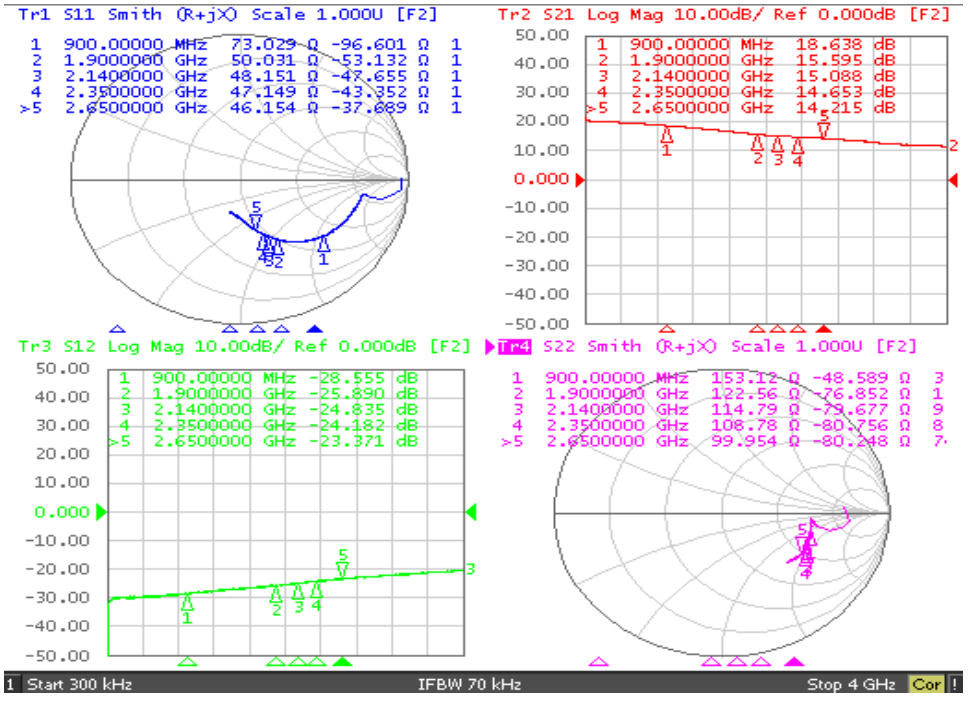
*Without vias under device degrade device performance.

Typical Device Data

S-parameters (V_d=5.0V, I_d=27mA , T=25°C)



S-parameters (V_d=3.3V, I_d=18mA, T=25°C)



S-Parameter

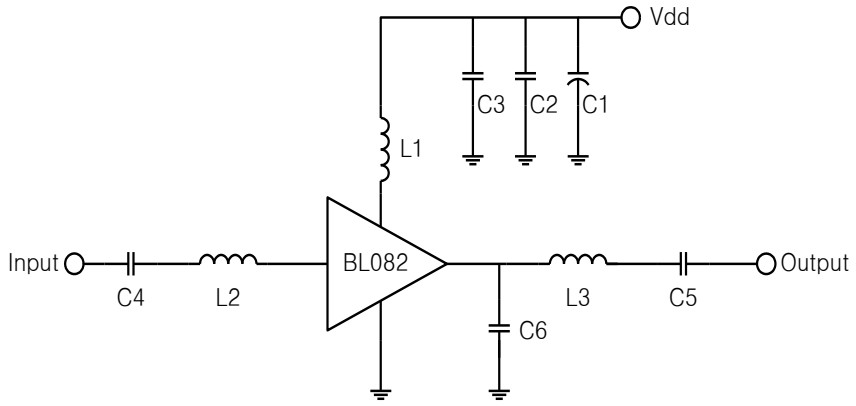
(Vd=5.0V,Id = 27mA, T = 25 °C, calibrated to device leads)

Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
40	-2.29	-9.57	21.16	173.05	-31.23	24.95	-4.34	-9.36
70	-2.68	-8.88	20.91	173.03	-30.11	16.14	-4.85	-6.90
250	-3.06	-14.48	20.59	165.75	-29.65	12.76	-5.18	-3.93
500	-3.48	-25.67	20.04	154.53	-29.99	14.93	-5.02	-4.99
1000	-4.71	-44.66	18.70	134.90	-29.41	27.50	-4.70	-9.27
1500	-6.24	-57.52	17.06	119.30	-28.47	37.06	-4.49	-14.47
2000	-7.73	-67.16	15.37	108.77	-27.42	45.98	-4.28	-19.09
2500	-9.35	-74.58	14.48	100.78	-26.01	53.57	-4.15	-23.65
3000	-11.37	-82.86	13.26	88.64	-24.72	57.28	-4.17	-27.99
3500	-13.11	-92.60	11.93	82.51	-23.60	61.17	-4.19	-32.00
4000	-14.38	-106.14	11.17	75.97	-22.65	65.89	-4.18	-36.72

(Vd=3.3V,Id = 18mA, T = 25 °C, calibrated to device leads)

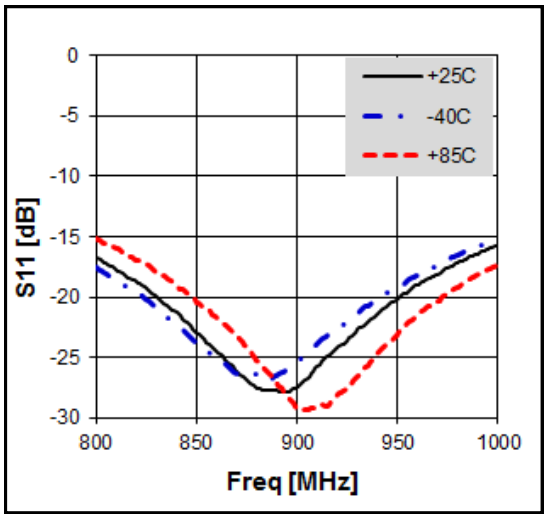
Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
40	-2.15	-9.04	20.49	173.81	-31.08	29.96	-4.65	-9.19
70	-2.50	-8.01	20.28	173.95	-30.30	17.90	-5.13	-6.78
250	-2.81	-13.25	20.03	166.99	-29.76	14.00	-5.41	-4.91
500	-3.17	-23.56	19.58	156.45	-29.61	19.15	-5.34	-7.16
1000	-4.19	-41.48	18.43	137.29	-28.16	34.34	-5.22	-12.77
1500	-5.48	-54.34	16.94	121.73	-27.05	43.05	-5.08	-18.34
2000	-6.84	-64.40	15.37	110.94	-25.54	50.93	-5.07	-23.51
2500	-8.20	-72.33	14.54	102.36	-23.83	53.63	-5.04	-28.30
3000	-9.96	-81.09	13.36	90.17	-22.60	55.62	-5.22	-32.49
3500	-11.49	-91.30	12.07	83.52	-21.37	58.79	-5.38	-36.88
4000	-12.73	-104.77	11.33	76.62	-20.49	59.04	-5.62	-41.44

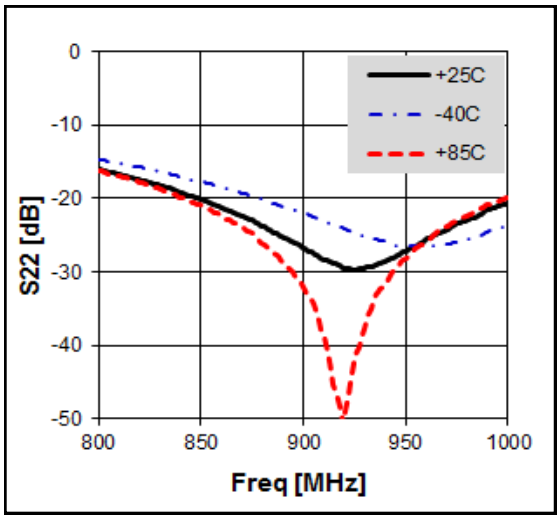
Application Circuit: 900 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	100nH	±5%
	L2	10nH	±5%
	L3	10nH	±5%

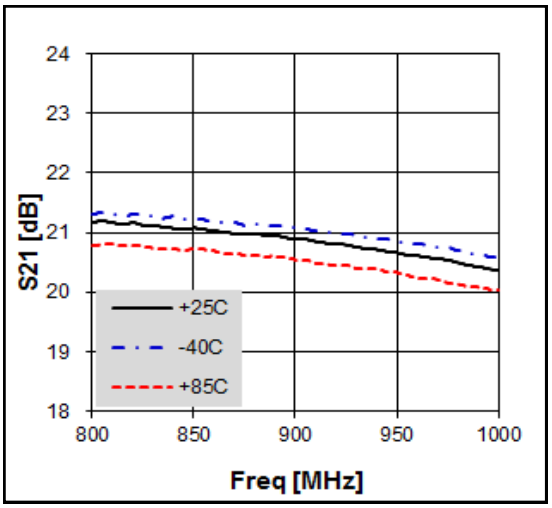
Typical Performance

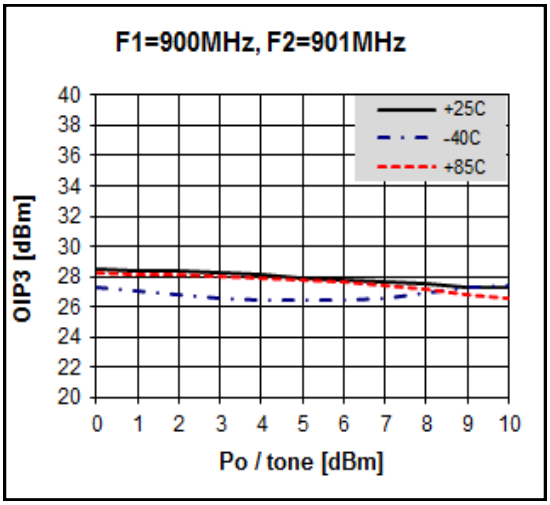
V_d = 5V, I_d = 27mA

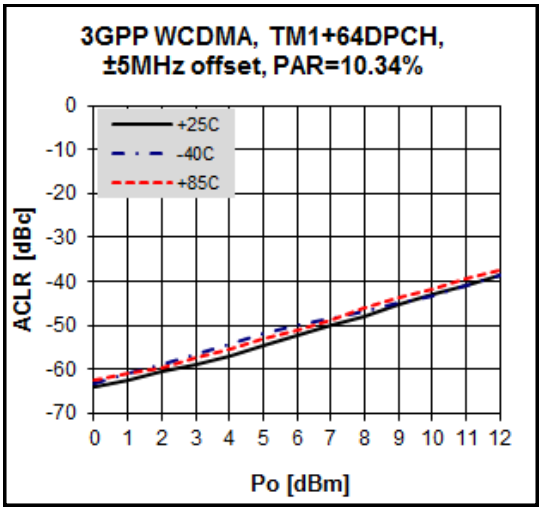


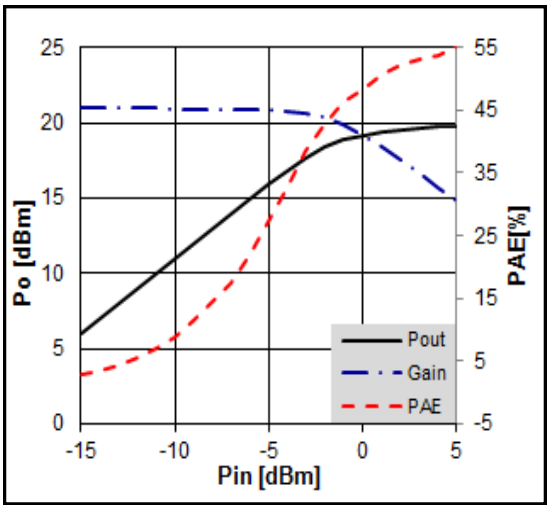


V_d = 5V, I_d = 27mA







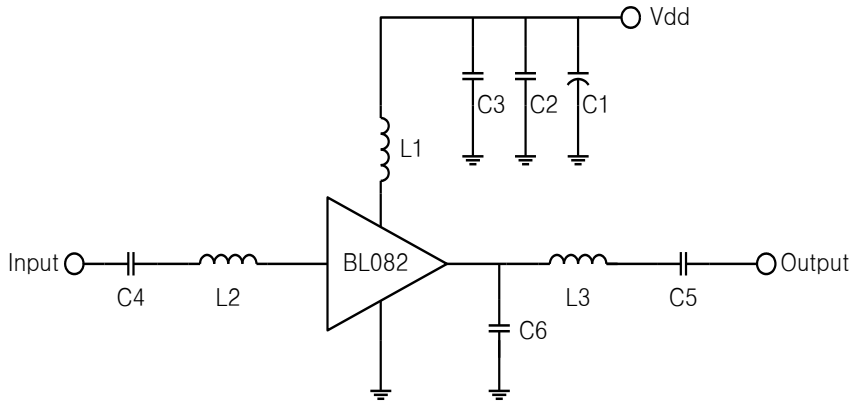


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 27.0mA)

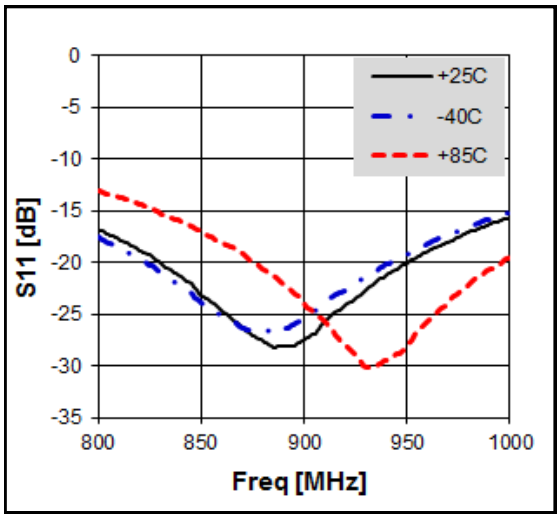
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.73	0.87	0.9	0.94	0.95
	25	0.88	1.00	1.08	1.14	1.14
	85	1.13	1.27	1.34	1.37	1.4

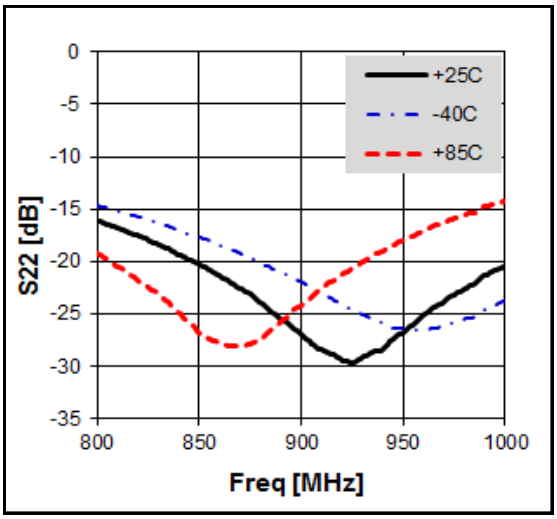
Application Circuit: 900 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	100nH	±5%
	L2	10nH	±5%
	L3	10nH	±5%

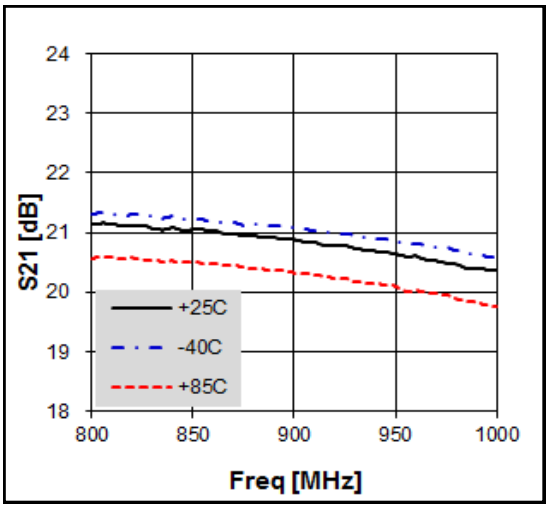
Typical Performance

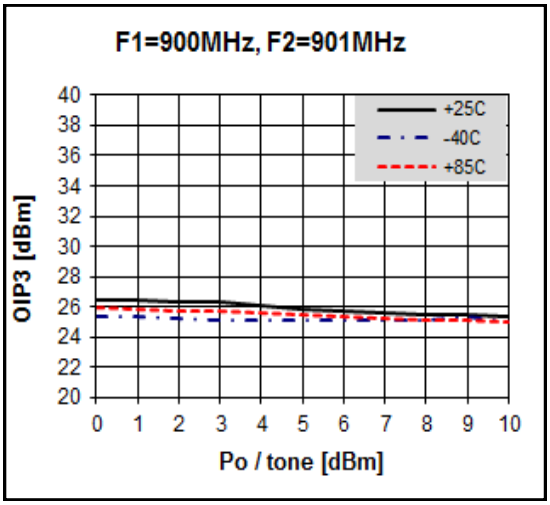
V_d = 3.3V, I_d = 18mA

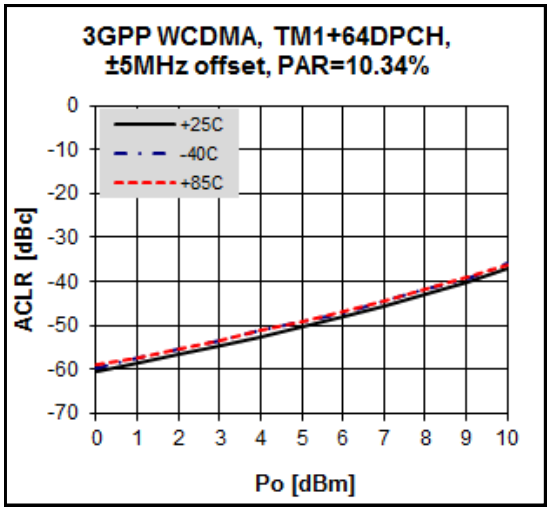


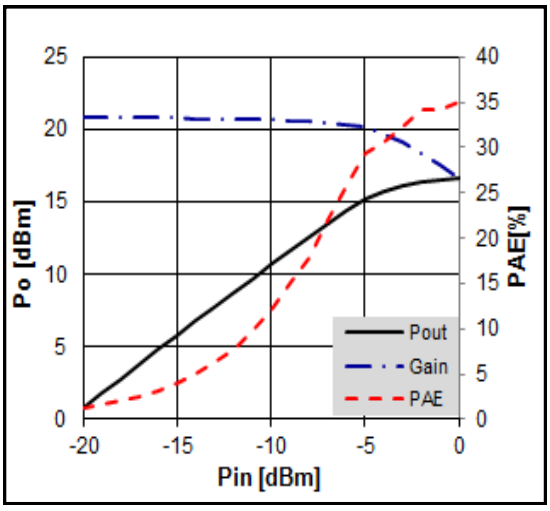


V_d = 3.3V, I_d = 18mA







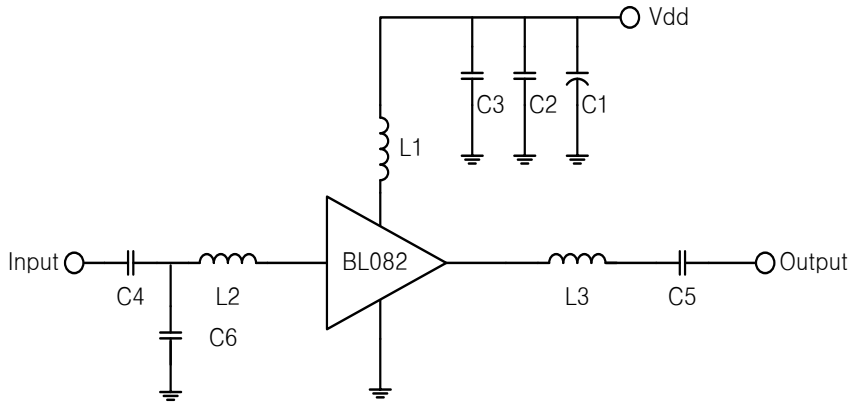


Noise Figure Temperature Performance

(Vds = 3.3V, Ids = 18.0mA)

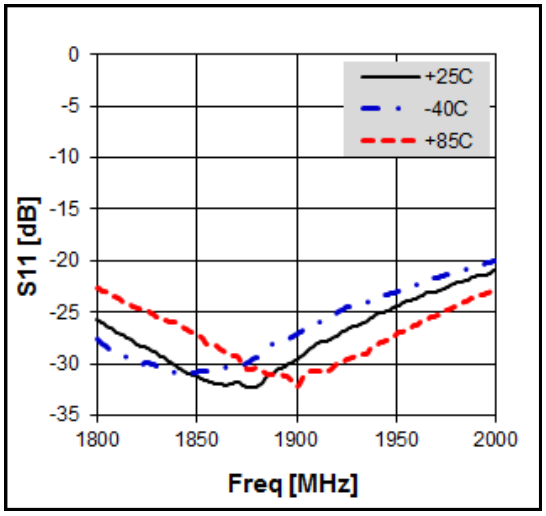
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.7	0.84	0.86	0.88	0.9
	25	0.85	0.97	1.04	1.09	1.09
	85	1.1	1.23	1.27	1.32	1.35

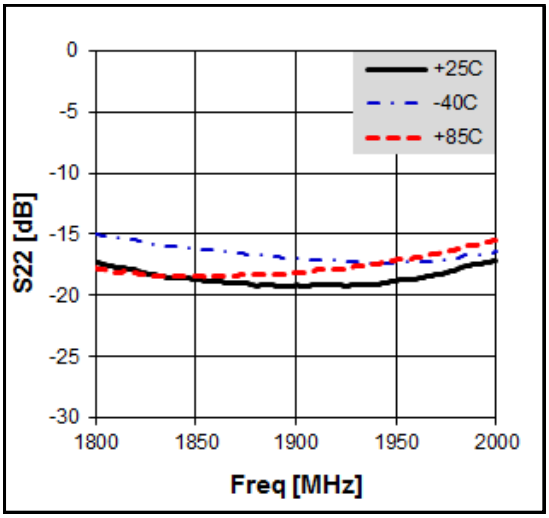
Application Circuit: 1900 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.75pF	± 5%
	L1	27nH	±5%
	L2	3.3nH	±5%
	L3	4.7nH	±5%

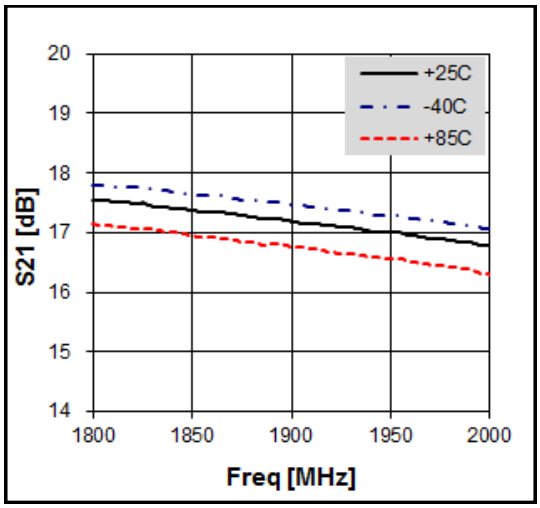
Typical Performance

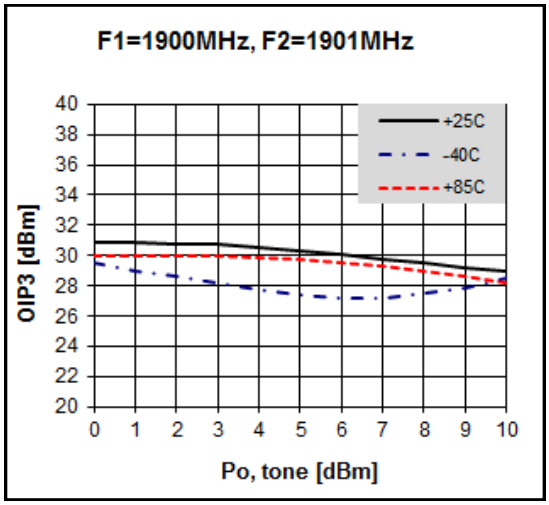
V_d = 5V, I_d = 27mA

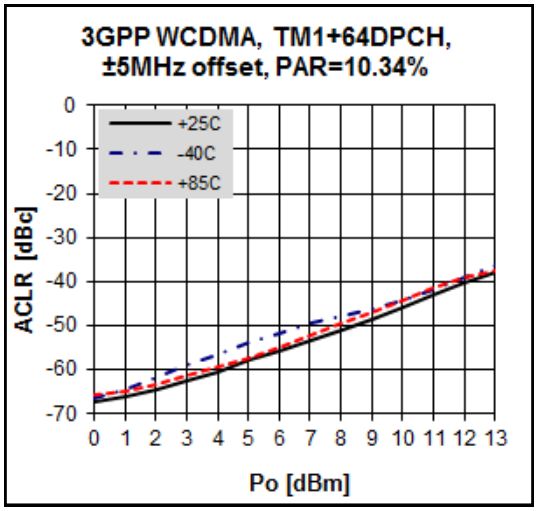


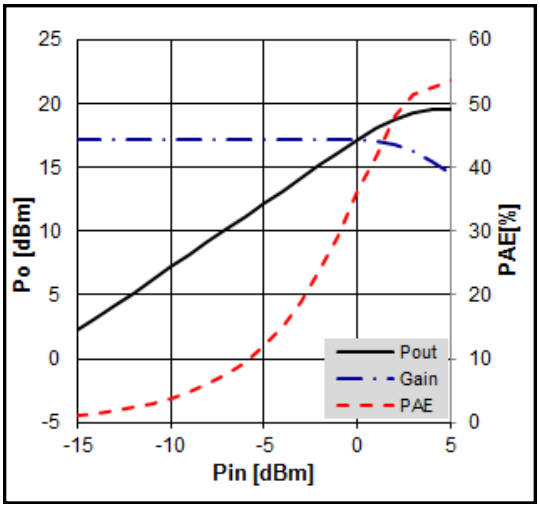


V_d = 5V, I_d = 27mA







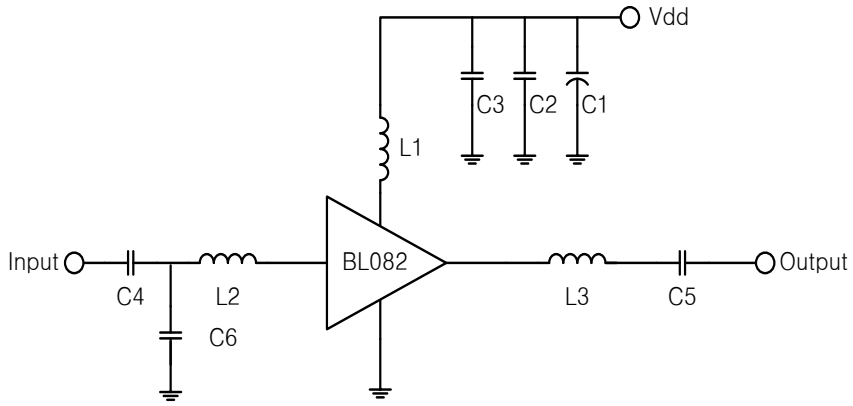


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 27.0mA)

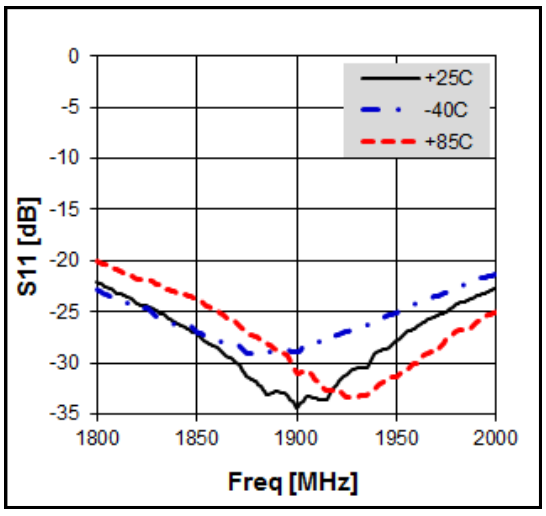
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.73	0.87	0.9	0.94	0.95
	25	0.88	1.00	1.08	1.14	1.14
	85	1.13	1.27	1.34	1.37	1.4

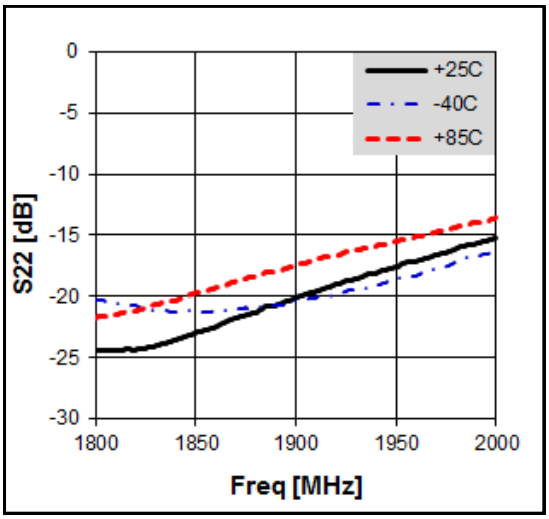
Application Circuit: 1900 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.75pF	± 5%
	L1	27nH	±5%
	L2	3.3nH	±5%
	L3	4.7nH	±5%

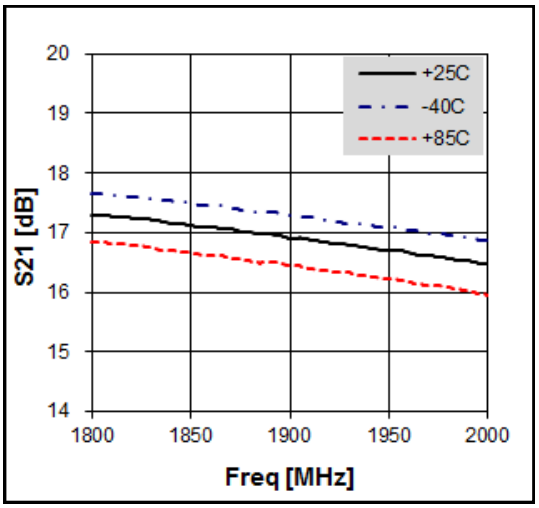
Typical Performance

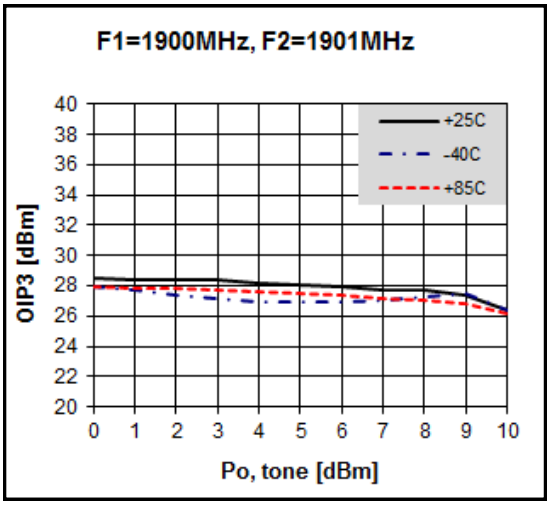
V_d = 3.3V, I_d = 18mA

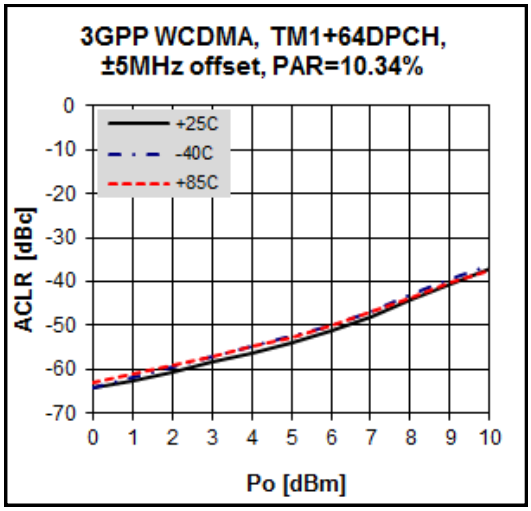


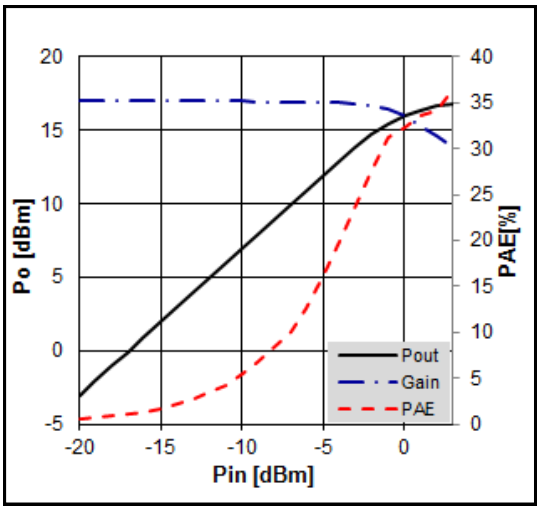


V_d = 3.3V, I_d = 18mA







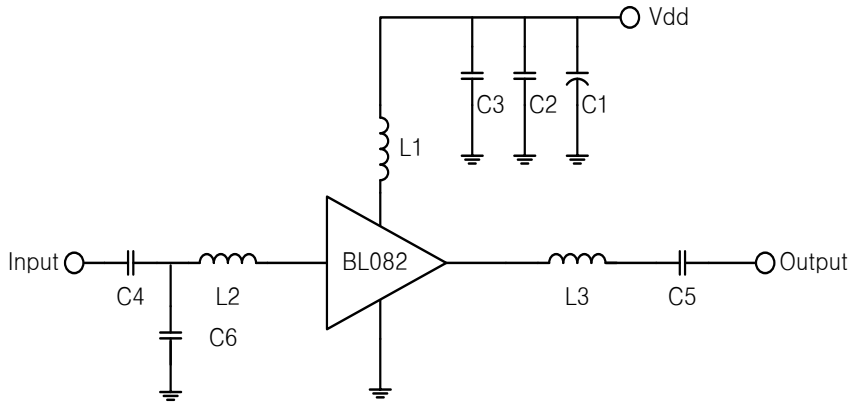


Noise Figure Temperature Performance

(Vds = 3.3V, Ids = 18.0mA)

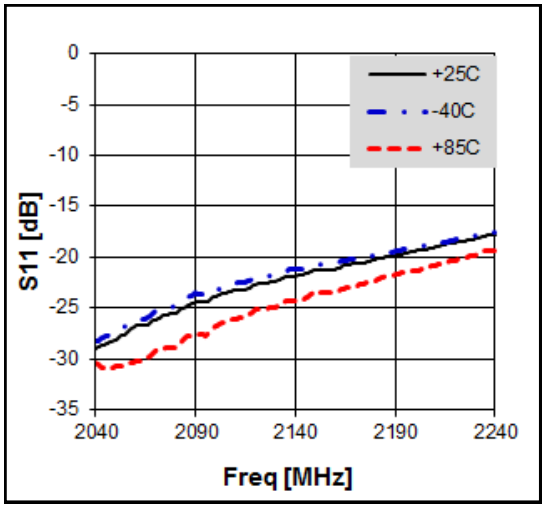
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.7	0.84	0.86	0.88	0.9
	25	0.85	0.97	1.04	1.09	1.09
	85	1.1	1.23	1.27	1.32	1.35

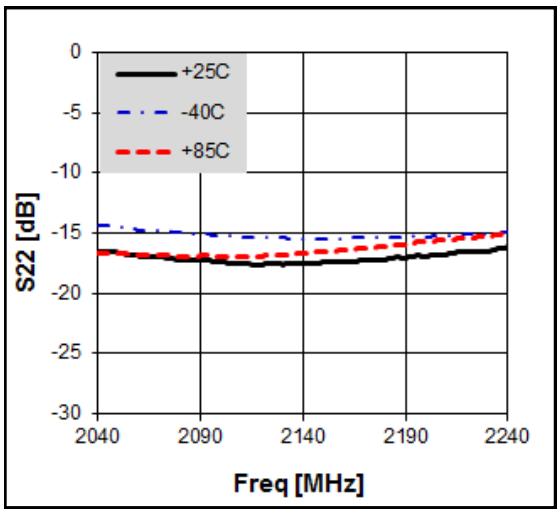
Application Circuit: 2140 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	22nH	±5%
	L2	3.3nH	±5%
	L3	3.9nH	±5%

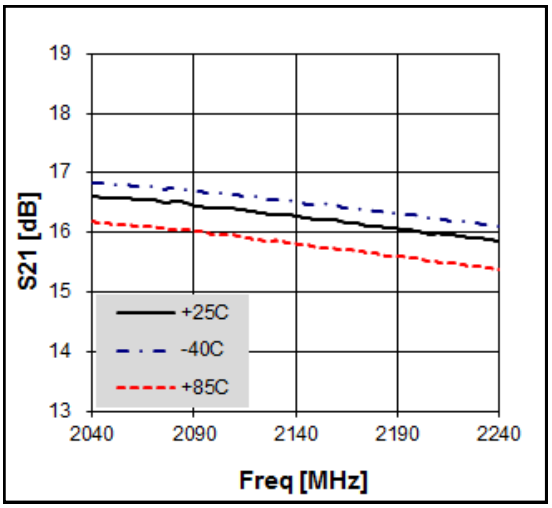
Typical Performance

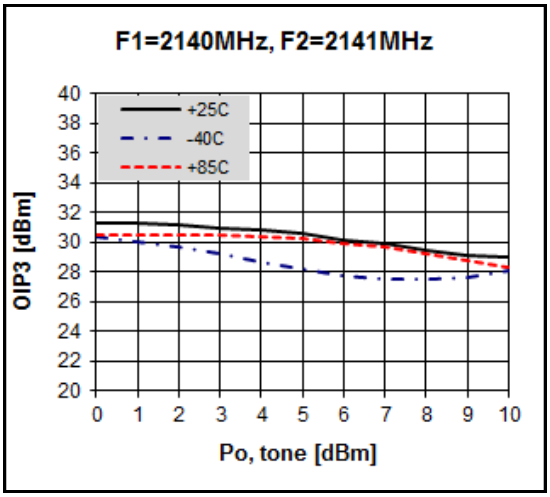
V_d = 5V, I_d = 27mA

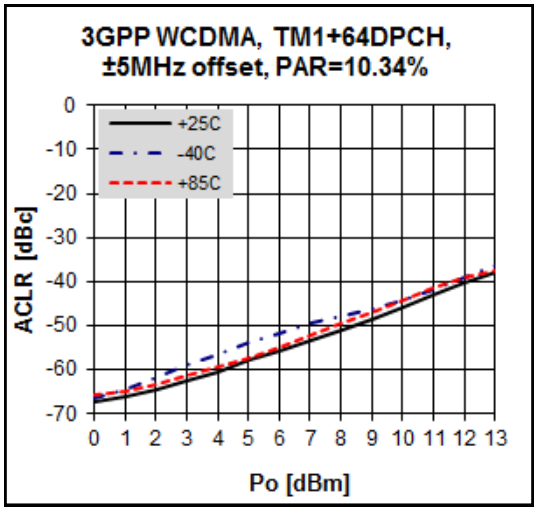


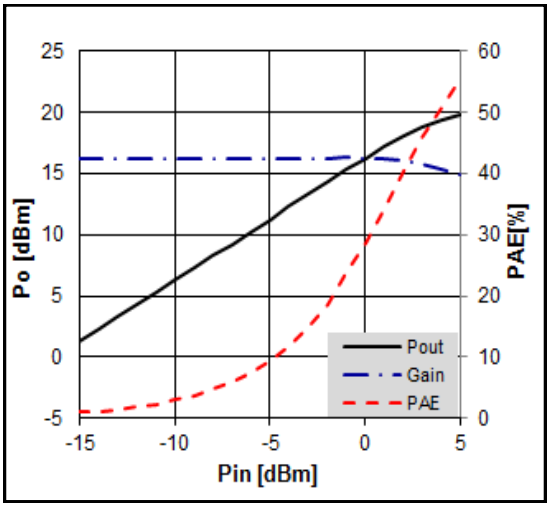


V_d = 5V, I_d = 27mA







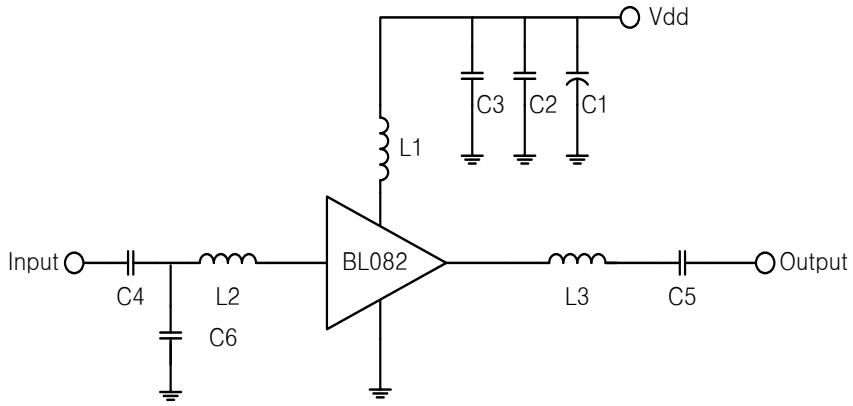


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 27.0mA)

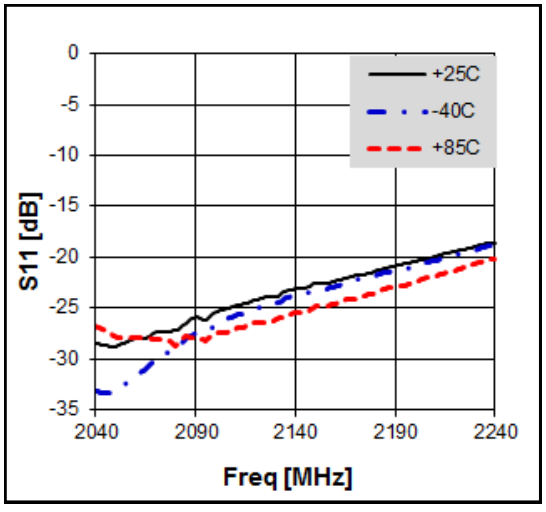
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.73	0.87	0.9	0.94	0.95
	25	0.88	1.00	1.08	1.14	1.14
	85	1.13	1.27	1.34	1.37	1.4

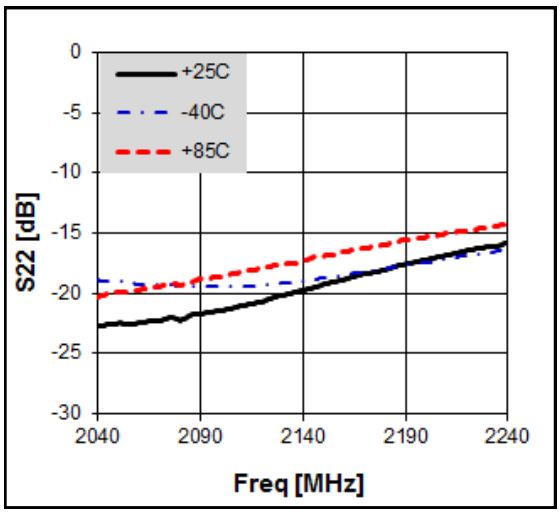
Application Circuit: 2140 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	22nH	±5%
	L2	3.3nH	±5%
	L3	3.9nH	±5%

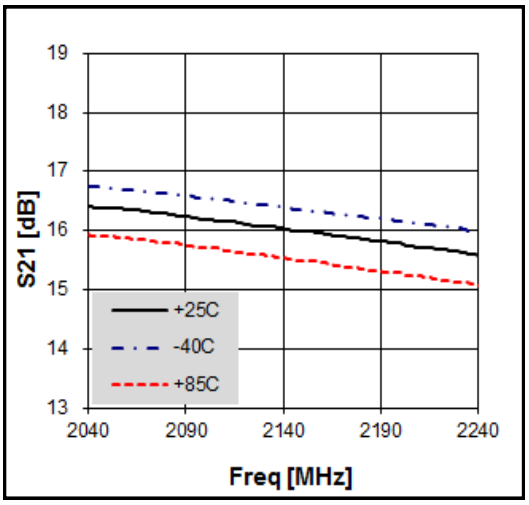
Typical Performance

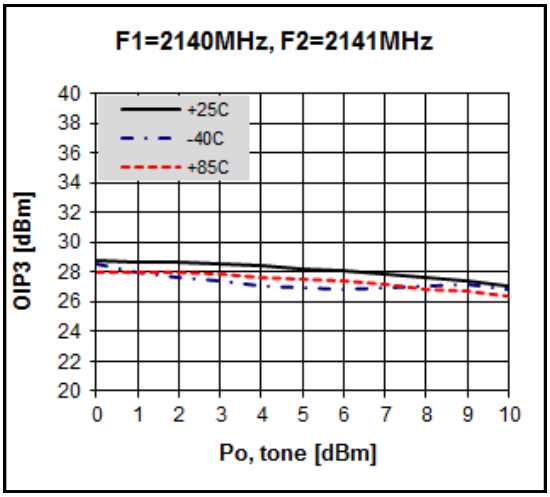
V_d = 3.3V, I_d = 18mA

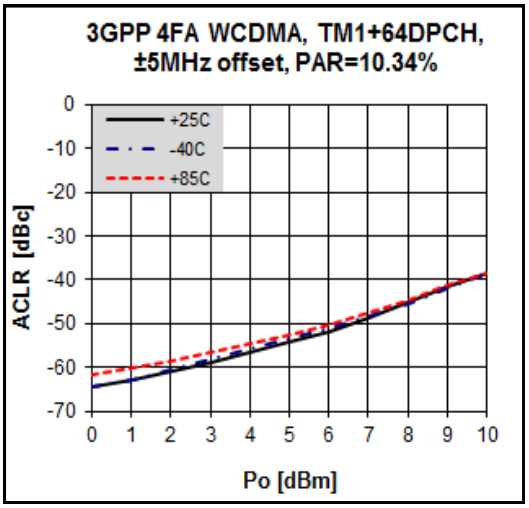


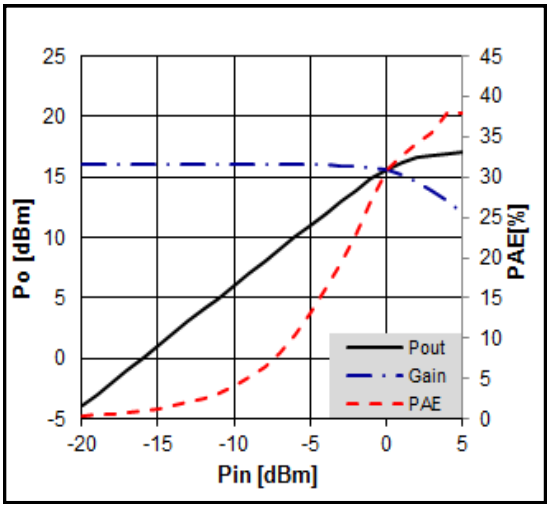


V_d = 3.3V, I_d = 18mA







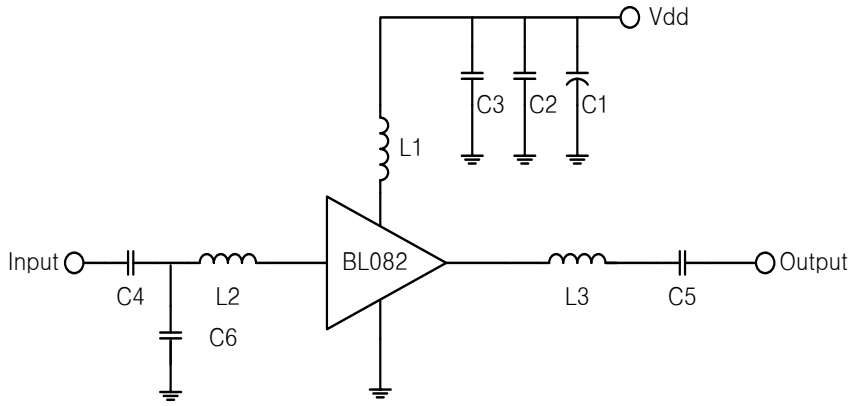


Noise Figure Temperature Performance

(Vds = 3.3V, Ids = 18.0mA)

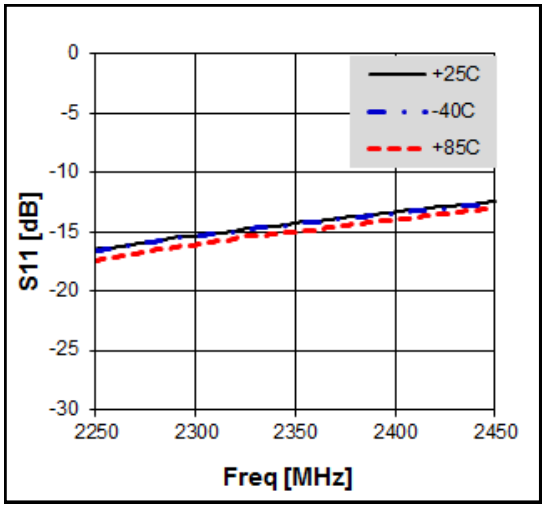
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.7	0.84	0.86	0.88	0.9
	25	0.85	0.97	1.04	1.09	1.09
	85	1.1	1.23	1.27	1.32	1.35

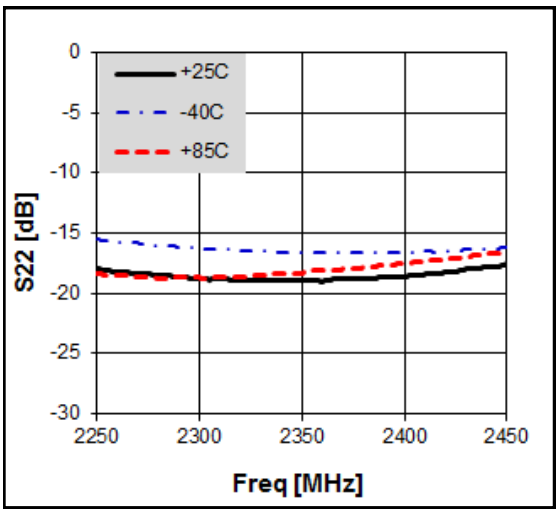
Application Circuit: 2350 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	15nH	±5%
	L2	3.3nH	±5%
	L3	3.3nH	±5%

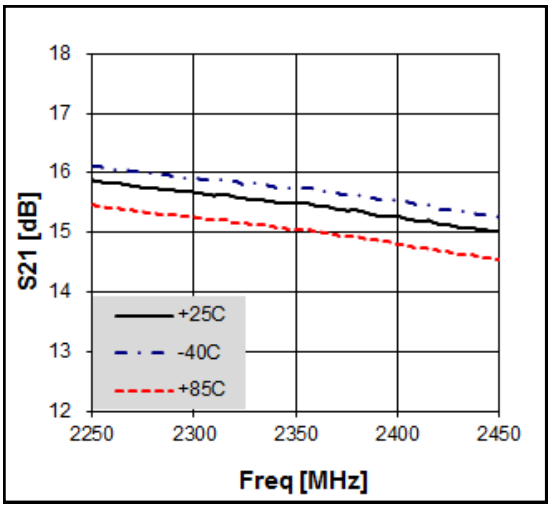
Typical Performance

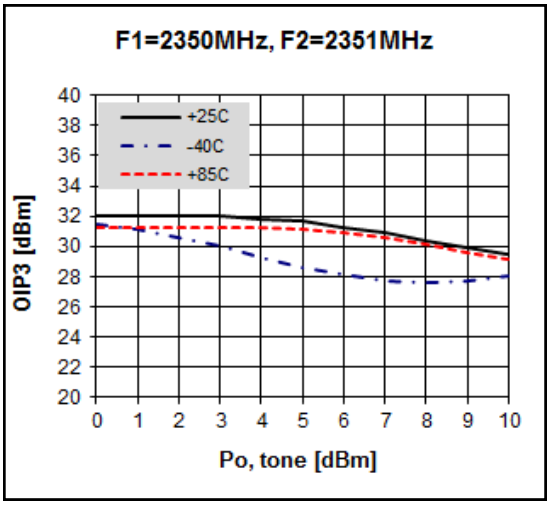
V_d = 5V, I_d = 27mA

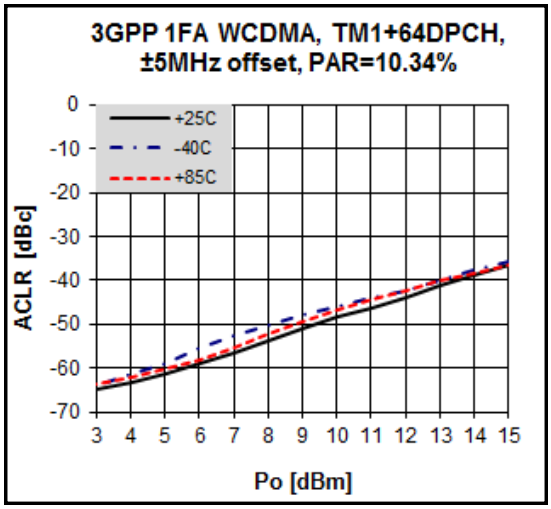


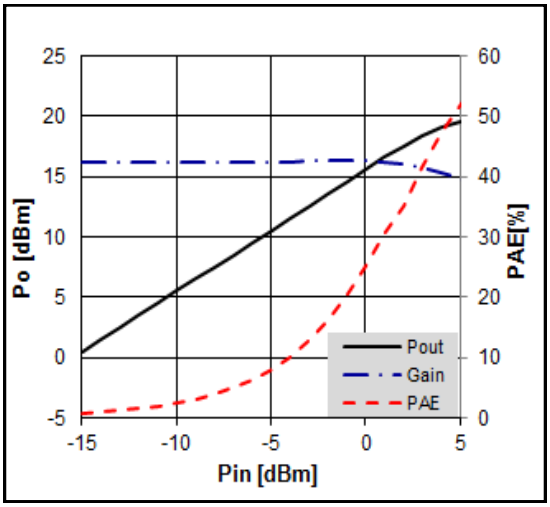


V_d = 5V, I_d = 27mA







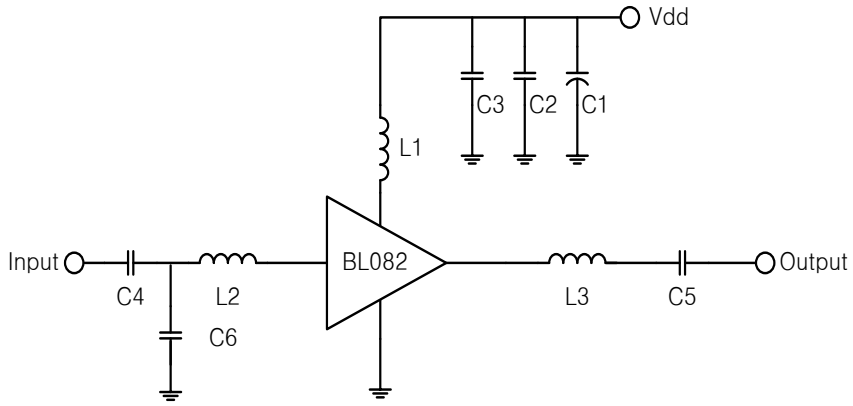


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 27.0mA)

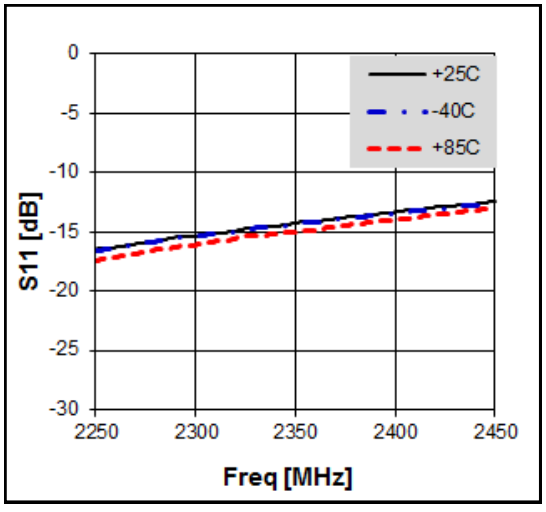
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.73	0.87	0.9	0.94	0.95
	25	0.88	1.00	1.08	1.14	1.14
	85	1.13	1.27	1.34	1.37	1.4

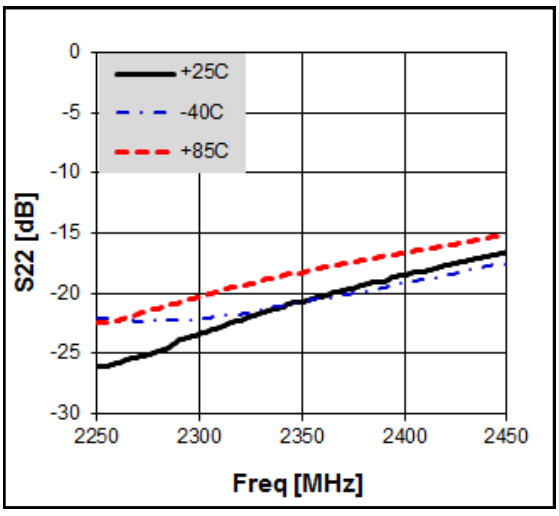
Application Circuit: 2350 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	15nH	±5%
	L2	3.3nH	±5%
	L3	3.3nH	±5%

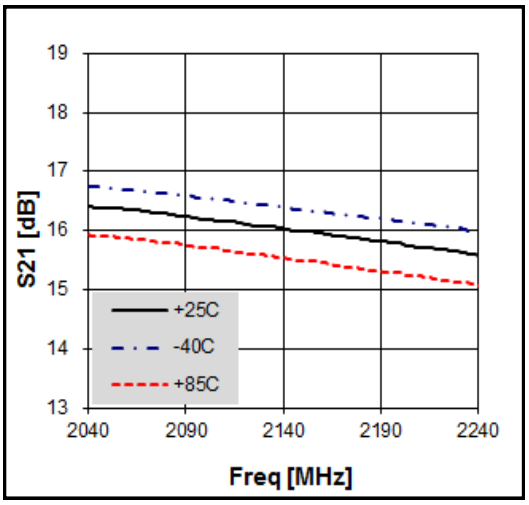
Typical Performance

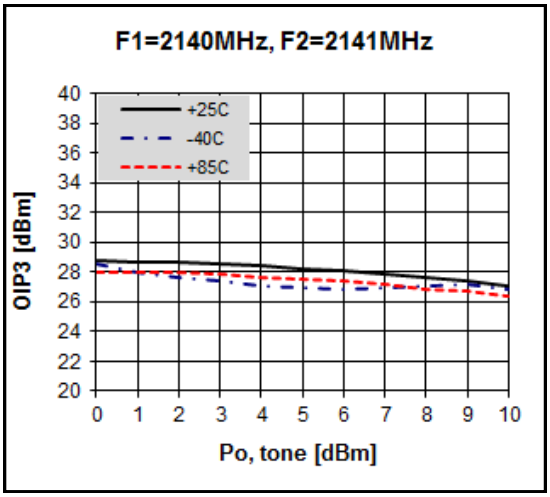
V_d = 3.3V, I_d = 18mA

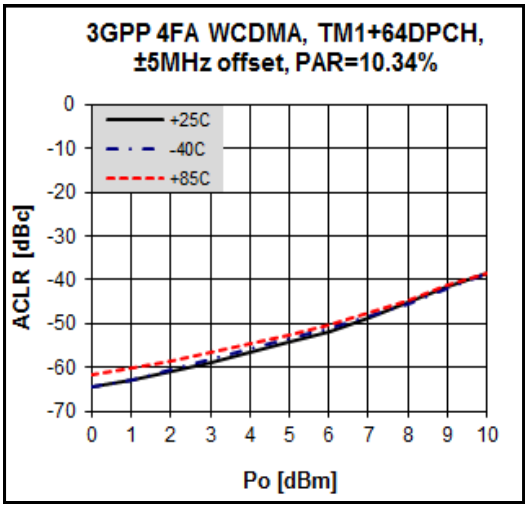


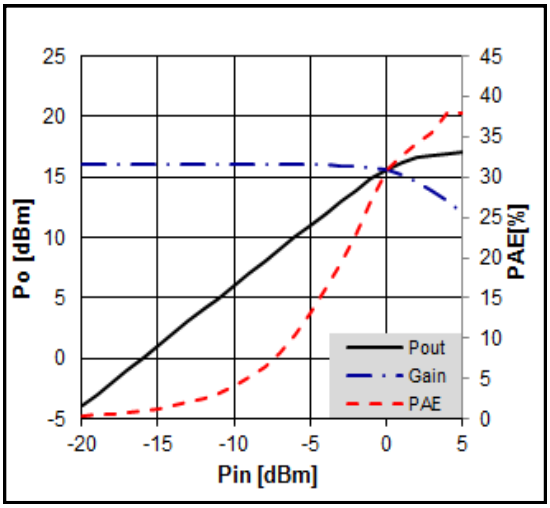


V_d = 3.3V, I_d = 18mA







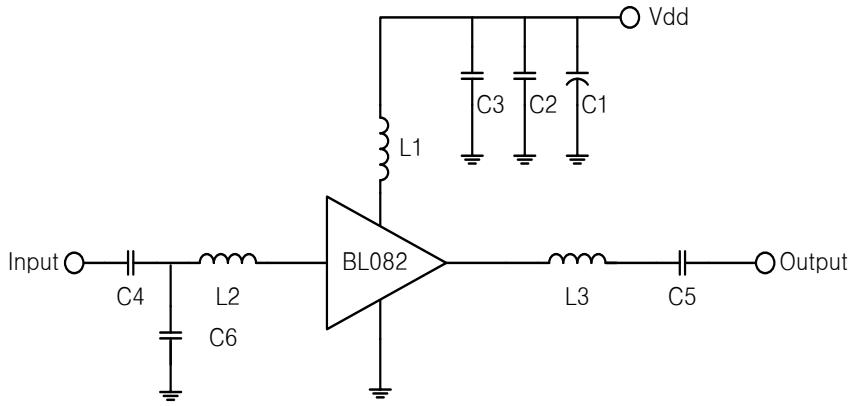


Noise Figure Temperature Performance

(Vds = 3.3V, Ids = 18.0mA)

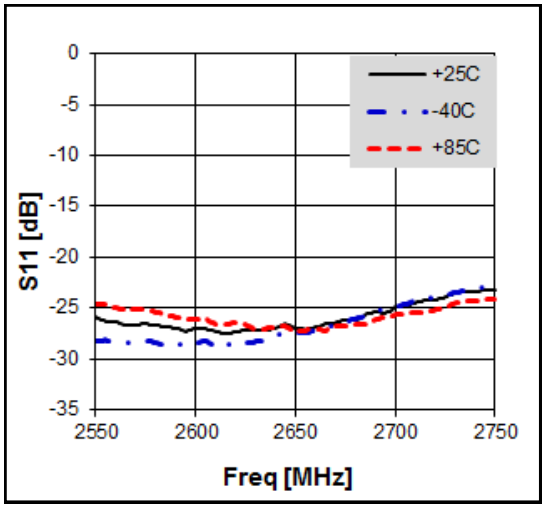
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.7	0.84	0.86	0.88	0.9
	25	0.85	0.97	1.04	1.09	1.09
	85	1.1	1.23	1.27	1.32	1.35

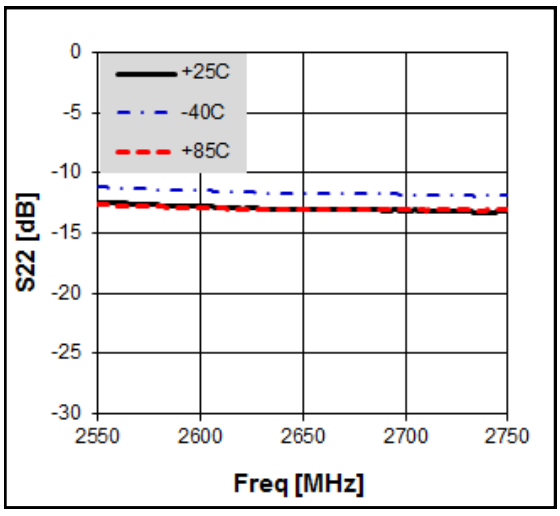
Application Circuit: 2650 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	22pF	±5%
	C5	22pF	±5%
	C6	0.3pF	± 5%
	L1	10nH	±5%
	L2	2.2nH	±5%
	L3	2.7nH	±5%

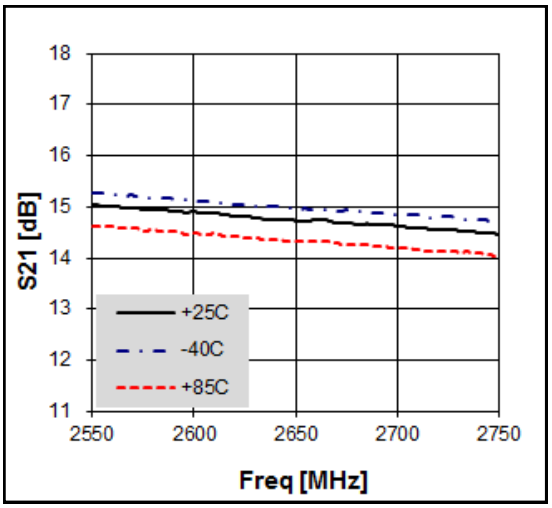
Typical Performance

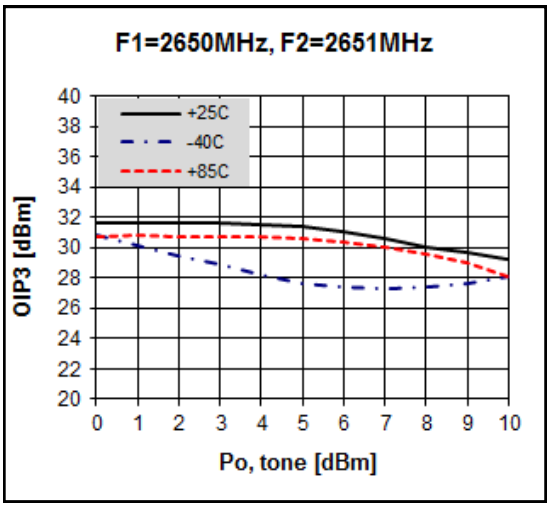
V_d = 5V, I_d = 27mA

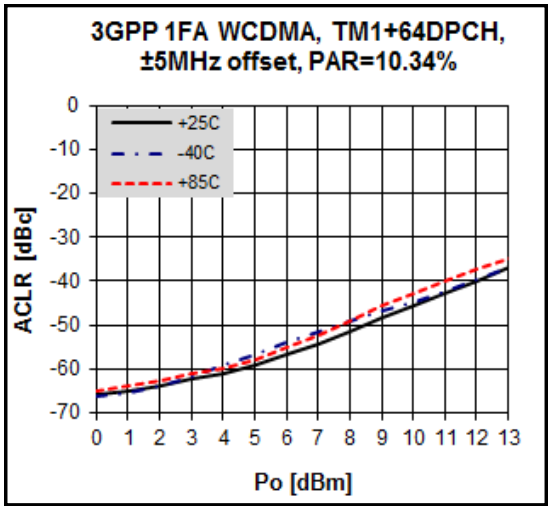


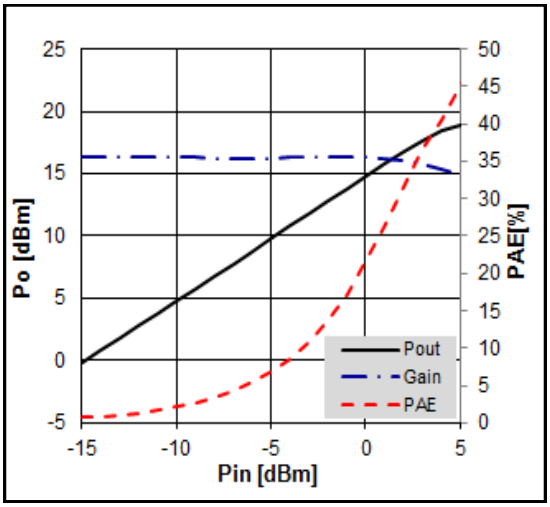


V_d = 5V, I_d = 27mA







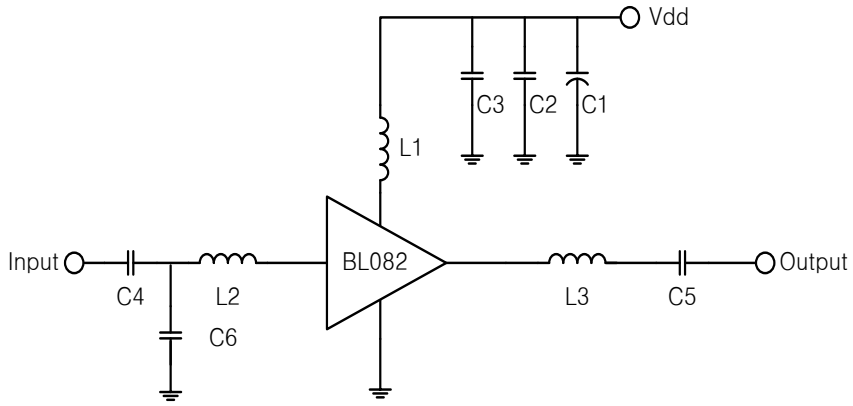


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 27.0mA)

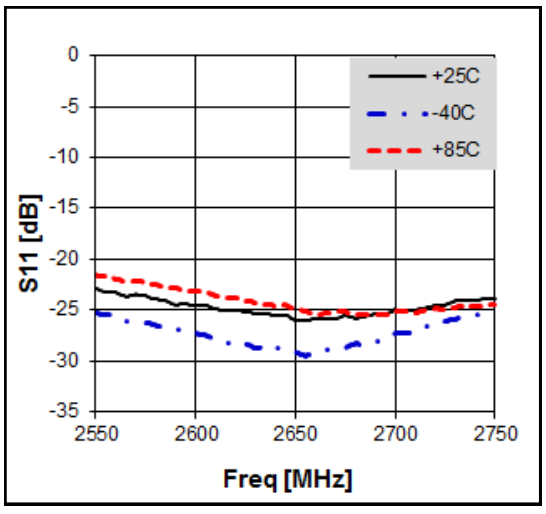
Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.73	0.87	0.9	0.94	0.95
	25	0.88	1.00	1.08	1.14	1.14
	85	1.13	1.27	1.34	1.37	1.4

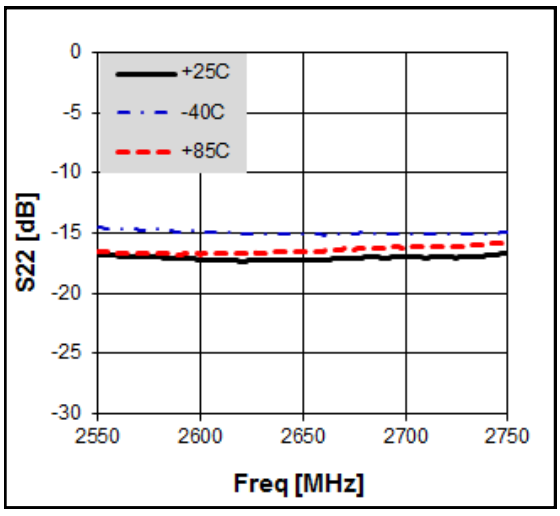
Application Circuit: 2650 MHz

Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	22pF	±5%
	C5	22pF	±5%
	C6	0.3pF	± 5%
	L1	10nH	±5%
	L2	2.2nH	±5%
	L3	2.7nH	±5%

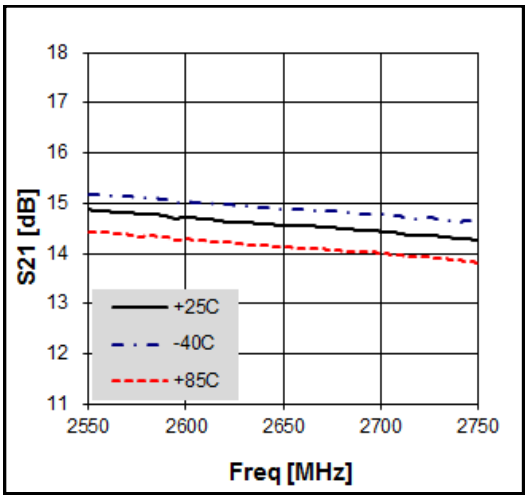
Typical Performance

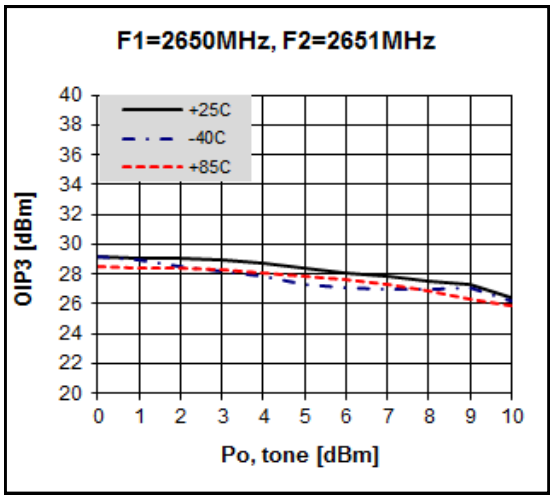
V_d = 3.3V, I_d = 18mA

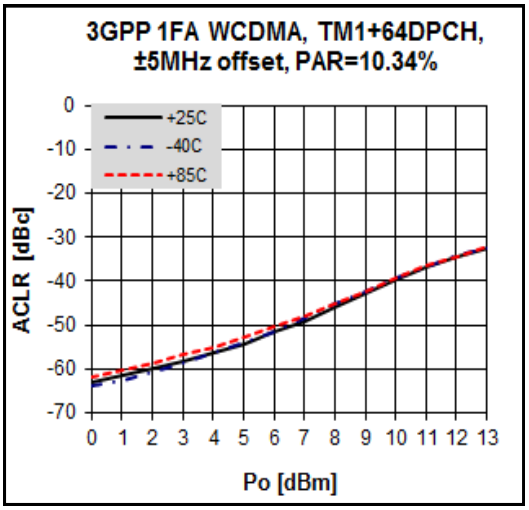


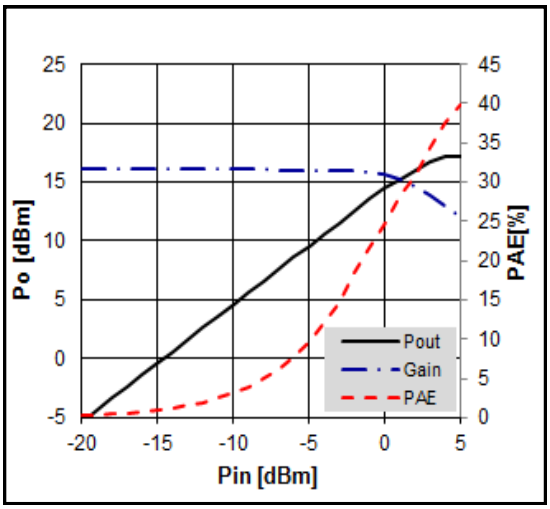


V_d = 3.3V, I_d = 18mA







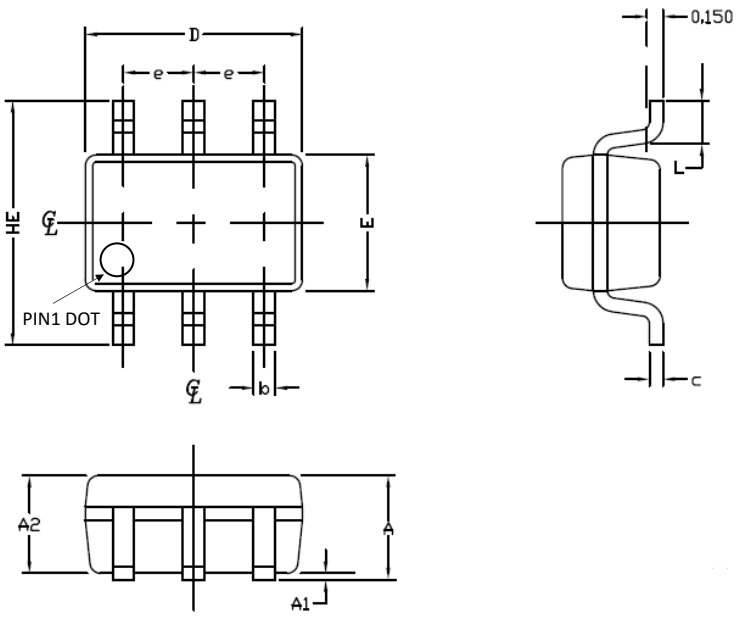


Noise Figure Temperature Performance

(Vds = 3.3V, Ids = 18.0mA)

Freq	MHz	900	1900	2140	2350	2650
Temp [°C]	-40	0.7	0.84	0.86	0.88	0.9
	25	0.85	0.97	1.04	1.09	1.09
	85	1.1	1.23	1.27	1.32	1.35

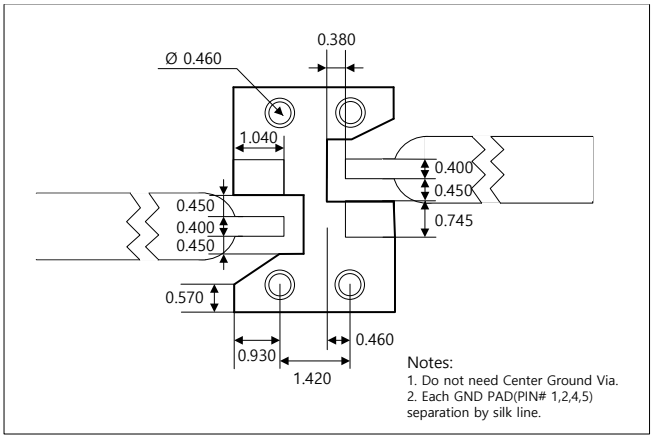
Package Outline Dimension



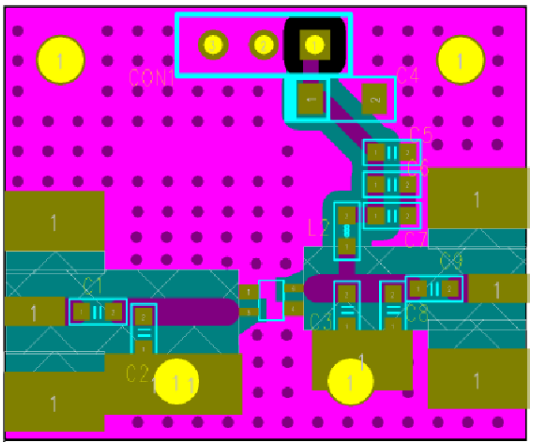
SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	2.00	2.30
A	0.80	1.00
A2	0.80	0.91
A1	0.00	0.09
e	0.65 BSC	
b	0.15	0.30
c	0.08	0.25
L	0.21	0.41

Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



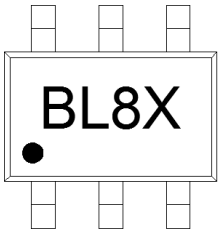
PCB Mounting



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

Package Marking

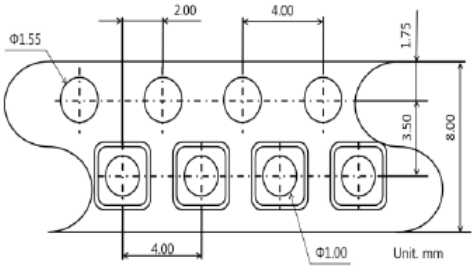


X = Wafer No.

Pin 1

Tape & Reel

SOT-363



Packaging information:

Tape Width (mm): 8

Reel Size (inches): 7

Device Cavity Pitch (mm): 4

Devices Per Reel: 3000

Lead plating finish

100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

MSL / ESD Rating

ESD Rating:	Class 0
Value:	**Passes <200V**
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114B
MSL Rating:	**Level 1 at +265°C convection reflow**
Standard:	JEDEC Standard J-STD-020

Proper ESD procedures should be followed when handling this device.

NATO CAGE code:

2	**N**	**9**	**6**	**F**