

50-4000 MHz Wideband Low Noise Amplifier

Device Features

- This can be operated at Vd of 3.0V
- N.F = 0.78 dB @ 1850MHz at Demo board
- 31.5 dBm Output IP3 at 0dBm/tone at 1850MHz
- 15.6 dB Gain at 1850MHz
- 17.7 dBm P1dB at 1850 MHz
- Lead-free/Green/RoHS Compliant SOT-363 SMT Package



Pin Description	
RF IN	3
RF OUT	6
GND	1,2,4,5

Product Description

BeRex's BL083 is a high performance LNA, based on GaAs material with E-pHEMT process and packaged in a RoHS-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 1B.

Typical Performance¹

Parameter	Frequency					Unit
	900	1850	2140	2650	3500	
Gain	20.4	15.6	14.3	13.3	10.6	dB
S11	-18.7	-12.1	-13.3	-16.8	-18.3	dB
S22	-19.5	-18.2	-15.5	-15.9	-16.0	dB
OIP3 ²	30	31.5	31.5	32.5	32.2	dBm
P1dB	17.9	17.7	17.7	17.4	17.6	dBm
N.F	0.78	0.78	0.95	0.95	1.16	dB

¹ Device performance _ measured on a BeRex evaluation board at 25°C, 50 Ω system.

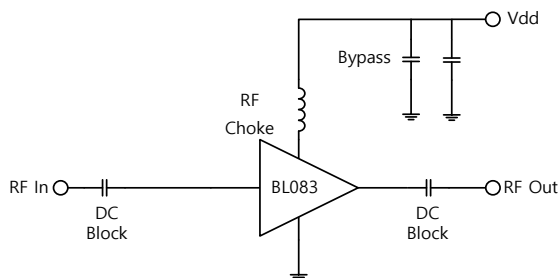
² OIP3 _ measured with two tones at an output of 0 dBm per tone separated by 1 MHz.

Applications

- Base station Infrastructure/RFID
- Commercial/Industrial/Military wireless system
- LTE / WCDMA / CDMA Wireless Infrastructure

	Min.	Typical	Max.	Unit
Bandwidth	50		4000	MHz
I _d @ (V _d = 3V)	34	42	50	mA
V _d		3		V
R _{TH}		95		°C/W

Applications Circuit



*External matching circuit : refer to the page 4 to 13

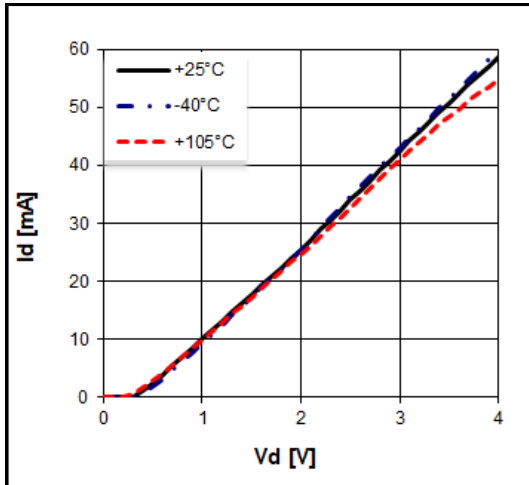
Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Case Temperature	-40 to +105	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+150	°C
Operating Voltage	+5	V
Supply Current	100	mA
Input RF Power	15	dBm

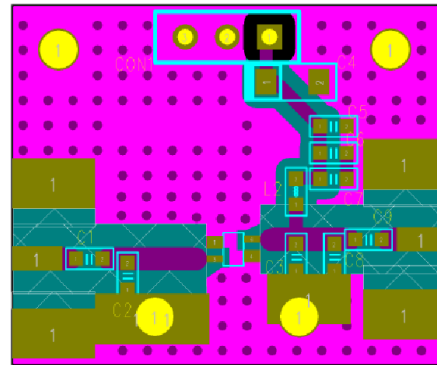
Operation of this device above any of these parameters may result in permanent damage.

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V-I Characteristics



BeRex SOT-363 Evaluation Board



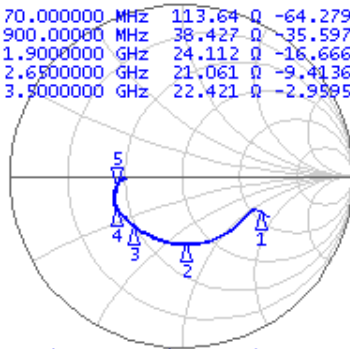
*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4 PCB
 *Without via under device degrade device performance.

Typical Device Data

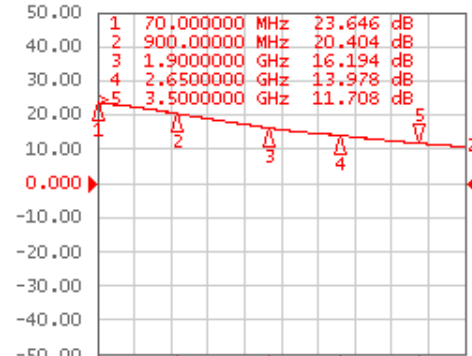
S-parameters ($V_d=3.0V$, $I_{ds}=42mA$, $T=25^\circ C$)

Tr1 S11 Smith (R+jX) Scale 1.000U [F2]

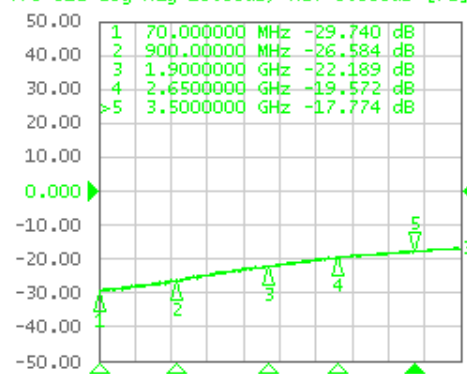
1	70.000000	MHz	113.64	Ω	-64.279	Ω	3!
2	900.000000	MHz	38.427	Ω	-35.597	Ω	4
3	1.90000000	GHz	24.112	Ω	-16.666	Ω	5
4	2.65000000	GHz	21.061	Ω	-9.4136	Ω	6
>5	3.50000000	GHz	22.421	Ω	-2.9885	Ω	1!



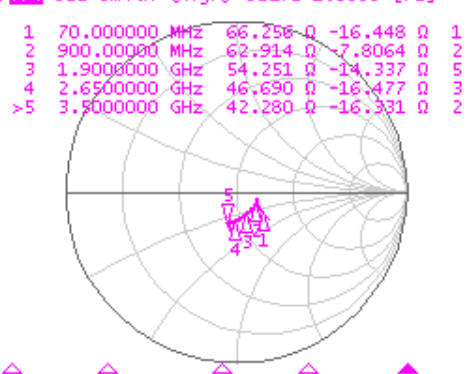
Tr2 S21 Log Mag 10.00dB/ Ref 0.000dB [F2]



Tr3 S12 Log Mag 10.00dB/ Ref 0.000dB [F2]



Tr4 S22 Smith (R+jX) Scale 1.000U [F2]



1 Start 50 MHz IFBW 70 kHz Stop 4 GHz Cor !

Preliminary Datasheet

50-4000 MHz Wideband Low Noise Amplifier

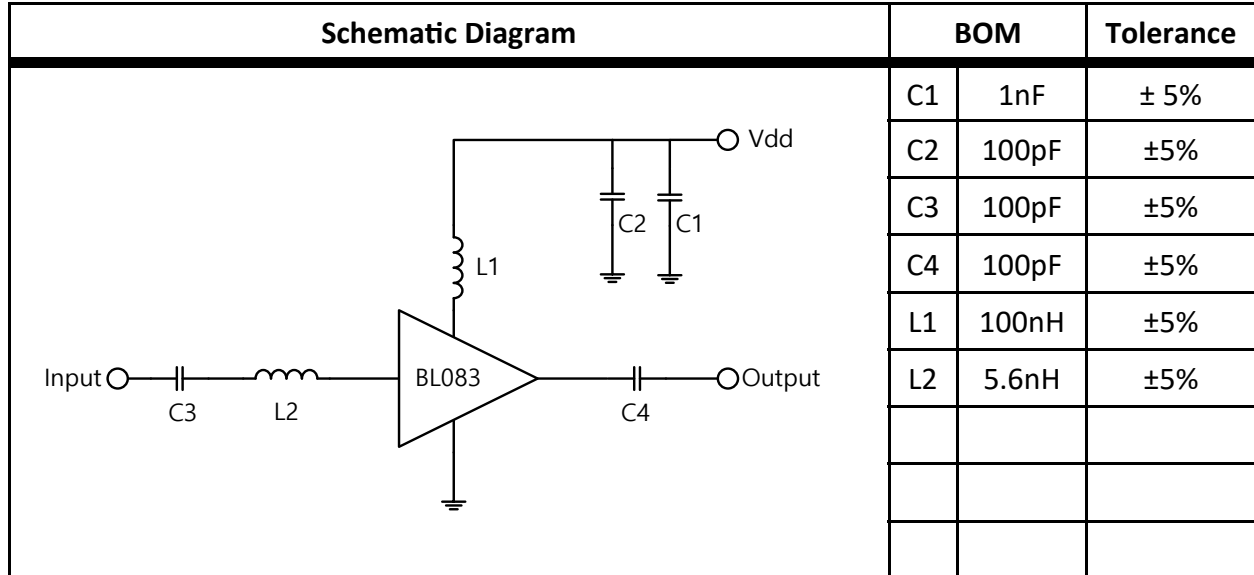
S-Parameter

(Vd=3.0V, Ids= 42mA, 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]
100	0.48	-24.14	14.85	167.26	0.035	17.00	0.16	-34.16
200	0.45	-29.04	14.33	162.11	0.036	15.26	0.13	-22.93
300	0.44	-37.34	13.89	155.85	0.036	17.58	0.13	-18.85
400	0.43	-46.12	13.36	149.47	0.039	19.05	0.13	-17.74
500	0.42	-55.40	12.82	143.16	0.039	23.01	0.13	-19.03
600	0.41	-63.83	12.22	137.32	0.041	28.86	0.13	-19.64
700	0.41	-71.69	11.66	131.85	0.044	33.61	0.13	-21.28
800	0.40	-79.16	11.04	126.91	0.045	34.28	0.13	-25.21
900	0.40	-85.97	10.49	121.99	0.049	37.43	0.14	-27.65
1000	0.39	-93.60	9.94	117.62	0.050	37.25	0.13	-31.43
1100	0.39	-99.44	9.49	113.41	0.054	37.97	0.14	-35.30
1200	0.40	-105.30	9.03	109.40	0.057	39.38	0.14	-38.49
1300	0.40	-110.18	8.57	105.61	0.058	41.46	0.14	-41.16
1400	0.39	-115.91	8.12	102.07	0.063	40.58	0.14	-45.65
1500	0.40	-119.98	7.76	98.82	0.067	41.61	0.14	-51.45
1600	0.40	-124.52	7.39	95.60	0.068	42.76	0.14	-54.71
1700	0.40	-128.02	7.08	92.48	0.071	41.78	0.14	-57.45
1800	0.41	-131.56	6.75	89.53	0.075	43.05	0.14	-61.84
1900	0.40	-134.60	6.43	86.89	0.078	41.78	0.14	-65.68
2000	0.40	-137.73	6.13	84.27	0.083	42.68	0.14	-70.75
2100	0.41	-140.57	5.93	81.94	0.084	42.94	0.15	-72.39
2200	0.41	-143.42	5.70	79.67	0.087	43.03	0.15	-76.85
2300	0.42	-146.14	5.54	77.03	0.093	43.60	0.16	-80.06
2400	0.42	-148.52	5.39	74.96	0.097	43.66	0.16	-84.15
2500	0.42	-150.55	5.22	72.86	0.100	42.55	0.17	-86.74
2600	0.42	-153.88	5.06	69.69	0.103	40.87	0.17	-90.49
2700	0.43	-157.59	4.96	67.06	0.107	39.51	0.17	-93.52
2800	0.42	-159.08	4.78	64.50	0.113	39.05	0.17	-97.15
2900	0.42	-161.36	4.61	61.88	0.111	38.73	0.17	-98.66
3000	0.41	-164.20	4.44	59.35	0.115	36.72	0.17	-99.62
3100	0.40	-165.86	4.37	57.47	0.119	36.08	0.18	-101.09
3200	0.40	-166.22	4.23	55.62	0.119	36.08	0.19	-102.16
3300	0.39	-168.66	4.06	52.67	0.124	34.52	0.19	-103.46
3400	0.39	-170.45	3.96	50.24	0.126	32.95	0.19	-104.64
3500	0.38	-171.62	3.84	48.10	0.129	32.56	0.19	-104.82
3600	0.38	-172.78	3.77	45.98	0.134	31.66	0.20	-105.39
3700	0.37	-174.41	3.68	43.57	0.135	29.16	0.20	-103.98
3800	0.36	-176.44	3.60	40.52	0.139	28.12	0.21	-101.78
3900	0.35	-177.54	3.52	37.78	0.141	25.63	0.22	-98.88
4000	0.33	-177.45	3.39	33.95	0.143	22.40	0.23	-95.63

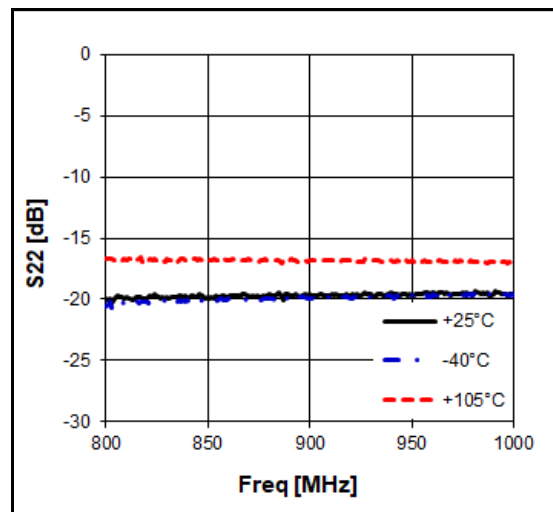
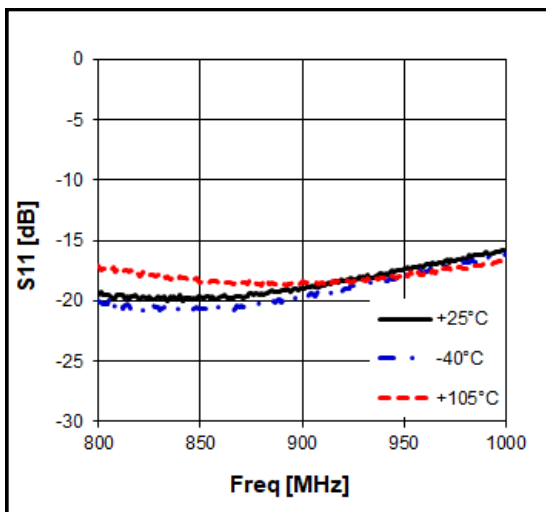
50-4000 MHz Wideband Low Noise Amplifier

Application Circuit: 900 MHz



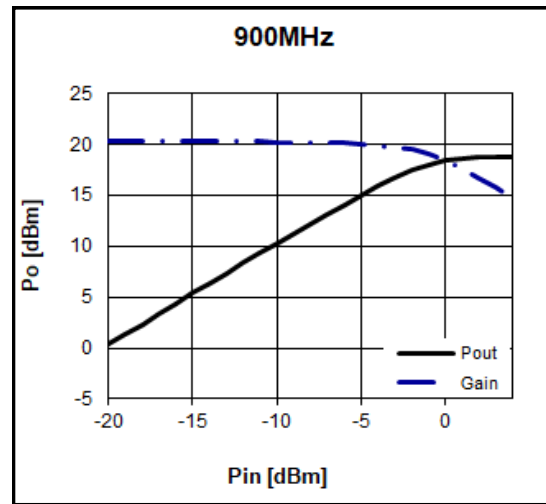
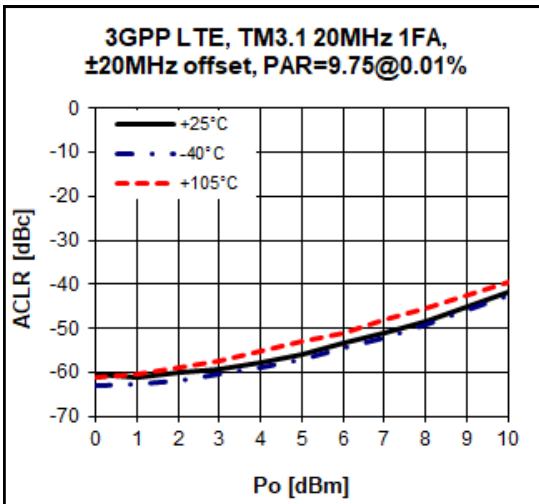
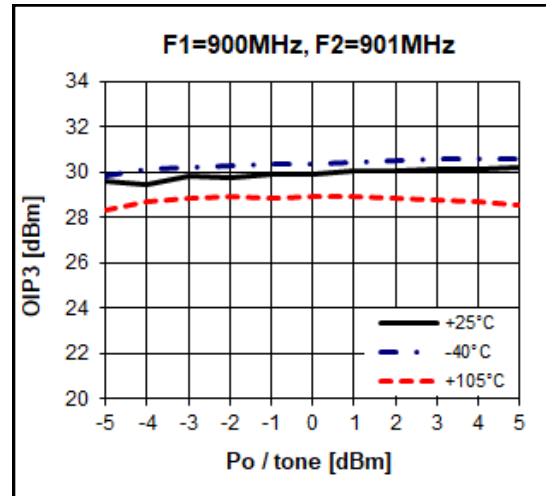
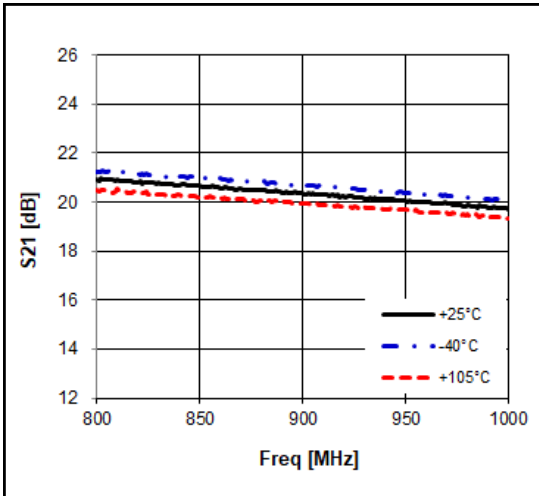
Typical Performance

$$V_d = 3V, I_{dq} = 42mA$$



50-4000 MHz Wideband Low Noise Amplifier

$V_d = 3V, I_{dq} = 42mA$



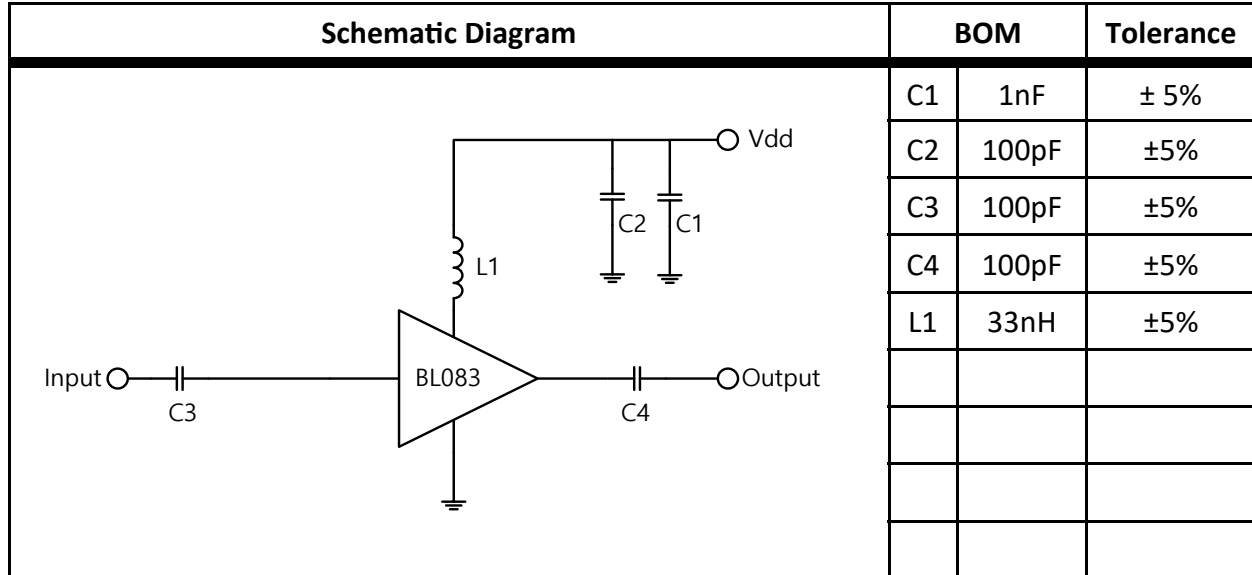
Noise Figure Temperature Performance

($V_d = 3V, I_{dq} = 42mA$)

Freq	MHz	900	1850	2140	2650	3500
Temp [°C]	-40	0.69	0.67	0.81	0.79	1.04
	25	0.78	0.78	0.95	0.95	1.16
	105	0.84	0.84	1.04	1.12	1.43

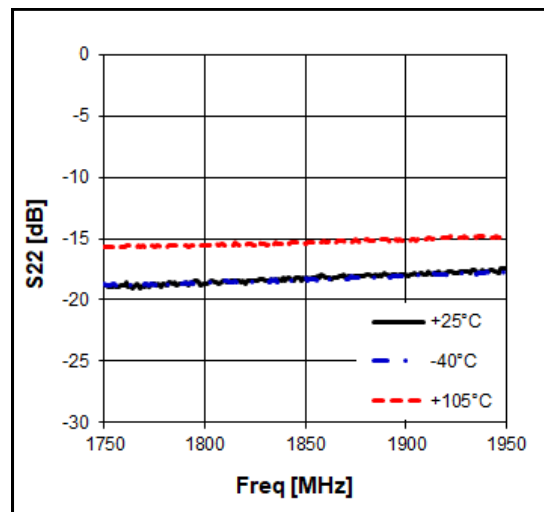
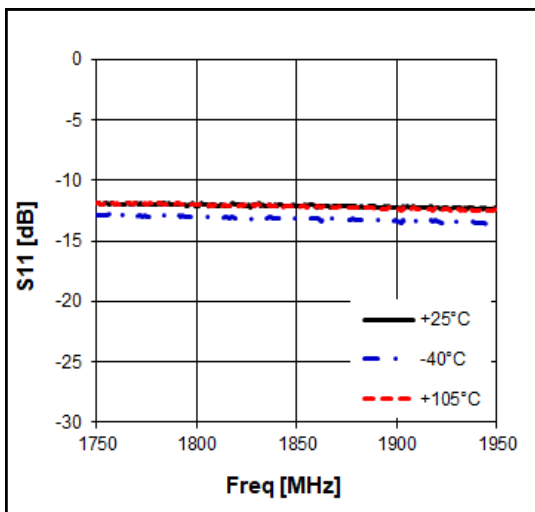
50-4000 MHz Wideband Low Noise Amplifier

Application Circuit: 1850 MHz



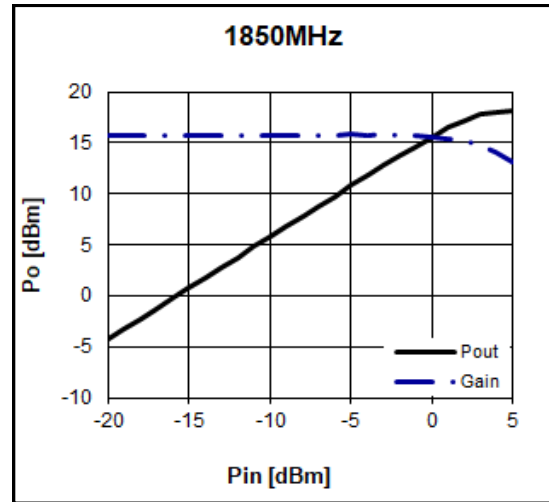
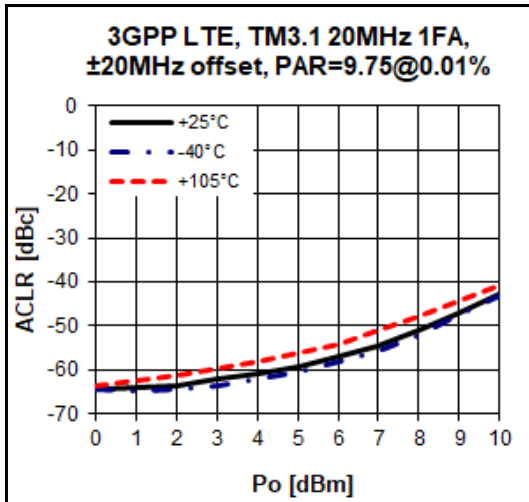
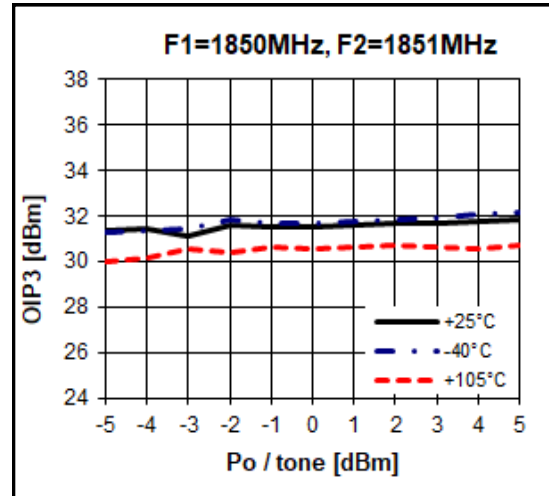
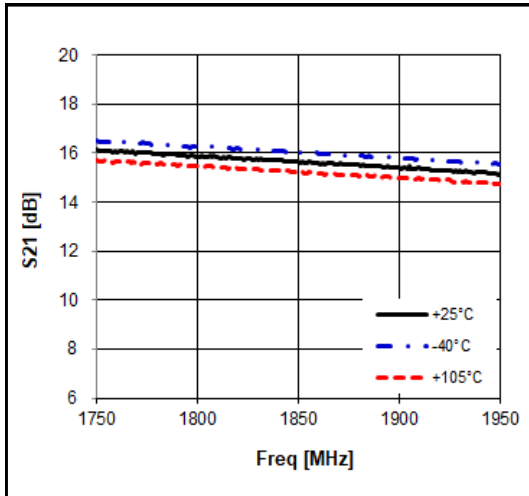
Typical Performance

$$V_d = 3V, I_{dq} = 42mA$$



50-4000 MHz Wideband Low Noise Amplifier

$V_d = 3V, I_{dq} = 42mA$



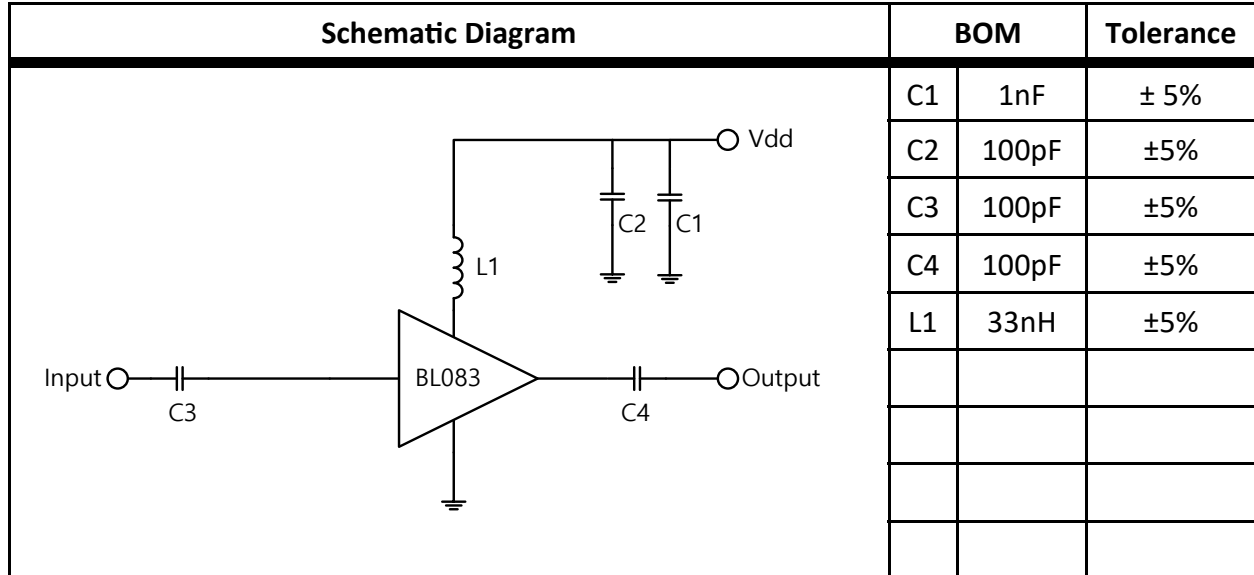
Noise Figure Temperature Performance

($V_d = 3V, I_{dq} = 42mA$)

Freq	MHz	900	1850	2140	2650	3500
Temp [°C]	-40	0.69	0.67	0.81	0.79	1.04
	25	0.78	0.78	0.95	0.95	1.16
	105	0.84	0.84	1.04	1.12	1.43

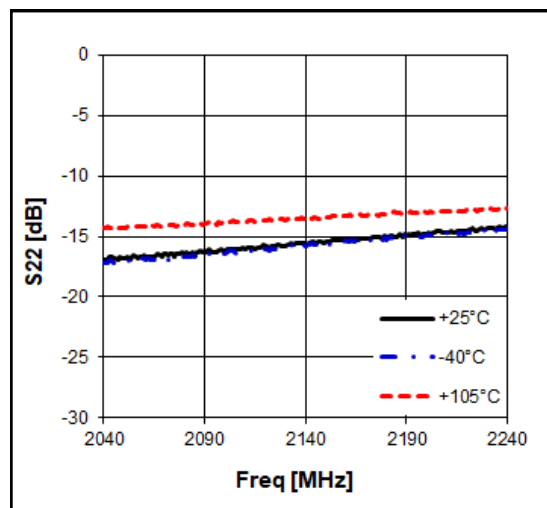
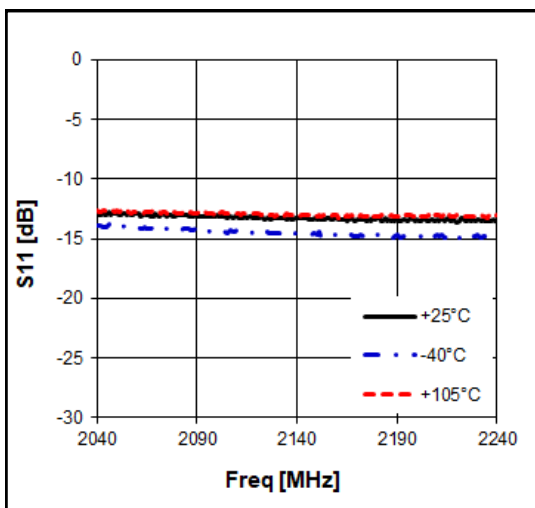
50-4000 MHz Wideband Low Noise Amplifier

Application Circuit: 2140 MHz



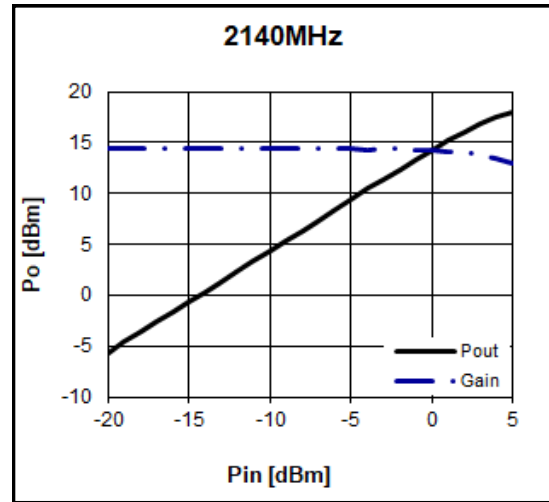
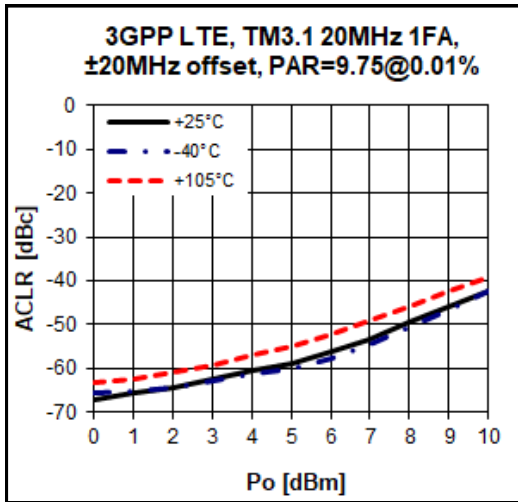
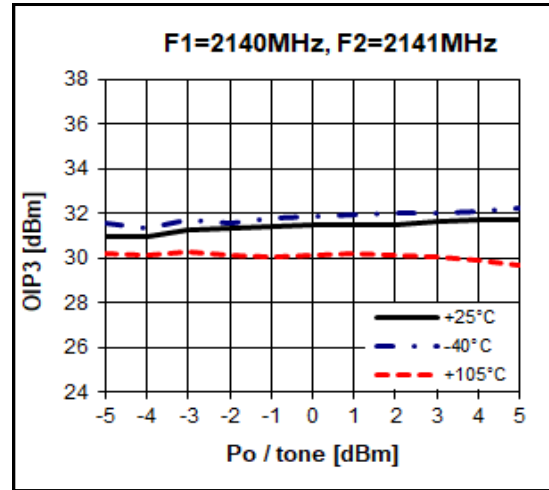
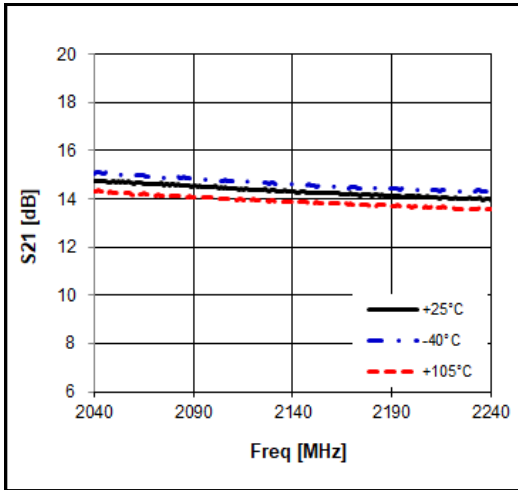
Typical Performance

$$V_d = 3V, I_{dq} = 42mA$$



50-4000 MHz Wideband Low Noise Amplifier

$V_d = 3V, I_{dq} = 42mA$



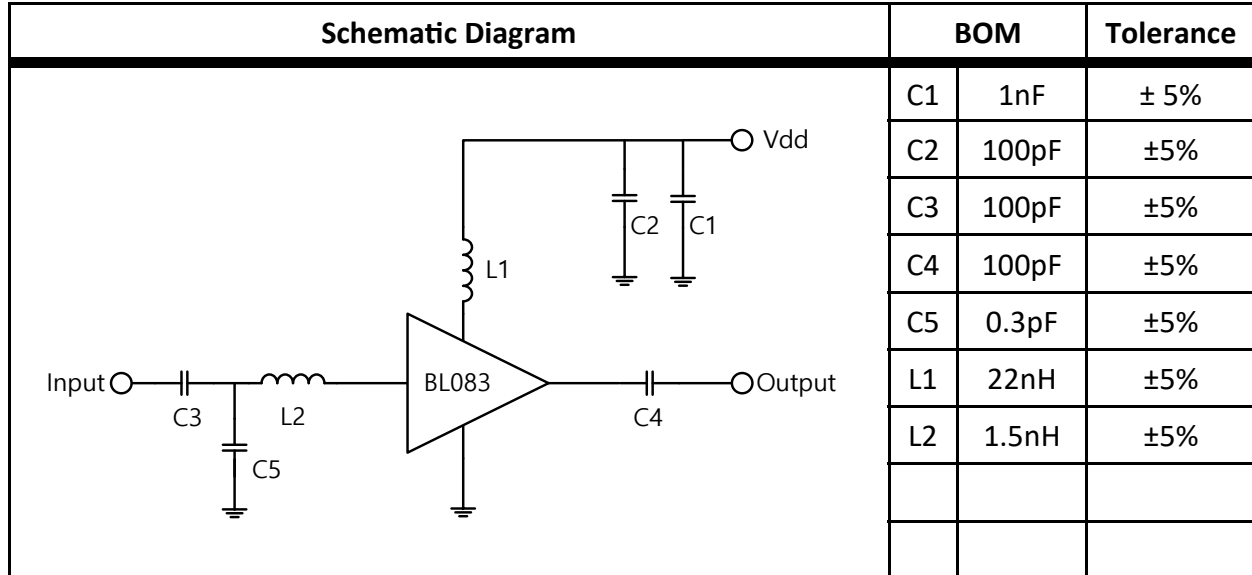
Noise Figure Temperature Performance

($V_d = 3V, I_{dq} = 42mA$)

Freq	MHz	900	1850	2140	2650	3500
Temp [°C]	-40	0.69	0.67	0.81	0.79	1.04
	25	0.78	0.78	0.95	0.95	1.16
	105	0.84	0.84	1.04	1.12	1.43

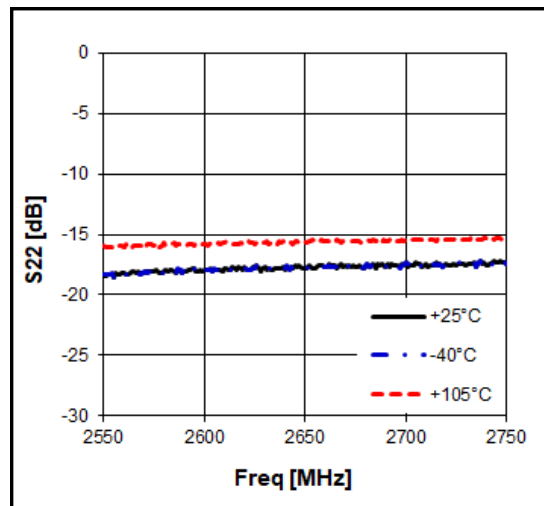
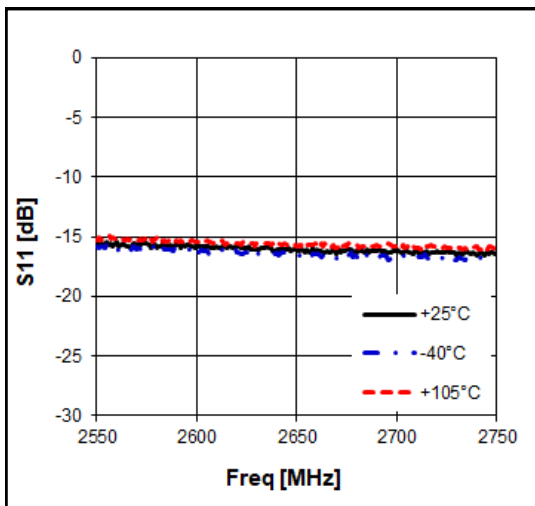
50-4000 MHz Wideband Low Noise Amplifier

Application Circuit: 2650 MHz



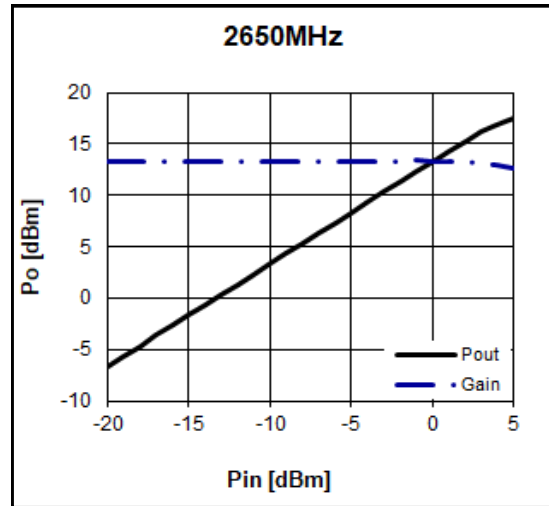
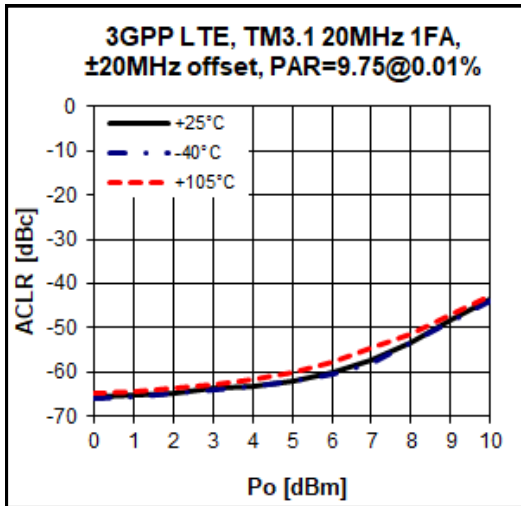
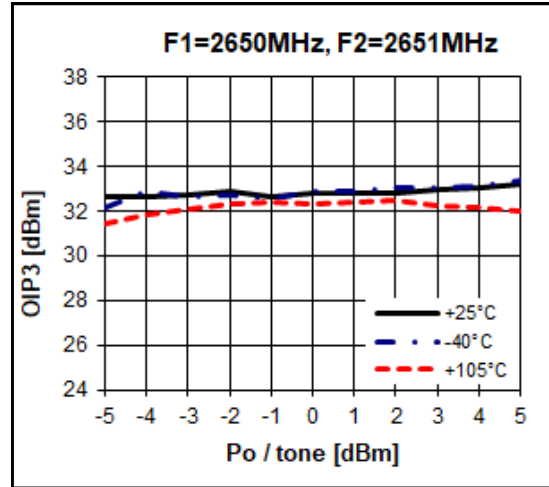
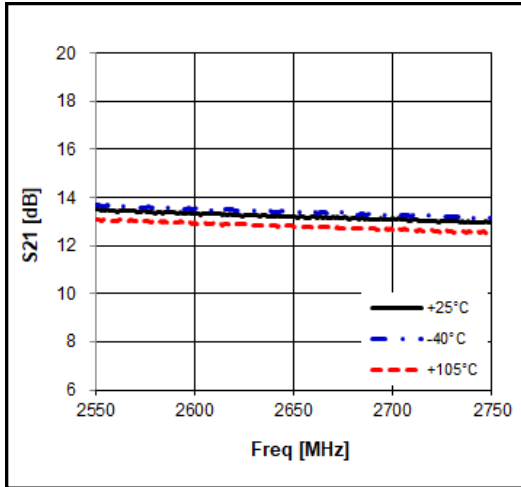
Typical Performance

$$V_d = 3V, I_{dq} = 42mA$$



50-4000 MHz Wideband Low Noise Amplifier

$V_d = 3V, I_{dq} = 42mA$



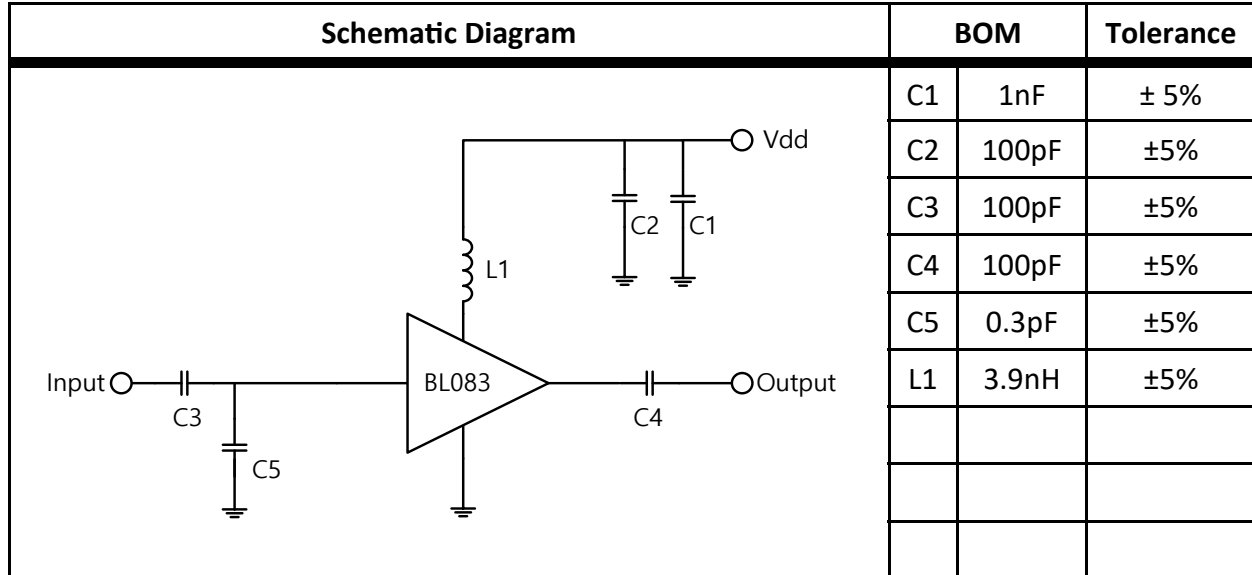
Noise Figure Temperature Performance

($V_d = 3V, I_{dq} = 42mA$)

Freq	MHz	900	1850	2140	2650	3500
Temp [°C]	-40	0.69	0.67	0.81	0.79	1.04
	25	0.78	0.78	0.95	0.95	1.16
	105	0.84	0.84	1.04	1.12	1.43

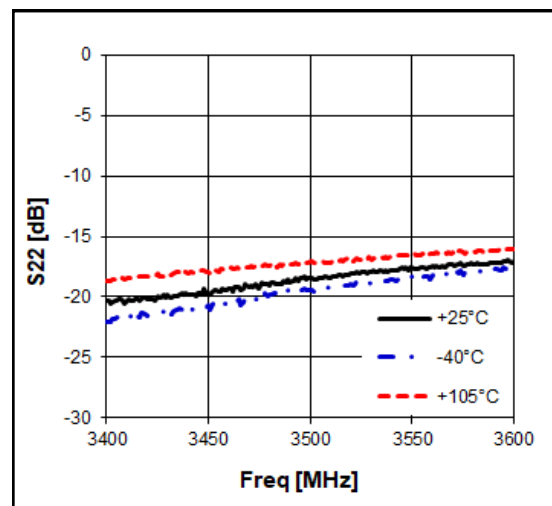
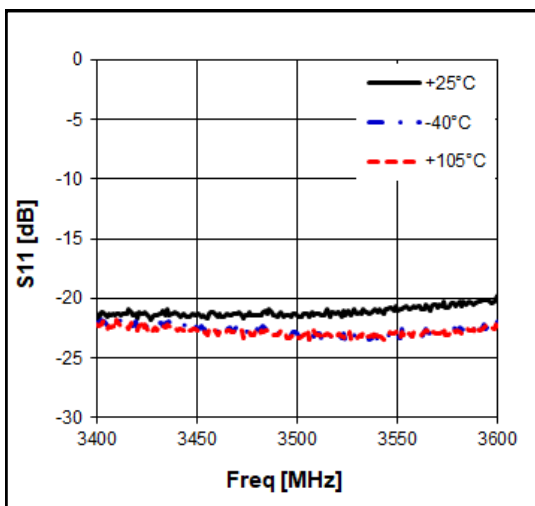
50-4000 MHz Wideband Low Noise Amplifier

Application Circuit: 3500 MHz



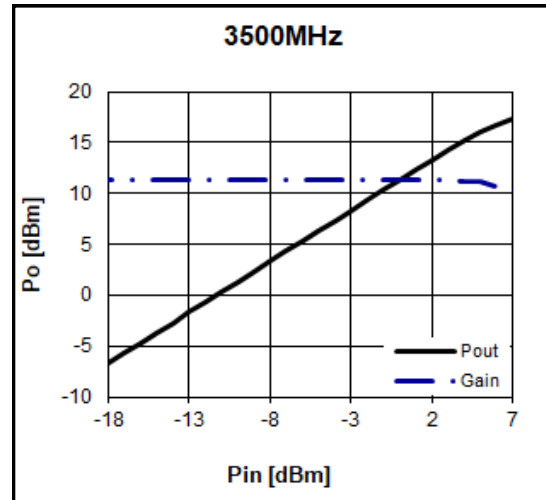
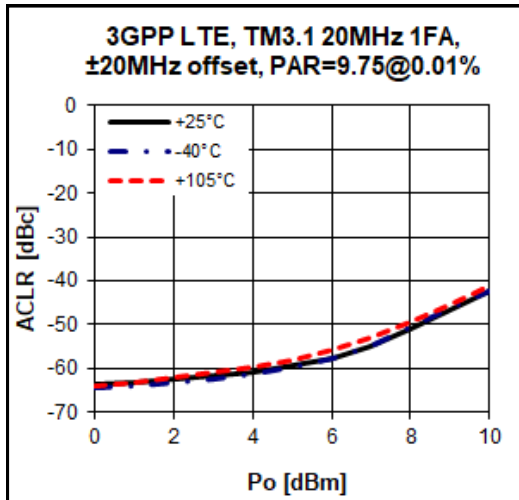
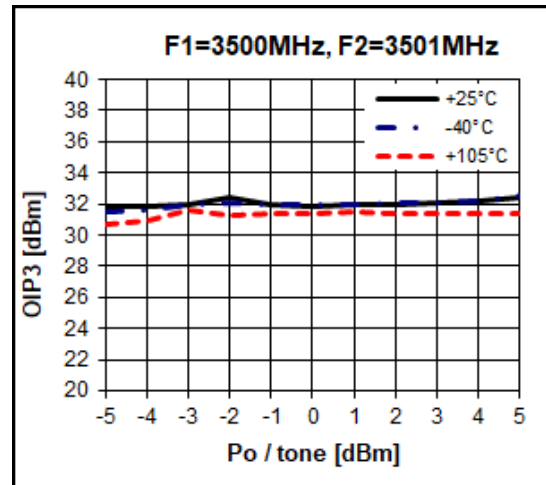
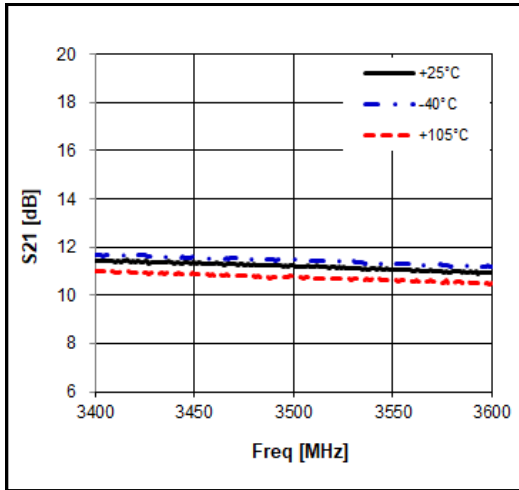
Typical Performance

$$V_d = 3V, I_{dq} = 42mA$$



50-4000 MHz Wideband Low Noise Amplifier

$V_d = 3V, I_{dq} = 42mA$



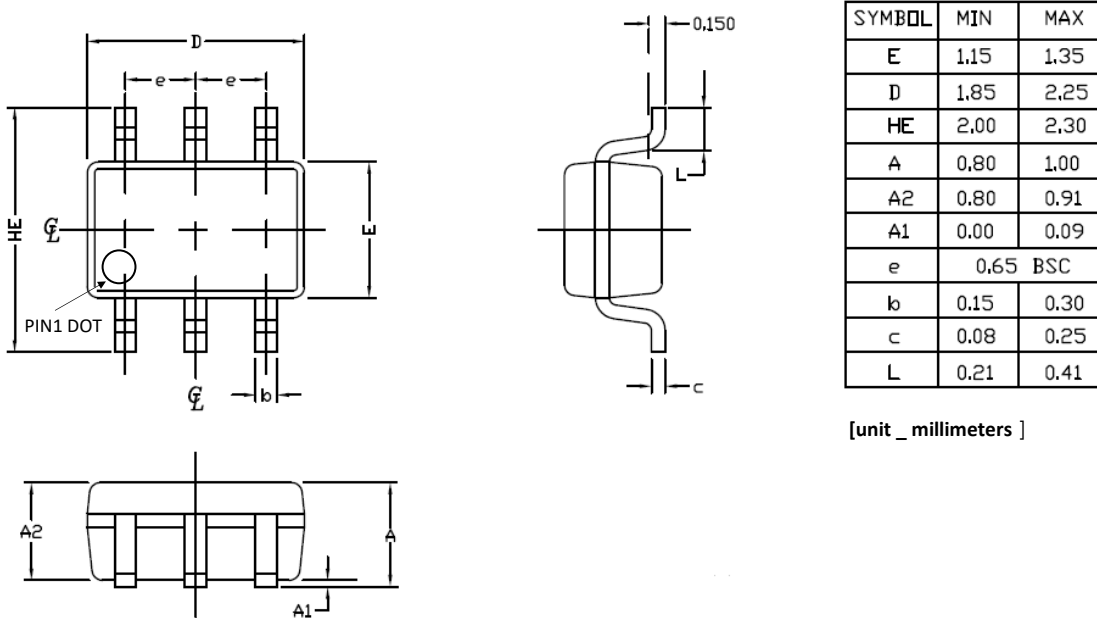
Noise Figure Temperature Performance

($V_d = 3V, I_{dq} = 42mA$)

Freq	MHz	900	1850	2140	2650	3500
Temp [°C]	-40	0.69	0.67	0.81	0.79	1.04
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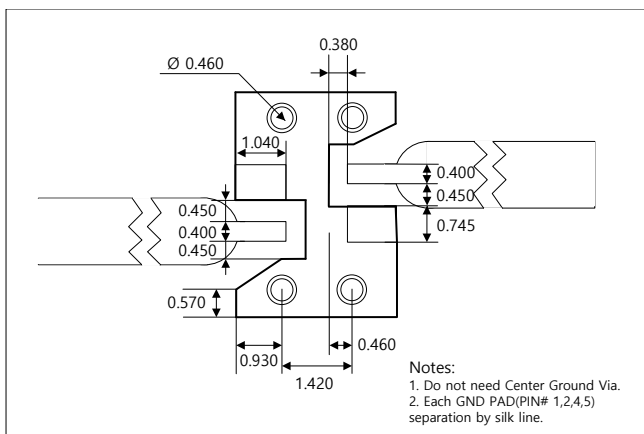
50-4000 MHz Wideband Low Noise Amplifier

Package Outline Dimension

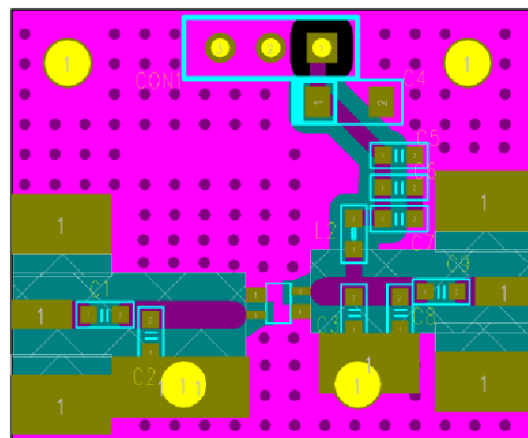


Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



PCB Mounting

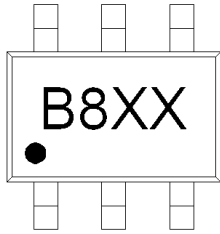


Note : All dimension _ millimeters

PCB lay out _ on BeRex website

50-4000 MHz Wideband Low Noise Amplifier

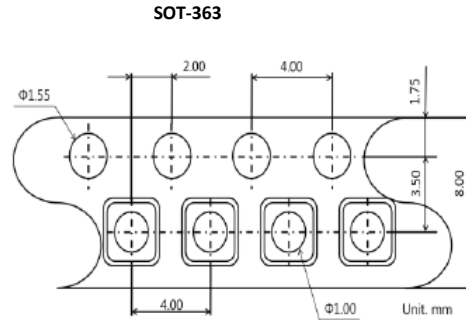
Package Marking



Pin 1

XX = Wafer No.

Tape & Reel



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 1B
Value:	Passes <1000V
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
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