BEREX

BMT332

700-2400 MHz 2W High Linearity 5V 2-Stage Power Amplifier

Device Features

- +5V/680mA at operating bias condition
- Gain = 27.3 dB @ 1850 MHz
- P1dB = 33.1 dBm @ 1850MHz
- LTE 10M ACLR = 23.5dBm Output Power at -50dBc @ 1850MHz
- Intergrated interstage matching
- Green/RoHS2-compliant QFN5x5 SMT package

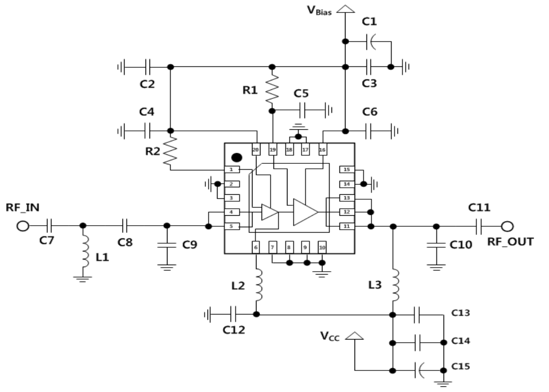
Product Description

The BMT332 is a high dynamic range two-stage power amplifier housed in RoHS2 compliant 20 pin, 5x5mm QFN package. The BMT332 uses a high reliability InGaP/GaAs HBT process technology. The BMT332 is designed for use where high linearity and gain is required. The BMT332 is able to deliver over 23 dBm output power from 700 to 2400MHz while maintaining superior ACLR performance with a few external matching components. All devices are 100% RF/DC screened.

Applications

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

Application Circuits



*External matching circuit: refer to the page 5 to 20.

Electrical Specifications

Device performance _ measured on a BeRex evaluation board at 25°C, Vc=5V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		700		2400	MHz
Test Frequency			1850		MHz
Gain		25.8	27.3		dB
Input Return Loss			-30.0		dB
Output Return Loss			-11.5		dB
Output IP3	23 dBm/tone, Δf=1 MHz	46.0	49.0		dBm
Output P1dB		32.1	33.1		dBm
LTE 10M ACLR*		22.5	23.5		dBm
WCDMA ACLR*		22.7	23.7		dBm
Noise Figure			5.6		dB

*ACLR Channel Power measured at -50dBc.

- LTE set-up: 3GPP LTE, FDD E-TM3.1, 10MHz BW, ±5MHz offset, PAR 9.75 @0.01% Prob.

- WCDMA set-up: 3GPP WCDMA, TM1+64DPCH, +5MHz offset, PAR 9.78 at 0.01% Prob.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
I_{bias} @ ($I_{REF1\&2}$ + $I_{B1\&2}$)	27	33	39	mA
Bandwidth	700		2400	MHz
I_C @ (I_{C1} + I_{C2})	550	680	810	mA
V_{CC}/V_{Bias}	4.75	5.0	5.25	V
R_{TH}		7.9		°C/W
Operating Case Temperature	-40		+85	°C

Electrical specifications are measured at specified test conditions.
Specifications are not guaranteed over all recommended operating conditions.

Absolute Maximum Ratings

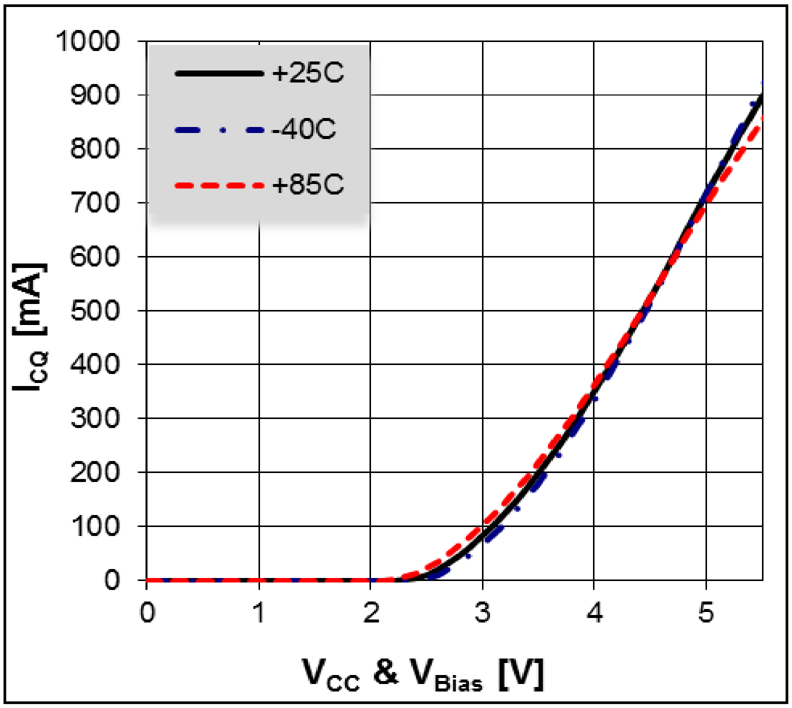
Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	+180	°C
Supply Voltage	+6	V
Supply Current	2000	mA
Input RF Power	23	dBm

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

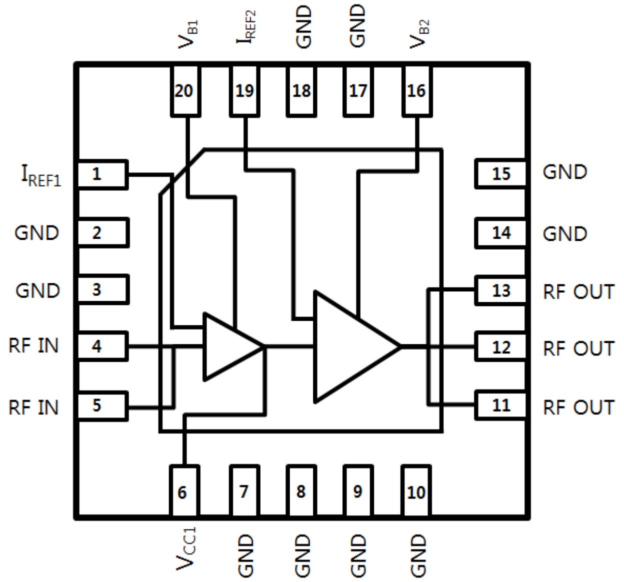
Typical Performance (V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

Parameter	Frequency						Unit
	850	**1750**	**1850**	**1960**	**2140**	**2350**	**MHz**
Gain	33.5	28.0	27.3	26.7	26.0	24.0	dB
S11	-18.0	-30.0	-30.0	-26.0	-17.0	-17.0	dB
S22	-14.5	-11.5	-11.5	-12.0	-11.0	-12.5	dB
OIP3	50.0	50.0	49.0	49.0	47.5	47.5	dBm
P1dB	33.6	33.2	33.1	33.1	33.2	33.1	dBm
LTE 10M ACLR	23.4	23.4	23.5	23.2	23.8	23.2	dBm
WCDMA ACLR	23.5	23.7	23.7	23.5	24.0	23.5	dBm
Noise Figure	7.0	5.6	5.6	5.5	5.5	5.3	dB

V-I Characteristics



Pin Configuration



Pin No.	Label
1	I_{REF1}
4,5	RF IN
6	V_{CC1}
11,12,13	RF OUT/V_{CC2}
16	V_{B2}
19	I_{REF2}
20	V_{B1}
2,3,7,8,9,10,14,	GND
Backside Paddle	GND

BeRex Evaluation Board

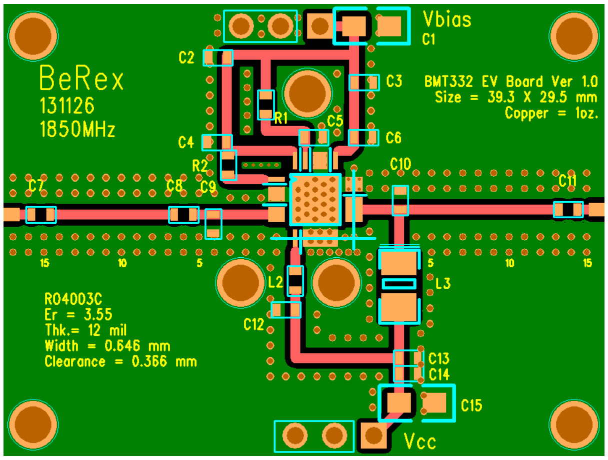
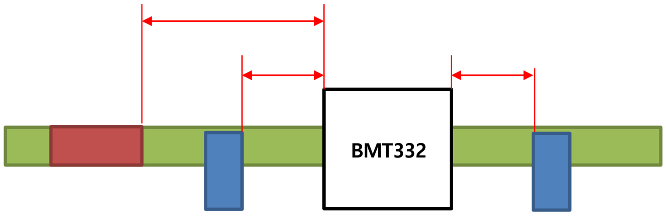
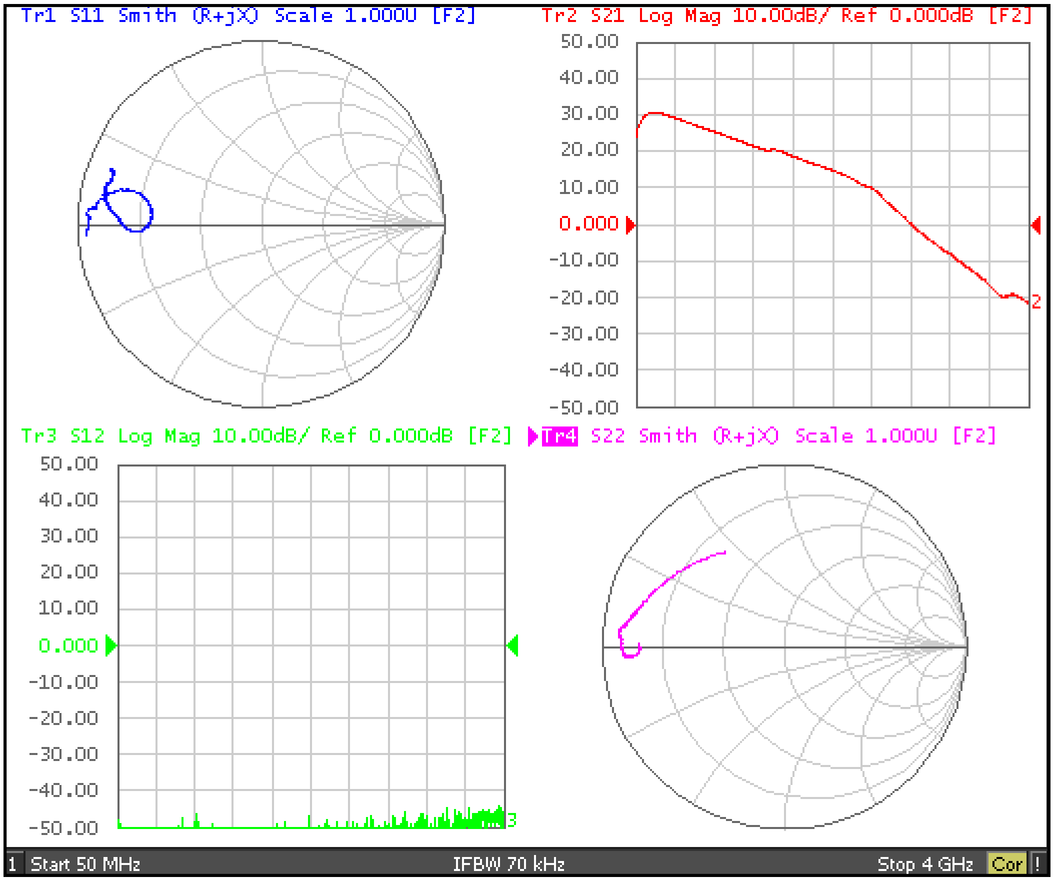


Figure about the reference position of components



Typical Device Data

S-parameters (V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)



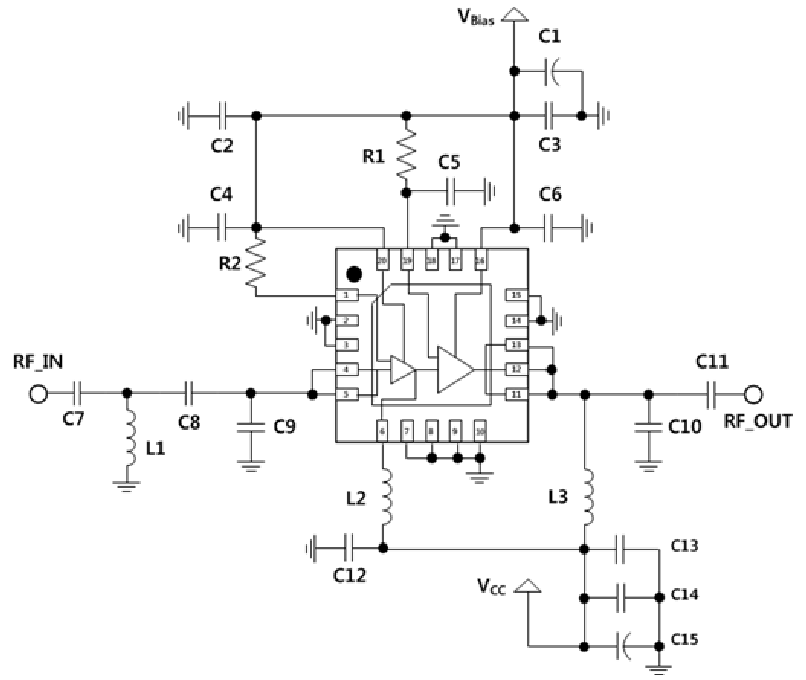
S-Parameter

(V_{cc} & $_{VBias}$ = 5.0V, I_{cq} = 680mA, T_a= 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	0.913	173.761	24.816	32.166	0.003	79.828	0.801	-178.428
500	0.619	171.121	26.921	-92.025	0.001	-44.058	0.869	-176.093
1000	0.701	-177.176	15.441	-178.364	0.002	59.383	0.879	-177.489
1500	0.784	177.684	10.073	107.582	0.001	119.430	0.895	179.724
2000	0.826	174.821	5.629	28.494	0.001	52.589	0.901	177.048
2500	0.877	167.581	2.533	-60.751	0.002	52.748	0.909	174.926
3000	0.856	164.082	0.614	-113.048	0.003	73.959	0.876	171.808
3500	0.863	160.570	0.198	-148.521	0.002	48.291	0.800	161.758
4000	0.868	160.252	0.085	179.517	0.004	44.770	0.607	121.233

Application Circuit: 850 MHz

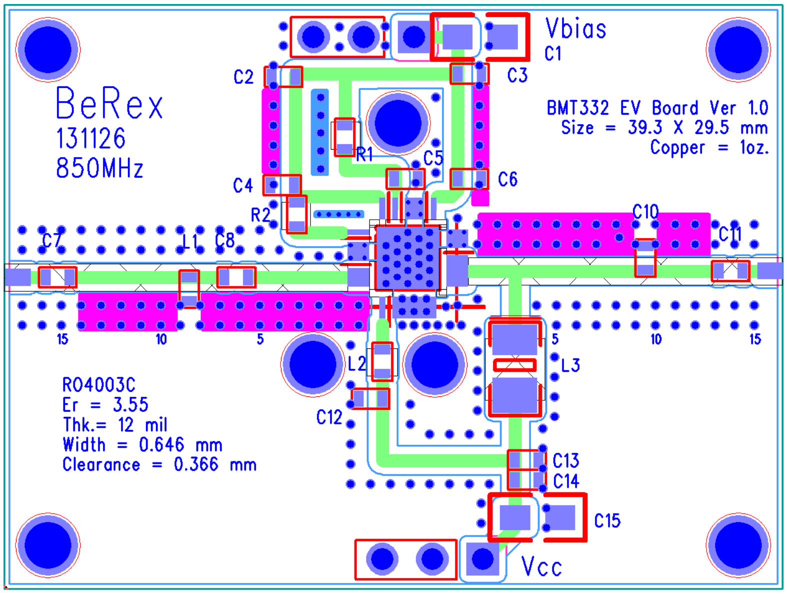
Schematic Diagram



BOM

BOM			Marks
C1	1206	10uF	Tantalum
C2	0603	N/A	
C3	0603	68pF	
C4	0603	1nF	
C5	0603	N/A	
C6	0603	3.3pF	
C7	0603	100pF	
C8	0603	5pF	
C9	0603	N/A	
C10	0603	10pF	High Q
C11	0603	100pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	5.6nH	
L2	0603	22nH	
L3	1008	22nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

Reference	Object	Distance
Input pin	L1	8.0mm
Input pin	C8	5.3mm
Output pin	C10	9.0mm
Pin 16	C3	7.2mm
Pin 16	C6	2.0mm
Pin 20	C4	5.0mm

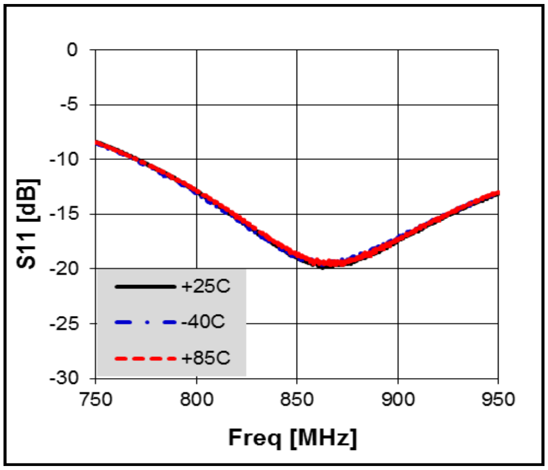
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

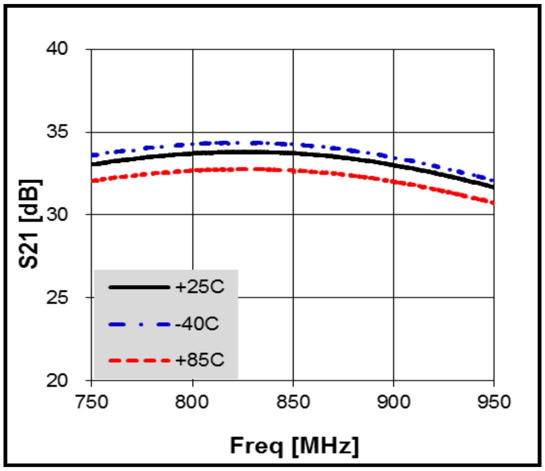
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used '10pF(251R14S100JV4, EIA 0603) of Johanson Technology.

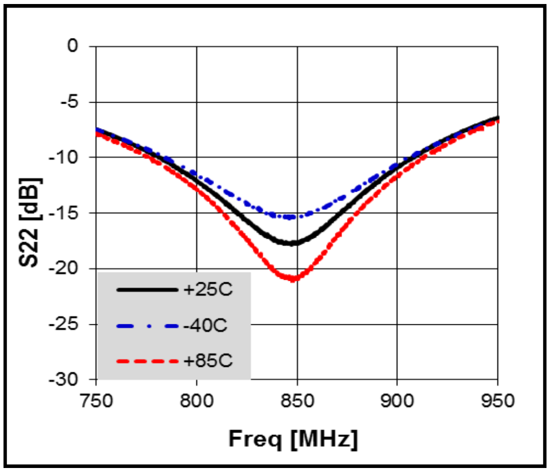
3. You could change C7 from 100 pF to 0 Ω or a line if you have other DC block front of

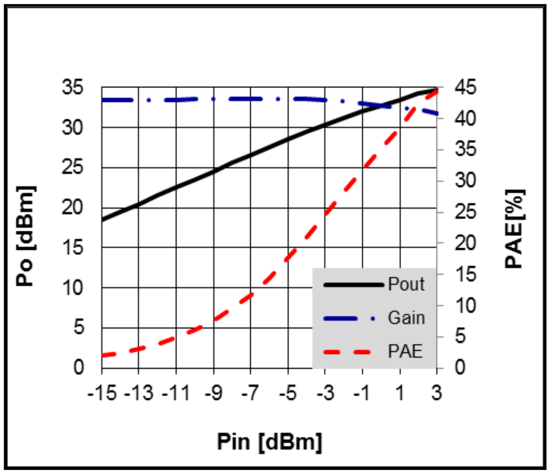
Typical Performance

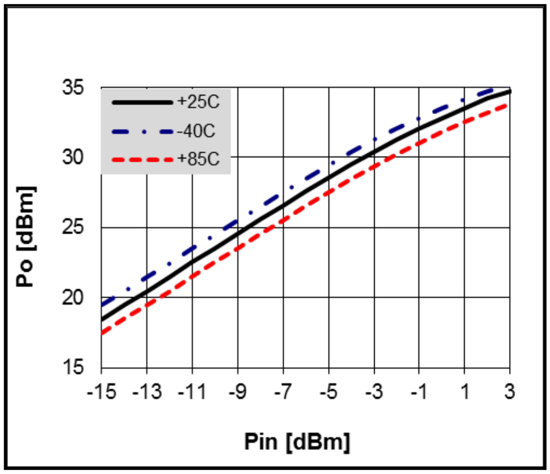
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

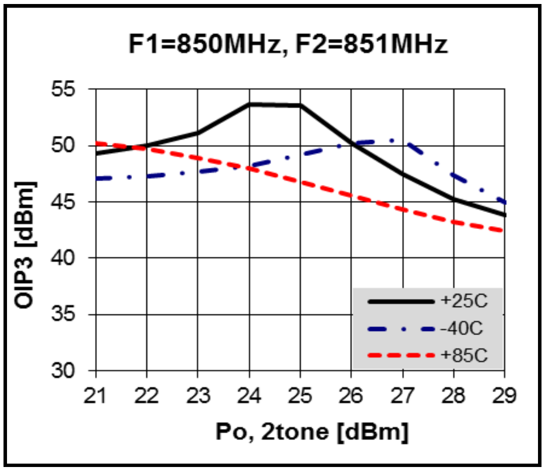


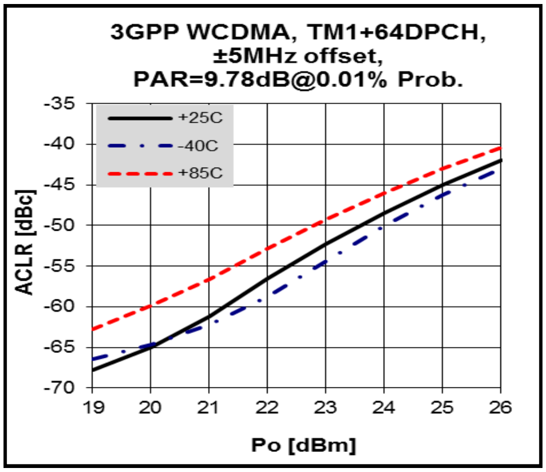


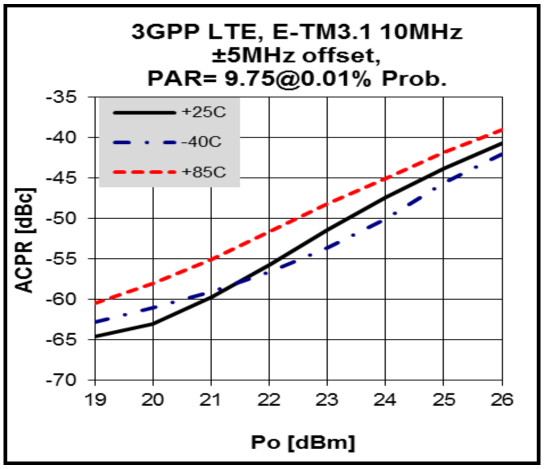




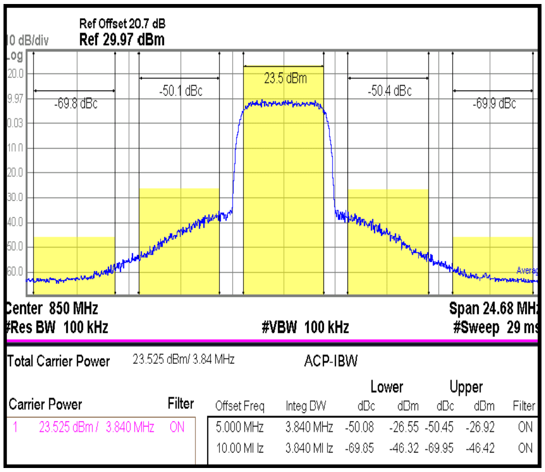





3GPP WCDMA, TM1+64DPCH, ±5MHz offset, PAR=9.78dB@0.01% Prob.


3GPP LTE, E-TM3.1 10MHz ±5MHz offset, PAR= 9.75@0.01% Prob.

3GPP WCDMA TM1 +64DPCH 1FA



Center 850 MHz
#Res BW 100 kHz
#VBW 100 kHz
Span 24.68 MHz
#Sweep 29 ms

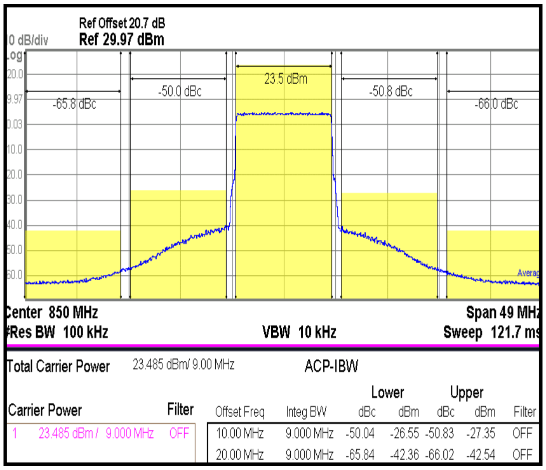
Total Carrier Power 23.525 dBm/ 3.84 MHz

Carrier Power		Filter
1	23.525 dBm / 3.840 MHz	ON

ACP-IBW

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.08	-26.55	-50.45	-26.92	ON
10.00 MHz	3.840 MHz	-69.85	-46.32	-69.95	-46.42	ON

3GPP LTE E-TM3.1 10MHz



Center 850 MHz
#Res BW 100 kHz
VBW 10 kHz
Span 49 MHz
Sweep 121.7 ms

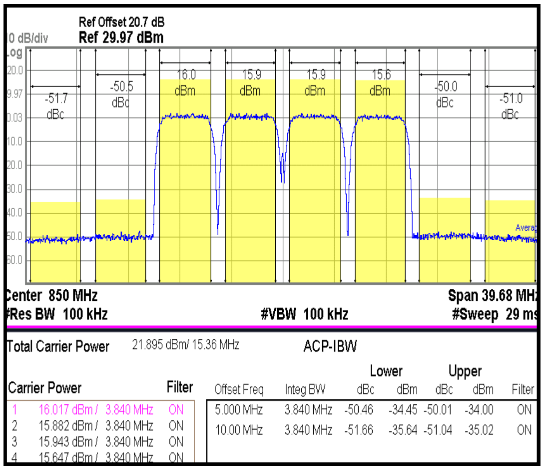
Total Carrier Power 23.485 dBm/ 9.00 MHz

Carrier Power		Filter
1	23.485 dBm / 9.000 MHz	OFF

ACP-IBW

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.04	-26.55	-50.83	-27.35	OFF
20.00 MHz	9.000 MHz	-65.84	-42.36	-66.02	-42.54	OFF

3GPP WCDMA TM1 +64DPCH 4FA



Center 850 MHz
#Res BW 100 kHz
#VBW 100 kHz
Span 39.68 MHz
#Sweep 29 ms

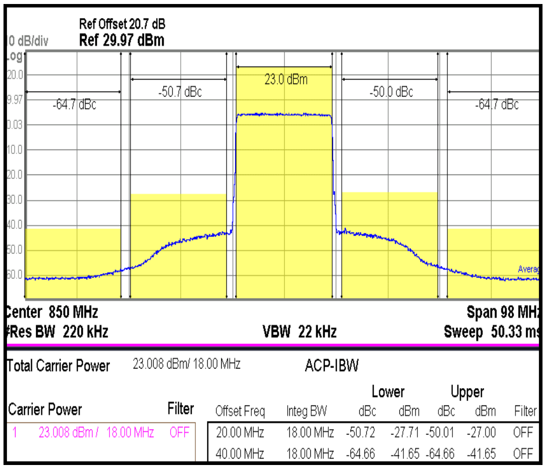
Total Carrier Power 21.895 dBm/ 15.36 MHz

Carrier Power		Filter
1	16.017 dBm / 3.840 MHz	ON
2	15.882 dBm / 3.840 MHz	ON
3	15.943 dBm / 3.840 MHz	ON
4	15.647 dBm / 3.840 MHz	ON

ACP-IBW

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.46	-34.45	-50.01	-34.00	ON
10.00 MHz	3.840 MHz	-51.66	-35.64	-51.04	-35.02	ON

3GPP LTE E-TM3.1 20MHz



Center 850 MHz
#Res BW 220 kHz
VBW 22 kHz
Span 98 MHz
Sweep 50.33 ms

Total Carrier Power 23.008 dBm/ 18.00 MHz

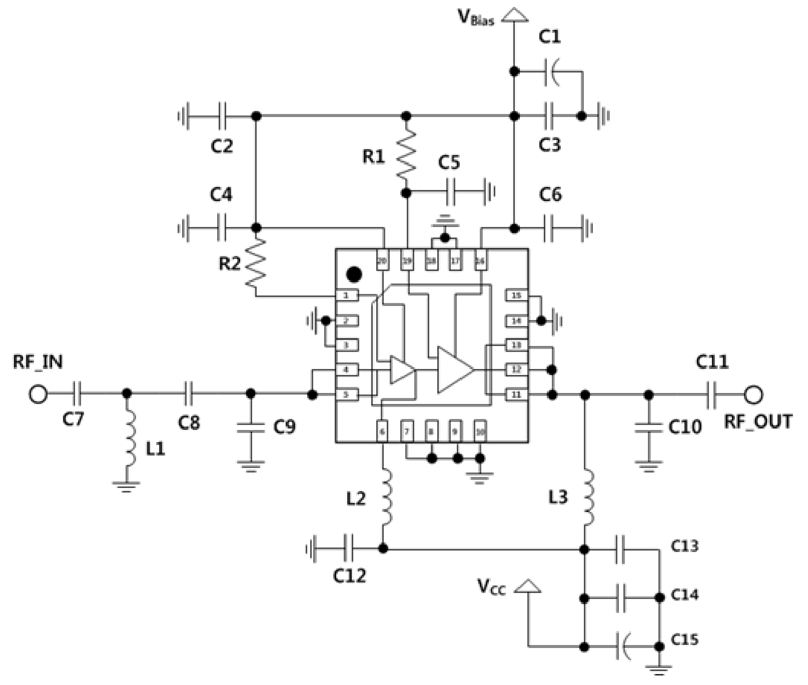
Carrier Power		Filter
1	23.008 dBm / 18.00 MHz	OFF

ACP-IBW

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.72	-27.71	-50.01	-27.00	OFF
40.00 MHz	18.00 MHz	-64.66	-41.65	-64.66	-41.65	OFF

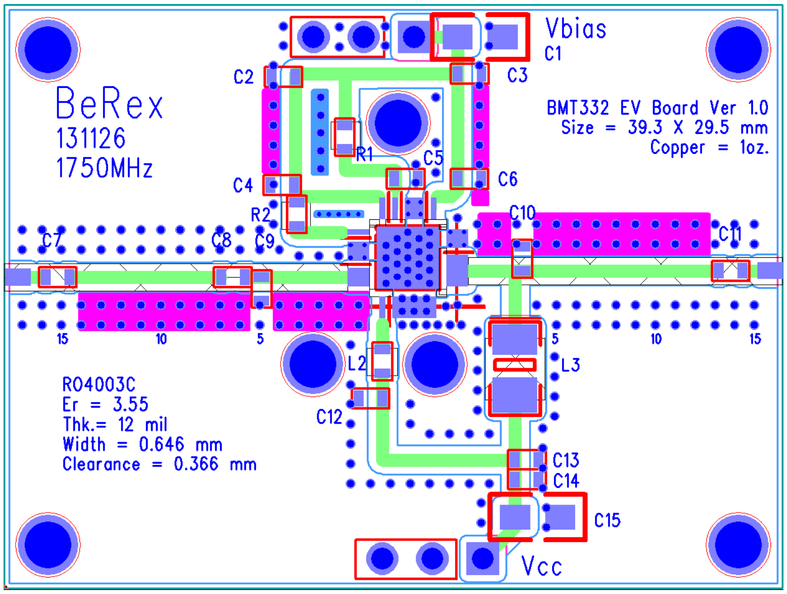
Application Circuit: 1750 MHz

Schematic Diagram



BOM			Marks
C1	1206	N/A	
C2	0603	1nF	
C3	0603	1nF	
C4	0603	N/A	
C5	0603	1nF	
C6	0603	2pF	
C7	0603	0 Ω	±5%
C8	0603	3.3pF	
C9	0603	2.7pF	
C10	0603	4.3pF	High Q
C11	0603	3.9pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	N/A	
L2	0603	12nH	
L3	1008	22nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

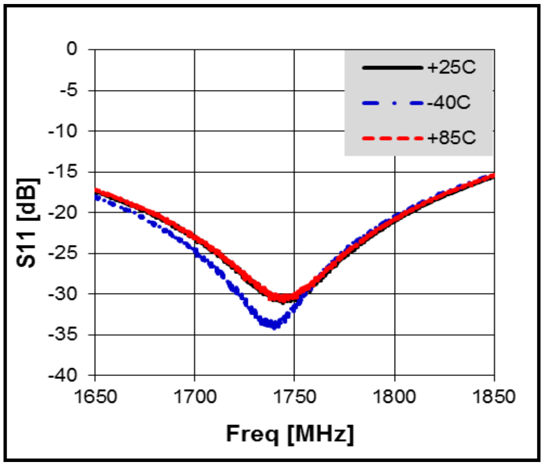
Reference	Object	Distance
Input pin	C8	5.5mm
Input pin	C9	4.4mm
Output pin	C10	2.8mm
Pin 16	C3	7.2mm
Pin 16	C6	2.0mm
Pin 19	C5	1.0mm
Pin 20	C2	10.6mm

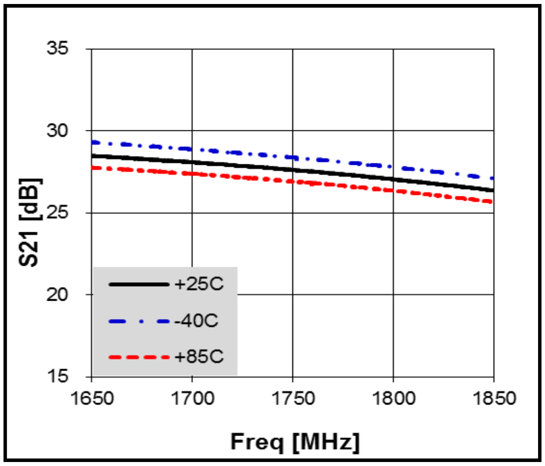
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

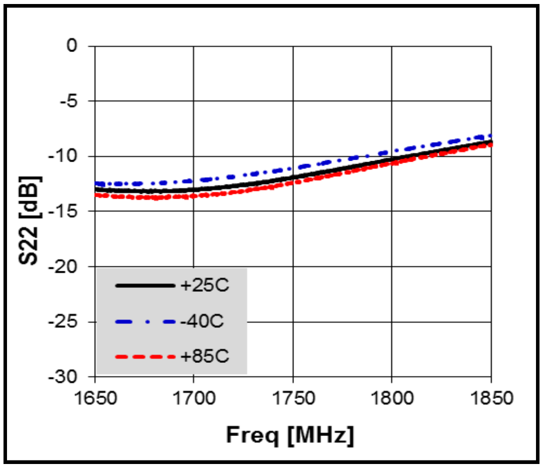
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used '4.3pF(251R14S4R3BV4, EIA 0603) of Johanson Technology.

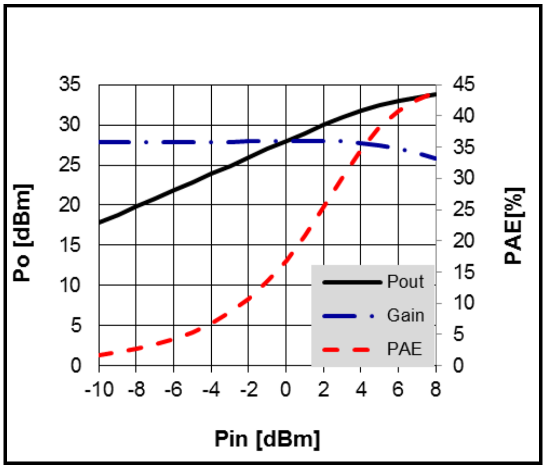
Typical Performance

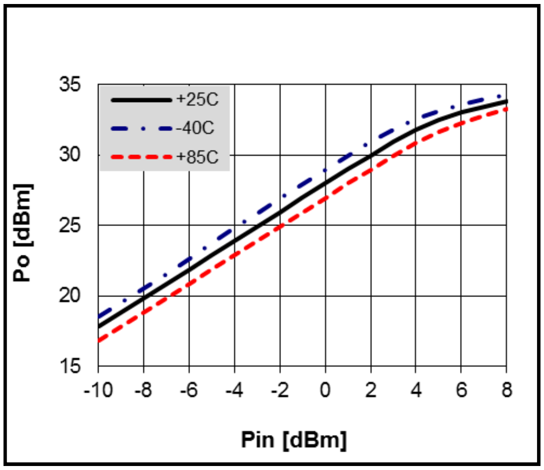
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

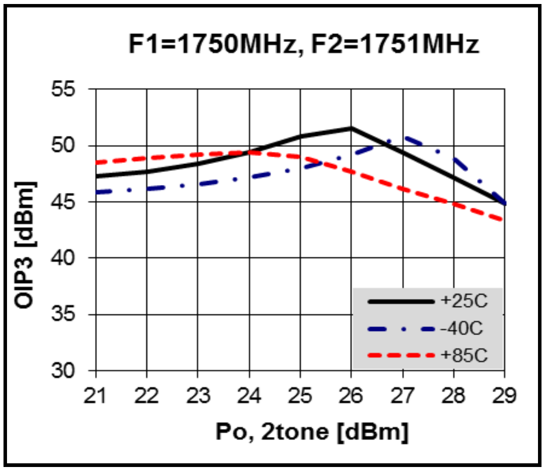


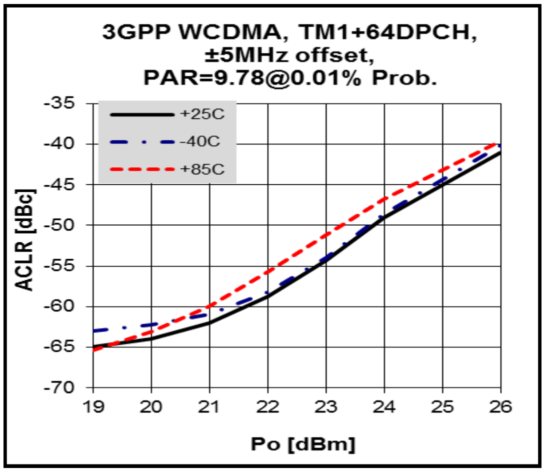


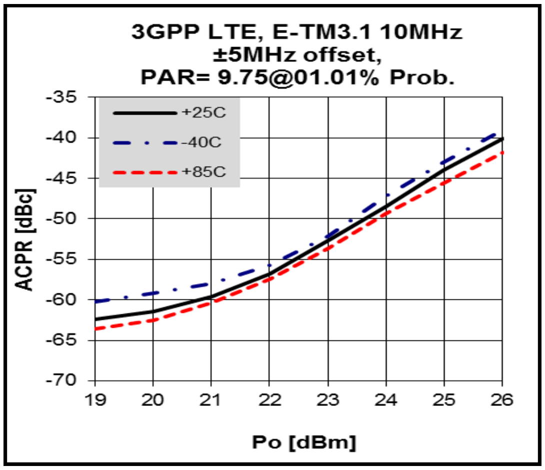




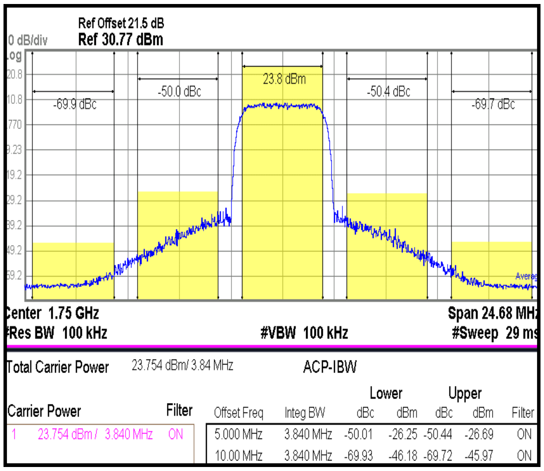





3GPP WCDMA, TM1+64DPCH, ±5MHz offset, PAR=9.78@0.01% Prob.


3GPP LTE, E-TM3.1 10MHz ±5MHz offset, PAR= 9.75@01.01% Prob.

3GPP WCDMA TM1 +64DPCH 1FA



Center 1.75 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 24.68 MH
#Sweep 29 ms

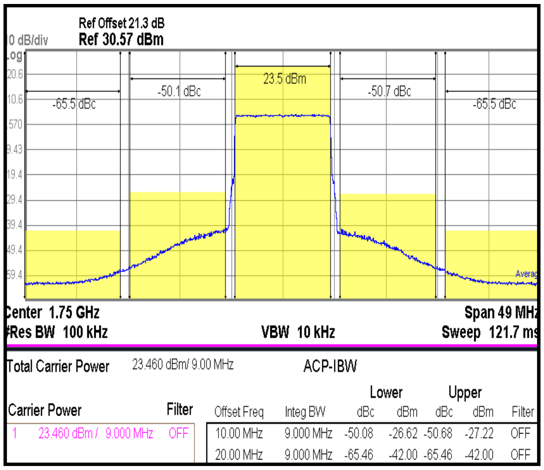
Total Carrier Power 23.754 dBm/ 3.84 MHz

ACP-IBW

Carrier Power		Filter
1	23.754 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.01	-26.25	-50.44	-26.69	ON
10.00 MHz	3.840 MHz	-69.93	-46.18	-69.72	-45.97	ON

3GPP LTE E-TM3.1 10MHz



Center 1.75 GHz
#Res BW 100 kHz
VBW 10 kHz
Span 49 MH
Sweep 121.7 ms

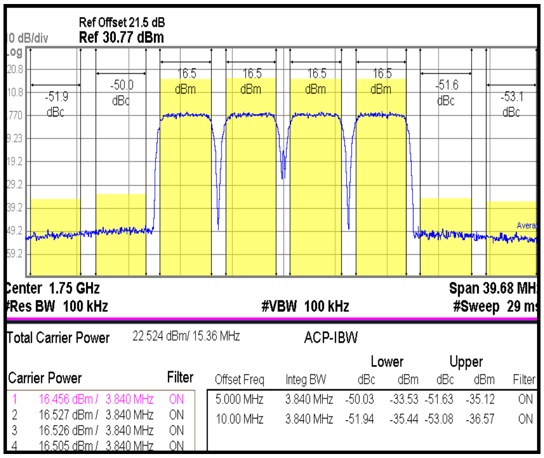
Total Carrier Power 23.460 dBm/ 9.00 MHz

ACP-IBW

Carrier Power		Filter
1	23.460 dBm / 9.000 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.08	-26.62	-50.68	-27.22	OFF
20.00 MHz	9.000 MHz	-65.46	-42.00	-65.46	-42.00	OFF

3GPP WCDMA TM1 +64DPCH 4FA



Center 1.75 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 39.68 MH
#Sweep 29 ms

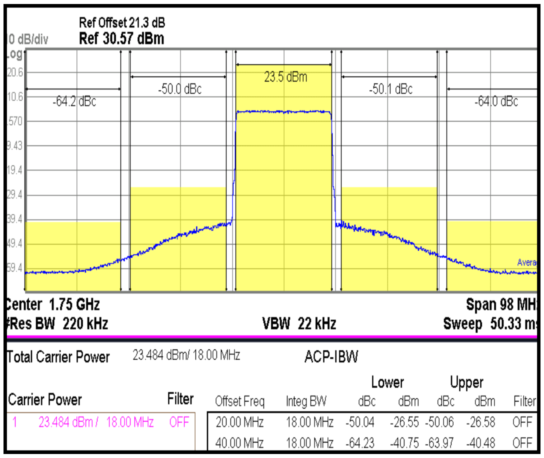
Total Carrier Power 22.524 dBm/ 15.36 MHz

ACP-IBW

Carrier Power		Filter
1	16.456 dBm / 3.840 MHz	ON
2	16.527 dBm / 3.840 MHz	ON
3	16.526 dBm / 3.840 MHz	ON
4	16.505 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.03	-33.53	-51.63	-35.12	ON
10.00 MHz	3.840 MHz	-51.94	-35.44	-53.08	-36.57	ON

3GPP LTE E-TM3.1 20MHz



Center 1.75 GHz
#Res BW 220 kHz
VBW 22 kHz
Span 98 MH
Sweep 50.33 ms

Total Carrier Power 23.484 dBm/ 18.00 MHz

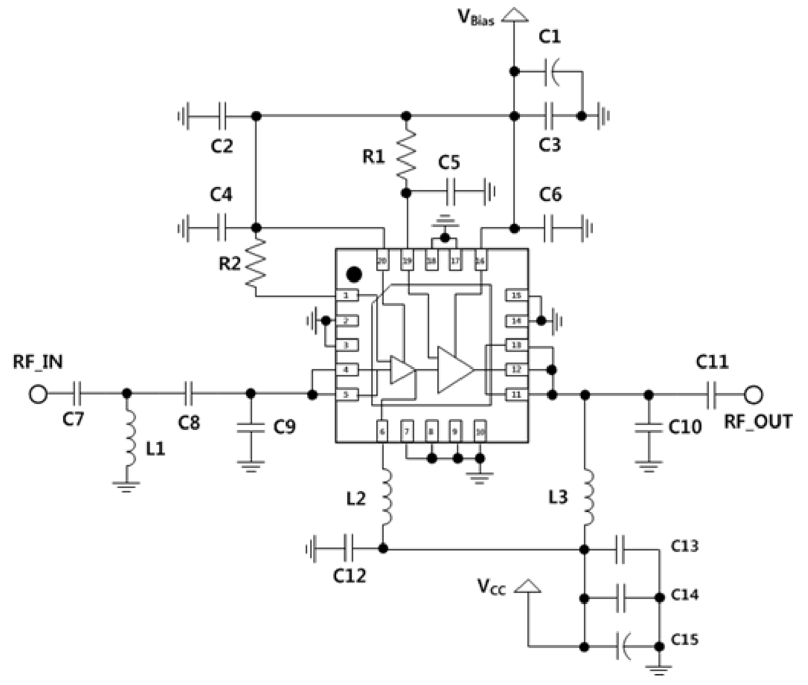
ACP-IBW

Carrier Power		Filter
1	23.484 dBm / 18.00 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.04	-26.55	-50.06	-26.58	OFF
40.00 MHz	18.00 MHz	-64.23	-40.75	-63.97	-40.48	OFF

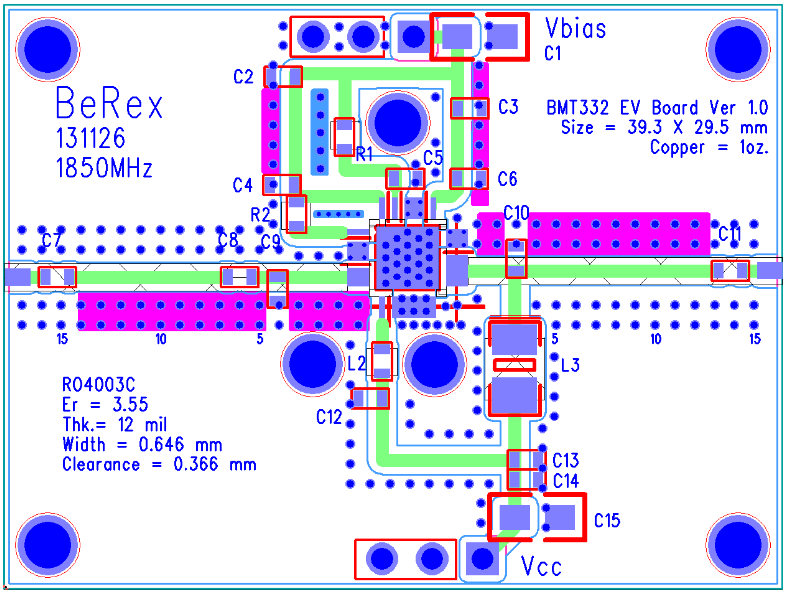
Application Circuit: 1850 MHz

Schematic Diagram



BOM			Marks
C1	1206	N/A	
C2	0603	1nF	
C3	0603	1nF	
C4	0603	N/A	
C5	0603	1nF	
C6	0603	3pF	
C7	0603	0 Ω	±5%
C8	0603	3.3pF	
C9	0603	2.7pF	
C10	0603	4.3pF	High Q
C11	0603	3.9pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	N/A	
L2	0603	12nH	
L3	1008	12nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

Reference	Object	Distance
Input pin	C8	5.0mm
Input pin	C9	3.5mm
Output pin	C10	2.5mm
Pin 16	C3	5.5mm
Pin 16	C6	2.0mm
Pin 19	C5	1.0mm
Pin 20	C2	10.6mm

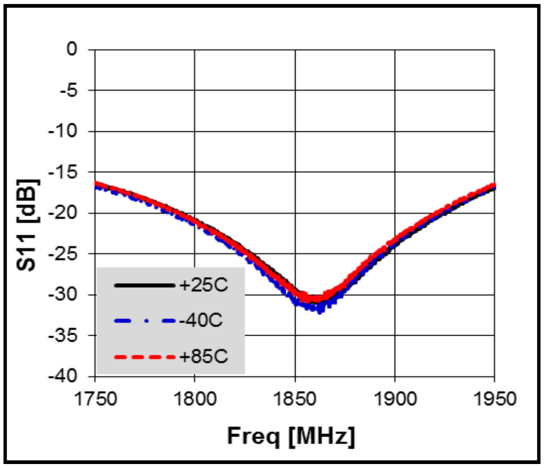
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

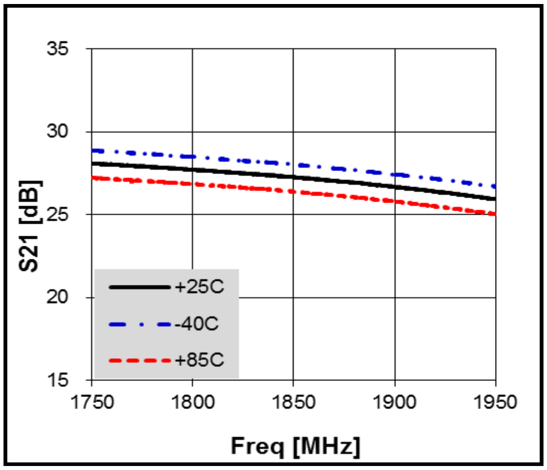
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used '4.3pF(251R14S4R3BV4, EIA 0603) of Johanson Technology.

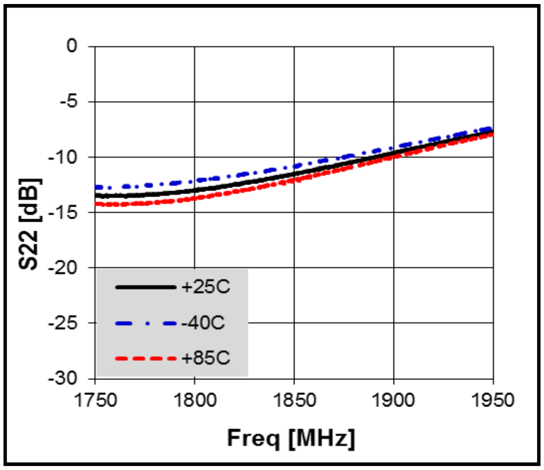
3. C7 : Non-critical 0 Ω.

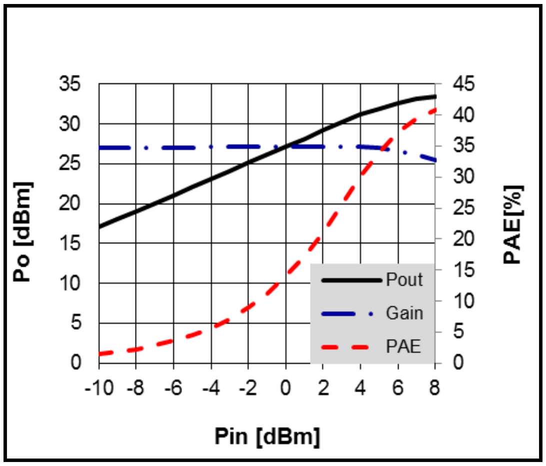
Typical Performance

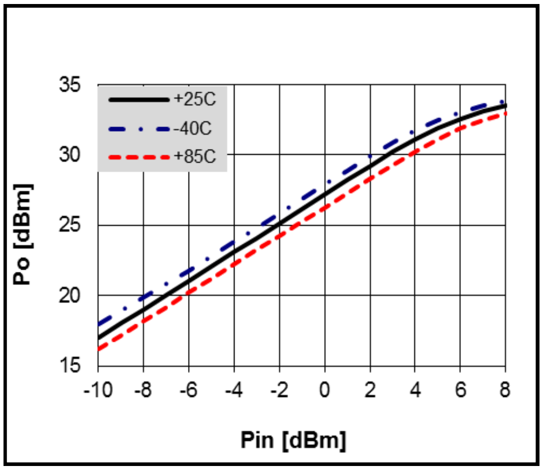
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

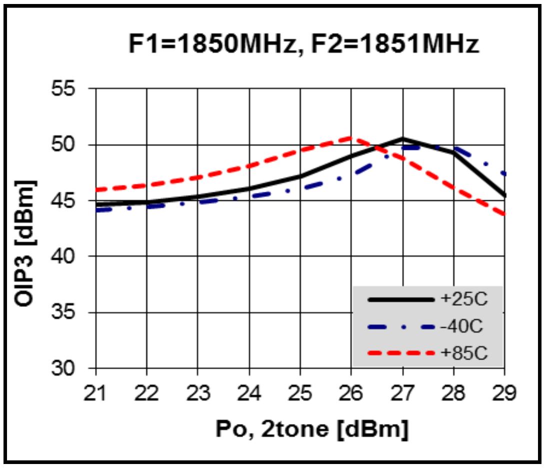


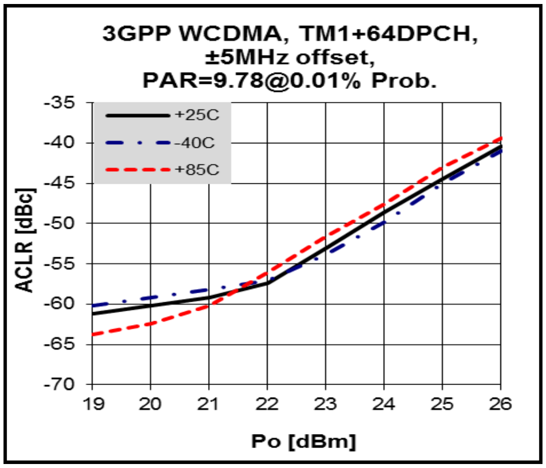




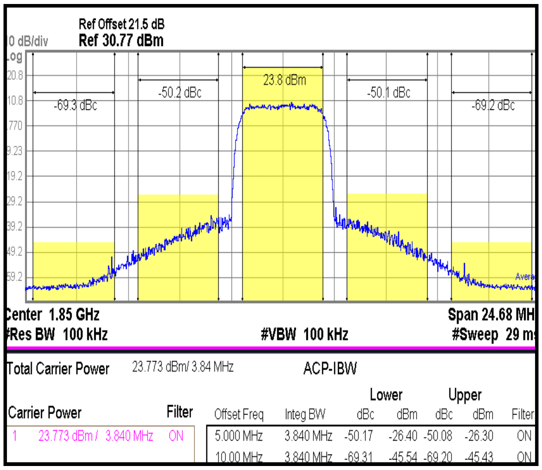








3GPP WCDMA TM1 +64DPCH 1FA



Ref Offset 21.5 dB
Ref 30.77 dBm

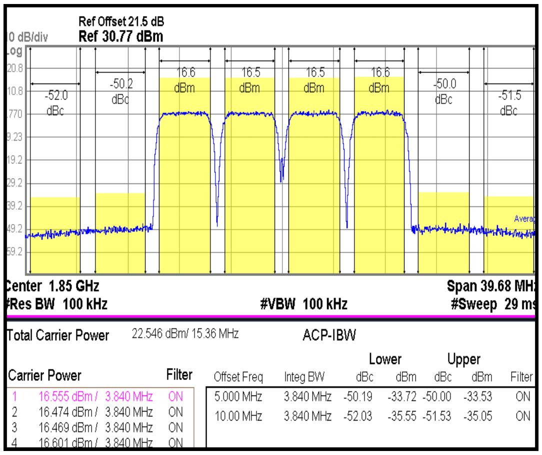
Center 1.85 GHz | Span 24.68 MH
#Res BW 100 kHz | #VBW 100 kHz | #Sweep 29 m

Total Carrier Power 23.773 dBm/ 3.84 MHz ACP-IBW

Carrier Power		Filter
1	23.773 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.17	-26.40	-50.08	-26.30	ON
10.00 MHz	3.840 MHz	-69.31	-45.54	-69.20	-45.43	ON

3GPP WCDMA TM1 +64DPCH 4FA



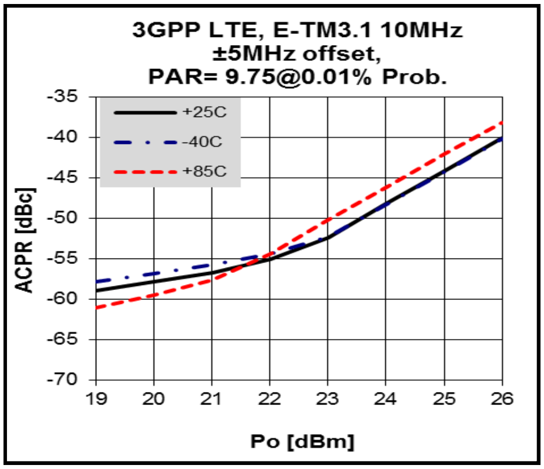
Ref Offset 21.5 dB
Ref 30.77 dBm

Center 1.85 GHz | Span 39.68 MH
#Res BW 100 kHz | #VBW 100 kHz | #Sweep 29 m

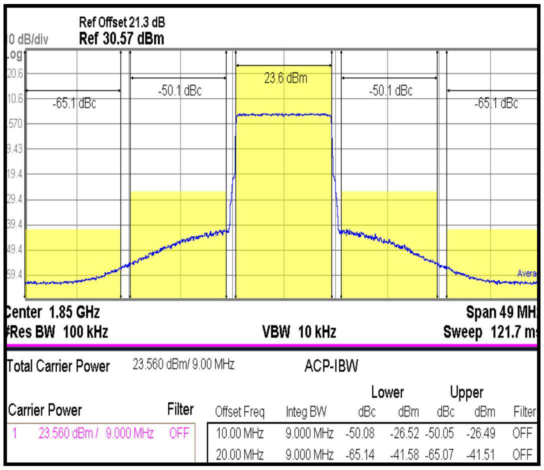
Total Carrier Power 22.546 dBm/ 15.36 MHz ACP-IBW

Carrier Power		Filter
1	16.555 dBm / 3.840 MHz	ON
2	16.474 dBm / 3.840 MHz	ON
3	16.469 dBm / 3.840 MHz	ON
4	16.601 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.19	-33.72	-50.00	-33.53	ON
10.00 MHz	3.840 MHz	-52.03	-35.55	-51.53	-35.05	ON



3GPP LTE E-TM3.1 10MHz



Ref Offset 21.3 dB
Ref 30.57 dBm

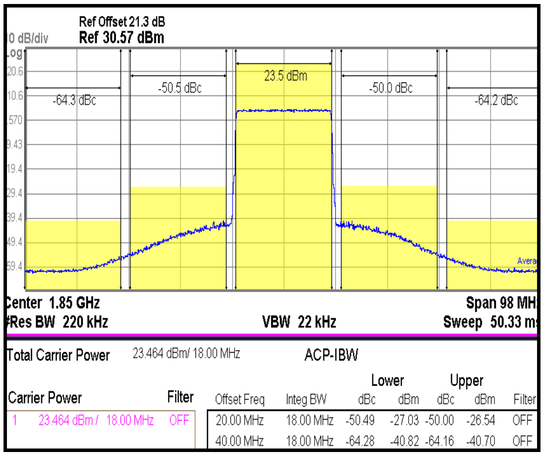
Center 1.85 GHz | Span 49 MH
#Res BW 100 kHz | VBW 10 kHz | Sweep 121.7 m

Total Carrier Power 23.560 dBm/ 9.00 MHz ACP-IBW

Carrier Power		Filter
1	23.560 dBm / 9.000 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.08	-26.52	-50.05	-26.49	OFF
20.00 MHz	9.000 MHz	-65.14	-41.58	-65.07	-41.51	OFF

3GPP LTE E-TM3.1 20MHz



Ref Offset 21.3 dB
Ref 30.57 dBm

Center 1.85 GHz | Span 98 MH
#Res BW 220 kHz | VBW 22 kHz | Sweep 50.33 m

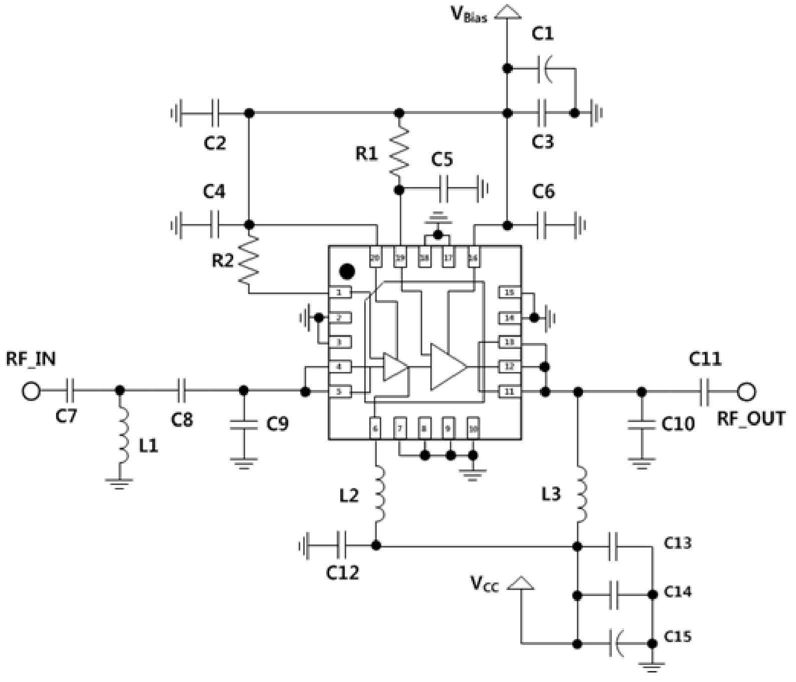
Total Carrier Power 23.464 dBm/ 18.00 MHz ACP-IBW

Carrier Power		Filter
1	23.464 dBm / 18.00 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.49	-27.03	-50.00	-26.54	OFF
40.00 MHz	18.00 MHz	-64.28	-40.82	-64.16	-40.70	OFF

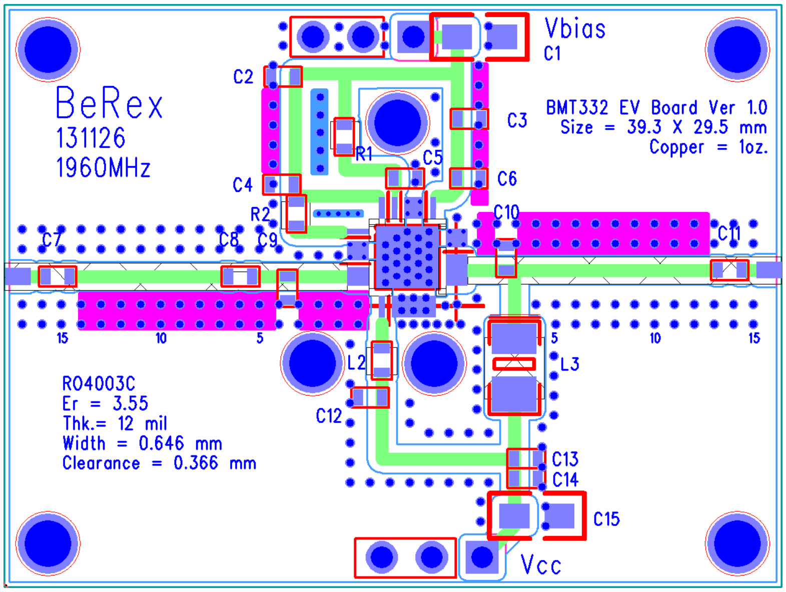
Application Circuit: 1960 MHz

Schematic Diagram



BOM			Marks
C1	1206	N/A	
C2	0603	1nF	
C3	0603	1nF	
C4	0603	N/A	
C5	0603	1nF	
C6	0603	2pF	
C7	0603	0 Ω	±5%
C8	0603	3.3pF	
C9	0603	2.7pF	
C10	0603	4.3pF	High Q
C11	0603	3.9pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	N/A	
L2	0603	12nH	
L3	1008	12nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

Reference	Object	Distance
Input pin	C8	5.0mm
Input pin	C9	3.1mm
Output pin	C10	2.0mm
Pin 16	C3	5.0mm
Pin 16	C6	2.0mm
Pin 19	C5	1.0mm
Pin 20	C2	10.6mm

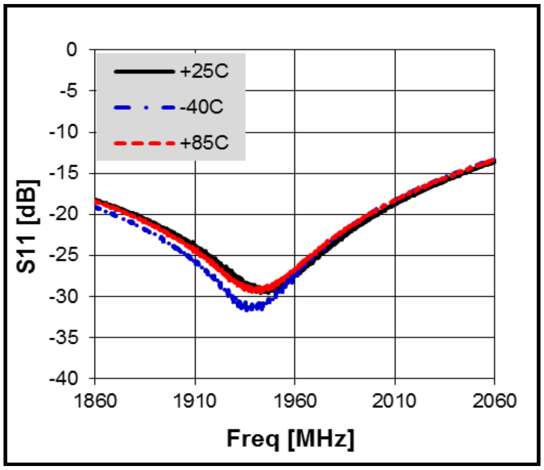
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

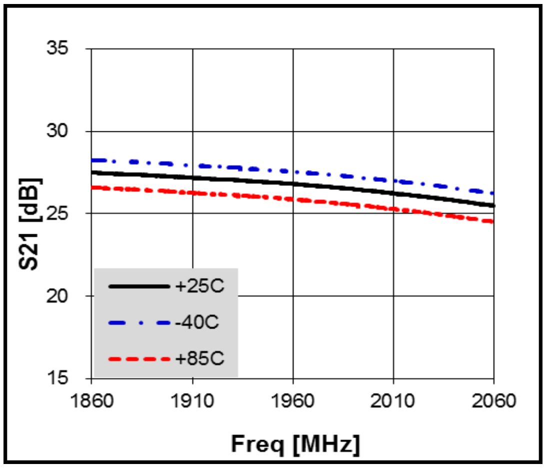
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used '4.3pF(251R14S4R3BV4, EIA 0603) of Johanson Technology.

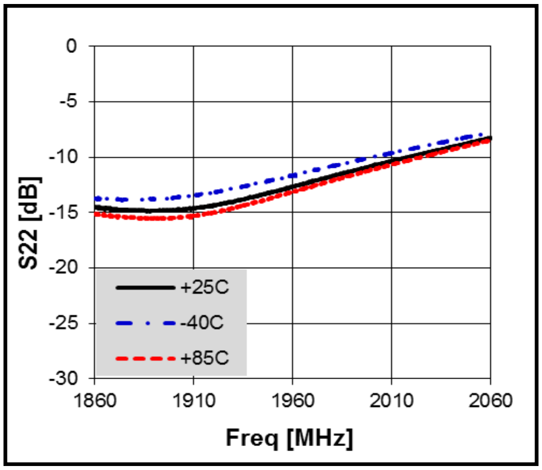
3.C7 : Non-critical 0 Ω.

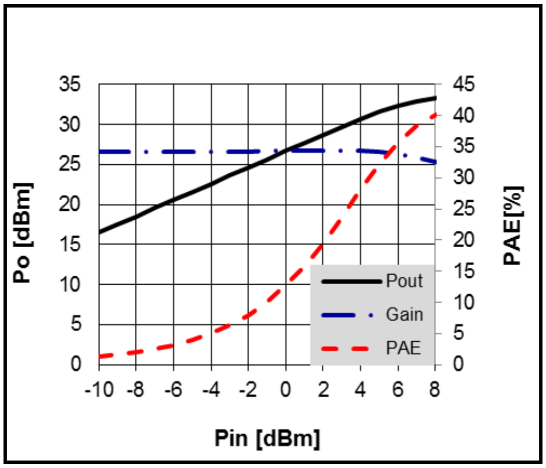
Typical Performance

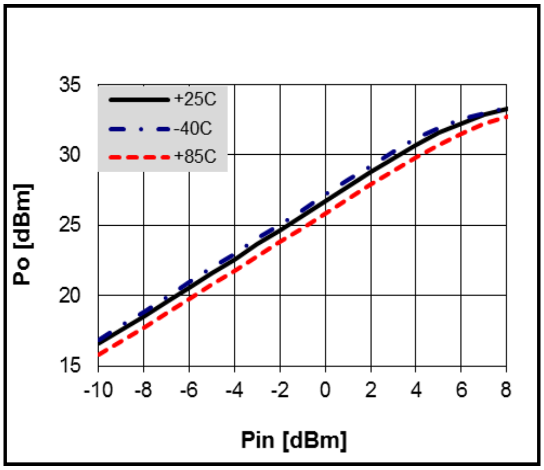
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

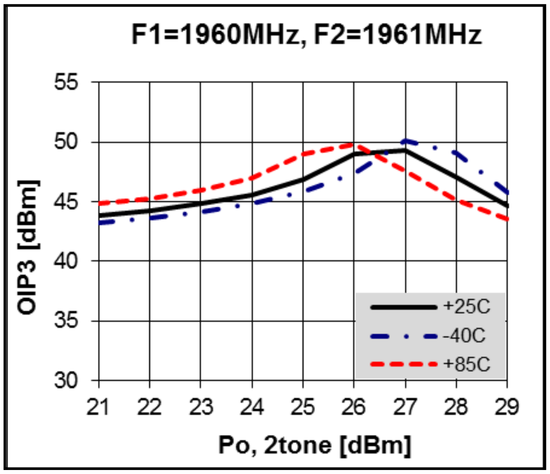


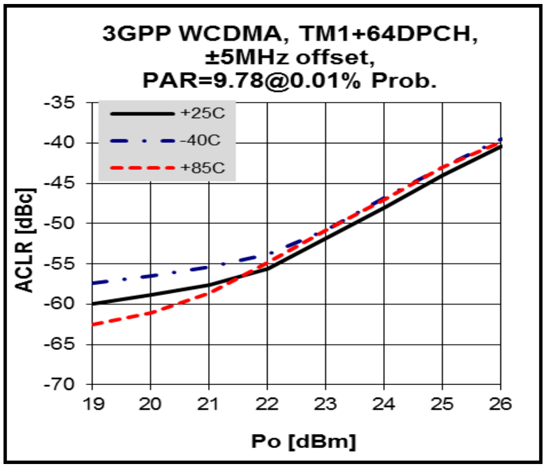


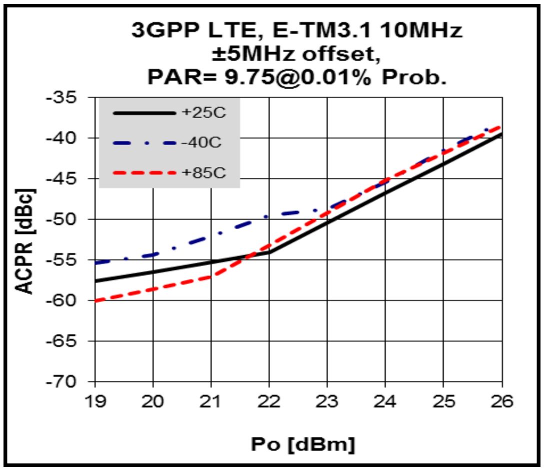




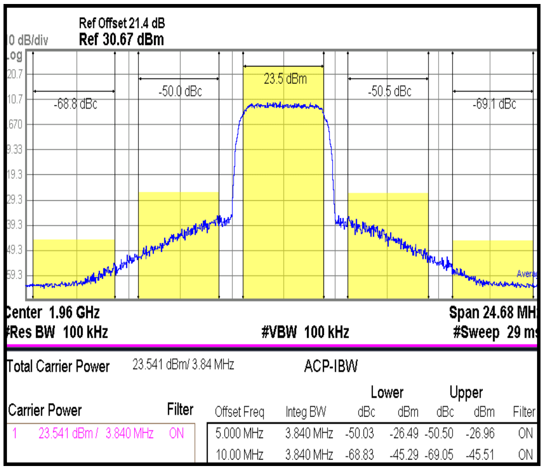








3GPP WCDMA TM1 +64DPCH 1FA



Ref Offset 21.4 dB
Ref 30.67 dBm

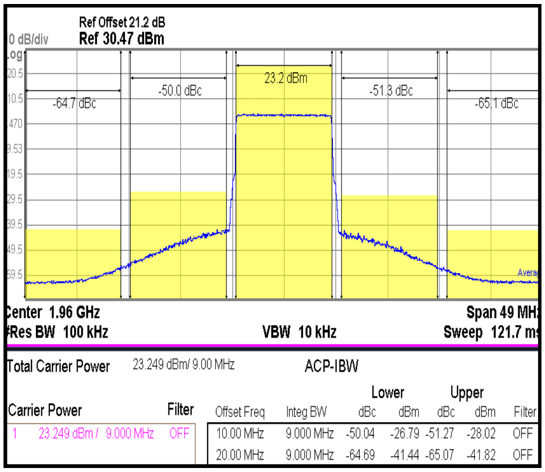
Center 1.96 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 24.68 MH
#Sweep 29 m

Total Carrier Power 23.541 dBm/ 3.84 MHz
ACP-IBW

Carrier Power		Filter
1	23.541 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.03	-26.49	-50.50	-26.96	ON
10.00 MHz	3.840 MHz	-68.83	-45.29	-69.05	-45.51	ON

3GPP LTE E-TM3.1 10MHz



Ref Offset 21.2 dB
Ref 30.47 dBm

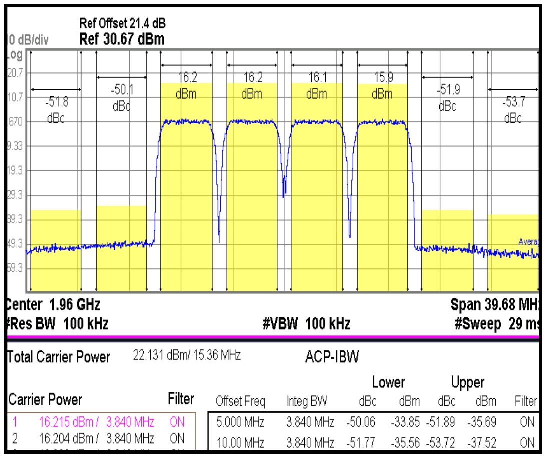
Center 1.96 GHz
#Res BW 100 kHz
VBW 10 kHz
Span 49 MH
Sweep 121.7 m

Total Carrier Power 23.249 dBm/ 9.00 MHz
ACP-IBW

Carrier Power		Filter
1	23.249 dBm / 9.000 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.04	-26.79	-51.27	-28.02	OFF
20.00 MHz	9.000 MHz	-64.69	-41.44	-65.07	-41.82	OFF

3GPP WCDMA TM1 +64DPCH 4FA



Ref Offset 21.4 dB
Ref 30.67 dBm

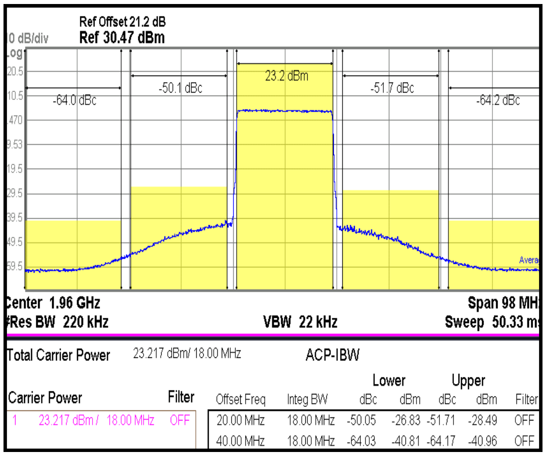
Center 1.96 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 39.68 MH
#Sweep 29 m

Total Carrier Power 22.131 dBm/ 15.36 MHz
ACP-IBW

Carrier Power		Filter
1	16.215 dBm / 3.840 MHz	ON
2	16.204 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.06	-33.85	-51.89	-35.69	ON
10.00 MHz	3.840 MHz	-51.77	-35.56	-53.72	-37.52	ON

3GPP LTE E-TM3.1 20MHz



Ref Offset 21.2 dB
Ref 30.47 dBm

Center 1.96 GHz
#Res BW 220 kHz
VBW 22 kHz
Span 98 MH
Sweep 50.33 m

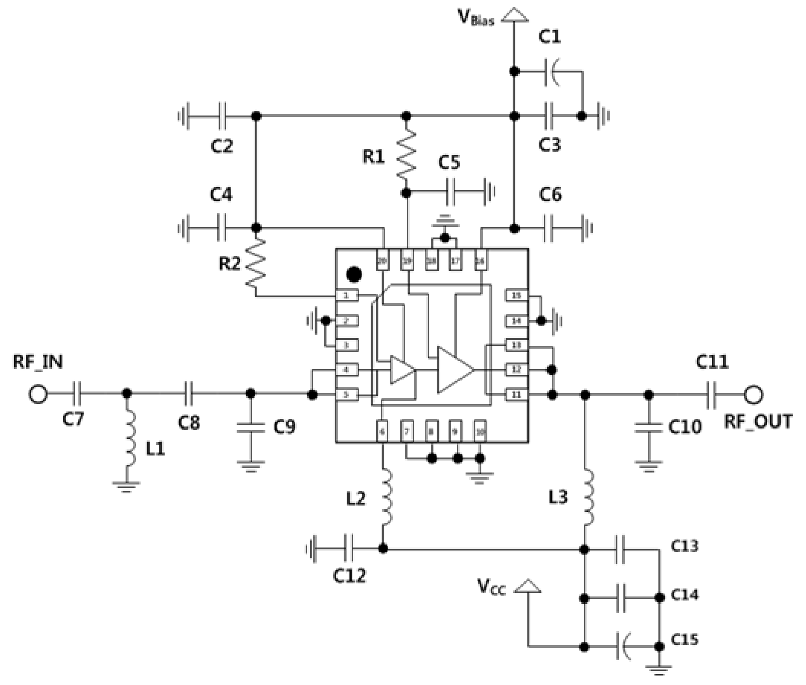
Total Carrier Power 23.217 dBm/ 18.00 MHz
ACP-IBW

Carrier Power		Filter
1	23.217 dBm / 18.00 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.05	-26.83	-51.71	-28.49	OFF
40.00 MHz	18.00 MHz	-64.03	-40.81	-64.17	-40.96	OFF

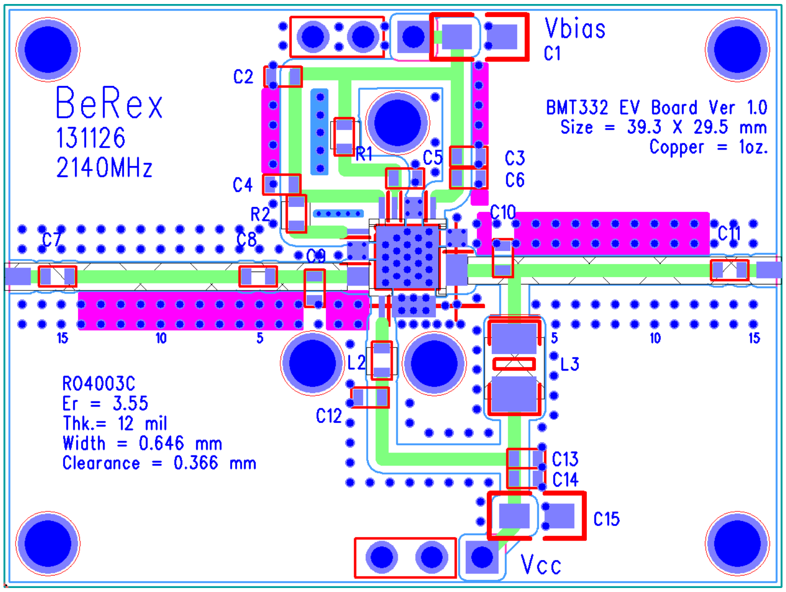
Application Circuit: 2140 MHz

Schematic Diagram



BOM			Marks
C1	1206	10uF	Tantalum
C2	0603	N/A	
C3	0603	1nF	
C4	0603	1nF	
C5	0603	1nF	
C6	0603	3pF	
C7	0603	0 Ω	±5%
C8	0603	3pF	
C9	0603	2.7pF	
C10	0603	3.9pF	High Q
C11	0603	4.3pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	N/A	
L2	0603	12nH	
L3	1008	10nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

Reference	Object	Distance
Input pin	C8	4.1mm
Input pin	C9	2.2mm
Output pin	C10	1.8mm
Pin 16	C3	3.0mm
Pin 16	C6	2.0mm
Pin 19	C5	1.0mm
Pin 20	C4	5.0mm

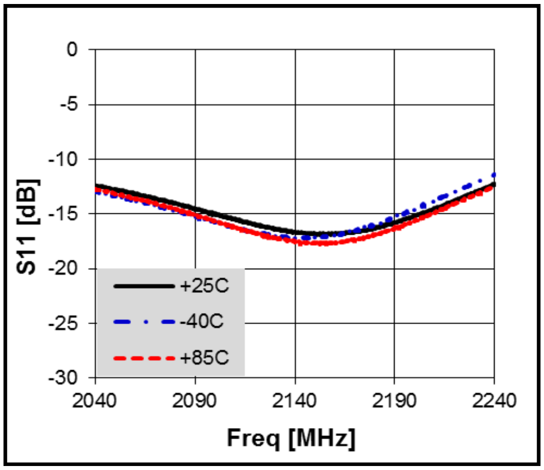
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

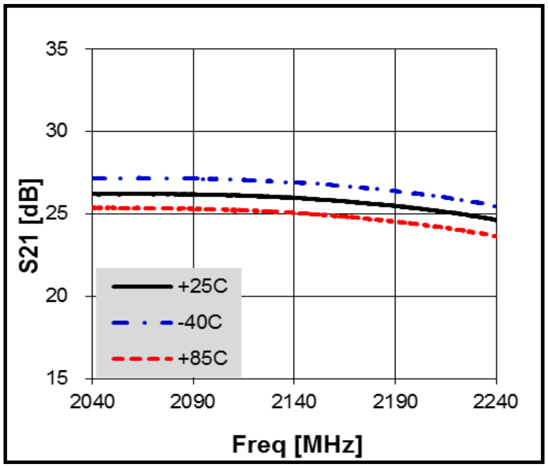
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used '3.9pF(251R14S3R9BV4, EIA 0603) of Johanson Technology.

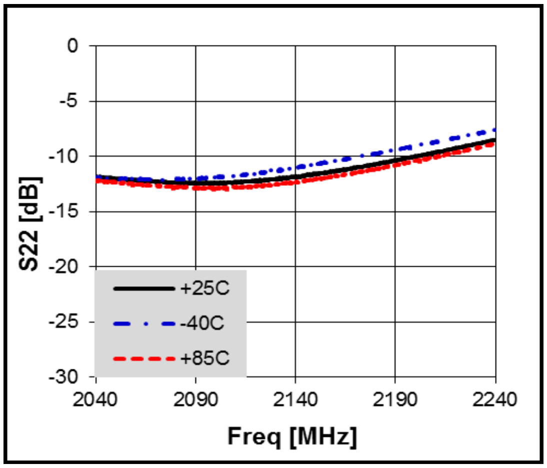
3.C7 : Non-critical 0 Ω.

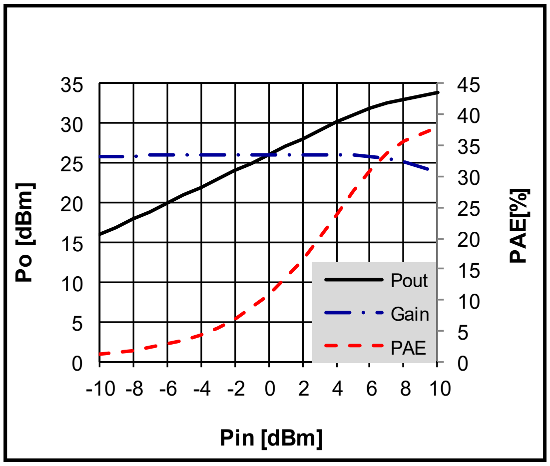
Typical Performance

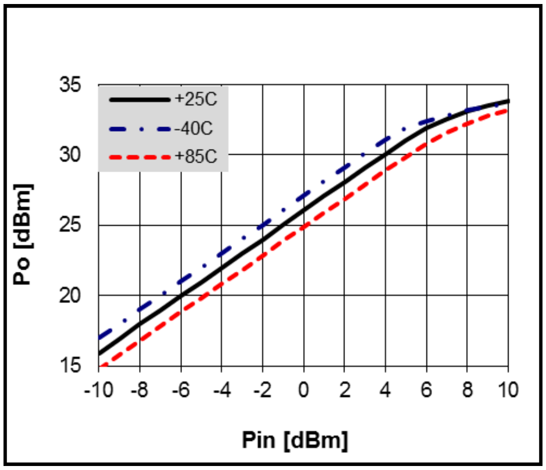
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

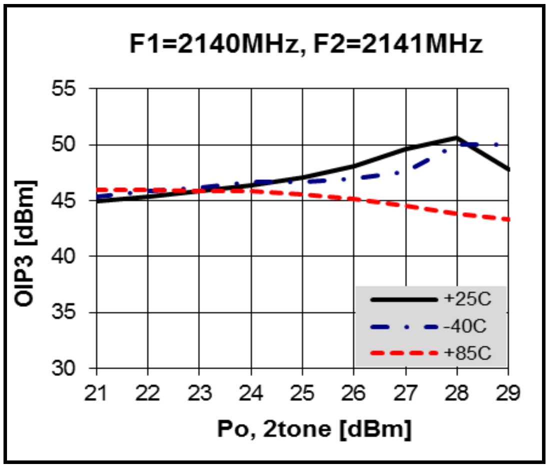


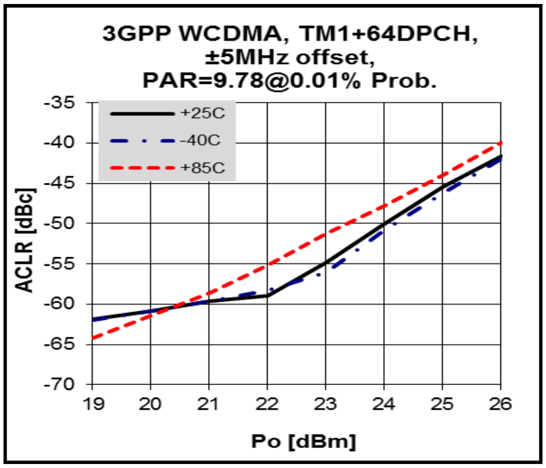


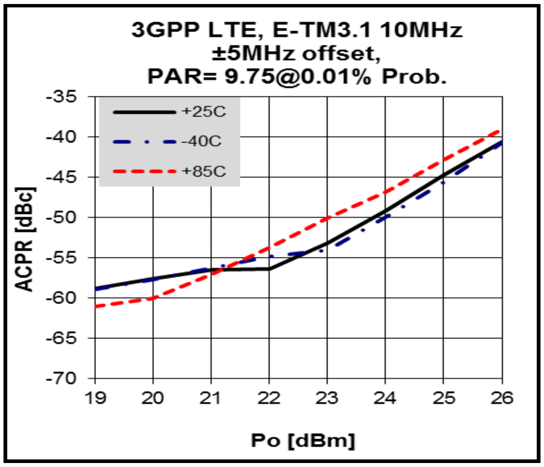




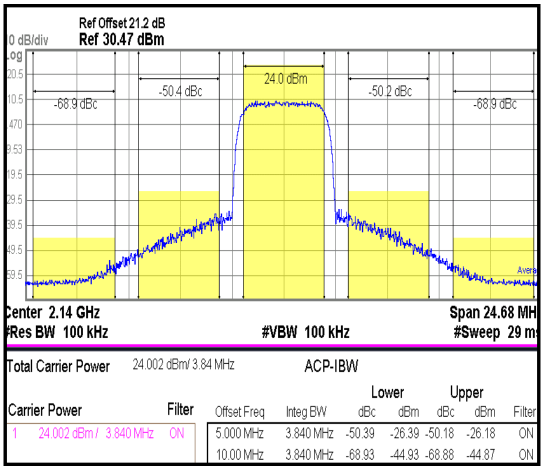








3GPP WCDMA TM1 +64DPCH 1FA



Ref Offset 21.2 dB
0 dB/div Ref 30.47 dBm

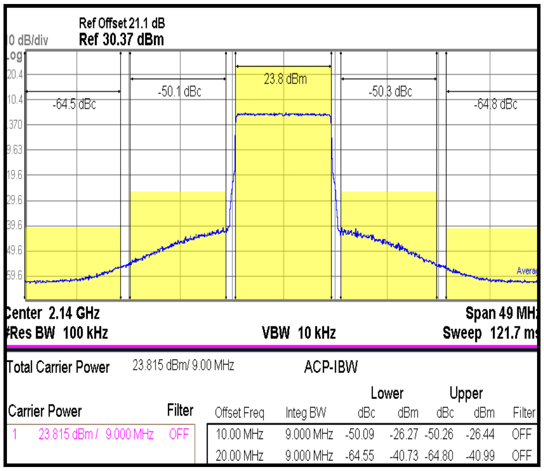
Center 2.14 GHz | Span 24.68 MH
#Res BW 100 kHz | #VBW 100 kHz | #Sweep 29 m

Total Carrier Power 24.002 dBm/ 3.84 MHz ACP-IBW

	Carrier Power	Filter
1	24.002 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.39	-26.39	-50.18	-26.18	ON
10.00 MHz	3.840 MHz	-68.93	-44.93	-68.88	-44.87	ON

3GPP LTE E-TM3.1 10MHz



Ref Offset 21.1 dB
0 dB/div Ref 30.37 dBm

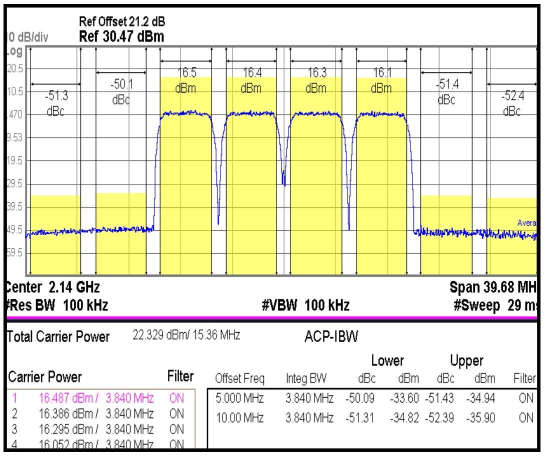
Center 2.14 GHz | Span 49 MH
#Res BW 100 kHz | VBW 10 kHz | Sweep 121.7 m

Total Carrier Power 23.815 dBm/ 9.00 MHz ACP-IBW

	Carrier Power	Filter
1	23.815 dBm / 9.000 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.09	-26.27	-50.26	-26.44	OFF
20.00 MHz	9.000 MHz	-64.55	-40.73	-64.80	-40.99	OFF

3GPP WCDMA TM1 +64DPCH 4FA



Ref Offset 21.2 dB
0 dB/div Ref 30.47 dBm

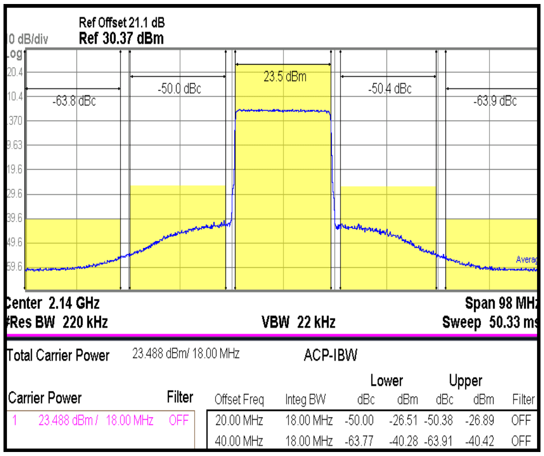
Center 2.14 GHz | Span 39.68 MH
#Res BW 100 kHz | #VBW 100 kHz | #Sweep 29 m

Total Carrier Power 22.329 dBm/ 15.36 MHz ACP-IBW

	Carrier Power	Filter
1	16.487 dBm / 3.840 MHz	ON
2	16.386 dBm / 3.840 MHz	ON
3	16.295 dBm / 3.840 MHz	ON
4	16.052 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.09	-33.60	-51.43	-34.94	ON
10.00 MHz	3.840 MHz	-51.31	-34.82	-52.39	-35.90	ON

3GPP LTE E-TM3.1 20MHz



Ref Offset 21.1 dB
0 dB/div Ref 30.37 dBm

Center 2.14 GHz | Span 98 MH
#Res BW 220 kHz | VBW 22 kHz | Sweep 50.33 m

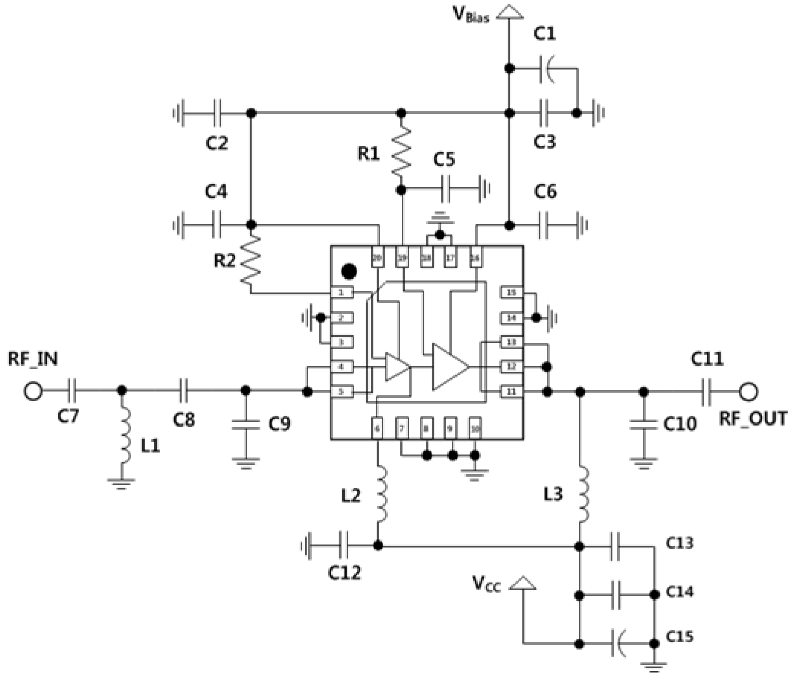
Total Carrier Power 23.488 dBm/ 18.00 MHz ACP-IBW

	Carrier Power	Filter
1	23.488 dBm / 18.00 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.00	-26.51	-50.38	-26.89	OFF
40.00 MHz	18.00 MHz	-63.77	-40.28	-63.91	-40.42	OFF

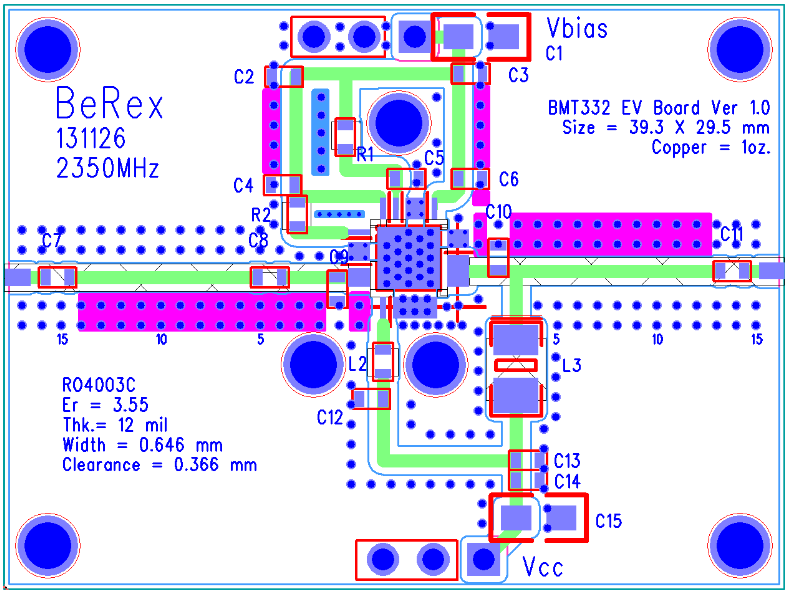
Application Circuit: 2350 MHz

Schematic Diagram



BOM			Marks
C1	1206	10uF	Tantalum
C2	0603	N/A	
C3	0603	N/A	
C4	0603	0.75pF	
C5	0603	1nF	
C6	0603	1nF	
C7	0603	0 Ω	±5%
C8	0603	2.2pF	
C9	0603	2.7pF	
C10	0603	3.3pF	High Q
C11	0603	22pF	
C12	0603	1uF	
C13	0603	100pF	
C14	0603	1nF	
C15	1206	10uF	Tantalum
L1	0603	N/A	
L2	0603	15nH	
L3	1008	10nH	Coil
R1	0603	100 Ω	±5%
R2	0603	270 Ω	±5%

PCB Diagram



Notice

Below information is subject to change as conditions of the substrate.

Reference	Object	Distance
Input pin	C8	3.6mm
Input pin	C9	0.6mm
Output pin	C10	1.3mm
Pin 16	C6	2.0mm
Pin 19	C5	1.0mm
Pin 20	C4	5.0mm

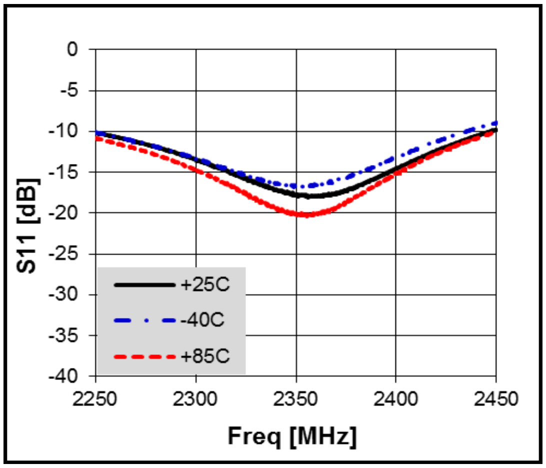
1. Pin 16 & 20 is used for Vce of the inner bias circuit. To eliminate bias line resonance you need above 10mm transmission line and adjust the position of C2, C3, C4 ,C5 and C6. Also you can adjust spectrum regrowth about bandwidth of signals which you want.

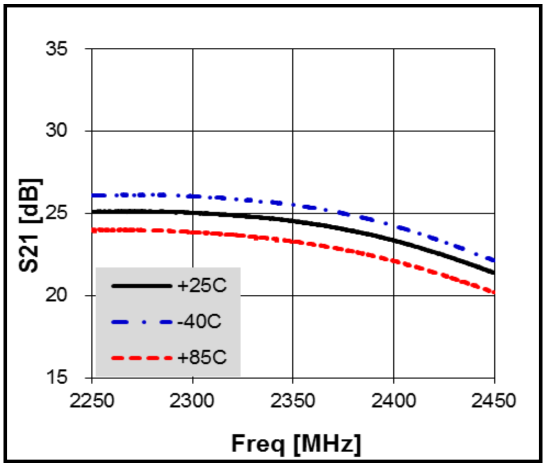
2. C10 : We recommend High-Q capacitor for better output power performance. In this document we used ‘3.3pF(251R14S3R3BV4, EIA 0603) of Johanson Technology.

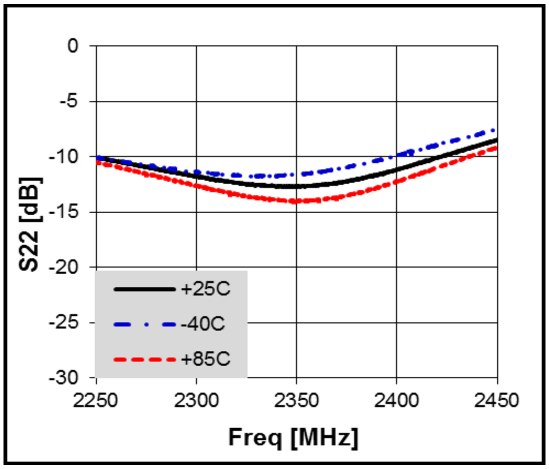
3. C7 : Non-critical 0 Ω.

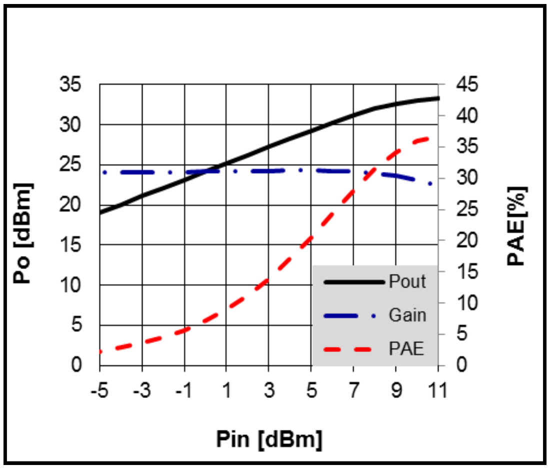
Typical Performance

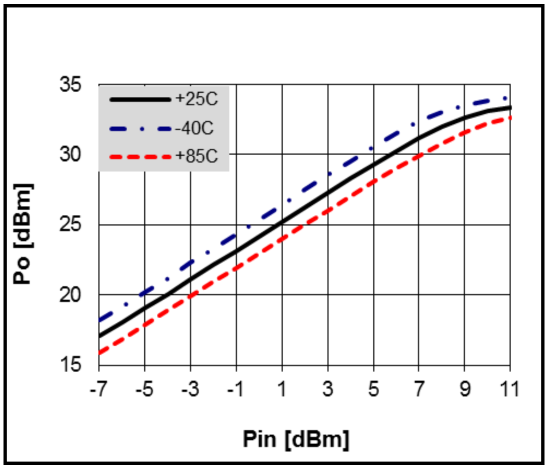
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

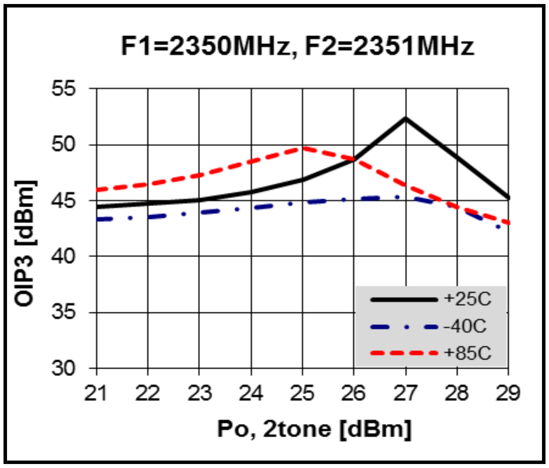


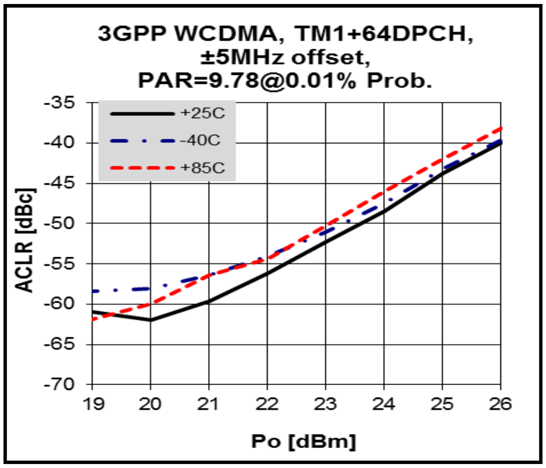


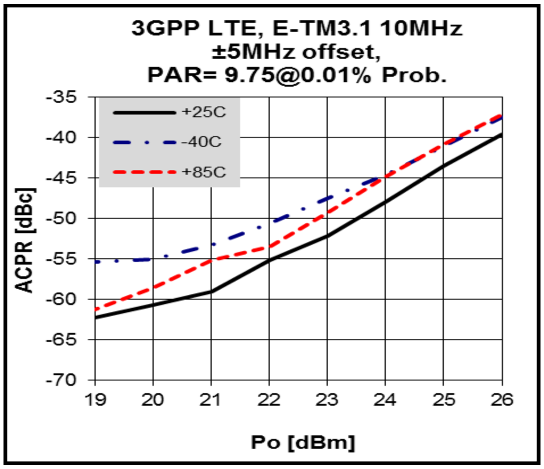




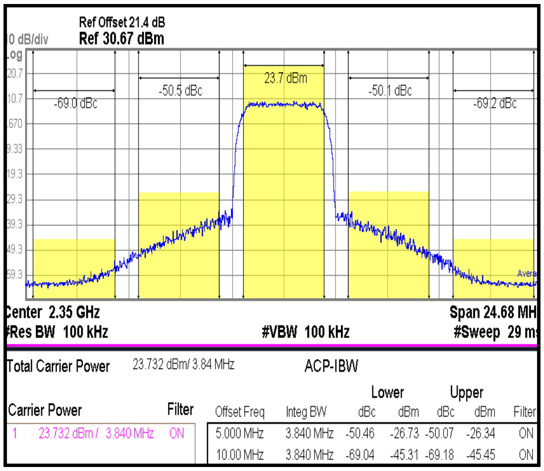








3GPP WCDMA TM1 +64DPCH 1FA



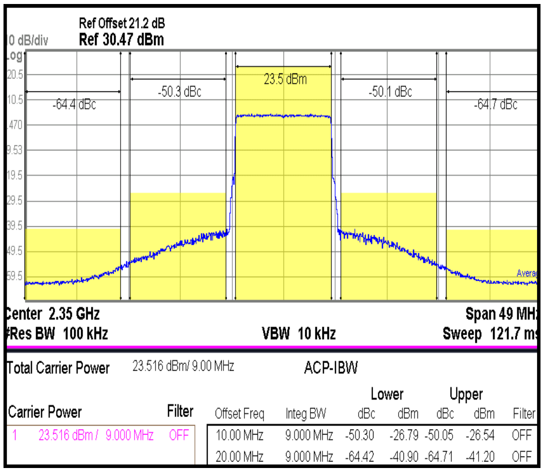
Center 2.35 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 24.68 MH
#Sweep 29 m

Total Carrier Power 23.732 dBm/ 3.84 MHz
ACP-IBW

Carrier Power		Filter
1	23.732 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-50.46	-26.73	-50.07	-26.34	ON
10.00 MHz	3.840 MHz	-69.04	-45.31	-69.18	-45.45	ON

3GPP LTE E-TM3.1 10MHz



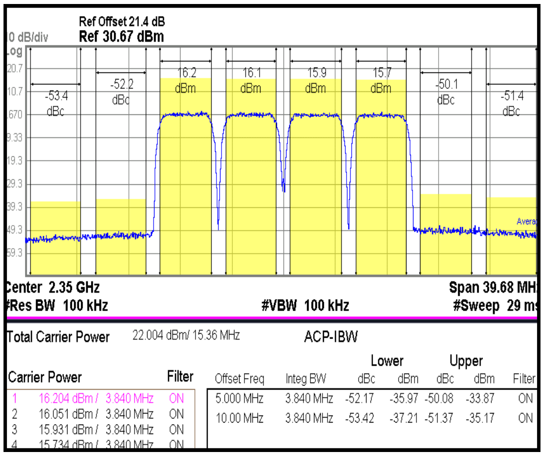
Center 2.35 GHz
#Res BW 100 kHz
VBW 10 kHz
Span 49 MH
Sweep 121.7 m

Total Carrier Power 23.516 dBm/ 9.00 MHz
ACP-IBW

Carrier Power		Filter
1	23.516 dBm / 9.000 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
10.00 MHz	9.000 MHz	-50.30	-26.79	-50.05	-26.54	OFF
20.00 MHz	9.000 MHz	-64.42	-40.90	-64.71	-41.20	OFF

3GPP WCDMA TM1 +64DPCH 4FA



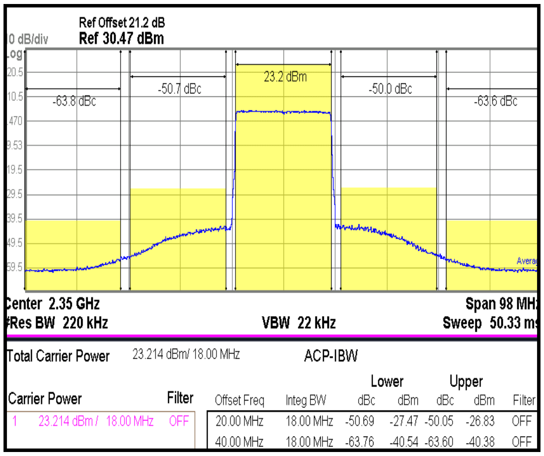
Center 2.35 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 39.68 MH
#Sweep 29 m

Total Carrier Power 22.004 dBm/ 15.36 MHz
ACP-IBW

Carrier Power		Filter
1	16.204 dBm / 3.840 MHz	ON
2	16.051 dBm / 3.840 MHz	ON
3	15.931 dBm / 3.840 MHz	ON
4	15.734 dBm / 3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-52.17	-35.97	-50.08	-33.87	ON
10.00 MHz	3.840 MHz	-53.42	-37.21	-51.37	-35.17	ON

3GPP LTE E-TM3.1 20MHz



Center 2.35 GHz
#Res BW 220 kHz
VBW 22 kHz
Span 98 MH
Sweep 50.33 m

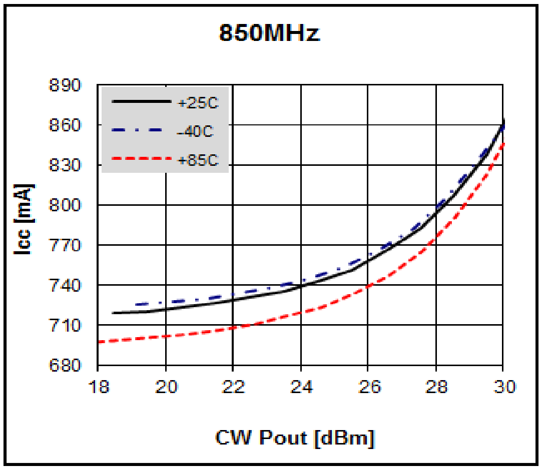
Total Carrier Power 23.214 dBm/ 18.00 MHz
ACP-IBW

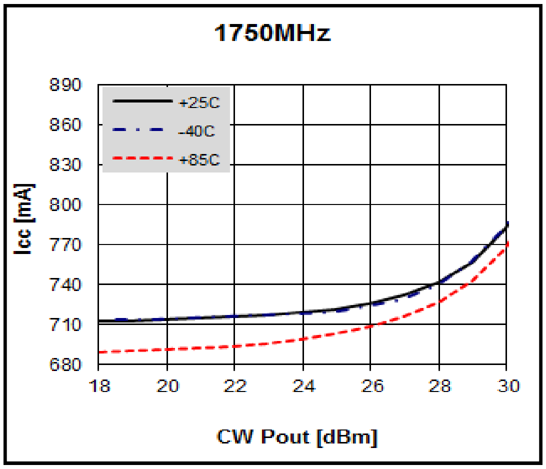
Carrier Power		Filter
1	23.214 dBm / 18.00 MHz	OFF

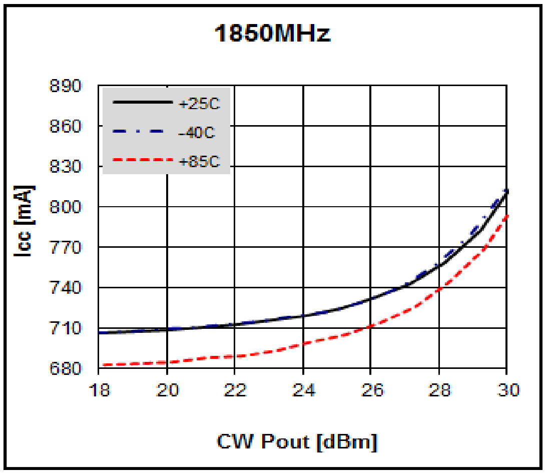
		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.69	-27.47	-50.05	-26.83	OFF
40.00 MHz	18.00 MHz	-63.76	-40.54	-63.60	-40.38	OFF

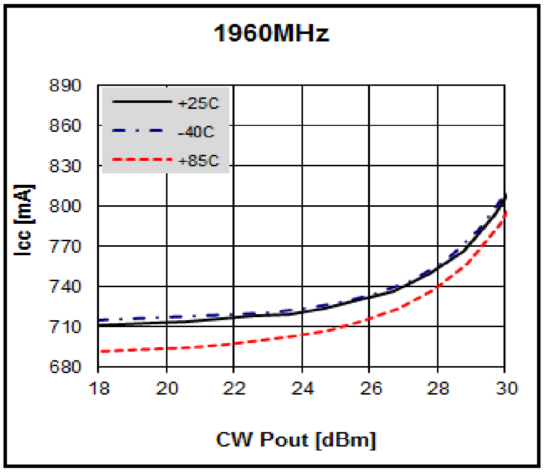
Typical Performance (Pout vs. Icc)

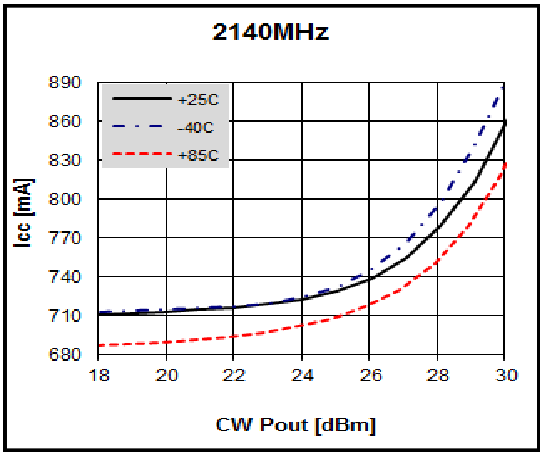
(V_{cc} & V_{Bias} =+5V, I_{cq}=680mA, T_a=25°C)

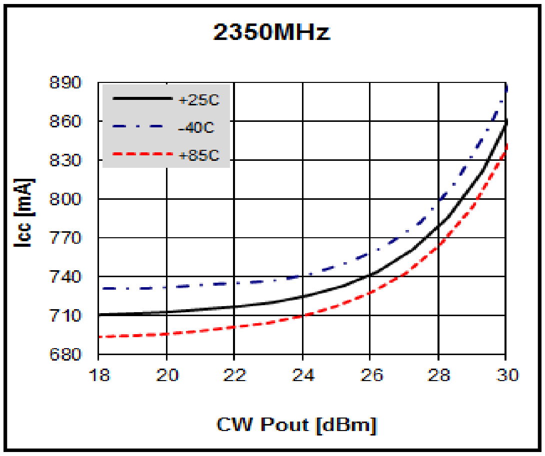




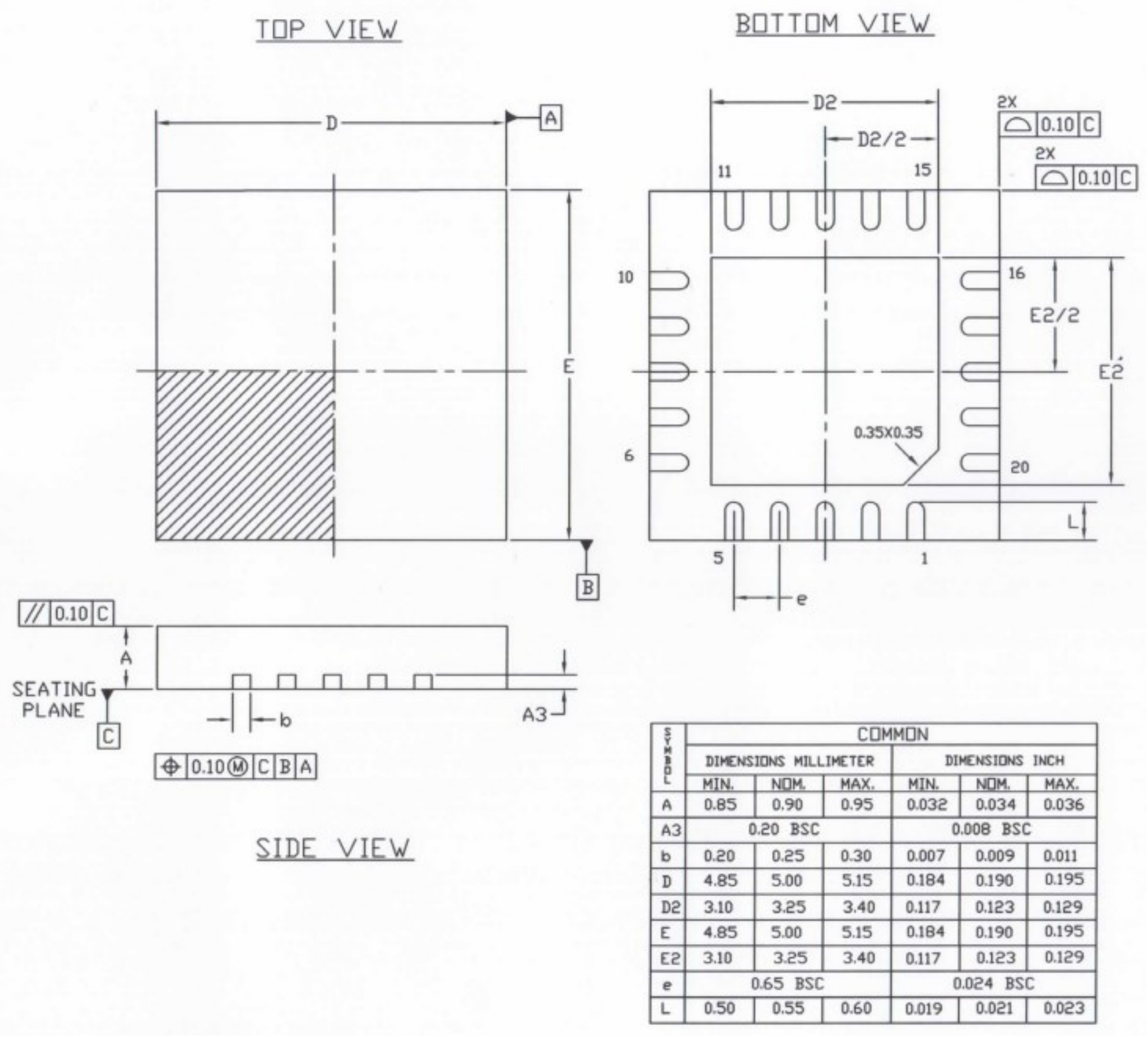




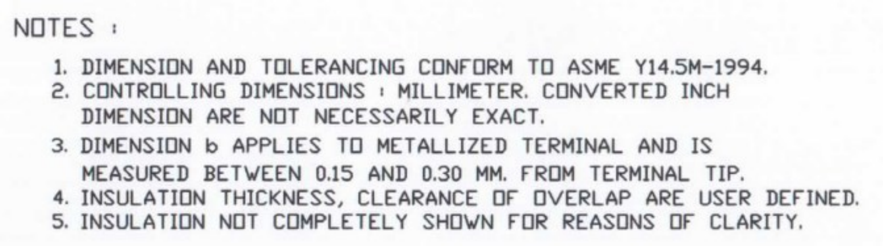




Package Outline Dimension

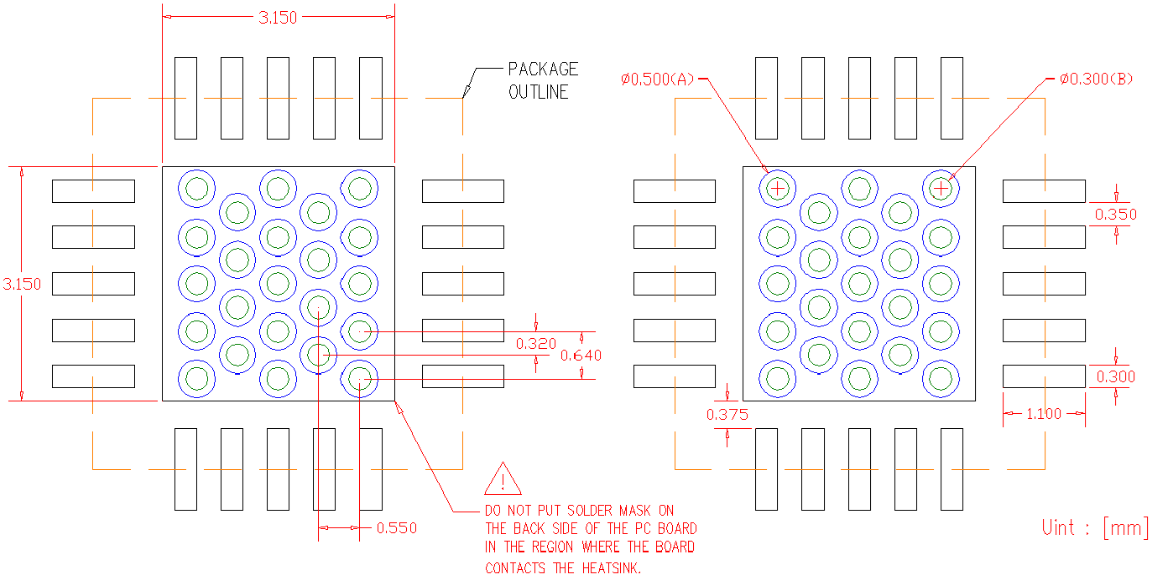


SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.85	0.90	0.95	0.032	0.034	0.036
A3	0.20 BSC			0.008 BSC		
b	0.20	0.25	0.30	0.007	0.009	0.011
D	4.85	5.00	5.15	0.184	0.190	0.195
D2	3.10	3.25	3.40	0.117	0.123	0.129
E	4.85	5.00	5.15	0.184	0.190	0.195
E2	3.10	3.25	3.40	0.117	0.123	0.129
e	0.65 BSC			0.024 BSC		
L	0.50	0.55	0.60	0.019	0.021	0.023


NOTES :

1. DIMENSION AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. CONTROLLING DIMENSIONS : MILLIMETER. CONVERTED INCH DIMENSION ARE NOT NECESSARILY EXACT.
3. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM. FROM TERMINAL TIP.
4. INSULATION THICKNESS, CLEARANCE OF OVERLAP ARE USER DEFINED.
5. INSULATION NOT COMPLETELY SHOWN FOR REASONS OF CLARITY.

Suggested PCB Land Pattern and PAD Layout



DO NOT PUT SOLDER MASK ON THE BACK SIDE OF THE PC BOARD IN THE REGION WHERE THE BOARD CONTACTS THE HEATSINK.

Uint : [mm]

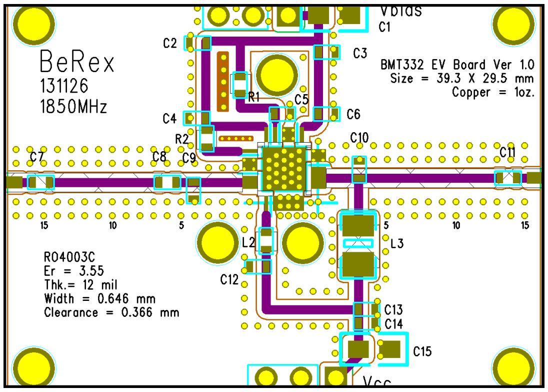
- Notes

1. Use 1 oz. copper minimum for top and bottom layer metal.
2. A heatsink underneath the area of the PCB for the mounted device is required for proper thermal operation.
3. Ground / thermal vias are critical for the proper performance of this device.

Package Marking

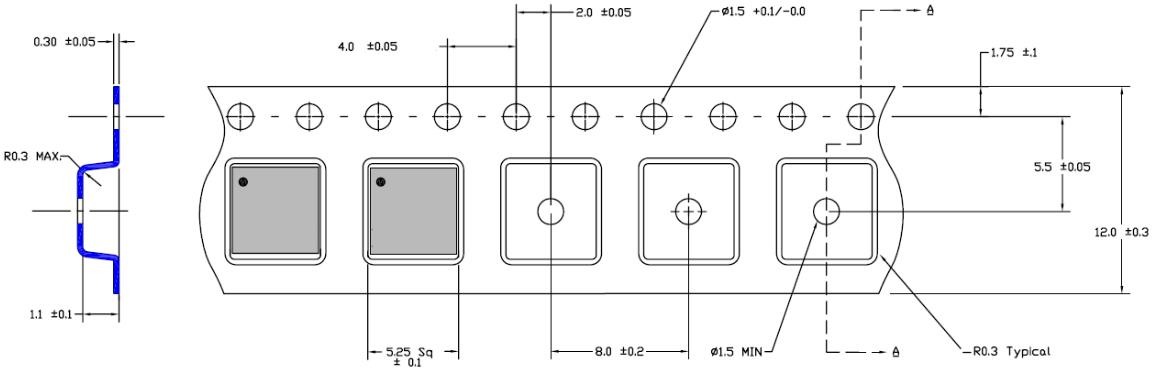
YY = Year, WW = Working Week,
XX = Wafer No.

PCB Mounting



Tape & Reel

QFN 5x5



Packaging information :

Tape width(mm) : 12

Reel Size (inches) : 7

Device Cavity Pitch(mm) : 8

Devices Per Reel : 1000

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 1C
Value:	Passes ≥ 1000V to < 2000 V
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JS-001-2012

ESD Rating:	Class C3
Value:	Passes >1000V
Test:	Charged Device Model (CDM)
Standard:	JEDEC Standard JESD22-C101F

MSL Rating:	Level 1 at +260°C convection reflow
Standard:	JEDEC Standard J-STD-020

Caution: ESD Sensitive
Appropriate precautions in handling, packaging
and testing devices must be observed.

Proper ESD procedures should be followed when handling this device.

RoHS Compliance

This part is compliant with Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU as amended by Directive 2015/863/EU.
This product also is compliant with a concentration of the Substances of Very High Concern (SVHC) candidate list which are contained in a quantity of less than 0.1%(w/w) in each components of a product and/or its packaging placed on the European Community market by the BeRex and Suppliers.

NATO CAGE code:

2	N	9	6	F