

Device Features

- OIP3 = 43.5 dBm @ 900 MHz
- Gain = 21.5 dB @ 900 MHz
- Output P1 dB = 23.9 dBm @ 900 MHz
- RoHS2-compliant SOT-89 SMT package



Product Description

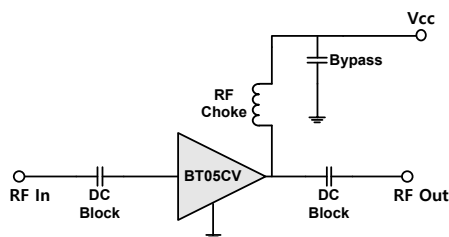
BeRex's BT05CV is a high performance and a high dynamic range amplifier in a low cost surface mount package(SOT-89) with a RoHS2-compliant, that incorporates reliable heterojunction-bipolar-transistor (HBT) devices fabricated with InGaP GaAs technology. This device is designed for use where high linearity is required and features high OIP3 and P1 with low consumption current(85mA) and requires a few external matching components such as a DC blocking capacitors on the In/Output pin, a bypass capacitor and a RF choke for the out port.

All devices are 100% RF/DC tested.

Applications

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

Application Circuits



*External matching circuit: refer to the page 5 to 11.

Electrical Specifications

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

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		5		4000	MHz
Test Frequency			900		MHz
Gain		20.0	21.5		dB
Input Return Loss			-18.0		dB
Output Return Loss			-15.0		dB
Output IP3	9 dBm / tone , Δf=1 MHz	40.5	43.5		dBm
Output P1dB		21.4	23.9		dBm
Noise Figure			4.4		dB

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	5		4000	MHz
I _c @ (V _c = 5V)	68	85	102	mA
V _c	4.75	5.0	5.25	V
R _{TH}		50		°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

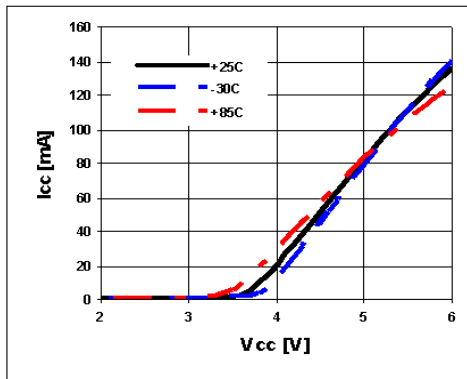
Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	+175	°C
Supply Voltage	+6.0	V
Supply Current	180	mA
Input RF Power	23	dBm

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

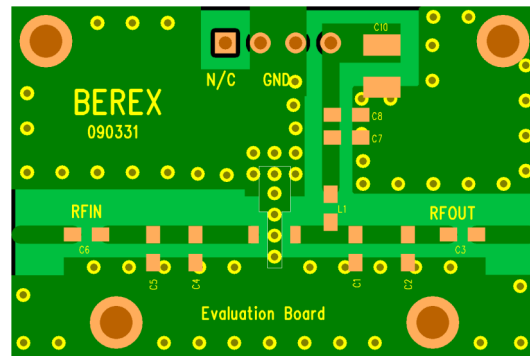
Typical Performance (Vc=5V, Ic=85mA, T=25°C)

Parameter	Frequency				Unit
	900	1900	2450	3500	MHz
Gain	21.5	17.5	15.0	12.3	dB
S11	-18.0	-15.0	-17.0	-23.0	dB
S22	-15.0	-15.0	-15.0	-22.0	dB
OIP3	43.5	42.0	40.5	40.0	dBm
P1dB	23.9	23.6	24.1	23.1	dBm
Noise Figure	4.4	4.2	4.3	5.4	dB

V-I Characteristics

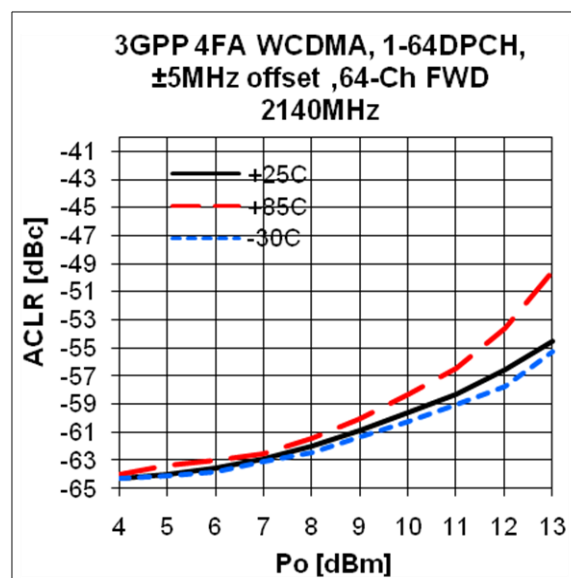


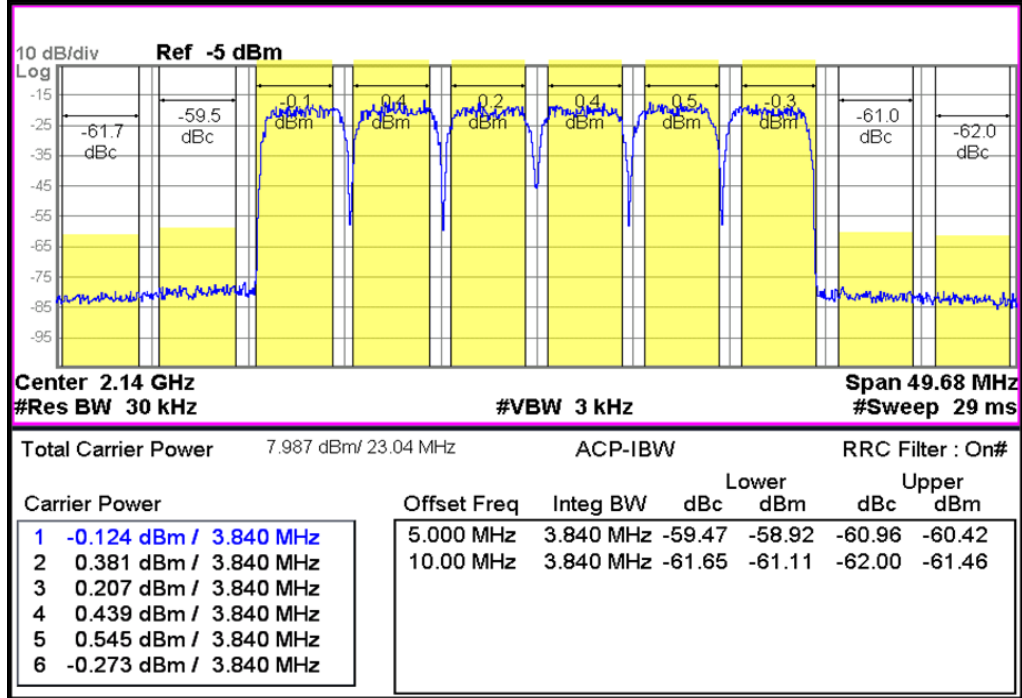
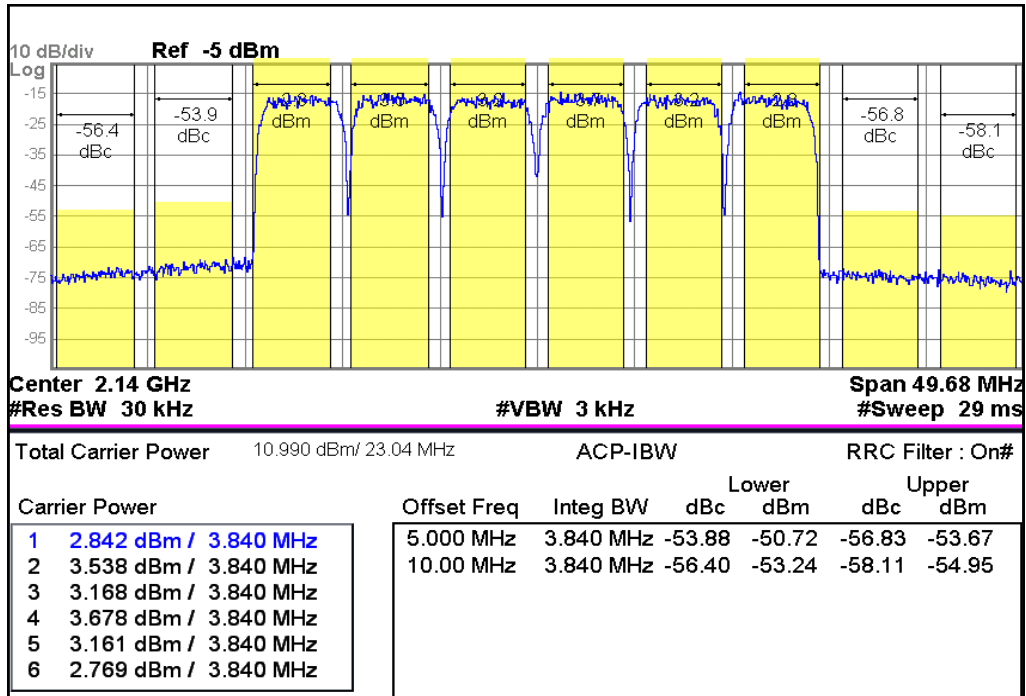
BeRex SOT89 Evaluation Board



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

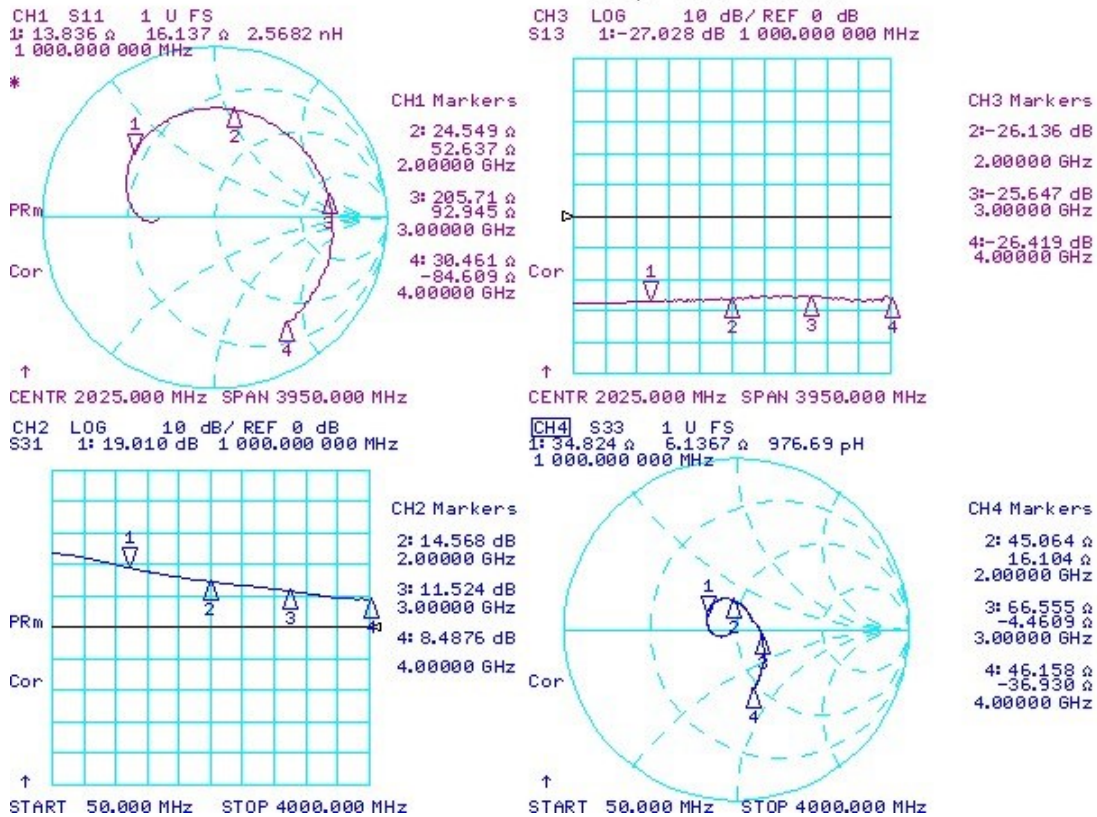
ACLR



WCDMA 6FA 2140 -60dBc

WCDMA 6FA 2140 -55dBc


Typical Device Data

S-parameters (Vc=5V, Ic=85mA, T=25°C)

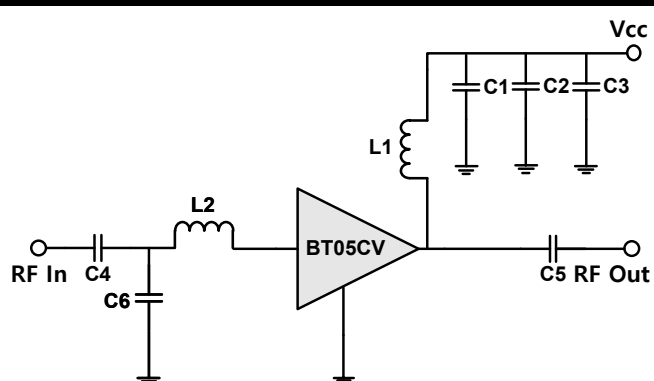


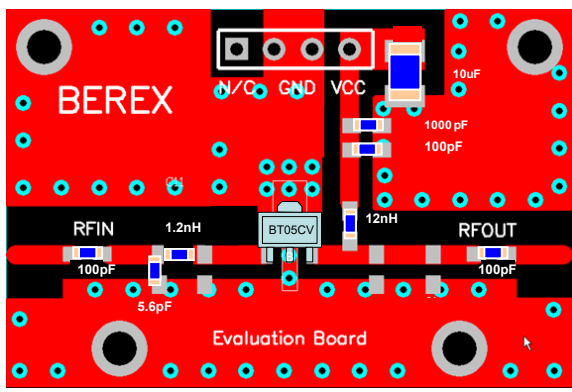
S-Parameter

(Vdevice = 5.0V, Icc = 85mA, 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	0.337	-176.993	14.904	167.360	0.041	-2.138	0.045	-150.827
500	0.482	173.684	12.408	122.325	0.042	-9.903	0.130	-166.023
1000	0.601	141.786	8.920	79.312	0.045	-24.247	0.192	153.711
1500	0.635	111.242	6.659	46.287	0.046	-38.801	0.201	124.357
2000	0.640	80.507	5.343	16.028	0.049	-54.092	0.174	97.447
2500	0.641	47.530	4.482	-13.531	0.051	-72.149	0.119	51.320
3000	0.667	10.847	3.774	-43.042	0.051	-93.463	0.147	-12.993
3500	0.706	-24.872	3.048	-71.311	0.047	-113.838	0.258	-52.979
4000	0.744	-56.383	2.650	-97.173	0.047	-134.880	0.358	-75.184

Application Circuit: 900 MHz

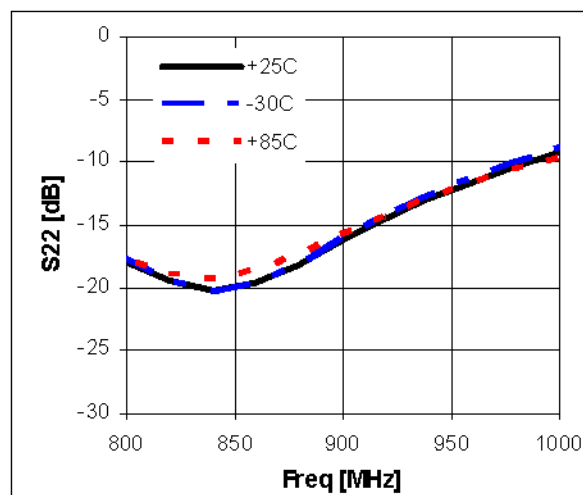
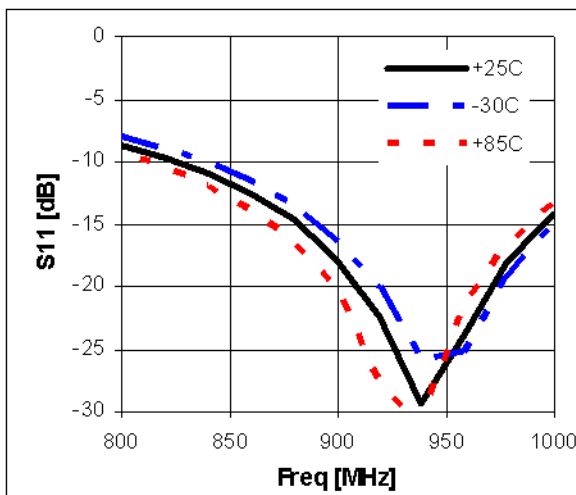
Schematic Diagram	BOM	Tolerance	
	C1	100pF	± 5%
	C2	1000pF	±5%
	C3	10uF	± 20%
	C4	100pF	± 5%
	C5	100pF	± 5%
	C6	5.6pF	±5%
	L1	12nH	±5%
	L2	1.2nH	± 5%

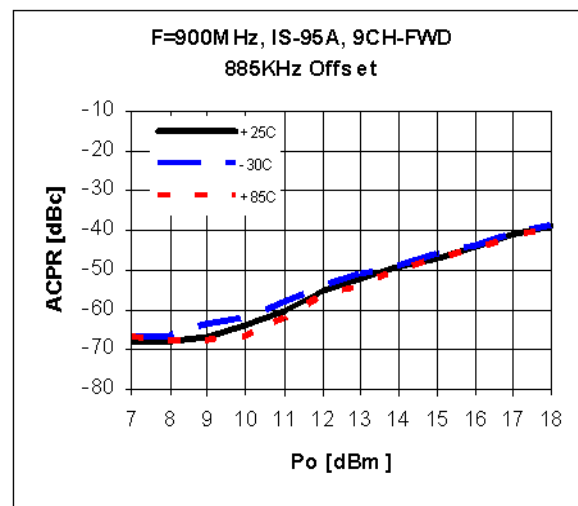
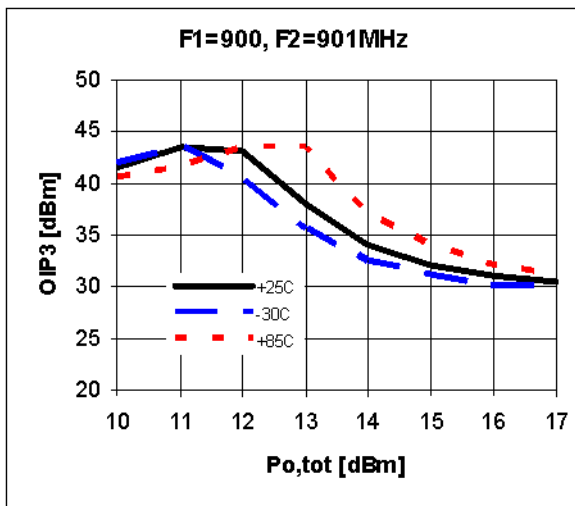
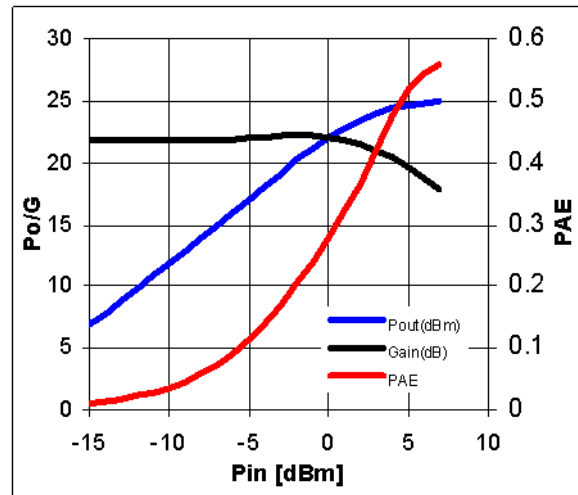
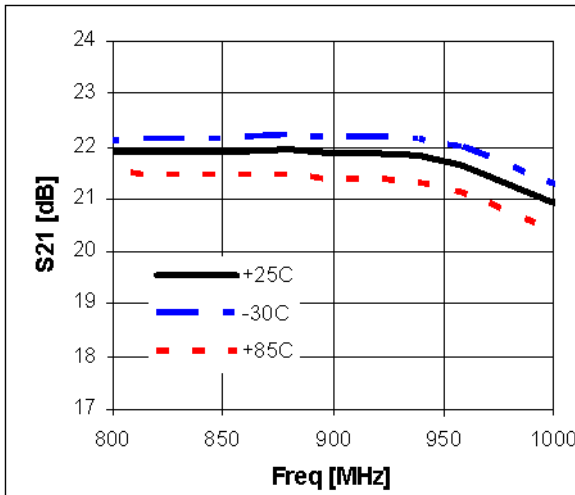


Note:

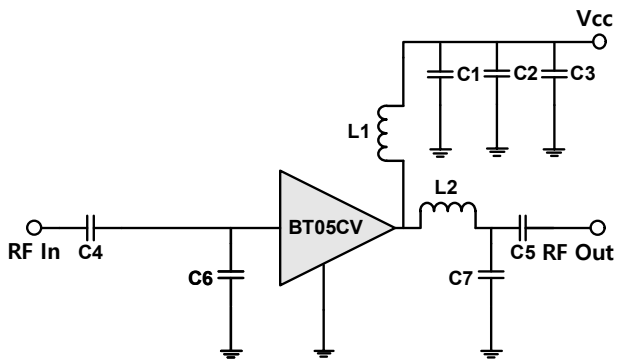
1. PCB: 31mil thick FR4.
2. Distance between the center of the series inductor(L2) and the input pin of BT05CV _ **2.0mm**.
3. Distance between the center of the shunt cap (C6) and the input pin of BT05CV _ **9.0mm**.

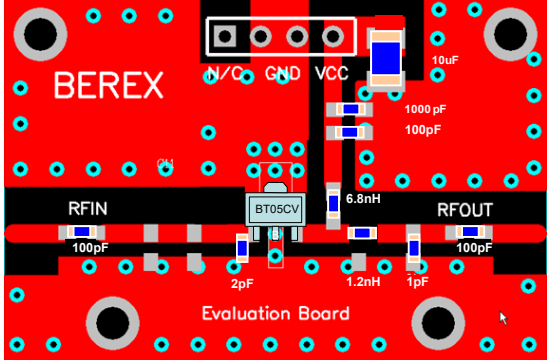
Typical Performance (Vc=5V, Ic=85mA, T=25°C)





Application Circuit: 1900 MHz

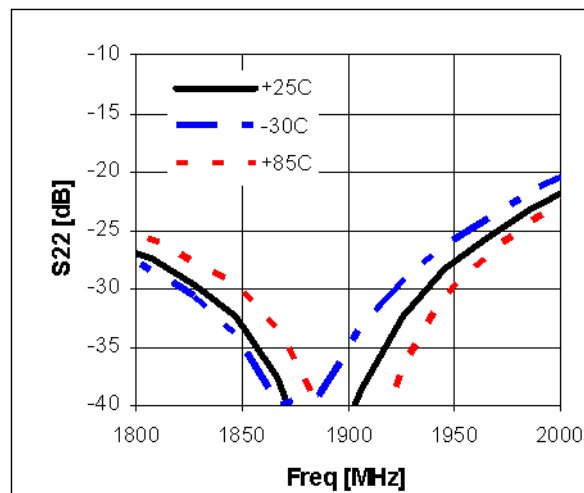
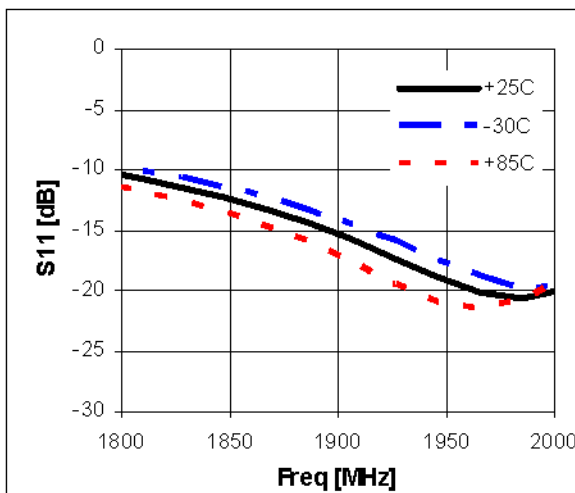
Schematic Diagram	BOM	Tolerance	
	C1	100pF	± 5%
	C2	1000pF	±5%
	C3	10uF	±20%
	C4	100pF	± 5%
	C5	100pF	± 5%
	C6	2pF	± 5%
	C7	1pF	±5%
	L1	6.8nH	±5%
L2	1.2nH	± 5%	

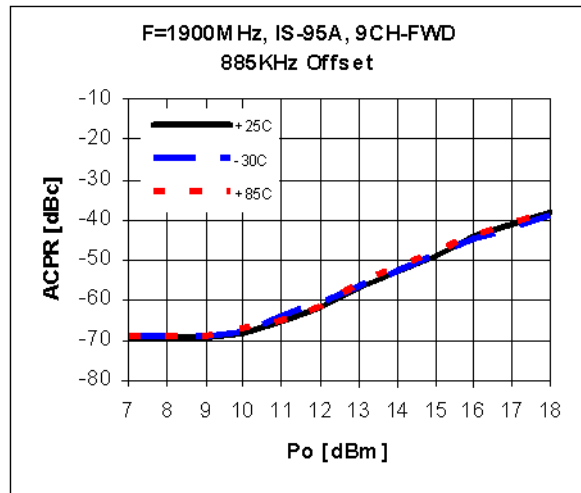
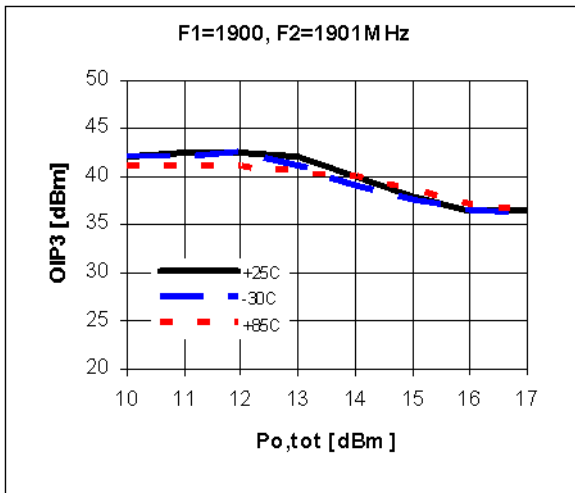
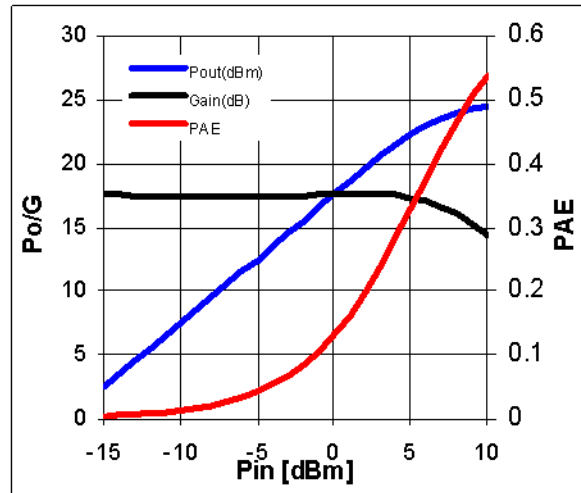
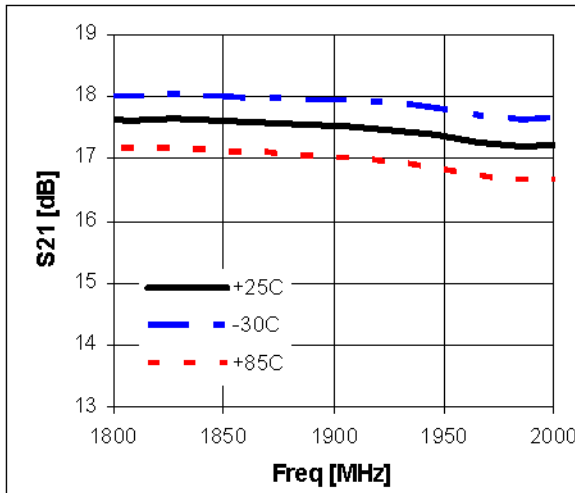


Note:

1. PCB: 31mil thick FR4.
2. Distance between the center of the shunt cap (C6) and the input pin of BT05CV _ **1.0mm**.
3. Distance between the center of the series inductor(L2) and the output pin of BT05CV _ **3.5mm**.
4. Distance between the center of the shunt cap (C7) and the output pin of BT05CV _ **10.0mm**.

Typical Performance (Vc=5V, Ic=85mA, T=25°C)





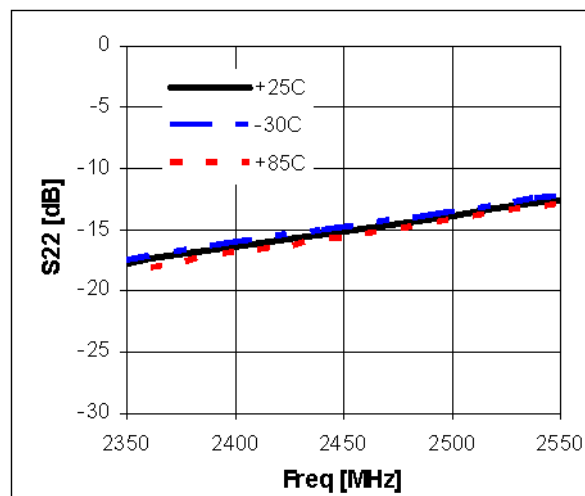
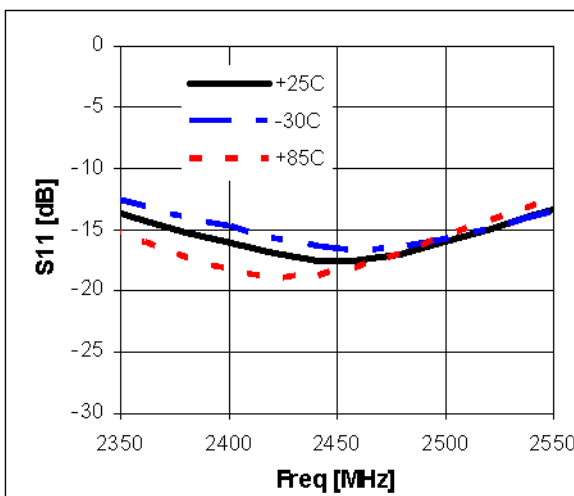
Application Circuit: 2450MHz

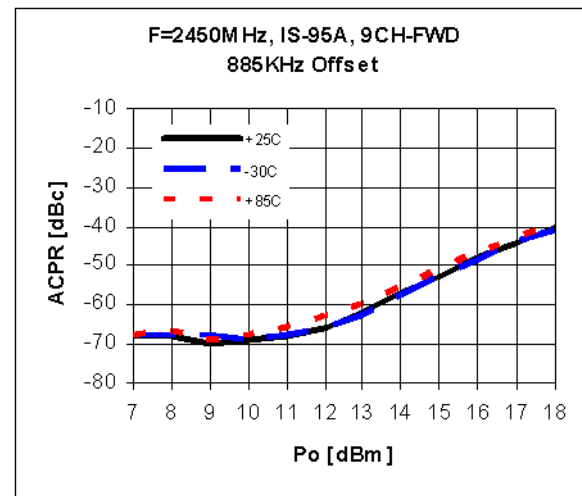
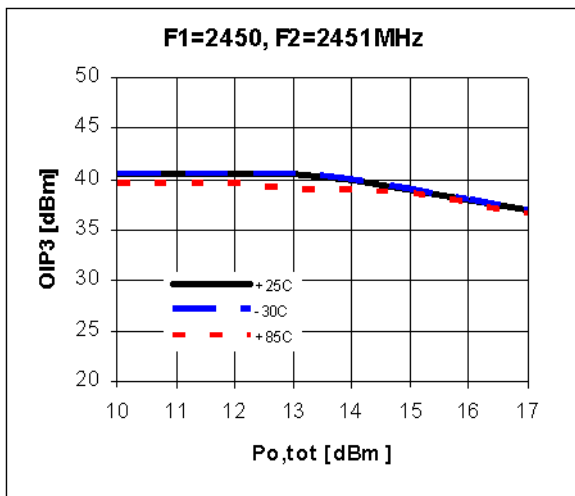
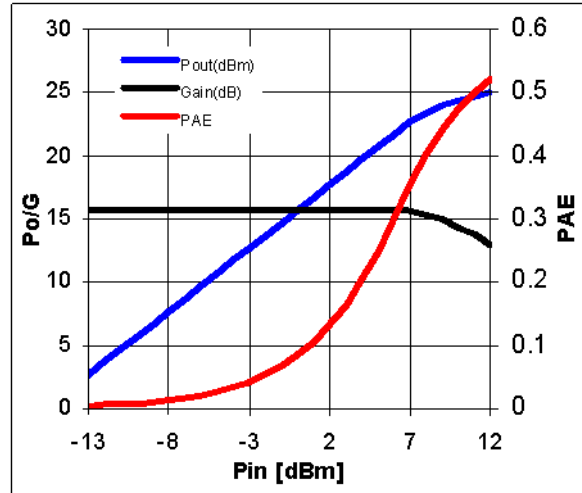
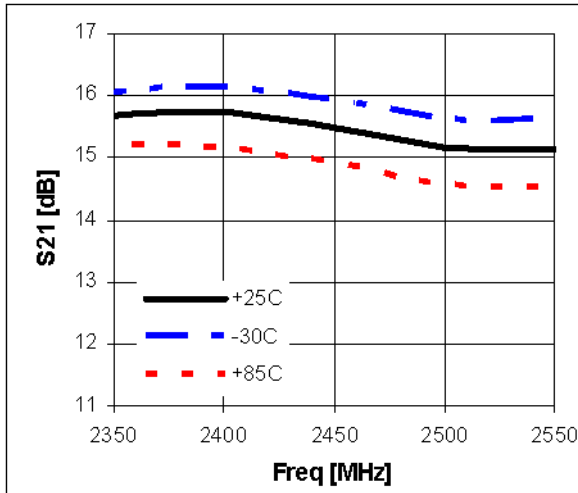
Schematic Diagram	BOM	Tolerance	
	C1	100pF	± 5%
	C2	1000pF	±5%
	C3	10uF	±20%
	C4	100pF	± 5%
	C5	100pF	± 5%
	C6	1.2pF	± 5%
	C7	0.75pF	±5%
	L1	12nH	±5%
	L2	1nH	± 5%

Note:

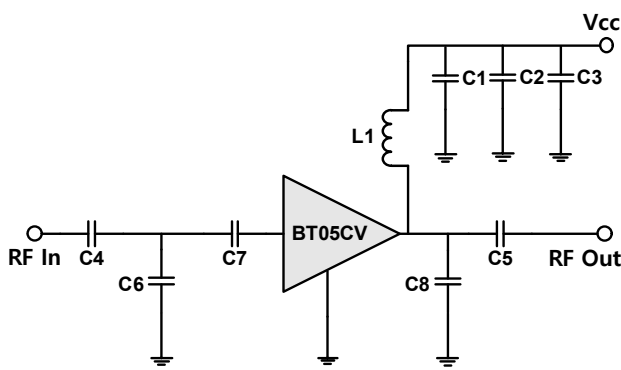
1. PCB: 31mil thick FR4.
2. Distance between the center of the shunt cap (C6) and the input pin of BT05CV _ **0.7mm.**
3. Distance between the center of the series inductor(L2) and the output pin of BT05CV _ **3.5mm.**
4. Distance between the center of the shunt cap (C7) and the output pin of BT05CV _ **7.5mm.**

Typical Performance (Vc=5V, Ic=85mA, T=25°C)

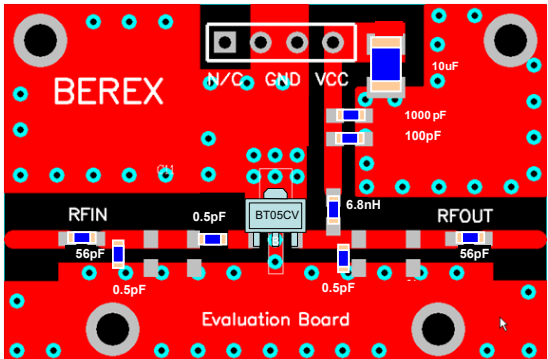




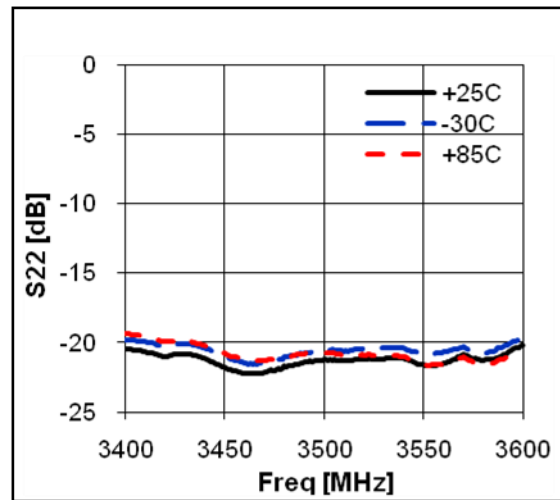
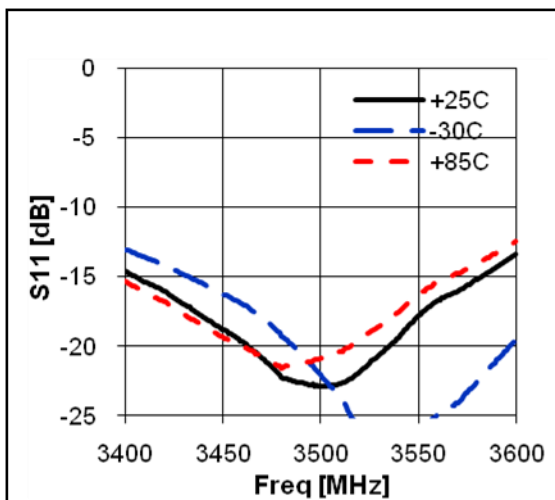
Application Circuit: 3500MHz

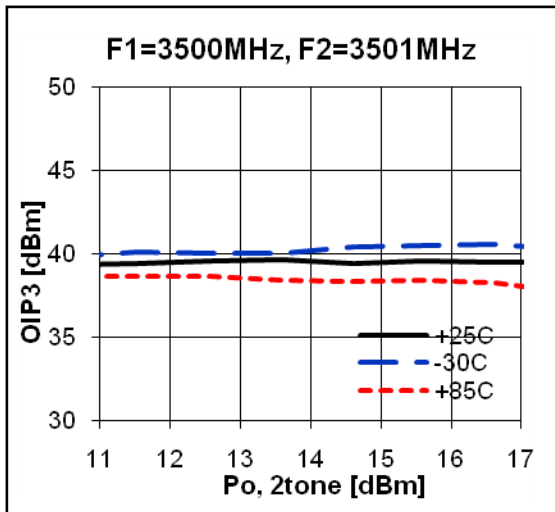
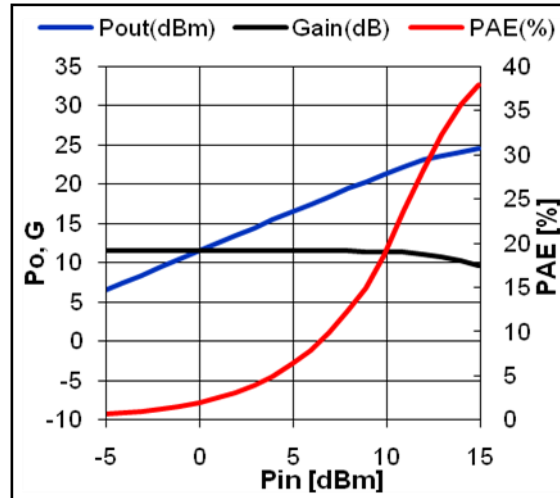
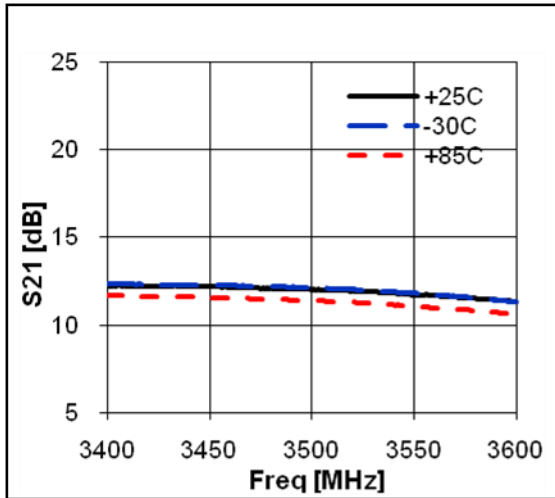
Schematic Diagram	BOM	Tolerance	
	C1	100pF	±5%
	C2	100pF	±5%
	C3	10uF	± 20%
	C4	56pF	± 5%
	C5	56pF	± 5%
	C6	0.5pF	± 5%
	C7	0.5pF	±5%
	C8	0.5pF	±5%
	L1	6.8nH	±5%

Note:
1. PCB: 31mil thick FR4.
2. Distance between the center of the series cap (C7) and the input pin of BT05CV _ <u>2.0mm.</u>
3. Distance between the center of the shunt cap (C7) and the input pin of BT05CV _ <u>10.0mm.</u>
4. Distance between the center of the shunt cap (C8) and the output pin of BT05CV _ <u>2.3mm.</u>

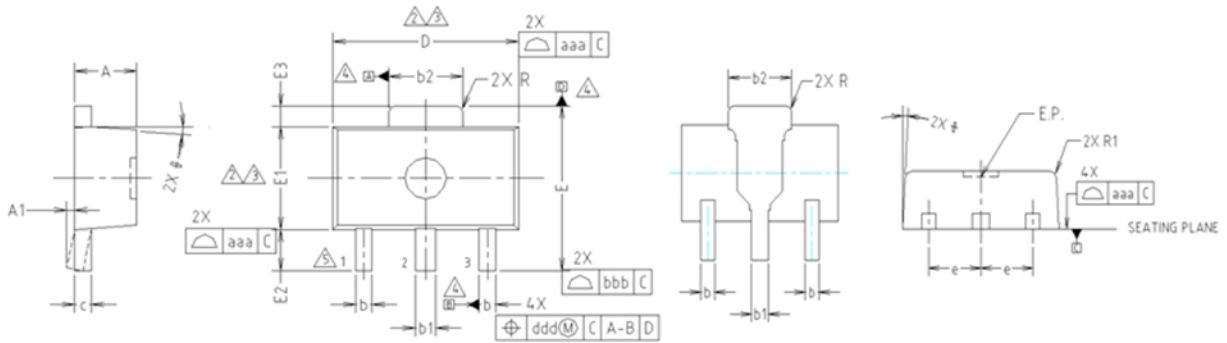


Typical Performance (Vc=5V, Ic=85mA, T=25°C)





Package Outline Dimension

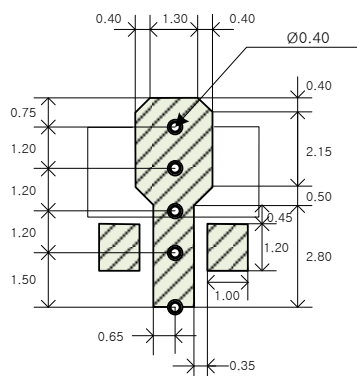


- NOTE:**
 1. DIMENSIONS IN MILLIMETERS.
- ⚠ DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5mm PER SIDE.
 - ⚠ DIMENSIONS D AND E1 ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
 - ⚠ DATUMS A, B AND D TO BE DETERMINED 0.18mm FROM THE LEAD TIP.
 - ⚠ TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.40	1.50	1.60	
A1	0.00	—	0.10	
b	0.38	0.42	0.48	
b1	0.48	0.52	0.58	
b2	1.79	1.82	1.87	
c	0.40	0.42	0.46	
D	4.40	4.50	4.70	2,3
E	3.70	4.00	4.30	
E1	2.40	2.50	2.70	2,3
E2	0.80	1.00	1.20	
E3	0.40	0.50	0.60	
e	1.50 TYP.			
φ	4° TYP.			
R	0.15 TYP.			
R1	—	—	0.20	
SYMBOL	TOLERANCES OF FORM AND POSITION		NOTE	
aaa	0.15			
bbb	0.20			
ccc	0.10			
ddd	0.10			

Suggested PCB Land Pattern and PAD Layout

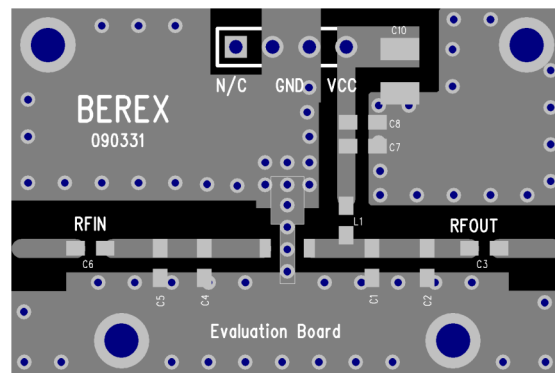
PCB Land Pattern



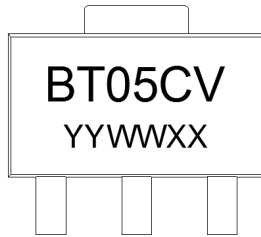
Note : All dimension are in millimeters

PCB lay out _ on BeRex website

PCB Mounting



Package Marking

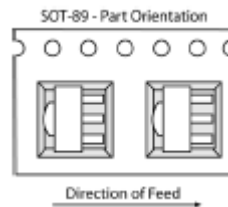


Pin 1

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

Tape & Reel

SOT89



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 1B
Value:	Passes <1000V
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114
MSL Rating:	Level 1 at +260°C convection reflow
Standard:	JEDEC Standard J-STD-020



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
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