

BT05CV

5-4000 MHz Wideband Drive Amplifier



Device Features

- OIP3 = 43.5 dBm @ 900 MHz
- Gain = 21.5 dB @ 900 MHz
- Output P1 dB = 23.9 dBm @ 900 MHz
- 50 Ω Cascadable
- Lead-free/RoHS-compliant SOT-89 SMT package



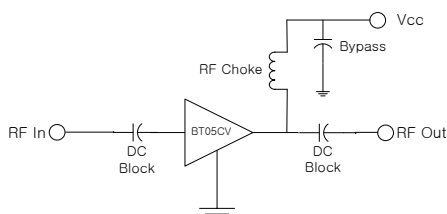
Product Description

BeRex's BT05CV is a high performance and a high dynamic range amplifier in a low cost surface mount package(SOT-89) with a RoHS-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

Application Circuits



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

Typical Performance¹

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 ²	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

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 9 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	5		4000	MHz
I _C @ (V _C = 5V)	75	85	95	mA
V _C		5.0		V
R _{TH}		50		°C/W

Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+220	°C
Operating Voltage	+6.5	V
Supply Current	180	mA
Input RF Power	23	dBm

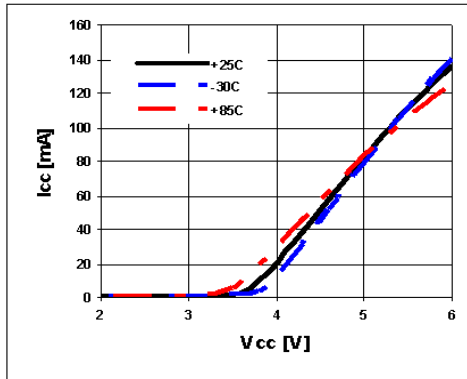
*Operation of this device above any of these parameters may result in permanent damage.

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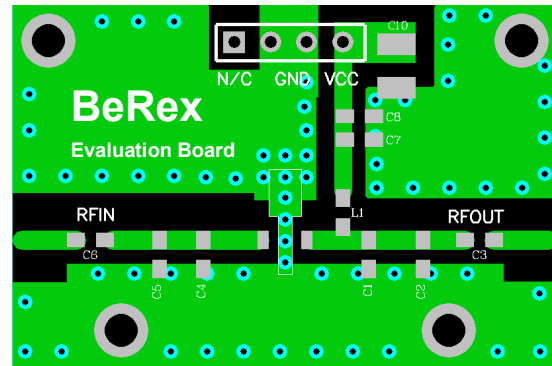
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V-I Characteristics



BeRex SOT89 Evaluation Board

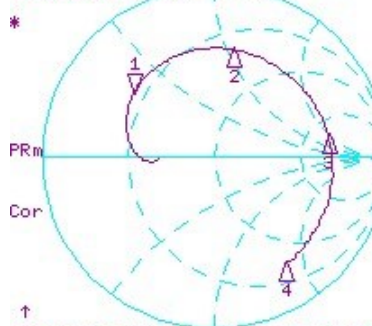


*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4 PCB

Typical Device Data

S-parameters (Vc=5V, Ic=83mA, T=25°C)

CH1 S11 1 U FS
1: 13.836 \angle 16.137 \angle 2.5682 nH
1 000.000 000 MHz

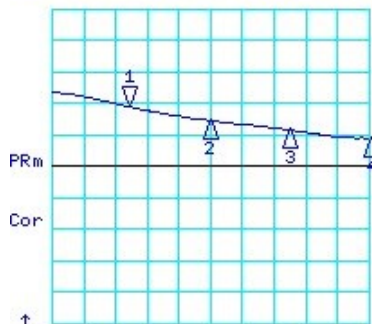


CH1 Markers

2: 24.549 \angle 52.637 \angle
2.00000 GHz
3: 205.71 \angle 92.945 \angle
3.00000 GHz
4: 30.461 \angle -84.609 \angle
4.00000 GHz

↑
CENTR 2025.000 MHz SPAN 3950.000 MHz

CH2 L06 10 dB/ REF 0 dB
S31 1: 19.010 dB 1 000.000 000 MHz

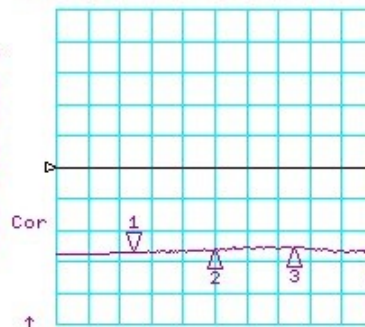


CH2 Markers

2: 14.568 dB
2.00000 GHz
3: 11.524 dB
3.00000 GHz
4: 8.4876 dB
4.00000 GHz

↑
START 50.000 MHz STOP 4000.000 MHz

CH3 L06 10 dB/ REF 0 dB
S13 1: -27.028 dB 1 000.000 000 MHz

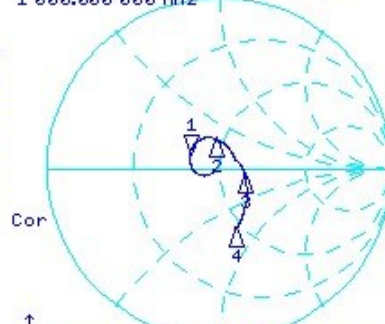


CH3 Markers

2: -26.136 dB
2.00000 GHz
3: -25.647 dB
3.00000 GHz
4: -26.419 dB
4.00000 GHz

↑
CENTR 2025.000 MHz SPAN 3950.000 MHz

CH4 S33 1 U FS
1: 34.824 \angle 6.1367 \angle 976.69 pH
1 000.000 000 MHz



CH4 Markers

2: 45.064 \angle 16.104 \angle
2.00000 GHz
3: 66.555 \angle -4.4609 \angle
3.00000 GHz
4: 46.158 \angle -36.930 \angle
4.00000 GHz

↑
START 50.000 MHz STOP 4000.000 MHz

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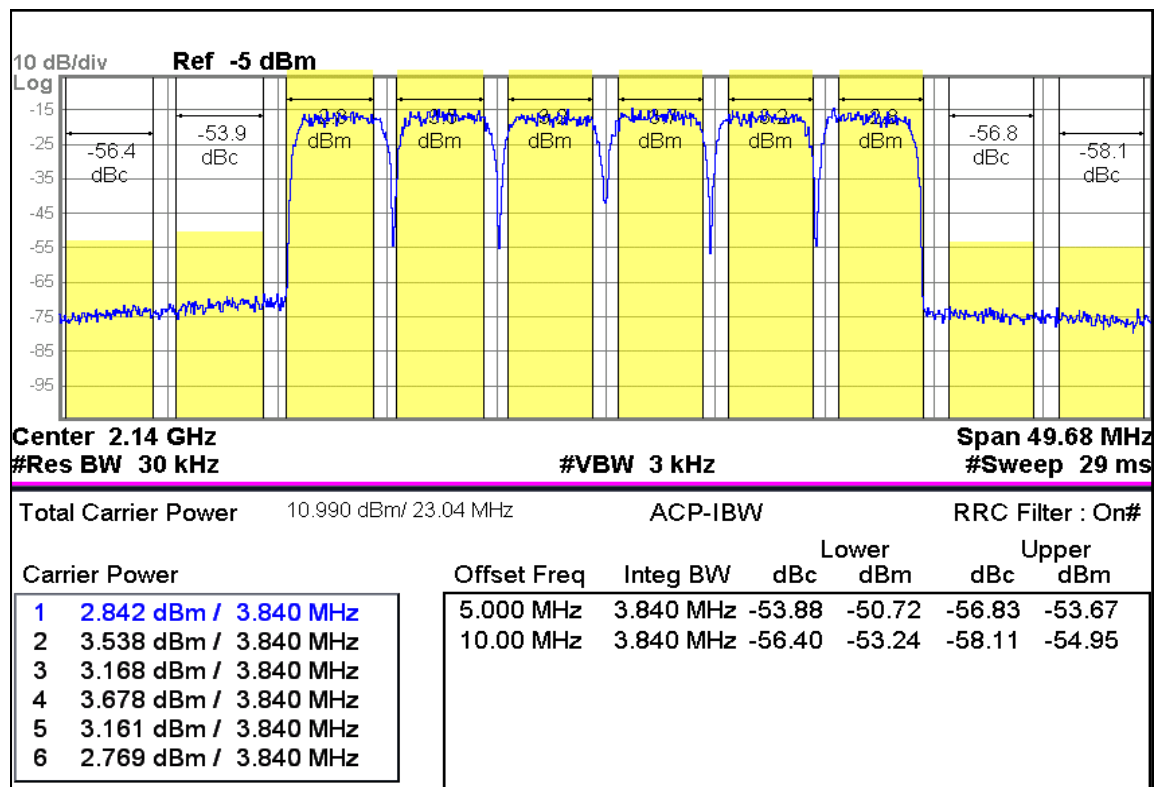


S-Parameter

(Vdevice = 5.0V, Icc = 83mA, 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

WCDMA 6FA 2140 -55dBc

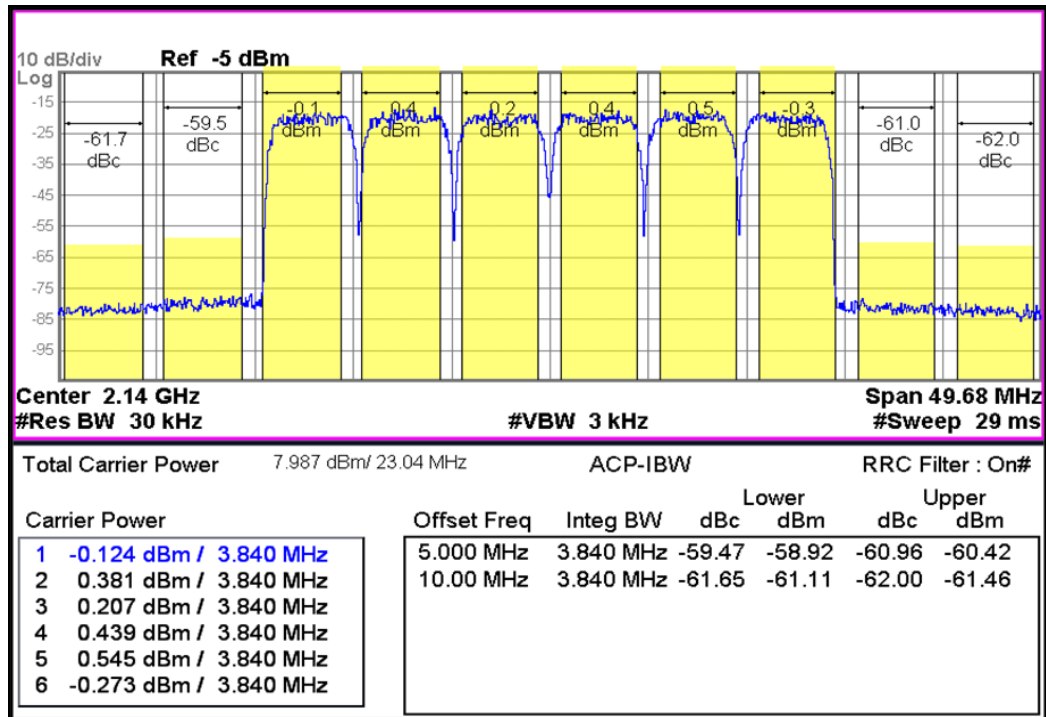


BT05CV

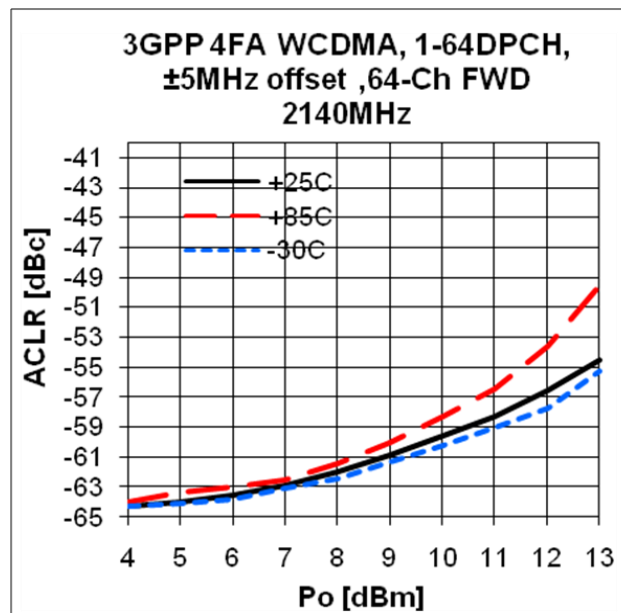
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WCDMA 6FA 2140 -60dBc



ACLR

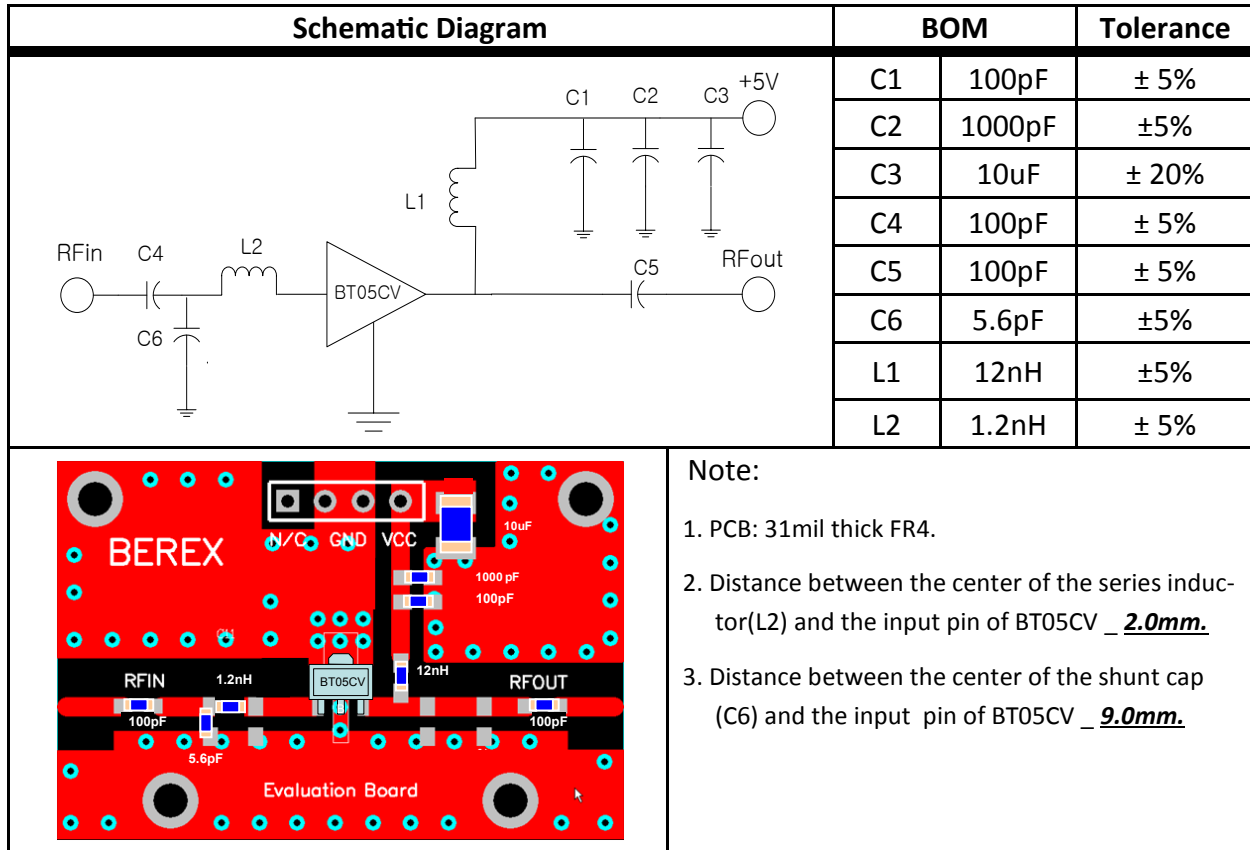


BT05CV

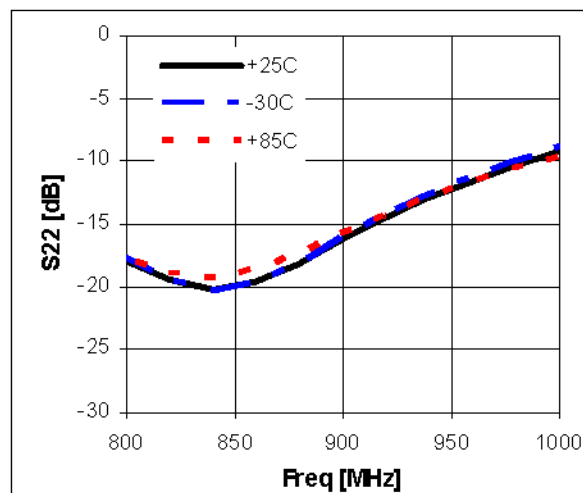
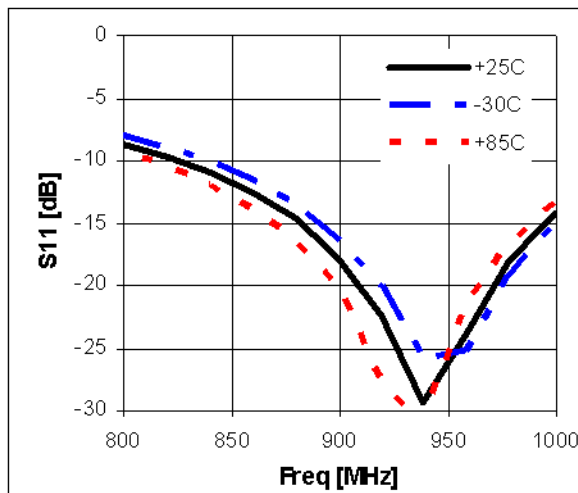
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Application Circuit: 900 MHz

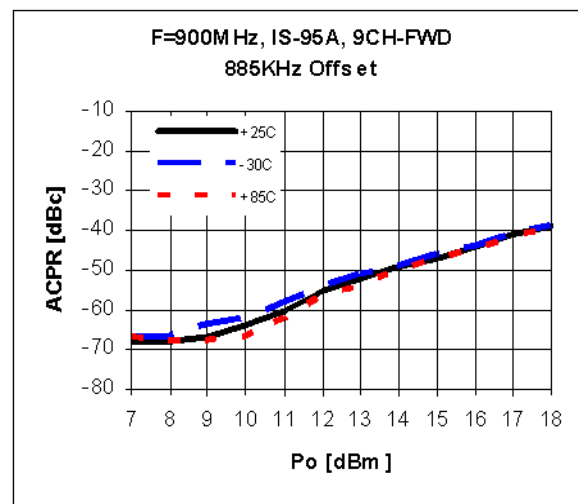
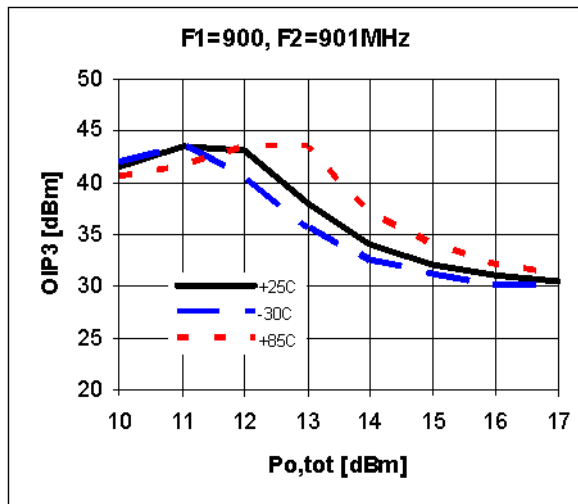
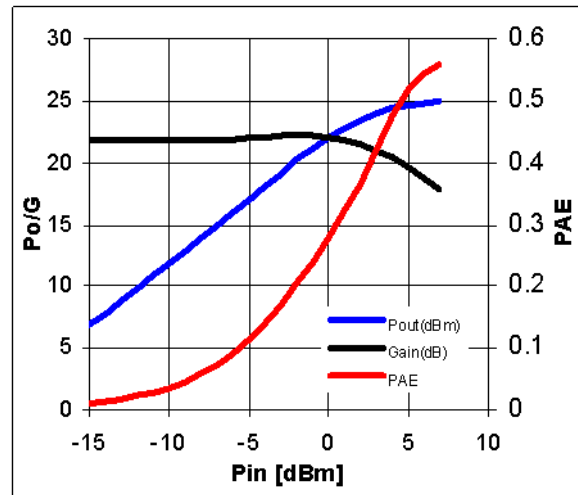
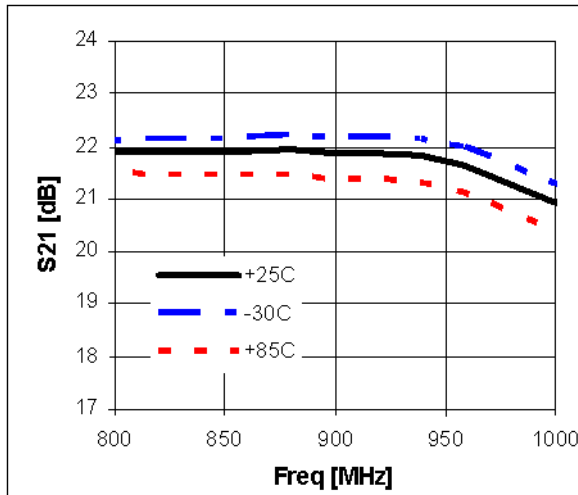


Typical Performance



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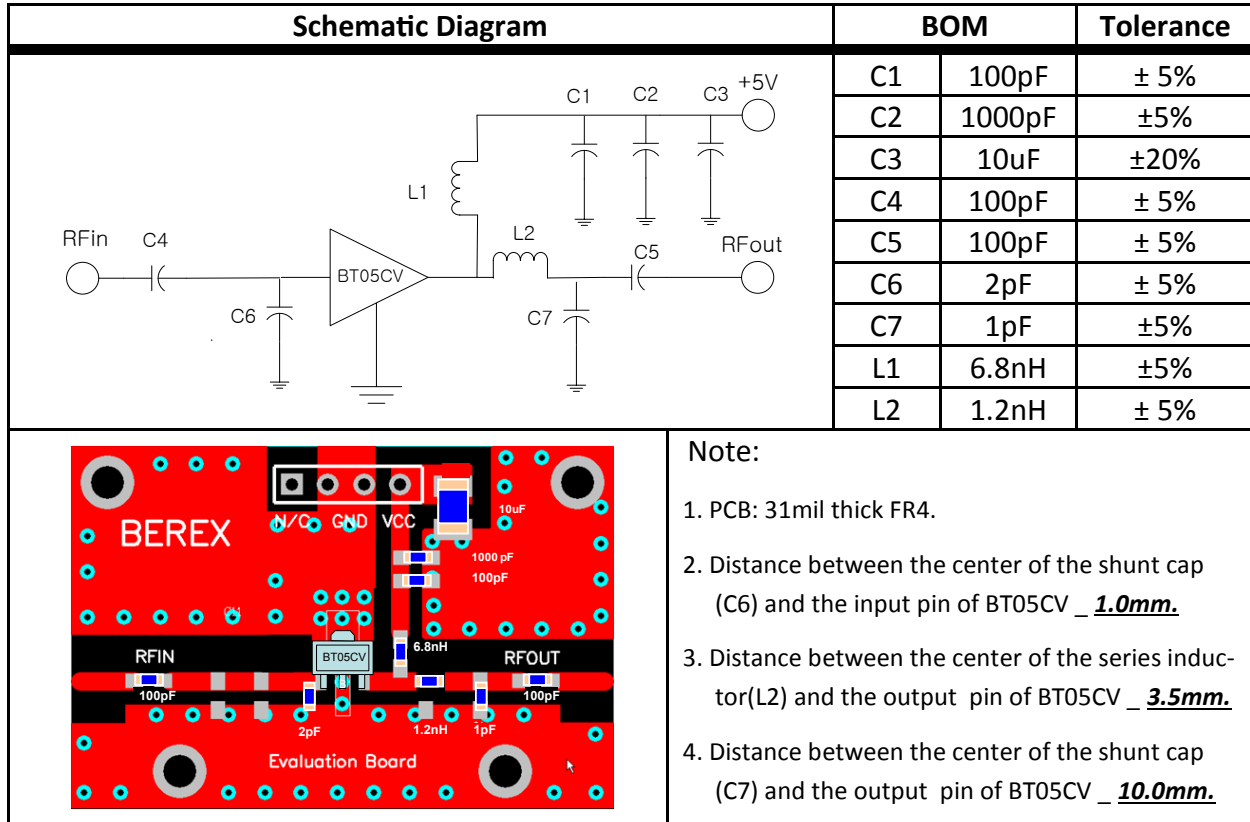


BT05CV

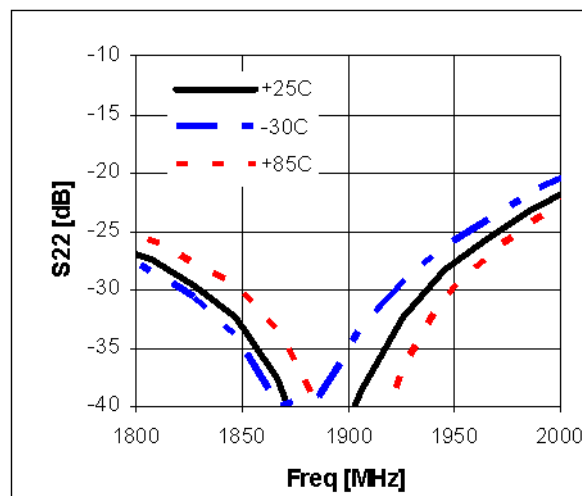
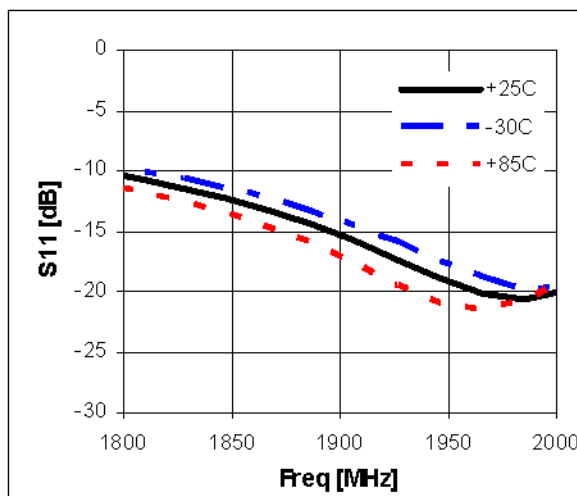
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Application Circuit: 1900 MHz

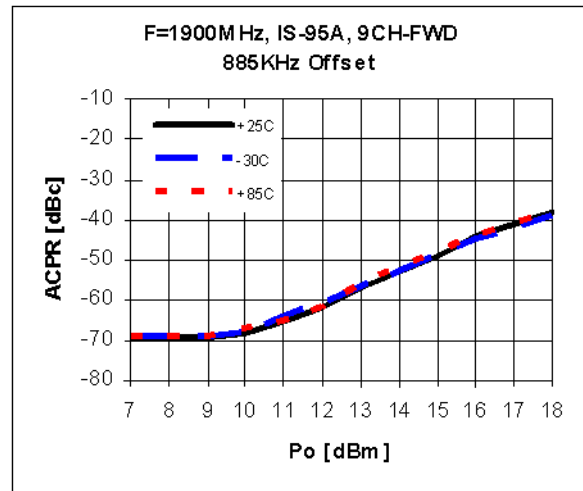
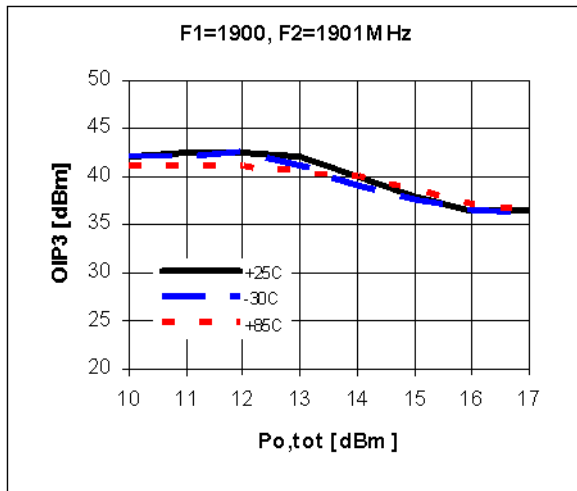
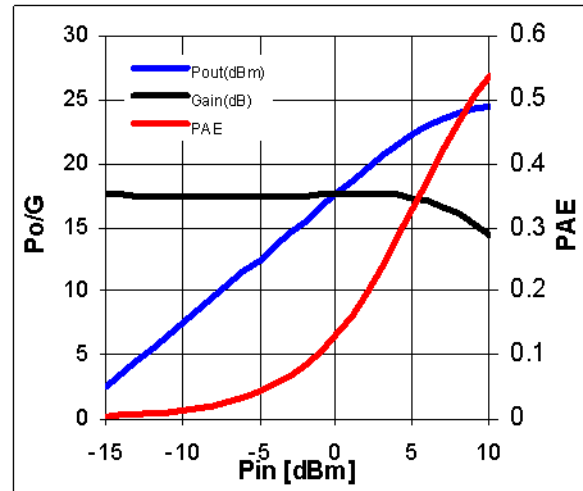
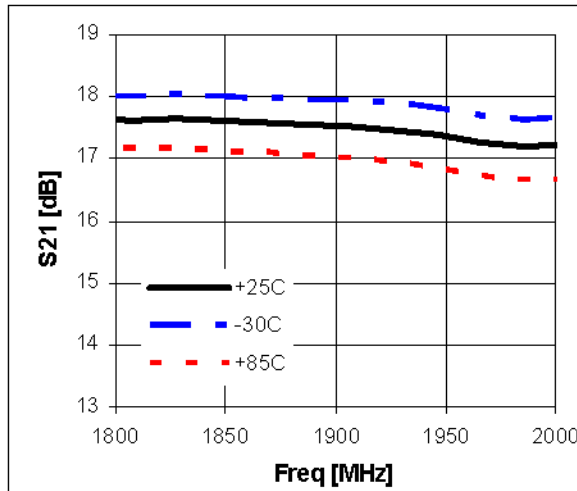


Typical Performance



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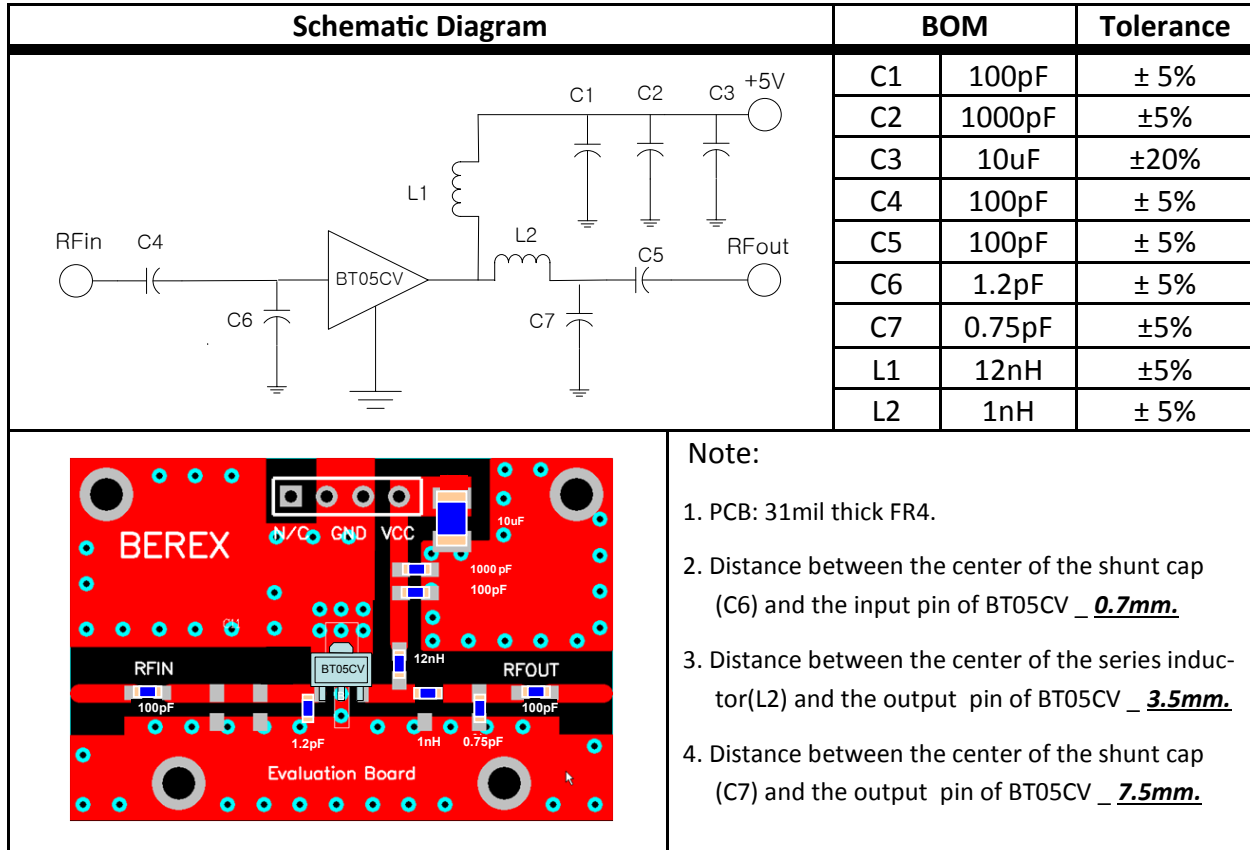


BT05CV

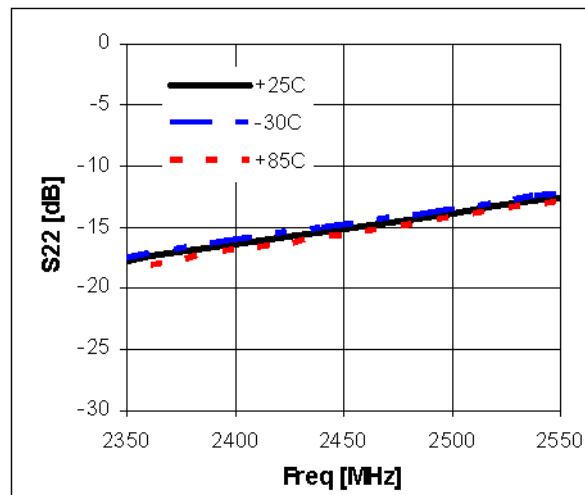
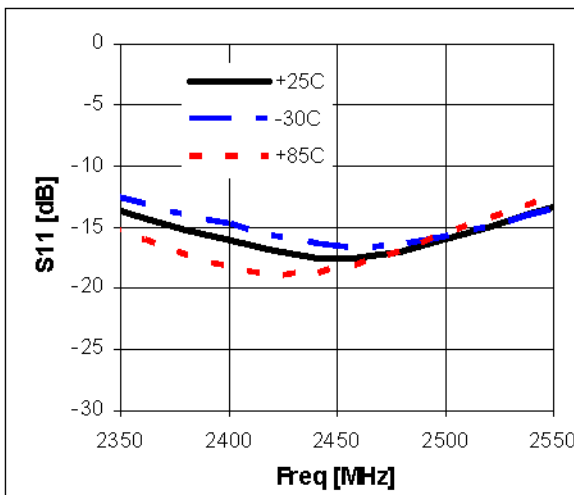
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Application Circuit: 2450MHz

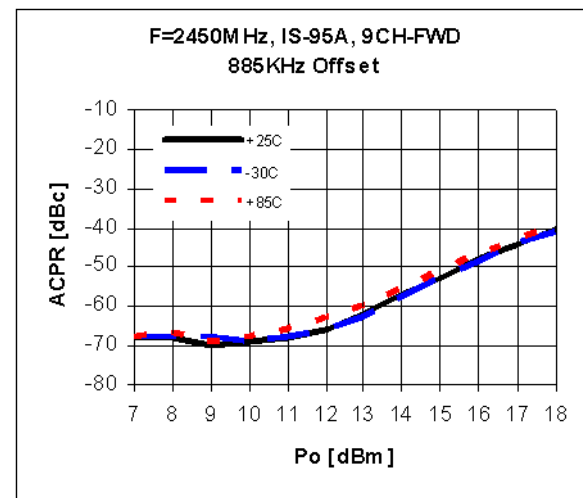
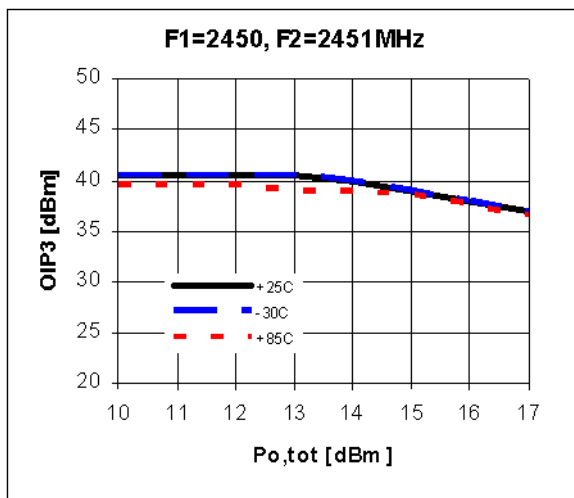
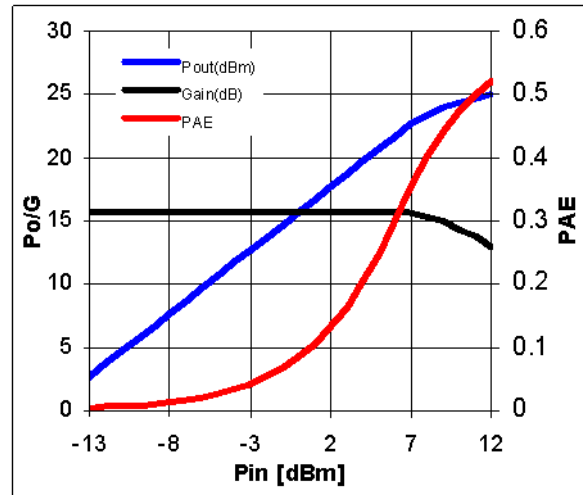
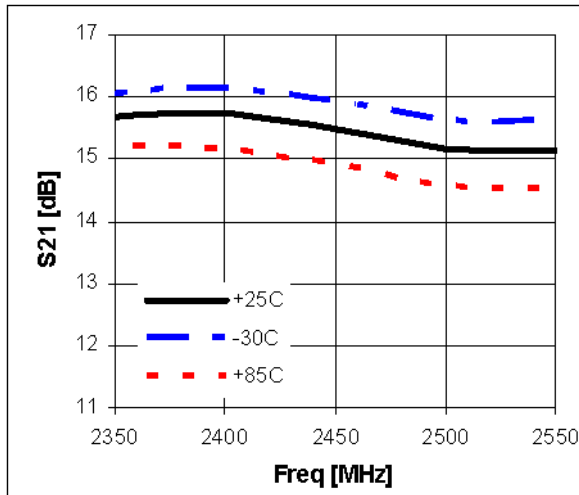


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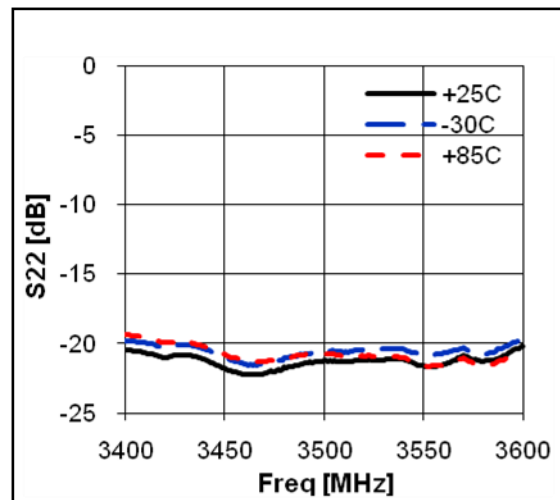
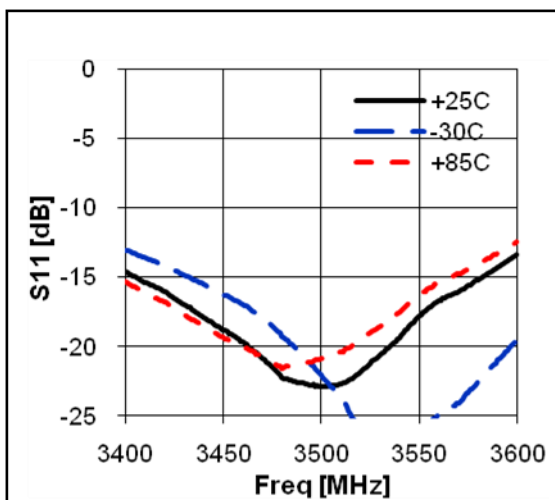
Application Circuit: 3500MHz

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

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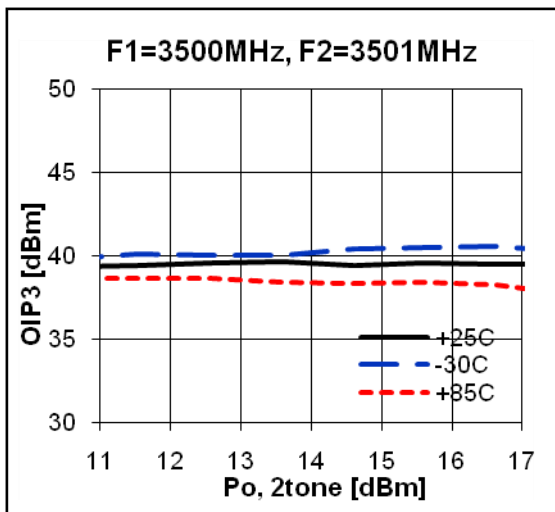
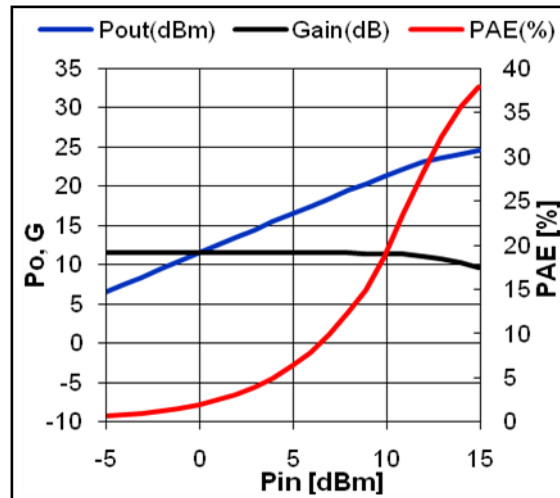
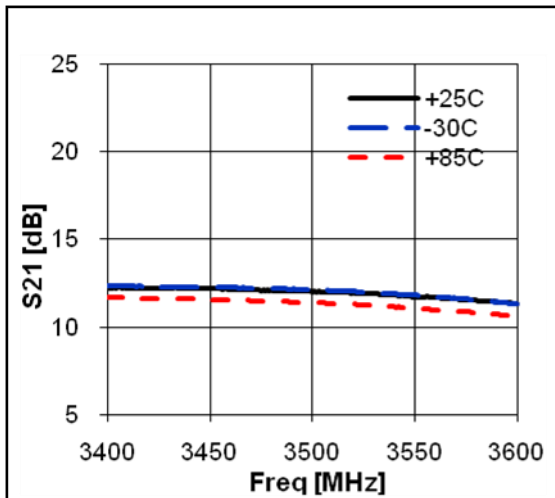
Note: <ol style="list-style-type: none"> 1. PCB: 31mil thick FR4. 2. Distance between the center of the series cap (C7) and the input pin of BT05CV _ <u>2.0mm.</u> 3. Distance between the center of the shunt cap (C7) and the input pin of BT05CV _ <u>10.0mm.</u> 4. Distance between the center of the shunt cap (C8) and the output pin of BT05CV _ <u>2.3mm.</u> 	
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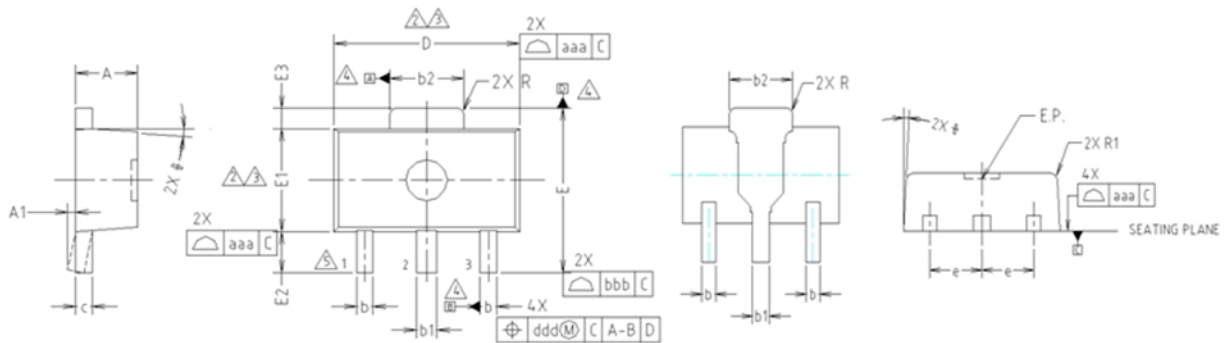


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Package Outline Dimension



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.

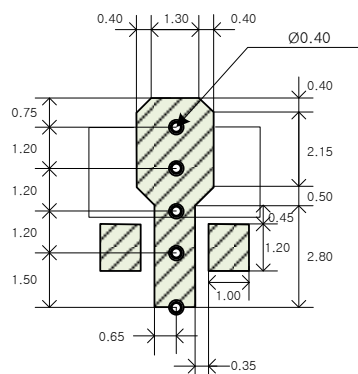
⚠ DATUMS A, B AND D TO BE DETERMINED 0.18mm FROM THE LEAD TIP.

⚠ 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

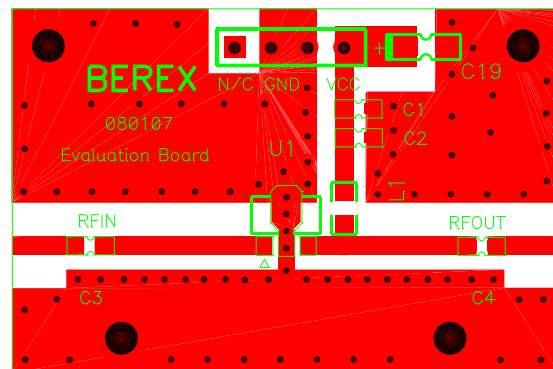
PCB Land Pattern



Note : All dimension are in millimeters

PCB lay out _ on BeRex website

PCB Mounting

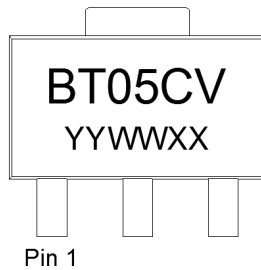


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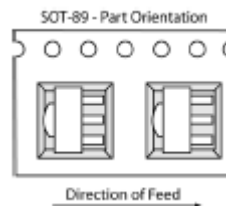
Package Marking



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-A114B
MSL Rating:	Level 1 at +265°C convection reflow
Standard:	JEDEC Standard J-STD-020

NATO CAGE code:

2	N	9	6	F
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