BCP030T

HIGH EFFICIENCY HETEROJUNCTION POWER FET CHIP (.25µm x 300µm)

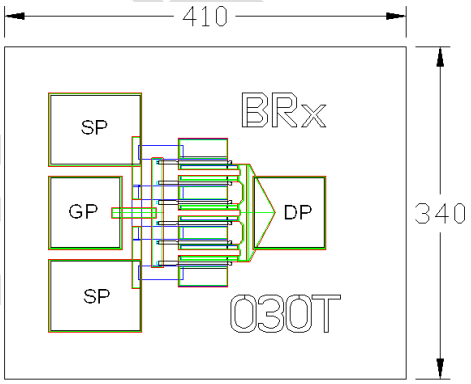
The BeRex BCP030T is a GaAs Power pHEMT with a nominal 0.25 micron gate length and 300 micron gate width making the product ideally suited for applications where high-gain and medium power in the 1000 MHz to 26.5 GHz frequency range are required. The product may be used in either wideband (6-18 GHz) or narrow-band applications. The BCP030T is produced using state of the art metallization with SI_3N_4 passivation and is screened to assure reliability.

PRODUCT FEATURES

- 25 dBm Typical Output Power
- 14 dB Typical Gain @ 12 GHz
- 0.25 X 300 Micron Recessed Gate

APPLICATIONS

- Commercial
- Military / Hi-Rel.
- Test & Measurement



Chip dimensions : 410 X 340 microns
Gate pad(GP) : 75 X 75 microns
Drain pad(DP) : 75 X 75 microns
Source pad(SP) : 95 X 75 microns
Chip thickness : 100 microns

PRELIMINARY

ELECTRICAL CHARACTERISTIC (TUNED FOR POWER) T_a = 25° C

SYMBOL	PARAMETER/TEST CONDITIONS	TEST FREQ.	MIN.	TYPICAL	MAX.	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	24.5	25.5 25.5		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	13.0	14.0 10.5		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		65 60		%
NF	50 Ohm Noise Figure (V_{ds}=2V, I_{ds}=15 mA	12 GHz		1.14		dB
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.0V)		60	90	120	mA
G_m	Transconductance (V_{ds} = 2V, V_{gs} = 50% I_{dss})			120		mS
V_p	Pinch-off Voltage (I_{ds} = 0.3 mA, V_{ds} = 3V)		-2.5	-1.1	-0.5	V
BV_{gd}	Drain Breakdown Voltage (I_g = 0.3 mA, source open)			-15.0	-12.0	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.3 mA, drain open)			-13.0		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			121		°C/W

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ELECTRICAL CHARACTERISTIC (TUNED FOR GAIN) T_a = 25° C

SYMBOL	PARAMETER/TEST CONDITIONS	TEST FREQ.	MIN.	TYPICAL	MAX.	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	22.0	23.0 23.0		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	14.5	15.5 11.5		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		45 45		%
NF	50 Ohm Noise Figure (V_{ds}=2V, I_{ds}=15 mA	12 GHz		1.14		dB
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.0V)		60	90	120	mA
G_m	Transconductance (V_{ds} = 2V, Vgs = 50% I_{dss})			120		mS
V_p	Pinch-off Voltage (I_{ds} = 0.3 mA, V_{ds} = 2V)		-2.5	-1.1	-0.5	V
BV_{gd}	Drain Breakdown Voltage (I_g = 0.3 mA, source open)			-15	-12	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.3 mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			121		°C/W

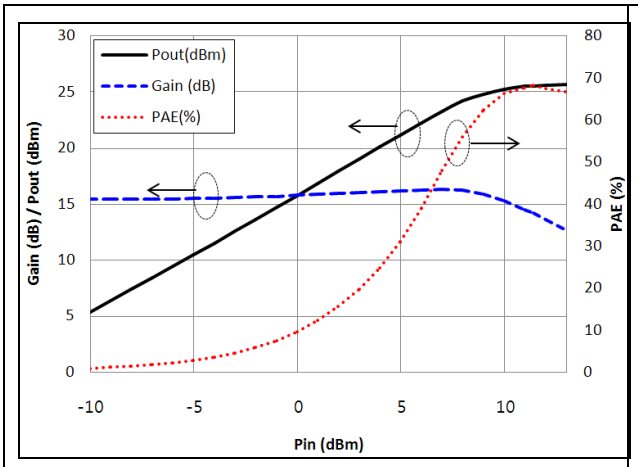
MAXIMUM RATING (T_a = 25° C)

SYMBOLS	PARAMETERS	ABSOLUTE	CONTINUOUS
V_{ds}	Drain-Source Voltage	12 V	8 V
V_{gs}	Gate-Source Voltage	-6 V	-3 V
I_{ds}	Drain Current	I_{dss}	I_{dss}
I_{gsf}	Forward Gate Current	18 mA	3 mA
P_{in}	Input Power	22 dBm	@ 3dB compression
T_{ch}	Channel Temperature	175° C	150° C
T_{stg}	Storage Temperature	-60° C - 150° C	-60° C - 150° C
P_t	Total Power Dissipation	1.4 W	1.2 W

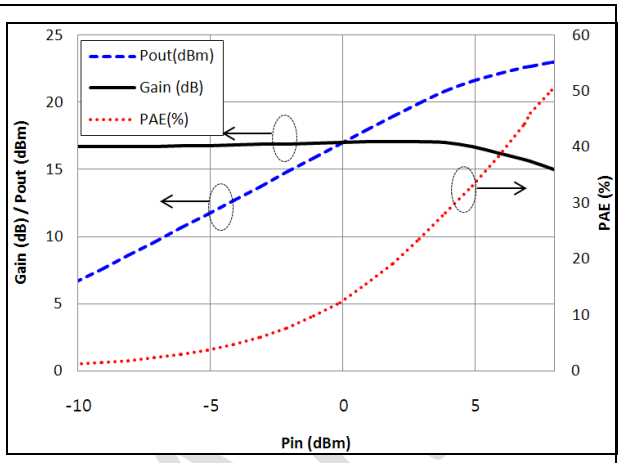
Exceeding any of the above Maximum Ratings will result in reduced MTTF and may cause permanent damage to the device.

PRELIMINARY

P_{IN}_P_{OUT}/GAIN, PAE (12 GHz)

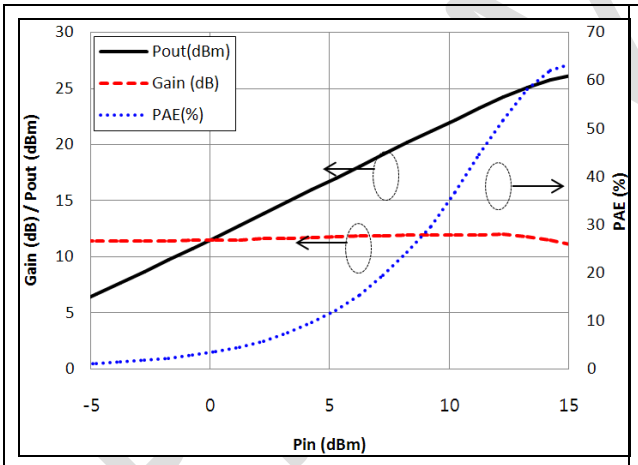


Frequency = 12GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Power)

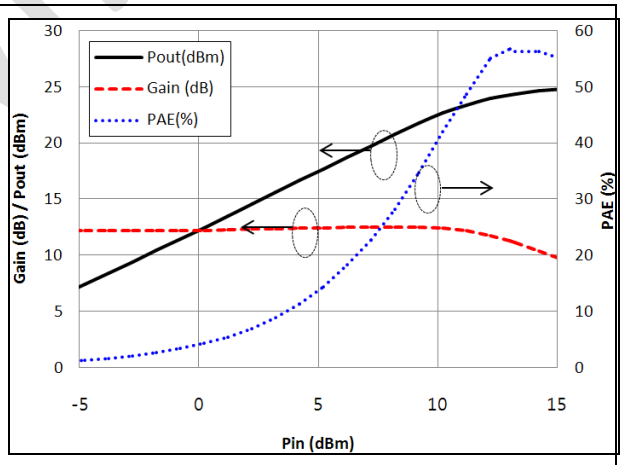


Frequency = 12GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Gain)

P_{IN}_P_{OUT}/GAIN, PAE (18 GHz)



Frequency = 18GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Power)



Frequency = 18GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Gain)

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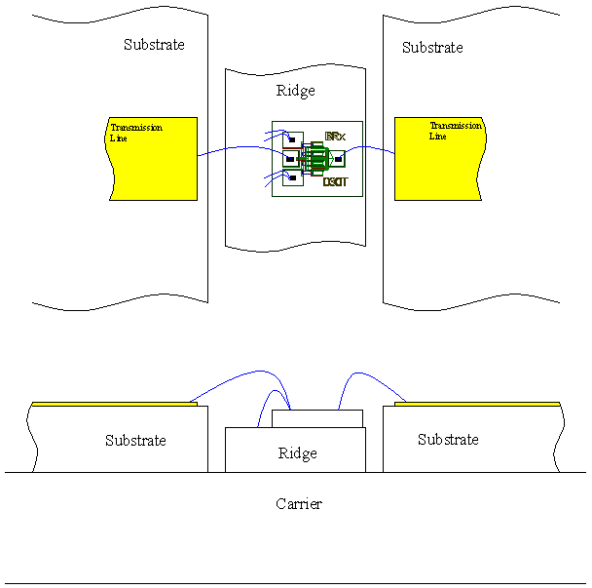
S-PARAMETER (V_{ds} = 8V, I_{ds} = 50% I_{dss})

FREQ. [GHZ]	S11 [MAG]	S11 [ANG.]	S21 [MAG]	S21 [ANG.]	S12 [MAG]	S12 [ANG.]	S22 [MAG]	S22 [ANG.]
1	0.97	-27.72	9.10	159.71	0.019	74.59	0.71	-10.54
2	0.91	-53.85	8.41	141.85	0.036	61.30	0.66	-19.37
3	0.85	-78.65	7.57	126.23	0.048	50.31	0.59	-26.23
4	0.79	-100.97	6.73	112.12	0.055	41.94	0.54	-32.00
5	0.75	-121.90	5.95	99.32	0.061	35.64	0.48	-37.41
6	0.73	-139.47	5.24	88.30	0.062	30.97	0.44	-41.98
7	0.72	-155.99	4.62	77.67	0.062	24.97	0.40	-48.43
8	0.72	-168.99	4.14	68.95	0.063	21.67	0.38	-51.15
9	0.72	-179.97	3.71	61.22	0.060	19.65	0.36	-54.78
10	0.72	169.20	3.37	53.50	0.060	18.02	0.34	-58.30
11	0.74	160.38	3.04	46.46	0.060	16.99	0.33	-60.45
12	0.75	151.34	2.81	39.07	0.059	13.84	0.32	-63.94
13	0.76	142.18	2.58	32.32	0.059	14.91	0.30	-65.39
14	0.79	135.08	2.37	25.60	0.059	12.56	0.28	-67.17
15	0.80	128.26	2.21	19.05	0.060	12.24	0.25	-70.97
16	0.82	120.51	2.05	12.14	0.061	10.92	0.21	-75.16
17	0.85	116.46	1.88	5.62	0.060	8.30	0.17	-84.42
18	0.86	110.04	1.73	-1.49	0.064	5.45	0.13	-99.08
19	0.88	104.87	1.57	-9.16	0.065	3.39	0.10	-131.69
20	0.89	103.82	1.43	-14.39	0.066	3.64	0.11	-175.84
21	0.90	100.91	1.30	-20.35	0.069	1.83	0.17	160.35
22	0.90	99.40	1.15	-25.89	0.068	1.36	0.24	149.32
23	0.90	100.87	1.04	-30.07	0.067	-0.48	0.31	142.60
24	0.90	98.38	0.93	-34.99	0.066	-1.84	0.39	139.62
25	0.92	99.27	0.83	-38.62	0.068	-0.48	0.45	137.44
26	0.92	101.85	0.76	-40.47	0.064	4.76	0.49	137.87

Note: S-parameters include bond wires. Reference planes are at edge of substrates shown on "Wire Bonding Information" figure below.

PRELIMINARY

WIRE BONDING INFORMATION



Using 1 mil. diameter, Au bonding wires.

1. Gate to input transmission line
   - Length and Height : 600 µm x 250 µm
   - Number of wire(s): 1
2. Drain to output transmission line
   - Length and Height : 400 µm x 250 µm
   - Number of wire(s) : 1
3. Source to ground plate
   - Length and Height : 250 µm x 300 µm
   - Number of wire(s) : 4

Proper ESD procedures should be followed when handling this device.

PRELIMINARY

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