BCP020T

HIGH EFFICIENCY HETEROJUNCTION POWER FET CHIP (.25µm x 200µm)

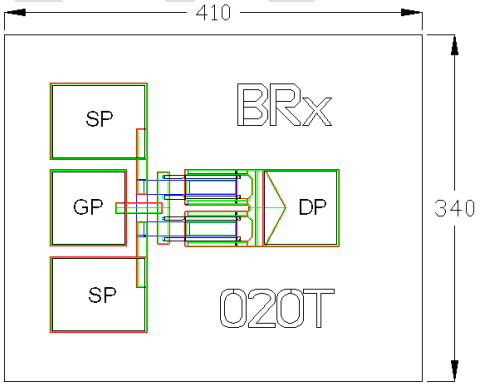
The BeRex BCP020T is a GaAs Power pHEMT with a nominal 0.25 micron gate length and 200 micron gate width making the product ideally suited for applications where high-gain and medium power in the 1000 MHz to 26.5 GHz frequency range are required. The product may be used in either wideband (6-18 GHz) or narrow-band applications. The BCP020T is produced using state of the art metallization with SI_3N_4 passivation and is screened to assure reliability.

PRODUCT FEATURES

- 24 dBm Typical Output Power
- 14 dB Typical Gain @ 12 GHz
- 0.25 X 200 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

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	22.5	24.0 24.0		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	12.0	14.0 12.0		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		60 55		%
NF	50 Ohm Noise Figure (V_{ds}=2V, I_{ds}=10 mA	12 GHz		1.09		dB
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 3V)		40	60	80	mA
G_m	Transconductance (V_{ds} = 3V, V_{gs} = 50% I_{dss})			80.0		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 = 0.6 mA, source open)			-15	-12	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.6 mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			160		° C/W

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

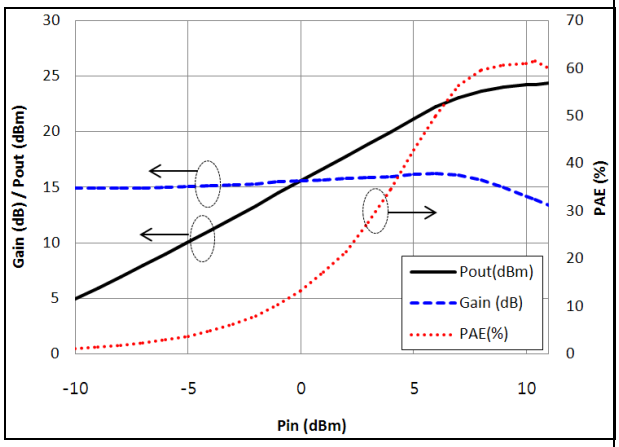
SYMBOL	PARAMETER/TEST CONDITIONS	TEST FREQ.	MIN.	TYPICAL	MAX.	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	20.0	21.0 21.0		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	15.5	17.0 13.0		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		45 45		%
NF	50 Ohm Noise Figure (V_{ds}=2V, I_{ds}=10 mA	12 GHz		1.09		dB
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.0V)		40	60	80	mA
G_m	Transconductance (V_{ds} = 3V, V_{gs} = 50% I_{dss})			80.0		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 = 0.6 mA, source open)			-15	-12	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.6 mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			160		°C/W

MAXIMUM RATING (T_a = 25° C)

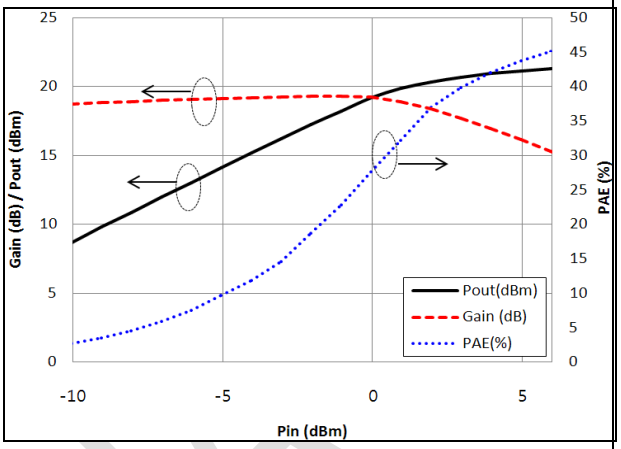
SYMBOLS	PARAMETERS	ABSOLUTE	CONTINUOUS
V_{ds}	Drain-Source Voltage	12 V	8 V
V_{gs}	Gate-Source Voltage	-6 V	-3 V
I_{ds}	Drain Current	I_{dss}	I_{dss}
I_{gsf}	Forward Gate Current	11 mA	2 mA
P_{in}	Input Power	17 dBm	@ 3dB compression
T_{ch}	Channel Temperature	175° C	150° C
T_{stg}	Storage Temperature	-60° C - 150° C	-60° C - 150° C
P_t	Total Power Dissipation	1.0 W	0.8 W

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

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

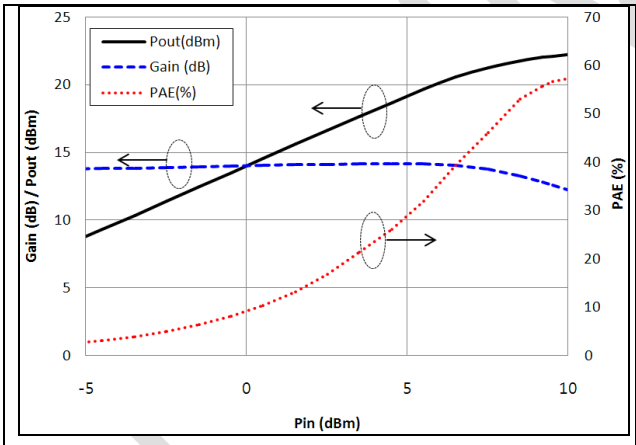


Frequency = 12GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Power)

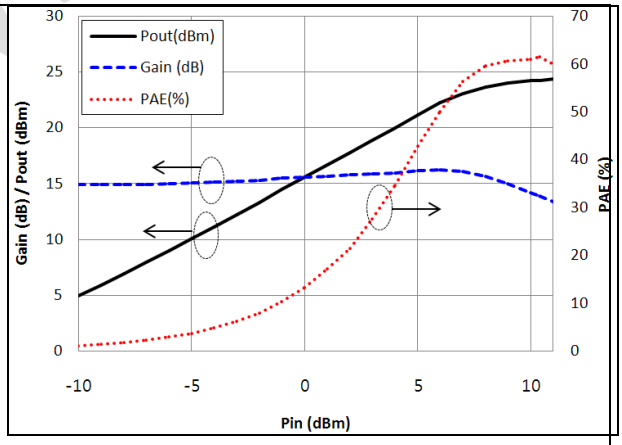


Frequency = 12GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Gain)

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



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



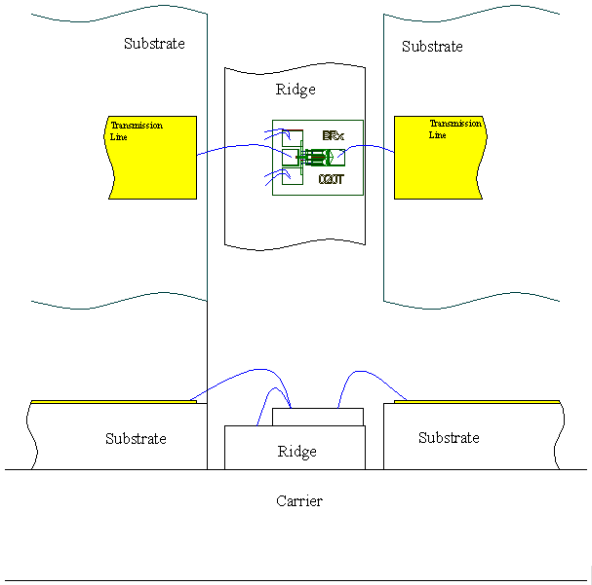
Frequency = 18GHz
V_{ds} = 8 V, I_{ds} = 50% I_{dss} (Tuned for Gain)

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	0.98	-17.63	6.54	165.56	0.014	81.13	0.80	-5.99
2	0.95	-35.11	6.35	152.34	0.027	70.37	0.78	-11.31
3	0.90	-52.87	6.08	140.12	0.039	64.06	0.75	-15.78
4	0.85	-69.99	5.77	127.94	0.048	53.79	0.71	-20.09
5	0.80	-88.24	5.43	116.00	0.054	47.49	0.67	-24.42
6	0.76	-105.52	5.04	104.87	0.058	40.26	0.63	-27.88
7	0.72	-122.72	4.68	93.83	0.063	33.49	0.59	-32.54
8	0.71	-138.65	4.33	84.53	0.064	29.01	0.56	-34.82
9	0.69	-152.44	3.97	75.99	0.063	25.78	0.53	-36.61
10	0.68	-166.12	3.69	67.53	0.064	22.40	0.51	-38.64
11	0.69	-178.47	3.38	59.72	0.064	18.97	0.47	-39.57
12	0.70	170.61	3.17	51.75	0.067	17.78	0.46	-42.35
13	0.71	158.55	2.94	44.52	0.061	12.25	0.43	-43.48
14	0.73	149.14	2.73	37.18	0.062	12.90	0.40	-45.06
15	0.74	140.53	2.57	30.17	0.063	10.83	0.37	-47.57
16	0.78	131.12	2.40	22.71	0.064	8.80	0.33	-49.99
17	0.81	125.12	2.23	15.52	0.062	6.82	0.29	-55.76
18	0.82	117.90	2.06	8.53	0.066	2.23	0.24	-62.01
19	0.84	111.86	1.89	0.82	0.065	0.95	0.19	-72.70
20	0.86	109.58	1.74	-5.04	0.066	-1.33	0.14	-89.32
21	0.87	105.71	1.60	-11.40	0.068	-0.98	0.11	-123.58
22	0.88	103.28	1.45	-17.65	0.068	-3.31	0.13	-160.51
23	0.88	103.13	1.32	-22.86	0.070	-5.10	0.18	174.94
24	0.88	101.01	1.20	-28.51	0.070	-5.63	0.25	162.82
25	0.90	100.91	1.08	-33.17	0.066	-6.26	0.32	154.30
26	0.90	102.38	1.00	-36.21	0.070	-2.08	0.38	150.28

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

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.

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