BCP080T

HIGH EFFICIENCY HETEROJUNCTION POWER FET CHIP (.25µm x 800µm)

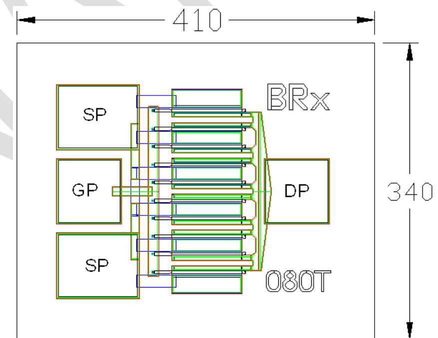
The BeRex BCP080T is a GaAs Power pHEMT with a nominal 0.25 micron gate length and 800 micron gate width making the product ideally suited for applications where high-gain and medium power in the 1000 MHz to 26.5 GHz frequency range are required. The product may be used in either wideband (6-18 GHz) or narrow-band applications. The BCP080T is produced using state of the art metallization with SI_3N_4 passivation and is screened to assure reliability.

PRODUCT FEATURES

- 30 dBm Typical Output Power
- 10.5 dB Typical Gain @ 12 GHz
- 0.25 X 800 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	29.0	30.0 30.0		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	9.5	10.5 7.5		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		60 55		%
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.0V)		160	240	320	mA
G_m	Transconductance (V_{ds} = 3V, V_{gs} = 50% I_{dss})			320		mS
V_p	Pinch-off Voltage (I_{ds} = 800 µA, V_{ds} = 2V)		-2.5	-1.1	-0.5	V
BV_{gd}	Drain Breakdown Voltage (I_{gd} = 0.8 mA, source open)			-15	-12.0	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.8 mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			61		°C/W

PRELIMINARY

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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	27.5	28.5 28.0		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz	10.5	11.5 8.0		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHz 18 GHz		58 45		%
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.0V)		160	240	320	mA
G_m	Transconductance (V_{ds} = 3V, V_{gs} = 50% I_{dss})			320		mS
V_p	Pinch-off Voltage (I_{ds} = 800 µA, V_{ds} = 2V)		-2.5	-1.1	-0.5	V
BV_{gd}	Drain Breakdown Voltage (I_{gd} = 0.8 mA, source open)			-15	- 12.0	V
BV_{gs}	Source Breakdown Voltage (I_g = 0.8 mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			61		° 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	40 mA	7 mA
P_{in}	Input Power	27 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	3.0 W	2.5 W

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

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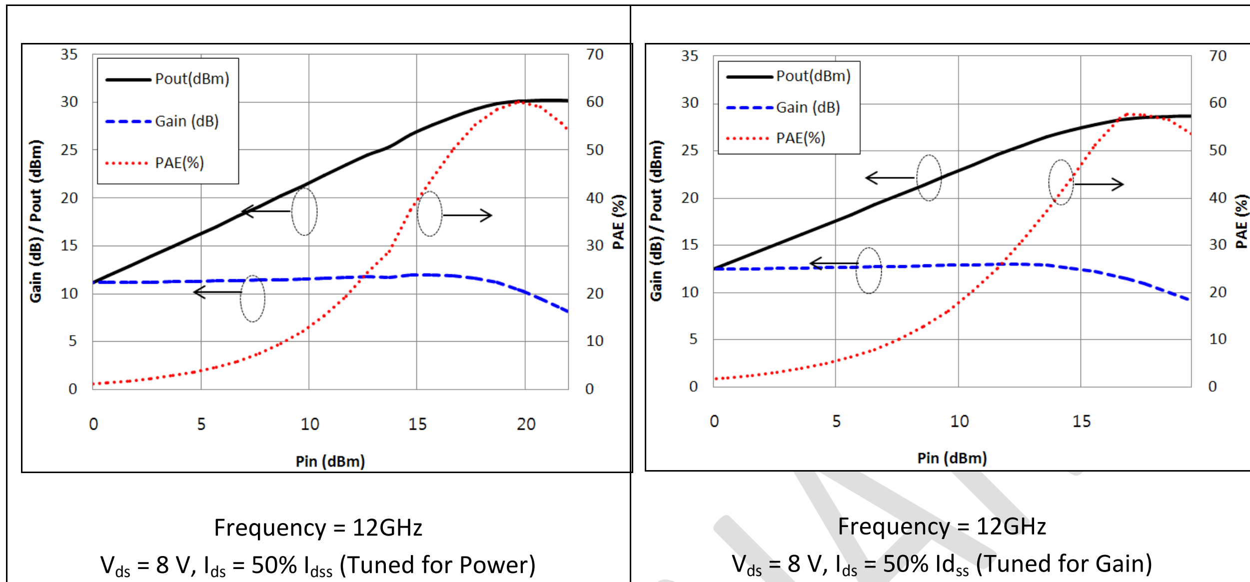
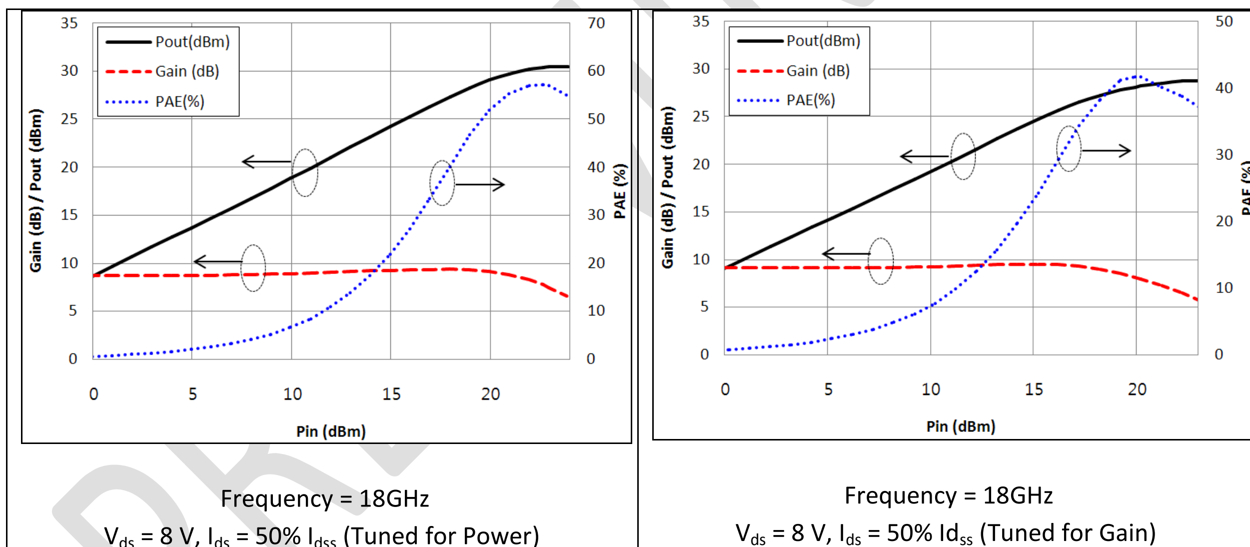
P_{IN}_P_{OUT}/Gain, PAE (12 GHz)



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

Frequency = 12GHz
V_{ds} = 8 V, I_{ds} = 50% Id_{ss} (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% Id_{ss} (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	0.88	-76.19	15.20	133.42	0.024	52.92	0.33	-48.85
2	0.80	-122.05	10.28	107.10	0.026	39.88	0.23	-79.11
3	0.78	-150.41	7.46	90.51	0.028	32.53	0.18	-100.71
4	0.78	-169.11	5.73	78.17	0.032	27.33	0.15	-118.62
5	0.78	177.02	4.62	67.37	0.033	26.98	0.15	-135.40
6	0.79	165.27	3.82	57.85	0.037	26.66	0.16	-148.85
7	0.81	156.52	3.20	49.39	0.039	26.35	0.18	-160.17
8	0.82	147.81	2.79	41.06	0.040	27.57	0.20	-167.44
9	0.84	140.62	2.44	33.85	0.045	26.68	0.22	-176.73
10	0.84	134.26	2.17	26.58	0.048	26.40	0.24	177.83
11	0.86	126.33	1.94	18.60	0.052	24.32	0.26	171.10
12	0.87	119.77	1.73	10.95	0.054	22.92	0.29	165.39
13	0.89	114.17	1.56	4.42	0.056	20.74	0.32	158.94
14	0.89	107.48	1.41	-3.40	0.058	17.25	0.35	152.81
15	0.90	102.39	1.24	-10.36	0.061	15.12	0.39	146.64
16	0.92	98.18	1.12	-16.82	0.062	12.32	0.44	140.53
17	0.93	93.38	0.99	-24.48	0.063	7.68	0.48	135.58
18	0.93	92.33	0.86	-28.98	0.065	8.39	0.52	130.41
19	0.93	90.25	0.76	-34.74	0.064	6.46	0.56	125.87
20	0.94	86.43	0.67	-40.26	0.063	6.69	0.61	122.41
21	0.95	87.08	0.57	-43.33	0.064	4.00	0.64	119.62
22	0.94	88.18	0.51	-46.45	0.063	3.40	0.66	117.23
23	0.94	87.44	0.44	-49.43	0.064	2.63	0.70	115.29
24	0.94	90.11	0.39	-50.10	0.064	1.51	0.73	114.62
25	0.94	91.60	0.35	-52.21	0.061	4.83	0.75	113.64
26	0.95	90.36	0.31	-52.11	0.058	10.58	0.76	114.36

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

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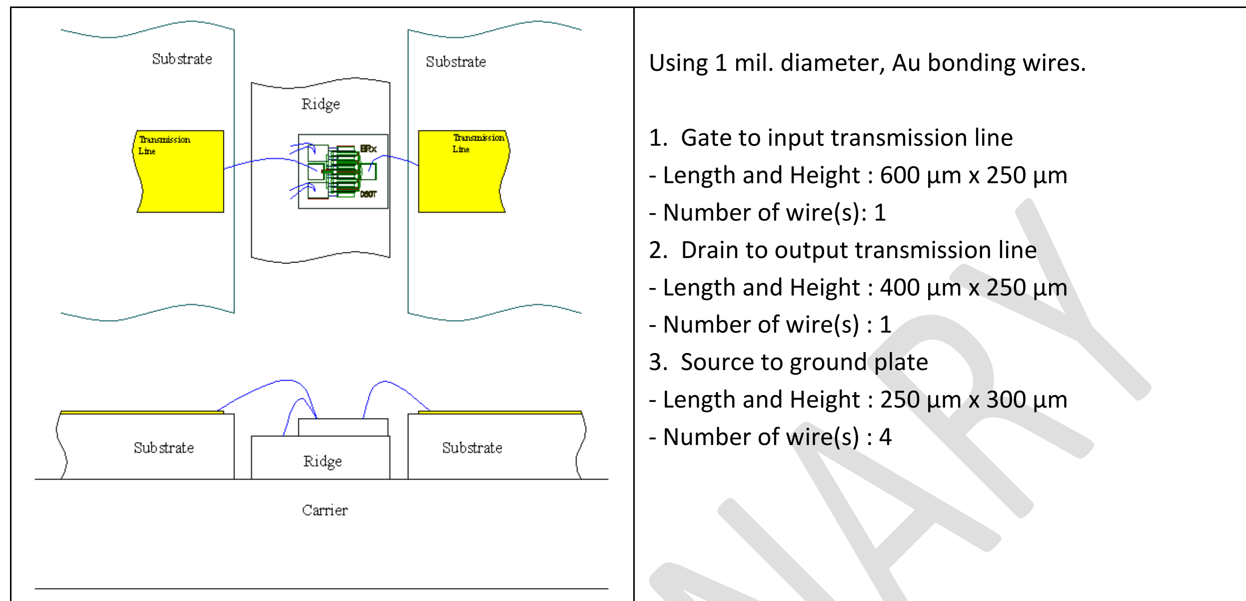
WIRE BONDING INFORMATION



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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