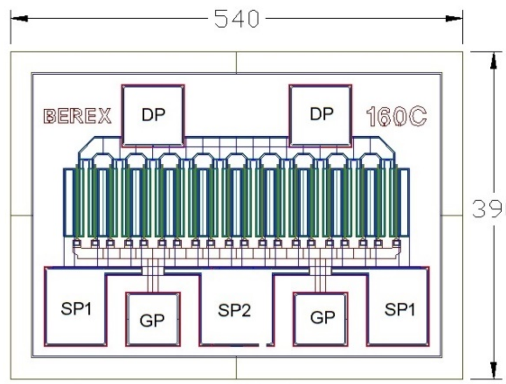
BCP160C

HIGH EFFICIENCY HETEROJUNCTION POWER FET CHIP (.25µm x 1600µm)

The BeRex BCP160C is a GaAs Power pHEMT with a nominal 0.25-micron by 1600-micron gate making this product ideally suited for applications where high-gain and medium power in the DC to 26.5 GHz frequency range are required. The product may be used in either wideband (6-18 GHz) or narrow-band applications. The BCP160C is produced using state of the art metallization with SI_3N_4 passivation and is screened to assure reliability.

PRODUCT FEATURES

- 31.5 dBm Typical Output Power
- 10 dB Typical Gain @ 12 GHz
- 0.25 X 1600 Micron Recessed Gate



Chip dimensions : 540 X 390 microns
Gate pad(GP) : 60 X 60 microns
Drain pad(DP) : 70 X 70 microns
Source pad1(SP1) : 70 X 90 microns
Source pad2(SP2) : 80 X 90 microns
Chip thickness : 75 microns

APPLICATIONS

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

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

PARAMETER/TEST CONDITIONS		TEST FREQ.	MIN.	TYPICAL	MAX.	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 8V, I_d = 240mA)	12 GHZ 18 GHz	30.0 29.0	31.5 30.5		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_d = 240mA)	12 GHZ 18 GHz	8.5 6.0	10 7.5		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_d = 240mA)	12 GHZ 18 GHz		55 45		%
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 1.1V)		340	510	680	mA
G_m	Transconductance (V_{ds} = 2V, I_d = 240mA)			620		mS
V_p	Pinch-off Voltage (I_{ds} = 1.6 mA, V_{ds} = 2V)		-2.5	-1.2		V
BV_{gd}	Drain Breakdown Voltage (I_g = -1.6mA, source open)			-15	-12	V
BV_{gs}	Source Breakdown Voltage (I_g = -1.6mA, drain open)			-13		V
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)			30		°C/W

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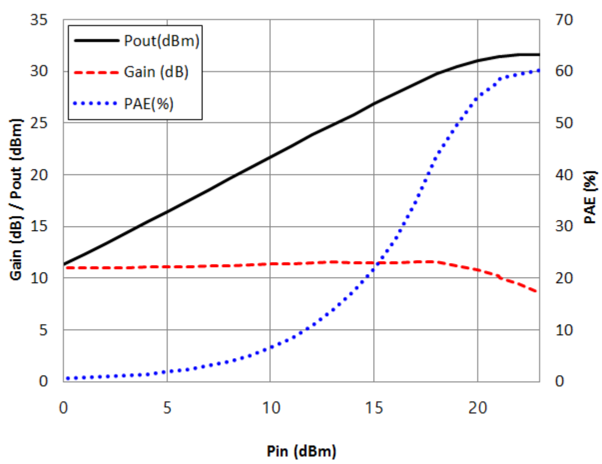
MAXIMUM RATING (T_a = 25° C)

PARAMETERS		ABSOLUTE	CONTINUOUS
V_{ds}	Drain-Source Voltage	12V	8 V
V_{gs}	Gate-Source Voltage	-6V	-3 V
I_d	Drain Current	I_{dss}	I_{dss}
I_{gsf}	Forward Gate Current	80 mA	14 mA
P_{in}	Input Power	30 dBm	@ 3 dB 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	5.0 W	4.2 W

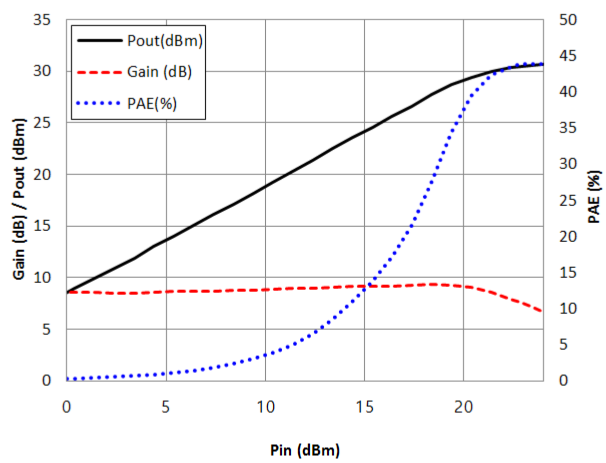
Exceeding any of the above Maximum Ratings will result in reduced MTTF and may cause permanent damage to the device.

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



Frequency = 12 GHz
V_{ds} = 8V, I_{ds} = 240mA (Tuned for Power)

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



Frequency = 18 GHz
V_{ds} = 8V, I_{ds} = 240mA (Tuned for Power)

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S-PARAMETERS (V_{ds} = 8V, I_{ds} = 240mA)

FREQ. [GHZ]	S11 [MAG]	S11 [ANG.]	S21 [MAG]	S21 [ANG.]	S12 [MAG]	S12 [ANG.]	S22 [MAG]	S22 [ANG.]
1.0	0.88	-116.24	14.15	114.87	0.029	39.20	0.24	-93.87
2.0	0.87	-149.90	8.01	93.59	0.032	28.02	0.22	-119.96
3.0	0.87	-165.65	5.49	80.76	0.033	22.51	0.24	-129.08
4.0	0.87	-175.91	4.14	70.78	0.033	29.86	0.26	-134.61
5.0	0.87	176.26	3.30	61.79	0.036	30.60	0.29	-138.23
6.0	0.88	169.76	2.71	53.37	0.035	35.12	0.32	-141.60
7.0	0.89	164.06	2.30	45.71	0.038	38.34	0.36	-145.15
8.0	0.89	159.00	1.98	38.27	0.039	40.63	0.39	-148.78
9.0	0.90	153.83	1.72	30.76	0.041	42.24	0.43	-152.01
10.0	0.90	149.26	1.51	23.89	0.044	43.39	0.46	-155.40
11.0	0.91	145.36	1.32	17.52	0.045	45.86	0.49	-159.65
12.0	0.92	142.05	1.16	11.07	0.049	45.60	0.53	-163.66
13.0	0.93	139.06	1.03	5.45	0.050	42.45	0.56	-167.37
14.0	0.93	136.60	0.92	0.19	0.054	46.91	0.59	-171.63
15.0	0.94	133.31	0.83	-5.60	0.057	43.45	0.62	-174.82
16.0	0.94	130.90	0.75	-10.81	0.058	42.52	0.65	-178.30
17.0	0.95	128.66	0.67	-15.36	0.060	39.69	0.68	177.91
18.0	0.95	125.30	0.61	-21.03	0.065	39.85	0.71	174.26
19.0	0.95	123.64	0.55	-25.48	0.066	36.99	0.74	170.89
20.0	0.96	121.32	0.49	-30.02	0.069	36.21	0.77	167.35
21.0	0.95	120.06	0.44	-33.32	0.067	33.87	0.79	164.73
22.0	0.94	118.56	0.39	-36.86	0.075	33.57	0.82	162.10
23.0	0.93	116.47	0.36	-40.62	0.082	32.17	0.83	159.06
24.0	0.93	115.13	0.32	-44.10	0.081	25.12	0.84	156.10
25.0	0.92	115.07	0.28	-45.66	0.077	26.23	0.85	153.65
26.0	0.94	112.11	0.24	-45.29	0.078	30.69	0.85	150.75

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

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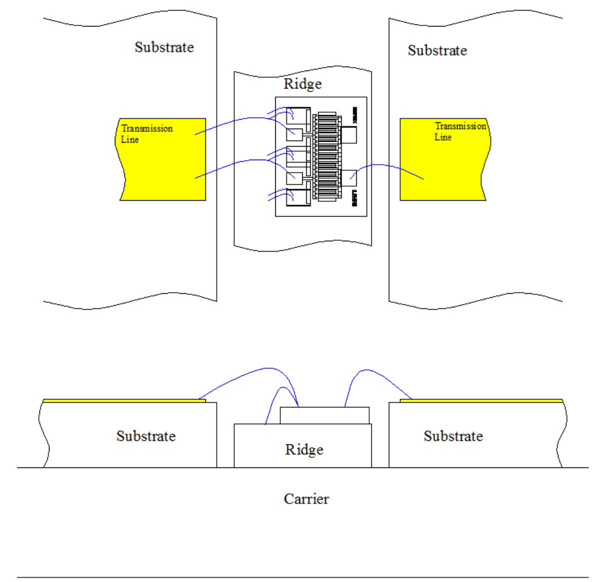
WIRE BONDING INFORMATION



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): 2
2. Drain to output transmission line
   - Length and Height : 400 µm x 250 µm
   - Number of wire(s) : 2
3. Source to ground plate
   - Length and Height : 250 µm x 300 µm
   - Number of wire(s) : 6

Proper ESD procedures should be followed when handling this device.

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DIE ATTACH RECOMMENDATIONS:

BeRex recommends the "Eutectic" die attach using Au-Sn (80%-20%) pre-forms. The die attach station must have accurate temperature control, and the operation should be performed with parts no hotter than 300°C for less than 60 seconds. An inert forming gas (90% N_2-10% H_2) or clean, dry N_2 should be used.

Use of conductive epoxy (gold or silver filled) may also be acceptable for die-attaching low power devices.

HANDLING PRECAUTIONS:

GaAs FETs are very sensitive to and may be damaged by Electrostatic Discharge (ESD). Therefore, proper ESD precautions must be taken whenever you are handling these devices. It is critically important that all work surfaces, and assembly equipment, as well as the operator be properly grounded when handling these devices to prevent ESD damage.

STORAGE & SHIPPING:

The BeRex standard chip device shipping package consists of an antistatic "Gel-Pak", holding the chips, placed inside a sealed antistatic and moisture barrier bag. This packaging is designed to provide a reasonable measure of protection from both mechanical and ESD damage.

Chip devices should be stored in a clean, dry Nitrogen gas environment at room temperature until they are required for assembly. Only open the shipping package or perform die assembly in a work area with a class 10,000 or better clean room environment to prevent contamination of the exposed devices.

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