BCF040T

HIGH EFFICIENCY HETEROJUNCTION POWER FET CHIP (.3 µm x 400 µm)

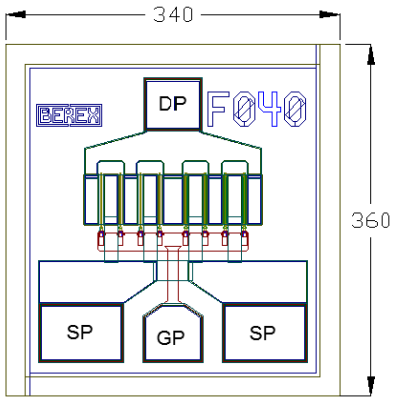
The BeRex BCF040T is a GaAs Power MESFET whose nominal 0.3 micron gate length and 400 micron gate width make the product ideally suited to applications requiring high OIP3 linearity and low phase noise while providing high-gain and medium power from DC to 26.5 GHz. This product is well suited for either wideband or narrow-band applications. The BCF040T is produced using state of the art metallization and devices from each wafer are screened to insure reliability. These chips utilize SI_3N_4 passivation for increased reliability.

Product Features

- 23.0 dBm Typical Output Power
- 13 dB Typical Power Gain @ 12 GHz
- Low Phase Noise
- 0.3 X 400 Micron Recessed Gate

Applications

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



Chip dimensions : 340 X 360 microns
Gate pad(GP) : 60 X 55 microns
Drain pad(DP) : 60 X 50 microns
Source pad(SP) : 90 X 65 microns
Chip thickness : 100 microns

DC CHARACTERISTIC (T_a = 25° C)

PARAMETER/TEST CONDITIONS		MINIMUM	TYPICAL	MAXIMUM	UNIT
I_{dss}	Saturated Drain Current (V_{gs} = 0V, V_{ds} = 2V)	80	120	160	mA
Gm	Transconductance (V_{ds} = 3V, V_{gs} = 50% I_{dss})	50	70		mS
Vp	Pinch-off Voltage (I_{ds} = 300 µA, V_{ds} = 3V)	-3.5	-2.0	-0.5	V
BV_{gd}	Drain Breakdown Voltage (I_g = 0.2 mA, source open)	-15	-11	V	
BV_{gs}	Source Breakdown Voltage (I_g = 0.2 mA, drain open)	-10	-7	V	
R_{th}	Thermal Resistance (Au-Sn Eutectic Attach)		100		° C/W

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ELECTRICAL CHARACTERISTIC (V_{ds} = 8V, T_a = 25° C)

PARAMETER/TEST CONDITIONS		TEST FREQUENCY	MINIMUM	TYPICAL	MAXIMUM	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz	21.0 20.5	23.0 22.5		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz	11.0 8.4	13.0 10.4		dB
PAE	PAE @ P_{1dB} (V_{ds} = 8V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz		32 30		%
NF	Noise figure (V_{ds} = 2V, I_{ds} = 10 mA)	12 GHz		1.65		dB
Ga	Associated Gain (V_{ds} = 2V, I_{ds} = 10 mA)	12 GHz		10		dB

ELECTRICAL CHARACTERISTIC (V_{ds} = 6V, T_a = 25° C)

PARAMETER/TEST CONDITIONS		TEST FREQUENCY	MINIMUM	TYPICAL	MAXIMUM	UNIT
P_{1dB}	Output Power @ P_{1dB} (V_{ds} = 6V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz	20.5 202	22.5 22.2		dBm
G_{1dB}	Gain @ P_{1dB} (V_{ds} = 6V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz	10.8 8.3	12.8 10.3		dB
PAE	PAE @ P_{1dB} (V_{ds} = 6V, I_{ds} = 50% I_{dss})	12 GHZ 18 GHz		39 37		%
NF	Noise figure (V_{ds} = 2V, I_{ds} = 10 mA)	12 GHz		1.65		dB
Ga	Associated Gain (V_{ds} = 2V, I_{ds} = 10 mA)	12 GHz		10		dB

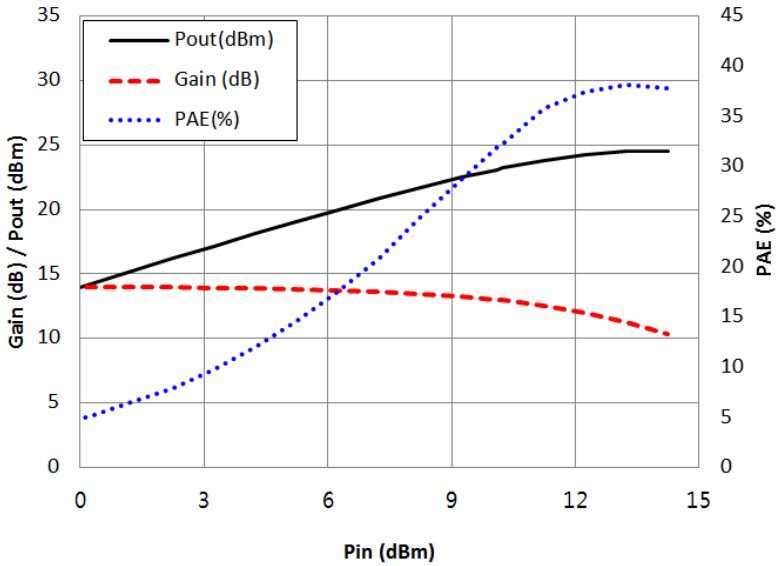
MAXIMUM RATINGS (T_a = 25° C)

PARAMETERS		ABSOLUTE	CONTINUOUS
V_{ds}	Drain-Source Voltage	12 V	8 V
V_{gs}	Gate-Source Voltage	-8 V	-4V
I_{ds}	Drain Current	I_{dss}	I_{dss}
I_{gsf}	Forward Gate Current	10 mA	1.6 mA
P_{in}	Input Power	18 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

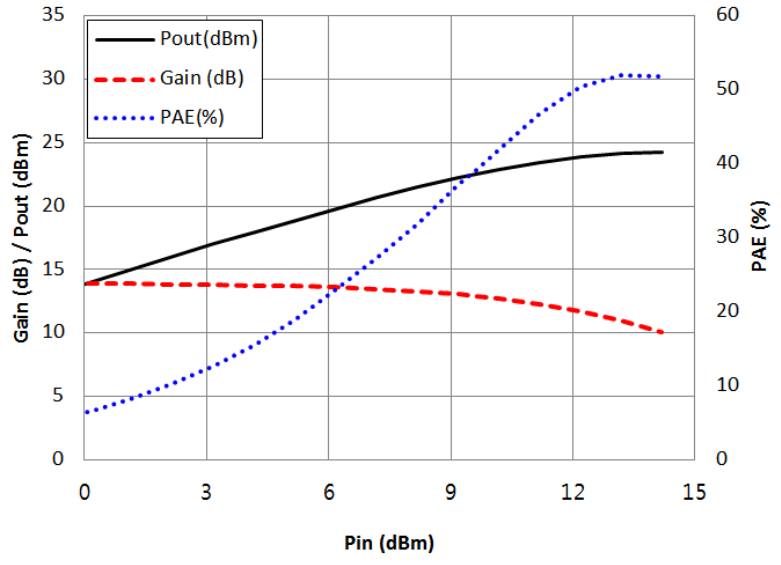
Exceeding any of the above Maximum Ratings will result in reduced MTTF and may cause permanent damage to the device

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P_{in}_P_{out}/Gain, PAE (12 GHz)

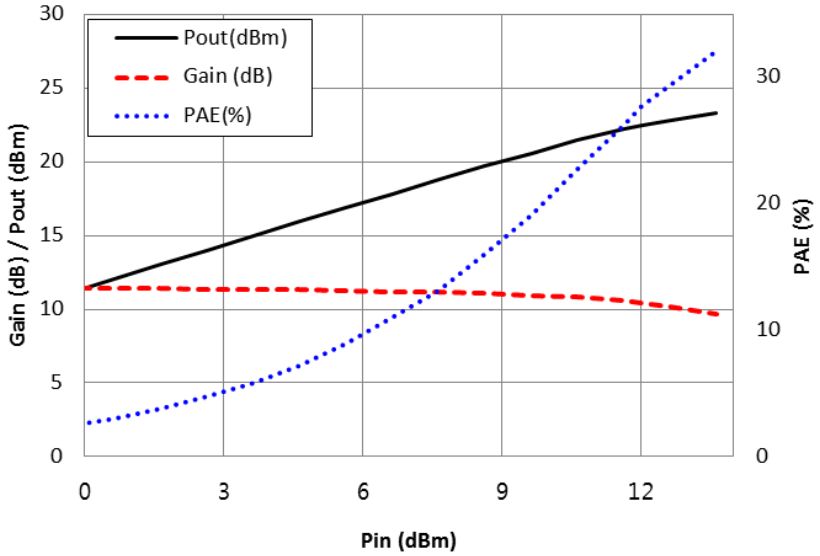


Freq. = 12 GHz, V_{ds} = 8 V, I_{ds} = 50% I_{dss}

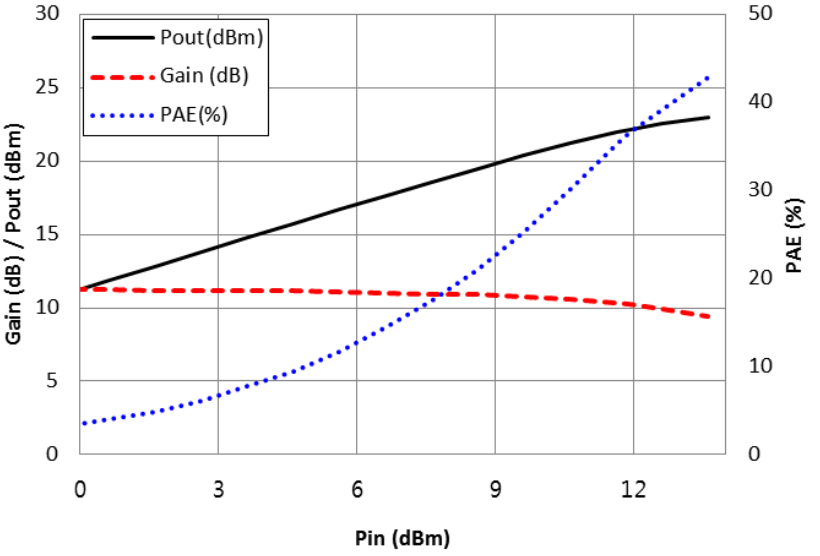


Freq. = 12 GHz, V_{ds} = 6 V, I_{ds} = 50% I_{dss}

P_{in}_P_{out}/Gain, PAE (18 GHz)



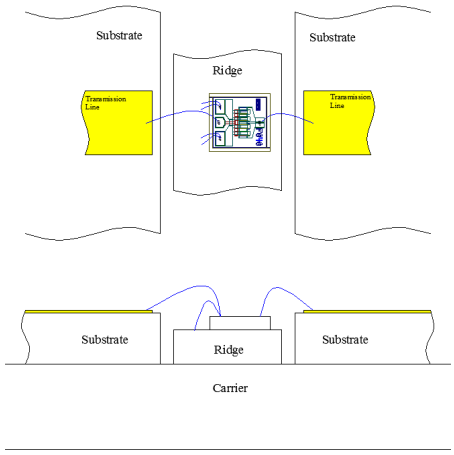
Freq. = 18 GHz, V_{ds} = 8V, I_{ds} = 50% I_{dss}



Freq. = 18 GHz, V_{ds} = 6V, I_{ds} = 50% I_{dss}

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Wire Bonding Options



- Gold Bonding Wire information

1. Gate to input transmission line
   - Length and Height : 400 um and 250 um
   - Number of wires: 1
2. Drain to output transmission line
   - Length and Height : 350 um and 250 um
   - Number of wires: 1
3. Source to ground plate
   - Length and Height : 200 um x 250 um
   - Number of wires: 4

Note: The diameter of bonding wires: 1 mil



Proper ESD procedures should be followed when handling this device.

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.

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:

BeRex's 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.

CAUTION:

THIS PRODUCT CONTAINS GALLIUM ARSENIDE (GaAs) WHICH CAN BE HAZARDOUS TO THE HUMAN BODY AND THE ENVIRONMENT. THEREFORE, IT MUST BE HANDLED WITH CARE AND IN ACCORDANCE WITH ALL GOVERNMENTAL AND COMPANY REGULATIONS FOR THE SAFE HANDLING AND DISPOSAL OF HAZARDOUS WASTE. DO NOT BURN, DESTROY, CUT, CRUSH OR CHEMICALLY DISSOLVE THE PRODUCT. DO NOT LICK THE PRODUCT OR IN ANY WAY ALLOW IT TO ENTER THE MOUTH. EXCLUDE THE PRODUCT FROM GENERAL INDUSTRIAL WASTE OR GARBAGE AND DISPOSE OF ONLY IN ACCORDANCE TO APPLICABLE LAWS AND/OR ORDINANCES.

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