

**Advanced Product Information****July 2002**

(1 of 4)

**1.85 to 1.91 GHz
28.5 dBm, PCS****InGaP HBT Amplifier Module****Features**

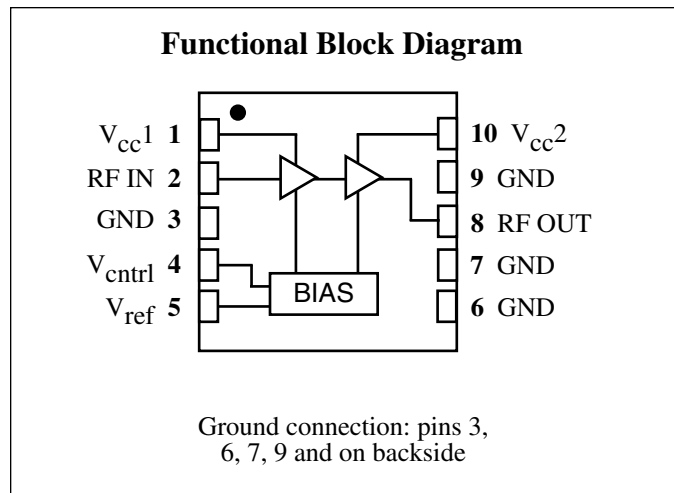
- ❑ InGaP HBT Technology
- ❑ 4mm Square, 50 Ohm Power Module
- ❑ Single Positive Supply
- ❑ 35% Linear Power Added Efficiency
- ❑ +28.5 dBm Output Power (CDMA Mode)
- ❑ +28.5 dBm Output Power (CDMA 2K 1X Mode)
- ❑ 27 dB Gain at Operating Output Power
- ❑ On-Board Power Down Mode

Applications

- ❑ PCS Handsets
- ❑ PCS Infrastructure
- ❑ Wireless Local Loop Subscriber Units
- ❑ CDMA Handsets
- ❑ CDMA2K 1X Handsets

Description

The CHP1207-QM is a 50 ohm matched, single supply, linear power amplifier module intended for use in PCS handsets and wireless local loop subscriber units. The highly integrated amplifier meets the requirements of PCS-1900 or CDMA systems. It is a member of Celeritek's new **QuadAmps™** family of 3V power amplifier modules that are packaged in a low-cost, space efficient, 4mm square, matched module that provides excellent electrical stability and



low thermal resistance. The module operates from a fixed positive voltage and requires no external matching which significantly reduces space, cost and enhances ease of use. A current adjustment pin (V_{cntrl}) is provided to improve efficiency for the low RF power range of operation.

The 4x4 mm package is self contained, incorporating 50 ohm input and output matching networks optimized for output power, linearity and efficiency.

Celeritek's InGaP HBT technology offers a thermally robust and reliable PAM (power amplifier module) solution.

Absolute Maximum Ratings

Parameter	Rating	Parameter	Rating	Parameter	Rating
Collector Voltage ($+V_{cc}$)	+6.0 V*	Reference Voltage (V_{ref})	+3.1 V	Operating Temperature	-30°C to +95°C
Collector Current (I_{cc})	1.2 A	Power Dissipation	4 W	Storage Temperature	-55°C to +135°C
RF Input Power (High Mode)	7 dBm	V_{cntrl}	+3.1 V	Soldering Temperature	260°C for 5 Sec.
RF Input Power (Low Mode)	13 dBm				

* RF Off.

Recommended Operating Conditions

Parameter	Typ	Units	Parameter	Typ	Units
Collector Voltage ($+V_{cc}$)	3.2 to 4.2	Volts	Operating Temperature (PC Board)	-20 to +70	°C
Reference Voltage (V_{ref}) (Fixed and regulated)	+3.0(±0.1V)	Volts	Control Voltage (V_{cntrl})	High Low	2.5-3.0 0-0.5
					V V

Application Information

The CHP1207-QM is a two-stage amplifier that requires a single regulated positive supply along with the unregulated battery voltage for proper operation. V_{ref} is a regulated 3.0 reference voltage for the bias control circuitry. It can also be used as a power down mode select. V_{cc} is an unregulated supply voltage directly from the battery. V_{cc} should be applied prior to V_{ref} and before RF input power. V_{cntrl} is a control voltage selection between high and low power mode. The CHP1207-QM can be operated over a range of supply voltages and bias points by adjustment of V_{ref} . It is important that the maximum power dissipation of the package be observed at all times and that the maximum voltage across the device is not exceeded.

Circuit Design Considerations

Biasing The positive V_{cc} supply voltages are applied to pins 1 and 10. Most bypass decoupling is provided on-board. V_{ref} is applied to pin 5.

The recommended DC bypass capacitance is shown in the schematic diagram on Page 3.

Inadequate bypass capacitance and inductance around the DC supply lines can compromise the adjacent channel power ratio (ACPR), reduce power gain and/or create oscillations.

– Continued on Page 2 –

Electrical Characteristics

Unless otherwise specified, the following specifications are guaranteed at room temperature with collector voltage (+V_{CC}) = 3.4 V.

Parameter	Condition	Min	Typ	Max	Units
Frequency Range		1.85		1.91	GHz
Gain	Pout = +28.5 dBm	25	27	30	dB
Gain Ripple*	1850–1910 MHz		1.0	1.5	dB
Gain Variation	Over supply voltage		2		dB/V
	Over temperature		0.03		dB/°C
Power Output	CDMA mode (IS-95)		+28.5		dBm
Harmonics	2nd @ Po = +28.0 dBm CDMA mode, no additional output trapping		-30		dBc
	3rd @ Po = +28.0 dBm CDMA mode, no additional output trapping		-30		dBc
Noise Power in Receive Band			-91		dBm
Linearity (ACPR)	CDMA mode @ +28.5 dBm Pout, 1.25 MHz offset		-50	-48	dBc/30KHz
	CDMA mode @ +28.5 dBm Pout, 1.98 MHz offset		-58	-55	dBc/30KHz
	CDMA2K 1X mode** @ +28.0 dBm Pout, 1.25 MHz offset		-48	-47	dBc/30KHz
	CDMA2K 1X mode** @ +28.0 dBm Pout, 1.98 MHz offset		-58	-55	dBc/30KHz
Noise Figure			6.0		dB
Input Return Loss			-10		dB
I _{CC}	Pout = +12.0 dBm - CDMA mode		100		mA
	Pout = +28.5 dBm - CDMA mode		590		mA
Quiescent Current (I _Q)	No RF V _{cntrl} = Low		80		mA
	V _{cntrl} = High		55		mA
V _{ref} Supply Current (I _{ref})			2.0	5.0	mA
V _{ref} Supply Voltage (V _{ref})	Fixed and regulated (±0.1V tolerance)		3.0		V
I _{cntrl}	V _{cntrl} = High		400	800	μA
Leakage Current	V _{ref} = 0 V, V _{CC} = 3.4 V			10	μA

* Specifications guaranteed over the temperature range of -20°C to +70°C. ** Modulation HPSK in 1.2288 MHz, RC3 PAR = 4.7 @ 1% CCDF.

RF Power Range Truth Table

Power State	V _{ref}	V _{cntrl}	RF Power Range
High Power	3.0 V	Low	16 – 28 dBm
Low Power	3.0 V	High	≤16 dBm
Shutdown	0 V	Low	—

– Continued from Page 1 –

Modulation When biased as specified, the CHP1207-QM will achieve the required adjacent channel response for the digital system specified. Celeritek tests each product under digital modulation to ensure correlation to customer applications.

Thermal

1. The ground pad on the backside of the CHP1207-QM must be soldered to the ground plane.
2. All leads of the package must be soldered to the appropriate electrical connection.

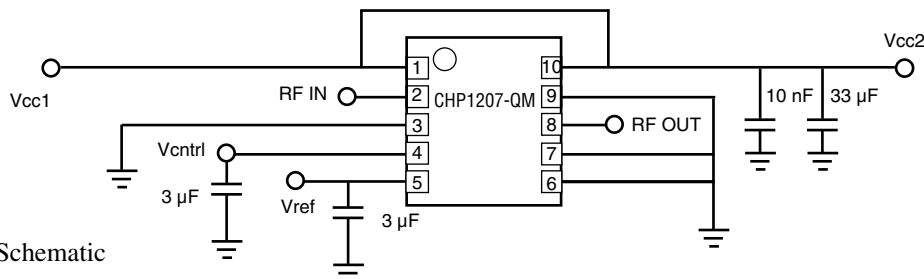
Physical Dimensions and PCB Footprint

Contact the factory for detailed information and dimensions of HBT power module package and recommended printed circuit board footprint.



Recommended Application Circuit

Note: This schematic represents the topology of the application circuit recommended by Celeritek.



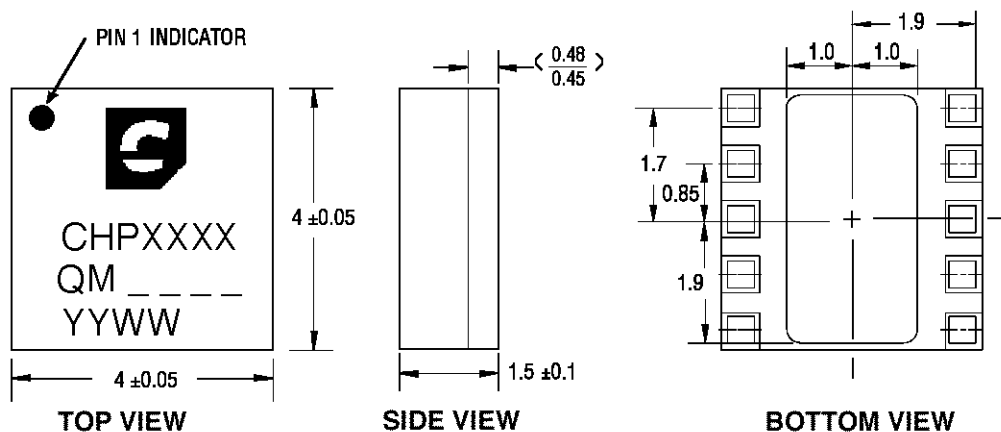
Evaluation Board Schematic

Board substrate:

ER = 4.60

Thickness = 0.031 in.

Physical Dimensions



Ordering Information

The CHP1207-QM is available in a surface mount 50 ohm matched module and devices are available in tube or tape and reel.

Part Number for Ordering

CHP1207-QM-0000

CHP1207-QM-000T

PB-CHP1207-QM

Package

QM10 surface mount power package in tube

QM10 surface mount power package in tape and reel

Evaluation Board with SMA connectors for CHP1207-QM

NOTES

Celeritek reserves the right to make changes without further notice to any products herein. Celeritek makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Celeritek assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Celeritek does not convey any license under its patent rights nor the rights of others. Celeritek products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Celeritek product could create a situation where personal injury or death may occur. Should Buyer purchase or use Celeritek products for any such unintended or unauthorized application, Buyer shall indemnify and hold Celeritek and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Celeritek was negligent regarding the design or manufacture of the part. Celeritek is a registered trademark of Celeritek, Inc. Celeritek, Inc. is an Equal Opportunity/Affirmative Action Employer.