2 GHz to 6 GHz, 500 W Power Amplifier

Preliminary Technical Data

HMC8113

FEATURES

- 2 GHz to 6 GHz
- 85 dB typical small signal gain
- 57 dBm typical saturated RF output power (P_{OUT})
- 61 dB digital attenuator (DATT) with 1 dB LSB
- Standard 5U 19" rack chassis (per EIA-310D)
- +10°C to +50°C operating temperature
- Status and control interface 5V TTL compatible
- 8-bit SPI attenuator control
- User replaceable air filter on front panel
- Over-temperature and over-VSWR protection
- Alarm status communicated via front-panel LED and Control connector
- Air cooled by front to rear air flow (2 rear mounted fans)
- Active RF circuitry hermetically sealed
- Control PWAs conformal coated for environmental protection]
- Meets Grade A High Impact Shock per MIL-S-901D
- Meets MIL-STD-167-1A Vibration

APPLICATIONS

- Test and measurement equipment
- Electronic warfare (EW)
- Commercial and military radars

GENERAL DESCRIPTION

The HMC8113 is a 500 W gallium nitride (GaN), monolithic microwave integrated circuit (MMIC) power amplifier (PA) module that operates between 2 GHz and 6 GHz, provided in an EIA-310D standard 5U, 19" rack mount chassis. The amplifier typically provides 85 dB of small signal gain and 57 dBm of saturated RF output power. The amplifier draws 3 kW of power from a 220 V ac supply. The RF input/outputs are dc blocked and matched to 50 Ω for ease of use.

FUNCTIONAL BLOCK DIAGRAM

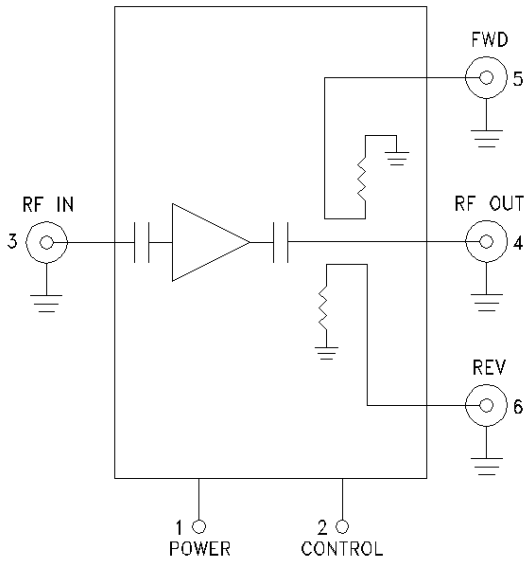

Figure 1.

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Technical Support
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HMC8113* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

DOCUMENTATION

Data Sheet

- HMC8113: 2 GHz to 6 GHz, 500 W Power Amplifier Preliminary Data Sheet

DESIGN RESOURCES

- HMC8113 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all HMC8113 EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

DOCUMENT FEEDBACK

Submit feedback for this data sheet.

TABLE OF CONTENTS

SPECIFICATIONS

POWER = 208 V ac, T_A = 25°C, DATT set to 0 dB attenuation unless otherwise noted.

Table 1.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
FREQUENCY RANGE	2		6	GHz	
GAIN					
Small Signal Gain		85		dB	Pin = -45 dBm
Power Gain		57		dB	Pin = 0 dBm
VOLTAGE STANDING WAVE RATIO (VSWR)					
Input		2:1			
Output		2:1			
RF OUTPUT					
Saturated Output Power (P_{SAT})	55.9	57		dBm	Pin = 0 dBm
Gain Control Range		61		dB	
Output Power for 1 dB Compression (P1dB)		47.5		dBm	
Output Third-Order Intercept (IP3)		57		dBm	
Spurious		-60		dBc	Excluding harmonics
Harmonics		-12		dBc	
RF COUPLED OUTPUTS					
FWD Port Level	37	38	43	dBc	
REV Port Level	46	50	53	dBc	
3rd Order Intermodulation Products		-40		dBc	Pout = P_{1dB} – 10 dB. 10 MHz spacing on two tones.
CONTROL INPUTS					
Input Voltage					
High (V_{INH})		2.0 to 5.0		V	
Low (V_{INL})		0 to 0.8		V	
SWITCHING CHARACTERISTICS					Pin = -45 dBm.
Cold Start		0.5		s	From ac applied to PS_OK high.
Standby Mode to Enable		5		ms	From rising edge of EN to RF out.
Attenuation level change		0.3		ms	From rising edge of ATT_SYNC to RF out.
Attenuation Step Accuracy					Pin = -45 dBm.
1 dB Bit	-2	-1	0	dB	
2 dB Bit	-3	-2	-1	dB	
4 dB Bit	-5	-4	-3	dB	
8 dB Bit	-9	-8	-7	dB	
16 dB Bit	-18	-15	-14	dB	
31 dB Bit	-33	-31	-29	dB	
SUPPLY INPUTS					
Input Voltage	175	220	227	V ac	
Input Frequency		60		Hz	
Input Power		2600	3900	W	
WEIGHT		100		lbs	

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
RF Input (RFIN) Power	5 dBm
Operating Temperature (CW)	+10°C to +50°C
Storage Temperature	−40°C to +70°C

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

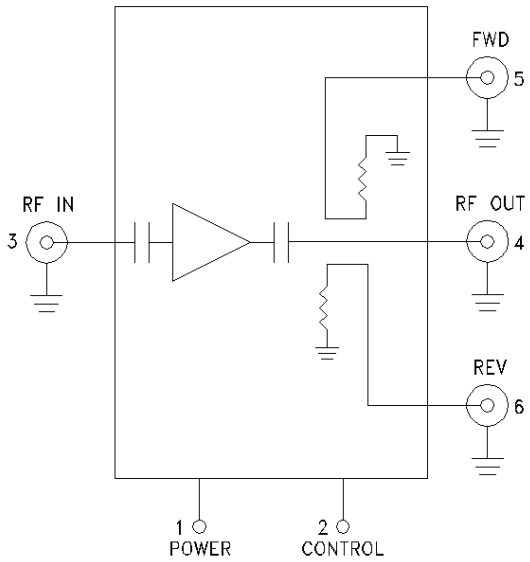

Figure 2. Pin Configuration

Table 3. Connector Function Descriptions

Connector No.	Mnemonic	Description
1	POWER	Supply Voltage Connector. This connects to a 220 V ac typical source. See Table 5 for pinout.
2	CONTROL	Alarm and Command Interfaces. See Table 4 for pinout.
3	RF IN	RF Input. This connector is ac-coupled and matched to 50 Ω.
4	RF OUT	RF Output. This connector is ac-coupled and matched to 50 Ω.
5	FWD	RF Output. This connector is ac-coupled and matched to 50 Ω.
6	REV	RF Output. This connector is ac-coupled and matched to 50 Ω.
Chassis	GND	The exposed metal parts of the chassis may be connected to the RF and internally generated dc ground.

TYPICAL PERFORMANCE CHARACTERISTICS

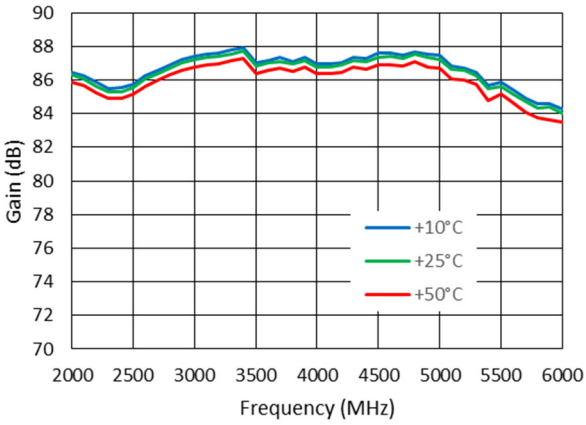

Figure 3. Gain vs. Frequency at Various Temperatures

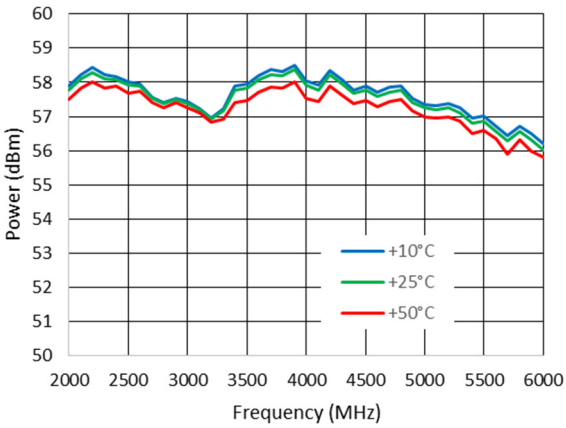

Figure 4. P_{SAT} vs. Frequency at Various Temperatures

THEORY OF OPERATION

Table 4. Connector 2 Pin Definition

PIN	NAME	HPA INPUT OR OUTPUT	Description
1	VENDOR ALARM	TTL OUTPUT	LOW = NORMAL HIGH = ALARM (OVER/UNDER CURRENT CONDITION, OR GATE VOLTAGE DROP-OUT)
2	TEMPERATURE	TTL OUTPUT	LOW = NORMAL HIGH = ALARM
3	VSWR	TTL OUTPUT	LOW = NORMAL HIGH = ALARM
4	PWR SUPPLY	TTL OUTPUT	LOW = POWER SUPPLY NOT FUNCTIONING PROPERLY HIGH = NORMAL
5, 6, 7	GROUND	NA	GROUND
8	ENABLE	TTL INPUT	LOW = STANDBY (RF AMP OFF) HIGH = ENABLED (RF AMP ON)
9	RESET	TTL INPUT	LOW = NORMAL HIGH = RESET LATCHED ALARMS (HELD HIGH FOR AT LEAST 500NS)
10	NC	NC	NOT CONNECTED
11	ATTN CLOCK	SPI	SPI CLOCK FOR GAIN CONTROL (UP TO 10MHZ)
12	ATTN DIN	SPI	SPI 8 BIT DATA FOR GAIN CONTROL. CLOCKED IN ON NEGATIVE EDGE OF ATTN CLOCK. BIT SEQUENCE SHOWN BELOW (see **Error! Reference source not found.**).
13	ATTN SYNC	SPI	SPI LATCH ENABLE FOR GAIN CONTROL (ACTIVE LOW)
14	BATTLE MODE	TTL INPUT	LOW = NORMAL HIGH = DO NOT SHUTDOWN FOR ALARMS/SELF-PROTECTION. POWER SUPPLY ALARMS EXCLUDED
15	CAPTAIN	GND/OPEN INPUT	GROUND = ALLOW HPA TO BE ENABLED OPEN = PROHIBIT HPA FROM BEING ENABLED
16, 17	GROUND	NA	GROUND
18, 19	NC	NC	NOT CONNECTED
20, 21	NC	NC	NOT CONNECTED

NOTE 1: BIT SEQUENCE 0 0 0 0 D7 D6 D5 D4 D3 D2 D1 D0 0 0 0 0 = 16 BITS TOTAL. D7 TO D0 REPRESENTS THE 8 BIT GIAN CONTROL DATA WHERE D7 IS THE MSB.

Table 5. Connector 1 Pin Definition

PIN	Description
A	L1
B	GND
C	L2/N
D	NC

Table 6. Connector Type

Connector No.	Mnemonic	Description or Part Number
1	POWER	MS3450W20-4P
2	CONTROL	M28840/10AC1S1
3	RF IN	N-Type Female Jack
4	RF OUT	N-Type Female Jack
5	FWD	N-Type Female Jack
6	REV	N-Type Female Jack

APPLICATIONS INFORMATION

To turn on the amplifier, complete the following steps:

1. Apply 220 V ac to POWER.
2. Apply the RF input power to RF IN.

To turn off the amplifier, complete the following steps:

1. Remove the RF input power from RF IN.
2. Disconnect 220 V ac from POWER.

OUTLINE DIMENSIONS

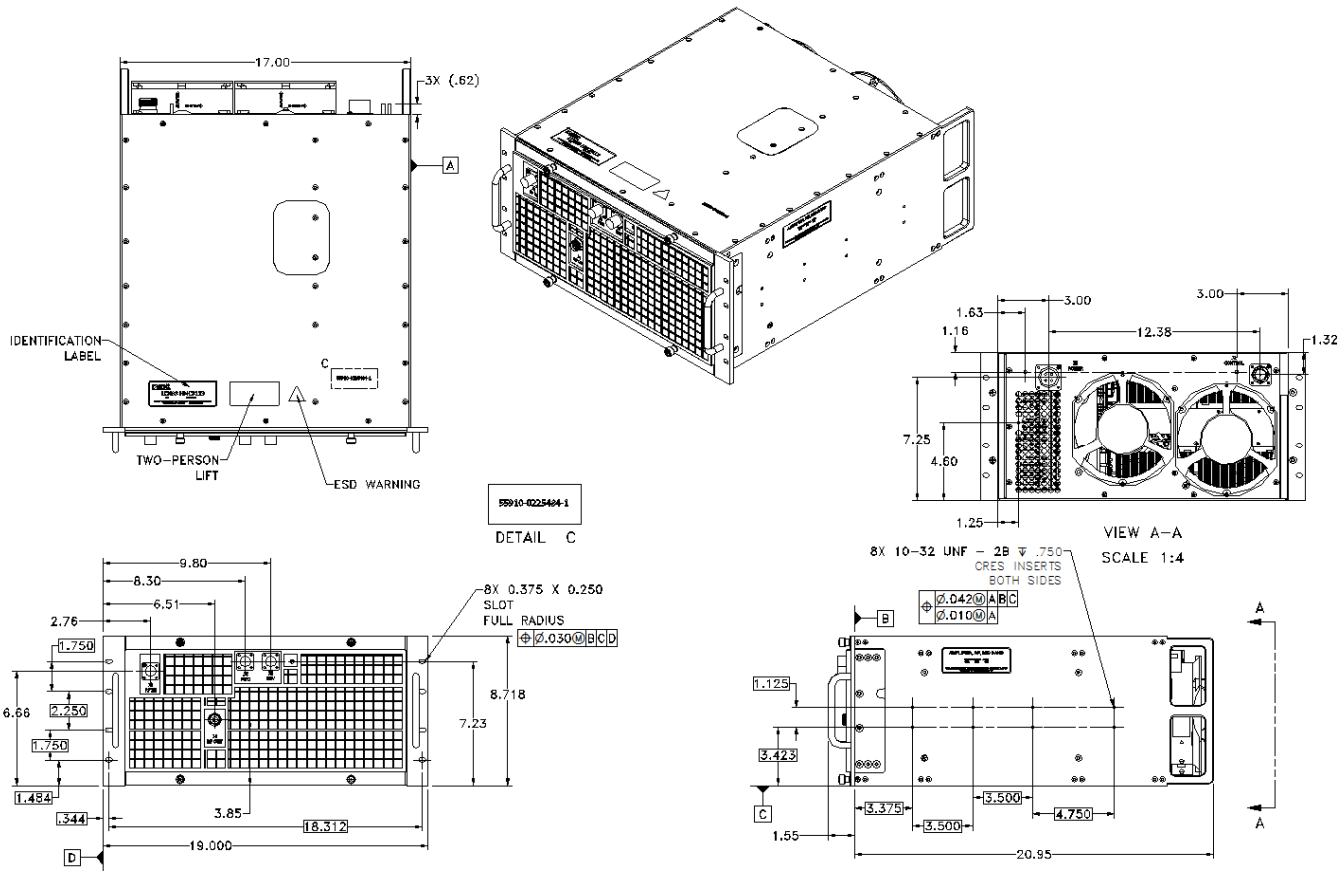

Figure 5. 5U Rack-Mount Chassis with Connector Interface [MODULE]
Dimensions shown in inches

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