

# PRODUCT SELECTION GUIDE

Analog, Digital & Mixed-Signal ICs, Modules,  
Subsystems & Instrumentation, DC - 110 GHz



## Automotive

Telematics & Sensors

## Broadband

Cable Modem, CATV, DBS & VoIP  
WiMAX, WiBro, WLAN & UWB

## Cellular Infrastructure

GSM, GPRS, CDMA, TD-SCDMA,  
WCDMA, UMTS & 4G/LTE

## Fiber Optics & Networking

OC-48 to 400G

## Microwave & mmWave Communications

Backhaul Radio Links  
Multi-Point Radios & VSAT

## Military

C<sup>3</sup>I, ECM & EW

## Space

Payload Electronics

## Test & Measurement

Commercial & Industrial Sensors  
Test Equipment

**Hittite**  
MICROWAVE PRODUCTS  
FROM ANALOG DEVICES

Fall 2014

REF# SG-0914

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Using a unique combination of design skills, systems understanding, and process technologies, Analog Devices offers the broadest portfolio of RF microwave products, covering the entire RF, microwave and millimeter wave signal chain from antenna to bits and back. This Selection Guide summarizes over 1100 Hittite Microwave products from Analog Devices. Full product specifications are available at [www.analog.com/hittitemw](http://www.analog.com/hittitemw).

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## Please Note:

- New products (in tables) are denoted in **boldface** with color tint backgrounds

## How to Buy:

Hittite Microwave Products from Analog Devices, Inc., offers many convenient ways to order products and/or receive pricing and delivery information. Our computerized order entry and MRP system assures customer orders will be entered quickly, tracked easily, and completed accurately and on-time.

### Direct Sales

#### ADI Field Sales Offices:

You may contact our corporate or field sales offices listed on the back cover for assistance in purchasing Hittite products.

#### Purchase Orders via HMC Corporate Sales

You may contact Hittite Microwave directly at 978-250-3343. Purchase orders can be faxed to 978-250-3373 or sent via email to sales@analog.com. For direct orders there is a minimum purchase order value of \$2000.00 (U.S. dollars).

#### Purchase Orders via HMI Corporate Sales - International Location

You may contact Hittite Microwave International Limited directly at +353 21 4839000. Purchase orders can be faxed to +353 21 4839001 or sent via email to RFMG-HittiteEMEA@analog.com or RFMG-HittiteAsia@analog.com. For direct orders there is a minimum purchase order value of \$2000.00 (U.S. dollars).

### Worldwide Network of Sales Representatives

You may purchase our products through our network of manufacturer representatives. See the listing at analog.com.

### Distributors

Hittite customers can enjoy the convenience of online ordering at www.DigiKey.com. Select products are linked from Hittite's product splash pages to the purchasing page at Digi-Key.

#### Digi-Key (Global Distributor):

Tel: 1-800-344-4539, or Web: [www.digikey.com](http://www.digikey.com)

#### Future Electronics (U.S. Domestic Distributor):

Tel: 1-800-675-1619, or Web: [www.futureelectronics.com](http://www.futureelectronics.com)

## Our Quality Policy:

### Analog Devices, Incorporated is Committed to:

- Being a supplier of products of the highest quality.
- Advancing state-of-the-art technology to support our products.
- Enhancing our competitive position with superior products.

### Our Quality Policy Recognizes Responsibilities for Every Individual to:

- Take the initiative to promote quality.
- Create an environment where the highest quality standards are maintained.
- Participate in continuous improvement practices.

## Quality & Product Support:

### The Quality & Product Support Section of our Web Site includes:

- Quality Assurance - Product manufacturing, qualification & screening flows
- Product Reliability
- Qualification Test Reports

### Product Application Support

- Application Engineering Support
- Application Notes
- Mixer Spur Chart Calculator, Parametric Search, and PLL Phase Noise Calculator
- Product Cross Reference
- Package & Layout Drawings - Product outline, PCB land pattern, and tape & reel drawings
- Published Papers

### Data Sheets

- Complete product data sheets can be found on our web site.

ADI is ISO 9001:2008, AS9100-2009 and ANS/ESD S20.20-2007 certified. Every component is backed by every ADI employee and subcontractor's commitment to total quality, thus providing our customers with products that meet or exceed all requirements, are delivered on-time and function reliability throughout their useful life.

## What We Do

Analog Devices debuts its RF and microwave portfolio which incorporates the Hittite Microwave Products from Analog Devices. With more than 2,000 high performance products from functional blocks to highly-integrated solutions, ADI's portfolio spans the entire frequency spectrum of RF, microwave, and millimeter wave from antenna to bits and back. Complemented by the world's leading data converters, Analog Devices offers complete solutions across a breadth of applications, including industrial instrumentation, aerospace and defense electronics, communications infrastructure, automotive safety and more.

### RF & Microwave ICs

Amplifiers  
Attenuators  
Automatic Gain Control  
DC Power Conditioning  
Filters - Tunable  
IF / Baseband Processing  
I/Q Mixers/IRMs  
I/Q Downconverter/Receivers  
I/Q Upconverters/Transmitters  
Mixers  
Modulators/Demodulators  
Passives  
Phase Shifters  
Power Detectors  
SDLVAs  
Switches  
Transceivers  
Variable Gain Amplifiers

### Analog & Mixed-Signal ICs

Broadband Time Delays  
Comparators  
Crosspoint Switches  
Data Converters  
DC Power Conditioning  
DC Power Management  
High Speed Digital Logic  
IF / Baseband Processing  
Interface  
Limiting Amplifiers  
Mux & Demux

Optical Modulator Drivers  
Signal Conditioners  
Transimpedance Amplifiers

### Clock & Timing ICs

Clock Distribution  
Clock Generators

### LO Freq. Generation ICs

DC Power Conditioning  
Filters - Tunable  
Freq. Dividers & Detectors  
Freq. Multipliers  
Phase Locked Loop  
PLL with Integrated VCOs  
VCOs + PLOs

### Connectorized Modules

Amplifiers  
Attenuators  
Block Upconverters w/HPA  
DROs

Freq. Dividers & Detectors  
Freq. Multipliers  
High Speed Digital Logic  
I/Q Mixers

Mixers  
Phase Shifters  
SDLVAs  
Switches  
Synthesizer Module, MicroSynth®  
VCOs

### Instrumentation

Signal Generators to 70 GHz

We design and supply custom analog and digital ICs, modules, subsystems and instrumentation, combining multiple functions for specific requirements. We select the most appropriate semiconductor and package technologies, uniquely balancing digital and analog integration techniques.

Our custom and standard products support a wide range of wireless / wired communications & radar applications for the following markets:



**Automotive**  
Telematics & Sensors



**Microwave & mmWave Communications**  
Backhaul Radio Links  
Multi-Pt Radios & VSAT



**Broadband**  
CATV, DBS, WiBro, WLAN,  
Fixed Wireless & UW



**Military**  
C-1, ECM & EW



**Cellular Infrastructure**  
GSM, GPRS, CDMA, WCDMA,  
UMTS, TD-SCDMA & 4G/LTE



**Space**  
Payload Electronics



**Fiber Optic & Networking**  
OC-48 to 400G



**Test & Measurement**  
Commercial / Industrial  
Sensors & Test Equipment

# FALL 2014 NEW PRODUCTS

## AMPLIFIERS

### Gain Blocks & Drivers (page 12)

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
4 - 10	HBT Gain Block	14.5	+25	3.5	+11	+5V @ 44 mA	LP3B	EAR99	HMC3587LP3BE

### GaN PAs (page 11)

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	Psat (dB)	Power Gain @ Psat (dB)	Bias Supply	Package	ECCN Code	Part Number
6 - 18	10 Watt GaN MMIC PA	20	+39.5	+40	10	+28V @ 680 mA	Chip	ITAR	HMC7149

### Linear & Power (pages 13, 14)

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
5.5 - 8.5	2 Watt PA	29	+41.5	-	+34.5	+8V @ 1200mA	LP5G	3A001.b.2.b	HMC7357LP5GE
27.5 - 31	2 Watt PA	23	+38	-	+34	+6V @ 1100mA	Chip	3A001.b.2.c	HMC7441

### Wideband (Distributed) (page 9, 47)

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
0.01 - 20	Wideband Power Amplifier Module	12	+28	4.5	+28	+11V @ 345mA	C-10B/SMA	EAR99	HMC6980

## BLOCK UP CONVERTERS (page 47, 48)

Frequency (GHz)	Function	IF Frequency (GHz)	Conv. Gain (dB)	Spurious Rejection (dBc)	Output P1dB (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	1 - 2	20	-60	+2	Module	ITAR	HMC7053

Frequency (GHz)	Function	Small Signal Gain (dB)	Spurious Rejection (dBc)	Linear Power (dBm)	Psat (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	42	-60	+37	+39.5	Module	ITAR	HMC7054

Frequency (GHz)	Function	IF Frequency (GHz)	Conv. Gain (dB)	Spurious Rejection (dBc)	Linear Power (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	2.8	26	-60	+37	Module	ITAR	HMC7056

## MIXERS

### I/Q Downconverter / Receiver (page 18)

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Noise Figure (dB)	Image Rejection (dBc)	IIP3 (dBm)	Package	ECCN Code	Part Number
27 - 34	I/Q Downconverter / Receiver	DC - 4	12	3	17	+2	LP4	EAR99	HMC1065LP4E

### Sub-Harmonic (page 20)

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	LO / RF Isolation (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
37 - 46.5	Sub-Harmonic Mixer w/ x4 LO Buffer	DC - 7.5	-14	20	+30	Chip	EAR99	HMC1093

## OPTICAL MODULATOR DRIVER (page 34)

Data Rate Max. (Gbps)	Function	Gain (dB)	Group Delay Variation (ps)	Additive Jitter (ps)	Output Voltage Max. (Vp-p)	Package	ECCN Code	Part Number
32	Quad Optical Modulator Driver	26	±3	.33	7.4	Module	EAR99	HMC7282B

## POWER DETECTORS

### Log Detector (page 18)

Frequency (GHz)	Function	Dynamic Range (dB)	RSSI Slope (mV/dB)	RF Threshold Level (dBm)	Bias Supply	Package	ECCN Code	Part Number
1 - 23	50 dB Logarithmic Detector	50 up to 23 GHz	21	-22	+3.3V @ 85 mA	LP3	EAR99	HMC1094LP3E

### mmW Power Detector (page 22)

RF/LO Frequency	Function	Dynamic Range (dB)	RSSI Slope (mV/dB)	RF Threshold Level (dBm)	Bias Supply	Package	ECCN Code	Part Number
71 - 86	E-Band Power Detector	24	20	-11	-	Chip	EAR99	HMC7447

## VARIABLE GAIN AMPLIFIERS Analog (page 24)

Frequency (GHz)	Function	Gain Control Range (dB)	NF (dB)	OIP3 (dBm)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
27 - 31.5	Analog	13	4.5	+31	+24	+5V @ 230 mA	LP4	3A001.b.2.d	HMC6187LP4E

Space Qualified Processes, People & Facilities

# HIGH POWER WIDEBAND AMPLIFIERS

MILITARY & SPACE

Analog, Digital & Mixed-Signal  
 ICs, Modules, Subsystems & Instrumentation

These products are high power, wideband amplifiers included in radar subsystems, rack-mounted instruments, EW system and tow decoys.

- Broadband Ultra High Power Amplifiers
- Industries' Most Compact Size
- World Class Efficiency

Our application support group provides technical product support to our customers through all phases of their product development. Please e-mail [RFMG-mil@analog.com](mailto:RFMG-mil@analog.com) for all inquiries.

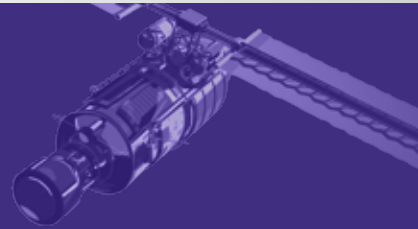
Part Number	Power	Function	RF Frequency	CW/Pulsed	ECCN
KHPA0811-8000WPA	8000W	X-Band Amplifier	8 - 11 GHz	Pulsed	ITAR
KHPA0811-XXXWPC	500/1000/2000W	X-Band Amplifier	8 - 11 GHz	Pulsed	ITAR
KHPA0608-XXXWPC	500/1000/2000W	C-Band Amplifier	6 - 18 GHz	Pulsed	ITAR
KHPA0206-100WR	100W	Amplifier	2 - 6 GHz	CW	ITAR
KHPA0206-200WR	200W	Amplifier	2 - 6 GHz	CW	ITAR
KHPA0206-300WR	300W	Amplifier	2 - 6 GHz	CW	ITAR
KHPA0218-50WA	50W	Amplifier	2 - 18 GHz	CW	ITAR
KHPA0618-100W	100W	Amplifier	6 - 18 GHz	CW	ITAR
KHPA0618-100WR	100W	Amplifier	6 - 18 GHz	CW	ITAR
KHPA0618-30W	100W	Amplifier	6 - 18 GHz	CW	ITAR

We look forward to providing strong customer service  
 & technical support for all products



# KHPA0811-8000W

## 8000W X-Band Pulsed Amplifier



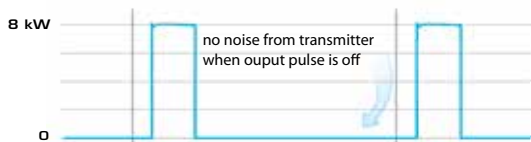
### Typical Applications

- Commercial Radar
- Military Radar
- Electronic Warfare
- Test Equipment

### Solid State Microwave Power Modules



500W DDH



### General Description

The KHPA0811-8000W X-Band power amplifiers provide four times the power density of our past product. Because our amplifiers are “off” between pulses, the receiving signal-to-noise ratio and dynamic range are greatly improved, providing superior radar resolution and range.

High power in a small package, our Dodecahedron package (DDH) is designed to pack a considerable amount of power in a small footprint plus cover a wide bandwidth. Only 2.3” x 2.5” dia., these DDHs are modular so that they can be combined in Solid-State Microwave Power Module housings. One DDH will provide 500W, two DDHs will provide 1000W and four DDHs will provide 2000W pulsed output in the X-Band. In this case, four 2000W Solid-State Microwave Power Modules (SSMPMs) are combined to obtain 8 kW output.

*The information provided in this document is for a product controlled by the International Traffic in Arms Regulations (ITAR). This product cannot be shipped outside of the United States without a U.S. Department of State export license.*

### Features

- Highest Power
- Smallest Footprint
- Lightest Weight



Stack of four 2000W MPAs

### Table 1. Specifications

Input Power	
DC Power	48 VDC
Output Specifications (@ 25° C)	
Frequency Range	8 -11 GHz
Saturated Power Output	8000W (4 SSMPMs)
Rise/Fall Time	200 nsec Max
Pulse Width	.05 to 100 µsec
Duty Cycle	20%
In/Out VSWR	1.5:1
Out of Band Spurious Noise	-70.0 dBc Max
2nd Harmonic	-40.0 dBc Max
Connectors	
RF Input	SMA Female
RF Output	Waveguide
Mechanical	
Size approx. 16” x 12” x 8”	
Compact Aluminum or Copper Housing (Depending upon Duty Cycle)	
Chassis Grounded	
Conduction Cooling	
Environmental	
Operating Temperature	-20° to 75° C
Storage Temperature	-40° to 50° C
Relative Humidity	5 to 95% non-condensing
MTBF	
200,000 hours	

# KHPA0618-100W

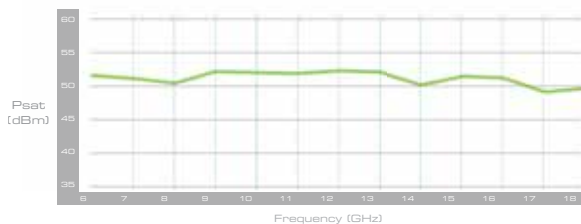
## 6 - 18 GHz 100W Amplifier



### Typical Applications

- Commercial Radar
- Military Radar
- Electronic Warfare
- Test Equipment

### Solid State High Power Amplifier



### Features

- Highest Power
- Smallest Footprint
- Lightest Weight

### General Description

The KHPA0618-100W is a high power rack mounted microwave amplifier that covers a 12 GHz range in the 6-18 GHz band. The KHPA0618 provides an output of 100 watts. A number of options are available depending on customer requirements. TTL Local/Remote switching is provided as an option.

Small and rugged, the KHPA0618-100W is ideal for replacement of TWT amplifiers – offering up to 30 dB improvement in noise and very short group delay characteristics. A small footprint and low power consumption make it excellent for mounting at the antenna or load, and no warm-up time is required, providing instant power-up.

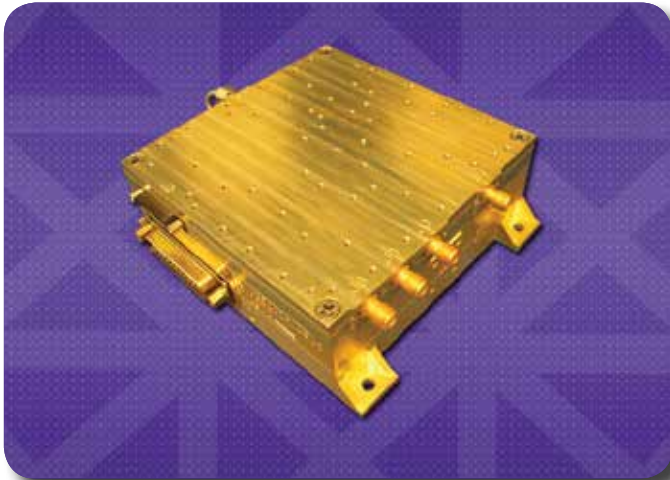
### Table 2. Specifications

Input Power	
DC Power	48 VDC
Output Specifications (@ 25° C)	
Frequency Range	6 -18 GHz
Saturated Power Output	100W TYP
Gain	60 dB TYP
Noise Figure	5 dB TYP
In/Out VSWR	<2:1 TYP
In/Out Impedance	50 Ω
Local/Remote	TTL
Connectors	
RF In/Out	"N" Female
Mechanical	
Compact Copper Chassis Chassis Grounded	
Environmental	
Operating Temperature	-40° to 50° C
Storage Temperature	-40° to 50° C
Relative Humidity	5 to 95% non-condensing
MTBF	
200,000 hours	

The information provided in this document is for a product controlled by the International Traffic in Arms Regulations (ITAR). This product cannot be shipped outside of the United States without a U.S. Department of State export license.

### HMC7056

# Ka-BAND BLOCK UPCONVERTER

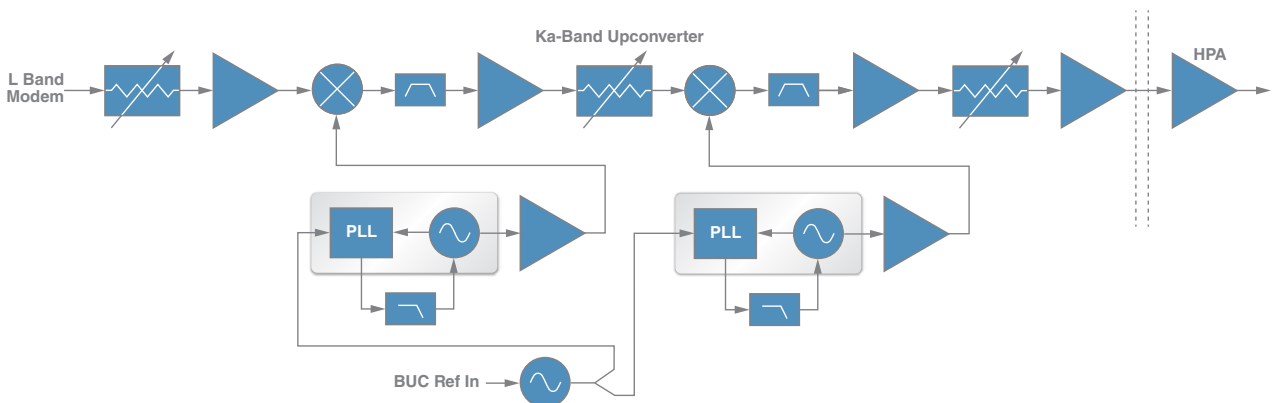


#### Features

- Compact Design
- Redundant L Band Inputs
- Dual up conversion to ensure no phase inversion
- WR28 Output
- PA Enable
- Thermal Monitoring and Gain Compensation
- Meets Military Environments

**The HMC7056 is a fully integrated Ka-Band Block Upconverter with HPA.** The unit is designed for single carrier use in satellite communications. It covers both Commercial and Military bands and is designed to meet military environmental conditions.

Input Frequency Range (GHz)	1 - 2
Output Frequency Range (GHz)	29 - 31
Conversion Gain (dB)	65
Gain Flatness -1 GHz (dB)	3
Gain Flatness -10 MHz (dB)	0.7
Input Power (dBm)	-30 - +5
Output Linear Power (dBm)	+40
Phase Noise (dBc/Hz)	
10 Hz	-37
100 Hz	-67
1 kHz	-80
10 kHz	-87
100 kHz	-92
1 MHz	-102
10 MHz	-112
Spurious (dBc)	-60
AM/PM Conversion (Deg/dB)	2
BUC DC Power (VDC @ AMP)	5.75V @ 2.25 A
HPA DC Power (VDC @ AMP)	5.5V @ 17.0 A
Size (in)	4.2" x 4.2" x 1.63"



Functional Diagram

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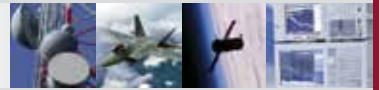


New & Expanded Product Lines

# WIDEBAND PA MODULE

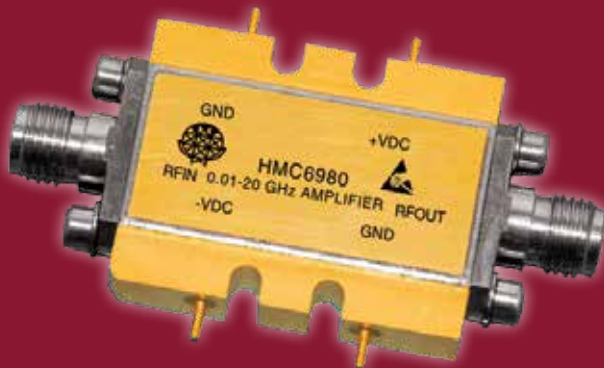
GaAs MMIC PHEMT Power Amplifier 0.01 - 20 GHz

Analog, Digital & Mixed-Signal  
ICs, Modules, Subsystems & Instrumentation

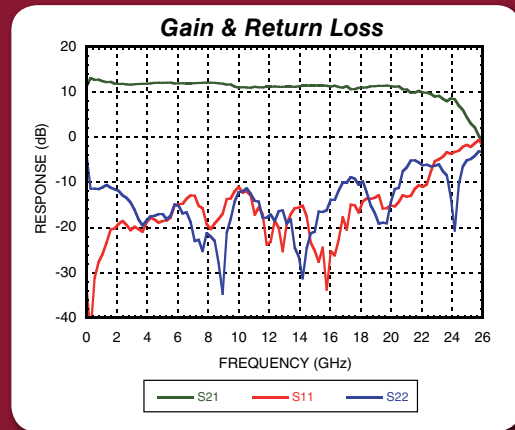


RF & MICROWAVE ICs

## HERMETIC MODULE WITH FIELD REPLACEABLE SMA CONNECTORS



**HMC6980**



### Features

- Gain: 12 dB
- P1dB Output Power: +28 dBm
- Regulated Supply and Bias Sequencing
- 0 °C to +85 °C Operating Temperature

### Applications

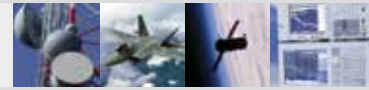
- Telecom Infrastructure
- Microwave Radio & VSAT
- Military & Space
- Test Instrumentation
- Fiber Optics

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	0.5 - 6.0			6 - 12			12 - 20			GHz
Gain	9	12		9	11		8	11		dB
Gain Flatness	±0.3			±0.3			±0.5			dB
Gain Variation Over Temperature	0.02			0.02			0.02			dB/ °C
Noise Figure	4.5			3.5			5.0			dB
Input Return Loss	25			17			15			dB
Output Return Loss	20			17			12			dB
Output Power for 1 dB Compression (P1dB)	25	28		24	27		20	24		dBm
Saturated Output Power (Psat)	29			27.5			26			dBm
Output Third Order Intercept (IP3)	36			34			29			dBm
Positive Supply Current (+IDC)	345			345			345			mA
Negative Supply Current (-IDC)	-5			-5			-5			mA

# Ka-BAND POWER AMPLIFIERS



Analog, Digital & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

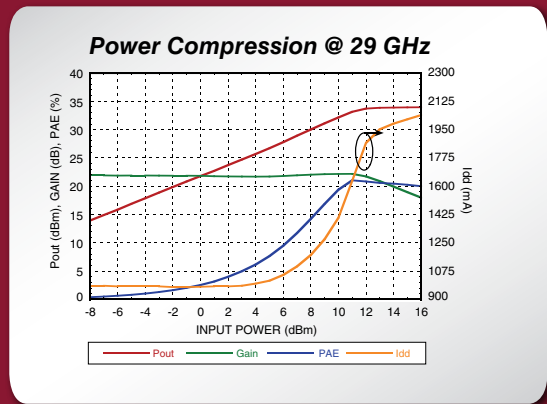
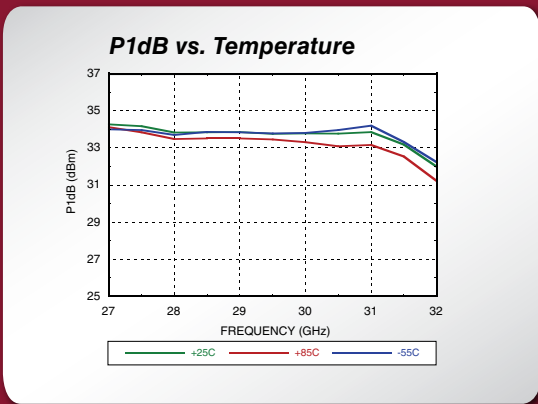


## 2 WATT GaAs pHEMT PA, 27.5 - 31 GHz



### HMC7441 Features

- Saturated Output Power: +34 dBm @ 25% PAE
- High Output IP3: +38 dBm
- High Gain: 23 dB
- No External Matching Required, 50 Ohm I/O



### IN STOCK GaAs MMIC Ka-BAND POWER AMPLIFIERS

Part Number	Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	P1dB (dBm)	Bias Supply	Package
HMC7441	27.5 - 31	2 Watt PA	23	+38	+34	+6V @ 1000 mA	Chip
HMC906	27.3 - 33.5	2 Watt PA	23	+43	+33	+6V @ 1200 mA	Chip
HMC1024	27.3 - 33.5	1 Watt Medium PA	24	+40	+29	+6V @ 500 mA	Chip
HMC943LP5E	24 - 31.5	1.5 Watt PA	21	+41	+34	+5.5V @ 1200 mA	LP5
HMC1029	29 - 37	2 Watt PA	22	+42	+32	+6V @ 1200 mA	Chip

## SMT & Chip (Die) Products

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	Psat (dBm)	Power Gain@ Psat (dB)	Bias Supply	Package	ECCN Code	Part Number
<b>GaN PAs</b>									
2 - 6	25 Watt GaN MMIC PA	22	+48	+44.5	14	+28V @ 1100 mA	Chip	3A001.b.2.a	HMC1086
2 - 6	25 Watt GaN MMIC Flange Mount, PA	23	+46	+44.5	11	+28V @ 1100 mA	F10	3A982.b.1	HMC1086F10
2 - 20	8 Watt GaN MMIC PA	11	+45	+39	5.5	+28V @ 850 mA	Chip	ITAR	HMC1087
2 - 20	8 Watt GaN MMIC Flange Mount, PA	11	+43.5	+38.5	6.5	+28V @ 850 mA	F10	ITAR	HMC1087F10
6 - 18	10 Watt GaN MMIC PA	20	+39.5	+40	10	+28V @ 680 mA	Chip	ITAR	HMC7149

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
<b>Low Noise Amplifiers</b>									
0.175 - 0.66	Low Noise	24	37	0.5	19	+5V @ 90 mA	LP3	EAR99	HMC616LP3E
0.23 - 0.66	Low Noise, Dual Channel	22	37	0.5	19	+5V @ 97 mA	LP4	EAR99	HMC816LP4E
0.3 - 3.0	Low Noise, High IP3	15	37	1.5	22	+5V @ 90 mA	SOT26	EAR99	HMC374E
0.3 - 3.0	Low Noise Amplifier	15	35	1.6	17	+3.3V @ 75 mA	SC70	EAR99	HMC374SC70E
0.55 - 1.2	Low Noise	16	37	0.5	21	+5V @ 88 mA	LP5	EAR99	HMC617LP3E
0.55 - 1.2	Low Noise, Dual Channel	16	37	0.5	20.5	+5V @ 95 mA	LP4	EAR99	HMC817LP4E
0.6 - 1.4	Low Noise	32	40	0.9	21.5	+5V @ 254 mA	LP4	EAR99	HMC718LP4E
0.7 - 1.2	Low Noise w/ Failsafe Bypass	16	33	0.9	13	+5V @ 57 mA	LP3	EAR99	HMC668LP3E
1 - 11	Low Noise	17	30	1.5	18	+5V @ 55 mA	LP4	EAR99	HMC753LP4E [1]
1 - 12	Low Noise	17	28	1.5	19	+5V @ 55 mA	Chip	EAR99	HMC-ALH444 [1]
1.2 - 3.0	Low Noise	26	21	1.3	11.5	+5V @ 21 mA	LP3	EAR99	HMC548LP3E
1.3 - 2.9	Low Noise	34	39	1	21.5	+5V @ 272 mA	LP4	EAR99	HMC719LP4E
1.7 - 2.2	Low Noise	19	36	0.75	20	+5V @ 117 mA	LP3	EAR99	HMC618LP3E
1.7 - 2.2	Low Noise w/ Failsafe Bypass	17	29	1.4	12	+5V @ 86 mA	LP3	EAR99	HMC669LP3E
1.7 - 2.2	Low Noise, Dual Channel	20.5	35	0.85	21	+5V @ 112 mA	LP4	EAR99	HMC818LP4E
2 - 12	Low Noise	15	25	1.8	13	+4V @ 45 mA	LC4	EAR99	HMC772LC4 [1]
2.1 - 2.9	Low Noise	19	33	0.9	19	+5V @ 95 mA	LP3	EAR99	HMC715LP3E
2.3 - 2.5	Low Noise	19	12	1.7	6	+3V @ 8.5 mA	SOT26	EAR99	HMC286E
2.3 - 2.7	Low Noise	19	29.5	0.75	16.5	+5V @ 59 mA	LP2	EAR99	HMC667LP2E
2.3 - 2.7	Low Noise w/ Bypass	20	31	1.1	17	+5V @ 74 mA	LP3	EAR99	HMC605LP3E
2.4 - 2.5	Transceiver, Front End	13	10	3	5	+3V @ 24 mA	MS8G	EAR99	HMC310MS8GE
3.1 - 3.9	Low Noise	18	33	1	19	+5V @ 65 mA	LP3	EAR99	HMC716LP3E
3.3 - 3.8	Low Noise w/ Bypass	19	29	1.2	16	+5V @ 40 mA	LP3	EAR99	HMC593LP3E
3.4 - 3.8	Low Noise w/ Bypass	16	18	2	7	+3V @ 9 mA	LP3	EAR99	HMC491LP3E
3.5 - 7.0	Low Noise	15.5	28	2.4	16	+5V @ 50 mA	Chip	EAR99	HMC392
3.5 - 7.0	Low Noise	16	30	2.5	16	+5V @ 55 mA	LC4	EAR99	HMC392LC4
3.5 - 7.0	Low Noise	15	28	3	16	+5V @ 65 mA	LH5	EAR99	HMC392LH5
4.8 - 6.0	Low Noise with Bypass	15	26	1.5	14	+5V @ 42 mA	LP3	EAR99	HMC604LP3E
4.8 - 6.0	Low Noise	16.5	31.5	1.1	18.5	+5V @ 73 mA	LP3	EAR99	HMC717LP3E
5 - 6	Low Noise	9	13	2.5	2	+3V @ 6 mA	MS8G	EAR99	HMC318MS8GE
5 - 6	Low Noise	12	10	2.5	9	+3V @ 25 mA	MS8G	EAR99	HMC320MS8GE
5 - 10	Low Noise	20	28	1.7	16	+3.5V @ 80 mA	Chip	EAR99	HMC902
5 - 10	Low Noise	19	28	1.8	16	+3.5V @ 80 mA	LP3	EAR99	HMC902LP3E
5 - 20	Low Noise	13	26	2.2	16	+5V @ 30 mA	Chip	EAR99	HMC-ALH435 [1]
6 - 17	Low Noise	18	25	1.7	14	+3.5V @ 80 mA	LP3	EAR99	HMC903LP3E
6 - 18	Low Noise	19	26	1.6	15	+3.5V @ 80 mA	Chip	EAR99	HMC903
6 - 20	Low Noise	22	20	2.3	10	+3V @ 53 mA	Chip	EAR99	HMC565
6 - 20	Low Noise	21	20	2.5	10	+3V @ 53 mA	LC5	EAR99	HMC565LC5
6 - 26.5	Low Noise	22	18	2.5	10	+3.5V @ 45 mA	LC4	EAR99	HMC963LC4
7 - 13.5	Low Noise	17	24	1.8	12	+3V @ 51 mA	Chip	EAR99	HMC564
7 - 14	Low Noise	17	25	1.8	13	+3V @ 51 mA	LC4	EAR99	HMC564LC4
7 - 17	Low Noise	21	20	1.8	15	+3V @ 65 mA	Chip	EAR99	HMC516
7.5 - 26.5	Low Noise	13	23	2.5	13	+3.5V @ 70 mA	LC4	EAR99	HMC962LC4
9 - 18	Low Noise	20	25	2	14	+3V @ 65 mA	LC5	EAR99	HMC516LC5
12 - 16	Medium Power LNA	23	34	2.5	25	+5V @ 200 mA	LP5	EAR99	HMC490LP5E [1]
12 - 17	Medium Power LNA	27	35	2	26	+5V @ 200 mA	Chip	EAR99	HMC490 [1]
13 - 25	Low Noise	21	13	3.5	5	+3V @ 41 mA	Chip	EAR99	HMC342
13 - 25	Low Noise	22	20	3.5	9	+3V @ 43 mA	LC4	EAR99	HMC342LC4
14 - 27	Low Noise	19.5	-	2.2	17	+4V @ 90 mA	LC4B	5A991.h	HMC504LC4B
14 - 27	Low Noise	18	-	2.5	+14	+4V @ 90 mA	Chip	5A991.h	HMC-ALH216 [1]

[1] Amplifiers that benefit from Hittite Active Bias Controllers

# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
14 - 27	Low Noise	20	-	2	+14	+4V @ 90 mA	Chip	5A991.h	HMC-ALH476 [1]
17 - 26	Low Noise	19	+23	2.2	+11	+3V @ 65 mA	Chip	EAR99	HMC517
17 - 26	Low Noise	19	+23	2.5	+13	+3V @ 67 mA	LC4	EAR99	HMC517LC4
17 - 27	Low Noise	25	+25	2.2	+13	+4V @ 73 mA	LC4	EAR99	HMC751LC4
18 - 31	Low Noise	15	+23	3.5	+11	+3V @ 75 mA	LC4	EAR99	HMC519LC4
18 - 32	Low Noise	15	+23	2.8	+12	+3V @ 65 mA	Chip	3A001.b.2.d	HMC519
18 - 40	Low Noise	10	-	3.9	+12	+5V @ 45 mA	Chip	3A001.b.2.d	HMC-ALH445
20 - 32	Low Noise	15	+23	3	12	+3V @ 65 mA	Chip	3A001.b.2.d	HMC518
21 - 29	Low Noise	13	+19	2.5	+8	+3V @ 35 mA	LC3B	EAR99	HMC341LC3B
22 - 26.5	Low Noise	25	-	3	+12	+2.5V @ 52 mA	Chip	5A991.h	HMC-ALH311 [1]
24 - 28	Low Noise	25	+26	2.5	+13	+3V @ 70 mA	LC4	EAR99	HMC752LC4 [1]
24 - 30	Low Noise	13	+16	2.5	+6	+3V @ 30 mA	Chip	EAR99	HMC341
24 - 32	Low Noise	21	-	2	+7	+5V @ 68 mA	Chip	3A001.b.2.d	HMC-ALH364
24 - 36	Low Noise	23	+17	2	+8	+3V @ 58 mA	Chip	3A001.b.2.d	HMC263
24 - 36	Low Noise	20	+18	2.2	+8	+3V @ 58 mA	LP4	3A001.b.2.d	HMC263LP4E
24 - 40	Low Noise	12	-	3.5	+13	+4V @ 45 mA	Chip	3A001.b.2.d	HMC-ALH244
24 - 40	Low Noise	22	-	2	+11	+5V @ 66 mA	Chip	3A001.b.2.d	HMC-ALH369
24 - 40	Low Noise	11.5	-	4	+15	+4V @ 60 mA	Chip	3A001.b.2.d	HMC-ALH140 [1]
24 - 43.5	Low Noise	22	+22	2.7	+12	+2.5V @ 70 mA	LP3C	3A001.b.2.d	HMC1040LP3CE
27 - 33	Low Noise	20	-	3	+12	+2.5V @ 52 mA	Chip	3A001.b.2.d	HMC-ALH313 [1]
28 - 36	Low Noise	21	+24	2.8	+12	+3V @ 82 mA	LP4	3A001.b.2.d	HMC566LP4E
29 - 36	Low Noise	20	+23.5	2.8	+12	+3V @ 80 mA	Chip	3A001.b.2.d	HMC566
35 - 45	Low Noise	16	-	2	+6	+4V @ 87 mA	Chip	3A001.b.2.d	HMC-ALH376
37 - 42	Low Noise	22	-	3.5	+12	+2.5V @ 52 mA	Chip	EAR99	HMC-ALH310 [1]
57 - 65	Low Noise	21	-	4	+12	+2.5V @ 64 mA	Chip	3A001.b.2.f	HMC-ALH382 [1]
71 - 86	Low Noise	13	-	5	+7	+2.4V @ 30 mA	Chip	EAR99	HMC-ALH508
71 - 86	Low Noise	14	-	5	+7	+2V @ 50 mA	Chip	EAR99	HMC-ALH509
<b>Broadband Gain Blocks (Listed by P1dB Output Power)</b>									
DC - 6	SiGe Gain Block	15.5	+22	3	+8	+5V @ 25 mA	MP86	EAR99	HMC474MP86E
DC - 6	SiGe Gain Block	15	+20	3	+8	+3V @ 25 mA	SC70	EAR99	HMC474SC70E
DC - 6	SiGe Gain Block	20	+25	2.5	+12	+5V @ 35 mA	MP86	EAR99	HMC476MP86E
DC - 6	SiGe Gain Block	19	+24	2.5	+12	+5V @ 35 mA	SC70	EAR99	HMC476SC70E
DC - 10	HBT Gain Block	15	+24	4.5	+13	+5V @ 56 mA	Chip	EAR99	HMC397
DC - 10	HBT Gain Block	15	+25	4	+13	+5V @ 50 mA	Chip	EAR99	HMC405
DC - 6	HBT Gain Block	17	+27	6.5	+14	+5V @ 50 mA	SOT26	EAR99	HMC313E
DC - 8	HBT Gain Block	12	+30	6	+14	+5V @ 56 mA	Chip	EAR99	HMC396
DC - 4	HBT Gain Block	15	+28	4.5	+15	+5V @ 54 mA	Chip	EAR99	HMC395
DC - 8	HBT Gain Block	15	+30	5	+15	+5V @ 54 mA	SC70	EAR99	HMC311SC70E
DC - 6	HBT Gain Block	14.5	+32	4.5	+15.5	+5V @ 56 mA	LP3	EAR99	HMC311LP3E
DC - 6	HBT Gain Block	16	+31.5	4.5	+15.5	+5V @ 54 mA	ST89	EAR99	HMC311ST89E
DC - 4	SiGe Gain Block	24	+31	2.5	+17	+5V @ 62 mA	SC70	EAR99	HMC478SC70E
DC - 4	SiGe Gain Block	22	+32	2	+18	+5V @ 62 mA	MP86	EAR99	HMC478MP86E
DC - 4	SiGe Gain Block	22	+33	3	+18	+5V @ 62 mA	ST89	EAR99	HMC478ST89E
DC - 5	SiGe Gain Block	15	+34	4	+18	+8V @ 72 mA	MP86	EAR99	HMC479MP86E
DC - 5	SiGe Gain Block	15	+34	4	+18	+8V @ 75 mA	ST89	EAR99	HMC479ST89E
DC - 5	Dual SiGe Gain Block	15	+34	4	+18	+8V @ 75 mA	MS8G	EAR99	HMC469MS8GE
DC - 5	SiGe Gain Block	20	+33	3.5	+19	+8V @ 79 mA	ST89	EAR99	HMC481ST89E
DC - 10	pHEMT Gain Block	14	+30	7	+20	+5V @ 76 mA	LP2	EAR99	HMC788LP2E
DC - 5	SiGe Gain Block	19	+34	2.9	+20	+8V @ 82 mA	ST89	EAR99	HMC480ST89E
DC - 5	SiGe Gain Block	20	+33	3.5	+20	+8V @ 74 mA	MP86	EAR99	HMC481MP86E
DC - 5	Dual SiGe Gain Block	20	+34	3.2	+20	+8V @ 80 mA	MS8G	EAR99	HMC471MS8GE
DC - 4	HBT Gain Block	21	+33	4	+21	+5V @ 82 mA	ST89	EAR99	HMC589ST89E
0.2 - 4.0	Low Noise, High IP3, pHEMT Gain Block	13	+38	2.3	+22	+5V @ 110 mA	ST89	EAR99	HMC639ST89E
0.2 - 4.0	Low Noise, High IP3, pHEMT Gain Block	13	+40	2.2	+22	+5V @ 155 mA	ST89	EAR99	HMC636ST89E
DC - 1	HBT Gain Block	22	+37	2.8	+22	+5V @ 88 mA	ST89	EAR99	HMC580ST89E
DC - 4.5	HBT Gain Block	21	+35	3.5	+22	+8V @ 110 mA	ST89	EAR99	HMC475ST89E
DC - 5	SiGe Gain Block	19	+36	4	+22	+8V @ 110 mA	ST89	EAR99	HMC482ST89E
<b>4 - 10</b>	<b>HBT Gain Block MMIC Amplifier</b>	<b>14.5</b>	<b>+25</b>	<b>3.5</b>	<b>+11</b>	<b>+5V @ 44 mA</b>	<b>LP3B</b>	<b>EAR99</b>	<b>HMC3587LP3BE</b>
7 - 15	HBT Gain Block	15	+28	4	+15	+5V @ 44 mA	LP3B	EAR99	HMC3653LP3BE

[1] Amplifiers that benefit from Hitrite Active Bias Controllers

## SMT & Chip (Die) Products

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
<b>CATV Amplifiers</b>									
0.04 - 0.96	Low Noise, Dual Output	5	+27	3.5	+12	+5V @ 120 mA	MS8G	EAR99	HMC549MS8GE
0.05 - 1.0	Low Noise, 75 Ohm	14	+39	2.2	+19	+5V @ 120 mA	ST89	EAR99	HMC599ST89E
0.04 - 1.0	Differential Gain Block, 50 / 75 Ohm	16	+40	2.5	+23.5	+5V @ 270 mA	LP4B	EAR99	HMC770LP4BE
0.05 - 3.0	HBT Gain Block	15	+40	3.5	+18	+5V @ 88 mA	ST89	EAR99	HMC740ST89E
0.05 - 3.0	HBT Gain Block	20	+42	2.5	+18.5	+5V @ 96 mA	ST89	EAR99	HMC741ST89E
DC - 1	HBT Gain Block, 75 Ohm	14	+38	5.5	+21	+5V @ 160 mA	S8G	EAR99	HMC754S8GE
<b>Driver Amplifiers</b>									
0.7 - 2.8	HBT Driver Amplifier	18	+42	3.8	+25	+5V @ 125 mA	ST89	EAR99	HMC789ST89E
0.8 - 3.8	Driver Amplifier	18	+30	7.5	+17	+5V @ 53 mA	SOT26	EAR99	HMC308E
3.0 - 4.5	HBT Driver Amplifier	21	+36	5	+23.5	+5V @ 130 mA	MS8G	EAR99	HMC326MS8GE
17.5 - 41	Driver Amplifier	21	+27	-	+20	+5V @ 295 mA	Chip	3A001.b.2.d	HMC-AUH256
<b>Linear &amp; PAs</b>									
0.4 - 2.5	0.5 Watt High IP3 Amp	12.5	+42	6	+27	+5V @ 150 mA	ST89	EAR99	HMC454ST89E
1.6 - 2.2	Medium PA	22	+40	5.5	+27	+3.6V @ 270 mA	QS16G	EAR99	HMC413QS16GE
5 - 6	Medium PA	17	+38	6	+26	+5V @ 300 mA	MS8G	EAR99	HMC406MS8GE
5 - 7	Medium PA	15	+40	5.5	+25	+5V @ 230 mA	MS8G	EAR99	HMC407MS8GE
5 - 18	Medium PA	18	+28	7	+19.5	+5V @ 120 mA	LP3	EAR99	HMC451LP3E
5 - 20	Medium PA	22	+30	6.5	+20	+5V @ 127 mA	Chip	EAR99	HMC451
5 - 20	Medium PA	19	+30	7	+19	+5V @ 114 mA	LC3	EAR99	HMC451LC3
<b>5.5 - 8.5</b>	<b>PA, 2 Watt</b>	<b>29</b>	<b>+41.5</b>	<b>-</b>	<b>+34.5</b>	<b>+8V @ 1200 mA</b>	<b>LP5G</b>	<b>3A001.b.2.b</b>	<b>HMC7357LP5GE</b>
6 - 18	Medium PA	15.5	+32	4.5	+20	+5V @ 95 mA	Chip	EAR99	HMC441
6 - 18	Medium PA	17	+32	4.5	+20	+5V @ 95 mA	LC3B	EAR99	HMC441LC3B
6 - 18	0.5 Watt Medium PA	22	+35	-	+25	+5V @ 220 mA	LP4E	EAR99	HMC1082LP4E
6.5 - 13.5	Medium PA	14	+29	4.5	+18	+5V @ 95 mA	LP3	EAR99	HMC441LP3E
7 - 15.5	Medium PA	15	+32	4.8	+20	+5V @ 95 mA	LH5 Hermetic	EAR99	HMC441LH5
7 - 15.5	Medium PA	16	+30	4.5	+19	+5V @ 90 mA	LM1	EAR99	HMC441LM1
9.5 - 11.5	Medium PA	29.5	+33	6	+27	+5V @ 310 mA	LC4	EAR99	HMC608LC4
12 - 30	Medium PA	16	+25	7	+16	+5V @ 101 mA	Chip	EAR99	HMC383
12 - 30	Medium PA	15	+25	7.5	+16.5	+5V @ 100 mA	LC4	EAR99	HMC383LC4
16 - 33	Medium PA	17	+33	-	+24	+5V @ 400 mA	Chip	5A991.h	HMC-APH596
17 - 24	Medium PA	24	+34	4	+25	+5V @ 250 mA	Chip	EAR99	HMC498
17 - 24	Medium PA	22	+36	4	+25	+5V @ 250 mA	LC4	EAR99	HMC498LC4
17 - 30	Medium PA	20	+31	-	+22	+4.5V @ 400 mA	Chip	EAR99	HMC-APH196
17.5 - 24	Medium PA	14	+28	6.5	+21.5	+5V @ 85 mA	LM1	EAR99	HMC442LM1
17.5 - 25.5	Medium PA	15	+28	5.5	+22	+5V @ 85 mA	Chip	EAR99	HMC442 [1]
17.5 - 25.5	Medium PA	13	+27	8	+22	+5V @ 84 mA	LC3B	EAR99	HMC442LC3B [1]
21 - 32	Medium PA	16	+33	5	+24	+5V @ 200 mA	Chip	3A001.b.2.d	HMC499 [1]
21 - 32	Medium PA	17	+34	5	+23	+5V @ 200 mA	LC4	3A001.b.2.d	HMC499LC4 [1]
33.5 - 46.5	0.5 Watt Medium PA	21	+35	-	+24.5	+6V @ 500 mA	Chip	3A001.b.2.d	HMC1014
34 - 42	Medium PA	18.5	+29	6.5	+18	+5V @ 120 mA	Chip	3A001.b.2.d	HMC-ABH264 [1]
34 - 46.5	Medium PA	22	+34	-	+24	+6V @ 250 mA	Chip	3A001.b.2.f	HMC1016
37 - 40	Medium PA	20	+35	-	+26	+5V @ 640 mA	Chip	EAR99	HMC-APH510
37 - 45	Medium PA	21	+32	-	+23	+5V @ 475 mA	Chip	3A001.b.2.d	HMC-APH403
50 - 66	Medium PA	24	+25	-	+17	+5V @ 220 mA	Chip	3A001.b.2.f	HMC-ABH241
55 - 65	Medium PA	13	+25	-	+16	+5V @ 80 mA	Chip	3A001.b.2.f	HMC-ABH209 [1]
71 - 76	Medium PA	24	-	-	+17.5	+4V @ 130 mA	Chip	3A001.b.2.f	HMC-AUH318 [1]
71 - 76	Medium PA	13	-	-	+20	+4V @ 240 mA	Chip	3A001.b.2.f	HMC-APH633
71 - 86	Medium PA	15	-	-	+15	+4V @ 130 mA	Chip	3A001.b.2.f	HMC-AUH320 [1]
81 - 86	Medium PA	22	-	-	+17.5	+4V @ 160 mA	Chip	3A001.b.2.f	HMC-AUH317 [1]
81 - 86	Medium PA	12	-	-	+19	+4V @ 240 mA	Chip	3A001.b.2.f	HMC-APH634
0.1 - 22	2 Watt PA	12	+41	5	+31	+15V @ 500 mA	Chip	3A001.b.2.c	HMC998
0.1 - 20	2 Watt PA	11	+41	-	+31	+15V @ 500 mA	LP5	3A001.b.2.c	HMC998LP5E
0.4 - 2.2	1 Watt PA	21	+49	6.5	+30	+5V @ 510 mA	ST89	EAR99	HMC452ST89E
0.4 - 2.2	1.6 Watt PA	20.5	+49	6.5	+32	+5V @ 725 mA	ST89	EAR99	HMC453ST89E
0.4 - 2.7	2 Watt PA	16	+48	8.5	+33	+5V @ 700 mA	LP4	EAR99	HMC921LP4E
0.45 - 2.2	1 Watt PA	22.5	+48	7	+30	+5V @ 485 mA	QS16G	EAR99	HMC452QS16GE
0.45 - 2.2	1.6 Watt PA	21.5	+51	6.5	+33	+5V @ 725 mA	QS16G	EAR99	HMC453QS16GE
DC - 32	0.5 Watt PA	14	+36	4	+28	+10V @ 250 mA	Chip	EAR99	HMC994
1.7 - 2.2	1 Watt PA	27	+46	5	+30.5	+5V @ 500 mA	QS16G	EAR99	HMC457QS16GE
2.3 - 2.8	1 Watt PA	31	+45	5	+32.5	+5V @ 430 mA	LP4	EAR99	HMC755LP4E
3 - 4	0.5 Watt PA	21	+40	5	+27	+5V @ 250 mA	MS8G	EAR99	HMC327MS8GE

[1] Amplifiers that benefit from Hittite Active Bias Controllers



# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
3.3 - 3.8	1 Watt PA	31	+45.5	5.8	+30.5	+5V @ 615 mA	LP4	EAR99	HMC409LP4E
5.1 - 5.9	1 Watt PA	20	+43	6	+30	+5V @ 750 mA	LP3	EAR99	HMC408LP3E
6 - 9.5	1 Watt PA	21	+40	-	+30.5	+7V @ 820 mA	LP5	EAR99	HMC590LP5E
6 - 9.5	2 Watt PA	18	+41	-	+33	+7V @ 1340 mA	LP5	3A001.b.2.b	HMC591LP5E
6 - 10	1 Watt PA	25	+41	-	+31.5	+7V @ 820 mA	Chip	3A001.b.2.b	HMC590
6 - 10	2 Watt PA	23	+43	-	+33.5	+7V @ 1340 mA	Chip	3A001.b.2.b	HMC591
7 - 9	2 Watt PA	26	+40	6.5	+33.5	+7V @ 1.3A	Chip	3A001.b.2.b	HMC486
7 - 9	2 Watt PA	22	+40	7	+32	+7V @ 1.3A	LP5	3A001.b.2.b	HMC486LP5E
9 - 12	2 Watt PA	20	+36	8	+32	+7V @ 1.3A	LP5	3A001.b.2.b	HMC487LP5E
9 - 12	<b>4 Watt GaAs pHEMT MMIC PA w/ Power Detector</b>	<b>35</b>	<b>+44</b>	-	<b>+35</b>	<b>+7V @ 2400 mA</b>	<b>LS7</b>	<b>3A001.b.2.b</b>	<b>HMC6741LS7</b>
9 - 14	2 Watt PA	34	+42	5.5	+33	+6V @ 1400 mA	Chip	3A001.b.2.b	HMC952
9 - 14	2 Watt PA	33	+43	-	+34	+6V @ 1400 mA	LP5G	3A001.b.2.b	HMC952LP5GE
9 - 14	5 Watt PA w/ Power Detector	34	+43	-	+36.5	+7V @ 2400 mA	Chip	3A001.b.2.b	HMC1053
12 - 16	1 Watt PA	13	+34	9	+31	+7V @ 1.3A	LP5	EAR99	HMC489LP5E
12.5 - 16	2 Watt PA	30	+42	-	+34.5	+7V @ 1200 mA	Chip	3A001.b.2.b	HMC949
12.5 - 16	4 Watt PA	28	+44	-	+36	+7V @ 1200 mA	Chip	3A001.b.2.b	HMC950
12.5 - 15.5	2 Watt PA	27	+40	-	+32	+6V @ 1200 mA	LP5	3A001.b.2.b	HMC965LP5E
12 - 16	3 Watt PA w/ Power Detector	27	+41	-	+34.5	+7V @ 1200 mA	LP5G	3A001.b.2.b	HMC995LP5GE
12 - 16	<b>4 Watt GaAs pHEMT MMIC PA</b>	<b>28</b>	<b>+44</b>	-	<b>+36</b>	<b>+7V @ 2400 mA</b>	<b>LS7</b>	<b>3A001.b.2.b</b>	<b>HMC5879LS7</b>
15 - 20	2 Watt PA	26	+43.5	-	+33.5	+6V @ 1100 mA	LS6	3A001.b.2.c	HMC6981LS6
15 - 27	1 Watt PA	17	+37	-	+29	+5V @ 1.44A	Chip	EAR99	HMC-APH462
16 - 24	1 Watt PA	23	+41	-	+31	+7V @ 790 mA	Chip	3A001.b.2.c	HMC756
16 - 24	0.5 Watt PA	22	+37	-	+29	+7V @ 395 mA	Chip	EAR99	HMC757
16 - 24	0.5 Watt PA	20.5	+34.5	-	+26.5	+5V @ 400 mA	LP4	EAR99	HMC757LP4E
18 - 20	1 Watt PA	17.5	+38.5	-	+30	+5V @ 900 mA	Chip	3A001.b.2.c	HMC-APH478
21 - 24	1 Watt PA	17	+39	-	+30.5	+5V @ 950 mA	Chip	3A001.b.2.c	HMC-APH518
22 - 26.5	0.5 Watt PA	20	+33	7	+26.5	+5V @ 400 mA	LP4	EAR99	HMC863LP4E
22.5 - 26.5	1 Watt PA	17	+40	-	+30	+5V @ 950 mA	Chip	3A001.b.2.c	HMC-APH608
24 - 29.5	0.5 Watt PA	22	-	-	+26.5	+6V @ 360 mA	Chip	EAR99	HMC863
24 - 29.5	1 Watt PA	27	+40	-	+29	+6V @ 750 mA	Chip	EAR99	HMC864
24 - 31.5	1.5 Watt PA	22	+43	-	+34	+5.5V @ 1200 mA	LP5	3A001.b.2.c	HMC943LP5E
27 - 31.5	0.5 Watt PA	14	+37	-	+28	+5V @ 900 mA	Chip	EAR99	HMC-APH460
27 - 34	1 Watt PA	17.5	+37	-	+29	+5V @ 800 mA	Chip	3A001.b.2.d	HMC693
27.3 - 33.5	2 Watt PA	23	+43	-	+33	+6V @ 1200 mA	Chip	3A001.b.2.d	HMC906
27.5 - 31	<b>2 Watt GaAs pHEMT MMIC PA</b>	<b>23</b>	<b>+38</b>	-	<b>+34</b>	<b>+6V @ 1000 mA</b>	<b>Chip</b>	<b>3A001.b.2.c</b>	<b>HMC7441</b>
27.5 - 33.5	1 Watt PA	24	+40	-	+29	+6V @ 600 mA	Chip	3A001.b.2.d	HMC1024
29 - 37	2 Watt PA	22	+42	6	+32	+6V @ 1200 mA	Chip	3A001.b.2.d	HMC1029
37 - 40	1 Watt PA	15	+37	-	+28	+5V @ 1.08A	Chip	EAR99	HMC-APH473
37 - 40	1 Watt PA	21	+38	-	+30.5	+6V @ 900 mA	Chip	3A001.b.2.d	HMC968
37 - 40	1 Watt PA	22	+38	-	+30	+6V @ 960 mA	LS6	3A001.b.2.d	HMC7229LS6
40 - 43.5	<b>1 Watt GaAs pHEMT MMIC PA</b>	<b>19</b>	<b>+36</b>	-	<b>+27</b>	<b>+6V @ 900 mA</b>	<b>LS6</b>	<b>3A001.b.2.f</b>	<b>HMC5929LS6</b>
40 - 43.5	1 Watt PA	22	+38	-	+29	+6V @ 900 mA	Chip	EAR99	HMC969

### Wideband (Distributed) Amplifiers

DC - 20	Wideband LNA	14	+28	2.5	+16	+8V @ 60 mA	Chip	EAR99	HMC460 [1]
DC - 20	Wideband LNA	14	+29.5	2.5	+17	+8V @ 75 mA	LC5	EAR99	HMC460LC5 [1]
0.3 - 20.0	Wideband LNA	16	+27	1.7	+15	+7V @ 70mA	Chip	EAR99	HMC1049
0.3 - 20.0	Wideband LNA	15	+29	1.8	+14.5	+7V @ 70mA	Chip	EAR99	HMC1049LP5E
2 - 20	Wideband LNA	15	+26.5	2.5	+15	+5V @ 63 mA	Chip	EAR99	HMC462
2 - 20	Wideband LNA	13	+25	2.5	+14	+5V @ 66 mA	LP5	EAR99	HMC462LP5E
2 - 20	Wideband LNA w/ AGC	14	+28	2.5	+19	+5V @ 60 mA	Chip	EAR99	HMC463 [1]
2 - 20	Wideband LNA w/ AGC	13	+26	3	+18	+5V @ 60 mA	LP5	EAR99	HMC463LP5E [1]
2 - 20	Wideband LNA w/ AGC	14	+28	2.5	+18	+5V @ 60 mA	LH250	EAR99	HMC463LH250
2 - 20	Wideband LNA	10	-	3.5	+10	+2V @ 55 mA	Chip	EAR99	HMC-ALH102
2 - 22	Wideband LNA	16	-	1.7	+14	+4V @ 45 mA	Chip	EAR99	HMC-ALH482
DC - 20	Wideband Driver	17	+30	2.5	+22	+8V @ 160 mA	Chip	EAR99	HMC465 [1]
DC - 20	Wideband Driver	15	+28	3	+23	+8V @ 160 mA	LP5	EAR99	HMC465LP5E [1]
DC - 35	Wideband Driver	15	-	-	+21	+5V @ 200 mA	Chip	3A001.b.2.d	HMC-AUH249
DC - 43	Wideband Driver	14	-	5.4	+16.5	+5V @ 180 mA	Chip	3A001.b.2.f	HMC-AUH232
0.5 - 65	Wideband Driver	10	-	-	-	+8V @ 60 mA	Chip	3A001.b.2.f	HMC-AUH312
2 - 35	Wideband Driver	12.5	+27	3	+18	+8V @ 80 mA	Chip	3A001.b.2.d	HMC562 [1]
5 - 17	Wideband Driver	31	+30	8	+23	+5V @ 180 mA	Chip	EAR99	HMC633 [1]

[1] Amplifiers that benefit from Hittite Active Bias Controllers

## SMT & Chip (Die) Products

### AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
5 - 20	Wideband Driver	22	+31	7.5	+23	+5V @ 180 mA	Chip	EAR99	HMC634 [1]
5 - 20	Wideband Driver	21	+29	7.5	+22	+5V @ 180 mA	LC4	EAR99	HMC634LC4 [1]
5.5 - 17	Wideband Driver	30	+30	8	+23	+5V @ 180 mA	LC4	EAR99	HMC633LC4 [1]
18 - 40	Wideband Driver	19.5	+29	8	+23	+5V @ 280 mA	Chip	3A001.b.2.d	HMC635
18 - 40	Wideband Driver	18.5	+27	7	+22	+5V @ 280 mA	LC4	3A001.b.2.d	HMC635LC4
DC - 6	Wideband PA	14	+45	5	+29	+12V @ 400 mA	Chip	EAR99	HMC637
DC - 6	Wideband PA	13	+40	5	+29	+12V @ 400 mA	LP5	EAR99	HMC637LP5E
DC - 10	Wideband PA	12	+41	6	+28.5	+12V @ 300 mA	Chip	EAR99	HMC619
DC - 10	Wideband PA	12	+41	6	+28	+12V @ 300 mA	LP5	EAR99	HMC619LP5E
DC - 15	Wideband PA	19	+35	2	+26.5	+8V @ 300 mA	Chip	EAR99	HMC659
DC - 15	Wideband PA	19	+35	2.5	+27.5	+8V @ 300 mA	LC5	EAR99	HMC659LC5
DC - 18	Wideband PA	17	+32	3	+25	+8V @ 290 mA	Chip	EAR99	HMC459
DC - 20	Wideband PA	14	+36	4	+28	+10V @ 400 mA	Chip	EAR99	HMC559
DC - 22	Wideband PA	14	+40	2.5	+28	+11V @ 400 mA	Chip	EAR99	HMC797
DC - 22	Wideband PA	13.5	+39	4	+28	+10V @ 400 mA	LP5	EAR99	HMC797LP5E
DC - 28	Wideband PA	13	+38	4	+27	+10V @ 250 mA	LP5	EAR99	HMC994LP5E
DC - 40	Wideband PA	13	+33.5	5	+22	+10V @ 175 mA	Chip	3A001.b.2.d	HMC930 [1]
<b>DC - 40</b>	<b>0.25 Watt GaAs pHEMT MMIC PA</b>	<b>13.5</b>	<b>+33</b>	<b>-</b>	<b>+22</b>	<b>+10V @ 175 mA</b>	<b>Chip</b>	<b>3A001.b.2.d</b>	<b>HMC5805</b>
DC - 48	Wideband PA	12	+32	-	+22	+10V @ 150 mA	Chip	3A001.b.2.f	HMC1022
0.2 - 22	Wideband PA	13	+38	3	+27	+11V @ 365 mA	Chip	EAR99	HMC907
0.2 - 22	Wideband PA	12	+36	3.5	+26	+10V @ 350 mA	LP5	EAR99	HMC907LP5E
2 - 20	Wideband PA	16	+30	4	+26	+8V @ 290 mA	Chip	EAR99	HMC464
2 - 20	Wideband PA	14	+30	4	+26	+8V @ 290 mA	LP5	EAR99	HMC464LP5E

[1] Amplifiers that benefit from Hittite Active Bias Controllers

### AMPLIFIERS - Low Phase Noise

Frequency (GHz)	Function	Gain / NF (dB)	OIP3 (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	P1dB / Psat (dBm)	Bias Supply	Package	ECCN Code	Part Number
2 - 18	Wideband, Low Phase Noise	14 / 4.5	27	-160	15 / 18	+5V @ 64 mA	Chip	EAR99	HMC606
2 - 18	Wideband, Low Phase Noise	13.5 / 5	27	-160	15 / 17	+5V @ 64 mA	LC5	EAR99	HMC606LC5

### ATTENUATORS

Frequency (GHz)	Function	Insertion Loss (dB)	Attenuation Range (dB)	IIP3 (dBm)	Control Input (Vdc)	Package	ECCN Code	Part Number
<b>Attenuators - Analog</b>								
0.45 - 2.2	Analog VVA	1.9	0 - 48	+20	0 to +3V	MS8	EAR99	HMC473MS8E
0.5 - 6.0	Analog VVA	2.5	0 - 26	+35	0 to +5V	LP3	EAR99	HMC973LP3E
DC - 8	Analog VVA	1.5	0 - 32	+10	0 to -3V	MS8G	EAR99	HMC346MS8GE
DC - 8	Analog VVA	2	0 - 30	+10	0 to -3V	C8	EAR99	HMC346C8
DC - 8	Analog VVA	2	0 - 30	+10	0 to -3V	G8 Hermetic	EAR99	HMC346G8
DC - 14	Analog VVA	2	0 - 30	+10	0 to -3V	LP3	EAR99	HMC346LP3E
DC - 18	Analog VVA	1.5	0 - 30	+10	0 to -3V	LC3B	EAR99	HMC346LC3B
DC - 20	Analog VVA	2.2	0 - 25	+10	0 to -3V	Chip	EAR99	HMC346
5 - 26.5	Analog VVA	3.5	0 - 28	+32	0 to -3V	LP3C	EAR99	HMC712LP3CE
5 - 30	Analog VVA	2.5	0 - 30	+32	0 to -3V	Chip	EAR99	HMC712
5 - 30	Analog VVA	2	0 - 28	+28	0 to -3V	LC4	EAR99	HMC812LC4
10 - 40	Analog VVA	3	0 - 35	+33	0 to +3V	LP4K	EAR99	HMC985LP4KE
17 - 27	Analog VVA	1.5	0 - 22	+17	-4 to +4V	Chip	5A991.h	HMC-VVD102
20 - 50	Analog VVA	3	0 - 35	+33	0 to +3V	Chip	EAR99	HMC985
36 - 50	Analog VVA	1.5	0 - 22	+17	0 to +4V	Chip	5A991.h	HMC-VVD106
70 - 86	Analog VVA	2	0 - 14	-	-5 to +5V	Chip	5A991.h	HMC-VVD104
<b>Attenuators - Digital</b>								
DC - 5	1-Bit Digital	1	10	+50	TTL/CMOS	LP3	EAR99	HMC541LP3E
DC - 10	1-Bit Digital	2	10	+54	0 / +3 to +5V	LP3	EAR99	HMC800LP3E
DC - 10	1-Bit Digital	1.5	15	+53	0 / +3 to +5V	LP3	EAR99	HMC801LP3E
DC - 10	1-Bit Digital	2.5	20	+53	0 / +3 to +5V	LP3	EAR99	HMC802LP3E
0.7 - 4.0	2-Bit Digital	0.5	2 - 6	+52	0 / +3V	SOT26	EAR99	HMC290E
0.7 - 4.0	2-Bit Digital	0.9	4 - 12	+54	0 / +3V	SOT26	EAR99	HMC291E
DC - 6	2-Bit Digital	0.5	2 - 6	+50	TTL/CMOS	LP3	EAR99	HMC467LP3E
0.75 - 2.0	3-Bit Digital	1.8	4 - 28	+45	0 / +3V	MS8	EAR99	HMC230MS8E
0.7 - 3.7	3-Bit Digital	1.3	2 - 14	+51	0 / +3V	MS8	EAR99	HMC288MS8E
DC - 6	3-Bit Digital	0.7	1 - 7	+50	TTL/CMOS	LP3	EAR99	HMC468LP3E
DC - 5.5	4-Bit Digital	0.8	1 - 15	+50	TTL/CMOS	LP3	EAR99	HMC540LP3E

# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### ATTENUATORS

Frequency (GHz)	Function	Insertion Loss (dB)	Attenuation Range (dB)	IIP3 (dBm)	Control Input (Vdc)	Package	ECCN Code	Part Number
DC - 6	4-Bit Digital, Serial & Parallel Control	2.5	3 - 45	+50	0 / +5V	LP4	EAR99	HMC629LP4E
0.1 - 30	5-Bit Digital	2.5	0.5 - 15.5	+45	0 / +3 to +5V	Chip	EAR99	HMC941
0.1 - 30	5-Bit Digital, Serial Control	5	1 - 31	+43	0 / +3 to +5V	LP4	EAR99	HMC1018LP4E
0.1 - 30	5-Bit Digital, Serial Control	4	0.5 - 15.5	+45	0 / +3 to +5V	LP4	EAR99	HMC1019LP4E
0.1 - 33	5-Bit Digital	5	1 - 31	+43	0 / +3 to +5V	LP4	EAR99	HMC939LP4E
0.1 - 33	5-Bit Digital	4	0.5 - 15.5	+45	0 / +3 to +5V	LP4	EAR99	HMC941LP4E
0.1 - 40	5-Bit Digital	3.5	1 - 31	+43	0 / +3 to +5V	Chip	EAR99	HMC939
0.7 - 2.7	5-Bit Digital	2.3	1 - 31	+54	0 / +3V	QS16	EAR99	HMC274QS16E
0.7 - 3.7	5-Bit Digital, Serial Control	2.1	1 - 31	+48	Serial / CMOS	LP4	EAR99	HMC271ALP4E
0.7 - 3.8	5-Bit Digital	2.1	1 - 31	+48	0 / +3V	MS10G	EAR99	HMC273MS10GE
0.7 - 3.8	5-Bit Digital, Serial Control	1.5	0.5 - 15.5	+52	Serial / CMOS	LP4	EAR99	HMC305ALP4E
0.7 - 3.8	5-Bit Digital	1.5	0.5 - 15.5	+52	0 / +3V	MS10	EAR99	HMC306MS10E
0.7 - 3.8	5-Bit Digital	1.3	0.5 - 15.5	+48	0 / +3V	MS10	EAR99	HMC603MS10E
0.7 - 3.8	5-Bit Digital	1.3	0.5 - 15.5	+48	0 / +3V	QS16	EAR99	HMC603QS16E
DC - 3	5-Bit Digital	2.0	1 - 31	+44	0 / -5V	G16 Hermetic	EAR99	HMC335G16
DC - 3	5-Bit Digital	1.3	1 - 31	+45	TTL / CMOS	LP3	EAR99	HMC470LP3E
DC - 4	5-Bit Digital	1.9	1 - 31	+44	0 / -5V	QS16G	EAR99	HMC307QS16GE
DC - 4	5-Bit Digital	0.7	0.25 - 7.75	+50	TTL / CMOS	LP3	EAR99	HMC539LP3E
DC - 3.8	6-Bit Digital	1.5	0.5 - 31.5	+45	TTL / CMOS	LP4	EAR99	HMC472ALP4E
DC - 3	6-Bit Digital	3.0	0.5 - 31.5	+32	0 / -5V	G16 Hermetic	EAR99	HMC424G16
DC - 4	6-Bit Digital, Serial Control	1.2	0.5 - 31.5	+45	Serial / CMOS	LP4	EAR99	HMC542BLP4E
DC - 6	6-Bit Digital, Serial & Parallel Control	1.8	0.5 - 31.5	+55	0 / +5V	LP4	EAR99	HMC624ALP4E
DC - 6	6-Bit Digital, Serial & Parallel Control	1.8	0.25 - 15.75	+55	TTL / CMOS	LP4	EAR99	HMC792ALP4E
DC - 13	6-Bit Digital	4.0	0.5 - 31.5	+32	0 / -5V	Chip	EAR99	HMC424
DC - 13	6-Bit Digital	3.2	0.5 - 31.5	+32	0 / -5V	LH5 Hermetic	EAR99	HMC424LH5
DC - 13	6-Bit Digital	4.0	0.5 - 31.5	+32	0 / -5V	LP3	EAR99	HMC424LP3E
2.4 - 8.0	6-Bit Digital	3.5	0.5 - 31.5	+40	0 / +5V	Chip	EAR99	HMC425
2.2 - 8.0	6-Bit Digital	3.2	0.5 - 31.5	+40	0 / +5V	LP3	EAR99	HMC425LP3E
0.01 - 0.3	7-Bit Digital	3.3	0.25 - 31.75	+40	TTL / CMOS	LP3	EAR99	HMC759LP3E

### AUTOMATIC GAIN CONTROL

Frequency (MHz)	Function	Gain Control Range (dB)	NF (dB)	OIP3 (dBm)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
50 - 800	IF Automatic Gain Controller	-10 to +38	6	+40	+19	+5V @ 215 mA	LP5	EAR99	HMC992LP5E
700 - 3000	RF Automatic Gain Controller	-11 to +32	7.6	+46	+25	+5V @ 260 mA	LP5	EAR99	HMC993LP5E

### DC POWER CONDITIONING - Linear Voltage Regulators

Input Voltage (V)	Function	Output Voltage (V)	Max. Output Current (mA)	Power Supply Rejection Ratio (PSRR) (dB)		Output Noise Spectral Density (nV/√Hz)		Regulated Outputs	Package	ECCN Code	Part Number
				1 kHz	1 MHz	1 kHz	10 kHz				
3.35 - 5.6	Quad High PSRR	2.5 - 5.2	240	80	60	7	3	4	LP3	EAR99	HMC860LP3E
3.35 - 5.6	Low Noise, High PSRR	1.8 - 5.2	500	80	60	7	3	4	LP3	EAR99	HMC1060LP3E
4.8 - 5.6	Low Noise, High PSRR	1.8 - 5.1	400	60	30	6	3	1	LP3	EAR99	HMC976LP3E

### FILTERS - Tunable

#### Band Pass

Frequency Range (GHz)	Function	Return Loss (dB)	3 dB Bandwidth (%)	Low Side Rejection Frequency (Ref. >20 dB)	High Side Rejection Frequency (Ref. >20 dB)	Tuning Response (ns)	Package	ECCN Code	Part Number
1 - 2	Band Pass	10	11	0.8 x Fcenter	1.2 x Fcenter	< 200	LP5	EAR99	HMC890LP5E
2 - 3.9	Band Pass	10	9	0.9 x Fcenter	1.15 x Fcenter	< 200	LP5	EAR99	HMC891LP5E
4 - 7.7	Band Pass	15	9	0.9 x Fcenter	1.13 x Fcenter	< 200	LP5	EAR99	HMC892LP5E
4.8 - 9.5	Band Pass	7	6.5	0.9 x Fcenter	1.1 x Fcenter	< 200	LP5	EAR99	HMC893LP5E
5.9 - 11.2	Band Pass	7.5	6	0.92 x Fcenter	1.08 x Fcenter	< 200	LP5	EAR99	HMC894LP5E
6.8 - 12.6	Band Pass	12	10	0.88 x Fcenter	1.1 x Fcenter	< 200	LP4	EAR99	HMC895LP4E
9 - 19	Band Pass	9.5	18	0.81 x Fcenter	1.17 x Fcenter	< 200	Chip	EAR99	HMC897
9 - 19	Band Pass	9.5	18	0.81 x Fcenter	1.17 x Fcenter	< 200	LP4	EAR99	HMC897LP4E
10 - 18	Band Pass	11	9	0.89 x Fcenter	1.1 x Fcenter	< 200	LP4	EAR99	HMC896LP4E
11.5 - 21.5	Band Pass	9	17	0.81 x Fcenter	1.16 x Fcenter	< 200	LP4	EAR99	HMC898LP4E
18.5 - 37.0	Band Pass	10	18	0.81 x Fcenter	1.20 x Fcenter	< 200	LP4	EAR99	HMC899LP4E
19 - 38	Band Pass	10	18	0.81 x Fcenter	1.20 x Fcenter	< 100	Chip	EAR99	HMC899

## SMT & Chip (Die) Products

### Low Pass

Frequency Range (GHz)	Function	Return Loss (dB)	Cutoff Frequency Range (GHz)	Stopband Frequency (Rej. >20 dB)	Tuning Response (ns)	Package	ECCN Code	Part Number
DC - 4.0	Low Pass	10	2.2 - 4.0	1.25 x Fcutoff	150	LP5	EAR99	HMC881LP5E
DC - 7.6	Low Pass	10	4.5 - 7.6	1.23 x Fcutoff	150	LP5	EAR99	HMC882LP5E

### Band Reject

Frequency Range (GHz)	Function	Rejection Band Tuning Freq. (GHz)	Pass Band Insertion Loss (dB)	Stop Band Rejection (dB)	20 dB Bandwidth (%)	Tuning Response (ns)	Package	ECCN Code	Part Number
0.1 - 25	Band Reject	3.6 - 12.2	3	25	8	200	LP5	EAR99	HMC1000LP5E

### Programmable Harmonic

Frequency Range (GHz)	Function	Return Loss (dB)	3 dB Bandwidth (GHz)	Stopband Frequency (Rej. >10 dB)	Tuning Response (ns)	Package	ECCN Code	Part Number
0.25 - 3.025	Programmable Harmonic Low Pass Filter	10	1 - 3	1.2 Fcutoff	10	LP3	EAR99	HMC1044LP3E

## IF / BASEBAND PROCESSING - Dual Baseband Low Pass Filter & Dual Baseband Digital VGA

### Dual Baseband Low Pass Filter

3 dB Bandwidth Setting (MHz)	Function	3 dB Bandwidth Accuracy (%)	Gain (dB)	NF (dB)	OIP3 (dBm)	Package	ECCN Code	Part Number
3.5 - 50	Dual Low Pass w/ ADC Driver	±2.5	0 / 10	12	+30	LP5	EAR99	HMC900LP5E
5 - 72	Dual Low Pass w/ ADC Driver	±2.5	0 / 10	10	+30	LP5	EAR99	HMC1023LP5E

Note: 400 Ohm Reference Impedance shown

### Dual Baseband Digital VGA

Frequency (MHz)	Function	NF (dB)	Variable Gain (dB)	OIP3 (dBm)	OIP2 (dBm)	Sideband Supp. (dB)	Magnitude (dB) / Phase (deg) Balance	Bias Supply	Package	ECCN Code	Part Number
DC - 100	Digital, Serial & Parallel Control	6	0 - 40	+30	+65	55	±0.1 / ±1	+5V @ 70 mA	LP4	EAR99	HMC960LP4E

Note: 100 Ohm Reference Impedance shown

## I/Q MIXERS / IRMs

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Image Rejection (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
3 - 7	I/Q Mixer / IRM	DC - 3.5	-7.5	33	+23	Chip	EAR99	HMC620
3 - 7	I/Q Mixer / IRM	DC - 3.5	-7.5	32	+22	LC4	EAR99	HMC620LC4
4 - 8.5	I/Q Mixer / IRM	DC - 3.5	-7.5	40	+23	Chip	EAR99	HMC525
4 - 8.5	I/Q Mixer / IRM	DC - 3.5	-7.5	40	+23	LC4	EAR99	HMC525LC4
5.9 - 12.0	I/Q Mixer / IRM	DC - 1.5	-8	30	+18	Chip	EAR99	HMC256
6 - 10	I/Q Mixer / IRM	DC - 3.5	-7	40	+22	Chip	EAR99	HMC520
6 - 10	I/Q Mixer / IRM	DC - 3.5	-7	40	+23	LC4	EAR99	HMC520LC4
6 - 10	I/Q Mixer / IRM	DC - 3.5	-7.5	40	+28	Chip	EAR99	HMC526
6 - 10	I/Q Mixer / IRM	DC - 3.5	-7.5	40	+28	LC4	EAR99	HMC526LC4
8 - 12	I/Q Mixer / IRM	DC - 4	-8	25	+18	LC4B	EAR99	HMC1056LP4BE
8.5 - 13.5	I/Q Mixer / IRM	DC - 3.5	-7.5	40	+24	Chip	EAR99	HMC521
8.5 - 13.5	I/Q Mixer / IRM	DC - 3.5	-7.5	38	+24	LC4	EAR99	HMC521LC4
8.5 - 13.5	I/Q Mixer / IRM	DC - 2	-7.5	35	+28	Chip	EAR99	HMC527
8.5 - 13.5	I/Q Mixer / IRM	DC - 2	-7.5	34	+28	LC4	EAR99	HMC527LC4
10 - 16	I/Q Mixer / IRM	DC - 3.5	-8	25	+25	LC5	EAR99	HMC775LC5
11 - 16	I/Q Mixer / IRM	DC - 3.5	-7.5	35	+24	Chip	EAR99	HMC522
11 - 16	I/Q Mixer / IRM	DC - 3.5	-7.5	35	+24	LC4	EAR99	HMC522LC4
11 - 16	I/Q Mixer / IRM	DC - 3.5	-8	35	+27	Chip	EAR99	HMC528
11 - 16	I/Q Mixer / IRM	DC - 3.5	-8	35	+26	LC4	EAR99	HMC528LC4
15 - 23	I/Q Mixer / IRM	DC - 3.5	-8	25	+25	LC4	EAR99	HMC523LC4
15 - 23.6	I/Q Mixer / IRM	DC - 3.5	-8	27	+25	Chip	EAR99	HMC523
15 - 33.5	I/Q Mixer / IRM	DC - 3.5	-10	40	+22	LC4	EAR99	HMC1042LC4
17 - 27	I/Q Mixer / IRM	DC - 3.5	-9	36	+20	LC4	EAR99	HMC1041LC4
19 - 33	I/Q Mixer / IRM	DC - 5	-8	25	+17	Chip	5A991.h	HMC-MDB172
22 - 32	I/Q Mixer / IRM	DC - 3.5	-10	23	+20	Chip	EAR99	HMC524
22 - 32	I/Q Mixer / IRM	DC - 4.5	-10	20	+20	LC3B	EAR99	HMC524LC3B
24 - 28	I/Q Mixer / IRM	DC - 3	-9.5	21	+17	LP3	EAR99	HMC1063LP3E
31 - 38	I/Q Mixer / IRM	DC - 3.5	-10.5	17	+21	Chip	EAR99	HMC555
35 - 45	I/Q Mixer / IRM	DC - 5	-8	25	+17	Chip	5A991.h	HMC-MDB171
36 - 41	I/Q Mixer / IRM	DC - 3.5	-11	18	+23	Chip	EAR99	HMC556
55 - 64	I/Q Mixer / IRM	DC - 3	-9	30	+16	Chip	5A991.h	HMC-MDB207
26 - 33 RF	Sub-Harmonic, I/Q Mixer / IRM	DC - 3	-11	22	+16	Chip	EAR99	HMC404
54 - 64 RF	Sub-Harmonic, I/Q Mixer / IRM	DC - 3	-12.5	30	+7	Chip	5A991.h	HMC-MDB218
71 - 86	Sub-Harmonic, I/Q Mixer / IRM	DC - 12	-12	-	+13	Chip	EAR99	HMC1057

# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### I/Q DOWNCONVERTER / RECEIVERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Noise Figure (dB)	Image Rejection (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
5.6 - 8.6	I/Q Downconverter / Receiver	DC - 3	12	2.2	20	+2	LP4	EAR99	HMC951LP4E
7 - 9	I/Q Downconverter / Receiver	DC - 3.5	10	2.5	35	+1.5	LC5	EAR99	HMC567LC5
9 - 12	I/Q Downconverter / Receiver	DC - 3.5	11	2.2	25	+2	LC5	EAR99	HMC908LC5
12 - 16	I/Q Downconverter / Receiver	DC - 3.5	14	2.8	32	-1	LC5	EAR99	HMC869LC5
17 - 20	I/Q Downconverter / Receiver	DC - 3.5	14	2.5	40	0	LP4	EAR99	HMC966LP4E
17 - 21	I/Q Downconverter / Receiver	DC - 3.5	10	3	17	+3	Chip	EAR99	HMC570
17 - 21	I/Q Downconverter / Receiver	DC - 3.5	10	3	18	+2	LC5	EAR99	HMC570LC5
17 - 24	I/Q Downconverter / Receiver	DC - 3.3	11	2.2	21	+2	LC5	EAR99	HMC904LC5
17 - 24	I/Q Downconverter / Receiver	DC - 3.5	15	2.5	25	+1	LP4	EAR99	HMC967LP4E
20 - 28	I/Q Downconverter / Receiver	DC - 3.5	14	2.5	21	+1	LP4	EAR99	HMC977LP4E
21 - 25	I/Q Downconverter / Receiver	DC - 3.5	11	3	24	+5	Chip	EAR99	HMC571
21 - 25	I/Q Downconverter / Receiver	DC - 3.5	10	2	20	+5	LC5	EAR99	HMC571LC5
24 - 28	I/Q Downconverter / Receiver	DC - 3.5	8	3.5	20	+5	Chip	EAR99	HMC572
24 - 28	I/Q Downconverter / Receiver	DC - 3.5	8	3.5	18	+5	LC5	EAR99	HMC572LC5
<b>27 - 34</b>	<b>I/Q Downconverter / Receiver</b>	<b>DC - 4</b>	<b>12</b>	<b>3.5</b>	<b>17</b>	<b>+2</b>	<b>LP4</b>	<b>EAR99</b>	<b>HMC1065LP4E</b>
37 - 44	I/Q Downconverter / Receiver	DC - 4	13	3.5	25	+2	LC5A	EAR99	HMC6147ALC5A

### I/Q UPCONVERTER / TRANSMITTERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Sideband Rejection (dBc)	OIP3 (dBm)	Package	ECCN Code	Part Number
<b>5.5 - 8.6</b>	<b>I/Q Upconverter w/ VGA</b>	<b>DC - 3</b>	<b>15</b>	<b>22</b>	<b>+35</b>	<b>LC5</b>	<b>EAR99</b>	<b>HMC6505LC5</b>
5.5 - 8.6	I/Q Upconverter / Transmitter w/ VGA	DC - 3	16.5	-30	+29	LC5	EAR99	HMC925LC5
10 - 16	I/Q Upconverter / Transmitter w/ VGA	DC - 3	17	-30	+14	LC5	EAR99	HMC924LC5
11 - 17	I/Q Upconverter / Transmitter	DC - 2	13	-20	+26	LC5	EAR99	HMC709LC5
16 - 21	I/Q Upconverter / Transmitter	DC - 3.5	12	-20	+30	LC5	EAR99	HMC710LC5
17.7 - 23.6	I/Q Upconverter / Transmitter	DC - 3.5	15	-35	+35	LC5	EAR99	HMC819LC5
21 - 27	I/Q Upconverter / Transmitter	DC - 3.75	12	-20	+27	LC5	EAR99	HMC815LC5
37 - 40	I/Q Upconverter / Transmitter w/ VGA	DC - 4	10	17	+27	LC5A	EAR99	HMC6787ALC5A
40 - 44	I/Q Upconverter / Transmitter w/ VGA	DC - 4	12	25	+27	LC5A	EAR99	HMC6146BLC5A

### MIXERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	LO / RF Isolation (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
<b>High IP3 Mixers</b>								
0.45 - 0.5	High IP3, SGL-END	DC - 0.15	-9.5	20	+32	MS8	EAR99	HMC387MS8E
0.5 - 2.7	High IP3, DBL-BAL, +2 LO	DC - 1	-8	28	+28	LP4	EAR99	HMC915LP4E
0.7 - 1.0	High IP3, SGL-END	DC - 0.25	-8.5	24	+35	MS8	EAR99	HMC399MS8E
0.7 - 1.0	High IP3, DBL-BAL, 0 LO	DC - 0.45	-7	23	+32	LP4	EAR99	HMC684LP4E
0.7 - 1.1	High IP3, DBL-BAL, 0 LO	0.05 - 0.25	-7.5	24	+40	LP4	EAR99	HMC786LP4
0.7 - 1.2	High IP3, DBL-BAL	DC - 0.3	-9	42	+25	S8	EAR99	HMC351S8E
0.7 - 1.5	High IP3, 0 LO	DC - 0.35	-9	20	+33	MS8G	EAR99	HMC483MS8GE
0.7 - 1.5	High IP3, DBL-BAL, 0 LO	DC - 0.5	-7.5	24	+34	LP4	EAR99	HMC686LP4E
0.8 - 1.2	High IP3, DBL-BAL, 0 LO	DC - 0.3	-8	27	+27	LP4	EAR99	HMC551LP4E
1.5 - 3.5	High IP3, DBL-BAL	DC - 1	-8	38	+25	MS8	EAR99	HMC316MS8E
1.6 - 3.0	High IP3, DBL-BAL, 0 LO	DC - 1	-8	30	+25	LP4	EAR99	HMC552LP4E
1.7 - 2.2	High IP3, SGL-END	DC - 0.3	-8.8	30	+36	MS8	EAR99	HMC400MS8E
1.7 - 2.2	High IP3, DBL-BAL, 0 LO	DC - 0.5	-8	30	+35	LP4	EAR99	HMC685LP4E
1.7 - 2.2	High IP3, DBL-BAL, 0 LO	DC - 0.5	-8	31	+34	LP4	EAR99	HMC687LP4E
1.7 - 2.2	High IP3, DBL-BAL, 0 LO	0.05 - 0.30	-8	30	+38	LP4	EAR99	HMC785LP4E
1.7 - 2.4	High IP3, SGL-END	0.05 - 0.3	-9.2	10	+34	MS8G	EAR99	HMC485MS8GE
1.7 - 3.0	High IP3, SGL-BAL	DC - 0.8	-9	30	+30	MS8	EAR99	HMC304MS8E
1.7 - 4.0	High IP3, DBL-BAL, +4 LO	DC - 1.0	-8	32	+25	LP4	EAR99	HMC215LP4E
1.8 - 2.2	High IP3, SGL-END	DC - 0.5	-8.5	25	+31	MS8	EAR99	HMC402MS8E
2.0 - 2.7	High IP3, DBL-BAL, 0 LO	DC - 0.45	-7.5	25	+31	LP4	EAR99	HMC688LP4E
2.0 - 2.7	High IP3, DBL-BAL, 0 LO	DC - 0.45	-7.5	26	+31	LP4	EAR99	HMC689LP4E
2.3 - 4.0	High IP3, +4 LO	DC - 1	-10	15	+35	LP4	EAR99	HMC615LP4E
2.4 - 4.0	High IP3, SGL-END	DC - 1	-10	30	+34	MS8	EAR99	HMC214MS8E
3.1 - 3.9	High IP3, DBL-BAL, 0 LO	DC - 0.6	-8.5	28	+30	LP4	EAR99	HMC666LP4E
6 - 12	High IP3, DBL-BAL	DC - 4	-8	40	+30	LC3	EAR99	HMC663LC3
9 - 15	High IP3, DBL-BAL	DC - 2.5	-7.5	40	+24	MS8G	EAR99	HMC410AMS8GE
<b>Downconverter RFICs</b>								
0.7 - 3.5	High IP3 Dual Downconverter	0.05 - 0.35	7	55	+25	LP4	EAR99	HMC990LP4E
0.7 - 3.5	High IP3 Downconverter	0.05 - 0.35	7	58	+25	LP3	EAR99	HMC1090LP3E



## SMT & Chip (Die) Products

### MIXERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	LO / RF Isolation (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
0.7 - 1.0	Downconverter	0.05 - 0.25	12.5	25	+15	QS16	EAR99	HMC420QS16E
0.7 - 1.0	High IP3, Dual Downconverter	0.06 - 0.5	7.5	16	+23	LP6C	EAR99	HMC683LP6CE
0.8 - 1.0	High IP3 Downconverter	0.05 - 0.25	13.8	28	+15	QS16G	EAR99	HMC377QS16GE
0.8 - 2.7	Hi-IP3 Wideband Downconverter	0.001 - 0.6	-1	48	+26	LP4	EAR99	HMC334LP4E
0.9 - 1.6	Hi-IP3 Downconverter w/ RF Amplifier	0.05 - 0.5	30	45	+6	LP4	EAR99	HMC621LP4E
1.4 - 2.3	High IP3 Downconverter	0.05 - 0.3	9	33	+19	QS16G	EAR99	HMC421QS16E
1.7 - 2.2	High IP3 Downconverter	0.05 - 0.3	11	25	+19	QS16G	EAR99	HMC380QS16GE
1.7 - 2.2	High IP3, Dual Downconverter	50 - 300	9	10	+27	LP6	EAR99	HMC381LP6E
1.7 - 2.2	High IP3, Dual Downconverter	0.06 - 0.4	6	25	+25	LP6C	EAR99	HMC682LP6CE
<b>0 to +7 dBm LO Double &amp; Single Balanced Mixers</b>								
0.6 - 1.3	Low LO, DBL-BAL	DC - 0.4	-8	35	+15	MS8	EAR99	HMC423MS8E
0.7 - 1.2	0 LO, DBL-BAL	0.25 - 0.45	10	36	+23	LP4	EAR99	HMC665LP4E
1.2 - 2.6	Low LO, DBL-BAL	DC - 1	-8	30	+15	MS8	EAR99	HMC422MS8E
1.8 - 3.9	+3 LO, DBL-BAL	0.2 - 0.55	9	33	+23	LP4	EAR99	HMC622LP4E
3 - 3.8	Low LO, SGL-BAL	DC - 1	-8.5	15	+10	SOT26	EAR99	HMC333E
4 - 7	0 LO, DBL-BAL	DC - 2.5	-7	32	+15	MS8G	EAR99	HMC488MS8GE
<b>+10 to +12 dBm LO Double &amp; Single Balanced Mixers</b>								
0.7 - 2.0	+10 LO, DBL-BAL	DC - 0.3	-9	45	+17	S8	EAR99	HMC207AS8E
0.7 - 2.0	+10 LO, DBL-BAL	DC - 0.5	-9	24	+17	MS8	EAR99	HMC208AMS8E
1.5 - 4.5	+10 LO, DBL-BAL	DC - 1.5	-8.5	40	+19	MS8	EAR99	HMC213AMS8E
1.7 - 3.0	+10 LO, SGL-BAL	DC - 0.8	-9	30	+21	MS8	EAR99	HMC272AMS8E
4.5 - 8.0	+10 LO, DBL-BAL	DC - 2	-8.2	35	+16	C8	EAR99	HMC168C8
5 - 12	+10 LO, DBL-BAL	DC - 4	-7.5	25	+17	MS8	EAR99	HMC220AMS8E
7 - 10	+10 LO, DBL-BAL	DC - 2	-9	32	+16	C8	EAR99	HMC171C8
<b>50 - 75</b>	<b>+10 LO, DBL-BAL</b>	<b>DC - 26</b>	<b>-7.5</b>	<b>30</b>	<b>+16</b>	<b>Chip</b>	<b>EAR99</b>	<b>HMC1081</b>
<b>+13 to +14 dBm LO Double &amp; Triple Balanced Mixers</b>								
0.7 - 1.2	+13 LO, SGL-BAL	DC - 0.3	-9	26	+21	MS8	EAR99	HMC277MS8E
1.7 - 4.5	+13 LO, DBL-BAL	DC - 1	-8	30	+20	MS8	EAR99	HMC175MS8E
1.7 - 4.5	+13 LO, Dual Channel	DC - 1.5	-8	-	+23	LP5	EAR99	HMC340ALP5E
2 - 18	Double Balance Mixer	DC - 4	-10	35	+19	LC3B	EAR99	HMC1048LC3B
2.5 - 4.0	+13 LO, DBL-BAL	DC - 2	-9	45	+18	C8	EAR99	HMC170C8
4.5 - 9.0	+13 LO, DBL-BAL	DC - 2.5	-8.5	25	+21	MS8	EAR99	HMC219AMS8E
6 - 26	+13 LO, DBL-BAL	DC - 10	-9	32	+20	Chip	EAR99	HMC773
6 - 26	+13 LO, DBL-BAL	DC - 8	-9	38	+22	LC3B	EAR99	HMC773LC3B
7 - 14	+13 LO, DBL-BAL	DC - 5	-7	48	+22	Chip	EAR99	HMC553
7 - 14	+13 LO, DBL-BAL	DC - 5	-7	50	+22	LC3B	EAR99	HMC553LC3B
7 - 34	+13 LO, DBL-BAL	DC - 8	-11	35	+22	LC3B	EAR99	HMC774LC3B
7 - 43	+13 LO, DBL-BAL	DC - 10	-9	35	+22	Chip	EAR99	HMC774
9 - 15	+13 LO, DBL-BAL	DC - 2.5	-7.5	40 - 50	+17	MS8G	EAR99	HMC412AMS8GE
11 - 20	+13 LO, DBL-BAL	DC - 6	-7	46	+18	Chip	EAR99	HMC554
11 - 20	+13 LO, DBL-BAL	DC - 6	-7	46	+18	LC3B	EAR99	HMC554LC3B
14 - 26	+13 LO, DBL-BAL	DC - 8	-7.5	39	+20	Chip	EAR99	HMC260
14 - 26	+13 LO, DBL-BAL	DC - 8	-7.5	38	+20	LC3B	EAR99	HMC260LC3B
16 - 30	+13 LO, DBL-BAL	DC - 8	-8	40	+21	LC3B	EAR99	HMC292LC3B
17 - 31	+13 LO, DBL-BAL	DC - 6	-8	32	+19	LM3C	EAR99	HMC292LM3C
18 - 32	+13 LO, DBL-BAL	DC - 8	-7.5	38	+19	Chip	EAR99	HMC292
24 - 32	+13 LO, DBL-BAL	DC - 8	-10	38	+19	LC3B	EAR99	HMC329LC3B
24 - 40	+13 LO, DBL-BAL	DC - 18	-8	35	+21	Chip	EAR99	HMC560
24 - 40	+13 LO, DBL-BAL	DC - 17	-10	35	+21	LM3	EAR99	HMC560LM3
25 - 40	+13 LO, DBL-BAL	DC - 8	-9.5	42	+19	Chip	EAR99	HMC329
26 - 32	+13 LO, TPL-BAL	16 - 22	-10	45	+22	Chip	EAR99	HMC1015
26 - 32	+13 LO, TPL-BAL	16 - 22	-10	45	+23	LC3	EAR99	HMC1043LC3
26 - 40	+13 LO, DBL-BAL	DC - 8	-8	37	+19	LM3	EAR99	HMC329LM3
54 - 64	+13 LO, DBL-BAL	DC - 5	-8	30	+13	Chip	5A991.h	HMC-MDB169
70 - 90	+14 LO, DBL-BAL	DC - 18	-12	-	-	Chip	5A991.h	HMC-MDB277
<b>+15 to +20 dBm LO Single &amp; Double Balanced Mixers</b>								
1.8 - 5.0	+15 LO, DBL-BAL	DC - 3	-7	42	+18	Chip	EAR99	HMC128
1.8 - 5.0	+15 LO, DBL-BAL	DC - 2	-10	40	+18	G8 Hermetic	EAR99	HMC128G8
2.5 - 7	+15 LO, DBL-BAL	DC - 3	-7	48	+22	Chip	EAR99	HMC557
2.5 - 7	+15 LO, DBL-BAL	DC - 3	-7	48	+22	LC4	EAR99	HMC557LC4
4 - 8	+15 LO, DBL-BAL	DC - 3	-7	40	+17	Chip	EAR99	HMC129
4 - 8	+15 LO, DBL-BAL	DC - 3	-8	30	+18	G8 Hermetic	EAR99	HMC129G8

# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### MIXERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	LO / RF Isolation (dB)	IIP3 (dBm)	Package	ECCN Code	Part Number
4 - 8	+15 LO, DBL-BAL	DC - 3	-7	40	+17	LC4	EAR99	HMC129LC4
5.5 - 14	+15 LO, DBL-BAL	DC - 6	-7	45	+24	Chip	EAR99	HMC558
5.5 - 14	+15 LO, DBL-BAL	DC - 6	-7	45	+24	LC3B	EAR99	HMC558LC3B
6 - 11	+15 LO, DBL-BAL	DC - 2	-7	40	+17	Chip	EAR99	HMC130
6 - 15	+15 LO, DBL-BAL	DC - 2	-8.5	35	+20	C8	EAR99	HMC141C8
6 - 18	+15 LO, DBL-BAL	DC - 6	-10	25	+21	Chip	EAR99	HMC141
7 - 14	+15 LO, DBL-BAL	DC - 2	-10	35	+20	LH5 Hermetic	EAR99	HMC141LH5
14 - 23	+15 LO, DBL-BAL	DC - 2	-10.5	38	+18	Chip	EAR99	HMC203
3 - 10	+17 LO, DBL-BAL	DC - 4	-9	55	+23	LC3B	EAR99	HMC787LC3B
5 - 20	+20 LO, DBL-BAL	DC - 3	-10	30	+25	Chip	EAR99	HMC143 / 144
6 - 20	+20 LO, DBL-BAL	DC - 3	-10	35	+23	LC4	EAR99	HMC144LC4
6 - 20	+20 LO, DBL-BAL	DC - 3	-10	35	+24	LH5 Hermetic	EAR99	HMC144LH5

### Sub-Harmonic Mixers

14 - 20	Sub-Harmonic	DC - 3	-10	40	+7	LM3	EAR99	HMC258LM3
14 - 21	Sub-Harmonic	DC - 3	-10	40	+7	Chip	EAR99	HMC258
14.5 - 19.5	Sub-Harmonic	DC - 3.5	-10	45	+5	LC3B	EAR99	HMC258LC3B
17 - 25	Sub-Harmonic	DC - 3	-9	27	+10	Chip	EAR99	HMC337
17.7 - 23.6	Sub-Harmonic, Upconverter	DC - 3.5	15	40	+13	LC5	EAR99	HMC711LC5
20 - 30	Sub-Harmonic	DC - 4	-9	30	+10	LM3	EAR99	HMC264LM3
20 - 31	Sub-Harmonic, Downconverter	0.7 - 3.0	3	28	+8	LM3	EAR99	HMC265LM3
20 - 32	Sub-Harmonic	DC - 6	-10	40	+13	Chip	EAR99	HMC264
20 - 32	Sub-Harmonic, Downconverter	0.7 - 3.0	3	30	+10	Chip	EAR99	HMC265
20 - 40	Sub-Harmonic	1 - 3	-12	24	+13	Chip	EAR99	HMC266
21 - 31	Sub-Harmonic	DC - 6	-9	40	+13	LC3B	EAR99	HMC264LC3B
24 - 34	Sub-Harmonic	DC - 3	-11	33	+13	LC3B	5A991.b	HMC338LC3B
24 - 34	Sub-Harmonic	DC - 4	-10	30	+22	LC4	EAR99	HMC798LC4
26 - 33	Sub-Harmonic	DC - 2.5	-9	33	+11	Chip	5A991.b	HMC338
33 - 42	Sub-Harmonic	DC - 3	-10	37	+10	Chip	EAR99	HMC339
37 - 46.5	Sub-Harmonic	DC - 7.5	-14	20	+30	Chip	EAR99	HMC1093
71 - 86	Sub-Harmonic	DC - 12	-11	28	+6	Chip	EAR99	HMC1058

### DEMODULATORS - I/Q Demodulator

Input Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Noise Figure (dB)	IIP3 / IIP2 (dBm)	Package	ECCN Code	Part Number
0.1 - 4.0	I/Q Demodulator	DC - 0.6	-3.5	15	+25 / +60	LP4	EAR99	HMC597LP4E

### MODULATORS - Bi-Phase Modulator

Input Frequency (GHz)	Function	Loss (dB)	Amp / Phase Balance (dB/Deg)	Carrier Suppression (dBc)	Bias Control (mA)	Package	ECCN Code	Part Number
1.8 - 5.2	Bi-Phase	8	0.2 / 2.5	30	+ / -5	Chip	EAR99	HMC135
4 - 8	Bi-Phase	8	0.1 / 4.0	30	+ / -5	Chip	EAR99	HMC136
6 - 11	Bi-Phase	9	0.25 / 10.0	20	+ / -5	Chip	EAR99	HMC137

### MODULATORS - Direct Quadrature Modulator

Input Freq. (GHz)	Function	OIP3 (dBm) / Carrier Suppression (dBc)	Modulation Bandwidth (MHz)	Output Noise Floor (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
0.02 - 2.7	Direct Quadrature	23 / 42	DC - 700	-162	+5V @ 160 mA	LP4	EAR99	HMC696LP4E
0.05 - 2.8	Direct Quadrature w/ VGA	25 / 50	DC - 440	-159	+5V @ 120 mA	LP5	EAR99	HMC795LP5E
0.1 - 4.0	Direct Quadrature	23 / 42	DC - 700	-159	+5V @ 170 mA	LP4	EAR99	HMC497LP4E
0.1 - 6.0	Direct Quadrature	30 / 40	DC - 700	-160	+5V @ 170 mA	LP4	EAR99	HMC1097LP4E
0.25 - 3.8	Direct Quadrature	14 / 38	DC - 250	-158	+3.3V @ 108 mA	LP3	EAR99	HMC495LP3E
0.45 - 4.0	Direct Quadrature	22 / 43	DC - 700	-165	+5V @ 168 mA	LP4	EAR99	HMC697LP4E
4 - 7	Direct Quadrature	17 / 34	DC - 250	-157	+3V @ 93 mA	LP3	EAR99	HMC496LP3E

### MODULATORS - Vector Modulators

Frequency (GHz)	Function	Gain Range (dB)	Continuous Phase Control (deg)	IP3 / Noise Floor (Ratio)	IIP3 @ Max. Gain (dBm)	Package	ECCN Code	Part Number
0.7 - 1.0	Vector	-50 to -10	360	186.5	+34	LP3	EAR99	HMC630LP3E
1.8 - 2.7	Vector	-50 to -10	360	186	+35	LP3	EAR99	HMC631LP3E
1.8 - 2.2	Vector	-50 to -10	360	185	+33	LP3	EAR99	HMC500LP3E

## SMT & Chip (Die) Products

### PASSIVES - Fixed Attenuators

Frequency (GHz)	Function	Attenuation Accuracy (dB)	Nominal Attenuation (dB)	Maximum Input Power (dBm)	Chip Size (Mils)	Package	ECCN Code	Part Number
DC - 50	Thru Line	±0.2	0.15	-	17 x 18	Chip	EAR99	HMC650
DC - 50	Thru Line	±0.3	0.15	-	23 x 18	Chip	EAR99	HMC651
DC - 50	Passive	±0.2	2	+27	17 x 18	Chip	EAR99	HMC652
DC - 25	Passive	±0.5	2	+27	-	LP2	EAR99	HMC652LP2E
DC - 50	Passive	±0.2	3	+26	17 x 18	Chip	EAR99	HMC653
DC - 25	Passive	±0.5	3	+26	-	LP2	EAR99	HMC653LP2E
DC - 50	Passive	±0.2	4	+25	17 x 18	Chip	EAR99	HMC654
DC - 25	Passive	±0.5	4	+25	-	LP2	EAR99	HMC654LP2E
DC - 50	Passive	±0.2	6	+26	17 x 18	Chip	EAR99	HMC655
DC - 25	Passive	±0.5	6	+26	-	LP2	EAR99	HMC655LP2E
DC - 50	Passive	±0.1	10	+25	17 x 18	Chip	EAR99	HMC656
DC - 25	Passive	±1.5	10	+25	N/A	LP2	EAR99	HMC656LP2E
DC - 50	Passive	±0.4	15	+25	17 x 18	Chip	EAR99	HMC657
DC - 25	Passive	±2	15	+25	N/A	LP2	EAR99	HMC657LP2E
DC - 50	Passive	±0.5	20	+25	23 x 18	Chip	EAR99	HMC658
DC - 25	Passive	±2	20	+25	N/A	LP2	EAR99	HMC658LP2E

### PHASE SHIFTERS - Analog

Frequency (GHz)	Function	Insertion Loss (dB)	Phase Range (deg)	2nd Harmonic Pin = -10 dBm (dBc)	Control Voltage Range (Vdc)	Package	ECCN Code	Part Number
1 - 2	Analog	3.5	400°	-40	0 to +13V	LP5	EAR99	HMC934LP5E
2 - 4	Analog	3.5	480° @ 2 GHz 450° @ 4 GHz	-40	0 to +13V	LP5	EAR99	HMC928LP5E
2 - 20	Analog	4	270° @ 2 GHz 180° @ 20 GHz	-45	0.5 to +11V	LP5	EAR99	HMC935LP5E
4 - 8	Analog	4	450° @ 4 GHz 430° @ 8 GHz	-40	0 to +13V	LP4	EAR99	HMC929LP4E
5 - 18	Analog	4	500° @ 5 GHz 100° @ 18 GHz	-80	0 to +10V	Chip	EAR99	HMC247
6 - 15	Analog	7	750° @ 6 GHz 500° @ 15 GHz	-40	0 to +5V	LP4	EAR99	HMC538LP4E
8 - 12	Analog	3.5	425° @ 8 GHz 405° @ 12 GHz	-35	0 to +13V	LP4	EAR99	HMC931LP4E
8 - 23	Analog	-	500°	-35	2.7 to 3.9V	LC3	EAR99	HMC877LC3
12 - 18	Analog	4	405° @ 12 GHz 385° @ 18 GHz	-40	0 to +13V	LP4	EAR99	HMC932LP4E
18 - 24	Analog	4.5	495° @ 18 GHz 460° @ 24 GHz	-37	0 to +13V	LP4	EAR99	HMC933LP4E

### PHASE SHIFTERS - Digital

Frequency (GHz)	Function	Insertion Loss (dB)	Phase Range (deg)	IIP3 (dBm)	Control Input (Vdc)	Package	ECCN Code	Part Number
8 - 12	4-Bit Digital	5	22.5 - 360	+40	0 / -3V	Chip	EAR99	HMC543
8 - 12	4-Bit Digital	6.5	22.5 - 360	+37	0 / -3V	LC4B	EAR99	HMC543LC4B
1.2 - 1.4	6-Bit Digital	4	5.625 - 360	+45	0 / +5V	LP6	EAR99	HMC936LP6E
2.5 - 3.1	6-Bit Digital	4	5.625 - 360	+54	0 / +5	Chip	EAR99	HMC647
2.5 - 3.1	6-Bit Digital	4	5.625 - 360	+54	0 / +5	LP6	EAR99	HMC647LP6E
2.9 - 3.9	6-Bit Digital	4	5.625 - 360	+45	0 / +5	Chip	EAR99	HMC648
2.9 - 3.9	6-Bit Digital	5	5.625 - 360	+45	0 / +5	LP6	EAR99	HMC648LP6E
3 - 6	6-Bit Digital	6.5	5.625 - 360	+44	0 / +5	Chip	EAR99	HMC649
3 - 6	6-Bit Digital	8	5.625 - 360	+44	0 / +5	LP6	EAR99	HMC649LP6E
9 - 12	6-Bit Digital	6.5	5.625 - 360	+38	0 / -3	Chip	EAR99	HMC643
9 - 12	6-Bit Digital	7	5.625 - 360	+38	0 / -3	LC5	EAR99	HMC643LC5
9 - 12.5	6-Bit Digital	6.5	5.625 - 360	+41	0 / +5	Chip	EAR99	HMC642
9 - 12.5	6-Bit Digital	7	5.625 - 360	+41	0 / +5	LC5	EAR99	HMC642LC5

### POWER DETECTORS - Log Detector / Controllers, RMS Detectors, & mmW Power Detectors

Frequency (GHz)	Function	Dynamic Range (dB)	RSSI Slope (mV/dB)	RF Threshold Level (dBm)	Bias Supply	Package	ECCN Code	Part Number
50 Hz - 3.0	Log Detector / Controller	74 ±3	19	-66	+3.3V @ 29 mA	LP4	EAR99	HMC612LP4E
0.001 - 8.0	Log Detector / Controller	70 ±3	-25	-61	+5V @ 113 mA	LP4	EAR99	HMC602LP4E
0.001 - 10.0	Log Detector / Controller	73 ±3	-25	-65	+5V @ 103 mA	Chip	EAR99	HMC611
0.001 - 10.0	Log Detector / Controller	70 ±3	-25	-65	+5V @ 106 mA	LP4	EAR99	HMC611LP4E
0.01 - 4.0	Log Detector / Controller	70 ±3	19	-68	+3.3V @ 30 mA	LP4	EAR99	HMC601LP4E
0.05 - 4.0	Log Detector / Controller	70 ±3	19	-69	+3.3V @ 29 mA	LP4	EAR99	HMC600LP4E

# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### POWER DETECTORS - Log Detector / Controllers, RMS Detectors, & mmW Power Detectors

Frequency (GHz)	Function	Dynamic Range (dB)	RSSI Slope (mV/dB)	RF Threshold Level (dBm)	Bias Supply	Package	ECCN Code	Part Number
0.05 - 8.0	Log Detector / Controller	54 ±1	17.5	-55	+5V @ 17 mA	LP3	EAR99	HMC713LP3E
0.1 - 2.7	Log Detector / Controller	54 ±1	17.5	-52	+5V @ 17 mA	MS8	EAR99	HMC713MS8E
<b>1 - 23</b>	<b>Log Detector</b>	<b>50 up to 23GHz</b>	<b>21</b>	<b>-22</b>	<b>+3.3V @ 85 mA</b>	<b>LP3</b>	<b>EAR99</b>	<b>HMC1094LP3E</b>
8 - 30	Log Detector	54 ±3	13.3	-55	+3.3V @ 88 mA	LP3	EAR99	HMC662LP3E
1 - 23	mmW Power Detector	56 ±3	14.2	-52	+3.3V @ 91 mA	LP3	EAR99	HMC948LP3E
<b>71 - 86</b>	<b>E-Band Power Detector</b>	<b>24</b>	<b>20</b>	<b>-11</b>	<b>-</b>	<b>Chip</b>	<b>EAR99</b>	<b>HMC7447</b>
DC - 3.9	RMS Power Detector	60 ±1	37	-69	+5V @ 50 mA	LP4	EAR99	HMC1010LP4E
DC - 3.9	RMS, Single-Ended	72 ±1	35	-68	+5V @ 55 mA	LP4	EAR99	HMC1020LP4E
DC - 3.9	RMS, Single-Ended w/ Envelope Tracker	70 ±1	35	-68	+5V @ 75 mA	LP4	EAR99	HMC1021LP4E
DC - 3.9	Dual RMS, Single-Ended	70 ±1	38.5	-66	+5V @ 143 mA	LP5	EAR99	HMC1030LP5E
DC - 5.8	RMS Power Detector	40 ±1	37	-69	+5V @ 42 mA	LP4	EAR99	HMC909LP4E

### SDLVAs - Successive Detection Log Video Amplifiers

Frequency (GHz)	Function	Dynamic Range (dB)	RSSI Slope (mV/dB)	RF Threshold Level (dBm)	Bias Supply	Package	ECCN Code	Part Number
0.1 - 20	SDLVA	59	14	-54	+3.3V @ 83 mA	LC4B	EAR99	HMC613LC4B
0.5 - 18.5	SDLVA, Extended Range	67	15	-62	+3.3V @ 183 mA	LP4	EAR99	HMC1013LP4E
0.6 - 20	SDLVA	59	14	-54	+3.3V @ 80 mA	Chip	EAR99	HMC913
0.6 - 20	SDLVA	59	14	-54	+3.3V @ 80 mA	LC4B	EAR99	HMC913LC4B
1 - 20	SDLVA w/ Limited RF Output	55	15	-53	+3.3V @ 153 mA	LC4B	EAR99	HMC813LC4B
1 - 26	SDLVA w/ Limited RF Output	55	14.5	-53	+3.3V @ 150 mA	Chip	EAR99	HMC813

### SWITCHES

Frequency (GHz)	Function	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Control Input (Vdc)	Package	ECCN Code	Part Number
<b>SPST &amp; SPDT Switches</b>								
DC - 3.5	SPST, Non-Reflective	0.6	40	+32	0 / +3V	LP2C	EAR99	HMC1055LP2CE
DC - 6	SPST, Failsafe	0.7	25	+27	0 / +2.2 to +5V	SOT26	EAR99	HMC550E
DC - 6	SPST, High Isolation	1.4	52	+27	0 / -5V	G7 Hermetic	EAR99	HMC231G7
DC - 2.5	SPDT, Reflective	0.4	36	+29	0 / -5V	S8	EAR99	HMC239AS8E
DC - 3	SPDT, Reflective	0.4	27	+30	0 / +3V	MS8	EAR99	HMC190BMS8E
DC - 3	SPDT, High Isolation	0.7	50	+23	0 / +5V	MS8	EAR99	HMC194MS8E
DC - 3	SPDT, Reflective	0.4	28	+30	0 / +3V	SOT26	EAR99	HMC197BE
DC - 3	SPDT, Reflective	0.4	28	+30	0 / +3V	SOT26	EAR99	HMCB221BE
DC - 3	SPDT, Reflective	0.3	31	+34	0 / +3 to +8V	SOT26	EAR99	HMC545E
DC - 3.5	SPST, Non-Reflective	0.5	45	+25	0 / +5V	AMS8G	EAR99	HMC284AMS8GE
DC - 3.5	SPST, Non-Reflective	0.6	40	+32	0 / +3V	LP2C	EAR99	HMC1055LP2CE
DC - 4	SPDT, Reflective	0.5	28	+29	0 / -5V or +5V / 0	Chip	EAR99	HMC240A
DC - 4	SPDT, High Isolation	0.9	65	+31	0 / +5V	LP4C	EAR99	HMC349ALP4CE
DC - 4	SPDT, High Isolation	0.9	57	+31	0 / +5V	MS8G	EAR99	HMC349AMS8GE
DC - 4	SPDT, High Isolation	1.1	47	+31	0 / +5V	MS8G	EAR99	HMC435AMS8GE
DC - 4	SPDT, Differential	0.8	45	+35	0 / +3V to 0 / +5V	LP4	EAR99	HMC922LP4E
DC - 6	SPDT, High Isolation	1.4	50	+26	0 / -5V	G7 Hermetic	EAR99	HMC232G7
DC - 6	SPDT, High Isolation	1.4	43	+26	0 / -5V	G8 Hermetic	EAR99	HMC232G8
DC - 6	SPDT, High Isolation	1.4	43	+26	0 / -5V	G8 Hermetic	EAR99	HMC233G8
DC - 6	SPDT, High Isolation	1.6	42	+25	0 / +5V	MS8G	EAR99	HMC336MS8GE
DC - 6	SPDT, High Isolation	1.4	46	+27	0 / -5V	G7 Hermetic	EAR99	HMC607G7
DC - 6	SPDT, High Isolation	0.8	60	+35	0 / +3 to +5V	LP4C	EAR99	HMC849ALP4CE
DC - 8	SPDT, High Isolation	1.4	50	+26	0 / -5V	C8	EAR99	HMC232C8
DC - 8	SPDT, High Isolation	1.5	45	+26	0 / -5V	C8	EAR99	HMC234C8
DC - 8	SPDT, High Isolation	1.2	48	+23	0 / -5V	MS8G	EAR99	HMC270MS8GE
DC - 8	SPDT, High Isolation	2.0	44	+23	0 / -5V	C8	EAR99	HMC347C8
DC - 8	SPDT, High Isolation	2.2	35	+23	0 / -5V	G8 Hermetic	EAR99	HMC347G8
DC - 12	SPDT, High Isolation	1.5	55	+27	0 / -5V	LP4	EAR99	HMC232LP4E
DC - 14	SPDT, High Isolation	1.7	44	+23	0 / -5V	LP3	EAR99	HMC347LP3E
DC - 15	SPDT, High Isolation	1.4	50	+26	0 / -5V	Chip	EAR99	HMC232
DC - 15	SPDT, High Isolation	1.7	60	+26	0 / -5V	Chip	EAR99	HMC607
DC - 20	SPDT, High Isolation	1.7	45	+23	0 / -5V	Chip	EAR99	HMC347
DC - 20	SPDT, High Isolation	1.8	47	+23	0 / -5V	LP3	EAR99	HMC547LP3E
DC - 28	SPDT, High Isolation	1.8	47	+23	0 / -5V	LC3	EAR99	HMC547LC3
0.1 - 50	SPDT, Reflective	1.9	31	+25	0 / -3V	Chip	EAR99	HMC986
55 - 86	SPDT, PIN MMIC	2	30	-	-5 / +5	Chip	5A991.h	HMC-SDD112

## SMT & Chip (Die) Products

### SWITCHES

Frequency (GHz)	Function	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Control Input (Vdc)	Package	ECCN Code	Part Number
0.1 - 2.1	40 Watt, SPDT, Failsafe	0.4	22	+46	0 / +3 to +8V	LP2	EAR99	HMC646LP2E
0.2 - 2.2	10 Watt, SPDT, Failsafe	0.4	40	> +40	0 / +3 to +8V	MS8G	EAR99	HMC546MS8GE
0.2 - 2.7	10 Watt, SPDT, Failsafe	0.4	35	+43	0 / +3 to +8V	LP2	EAR99	HMC546LP2E
0.824 - 0.894	10 Watt, SPDT, T/R	0.6	22	> +40	0 / +5V	SOT26	EAR99	HMC446E
DC - 2.5	SPDT, CATV	0.6	58	+28	0 / +5V	LP3	EAR99	HMC348LP3E
DC - 3	SPDT T/R	0.5	25	+39	0 / +3 to +8V	MS8	EAR99	HMC174MS8E
DC - 3	5 Watt, SPDT, T/R	0.3	30	+39	0 / +3 to +10V	MS8	EAR99	HMC574MS8E
DC - 3	3 Watt, SPDT, T/R	0.3	30	+37	0 / +3 to +10V	SOT26	EAR99	HMC595E
DC - 4	SPDT T/R	0.25	23	+39	0 / +3 to +5V	SOT26	EAR99	HMC544E
DC - 4	10 Watt, SPDT, T/R	0.4	30	+40	0 / +3 to +8V	MS8G	EAR99	HMC784MS8GE
DC - 6	SPDT T/R	0.5	27	+37	0 / +3 to +5V	MS8G	EAR99	HMC536MS8GE
DC - 6	SPDT T/R	0.6	27	+37	0 / +3 to +5V	LP2	EAR99	HMC536LP2E

#### Multi-Throw Switches

DC - 3.5	SP3T	0.5	44	+26	TTL/CMOS	QS16	EAR99	HMC245QS16E
DC - 2	SP4T	0.8	32	+24	0 / -5V	S14	EAR99	HMC182S14E
DC - 3.5	SP4T	0.5	45	+25	TTL/CMOS	QS16	EAR99	HMC241QS16E
DC - 4	SP4T	0.6	47	+26	TTL/CMOS	LP3	EAR99	HMC241LP3E
DC - 4	SP4T	0.7	40	+25	TTL/CMOS	G16 Hermetic	EAR99	HMC244G16
DC - 8	SP4T	1.8	42	+21	0 / -5V	Chip	EAR99	HMC344
DC - 8	SP4T	2.0	45	+26	0 / -5V	LC3	EAR99	HMC344LC3
DC - 8	SP4T	1.8	40	+21	0 / -5V	LP3	EAR99	HMC344LP3E
DC - 8	SP4T	2.2	32	+21	0 / 5V	LP3	EAR99	HMC345LP3E
DC - 12	SP4T	1.8	42	+27	0 / -5V	LH5 Hermetic	EAR99	HMC344LH5
DC - 18	SP4T	2.1	42	+24	0 / -5V	Chip	EAR99	HMC641
DC - 20	SP4T	2.1	42	+23	0 / -5V	LC4	EAR99	HMC641LC4
DC - 20	SP4T	2.3	45	+22	0 / -5V	LP4	EAR99	HMC641LP4E
23 - 30	SP4T	2.8	35	+25	0 / -3V	LC4	EAR99	HMC944LC4
<b>23 - 30</b>	<b>SP4T</b>	<b>2.8</b>	<b>26</b>	<b>-</b>	<b>0 / -3V</b>	<b>LC4</b>	<b>EAR99</b>	<b>HMC1084LC4</b>
DC - 3	SP6T	0.8	41	+24	TTL/CMOS	QS24	EAR99	HMC252QS24E
DC - 2	SP8T	1.3	30	+20	0 / -5V	QS24	EAR99	HMC183QS24E
DC - 2.5	SP8T	1.1	36	+23	TTL/CMOS	QS24	EAR99	HMC253QS24E
DC - 3.5	SP8T	1.2	36	+24	TTL/CMOS	LC4	EAR99	HMC253LC4
DC - 8	SP8T	2.3	40	+23	0 / 5V	LP4	EAR99	HMC321LP4E
DC - 8	SP8T	2.5	25	+23	0 / -5V	LP4	EAR99	HMC322LP4E
DC - 10	SP8T	2	38	+23	0 / -5V	Chip	EAR99	HMC322

#### Bypass, Diversity, Matrix & Transfer Switches

DC - 2.5	Bypass DPDT	0.3	25	+23	0 / +5V	MS8	EAR99	HMC199MS8E
5 - 6	DPDT, Diversity	1.2	20	+30	0 / +5V	MS8G	EAR99	HMC393MS8GE
0.2 - 3.0	4 x 2 Matrix	6	44	+26	0 / +5V	LP4	EAR99	HMC276LP4E
0.2 - 3.0	4 x 2 Matrix	6.5	43	+22	0 / +3 to +5V	LP4	EAR99	HMC596LP4E
0.7 - 3.0	4 x 2 Matrix	5.8	33	+26	0 / +5V	QS24	EAR99	HMC276QS24E
DC - 8	Transfer	1.2	42	+26	0 / +5V	LP3	EAR99	HMC427LP3E

### TRANSCEIVERS

#### Tx / Rx mmWave ICs

Frequency (GHz)	Function	P1dB (dBm) NF (dB)	Max Gain (dB)	Gain Adjust (dB)	Phase Noise @ 1 MHz Offset (dBc / Hz)	Power Dissipation (W)	Package	ECCN Code	Part Number
57 - 64	60 GHz Integrated Transmitter	+12 dBm	38	17	-86	0.8	Chip	5A991.b	HMC6000
57 - 64	60 GHz Integrated Receiver	6 dB	67	65	-86	0.61	Chip	5A991.b	HMC6001

#### Tx / Rx mmWave ICs (w/ Antenna-in-Package)

Frequency (GHz)	Function	Antenna Gain (dBi)	P1dB (dBm)	NF (dB)	Max Gain (dB)	Gain Adjust (dB)	Phase Noise @ 1 MHz (dBc / Hz)	Package	ECCN Code	Part Number
57 - 64	60 GHz Tx w/ Integrated Antenna	7.5	11	-	38	17	-86	LP711	5A991.b	HMC6000LP711E
57 - 64	60 GHz Rx w/ Integrated Antenna	7.5	-	7	67	65	-86	LP711	5A991.b	HMC6001LP711E

#### Rx RFICs

Frequency (GHz)	Function	Input IP3 (dBm)	NF (dB)	Conv. Gain (dB)	PLL FOM (dBc / Hz) (Int./Frac.)	Package	ECCN Code	Part Number
0.7 - 3.5	Wideband Dual-Downconverter w/ Frac-N PLL + VCO	+24	9	8	-230 / -227	LP6G	5A991.b	HMC1190LP6GE



# RF & MICROWAVE ICs

## SMT & Chip (Die) Products

### Tx RFICs

Frequency (GHz)	Function	Output IP3 (dBm)	Output P1dB (dBm)	Output Noise Floor (dBc / Hz)	PLL FOM (dBc / Hz) (Int./Frac.)	Package	ECCN Code	Part Number
0.4 - 4	Wideband Direct Modulator w/ Frac-N PLL + VCO	+30	+11	-160	-230 / -227	LP7F	5A991.b	HMC1197LP7FE

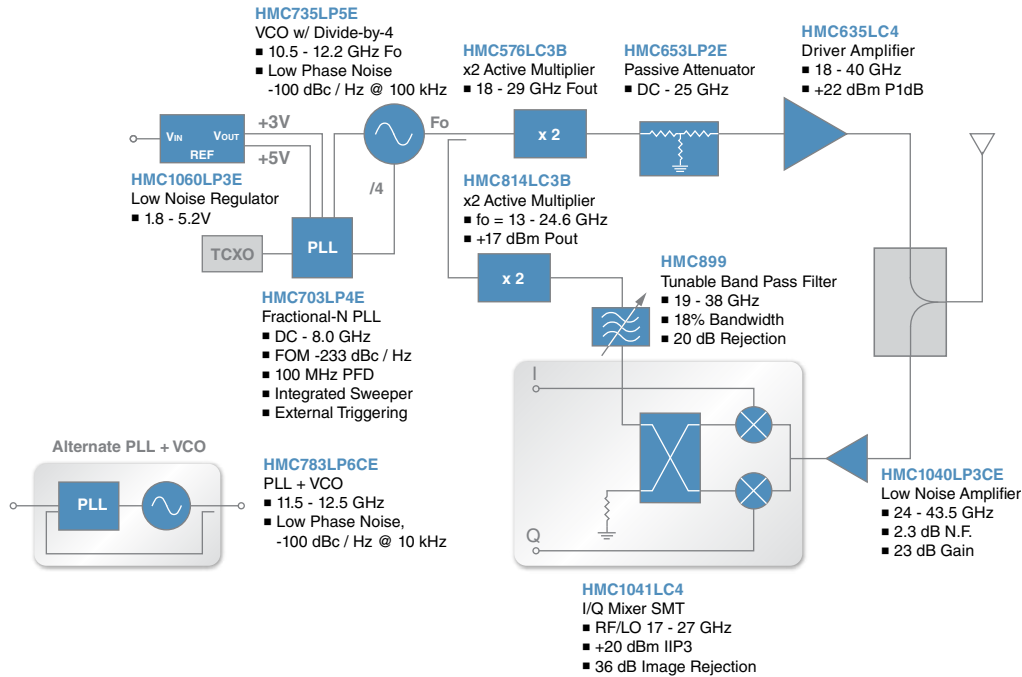
### VARIABLE GAIN AMPLIFIERS

Frequency (GHz)	Function	Gain Control Range (dB)	NF * (dB)	OIP3 * +(dBm)	P1dB (dBm)	Bias Supply	Package	ECCN Code	Part Number
0.5 - 6.0	Analog	-35 to 15	7.5	+28	+21	+5V @ 90 mA	LP5	EAR99	HMC972LP5E
2.3 - 2.5	Analog	-8 to 22	2.5	+7	+3	+3V @ 9 mA	MS8	EAR99	HMC287MS8E
5 - 12	Analog	22	2	+34	+23	+5V @ 120 mA	LP4	EAR99	HMC996LP4E
6 - 17	Analog	0 to 23	5	+30	+22	+5V @ 170 mA	Chip	EAR99	HMC694
6 - 17	Analog	0 to 23	6	+30	+22	+5V @ 175 mA	LP4	EAR99	HMC694LP4E
17 - 27	Analog	15	3.5	+30	+24	+5V @ 170 mA	LC4	EAR99	HMC997LC4
<b>27 - 31.5</b>	<b>Analog</b>	<b>13</b>	<b>4.5</b>	<b>+31</b>	<b>+24</b>	<b>+5V @ 230 mA</b>	<b>LP4</b>	<b>3A001.b.2.d</b>	<b>HMC6187LP4E</b>
0.03 - 0.4	5-Bit Digital, Differential Outputs	-4 to 19	5	+40	+25	+5V @ 240 mA	LP4	EAR99	HMC680LP4E
0.05 - 0.8	5-Bit Digital	-8 to 15	5	+35	+18	+5V @ 65 mA	LP4	EAR99	HMC628LP4E
0.07 - 4.0	6-Bit Digital, Serial & Parallel Control	-19.5 to 12	4	+39	+23	+5V @ 150 mA	LP5	EAR99	HMC742ALP5E
0.5 - 4.0	6-Bit Digital, Serial & Parallel Control or Latched Parallel Control	-19 to 12.5	4	+39	+21.5	+5V @ 150 mA	LP5	EAR99	HMC742HFLP5E
0.7 - 1.2	6-Bit Digital, Serial & Parallel Control	-2.5 to 29	0.8	+38.5	+21	+5V @ 236 mA	LP5	EAR99	HMC707LP5E
0.7 - 2.7	6-Bit Digital	6.5 to 38	4.4	+45	+25	+5V @ 218 mA	LP5	EAR99	HMC926LP5E
DC - 1	6-Bit Digital, Serial & Parallel Control	-11.5 to 20	4.3	+36	+20	+5V @ 90 mA	LP5	EAR99	HMC627ALP5E
DC - 1	6-Bit Digital, Parallel Control	8.5 to 40	2.8	+36	+20	+5V @ 176 mA	LP5	EAR99	HMC626ALP5E
DC - 1	6-Bit Digital, Serial Control	13.5 to 45	2.7	+36	+20	+5V @ 176 mA	LP5	EAR99	HMC681ALP5E
DC - 6	6-Bit Digital, Serial & Parallel Control	-13.5 to 18	6	+33	+19	+5V @ 88 mA	LP5	EAR99	HMC625ALP5E
0.5 - 6.0	6-Bit Digital, Serial & Parallel Control	-13.5 to 18	6	+33	+19	+5V @ 88 mA	LP5	EAR99	HMC625HFLP5E
1.7 - 2.2	6-Bit Digital, Serial & Parallel Control	-2.5 to 29	1.0	+37.5	+21.5	+5V @ 252 mA	LP5	EAR99	HMC708LP5E
DC - 4	Dual 6-Bit Digital, Serial Control	-45 to 18	6	+33	+18	+5V @ 82 mA	LP6C	EAR99	HMC743ALP6CE

\*Maximum Gain State

## Automotive: Telematics & Sensors, 2 - 110 GHz and Broadband, DC - 11 GHz

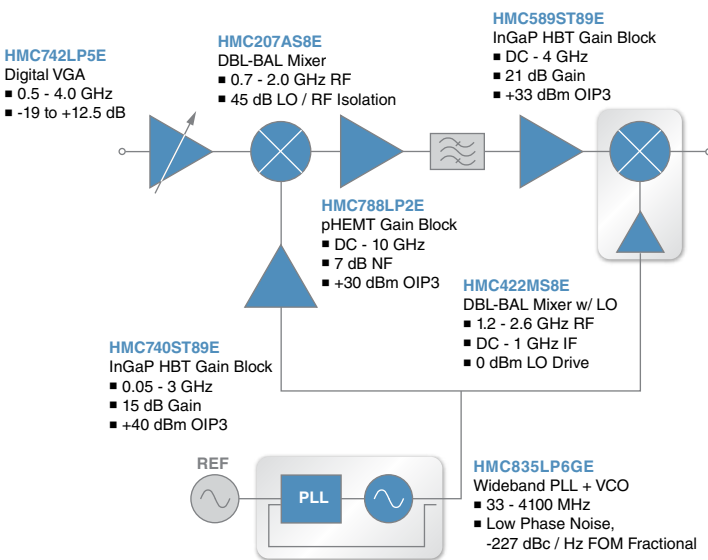
### 24 GHz FMCW AUTOMOTIVE SENSOR



Typical Automotive application is illustrated. See the full product listing for alternatives to the products shown in each functional block.

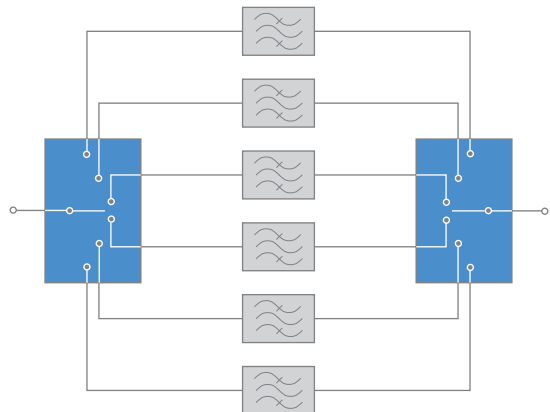
## CABLE MODEM, CATV, DBS & VoIP SOLUTIONS, 5 - 2150 MHz

### Cable Modem Termination System (CMTS)



### A Selection of SPNT Switches for CATV Filter & Signal Routing

Part Number	Frequency (GHz)	Function	1 GHz Loss / Isolation (dB)
HMC348LP3E	DC - 2.5	SPDT, 75 Ω	0.6 / 58
HMC349ALP4CE	DC - 4	SPDT	0.9 / 65
HMC347LP3E	DC - 14	SPDT	1.7 / 44
HMC245QS16E	DC - 3.5	SP3T	0.5 / 44
HMC345LP3E	DC - 8	SP4T	2.2 / 32
HMC252QS24E	DC - 3	SP6T	2.0 / >45
HMC321LP4E	DC - 8	SP8T	2.0 / >45

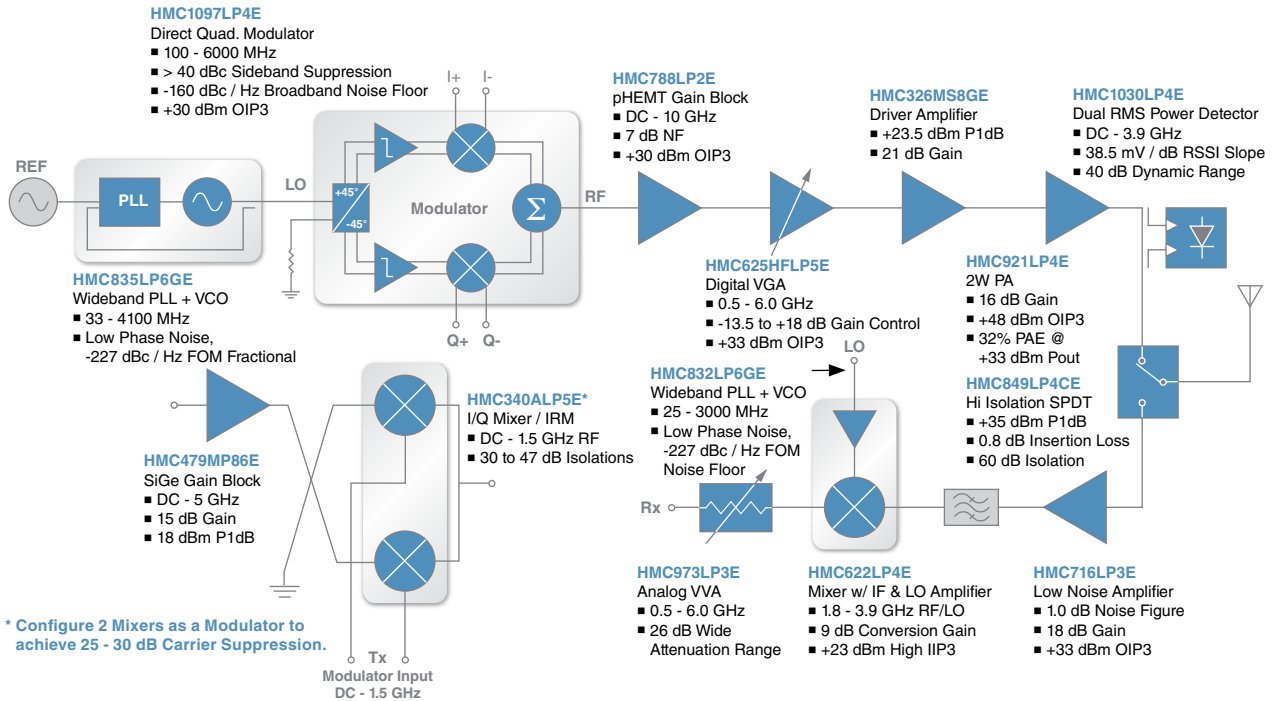


Typical Broadband applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

# MARKET & APPLICATION GUIDE

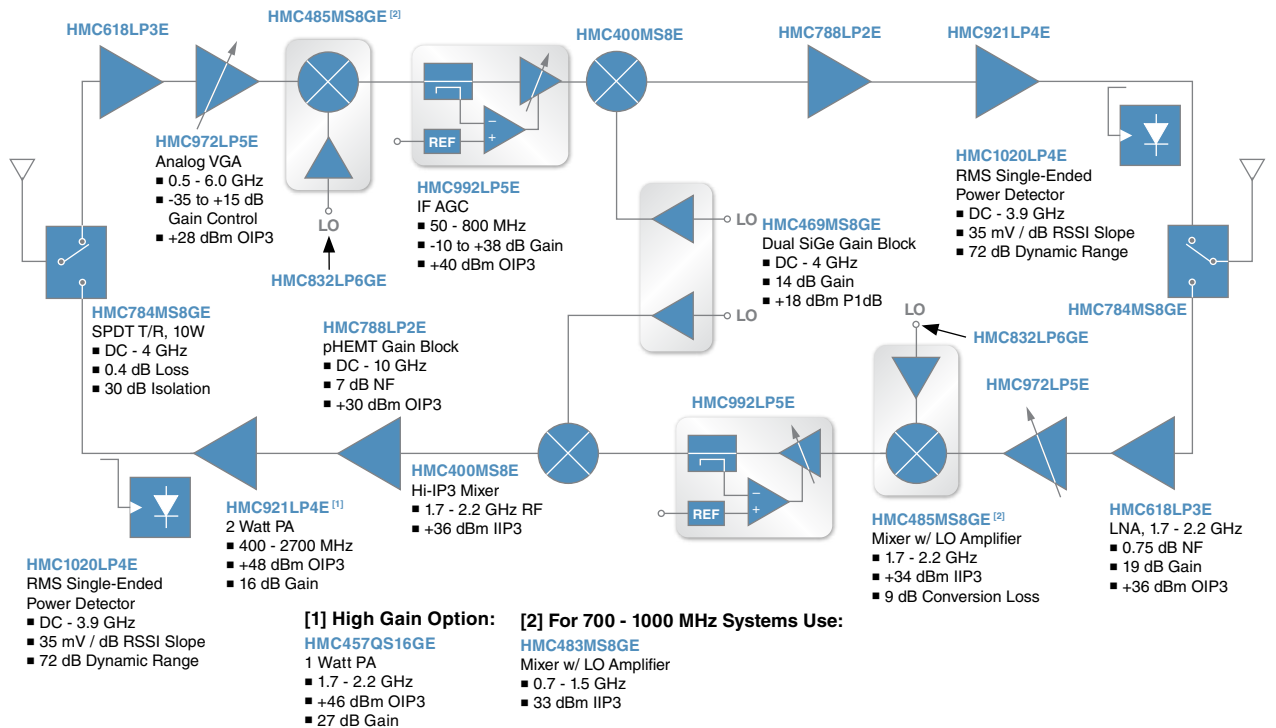
## Broadband, DC - 11 GHz and Cellular Infrastructure, 380 - 2690 MHz

### Fixed Wireless, 2 - 6 GHz



Typical FWA Transceiver is illustrated. See the full product listing for alternatives to the select products shown in each functional block.

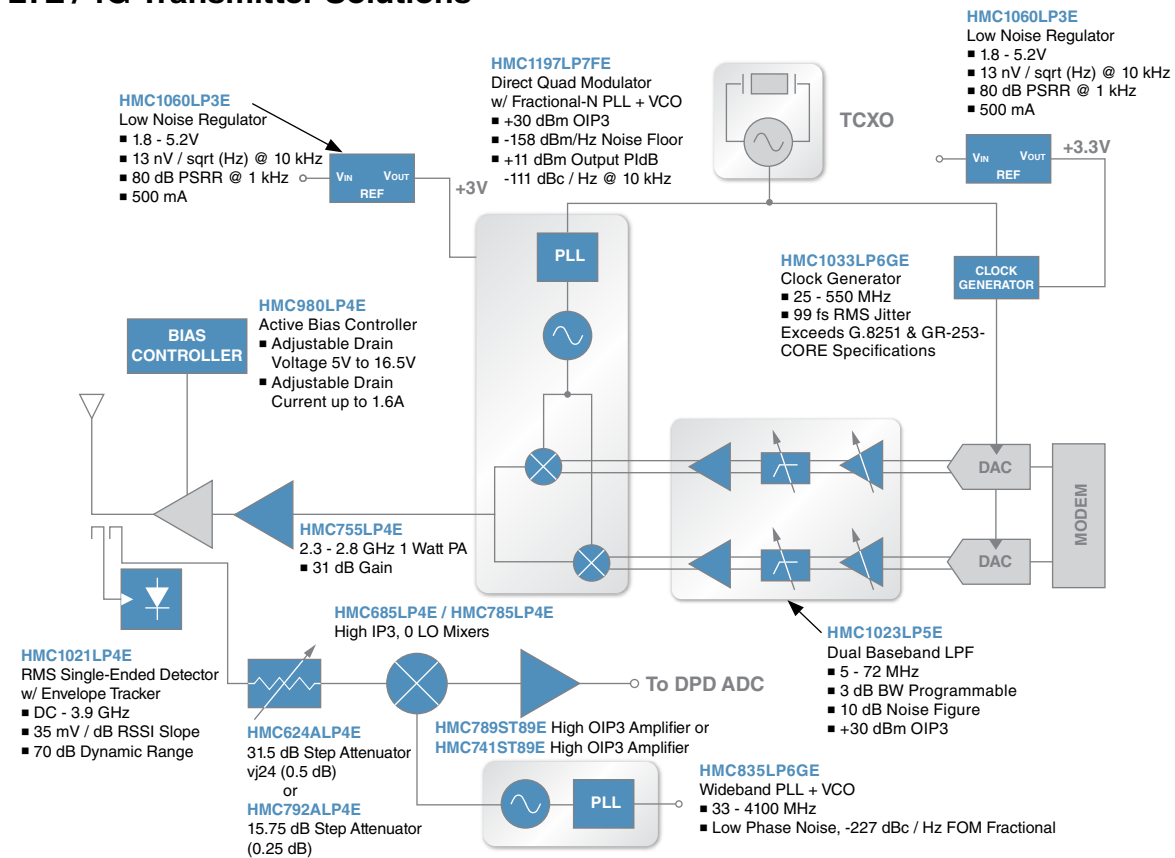
### CDMA/GSM/TD-SCDMA Repeater Solutions



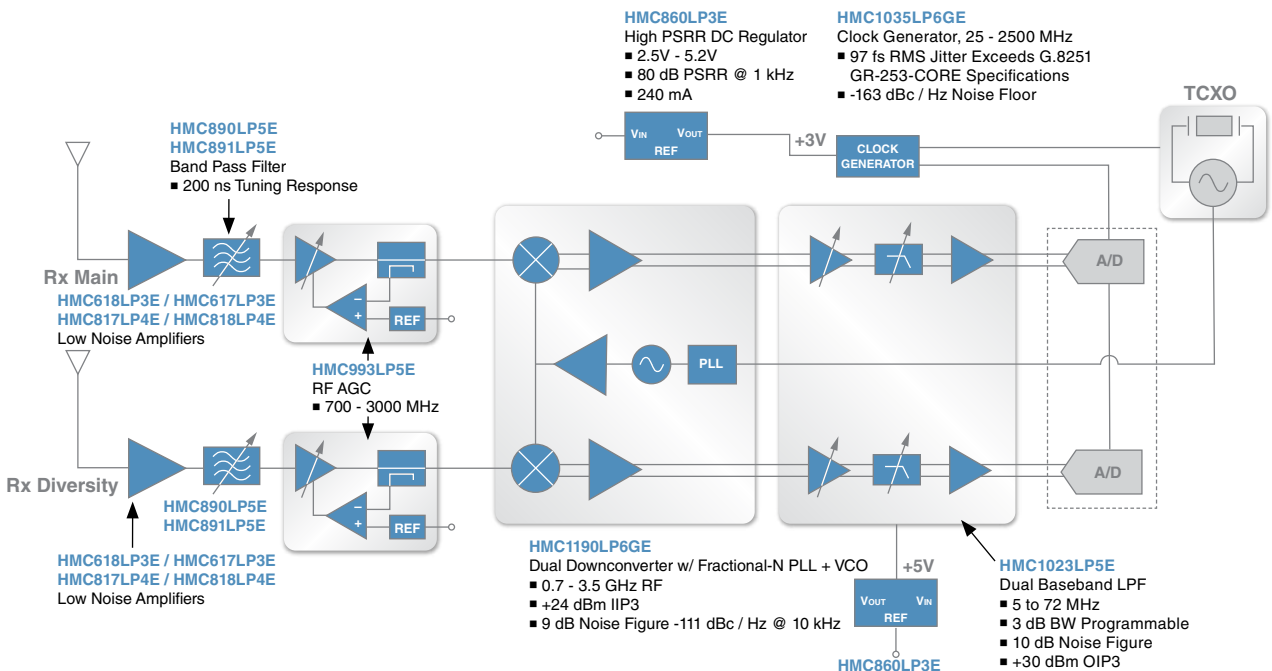
Typical Cellular/PCS/3G applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

## Cellular Infrastructure, 380 - 2690 MHz

### LTE / 4G Transmitter Solutions



### LTE / 4G Receiver Solutions Featuring Heterodyne Downconversion

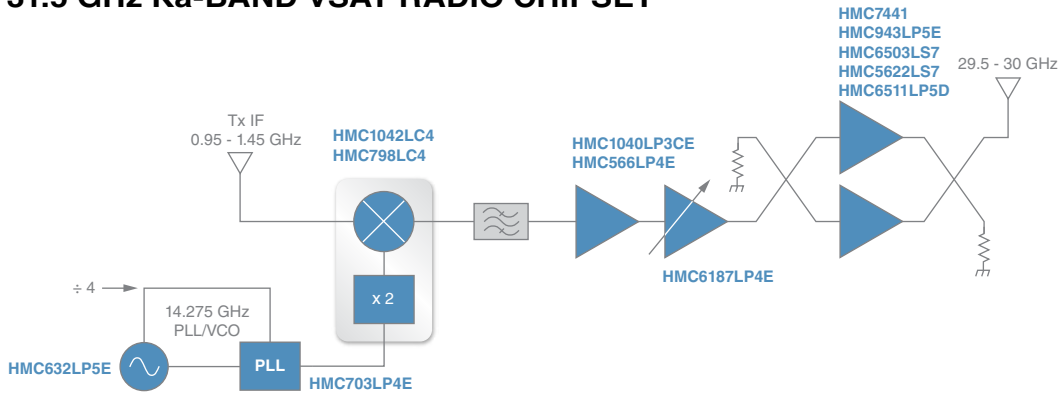


Typical LTE/4G applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

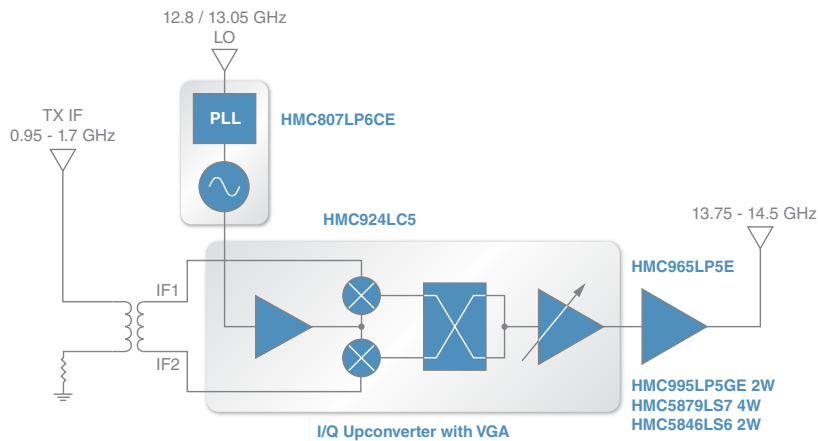
# MARKET & APPLICATION GUIDE

## Microwave & mmWave Communications, Test & Measurement & Sensors, 2 - 86 GHz

### 28 - 31.5 GHz Ka-BAND VSAT RADIO CHIPSET

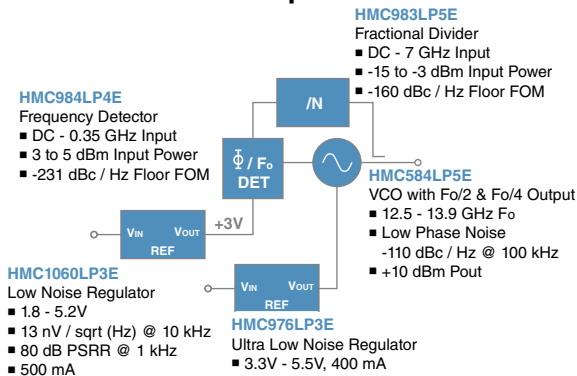


### 13.75 - 14.5 GHz Ku-BAND VSAT RADIO CHIPSET

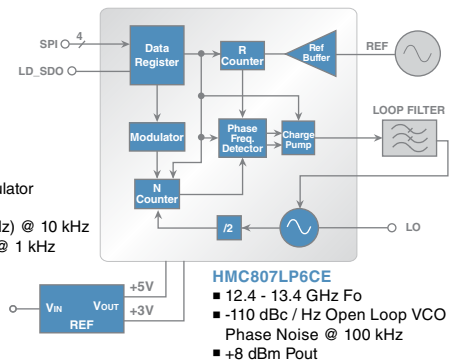


### High Frequency LO Source Alternatives

#### PLL + VCO Chipset



#### PLL with Integrated VCO IC



Typical Microwave / Millimeterwave application is illustrated. See the full product listing for alternatives to the select products shown in each functional block.



## Microwave & mmWave Communications, Test & Measurement & Sensors, 2 - 86 GHz

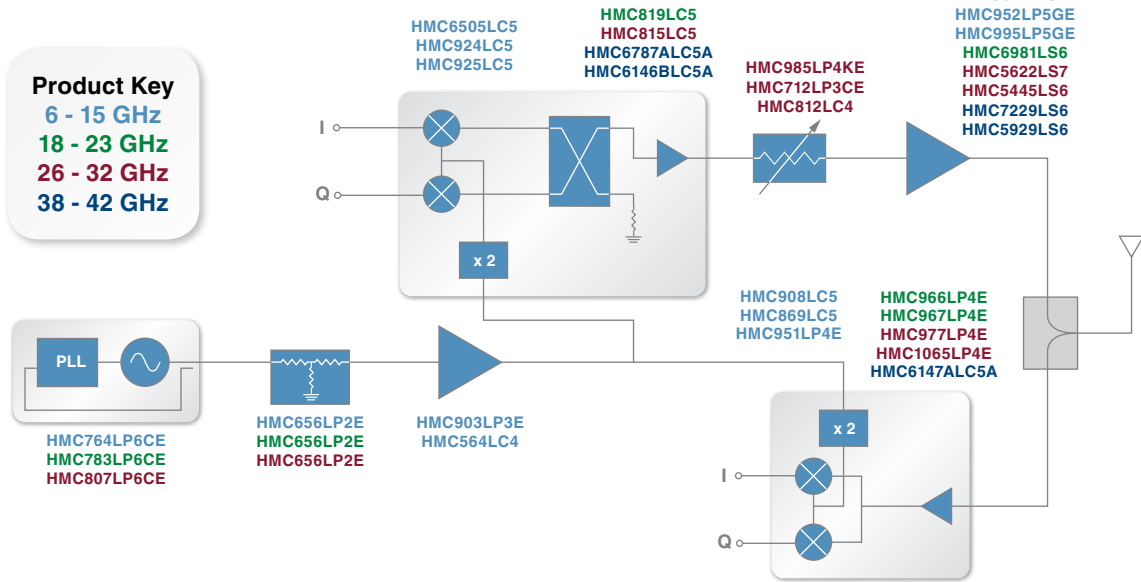
### Chipsets for 6 to 42 GHz Microwave Radio Backhaul

#### Features

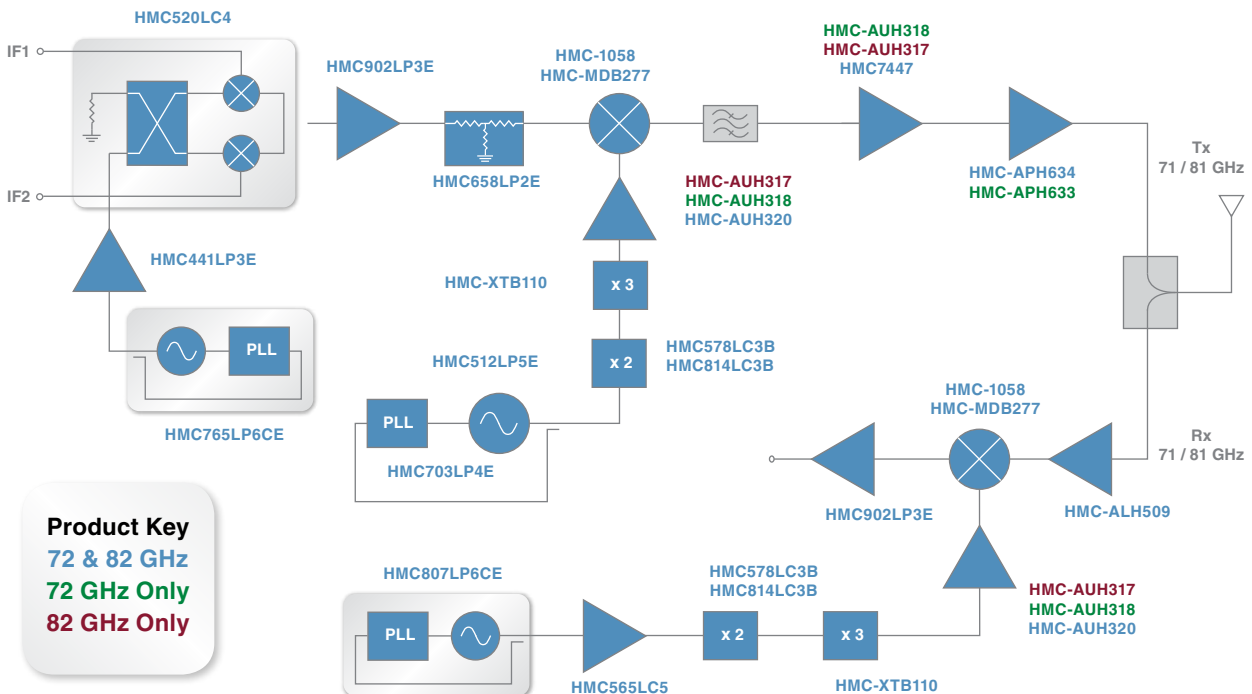
- Integrated IQ Tx Upconverter IC with an X2 LO Buffer & a High Linearity Driver Amplifier
- High Linearity 6 - 42 GHz PAs with up to +44 dBm IOP3 & 5W Output Power
- Low Noise Image Rejection Downconverter IC with an X2 Integrated LO Buffer
- Very Low Phase Noise PLL IC with an Integrated VCO

**Product Key**

6 - 15 GHz  
18 - 23 GHz  
26 - 32 GHz  
38 - 42 GHz



### 70 / 80 GHz Chipset for E-Band Backhaul Radio



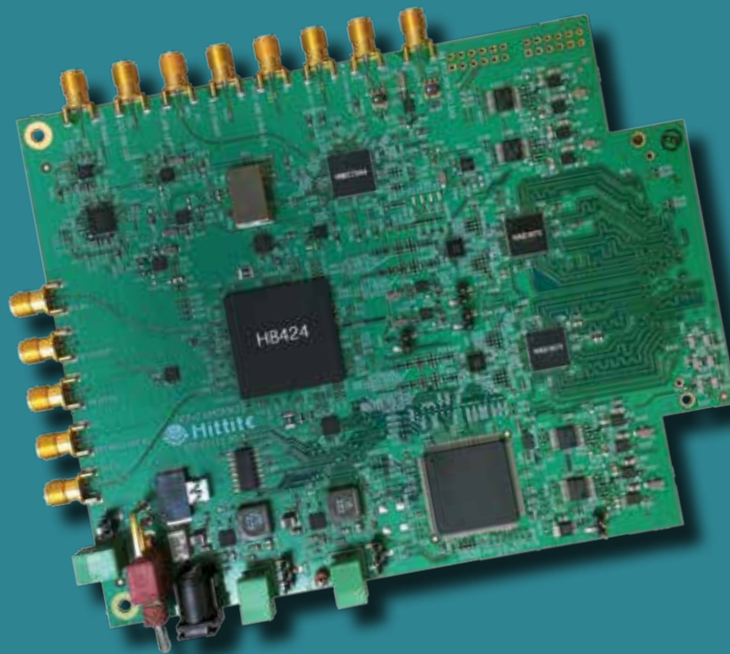
**Product Key**

72 & 82 GHz  
72 GHz Only  
82 GHz Only

Typical Microwave / Millimeterwave application is illustrated. See the full product listing for alternatives to the select products shown in each functional block.

# DUAL DIRECT CONVERSION RECEIVER

Highly Integrated, High Performance, Modular Design  
Supporting Scalable MIMO Architectures



## HMC8363: COMPLETE, INTERGRATED, MULTI-CARRIER GSM COMPLIANT RECEIVER SOLUTION FOR 600 MHz TO 4000 MHz

### Typical Applications

- Multi-Carrier Multi-Standard Cellular Base Stations
- Microwave Point-to-Point
- Adaptive IF Strips
- Test Equipment
- Software Defined Radios

### Features

- Arbitrarily Programmable BW: 7 MHz to 100 MHz
  - Unprecedented BW Accuracy: +/- 2.5%
- Integrated DSP
  - Real-time DC-Offset Compensation
- High Performance ADCs:
  - 80 dBc SFDR, 75 dBFS SNR @ 500 MSPS
- 153 dB of Distributed Programmable Gain

## SMT & Chip (Die) Products

### BROADBAND TIME DELAYS - Analog & Digital

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall (ps)	Deterministic Jitter (ps)	Differential Output Voltage Swing (Vp-p)	DC Power Consumption (mW)	Vcc Power Supply (Vdc)	Package	ECCN Code	Part Number
8 / 23	Analog Time Delay	10 / 11	-	0.5 - 0.95	630	+3.3	LC3	EAR99	HMC877LC3
32 / 24	Analog Time Delay	14 / 14	6	0.15 - 0.6	1450	+3.3	LC4B	3A001.a.11.b	HMC910LC4B
32 / 24	Analog Time Delay	15 / 14	6	0.8	1600	+3.3	LC4	EAR99	HMC911LC4B
28 / 28	5-Bit Digital Time Delay	20 / 18	< 2	0.5 - 1.35	610	-3.3	LC5	3A001.a.11.b	HMC856LC5

### COMPARATORS - High Speed Clocked, Latched & Window Comparators

Analog Input B / W (GHz) / Rate Clock (Gbps)	Function	Deterministic Jitter (ps)	Propagation Delay (ps)	Output Voltage Swing (Vdc)	DC Power (mW)	Vcc / Vterm Power Supply (Vdc)	Package	ECCN Code	Part Number
10 / 20	Clocked Comparator-RSPECL	< 3	120	0.4	150	+3.3 / +1.3	LC3C	3A001.a.11.b	HMC874LC3C
10 / 20	Clocked Comparator-RSCML	< 3	120	0.4	130	0 / 0	LC3C	EAR99	HMC875LC3C
10 / 20	Clocked Comparator-RSECL	< 3	120	0.4	150	0 / -2.0	LC3C	EAR99	HMC876LC3C
10 / [2]	Latched Comparator-RSPECL	2	85	0.4	140	+3.3 / 1.3	LC3C	EAR99	HMC674LC3C
10 / [2]	Latched Comparator-RSPECL	2	85	0.4	140	+3.3 / 1.3	LP3	EAR99	HMC674LP3E
10 / [2]	Latched Comparator-RSCML	2	100	0.4	100	0 / 0	LC3C	EAR99	HMC675LC3C
10 / [2]	Latched Comparator-RSCML	2	100	0.4	100	0 / 0	LP3	EAR99b	HMC675LP3E
10 / [2]	Latched Comparator-RSECL	2	100	0.35	120	0 / -2.0	LC3C	EAR99	HMC676LC3C
10 / [2]	Latched Comparator-RSECL	2	100	0.35	120	0 / -2.0	LP3	EAR99	HMC676LP3E
10	Window Comparator	2	88	0.4	240	+2 / 0	LC3C	EAR99	HMC974LC3C

[1] Vee = -3.0V & Vcci = +3.3V [2] These products are pin for pin compatible

### CROSSPOINT SWITCHES

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (Vppd)	DC Power per Channel (mW)	DC Power Supply (Vdc)	Package	ECCN Code	Part Number
14 / 14	2 x 2 Crosspoint Switch	21 / 21	2	0.5 - 1.2	150	-3.3	LC5	EAR99	HMC857LC5
14.2	13 x 13 Crosspoint Switch Equalization and De-emphasis	22 / 23	-	0.4 - 0.8	100	2.5V, 1.8V	BGA	EAR99	HMC1027BG

### DATA CONVERTERS

#### Ultra High Speed Analog-to-Digital Converters

Input Frequency (GHz)	Function	Sample Rate (GSPS)	Resolution (Bits)	ENOB	SFDR (dBFS)	Package	ECCN Code	Part Number
20	3-Bit ADC with 1:2 Demux	26	3	2.9	26	LP9	EAR99	HMCAD5831LP9BE

#### Track-and-Hold Amplifiers

Input Frequency (GHz)	Function	Single Tone THD/SFDR (dB)	Maximum Clock Rate (GSPS)	Output Noise (mV RMS)	Hold Mode Feed-through Rejection (dB)	Package	ECCN Code	Part Number
DC - 5	Track-and-Hold	-65 / 67	4.0	0.86	> 60	LC4B	EAR99	HMC760LC4B
DC - 18	Track-and-Hold	-65 / 67	4.0	1.05	> 60	LC4B	EAR99	HMC661LC4B
0.02 - 4.5	Track-and-Hold	-66 / 67	3	0.95	> 60	LC4B	EAR99	HMC660LC4B
18	Dual Rank Track-and-Hold	55 / 56	4	1.4	> 65	LC5	EAR99	HMC1061LC5

#### Multi-GHz Quantizer

Input Frequency (GHz)	Function	Content	Sampling Rate (MSPS)	SFDR	SNR	Input Signal Range (Vp - p)	Package	ECCN Code	Part Number
DC - 18	High Speed Data Acquisition	HMC6804LC4B T/H, Amplifier, HMCAD8101 ADC	1000	> 50 dB @ 7 GHz	> 40 dB @ 9 GHz	1	LC4B LP7DE	3A001.a.5.a.1	EKIT01-HMC9000

### DC POWER CONDITIONING - Linear Voltage Regulators

Input Voltage (V)	Function	Output Voltage (V)	Output Current (mA)	Power Supply Rejection Ratio (PSRR) (dB)		Output Noise Spectral Density (nV/√Hz)		Regulated Outputs	Package	ECCN Code	Part Number
				1 kHz	1 MHz	1 kHz	10 kHz				
3.35 - 5.6	Quad High PSRR	2.5 - 5.2	15 - 100	80	60	7	3	4	LP3	EAR99	HMC860LP3E
3.35 - 5.6	Low Noise, High PSRR	1.8 - 5.2	500	80	60	7	3	4	LP3	EAR99	HMC1060LP3E
4.8 to 5.6	Low Noise, High PSRR	1.8 - 5.1	400	60	30	6	3	1	LP3	EAR99	HMC976LP3E

# ANALOG & MIXED-SIGNAL ICS

## SMT & Chip (Die) Products

### DC POWER MANAGEMENT - Active Bias Controller

Supply Voltage Range (V)	Function	VDRAIN Voltage Range (V)	IDRAIN Bias Current (mA)	IGATE Drive Current (mA)	VGATE Voltage Range (V)	Over / Under IDRAIN Current Alarm	Low VDD Alarm	Package	ECCN Code	Part Number
4 - 12	Active Bias Controller	4 - 12	20 - 200	-0.8 to +0.8	-2.5 to +2.0	-	-	Chip	EAR99	HMC981
4 - 12	Active Bias Controller	4 - 12	0 - 200	-0.8 to +0.8	-2.5 to +2.5	-	-	LP3	EAR99	HMC981LP3E
5 - 16.5	Active Bias Controller	3 - 15	0 - 500	-4 to +4	-2.5 to +2.5	Yes	Yes	LP5	EAR99	HMC920LP5E
5 - 16.5	Active Bias Controller	5 - 16.5	50 - 1600	-4 to +4	-2.46 to +2.04	Yes	-	Chip	EAR99	HMC980
5 - 16.5	Active Bias Controller	5 - 16.5	50 - 1600	-4 to +4	-2.46 to +2.04	Yes	-	LP4	EAR99	HMC980LP4E

### HIGH SPEED DIGITAL LOGIC

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (Vppd)	DC Power (mW)	DC Power Supply (Vdc)	Package	ECCN Code	Part Number
<b>1:2 &amp; 1:4 Fanout Buffers</b>									
13 / 13	Fast Rise Time 1:2 Fanout Buffer*	19 / 18	2	0.6 - 1.1	300	-3.3 or +3.3	LP3	EAR99	HMC720LP3E
13 / 13	Fast Rise Time 1:2 Fanout Buffer	19 / 18	2	1.1	300	-3.3 or +3.3	LC3	EAR99	HMC724LC3
13 / 13	Fast Rise Time 1:2 Fanout Buffer*	22 / 20	2	0.6 - 1.2	290	-3.3 or +3.3	LC3	EAR99	HMC744LC3
28 / 20	1:2 Fanout Buffer*	16 / 15	2	0.6 - 1.1	315	-3.3 or +3.3	LC3	EAR99	HMC850LC3
45 / 28	1:2 Fanout Buffer w/ Adj. Vout*	11 / 11	3	0.4 - 1.2	465	-3.3	LC4B	EAR99	HMC842LC4B
13 / 13	1:4 Fanout Buffer*	26 / 25	4	0.6 - 1.4	440	-3.3 or +3.3	LC4B	EAR99	HMC940LC4B
<b>2:1 Selectors</b>									
14 / 14	2:1 Differential Selector*	19 / 20	2	0.5 - 1.3	221	-3.3 or +3.3	LC4B	EAR99	HMC858LC4B
13 / 13	2:1 Differential Selector	17 / 15	-	0.6 - 1.2	250	-3.3 or +3.3	LC3C	EAR99	HMC678LC3C
13 / 13	2:1 Differential Selector	17 / 15	-	1.1	250	-3.3 or +3.3	LC3C	EAR99	HMC728LC3C
13 / 13	2:1 Selector*	22 / 22	2	0.6 - 1.2	250	-3.3 or +3.3	LC3C	EAR99	HMC748LC3C
14 / 14	4:1 Selector*	17 / 17	2	0.5 - 1.3	294	-3.3 or +3.3	LC5	EAR99	HMC958LC5
<b>AND / NAND / OR / NORs</b>									
13 / 13	Fast Rise Time AND / NAND / OR / NOR w/ Adj. Vout*	19 / 18	2	0.6 - 1.1	230	-3.3 or +3.3	LC3C	EAR99	HMC722LC3C
13 / 13	Fast Rise Time AND / NAND / OR / NOR*	19 / 18	2	0.6 - 1.1	230	-3.3 or +3.3	LP3	EAR99	HMC722LP3E
13 / 13	Fast Rise Time AND / NAND / OR / NOR	19 / 18	2	1.1	230	-3.3 or +3.3	LC3C	EAR99	HMC726LC3C
13 / 13	Fast Rise Time AND / NAND / OR / NOR*	22 / 21	2	0.6 - 1.2	230	-3.3 or +3.3	LC3C	EAR99	HMC746LC3C
28 / 28	AND / NAND / OR / NOR*	15 / 14	2	0.6 - 1.5	241	-3.3 or +3.3	LC3C	EAR99	HMC852LC3C
45 / 25	AND / NAND / OR / NOR*	10 / 10	2	0.2 - 0.9	530	-3.3	LC4B	3A001.a.11.b	HMC843LC4B
<b>Clock Dividers</b>									
- / 26	Clock Divide-by- 4*	19 / 19	2	0.8 - 1.8	281	-3.3 or +3.3	LC3	EAR99	HMC959LC3
- / 26	Clock Divide-by- 8*	19 / 17	2	0.8 - 1.8	520	-3.3 or +3.3	LC3	EAR99	HMC859LC3
<b>D-Type Flip-Flops</b>									
14 / 14	Dual D-Type Flip-Flop w/ Common Clock*	22 / 20	2	0.6 - 1.3	442	-3.3 or +3.3	LC4B	EAR99	HMC953LC4B
13 / 13	Fast Rise Time D-Type Flip-Flop w/ Adj. Vout*	19 / 17	2	0.7 - 1.3	264	-3.3 or +3.3	LC3C	EAR99	HMC723LC3C
13 / 13	Fast Rise Time D-Type Flip-Flop*	19 / 17	2	0.7 - 1.3	260	-3.3 or +3.3	LP3	EAR99	HMC723LP3E
13 / 13	Fast Rise Time D-Type Flip-Flop	19 / 17	2	1.1	260	-3.3 or +3.3	LC3C	EAR99	HMC727LC3C
13 / 13	Fast Rise Time D-Type Flip-Flop*	22 / 20	2	0.7 - 1.2	264	-3.3 or +3.3	LC3C	EAR99	HMC747LC3C
28 / 28	D-Type Flip-Flop*	15 / 14	2	0.7 - 1.3	260	-3.3 or +3.3	LC3	EAR99	HMC853LC3
43 / 43	D-Type Flip-Flop*	12 / 12	2	0.2 - 0.85	630	-3.3	LC4B	EAR99	HMC841LC4B
<b>NRZ-to-RZ Converters</b>									
13 / 13	NRZ-to-RZ Converter	15 / 13	2	0.3 - 1.2	594	-3.3 or +3.3	LC3C	EAR99	HMC706LC3C

## SMT & Chip (Die) Products

### HIGH SPEED DIGITAL LOGIC

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (Vppd)	DC Power (mW)	DC Power Supply (Vdc)	Package	ECCN Code	Part Number
26 / 26	T Flip-Flop w/ Reset*	18 / 17	2	0.4 - 1.1	270	-3.3 or +3.3	LC3C	EAR99	HMC679LC3C
26 / 26	T Flip-Flop w/ Reset*	18 / 17	2	1.1	270	-3.3 or +3.3	LC3C	3A001.a.11.b	HMC729LC3C
26 / 26	T Flip-Flop w/ Reset*	18 / 17	2	0.6 - 1.2	270	-3.3 or +3.3	LC3C	EAR99	HMC749LC3C

\*Programmable Output Voltage Swing.

### XOR / XNORs

13 / 13	Fast Rise Time XOR / XNOR w/ Adj. Vout*	19 / 18	2	0.6 - 1.2	230	-3.3 or +3.3	LC3C	EAR99	HMC721LC3C
13 / 13	Fast Rise Time XOR / XNOR*	19 / 18	2	0.6 - 1.2	230	-3.3 or +3.3	LP3	EAR99	HMC721LP3E
13 / 13	Fast Rise Time XOR / XNOR	19 / 18	2	1.1	230	-3.3 or +3.3	LC3C	EAR99	HMC725LC3C
13 / 13	Fast Rise Time XOR / XNOR*	21 / 19	2	0.6 - 1.2	240	-3.3 or +3.3	LC3C	EAR99	HMC745LC3
28 / 28	XOR / XNOR*	15 / 14	2	0.6 - 1.4	241	-3.3 or +3.3	LC3C	EAR99	HMC851LC3C
45 / 28	XOR / XNOR*	11 / 10	3	0.2 - 8.5	512	-3.3	LC4B	EAR99	HMC844LC4B

\*Programmable Output Voltage Swing.

### 1:9 Fanout Buffer

Clock Rate (GHz)	Function	Input	Output	Phase Jitter (12 k to 20 MHz)	Rise/Fall Time (ps)	Channel Skew (ps)	Disable Mode	Power Supply (V)	Package	ECCN Code	Part Number
DC - 8	1:9 Fanout Buffer	LVPECL, LVDS, CML, CMOS	LVPECL	8 fs RMS	65	3.1	Yes	3.3	LP5	EAR99	HMC987LP5E

### IF / BASEBAND PROCESSING - Dual Baseband Low Pass Filter & Dual Baseband Digital VGA

#### Dual Baseband Low Pass Filter

3 dB Bandwidth Setting (MHz)	Function	3 dB Bandwidth Accuracy (%)	Gain (dB)	NF (dB)	OIP3 (dBm)	Package	ECCN Code	Part Number
3.5 - 50	Dual Low Pass w/ ADC Driver	±2.5	0 / 10	12	30	LP5	EAR99	HMC900LP5E
5 - 72	Dual Low Pass w/ ADC Driver	±2.5	0 / 10	10	30	LP5	EAR99	HMC1023LP5E

#### Dual Baseband Digital VGA

Frequency (MHz)	Function	NF (dB)	Variable Gain (dB)	OIP3 (dBm)	OIP2 (dBm)	Sideband Supp. (dB)	Magnitude (dB) / Phase (deg) Balance	Bias Supply	Package	ECCN Code	Part Number
DC - 100	Digital, Serial & Parallel Control	6	0 - 40	+30	+65	55	±0.1 / ±1	+5V @ 70 mA	LP4	EAR99	HMC960LP4E

### INTERFACE - RF Switch, Attenuator & Phase Shifter Digital Drivers

Bit Rate (mbps)	Function	Input	Output Voltage (V)	Output Current (mA)	Bias Supply	Package	ECCN Code	Part Number
10	6-Bit Switch Driver / Controller	TTL/CMOS	-5 / +2.2	1	+5V @ 1.5 mA	LP5	EAR99	HMC677LP5E
10	6-Bit Switch Driver / Controller	TTL/CMOS	-5 / +2.2	1	+5V @ 1 mA	G32	EAR99	HMC677G32

### LIMITING AMPLIFIERS

Data Rate (Gbps)	Function	Small Signal Bandwidth (GHz)	Differential Gain (dB)	Deterministic Jitter (ps p-p)	Additive Random Jitter (ps rms)	Supply Current	Package	ECCN Code	Part Number
12.5	Limiting Amplifier	11	44	5	0.2	+5V @ 106 mA	LP4	EAR99	HMC750LP4E
12.5	Limiting Amplifier w/ LOS	9.5	32	-	0.9	+3.3V @ 47 mA	LP4	EAR99	HMC914LP4E
32	Limiting w/ DC Offset Cancellation	26.5	30	5.6	0.3	+3.3V @ 90 mA	LC3	EAR99	HMC865LC3
32	Limiting w/o DC Offset Cancellation	26.5	29	6.84	0.3	+3.3V @ 85 mA	LC3	EAR99	HMC866LC3

### MUX & DEMUX

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall (ps)	Deterministic Jitter (ps)	Differential Output Voltage Swing (Vppd)	DC Power Consumption (mW)	Vee Power Supply (Vdc)	Package	ECCN Code	Part Number
32 / 16	2:1 Mux*	15 / 15	-	0.8 - 1.5	480	-3.3 or +3.3	LC4B	EAR99	HMC954LC4B
28 / 14	4:1 Mux*	16 / 16	4	0.7 - 1.25	510	-3.3 or +3.3	LC5	EAR99	HMC854LC5
45 / 22.5	4:1 Mux*	11 / 12	3	0.25 - 0.9	1782	+3.3	LC5	EAR99	HMC847LC5
32 / 16	1:2 Demux w/ High Speed Invert*	19 / 18	< 3	0.5 - 1.2	644	-3.3 or +3.3	LC4B	EAR99	HMC955LC4B
28 / 14	1:4 Demux*	22 / 22	-	0.45 - 1.14	644	-3.3 or +3.3	LC5	EAR99	HMC855LC5
45 / 22.5	1:4 Demux*	25 / 21	4	0.3 - 1.0	1782	+3.3	LC5	EAR99	HMC848LC5

\*Programmable Output Voltage and/or Duty Cycle Control



# ANALOG & MIXED-SIGNAL ICS

## SMT & Chip (Die) Products

### OPTICAL MODULATOR DRIVERS

Data Rate Max. (Gbps)	Function	Gain (dB)	Group Delay Variation (ps)	Additive Jitter (ps)	Output Voltage Max. (Vp-p)	Package	ECCN Code	Part Number
22.5	8 Vp-p Optical Modulator Driver	18	±15	0.3	8	LC5	EAR99	HMC870LC5 [1]
22.5	3 Vp-p Optical Modulator Driver	15	±15	0.3	3	LC5	EAR99	HMC871LC5 [1]
28	28 Gbps EML Driver	11	±7	0.27	2.2	LP3D	EAR99	HMC7150LP3DE [1]
28	Quad Optical Modulator Driver	28	±4	0.23	7.5	Module	EAR99	HMC6282A
<b>32</b>	<b>Quad Optical Modulator Driver</b>	<b>26</b>	<b>±3</b>	<b>0.325</b>	<b>7.4</b>	<b>Module</b>	<b>EAR99</b>	<b>HMC7282B</b>
32	3 Vp-p Optical Modulator Driver, w/ Peak Detect	14	±5	0.3	3	Chip	EAR99	HMC1050
32	32 Gbps Optical Modulator Driver, Pre-Stage	15	±5	0.3	3	Chip	EAR99	HMC1068
32	32 Gbps Optical Modulator Driver	15	±5	0.3	7.5	Chip	EAR99	HMC1069
32	8 Vp-p Optical Modulator Drive, w/ Peak Detect	16	±5	0.3	8	Chip	EAR99	HMC1051
32	8 Vp-p Optical Modulator Driver, SMT Package	32	±7	0.25	8	BGA	EAR99	HMC5850BG

[1] Drivers that benefit from Hittite Active Bias Controllers [2] Request Data Sheet: RFMG-FO@analog.com

### SIGNAL CONDITIONER

Data Rate Max. (Gbps)	Function	Number of Taps	Differential Input Sensitivity (mVpp)	Tap Delay (ps)	Total Harmonic Distortion (%)	Package	ECCN Code	Part Number
32	Advanced Linear Equalizer	9	20	18	5	LP5	3A001.a.11.b	HMC6545LP5

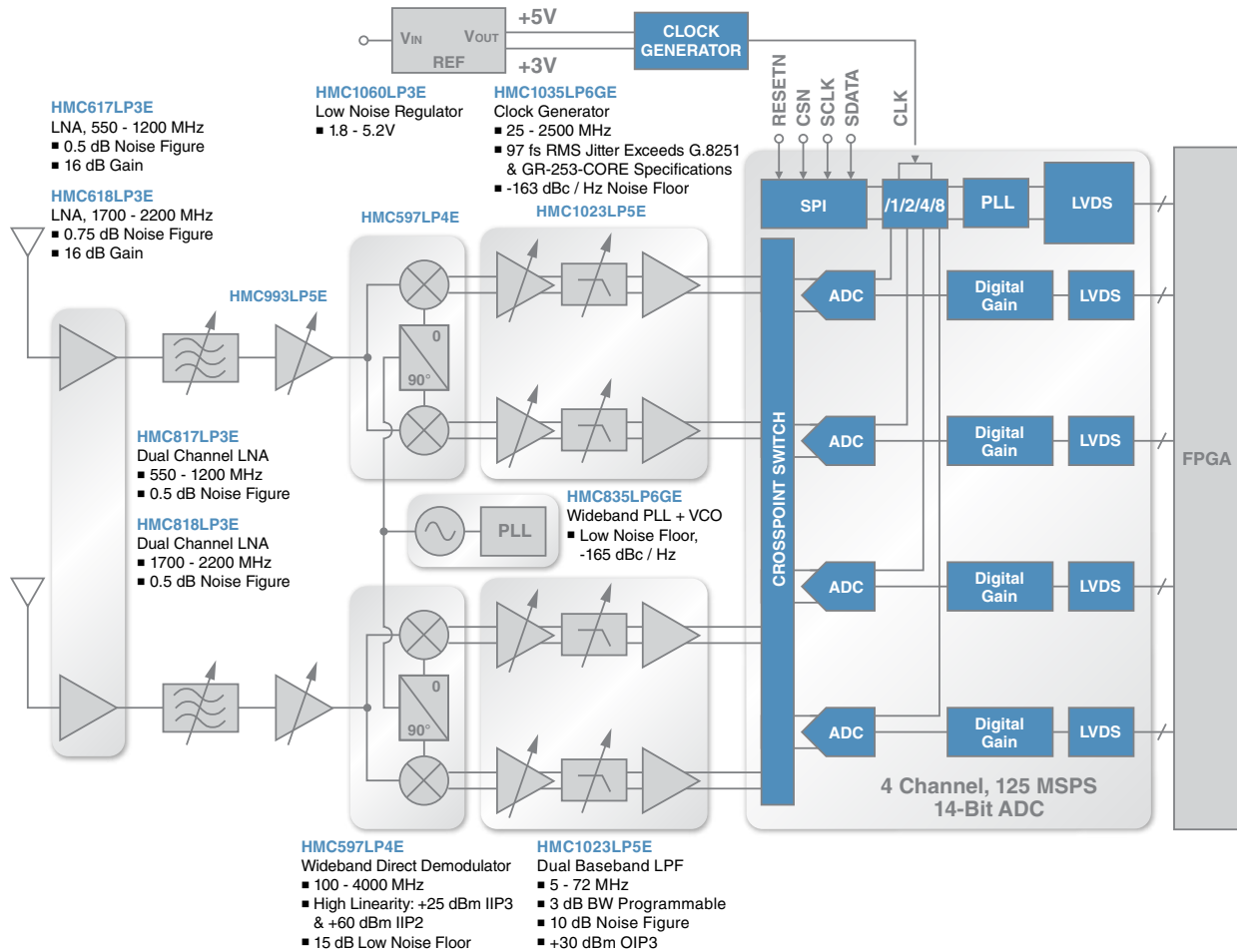
### TRANSIMPEDANCE AMPLIFIERS

Data Rate (Gbps)	Function	Transimpedance (kΩ)	Input Overload (mApp)	Small Signal Bandwidth (GHz)	Deterministic Jitter (ps)	Noise (pA/√Hz)	Package	ECCN Code	Part Number
0.1 - 1.0	Low Noise Transimpedance Amplifier	10	20	0.7	< 100	4.6	LP3	EAR99	HMC799LP3E
1 - 10	Transimpedance Amplifier	1.25	3	7.5	< 10	11	Chip	EAR99	HMC690
43	Transimpedance Amplifier	3.5	4.5	32	-	20	Chip	EAR99	HMC7590

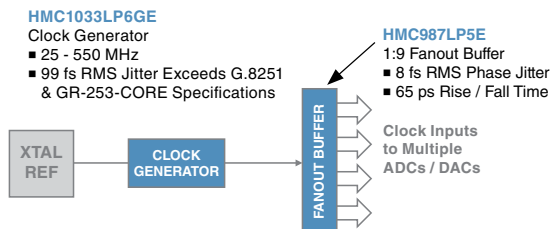
## MARKET & APPLICATION GUIDE

### Baseband and Zero IF Communication

#### Direct Conversion Receiver w/ Diversity



#### ADC / DAC Clock Driver Circuit

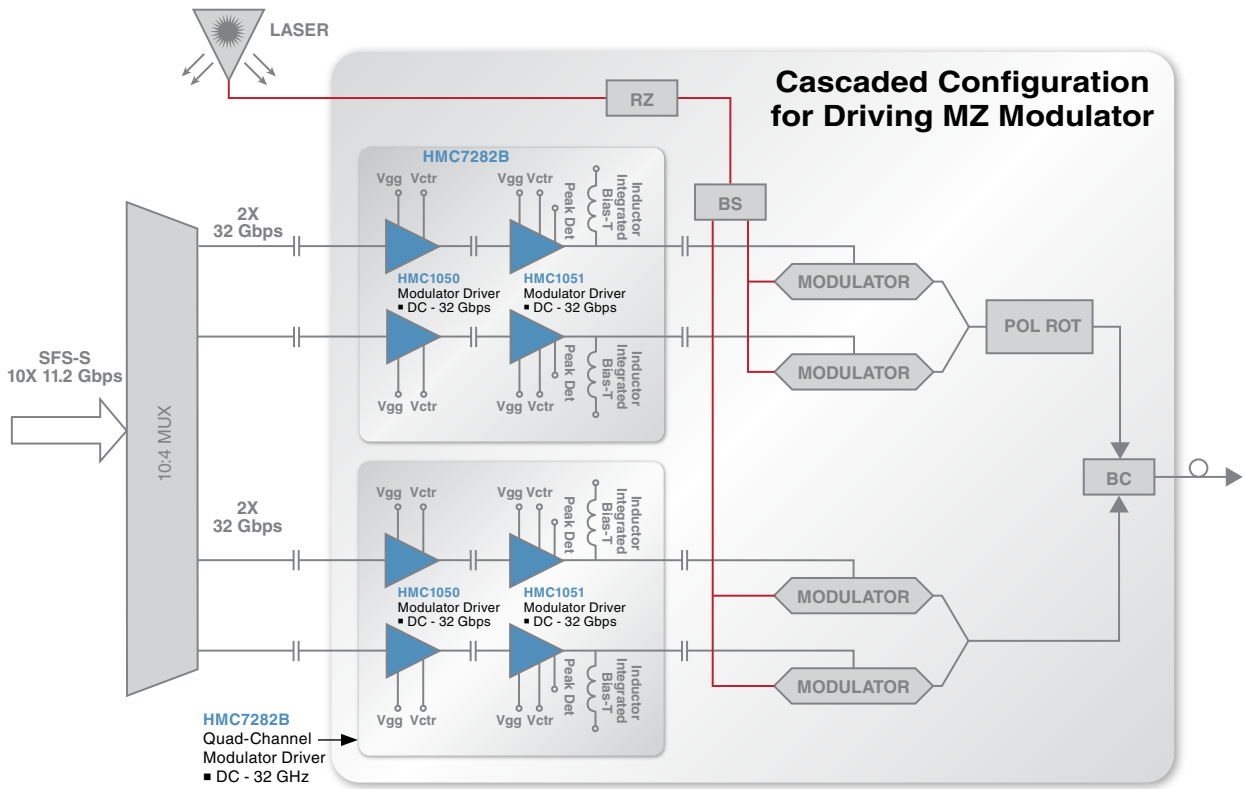


Typical Fiber Optic & Networking applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

# MARKET & APPLICATION GUIDE

## Fiber Optics & Networking

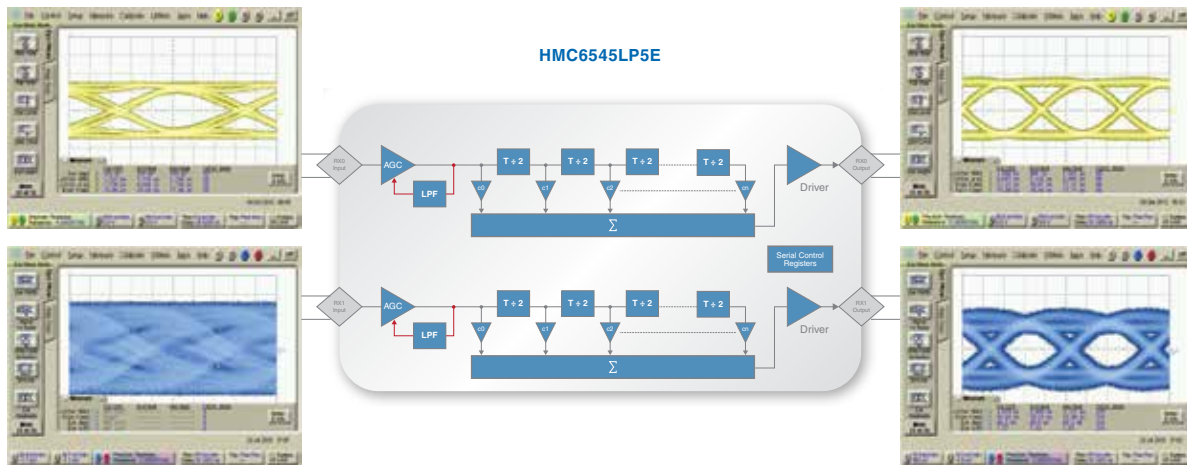
### 100G DWDM Transponder Transmit Path



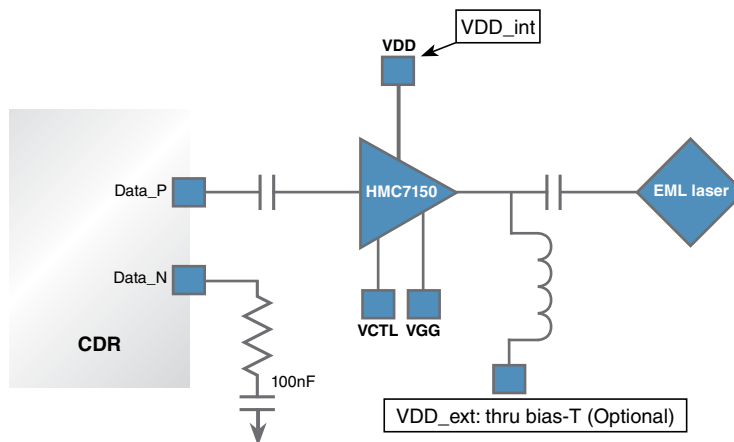
Typical Fiber Optic & Networking applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

## Fiber Optics & Networking

### Dual Channel Advanced Linear Equalizer



### HMC7150 SE Interface with CDR: Self Biasing



Typical Fiber Optic & Networking applications are illustrated.  
See the full product listing for alternatives to the select products shown in each functional block.

# CLOCK & TIMING ICs

## SMT & Chip (Die) Products & Clock Generators for Data Converters Clocking

### CLOCK DISTRIBUTION

Max. Clock Rate (GHz)	Function	Input	Output	Phase Jitter (12 kHz - 20 MHz)	Rise / Fall Time (ps)	Channel Skew (ps)	Disable Mode	Power Supply (V)	Package	ECCN Code	Part Number
4	Clock Divider & Delay Management	LVPECL, LVDS, CML, CMOS	LVPECL	13 fs RMS	90	300 to 1500 Prog. Delay	Yes	5 or 3.3	LP3	EAR99	HMC988LP3E
8	1:8+1 Fanout Buffer	LVPECL, LVDS, CML, CMOS	LVPECL	8 fs RMS	65	3.1	Yes	3.3	LP5	EAR99	HMC987LP5E

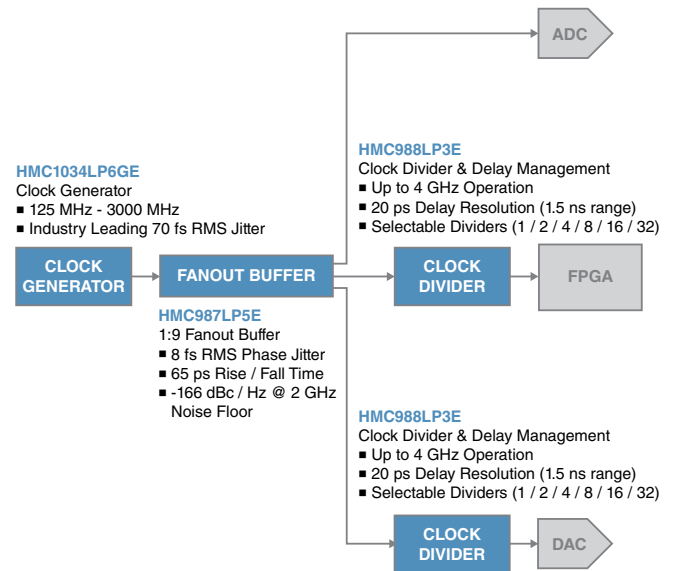
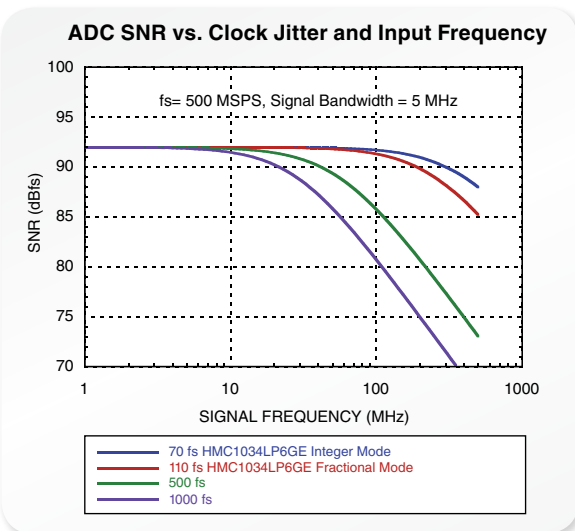
### CLOCK GENERATORS

Max. Frequency (MHz)	Function	Typical Phase Jitter (fsRMS)	Phase Noise Floor (dBc / Hz)	Maximum Reference Freq. (MHz)	Typical Power Consumption (W)	Figure of Merit (Frac/Int) (dBc / Hz)	Package	ECCN Code	Part Number
350	Clock Generator with Fractional-N PLL + VCO	75	-165	350	0.86	-227 / -230	LP6G	3A001.a.11.b	HMC1032LP6GE
500	Integer Mode PLL (x1, x5, x10)	Defined by VCXO	Defined by VCXO	140	0.0064	-208	MS8	3A001.a.11.b	HMC1031MS8E
550	High Performance +3.3V Clock Generator	99	-163	350	0.64	-226 / -227	LP6G	EAR99	HMC1033LP6GE
2500	High Performance +3.3V Clock Generator	97	-163	350	0.57	-226 / -227	LP6G	3A001.a.11.b	HMC1035LP6GE
3000	Clock Generator with Fractional-N PLL + VCO	78	-165	350	0.86	-227 / -230	LP6G	3A001.a.11.b	HMC1034LP6GE

### Extract the Best SNR Performance from Your Data Converters

- HMC1034LP6GE achieves 70 fs Typ. RMS Phase Jitter in Integer Mode
- HMC987LP5E, 1:8 LVPECL Fan-Out Buffer Distributes Data Converter Sample Clocks with Only 8 fs RMS Additive Jitter (12 kHz - 20 MHz)
- HMC988LP3E Clock Divider & Delay Management IC Adjusts Data Converter Sample Clock Windows in 20 ps Resolution and Offers -170 dBc / Hz Phase Noise Floor

The low phase noise floor of a clock signal as well as its low integrated phase jitter helps to minimize the SNR degradation at high ADC / DAC input frequencies in multi-carrier, multi-acquisition applications. Our Clock & Timing ICs are designed with data converter applications in mind.



Please note the DC Power Conditioning table is in the LO Generation ICs section.



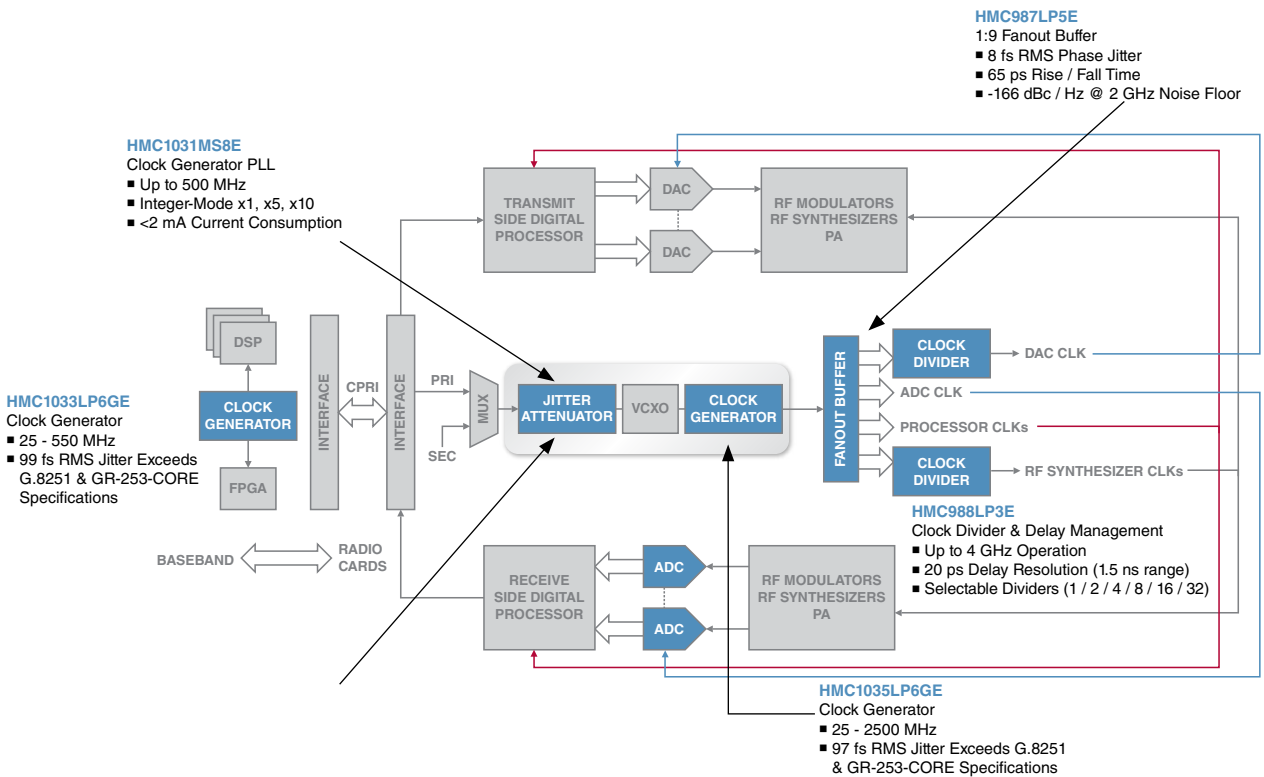
## MARKET & APPLICATION GUIDE

### Clock & Timing

#### For Broadband, Cellular Infrastructure and Fiber Optic & Networking

##### Features

- Low Noise Floor of -166 dBc / Hz Makes the HMC987LP5E Ideal for Clocking High Performance ADC/DAC & SERDES Devices
- HMC1031MS8E Ultra-Low Power Integer Mode PLL Enables Jitter Attenuation with 1.6 mA Typical Current Consumption from a Single 3.3V Supply
- HMC988LP3E Offers Selectable Frequency Division and Clock Delay Management with 20 ps Resolution Up to 1.5 ns Total Delay Range
- <100 fs Integrated Phase Jitter of the HMC1035LP6GE Clock Generator Improves Data Converter SNR



Contact us for Custom Multi-Chip-Module  
Timing Applications: [RFMG-timing@analog.com](mailto:RFMG-timing@analog.com)

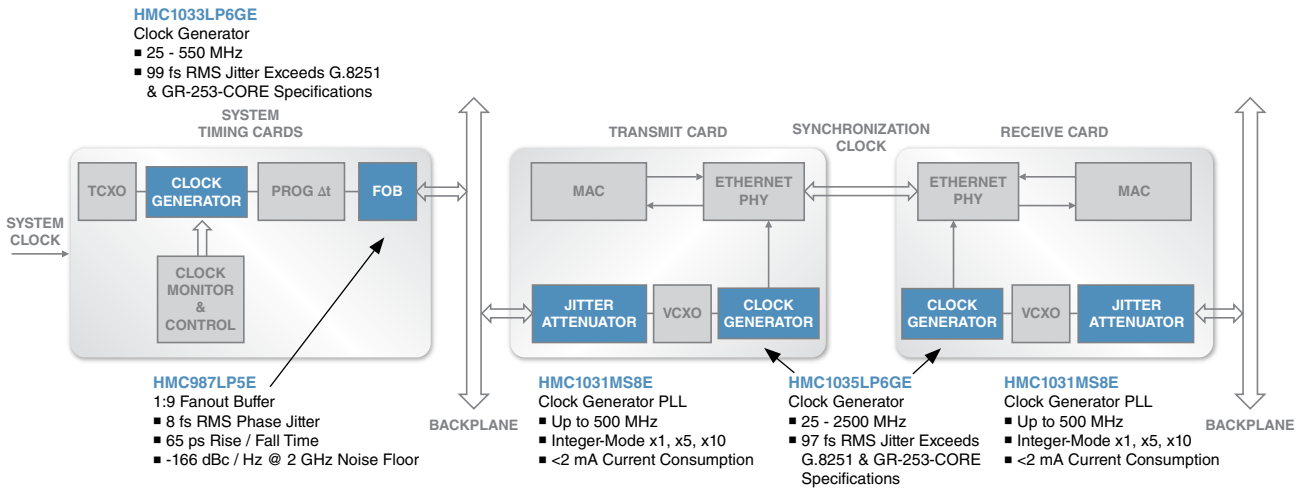
# MARKET & APPLICATION GUIDE

## Clock & Timing

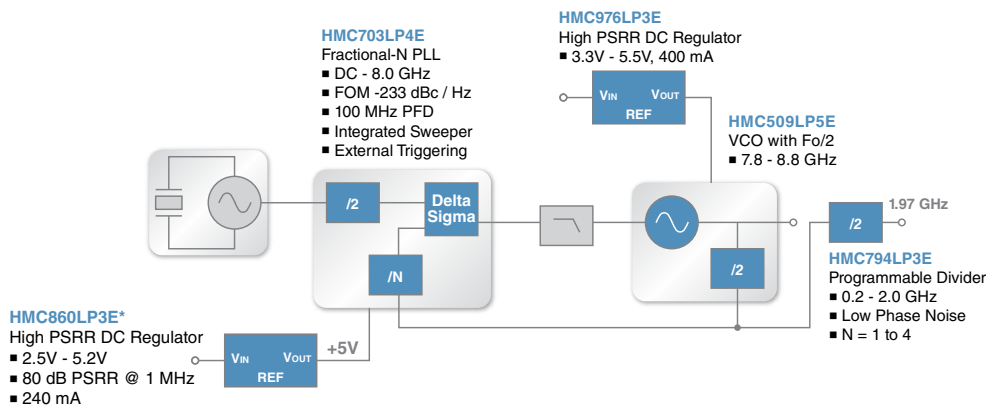
### For Broadband, Cellular Infrastructure and Fiber Optic & Networking

#### Features

- <10 fs 12 kHz - 20 MHz integrated Phase Jitter Performance of HMC987LP5E Enables High Performance Clock Distribution with Negligible Jitter Generation
- A Flexible Input Interface Allows the HMC987LP5E LVDS, CML & CMOS Inputs to 8 LVPECL Outputs
- HMC1035LP6GE May be Used for Clock Generation & Fractional Multiplication with Outputs Up to 2500 GHz
- The HMC1035LP6GE Achieves Industry Leading Phase Jitter of 97 fs RMS



### Reference Clock Solutions for 100G DP-QPSK



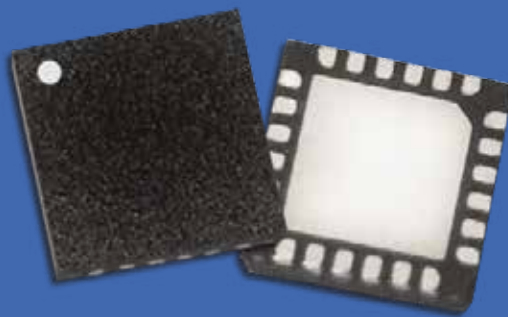
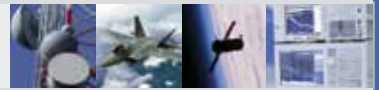
Typical Clocks & Timing ICs applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

# TUNABLE BANDPASS FILTERS

Dynamically Adjustable Solutions in Advanced Communications



Analog, Digital & Mixed-Signal  
ICs, Modules, Subsystems & Instrumentation



Tunable Filter Family  
Band Pass SMT 1 - 37 GHz

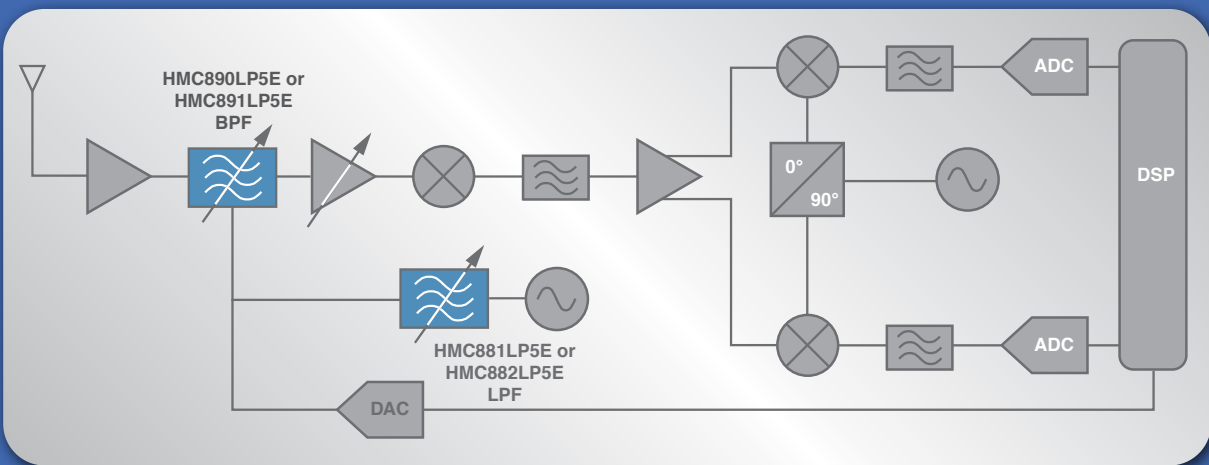
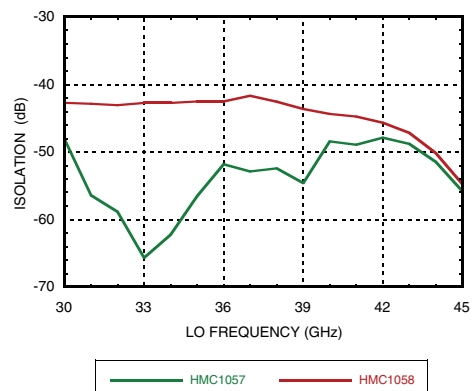
## Features

- Fast Tuning Response
- Excellent Wideband Rejection
- Tunable Low Side/High Side Rejection “notch”
- Single Chip Replacement for Mechanically Tuned Designs
- 24 Lead 4 x 4 & 5 x 5 mm SMT Package

## Applications

- Test & Measurement Equipment
- Military RADAR & EW/ECM
- SATCOM & Space
- Industrial & Medical Equipment

Broadband Insertion Loss  $VfCH=Vnctl$



Super-Heterodyne Receiver with Tunable Pre-Selector Filter

LO FREQUENCY GENERATION ICs

# LO FREQUENCY GENERATION ICs

## SMT & Chip (Die) Products

### DC POWER CONDITIONING - Linear Voltage Regulators

Input Voltage (V)	Function	Output Voltage (V)	Max. Output Current (mA)	Power Supply Rejection Ratio (PSRR) (dB)		Output Noise Spectral Density (nV/√Hz)		Regulated Outputs	Package	ECCN Code	Part Number
				1 kHz	1 MHz	1 kHz	10 kHz				
3.35 - 5.6	Quad High PSRR	2.5 - 5.2	240	80	60	7	3	4	LP3	EAR99	HMC860LP3E
3.35 - 5.6	Low Noise, High PSRR	1.8 - 5.2	500	80	60	7	3	4	LP3	EAR99	HMC1060LP3E
4.8 to 5.6	Low Noise, High PSRR	1.8 - 5.1	400	60	30	6	3	1	LP3	EAR99	HMC976LP3E

### FILTERS - Tunable Programmable Harmonic

Frequency Range (GHz)	Function	Return Loss (dB)	3 dB Bandwidth (GHz)	Stopband Frequency (Rej. >10 dB)	Tuning Response (ns)	Package	ECCN Code	Part Number
0.25 - 3.025	Programmable Harmonic Low Pass	10	1 - 3	1.2 Fcutoff	10	LP3	EAR99	HMC1044LP3E

### FREQUENCY DIVIDERS (Prescalers) & DETECTORS

#### Frequency Dividers & Phase / Frequency Detectors

Input Frequency (GHz)	Function	Input Power (dBm)	Output Power (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
DC - 8	Divide-by-2	-12 to +12	-6	-148	+3V @ 42 mA	SOT26	3A001.a.11.b	HMC432E
DC - 10	Divide-by-2	-15 to +10	3	-148	+5V @ 83 mA	S8G	3A001.a.11.b	HMC361S8G
DC - 10	Divide-by-2	-15 to +10	3	-148	+5V @ 83 mA	S8G	3A001.a.11.b	HMC361S8GE
DC - 11	Divide-by-2	-15 to +10	3	-148	+5V @ 105 mA	Chip	3A001.a.11.b	HMC361
DC - 13	Divide-by-2	-15 to +10	3	-148	+5V @ 84 mA	G8	3A001.a.11.b	HMC361G8
DC - 18	Divide-by-2	-15 to +10	-4	-150	+5V @ 77 mA	LP3	3A001.a.11.b	HMC492LP3E
DC - 7	Divide-by-3	-12 to +12	-2	-153	+5V @ 69 mA	MS8G	3A001.a.11.b	HMC437MS8GE
DC - 4	Divide-by-4	-15 to +10	3.5	-146	+3V @ 13 mA	MS8	EAR99	HMC426MS8E
DC - 8	Divide-by-4	-12 to +12	-3	-150	+3V @ 53 mA	SOT26	3A001.a.11.b	HMC433E
DC - 11	Divide-by-4	-15 to +10	-6	-149	+5V @ 68 mA	Chip	3A001.a.11.b	HMC362
DC - 12	Divide-by-4	-15 to +10	-6	-149	+5V @ 68 mA	S8G	3A001.a.11.b	HMC362S8GE
DC - 13	Divide-by-4	-15 to +10	2	-151	+5V @ 110 mA	Chip	3A001.a.11.b	HMC365
DC - 13	Divide-by-4	-15 to +10	7	-151	+5V @ 120 mA	G8 Hermetic	3A001.a.11.b	HMC365G8
DC - 13	Divide-by-4	-15 to +10	2	-151	+5V @ 110 mA	S8G	3A001.a.11.b	HMC365S8GE
DC - 18	Divide-by-4	-15 to +10	-4	-150	+5V @ 96 mA	LP3	3A001.a.11.b	HMC493LP3E
10 - 26	Divide-by-4	-15 to +10	-4	-150	+5V @ 96 mA	LC3	3A001.a.11.b	HMC447LC3
DC - 7	Divide-by-5	-12 to +12	-1	-153	+5V @ 80 mA	MS8G	3A001.a.11.b	HMC438MS8GE
DC - 8	Divide-by-8	-5 to +12	-2	-150	+3V @ 62 mA	SOT26	3A001.a.11.b	HMC434E
DC - 12	Divide-by-8	-15 to +10	-9	-153	+5V @ 70 mA	Chip	3A001.a.11.b	HMC363
DC - 12	Divide-by-8	-15 to +10	4	-153	+5V @ 90 mA	G8 Hermetic	3A001.a.11.b	HMC363G8
DC - 12	Divide-by-8	-15 to +10	-9	-153	+5V @ 70 mA	S8G	3A001.a.11.b	HMC363S8GE
DC - 18	Divide-by-8	-15 to +10	-4	-150	+5V @ 105 mA	LP3	3A001.a.11.b	HMC494LP3E
0.1 - 6.5	Programmable Divider (N = 1 - 17)	-15 to +10	0	-153	+5V @ 200 mA	LP4	EAR99	HMC705LP4E
0.1 - 13.0	Programmable Divider (N = 1, 3)	-10 to +10	2	-152	+5V @ 185 mA	LP3	EAR99	HMC861LP3E
0.1 - 15	Programmable Divider (N = 1, 2, 4, 8)	-15 to +10	2	-153	+5V @ 105 mA	LP3	3A001.a.11.b	HMC862LP3E
0.2 - 2.0	Programmable Divider (N = 1 - 4)	-2 to +10	10	-160	+5V @ 135 mA	LP3	EAR99	HMC794LP3E
0.4 - 6.0	Programmable Divider (N = 1 - 4)	0 to +9	5	-156	+3.3V @ 100 mA	LP3	EAR99	HMC905LP3E
DC - 2.2	5-bit Counter, Divide-by-2 - 32	-15 to +10	4	-153	+5V @ 194 mA	LP4	3A001.a.11.b	HMC394LP4E
0.01 - 1.3	Phase Frequency Detector	-10 to +10	2 Vp-p	-153	+5V @ 96 mA	QS16G	3A001.a.11.b	HMC439QS16GE

### Fractional Divider & Frequency Detector

Input Frequency (GHz)	Function	Input Power (dBm)	Output Level (dBm)	Floor FOM (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
DC - 7	48-Bit Delta Sigma Programmable Fractional Divider w/ Sweeper	-15 to -3	0.75 Vp-p to 2 Vp-p into 100 Ohm	-160	+5V @ 1 mA +3V @ 244 mA	LP5	EAR99	HMC983LP5E
DC - 0.35	Frequency Detector & Charge Pump	+3 to +12	+0.02 to +2.5 mA	-231	+5V @ 97 mA +3V @ 27 mA	LP4	EAR99	HMC984LP4E

### FREQUENCY MULTIPLIERS - Active

Input Frequency (GHz)	Function	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Package	ECCN Code	Part Number
3 - 4	x2 Active	6 - 9	0	+17	-140	LP4	EAR99	HMC575LP4E
4.0 - 10.5	x2 Active	8 - 21	+5	+17	-139	Chip	EAR99	HMC561
4.0 - 10.5	x2 Active	8 - 21	+5	+14	-139	LP3	EAR99	HMC561LP3E
4 - 11	x2 Active	8 - 22	+5	+12	-134	LC3B	EAR99	HMC573LC3B
4.5 - 8.0	x2 Active	9 - 16	+2	+15	-140	LP4	EAR99	HMC368LP4E
4.95 - 6.35	x2 Active	9.9 - 12.7	0	+4	-142	LP3	EAR99	HMC369LP3E
6.5 - 12.3	x2 Active	13.0 - 24.6	+4	+17	-136	Chip	EAR99	HMC814
6.5 - 12.3	x2 Active	13.0 - 24.6	+4	+17	-136	LC3B	EAR99	HMC814LC3B
9.0 - 14.5	x2 Active	18 - 29	+3	+17	-132	Chip	EAR99	HMC576

## SMT & Chip (Die) Products

### FREQUENCY MULTIPLIERS - Active

Input Frequency (GHz)	Function	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Package	ECCN Code	Part Number
9.0 - 14.5	x2 Active	18 - 29	+3	+15	-132	LC3B	EAR99	HMC576LC3B
9.5 - 12.5	x2 Active	19 - 25	0	+11	-135	Chip	EAR99	HMC448
10.0 - 12.5	x2 Active	20 - 25	0	+11	-135	LC3B	EAR99	HMC448LC3B
11 - 23	x2 Active	22 - 46	+5	+15	-	Chip	EAR99	HMC598
12.0 - 16.5	x2 Active	24 - 33	+3	+17	-132	Chip	EAR99	HMC578
12.0 - 16.5	x2 Active	24 - 33	+3	+15	-132	LC3B	EAR99	HMC578LC3B
12.5 - 15.5	x2 Active	25 - 31	+3	+21	-	LP4	EAR99	HMC942LP4E
13.5 - 15.5	x2 Active	27 - 31	+5	+20	-128	LC4B	EAR99	HMC577LC4B
16 - 23	x2 Active	32 - 46	+3	+13	-127	Chip	EAR99	HMC579
2.66 - 5.33	x3 Active	8 - 16	+5	+2	-152	LP3	EAR99	HMC916LP3E
1.5 - 2.5	x4 Active	6 - 10	+5	+2	-148	LP3	EAR99	HMC917LP3E
2.45 - 2.8	x4 Active	9.8 - 11.2	-15	+3	-142	LP4	EAR99	HMC443LP4E
2.85 - 3.3	x4 Active	11.4 - 13.2	-15 to +5	+7	-140	LP4	EAR99	HMC695LP4E
3.6 - 4.1	x4 Active	14.4 - 16.4	-15	0	-140	LP4	EAR99	HMC370LP4E
1.2375 - 1.4	x8 Active	9.9 - 11.2	-15	+6	-136	LP4	EAR99	HMC444LP4E
0.61875 - 0.6875	x16 Active	9.9 - 11	-15	+7	-130	LP4	EAR99	HMC445LP4E

### FREQUENCY MULTIPLIERS - Passive

Input Frequency (GHz)	Function	Output Frequency (GHz)	Conversion Loss (dB)	1Fo / 4Fo Isolation (dB)	Input Drive (dBm)	Package	ECCN Code	Part Number
0.85 - 2.0	x2 Passive	1.7 - 4.0	15	45 / 40	+10 to +20	MS8	EAR99	HMC187AMS8E
1.25 - 3.0	x2 Passive	2.5 - 6.0	15	45 / 45	+10 to +20	MS8	EAR99	HMC188MS8E
1.3 - 4.0	x2 Passive	2.6 - 8.0	15	45 / 40	+10 to +20	Chip	EAR99	HMC158
1.3 - 4.0	x2 Passive	2.6 - 8.0	15	45 / 40	+10 to +20	C8	EAR99	HMC158C8
2 - 4	x2 Passive	4 - 8	13	34 / 40	+10 to +15	MS8	EAR99	HMC189AMS8E
4 - 8	x2 Passive	8 - 16	20	45 / 38	+10 to +15	Chip	EAR99	HMC204
4 - 8	x2 Passive	8 - 16	17	41 / 40	+10 to +15	C8	EAR99	HMC204C8
4 - 8	x2 Passive	8 - 16	17	42 / 50	+10 to +15	MS8G	EAR99	HMC204MS8GE
6 - 12	x2 Passive	12 - 24	17	32 / 32	+10 to +15	Chip	EAR99	HMC205
10 - 15	x2 Passive	20 - 30	13	30	+13	Chip	5A991.h	HMC-XDB112
12 - 18	x2 Passive	24 - 36	14	50 / 60	+11 to +15	Chip	EAR99	HMC331
24 - 30	x3 Passive	72 - 90	19	-	+13	Chip	5A991.h	HMC-XTB110

### PHASE LOCKED LOOP - Fractional-N & Integer-N ICs

Frequency	Function	Max. PFD Frequency	Max. Reference Frequency	Figure of Merit (Frac/Int) (dBc / Hz)	Frequency Resolution w/ 50 MHz Ref.	Bias Supply	Package	ECCN Code	Part Number
10 kHz - 8 GHz	Fractional-N w/ Sweeper	75 MHz	200 MHz	-221 / -227	3 Hz	+5V @ 37 mA +3.3V @ 90 mA	LP6C	EAR99	HMC701LP6CE
10 kHz - 14 GHz	Fractional-N w/ Sweeper	75 MHz	250 MHz	-221 / -227	6 Hz	+5V @ 37 mA +3.3V @ 136 mA	LP6C	EAR99	HMC702LP6CE
100 MHz - 8 GHz	Fractional-N	70 MHz	200 MHz	-221 / -226	3 Hz	+5V @ 7 mA +3.3V @ 95 mA	LP4	EAR99	HMC700LP4E
DC - 7	Fractional-N w/ Sweeper	150 MHz	350 MHz	-228 / -231	177 nHz	+5V @ 97 mA +3V @ 149 mA	LP5 / LP4	EAR99	HMC983LP5E* / HMC984LP4E*
DC - 8 GHz	Fractional-N w/ Sweeper	100 MHz	350 MHz	-230 / -233	3 Hz	+5V @ 6 mA +3.3V @ 52 mA	LP4	EAR99	HMC703LP4E
DC - 8 GHz	Fractional-N	100 MHz	350 MHz	-230 / -233	3 Hz	+5V @ 6 mA +3.3V @ 52 mA	LP4	EAR99	HMC704LP4E
80 MHz - 7 GHz	Integer-N	1300 MHz	1300 MHz	-233	50 MHz	+5V @ 310 mA	LP5	3A001.a.11.b	HMC698LP5E
160 MHz - 7 GHz	Integer-N	1300 MHz	1300 MHz	-233	50 MHz	+5V @ 310 mA	LP5	3A001.a.11.b	HMC699LP5E
10 MHz - 2.8 GHz	Integer-N	1300 MHz	1300 MHz	-233	50 MHz	+5V @ 250 mA	QS16G	3A001.a.11.b	HMC440QS16GE

\*Two Parts Together Comprise One PLL.

### PLLs with INTEGRATED VCOs - Microwave & RF PLLs with Integrated VCOs

Frequency (MHz)	Function	Closed Loop SSB Phase Noise @ 10 kHz Offset	Open Loop VCO Phase Noise @ 1 MHz Offset	Pout (dBm)	RMS Jitter Fractional Mode (fs)	Integrated PN Fractional Mode (deg rms)	Package	ECCN Code	Part Number
665 - 825	Tri-Band RF VCO	-118 dBc / Hz	-148 dBc / Hz	+11	180	0.05	LP6C	EAR99	HMC822LP6CE
795 - 945	Tri-Band RF VCO	-123 dBc / Hz	-148 dBc / Hz	+10	180	0.06	LP6C	EAR99	HMC838LP6CE
780 - 870	RF VCO	-116 dBc / Hz	-148 dBc / Hz	+14	180	0.06	LP6C	EAR99	HMC824LP6CE
860 - 1040	Tri-Band RF VCO	-118 dBc / Hz	-147 dBc / Hz	+10	180	0.07	LP6C	EAR99	HMC821LP6CE
990 - 1105	RF VCO	-114 dBc / Hz	-146 dBc / Hz	+11	180	0.07	LP6C	EAR99	HMC826LP6CE
1025 - 1150	Tri-Band RF VCO	-123 dBc / Hz	-147 dBc / Hz	+12	180	0.07	LP6C	EAR99	HMC837LP6CE
1050 - 1205	Tri-Band RF VCO	-121 dBc / Hz	-146 dBc / Hz	+10	180	0.08	LP6C	EAR99	HMC839LP6CE
1095 - 1275	Tri-Band RF VCO	-118 dBc / Hz	-147 dBc / Hz	+10	180	0.08	LP6C	EAR99	HMC820LP6CE
1310 - 1415	Tri-Band RF VCO	-121 dBc / Hz	-145 dBc / Hz	+10	180	0.09	LP6C	EAR99	HMC840LP6CE

to/2

LO FREQUENCY GENERATION ICs



# LO FREQUENCY GENERATION ICs

## SMT & Chip (Die) Products

### PLLs with INTEGRATED VCOs - Microwave & RF PLLs with Integrated VCOs

Frequency (MHz)	Function	Closed Loop SSB Phase Noise @ 10 kHz Offset	Open Loop VCO Phase Noise @ 1 MHz Offset	Pout (dBm)	RMS Jitter Fractional Mode (fs)	Integrated PN Fractional Mode (deg rms)	Package	ECCN Code	Part Number
<b>fo</b>									
1285 - 1415	RF VCO	-112 dBc / Hz	-143 dBc / Hz	+10	180	0.09	LP6C	EAR99	HMC828LP6CE
1330 - 1650	Tri-Band RF VCO	-112 dBc / Hz	-142 dBc / Hz	+6.5	180	0.11	LP6C	EAR99	HMC822LP6CE
1590 - 1890	Tri-Band RF VCO	-118 dBc / Hz	-143 dBc / Hz	+7.5	180	0.12	LP6C	EAR99	HMC838LP6CE
1720 - 2080	Tri-Band RF VCO	-112 dBc / Hz	-141 dBc / Hz	+6.5	180	0.13	LP6C	EAR99	HMC821LP6CE
1815 - 2010	RF VCO	-112 dBc / Hz	-143 dBc / Hz	+7.5	180	0.13	LP6C	EAR99	HMC831LP6CE
2050 - 2300	Tri-Band RF VCO	-117 dBc / Hz	-141 dBc / Hz	+10.5	180	0.15	LP6C	EAR99	HMC837LP6CE
2100 - 2410	Tri-Band RF VCO	-115 dBc / Hz	-140 dBc / Hz	+7.5	180	0.16	LP6C	EAR99	HMC839LP6CE
2190 - 2550	Tri-Band RF VCO	-112 dBc / Hz	-141 dBc / Hz	+6.5	180	0.17	LP6C	EAR99	HMC820LP6CE
2620 - 2830	Tri-Band RF VCO	-115 dBc / Hz	-139 dBc / Hz	+9	180	0.18	LP6C	EAR99	HMC840LP6CE
<b>2fo</b>									
2660 - 3300	Tri-Band RF VCO	-106 dBc / Hz	-136 dBc / Hz	-4	180	0.21	LP6C	EAR99	HMC822LP6CE
3180 - 3780	Tri-Band RF VCO	-112 dBc / Hz	-135 dBc / Hz	-4	180	0.24	LP6C	EAR99	HMC838LP6CE
3365 - 3705	RF VCO	-107 dBc / Hz	-135 dBc / Hz	0	190	0.25	LP6C	EAR99	HMC836LP6CE
3440 - 4160	Tri-Band RF VCO	-106 dBc / Hz	-135 dBc / Hz	-4	180	0.27	LP6C	EAR99	HMC821LP6CE
4100 - 4600	Tri-Band RF VCO	-111 dBc / Hz	-135 dBc / Hz	-0.5	180	0.30	LP6C	EAR99	HMC837LP6CE
4200 - 4820	Tri-Band RF VCO	-108 dBc / Hz	-135 dBc / Hz	-4	180	0.31	LP6C	EAR99	HMC839LP6CE
4380 - 5100	Tri-Band RF VCO	-106 dBc / Hz	-135 dBc / Hz	-4	180	0.33	LP6C	EAR99	HMC820LP6CE
5240 - 5660	Tri-Band RF VCO	-109 dBc / Hz	-133 dBc / Hz	-3	180	0.37	LP6C	EAR99	HMC840LP6CE
7300 - 8200	Microwave PLL + VCO	-101 dBc / Hz	-140 dBc / Hz	+15	196	0.58	LP6C	EAR99	HMC764LP6CE
7800 - 8800	Microwave PLL + VCO	-101 dBc / Hz	-140 dBc / Hz	+13	193	0.61	LP6C	EAR99	HMC765LP6CE
8450 - 9550	Microwave PLL + VCO	-107 dBc / Hz	-138 dBc / Hz	+12	93	0.30	LP6C	EAR99	HMC767LP6CE
9050 - 10150	Microwave PLL + VCO	-106 dBc / Hz	-140 dBc / Hz	+12	82	0.28	LP6C	EAR99	HMC769LP6CE
9600 - 10800	Microwave PLL + VCO	-106 dBc / Hz	-140 dBc / Hz	+9	83	0.31	LP6C	EAR99	HMC778LP6CE
11500 - 12500	Microwave PLL + VCO	-99 dBc / Hz	-134 dBc / Hz	+10	181	0.81	LP6C	EAR99	HMC783LP6CE
12400 - 13400	Microwave PLL + VCO	-98 dBc / Hz	-132 dBc / Hz	+8	175	0.84	LP6C	EAR99	HMC807LP6CE
<b>Wideband Continuous Tuning</b>									
25 - 3000	Wideband RF VCO	-114 dBc / Hz @ 2 GHz	-141 dBc / Hz @ 2 GHz	+6	82 [1]	0.114 @ 2 GHz	LP6G	3A001.a.11.b	HMC830LP6GE
25 - 3000	Wideband PLL + VCO, (+3.3V)	-114 dBc / Hz @ 2 GHz	-139 dBc / Hz @ 2 GHz	+7	82 [1]	0.114 @ 2 GHz	LP6G	3A001.a.11.b	HMC832LP6GE
25 - 6000	Wideband RF VCO	-114 dBc / Hz @ 2 GHz	-135 dBc / Hz @ 4 GHz	-4	82 [1]	0.22 @ 4 GHz	LP6G	EAR99	HMC833LP6GE
33 - 4100	Wideband PLL + VCO	-105 dBc / Hz @ 4 GHz	-133 dBc / Hz @ 4 GHz	+7	82 [1]	0.23 @ 4 GHz	LP6G	5A991.b	HMC835LP6GE
45 - 1050 1400 - 2100 2800 - 4200 Fo	Wideband RF VCO	-108 dBc / Hz @ 4 GHz	-134 dBc / Hz @ 4 GHz	+4	82 [1]	0.229 @ 4 GHz	LP6G	EAR99	HMC829LP6GE
45 - 1050 1400 - 2100 2800 - 4200 Fo 5600 - 8400	Wideband RF VCO	-108 dBc / Hz @ 4 GHz	-128 dBc / Hz @ 8 GHz	+5 +2 +2 -10	82 [1]	0.46 @ 8 GHz	LP6G	EAR99	HMC834LP6GE

[1] RMS Jitter Integration Bandwidth from 12 kHz to 20 MHz

### VOLTAGE CONTROLLED OSCILLATORS\* - VCOs with Buffer Amplifiers & Wideband VCOs

Fo Frequency (GHz)	Function	Fo Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
2.05 - 2.25	VCO w/ Buffer	+3.5	-89	-112	+3V @ 35 mA	LP4	EAR99	HMC384LP4E
2.25 - 2.5	VCO w/ Buffer	+4.5	-89	-115	+3V @ 35 mA	LP4	EAR99	HMC385LP4E
2.6 - 2.8	VCO w/ Buffer	+5	-88	-115	+3V @ 35 mA	LP4	EAR99	HMC386LP4E
2.75 - 3.0	VCO w/ Buffer	+4.5	-89	-114	+3V @ 37 mA	LP4	EAR99	HMC416LP4E
3.15 - 3.4	VCO w/ Buffer	+4.9	-88	-113	+3V @ 39 mA	LP4	EAR99	HMC388LP4E
3.35 - 3.55	VCO w/ Buffer	+4.7	-89	-112	+3V @ 41 mA	LP4	EAR99	HMC389LP4E
3.55 - 3.9	VCO w/ Buffer	+4.7	-87	-112	+3V @ 42 mA	LP4	EAR99	HMC390LP4E
3.9 - 4.45	VCO w/ Buffer	+5	-81	-106	+3V @ 30 mA	LP4	EAR99	HMC391LP4E
4.45 - 5.0	VCO w/ Buffer	+4	-79	-105	+3V @ 30 mA	LP4	EAR99	HMC429LP4E
5.0 - 5.5	VCO w/ Buffer	+2	-80	-103	+3V @ 27 mA	LP4	EAR99	HMC430LP4E
5.5 - 6.1	VCO w/ Buffer	+2	-80	-102	+3V @ 27 mA	LP4	EAR99	HMC431LP4E
5.8 - 6.8	VCO w/ Buffer	+10	-82	-105	+3V @ 100 mA	MS8G	EAR99	HMC358MS8GE
6.1 - 6.72	VCO w/ Buffer	+4.5	-73	-101	+3V @ 31 mA	LP4	EAR99	HMC466LP4E
6.8 - 7.4	VCO w/ Buffer	+11	-80	-106	+3V @ 80 mA	LP4	EAR99	HMC505LP4E
7.1 - 7.9	VCO w/ Buffer	14	-80	-101	+3V @ 85 mA	LP4	EAR99	HMC532LP4E
7.8 - 8.7	VCO w/ Buffer	14	-80	-103	+3V @ 77 mA	LP4	EAR99	HMC506LP4E
8.6 - 10.2	VCO w/ Divide-by-4	18	-70	-100	+5V @ 220 mA	LP5	3A001.a.11.b	HMC734LP5E
10.5 - 12.2	VCO w/ Divide-by-4	17	-75	-100	+5V @ 220 mA	LP5	3A001.a.11.b	HMC735LP5E

## SMT & Chip (Die) Products

### VOLTAGE CONTROLLED OSCILLATORS\* - VCOs with Buffer Amplifiers & Wideband VCOs

Fo Frequency (GHz)	Function	Fo Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
13.2 - 13.5	VCO w/ Divide-by-8	-8	-83	-110	+5V @ 230 mA	QS16G	3A001.a.11.b	HMC401QS16GE
14.0 - 15.0	VCO w/ Divide-by-8	6	-75	-110	+5V @ 260 mA	QS16G	3A001.a.11.b	HMC398QS16GE
23.8 - 24.8	VCO w/ Divide-by-16	12	-70	-95	+5V @ 220 mA	LP4	3A001.a.11.b	HMC533LP4E
4 - 8	Wideband VCO	5	-75	-100	+5V @ 55 mA	LC4B	EAR99	HMC586LC4B
5 - 10	Wideband VCO	5	-65	-95	+5V @ 55 mA	LC4B	EAR99	HMC587LC4B
6 - 12	Wideband VCO	1	-65	-95	+5V @ 57 mA	LC4B	EAR99	HMC732LC4B
8 - 12.5	Wideband VCO	5	-65	-93	+5V @ 55 mA	LC4B	EAR99	HMC588LC4B
10 - 20	Wideband VCO	3	-60	-90	+5V @ 70 mA	LC4B	EAR99	HMC733LC4B

\*Hittite's VCOs Integrate Resonator, Negative Resistance Generator and Tuning Varactor Circuits On-Chip. No external components are required.

### VOLTAGE CONTROLLED OSCILLATORS WITH Fo/2 OUTPUT

Fo Frequency (GHz)	Fo/2 Frequency (GHz)	Function	Fo Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
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#### VCOs with Fo/2

6.65 - 7.65	3.325 - 3.825	VCO w/ Fo/2	+13	-90	-115	+5V @ 230 mA	LP5	EAR99	HMC507LP5E
7.3 - 8.2	3.65 - 4.1	VCO w/ Fo/2	+15	-90	-116	+5V @ 240 mA	LP5	EAR99	HMC508LP5E
7.8 - 8.8	3.9 - 4.4	VCO w/ Fo/2	+13	-90	-115	+5V @ 250 mA	LP5	EAR99	HMC509LP5E
9.05 - 10.15	4.525 - 5.075	VCO w/ Fo/2	+13	-88	-115	+5V @ 265 mA	LP5	EAR99	HMC511LP5E
14.5 - 15.0	7.25 - 7.5	VCO w/ Fo/2	+9	-80	-105	+4.2V @ 150 mA	LP4	EAR99	HMC736LP4E
14.9 - 15.5	7.45 - 7.75	VCO w/ Fo/2	+9	-80	-105	+4.2V @ 150 mA	LP4	EAR99	HMC737LP4E

#### VCOs with Fo/2 & Divide-by- 4

8.45 - 9.55	4.225 - 4.775	VCO w/ Fo/2 & Divide-by-4	+13	-92	-116	+5V @ 315 mA	LP5	3A001.a.11.b	HMC510LP5E
9.5 - 10.8	4.75 - 5.4	VCO w/ Fo/2 & Divide-by-4	+11	-85	-110	+5V @ 350 mA	LP5	3A001.a.11.b	HMC530LP5E
9.6 - 10.8	4.8 - 5.4	VCO w/ Fo/2 & Divide-by-4	+9	-85	-111	+5V @ 330 mA	LP5	3A001.a.11.b	HMC512LP5E
10.43 - 11.46	5.215 - 5.73	VCO w/ Fo/2 & Divide-by-4	+7	-85	-110	+3V @ 275 mA	LP5	3A001.a.11.b	HMC513LP5E
10.6 - 11.8	5.3 - 5.9	VCO w/ Fo/2 & Divide-by-4	+11	-82	-110	+5V @ 350 mA	LP5	3A001.a.11.b	HMC534LP5E
11.1 - 12.4	5.55 - 6.2	VCO w/ Fo/2 & Divide-by-4	+9	-83	-110	+5V @ 350 mA	LP5	3A001.a.11.b	HMC582LP5E
11.17 - 12.02	5.585 - 6.01	VCO w/ Fo/2 & Divide-by-4	+7	-87	-110	+3V @ 275 mA	LP5	3A001.a.11.b	HMC514LP5E
11.5 - 12.5	5.75 - 6.25	VCO w/ Fo/2 & Divide-by-4	+10	-83	-110	+5V @ 200 mA	LP5	3A001.a.11.b	HMC515LP5E
11.5 - 12.8	5.75 - 6.4	VCO w/ Fo/2 & Divide-by-4	+11	-80	-110	+5V @ 350 mA	LP5	3A001.a.11.b	HMC583LP5E
12.4 - 13.4	6.2 - 6.7	VCO w/ Fo/2 & Divide-by-4	+8	-83	-110	+5V @ 260 mA	LP5	3A001.a.11.b	HMC529LP5E
12.5 - 13.9	6.25 - 6.95	VCO w/ Fo/2 & Divide-by-4	+10	-81	-110	+5V @ 330 mA	LP5	3A001.a.11.b	HMC584LP5E
13.6 - 14.9	6.8 - 7.45	VCO w/ Fo/2 & Divide-by-4	+7	-82	-110	+5V @ 260 mA	LP5	3A001.a.11.b	HMC531LP5E
14.25 - 15.65	7.125 - 7.825	VCO w/ Fo/2 & Divide-by-4	+9	-80	-107	+5V @ 350 mA	LP5	3A001.a.11.b	HMC632LP5E

#### VCOs with Fo/2 & Divide-by- 16

20.9 - 23.9	10.45 - 11.95	VCO w/ Fo/2 & Divide-by-16	+9	-65	-95	+5V @ 200 mA	LP4	3A001.a.11.b	HMC738LP4E
23.8 - 26.8	11.9 - 13.4	VCO w/ Fo/2 & Divide-by-16	+8	-64	-93	+5V @ 200 mA	LP4	3A001.a.11.b	HMC739LP4E

### PHASE LOCKED OSCILLATOR

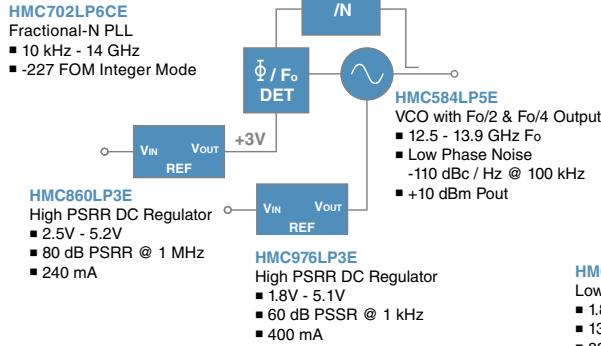
Fo Frequency (GHz)	Function	Fo Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package	ECCN Code	Part Number
14.7 - 15.4	Phase Locked Oscillator	+9	-80	-110	+5V @ 340 mA +12V @ 28 mA	LP4	3A001.a.11.b	HMC535LP4E

# MARKET & APPLICATION GUIDE

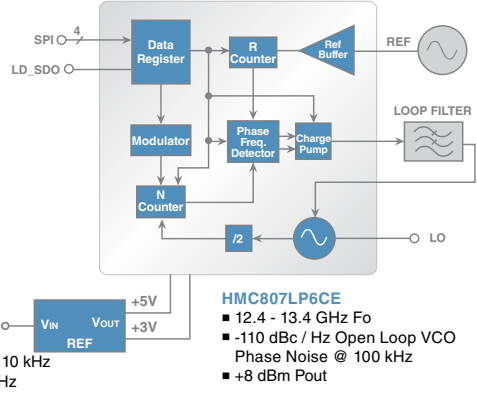
## For LO Generation Applications

### High Frequency LO Source Alternatives

#### PLL + VCO Chipset

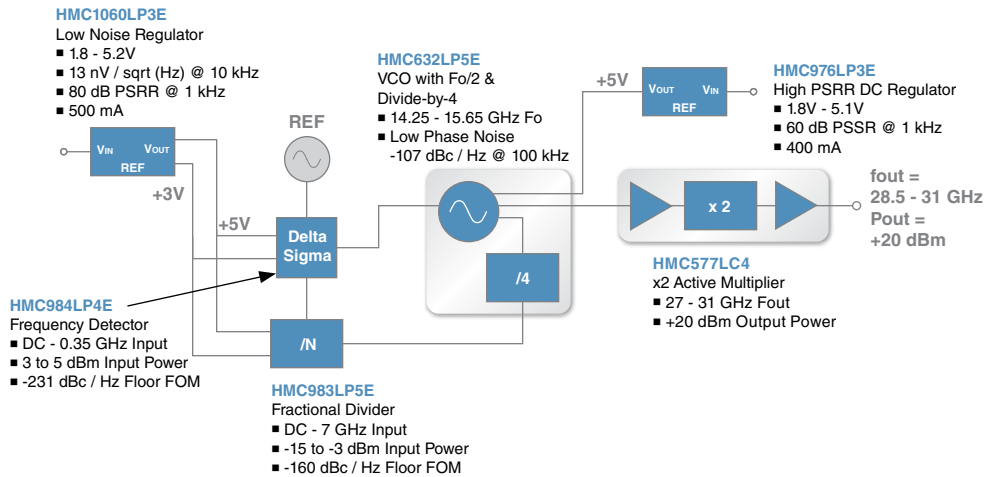


#### PLL with Integrated VCO IC

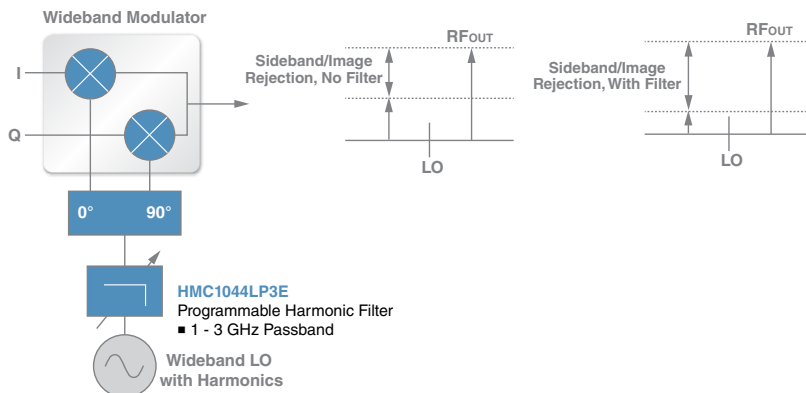


Contact us: [RFMG-PLL@analog.com](mailto:RFMG-PLL@analog.com)

### Ka-Band Phase Locked Oscillator Featuring DC Power Conditioning & Frequency Generation Components



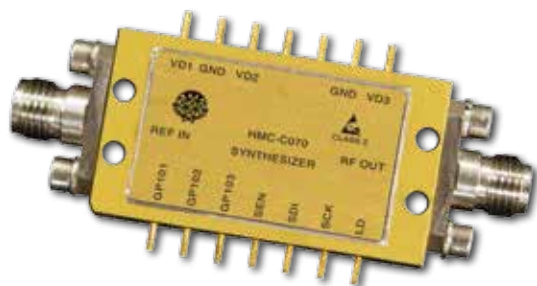
### Using HMC1044LP3E as an LO Harmonic Filter to Improve Modulator/Demodulator Sideband/Image Rejection



Typical LO Generation IC applications are illustrated. See the full product listing for alternatives to the select products shown in each functional block.

## Robust, High Performance RF to Light Solutions

Our hermetic module product line spans a wide range of popular product types including amplifiers, attenuators, DROs, high speed digital logic, frequency multipliers, MicroSynth® integrated synthesizers, mixers, phase shifters, prescalers, SDLVAs, switches & VCOs. Utilizing our standard MMIC products, we take advantage of our world-class design, manufacturing and quality expertise. We can also up-screen modules for high-reliability/military specification applications. Contact us to discuss your custom module requirements.



### Features:

- Extremely Compact, Broadband Synthesizer
- 24-Bit Step Size, 1.2 Hz Resolution
- Auto & Triggered Sweeper Functions
- Integrated Low Noise Voltage Regulators
- Hermetic Module
- Operating Temperature: -40 °C to +85 °C
- Class 2 ESD Rating (2 kV)

## AMPLIFIERS

Frequency (GHz)	Function	Gain (dB)	OIP3 (dBm)	NF (dB)	P1dB (dBm)	Bias Supply	Package / Connector	ECCN Code	Part Number
1 - 12	Low Noise	16	+30	1.8	+16	+6V @ 60 mA	C-10B / SMA	EAR99	HMC-C059
1.8 - 4.2	Low Noise	26	+26	0.7	+15.5	+12V @ 112 mA	C-10 / SMA	EAR99	HMC-C045
5 - 9	Low Noise	22.5	+25	1.75	+15	+12V @ 105 mA	C-10 / SMA	EAR99	HMC-C048
29 - 36	Low Noise	20	+22	2.9	+11	+3V @ 80 mA	C-10 / 2.92 mm	3A001.b.4.c	HMC-C027
2 - 20	Wideband LNA	15	+25	2.5	+14	+12V @ 65 mA	C-1 / SMA	EAR99	HMC-C001
2 - 20	Wideband LNA	14	+26	2	+18	+12V @ 60 mA	C-2 / SMA	EAR99	HMC-C002
2 - 20	Wideband LNA	14	+27	2	+16	+8V @ 75 mA	C-2B / SMA	EAR99	HMC-C022
7 - 17	Wideband LNA	22	+25	2	+14	+8V @ 93 mA	C-1 / SMA	EAR99	HMC-C016
17 - 27	Wideband LNA	18	+25	3	+14	+8V @ 96 mA	C-1B / 2.92 mm	EAR99	HMC-C017
0.01 - 20	Wideband Driver	16	+33	3	+23	+12V @ 195 mA	C-3 / SMA	3A001.b.4.f	HMC-C004
0.01 - 20	Wideband Driver	15	+30	3	+23	+12V @ 225 mA	C-3B / SMA	3A001.b.4.f	HMC-C024
2 - 35	Wideband Driver	12	+29	3	+18	+11V @ 92 mA	C-10 / 2.92 mm	3A001.b.4.c	HMC-C038
0.01 - 6.0	1 Watt Single Stage PA	13	+40	5	29.5	-5V @ 5 mA +15V @ 450 mA	C-17 / SMA	EAR99	HMC-C074
0.01 - 6.0	1 Watt Two Stage PA	24	+42	5	+29.5	-5V @ 5 mA +15V @ 740 mA	C-17 / SMA	EAR99	HMC-C075
0.01 - 15	0.5 Watt Wideband PA	12	+36	4	+28	+11V @ 360 mA	C-10B / SMA	3A001.b.4.f	HMC-C036
0.01 - 15	0.5 Watt Wideband PA	12	+36	4	+28	+11V @ 360 mA	C-12 / SMA	3A001.b.4.f	HMC-C037
0.01 - 20	<b>Wideband PA</b>	<b>12</b>	<b>28</b>	<b>4.5</b>	<b>+28</b>	<b>+11V @ 345mA</b>	<b>C-10B/SMA</b>	<b>EAR99</b>	<b>HMC6980</b>
2 - 20	Wideband PA	15	+34	4	+26	+12V @ 310 mA	C-2 / SMA	3A001.b.4.f	HMC-C003
2 - 20	Wideband PA	15	+34	4	+26	+12V @ 310 mA	C-2B / SMA	3A001.b.4.f	HMC-C023
2 - 20	Wideband PA	31	+33	3	+26	+12V @ 400 mA	C-3B / SMA	3A001.b.4.f	HMC-C026
17 - 24	Wideband PA	22	+33	3.5	+24	+8V @ 250 mA	C-10 / 2.92 mm	EAR99	HMC-C020
21 - 31	Wideband PA	15	+32	5	+24	+8V @ 215 mA	C-10 / 2.92 mm	3A001.b.4.c	HMC-C021

## AMPLIFIERS - Low Phase Noise

Frequency (GHz)	Function	Gain / NF (dB)	OIP3 (dBm)	10 kHz Phase Noise (dBc / Hz)	P1dB / Psat (dBm)	Bias Supply	Package / Connector	ECCN Code	Part Number
1.5 - 5.0	Low Phase Noise	14 / 4.5	+26.5	-171	+17 / +22	+7V @ 170 mA	C-16 / SMA	EAR99	HMC-C077
2 - 18	Low Phase Noise	13.5 / 5	+22.5	-160	+15 / +18.5	+5V @ 80 mA	C-1 / SMA	EAR99	HMC-C050
3 - 8	Low Phase Noise	9 / 6	+33	-168	+22 / +25	+7V @ 300 mA	C-16 / SMA	EAR99	HMC-C079
6 - 12	Low Phase Noise	11 / 4.5	+34	-176	+20 / +22	+7V @ 170 mA	C-16 / SMA	EAR99	HMC-C072
7 - 11	Low Phase Noise	9 / 6	+33	-170	+22 / +25	+7V @ 300 mA	C-16 / SMA	EAR99	HMC-C076

## ATTENUATORS - Analog & Digital

Frequency (GHz)	Function	Loss (dB)	Attenuation Range (dB)	IIP3 (dBm)	Control Input (Vdc)	Package / Connector	ECCN Code	Part Number
DC - 20	Analog VVA	5.5	35	+10	-5	C-10 / SMA	EAR99	HMC-C053
DC - 13	6-Bit Digital, Serial Control	3.6	0.5 to 31.5	+32	Serial/CMOS	C-6 / SMA	EAR99	HMC-C018
DC - 13	6-Bit Digital	3.2	0.5 to 31.5	+38	0 / +5V	C-6 / SMA	EAR99	HMC-C025

## BLOCK UP CONVERTERS

Frequency (GHz)	Function	IF Frequency (GHz)	Conv. Gain (dB)	Spurious Rejection (dBc)	Output P1dB (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	1 - 2	20	-60	+2	Module	ITAR	HMC7053

# CONNECTORIZED MODULES

## Robust, High Performance RF to Light Solutions

### BLOCK UPCONVERTERS

Frequency (GHz)	Function	Small Signal Gain (dB)	Spurious Rejection (dBc)	Linear Power (dBm)	Psat (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	42	-60	+37	+39.5	Module	ITAR	HMC7054

Frequency (GHz)	Function	IF Freq. (GHz)	Conv. Gain (dB)	Spurious Rejection (dBc)	Linear Power (dBm)	Package	ECCN Code	Part Number
29 - 31	Ka-Band Upconverter w/HPA	1 - 2	65	-60	+37	Module	ITAR	HMC7056

### DIELECTRIC RESONATOR OSCILLATORS (DRO)

Frequency (GHz)	Function	Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Frequency Drift (ppm / °C)	Bias Supply	Package	ECCN Code	Part Number
8.0 - 8.3	Dielectric Resonator Oscillator	14.5	-122	-140	2	+6 to +15V @ 125 mA	C-18 / SMA	EAR99	HMC-C200

### FREQUENCY DIVIDERS (Prescalers)

Input Freq. (GHz)	Function	Input Power (dBm)	Output Power (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package / Connector	ECCN Code	Part Number
DC - 18	Divide-by-2	-15 to +10	-4	-150	+5V @ 75 mA	C-1 / SMA	3A001.a.11.b	HMC-C005
DC - 18	Divide-by-4	-15 to +10	-4	-150	+5V @ 93 mA	C-1 / SMA	3A001.a.11.b	HMC-C006
0.5 - 8	Divide-by-5	-15 to +10	-1	-155	+5V @ 80 mA	C-1 / SMA	3A001.a.11.b	HMC-C039
DC - 18	Divide-by-8	-15 to +10	-4	-150	+5V @ 98 mA	C-1 / SMA	3A001.a.11.b	HMC-C007
0.5 - 17	Divide-by-10	-15 to +10	-1	-155	+5V @ 152 mA	C-1 / SMA	3A001.a.11.b	HMC-C040

### FREQUENCY MULTIPLIERS - Active

Input Freq. (GHz)	Function	Output Freq. (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Package / Connector	ECCN Code	Part Number
3 - 5	x2 Active	6 - 10	+3	+17	-140	C-10 / SMA	EAR99	HMC-C031
9.0 - 14.5	x2 Active	18 - 29	+3	+16	-132	C-10 / 2.92 mm	EAR99	HMC-C032
12.0 - 16.5	x2 Active	24 - 33	+3	+17	-132	C-10 / 2.92 mm	EAR99	HMC-C033
16 - 23	x2 Active	32 - 46	+3	+13	-130	C-10 / 2.92 mm	EAR99	HMC-C034
4.0 - 10.5	x2 Active	8 - 21	+6	+14	-142	C-10 / SMA	EAR99	HMC-C056

### HIGH SPEED DIGITAL LOGIC

Data / Clock Rate (Gbps / GHz)	Function	Rise / Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (Vp-p)	DC Power (mW)	Vee Power Supply (Vdc)	Package / Connector	ECCN Code	Part Number
50 / 30	1:2 Fanout Buffer	9.5 / 11	2	0.5	455	-3.3	C-13 / 1.85 mm	EAR99	HMC-C062
50 / 25	AND / NAND / OR / NOR	9 / 10	2	0.5	560	-3.3	C-13 / 1.85 mm	EAR99	HMC-C065
43 / 43	D-Type Flip-Flop	9 / 10	1.5	0.5	580	-3.3	C-13 / 1.85 mm	EAR99	HMC-C060
50 / 25	D-Type Flip-Flop Double Edge Triggered	9 / 11	1.5	0.5	690	-3.3	C-13 / 1.85 mm	EAR99	HMC-C061
50 / 25	XOR / XNOR	6.5 / 10	2	0.5	550	-3.3	C-13 / 1.85 mm	EAR99	HMC-C064

### I/Q MIXERS

RF / LO Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	Image Rejection (dB)	IIP3 (dBm)	Package / Connector	ECCN Code	Part Number
4 - 8.5	I/Q Mixer / IRM	DC - 3.5	-7.5	35	+23	C-4 / SMA	EAR99	HMC-C009
6 - 10	I/Q Mixer / IRM	DC - 3.5	-7.5	35	+25	C-4 / SMA	EAR99	HMC-C041
8.5 - 13.5	I/Q Mixer / IRM	DC - 2	-8	28	+25	C-4 / SMA	EAR99	HMC-C042
11 - 16	I/Q Mixer / IRM	DC - 3.5	-9	30	+28	C-4 / SMA	EAR99	HMC-C043
15 - 23	I/Q Mixer / IRM	DC - 3.5	-8	30	+25	C-4 / 2.92 mm & SMA	EAR99	HMC-C044
20 - 31	I/Q Mixer / IRM	DC - 4.5	-10	24	+22.5	C-4B / 2.92 mm & SMA	EAR99	HMC-C046
30 - 38	I/Q Mixer / IRM	DC - 3.5	-10.5	15	+19	C-4 / 2.92 mm & SMA	EAR99	HMC-C047

### MIXERS

RF Frequency (GHz)	Function	IF Frequency (GHz)	Conversion Gain (dB)	LO/RF Isolation (dB)	IIP3 (dBm)	Package / Connector	ECCN Code	Part Number
7 - 14	+13 LO, DBL-BAL	DC - 5	-7	48	+20	C-11 / SMA	EAR99	HMC-C049
11 - 20	+13 LO, DBL-BAL	DC - 6	-7	43	+18	C-11 / 2.92 mm & SMA	EAR99	HMC-C051
16 - 32	+13 LO, DBL-BAL	DC - 8	-8	35	+19	C-11 / 2.92 mm & SMA	EAR99	HMC-C014
23 - 37	+13 LO, DBL-BAL	DC - 13	-9	35	+19	C-11 / 2.92 mm & SMA	EAR99	HMC-C035
24 - 38	+13 LO, DBL-BAL	DC - 8	-8.5	35	+20	C-11 / 2.92 mm & SMA	EAR99	HMC-C015

## Robust, High Performance RF to Light Solutions

### PHASE SHIFTERS - Analog

Frequency (GHz)	Function	Insertion Loss (dB)	Phase Range (deg)	2nd harmonic Pin = 10 dBm (dBc)	Control Voltage Range (Vdc)	Package / Connector	ECCN Code	Part Number
6 - 15	Analog	7	750° @ 6 GHz 450° @ 15 GHz	+40	0V to +5V	C-1 / SMA	EAR99	HMC-C010

### PHASE SHIFTERS - Digital

Frequency (GHz)	Function	Insertion Loss (dB)	Phase Range (deg)	IIP3 (dBm)	Control Voltage Range (Vdc)	Package / Connector	ECCN Code	Part Number
8 - 12	4-Bit Digital	7	22.5 to 360	+38	0V to +5V	C-6 / SMA	EAR99	HMC-C055

### SDLVAs - Successive Detection Log Video Amplifier

Frequency (GHz)	Function	Dynamic Range (dB)	RSSI Slope (mV / dB)	RF Threshold Level (dBm)	Bias Supply	Package / Connector	ECCN Code	Part Number
1 - 20	SDLVA	59	14	-54	+7V to +16V @ 86 mA	C-10	EAR99	HMC-C088
2 - 20	SDLVA w/ Limited RF Output	50	45	-45	+12V @ 370 mA -5V @ 20 mA	C-21 / SMA	EAR99	HMC-C078

### SWITCHES - SPST, SPDT & SP4T

Frequency (GHz)	Function	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Switching Speed (ns)	Package / Connector	ECCN Code	Part Number
DC - 20	SPST, Hi Isolation	3	100	+23	8.5	C-9 / SMA	EAR99	HMC-C019
DC - 18	SPDT, Hi Isolation	2	55	+27	3	C-14 / SMA	EAR99	HMC-C058
DC - 20	SPDT, Hi Isolation	2	40	+23	5	C-5 / SMA	EAR99	HMC-C011
DC - 20	SP4T, Hi Isolation	3	40	+24	14	C-15 / SMA	EAR99	HMC-C071

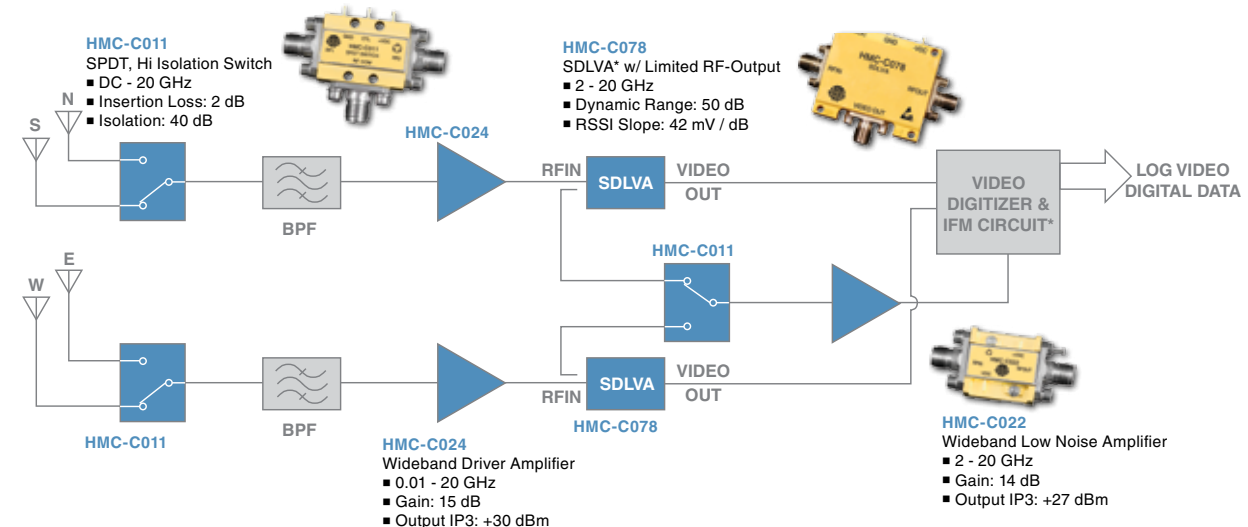
### SYNTHESIZED MODULES - MicroSynth®

Frequency (GHz)	Function	Min. Step Size Resolution (Hz)	Reference Frequency (MHz)	SSB Phase Noise @ 100 kHz Offset (dBc / Hz)	Output Power (dBm)	Bias Supply	Package	ECCN Code	Part Number
2 - 6	MicroSynth® Synthesizer	0.6	10	-93	+17	+20V @ 7 mA +6V @ 330 mA	C-20 / SMA	EAR99	HMC-C083
5.5 - 10.5	MicroSynth® Synthesizer	1.2	10	-92	+21	+20V @ 20 mA +6V @ 300 mA +3.6V @ 100 mA	C-20 / SMA	EAR99	HMC-C070

### VOLTAGE CONTROLLED OSCILLATORS

Frequency (GHz)	Function	Output Power (dBm)	10 kHz SSB Phase Noise (dBc / Hz)	100 kHz SSB Phase Noise (dBc / Hz)	Bias Supply	Package / Connector	ECCN Code	Part Number
4 - 8	Wideband VCO	+20	-75	-95	+12V @ 185 mA	C-1 / SMA	EAR99	HMC-C028
5 - 10	Wideband VCO	+20	-64	-93	+12V @ 195 mA	C-1 / SMA	EAR99	HMC-C029
8 - 12.5	Wideband VCO	+21	-59	-83	+12V @ 195 mA	C-1 / SMA	EAR99	HMC-C030
38.4 - 43.2	VCO	+13	-74	-98	+5V @ 350 mA	C-19 / 2.4 mm	EAR99	HMC-C073

### Military Radar Receiver Solution



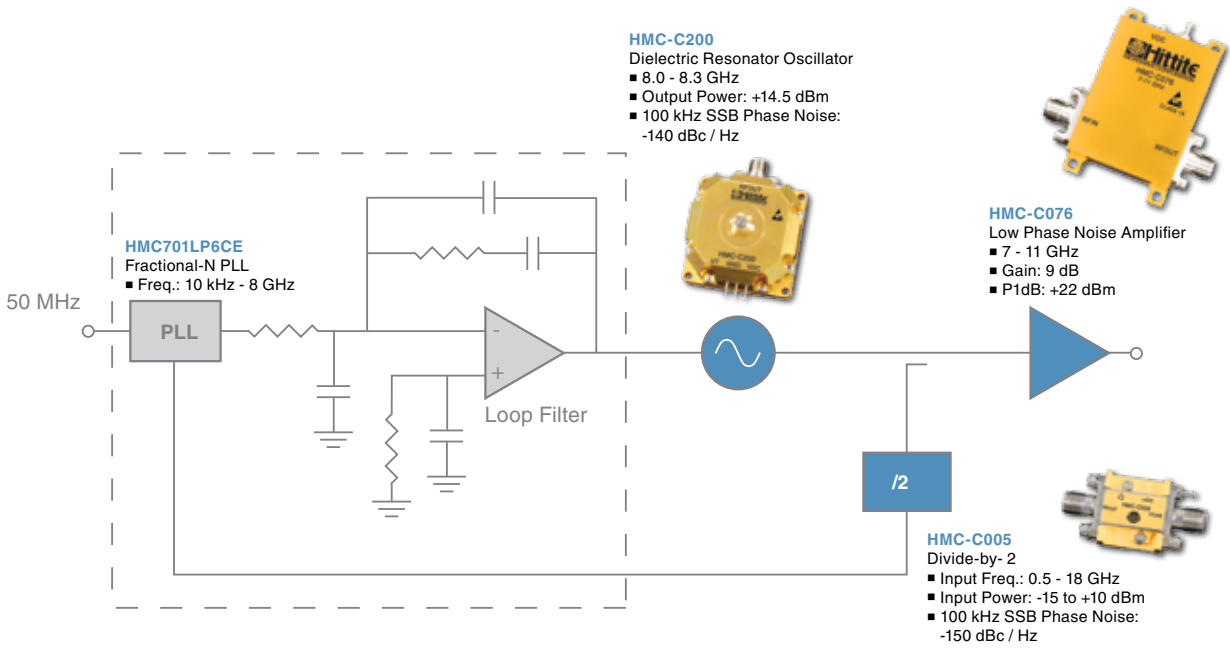
\*Successive Detection Log Video Amplifier



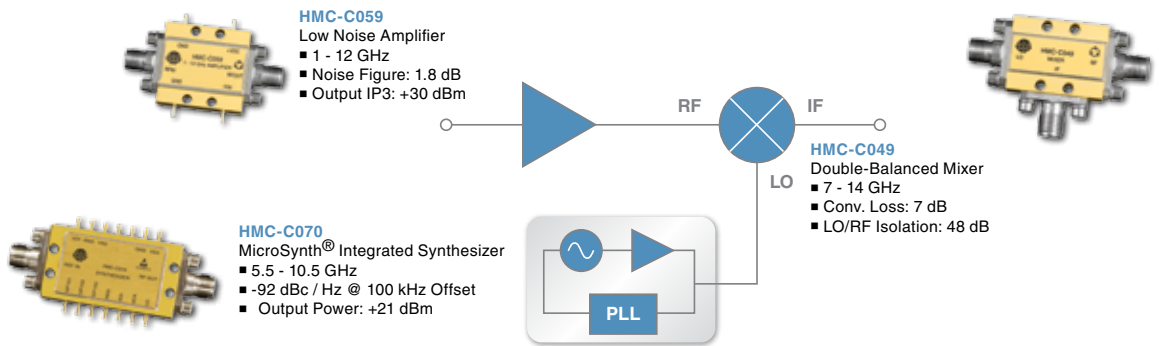
# CONNECTORIZED MODULES

## Robust, High Performance RF to Light Solutions

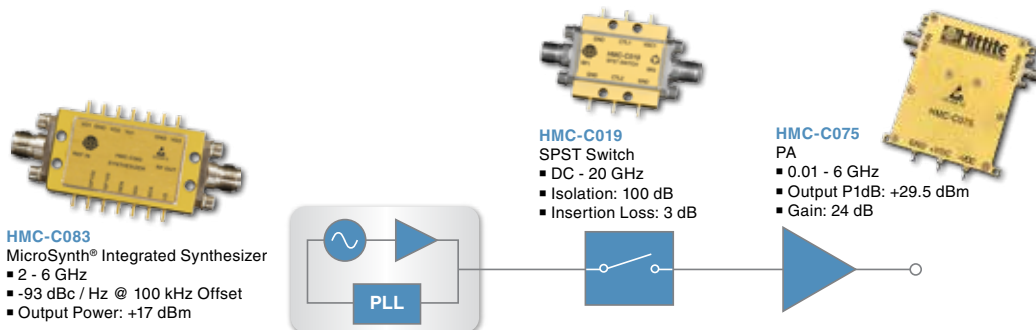
### Ultra Low Noise Phase Locked Oscillator (PLO), Test Equipment Solution



### X-Band Military Downconverter Solution



### Pulsed 0.5 Watt C-Band Military & Test Equipment Synthesizer Solution

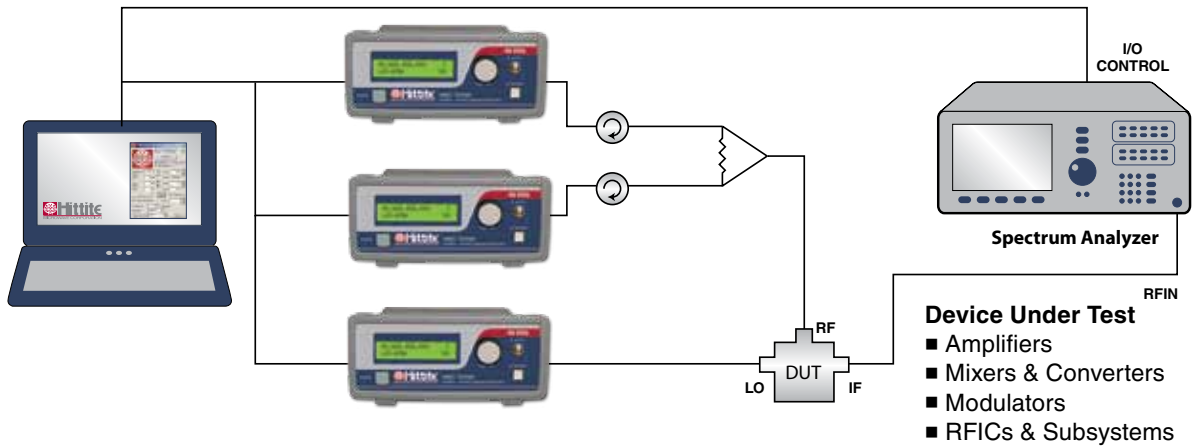


## Signal Generator Family to 70 GHz

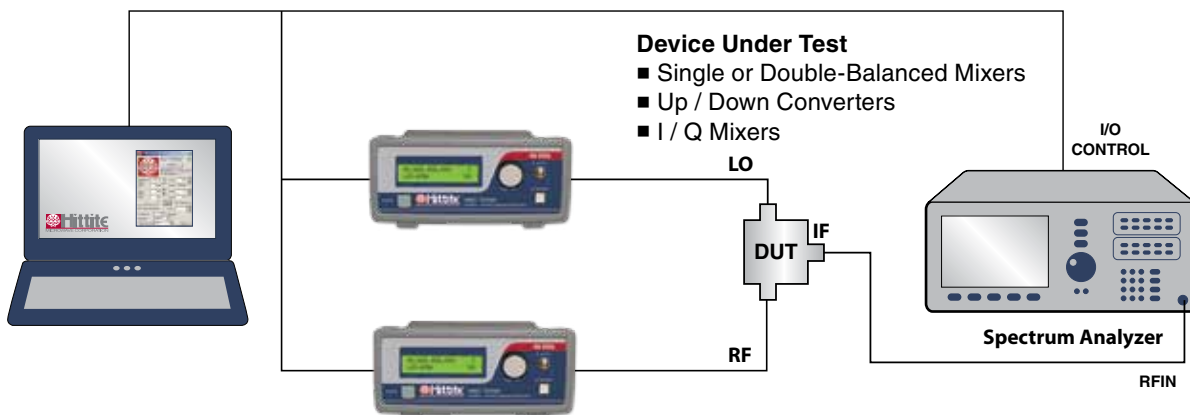
### SIGNAL GENERATORS - Precise RF Signal Generation for ATE & Lab Environments

Frequency (GHz)	Function	Frequency Resolution	Maximum Power Output (dBm)	100 kHz SSB Phase Noise (dBc / Hz)	Spurious (dBc)	Switching Speed Steps (µs)	Package	ECCN Code	Part Number
0.01 - 20	Portable Signal Generator	1 Hz	+28 @ 1 GHz +24 @ 20 GHz	-99 @ 10 GHz	< -57	300	Portable / Benchtop	EAR99	HMC-T2220B
0.01 - 20	Signal Generator	1 Hz	+28 @ 1 GHz +24 @ 20 GHz	-99 @ 10 GHz	< -57	300	Rack Mountable / Benchtop	EAR99	HMC-T2220
0.01 - 40	Signal Generator	1 Hz	+30 @ 1 GHz +20 @ 40 GHz	-99 @ 10 GHz	< -52	500	Rack Mountable / Benchtop	EAR99	HMC-T2240
0.01 - 70	Signal Generator	1 Hz	+29 @ 1 GHz +3 @ 70 GHz	-118 @ 1 GHz -79 @ 70 GHz	< -46	500	Rack Mountable / Benchtop	3A002.d.3.f	HMC-T2270

### Two Tone Third Order Intercept Test Set-up



### Efficient Mixer Conversion Loss, Isolation, & MxN Spurious Test Set-up




Contact us today with your Custom Test Instrumentation Requirements at [RFMG-TE@analog.com](mailto:RFMG-TE@analog.com)

# PACKAGE INFORMATION

## Available Plastic, Ceramic, Hermetic SMT & Connectorized Module Packages

PACKAGE INFORMATION

 <b>LP2 "DFN"</b> 2.0 x 2.0 x 1.0 mm	 <b>LP2C "DFN"</b> 2.0 x 2.0 x 1.0 mm	 <b>LP3 / LP3B / LP3D "QFN"</b> 3.0 x 3.0 x 1.0 mm	 <b>LP4 / LP4B / LP4C "QFN"</b> 4.0 x 4.0 x 1.0 mm	 <b>LP5 / LP5D "QFN"</b> 5.0 x 5.0 x 1.0 mm	 <b>LP6 / LP6C / LP6G "QFN"</b> 6.0 x 6.0 x 1.0 mm
 <b>LP6H "QFN"</b> 6.0 x 6.0 x 1.0 mm	 <b>LP7 / LP7D / LP7F "QFN"</b> 7.0 x 7.0 x 1.0 mm	 <b>LP9 "QFN"</b> 9.0 x 9.0 x 1.0 mm	 <b>LP711 "QFN"</b> 7.0 x 11.0 x 1.0 mm	 <b>MP86 "Micro-P"</b> 5.21 x 5.08 x 1.57 mm	 <b>MS8 / MS8G</b> 4.9 x 3.0 x 1.0 mm
 <b>MS10 / MS10G</b> 4.9 x 3.0 x 1.0 mm	 <b>QS16 / QS16G</b> 6.0 x 4.9 x 1.5 mm	 <b>QS24</b> 6.0 x 8.7 x 1.6 mm	 <b>S8 / S8G</b> 6.0 x 4.9 x 1.6 mm	 <b>S14</b> 6.0 x 8.7 x 1.6 mm	 <b>SC70</b> 2.15 x 2.1 x 0.9 mm
 <b>SOT26</b> 2.8 x 2.9 x 1.2 mm	 <b>ST89</b> 4.50 x 4.14 x 1.54 mm	 <b>BGA</b> See Product Outlines for Sizes	 <b>C8</b> 7.4 x 5.1 x 2.4 mm	 <b>G7 Hermetic</b> 16.1 x 17.3 x 1.7 mm	 <b>G8 Hermetic</b> 10.2 x 4.6 x 1.8 mm
 <b>G16 Hermetic</b> 10.4 x 10.4 x 1.7 mm	 <b>G32 Hermetic</b> 16 x 16 x 1.96 mm	 <b>F10</b> 10 Lead Flange Mount	 <b>LC3 / LC3B / LC3C</b> 3.0 x 3.0 x 1.0 / 1.45 mm	 <b>LC4 / LC4B</b> 4.0 x 4.0 x 1.0 / 1.2 mm	 <b>LC5 / LC5A</b> 5.0 x 5.0 x 1.0 mm
 <b>LH5 Hermetic</b> 5.0 x 5.0 x 1.0 mm	 <b>LH250 Hermetic</b> 6.35 x 6.35 x 1.27 mm	 <b>LM1 / LM3</b> 5.1 x 5.1 x 1.1 mm	 <b>LS6</b> 6 x 6 x 1.1 mm	 <b>C-1 / C-1B</b> 35.31 x 17.78 x 7.38 mm	 <b>C-2 / C-2B</b> 38.1 x 17.78 x 7.38 mm
 <b>C-3 / C-3B</b> 40.89 x 17.78 x 7.38 mm	 <b>C-4</b> 41.66 x 36.32 x 8.50 mm	 <b>C-5</b> 41.66 x 26.8 x 8.79 mm	 <b>C-6</b> 45.34 x 17.27 x 8.50 mm	 <b>C-9</b> 44.45 x 21.59 x 8.76 mm	 <b>C-10 / C-10B</b> 46.63 x 21.59 x 8.50 mm
 <b>C-11</b> 41.66 x 26.8 x 8.64 mm	 <b>C-12</b> 107.6 x 43.0 x 43.0 mm	 <b>C-13</b> 39.43 x 47.12 x 11.42 mm	 <b>C-14</b> 41.91 x 29.85 x 9.65 mm	 <b>C-15</b> 59.69 mm DIA x 9.14 mm	 <b>C-16</b> 48.0 x 48.26 x 14.10 mm
 <b>C-17</b> 68.5 x 66.0 x 14.2 mm	 <b>C-18</b> 38.10 x 47.62 x 26.67 mm	 <b>C-19</b> 27.31 x 25.15 x 5.84 mm	 <b>C-20</b> 53.59 x 19.05 x 6.22 mm	 <b>C-21</b> 38.10 x 33.53 x 5.84 mm	

**E** or  = RoHS Compliant. For details on our RoHS compliant products or see the RoHS Compliant Components link on our website.



# PART NUMBER INDEX

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HMC607G7	22	HMC680LP4E	24	HMC770LP4BE	13	HMC881LP5E	17	HMC984LP4E	42, 43
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