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RF, MICROWAVE, AND MILLIMETER WAVE IC

Selection Guide 2017

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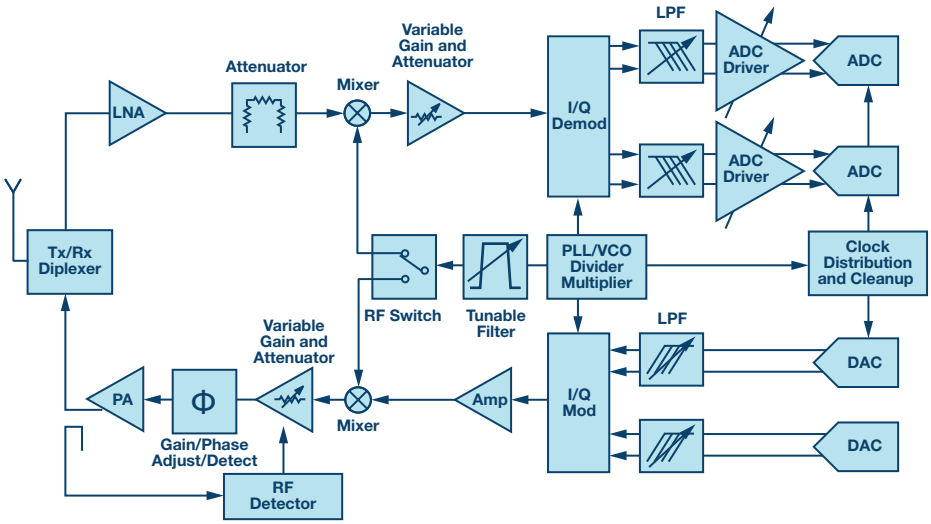
Contents

New: recently released parts that are also available for samples.
Upcoming: parts planned for release. Samples may be available—for sample availability, please contact your local ADI salesperson.

Introduction

From Antenna to Bits and Back … using a unique combination of design skills, systems understanding, and process technologies, Analog Devices offers the broadest portfolio of RF ICs, covering the entire RF signal chain from dc to beyond 90 GHz. With over 1000 high performance RF ICs, ADI offers a wide variety of RF function blocks, as well as highly integrated solutions for the communication, T&M instrumentation, and military markets. These products are supported by a full range of design resources to ease the development of RF systems, including free design tools, FMC rapid prototyping platforms, Circuits from the Lab® reference designs, and EngineerZone® technical forums. For more information, please visit *analog.com/rf*.



New Product Listing

RF/IF Differential Amplifiers

Part Number	Description	Frequency (MHz)	Gain Range (dB)	Output IP3 (dBm)	2nd/3rd Harmonic (dBc)	Noise Figure at Max Gain (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5205	Parallel and serial control, dual, 1 dB step	1700	–9 to +26	48.5	–75/–87.5	6.6	3.3, 5	175	6 × 6 LFCSP	5A991.b	ADL5205ACPZ-R7
ADL5567	Dual	4300	20	49.8	–94/–103	7.1	3.3, 5	148	4 × 4 LFCSP	EAR 99	ADL5567ACPZN-R7

Low Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8410	LNA	0.01 to 10	19.5	21.5	33	1.4	Internal	5	65	2 × 2 LFCSP	EAR 99	HMC8410LP2FE
HMC8401	LNA	0.01 to 28	14.5	16.5	26	1.5	Internal	7.5	60	Die	EAR 99	HMC8401
HMC8400	LNA	0.2 to 30	13.5	14.5	26.5	2	Internal	5	67	Die	3A001.b.2.d	HMC8400
HMC8402	LNA	2 to 30	13.5	21.5	26	2	Internal	7	68	Die	3A001.b.2.d	HMC8402
ADL5721	LNA	5.9 to 8.5	25.9	–10.6	4	1.6	Internal	3.3	86.5	2 × 2 LFCSP	EAR 99	ADL5721ACPZN-R7
ADL5723	LNA	10.1 to 11.7	24.5	–10	2.2	2.2	Internal	3.3	109.1	2 × 2 LFCSP	EAR 99	ADL5723ACPZN-R7
ADL5724	LNA	12.7 to 15.4	26.4	–8	2	2.1	Internal	3.3	109.7	2 × 2 LFCSP	EAR 99	ADL5724ACPZN-R7
ADL5725	LNA	17.7 to 19.7	27.8	–11.5	–1.5	2.4	Internal	3.3	108	2 × 2 LFCSP	EAR 99	ADL5725ACPZN-R7
ADL5726	LNA	21.2 to 23.6	24.7	–8	1	3.3	Internal	3.3	92.4	2 × 2 LFCSP	EAR 99	ADL5726ACPZN-R7

Gain Blocks and Driver Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC589A	Gain block	0 to 4	21	21	33	4.5	Internal	5	82	SOT-89	EAR 99	HMC589AST89

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Wideband Distributed Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC637A	Distributed	0 to 6	13	29	44	5	Internal	12	400	Die	EAR 99	HMC637A
HMC930A	Distributed	0 to 40	13	22	33.5	4.5	Internal	10	175	Die	3A001.b.2.d	HMC930A
HMC5805A	Distributed	0 to 40	13.5	22	33	5.5	Internal	10	175	6 × 6 LFCSP	3A001.b.2.d	HMC5805ALS6

Linear and Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC952A	Power amp	9 to 14	33	36	43	—	Internal	6	1400	5 × 5 LFCSP	EAR 99	HMC952ALP5GE
HMC1121	Power amp	5.5 to 7.5	27	36	44	—	Internal	7.5	2200	6 × 6 LFCSP	3A001.b.2.d	HMC1121LP6GE
HMC1132	Power amp	27 to 32	22	30.5	35	—	Internal	6	600	5 × 5 LFCSP	3A001.b.2.d	HMC1132
HMC7229	Power amp	33 to 37	24.5	31.5	39.5	—	Internal	6	1200	Die	3A001.b.2.d	HMC7229
HMC1144	Driver amp	40 to 70	19	21	28	—	Internal	4	320	Die	3A001.b.2.f	HMC1144

GaN Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P4dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	P_{SAT} (dBm)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1099	GaN PA	0.01 to 1.1	19	40	49	18.5	Internal	40.5	28	100	5 × 5 QFN	EAR 99	HMC1099LP5DE
HMC1114	10 W, GaN PA	2.7 to 3.8	25.5	41	44	14	Internal	41.5	28	150	5 × 5 LFCSP	3A001.b.2.a.4	HMC1114LP5DE

Digitally Controlled VGAs

Part Number	Description	Frequency (GHz)	Gain Range (dB)	Step (dB)	Output IP3 (dBm)	Noise Figure (dB)	Vs (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC625B	Gain block/VGA/driver amp parallel/serial control	0 to 5	–13.5 to +18	0.5	33	6	5	87.5	5 × 5 LFCSP	EAR 99	HMC625BLP5E

Baseband Programmable VGA Filters

Part Number	Description	Bandwidth (MHz)	Gain Range (dB)	Output IP3 (dBm)	Noise Figure (dB)	V_S (V)	I_S (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6520	Dual, with selectable LPF for E-band	LF to 1250	–6 to +54	27 dBV	11	3.3	420	5 × 5 LFCSP	5A991.b	ADRF6520ACPZ-R7

Digital Step Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Atten Range (dB)	Step (dB)	Input IP3 (dBm)	P0.1 dB (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC802A	1-bit	0 to 10	1.5	1.5 to 20	20	55	30	+3.3 to +5	3 × 3 LFCSP	EAR 99	HMC802ALP3E
HMC291S	2-bit DSA	0.7 to 4	0.9	0.7 to 12.7	4	54	26	—	SOT-26	EAR 99	HMC291SE
HMC629A	4-bit digital, serial and parallel control	0 to 6	2.5	3 to 45	3	50	—	0/+5	4 × 4 LFCSP	EAR 99	HMC629ALP4E
HMC540S	4-bit parallel	0.1 to 8	0.8	0.7 to 15.7	1	54	31	+3.3 to +5	3 × 3 LFCSP	EAR 99	HMC540SLP3E
HMC470A	5-bit	0 to 3	1.7	1.3 to 32.3	1	48	27	0/+5	3 × 3 LFCSP	EAR 99	HMC470ALP3E
HMC305S	5-bit, glitch free	0.4 to 7	1.4	1.3 to 17	0.5	52	28	+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC305SLP4E
HMC424A	6-bit	0 to 13	3.3	3.4 to 34.4	0.5	42	24	0/–5	Die	EAR 99	HMC424A
HMC424A	6-bit	0 to 13	3.3	3.3 to 35.5	0.5	42	23	0/–5	3 × 3 QFN	EAR 99	HMC424ALP3E
HMC424A	6-bit	0.1 to 3	3	3 to 34.5	0.5	42	23	0/–5	MSOP	EAR99	HMC424AG16
HMC424A	6-bit	0.1 to 13	3.3	3.3 to 34.3	0.5	42	23	0/–5	5 × 5 QFN	EAR99	HMC424ALH5
HMC273A	5-bit	0.7 to 3.7	2.8	1.9 to 32.9	1	48	—	+3.3 to +5	MSOP	EAR 99	HMC273AMS10GE
HMC539A	5-bit	0 to 4	1	0.7 to 8.45	0.25	50	28	0/+5	3 × 3 LFCSP	EAR 99	HMC539ALP3E
HMC1019A	5-bit DSA	0.1 to 30	4	0.5 to 15.5	0.5	45	25	0/+5	4 × 4 LFCSP	EAR 99	HMC1019ALP4E
HMC1018A	5-bit DSA	0.1 to 30	5.5	4.5 to 35.5	1	42	22	0/+5	4 × 4 LFCSP	EAR 99	HMC1018ALP4E
HMC1122	6-bit	0.1 to 6	1.2	1.3 to 33	0.5	55	30	+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC1122LP4ME
HMC1119	7-bit serial/parallel DSA	0.1 to 6	1.5	1.3 to 33.5	0.25	54	30	+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC1119LP4ME

Voltage Variable Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Atten Range (dB)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC973A	Analog VVA	0.5 to 6	3.5	3.5 to 29.5	35	0 to 5	3 × 3 LFCSP	EAR99	HMC973ALP3E

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Single, Double, and Triple Balanced Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	IP3 Input Typ (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	NF Typ (dB)	P1dB Input Typ (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
ADL5369	Passive	0.3 to 1.1	0.33 to 1.55	0.03 to 0.45	—	28	—	—	7.2	20	—	5 × 5 LFCSP	EAR 99	ADL5369
HMC557A	Passive	2.5 to 7	2.5 to 7	0 to 3	–7	22	47	34	7	10	15	4 × 4 LFCSP	EAR 99	HMC557ALC4
HMC787A	Passive mixer	3 to 10	3 to 10	0 to 4	–9	23	55	42	9	15	17	3 × 3 LFCSP	EAR 99	HMC787ALC3B
HMC558A	Passive	5.5 to 14	5.5 to 14	0 to 6	–8	22	40	25	8	12	15	3 × 3 LFCSP	EAR 99	HMC558ALC3B
HMC773A	Passive	6 to 26	6 to 26	0 to 8	–9	19	37	37	9	10	13	3 × 3 LFCSP	EAR 99	HMC773ALC3B
HMC412B	Passive	9 to 15	9 to 15	0 to 2.5	–8.4	18	44	41	8.4	11	13	MSOP	EAR 99	HMC412BMS8GE

I/Q Mixers and Image Reject Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dB)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	P1dB Input Typ (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC520A	I/Q and IRM	6 to 10	6 to 10	0 to 3.5	–8	19	22	43	25	10	15	4 × 4 LFCSP	EAR 99	HMC520ALC4
HMC8191	I/Q and IRM	6 to 26	6 to 26	0 to 5	–9	20	25	42	41	12	18	4 × 4 LFCSP	EAR 99	HMC8191LC4

I/Q Downconverters/Receivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dBc)	NF Typ (dB)	LO Drive Nominal (dBm)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC7586	E-band I/Q downconverter	71 to 76	11.83 to 14.33	0 to 10	12.5	–1	28	5	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7586
HMC7587	E-band I/Q downconverter	81 to 86	11.83 to 14.33	0 to 10	10	–2	30	6	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7587

I/Q Upconverters/Transmitters

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Output IP3 Typ (dBm)	Sideband Rejection (dBc)	LO Drive Nominal	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6780	Wideband I/Q upconverter	5.9 to 23.6	5.4 to 14	0 to 3.5	13	26	25	0	3.3, 5	400, 160	5 × 5 LFCSP	5A991.h	ADRF6780ACPZN-R7
HMC7911	I/Q upconverter	17.5 to 20	7.1 to 11.6	0 to 3.5	18	33	30	4	5	320	5 × 5 LFCSP	EAR 99	HMC7911LP5E
HMC7912	I/Q upconverter	21 to 24	8.5 to 14	0 to 3.5	14	32	18	4	5	320	5 × 5 LFCSP	EAR 99	HMC7912LP5E
HMC8118	E-band I/Q upconverter	71 to 76	11.83 to 14.33	0 to 10	11	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8118
HMC8119	E-band I/Q upconverter	81 to 86	11.83 to 14.33	0 to 10	10	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8119

Mixers with Integrated LO

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Power Gain (dB)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	VCO Phase Noise @ 1 MHz Offset (dBc/Hz)	Input IP3 (dBm)	Noise Figure (dB)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6614	Dual Rx mixer with tunable balun, PLL and VCO	0.7 to 3	0.2 to 2.7	0.02 to 0.5	9.3	MC-GSM compliant	MC-GSM compliant	28	11.3	5, 3.6	260, 260	7 × 7 LFCSP	5A991.h	ADRF6614ACPZ-R7
HMC1190A	Dual Rx with frac-N PLL and VCO	0.7 to 2.388	0.05 to 4	0.05 to 0.35	8.9	–118	–139	27	9	5, 3.3	—	6 × 6 LFSCP	5A991.h	HMC1190ALP6NETR

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Microwave and Millimeter Wave Integrated Transmitters and Receivers

IF Subsystem Transmitters and Receivers

Part Number	Description	RF (GHz)	IF (GHz)	Conversion Gain (dB)	RF VGA Dynamic Range (dB)	IF VGA Dynamic Range (dB)	Output IP3 Typ (dBm)	Image Rejection (dBc)	Noise Figure (dB)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8100	Intermediate frequency receiver	0.8 to 4	0.08 to 0.2	85	47	49	18	36	5	3.3	600	6 × 6 LFCSP	5A991.b	HMC8100LP6JE
HMC8200	Intermediate frequency transmitter	0.8 to 4	0.2 to 0.7	34	35	—	31	15	6	3.3	540	5 × 5 LFCSP	5A991.b	HMC8200LP5ME

V-Band Transmitters/Receivers

Part Number	Description	RF (GHz)	I/Q Bandwidth (GHz)	Max Gain (dB)	RF Control Range (dB)	IF Control Range (dB)	IP3 Typ (dBm)	Image Rejection (dBc)	Noise Figure (dB)	P1dB Typ (dBm)	Power Disspation (W)	Package (mm)	ECCN Code	Ordering Part Number
HMC6300	60 GHz integrated transmitter	57 to 64	1.8	35	22	14	20 (OIP3)	40	—	12 (single end) 15 (balanced)	0.88 (single end) 1.0 (balanced)	BGA	5A991.h	HMC6300BG46
HMC6301	60 GHz integrated receiver	57 to 64	1.8	67	6	12 (analog) 15 (digital)	–9 (IIP3)	35	8	30	0.82 (single end) 0.57 (Ext. LO)	BGA	5A991.h	HMC6301BG46

Fractional-N/Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4152HV	Fractional-N/ integer-N PLLs	0.5 to 5	–213	26	3.3	50	5 × 5 LFCSP	EAR 99	ADF4152HV

Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC4069	Integer-N PLL (N = 2 – 32)	0.01 to 2.9	–233	1300	5	295	4 × 4 LFCSP	3A001.a.11.b	HMC4069LP4E

Wideband Fractional-N/Integer-N PLLs with Integrated VCO

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	VCO Phase Noise @ 1 MHz (dBc/Hz)	Figure of Merit (dBc/Hz)	PFD_{MAX} Frac-N Mode (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4356	Wideband frac-N/ int-N PLL and VCO	0.053 to 6.8	–116	–138	–227	125	3.3/5	110/80	5 × 5 LFCSP	5A991.b	ADF4356BCPZ

High Performance VCOs

Part Number	Description	Frequency (GHz)	Primary Divide Output (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	V_{TUNE} (V)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1161	With f0/2	8.71 to 9.55	4.355 to 4.775	–90	–115	11	2 to 13	5	250	5 × 5 LFCSP	EAR 99	HMC1161LP5E
HMC1163	With f0/2	9.65 to 10.41	4.825 to 5.205	–87	–114	11	2 to 13	5	205	5 × 5 LFCSP	EAR 99	HMC1163LP5E
HMC1164	With f0/2	10.38 to 11.3	5.19 to 5.65	–86	–114	8	2 to 13	5	200	5 × 5 LFCSP	EAR 99	HMC1164LP5E
HMC1165	With f0/2	11.07 to 11.62	5.535 to 5.81	–88	–113	8	2 to 13	5	210	5 × 5 LFCSP	EAR 99	HMC1165LP5E
HMC1166	With f0/2	11.41 to 12.62	5.705 to 6.31	–89	–115	11	2 to 13	5	220	5 × 5 LFCSP	EAR 99	HMC1166LP5E
HMC1167	With f0/2	12.17 to 13.3	6.085 to 6.65	–86	–113	10	2 to 13	5	200	5 × 5 LFCSP	EAR 99	HMC1167LP5E
HMC1168	With f0/2	12.47 to 13.72	6.235 to 6.86	–85	–113	10	2 to 13	5	190	5 × 5 LFCSP	EAR 99	HMC1168LP5E
HMC1169	With f0/2	12.92 to 14.07	6.46 to 7.035	–86	–113	11	2 to 13	5	220	5 × 5 LFCSP	EAR 99	HMC1169LP5E

Phase Frequency Detectors

Part Number	Description	Input Freq (GHz)	Input Power (dBm)	10 kHz Phase Noise (dBc/Hz)	Output Level (mA)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC3716	High frequency phase frequency detector	0.01 to 1.3	–10 to +5	–153	2 V p-p	5	115	4 × 4 LFCSP	3A001.a.11.b	HMC3716LP4E

SPDT Switches

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1 (dB)	Input P0.1 (dB)	Input IP3	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC270A	Nonreflective	0 to 8	1	45	28	—	42	0/–5	MSOP	EAR 99	HMC270AMS8GE
HMC574A	5 W, Tx/Rx	0 to 3	0.25	30	38	36	63	0/+3 to +8	8-lead MSOP	EAR 99	HMC574AMS8E
HMC8038	Nonreflective	0.1 to 6	0.8	60	36	35	60	0/+3.3 to +5	—	—	HMC8038LP4CE
HMC1118	Nonreflective	0 to 13	0.6	56	37	—	62	0/+3.3	3 × 3 LFCSP	EAR 99	HMC1118LP3DE
ADRF5021	Nonreflective	~0 to 30	2	60	28	27	52	0 to +3/5.4	3 × 3 LGA	EAR 99	ADRF5021BCCZN
ADRF5020	Nonreflective	0.1 to 30	1.4	56	27	—	50	0/+3.3	3 × 3 LGA	EAR 99	ADRF5020BCCZN
HMC986A	Reflective	0.1 to 50	1.7	36	25	21	40	0/–3	Die	EAR 99	HMC986A
ADRF5130	44 W, Reflective	0.7 to 3.5	0.6	50	—	46	68	0/+3.3 to +5	3 × 3 LFCSP	EAR 99	ADRF5130BCPZ
HMC347A	Nonreflective	0.1 to 20	1.7	45	23	—	43	0/–5	Die	EAR 99	HMC347A
HMC347A	Nonreflective	0.1 to 14	1.6	44	23	—	43	0/–5	3 × 3 LFCSP	EAR 99	HMC347ALP3E
HMC547A	Nonreflective	0.1 to 28	1.9	40	23	—	46	0/–5	3 × 3 LFCSP	EAR 99	HMC547ALP3E

SP3T, SP4T, SP6T, SP8T Switches

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1 (dB)	Input P0.1 (dB)	Input IP3	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC252A	SP6T	0 to 3	0.8	45	24	—	47	0/+3.3 to +5	QSOP	EAR 99	HMC252AQS24E
HMC244A	SP4T	0 to 4	0.7	40	26	22	47	TTL/CMOS	Hermetic SMT	EAR 99	HMC244AG16
HMC322A	SP8T	0 to 8	2.5	35	26	22	40	0/–5	4 × 4 LFCSP	EAR 99	HMC322ALP4E
HMC344A	SP4T	0 to 8	2.1	32	28	19	44	0/–5	3 × 3 LFCSP	EAR 99	HMC344ALP3E
HMC641A	SP4T	0 to 18	2.1	42	25	—	41	0/+3.3 to +5	Die	EAR 99	HMC641A
HMC641A	SP4T	0 to 20	2.3	43	22	—	38	0/–5	4 × 4 LFCSP	EAR 99	HMC641ALC4
HMC641A	SP4T	0 to 20	2.3	41	22	—	36	0/–5	4 × 4 LFCSP	EAR 99	HMC641ALP4E
ADRF5040	SP4T	~0 to 12	0.8	34	34	34	58	0/+3.3	4 × 4 LFCSP	EAR 99	ADRF5040
HMC7992	SP4T	0.1 to 6	0.7	45	35	33	58	0/+3.3 to +5	3 × 3 LFCSP	EAR99	HMC7992LP3DE

Digital Phase Shifters

Part Number	Description	Frequency (GHz)	Loss (dB)	Phase Range Frequency (°)	Phase Adjust Resolution	RMS Phase Error (°)	Input IP3 (dBm)	Input P1dB (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC936A	6-bit	1.2 to 1.4	5	360	6-bit, 5.625°	1.2	45	29	6 × 6 LFCSP	EAR 99	HMC936ALP6E
HMC648A	6-bit	2.9 to 3.9	5	360	6-bit, 5.625°	1.2	45	31	6 × 6 LFCSP	EAR 99	HMC648ALP6E
HMC1133	6-bit	5 to 6	5	360	6-bit, 5.625°	2.8	46	30	5 × 5 LFCSP	EAR 99	HMC1133LP5E
HMC543A	4-bit	8 to 12	6.5	360	4-bit, 22.5°	4	40	24.5	4 × 4 LFCSP	EAR 99	HMC543ALC4B
HMC644A	5-bit	15 to 18.5	7.5	360	5-bit, 11.25°	3.5	40	23	5 x 5 LFCSP	EAR 99	HMC644ALC5

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

A Letter from ADI's RF and Microwave Group's Management

Thank you for considering Analog Devices. With the industry's broadest RF, microwave, and millimeter wave portfolio, ADI has more than 1000 commercially available parts. We have created the *RF, Microwave, and Millimeter Wave IC Selection Guide* to give you quick and easy access to information so you can find the best parts for your designs.

Supporting a Complete Signal Chain Solution

With the rapid growth of global mobile data needs, industrial sensor applications, military radars, and interest in 5G and IoT (Internet of Things), companies today require complete signal chain solutions so they can bring products to market faster. There's very little time to select individual components from multiple vendors and make them work together for their desired application. We realize this is a critical shift in the design approach, and so we've created this new selection guide that simplifies part selection for your design needs. It features:

- A complete selection of parts for each component in the RF signal chain
- A separate category of integrated transmitter/receiver parts
- Clearly highlighted parts that are available in ADIsimRF and ADIsimPLL simulation tools
- A resource library of different simulation tools to help with your designs

Easy Access to New Products

We have also included a "New Product List" and featured product pages to highlight recently released and noteworthy parts for your designs. In addition, we have marked several parts to be released in the near future so you can consider those for upcoming designs.

Tools and Support

You'll also find access to useful tools, resources, and technical references to help with your designs and keep you up to date on ADI's latest involvement in various RF forums.

These are exciting times in the RF and microwave industry. We're glad to have the opportunity to provide innovative technical solutions to help you develop a smarter and more connected world.

Sincerely,

Greg Henderson
Vice President,
RF and Microwave Group

RF Amplifiers

RF/IF Differential Amplifiers

Part Number	Description	Frequency (MHz)	Gain Range (dB)	Output IP3 (dBm)	2nd/3rd Harmonic (dBc)	Noise Figure at Max Gain (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8372	Dual, 1 dB step	130	–9 to +32	35	–78/–85	7.9	5	212	5 × 5 LFCSP	EAR 99	AD8372ACPZ-R7
AD8375	Dual, 1 dB step	630	–4 to +20	50	–85/–92	8.3	5	125	4 × 4 LFCSP	EAR 99	AD8375ACPZ-R7
ADL5201	Parallel and serial control, 0.5 dB step	700	–11.5 to +20	51	–89/–97	7.5	5	110	4 × 4 LFCSP	EAR 99	ADL5201ACPZ-R7
ADL5202	Parallel and serial control, dual, 0.5 dB step	700	–11.5 to +20	50	–86/–105	7.5	5	210	6 × 6 LFCSP	EAR 99	ADL5202ACPZ-R7
AD8376	Dual, 1 dB step	700	–4 to +20	50	–82/–91	8.7	5	250	5 × 5 LFCSP	EAR 99	AD8376ACPZ-R7
AD8370	<1dB step	750	–8 to +34	35	–65/–62	7.2	3, 5	79	TSSOP	EAR 99	AD8370AREZ-RL7
AD8350	Fixed-gain	900	15	28	–66/–65	6.8	5	28, 30	SOIC	EAR 99	AD8350ARMZ15-REEL7
AD8350	Fixed-gain	900	20	28	–66/–65	6.8	5	28, 30	MSOP	EAR 99	AD8350ARMZ20-REEL7
ADL5205 ***New***	Parallel and serial control, dual, 1 dB step	1700	–9 to +26	48.5	–75/–87.5	6.6	3.3, 5	175	6 × 6 LFCSP	5A991.b	ADL5205ACPZ-R7
AD8351	Resistor programmed	2200	0 to +26	31	–79/–81	15.5	3, 5	28	MSOP	EAR 99	AD8351ACPZ-R7
AD8352	Resistor programmed	2200	+3 to +25	41	–83/–82	15.5	3, 5	37	3 × 3 LFCSP	EAR 99	AD8352ACPZ-R7
ADL5561	Pin strap	2900	+6, +12, +15.5	49	–95/–87	8	3.3	40	3 × 3 LFCSP	EAR 99	ADL5561ACPZ-R7
ADA4961	Parallel and serial control, 1 dB step	3200	–3 to +18	50	–84/–100	5.6	3, 5	150	4 × 4 LFCSP	EAR 99	ADA4961ACPZN-R7
ADL5562	Pin strap	3300	+6, +12, +15.5	47	–104/–87	7.3	3.3	80	3 × 3 LFCSP	EAR 99	ADL5562ACPZ-R7
ADL5566	Dual	4500	16	51	–94.7/–100	6.58	3, 5	140, 160	4 × 4 LFCSP	EAR 99	ADL5566ACPZ-R7
ADL5565	Pin strap	7000	+6, +12, +15.5	53	–108/–103	8.7	3, 5	70, 80	3 × 3 LFCSP	EAR 99	ADL5565ACPZ-R7
ADL5567 ***New***	Dual	4300	20	49.8	–94/–103	7.1	3.3, 5	148	4 × 4 LFCSP	EAR 99	ADL5567ACPZN-R7

Low Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8410 ***New***	LNA	0.01 to 10	19.5	21.5	33	1.1	Internal	5	65	2 × 2 LFCSP	EAR 99	HMC8410LP2FE
HMC8401 ***New***	LNA	0.01 to 28	14.5	16.5	26	1.5	Internal	7.5	60	Die	EAR 99	HMC8401
HMC549	LNA	0.04 to 0.96	5	12	27	3.5	Internal	5	120	MSOP	EAR 99	HMC549MS8GE
HMC599	LNA	0.05 to 1	14	19	39	2.2	Internal	5	120	SOT-89	EAR 99	HMC599ST89E
HMC639	LNA	0.2 to 4	13	22	38	2.3	Internal	5	110	SOT-89	EAR 99	HMC639ST89E
HMC374	LNA	0.3 to 3	15	22	37	1.5	Internal	5	90	SOT-26	EAR 99	HMC374E
HMC374	LNA	0.3 to 3	15	17	35	1.6	Internal	3.3	75	SC70	EAR 99	HMC374SC70E
HMC356	LNA	0.35 to 0.55	17	21	38	1	External	5	104	3 × 3 LFCSP	EAR 99	HMC356LP3E
HMC8400	LNA	0.2 to 30	13.5	14.5	26.5	2	Internal	5	67	Die	3A001.b.2.d	HMC8400
ADL5521	LNA	0.4 to 4	20.8	22	37	0.9	External	5	60	3 × 3 LFCSP	5A991.b	ADL5521ACPZ-R7
ADL5523	LNA	0.4 to 4	21.5	21	34	0.8	External	5	60	3 × 3 LFCSP	5A991.b	ADL5523ACPZ-R7
HMC373	LNA	0.7 to 1	14	20	35	1	Internal	5	90	3 × 3 LFCSP	EAR 99	HMC373LP3E
HMC376	LNA	0.7 to 1	15	21	36	0.7	Internal	5	73	3 × 3 LFCSP	EAR 99	HMC376LP3E
HMC372	LNA	0.7 to 1	15	21	34	1	External	5	100	3 × 3 LFCSP	EAR 99	HMC372LP3E
HMC753	LNA	1 to 11	17	18	30	1.5	Internal	5	55	4 × 4 LFCSP	EAR 99	HMC753LP4E
HMC-ALH444	LNA	1 to 12	17	19	28	1.5	Internal	5	55	Die	EAR 99	HMC-ALH444
HMC618A	LNA	1.2 to 2.2	19	20	36	0.75	External	5	117	3 × 3 LFCSP	EAR 99	HMC618ALP3E
HMC375	LNA	1.7 to 2.2	17	18	34	0.9	External	5	136	3 × 3 LFCSP	EAR 99	HMC375LP3E
HMC382	LNA	1.7 to 2.2	17	16	30	1	Internal	5	67	3 × 3 LFCSP	EAR 99	HMC382LP3E
HMC772	LNA	2 to 12	15	13	25	1.8	Internal	4	45	4 × 4 LFCSP	EAR 99	HMC772LC4
HMC8402 ***New***	LNA	2 to 30	13.5	21.5	26	2	Internal	7	68	Die	3A001.b.2.d	HMC8402
HMC392A ***Upcoming***	LNA	3.5 to 7	15.5	16	28	2.4	Internal	5	50	Die	EAR 99	HMC392A
HMC392A ***Upcoming***	LNA	3.5 to 7	16	16	28	2.4	Internal	5	65	4 × 4 LFCSP	EAR 99	HMC392ALC4
HMC717A ***Upcoming***	LNA	4.8 to 6	16.5	19	32	1.1	External	5	73	3 × 3 LFCSP	EAR 99	HMC717ALP3E
HMC-ALH435	LNA	5 to 20	13	16	25	2.2	Internal	5	30	Die	EAR 99	HMC-ALH435
HMC902	LNA	5 to 10	19	16	28	1.8	Internal	3.5	80	3 × 3 LFCSP	EAR 99	HMC902LP3E
HMC902	LNA	5 to 10	20	16	28	1.6	Internal	3.5	80	Die	EAR 99	HMC902
ADL5721 ***New***	LNA	5.9 to 8.5	25.9	–10.6	4	1.6	Internal	3.3	86.5	2 × 2 LFCSP	EAR 99	ADL5721ACPZN-R7
HMC903	LNA	6 to 17	18	14	25	1.7	Internal	3.5	80	3 × 3 LFCSP	EAR 99	HMC903LP3E
HMC903	LNA	6 to 18	19	15	27	1.6	Internal	3.5	90	Die	EAR 99	HMC903
HMC565	LNA	6 to 20	21	10	20	2.5	Internal	3	53	5 × 5 LFCSP	EAR 99	HMC565LC5
HMC565	LNA	6 to 20	22	10	20	2.3	Internal	3	53	Die	EAR 99	HMC565
HMC963	LNA	6 to 26.5	22	10	18	2.5	Internal	3.5	45	4 × 4 LFCSP	EAR 99	HMC963LC4
HMC564	LNA	7 to 14	17	12	24	1.8	Internal	3	51	Die	EAR 99	HMC564
HMC564	LNA	7 to 14	17	13	25	1.8	Internal	3	51	4 × 4 LFCSP	EAR 99	HMC564LC4
HMC962	LNA	7.5 to 26.5	13	13	23	2.5	Internal	3.5	70	4 × 4 LFCSP	EAR 99	HMC962LC4

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Low Noise Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC516	LNA	9 to 18	20	13	25	2	Internal	3	65	5 × 5 LFCSP	EAR 99	HMC516LC5
HMC516	LNA	9 to 18	21	13	20	2	Internal	3	65	Die	EAR 99	HMC516
ADL5723 ***New***	LNA	10.1 to 11.7	24.5	–10	2.2	2.2	Internal	3.3	109.1	2 × 2 LFCSP	EAR 99	ADL5723ACPZN-R7
HMC490	LNA	12 to 17	27	26	35	2	Internal	5	200	Die	EAR 99	HMC490
HMC490	LNA	12 to 16	27	25	35	2.5	Internal	5	200	5 × 5 LFCSP	EAR 99	HMC490LP5E
ADL5724 ***New***	LNA	12.7 to 15.4	26.4	–8	2	2.1	Internal	3.3	109.7	2 × 2 LFCSP	EAR 99	ADL5724ACPZN-R7
HMC342	LNA	13 to 25	20	5	13	3.5	Internal	3	43	Die	EAR 99	HMC342
HMC342	LNA	13 to 25	22	9	20	3.5	Internal	3	43	3 × 3 LFCSP	EAR 99	HMC342LC4
HMC-ALH216	LNA	14 to 27	18	14	—	2.5	Internal	4	90	Die	5A991.h	HMC-ALH216
HMC504	LNA	14 to 27	19.5	17	26	2.2	Internal	4	90	4 × 4 LFCSP	5A991.h	HMC504LC4B
HMC-ALH476	LNA	14 to 27	20	14	—	2	Internal	4	90	Die	5A991.h	HMC-ALH476
HMC517	LNA	17 to 26	19	13	23	2.5	Internal	3	67	4 × 4 LFCSP	EAR 99	HMC517LC4
HMC517	LNA	17 to 26	20	11	23	2	Internal	3	65	Die	EAR 99	HMC517
HMC751	LNA	17 to 27	25	13	25	2.2	Internal	4	73	4 × 4 LCC	EAR 99	HMC751LC4
ADL5725 ***New***	LNA	17.7 to 19.7	27.8	–11.5	–1.5	2.4	Internal	3.3	108	2 × 2 LFCSP	EAR 99	ADL5725ACPZN-R7
HMC-ALH445	LNA	18 to 40	10	12	—	3.9	Internal	5	45	Die	3A001.b.2.d	HMC-ALH445
HMC519	LNA	18 to 31	14.4	11	23	3	Internal	3	75	4 × 4 LFCSP	EAR 99	HMC519LC4
HMC519	LNA	18 to 31	15	14	23	3	Internal	3	75	Die	EAR 99	HMC519
HMC518	LNA	20 to 32	15	12	23	3	Internal	3	65	Die	3A001.b.2.d	HMC518
HMC341	LNA	21 to 29	13	6	16	2.5	Internal	3	30	Die	EAR 99	HMC341
HMC341	LNA	21 to 29	13	8	19	2.5	Internal	3	35	3 × 3 LFCSP	EAR 99	HMC341LC3B
ADL5726 ***New***	LNA	21.2 to 23.6	24.7	–8	1	3.3	Internal	3.3	92.4	2 × 2 LFCSP	EAR 99	ADL5726ACPZN-R7
HMC-ALH311	LNA	22 to 26.5	25	12	—	3	Internal	2.5	54	Die	5A991.h	HMC-ALH311
HMC-ALH140	LNA	24 to 40	11.5	15	—	4	Internal	4	60	Die	3A001.b.2.d	HMC-ALH140
HMC-ALH244	LNA	24 to 40	12	13	—	3.5	Internal	4	45	Die	3A001.b.2.d	HMC-ALH244
HMC263	LNA	24 to 36	20	8	18	2.2	Internal	3	58	3 × 3 LFCSP	3A001.b.2.d	HMC263LP4E
HMC263	LNA	24 to 36	22	8	17	2	Internal	3	58	Die	3A001.b.2.d	HMC263
HMC-ALH364	LNA	24 to 32	21	7	—	2	Internal	5	68	Die	3A001.b.2.d	HMC-ALH364
HMC-ALH369	LNA	24 to 40	22	11	—	2	Internal	5	66	Die	3A001.b.2.d	HMC-ALH369
HMC1040	LNA	24 to 43.5	22	12	22	2.7	Internal	2.5	70	3 × 3 LFCSP	3A001.b.2.d	HMC1040LP3CE
HMC752	LNA	24 to 28	25	13	26	2.5	Internal	3	70	4 × 4 LFCSP	EAR 99	HMC752LC4
HMC-ALH313	LNA	27 to 33	20	12	—	3	Internal	2.5	52	Die	3A001.b.2.d	HMC-ALH313
HMC566	LNA	29 to 36	20	12	24	2.8	Internal	3	80	Die	3A001.b.2.d	HMC566
HMC566	LNA	29 to 36	21	12	24	2.8	Internal	3	82	4 × 4 LFCSP	3A001.b.2.d	HMC566LP4E
HMC-ALH376	LNA	35 to 45	16	6	—	2	Internal	4	87	Die	3A001.b.2.d	HMC-ALH376
HMC-ALH310	LNA	37 to 42	22	12	—	3.5	Internal	2.5	52	Die	3A001.b.2.d	HMC-ALH310
HMC-ALH382	LNA	57 to 65	21	12	—	4	Internal	2.5	64	Die	EAR 99	HMC-ALH382
HMC-ALH508	LNA	71 to 86	13	7	—	5	Internal	2.4	30	Die	EAR 99	HMC-ALH508
HMC-ALH509	LNA	71 to 86	14	7	—	5	Internal	2	50	Die	EAR 99	HMC-ALH509
HMC8325 ***Upcoming***	LNA	71 to 86	21	13	22	3.7	Internal	3	50	Die	3A001.b.2.g	HMC8325

Gain Blocks and Driver Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC754	Gain block	0 to 1	14.5	21	38	5.5	Internal	5	160	SOIC	EAR 99	HMC754S8GE
ADL5530	Gain block	0 to 1	16.8	22	37	3	Internal	3	110	2 × 3 LFCSP	EAR 99	ADL5530ACPZ-WP
HMC395	Gain block	0 to 4	15	15	28	4.5	Internal	5	54	Die	EAR 99	HMC395
HMC589A ***New***	Gain block	0 to 4	21	21	33	4.5	Internal	5	82	SOT-89	EAR 99	HMC589AST89
HMC480	Gain block	0 to 5	19	20	34	2.9	Internal	8	82	SOT-89	EAR 99	HMC480ST89
HMC313	Gain block	0 to 6	17	14	27	6.5	Internal	5	50	SOT-26	EAR 99	HMC313
HMC311	Gain block	0 to 6	15	16	32	5	External	5	55	SOT-89	EAR 99	HMC311ST89E
HMC311	Gain block	0 to 6	14.5	16	32	4.5	External	5	55	3 × 3 LFCSP	EAR 99	HMC311LP3
HMC311	Gain block	0 to 8	15	15	30	5	External	5	55	SC70	EAR 99	HMC311SC70E
HMC396	Gain block	0 to 8	12	14	30	6	Internal	5	56	Die	EAR 99	HMC396
HMC405	Gain block	0 to 10	16	13	25	4	Internal	5	50	Die	EAR 99	HMC405
HMC397	Gain block	0 to 10	15	13	24	4.5	Internal	5	56	Die	EAR 99	HMC397
HMC788A	Gain block	0 to 10	14	20	33	7	Internal	5	76	2 × 2 LFCSP	EAR 99	HMC788ALP2E
HMC3587	Gain block	~0 to 10	14.5	11	25	3.5	Internal	5	44	3 × 3 LFCSP	EAR 99	HMC3587LP3BE
AD8354	Gain block	0.001 to 2.7	20	5	19	4.2	Internal	3	25	2 × 3 LFCSP	EAR 99	AD8354ACPZ-REEL7
AD8353	Gain block	0.001 to 2.7	20	9	24	5.6	Internal	3	42	2 × 3 LFCSP	EAR 99	AD8353ACPZ-REEL7
HMC3653	Gain block	0.007 to 15	15	15	28	4	Internal	5	44	3 × 3 LFCSP	EAR 99	HMC3653LP3BE
ADL5534	Gain block	0.02 to 0.5	21	20	40	2.5	Internal	5	98	5 × 5 LFCSP	EAR 99	ADL5534ACPZ-R7
ADL5531	Gain block	0.02 to 0.5	20.9	20	41	2.5	Internal	5	100	3 × 3 LFCSP	EAR 99	ADL5531ACPZ-R7
ADL5536	Gain block	0.02 to 1	20	20	45	2.6	Internal	5	105	SOT-89	EAR 99	ADL5536ARKZ-R7
ADL5535	Gain block	0.02 to 1	16	19	46	3.2	Internal	5	97	SOT-89	EAR 99	ADL5535ARKZ-R7
ADL5545	Gain block	0.03 to 6	24.1	18	36	2.9	Internal	5	56	SOT-89	EAR 99	ADL5545ARKZ-R7
ADL5544	Gain block	0.03 to 6	17.4	18	35	2.9	Internal	5	55	SOT-89	EAR 99	ADL5544ARKZ-R7

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Gain Blocks and Driver Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5610	Gain block	0.03 to 6	18.4	21	38	2.1	Internal	5	91	SOT-89	EAR 99	ADL5610ARKZ-R7
ADL5611	Gain block	0.03 to 6	22.1	21	39	2.1	Internal	5	91	SOT-89	EAR 99	ADL5611ARKZ-R7
HMC741	Gain block	0.05 to 3	20	19	42	2.5	Internal	5	96	SOT-89	EAR 99	HMC741ST89E
HMC740	Gain block	0.05 to 3	15	18	40	3.5	Internal	5	88	SOT-89	EAR 99	HMC740ST89E
ADL5601	Gain block	0.05 to 4	15	19	43	3.7	Internal	5	83	SOT-89	EAR 99	ADL5601ARKZ-R7
ADL5602	Gain block	0.05 to 4	19.3	19	42	3.3	Internal	5	89	SOT-89	EAR 99	ADL5602ARKZ-R7
ADL5542	Gain block	0.05 to 6	18.7	18	39	3.2	Internal	5	93	3 × 3 LFCSP	EAR 99	ADL5542ACPZ-R7
ADL5541	Gain block	0.05 to 6	14.7	16	39	3.8	Internal	5	90	3 × 3 LFCSP	EAR 99	ADL5541ACPZ-R7
HMC636	Gain block	0.2 to 4	13	22	40	2.2	Internal	5	155	SOT-89	EAR 99	HMC636ST89
ADL5320	Driver amp	0.4 to 2.7	13.2	26	42	4.4	External	3.3	47	SOT-89	EAR 99	ADL5320ARKZ-R7
ADL5324	Driver amp	0.4 to 4	14	29	44	3.5	External	3.3	60	SOT-89	EAR 99	ADL5324ARKZ-R7
ADL5605	Driver amp	0.7 to 1	23	31	44	4.8	External	5	307	4 × 4 LFCSP	EAR 99	ADL5605ACPZ-R7
ADL5604	Driver amp	0.7 to 2.7	12.2	29	42	4.6	External	5	318	4 × 4 LFCSP	EAR 99	ADL5604ACPZ-R7
HMC789	Driver amp	0.7 to 2.8	18	25	42	3.8	External	5	125	SOT-89	EAR 99	HMC789ST89E
ADL5606	Driver amp	1.8 to 2.7	24.3	31	46	4.7	External	5	362	4 × 4 LFCSP	EAR 99	ADL5606ACPZ-R7
ADL5321	Driver amp	2.3 to 4	14	26	41	4	External	3.3	37	SOT-89	EAR 99	ADL5321ARKZ-R7
HMC326	Driver amp	3 to 4.5	21	24	36	5	Internal	5	130	MSOP	EAR 99	HMC326MS8G

Wideband Distributed Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC637A	Distributed	0 to 6	13	29	44	5	Internal	12	400	5 × 5 LFCSP	EAR 99	HMC637ALP5E
HMC637A ***New***	Distributed	0 to 6	13	29	44	5	Internal	12	400	Die	EAR 99	HMC637A
HMC659	Distributed	0 to 15	19	27	35	2	Internal	8	300	Die	EAR 99	HMC659
HMC659	Distributed	0 to 15	19	28	35	2.5	Internal	8	300	5 × 5 LFCSP	EAR 99	HMC659LC5
HMC459	Distributed	0 to 18	17	25	32	3	Internal	8	290	Die	EAR 99	HMC459
HMC559	Distributed	0 to 20	14	28	36	4	Internal	10	400	Die	EAR 99	HMC559
HMC460	Distributed	0 to 20	14	16	29	2.5	Internal	8	75	Die	EAR 99	HMC460
HMC460	Distributed	0 to 20	14	17	30	2.5	Internal	8	75	5 × 5 LFCSP	EAR 99	HMC460LC5
HMC465	Distributed	0 to 20	17	22	30	2.5	Internal	8	160	Die	EAR 99	HMC465
HMC465	Distributed	0 to 20	15	23	28	3	Internal	8	160	5 × 5 LFCSP	EAR 99	HMC465LP5
HMC930A ***New***	Distributed	0 to 40	13	22	33.5	4.5	Internal	10	175	Die	3A001.b.2.d	HMC930A
HMC-AUH249	Distributed	0 to 35	15	21	—	—	Internal	5	200	Die	3A001.b.2.d	HMC-AUH249
HMC-AUH232	Distributed	0 to 45	14	17	—	4.2	Internal	5	180	Die	3A001.b.2.d	HMC-AUH232
HMC5805A ***New***	Distributed	0 to 40	13.5	22	33	5.5	Internal	10	175	6 × 6 LFCSP	3A001.b.2.d	HMC5805ALS6
HMC6980	Distributed	0.01 to 20	12	28	28	4.5	Internal	12	345		3A001.b.2.d	—
HMC998A ***Upcoming***	Distributed	0.1 to 22	12	31	41	4.5	Internal	5	500	Die	—	HMC998A
HMC1049	LNA, distributed	0.3 to 19	16	15	27	1.7	Internal	7	70	Die	EAR 99	HMC1049
HMC1049	LNA, distributed	0.3 to 20	15	15	29	1.8	Internal	7	70	5 × 5 LFCSP	EAR 99	HMC1049LP5E
HMC-AUH312	Distributed	0.5 to 65	10	—	—	—	Internal	8	60	Die	3A001.b.2.f	HMC-AUH312
HMC606	Low phase noise	2 to 18	12.5	13	22	7	Internal	—	64	Die	EAR 99	HMC606
HMC606	Low phase noise	2 to 18	13.5	15	—	—	—	—	—	5 × 5 LFCSP	EAR 99	HMC606LC5
HMC-ALH482	LNA, distributed	2 to 20	16	14	—	1.7	Internal	4	45	Die	EAR 99	HMC-ALH482
HMC-ALH102	Distributed	2 to 20	10	10	—	2.5	Internal	2	55	Die	EAR 99	HMC-ALH102
HMC464	Distributed	2 to 20	16	26	30	4	Internal	8	290	Die	EAR 99	HMC464
HMC464	Distributed	2 to 20	14	26	30	4	Internal	8	290	5 × 5 LFCSP	EAR 99	HMC464LP5E
HMC463	Distributed	2 to 20	14	16	28	2.5	Internal	5	60	Die	EAR 99	HMC463
HMC463	Distributed	2 to 20	13	18	26	3	Internal	5	60	5 × 5 LFCSP	EAR 99	HMC463LP5
HMC463	Distributed	2 to 20	14	18	28	2.5	Internal	5	60	LFCSP	EAR 99	HMC463LH250
HMC462	Distributed	2 to 20	15	15	27	2.5	Internal	5	63	Die	EAR 99	HMC462
HMC462	Distributed	2 to 20	13	14	25	2.5	Internal	5	66	5 × 5 LFCSP	EAR 99	HMC462LP5
HMC562	Distributed	2 to 35	12.5	18	27	3	Internal	8	80	Die	3A001.b.2.d	HMC562
HMC1127	Distributed	2 to 50	14	12	22	—	—	5	65	Die	3A001.b.2.d	HMC1127
HMC1126	Distributed	2 to 50	11	15	28	—	—	5	66	Die	3A001.b.2.d	HMC1126
HMC633	Distributed	5 to 17	29	23	30	8	Internal	5	180	Die	EAR 99	HMC633
HMC634	Distributed	5 to 20	22	23	31	7.5	Internal	5	180	Die	EAR 99	HMC634
HMC634	Distributed	5 to 20	21	22	29	7.5	Internal	5	180	4 × 4 LFCSP	EAR 99	HMC634LC4
HMC633	Distributed	5.5 to 17	30	23	30	8	Internal	5	180	4 × 4 LFCSP	EAR 99	HMC633LC4
HMC635	Distributed	18 to 40	19.5	23	29	8	Internal	5	280	Die	3A001.b.2.d	HMC635
HMC635	Distributed	18 to 40	18.5	22	27	8	Internal	5	280	4 × 4 LFCSP	3A001.b.2.d	HMC635LC4

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Linear and Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC453	Power amp	0.4 to 2.2	22	33	50	6.5	External	5	725	QSOP	EAR 99	HMC453QS16GE
HMC452	Power amp	0.4 to 2.2	21	30	49	7.5	External	5	510	SOT-89	EAR 99	HMC452ST89
HMC452	Power amp	0.4 to 2.2	23	30	48	7	External	5	485	QSOP	EAR 99	HMC452QS16GE
HMC454	Power amp	0.4 to 2.5	13	27	42	6	External	5	150	SOT-89	EAR 99	HMC454ST89
HMC453	Power amp	0.45 to 2.2	21	32	49	6.5	External	5	725	SOT-89	EAR 99	HMC453ST89
HMC450	Driver amp	0.8 to 1	26	26	40	8	External	5	310	QSOP	EAR 99	HMC450QS16GE
HMC413	Power amp	1.6 to 2.2	22	27	40	5.5	External	3.6	270	QSOP	EAR 99	HMC413QS16GE
HMC457	Power amp	1.7 to 2.2	27	31	46	5	External	5	500	QSOP	EAR 99	HMC457QS16G
HMC461	Power amp	1.7 to 2.2	12	30	45	6	External	5	300	3 × 3 LFCSP	EAR 99	HMC461LP3E
HMC455	Power amp	1.7 to 2.5	13	27	42	—	External	5	150	3 × 3 LFCSP	EAR 99	HMC455LP3E
HMC414	Power amp	2.2 to 2.8	20	27	39	—	External	5	300	MSOP	EAR 99	HMC414MS8GE
HMC327	Power amp	3 to 4	21	27	40	5	Internal	5	250	MSOP	EAR 99	HMC327MS8GE
HMC409	Power amp	3.3 to 3.8	31	31	46	5.8	External	5	615	3 × 3 LFCSP	EAR 99	HMC409LP4E
HMC415	Driver amp	4.9 to 5.9	20	22	32	6	External	3	285	3 × 3 LFCSP	EAR 99	HMC415LP3E
HMC406	Driver amp	5 to 6	18	26	38	6	External	5	300	MSOP	EAR 99	HMC406MS8GE
HMC407	Driver amp	5 to 7	15	25	40	5.5	Internal	5	230	MSOP	EAR 99	HMC407MS8GE
HMC451	Driver amp	5 to 20	22	20	30		Internal	5	127	Die	EAR 99	HMC451
HMC451	Driver amp	5 to 20	18	20	28	7	Internal	5	120	3 × 3 QFN	EAR 99	HMC451LP3E
HMC451	Driver amp	5 to 20	19	19	30	7	Internal	5	114	3 × 3 QFN	EAR 99	HMC451LC3
HMC408	Power amp	5.1 to 5.9	20	30	43	6	External	5	750	3 × 3 QFN	EAR 99	HMC408LP3E
HMC7357	Power amp	5.5 to 8.5	29	35	42	—	Internal	8	1200	4 × 4 QFN	EAR 99	HMC7357LP5GE
HMC1121 ***New***	Power amp	5.5 to 7.5	27	36	44	—	Internal	7.5	2200	6 × 6 LFCSP	3A001.b.2.d	HMC1121LP6GE
HMC1082	Driver amp	5.5 to 18	22	24	35	—	Internal	5	220	4 × 4 QFN	EAR 99	HMC1082LP4E
HMC591	Power amp	6 to 9.5	18	33	41	—	Internal	7	1340	5 × 5 QFN	EAR 99	HMC591LP5E
HMC591	Power amp	6 to 10	23	33	43	—	Internal	7	1340	Die	EAR 99	HMC591
HMC590	Power amp	6 to 10	25	32	41	—	Internal	7	820	Die	EAR 99	HMC590
HMC590	Power amp	6 to 10	21	31	40	—	Internal	7	820	5 × 5 QFN	EAR 99	HMC590LP5E
HMC441	Driver amp	6 to 18	16	20	32	4.5	Internal	5	95	Die	EAR 99	HMC441
HMC441	Driver amp	6 to 18	17	20	32	4.5	Internal	5	95	3 × 3 QFN	EAR 99	HMC441LC3B
HMC441	Driver amp	6.5 to 13.5	14	18	29	4.5	Internal	5	95	3 × 3 QFN	EAR 99	HMC441LP3
HMC441	Driver amp	7 to 15.5	15	20	32	4.8	Internal	5	90	5 × 5 LFCSP	EAR 99	HMC441LH5
HMC487	Power amp	9 to 12	20	32	36	8	Internal	7	1300	5 × 5 QFN	EAR 99	HMC487LP5E
HMC952A ***New***	Power amp	9 to 14	33	36	43	—	Internal	6	1400	5 × 5 LFCSP	EAR 99	HMC952ALP5GE
HMC608	Driver amp	9.5 to 11.5	29	27	33	6	Internal	5	310	4 × 4 QFN	EAR 99	HMC608LC4
HMC383	Driver amp	12 to 30	16	16	25	7	Internal	5	100	Die	EAR 99	HMC383
HMC383	Driver amp	12 to 30	15	17	25	7.5	Internal	5	100	4 × 4 QFN	EAR 99	HMC383LC4
HMC6981	Power amp	15 to 20	26	34	44	—	External	6	1100	6 × 6 LFCSP	EAR 99	HMC6981LS6
HMC-APH462	Power amp	15 to 27	17	29	37	—	Internal	5	1440	6 × 6 QFN	EAR 99	HMC-APH462
HMC-APH596	Driver amp	16 to 33	17	24	33	—	Internal	5	400	Die	5A991.h	HMC-APH596
HMC498	Driver amp	17 to 24	24	25	34	—	Internal	5	250	Die	EAR 99	HMC498
HMC498	Driver amp	17 to 24	22	25	36	4	Internal	5	250	4 × 4 QFN	EAR 99	HMC498LC4
HMC-APH196	Driver amp	17 to 30	20	24	31	—	Internal	5	400	Die	EAR 99	HMC-APH196
HMC442	Driver amp	17.5 to 24	14	22	28	6.5	Internal	5	85	1.35 LCC	EAR 99	HMC442LM1
HMC442	Driver amp	17.5 to 25.5	15	22	28	5.5	Internal	5	84	Die	EAR 99	HMC442
HMC442	Driver amp	17.5 to 25.5	13	22	27	8	Internal	5	84	3 × 3 QFN	EAR 99	HMC442LC3B
HMC-AUH256	Driver amp	17.5 to 41	21	20	27	—	Internal	5	295	Die	3A001.b.2.d	HMC-AUH256
HMC-APH478	Power amp	18 to 20	18	30	39	—	Internal	5	900	Die	3A001.b.2.d	HMC-APH478
HMC-APH518	Power amp	21 to 24	17	31	39	—	Internal	5	950	Die	3A001.b.2.c	HMC-APH518
HMC499	Driver amp	21 to 32	16	24	33	—	Internal	5	200	Die	3A001.b.2.d	HMC499
HMC499	Driver amp	21 to 32	17	23	34	5	Internal	5	200	4 × 4 QFN	3A001.b.2.d	HMC499LC4
HMC-APH608	Power amp	22.5 to 26.5	17	30	38	—	Internal	5	950	Die	EAR 99	HMC-APH608
HMC943A ***Upcoming***	Power amp	24 to 31.5	21	32	41	—	Internal	5.5	1200	5 × 5 LFCSP	3A001.b.2.d	HMC943ALP5DE
HMC1131	Driver amp	24 to 35	22	24	35	—	Internal	5	225	4 × 4 LFCSP	3A001.b.2.d	HMC1131LC4
HMC-APH460	Power amp	27 to 31.5	14	28	37	—	Internal	5	900	Die	EAR 99	HMC-APH460
HMC1132 ***New***	Power amp	27 to 32	22	30	35	—	Internal	6	600	5 × 5 LFCSP	3A001.b.2.d	HMC1132LP5DE
HMC7441	Power amp	27.5 to 31.5	23	34	38	—	Internal	6	1000	Die	3A001.b.2.d	HMC7441
HMC-ABH264	Driver amp	34 to 42	19	18	29	6.5	Internal	5	120	Die	3A001.b.2.d	HMC-ABH264
HMC7229 ***New***	Power amp	37 to 40	24	32	40	—	Internal	6	1200	6 × 6 LFCSP	3A001.b.2.d	HMC7229LS6
HMC-APH510	Driver amp	37 to 40	20	26	35	—	Internal	5	640	Die	3A001.b.2.d	HMC-APH510
HMC-APH473	Power amp	37 to 40	15	28	37	—	Internal	5	1080	Die	3A001.b.2.d	HMC-APH473
HMC-APH403	Driver amp	37 to 45	21	23	32	—	Internal	5	475	Die	3A001.b.2.f	HMC-APH403
HMC1144 ***New***	Driver amp	40 to 70	19	21	28	—	Internal	4	320	Die	3A001.b.2.f	HMC1144
HMC-ABH241	Driver amp	50 to 66	24	17	25	—	Internal	5	220	Die	3A001.b.2.f	HMC-ABH241
HMC-ABH209	Driver amp	55 to 65	13	16	25	—	Internal	5	80	Die	3A001.b.2.f	HMC-ABH209
HMC-AUH318	Driver amp	71 to 76	24	18	—	—	Internal	4	130	Die	3A001.b.2.g	HMC-AUH318

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Linear and Power Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC-APH633	Driver amp	71 to 76	13	20	—	—	Internal	4	240	Die	3A001.b.2.g	HMC-APH633
HMC-AUH320	Driver amp	71 to 86	15	15	—	—	Internal	4	130	Die	3A001.b.2.f	HMC-AUH320
HMC-AUH317	Driver amp	81 to 86	22	18	—	—	Internal	4	160	Die	3A001.b.2.g	HMC-AUH317
HMC-APH634	Driver amp	81 to 86	12	19	—	—	Internal	4	240	Die	3A001.b.2.g	HMC-APH634

GaN Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Match	P_{SAT} (dBm)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1099 ***New***	10 W, GaN PA	0.01 to 1.1	19	40	49	18.5	Internal	40.5	28	100	5 × 5 QFN	EAR 99	HMC1099LP5DE
HMC1114 ***New***	10 W, GaN PA	2.7 to 3.8	25.5	41	44	14	Internal	41.5	28	150	5 × 5 LFCSP	3A001.b.2.a.4	HMC1114LP5DE
HMC7149	10 W, GaN PA	6 to 18	19	35	39.5	10	Internal	40	28	680	Die	3A001.b.2.c	HMC7149
HMC1087	8 W, GaN PA	2 to 20	11	38	44	5.5	Internal	39	28	850	Die	3A001.b.2.c	HMC1087
HMC1087	8 W, GaN PA	2 to 20	11	38	44	5.5	Internal	39	28	850	Flange	3A001.b.2.c	HMC1087F10
HMC1086	25 W, GaN PA	2 to 6	22	41	48	14	Internal	44.5	28	1100	Die	3A001.b.2.a.4	HMC1086
HMC1086	25 W, GaN PA	2 to 6	22	41	46	14	Internal	44.5	28	1100	Flange	3A001.b.2.a.4	HMC1086F10

Active Bias Controllers

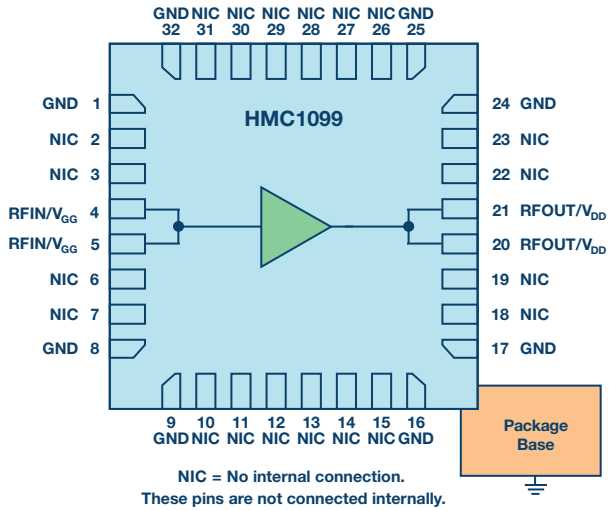
Part Number	Description	V_{SUPPLY} (V)	V_{SUPPLY} Drain (V)	I_{DRAIN} (mA)	I_{GATE} Drive (mA)	V_{GATE} (V)	Over/Under I_{DRAIN} Alarm	Low V_{SUPPLY} Alarm	Package (mm)	ECCN Code	Ordering Part Number
HMC920	Active bias controller	5 to 16.5	3 to 15	0 to 500	−4 to +4	−2.5 to +2	Yes	Yes	5 × 5 LFCSP	EAR 99	HMC920LP5E
HMC980	Active bias controller	5 to 16.5	5 to 16.5	0.05 to 1.6	−4 to +4	−2.46 to +2.04	Yes	No	Die	EAR 99	HMC980
HMC980	Active bias controller	5 to 16.5	5 to 16.5	0.05 to 1.6	−4 to +4	−2.46 to +2.04	Yes	No	4 × 4 LFCSP	EAR 99	HMC980LP4E
HMC981	Active bias controller	4 to 12	4 to 12	20 to 200	−0.8 to +0.8	−2.5 to +2	No	No	Die	EAR 99	HMC981
HMC981	Active bias controller	4 to 12	4 to 12	20 to 200	−0.8 to +0.8	−2.5 to +2	No	No	3 × 3 LFCSP	EAR 99	HMC981LP3E

HMC1099: 10 W GaN Power Amplifier; 0.01 GHz to 1.1 GHz

Key Features

- Wide instantaneous bandwidth: 0.01 GHz to 1.1 GHz
- High saturated output power (P_{SAT}): 40.5 dBm typical
- Gain flatness of 25 dB
- High small signal gain: 18.5 dB typical
- High power added efficiency (PAE): 69% typical
- Supply voltage: V_{DD} = 28 V at 100 mA
- Internal prematching
- 32-lead, 5 mm × 5 mm, LFCSP package: 25 mm²

Frequency Range	Gain Flatness	Noise Figure	Temperature Range	Package	Price @ 1k ($U.S.)
20 MHz to 1.1 GHz	±0.25 dB	5.5 dB @ 1 GHz	−40°C to +85°C	LFCSP	77.00



NIC = No internal connection.
These pins are not connected internally.

Benefits

- Simplifies circuit layout—compact external tuning for optimal performance
- Minimizes power consumption and self heating while extending battery life for portable applications

Common Applications

- Long battery life portable radios for public safety and military
- High power, phased array commercial and military radars
- Wide instantaneous bandwidth test and measurement equipment
- Power amplifier stage for wireless infrastructure

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Variable Gain Amplifiers

Analog Controlled VGAs

Part Number	Description	Bandwidth (GHz)	Gain Range (dB)	Output IP3 (dBm)	Noise Figure (dB)	V_S (V)	I_S (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8367	Single-ended, with AGC	LF to 0.5	–2.5 to +42.5	36.5	6.2	3 to 5	26	TSSOP	EAR 99	AD8367ARUZ
AD8368	Single-ended, with AGC	LF to 0.8	–12 to +22	34	9.5	5	60	4 × 4 LFCSP	EAR 99	AD8368ACPZ-REEL7
ADL5336	Cascadable, with programmable rms detector	LF to 1	–25.4 to +34.7	28	7.1	5	80	5 × 5 LFCSP	5A991.g	ADL5336ACPZ-R7
ADL5331	Differential Tx VGA	LF to 1.2	—	47	9	5	240	4 × 4 LFCSP	EAR 99	ADL5331ACPZ-R7
ADL5330	Differential Tx VGA	LF to 3	–32 to +21	31.5	9	5	215	4 × 4 LFCSP	EAR 99	ADL5330ACPZ-R2
ADL5246	Variable gain LNA/driver amp	0.6 to 3	–12 to +31.5	37	1.8	3.3, 5	141, 270	5 × 5 LFCSP	5A991.b	ADL5246ACPZN-R7
HMC996	Analog VGA	5 to 12	–3.5 to +18.5	34	2	5	120	4 × 4 LFCSP	EAR 99	HMC996LP4E
HMC694	Analog VGA	6 to 17	0 to +23	30	5	5	170	Die	EAR 99	HMC694
HMC694	Analog VGA	6 to 17	0 to +23	30	6	5	170	4 × 4 LFCSP	EAR 99	HMC694LP4E
HMC997	Analog VGA	17 to 27	+5.5 to +20.5	30	3.5	5	170	4 × 4 LFCSP	EAR 99	HMC997LC4
HMC6187	Analog VGA	27 to 31.5	+6 to +19	31	4.5	5	230	4 × 4 LFCSP	3A001.b.2.d	HMC6187LP4E
HMC8120	Analog VGA/driver amp	71 to 76	+15	30	—	4	250	Die	5A991.b	HMC8120
HMC8121	Analog VGA/driver amp	81 to 86	+17	27.5	—	4	265	Die	5A991.b	HMC8121

Digitally Controlled VGAs

Part Number	Description	Bandwidth (GHz)	Gain Range (dB)	Step (dB)	Output IP3 (dBm)	Noise Figure (dB)	V_S (V)	I_S (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8372	Dual-channel diff VGA with serial/parallel control	0 to 0.1	–9 to +32	1	35	7.9	5	2 × 106	5 × 5 LFCSP	EAR 99	AD8372ACPZ-R7
HMC960	Programmable, dual	LF to 0.13	0 to +40	0.5	30	6	5	70	4 × 4 LFCSP	EAR 99	HMC960LP4E
HMC680	Dual VGA	LF to 0.6	–4 to +19	1	40	5	5	250	4 × 4 LFCSP	EAR 99	HMC680LP4E
AD8366	Diff VGA	LF to 0.6	+4.5 to +20.25	0.25	45	11.4	5	2 × 90	5 × 5 LFCSP	EAR 99	AD8366ACPZ-R7
AD8369	Diff VGA	LF to 0..63	–5 to +40	3	19.5	7	3 to 5	37	TSSOP	EAR 99	AD8369ARUZ
AD8375	Dual diff VGA	LF to 0.7	–4 to +20	1	50	8.3	5	125	4 × 4 LFCSP	EAR 99	AD8375ACPZ-R7
AD8376	Diff VGA parallel/serial control	LF to 0.8	–4 to +20	1	50	8.7	5	2 × 125	5 × 5 LFCSP	EAR 99	AD8376ACPZ-R7
ADL5201	Dual diff VGA parallel/serial control	LF to 0.9	–11.5 to +20	0.5	50	7.5	5	110	4 × 4 LFCSP	EAR 99	ADL5201ACPZ-R7
ADL5202	Diff VGA	LF to 0.75	–11.5 to +20	0.5	50	7.5	5	2 × 110	6 × 6 LFCSP	EAR 99	ADL5202ACPZ-R7
AD8370	5-bit diff VGA	0.03 to 0.4	–8 to +34	Variable	35	7.2	3 to 5	79	TSSOP	EAR 99	AD8370AREZ
HMC628	5-bit VGA	0.05 to 0.8	–8 to +15	1	35	5	5	65	4 × 4 LFCSP	EAR 99	HMC628LP4E
HMC681A	6-bit VGA serial control	0 to 1	+13.5 to +45	0.5	36	2.7	5	176	5 × 5 LFCSP	EAR 99	HMC681ALP5E
HMC625B ***New***	Gain block/VGA/driver amp parallel/serial control	0 to 5	–13.5 to +18	0.5	33	6	5	87.5	5 × 5 LFCSP	EAR 99	HMC625BLP5E
ADL5240	Gain block/VGA parallel/serial control	0.1 to 4	–13.1 to +18	0.5	38	4.9	5	93	5 × 5 LFCSP	5A991.b	ADL5240ACPZ-R7
ADL5243	Gain block/VGA/driver amp parallel/serial control	0.1 to 4	–1.2 to +31.3	0.5	40	3.1	5	175.5	5 × 5 LFCSP	5A991.b	ADL5243ACPZ-R7
HMC742A	6-bit VGA serial/parallel control	0.5 to 4	–19.5 to +12	0.5	39	4	5	150	5 × 5 LFCSP	EAR 99	HMC742ALP5E

Baseband Programmable VGA Filters

Part Number	Description	Bandwidth (MHz)	Gain Range (dB)	Output IP3 (dBm)	Noise Figure (dB)	V_S (V)	I_S (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6516	Dual, with variable LPF	LF to 31	–5 to +45	40	25	3.3	360	5 × 5 LFCSP	EAR 99	ADRF6516ACPZ-R7
ADRF6510	Dual, with variable LPF	LF to 31	–5 to +45	27	28	5	258	5 × 5 LFCSP	EAR 99	ADRF6510ACPZ-R7
AD8366	Dual	LF to 600	+4.5 to +20.25	38	11.4	5	180	5 × 5 LFCSP	EAR 99	AD8366ACPZ-R7
ADRF6518	Dual, with variable LPF	LF to 1100	–36 to +66	36	16	3.3	360	5 × 5 LFCSP	EAR 99	ADRF6518ACPZ-R7
HMC900	Dual, with programmable LPF	3.5 to 50	0/+10	30	12	5	130	5 × 5 LFCSP	EAR 99	HMC900LP5E
HMC1023	Dual, with programmable LPF	5 to 72	0/+10	30	10	5	240	5 × 5 LFCSP	EAR 99	HMC1023LP5E
ADRF6520 ***New***	Dual, with selectable LPF for E-band	LF to 1250	–6 to +54	27 dBV	11	3.3	420	5 × 5 LFCSP	5A991.b	ADRF6520ACPZ-R7

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Attenuators

Digital Step Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Attenuation Range (dB)	Step (dB)	Input IP3 (dBm)	P0.1 dB (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC802A ***New***	1-bit DSA	0 to 10	1.5	1.5 to 20	20	55	30	0/+5	3 × 3 LFCSP	EAR 99	HMC802ALP3E
HMC291S ***New***	2-bit DSA	0.7 to 4	0.9	0.7 to 12.7	4	54	26	—	SOT-26	EAR 99	HMC291SE
HMC468A	3-bit DSA	0 to 6	0.7	0.7 to 7.7	1	55	26	0/+5	3 × 3 LFCSP	EAR 99	HMC468ALP3E
HMC468A ***New***	3-bit DSA	0.1 to 6	0.5	1 to 8	1	55	26	0/+5	3 × 3 LFCSP	EAR99	HMC468ALP3E
HMC629A ***New***	4-bit digital, serial and parallel control DSA	0 to 6	2.5	3 to 45	3	50	—	0/+5	4 × 4 LFCSP	EAR 99	HMC629ALP4E
HMC540S ***New***	4-bit parallel DSA	0.1 to 8	0.8	0.7 to 15.7	1	54	31	+3.3 to +5	3 × 3 LFCSP	EAR 99	HMC540SLP3E
HMC470A ***New***	5-bit DSA	0 to 3	1.7	1.3 to 32.3	1	48	27	0/+5	3 × 3 LFCSP	EAR 99	HMC470ALP3E
HMC539A ***New***	5-bit DSA	0 to 4	1	0.7 to 8.45	0.25	50	28	0/+5	3 × 3 LFCSP	EAR 99	HMC539ALP3E
HMC1019A ***New***	5-bit DSA	0.1 to 30	4	0.5 to 15.5	0.5	45	25	0/+5	4 × 4 LFCSP	EAR 99	HMC1019ALP4E
HMC1018A ***New***	5-bit DSA	0.1 to 30	5.5	4.5 to 35.5	1	42	22	0/+5	4 × 4 LFCSP	EAR 99	HMC1018ALP4E
HMC941A	5-bit DSA	0.1 to 30	4	2.5 to 18	0.5	43	24	0/+5	4 × 4 LFCSP	EAR 99	HMC941ALP4E
HMC939A ***Upcoming***	5-bit DSA	0.1 to 33	5.5	1 to 31	1	43	25	0/+5	4 × 4 LFCSP	EAR 99	HMC939ALP4E
HMC939A ***Upcoming***	5-bit DSA	0.1 to 40	4.2	4 to 34	1	43	25	0/+5	Die	EAR 99	HMC939A
HMC941A	5-bit DSA	0.1 to 40	3.2	3 to 18	0.5	45	25	0/+5	Die	EAR 99	HMC941A
HMC273A ***New***	5-bit DSA	0.7 to 3.7	2.8	1.9 to 32.9	1	48	—	+3.3 to +5	MSOP	EAR 99	HMC273AMS10GE
HMC306A	5-bit DSA	0.7 to 3.8	1.5	1.3 to 16.8	0.5	52	25	+3.3 to +5	MSOP	EAR 99	HMC306AMS10GE
HMC305S ***New***	5-bit, glitch free DSA	0.4 to 7	1.4	1.3 to 17	0.5	52	28	+3.3 to +5	4 × 4LFCSP	EAR 99	HMC305SLP4E
HMC472A	6-bit DSA	0 to 3.8	1.7	1.4 to 32.9	0.5	54	30	0/+5	4 × 4 LFCSP	EAR 99	HMC472ALP4E
HMC424A ***New***	6-bit DSA	0 to 13	3.3	3.4 to 34.4	0.5	42	24	0/–5	Die	EAR 99	HMC424A
HMC424A ***New***	6-bit DSA	0 to 13	3.3	3.3 to 35.5	0.5	42	23	0/–5	3 × 3 QFN	EAR 99	HMC424ALP3E
HMC424A ***New***	6-bit DSA	0.1 to 13	3.3	3.3 to 34.3	0.5	42	23	0/–5	5 × 5 QFN	EAR99	HMC424ALH5
HMC424A ***New***	6-bit DSA	0.1 to 3	3	3 to 34.5	0.5	42	23	0/–5	MSOP	EAR99	HMC424AG16
HMC1122 ***New***	6-bit DSA	0.1 to 6	1.2	1.3 to 33	0.5	55	30	+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC1122LP4ME
HMC425A ***Upcoming***	6-bit DSA	2.2 to 8	3.6	0.5 to 31.5	0.5	40	21	0/+5	3 × 3 LFCSP	EAR 99	HMC425ALP3E
HMC542B	6-bit serial DSA	0 to 4	1.7	1.4 to 32.9	0.5	50	30	0/+5	4 × 4 LFCSP	EAR 99	HMC542BLP4E
HMC792A	6-bit serial DSA	0 to 6	1.8	1.8 to 17.5	0.25	53	31	0/+5	4 × 4 LFCSP	EAR 99	HMC792ALP4E
HMC624A	6-bit serial/parallel DSA	0 to 6	2.2	1.5 to 33	0.5	55	30	0/+5	4 × 4 LFCSP	EAR 99	HMC624ALP4E
HMC1095	6-bit DSA	0 to 3	1.3	1.3 to 32.8	0.5	57	30	0/+5	4 × 4 LFCSP	EAR 99	HMC1095LP4E
HMC759	7-bit serial DSA	0.01 to 0.3	3.3	3.3 to 35	0.25	40	—	0/+5	3 × 3 LFCSP	EAR 99	HMC759LP3E
HMC1119 ***New***	7-bit serial/parallel DSA	0.1 to 6	1.5	1.3 to 33.5	0.25	54	30	+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC1119LP4ME

Voltage Variable Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Attenuation Range (dB)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC973A ***New***	Analog VVA	0.5 to 6	3.5	3.5 to 29.5	35	0 to +5	3 × 3 LFCSP	EAR99	HMC973ALP3E
HMC346A ***Upcoming***	Analog VVA	0.1 to 8	1.5	1.5 to 31.5	25	0 to –5	MSOP	EAR99	HMC346AMS8GE
HMC346A ***Upcoming***	Analog VVA	0.1 to 14	1.7	1.7 to 31.7	25	0 to –5	3 × 3 LFCSP	EAR99	HMC346ALP3E
HMC712A ***Upcoming***	Analog VVA	5 to 26.5	3.5	3.5 to 31.5	32	0 to –5	3 × 3 LFCSP	EAR99	HMC712ALP3CE
HMC812A ***Upcoming***	Analog VVA	5 to 30	3	3 to 33	28	0 to –5	4 × 4 LFCSP	EAR99	HMC812ALC4
HMC985A ***Upcoming***	Analog VVA	10 to 40	3	3 to 33	33	0 to –3	4 × 4 LFCSP	EAR99	HMC985ALP4KE
HMC-VVD102	Analog VVA	17 to 27	1.5	1.5 to 19.5	17	–4 V to +4 V	Die	5A991.h	HMC-VVD102
HMC985A ***Upcoming***	Analog VVA	20 to 50	3	3 to 33	33	0 to –3	Die	EAR99	HMC985A
HMC-VVD106	Analog VVA	35 to 50	1.5	1.5 to 23.5	17	0 to +4	Die	5A991.h	HMC-VVD106
HMC-VVD104	Analog VVA	70 to 86	2	2 to 16	—	–5 V to +5 V	Die	5A991.h	HMC-VVD104

Fixed Attenuators

Part Number	Description	Frequency (GHz)	Nominal Attenuation Range (dB)	Attenuation Accuracy	Max Input Power (dBm)	Die Size (mm)	Package (mm)	ECCN Code	Ordering Part Number
HMC652	Fixed passive	0 to 25	2	±0.5	27	—	2 × 2 QFN	EAR 99	HMC652LP2E
HMC653	Fixed passive	0 to 25	3	±0.5	26	—	2 × 2 QFN	EAR 99	HMC653LP2E
HMC654	Fixed passive	0 to 25	4	±0.5	25	—	2 × 2 QFN	EAR 99	HMC654LP2E
HMC656	Fixed passive	0 to 25	10	±1.5	25	—	2 × 2 QFN	EAR 99	HMC656LP2E
HMC657	Fixed passive	0 to 25	15	±2	25	—	2 × 2 QFN	EAR 99	HMC657LP2E
HMC658	Fixed passive	0 to 25	20	±2	25	—	2 × 2 QFN	EAR 99	HMC658LP2E
HMC650	Through line	0 to 50	0.15	±0.2	—	17 × 18	Die	EAR 99	HMC650
HMC651	Through line	0 to 50	0.15	±0.2	—	23 × 18	Die	EAR 99	HMC651
HMC652	Fixed passive	0 to 50	2	±0.2	27	17 × 18	Die	EAR 99	HMC652
HMC653	Fixed passive	0 to 50	3	±0.2	26	17 × 18	Die	EAR 99	HMC653
HMC654	Fixed passive	0 to 50	4	±0.2	25	17 × 18	Die	EAR 99	HMC654
HMC656	Fixed passive	0 to 50	10	±0.1	25	17 × 18	Die	EAR 99	HMC656
HMC657	Fixed passive	0 to 50	15	±0.4	25	17 × 18	Die	EAR 99	HMC657
HMC658	Fixed passive	0 to 50	20	±0.5	25	23 × 18	Die	EAR 99	HMC658

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

HMC1122: 0.5 dB, 6-Bit, Silicon Digital Attenuator; 0.1 GHz to 6.0 GHz
HMC1119: 0.25 dB, 7-Bit, Silicon Digital Attenuator; 0.1 GHz to 6.0 GHz

Key Features

- Attenuation range: 0.5 dB LSB steps to 31.5 dB
- Low insertion loss:
  - 1.1 dB @ 1.0 GHz
  - 1.3 dB @ 2.0 GHz
- Typical step error: Less than ±0.1 dB
- Excellent attenuation accuracy: <±0.2 dB
- Low 6° phase shift at 1.0 GHz
- Safe-state transitions
- High linearity
  - 1 dB compression (P1dB): 31 dBm typical
  - Input third-order intercept (IP3): 54 dBm typical
- RF settling time (0.05 dB final RF output): 250 ns
- Single-supply operation: 3.3 V to 5.0 V
- ESD rating: Class 2 (2 kV HBM)
- 24-lead, 4 mm × 4 mm LFCSP package

Benefits

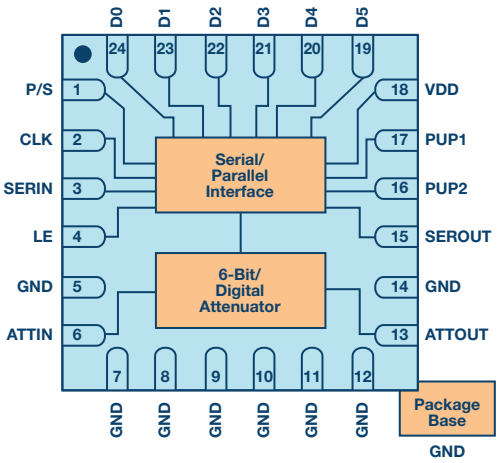
- Low attenuation reduces cost and improves performance by eliminating the need for gain compensation
- Fast switching and settling times for fast switching and time division multiplexing
- Glitch free and safe operation of RF components

Common Applications

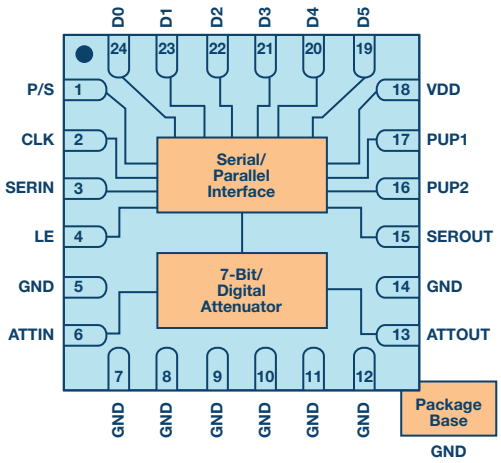
- RF input stage for spectrum and network analyzers
- RF front end of cellular protocol tester
- Receive signal chain of wireless infrastructure: cellular repeaters and boosters

Part Number	Frequency Range	Attenuator Topology	Process	Temperature Range	Package	Price @ 1k ($U.S.)
HMC1119	0.1 GHz to 6 GHz	7-bit	Silicon	–40°C to +85°C	24-lead LFCSP	4.54
HMC1122	0.1 GHz to 6 GHz	6-bit	Silicon	–40°C to +85°C	24-lead LFCSP	3.62

HMC1122



HMC1119



HMC305S: 0.5 dB, 5-Bit, Silicon Digital Attenuator; 0.4 GHz to 7.0 GHz
HMC540S: 1 dB, 4-Bit, Silicon Digital Attenuator; 0.1 GHz to 8.0 GHz

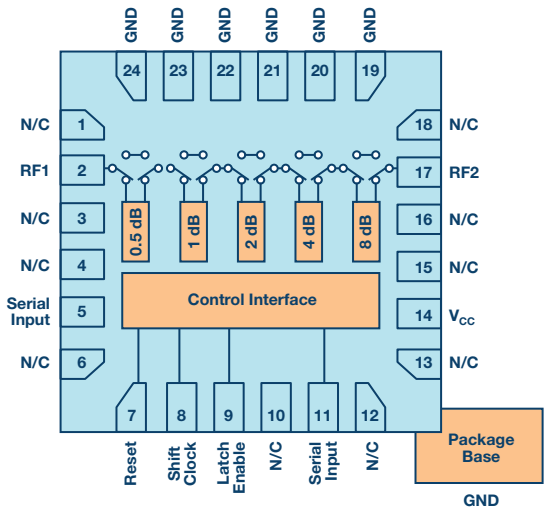
Key Features

- Glitch free state transitions
- Attenuation range:
  - 0.5 dB LSB steps to 15.5 dB (HMC305S)
  - 1 dB LSB steps to 15 dB (HMC540S)
- Low insertions loss:*
  - 1.0 dB/0.7 dB @ 1.0 GHz
  - 1.1 dB/0.8 dB @ 2.0 GHz
- High linearity*
  - P0.1dB: 28 dBm/31 dBm
  - Input IP3: 50 dBm/56 dBm
- TTL/CMOS-compatible serial data interface
  - SPI-compatible serial output (HMC305S)
  - Single control line per bit, parallel control (HMC540S)
- Excellent attenuation accuracy:*
  - ±0.25/±0.20 dB typical bit error
- Single 3.3 V to 5 V supply
- ESD rating: Class 2 (2 kV HBM)
- LFCSP package
  - 24-lead, 4 mm × 4 mm (HMC305S)
  - 16-lead, 3 mm × 3 mm (HMC540S)
- Drop-in replacement for HMC305A and HMC540

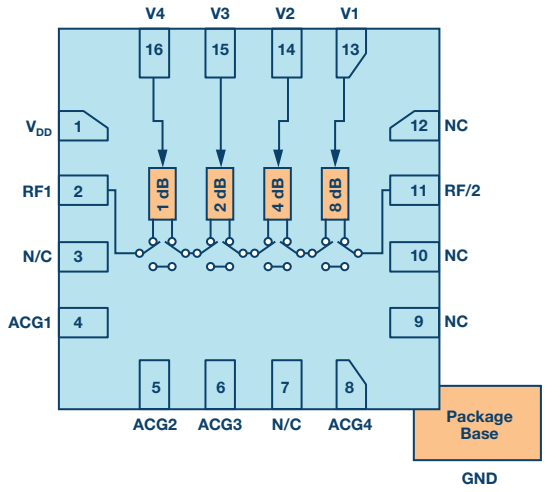
*HMC305S/HMC540S

Frequency Range	Attenuator Topology	Process Technology	Temperature Range	Package	Price @ 1k ($U.S.)
0.4 GHz to 7 GHz	5-bit	Silicon	–40°C to +85°C	24-lead LFCSP	4.70
0.1 GHz to 8 GHz	4-bit	Silicon	–40°C to +85°C	16-lead LFCSP	2.05

HMC305S



HMC540S



Benefits

- Low attenuation reduces cost and improves performance by eliminating the need for gain compensation
- Fast switching and settling times for fast switching and time division multiplexing
- Glitch free and safe operation of RF components

Common Applications

- RF input stage for spectrum and network analyzers
- RF front end of cellular protocol tester
- Receive signal chain of wireless infrastructure: cellular repeaters and boosters

RF Mixers

Single, Double, and Triple Balanced Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	NF Typ (dB)	P1dB Input Typ (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
AD8342	Active	0.001 to 3.8	0.001 to 4.1	0 to 2.4	3.7	23	55	27	12.2	8	0	3 × 3 LFCSP	5A991.b	AD8342ACPZ-R2
AD8343	Active	0 to 2.5	0 to 2.5	0 to 2.5	7	17	18	44	14	3	–10	TSSP	5A991.b	AD8343ARUZ
AD831	Active	0 to 0.5	0 to 0.5	0 to 0.2	0	24	70	30	10.3	10	–10	PLCC	5A991.b	AD831APZ
ADL5350	Passive	0.001 to 4	0.001 to 4	0.001 to 4	–6.7	25	13	29	6.4	19	4	2 × 3 LFCSP	5A991.b	ADL5350ACPZ-R2
ADL5801	Active	0.001 to 6	0.001 to 6	0.001 to 0.6	1.8	29	31	27	9.75	13	0	4 × 4 LFCSP	5A991.b	ADL5801ACPZ-R7
ADL5802	Dual active	0.1 to 6	0.1 to 6	0 to 3	1.5	28	30	37	11	12	0	4 × 4 LFCSP	5A991.b	ADL5802ACPZ-R7
ADL5369 ***New***	Passive	0.3 to 1.1	0.33 to 1.55	0.03 to 0.45	—	28	—	—	7.2	20	—	5 × 5 LFCSP	EAR 99	ADL5369
AD8344	Active Rx	0.4 to 1.2	0.47 to 1.6	0.07 to 0.4	4.5	24	48	23	10.5	24	0	3 × 3 LFCSP	5A991.b	AD8344ACPZ-REEL7
ADL5367	With LO amp	0.5 to 1.7	0.7 to 1.7	0.03 to 0.45	–7.7	34	40	15	8.3	25	0	5 × 5 LFCSP	5A991.b	ADL5367ACPZ-R7
ADL5357	With LO and IF amp	0.5 to 1.7	0.7 to 1.7	0.03 to 0.45	–8.6	27	47	7	9.1	10	0	5 × 5 LFCSP	EAR 99	ADL5357ACPZ-R8
ADL5812	With LO and IF amp	0.7 to 2.8	0.25 to 2.8	0.03 to 0.45	6.7	27	46	37	11.6	13	0	6 × 6 LFCSP	5A991.g	ADL5812ACPZ-R7
ADL5811	With LO and IF amp	0.7 to 2.8	0.25 to 2.8	0.03 to 0.45	7.5	28	25	40	10.7	13	0	5 × 5 LFCSP	5A991.g	ADL5811ACPZ-R7
ADL5358	With LO and IF amp	0.7 to 1	0.53 to 1.67	0.03 to 0.45	8.3	25	31	33	9.9	11	0	6 × 6 LFCSP	5A991.b	ADL5358ACPZ-R7
HMC686	With LO amp	0.7 to 1.5	0.85 to 1.5	0 to 0.5	–7.5	34	26	41	7.5	24	0	4 × 4 LFCSP	EAR 99	HMC686LP4E
HMC684	With LO amp	0.7 to 1	0.6 to 1	0 to 0.45	–7	32	23	30	7	25	0	4 × 4 LFCSP	EAR 99	HMC684LP4E
HMC683	Dual Rx with LO amp	0.7 to 1	0.57 to 0.9	0.06 to 0.5	7.5	23	16	20	11	11	0	6 × 6 LFCSP	EAR 99	HMC683LP6CE
ADL5365	With LO amp	1.2 to 2.5	1.23 to 2.47	0 to 0.45	–7.3	36	33	18	8.3	25	0	5 × 5 LFCSP	5A991.b	ADL5365ACPZ-R7
ADL5355	With LO and IF amp	1.2 to 2.5	1.23 to 2.47	0.03 to 0.45	8.4	27	39	13	9.2	10	0	5 × 5 LFCSP	5A991.b	ADL5355ACPZ-R7
HMC213B ***Upcoming***	Passive	1.5 to 4.5	1.5 to 4.5	0 to 1.5	–8.5	19	40	40	8.5	10	13	8-lead MSOP	EAR 99	HMC213BMS8GE
ADL5356	Passive mixer	1.7 to 2.2	1.4 to 2.1	0.03 to 0.45	8.2	31	35	24	9.9	11	0	6 × 6 LFCSP	5A991.g	ADL5356ACPZ-R7
HMC687	With LO amp	1.7 to 2.2	1.7 to 2.4	0 to 0.5	–8	35	32	29	8	23	0	4 × 4 QFN	EAR 99	HMC687LP4E
HMC685	With LO amp	1.7 to 2.2	1.5 to 2.2	0 to 0.5	–8	35	30	30	8	24	0	4 × 4 QFN	EAR 99	HMC685LP4E
HMC682	Dual Rx with LO amp	1.7 to 2.2	1.4 to 2	0.06 to 0.4	6	25	25	22	12	15	0	6 × 6 QFN	EAR 99	HMC682LP6CE
HMC689	With LO amp	2 to 2.7	2 to 3	0 to 0.8	–7.5	32	34	26	7.5	23	0	4 × 4 QFN	EAR 99	HMC689LP4E
HMC688	With LO amp	2 to 2.7	1.7 to 2.4	0 to 0.7	–7.5	35	25	27	7.5	25	0	4 × 4 QFN	EAR 99	HMC688LP4E
HMC1048A ***Upcoming***	Passive	2 to 18	2 to 18	0 to 4	–10	22	37	25	10	12	13	3 × 3 LFCSP	EAR 99	HMC1048ALC3B
ADL5363	With LO amp	2.3 to 2.9	2.33 to 3.35	0 to 0.45	–7.7	31	32	22	7.6	25	0	5 × 5 LFCSP	5A991.b	ADL5363ACPZ-R7
ADL5354	Dual Rx with LO amp	2.2 to 2.7	1.75 to 2.67	0.03 to 0.45	8.6	26	37	21	10.4	11	0	6 × 6 LFCSP	5A991.b	ADL5354ACPZ-R7
ADL5353	With LO and IF amp	2.2 to 2.7	2.23 to 3.15	0.03 to 0.45	9	24	38	15	9.8	10	0	5 × 5 LFCSP	5A991.b	ADL5353ACPZ-R7
HMC557A ***New***	Passive	2.5 to 7	2.5 to 7	0 to 3	–7	22	47	34	7	10	15	4 × 4 LFCSP	EAR 99	HMC557ALC4
HMC787A ***New***	Passive mixer	3 to 10	3 to 10	0 to 4	–9	23	55	42	9	15	17	3 × 3 LFCSP	EAR 99	HMC787ALC3B
HMC666	With LO amp	3.1 to 3.9	2.8 to 3.6	0 to 0.8	–9	31	27	29	9	23	0	4 × 4 LFCSP	EAR 99	HMC666LP4E
HMC218B	Passive	3.5 to 8	3.5 to 8	0 to 1.6	–7	17	38	32	7	10	13	MSOP	EAR 99	HMC218BMS8GE
HMC129A ***Upcoming***	Passive	4 to 8	4 to 8	0 to 3	–7	17	40	40	7	10	15	4 × 4 LFCSP	EAR 99	HMC129ALC4
HMC558A ***New***	Passive	5.5 to 14	5.5 to 14	0 to 6	–8	22	40	25	8	12	15	3 × 3 LFCSP	EAR 99	HMC558ALC3B
HMC773A ***New***	Passive	6 to 26	6 to 26	0 to 8	–9	19	37	37	9	10	13	3 × 3 LFCSP	EAR 99	HMC773ALC3B

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Single, Double, and Triple Balanced Mixers (Continued)

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	NF Typ (dB)	P1dB Input Typ (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC553A ***Upcoming***	Passive	7 to 14	7 to 14	0 to 5	–7.5	20	50	35	7.5	10.5	13	3 × 3 LFCSP	EAR 99	HMC553ALC3B
HMC774A ***Upcoming***	Passive	7 to 34	7 to 34	0 to 8	–10.5	21	35	35	10.5	13	15	3 × 3 LFCSP	EAR 99	HMC774ALC3B
HMC774A ***Upcoming***	Passive	7 to 43	7 to 43	0 to 8	–9.5	21	35	35	9.5	13	13	Die	EAR 99	HMC774A
HMC412B ***New***	Passive	9 to 15	9 to 15	0 to 2.5	–8.4	18	44	41	8.4	11	13	MSOP	EAR 99	HMC412BMS8GE
HMC260A ***Upcoming***	Passive	14 to 26	14 to 26	0 to 8	–8.5	20	40	32	8.5	13	13	3 × 3 LFCSP	EAR 99	HMC260ALC3B
HMC1106	Passive	15 to 36	20 to 50	0 to 24	–11	16	38	32	9	0	15	Die	EAR 99	HMC1106
HMC1081	Passive	50 to 75	40 to 85	0 to 26	–7.5	16	30	20	7.5	10	12	Die	EAR 99	HMC1081
HMC-MDB169	Passive	54 to 64	54 to 64	0 to 5	–8	13	30	25	8	4	13	Die	5A991.h	HMC-MDB169
HMC-MDB277	Passive	70 to 90	70 to 90	0 to 18	–12	—	—	—	—	—	14	Die	5A991.h	HMC-MDB277
HMC292A ***Upcoming***	Passive	16 to 30	16 to 30	0 to 8	–8.5	20	40	32	8.5	14	13	3 × 3 LFCSP	EAR 99	HMC292ALC3B
HMC292A ***Upcoming***	Passive	18 to 32	18 to 32	0 to 8	–8	19	38	40	8	12	13	Die	EAR 99	HMC292A
HMC554A ***Upcoming***	Passive	11 to 20	11 to 20	0 to 6	–7.5	18	46	40	7.5	11	13	3 × 3 LFCSP	EAR 99	HMC554ALC3B
HMC329A ***Upcoming***	Passive	24 to 32	24 to 32	0 to 8	–10.5	18	38	40	10.5	13	13	3 × 3 QFN	EAR 99	HMC329ALC3B
HMC560A ***Upcoming***	Passive	24 to 40	24 to 40	0 to 17	–10.5	21	31	35	10.5	14	13	5 × 5 LFCSP	EAR 99	HMC560ALM3

I/Q Mixers and Image Reject Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dB)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	P1dB Input Typ (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC8193 ***Upcoming***	I/Q and IRM	2.5 to 8.5	2.5 to 8.5	0 to 3.5	–8	21	32	45	40	14	18	4 × 4 LFCSP	EAR 99	HMC8193LC4
HMC525A ***Upcoming***	I/Q and IRM	4 to 8.5	4 to 8.5	0 to 3.5	–8	23	35	45	20	14	15	4 × 4 LFCSP	EAR 99	HMC525ALC4
HMC520A ***New***	I/Q and IRM	6 to 10	6 to 10	0 to 3.5	–8	19	22	43	25	10	15	4 × 4 LFCSP	EAR 99	HMC520ALC4
HMC521A ***Upcoming***	I/Q and IRM	8.5 to 13.5	8.5 to 13.5	0 to 3.5	–8	23	38	50	22	14	15	4 × 4 LFCSP	EAR 99	HMC521ALC4
HMC8191 ***New***	I/Q and IRM	6 to 26	6 to 26	0 to 5	–9	20	25	42	41	12	18	4 × 4 LFCSP	EAR 99	HMC8191LC4
HMC1056	I/Q and IRM	8 to 12	8 to 12	0 to 4	–8	18	21	40	37	9	10	4 × 4 LFCSP	EAR 99	HMC1056LP4BE
HMC524A ***Upcoming***	I/Q and IRM	22 to 32	22 to 32	0 to 4.5	–9	24	26	41	29	14	15	3 × 3 LFCSP	EAR 99	HMC524ALC3B
HMC-MDB172	I/Q and IRM	19 to 33	19 to 33	0 to 5	–8	17	25	35	23	8	16	Die	5A991.h	HMC-MDB172
HMC1063	I/Q and IRM	24 to 28	24 to 28	0 to 3	–9.5	17	21	38	40	8	10	3 × 3 LFCSP	EAR 99	HMC1063LP3E
HMC-MDB171	Subharmonic I/Q	35 to 45	35 to 45	0 to 5	–12.5	17	25	35	20	8	16	Die	5A991.h	HMC-MDB171
HMC-MDB218	Subharmonic I/Q	54 to 64	27 to 32	0 to 3	–12.5	7	30	30	30	–2	10	Die	5A991.h	HMC-MDB218

Subharmonic Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Input P1dB (dBm)	Image Rejection (dB)	LO Drive (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC337	Subharmonic	17 to 25	9 to 12	0 to 3	–9	10	27	47	0	—	–5	Die	EAR 99	HMC337
HMC264	Subharmonic	20 to 32	10 to 16	0 to 6	–10	13	37	40	4	—	–4	Die	EAR 99	HMC264
HMC264	Subharmonic	20 to 30	10 to 15	0 to 4	–9	12	35	40	4	—	–4	3 × 3 QFN	EAR 99	HMC264LM3
HMC264	Subharmonic	21 to 31	10.5 to 15.5	0 to 6	–9	12	30	40	3	—	–4	3 × 3 LFCSP	EAR 99	HMC264LC3B
HMC265	Subharmonic	20 to 32	10 to 16	0.7 to 3	3	10	30	55	2	—	–4	Die	EAR 99	HMC265
HMC265	Subharmonic	20 to 31	10 to 15.5	0.7 to 3	3	10	28	47	2	—	–4	3 × 3 QFN	EAR 99	HMC265LM3
HMC338	Subharmonic	26 to 33	13 to 16.5	0 to 2.5	–9	10	32	40	1	—	–5	Die	5A991.b	HMC338
HMC338	Subharmonic	24 to 34	12 to 16.5	0 to 3	–11	13	33	50	5	—	–5	3 × 3 LFCSP	5A991.b	HMC338LC3B
HMC404	Subharmonic I/Q	26 to 33	13 to 16.5	0 to 3	–11	16	35	35	6	22	2	Die	EAR 99	HMC404
HMC339	Subharmonic	33 to 42	16.5 to 21	0 to 3	–10	10	37	40	0	—	2	Die	EAR 99	HMC339
HMC1093	Subharmonic	37 to 46.5	8.5 to 11	0 to 7.5	–11	26	15	18	18	—	–1	Die	EAR 99	HMC1093
HMC1057	Subharmonic I/Q	71 to 86	29 to 43	0 to 12	–12	13	50	30	0	16	13	Die	EAR 99	HMC1057
HMC1058	Subharmonic	71 to 86	29 to 43	0 to 12	–11	6	28	20	0	—	9	Die	EAR 99	HMC1058

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

I/Q Downconverters/Receivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dBc)	NF Typ (dB)	LO Drive Nominal (dBm)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC951B	I/Q downconverter	5.6 to 8.6	5.6 to 8.6	0 to 3.5	13	1	24	2	2	3.5	160	5 × 5 LFCSP	EAR 99	HMC951BLP4E
HMC1113	I/Q downconverter	10 to 16	10 to 16	0 to 3.5	12	1	25	2	6	3, 4	160	5 × 5 LFCSP	EAR 99	HMC1113LP5E
HMC1065	I/Q downconverter	27 to 34	11.5 to 19	0 to 4	12	–2	17	3	2	3.0	240	4 × 4 LFCSP	EAR 99	HMC1065LP4E
HMC6147A	I/Q downconverter	37 to 44	16.5 to 22	0 to 4	13	2	25	4	3	3.0	225	5 × 5 LFCSP	EAR 99	HMC6147ALC5A
HMC977	I/Q downconverter	20 to 28	8.3 to 15.7	0 to 3.5	14	2	21	3	6	3.5	170	4 × 4 LFCSP	EAR 99	HMC977LP4E
HMC967	I/Q downconverter	21 to 24	8.8 to 13.5	0 to 3.5	15	1	25	3	6	3.5	170	4 × 4 LFCSP	EAR 99	HMC967LP4E
HMC966	I/Q downconverter	17 to 20	7.5 to 11.75	0 to 3.5	14	0	40	3	6	3.5	160	4 × 4 LFCSP	EAR 99	HMC966LP4E
HMC904	I/Q downconverter	17 to 24	7.5 to 12.3	0 to 3.5	12	0	32	3	4	3.5	160	5 × 5 LFCSP	EAR 99	HMC904LC5
HMC570	I/Q downconverter	17 to 21	7 to 12	0 to 3.5	12	1	22	4	3.5	3.5	125	Die	EAR 99	HMC570
HMC570	I/Q downconverter	17 to 21	7 to 12	0 to 3.5	10	2	17	3	4	3.5	125	5 × 5 LFCSP	EAR 99	HMC570LC5
HMC571	I/Q downconverter	21 to 25	9 to 14	0 to 3.5	11	5	24	3	4	3.5	125	Die	EAR 99	HMC571
HMC571	I/Q downconverter	21 to 25	9 to 14	0 to 3.5	11	6	23	3	4	3.5	125	5 × 5 LFCSP	EAR 99	HMC571LC5
HMC572	I/Q downconverter	23 to 28	9 to 15.5	0 to 3.5	10	6	20	4	4	3.5	125	5 × 5 LFCSP	EAR 99	HMC572LC5
HMC7586 ***New***	E-band I/Q downconverter	71 to 76	11.83 to 14.33	0 to 10	12.5	–1	28	5	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7586
HMC7587 ***New***	E-band I/Q downconverter	81 to 86	11.83 to 14.33	0 to 10	10	–2	30	6	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7587

I/Q Upconverters/Transmitters

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Output IP3 (dBm)	Sideband Rejection (dBc)	LO Drive Nominal	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC6505A ***Upcoming***	I/Q upconverter	5.6 to 8.6	5.6 to 11.6	0 to 3.5	13	35	24	2	3.5	160	5 × 5 LFCSP	EAR 99	HMC6505ALC5
ADRF6780 ***New***	Wideband I/Q upconverter	5.9 to 23.6	5.4 to 14	0 to 3.5	13	26	25	0	3.3, 5	400, 160	5 × 5 LFCSP	5A991.h	ADRF6780ACPZN-R7
HMC7911 ***New***	I/Q upconverter	17.5 to 20	7.1 to 11.6	0 to 3.5	18	33	30	4	5	320	5 × 5 LFCSP	EAR 99	HMC7911LP5E
HMC7912 ***New***	I/Q upconverter	21 to 24	8.5 to 14	0 to 3.5	14	32	18	4	5	320	5 × 5 LFCSP	EAR 99	HMC7912LP5E
HMC815B ***Upcoming***	I/Q upconverter	21 to 27	10.5 to 14.5	0 to 3.75	12	27	22	4	4.5	350	5 × 5 LFCSP	EAR 99	HMC815BLC5
HMC6787A	I/Q upconverter	37 to 40	16.5 to 22	0 to 4	10	26	17	4	3	350	5 × 5 LFCSP	EAR 99	HMC6787ALC5A
HMC6146B	I/Q upconverter	40 to 44	18 to 22	0 to 4	11	28	18	4	3	350	5 × 5 LFCSP	EAR 99	HMC6146BLC5A
HMC8118 ***New***	E-band I/Q upconverter	71 to 76	11.83 to 14.33	0 to 10	11	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8118
HMC8119 ***New***	E-band I/Q upconverter	81 to 86	11.83 to 14.33	0 to 10	10	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8119

Mixers with Integrated LO

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Power Gain (dB)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	VCO Phase Noise @ 1 MHz Offset (dBc/Hz)	Input IP3 (dBm)	Noise Figure (dB)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6655	With PLL and VCO	0.1 to 2.5	1.05 to 2.3	LF to 2.2	6	–83	–136	29	12	5	260 to 285	6 × 6 LFCSP	5A991.b	ADRF6655ACPZ-R7
ADRF6601	With PLL and VCO	0.3 to 2.5	0.75 to 1.16	0 to 0.5	6.7	–99	–135	30.9	13.5	5	253 to 281	6 × 6 LFCSP	5A991.b	ADRF6601ACPZ-R7
ADRF6658	Dual Rx with IF amp	0.69 to 3.8	N/A	—	Programmable 26.5	N/A	N/A	12 to 29	13	3.3	Selectable 260 to 440	7 × 7 LFCSP	5A991.h	ADRF6658BCPZ-RL7
ADRF6620	Rx mixer with IF, DGA, frac-N PLL and VCO	0.7 to 2.5	0.35 to 2.85	—	9	–81	–110	40	19	5	260, 340	7 × 7 LFCSP	5A991.h	ADRF6620ACPZ-R7
HMC1190A ***New***	Dual Rx with frac-N PLL and VCO	0.7 to 2.39	0.05 to 4	0.05 to 0.35	8.9	–118	–139	27	9	5, 3.3	—	6 × 6 LFSCP	5A991.h	HMC1190ALP6NETR

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Mixers with Integrated LO (Continued)

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Power Gain (dB)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	VCO Phase Noise @ 1 MHz Offset (dBc/Hz)	Input IP3 (dBm)	Noise Figure (dB)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6612	Dual Rx mixer with tunable balun, PLL, and VCO	0.7 to 3	0.2 to 2.7	0.04 to 0.5	9.3	–80	–138	28	11.3	5, 3.6	260, 260	7 × 7 LFCSP	5A991.g	ADRF6612ACPZ-R7
ADRF6614 ***New***	Dual Rx mixer with tunable balun, PLL, and VCO	0.7 to 3	0.2 to 2.7	0.02 to 0.5	9.3	MC-GSM compliant	MC-GSM compliant	28	11.3	5, 3.6	260, 260	7 × 7 LFCSP	5A991.h	ADRF6614ACPZ-R7
ADRF6602	With PLL and VCO	1 to 3.1	1.55 to 2.15	0 to 0.5	6.5	–92	–128	29.5	12	5	235 to 263	6 × 6 LFCSP	5A991.b	ADRF6602ACPZ-R7
ADRF6603	With PLL and VCO	1.1 to 3.2	2.1 to 2.6	0 to 0.5	6.7	–88	–128	29.3	15.6	5	235 to 261	6 × 6 LFCSP	5A991.b	ADRF6603ACPZ-R7
ADRF6604	With PLL and VCO	1.2 to 3.6	2.5 to 2.9	0 to 0.5	6.8	–87	–126	27	15.5	5	135 to 276	6 × 6 LFCSP	5A991.b	ADRF6604ACPZ-R7

ADRF6780: 6 GHz to 24 GHz Wideband I/Q Modulator

Key Features

- Wideband RF frequency from 6 GHz to 24 GHz
- Selectable LO multiplier path:
  - 1× LO path for 5.4 to 14 GHz
  - 2× LO path for 10.8 to 28 GHz
- Supports direct conversion and IF modes
  - ~1 GHz I/Q bandwidth @ –1 dB for baseband interface
  - 0.8 GHz to 3.5 GHz for IF interface
- High single sideband rejection of >35 dBc
- Integrated VVA for adjustable gain range between +10 dB to –8 dB
- High output IP3 > 20 dBm
- Low output noise: <–150 dBm/Hz
- SPI-programmable interface for increased flexibility and control
  - Linearizer to optimize linearity by phase correction
  - Quadrature phase balancing for improved sideband rejection
  - Supports power-down and reset modes
- Integrated power detector for feed through optimization
- Standard supply voltage rails: 1.8 V, 3.3 V, and 5 V
- 5 mm × 5 mm LFCSP

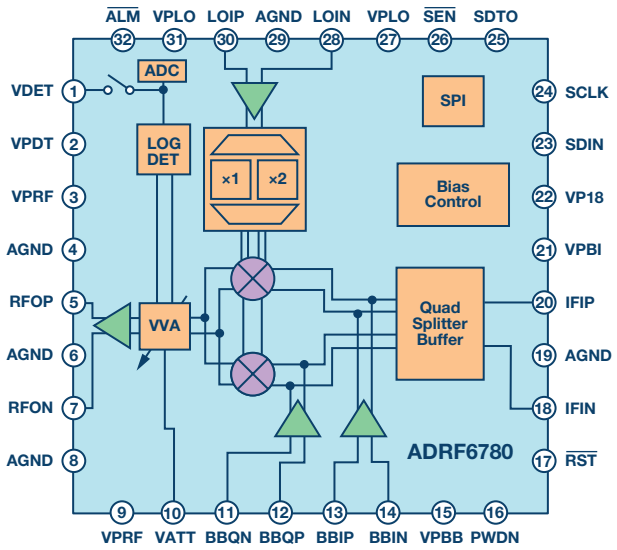
Benefits

- Simplifies design by replacing the entire transmit chain with one integrated component
- One part for all upconverter designs between 6 GHz to 24 GHz; eliminates multiple upconverters for each band
- Flexibility of ZIF or superhetrodyne architecture
- Programmable interface provides increased control to optimize the parts performance to specific design goals

Common Applications

- Microwave point-to-point or point-to-multipoint radios
- Military systems and electronic radars requiring improved sensitivity

Frequency Range	IF Range	I/Q Bandwidth	Temperature Range	Package	Price @ 1k ($U.S.)
6 GHz to 24 GHz	0.8 GHz to 3.5 GHz	~1 GHz	–40°C to +85°C	32-lead LFCSP	64.45



= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

I/Q Modulators and Demodulators

I/Q Modulators

Part Number	Description	RF Frequency (GHz)	LO Spur (dBm)	Sideband Suppression (dBc)	Noise (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5386	VVA and AGC	0.05 to 2.2	–38	–46	–160	11.1	25	700	5	230	6 × 6 LFCSP	5A991.b	ADL5386ACPZ-R7
HMC795	With VGA	0.05 to 2.8	—	–53	–156	11	25	440	3.3, 5	127	5 × 5 QFN	EAR 99	HMC795LP5E
HMC1097	Direct quadrature	0.1 to 6	–40	–40	–162	11	29	700	5	170	4 × 4 LFCSP	EAR 99	HMC1097LP4E
AD8345	Low power	0.14 to 1	–42	–42	–155	2.5	25	80	3, 5	58, 62	TSSOP	5A991.b	AD8345AREZ
ADL5370	Narrow-band	0.3 to 1	–50	–41	–160	11	24	500	5	205	4 × 4 LFCSP	5A991.b	ADL5370ACPZ-R7
ADL5385	Broadband	0.3 to 2.2	–46	–50	–159	11	26	500	5	215	4 × 4 LFCSP	5A991.b	ADL5385ACPZ-R7
ADL5375	Broadband	0.4 to 6	–46	–52	–160	9.4	26.8	750	5	200	4 × 4 LFCSP	5A991.b	ADL5375-05ACPZ-R2
ADL5371	Narrow-band	0.5 to 1.5	–50	–55	–159	14.5	27	500	5	175	4 × 4 LFCSP	5A991.b	ADL5371ACPZ-R7
AD8349	Low power	0.7 to 2.7	–45	–35	–155	7.6	21	160	5	135	TSSOP	5A991.b	AD8349AREZ
AD8346	Low power	0.8 to 2.5	–42	–36	–147	–3	20	70	3, 5	43, 45	TSSOP	5A991.b	AD8346ARUZ
ADL5591	Narrow-band	0.805 to 1.905	—	–47	–157	16	30	250	5	170	6 × 6 LFCSP	5A991.b	ADL5591ACPZ-R7
ADL5590	Narrow-band	0.869 to 0.9	—	–50	–157	16	29	250	5	170	6 × 6 LFCSP	5A991.b	ADL5590ACPZ-R7
ADL5372	Narrow-band	1.5 to 2.5	–45	–45	–158	14.2	27	500	5	165	4 × 5 LFCSP	5A991.b	ADL5372ACPZ-R2
ADL5373	Narrow-band	2.3 to 3	–32	–57	–157	13.8	26	500	5	174	4 × 4 LFCSP	5A991.b	ADL5373ACPZ-WP
ADRF6780 ***New***	Wideband	5.9 to 23.6	–38	25	–147	11	26	1000	3.3, 5	400, 160	5 × 5 LFCSP	5A991.h	ADRF6780ACPZN-R7

I/Q Demodulators

Part Number	Description	RF Frequency (MHz)	Gain Error (dB)	Phase Error (°)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8348	Broadband with VGA	0.05 to 1	0.25	0.5	10.75	13	28	125	3, 5	47, 51	TSSOP	5A991.b	AD8348ARUZ
ADL5387	2× LO, broadband	0.03 to 2	0.05	0.2	12	13	31	240	5	180	4 × 4 LFCSP	5A991.b	ADL5387ACPZ-WP
ADL5380	Broadband	0.4 to 6	0.07	0.2	11.7	11.6	27.8	390	5	245	4 × 4 LFCSP	5A991.b	ADL5380ACPZ-WP
ADL5382	Broadband	0.7 to 2.7	0.05	0.2	15.6	14.4	30.5	370	5	220	4 × 4 LFCSP	5A991.b	ADL5382ACPZ-WP
AD8347	I/Q demodulator and VGA	0.8 to 2.7	0.3	1	11	–2	11.5	65	3, 5	64, 68	4 × 4 LFCSP	5A991.b	AD8347ARUZ

I/Q Modulators with Integrated LO

Part Number	Description	RF Frequency (MHz)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	PLL Phase Noise 1 MHz Offset (dBc/Hz)	LO Spur (dBm)	Sideband Suppression (dBc)	Noise (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1197	I/Q modulators with integrated LO	100 to 4000	–110	–134.5	–40	–45	–160	11	30	600	5, 3.3	—	7 × 7 QFN	5A991.b	HMC1197LP7FE
ADRF6755	I/Q modulators with integrated LO	300 to 2310	–93	–133	–45	–45	–162	8	21	600	5	—	8 × 8 LFCSP	5A991.b	ADRF6755ACPZ
ADRF6701	I/Q modulators with integrated LO	400 to 1250	–113	–135	–45	–40	–159.7	11.2	31.7	750	5	—	6 × 6 LFCSP	5A991.b	ADRF6701ACPZ-R7
ADRF6720	I/Q modulators with integrated LO	700 to 3000	–91.5	–136.8	–40	–38	–157	12.7	35.7	1000	3.3	—	6 × 6 LFCSP	5A991.b	ADRF6720ACPZ-R7
ADRF6720-27	I/Q modulators with integrated LO	400 to 3000	–92.4	–136.8	–44	–40.8	–159.5	10.8	31.1	1000	3.3	—	6 × 6 LFCSP	5A991.b	ADRF6720-27ACPZ-R7
ADRF6750	I/Q modulators with integrated LO	950 to 1575	–93	–133	–45	–45	–162	8.5	23	600	5	—	8 × 8 LFCSP	5A991.b	ADRF6750ACPZ-R7
ADRF6702	I/Q modulators with integrated LO	1200 to 2400	–110.8	–124.6	–40	–53.9	–159.6	13.6	30.1	750	5	—	6 × 6 LFCSP	5A991.b	ADRF6702ACPZ-R7
ADRF6703	I/Q modulators with integrated LO	1550 to 2650	–98.8	–129.2	–40	–44	–159.7	13.5	32.7	750	5	—	6 × 6 LFCSP	5A991.b	ADRF6703ACPZ-R7
ADRF6704	I/Q modulators with integrated LO	2050 to 3000	–92.3	–125.2	–41	–37.7	–158.3	12.1	27.2	750	5	—	6 × 6 LFCSP	5A991.b	ADRF6704ACPZ-R7

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

I/Q Demodulators with Integrated LO

Part Number	Description	RF Frequency (MHz)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	PLL Phase Noise 1 MHz Offset (dBc/Hz)	Gain Error (dB)	Phase Error (°)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6806	I/Q demodulator and frac-N PLL and VCO	50 to 525	—	—	0.1	0.5	12.2	12.2	28.5	170	3, 5	86, 270	6 × 6 LFCSP	5A991.b	ADRF6806ACPZ-R7
ADRF6850	I/Q demodulator and frac-N PLL and VCO	100 to 1000	–98	–136	0.1	0.5	11	12	22.5	300	3	350	8 × 8 LFCSP	5A991.b	ADRF6850BCPZ
ADRF6820	Broadband I/Q demodulator and frac-N PLL and VCO	695 to 2700	–94.7	–141.5	0.1	0.5	20	14.5	37	1400	3.3, 5	83, 310	6 × 6 LFCSP	5A991.b	ADRF6820ACPZ-R7
ADRF6807	I/Q demodulator and frac-N PLL and VCO	700 to 1050	–107	–137	0.1	0.5	13.1	12.8	26.7	170	3, 5	86, 227	6 × 6 LFCSP	5A991.b	ADRF6807ACPZ-R7
ADRF6801	I/Q demodulator and frac-N PLL and VCO	750 to 1150	–88.3	–138.6	0.05	0.3	14.3	12.5	25	275	5	262	6 × 6 LFCSP	5A991.b	ADRF6801ACPZ-R7

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Integrated Transceivers, Transmitters, and Receivers

Microwave and Millimeter Wave Integrated Transmitters/Receivers

V-Band Transmitters/Receivers

Part Number	Description	Frequency (GHz)	I/Q Bandwidth (GHz)	Max Gain (dB)	RF Control Range (dB)	IF Control Range (dB)	IP3 Typ (dBm)	Image/ Sideband Rejection (dBc)	Noise Figure (dB)	P1dB Typ (dBm)	Power Dissipation (W)	Package (mm)	ECCN Code	Ordering Part Number
HMC6300	60 GHz integrated transmitter	57 to 64	1.8	35	22	14	20 (OIP3)	40	—	12 (single end) 15 (balanced)	0.88 (single end) 1.0 (balanced)	BGA	5A991.h	HMC6300BG46
HMC6301	60 GHz integrated receiver	57 to 64	1.8	67	6	12 (analog) 15 (digital)	–9 (IIP3)	35	8	30	0.82 (single end) 0.57 (external LO)	BGA	5A991.h	HMC6301BG46

E-Band Transmitters/Receivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	IP3 (dBm)	Image/ Sideband Rejection (dBc)	NF Typ (dB)	LO Drive Nominal (dBm)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC7586 ***New***	E-band I/Q Receiver	71 to 76	11.83 to 14.33	0 to 10	12.5	–1 (IIP3)	28	5	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7586
HMC7587 ***New***	E-band I/Q Receiver	81 to 86	11.83 to 14.33	0 to 10	10	–2 (IIP3)	30	6	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7587
HMC8118 ***New***	E-band I/Q upconverter	71 to 76	11.83 to 14.33	0 to 10	11	—	22	—	2	4, 1.5	175, 80	Die	5A991.b	HMC8118
HMC8119 ***New***	E-band I/Q upconverter	81 to 86	11.83 to 14.33	0 to 10	10	—	22	—	2	4, 1.5	175, 80	Die	5A991.b	HMC8119

IF Subsystem Transmitters and Receivers

Part Number	Description	RF (MHz)	IF (MHz)	Conversion Gain (dB)	RF VGA Dynamic Range (dB)	IF VGA Dynamic Range (dB)	Output IP3 Typ (dBm)	Image Rejection (dBc)	Noise Figure (dB)	V_{SUPPLY} Typ (V)	I_{SUPPLY} Typ (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8100 ***New***	Intermediate frequency receiver	800 to 4000	80 to 200	85	47	49	18	36	5	3.3	600	6 × 6 LFCSP	5A991.b	HMC8100LP6JE
HMC8200 ***New***	Intermediate frequency transmitter	800 to 4000	200 to 700	34	35	—	31	15	6	3.3	540	5 × 5 LFCSP	5A991.b	HMC8200LP5ME

24 GHz ADAS Radar Solution

Part Number	Description	Function	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4158	6 GHz, frac-N FMCW ramping PLL	Ramp generator	0.5 to 6.1	–216	32	3	23	4 × 4 LFCSP	5A991.h	ADF4158CCPZ
ADF4159	13 GHz, frac-N FMCW ramping PLL	Ramp generator	0.5 to 13	–224	110	3	33	4 × 4 LFCSP	5A991.h	ADF4159CCPZ

Part Number	Description	Function	RF (MHz)	Signal Bandwidth (MHz)	Phase Noise @ 10 MHz Offset (dBc/Hz)	Output Power (dBm)	Input	ADC resolution	V_{Tune} (V)	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
ADF5901	ISM band, 2-ch FMCW transmitter	Tx MMIC	24 to 24.25	250	–128	2 to 10	Single ended	8-bit	1 to 2.8	0.002	5 × 5 LFCSP	EAR 99	ADF5901WCCPZ

Part Number	Description	Function	RF (MHz)	Signal Bandwidth (MHz)	Rx Channel Gain (dB)	P1dB (dBm)	RF-IF Isolation (dB)	Noise Figure (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADF5904	ISM band, 4-ch receiver	Rx MMIC	24 to 24.25	250	22	–10	30	10	5 × 5 LFCSP	EAR 99	ADF5904ACPZ

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

24 GHz ADAS Radar Solution (Continued)

Part Number	Description	Function	Sample Rate (MSPS)	Gain (dB)	Low Pass Filter BW (MHz)	SNR (dB)	SFDR (dB)	Noise (nV/√Hz)	Antialiasing Filter	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD8283	6-ch LNA/PGA/AAF with ADC	AFE	72	16 to 34 (programmable)	1 to 12 (programmable)	67	68	3.5	Included	0.17	10 × 10 LFCSP	—	AD8283WBCPZ
AD8284	6-ch LNA/PGA/AAF with ADC	AFE	60	17 to 35 (programmable)	9 to 15 (programmable)	67	68	3.5	Included	0.345	10 × 10 TQFP	—	AD8284WCSVZ
ADAR7251	4-ch, 16-bit, continuous time data acquisition ADC	AFE	0.3 to 1.2	0 to 45 (programmable)	—	—	—	2.4	Not required	0.4	7 × 7 LFCSP	—	ADAR7251WBCSZ

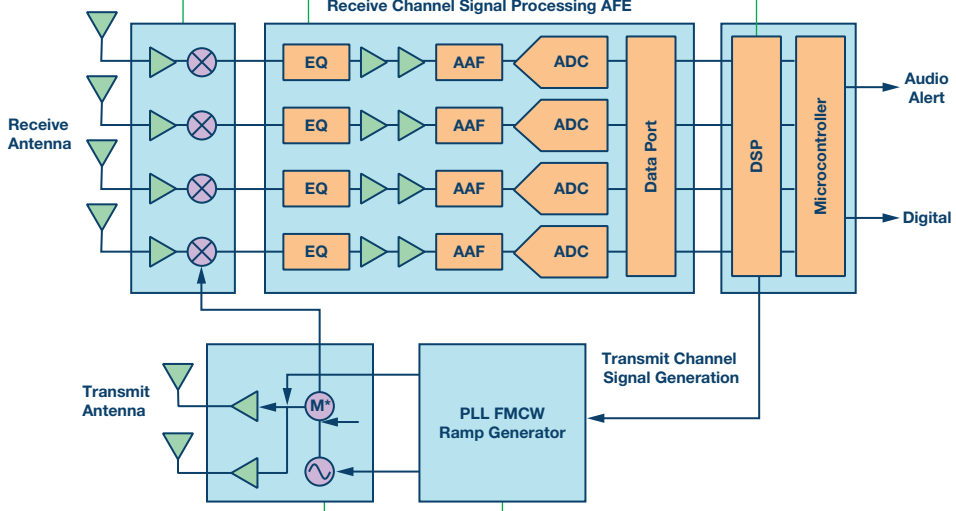
Part Number	Description	Function	Operating Frequency (MHz)	Core	On-Chip L1 SRAM (kB)	On-Chip L2 SRAM (MB)	On-Chip L2 ROM (kB)	On-Chip RAM (MB)	On-Chip ROM (MB)	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
ADSP-BF70x	Low power ADSP-BF70x series of Blackfin+® embedded DSP processors with 512 kB L2 SRAM and DDR2/LPDDR interface	DSP	200 to 400	16-bit 32-bit	136	256	512	—	—	<1	12 × 12 LFCSP 12 × 12 BGA	—	—
ADSP-2147x	ADSP-2147x SHARC® DSP	DSP	200 to 300	32-bit 40-bit	—	—	—	2 to 5	4		LFCSP BGA	—	ADSP-2147xKCPZ-1A

24 GHz ISM Band Multichannel Radar Solution

Receiver chip (1) ADF5904
- Four receive channels compared to traditional single channel
- Integrated temperature sensor to reduce components and temperature calibration

AD8285—4 channels (1)
ADAR7251—4 channels (1)
- Fully integrated 4-channel signal processing
- Integrated ADC and equalizers for ease of design

ADSP-BF70 or ADSP-2147x (DSP)
- Digital signal processing solution included



Common Applications
- Automotive radar
- Drones: radio altimeters, collision avoidance
- Motion detection and surveillance
- Robotics

Transmitter chip (1) ADF5901
- Four transmit channels
- Independent transmitter and receiver ICs to provide spatial flexibility
- Best-in-class output power for increased range

PLL (1) ADF4159/ADF4158
- Best-in-class phase noise and high speed FMCW ramping for increased resolution

HMC6300: 57 GHz to 64 GHz Transmitter SMT Chipset (V-Band)
HMC6301: 57 GHz to 64 GHz Receiver SMT Chipset (V-Band)

Key Features

Transmitter (HMC6300)

- High output power of
  - P1dB: 15 dBm
  - P_{SAT}: 17 dBm
- Single-ended and differential output modes

Receiver (HMC6301)

- Noise figure of 7 dB
- Gain of up to 68 dB
- Programmable baseband gain and filter bandwidth

Common Features

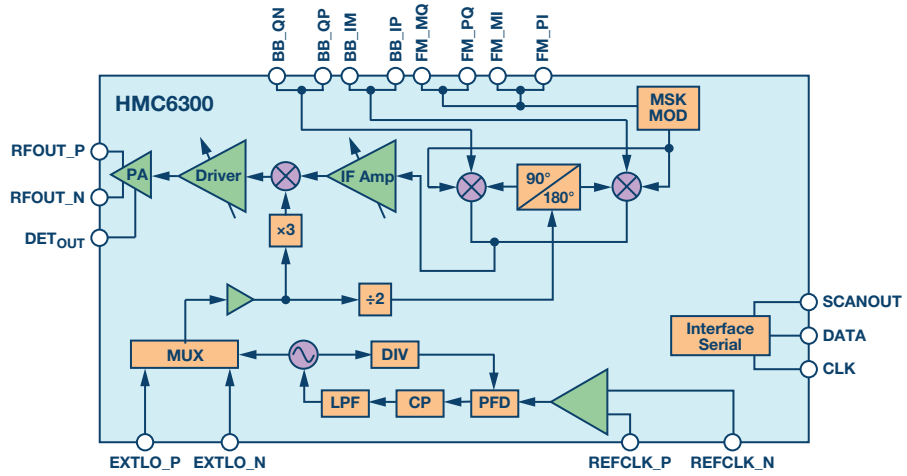
- Frequency coverage of 57 GHz to 64 GHz
- Wafer level ball grid array (WLBGA) package
- On-chip temperature sensor
- Integrated frequency synthesizer
- Support for up to 256 QAM with external LO
- SPI control
- Integrated synthesizer capable of 64 QAM
- External LO capability for modulations up to 256 QAM
- Continuous analog and digital gain control
- RF bandwidth up to 1.8 GHz supported
- Supports FDD or TDD through an external switch

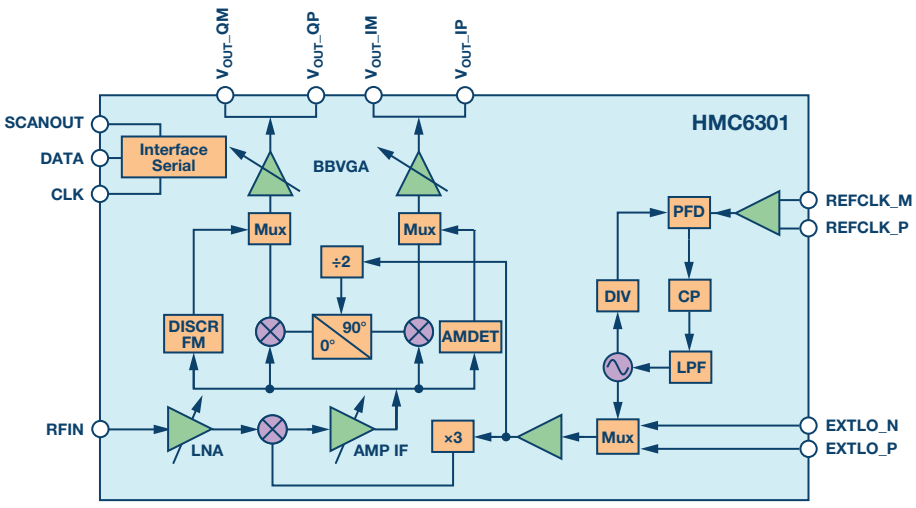
Benefits

- Surface-mount packaging eliminates costly chip and wire assembly
- Single transmitter and receiver for entire V-band backhaul radio signal chain
- Flexibility to operate in single-ended mode for direct interface or differential output mode for higher power
- Increased flexibility and industry-leading performance with option to use external LO

Common Applications

- Small cell backhaul
- 60 GHz ISM band data transfer
- Multi-Gbps data communication
- WiGig/802.11ad radio
- High definition video transmission
- Radar/high resolution imaging





HMC8100: 0.8 GHz to 4 GHz Intermediate Frequency Receiver
HMC8200: 0.8 GHz to 4 GHz Intermediate Frequency Transmitter

Key Features

- High linearity: support modulations to 1024 QAM
- Receiver IF range: 80 MHz to 200 MHz
- Receiver RF range: 800 MHz to 4000 MHz
- Receiver power control range: 80 dB
- SPI programmable band-pass filters
- SPI controlled interface
- Transmitter IF range: 200 MHz to 700 MHz
- Transmitter RF range: 800 MHz to 4000 MHz
- Transmitter power control range: 25 dB

Benefits

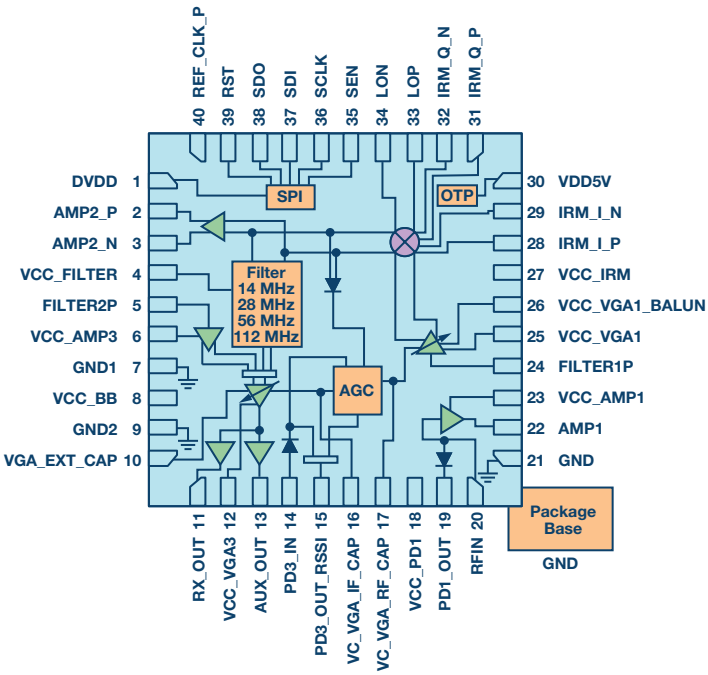
- Up to 75% reduction in board area and 30% reduction in solution cost, using a single IC with complete IF subsystem
- No need for external switches or filters
- Flexibility of heterodyne or ZIF architecture
- Improved sensitivity due to 6 dB better NF

Common Applications

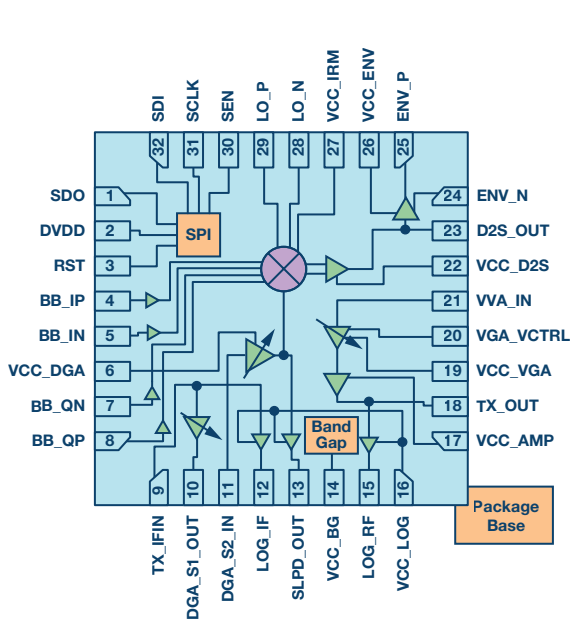
- Microwave point-to-point or point-to-multipoint radios
- Military systems and electronic radars requiring improved sensitivity
- Small form factor test and measurement instrumentation

LO Frequency Range	Input Impedance	Power Conversion Gain	Temperature Range	Package	Price @ 1k ($U.S.)
600 MHz to 2000 MHz	50 Ω (typical)	86 dB (typical)	–40°C to +85°C	40-lead LFCSP, 32-lead LFCSP	HMC8100: 19.98 HMC8200: 17.06

HMC8100



HMC8200



PLL/Synthesizers

Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1031	Integer-N	0 to 0.5	–208	140	3	2	MSOP	EAR 99	HMC1031MS8E
ADF4002	Integer-N	0.005 to 0.4	–222	104	3	5	4 × 4 LFCSP	5A991.b	ADF4002BCPZ-RL7
ADF4001	Integer-N	0.01 to 0.2	–217	—	2.7 to 5.5	4.5	4 × 4 LFCSP	5A991.b	ADF4001BCPZ-RL7
HMC440	Integer-N	0.01 to 2.8	–233	1300	5	250	QSOP	3A001.a.11.b	HMC440QS16GE
HMC4069 ***New***	Integer-N	0.01 to 2.9	–233	1300	5	295	4 × 4 LFCSP	3A001.a.11.b	HMC4069LP4E
ADF4110	Integer-N	0.05 to 0.55	–213	—	2.7 to 5.5	4.5	4 × 4 LFCSP	5A991.b	ADF4110BCPZ-RL7
ADF4116	Integer-N	0.08 to 0.55	–211	55	2.7 to 5.5	4.5	TSSOP	5A991.b	ADF4116BRUZ-REEL7
ADF4111	Integer-N	0.08 to 1.2	–213	—	2.7 to 5.5	4.5	TSSOP	5A991.b	ADF4111BRUZ-RL7
HMC698	Integer-N	0.08 to 7	–233	1300	5	310	5 × 5 QFN	3A001.a.11.b	HMC698LP5E
ADF4117	Integer-N	0.1 to 1.2	–213	55	2.7 to 5.5	4.5	TSSOP	5A991.b	ADF4117BRUZ
ADF4118	Integer-N	0.1 to 3	–216	55	2.7 to 5.5	6.5	TSSOP	5A991.b	ADF4118YRUZ-RL7
HMC699	Integer-N	0.16 to 7	–233	1300	5	310	5 × 5 QFN	3A001.a.11.b	HMC699LP5E
ADF4212L	Integer-N	0.2 to 2.4	–215	75	3	7.5	TSSOP	5A991.b	ADF4212LBRUZ
ADF4113	Integer-N	0.2 to 3.7	–217	—	2.7 to 5.5	8.5	4 × 4 LFCSP	5A991.b	ADF4113BCPZ-RL7
ADF4113HV	Integer-N	0.2 to 3.7	–212	5	2.7 to 5.5	11	4 × 4 LFCSP	5A991.b	ADF4113HVBCPZ-RL7
ADF4106	Integer-N	0.5 to 6	–223	104	3	13	4 × 4 LFCSP	5A991.b	ADF4106BCPZ-R7
ADF4107	Integer-N	1 to 7	–223	104	3	17	4 × 4 LFCSP	5A991.b	ADF4107BCPZ-REEL7
ADF4007	Integer-N	1 to 7.5	–219	120	3	15	4 × 4 LFCSP	5A991.b	ADF4007BCPZ-RL7
ADF4108	Integer-N	1 to 8	–223	104	3	15	4 × 4 LFCSP	5A991.b	ADF4108BCPZ-RL7
ADF41020	Integer-N	4 to 18	–221	100	3	30	4 × 4 LFCSP	5A991.b	ADF41020BCPZ-RL7

Fractional-N/Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC702	Frac-N with sweeper	~0 to 14	–221	70	3.3, 5	135, 26	6 × 6 LFCSP	EAR 99	HMC702LP6CE
HMC704	Frac-N	~0 to 8	–230	100	3.3, 5	52, 6	4 × 4 LFCSP	EAR 99	HMC704LP4E
HMC703	Frac-N with sweeper	~0 to 8	–230	100	3.3, 5	54, 7	4 × 4 LFCSP	EAR 99	HMC703LP4E
HMC701	Frac-N with sweeper	~0 to 8	–221	70	3.3, 5	90, 37	6 × 6 LFCSP	EAR 99	HMC701LP6CE
HMC700	Frac-N with sweeper	~0 to 8	–221	70	3.3, 5	90, 5.5	4 × 4 LFCSP	EAR 99	HMC700LP4E
ADF4150	Frac-N/integer-N PLLs	0.01 to 0.25	–223	32	3.3	50	4 × 4 LFCSP	5A991.b	ADF4150BCPZ-RL7
ADF4151	Integer-N and frac-N	0.01 to 0.25	–221	32	3.3	42	5 × 5 LFCSP	5A991.b	ADF4151BCPZ-RL7
ADF4150HV	Frac-N/integer-N PLL, 30 V charge pump	0.01 to 0.3	–213	26	3.3	50	5 × 5 LFCSP	5A991.b	ADF4150HVBCPZ-RL7
ADF4152HV ***New***	Frac-N/integer-N PLL, 30 V charge pump	0.5 to 5	–213	26	3.3	50	5 × 5 LFCSP	5A991.b	ADF4152HV
ADF4155	Integer-N and frac-N	0.1 to 0.6	–223	125	3.3	38	4 × 4 LFCSP	5A991.b	ADF4155BCPZ-RL7
ADF4252	Frac-N/integer-N PLLs	0.25 to 3	–214	RF_PFD 30 IF_PFD 55	3	13	4 × 4 LFCSP	5A991.b	ADF4252BCPZ-R7
ADF4193	Frac-N/integer-N PLLs	0.4 to 3.5	–216	30	3	68	5 × 5 LFCSP	5A991.h	ADF4193RL7
ADF4196	Integer-N and frac-N	0.4 to 6	–216	25	3	68	5 × 5 LFCSP	5A991.b	ADF4196BCPZ-RL7
ADF4153A	Frac-N/integer-N PLLs	0.5 to 4	–223	32	3	20	TSSOP	5A991.b	ADF4153ABRUZ
ADF4153A	Frac-N/integer-N PLLs	0.5 to 4	–223	32	3	20	4 × 4 LFCSP	5A991.b	ADF4153ABCPZ-RL7
ADF4153	Frac-N/integer-N PLLs	0.5 to 4	–220	32	3	20	TSSOP	5A991.b	ADF4153BRUZ-RL7
ADF4153	Frac-N/integer-N PLLs	0.5 to 4	–220	32	3	20	4 × 4 LFCSP	5A991.b	ADF4153BCPZ-RL7
ADF4154	Frac-N/integer-N PLLs	0.5 to 4	–220	32	3	20	TSSOP	5A991.b	ADF4154BRUZ-RL7
ADF4154	Frac-N/integer-N PLLs	0.5 to 4	–220	32	3	20	4 × 4 LFCSP	5A991.b	ADF4154BCPZ-RL7
ADF4157	Frac-N/integer-N PLLs	0.5 to 6	–211	32	3	23	TSSOP	5A991.b	ADF4157BRUZ-RL7
ADF4157	Frac-N/integer-N PLLs	0.5 to 6	–211	32	3	23	4 × 4 LFCSP	5A991.b	ADF4157BCPZ-RL7
ADF4158	Integer-N and frac-N	0.5 to 6.1	–216	32	3	23	4 × 4 LFCSP	5A991.b	ADF4158CCPZ-RL7
ADF4156	Frac-N	0.5 to 6.2	–220	32	3	26	TSSOP	5A991.b	ADF4156BRUZ-RL7
ADF4156	Frac-N	0.5 to 6.2	–220	32	3	26	4 × 4 LFCSP	5A991.b	ADF4156BCPZ-RL7
ADF4159	Swept frequency integer-N and frac-N	0.5 to 13	–224	110	3	33	4 × 4 LFCSP	5A991.b	ADF4159CCPZ-RL7
ADF4169	Frac-N/integer-N PLLs	0.5 to 13.5	–224	130	3.3	65	4 × 4 LFCSP	5A991.b	ADF4169CCPZ-RL7

Integer-N PLLs with Integrated VCO

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	Divider	VCO Tuning Inductor	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4360-9	Integer-N PLLs with VCO	~0 to 0.2	–120	/2 to /62	Ext L sets frequency range	–218	8	3.3	20 to 40	4 × 4 LFCSP	5A991.b	ADF4360-9BCPZRL7
ADF4360-8	Integer-N PLLs with VCO	0.065 to 0.4	–120	No	Ext L sets frequency range	–216	8	3.3	20 to 40	4 × 4 LFCSP	5A991.b	ADF4360-8BCPZRL7
ADF4360-7	Integer-N PLLs with VCO	0.35 to 1.8	–116	/1, /2	Ext L sets frequency range	–216	8	3.3	25 to 45	4 × 4 LFCSP	5A991.b	ADF4360-7BCPZRL7
ADF4360-6	Integer-N PLLs with VCO	1.05 to 1.25	–110	/1, /2	Internal	–216	8	3.3	25 to 45	4 × 4 LFCSP	5A991.b	ADF4360-6BCPZRL7
ADF4360-5	Integer-N PLLs with VCO	1.2 to 1.4	–110	/1, /2	Internal	–216	8	3.3	25 to 45	4 × 4 LFCSP	5A991.b	ADF4360-5BCPZRL7

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Integer-N PLLs with Integrated VCO (Continued)

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	Divider	VCO Tuning Inductor	Figure of Merit (dBc/Hz)	PFD_{MAX} (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4360-4	Integer-N PLLs with VCO	1.45 to 1.75	–110	/1, /2	Internal	–216	8	3.3	25 to 50	4 × 4 LFCSP	5A991.b	ADF4360-4BCPZRL7
ADF4360-3	Integer-N PLLs with VCO	1.6 to 1.95	–110	/1, /2	Internal	–216	8	3.3	25 to 50	4 × 4 LFCSP	5A991.b	ADF4360-3BCPZRL7
ADF4360-2	Integer-N PLLs with VCO	1.85 to 2.17	–110	/1, /2	Internal	–216	8	3.3	25 to 50	4 × 4 LFCSP	5A991.b	ADF4360-2BCPZRL7
ADF4360-1	Integer-N PLLs with VCO	2.05 to 2.45	–110	/1, /2	Internal	–216	8	3.3	25 to 50	4 × 4 LFCSP	5A991.b	ADF4360-1BCPZRL7
ADF4360-0	Integer-N PLLs with VCO	2.4 to 2.75	–110	/1, /2	Internal	–216	8	3.3	25 to 50	4 × 4 LFCSP	5A991.b	ADF4360-0BCPZRL7

Narrow-Band RF Fractional-N/Integer-N PLLs with VCO

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	VCO Phase Noise @ 1 MHz (dBc/Hz)	P_{OUT} (dBm)	Figure of Merit (dBc/Hz)	PFD_{MAX} Frac-N Mode (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC824	Frac-N PLL	0.78 to 0.87	–123	–148	14	–229	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC824LP6CE
HMC826	Frac-N PLL	0.99 to 1.105	–121	–146	11	–229	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC826LP6CE
HMC828	Frac-N PLL	1.285 to 1.415	–118	–143	10	–229	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC828LP6CE
HMC831	Frac-N PLL	1.815 to 2.01	–118	–143	7.5	–229	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC831LP6CE
HMC836	Frac-N PLL	3.365 to 3.705	–111	–136	0	–227	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC836LP6CE
HMC822	Frac-N PLL, triband VCO	0.665 to 0.825 1.33 to 1.65 2.66 to 3.3	–124 –118 –112	–148 –142 –136	+11 +6.5 +4	–229	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC822LP6CE
HMC838	Frac-N PLL, triband VCO	0.795 to 0.945 1.59 to 1.89 3.18 to 3.78	–123 –118 –112	–148 –118 –112	+10 +7.5 –4	–229	fvco/20	3.3/5	51/77	6 × 6 LFCSP	EAR 99	HMC838LP6CE
HMC821	Frac-N PLL, triband VCO	0.86 to 1.04 1.72 to 2.08 3.44 to 4.16	–122 –116 –110	–147 –141 –135	+10 +6.5 –4	–227	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC821LP6CE
HMC837	Frac-N PLL, triband VCO	1.025 to 1.15 2.05 to 2.3 4.1 to 4.6	–120 –114 –108	–147 –141 –135	+12 +10.5 -0.5	–230	fvco/20	3.3/5	47/94	6 × 6 LFCSP	EAR 99	HMC837LP6CE
HMC839	Frac-N PLL, triband VCO	1.05 to 1.205 2.1 to 2.41 4.2 to 4.82	–121 –116 –109	–146 –140 –135	+10 +7.5 –4	–229	fvco/20	3.3/5	51/78	6 × 6 LFCSP	EAR 99	HMC839LP6CE
HMC820	Frac-N PLL, triband VCO	1.095 to 1.275 2.19 to 2.55 4.38 to 5.1	–122 –116 –110	–147 –141 –135	+10 +6.5 –4	–227	fvco/20	3.3/5	51/97	6 × 6 LFCSP	EAR 99	HMC820LP6CE
HMC840	Frac-N PLL, triband VCO	1.31 to 1.415 2.62 to 2.83	–117 –111	–145 –139	+10 +9	–230	fvco/20	3.3/5	47/97	6 × 6 LFCSP	EAR 99	HMC840LP6CE

Narrow-Band Fractional-N/Integer-N PLLs with Integrated VCO

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	Figure of Merit (dBc/Hz)	PFD_{MAX} Frac-N Mode (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC764	Wideband frac-N/ integer-N PLL and VCO	7.3 to 8.2	–140	15	–226	70	3.3/5	90/245	6 × 6 LFCSP	EAR 99	HMC764LP6CE
HMC765	Wideband frac-N/ integer-N PLL and VCO	7.8 to 8.8	–140	13	–226	70	3.3/5	90/245	6 × 6 LFCSP	EAR 99	HMC765LP6CE
HMC767	Wideband frac-N/ integer-N PLL and VCO	8.45 to 9.55	–138	12	–230	100	3.3/5	54/257	6 × 6 LFCSP	EAR 99	HMC767LP6CE
HMC769	Wideband frac-N/ integer-N PLL and VCO	9.05 to 10.15	–140	12	–230	100	3.3/5	54/272	6 × 6 LFCSP	EAR 99	HMC769LP6CE
HMC778	Wideband frac-N/ integer-N PLL and VCO	9.6 to 10.8	–140	9	–230	100	3.3/5	54/272	6 × 6 LFCSP	EAR 99	HMC778LP6CE
HMC783	Wideband frac-N/ integer-N PLL and VCO	11.5 to 12.5	–134	10	–226	70	3.3/5	90/145	6 × 6 LFCSP	EAR 99	HMC783LP6CE
HMC807	Wideband frac-N/ integer-N PLL and VCO	12.4 to 13.4	–132	8	–226	70	3.3/5	90/205	6 × 6 LFCSP	EAR 99	HMC807LP6CE

Wideband Fractional-N/Integer-N PLLs with Integrated VCO

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	VCO Phase Noise @ 1 MHz (dBc/Hz)	Figure of Merit (dBc/Hz)	PFD_{MAX} Frac-N Mode (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC832	Wideband frac-N/ integer-N PLL and VCO	0.025 to 3	–116	–139	–226	100	3.3	219	6 × 6 LFCSP	5A991.b	HMC832LP6GE
HMC830	Wideband frac-N/ integer-N PLL and VCO	0.025 to 3	–116	–141	–227	100	3.3/5	52/185	6 × 6 LFCSP	5A991.b	HMC830LP6GE
HMC835	Wideband frac-N/ integer-N PLL and VCO	0.033 to 4.1	–108	–134	–227	100	3.3/5	48/220	6 × 6 LFCSP	5A991.b	HMC835LP6GE

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Wideband Fractional-N/Integer-N PLLs with Integrated VCO (Continued)

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	VCO Phase Noise @ 1 MHz (dBc/Hz)	Figure of Merit (dBc/Hz)	PFD_{MAX} Frac-N Mode (MHz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC829	Wideband frac-N/ integer-N PLL and VCO	0.045 to 1.05 1.4 to 2.1 2.8 to 4.2	–108	–134	–227	100	3.3/5	52/185	6 × 6 LFCSP	EAR 99	HMC829LP6GE
ADF4355-2	Wideband frac-N/ integer-N PLL and VCO	0.055 to 4.4	–120	–142	–222	125	3.3/5	110/80	5 × 5 LFCSP	5A991.g	ADF4355–2BCPZ
ADF4351	Wideband frac-N/ integer-N PLL and VCO	0.035 to 4.4	–114	–134	–221	32	3.3	112 to 148	5 × 5 LFCSP	5A991.b	ADF4351BCPZ
ADF4350	Wideband frac-N/ integer-N PLL and VCO	0.1375 to 4.4	–114	–134	–220	32	3.3	112 to 136	5 × 5 LFCSP	5A991.b	ADF4350BCPZ
HMC833	Wideband frac-N/ integer-N PLL and VCO	0.025 to 6	–116	–141	–227	100	3.3/5	52/185	6 × 6 LFCSP	EAR 99	HMC833LP6GE
ADF4355-3	Wideband frac-N/ integer-N PLL and VCO	5.156 to 6.6	–118	–140	–222	125	3.3	146	5 × 5 LFCSP	5A991.b	ADF4355-3BCPZ
ADF4355	Wideband frac-N/ integer-N PLL and VCO	0.055 to 6.8	–120	–142	–222	125	3.3/5	110/80	5 × 5 LFCSP	5A991.b	ADF4355BCPZ
ADF4356 ***New***	Wideband frac-N/ int-N PLL and VCO	0.053 to 6.8	–116	–138	–227	125	3.3/5	110/80	5 × 5 LFCSP	5A991.b	ADF4356BCPZ
HMC834	Wideband frac-N/ integer-N PLL and VCO	0.045 to 1.05 1.4 to 2.1 2.8 to 4.2 5.6 to 8.4	–108	–134	–227	100	3.3/5	52/185	6 × 6 LFCSP	EAR 99	HMC834LP6GE
ADF5355	Wideband frac-N/ integer-N PLL and VCO	0.054 to 13.6	–107	–129	–221	125	3.3/5	110/80	5 × 5 LFCSP	5A991.b	ADF5355BCPZ

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

ADF4355: 6.8 GHz Wideband Synthesizer with Integrated VCO

Key Features

- RF output frequency range: 54 MHz to 6800 MHz
- Fractional-N synthesizer and integer-N synthesizer
- High resolution 38-bit modulus
- –148 dBc/Hz @ 1 MHz phase noise
- Programmable divide by 1, 2, 4, 8, 16, 32, or 64 output
- Analog and digital supply of 3.3 V
- Charge pump and VCO power supplies: 5.0 V typical
- Logic compatibility: 1.8 V
- Programmable output power level
- RF output mute function
- 3-wire serial interface
- Analog and digital lock detect

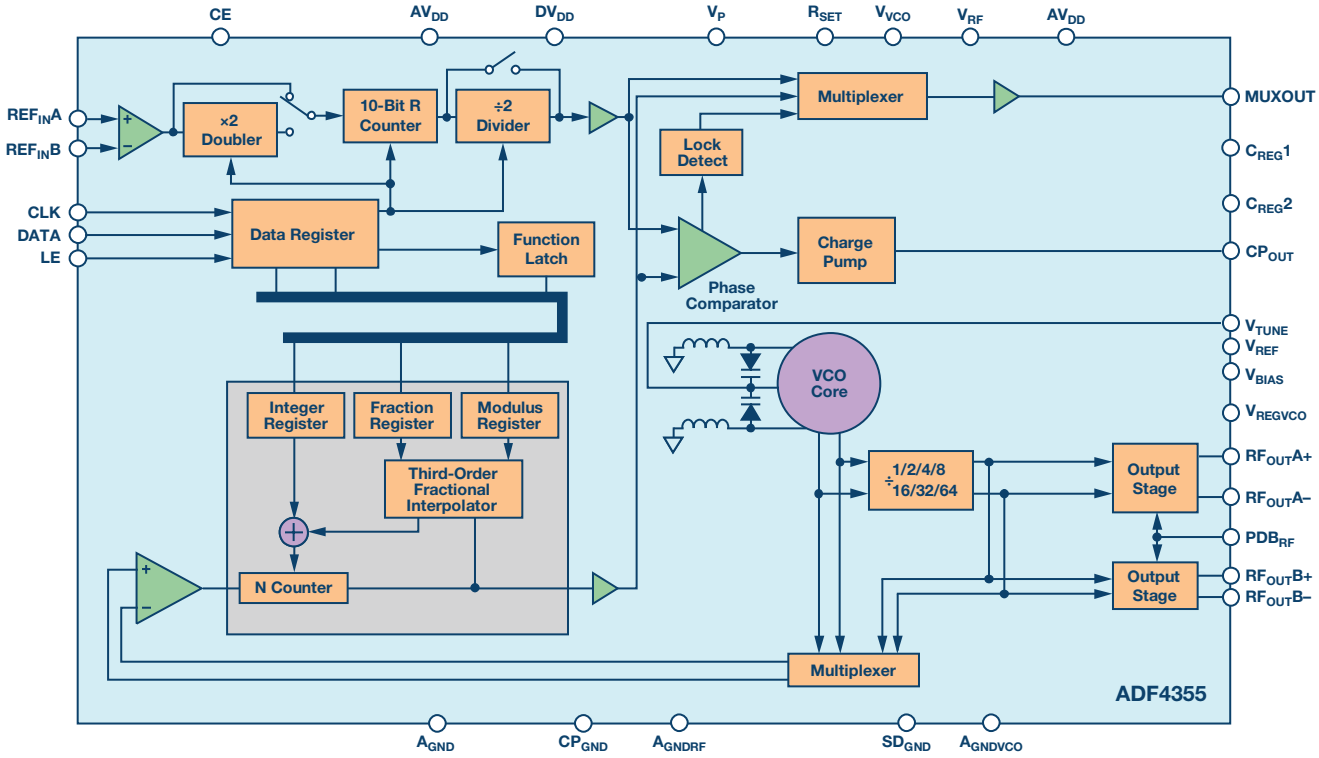
Benefits

- Integrated PLL/VCO reduces board space, design complexity, and cost
- Equivalent phase noise to high performance legacy GaAs VCOs
- Low phase noise due to high PFD frequency

Common Applications

- LO for communications infrastructure base station applications
- High performance clock for ADC/DAC
- Low phase noise LO signal for test and measurement instrumentation

Max Frequency	Continuous Range Without Gaps	PLL Figure of Merit	Temperature Range	Package	Price @ 1k ($U.S.)
6800 MHz	6746 MHz	–221 dBc/Hz	–40°C to +85°C	32-lead LFCSP	20.44



Voltage Controlled Oscillators

Low Current VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	V_{TUNE} (V)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC384	With buffer	2.05 to 2.25	–89	–112	3.5	0 to 10	3	35	4 × 4 LFCSP	EAR 99	HMC384LP4E
HMC385	With buffer	2.25 to 2.5	–89	–115	4.5	0 to 10	3	35	4 × 4 LFCSP	EAR 99	HMC385LP4E
HMC386	With buffer	2.6 to 2.8	–88	–115	5	0 to 10	3	35	4 × 4 LFCSP	EAR 99	HMC386LP4E
HMC416	With buffer	2.75 to 3	–89	–114	4.5	0 to 10	3	37	4 × 4 LFCSP	EAR 99	HMC416LP4E
HMC388	With buffer	3.15 to 3.4	–88	–113	4.9	0 to 10	3	39	4 × 4 LFCSP	EAR 99	HMC388LP4E
HMC389	With buffer	3.35 to 3.55	–89	–112	4.7	0 to 10	3	41	4 × 4 LFCSP	EAR 99	HMC389LP4E
HMC390	With buffer	3.55 to 3.9	–87	–112	4.7	0 to 10	3	42	4 × 4 LFCSP	EAR 99	HMC390LP4E
HMC391	With buffer	3.9 to 4.45	–81	–106	5	0 to 10	3	30	4 × 4 LFCSP	EAR 99	HMC391LP4E
HMC429	With buffer	4.45 to 5	–79	–105	4	0 to 10	3	30	4 × 4 LFCSP	EAR 99	HMC429LP4E
HMC430	With buffer	5 to 5.5	–80	–103	2	0 to 10	3	27	4 × 4 LFCSP	EAR 99	HMC430LP4E
HMC431	With buffer	5.5 to 6.1	–80	–102	2	0 to 10	3	27	4 × 4 LFCSP	EAR 99	HMC431LP4E
HMC358	With buffer	5.8 to 6.8	–82	–110	11	0 to 10	3	100	MSOP	EAR 99	HMC358MS8GE
HMC466	With buffer	6.1 to 6.72	–73	–101	4.5	0 to 10	3	13	4 × 4 LFCSP	EAR 99	HMC466LP4E
HMC505	With buffer	6.8 to 7.4	–80	–106	11	1 to 11	3	80	4 × 4 LFCSP	EAR 99	HMC505LP4E
HMC532	With buffer	7.1 to 7.9	–80	–101	14	1 to 13	3	85	4 × 4 LFCSP	EAR 99	HMC532LP4E
HMC506	With buffer	7.8 to 8.7	–80	–103	14	1 to 11	3	77	4 × 4 LFCSP	EAR 99	HMC506LP4E

High Performance VCOs

Part Number	Description	Frequency (GHz)	Primary Divide Output (MHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	V_{TUNE} (V)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC507	With f0/2	6.65 to 7.65	3.325 to 3.825	–90	–115	13	2 to 13	5	230	5 × 5 LFCSP	EAR 99	HMC507LP5E
HMC508	With f0/2	7.3 to 8.2	3.65 to 4.1	–90	–116	15	2 to 13	5	240	5 × 5 LFCSP	EAR 99	HMC508LP5E
HMC509	With f0/2	7.8 to 8.8	3.9 to 4.4	–90	–115	13	2 to 13	5	250	5 × 5 LFCSP	EAR 99	HMC509LP5E
HMC1160	With f0/2	8.45 to 9.3	4.225 to 4.65	–90	–116	12	2 to 13	5	260	5 × 5 LFCSP	EAR 99	HMC1160LP5E
HMC510	With f0/2 and divide by 4	8.45 to 9.55	4.225 to 4.775	–92	–116	13	2 to 13	5	315	5 × 5 LFCSP	3A001.a.11.b	HMC510LP5E
HMC1161 ***New***	With f0/2	8.71 to 9.55	4.355 to 4.775	–90	–115	11	2 to 13	5	250	5 × 5 LFCSP	EAR 99	HMC1161LP5E
HMC511	With f0/2	9.05 to 10.15	4.525 to 5.075	–88	–115	13	2 to 13	5	265	5 × 5 LFCSP	EAR 99	HMC511LP5E
HMC1162	With f0/2	9.25 to 10.1	4.625 to 5.05	–86	–115	11	2 to 13	5	230	5 × 5 LFCSP	EAR 99	HMC1162LP5E
HMC530	With f0/2 and divide by 4	9.5 to 10.8	4.75 to 5.4	–85	–110	11	2 to 13	5	350	5 × 5 LFCSP	3A001.a.11.b	HMC530LP5E
HMC512	With f0/2 and divide by 4	9.6 to 10.8	4.8 to 5.4	–85	–111	9	2 to 13	5	330	5 × 5 LFCSP	3A001.a.11.b	HMC512LP5E
HMC1163 ***New***	With f0/2	9.65 to 10.41	4.825 to 5.205	–87	–114	11	2 to 13	5	205	5 × 5 LFCSP	EAR 99	HMC1163LP5E
HMC1164 ***New***	With f0/2	10.38 to 11.3	5.19 to 5.65	–86	–114	8	2 to 13	5	200	5 × 5 LFCSP	EAR 99	HMC1164LP5E
HMC513	With f0/2 and divide by 4	10.43 to 11.46	5.215 to 5.73	–85	–110	7	2 to 13	5	275	5 × 5 LFCSP	3A001.a.11.b	HMC513LP5E
HMC534	With f0/2 and divide by 4	10.6 to 11.8	5.3 to 5.9	–82	–110	11	2 to 13	5	350	5 × 5 LFCSP	3A001.a.11.b	HMC534LP5E
HMC1165 ***New***	With f0/2	11.07 to 11.62	5.535 to 5.81	–88	–113	8	2 to 13	5	210	5 × 5 LFCSP	EAR 99	HMC1165LP5E
HMC582	With f0/2 and divide by 4	11.1 to 12.4	5.55 to 6.2	–83	–110	9	2 to 13	5	350	5 × 5 LFCSP	3A001.a.11.b	HMC582LP5E
HMC514	With f0/2 and divide by 4	11.17 to 12.02	5.585 to 6.01	–87	–110	7	2 to 13	3	275	5 × 5 LFCSP	EAR 99	HMC514LP5E
HMC1166 ***New***	With f0/2	11.41 to 12.62	5.705 to 6.31	–89	–115	11	2 to 13	5	220	5 × 5 LFCSP	EAR 99	HMC1166LP5E
HMC515	With f0/2 and divide by 4	11.5 to 12.5	5.75 to 6.25	–83	–110	10	2 to 13	5	200	5 × 5 LFCSP	3A001.a.11.b	HMC515LP5E
HMC583	With f0/2 and divide by 4	11.5 to 12.8	5.75 to 6.4	–80	–110	11	2 to 13	5	350	5 × 5 LFCSP	3A001.a.11.b	HMC583LP5E
HMC1167 ***New***	With f0/2	12.17 to 13.3	6.085 to 6.65	-86	–113	10	2 to 13	5	200	5 × 5 LFCSP	EAR 99	HMC1167LP5E
HMC529	With f0/2 and divide by 4	12.4 to 13.4	6.2 to 6.7	–83	–110	8	2 to 13	5	260	5 × 5 LFCSP	3A001.a.11.b	HMC529LP5E
HMC1168 ***New***	With f0/2	12.47 to 13.72	6.235 to 6.86	–85	–113	10	2 to 13	5	190	5 × 5 LFCSP	EAR 99	HMC1168LP5E
HMC584	With f0/2 and divide by 4	12.5 to 13.9	6.25 to 6.95	–81	–110	10	2 to 13	5	330	5 × 5 LFCSP	3A001.a.11.b	HMC584LP5E
HMC1169 ***New***	With f0/2	12.92 to 14.07	6.46 to 7.035	–86	–113	11	2 to 13	5	220	5 × 5 LFCSP	EAR 99	HMC1169LP5E
HMC531	With f0/2 and divide by 4	13.6 to 14.9	6.8 to 7.45	–81	–110	10	2 to 13	5	330	5 × 5 LFCSP	3A001.a.11.b	HMC531LP5E
HMC632	With f0/2 and divide by 4	14.25 to 15.65	7.125 to 7.825	–80	–107	9	2 to 13	5	350	5 × 5 LFCSP	3A001.a.11.b	HMC632LP5E

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Higher Power and Frequency VCOs

Part Number	Description	Frequency (GHz)	Primary Divide Output (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	V_{TUNE} (V)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC734	With divide by 4	8.6 to 10.2	2.15 to 2.55	–70	–100	18	1 to 13	5	218	5 × 5 LFCSP	3A001.a.11.b	HMC734LP5E
HMC735	With divide by 4	10.5 to 12.2	2.625 to 3.05	–75	–100	17	1 to 13	5	217	5 × 5 LFCSP	3A001.a.11.b	HMC735LP5E
HMC398	With divide by 8	14 to 15	1.75 to 1.875	–75	–110	6	1 to 13	5	325	TSSOP	3A001.a.11.b	HMC398QS16GE
HMC736	With f0/2	14.5 to 15	7.25 to 7.5	–80	–105	9	1 to 13	4.2	150	4 × 4 LFCSP	EAR 99	HMC736LP4E
HMC737	With f0/2	14.9 to 15.5	7.45 to 7.75	–80	–105	9	1 to 13	4.2	150	4 × 4 LFCSP	EAR 99	HMC737LP4E
HMC738	With f0/2 and divide by 16	20.9 to 23.9	10.45 to 11.95	–65	–95	9	1 to 13	5	200	4 × 4 LFCSP	3A001.a.11.b	HMC738LP4E
HMC533	With divide by 16	23.8 to 24.8	1.4875 to 1.55	–70	–95	12	1 to 13	5	220	4 × 4 LFCSP	3A001.a.11.b	HMC533LP4E
HMC739	With f0/2 and divide by 16	23.8 to 26.8	11.9 to 13.4	–64	–93	8	1 to 13	5	200	4 × 4 LFCSP	3A001.a.11.b	HMC739LP4E

Ultrawideband VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P_{OUT} (dBm)	V_{TUNE} (V)	V_{CC} (V)	I_{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC586	Wideband VCO	4 to 8	–75	–100	5	0 to 18	5	55	4 × 4 LFCSP	EAR 99	HMC586LC4B
HMC587	Wideband VCO	5 to 10	–65	–95	5	0 to 18	5	55	4 × 4 LFCSP	EAR 99	HMC587LC4B
HMC732	Wideband VCO	6 to 12	–65	–95	1	0 to 23	5	57	4 × 4 LFCSP	EAR 99	HMC732LC4B
HMC588	Wideband VCO	8 to 12.5	–65	–93	5	0 to 13	5	55	4 × 4 LFCSP	EAR 99	HMC588LC4B
HMC733	Wideband VCO	10 to 20	–60	–90	2	–0.25 to +23	5	70	4 × 4 LFCSP	EAR 99	HMC733LC4B

HMC116x: Family of Ultralow Phase Noise MMIC VCOs

Key Features

- Industry's lowest phase noise
  - –89 dBc/Hz @ 10 kHz offset
  - –115 dBc/Hz @ 100 kHz offset
- ~20% lower dc power consumption than HMC5xx series VCOs
- 10 dBm RF output
- RF/2 port for PLL (~3 dBm output power)
- 2 V to 13 V V_{TUNE}
- 5 mm × 5 mm LFCSP package and pinout

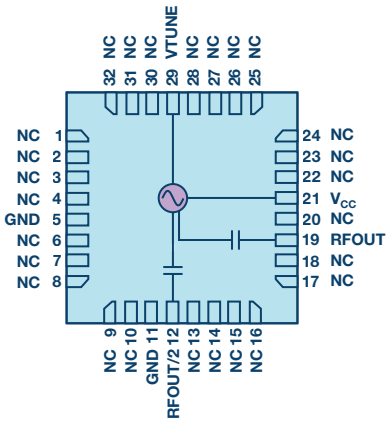
Benefits

- Lower phase noise enable higher modulation and lower BER
- Lower power dissipation reduces power supply demands
- High output power reduces need for external amplification to drive a mixer
- Integrated divider eliminates need for external divider for PLL
- Low harmonics and spurs levels reduces complex filtering

Common Applications

- V_{SAT} and point-to-point backhaul radios
- Electronic test and measurement instrumentation

HMC1166



VCO Part Number	Frequency Min (GHz)	Frequency Max (GHz)	F0 Output Power (dBm) Typ	SSB Phase Noise @ 10 kHz (dBc/Hz) Typ	SSB Phase Noise @ 100 kHz Typ	Current (mA) @ 5 V Typ	Temperature Range	Package	Price @ 1K ($U.S.) as of Feb 2016
HMC1160	8.45	9.3	12	–90	–116	260	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1161	8.71	9.55	11	–90	–115	250	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1162	9.25	10.1	11	–86	–115	230	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1163	9.65	10.41	11	–87	–114	205	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1164	10.38	11.3	8	–86	–114	200	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1165	11.07	11.62	8	–88	–113	210	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1166	11.41	12.62	11	–89	–115	220	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1167	12.17	13.33	10.5	–86	–113	200	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1168	12.47	13.72	10	–85	–113	190	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25
HMC1169	12.92	14.07	11.5	–86	–113	220	–40°C to +85°C	32-lead, 5 mm × 5 mm PQFN	17.25

Frequency Dividers, Multipliers, and Detectors

Frequency Dividers, Prescalers, and Counters

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	Phase Noise @ 100 kHz Offset (dBc/Hz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC705	Programmable divide by n = 1 to 17	0.1 to 6.5	Variable	–15 to +10	0	–153	5	190	4 × 4 LFCSP	EAR 99	HMC705LP4E
HMC794	Programmable divide by n = 1 to 4	0.2 to 2	Variable	–2 to +10	+10	–160	5	135	3 × 3 LFCSP	EAR 99	HMC794LP3E
HMC905	Programmable divide by n = 1 to 4	0.4 to 6	Variable	0 to +10	+3	–158	3.3	100	3 × 3 LFCSP	EAR 99	HMC905LP3E
HMC983	48-bit SD programmable	0 to 7	Variable	–15 to –30	+2 V p–p into 100 Ω	–160	5, 3.3	1, 244	5 × 5 LFCSP	EAR 99	HMC983LP5E
HMC394	5-bit counter, divide by n = 2 to 32	0.1 to 2.2	Variable	–15 to +10	+4	–153	5	194	4 × 4 LFCSP	3A001.a.11.b	HMC394LP4E
HMC432	Fixed divide by 2	0 to 8	0 to 4	–12 to +12	–3	–148	3	42	SOT-26	3A001.a.11.b	HMC432E
HMC361	Fixed divide by 2	0 to 12	0 to 6	–15 to +10	+3	–148	5	83	Die	3A001.a.11.b	HMC361
HMC361	Fixed divide by 2	0 to 13	0 to 6.5	–15 to +10	+4	–148	5	83	Hermetic SMT	3A001.a.11.b	HMC361G8
HMC361	Fixed divide by 2	0 to 10	0 to 5	–15 to +10	+3	–148	5	83	SOIC	3A001.a.11.b	HMC361S8GE
HMC492	Fixed divide by 2	0 to 18	0 to 9	–20 to +10	–4	–150	5	78	3 × 3 LFCSP	3A001.a.11.b	HMC492LP3E
ADF5000	Fixed divide by 2	4 to 18	2 to 9	–10 to +10	–5	–147	3.3	30	3 × 3 LFCSP	EAR 99	ADF5000BCPZ-RL7
HMC437	Fixed divide by 3	0 to 7	0 to 2.334	–12 to +12	–1	–153	5	69	MSOP	3A001.a.11.b	HMC437MS8GE
HMC433	Fixed divide by 4	0 to 8	0 to 2	–12 to +12	–2	–150	3	53	SOT-26	3A001.a.11.b	HMC433
HMC362	Fixed divide by 4	0 to 12	0 to 3	–15 to +10	–6	–149	5	68	Die	3A001.a.11.b	HMC362
HMC362	Fixed divide by 4	0 to 12	0 to 3	–15 to +10	–6	–149	5	68	SOIC	3A001.a.11.b	HMC362S8GE
HMC365	Fixed divide by 4	0 to 13	0 to 3.25	–15 to +10	+5	–151	5	120	Die	3A001.a.11.b	HMC365
HMC365	Fixed divide by 4	0 to 13	0 to 3.25	–15 to +10	+7	–151	5	120	Hermetic SMT	3A001.b.2.d	HMC3658G
HMC365	Fixed divide by 4	0 to 13	0 to 3.25	–15 to +10	+5	–151	5	120	SOIC	3A001.b.2.d	HMC365S8GE
HMC493	Fixed divide by 4	0 to 18	0 to 4.5	–20 to +10	–4	–150	5	96	3 × 3 LFCSP	3A001.a.11.b	HMC493LP3E
ADF5001	Fixed divide by 4	4 to 18	2 to 4.5	–10 to +10	–5	–150	3.3	30	3 × 3 LFCSP	EAR 99	ADF5001BCPZ-RL7
HMC447	Fixed divide by 4	10 to 26	2.5 to 5.5	–15 to +10	–4	–150	5	96	3 × 3 LFCSP	3A001.a.11.b	HMC447LC3
HMC438	Fixed divide by 5	0 to 7	0 to 1.4	–15 to +10	–1	–153	5	80	MSOP	3A001.a.11.b	HMC438MS8GE
HMC434	Fixed divide by 8	0 to 8	0 to 1	–10 to +12	–2	–150	3	62	SOT-26	3A001.a.11.b	HMC434E
HMC363	Fixed divide by 8	0 to 12	0 to 1.5	–15 to +10	–6	–153	5	90	Die	3A001.a.11.b	HMC363
HMC363	Fixed divide by 8	0 to 12	0 to 1.5	–15 to +10	+4	–153	5	90	Hermetic SMT	3A001.a.11.b	HMC3638G
HMC363	Fixed divide by 8	0 to 12	0 to 1.5	–15 to +10	–6	–153	5	90	SOIC	3A001.a.11.b	HMC363S8GE
HMC494	Fixed divide by 8	0 to 18	0 to 2.25	–20 to +10	–4	–150	5	103	3 × 3 LFCSP	3A001.a.11.b	HMC494LP3E
ADF5002	Fixed divide by 8	4 to 18	0.5 to 2.25	–10 to +10	–5	–153	3.3	30	3 × 3 LFCSP	EAR 99	ADF5002BCPZ-RL7

Frequency Multipliers—Active

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz Phase Noise (dBc/Hz)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC575	×2 active	3 to 4.5	6 to 9	+3	17	–140	5	90	4 × 4 LFCSP	EAR 99	HMC575LP4E
HMC561	×2 active	4 to 10.5	8 to 21	+5	17	–139	5	98	Die	EAR 99	HMC561
HMC561	×2 active	4 to 10.5	8 to 21	+5	17	–139	5	98	3 × 3 LFCSP	EAR 99	HMC561LP3E
HMC573	×2 active	4 to 11	8 to 22	+5	12	–134	5	92	3 × 3 LFCSP	EAR 99	HMC573LC3B
HMC368	×2 active	45 to 8	9 to 16	+2	13	–140	5	75	4 × 4 LFCSP	EAR 99	HMC368LP4E
HMC369	×2 active	4.95 to 6.35	9.9 to 12.7	0	4	–142	5	46	3 × 3 LFCSP	EAR 99	HMC369LP3E
HMC814	×2 active	6.5 to 12.3	13 to 24.6	+4	17	–136	5	88	Die	EAR 99	HMC814
HMC814	×2 active	6.5 to 12.3	13 to 24.6	+4	17	–136	5	88	3 × 3 LFCSP	EAR 99	HMC814LC3B
HMC576	×2 active	9 to 14.5	18 to 29	+3	17	–132	5	82	Die	EAR 99	HMC576
HMC576	×2 active	9 to 14.5	18 to 29	+3	17	–132	5	82	3 × 3 LFCSP	EAR 99	HMC576LC3B
HMC448	×2 active	9.5 to 12.5	19 to 25	0	11	–135	5	48	Die	EAR 99	HMC448
HMC598	×2 active	11 to 23	22 to 46	+5	15	—	5	175	Die	EAR 99	HMC598
HMC578	×2 active	12 to 16.5	24 to 33	+3	17	–132	5	81	Die	EAR 99	HMC578
HMC578	×2 active	12 to 16.5	24 to 33	+3	17	–132	5	81	3 × 3 LFCSP	EAR 99	HMC578LC3B
HMC942	×2 active	12 to 15.5	25 to 31	+4	17	—	4.5	214	4 × 4 LFCSP	EAR 99	HMC942LP4E
HMC577	×2 active	13.5 to 15.5	27 to 31	+5	20	–128	5	213	4 × 4 LFCSP	EAR 99	HMC577LC4B
HMC579	×2 active	16 to 23	32 to 46	+3	9	–127	5	70	Die	EAR 99	HMC579
HMC1096	×2 active	1.9 to 2.8	3.7 to 5.6	0	12	–142	5	100	3 × 3 LFCSP	EAR 99	HMC1096LP3E
HMC443	×4 active	2.45 to 2.8	9 to 11.2	–15	4	–142	5	52	4 × 4 LFCSP	EAR 99	HMC443LP4E
HMC695	×4 active	2.85 to 3.3	11.4 to 13.2	–15	7	–140	5	60	4 × 4 LFCSP	EAR 99	HMC695LP4E
HMC370	×4 active	3.6 to 4.1	14.4 to 16.4	–15	0	–140	5	55	4 × 4 LFCSP	EAR 99	HMC370LP4E
HMC1110	×6 active	11.83 to 14.33	71 to 86	+3	13	—	4	255	Die	EAR 99	HMC1110
HMC444	×8 active	1.2375 to 1.4	9.9 to 11.2	–15	6	–136	5	68	4 × 4 LFCSP	EAR 99	HMC444LP4E
HMC445	×16 active	0.61875 to 0.6875	9.9 to 11	–15	7	–130	5	78	4 × 4 LFCSP	EAR 99	HMC445LP4E

Frequency Multipliers—Passive

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Drive (dBm)	Conversion Loss (dB)	1 FO Isolation (dB)	4 FO Isolation (dB)	Package (mm)	ECCN Code	Ordering Part Number
HMC-XDB112	×2 passive	10 to 15	20 to 30	10 to 15	13	30	—	Die	5A991.h	HMC-XDB112
HMC1105	×2 passive	20 to 40	40 to 80	11 to 15	11	41	46	Die	EAR 99	HMC1105
HMC-XTB110	×3 passive	24 to 30	72 to 90	10 to 15	19	—	—	Die	5A991.h	HMC-XTB110

Phase Frequency Detectors

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	10 kHz Phase Noise (dBc/Hz)	Output Level (mA)	V_{cc} (V)	I_{cc} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC984	Frequency detector and charge pump	0 to 0.35	+3 to +12	—	0.02 to 2.5	5, 3	97, 27	4 × 4 LFCSP	EAR 99	HMC984LP4E
HMC439	High frequency phase frequency detector	0.01 to 1.3	–10 to +10	–153	2 V p-p	5	96	QSOP	3A001.a.11.b	HMC439QS16GE
HMC3716 ***New***	High frequency phase frequency detector	0.01 to 1.3	–10 to +5	–153	2 V p-p	5	115	4 × 4 LFCSP	3A001.a.11.b	HMC3716LP4E

Tunable Harmonic Low-Pass Filters

Part Number	Description	Frequency (GHz)	Control	Cutoff Freq Range (MHz)	Stop Band Frequency (Rej > 20 dB)	Tuning Response (ns)	Return Loss (dB)	Package (mm)	ECCN Code	Ordering Part Number
HMC1044	Programmable, harmonic low-pass filter	0 to 3.025	Digital 3 bits	1000 to 3000	—	10	10	3 × 3 LFCSP	EAR 99	HMC1044LP3E

High Speed Logic

1:2 and 1:4 Fanout Buffers

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC720	1:2 fanout buffer	13/13	19/18	2	0.6 to 1.1	300	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC720LP3E
HMC724	1:2 fanout buffer	13/13	19/18	2	1.1	300	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC724LC3
HMC744	1:2 fanout buffer	13/13	22/20	2	0.6 to 1.2	290	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC744LC3
HMC850	1:2 fanout buffer	28/20	16/15	2	0.6 to 1.1	315	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC850LC3
HMC842	1:2 fanout buffer with adjustable V_{OUT}	45/28	11/11	3	0.4 to 1.2	465	–3.3	4 × 4 LFCSP	EAR99	HMC842LC4B
HMC940	1:4 fanout buffer	13/13	26/25	4	0.6 to 1.4	440	–3.3 or +3.3	4 × 4 LFCSP	EAR99	HMC940LC4B

2:1 Selectors

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC858	2:1 differential selector	14/14	19/20	2	0.5 to 1.3	221	–3.3 or +3.3	4 × 4 LFCSP	EAR99	HMC858LC4B
HMC678	2:1 differential selector	13/13	17/15	—	0.6 to 1.2	250	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC678LC3C
HMC728	2:1 differential selector	13/13	17/15	—	1.1	250	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC728LC3C
HMC748	2:1 selector	13/13	22/22	2	0.6 to 1.2	250	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC748LC3C
HMC958	4:1 selector	14/14	17/17	2	0.5 to 1.3	294	–3.3 or +3.3	5 x 5 LFCSP	EAR99	HMC958LC5

AND/NAND/OR/NOR

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC722	AND/NAND/OR/NOR with adjustable V_{OUT}	13/13	19/18	2	0.6 to 1.1	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC722LC3C
HMC722	AND/NAND/OR/NOR	13/13	19/18	2	0.6 to 1.1	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC722LP3E
HMC726	AND/NAND/OR/NOR	13/13	19/18	2	1.1	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC726LC3C
HMC746	AND/NAND/OR/NOR	13/13	22/21	2	0.6 to 1.2	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC746LC3C
HMC852	AND/NAND/OR/NOR	28/28	15/14	2	0.6 to 1.5	241	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC852LC3C
HMC843	AND/NAND/OR/NOR	45/45	10/10	2	0.2 to 0.9	520	–3.3	4 × 4 LFCSP	EAR99	HMC843LC4B

Clock Dividers

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC959	Clock divide by 4	—/26	19/19	2	0.8 to 1.8	281	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC959LC3
HMC859	Clock divide by 8	—/26	19/17	2	0.8 to 1.8	520	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC859LC3

D-Type Flip Flops

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC953	Dual D-type flip flop with common	14/14	22/20	2	0.6 to 1.3	442	–3.3 or +3.3	4 × 4 LFCSP	EAR99	HMC953LC4B
HMC723	D-type flip flop with adjustable V_{OUT}	13/13	19/17	2	0.7 to 1.3	264	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC723LC3C
HMC723	D-type flip flop	13/13	19/17	2	0.7 to 1.3	260	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC723LP3E
HMC727	D-type flip flop	13/13	19/17	2	1.1	260	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC727LC3C
HMC747	D-type flip flop	13/13	22/20	2	0.7 to 1.2	264	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC747LC3C
HMC853	D-type flip flop	28/28	15/14	2	0.7 to 1.3	260	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC853LC3
HMC841	D-type flip flop	43/43	12/12	2	0.2 to 0.85	630	–3.3	4 × 4 LFCSP	EAR99	HMC841LC4B

T-Flip Flops

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC679	T-flip flop with reset	26/26	18/17	2	0.4 to 1.1	270	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC679LC3C
HMC729	T-flip flop with reset	26/26	18/17	2	1.1	270	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC729LC3C
HMC749	T-flip flop with reset	26/26	18/17	2	0.6 to 1.2	270	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC749LC3C

XOR/XNORs

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC721	XOR/XNOR with adjustable V_{OUT}	13/13	19/18	2	0.6 to 1.2	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC721LC3C
HMC721	XOR/XNOR	13/13	19/18	2	0.6 to 1.2	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC721LP3E
HMC725	XOR/XNOR	13/13	19/18	2	1.1	230	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC725LC3C
HMC745	XOR/XNOR	13/13	21/19	2	0.6 to 1.2	240	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC745LC3
HMC851	XOR/XNOR	28/28	15/14	2	0.6 to 1.4	241	–3.3 or +3.3	3 × 3 LFCSP	EAR99	HMC851LC3C
HMC844	XOR/XNOR	45/28	11/10	2	0.2 to 0.85	512	–3.3	4 × 4 LFCSP	EAR99	HMC844LC4B

Muxes and Demuxes

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC954	2:1 mux	23/16	15/15	—	0.8 to 1.5	480	–3.3 or +3.3	4 × 4 LFCSP	EAR99	HMC954LC4B
HMC854	4:1 mux	28/14	16/16	4	0.7 to 1.25	510	–3.3 or +3.3	5 × 5 LFCSP	EAR99	HMC854LC5
HMC847	4:1 mux	45/22.5	11/12	3	0.25 to 0.9	1782	+3.3	5 × 5 LFCSP	EAR99	HMC847LC5
HMC955	1:2 mux with high speed invert	32/16	19/18	<3	0.5 to 1.2	644	–3.3 or +3.3	4 × 4 LFCSP	EAR99	HMC955LC4B
HMC855	1:4 demux	28/14	22/22	—	0.45 to 1.14	644	–3.3 or +3.3	5 × 5 LFCSP	EAR99	HMC855LC5
HMC848	1:4 demux	45/22.5	25/21	4	0.3 to 1.0	1782	+3.3	5 × 5 LFCSP	EAR99	HMC848LC5

Data Path Signal Conditioners

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC7545	Signal conditioner	14.2	25/25	Feed forward equalizer	0.4 to 0.9	340	3.3	7 × 4 LFCSP	EAR99	HMC7545ABLP47E
HMC6545	Linear equalizer	32	16/16	Continous time linear equalizer	0.4 to 0.96	430	+2.5 or +3.3	5 × 5 LFCSP	EAR99	HMC6545LP5E

Track-and-Hold Data

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC1061	Track-and-hold	4	DC to 18	Dual	<70	2340	–4.75 and +2	5 × 5 LFCSP	EAR99	HMC1061LC5
HMC760	Track-and-hold	4	DC to 5	Single	<70	1420	–4.75 and +2	4 × 4 LFCSP	EAR99	HMC760LC4B
HMC661	Track-and-hold	4	DC to 18	Single	<70	1590	–4.75 and +2	4 × 4 LFCSP	EAR99	HMC661LC4B

Digital Crosspoint Switches

Part Number	Description	Data/Clock Rate (Gbps/GHz)	Rise/Fall Time (ps)	Deterministic Jitter (ps)	Differential Output Swing (V_{PPD})	DC Power Consumption (mW)	DC Power Supply (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC1027	13 × 13 crosspoint switch	14.2	22/23	0.05 to 2	0.4 to 0.8	1200	2.5 and 3.3	14 × 14 BGA	EAR99	HMC1027BG

RF Power Detectors

TruPwr™ rms Responding Detectors

Part Number	Description	Input Frequency (GHz)	Input Range (dB)	Temperature Drift (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8361	Linear in V/V rms	LF to 2.5	30	±0.25	3 to 5	1.1	SOT-23	5A991.b	AD8361ARTZ-RL7
AD8361	Linear in V/V rms	LF to 2.5	30	±0.25	3 to 5	1.1	SOIC	5A991.b	AD8361ARMZ-REEL7
AD8364	Dual linear-in-dB	LF to 2.7	60	±0.5	5	70	5 × 5 LFCSP	5A991.b	AD8364ACPZ-WP
AD8362	Linear-in-dB	LF to 3.8	65	±1.0	5	20	TSSOP	5A991.b	AD8362ARUZ-REEL7
HMC1010	Linear-in-dB	0 to 3.9	60	±0.5	5	48	4 × 4 LFCSP	EAR 99	HMC1010LP4E
HMC1020	Linear-in-dB	0 to 3.9	72	±0.75	5	55	4 × 4 LFCSP	EAR 99	HMC1020LP4E
HMC1021	Linear-in-dB with envelope detector	0 to 3.9	70	±0.5	5	75	4 × 4 LFCSP	EAR 99	HMC1021LP4E
HMC1030	Dual linear-in-dB with envelope detector	0 to 3.9	70	±0.5	5	143	5 × 5 LFCSP	EAR 99	HMC1030LP5E
HMC1120	Linear-in-dB with envelope detector	0 to 3.9	72	±0.5	3	70	4 × 4 LFCSP	EAR 99	HMC1120LP4E
HMC909	Linear-in-dB	0 to 5.8	40	±0.5	5	42	4 × 4 LFCSP	EAR 99	HMC909LP4E
ADL5511	Linear in V/V rms with envelope detector	0 to 6	47	±0.1	5	21.5	4 × 4 LFCSP	EAR 99	ADL5511ACPZ-R7
AD8363	Linear-in-dB	~0 to 6	60	±0.5	5	60	4 × 4 LFCSP	5A991.b	AD8363ACPZ-WP
ADL5501	Linear in V/V rms	0.05 to 6	30	±0.1	3 to 5	1.1	2 × 2 SC70	5A991.b	ADL5501AKSZ-R2
ADL5500	Linear in V/V rms	0.1 to 6	30	±0.25	3 to 5	1	1 × 1 WLCSP	5A991.b	ADL5500ACBZ-P7
ADL5903	Linear-in-dB	0.2 to 6	35	±0.2	3 to 5	2.5	2 × 2 LFCSP	5A991.b	ADL5903ACPZN-R7
ADL5502	Linear in V/V rms with peak/envelope detector	0.45 to 6	35	±0.1	3	3	3 × 3 WLCSP	5A991.b	ADL5502ACBZ-P7
ADL5504	Linear in V/V rms excellent rms accuracy	0.45 to 6	30	±0.1	3	1.8	1.2 × 0.8 WLCSP	5A991.b	ADL5504ACBZ-P7
ADL5505	Linear in V/V rms	0.45 to 6	30	±0.1	3	1.8	0.8 × 0.8 WLCSP	5A991.b	ADL5505ACBZ-P7
ADL5902	Linear-in-dB	0.05 to 9	65	±0.5	5	73	4 × 4 LFCSP	5A991.b	ADL5902ACPZ-WP
ADL5904 ***Upcoming***	Linear-in-dB rms with threshold detector	0 to 6	45	±0.5	3.3	3	3 × 3 LFCSP	EAR 99	ADL5904ACPZN-R7
ADL5906	Linear-in-dB	0.01 to 10	60	±1	5	70	4 × 4 LFCSP	5A991.b	ADL5906ACPZN-R2

Non-rms Responding RF Detectors

Part Number	Description	Input Frequency (GHz)	Input Range (dB)	Temperature Drift (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8307	Log amp	0 to 0.5	92	±1	3 to 5	8	SOIC	EAR 99	AD8307ARZ-RL7
AD8307	Log amp	0 to 0.5	92	±1	3 to 5	8	PDIP	EAR 99	AD8307ANZ
AD8310	Log amp	0 to 0.44	95	±1	3 to 5	8	Die	EAR 99	AD8310ACHIPS
AD8310	Log amp	0 to 0.44	95	±1	3 to 5	8	MSOP	EAR 99	AD8310ARMZ-REEL7
AD8302	Gain and phase	0 to 2.7	60	±1	3 to 5	19	TSSOP	EAR 99	AD8302ARUZ-RL7
HMC612	Log detector/controller	0 to 3	74	±0.75	3 to 5	29	4 × 4 LFCSP	EAR 99	HMC612LP4E
ADL5513	Log detector/controller	0.001 to 4	80	±0.5	3 to 5	31	3 × 3 WLCSP	EAR 99	ADL5513ACPZ-WP
AD8318	Log detector/controller	0.001 to 8	70	±0.5	5	68	4 × 4 LFCSP	EAR 99	AD8318ACPZ-WP
HMC602	Log detector/controller	0.001 to 8	72	±1	5	113	4 × 4 LFCSP	EAR 99	HMC602LP4E
AD8319	Log detector/controller	0.001 to 10	45	±0.5	3.3 to 5	22	2 × 3 LFCSP	EAR 99	AD8319ACPZ-WP
AD8317	Log detector/controller	0.001 to 10	55	±0.5	3.3 to 5	22	2 × 2 LFCSP	EAR 99	AD8317ACPZ-WP
AD8317	Log detector/controller	0.001 to 10	55	±0.5	3.3 to 5	22	Die	EAR 99	AD8317ACHIPS
HMC611	Log detector/controller	0.001 to 10	69	±1	5	106	Die	EAR 99	HMC611
HMC611	Log detector/controller	0.001 to 10	69	±1	5	106	4 × 4 LFCSP	EAR 99	HMC611LP4E
ADL5519	Dual log amp	0.001 to 10	62	±0.5	3.3 to 5	60	5 × 5 LFCSP	EAR 99	ADL5519ACPZ-WP
AD8306	Log/limiting amp	0.005 to 0.4	100	±1	3 to 5	16	Die	EAR 99	AD8306ACHIPS
AD8306	Log/limiting amp	0.005 to 0.4	100	±1	3 to 5	16	SOP	EAR 99	AD8306ARZ-RL7
AD8309	Log/limiter amp	0.005 to 0.5	100	±1	3 to 5	16	TSSOP	EAR 99	AD8309ARUZ-REEL7
HMC713	Log detector/controller	0.045 to 2.7	54	±1	3 to 5	17	MSOP	EAR 99	HMC713MS8E
HMC601	Log detector/controller	0.01 to 4	75	±0.5	3 to 5	30	4 × 4 LFCSP	EAR 99	HMC601LP4E
ADL5506	Log amp	0.03 to 4.5	45	±1	3 to 5	3.75	0.8 × 1.2 WLCSP	5A991.b	ADL5506ACBZ-R7
AD8312	Log amp	0.05 to 3.5	45	±0.5	3 to 5	4.2	1 × 1.5 WLCSP	5A991.g	AD8312ACBZ-P2
HMC600	Log detector/controller	0.05 to 4	70	±0.5	3 to 5	29	4 × 4 LFCSP	EAR 99	HMC600LP4E
HMC713	Log detector/controller	0.05 to 8	54	±0.5	3.3 to 5	17	3 × 3 LFCSP	EAR 99	HMC713LP3E
AD8313	Log amp	0.1 to 2.5	70	±1.25	3 to 5	13.7	MSOP	EAR 99	AD8313ARMZ-REEL7
AD8314	Log amp	0.1 to 2.7	45	±1	3 to 5	4, 5	MSOP	EAR 99	AD8314ARMZ-REEL7
AD8314	Log amp	0.1 to 2.7	45	±1	3 to 5	4, 5	2 × 3 LFCSP	EAR 99	AD8314ACPZ-RL7
ADL6010	Linear-in-V/V	0.5 to 43.5	40	±0.3	5	3	2 × 2 LFCSP	5A991.b	ADL6010ACPZN-R7
HMC1094	Millimeter wave log detector	1 to 23	50	±0.5	3.3	85	3 × 3 LFCSP	EAR 99	HMC1094LP3E
HMC948	Millimeter wave log detector	1 to 23	54	±0.5	3.3	91	3 × 3 LFCSP	EAR 99	HMC948LP3E
HMC662	Millimeter wave log detector	8 to 30	54	±0.5	3.3	88	3 × 3 LFCSP	EAR 99	HMC662LP3E
HMC7447	E-band detector	71 to 86	24	±0.5	—	—	Die	EAR 99	HMC7447

Envelope and Peak Detectors

Part Number	Description	Frequency (GHz)	Envelope Bandwidth (MHz)	Input Range (dB)	Temperature Drift (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1030	Dual rms linear-in-dB with envelope detector	0 to 3.9	150	70	±0.5	5	143	5 × 5 LFCSP	EAR 99	HMC1030LP5E
HMC1021	RMS linear-in-dB with envelope detector	0 to 3.9	150	70	±0.5	5	75	4 × 4 LFCSP	EAR 99	HMC1021LP4E
HMC1120	Linear-in-dB with envelope detector	0 to 6	150	72	±0.5	3	70	4 × 4 LFCSP	EAR 99	HMC1120LP4E
ADL5511	RMS linear-in-V/V with envelope detector	0 to 6	130	47	±0.1	5	21.5	4 × 4 LFCSP	EAR 99	ADL5511ACPZ-R7
ADL5502	RMS linear-in-V/V with peak/envelope detector	0.1 to 3.9	10	35	±0.1	3	3	3 × 3 WLCSP	5A991.b	ADL5502ACBZ-P7
ADL5910 ***Upcoming***	Threshold detector	0.45 to 6	—	45	±0.5	3.3	3	3 × 3 LFCSP	EAR 99	ADL5910ACPZN-R7

Envelope and Peak Detectors (Continued)

Part Number	Description	Frequency (GHz)	Envelope Bandwidth (MHz)	Input Range (dB)	Temperature Drift (dB)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL6010	Linear-in-V/V	0.5 to 43.5	45	45	±0.3	5	3	2 × 2 LFCSP	5A991.b	ADL6010ACPZN-R7
ADL6012 ***Upcoming***	Linear-in-V/V	0.5 to 43.5	500	45	±0.3	5	26	3 × 2 LFCSP	—	ADL6012ACPZN-R7

SDLVAs

Part Number	Description	Frequency (GHz)	Rise/Fall Time (ns)	Input Range (dB)	Temperature Drift (dB)	Threshold (dBm)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC813	SDLVA with limited output	0.1 to 20	5 to 10	55	±0.5	–53	3.3	150	4 × 4 LFCSP	EAR 99	HMC813LC4B
HMC913	SDLVA	0.6 to 20	5 to 10	59	±0.5	–54	3.3	80	4 × 4 LFCSP	EAR 99	HMC913LC4B
HMC613	SDLVA	0.5 to 18.5	4 to 18	59	±0.5	–54	3.3	83	4 × 4 LFCSP	EAR 99	HMC613LC4B
HMC1013	High range SDLVA	1 to 26	5 to 15	67	±0.5	–62	3.3	183	4 × 4 LFCSP	EAR 99	HMC1013LP4E

RF Switches

SPST

Part Number	Description	RF Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dB)	Input P0.1 dB (dB)	Input IP3	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
ADG919	Reflective	0 to 2	0.8	43	17	—	36	CMOS/LVTTL	MSOP	EAR 99	ADG919BRMZ
ADG901	Absorptive	0 to 2.5	0.8	40	17	—	36	CMOS/LVTTL	MSOP	EAR 99	ADG901BRMZ
ADG902	Reflective	0 to 2.5	0.8	40	17	—	36	CMOS/LVTTL	MSOP	EAR 99	ADG902BRMZ
HMC1055	Nonreflective	0 to 3.5	0.6	36	32	28	63	0/3	SOT-26	EAR 99	HMC1055LP2CE
HMC550A	Fail-safe	0 to 6	0.7	25	—	32	52	0/2.2 to 5	SOT-26	EAR 99	HMC550AE

SPDT

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
ADG918	Absorptive	0 to 2	0.8	43	17	—	36	CMOS/LVTTL	MSOP	EAR 99	ADG918BRMZ
ADG936	Dual absorptive	0 to 2	0.9	36	16	—	32	CMOS/LVTTL	TSSOP	EAR 99	ADG936BRUZ
ADG936-R	Dual reflective	0 to 2	0.9	36	16	—	32	CMOS/LVTTL	TSSOP	EAR 99	ADG936BRUZ-R
HMC199A	Dual switch	0 to 2.5	0.4	25	28	27	55	0/+5	MSOP	EAR 99	HMC199AMS8E
HMC546	10 W, fail-safe	0.2 to 2.7	0.4	22	—	41	64	0/+3 to +8	MSOP	EAR 99	HMC546MS8GE
HMC546	10 W, fail-safe	0.2 to 2.7	0.3	27	—	21	45	0/+3 to +8	2 × 2 DFN	EAR 99	HMC546LP2E
HMC197B	Reflective	0 to 3	0.4	28	30	28	45	0/+3	SOT-26	EAR 99	HMC197BE
HMC194A	High isolation	0 to 3	0.5	55	30	28	53	0/+5	8-lead MSOP	EAR 99	HMC194AMS8E
HMC221B	Reflective	0 to 3	0.4	29	30	27	55	0/+3	SOT-26	EAR 99	HMC221BE
HMC190B	Reflective	0 to 3	0.4	30	30	27	55	0/+3	8-lead MSOP	EAR 99	HMC190BMS8E
HMC545A	Reflective	0 to 3	0.27	31	30	27	46	0/+3.3 to +5	QSOP	EAR 99	HMC545AE
HMC284A	Nonreflective	0 to 3.5	0.5	45	29	27	50	0/+5	8-lead MSOP	EAR 99	HMC284AMS8GE
HMC349A	High isolation	0 to 4	0.9	67	34	30	53	0/+5	4 × 4 LFCSP	EAR 99	HMC349ALP4CE
HMC349A	High isolation	0 to 4	0.9	70	34	32	53	0/+5	MSOP	EAR 99	HMC349AMS8GE
HMC435A	Nonreflective	0 to 4	0.8	62	30	27	54	0/+5	MSOP	EAR 99	HMC435AMS8GE
HMC849A	Nonreflective	0 to 6	0.9	60	34	32	52	0/+3 to +5	4 × 4 LFCSP	EAR 99	HMC849ALP4CE
HMC270A ***New***	Nonreflective	0 to 8	1	45	28	—	42	0/–5	MSOP	EAR 99	HMC270AMS8GE
HMC232A	High isolation	0 to 12	1.5	57	30	27	47	0/–5	4 × 4 LFCSP	EAR 99	HMC232ALP4E
HMC1118 ***New***	Nonreflective	0 to 13	0.6	56	37	—	62	0/+3.3	3 × 3 LFCSP	EAR 99	HMC1118LP3DE
ADRF5021 ***New***	Nonreflective	~0 to 30	2	60	—	27	52	CMOS/LVTTL	3 × 3 LGA	EAR 99	ADRF5021BCCZN
HMC8038 ***New***	Nonreflective	0.1 to 6	0.8	60	36	35	60	0/+3.3 to +5	4 × 4 LFCSP	EAR 99	HMC8038LP4CE
HMC347A ***New***	Nonreflective	0.1 to 20	1.7	45	23	—	43	0/–5	Die	EAR 99	HMC347A
HMC347A ***New***	Nonreflective	0.1 to 14	1.6	44	23	—	43	0/–5	3 × 3 LFCSP	EAR 99	HMC347ALP3E
HMC547A ***New***	Nonreflective	0.1 to 28	1.9	40	23	—	46	0/–5	3 × 3 LFCSP	EAR 99	HMC547ALP3E
ADRF5020 ***New***	Nonreflective	0.1 to 30	1.4	56	27	—	50	0/+3.3	3 × 3 LGA	EAR 99	ADRF5020BCCZN
HMC986A ***New***	Reflective	0.1 to 50	1.7	36	25	21	40	0/–3	Die	EAR 99	HMC986A
ADRF5130 ***New***	44 W, reflective	0.7 to 3.5	0.6	50	—	46	68	0/+3.3 to +5	3 × 3 LFCSP	EAR 99	ADRF5130BCPZ
HMC-SDD112	Pin MMIC	55 to 86	2	30	—	—	—	–1	Die	5A991.h	HMC-SDD112
HMC646	40 W T/R	0.1 to 2.1	0.7	32	—	46	74	0/+3 to +8	2 × 2 LFCSP	EAR 99	HMC646LP2E
HMC574A ***New***	5 W, T/R	0 to 3	0.25	30	38	36	63	0/+3 to +8	8-lead MSOP	EAR 99	HMC574AMS8E
HMC595A	3 W, T/R	0 to 3	0.25	30	38	36	64	0/+3 to +10	SOT-26	EAR 99	HMC595AE
HMC544A	T/R	0 to 4	0.25	23	39	37	55	0/+3 to +5	SOT-26	EAR 99	HMC544AE
HMC536	T/R	0 to 6	0.5	27	—	33	52	0/+3 to +5	8-lead MSOP	EAR 99	HMC536MS8GE
HMC536	T/R	0 to 6	0.7	30	—	34	52	0/+3 to +5	2 × 2 DFN	EAR 99	HMC536LP2E
HMC784A ***Upcoming***	10 W, T/R	0.1 to 4	0.6	30	41	—	62	0/+3 to +8	MSOP	EAR 99	HMC784AMS8GE

SP3T, SP4T, SP6T, SP8T

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC245A	SP3T	0 to 2.5	0.5	44	26	24	48	TTL/CMOS	TSSOP	EAR 99	HMC245AQS16E
ADG904	SP4T, absorptive	0 to 2.5	0.4	37	16	—	31	CMOS/LVTTL	TSSOP LFCSP	EAR 99	ADG904BCPZ ADG904BRUZ
ADG904-R	SP4T, reflective	0 to 2.5	0.4	37	16	—	31	CMOS/LVTTL	TSSOP LFCSP	EAR 99	ADG904BCPZ-R-REEL ADG904BRUZ-R
HMC241A	SP4T	0 to 4	0.7	43	30	26	47	TTL/CMOS	3 × 3 LFCSP	EAR 99	HMC241ALP3E
HMC241A	SP4T	0 to 4	0.8	41	29	26	48	TTL/CMOS	TSSOP	EAR 99	HMC241AQS16E
HMC244A ***New***	SP4T	0 to 4	0.7	40	26	22	47	TTL/CMOS	Hermetic SMT	EAR 99	HMC244AG16
HMC344A ***New***	SP4T	0 to 8	2.1	32	28	19	44	0/–5	3 × 3 LFCSP	EAR 99	HMC344ALP3E
HMC345A	SP4T	0 to 8	2.2	32	21	19	45	0/+5	3 × 3 LFCSP	EAR 99	HMC345ALP3E
HMC641A	SP4T	0 to 20	2.3	43	22	—	38	0/–5	4 × 4 LFCSP	EAR 99	HMC641ALC4
HMC641A	SP4T	0 to 20	2.3	41	22	—	36	0/–5	4 × 4 LFCSP	EAR 99	HMC641ALP4E
HMC641A ***New***	SP4T	0 to 18	2.1	42	25	—	41	0/–5	Die	EAR 99	HMC641A

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

SP3T, SP4T, SP6T, SP8T (Continued)

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
ADRF5040 ***New***	SP4T	~0 to 12	0.8	34	—	34	58	0/+3.3	4 × 4 LFCSP	EAR 99	ADRF5040
HMC7992 ***New***	SP4T	0.1 to 6	0.7	45	35	33	58	0/+3.3 to +5	3 × 3 LFCSP	EAR99	HMC7992LP3DE
HMC1084	SP4T	23 to 30	2.8	26	—	—	47	0/–3	4 × 4 LFCSP	EAR 99	HMC1084LC4
HMC252A ***New***	SP6T	0 to 3	0.8	45	24	—	47	0/+3.3 to +5	QSOP	EAR 99	HMC252AQS24E
HMC253A	SP8T	0 to 3.5	1.2	36	24	20	43	TTL/CMOS	4 × 4 LFCSP	EAR 99	HMC253ALC4
HMC253A	SP8T	0 to 3.5	1.2	36	24	20	43	TTL/CMOS	QSOP	EAR 99	HMC253AQS24E
HMC322A ***New***	SP8T	0 to 8	2.5	35	26	22	40	0/–5	4 × 4 LFCSP	EAR 99	HMC322ALP4E
HMC321A	SP8T	0.1 to 8	2.5	35	23	—	40	0/+5	4 × 4 LFCSP	EAR99	HMC321ALP4E

Bypass, Diversity, Matrix, and Transfer

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1 dB (dBm)	Input IP3 (dBm)	Control Input (V_{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC596	4 × 2 matrix	0.2 to 3	6.5	43	22	—	27	0/3 to 5	4 × 4 LFCSP	EAR 99	HMC596LP4E
HMC427A	Transfer	0.1 to 12	1.6	38	30	—	47	0/5	3 × 3 LFCSP	EAR99	HMC427ALP3E

ADRF5020: Ultra Wideband Silicon SPDT Switch; 0.1 GHz to 30 GHz
ADRF5021: Ultra Wideband Silicon SPDT Switch; 9 kHz to 30 GHz

Key Features

- Nonreflective 50 Ω design
- Low insertion loss: 2.0 dB up to 30 GHz
- High isolation: 60 dB to 30 GHz
- RF settling time (0.1 dB):
  - 10 ns (ADRF5020): fast settling
  - 15 µs (ADRF5021): low cutoff of 9 kHz
- High power handling: 24 dBm
- High input linearity:
  - 28 dBm P1dB typical
  - 52 dBm IM3 typical
- Supply voltage: –2.5 V, +3.3 V
- 1 kV ESD robustness (HBM)
- Temperature range: –40°C to +85°C
- 20-lead, 3 mm × 3 mm, compact NiAu plated RoHS SMT package

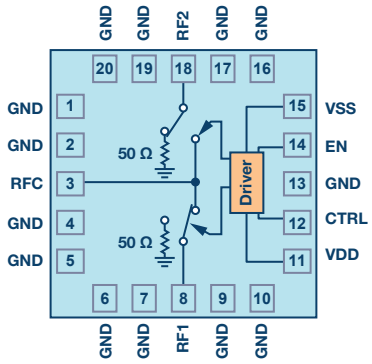
Benefits

- Wide useful bandwidth of up to 30 GHz
- Option for fast switching and settling time for fast switching applications
- High hot switching power handling capabilities
- Low insertion loss and flat characteristics
- Excellent isolation even at high frequencies

Common Applications

- RF and microwave test and measurement equipment
- Military radios, radars, and electronic counter measure systems
- Broadband telecommunication
- 5G cellular RF front ends

ADRF5020



Frequency Range	Process Technology	Switch Topology	Temperature Range	Package	Price @ 1k ($U.S.)
0.1 GHz to 30 GHz	Silicon	SPDT	–40°C to +85°C	20-lead, 3 mm × 3 mm LFCSP	50.44
9 kHz to 30 GHz	Silicon	SPDT	–40°C to +85°C	20-lead, 3 mm × 3 mm LFCSP	52.96

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

HMC8038: High Isolation, Silicon SPDT Nonreflective Switch; 0.1 GHz to 6.0 GHz
HMC7992: Nonreflective, Silicon SP4T Switch; 0.1 GHz to 6 GHz

Key Features

- Nonreflective, 50 Ω design
- High isolation*
  - 60 dB/45 dB @ 2 GHz
- Low insertion loss*
  - 0.8 dB/0.7 dB @ 2 GHz
- High power handling*
  - 34 dBm/33 dBm through path
  - 29 dBm/27 dBm terminated path
- High linearity
  - P0.1dB: 35 dBm/35 dBm
  - Input IP3: 60 dBm/58 dBm
- ESD ratings
  - 4 kV Class 3A/2 kV Class 2
- Single positive supply: 3.3 V to 5 V
- Standard TTL, CMOS, and 1.8 V-compatible control
- Pin-compatible with HMC849A and 241A

* HMC8038/HMC7992

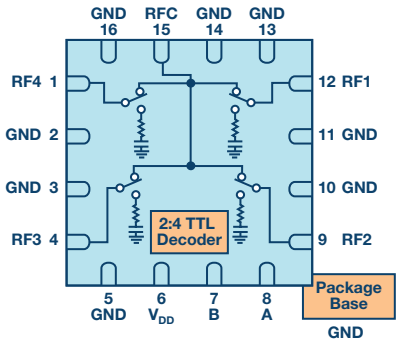
Benefits

- Low insertion loss ensures signal integrity in receiver applications
- Reliable operations in through mode and hot switching due to high power handling
- Fast switching and settling time characteristics enable faster applications
- Compact package saves PCB area

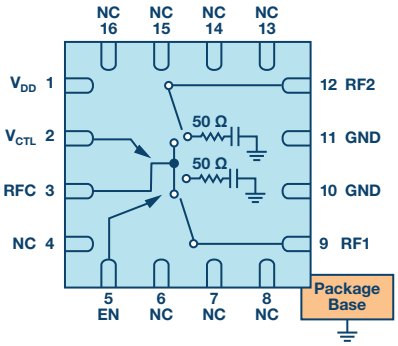
Common Applications

- LNA protection for wireless infrastructure
- Predistortion feedback loops for wireless infrastructure
- RF front end for fast cellular protocol testers

HMC7992



HMC8038



Frequency Range	Process Technology	Switch Topology	Temperature Range	Package	Price @ 1k ($U.S.)
0.1 GHz to 6 GHz	Silicon	SPDT	–40°C to +105°C	16-lead, 4 mm × 4 mm LFCSP	2.39
0.1 GHz to 6 GHz	Silicon	SP4T	–40°C to +105°C	16-lead, 3 mm × 3 mm LFCSP	3.09

ADRF5130: High Power Silicon Switch; 0.7 GHz to 3.5 GHz

Key Features

- Reflective 50 Ω design
- Low insertion loss: 0.6 dB typical at 2 GHz
- High isolation: 50 dB to 2 GHz
- High power handling
  - 43 dBm continuous (44 W)
  - 46.5 dBm peak
- High input linearity:
  - Better than 46 dBm P0.1dB
  - 68 dBm typical at 2 GHz
- Single positive supply: 5 V/1 mA
- 2 kV ESD robustness (HBM)
- Temperature range: –40°C to +85°C
- 24-lead, 4 mm × 4 mm RoHS SMT package

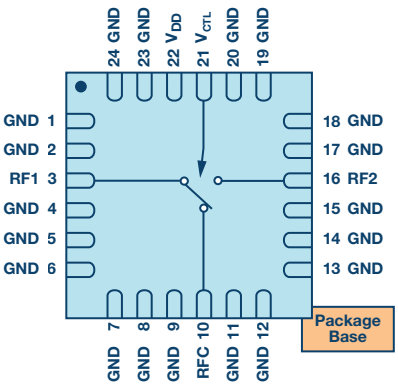
Benefits

- Fast switching characteristics using advanced silicon process
- High power handling of up to 44 W
- Increased control and flexibility with CMOS control
- Simpler designs with no need for external components
- Increased reliability with fault-case (open termination) protection

Common Applications

- Cellular infrastructure, MIMO system LNA protection
  - RF and microwave test and measurement equipment
  - Military and high reliability applications
  - High power RF application
- Alternative for PIN diode-based switches

ADRF5130



Exposed pad. Exposed pad must be connected to RF/DC ground.

Frequency Range	Process Technology	Switch Topology	Temperature Range	Package	Price @ 1k ($U.S.)
0.7 GHz to 3.5 GHz	Silicon	SPDT	–40°C to +85°C	24-lead, 4 mm × 4 mm LFCSP	10.04

Phase Shifters and Vector Modulators

Analog Phase Shifters

Part Number	Description	Frequency (GHz)	Loss (dB)	Phase Range @ Min Frequency (°)	Phase Range @ Max Frequency (°)	2nd Harmonic @ Pin = –10 dBm (dBc)	Input IP3 (dBm)	Control Voltage Range (V)	Package (mm)	ECCN Code	Ordering Part Number
HMC247	Analog phase shifter	0.5 to 18	4	500	100	–80	32	0 to –10	Die	EAR 99	HMC247
HMC877	Analog time delay/ phase shifter	0.8 to 23	—	504	485	–35	—	2.7 to 3.9	3 × 3 SMT	EAR 99	HMC877LC3

Digital Phase Shifters

Part Number	Description	Frequency (MHz)	Loss (dB)	Phase Range Frequency (°)	Phase Adjust Resolution	RMS Phase Error (°)	Input IP3 (dBm)	Input P1dB (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC647A	6-bit digital phase shifter	2.5 to 3.1	4	360	6-bit, 5.625°	1.5	50	31	6 × 6 LFCSP	EAR 99	HMC647ALP6E
HMC648A ***New***	6-bit digital phase shifter	2.9 to 3.9	5	360	6-bit, 5.625°	1.2	45	31	6 × 6 LFCSP	EAR 99	HMC648ALP6E
HMC649A	6-bit digital phase shifter	3 to 6	8	360	6-bit, 5.625°	4	40	31	6 × 6 LFCSP	EAR 99	HMC649ALP6E
HMC1133 ***New***	6-bit digital phase shifter	5 to 6	5	360	6-bit, 5.625°	2.8	46	30	5 × 5 LFCSP	EAR 99	HMC1133LP5E
HMC543A ***New***	4-bit digital phase shifter	8 to 12	6.5	360	4-bit, 22.5°	4	40	24.5	4 × 4 LFCSP	EAR 99	HMC543ALC4B
HMC642A	6-bit digital phase shifter	9 to 12.5	7	360	6-bit, 5.625°	4.5	35	30	5 × 5 LFCSP	EAR 99	HMC642ALC5
HMC936A ***New***	6-bit digital phase shifter	12 to 14	5	360	6-bit, 5.625°	1.2	45	29	6 × 6 LFCSP	EAR 99	HMC936ALP6E
HMC644A ***New***	5-bit digital phase shifter	15 to 18.5	7.5	360	5-bit, 11.25°	3.5	40	23	5 x 5 LFCSP	EAR 99	HMC644ALC5

Vector Modulators

Part Number	Description	Frequency (GHz)	I/Q Bandwidth (MHz)	Noise Floor (dBm/Hz)	Gain Range (dB)	Phase Range (°)	Input IP3 (dBm)	P1dB (dBm)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC630	Vector modulator	0.7 to 1	180	–162	40	360	34	17	8	92	3 × 3 LFCSP	EAR 99	HMC630LP3E
AD8340	Vector modulator	0.7 to 1	230	–149	—	360	—	11	5	130	4 × 4 LFCSP	5A991.b	AD8340ACPZ-WP
ADL5390	Vector modulator	0.2 to 2.4	230	–150	—	360	—	13	5	130	4 × 4 LFCSP	5A991.b	ADL5390ACPZ-REEL7
AD8341	Vector modulator	1.5 to 2.4	230	–151	—	360	—	8.5	5	130	4 × 4 LFCSP	5A991.b	AD8341ACPZ-WP
HMC500	Vector modulator	1.8 to 2.2	150	–162	40	360	33	16	8	90	3 × 3 LFCSP	EAR 99	HMC500LP3E
HMC631	Vector modulator	1.8 to 2.7	160	–160	40	360	35	21	8	93	3 × 3 LFCSP	EAR 99	HMC631LP3E

Analog Multipliers

Part Number	Description	Frequency (GHz)	Dynamic Range (dB)	Accuracy (dB)	Response Time (ns)	V_S (V)	I_{SY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5391	RF/IF multiplier	0 to 2	60	±0.2	60	4.75 to 5.5	135	3 × 3 LFCSP	5A991.b	ADL5391ACPZ-WP

Timing ICs and Clocks

Clock Distribution

Part Number	Clock Function	Configuration/ Programming Interface	On-Chip VCO or DCO	Number of Outputs	Output Frequency	Output Logic	Power Dissipation	Reference Clock	Package (mm)	ECCN Code	Ordering Part Number
HMC7043	Distribution	SPI	No	14	3200	CMOS, LVDS, LVPECL, CML	1.5	200 to 6000	7 × 7 LFCSP	EAR 99	HMC7043LP7FE
HMC6832	Distribution	Pin select	No	8	3500	LVDS, LVPECL	0.5	10 to 3500	5 × 5 LFCSP	EAR 99	HMC6832ALP5LE

Multioutput Clock Generators

Part Number	Description	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
HMC7044	—	3.3	4	14	14	14	Yes	3200	CMOS, LVDS, LVPECL, CML	0.044	Serial	68-lead LFCSP	EAR 99	HMC7044LP10BETR
AD9510	—	3.3	1	8	8	2	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	64-lead LFCSP	EAR 99	AD9510BCPZ-REEL7
AD9511	—	3.3	1	5	5	1	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	48-lead LFCSP	EAR 99	AD9511BCPZ-REEL7
AD9516-0	—	3.3	2	14	5	4	Yes	2950	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-0BCPZ-REEL7
AD9516-1	—	3.3	2	14	5	4	Yes	2650	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-1BCPZ-REEL7
AD9516-2	—	3.3	2	14	5	4	Yes	2335	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-2BCPZ-REEL7
AD9516-3	—	3.3	2	14	5	4	Yes	2250	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-3BCPZ-REEL7
AD9516-4	—	3.3	2	14	5	4	Yes	1800	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-4BCPZ-REEL7
AD9516-5	—	3.3	2	14	5	4	No	2400	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR 99	AD9516-5BCPZ-REEL7
AD9525	—	3.3	3	9	2	0	No	3600	LVPECL/ CM	0.08	Serial	48-lead LFCSP	EAR 99	AD9525BCPZ-REEL7
AD9517-0	—	3.3	2	12	4	4	Yes	2950	CMOS, LVDS, LVPECL	<0.4	Serial	48-lead LFCSP	EAR 99	AD9517-0ABCPZ-RL7
AD9517-1	—	—	—	—	—	—	—	2650	—	—	—	—	EAR 99	AD9517-1ABCPZ-RL7
AD9517-2	—	—	—	—	—	—	—	2335	—	—	—	—	EAR 99	AD9517-2ABCPZ-RL7
AD9517-3	—	—	—	—	—	—	—	2250	—	—	—	—	EAR 99	AD9517-3ABCPZ-RL7
AD9517-4	—	—	—	—	—	—	—	1800	—	—	—	—	EAR 99	AD9517-4ABCPZ-RL7
AD9518-0	—	3.3	2	6	3	0	Yes	2950	LVPECL	<0.4	Serial	48-lead LFCSP	EAR 99	AD9518-0ABCPZ-RL7
AD9518-1	—	—	—	—	—	—	—	2650	—	—	—	—	EAR 99	AD9518-1ABCPZ-RL7
AD9518-2	—	—	—	—	—	—	—	2335	—	—	—	—	EAR 99	AD9518-2ABCPZ-RL7
AD9518-3	—	—	—	—	—	—	—	2250	—	—	—	—	EAR 99	AD9518-3ABCPZ-RL7
AD9518-4	—	—	—	—	—	—	—	1800	—	—	—	—	EAR 99	AD9518-4ABCPZ-RL7
AD9520-0	—	3.3	2	12/24	4	0	Yes	2950	LVPECL, CMOS	<0.4	Serial with EEPROM	64-lead LFCSP	EAR 99	AD9520-0BCPZ-REEL7
AD9520-1	—	—	—	—	—	—	—	2650	—	—	—	—	EAR 99	AD9520-1BCPZ-REEL7
AD9520-2	—	—	—	—	—	—	—	2335	—	—	—	—	EAR 99	AD9520-2BCPZ-REEL7
AD9520-3	—	—	—	—	—	—	—	1800, 2250	—	—	—	—	EAR 99	AD9520-3BCPZ-REEL7
AD9520-5	—	—	—	—	—	—	No	2400	—	—	—	—	EAR 99	AD9520-5BCPZ-REEL7
AD9522-0	—	3.3	2	12/24	4	0	Yes	800	LVDS, CMOS	<0.4	Serial with EEPROM	64-lead LFCSP	EAR 99	AD9522-0BCPZ-REEL7
AD9522-1	—	—	—	—	—	—	—	—	—	—	—	—	EAR 99	AD9522-1BCPZ-REEL7
AD9522-2	—	—	—	—	—	—	—	—	—	—	—	—	EAR 99	AD9522-2BCPZ-REEL7
AD9522-3	—	—	—	—	—	—	—	—	—	—	—	—	EAR 99	AD9522-3BCPZ-REEL7
AD9522-4	—	—	—	—	—	—	—	—	—	—	—	—	EAR 99	AD9522-4BCPZ-REEL7
AD9522-5	—	—	—	—	—	—	No	—	—	—	—	—	EAR 99	AD9522-5BCPZ-REEL7

Multioutput Clock Generators (Continued)

Part Number	Description	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9523	—	3.3	2	14	14	0	Yes	1000	CMOS, HSTL, LVDS, LVPECL	0.225	Serial	72-lead LFCSP	EAR 99	AD9523BCPZ-REEL7
AD9523-1	—	—	—	—	—	—	—	—	—	0.187	—	—	EAR 99	AD9523-1BCPZ-REEL7
AD9524	—	3.3	2	6	6	0	Yes	1000	CMOS, HSTL, LVDS, LVPECL	0.225	Serial	48-lead LFCSP	EAR 99	AD9524BCPZ-REEL7

Clock Generators and Synchronizers

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9547	1.8, 3.3	2	2	2	1	Yes	450	LVDS, LVPE	0.7	Serial	64-lead LFCSP	EAR 99	AD9547BCPZ-REEL7
AD9549	1.8, 3.3	2	2	1	0	Yes	750	CMOS, HSTL	0.6	Serial	64-lead LFCSP	EAR 99	AD9549ABCPZ-REEL7
AD9548	1.8, 3.3	8	8	4	1	Yes	450	LVDS, LVPECL, CMOS	0.7	Serial	88-lead LFCSP	EAR 99	AD9548BCPZ-REEL7
AD9550	1.8, 3.3	1	2	2	0	Yes	810	LVPECL, LV	0.5	N/A	32-lead LFCSP	EAR 99	AD9550BCPZ-REEL7
AD9552	1.8, 3.3	2	2	2	0	Yes	900	LVDS, LVPE	0.5	Serial	32-lead LFCSP	EAR 99	AD9552BCPZ-REEL7
AD9553	1.8, 3.3	3	2	2	0	Yes	810	LVDS, LVPE	0.5	Serial	32-lead LFCSP	EAR 99	AD9553BCPZ-REEL7
AD9557	1.8, 3.3	2	2	2	0	Yes	1250	HSTL, LVDS	0.5	Serial	40-lead LFCSP	EAR 99	AD9557BCPZ-REEL7
AD9558	1.8, 3.3	4	6	4	0	Yes	1250	HSTL, LVDS	0.5	Serial	64-lead LFCSP	EAR 99	AD9558BCPZ-REEL7
AD9559	1.8, 3.3	4	4	4	0	Yes	1250	HSTL, LVDS	0.5	Serial	72-lead LFCSP	EAR 99	AD9559BCPZ-REEL7

Clock Buffers and Dividers

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9513	3.3	1	3	3	1	No	800	CMOS, LVDS	0.3	Pin select	32-lead LFCSP	EAR 99	AD9513BCPZ-REEL7
AD9515	3.3	1	2	2	1	No	1600	CMOS, LVDS, LVPECL	0.225	Pin select	32-lead LFCSP	EAR 99	AD9515BCPZ-REEL7
ADCLK905	2.5 to 3.3	1	1	—	—	No	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR 99	ADCLK905BCPZ-WP
ADCLK907	2.5 to 3.3	2	2	—	—	No	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR 99	ADCLK907BCPZ-WP
ADCLK925	2.5 to 3.3	1	2	—	—	No	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR 99	ADCLK925BCPZ-WP
ADCLK914	3.3	1	1	0	0	No	7500	HVDS, CML	0.11	—	16-lead LFCSP	EAR 99	ADCLK914BCPZ-WP
ADCLK954	3.3	2	12	0	0	No	4800	LVPECL	0.075	—	40-lead LFCSP	EAR 99	ADCLK954BCPZ-REEL7
ADCLK946	3.3	1	6	0	0	No	4800	LVPECL	0.075	—	24-lead LFCSP	EAR 99	ADCLK946BCPZ-REEL7
ADCLK854	1.8	2	12	0	0	No	1200	LVDS, CMOS	0.15	—	48-lead LFCSP	EAR 99	ADCLK854BCPZ-REEL7
ADCLK846	1.8	1	6	0	0	No	1200	LVDS, CMOS	0.15	—	24-lead LFCSP	EAR 99	ADCLK846BCPZ-REEL7
HMC7043	3.3	1	14	14	14	No	3200	CMOS, LVDS, LVPECL, CML	0.015	Serial	48-lead LFCSP	EAR 99	HMC7043LP7FE
HMC6832	2.5 or 3.3	2	8	—	—	No	3500	LVDS, LVPECL	0.01	Pin Select	28-lead LFCSP	EAR 99	HMC6832ALP5LE

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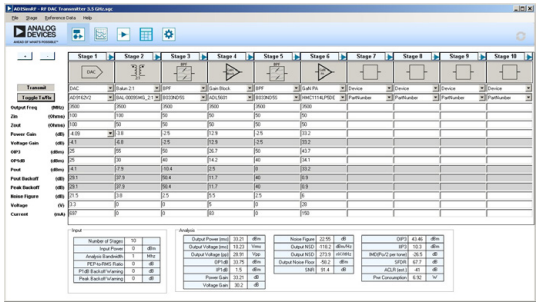

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