

RFIC Selection Guide

GaAs Fixed Gain Amplifiers

Part Number	Frequency Range (GHz)	NF (dB @ GHz)	Gain (dB @ GHz)	P _{1dB} (dBm @ GHz)	IP ₃ (dBm @ GHz)	Supply Voltage (V)	Supply Current (mA)	Package
HPMX-3003 (PA only)	1.5 - 2.5	-	24 @ 1.9	+27.5 @ 1.9	-	3.6/-1	450	SSOP-28
HPMX-3003 (LNA only)	1.5 - 2.5	2.2 @ 1.9	13 @ 1.9	-	-1 @ 1.9	3.6	6.5	SSOP-28
MGA-64135	2 - 6	7.5 @ 2-6	12 @ 2-6	+12 @ 2-6	-	10	50	micro-X ceramic
MGA-86563	0.5 - 6	1.6 @ 2.4	22.5 @ 2.4	+4.2 @ 2.4	+15 @ 2.4	5	14	SOT-363 (SC-70)
MGA-86576	1.5 - 8	2.0 @ 4	23 @ 4	+6.4 @ 4	+16 @ 4	5	16	SM ceramic
MGA-87563	0.5 - 4	1.6 @ 2.4	12.5 @ 2.4	-2 @ 2.4	+8 @ 2.4	3	4.5	SOT-363 (SC-70)
MGA-81563	0.1 - 6	2.7 @ 2.0	12.3 @ 2.0	+14.8 @ 2.0	+27	3	42	SOT-363 (SC-70)
MGA-82563	0.1 - 6	2.2 @ 2.0	13.5 @ 2.0	+17.3 @ 2.0	+31	3	84	SOT-363 (SC-70)
MGA-83563	0.5 - 6	-	23 @ 2.0	+21 @ 2.0	+29	3	162	SOT-363 (SC-70)
MGA-85563	0.8 - 6	1.9 @ 2.0	19 @ 2.0	+1 to +7 @ 2.0	+11 to +17	3	15 to 30*	SOT-363 (SC-70)

* Adjustable current

Silicon Fixed Gain Amplifiers

Part Number	Frequency Range (GHz)	NF @ 1 GHz (dB)	Gain @ 0.1 GHz (dB)	Gain @ 1 GHz (dB)	P _{1dB} (dBm)	IP ₃ (dBm)	Stability Factor	V _{CC} MIN (V)	Device Voltage (V)	Device Current (mA)	Package
INA-01170	DC - 500	1.7 (0.1 GHz)	32.5	24.0	+11	+23	K > 1	8	5.5	35	70 mil stripline
INA-02170	DC - 1000	2.0 (0.5 GHz)	31.5	29.0	+11	+23	K > 1	8	5.5	35	70 mil stripline
INA-02184	DC - 800	2.0 (0.5 GHz)	32.0	28.5	+11	+23	K > 1	8	5.5	35	85 mil plastic
INA-02186	DC - 800	2.0 (0.5 GHz)	31.5	28.5	+11	+23	K > 1	8	5.5	35	85 mil SM plastic
INA-03170	DC - 2800	2.3	26.0	26.0	+1	+10	K > 1	7	4.5	12	70 mil stripline
INA-03184	DC - 2500	2.6	25.5	25.0	-2	+7	K > 1	7	4.0	10	85 mil plastic
INA-10386	DC - 1800	3.7 (1.5 GHz)	26.7	26.8	+10	+23	K > 1	-	6	50	85 mil SM plastic
INA-12063*	50-2000	2.0 (0.9 GHz)	23	16	0	+15	-	-	3	5	SOT-363 (SC-70)
INA-30311	DC - 1000	3.5	16	12.5	-11	-2	K > 1	-	3	6.3	SOT-143
NEW INA-31063	DC - 3500	6.1 (1.9 GHz)	13.6	15.1 (1.9 GHz)	+2.1	+8.5	K > 1	-	3	11	SOT-363 (SC-70)
NEW INA-32063	DC - 4000	4.4 (1.9 GHz)	16.5	17.8 (1.9 GHz)	+4.8	+14.4	K > 1	-	3	20	SOT-363 (SC-70)
NEW INA-34063	DC - 3000	4.5 (1.9 GHz)	19.3	21.4 (1.9 GHz)	+8.2	+18	K > 1	-	3	30	SOT-363 (SC-70)

* Self-biased transistor

Notes:

All specifications are typical at +25°C case temperature.

Silicon Fixed Gain Amplifiers, continued

Part Number	Frequency Range (MHz)	NF @ 1 GHz (dB)	Gain @ 0.1 GHz (dB)	Gain @ 1 GHz (dB)	P _{1dB} (dBm)	IP ₃ (dBm)	Stability Factor	V _{CC} MIN (V)	Device Voltage (V)	Device Current (mA)	Package
INA-50311	DC - 1000	3.6	22	19	0	+10	K > 1	-	5	17	SOT-143
INA-51063	DC - 2400	3.0 (1.5 GHz)	20.8	20.9	-2.5	+6	K > 1	-	5	12	SOT-363 (SC-70)
INA-52063	DC - 1300	4.0	23	22	+7.8	+20	K > 1	-	5	30	SOT-363 (SC-70)
INA-54063	100-3000	5 (1.9 GHz)	17	21(1.9 GHz)	+8.5	+17	K > 1	-	5	29	SOT-363 (SC-70)
MSA-0611	DC - 700	3.2	19.5	15.0	+2	+14	-	5	3.3	16	SOT-143
MSA-0635	DC - 900	3.0	20.0	16.5	+2	+14.5	-	5	3.5	15	micro-X ceramic
MSA-0636	DC - 900	3.0	20.0	16.5	+2	+14.5	-	5	3.5	15	trim lead micro-X
MSA-0670	DC - 1000	3.0	20.5	17.5	+2	+14.5	-	5	3.5	16	70 mil stripline
MSA-0685	DC - 800	3.2	20.0	16.5	+2	+14.5	-	5	3.5	16	85 mil plastic
MSA-0686	DC - 800	3.2	20.0	16.5	+2	+14.5	-	5	3.5	16	85 mil SM plastic
MSA-2111	DC - 500	3.3	22.0	16.0	+10	+20	-	5	3.6	29	SOT-143
MSA-0835	DC - 4000	3.0	32.5	23.0	+12.5	+27	-	10	7.8	36	micro-X ceramic
MSA-0836	DC - 4000	3.0	32.5	23.0	+12.5	+27	-	10	7.8	36	trim lead micro-X
MSA-0870	DC - 4000	3.0	32.5	23.5	+12.5	+27	-	10	7.8	36	70 mil stripline
MSA-0885	DC - 4000	3.3	32.5	22.5	+12.5	+27	-	10	7.8	36	85 mil plastic
MSA-0886	DC - 4000	3.3	32.5	22.5	+12.5	+27	-	10	7.8	36	85 mil SM plastic
MSA-3111	DC - 500	3.5	24.4	18.4	+9	+23	K > 1	7	4.5	29	SOT-143
MSA-3135	DC - 600	3.2	24.5	19.6	+9.3	+22	K > 1	7	4.7	29	micro-X ceramic
MSA-3185	DC - 500	3.5	24.6	18.7	+9	+21	K > 1	7	4.7	29	85 mil plastic
MSA-3186	DC - 500	3.5	24.6	18.7	+9	+21	K > 1	7	4.7	29	85 mil SM plastic
MSA-1104	5 - 1300	4.2	12.5	10.5	+17.5	+30	-	8	5.5	60	145 mil plastic
MSA-1105	5 - 1300	4.2	12.5	10.5	+17.5	+30	-	8	5.5	60	85 mil SM plastic
MSA-1110	5 - 1600	4.0	12.5	11.0	+17.5	+30	-	8	5.5	60	100 mil stripline
MSA-1120	5 - 1600	4.0	12.5	11.0	+17.5	+30	-	8	5.5	60	200 mil BeO disk
MSA-2011	DC - 1000	4.3	18.9	16.2	+9	+22	K > 1	7	5.0	32	SOT-143
MSA-2035	DC - 1100	3.7	19.2	17.3	+9.5	+22	K > 1	7	5.0	32	micro-X ceramic
MSA-2085	DC - 1100	3.7	19.2	16.6	+9	+22	K > 1	7	5.0	32	85 mil plastic
MSA-2086	DC - 1100	3.7	19.2	16.6	+9	+22	K > 1	7	5.0	32	85 mil SM plastic
MSA-0711	DC - 1900	5.0	13.0	12.0	+5.5	+18	K > 1	5	3.8	22	SOT-143
MSA-0735	DC - 2400	4.5	13.5	13.0	+5.5	+19	K > 1	5	4.0	22	micro-X ceramic
MSA-0736	DC - 2400	4.5	13.5	13.0	+5.5	+19	K > 1	5	4.0	22	trim lead micro-X
MSA-0770	DC - 2500	4.5	13.5	13.0	+5.5	+19	K > 1	5	4.0	22	70 mil stripline
MSA-0785	DC - 2000	5.0	13.5	12.5	+5.5	+19	K > 1	5	4.0	22	85 mil plastic
MSA-0786	DC - 2000	5.0	13.5	12.5	+5.5	+19	K > 1	5	4.0	22	85 mil SM plastic
MSA-0104	DC - 800	6.0	18.5	15.0	+1.5	+14	K > 1	7	5.0	17	145 mil plastic
MSA-0135	DC - 1200	6.0	19.0	16.5	+1.5	+14	K > 1	7	5.0	17	micro-X ceramic
MSA-0136	DC - 1200	6.0	19.0	16.5	+1.5	+14	K > 1	7	5.0	17	trim lead micro-X
MSA-0170	DC - 1300	6.0	19.0	16.5	+1.5	+14	K > 1	7	5.0	17	70 mil stripline
MSA-0185	DC - 1000	6.0	18.5	15.0	+1.5	+14	K > 1	7	5.0	17	85 mil plastic
MSA-0186	DC - 900	6.0	18.5	15.0	+1.5	+14	K > 1	7	5.0	17	85 mil SM plastic
MSA-0304	DC - 1600	6.0	12.5	11.0	+10	+23	K > 1	7	5.0	35	145 mil plastic
MSA-0311	DC - 2300	6.0	11.5	11.0	+9	+22	K > 1	7	4.7	35	SOT-143
MSA-0335	DC - 2700	6.0	12.5	12.0	+10	+23	K > 1	7	5.0	35	micro-X ceramic
MSA-0336	DC - 2700	6.0	12.5	12.0	+10	+23	K > 1	7	5.0	35	trim lead micro-X
MSA-0370	DC - 2800	6.0	12.5	12.0	+10	+23	K > 1	7	5.0	35	70 mil stripline
MSA-0385	DC - 2500	6.0	12.5	12.0	+10	+23	K > 1	7	5.0	35	85 mil plastic
MSA-0386	DC - 2400	6.0	12.5	12.0	+10	+23	K > 1	7	5.0	35	85 mil SM plastic

Notes:

All specifications are typical at +25°C case temperature.

Silicon Fixed Gain Amplifiers, continued

Part Number	Frequency Range (MHz)	NF @ 1 GHz (dB)	Gain @ 0.1 GHz (dB)	Gain @ 1 GHz (dB)	P _{1dB} (dBm)	IP ₃ (dBm)	Stability Factor	V _{CC} MIN (V)	Device Voltage (V)	Device Current (mA)	Package
MSA-0910	50 - 6000	6.0	8.0	8.0	+11.5	+23	-	12	7.8	35	100 mil stripline
MSA-0986	50 - 5500	6.0	8.0	7.5	+11.5	+23	-	12	7.8	35	85 mil SM plastic
MSA-0204	DC - 1800	6.5	12.5	11.0	+4.5	+17	K > 1	7	5.0	25	145 mil plastic
MSA-0235	DC - 2700	6.5	12.5	12.0	+4.5	+17	K > 1	7	5.0	25	micro-X ceramic
MSA-0236	DC - 2700	6.5	12.5	12.0	+4.5	+17	K > 1	7	5.0	25	trim lead micro-X
MSA-0270	DC - 2800	6.5	12.5	12.0	+4.5	+17	K > 1	7	5.0	25	70 mil stripline
MSA-0285	DC - 2600	6.5	12.5	12.0	+4.5	+17	K > 1	7	5.0	25	85 mil plastic
MSA-0286	DC - 2500	6.5	12.5	12.0	+4.5	+17	K > 1	7	5.0	25	85 mil SM plastic
MSA-0404	DC - 2500	7.0	8.3	7.7	+11.5	+24.5	K > 1	7	5.3	50	145 mil plastic
MSA-0420	DC - 4000	6.5	8.5	8.5	+16	+30	K > 1	10	6.3	90	200 mil BeO disk
MSA-0435	DC - 3800	6.5	8.5	8.3	+12.5	+25.5	K > 1	7	5.3	50	micro-X ceramic
MSA-0436	DC - 3800	6.5	8.5	8.3	+12.5	+25.5	K > 1	7	5.3	50	trim lead micro-X
MSA-0470	DC - 4000	6.5	8.5	8.3	+12.5	+25.5	K > 1	7	5.3	50	70 mil stripline
MSA-0485	DC - 3600	7.0	8.3	8.0	+12.5	+25.5	K > 1	7	5.3	50	85 mil plastic
MSA-0486	DC - 3200	7.0	8.3	8.0	+12.5	+25.5	K > 1	7	5.3	50	85 mil SM plastic
MSA-0504	20 - 2300	6.5	8.0	7.0	+18	+29	-	12	8.4	80	145 mil plastic
MSA-0505	20 - 2300	6.5	8.0	7.0	+18	+29	-	12	8.4	80	85 mil SM plastic
MSA-0520	20 - 2800	6.5	9.0	8.5	+23	+33	-	15	12.0	165	200 mil BeO disk
MSA-9970 (open loop)	DC - 2000	-	17.5	16.0	+14.5	+25	-	10	7.8	35	70 mil stripline
HPMX-3002 (w/power control)	150 - 960 (900 MHz)	9.5 (900 MHz)	46	32 (900 MHz)	+22 (900 MHz)	+29 (900 MHz)	-	-	6	160	SO-8

Silicon Variable Gain Amplifiers

Part Number	Frequency Range (MHz)	NF @ 0.5 GHz (dB)	Gain @ 0.5 GHz (dB)	Gain Control Range @ 0.5 GHz (dB)	P _{1dB} @ 0.5 GHz (dBm)	Supply Voltage (V)	Device Current (mA)	Package
IVA-05128	0.05 - 1500	9	26	30	-2	5	35	8-pin SM Ceramic
IVA-05208	DC - 1800	9	30	30	-3	5	35	SO-8 SM plastic
IVA-05228	DC - 1800	9	30	30	-3	5	35	8-pin SM Ceramic
IVA-14208	DC - 2500	9 (1 GHz)	24 (1 GHz)	34 (1 GHz)	-2 (1 GHz)	6	38	SO-8 SM plastic
IVA-14228	DC - 2500	9 (1 GHz)	24 (1 GHz)	34 (1 GHz)	-2 (1 GHz)	6	38	8-pin SM Ceramic

Switches

Part Number	Frequency Range (GHz)	Type	Insertion Loss @ 1 GHz (dB)	Isolation @ 1 GHz (dB)	Switching Speed (ns)	Output IP ₃ (dBm)	Package
HPMX-3003 (Switch only)	1.5 - 2.5	SPDT	0.8 (1.9 GHz)	15 (1.9 GHz)	-	+55	SSOP-28

Notes:

All specifications are typical at +25°C case temperature.

Mixers

Part Number	Description & Features	RF & LO Frequency Range (GHz)	IF Frequency Range (GHz)	NF (SSB) (dB @ GHz)	Conversion Gain (dB @ GHz)	P _{1dB} (dBm @ GHz)	Output IP ₃ (dBm @ GHz)	Supply Voltage (V)	Supply Current (mA)	Package(s)
HPMX-2006	Upconverter + Amplifier	DC - 0.9 DC - 0.9	0.8 - 2.5 0.8 - 2.5			-8.5 @ 1.9 +4.5 @ 1.9	+2 @ 1.9 +14 @ 1.9	2.7 - 4	15 (Mixer) 23 (Amp.)	SSOP-16
IAM-81008	3-Port DBM	0.05 - 5	DC to 2.4	17 @ 2	8.5 @ 2	-6 @ 2	+3 @ 2	5	13	SO-8
IAM-81028	3-Port DBM	0.05 - 5	DC to 2.4	17 @ 2	8.5 @ 2	-6 @ 2	+3 @ 2	5	13	180 mil SM Ceramic
IAM-82008	3-Port DBM	0.05 - 5	DC to 3	19 @ 2	15 @ 2	+8 @ 2	+18 @ 2	10	55	SO-8
IAM-82028	3-Port DBM	0.05 - 5	DC to 3	16 @ 2	15 @ 2	+8 @ 2	+18 @ 2	10	55	180 mil SM Ceramic
IAM-91563	3-Port GaAs Downconverter	0.8-6	0.05 - 0.7	8.5 @ 1.9	9 @ 1.9	-8 @ 1.9	-6 @ 1.9 (input IP ₃)	3	9	SOT-363 (SC-70)

Vector Modulators

Part Number	Description & Features	Modulator Frequency Range (LO) (MHz)	Output Frequency Range (MHz)	Output Power (P _{1dB}) (dBm)	Supply Voltage (V)	Supply Current (mA)	Package
HPMX-2007	Vector Modulator + Mixer (Modulator with up/down converting mixer and internal 90° phase shifter)	40 - 400	5 - 4000	-15	3	10 (Mod.) 25 (Mod.+ Mixer)	SSOP-16

Multi-Function RFICs

Part Number	Description	Functions	Frequency Range (MHz)	Supply Voltage (V)	Package
HPMX-3003	Transceiver Front End (GaAs MMIC)	LNA, T/R Switch, Power Amplifier (27.5 dBm output power)	1500 - 2500	2.7 - 5.5	SSOP-28
HPMX-5001	Upconverter/Downconverter (Silicon MMIC)	Synthesizer (VCO & prescaler), doubler, upconverting mixer, downconverting mixer, buffers, power down standby	1500 - 2500	2.7 - 5.5	TQFP-32
HPMX-5002	IF Modulator/Demodulator (Silicon MMIC)	Downconverting Mixer, Limiting Amplifier, Discriminator/Data Slicer, PLL, Lock Detector, RSSI Circuit	up to 250	2.7 - 5.5	TQFP-48

PLL Synthesizer

Part Number	Description	Features	Frequency Range (MHz)	Supply Voltage (V)	Package
NEW HPLL-8001	PLL Synthesizer	Low operating current, synchronous programming of the counters, large dividing ratios for small channel spacings, serial control 3-wire bus, digital phase detector output signals	Dual-Mode: 4 - 30 (2.7 V) 4 - 65 (4.5 V) Single HF Mode: 4 - 100 (2.7 V) 4 - 160 (4.5 V)	2.7 - 5.5	SOP-14

Notes:

All specifications are typical at +25°C case temperature.

GaAs MMIC Low Noise Amplifiers

Part Number	Frequency Range (GHz)	Bias Cond. (V @ mA)	Gain (dB)	P _{1dB} (dBm)	NF (dB)	Package
HMMC-5023	21.2 - 26.5	5 @ 24	24	+14	2.5 ^[1]	chip
HMMC-5038	37 - 40	3 @ 120	23	+12	4.8	chip

Note:

1. Typ. 21.2-23.6 GHz; 2.8 typ. 24.5-26.5 GHz.

GaAs MMIC Broadband Medium-Power Amplifiers

Part Number	Description & Features	Freq. Range (GHz)	Bias Cond. (V @ mA)	Gain (dB)	Gain Flatness (dB)	P _{1dB} (dBm)	Package
HMMC-5021	distributed amplifier with low-frequency extension capabilities	2 - 22.0	7 @ 150	8	± 1	+17.5	chip
HMMC-5022	distributed amplifier with low-frequency extension capabilities	2 - 22.0	7 @ 150	9.5	± 1	+17.5	chip
HMMC-5026	distributed amplifier with low-frequency extension capabilities	2 - 26.5	7 @ 150	7.5	± 1	+15	chip
HMMC-5027	distributed amplifier with low-frequency extension capabilities	2 - 26.5	8 @ 250	6.0	± 0.8	+19	chip
HMMC-5025	distributed amplifier with low-frequency extension capabilities	2 - 50	5 @ 75	8.5	± 0.5	+10	chip
NEW HMMC-5032	compact transmitter amplifier with integrated output power detector	17.7 - 32	4.5 @ 250	8	± 1	+22	chip
NEW HMMC-5033	high gain transmitter amplifier with integrated output power detector	17.7 - 32	5 @ 680	18	± 1	+26	chip
HMMC-5040	good input match to DC; can bias input stage for multiplication	20 - 40	4.5 @ 300, -0.6 V	22	± 1.5	+18	chip
NEW HMMC-5200	general purpose HBT amplifier	DC - 20	5 @ 45	9.5	± 1	+12	chip
NEW HMMC-5220	general purpose HBT amplifier	DC - 15	5 @ 45	9.5	± 1	+12	chip
HMMC-5618	efficient two-stage amplifier	6 - 20	5 @ 110	14	± 0.5	+18	chip
HMMC-5620	high-gain four stage amplifier	6 - 20	5 @ 100	16	± 0.75	+14	chip

GaAs MMIC Broadband Attenuators

Part Number	Frequency Range (GHz)	Control Voltages	Min./Max Atten (dB typ. @ GHz)	Comments	Package
HMMC-1002	DC - 50	two 0 to -4V lines	2/40 @ 26.5	general-purpose atten. (e.g., AGC loops)	chip
HMMC-1015	DC - 50	two 0 to -9V lines	2/40 @ 26.5	lower distortion general-purpose atten.	chip

GaAs MMIC SPDT Switches

Part Number	Frequency Range (GHz)	Control Voltages Complementary (V)	Insertion Loss (dB)	Isolation (dB)	P _{1dB} (dBm)	Package
HMMC-2006 (refl.)	DC - 6	0/-10	1.0	40	+ 23	chip
HMMC-2007 (abs.)	DC - 8	+10/-10	1.1	38	> 27	chip
HMMC-2027 (abs.)	DC - 26.5	0/-10	2.5	30	> 27	chip

GaAs MMIC Mixer

Part Number	Description & Features	RF & LO Freq. Range (GHz)	IF Freq. Range (GHz)	LO Drive Level (dBm)	Bias Cond. (V @ mA)	P _{-1dB} (dBm)	Conv. Loss (dB)	Package
NEW HMMC-3040	3-PORT DBM Up/Dn converter +LO amplifier (input stage can be biased as multiplier)	20 - 43	DC - 5	2	4.5 @ 150	8 (up-conv.) 15 (dn-conv.)	9.5	chip

GaAs HBT Prescalers

Part Number	Description & Features	Input Freq. (GHz)	Input Power (dBm)	Bias (V @ mA) ¹	P _{out} (dBm)	Phase Noise (dBc/Hz)	Package
NEW HMMC-3002	+ 2; on-chip pre- and post-amps; differential I/O	DC - 16	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 80 or 60	Dual Mode +6 or 0	-153 @ 100 KHz offset	chip
NEW HMMC-3004	+ 4; on-chip pre- and post-amps; differential I/O	DC - 16	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 80 or 60	Dual Mode +6 or 0	-153 @ 100 KHz offset	chip
NEW HMMC-3008	+ 8; on-chip pre- and post-amps; differential I/O	DC - 16	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 80 or 60	Dual Mode +6 or 0	-153 @ 100 KHz offset	chip
NEW HMMC-3022	+ 2; on-chip pre- and post-amps; differential I/O	DC - 12	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 40 or 30	Dual Mode 0 or -6	-153 @ 100 KHz offset	chip
NEW HMMC-3024	+ 4; on-chip pre- and post-amps; differential I/O	DC - 12	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 40 or 30	Dual Mode 0 or -6	-153 @ 100 KHz offset	chip
NEW HMMC-3028	+ 8; on-chip pre- and post-amps; differential I/O	DC - 12	-20 to +10	Single supply Pos. OR Neg. 4.5 to 6.5 @ 40 or 30	Dual Mode 0 or -6	-153 @ 100 KHz offset	chip

Note:

1. higher current listed corresponds to higher output power mode; controlled by Power Select pad on chip (V_{PwrSel})

www.hp.com/go/rf

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Obsoletes 5968-0408E

5968-1779E (9/98)