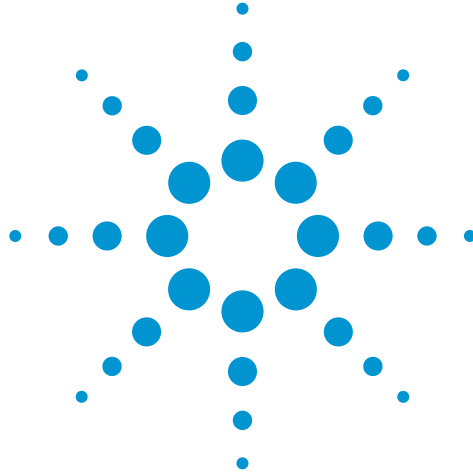


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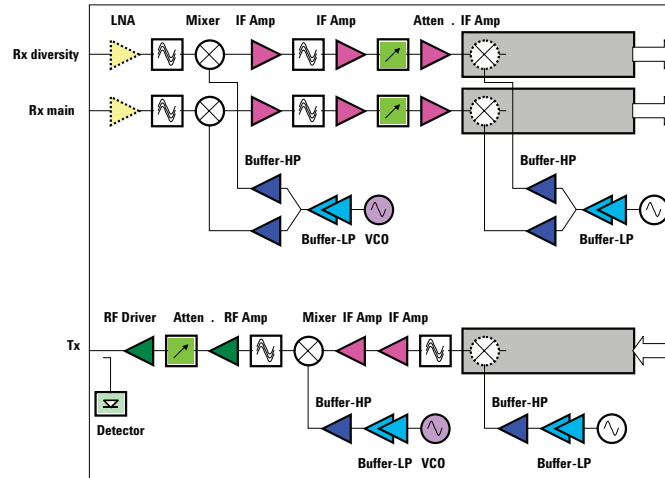
Semiconductor Solutions for the Connected World



System Block Diagrams and Product Suggestions

Wireless Infrastructure - Basestation Radiocard

Radiocard



Radiocard Component Suggestions

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 2GHz	P1dB/dBm ¹ @ 2GHz	OIP3/dBm @ 2GHz	NF/dB ² @ 2GHz	Device Type and Package
LNA	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	MGA-52543	5/53	0.4- 6	14.2	17.4	31.7	1.9	GaAs MMIC, SOT343
	ATF-58143	3/30	0.45- 6	16.5	19	30.5	0.5	E-pHEMT FET, SOT343
	ATF-54143	3/60	0.45- 6	16.6	20	36.2	0.5	E-pHEMT FET, SOT343
	ATF-531P8	4/135	0.05- 6	20	24.5	38	0.6	E-pHEMT FET, LPCC
RF Amplifier	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	12.4	14.8	27	2.8	GaAs MMIC, SOT363
	ATF-521P8	4.5/200	0.05- 6	17	26.5	42	0.5	E-pHEMT FET, LPCC
	ATF-531P8	4/135	0.05- 6	20	24.5	38	0.6	E-pHEMT FET, LPCC
RF Driver	ATF-501P8	4.5/280	0.05- 6	14.7	28	45	1.4	E-pHEMT FET, LPCC
	ATF-511P8	4.5/200	0.05- 6	14.8	30	41.7	1.4	E-pHEMT FET, LPCC
	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
Buffer-High Power	MGA-565P8³	5/67	0.1- 3.5	21.8	20 (Psat)	-	-	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
Buffer-Low Power	ABA-51563	5/18	DC- 3.5	21.5	1.8	11.4	3.7	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.5	9.8	19.9	3.3	Si MMIC, SOT363
	ADA-4543	(3.4)/15	DC- 2.5	15.1	1.9	15	3.7	Si MMIC, SOT343
	ADA-4643	(3.5)/35	DC- 2.5	17	13.4	28.3	4	Si MMIC, SOT343
	MGA-85563 ⁴	3/15 to 30	0.8- 6	19	1 to 8	12 to 17	1.9	GaAs MMIC, SOT363
VCO	AT-41532	5/5	10GHz ft	10.5	7	-	1.5	Si BJT, SOT323
	AT-32032	2.7/5	10GHz ft	10.4	7.5	-	1.25	Si BJT, SOT323

Application	Part Number	Typ. Bias V/mA	Frequency Range	Gain/dB ¹ @ 500MHz	P1dB/dBm ¹ @ 500MHz	OIP3/dBm @ 500MHz	NF/dB ² @ 500MHz	Device Type and Package
IF Amplifier	MGA-62563³	3/55	0.1-3	22	18	34.8	0.8	E-pHEMT MMIC, SOT363
	MGA-545P8	3/135	0.1- 7	22	19	36	2	E-pHEMT MMIC, SOT363
	ADA-4743	(3.8)/60	DC-2.5	16.6	17.1	34	4.2	Si MMIC, SOT343
	MGA-82563	3/84	0.1- 6	14.7	17.4	31	2.3	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	12.5	15.1	27	3.1	GaAs MMIC, SOT363
	ABA-53563	5/46	DC- 3.5	21.5	15	27.5	2.9	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.8	12.5	28	2.7	Si MMIC, SOT363
Detector -Schottky Diodes ⁶	HSMS-282x HSMS-286x	Ct max = 1pF @0V Ct max = 0.3pF @0V						SOT323/363/23/143 SOT323/363/23/143
Attenuator -PIN Diodes ⁶	HSMP-381x⁵ HSMP-386x ⁵	very low distortion, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design lower current, low cost, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design						SOT323/23 SOT323/363/23

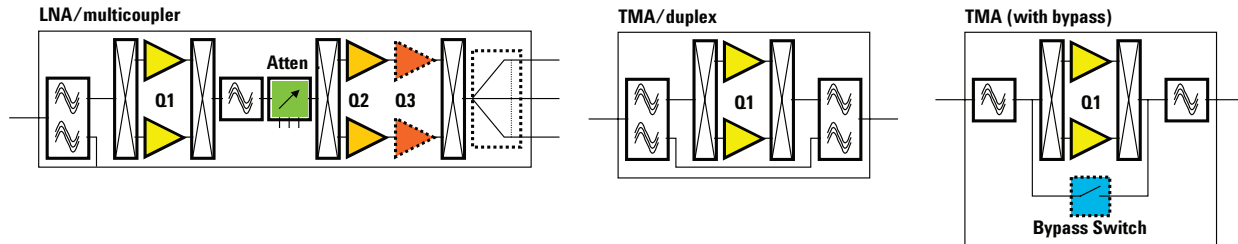
Recommended Parts in **Bold**.

Notes:

- Gain and P1dB performance for discrete FETs when matched for best IP3.
- NFmin figures for discrete FETs.
- High reverse isolation: 50dB typical.
- Reverse Isolation 40 dB typical.
- See AN1048.
- Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

Wireless Infrastructure - Basestation Low Noise Amplifier (LNA) Basestation Tower Mounted Amplifiers (TMA)



LNA & TMA Suggested Components

Application	Part Number	Typ. Bias V/mA	Frequency Range	Gain/dB ¹ @ 2GHz	P1dB/dBm ¹ @ 2GHz	OIP3/dBm @ 2GHz	NF/dB ² @ 2GHz	Device Type and Package
Q1	ATF-58143	3/30	0.45- 6	16.5	19	30.5	0.5	E-pHEMT FET, SOT343
	ATF-54143	3/60	0.45- 6	16.6	20	36.2	0.5	E-pHEMT FET, SOT343
	ATF-541M4	3/60	0.45- 10	17.5	21	35.8	0.5	E-pHEMT FET, MiniPak
	ATF55143	2.7/10	0.45- 6	17.7	14	24.2	0.6	E-pHEMT FET, SOT343
	ATF-551M4	2.7/10	0.45- 10	17.5	15	24.1	0.5	E-pHEMT FET, MiniPak
	ATF-531P8	4/135	0.05- 6	20	24.5	38	0.6	E-pHEMT FET, LPCC
Q2/Q3	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	ATF-501P8	4.5/280	0.05- 6	14.7	28	45	1.4	E-pHEMT FET, LPCC
	ATF-511P8	4.5/200	0.05- 6	14.8	30	41.7	1.4	E-pHEMT FET, LPCC
	ATF-521P8	4.5/200	0.05- 6	17	26.5	42	1.5	E-pHEMT FET, LPCC
	ATF-531P8	4/135	0.05- 6	20	24.5	38	0.6	E-pHEMT FET, LPCC
Bypass Switch - PIN Diodes ⁴	HSMP-389x HSMP-489x HSMP-386x	General purpose switch, Ct typ. = 0.4pF @ 0 V low inductance, shunt, Ct typ. = 0.4pF @ 0 V higher linearity switch, Ct typ = 0.2pF @ 0 V					SOT323/363/23/143 SOT323/23 SOT323/363/23	
Attenuator - PIN Diodes ⁴	HSMP-381x³ HSMP-386x ³	Very low distortion, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design lower current, low cost, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design					SOT323/23 SOT323/363/23	

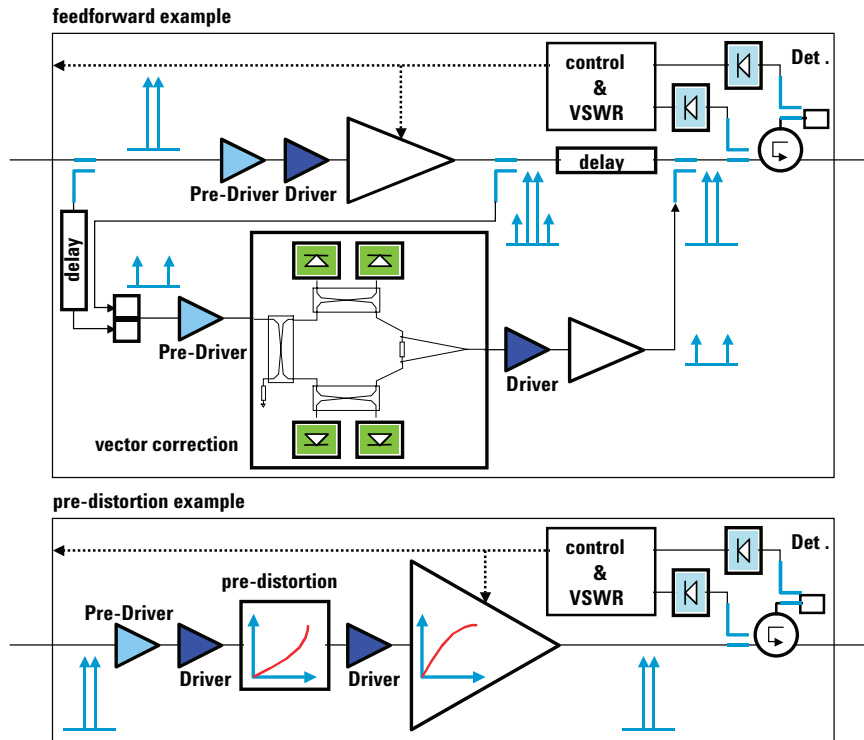
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. NFmin figures for discrete FETs.
3. See AN1048.
4. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

Wireless Infrastructure - Basestation Multi-carrier Power Amplifier (MCPA)



MCPA Suggested Components

Application	Part Number	Typ. Bias V/mA	Frequency Range	Gain/dB ¹ @ 2GHz	P1dB/dBm ¹ @ 2GHz	OIP3/dBm @ 2GHz	NF/dB ² @ 2GHz	Device Type and Package
Pre-Driver	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	ATF-501P8	4.5/280	0.05- 6	14.7	28	45	1.4	E-pHEMT FET, LPCC
	ATF-511P8	4.5/200	0.05- 6	14.8	30	41.7	1.4	E-pHEMT FET, LPCC
	ATF-521P8	4.5/200	0.05- 6	17	26.5	42	1.5	E-pHEMT FET, LPCC
	ATF-531P8	4/135	0.05- 6	20	24.5	38	0.6	E-pHEMT FET, LPCC
Driver	ATF-501P8	4.5/280	0.05- 6	14.7	28	45	1.4	E-pHEMT FET, LPCC
	ATF-511P8	4.5/200	0.05- 6	14.8	30	41.7	1.4	E-pHEMT FET, LPCC
	ATF-521P8	4.5/200	0.05- 6	17	26.5	42	1.5	E-pHEMT FET, LPCC
Detector - Schottky Diodes ³	HSMS-282x HSMS-286x	Ct max = 1pF @0V Ct max = 0.3pF @0V						SOT323/363/23/143 SOT323/363/23/143
Vector Correction - PIN Diodes ³	HSMP-481x HSMP-381x	Low inductance, shunt, very low distortion, Ct typ. = 0.2pF @ 0 V very low distortion, Ct typ. = 0.2pF @ 0 V						SOT323/23 SOT323/23

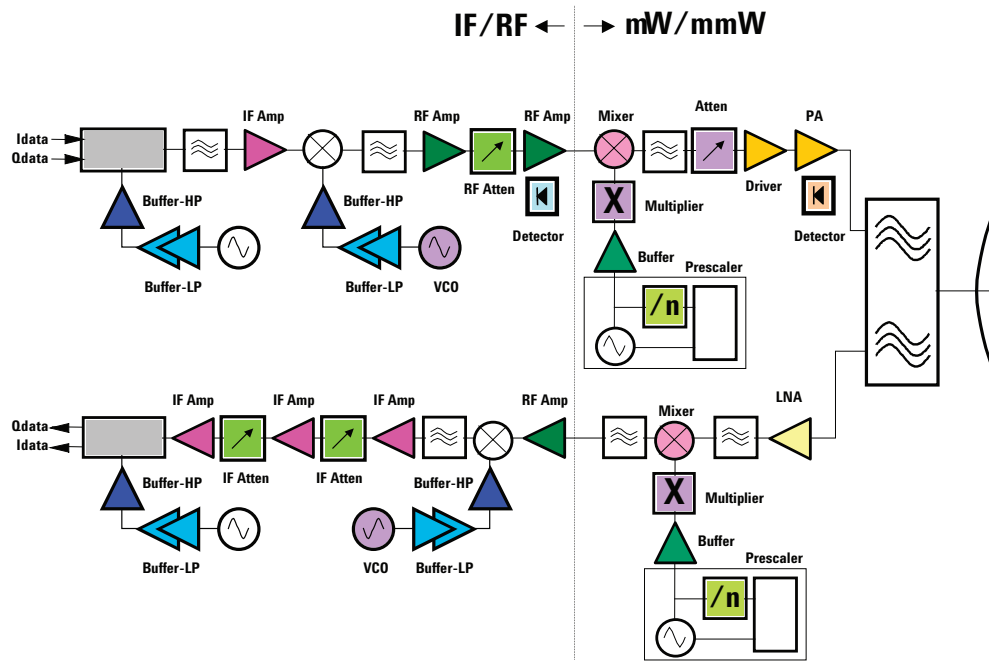
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. NFmin figures for discrete FETs.
3. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

Wireless Infrastructure - Microwave Link (Point-point/point-multipoint)



**Microwave Link – mW/mmW
LNA/Driver/Buffer/PA Suggestions**

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB	P1dB/dBm	OIP3/dBm	NF/dB	Package
LNA	AMMC-5023	5/28	21.2 - 26.5	23.6	9.5	18	2.3	chip
	HMMC-5023	5/24	21.2 - 26.5	24	10	-	2.5	chip
	HMMC-5038	3/120	37 - 40	23	12	-	4.8	chip
Drivers/Buffers	AMMC-5023	5/28	21.2 - 26.5	23.6	9.5	18	2.3	chip
	HMMC-5023	5/24	21.2 - 26.5	24	10	-	2.5	chip
	HMMC-5038	3/120	37 - 40	23	12	-	4.8	chip
	AMMC-5040	4.5/300, -0.5	20 - 45	25	19.5	30	-	chip
	HMMC-5040	4.5/300, -0.6	20 - 40	22	18	-	-	chip
	HMMC-5618	5/110	6 - 20	14	18	-	5.5	chip
	HMMC-5620	5/100	6 - 20	16	14	-	9	chip
	AMMC-5024	7/200	30k - 40	16	22.5	30	4.6	chip
	AMMC-5026	7/150	2 - 35	10.5	21	27	3.6	chip
HMMC-5200	5/45	DC - 20	9.5	12	-	-	chip	
PA	HMMC-5032	4.5/250	17.7 - 32	8	22	-	-	chip
	HMMC-5033	5/460 +3.5/240	17.7 - 32	18	26	-	-	chip
	HMMC-5034	4.5/300	37 - 43	8	23	-	-	chip
	AMMC-5040	4.5/300, -0.5	20 - 45	25	19.5	30	-	chip
	HMMC-5040	4.5/300, -0.6	20 - 40	22	18	-	-	chip

Recommended Parts in **Bold**.

System Block Diagrams and Product Suggestions

Wireless Infrastructure - Microwave Link (Point-point/point-multipoint)

Microwave Link – mW/mmW Mixer/Multiplier Suggestions

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Loss/dB	P1dB/dBm (input)	IP3/dBm (input)	Package
Mixer - mmic	HMMC-3040	4.5/150	20 - 43	9.5	15 (down) 8 (up)	- -	chip
- Schottky diodes ¹	HSCH-9201/9251 HSCH-9301 HSCH-9501/9551 HSCH-5310/5330 HSCH-5312/5332 HSCH-5531/5512	GaAs series pair, Ct=40fF / GaAs anti-parallel pair, Ct=40fF GaAs ring quad, Ct=75fF GaAs series pair, Ct=50fF / GaAs anti-parallel pair, Ct=50fF Si single, Ct=0.1pF, med. barrier/low barrier Si single Ct=0.15pF, med. barrier/low barrier Si series pair, Ct=0.15pF, low barrier/ Ct=0.1pF, med. barrier					beamlead beamlead beamless beamlead beamlead
Multiplier - mmic	HMMC-3040 AMMC-5040 HMMC-5040 AMMC-5023 HMMC-5023	LO input can be biased as multiplier, see PN #15, AN #50 Input can be biased as a multiplier, see AN #50 Input can be biased as a multiplier, see AN #50 Can be biased as a doubler, see PN #11 Can be biased as a doubler, see PN #11					chip chip chip chip chip
- Schottky diodes ¹	HSCH-9101/9251 HSCH-9401/9551 HSCH-5310/5330 HSCH-5312/5332 HSCH-5531/5512	GaAs single, Ct=40fF / GaAs anti-parallel pair, Ct=40fF GaAs single, Ct=15fF / GaAs anti-parallel pair, Ct=50fF Si single, Ct=0.1pF, med. barrier/low barrier Si single Ct=0.15pF, med. barrier/low barrier Si series pair, Ct=0.15pF, low barrier/ Ct=0.1pF, med. barrier					beamlead beamless beamlead beamlead beamlead

Microwave Link – mW/mmW Attenuator/Switch/Prescaler/Detector Suggestions

Application	Part Number	Typ. Control /V	Frequency Range/GHz	Loss/dB	P1dB/dBm (input)	IP3/dBm (input)	Package
Attenuator - mmic	HMMC-1002 HMMC-1015	two 0/-4V two 0/-9V	DC - 50 DC - 50	2 - 40 2 - 40	11 27	- -	chip chip
- PIN diodes ¹	HPND-4005	Si single, Ct=17fF, =100ns					beamlead
Switch - mmic (SPDT)	AMMC-2008	two 0/-3V	DC - 50	1.6	14	32	chip
- PIN diodes ¹	HPND-4005 HPND-4028/4038	Si single, Ct=17fF, =100ns Si single. Ct=45fF, =36ns / Ct=65ns, =45ns					beamlead beamlead

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Input Power /dBm	Output Power /dBm	Phase Noise /dBc/Hz	Package
Prescaler - divide by 2, 4, or 8	HMMC-3002/4/8 HMMC-3022/4/8 HMMC-3102/4/8 HMMC-3122/4/8	5/80 or 60 5/40 or 30 5/80 5/40	DC - 16 DC - 12 DC - 16 DC - 12	-20 to +10 -20 to +10 -20 to +10 -20 to +10	+6 or 0 0 or -6 +6 0	-153 @100kHz -153 @100kHz -153 @100kHz -153 @100kHz	chip chip SOIC-8 SOIC-8

Application	Part Number	Features	Package
Detector - Schottky diodes ¹	HSCH-9161 HSCH-9401 HSCH-5310/5330 HSCH-5312/5332	GaAs single, Ct=35fF, zero-bias GaAs single, Ct=15fF Si single, Ct=0.1pF, med. barrier/low barrier Si single Ct=0.15pF, med. barrier/low barrier	beamlead chip beamlead beamlead

Recommended Parts in **Bold**.

Notes:

1. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions**Wireless Infrastructure - Microwave Link (Point-point/point-multipoint)****Microwave Link – RF Component Suggestions**

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 2GHz	P1dB/dBm @ 2GHz	OIP3/dBm @ 2GHz	NF/dB @ 2GHz	Device Type and Package
RF Amplifier	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	MGA-52543	5/53	0.4- 6	14.2	17.4	31.7	1.9	GaAs MMIC, SOT343
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	12.4	14.8	27	2.8	GaAs MMIC, SOT363
	ABA-53563	5/46	DC- 3.5	21.5	12.7	22.9	3.5	Si MMIC, SOT363
Buffer-High Power	MGA-565P8¹	5/67	0.1- 3.5	21.8	20 (Psat)	-	-	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
Buffer-Low Power	ABA-51563	5/18	DC- 3.5	21.5	1.8	11.4	3.7	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.5	9.8	19.9	3.3	Si MMIC, SOT363
	MGA-85563 ²	3/15 to 30	0.8- 6	19	1 to 8	12 to 17	1.9	GaAs MMIC, SOT363
VCO	AT-41532	5/5	10 GHz ft	10.5	7	-	1.5	Si BJT, SOT323
	AT-32032	2.7/5	10 GHz ft	10.4	7.5	-	1.25	Si BJT, SOT323

Application	Part Number	Features	Package
Detector - Schottky Diodes ³	HSMS-282x HSMS-286x	Ct max = 1pF @ 0V Ct max = 0.3pF @ 0V	SOT323/363/23/143 SOT323/363/23/143
RF Attenuator - PIN Diodes ³	HSMP-381x HSMP-386x	Very low distortion, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design lower current, low cost, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design	SOT323/23 SOT323/363/23

Microwave Link – IF Component Suggestions

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 500MHz	P1dB/dBm @ 500MHz	OIP3/dBm @ 500MHz	NF/dB @ 500MHz	Device Type and Package
IF Amplifier	MGA-545P8	3.3/135	0.1- 7	22	19	36	2	E-pHEMT MMIC, SOT363
	ADA-4743	(3.8)/60	DC-2.5	16.6	17.1	34	4.2	Si MMIC, SOT343
	MGA-82563	3/84	0.1- 6	14.7	17.4	31	2.3	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	12.5	15.1	27	3.1	GaAs MMIC, SOT363
	ABA-53563	5/46	DC- 3.5	21.5	15	27.5	2.9	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.8	12.5	28	2.7	Si MMIC, SOT363
IF Attenuator - PIN Diodes ³	HSMP-381x							SOT323/23
	HSMP-386x							SOT323/363/23

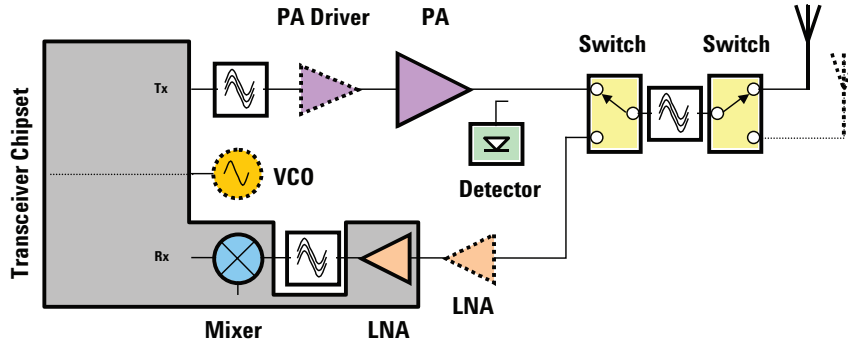
Recommended Parts in **Bold**.

Notes:

1. High reverse isolation: 50dB typical.
2. Reverse Isolation 40dB typical.
3. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

2.45 GHz and 5-6 GHz Systems



2.45 GHz Systems (inc. 802.11b/g)

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 2.45GHz	P1dB/dBm ¹ @ 2.45GHz	OIP3/dBm @ 2.45GHz	NF/dB ² @ 2.45GHz	Device Type and Package
PA/PA Driver	MGA-545P8	3.3/135	0.1-6	17	21.5	34	2.6	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1-6	13	17	31	2.2	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1-6	12	14.5	27	2.7	GaAs MMIC, SOT363
	ATF-541M4	3/60	0.5-6	17	21	36	0.57	E-pHEMT FET, MiniPak
	ATF-54143	3/60	0.5-6	16	20	36.5	0.52	E-pHEMT FET, SOT343
	ATF-501P8	4.5/280	0.5-6	14	28	45	1.4	E-pHEMT FET, LPCC
	ATF-511P8	4.5/200	0.5-6	14	30	43	-	E-pHEMT FET, LPCC
	ATF-531P8	4/135	0.5-6	13	25	41.5	0.56	E-pHEMT FET, LPCC
LNA	MGA-85563	3/15 to 30	0.9-6	18.5	1 to 8	11.5 to 17	1.6	GaAs MMIC, SOT363
	MGA-87563	3/4.5	0.5-4	12.5	-2	8	1.6	GaAs MMIC, SOT363
	MGA-71563³	3/10 to 40	0.1-6	15	7.5 to 15.5	18 to 23.5	0.8	GaAs MMIC, Bypass, SOT363
	ATF-551M4	2.7/10	0.5-6	16.5	14.5	24	0.5	E-pHEMT FET, MiniPak
	ATF-55143	2.7/10	0.5-6	16.5	14.5	24	0.5	E-pHEMT FET, SOT343
Mixer	IAM-91563	3/9 to 15	0.5-6	7.5	-9 to -5	1.5 to 4.5	11	GaAs MMIC, SOT363
Detector - Schottky Diodes ⁴	HMPS-282x	Ct max = 1pF @ 0 V						MiniPak
	HSMS-282x	Ct max = 1pF @ 0 V						SOT323/363/23/143
	HSMS-286x	Ct max = 0.3pF @ 0 V						SOT323/363/23/143
Switch - PIN Diodes ⁴	HMPP-389x	general purpose switch, Ct typ. = 0.4pF @ 0 V						MiniPak
	HSMP-389x	general purpose switch, Ct typ. = 0.4pF @ 0 V						SOT323/363/23/143
	HMPP-386x	higher linearity switch, Ct typ. = 0.2pF @ 0 V						MiniPak
	HSMP-386x	higher linearity switch, Ct typ. = 0.2pF @ 0 V						SOT323/363/23
VCO	AT-41532	2.7/5	10 GHz ft	8.5	6.5	-	1.7	Si BJT, SOT323
	AT-32032	2.7/5	10 GHz ft	9	8	-	1.3	Si BJT, SOT323

Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. Nfmin figures for discrete FETs.
3. Source grounded configuration.
4. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions**2.45 GHz and 5-6 GHz Systems****5-6 GHz Systems (inc. 802.11a)**

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 5GHz	P1dB/dBm ¹ @ 5GHz	OIP3/dBm @ 5GHz	NF/dB ² @ 5GHz	Device Type and Package
PA/PA Driver	MGA-545P8	3.3/135	0.1-6	12	21	34	3.6	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1-6	9.5	17	31	2.6	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1-6	10.5	14.5	27	3.2	GaAs MMIC, SOT363
	ATF-541M4	3/60	0.5-6	11	19.5	37.5	1.02	E-pHEMT FET, MiniPak
	ATF-54143	3/60	0.5-6	11	18	36	0.93	E-pHEMT FET, SOT343
	ATF-521P8	4.5/200	0.5-6	10	27	39	1.75	E-pHEMT FET, LPCC
	ATF-531P8	4/135	0.5-6	8	24.5	41	1.03	E-pHEMT FET, LPCC
LNA	MGA-85563	3/15 to 30	0.9-6	16	1 to 8	12.5 to 18	1.6	GaAs MMIC, SOT363
	MGA-715633	3/10 to 40	0.1-6	11	7.5 to 15.5	19 to 24.5	1	GaAs MMIC, Bypass, SOT363
	ATF-551M4	2.7/10	0.5-6	12	14.5	24.5	0.75	E-pHEMT FET, MiniPak
	ATF-55143	2.7/10	0.5-6	12	13.5	24	0.9	E-pHEMT FET, SOT343
Mixer	IAM-91563	3/9 to 15	0.5-6	3	-16.5 to -13.5	-6 to -3	17.3	GaAs MMIC, SOT363
Detector - Schottky Diodes ⁴	HSMS-286x	Ct max = 0.3pF @0V	Ct max = 0.3pF @0V	Ct max = 0.3pF @0V	Ct max = 0.3pF @0V	Ct max = 0.3pF @0V	Ct max = 0.3pF @0V	SOT323/363/23/143
Switch - PIN Diodes ⁴	HMPP-389x HSMP-389x HMPP-386x HSMP-386x	General purpose switch, Ct typ. = 0.4pF @ 0 V general purpose switch, Ct typ. = 0.4pF @ 0 V higher linearity switch, Ct typ = 0.2pF @ 0 V higher linearity switch, Ct typ = 0.2pF @ 0 V						MiniPak SOT323/363/23/143 MiniPak SOT323/363/23
VCO	AT-32032	2.7/5	10GHz ft	6	8	-	2.5	Si BJT, SOT323

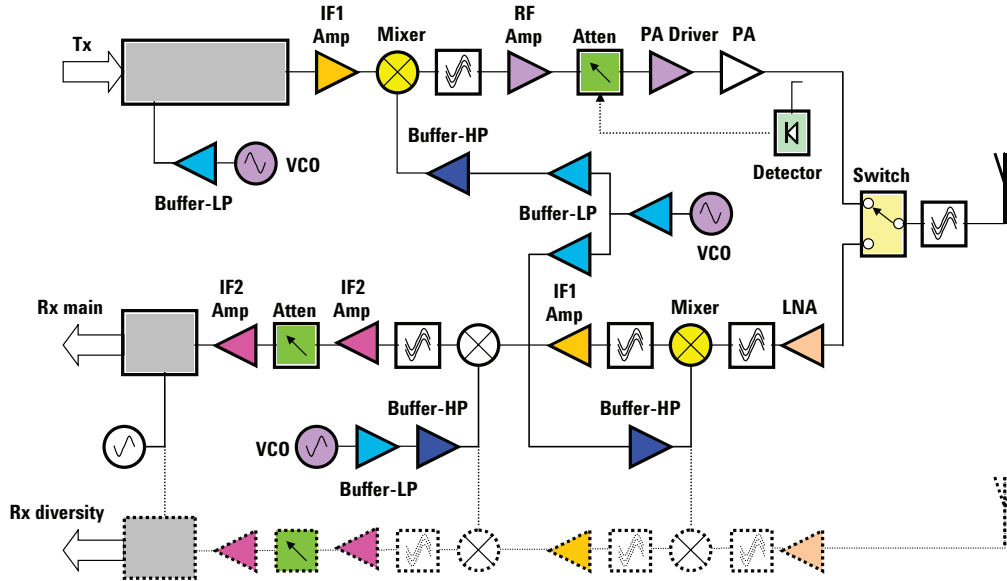
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. Nfmin figures for discrete FETs.
3. Source grounded configuration.
4. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

3-4 GHz Systems



3-4 GHz Systems – Component Suggestions

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 3.5GHz	P1dB/dBm ¹ @ 3.5GHz	OIP3/dBm @ 3.5GHz	NF/dB ² @ 3.5GHz	Device Type and Package
LNA	MGA-85563	3/15 to 30	0.8 - 6	18.5	1 to 9	12 to 17	1.6	GaAs MMIC, SOT363
	MGA-87563	3/4.5	0.5 - 4	11	-2.2	8	1.8	GaAs MMIC, SOT363
	ATF-551M4	2.7/10	0.5 - 6	14.5	14.6	24.3	0.6	E-pHEMT FET, MiniPak
	ATF-55143	2.7/10	0.5 - 6	14	13.7	23.5	0.65	E-pHEMT FET, SOT343
	ATF-531P8	4/135	0.5 - 6	10.5	24.5	42	0.73	E-pHEMT FET, LPCC
	Mixer	IAM-91563	3/9 to 15	0.8 - 6	5.5	-13 to -10	-0.5 to 3.5	15
RF Amplifier PA Driver	MGA-545P8	3.3/135	0.1 - 6	14	21.5	34	3.1	E-pHEMT MMIC, LPCC
	MGA-53543	5/54	0.1 - 6	13	16.5	32	1.6	E-pHEMT MMIC, SOT343
	MGA-82563	3/84	0.1 - 6	11.2	17	31	2.3	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1 - 6	11.5	14.8	27	2.8	GaAs MMIC, SOT363
	MGA-85563	3/15 to 30	0.8 - 6	18.5	1 to 9	12 to 17	1.6	GaAs MMIC, SOT363
	ATF-541M4	3/60	0.5 - 6	13	20.6	37.5	0.7	E-pHEMT FET, MiniPak
	ATF-54143	3/60	0.5 - 6	13	20.5	37.5	0.75	E-pHEMT FET, SOT343
	ATF-521P8	4.5/200	0.5 - 6	10	27	41	1.3	E-pHEMT FET, LPCC

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 500MHz	P1dB/dBm @ 500MHz	OIP3/dBm @ 500MHz	NF/dB @ 500MHz	Device Type and Package
IF Amplifier	MGA-545P8	3.3/135	0.1 - 7	22	19	36	2	E-pHEMT MMIC, SOT363
	ADA-4743	(3.8)/60	DC-2.5	16.6	17.1	34	4.2	Si MMIC, SOT343
	ABA-53563	5/46	DC-3.5	21.5	15	27.5	2.9	Si MMIC, SOT363
	ABA-52563	5/35	DC-3.5	21.8	12.5	28	2.7	Si MMIC, SOT363

Recommended Parts in **Bold**.

Notes:

- Gain and P1dB performance for discrete FETs when matched for best IP3
- NFmin figures for discrete FETs

System Block Diagrams and Product Suggestions**3-4 GHz Systems****3-4 GHz Systems – Component Suggestions**

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 2GHz	P1dB/dBm @ 2GHz	OIP3/dBm @ 2GHz	NF/dB @ 2GHz	Device Type and Package
Buffer - low power	MGA-81563	3/42	0.1- 6	12.4	14.8	27	2.8	GaAs MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.5	9.8	19.9	3.3	Si MMIC, SOT363
	ABA-51563	5/18	DC- 3.5	21.5	1.8	11.4	3.7	Si MMIC, SOT363
	MGA-85563 ²	3/15 to 30	0.8- 6	19	1 to 8	12 to 17	1.9	GaAs MMIC, SOT363
Buffer-High Power	MGA-565P8¹	5/67	0.1- 3.5	21.8	20 (Psat)	-	-	E-pHEMT MMIC, LPCC
	MGA-53543	5/54	0.4 - 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
	ABA-53563	5/46	DC - 3.5	21.5	12.7	22.9	3.5	Si MMIC, SOT363
VCO	AT-41532	5/5	10 GHz ft	10.5	7	-	1.5	Si BJT, SOT323
	AT-32032	2.7/5	10 GHz ft	10.4	7.5	-	1.25	Si BJT, SOT323

Application	Part Number	Features	Package
Switch - PIN diodes ³	HMPP-389x	general purpose switch, Ct typ. = 0.4pF @ 0 V	MiniPak
	HSMP-389x	general purpose switch, Ct typ. = 0.4pF @ 0 V	SOT323/363/23
	HMPP-386x	higher linearity switch, Ct typ = 0.2pF @ 0 V	MiniPak
	HSMP-386x	higher linearity switch, Ct typ = 0.2pF @ 0 V	SOT323/363/23
Mixer - Schottky diodes ³	HSMS-8202	Si series pair, Ct=0.26pF, low-cost	SOT23
Detector - Schottky Diodes ³	HSMS-282x	Ct max = 1pF @ 0 V	SOT323/363/23/143
	HSMS-286x	Ct max = 0.3pF @ 0 V	SOT323/363/23/143
Attenuator - PIN Diodes ³	HSMP-381x	very low distortion, Ct typ. = 0.2pF, see AN1048 pi-attenuator design	SOT323/23
	HSMP-386x	lower current, low cost, Ct typ. = 0.2pF, see AN1048 pi-attenuator design	SOT323/363/23

Recommended Parts in **Bold**.

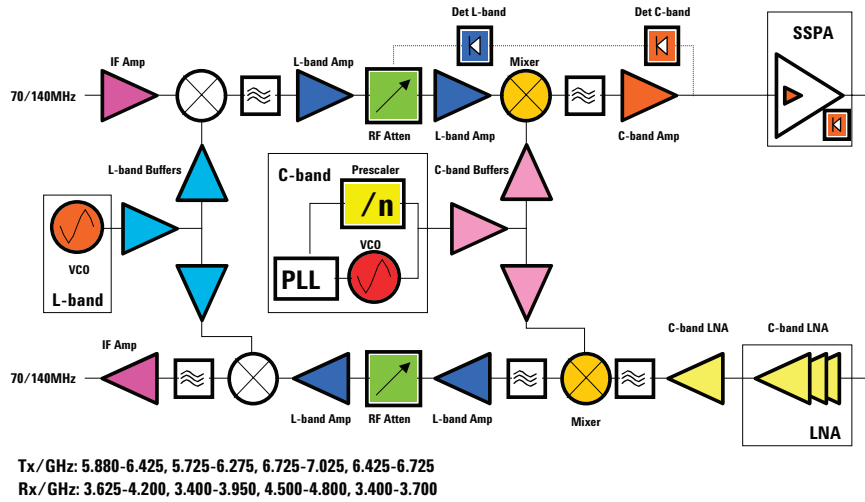
Notes:

1. High reverse isolation: 50dB typical.
2. Reverse Isolation 40dB typical.
3. Diode capacitance at Vr=0 V

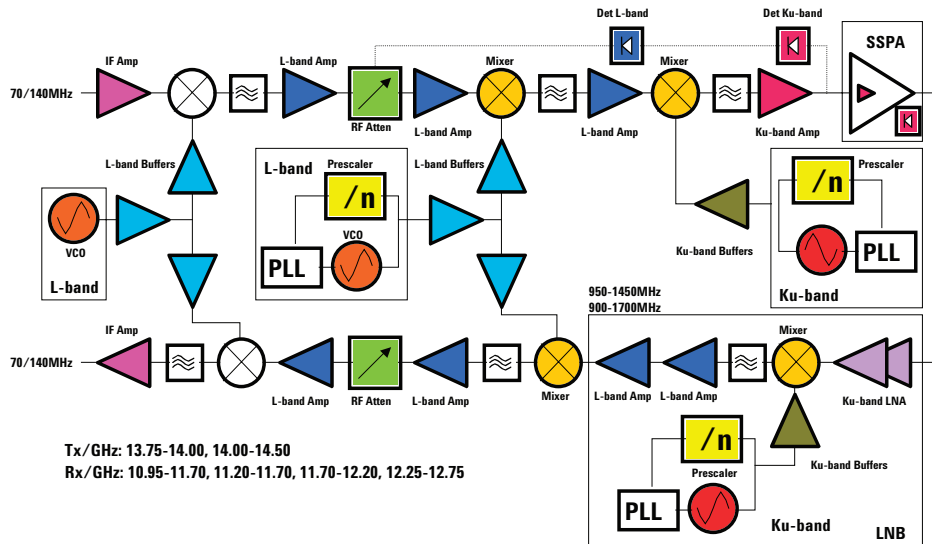
System Block Diagrams and Product Suggestions

VSAT - C-Band and Ku-Band

C-band example



Ku-band example



System Block Diagrams and Product Suggestions**VSAT - C-Band****VSAT Component Suggestions**

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 500MHz	P1dB/dBm @ 500MHz	OIP3/dBm @ 500MHz	NF/dB @ 500MHz	Device Type and Package
IF Amplifier	MGA-545P8	3.3/135	0.1- 7	22	19	36	2	E-pHEMT MMIC, SOT363
	ADA-4743	(3.8)/60	DC-2.5	16.6	17.1	34	4.2	Si MMIC, SOT343
	ABA-53563	5/46	DC- 3.5	21.5	15	27.5	2.9	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.8	12.5	28	2.7	Si MMIC, SOT363

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB @ 2GHz	P1dB/dBm @ 2GHz	OIP3/dBm @ 2GHz	NF/dB @ 2GHz	Device Type and Package
L-band Amplifier L-band Buffer - low power	MGA-53543	5/54	0.4- 6	15.4	18.6	39.1	1.5	E-pHEMT MMIC, SOT343
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	12.4	14.8	27	2.8	GaAs MMIC, SOT363
	ABA-53563	5/46	DC- 3.5	21.5	12.7	22.9	3.5	Si MMIC, SOT363
	ABA-52563	5/35	DC- 3.5	21.5	9.8	19.9	3.3	Si MMIC, SOT363
	ABA-51563	5/18	DC- 3.5	21.5	1.8	11.4	3.7	Si MMIC, SOT363
L-band Buffer-High Power	MGA-565P8'	5/67	0.1- 3.5	21.8	20 (P _{sat})	-	-	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1- 6	13.2	17.3	31	2.2	GaAs MMIC, SOT363
L-band VCO	AT-41532	5/5	10GHz ft	10.5	7	-	1.5	Si BJT, SOT323
	AT-32032	2.7/5	10GHz ft	10.4	7.5	-	1.25	Si BJT, SOT323

Recommended Parts in **Bold**.

Notes:

1. High reverse isolation: 50 dB typical.
2. Reverse Isolation 40 dB typical.

Application	Part Number	Features	Package
L-band/C-band Detector - Schottky Diodes ³	HSMS-282x HSMS-286x	Ct max = 1pF @ 0V Ct max = 0.3pF @ 0V	SOT323/363/23/143 SOT323/363/23/143
RF Attenuator - PIN Diodes ³	HSMP-381x HSMP-386x	very low distortion, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design lower current, low cost, Ct typ. = 0.2pF @ 0 V, see AN1048 pi-attenuator design	SOT323/23 SOT323/363/23

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 5GHz	P1dB/dBm ¹ @ 5GHz	OIP3/dBm @ 5GHz	NF/dB ² @ 5GHz	Device Type and Package
C-band LNA	ATF-36077	1.5/10	2-18	16	5	-	0.3	PHEMT FET, ceramic
	ATF-36163	1.5/10	1.5-18	15	5	-	0.61	PHEMT FET, SOT363
	ATF-551M4	2.7/10	0.5-6	12	14.5	24.5	0.75	E-pHEMT FET, MiniPak
	ATF-55143	2.7/10	0.5-6	12	13.5	24	0.9	E-pHEMT FET, SOT343
C-band Amplifier C-band Buffer	MGA-545P8	3.3/135	0.1-6	12	21	34	3.6	E-pHEMT MMIC, LPCC
	MGA-82563	3/84	0.1- 6	9.5	17	31	2.6	GaAs MMIC, SOT363
	MGA-81563	3/42	0.1- 6	10.5	14.5	27	3.2	GaAs MMIC, SOT363
	MGA-85563	3/15 to 30	0.8- 6	16	1 to 8	12 to 18	1.6	GaAs MMIC, SOT363
	ATF-541M4	3/60	0.5-8	11	19.5	37.5	1.02	E-pHEMT FET, MiniPak
	ATF-54143	3/60	0.5-6	11	18	36	0.93	E-pHEMT FET, SOT343
	ATF-521P8	4.5/200	0.5-6	10	27	39	1.75	E-pHEMT FET, LPCC
HMMC-5200	5/45	DC-20	9.5	12	-	-	chip	
C-band VCO	AT-41532	5/5	10GHz ft	10.5	7	-	1.5	Si BJT, SOT323
	AT-32032	2.7/5	10GHz ft	10.4	7.5	-	1.25	Si BJT, SOT323
	AT-31033	2.7/10	10GHz ft	11	9	-	1.4	Si BJT, SOT23

Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3
2. NFmin figures for discrete FETs
3. Diode capacitance at Vr=0 V

System Block Diagrams and Product Suggestions

VSAT - Ku-Band

VSAT Component Suggestions

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Gain/dB ¹ @ 12GHz	P1dB/dBm ¹ @ 12GHz	OIP3/dBm @ 12GHz	NF/dB ² @ 12GHz	Device Type and Package
Ku-band LNA	ATF-36077	1.5/10	2-18	12	5	-	0.5	PHEMT FET, ceramic PHEMT FET, SOT363
	ATF-36163	1.5/10	1.5-18	9.4	5	-	1	
Ku-band Amplifier Ku-band Buffer	HMMC-5200	5/45	DC-20	9.5	12	-	-	chip
	HMMC-5618	5/110	6-20	14	18	-	5.5	chip
	HMMC-5620	5/100	6-20	16	14	-	9	chip
Ku-band VCO	ATF-36163	1.5/10	1.5-18	9.4	5	-	1	PHEMT FET, SOT363

Application	Part Number	Features	Package
Ku-band Detector - Schottky diodes ³	HSMS-286x HSCH-5310/5330 HSCH-5312/5332	Ct max = 0.3pF @0V Si single, Ct=0.1pF, med. barrier/low barrier Si single Ct=0.15pF, med. barrier/low barrier	SOT323/363/23/143 beamlead beamlead
Ku-band Mixer - Schottky diodes ³	HSMS-8202 HSCH-5312/5332 HSCH-5531/5512	Si series pair, Ct=0.26pF, low-cost Si single Ct=0.15pF, med. barrier/low barrier Si series pair, Ct=0.15pF, low barrier/ Ct=0.1pF, med. barrier	SOT23 beamlead beamlead

Application	Part Number	Typ. Bias V/mA	Frequency Range/GHz	Input Power /dBm	Output Power /dBm	Phase Noise /dBc/Hz	Package
Prescaler - divide by 2, 4, or 8	HMMC-3002/4/8	5/80 or 60	DC-16	-20 to +10	+6 or 0	-153 @ 100kHz	chip
	HMMC-3022/4/8	5/40 or 30	DC-12	-20 to +10	0 or -6	-153 @ 100kHz	chip
	HMMC-3102/4/8	5/80	DC-16	-20 to +10	+6	-153 @ 100kHz	SOIC-8
	HMMC-3122/4/8	5/40	DC-12	-20 to +10	0	-153 @ 100kHz	SOIC-8

Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best noise
2. NFmin figures for discrete FETs
3. Diode capacitance at Vr=0 V

Product Selection Guides

GaAs and Silicon RFIC Selection Guide

GaAs Fixed Gain Amplifiers

Part Number	Frequency Range (GHz)	Test Freq (GHz)	V _{dd} (V)	I _{dd} (mA)	NF (dB)	Gain (dB)	P _{1dB} (dBm)	OIP ₃ (dBm)	Package
MGA-52543	0.4 – 6	1.9	5	53	1.9	14.2	+17.4	+31.7 ^[3]	SOT-343 (SC-70)
MGA-53543	0.4 – 6	1.9	5	54	1.5	15.4	+18.6	+39.1	SOT-343 (SC-70)
MGA-81563	0.1 – 6	2	3	42	2.8	12.4	+14.8	+27.0	SOT-363 (SC-70)
MGA-82563	0.1 – 6	2	3	84	2.2	13.2	+17.3	+31.0	SOT-363 (SC-70)
MGA-85563	0.8 – 6	2	3	15 to 30 ^[1]	1.9	19	+1 to +8	+12.0 to +17.0	SOT-363 (SC-70)
MGA-86563	0.5 – 6	2	5	14	1.8	20	+4.1	+15.0	SOT-363 (SC-70)
MGA-86576	1.5 – 8	4	5	16	2.0	23.1	+6.3	+16.0	SM Ceramic
MGA-87563	0.5 – 4	2	3	4.5	1.8	14	-2	+8.0	SOT-363 (SC-70)

GaAs Medium Power Amplifiers

Part Number	Frequency Range (GHz)	Test Freq (GHz)	V _{dd} (V)	I _{dsat} (mA)	P _{sat} (dBm)	PAE (%)	Gain (dB)	Package
MGA-83563	0.5 – 6	2.4	3	152	22.4	37	22	SOT-363 (SC-70)
MGA-545P8	0.1 – 7	5.8	3.3	92	22	46	11.5	LPCC 2x2

GaAs LNA with Bypass Switch

Part Number	Frequency Range (GHz)	Test Freq (GHz)	NF _{min} (dB)	G _a (dB)	IIP ₃ (dBm @ mA)	Switch IL (dB)	Supply Voltage (V)	Supply Current (mA)	Package
MGA-71543	0.1 – 6	2	0.8	15.4	+7.4 @ 20	5.6	3	0 to 60 ^[1]	SOT-343 (SC-70)
MGA-72543	0.1 – 6	2	1.4	13.6	+10.5 @ 20	2.5	3	0 to 60 ^[1]	SOT-343 (SC-70)
MGA-725M4	0.1 – 6	2	1.3	15.7	+9.9 @ 20	2.5	3	0 to 60 ^[1]	MiniPak Package ^[2]

GaAs Buffer Amplifier

Part Number	Frequency Range (GHz)	Test Freq (GHz)	V _{dd} (V)	I _{dsat} (mA)	P _{sat} (dBm)	Isolation (dB)	Gain (dB)	Package
MGA-565P8	0.1 – 3	2	5	67	+20	50.0	21.8	LPCC 2x2

Silicon Fixed Gain Amplifiers

Part Number	Frequency Range (GHz)	Test Freq (GHz)	V _{dd} (V)	I _{dd} (mA)	NF (dB)	Gain (dB)	P1dB (dBm)	OIP3 (dBm)	Package
ADA-4543	DC – 2.5	0.9	3.4	15	3.7	15.1	1.9	15.0	SOT-343 (SC-70)
ADA-4643	DC – 2.5	0.9	3.5	35	4.0	17.0	13.4	28.3	SOT-343 (SC-70)
ADA-4743	DC – 2.5	0.9	3.8	60	4.2	16.5	17.1	32.6	SOT-343 (SC-70)
ABA-51543	DC – 3.5	2	5	18	3.7	21.5	1.8	11.4	SOT-363 (SC-70)
ABA-52563	DC – 3.5	2	5	35	3.3	21.5	9.8	19.9	SOT-363 (SC-70)
ABA-53563	DC – 3.5	2	5	46	3.5	21.5	12.7	22.9	SOT-363 (SC-70)

Notes:

- Supply current can be adjusted using an external resistor to vary P1dB and IIP3
- MiniPak dimension: 1.4 mm (L) x 1.2 mm (W) x 0.7 mm (D)
- IIP3 of MGA-52543 is 17.5 dBm at 1.9 GHz

All specifications are typical at +25°C case temperature

Product Selection Guides

GaAs and Silicon RFIC Selection Guide

Silicon Fixed Gain Amplifiers (Continued)

f = 1 GHz

Part Number	Frequency Range (GHz)	NF @ 1 GHz (dB)	Gain @ 0.1 GHz (dB)	Gain @ 1 GHz (dB)	P _{1dB} @ 1 GHz (dBm)	IP ₃ @ 1 GHz (dBm)	V _{DD} Min (V)	Device Voltage (V)	Device Current (mA)	Package
MSA-0836	DC - 4	3.0	32.5	23.0	+12.5	+27	10	7.8	36	35 micro-X
MSA-0870	DC - 4	3.0	32.5	23.5	+12.5	+27	10	7.8	36	70 mil
MSA-0886	DC - 4	3.3	32.5	22.5	+12.5	+27	10	7.8	36	86 Plastic
MSA-3111	DC - 0.5	3.5	24.4	18.4	+9	+23	7	4.5	29	SOT-143
MSA-3186	DC - 0.5	3.5	24.6	18.7	+9	+21	7	4.7	29	86 Plastic
MSA-2011	DC - 1.0	4.3	18.9	16.2	+9	+22	7	5.0	32	SOT-143
MSA-2086	DC - 1.1	3.7	19.2	16.6	+9	+22	7	5.0	32	86 Plastic
MSA-0711	DC - 1.9	5.0	13.0	12.0	+5.5	+18	5	3.8	22	SOT-143
MSA-0736	DC - 2.4	4.5	12.5	13.0	+5.5	+19	5	4.0	22	35 micro-X
MSA-0770	DC - 2.5	4.5	13.5	13.0	+5.5	+19	5	4.0	22	70 mil
MSA-0786	DC - 2.0	5.0	13.5	12.5	+5.5	+19	5	4.0	22	86 Plastic
MSA-0986	0.1 - 5.5	6.2 (f=2 GHz)	—	7.2 (f=2 GHz)	+10.5 (f=2 GHz)	+23 (f=2 GHz)	12	7.8	35	86 Plastic
MSA-0236	DC - 2.7	6.5	12.5	12.0	+4.5	+17	7	5.0	25	35 micro-X
MSA-0270	DC - 2.8	6.5	12.5	12.0	+4.5	+17	7	5.0	25	70 mil
MSA-0286	DC - 2.5	6.5	12.5	12.0	+4.5	+17	7	5.0	25	86 Plastic
MSA-0420	DC - 4.0	6.5	8.5	8.5	+16	+30	10	6.3	90	200 mil BeO
MSA-0436	DC - 3.8	6.5	8.5	8.5	+12.5	+25.5	7	5.25	50	35 micro-X
MSA-0470	DC - 4.0	6.5	8.5	8.5	+12.5	+25.5	7	5.25	50	70 mil
MSA-0486	DC - 3.2	7.0	8.3	8.0	+12.5	+25.5	7	5.25	50	86 Plastic
MSA-0505	0.02 - 2.3	6.5	8.0	7.0	+18	+29	12	8.4	80	05 Plastic
MSA-0520	0.02 - 2.8	6.5	8.5	8.5	+23	+33	15	12.0	165	200 mil BeO
MSA-9970	DC - 2.0	—	17.5	16.0	+14.5	+25	10	7.8	35	70 mil
MSA-0686	DC - 0.8	3.0	20	15	+1	NA	5	7.8	16	86 Plastic
MSA-0311	DC - 2.3	6.0	11.5	11.0	+9	+22	7	4.7	35	SOT-143
MSA-0336	DC - 2.7	6.0	12.5	12.0	+10	+23	7	5.0	35	35 micro-X
MSA-0370	DC - 2.8	6.0	12.5	12.0	+10	+23	7	5.0	35	70 mil
MSA-0386	DC - 2.4	6.0	12.5	12.0	+10	+23	7	5.0	35	86 Plastic

f = 0.5 GHz

Part Number	Freq Range (GHz)	NF @ 0.5 GHz (dB)	Gain @ 0.05 GHz (dB)	Gain @ 0.1 GHz (dB)	Gain @ 0.5 GHz (dB)	Gain @ 1 GHz (dB)	P _{1dB} @ 0.5 GHz (dBm)	IP ₃ @ 0.5 GHz (dBm)	V _{CC} Min (V)	Device Voltage (V)	Device Current (mA)	Package
MSA-0611	DC - 0.7	3.0	—	19.5	18.0	—	+2.0	+14.0	5	3.3	16	SOT-143
MSA-0636	DC - 0.9	2.8	—	20.5	19.0	—	+2.0	+14.5	5	3.5	16	35 micro-X
MSA-0670	DC - 1.0	2.8	—	20.5	19.5	—	+2.0	+14.5	5	3.5	16	70 mil
MSA-0686	DC - 0.8	3.0	—	20.0	18.5	—	+2.0	+14.5	5	3.5	16	86 Plastic
MSA-1105	0.05 - 1.3	3.6	12.7	—	12.0	10.5	+17.5	+30.0	8	5.5	60	05 Plastic
MSA-1110	0.05 - 1.6	3.5	—	12.5	12.0	—	+17.5	+30.0	8	5.5	60	100 mil
MSA-1120	0.05 - 1.6	3.5	—	12.5	12.0	—	+17.5	+30.0	8	5.5	60	200 mil BeO

Silicon Fixed Gain Amplifiers

f = 0.9 GHz

Part Number	Freq Range (GHz)	NF @ 0.9 GHz (dB)	Gain @ 2 GHz (dB)	Gain @ 0.9 GHz (dB)	Gain @ 2 GHz (dB)	Gain @ 0.9 GHz (dB)	P _{1dB} @ 2 GHz (dBm)	IP ₃ @ 0.9 GHz (dB)	OIP ₃ @ 2 GHz (dB)	V _{CC} Min (V)	Device Voltage (V)	Device Current (mA)	Package
MSA-2111	DC - 0.5	3.3	—	17.5	17.5	10	—	20	—	5	3.6	29	SOT-143

Mixers - Downconverters

Part Number	Description	RF & LO Freq Range (GHz)	IF Freq Range (MHz)	NF (dB)	Conversion Gain (dB)	Input IP ₃ (dBm)	Supply Voltage (V)	Supply Current (mA)	Test Frequencies	Package
IAM-91563	GaAs	0.8 - 6	50 - 700	8.5	9	-6	3	9	RF input: 1.9 GHz LO input: 1.64 GHz IF input: 250 MHz	SOT-363 (SC-70)

Product Selection Guides**Transistors Selection Guide****Silicon Bipolar Transistors**

NF_o and G_a are specified at a low noise bias point, while P_{1dB} , G_{1dB} , and $|S_{21E}|^2$ are specified at bias points which optimize these parameters.

Low Noise Transistors (Typical Specifications @ 25°C Case Temperature)

Part Number	Frequency (GHz)	V_{CE} (V)	NF_o (dB)	G_a (dB)	P_{1dB} (dBm)	G_{1dB} (dBm)	$ S_{21E} ^2$ @ 1.0 GHz (dB)	Package
AT-30511	0.9	2.7	1.1	16.0	+7.0	16.5	17.9 ^[1]	SOT-143 plastic SM
AT-30533	0.9	2.7	1.1	13.0	+7.0	15.0	15.2 ^[1]	SOT-23 plastic SM
AT-31011	0.9	2.7	0.9	13.0	+9.0	14.0	19.1 ^[1]	SOT-143 plastic SM
AT-31033	0.9	2.7	0.9	11.0	+9.0	12.0	15.8 ^[1]	SOT-23 plastic SM
AT-32011	0.9	2.7	1.0	14.0	+13.0	16.5	18.9 ^[1]	SOT-143 plastic SM
AT-32032	0.9	2.7	1.0	15.0	+13.0	15.5	11.5 ^[1]	SOT-323 plastic SM
AT-32033	0.9	2.7	1.0	12.5	+13.0	14.5	15.1 ^[1]	SOT-23 plastic SM
AT-32063 ^[2]	0.9	2.7	1.1	14.5	+12.0	16.0	17.0 ^[1]	SOT-363 plastic SM
AT-41411	2.0	8.0	1.8	13.0	+17.0	13.0	16.7	SOT-143 plastic SM
AT-41435	2.0	8.0	1.7	14.0	+19.0	14.0	17.2	micro-X SM
AT-41486	1.0	8.0	1.4	18.0	+18.0	13.5 ^[3]	17.5	85 mil plastic SM
AT-41511	0.9	5.0	1.0	15.5	+14.5	17.5	15.8 ^[1]	SOT-143 plastic SM
AT-41532	0.9	5.0	1.0	15.5	+14.5	14.5	13.3 ^[1]	SOT-323 plastic SM
AT-41533	0.9	5.0	1.0	14.5	+14.5	14.5	13.9 ^[1]	SOT-23 plastic SM
AT-41586	1.0	8.0	1.4	17.0	+18.0	13.0 ^[3]	17.0	85 mil plastic SM
AT-42036	2.0	8.0	1.9	13.5	+21.0	14.0	16.6	micro-X SM
AT-42070	2.0	8.0	1.9	14.0	+21.0	15.0	17.3	70 mil stripline
AT-42085	2.0	8.0	1.9	13.5	+20.5	14.0	17.0	85 mil plastic
AT-42086	2.0	8.0	1.9	13.0	+20.5	13.5	16.5	85 mil plastic SM

Medium Power Transistors (Typical Specifications @ 25°C Case Temperature)

Part Number	V_{CE} (V)	P_{1dB} @ 2 GHz (dBm)	G_{1dB} @ 2 GHz (dBm)	P_{1dB} @ 4 GHz (dBm)	G_{1dB} @ 4 GHz (dBm)	Package
AT-64020	16.0	+28	10.0	+27	6.5	200 mil BeO disk

Notes:

1. Typical at 900 MHz
2. Dual transistor — All data is per individual transistor.
3. Typical G_{1dB} at 2 GHz

Product Selection Guides**Transistors Selection Guide****Gallium Arsenide (GaAs) Field Effect Transistors (FETs)**

NF_o and G_a are specified at a low noise bias point, while P_{1dB} and G_{1dB} are specified at bias points which optimize these parameters.

Single Voltage Low Noise E-pHEMTs[1] (Typical Specifications @ 25°C Case Temperature)

Part Number	Gate Width (μm)	Frequency Range (GHz)	Test Freq. (GHz)	V_{dd} (V)	I_{dd} (mA)	NF_o (dB)	G_a (dB)	OIP3 (dBm)	P_{1dB} (dBm)	Package
ATF-501P8	6400	0.05 - 6	2	4.5	280	1.4	15.5	45.5	+29	LPCC ^[3]
ATF-511P8	6400	0.05 - 6	2	4.5	200	1.4	14.8	41.7	+30	LPCC ^[3]
ATF-521P8	3200	0.05 - 6	2	4.5	200	1.5	17.0	42	+26.5	LPCC ^[3]
ATF-531P8	1600	0.05 - 6	2	4.0	135	0.6	20.0	38	+24.5	LPCC ^[3]
ATF-54143	800	0.45 - 6	2	3	60	0.5	16.6	36.2	+20	SOT-343 (SC-70)
ATF-541M4	800	0.45 - 10	2	3	60	0.5	17.5	35.8	+21	MiniPak ^[2]
New ATF-55143	400	0.45 - 6	2	2.7	10	0.6	17.7	24.2	+14	SOT-343 (SC-70)
ATF-551M4	400	0.45 - 10	2	2.7	10	0.5	17.5	24.1	+15	MiniPak ^[2]
ATF-58143	800	0.45 - 6	2	3	30	0.5	16.5	30.5	+19	SOT-343 (SC-70)

Low Noise pHEMTs (Typical Specifications @ 25°C Case Temperature)

Part Number	Gate Width (μm)	Frequency Range (GHz)	Test Freq. (GHz)	V_{dd} (V)	I_{dd} (mA)	NF_o (dB)	G_a (dB)	OIP3 (dBm)	P_{1dB} (dBm)	Package
ATF-33143	1600	0.45 - 6	2	4	80	0.5	15.0	33.5	+22	SOT-343 (SC-70)
ATF-331M4	1600	0.45 - 6	2	4	60	0.6	15.0	31	+19	MiniPak ^[2]
ATF-34143	800	0.45 - 6	2	4	60	0.5	17.5	31.5	+20	SOT-343 (SC-70)
ATF-35143	400	0.45 - 6	2	2	15	0.4	18.0	21	+10	SOT-343 (SC-70)
ATF-38143	800	0.45 - 6	2	2	10	0.4	16.0	22	+12	SOT-343 (SC-70)
ATF-36077	200	1.5 - 18	12	1.5	10	0.5	12.0	—	+5	70 mil SM
ATF-36163	200	1.5 - 18	12	1.5	15	1.2	10.0	—	+5	SOT-363 (SC-70)

Notes:

- Agilent's enhancement mode E-pHEMT devices are the first commercially available single-supply GaAs transistors that do not need a negative gate bias voltage for operation. They can help simplify the design and reduce the cost of receivers and transmitters in many RF applications.
- MiniPak is a thin miniature packaging with the following dimension: 1.4 mm (L) x 1.2 mm (W) x 0.7 mm (D)
- LPCC (Leadless Plastic Chip Carrier) is a copper leadframe based plastic molded package with the following dimensions: 2.0 mm (L) x 2.0 mm (W) x 0.75 mm (D)

Product Selection Guides

Diodes (PIN and Schottky) Selection Guide

PIN Diodes

Application	Part Number	Ct (pF)	RS (ohm)	VBR (V)	Trr (nS)	Lifetime (nS)	Configuration	Package
Low distortion attenuator	HSMP-381B	0.27	3	100	300	1500	Single	SOT-323 (SC-70)
	HSMP-381C	0.27	3	100	300	1500	Series Pair	SOT-323 (SC-70)
	HSMP-381E	0.27	3	100	300	1500	Common Anode	SOT-323 (SC-70)
	HSMP-381F	0.27	3	100	300	1500	Common Cathode	SOT-323 (SC-70)
	HSMP-3810	0.27	3	100	300	1500	Single	SOT-23
	HSMP-3812	0.27	3	100	300	1500	Series Pair	SOT-23
	HSMP-3813	0.27	3	100	300	1500	Common Anode	SOT-23
Low distortion/low inductance attenuator	HSMP-481B	0.35	3	100	300	1500	Dual Cathode	SOT-323 (SC-70)
	HSMP-4810	0.35	3	100	300	1500	Dual Cathode	SOT-23
Low inductance limiter	HSMP-482B	0.75	0.6	50	7	70	Dual Anode	SOT-323 (SC-70)
	HSMP-4820	0.75	0.6	50	7	70	Dual Anode	SOT-23
Low current switch/ attenuator	HMPP-3860	0.2	1.5	50	80	500	Single	MiniPak
	HMPP-3862	0.2	1.5	50	80	500	Anti-parallel	MiniPak
	HMPP-3865	0.2	1.5	50	80	500	Parallel	MiniPak
	HSMP-386B	0.2	1.5	50	80	500	Single	SOT-323 (SC-70)
	HSMP-386C	0.2	1.5	50	80	500	Series Pair	SOT-323 (SC-70)
	HSMP-386E	0.2	1.5	50	80	500	Common Anode	SOT-323 (SC-70)
	HSMP-386F	0.2	1.5	50	80	500	Common Cathode	SOT-323 (SC-70)
	HSMP-386L	0.2	1.5	50	80	500	Unconnected Trio	SOT-363 (SC-70)
	HSMP-3860	0.2	1.5	50	80	500	Single	SOT-23
	HSMP-3862	0.2	1.5	50	80	500	Series Pair	SOT-23
	HSMP-3863	0.2	1.5	50	80	500	Common Anode	SOT-23
	HSMP-3864	0.2	1.5	50	80	500	Common Cathode	SOT-23
Low resistance switch	HMPP-3890	0.2	2.5	100		200	Single	MiniPak
	HMPP-3892	0.2	2.5	100		200	Anti-parallel	MiniPak
	HMPP-3895	0.2	2.5	100		200	Parallel	MiniPak
	HMPP-389T	0.2	2.5	100		200	Shunt Switch	MiniPak
	HSMP-389B	0.2	2.5	100		200	Single	SOT-323 (SC-70)
	HSMP-389C	0.2	2.5	100		200	Series Pair	SOT-323 (SC-70)
	HSMP-389E	0.2	2.5	100		200	Common Anode	SOT-323 (SC-70)
	HSMP-389F	0.2	2.5	100		200	Common Cathode	SOT-323 (SC-70)
	HSMP-389L	0.2	2.5	100		200	Unconnected Trio	SOT-363 (SC-70)
	HSMP-389R	0.2	2.5	100		200	Dual Mode Switch	SOT-363 (SC-70)
	HSMP-389T	0.2	2.5	100		200	Low Inductance	SOT-363 (SC-70)
	HSMP-389U	0.2	2.5	100		200	Series Shunt Pair	SOT-363 (SC-70)
	HSMP-389V	0.2	2.5	100		200	High Freq Series Shunt Pair	SOT-363 (SC-70)
	HSMP-3890	0.2	2.5	100		200	Single	SOT-23
	HSMP-3892	0.2	2.5	100		200	Series Pair	SOT-23
	HSMP-3893	0.2	2.5	100		200	Common Anode	SOT-23
	HSMP-3894	0.2	2.5	100		200	Common Cathode	SOT-23
HSMP-3895	0.2	2.5	100		200	Unconnected Pair	SOT-143	
Low resistance/low inductance switch	HSMP-4890	0.33	2.5	100		200	Dual Anode	SOT-23
	HSMP-489B	0.33	2.5	100		200	Dual Anode	SOT-323 (SC-70)
Axial Glass Packaged Pin Diodes	1N5719	0.3	1.25	150	100	100	Single	Axial
	1N5767	0.4	2.5	100		1300	Single	Axial
	5082-3039	0.25	1.25	150	100	100	Single	Axial
	5082-3077	0.3	1.5	200	100	100	Single	Axial
	5082-3080	0.4	2.5	100		1300	Single	Axial
5082-3081	0.4	3.5	100		2500	Single	Axial	
Hybrid Assemblies	5082-0012	0.12	1	150	100	400	Single	Chip
	HPND-0002	0.2	3.5	100	300	1500	Single	Chip
Beam Lead PIN	HPND-4028	0.045	2.3	60	3	36	Single	Beam Lead
	HPND-4038	0.065	1.5	60	2	45	Single	Beam Lead

Schottky-Barrier Diodes

Product Selection Guides

Diodes (PIN and Schottky) Selection Guide

Applications	Part Number	VBR (V)	VF (mV)	Ct (pF)	RD (Ohm)	Configuration	Package
Best overall general purpose	HMPS-2820	15	340	1.0	12.0	Single	MiniPak
	HMPS-2822	15	340	1.0	12.0	Anti-parallel	MiniPak
	HMPS-2825	15	340	1.0	12.0	Parallel	MiniPak
	HSMS-282B	15	340	1.0	12.0	Single	SOT-323 (SC-70)
	HSMS-282C	15	340	1.0	12.0	Series Pair	SOT-323 (SC-70)
	HSMS-282E	15	340	1.0	12.0	Common Anode	SOT-323 (SC-70)
	HSMS-282F	15	340	1.0	12.0	Common Cathode	SOT-323 (SC-70)
	HSMS-282K	15	340	1.0	12.0	High Isolation Unconnected Pair	SOT-363
	HSMS-282L	15	340	1.0	12.0	Unconnected Trio	SOT-363
	HSMS-282M	15	340	1.0	12.0	Common Cathode Quad	SOT-363
	HSMS-282N	15	340	1.0	12.0	Common Anode Quad	SOT-363
	HSMS-282P	15	340	1.0	12.0	Bridge Quad	SOT-363
	HSMS-282R	15	340	1.0	12.0	Ring Quad	SOT-363
	HSMS-2820	15	340	1.0	12.0	Single	SOT-23
	HSMS-2822	15	340	1.0	12.0	Series Pair	SOT-23
	HSMS-2823	15	340	1.0	12.0	Common Anode	SOT-23
	HSMS-2824	15	340	1.0	12.0	Common Cathode	SOT-23
	HSMS-2825	15	340	1.0	12.0	Unconnected Pair	SOT-143
HSMS-2827	15	340	1.0	12.0	Ring Quad	SOT-143	
HSMS-2828	15	340	1.0	12.0	Bridge Quad	SOT-143	
HSMS-2829	15	340	1.0	12.0	Crossover Quad	SOT-143	
Clipping/Clamping	HBAT-540B	30	800	3.0	2.4	Single	SOT-323
	HBAT-540C	30	800	3.0	2.4	Series Pair	SOT-323
	HBAT-5400	30	800	3.0	2.4	Single	SOT-23
	HBAT-5402	30	800	3.0	2.4	Series Pair	SOT-23
High Current Clipping/Clamping	HSMS-270B	15	550	6.7	0.65	Single	SOT-323
	HSMS-270C	15	550	6.7	0.65	Series Pair	SOT-323
	HSMS-2700	15	550	6.7	0.65	Single	SOT-23
	HSMS-2702	15	550	6.7	0.65	Series Pair	SOT-23
Lowest flicker noise	HSMS-281B	20	400	1.2	15.0	Single	SOT-323
	HSMS-281C	20	400	1.2	15.0	Series Pair	SOT-323
	HSMS-281E	20	400	1.2	15.0	Common Anode	SOT-323
	HSMS-281F	20	400	1.2	15.0	Common Cathode	SOT-323
	HSMS-281K	20	400	1.2	15.0	High Isolation Unconnected Pair	SOT-363
	HSMS-281L	20	400	1.2	15.0	Unconnected Trio	SOT-363
	HSMS-2810	20	400	1.2	15.0	Single	SOT-23
	HSMS-2812	20	400	1.2	15.0	Series Pair	SOT-23
	HSMS-2813	20	400	1.2	15.0	Common Anode	SOT-23
	HSMS-2814	20	400	1.2	15.0	Common Cathode	SOT-23
HSMS-2815	20	400	1.2	15.0	Unconnected Pair	SOT-143	
HSMS-2817	20	400	1.2	15.0	Ring Quad	SOT-143	
HSMS-2818	20	400	1.2	15.0	Bridge Quad	SOT-143	
High VBR	HSMS-280B	70	400	2.0	35.0	Single	SOT-323
	HSMS-280C	70	400	2.0	35.0	Series Pair	SOT-323
	HSMS-280E	70	400	2.0	35.0	Common Anode	SOT-323
	HSMS-280F	70	400	2.0	35.0	Common Cathode	SOT-323
	HSMS-280K	70	400	2.0	35.0	High Isolation Unconnected Pair	SOT-363
	HSMS-280L	70	400	2.0	35.0	Unconnected Trio	SOT-363
	HSMS-280M	70	400	2.0	35.0	Common Cathode Quad	SOT-363
	HSMS-280N	70	400	2.0	35.0	Common Anode Quad	SOT-363
	HSMS-280P	70	400	2.0	35.0	Bridge Quad	SOT-363
	HSMS-280R	70	400	2.0	35.0	Ring Quad	SOT-363
	HSMS-2800	70	400	2.0	35.0	Single	SOT-23
	HSMS-2802	70	400	2.0	35.0	Series Pair	SOT-23
	HSMS-2803	70	400	2.0	35.0	Common Anode	SOT-23
	HSMS-2804	70	400	2.0	35.0	Common Cathode	SOT-23
HSMS-2805	70	400	2.0	35.0	Unconnected Pair	SOT-143	
HSMS-2808	70	400	2.0	35.0	Bridge Quad	SOT-143	

Product Selection Guides

Diodes (PIN and Schottky) Selection Guide

Schottky-Barrier Diodes (Continued)

Applications	Part Number	VBR (V)	VF (mV)	Ct (pF)	RD (Ohm)	Configuration	Package
Zero bias detector	HSMS-285B	2	150	0.3		Single	SOT-323
	HSMS-285C	2	150	0.3		Series Pair	SOT-323
	HSMS-285L	2	150	0.3		Unconnected Trio	SOT-363
	HSMS-285P	2	150	0.3		Bridge Quad	SOT-363
	HSMS-2850	2	150	0.3		Single	SOT-23
	HSMS-2852	2	150	0.3		Series Pair	SOT-23
	HSMS-2855	2	150	0.3		Unconnected Pair	SOT-143
High frequency- up to 14 GHz	HSMS-286B	4	250	0.3	14.0	Single	SOT-323
	HSMS-286C	4	250	0.3	14.0	Series Pair	SOT-323
	HSMS-286E	4	250	0.3	14.0	Common Anode	SOT-323
	HSMS-286F	4	250	0.3	14.0	Common Cathode	SOT-323
	HSMS-286K	4	250	0.3	14.0	High Isolation Unconnected Pair	SOT-363
	HSMS-286L	4	250	0.3	14.0	Unconnected Trio	SOT-363
	HSMS-286P	4	250	0.3	14.0	Bridge Quad	SOT-363
	HSMS-286R	4	250	0.3	14.0	Ring Quad	SOT-363
	HSMS-2860	4	250	0.3	14.0	Single	SOT-23
	HSMS-2862	4	250	0.3	14.0	Series Pair	SOT-23
	HSMS-2863	4	250	0.3	14.0	Common Anode	SOT-23
	HSMS-2864	4	250	0.3	14.0	Common Cathode	SOT-23
	HSMS-2865	4	250	0.3	14.0	Unconnected Pair	SOT-143
	HSMS-8101	4	250	0.26	14.0	Single	SOT-23
	HSMS-8202	4	250	0.26	14.0	Series Pair	SOT-23
HSMS-8207	4	250	0.26	14.0	Ring Quad	SOT-143	
HSMS-8209	4	250	0.26	14.0	Crossover Quad	SOT-143	
Axial Glass Packaged Schottky Diodes	1N5711	70	410	2.0		Single	Axial
	1N5712	20	550	1.2		Single	Axial
	5082-2835	8	340	1.0		Single	Axial
	5082-2800	70	410	2.0		Single	Axial

Beam Lead Schottky Diodes

Applications	Part Number	VBR (V)	VF (mV)	Ct (pF)	RD (Ohm)	Configuration	Package
Microwave Beam Lead Schottky Diodes	HSCH-5310	4	500	0.1	20.0	Medium Barrier	Beam-Lead
	HSCH-5312	4	500	0.15	16.0	Medium Barrier	Beam-Lead
	HSCH-5314	4	500	0.15	16.0	Medium Barrier	Beam-Lead
	HSCH-5330	4	375	0.1	20.0	Low Barrier	Beam-Lead
	HSCH-5331	4	375	0.1	20.0	Batch Match	Beam-Lead
	HSCH-5332	4	375	0.15	16.0	Series Pair	Beam-Lead
	HSCH-5340	4	375	0.1	20.0	Low Barrier	Beam-Lead
	HSCH-5512	4	500	0.15	16.0	Series Pair	Dual Beam Lead
Beam Lead GaAs Schottky Diodes	HSCH-5531	4	375	0.1	20.0	Low Barrier	Dual Beam Lead
	HSCH-9101	4.5	700	0.04	12	Single	Beam-Lead
	HSCH-9201	4.5	700	0.04	12	Series Pair	Beam-Lead
	HSCH-9251	4.5	700	0.04	12	Antiparallel Pair	Beam-Lead
Zero-Bias Beam Lead GaAs Detector	HSCH-9301	4.5	700	0.075	12	Ring Quad	Beam-Lead
	HSCH-9161			0.035		Single	Beam-Lead
GaAs Schottky Microwave/Millimeter-wave	HSCH-9401		700	0.015	8.5	Single	Chip
	HSCH-9501	4.5	700	0.05	6	Series Pair	Chip
	HSCH-9551		700	0.05	6	Antiparallel Pair	Chip

Notes:
Diode capacitance at Vr=0 V

Product Selection Guides

mmW MMIC Selection Guide

GaAs MMIC Low Noise Amplifiers

Part Number	Frequency Range (GHz)	Bias Cond. (V @ mA)	Gain (dB)	P _{1dB} (dBm)	NF (dB)	Package
AMMC-5023	21.2 – 26.5	5 @ 28	23	+10	2.3	chip
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
AMMC-5024	distributed amplifier with low-frequency extension capabilities	0.3 – 40	7 @ 200	16	±0.75	+22.5	chip
AMMC-5026	distributed amplifier with low-frequency extension capabilities	2 – 35	7 @ 150	10.5	±0.75	+24	chip
AMMC-5040	good input match to DC; can bias input stage for multiplication	20 – 45	4.5 @ 300	22	±2	+21	chip
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
HMMC-5032	compact transmitter amplifier with integrated output power detector	17.7 – 32	4.5 @ 250	8	±1	+22	chip
HMMC-5033	high gain transmitter amplifier with integrated output power detector	17.7 – 32	5 @ 680	18	±1	+26	chip
HMMC-5034	compact transmitter amplifier with integrated output power detector	37 – 43	4.5 @ 300	8	±1	+23	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
HMMC-5200	general purpose HBT amplifier	DC – 20	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

Product Selection Guides**mmW MMIC Selection Guide****GaAs MMIC SPDT Switches**

Part Number	Frequency Range (GHz)	Insertion Loss (dB)	Isolation (dB)	P _{1dB} (dBm)	Package
AMMC-2008	DC – 50	2.3	25	+14	chip
HMMC-2007 (abs.)	DC – 8	1.1	38	> 27	chip
HMMC-2027 (abs.)	DC – 26.5	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
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	Freq. (GHz)	Input Power (dBm)	Input Bias (V @ mA) ⁽¹⁾	P _{out} (dBm)	Phase Noise (dBc/Hz)	Package
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
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
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
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
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
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
HMMC-3102	÷ 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	+6.0	-153 @ 100 KHz offset	SOIC-8
HMMC-3104	÷ 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	+6.0	-153 @ 100 KHz offset	SOIC-8
HMMC-3108	÷ 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	+6.0	-153 @ 100 KHz offset	SOIC-8
HMMC-3122	÷ 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	0	-153 @ 100 KHz offset	SOIC-8
HMMC-3124	÷ 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	0	-153 @ 100 KHz offset	SOIC-8
HMMC-3128	÷ 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	0	-153 @ 100 KHz offset	SOIC-8

Note:

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