

Semiconductor Wireless Applications and Selection Guides

System Block Diagrams and
Product Suggestions

Product Selection Guides



Agilent Technologies

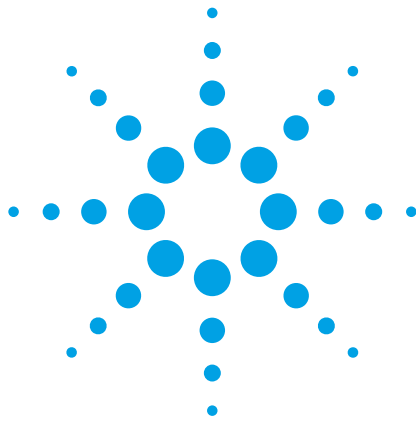


Table of Contents

System Block Diagrams and Product Suggestions

Wireless Infrastructure	3
Basestation Radiocard	3
Basestation Low Noise Amplifier (LNA)	4
Basestation Tower Mounted Amplifier (TMA)	4
Basestation Multi-carrier Power Amplifier (MCPA)	5
Microwave Link (Point-Point/Point-Multipoint)	6
DBS Satellite TV System	9
DAB/GPS/SDARS/DMB Digital Receivers	10
2.4 GHz and 5-6 GHz Systems (including 802.11a/b/g)	11
3-4 Ghz Systems (Broadband Wireless Access)	13
VSAT	15
C-band	16
Ku-band	17

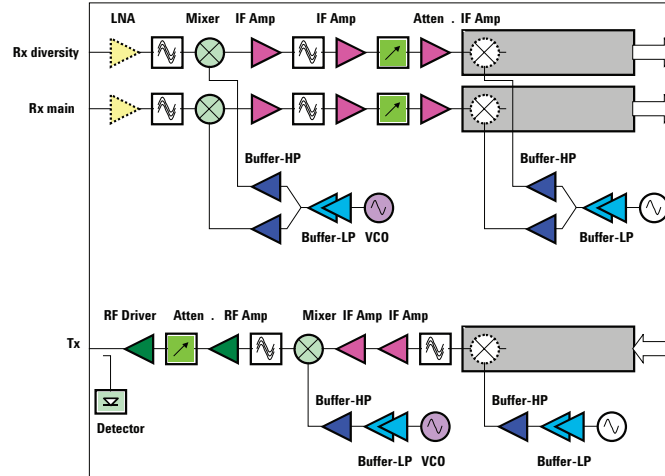
Product Selection Guides

RFICs (GaAs and Silicon)	18
Transistors (FET and Bipolar)	20
Diodes (PIN and Schottky)	22
Diodes (GaAs Schottky)	23
MMICs (mmW GaAs and HBT)	25

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 ATF-58143 ATF-54143	5/54 3/30 3/60	0.4- 6 0.45- 6 0.45- 6	15.4 16.5 16.6	18.6 19 20	39.1 30.5 36.2	1.5 0.5 0.5	E-pHEMT MMIC, SOT343 E-pHEMT FET, SOT343 E-pHEMT FET, SOT343
RF Amplifier	MGA-53543 MGA-61563⁵ ATF-521P8 ATF-531P8	5/54 3/41.6 4.5/200 4/135	0.4- 6 0.5- 4 0.05- 6 0.05- 6	15.4 15.5 17 20	18.6 15.1 26.5 24.5	39.1 31.7 42 38	1.5 1 0.5 0.6	E-pHEMT MMIC, SOT343 E-pHEMT MMIC, SOT363 E-pHEMT FET, LPCC E-pHEMT FET, LPCC
RF Driver	ATF-50189 ATF-501P8 ATF-511P8	4.5/280 4.5/280 4.5/200	0.05- 6 0.05- 6 0.05- 6	15.5 14.7 14.8	29 28 30	45 45 41.7	1.1 1.4 1.4	e-pHEMT FET, SOT89 E-pHEMT FET, LPCC E-pHEMT FET, LPCC
Mixer	IAM-92516	5/27	0.7- 2.4	6 (CL)	0 (IP1dB)	27 (IIP3)	9.5	E-pHEMT MMIC, LPCC(3x3)
Buffer-High Power	MGA-565P8³ ABA-54563	5/67 5/81	0.1- 3.5 DC- 3	21.8 22.5	20 (Psat) 16	- 26	- 4.1	E-pHEMT MMIC, LPCC Si MMIC, SOT363
Buffer-Low Power	ABA-51563 ABA-52563	5/18 5/35	DC- 3.5 DC- 3.5	21.5 21.5	1.8 9.8	11.4 19.9	3.7 3.3	Si MMIC, SOT363 Si MMIC, SOT363
VCO	AT-41532 AT-32032	5/5 2.7/5	10GHz ft 10GHz ft	10.5 10.4	7 7.5	- -	1.5 1.25	Si BJT, SOT323 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-62563⁵ MGA-545P8 ADA-4743 ADA-4643 ABA-54563 ABA-53563 ABA-52563	3/55 3/135 (3.8)/60 (3.5)/35 5/81 5/46 5/35	0.1- 3 0.1- 7 DC- 2.5 DC- 2.5 DC- 3 DC- 3.5 DC- 3.5	22 22 16.6 17.3 23 21.5 21.8	18 19 17.1 14 18 15 12.5	34.8 36 34 29 32 27.5 28	0.8 2 4.2 4 3 2.9 2.7	E-pHEMT MMIC, LPCC E-pHEMT MMIC, SOT363 Si MMIC, SOT343 Si MMIC, SOT343 Si MMIC, SOT363 Si MMIC, SOT363 Si MMIC, SOT363
Detector -Schottky Diodes	HSMS-282x HSMS-286x	Ct max = 1pF @0V Ct max = 0.3pF @0V						SOT323/363/23/143 SOT323/363/23/143
Attenuator -PIN Diodes	HSMP-381x⁴ HSMP-386x ⁴	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

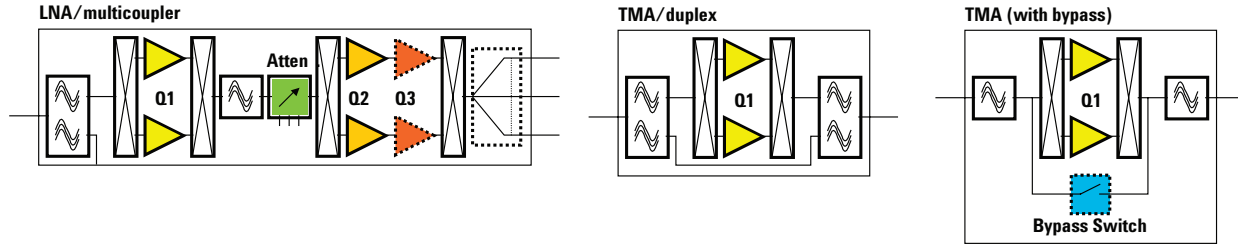
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. NFmin figures for discrete FETs.
3. High reverse isolation: 50dB typical.
4. See AN1048
5. Current Adjustable: 20-60mA

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-55143	2.7/10	0.45- 6	17.7	14	24.2	0.6	E-pHEMT FET, SOT343
	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-50189	4.5/280	0.05- 6	15.5	29	45	1.1	E-pHEMT FET, SOT89
	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	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	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

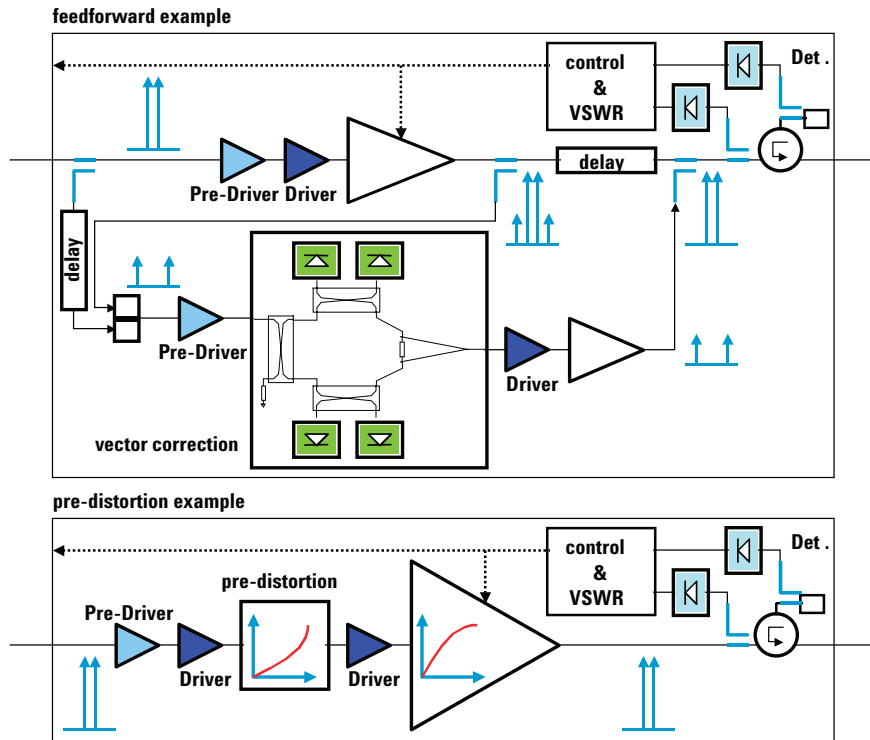
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. NFmin figures for discrete FETs.
3. See AN1048.

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-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-50189	4.5/280	0.05- 6	15.5	29	45	1.1	E-pHEMT FET, SOT89
	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
Detector - Schottky Diodes	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	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

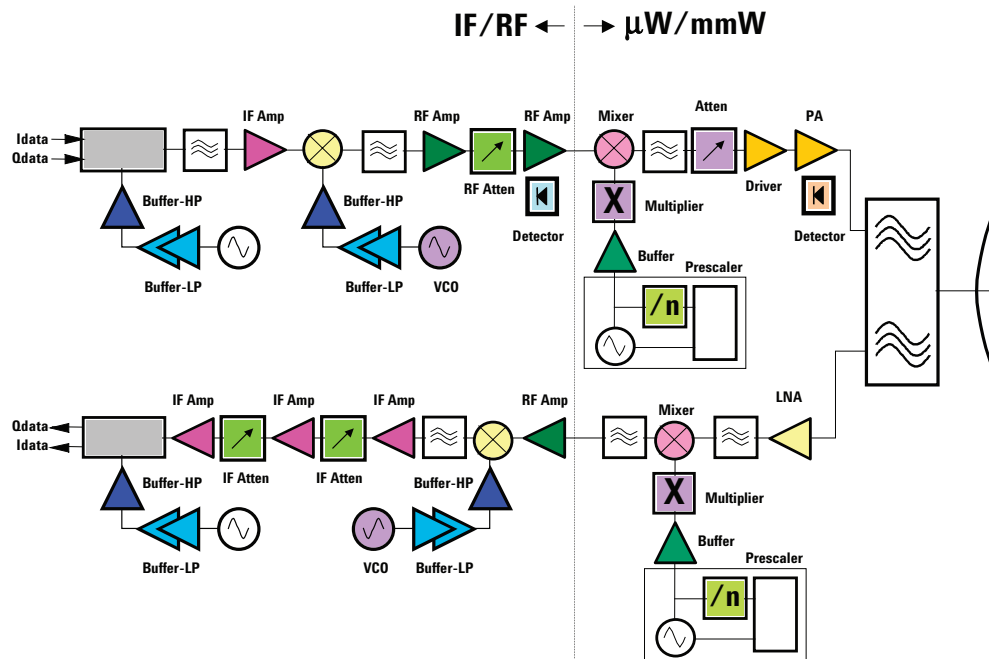
Recommended Parts in **Bold**.

Notes:

1. Gain and P1dB performance for discrete FETs when matched for best IP3.
2. NFmin figures for discrete FETs.

System Block Diagrams and Product Suggestions

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



Microwave Link – μW/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 HMMC-5038	5/28 3/120	21.2 - 26.5 37 - 40	23.6 23	9.5 12	18 -	2.3 4.8	chip chip
Drivers/Buffers	AMMC-5023 AMMC-5040 AMMC-5618 AMMC-5620 AMMC-5026	5/28 4.5/300, -0.5 5/107 5/95 7/150	21.2 - 26.5 20 - 45 6 - 20 6 - 20 2 - 35	23.6 25 14.5 19 10.5	9.5 19.5 19.5 15 21	18 30 - 23.5 27	2.3 - 4.4 4.2 3.6	chip chip chip chip chip
PA	AMMC-5033 HMMC-5034	5/500+3.5/280 4.5/300	17.7 - 32 37 - 43	20 8	27 23	32 -	- -	chip chip

Recommended Parts in **Bold**.

System Block Diagrams and Product Suggestions

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

Microwave Link – μ W/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	AMMC-3040	3.5/250 or 4.5/150	18 - 36	9.5 (down) 10 (up)	17	23	chip
	AMMC-3041	none	18 - 42	9.5 (down) 9 (up)	16	23	chip
- Schottky diodes	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 beamlead
Multiplier - mmic	AMMC-3040 AMMC-5040 AMMC-5023	LO input can be biased as a multiplier Input can be biased as a multiplier, see AN #50 Can be biased as a doubler, see PN #11					chip chip chip
	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 – μ W/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	HPND-4005	Si single, Ct=17fF, =100ns					beamlead
Switch - mmic (SPDT)	AMMC-2008	two 0/-3V	DC - 50	1.6	14	32	chip
	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	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

Application	Part Number	Features	Package
Detector - Schottky diodes	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**.

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-61563 ²	3/41.6	0.5- 4	15.5	15.1	31.7	1	E-pHEMT 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
	ABA-54563	5/81	DC- 3	22.5	16	26	4.1	Si MMIC, SOT363
Buffer-Low Power	ABA-31563	3/14.5	DC- 3	21	2	13	3.8	Si MMIC, SOT363
	ABA-32563	3/38	DC- 2	18.5	8	19	3.4	Si MMIC, SOT363
	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
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	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	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-62563²	3/55	0.1- 3	22	18	35	0.8	E-pHEMT MMIC, SOT363
	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-54563	5/81	DC- 3	23	18	32	3	Si 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

Application	Part Number	Features	Package
IF Attenuator - PIN Diodes	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

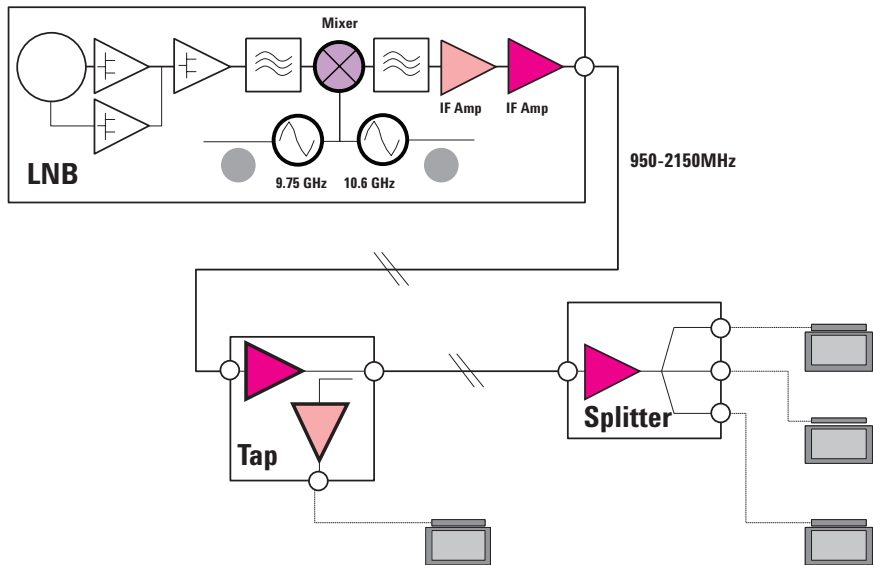
Recommended Parts in **Bold**.

Notes:

1. High reverse isolation: 50dB typical.
2. Current adjustable: 20 - 60mA

System Block Diagrams and Product Suggestions

DBS Satellite TV System



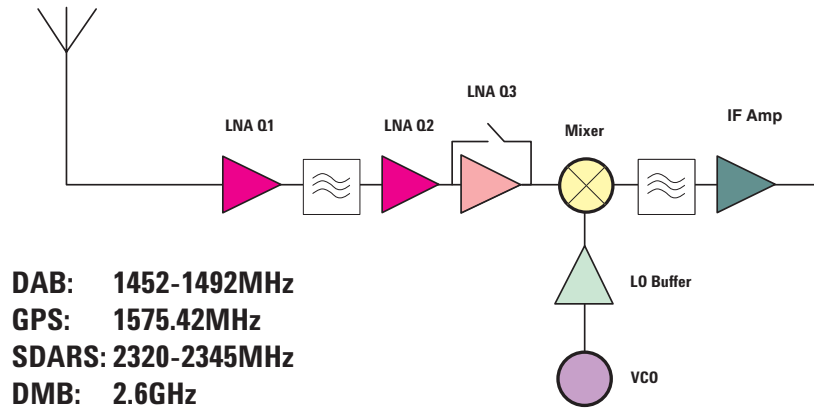
DBS Satellite TV System

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
IF Amplifier	ABA-31563	3/14	DC- 3	21.5	2	13.1	3.8	Si MMIC, SOT363
	ABA-32563	3/37	DC- 3	19.0	8.4	19.5	3.5	Si MMIC, SOT363
	ABA-51563	5/18	DC- 3.5	21.5	1.8	11.4	3.7	Si MMIC, SOT363
	ABA-52563	5/18	DC- 3.5	21.5	9.8	19.9	3.3	Si MMIC, SOT363
	ABA-53563	5/35	DC- 3.5	21.5	12.7	22.9	3.5	Si MMIC, SOT363
	ABA-54563	5/81	DC- 3	22.5	16	26	4.2	Si MMIC, SOT363
	AT-41511	5/25	10GHz ft	12.5 (MAG)	14.5	25	2.5	Si BJT, SOT143
Mixer - Schottky Diodes	HSMS-8202	Ct max = 0.26pF @0V R _o max = 14Ω @ I _F =5mA						SOT143

Recommended Parts in **Bold**.

System Block Diagrams and Product Suggestions

DAB/GPS/SDARS/DMB Digital Receivers



DAB/GPS/SDARS/DMB Digital Receivers

Application	Part Number	Typ. Bias V/mA	Gain/dB ¹				OIP3/dBm				NF/dB ²				Device Type and Package
			DAB	GPS	SDARS	DMB	DAB	GPS	SDARS	DMB	DAB	GPS	SDARS	DMB	
LNA Q1/Q2	ATF-55143	2.7/10	20.0	19.0	17.0	16.0	23.0	23.5	24.0	24.0	0.3	0.35	0.45	0.5	E-pHEMT FET, SOT343
	ATF-551M4	2.7/10	20.0	19.0	16.5	16.0	23.0	23.5	24.2	24.2	0.3	0.35	0.45	0.5	E-pHEMT FET, MiniPak
LNA Q3	MGA-71543³	3/10 ⁴	16.5	16.3	15.2	14.6	19.5	19.3	18.2	17.6	0.7	0.75	0.8	0.85	GaAs MMIC, SOT343
	MGA-72543³	3/20 ⁴	14.3	14.1	13.2	12.8	24.8	24.6	23.7	23.3	1.4	1.4	1.45	1.45	GaAs MMIC, SOT343
	MGA-725M4³	3/20 ⁴	16.6	16.4	15.3	14.6	26.5	26.3	25.2	24.3	1.2	1.2	1.3	1.3	GaAs MMIC, SOT343
Mixer	IAM-91563	3/9 to 15	9.5	9.0	7.5	7.0	3.0 to 4.5				7.5	8.2	11.0	11.5	GaAs MMIC, SOT343

Notes:

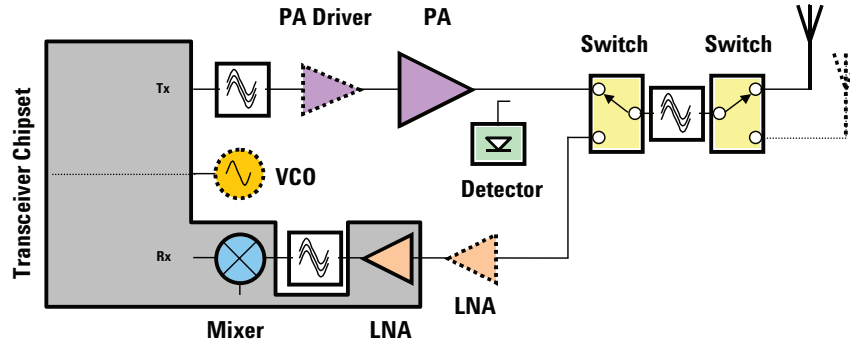
1. Gain for discrete FETs when matched for best IP3.
2. NFmin figures for LNA parts.
3. LNA bypass switch included.
4. Current adjustable set to linearity performance.

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
LO Buffer	ABA-31563	3/14	DC- 3	21.5	2.2	13.1	3.8	Si MMIC, SOT363
	ABA-32563	3/37	DC- 3	19.0	8.4	19.5	3.5	Si MMIC, SOT363
VCO	AT-41532	2.7/5	10GHz ft	10	7	-	1.1	Si BJT, SOT323
	AT32032	2.7/5	10GHz ft	10	7.5	-	1.2	Si BJT, SOT323

Recommended Parts in **Bold**.

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-521P8	4.5/200	0.5-6	10	27	39	1.75	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-71543³	3/10 to 40	0.1-6	15	7.5 to 15.5	18 to 23.5	0.8	GaAs MMIC, Bypass, SOT343
	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	HSMS-286x	Ct max = 0.3pF @ 0 V						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-41532	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-501P8	4.5/280	0.5-6	14	28	47	-	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	8	24.5	41	1.03	E-pHEMT FET, LPCC
LNA	MGA-61563 ⁴		0.1-6	14	15.1	31.5	1.2	E-pHEMT FET, SOT363
	MGA-85563	3/15 to 30	0.9-6	16	1 to 8	12.5 to 18	1.6	GaAs MMIC, SOT363
	MGA-87563		0.5-4	12.5	-2	8	1.6	GaAs MMIC, SOT363
	MGA-71543 ³	3/10 to 40	0.1-6	11	7.5 to 15.5	19 to 24.5	1	GaAs MMIC, Bypass, SOT343
	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	HMPS-282x HSMS-282x HSMS-286x	Ct max = 1pF @0 V Ct max = 1pF @0 V Ct max = 0.3pF @0 V						MiniPak SOT323/363/23/143 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-41532	2.7/5	10GHz ft	8.5	6.5	-	1.7	Si BJT, SOT323
	AT-32032	2.7/5	10GHz ft	6	8	-	2.5	Si BJT, SOT323

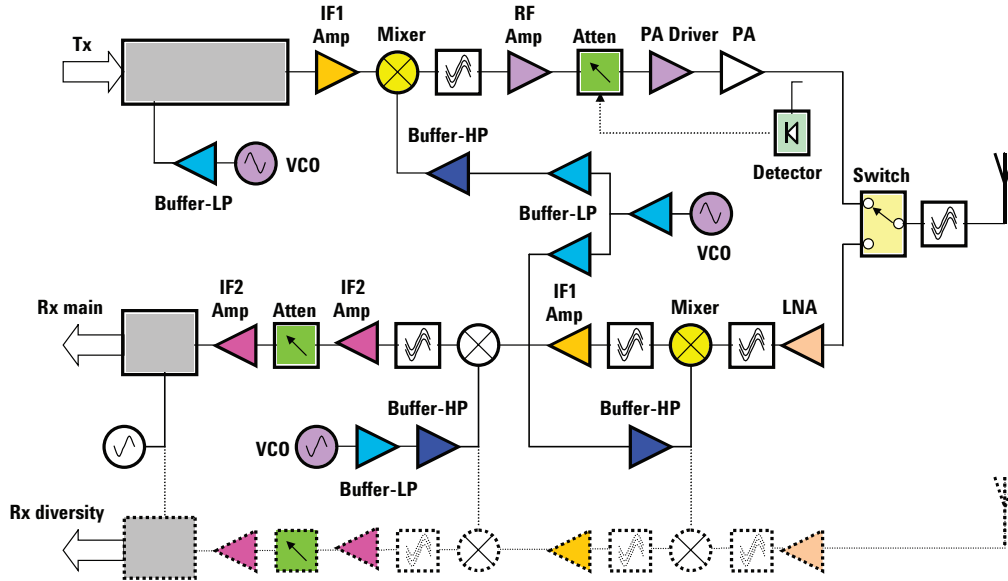
Recommended Parts in **Bold**.

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. Current adjustable: 20-60mA

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-61563³	3/41	0.1 - 6	11.4	15	30.7	1.6	E-pHEMT FET, SOT363
	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	GaAs MMIC, SOT363
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-61563³	3/41	0.1 - 6	11.4	15	30.7	1.6	E-pHEMT FET, 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-62563³	3/62	0.1 - 3	22	18	34.8	0.8	E-pHEMT MMIC, SOT363
	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-54563	5/81	DC- 3	23	18	32	3	Si 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

Recommended Parts in **Bold**.

Notes:

- Gain and P1dB performance for discrete FETs when matched for best IP3
- NFmin figures for discrete FETs
- Current adjustable: 20-60mA

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-61563 ³	3/41	0.1 - 6	15.5	15.1	31.7	1	E-pHEMT 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-62563³	3/62	0.1 - 3	15.5	17.7	32.3	1.2	E-pHEMT MMIC, SOT363
	ABA-54563	5/81	DC- 3	22.5	16	26	4.1	Si 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	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	HSMS-8202	Si series pair, Ct=0.26pF, low-cost	SOT23
Detector - Schottky diodes	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	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**.

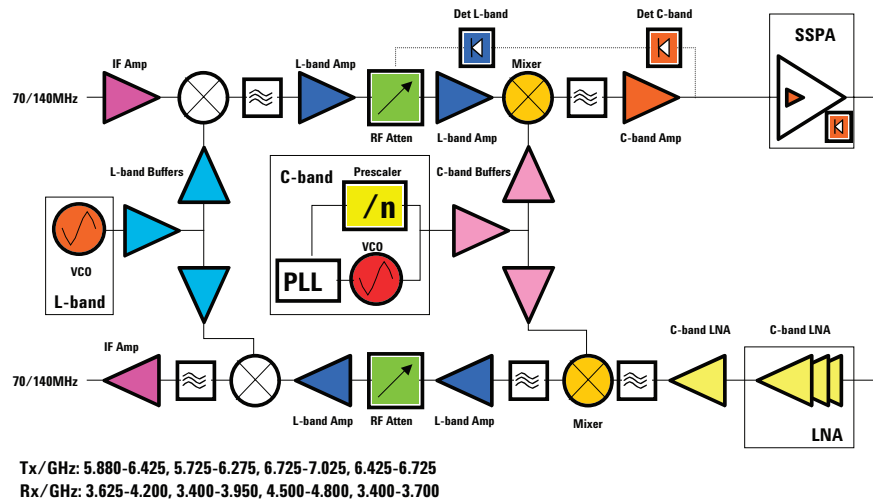
Notes:

1. High reverse isolation: 50dB typical.
2. Reverse Isolation 40dB typical.
3. Current adjustable: 20-60mA

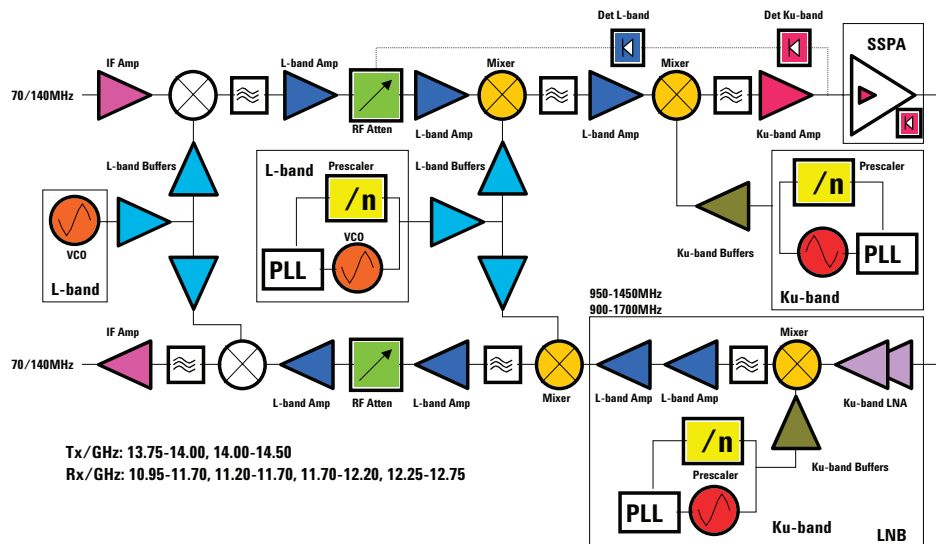
System Block Diagrams and Product Suggestions

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-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
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	PHMET FET, ceramic
	ATF-36163	1.5/10	1.5-18	15	5	-	0.61	PHMET 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
	ATF-36163	1.5/10	1.5-18	9.4	5	-	1	PHEMT FET, SOT363
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	Ct max = 0.3pF @0V	SOT323/363/23/143 beamlead beamlead
	HSCH-5310/5330 HSCH-5312/5332	Si single, Ct=0.1pF, med. barrier/low barrier Si single Ct=0.15pF, med. barrier/low barrier	
Ku-band Mixer - Schottky diodes ³	HSMS-8202	Si series pair, Ct=0.26pF, low-cost	SOT23 beamlead beamlead
	HSCH-5312/5332 HSCH-5531/5512	Si single Ct=0.15pF, med. barrier/low barrier Si series pair, Ct=0.15pF, low barrier/ Ct=0.1pF, med. barrier	

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 Smart Bias 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-61563	0.1 – 6	2	3	41	1.2	16.6	+15.8	+28.5	SOT-363 (SC-70)
MGA-62563	0.1 – 3	0.5	3	60	0.9	22	+17.8	+32.9	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-31563	DC – 3	2	3	14	3.8	21.5	+2.2	13.1	SOT-363 (SC-70)
ABA-32563	DC – 3	2	3	37	3.5	19.0	+8.4	19.5	SOT-363 (SC-70)
ABA-54563	DC – 3	2	5	81	4.1	22.5	+16	26.0	SOT-363 (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 _{CC} 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 (dBm)	OIP ₃ @ 2 GHz (dBm)	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-50189	6400	0.05 - 6	2	4.5	280	1.1	15.5	45.3	+29.1	SOT-89
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]
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:

1. 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.
2. MiniPak is a thin miniature packaging with the following dimension: 1.4 mm (L) x 1.2 mm (W) x 0.7 mm (D)
3. 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-3814	0.27	3	100	300	1500	Common Cathode	SOT-23
	HSMP-481B	0.35	3	100	300	1500	Dual Cathode	SOT-323 (SC-70)
Low inductance limiter	HSMP-4810	0.35	3	100	300	1500	Dual Cathode	SOT-23
	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

Product Selection Guides

Diodes (PIN and Schottky) Selection Guide

Schottky-Barrier Diodes

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
High frequency- up to 14 GHz	HSMS-2855	2	150	0.3		Unconnected Pair	SOT-143
	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-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-5618	efficient two-stage amplifier	6 – 20	5 @ 107	14.5	±0.3	+19.5	chip
AMMC-5620	high gain four-stage amplifier	6 – 20	5 @ 95	19	±0.21	+15	chip
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-5033	high gain transmitter amplifier with integrated output power detector	17.7 – 32	5 @ 780	20	±2	+27	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-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-5034	compact transmitter amplifier with integrated output power detector	37 – 43	4.5 @ 300	8	±1	+23	chip
HMMC-5200	general purpose HBT amplifier	DC – 20	5 @ 45	9.5	±1	+12	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 Mixers

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
AMMC-3040	3-PORT DBM Up/Dn converter +LO amplifier	18 – 36	DC – 3	+2	3.5 @ 250	17 dn	10 dn	chip
AMMC-3041	3-PORT DBM Up/Dn converter	18 – 42	DC – 5	+14	none required	9.5 dn	9.5 dn	chip
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-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_{PwrSel})

www.agilent.com/view/rf

www.agilent.com
www.agilent.com/view/rf

Agilent Technologies is a leading provider of innovative technologies for communications and life sciences. Agilent delivers a wide range of solutions and services, including semiconductors, test and measurement, and chemical analysis, for the leading corporations around the world.

Agilent's communications solutions include leading-edge components, test, monitoring, management, and sub-systems for optical and wireless systems and networks. Agilent has an extremely broad range of technology and system expertise to help customers stay ahead in the fast-moving communications industry.

Agilent's semiconductor solutions for the connected world include fiber-optic and IC products for networking, radio frequency and infrared devices for mobile communications, image sensors for cameras and optical computer mice, storage area network solutions, and applications specific IC for networking and imaging.

www.agilent.com/semiconductors

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or
(916) 788-6763

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+65) 6271 2394

India, Australia, New Zealand: (+65) 6271 1939

Japan: (+81 3) 3335-8152 (Domestic/International), or
0120-61-1280 (Domestic Only)

Korea: (+65) 6755 1989

Malaysia, Singapore: (+65) 6755 2044

Taiwan: (+65) 6755 1843

Data subject to change.

Copyright © 2004 Agilent Technologies, Inc.

Obsoletes 5988-9866EN (8/03)

March 5, 2004

5989-0839EN



Agilent Technologies