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RF SEMICONDUCTORS

WJ Communications, utilizing its own Gallium Arsenide (GaAs) foundry and external best-of-breed foundries, offers a variety of highly linear RF semiconductor products including amplifiers, MCMs, converters, FETs and mixers. Internal and external process technologies are leveraged to produce the optimum trade-off between product performance and price, while guaranteeing high quality and reliability. WJ's products are ideally suited for current and next generation wireless and wireline services as well as for COMINT and ELINT applications within the defense and homeland security sectors.

AMPLIFIERS

WJ offers an extensive range of highly linear amplifiers—your perfect choice for today's high data rate telecommunications systems. WJ's amplifiers provide high reliability, high output IP3, low noise, and excellent linear figure of merit (LFOM = OIP3/DC power) in frequency ranges from DC–6 GHz. WJ's amplifiers are available in industry standard surface mount packages.

RF Amplifiers	Frequency Range (MHz)	Small Signal Gain (dB)	Noise Figure (dB)	P1dB (dBm)	OIP3 (dBm)	VSWR (I/O)	Bias (V)	Current (mA)	Package Style
AG101	60-3000	14.0	2.4	15	32	1.7 / 1.4	4.5	50	SOT-89
AH1	250-3000	13.5	2.7	21	41	1.4 / 1.4	5.0	150	SOT-89
AH3	50-870	13.0	3.0	20	41	1.9 / 1.2	5.0	150	SOT-89
AH31 NEW	50-1000	19.0	1.8	22	42	1.4 / 1.3	5.0	150	SOT-89
AH4	250-6000	13.5	2.7	21	41	1.9 / 1.2	5.0	150	LGA-3x3
AH11-Balanced*	600-2100	12.2	4.2	24	46	1.7 / 1.7	5.0	300	SOIC-8 (B)
AH11-Dual Push Pull*	1700-2000	12.0	3.7	27	47	1.7 / 1.7	5.0	600	SOIC-8 (B)
AM1	60-3000	14.0	2.4	18	37	1.7 / 1.4	4.5	75	SOT-89

Medium and High Power RF Amplifiers	Frequency Range (MHz)	Small Signal Gain (dB)	Noise Figure (dB)	P1dB (dBm)	OIP3 (dBm)	VSWR (I/O)	Bias (V)	Current (mA)	Package Style
AH101	50-1500	13.5	3.5	27	47	1.5 / 1.5	9	200	SOT-89
AH102	350-3000	13.9	3.1	27	46	1.5 / 1.5	9	200	SOT-89
AH201	50-2200	17.0	2.5	30	47	1.6 / 1.4	11	350	10-PIN QFN
AH103 NEW	700-2200	29	2.9	27	46	1.4 / 1.8	4.5,9	275	SOIC-8 (B)

CATV Amplifiers	Frequency Range (MHz)	Small Signal Gain (dB)	Noise Figure (dB)	P1dB (dBm)	OIP2 (dBm)	CSO/CTB (dBc)	Bias (V)	Current (mA)	Package Style
AH2	50-860	14.5	3.5	20	47	-48 / -71	5.0	150	SOT-89
AH22-Single Push Pull*	50-860	11.7	4.5	23	70	-70 / -69	5.0	300	SOIC-8 (B)
AH22-Dual Push Pull*	50-860	13.0	4.5	26	73	-74 / -73	5.0	600	SOIC-8 (B)

CSO and CTB test conditions: AH2 – 77 channels, +34 dBmV/channel flat-loaded
 AH22 Single – 77 channels, +39 dBmV/channel flat-loaded
 AH22 Dual – 110 channels, +40 dBmV/channel flat-loaded

* All specs are for the devices on application boards, including coupler and other losses as realized in actual applications. Intrinsic device specs are better than listed herein within the application circuit.

AMPLIFIERS (continued)

The AG series are a broad family of general-purpose buffer amplifiers offering superior dynamic range in low-cost, surface mount packages. The AG series are designed to provide broadband gain at frequencies from DC to 6 GHz. Targeted at telecommunication infrastructure and CATV markets, they can be directly applied to various current and next generation system applications wherever low-cost gain blocks are needed.

InGaP Gain Block Amplifiers	Frequency Range (MHz)	Gain (dB) 0.9GHz/1.9GHz		P1dB (dBm) 0.9GHz/1.9GHz	OIP3 (dBm) 0.9GHz/1.9GHz		Device Voltage (V)	Current (mA)	Package Style
AG201	DC-6000	11.0	10.5	6.7 / 6.1	19.3	18.4	4.00	20	SOT-86 / SOT-363
AG202	DC-6000	14.5	14.0	7.6 / 6.5	19.6	19.2	4.05	20	SOT-86 / SOT-363
AG203	DC-6000	19.5	17.0	8.0 / 7.3	20.8	20.7	4.05	20	SOT-86 / SOT-363
AG302	DC-6000	15.5	14.5	13.5 / 12.2	25.9	25.0	4.23	35	SOT-86 / SOT-363
AG303	DC-6000	20.5	18.0	14.0 / 12.7	26.1	24.8	4.23	35	SOT-86 / SOT-363
AG402	DC-6000	15.0	14.5	17.1 / 15.9	32.6	29.6	4.91	60	SOT-86 / SOT-89
AG403	DC-6000	20.5	18.0	17.8 / 16.0	31.4	28.5	4.91	60	SOT-86 / SOT-89
AG503	DC-6000	20.0	18.0	15.9 / 14.6	28.8	27.8	5.00	45	SOT-86 / SOT-89
AG602	DC-6000	14.0	13.0	19.0 / 18.7	33.7	33.5	5.16	75	SOT-86 / SOT-89
AG603	DC-6000	18.0	16.0	19.4 / 19.2	33.7	33.4	5.16	75	SOT-86 / SOT-89
AG604	DC-6000	20.5	17.0	19.4 / 19.2	33.1	33.1	5.16	75	SOT-86 / SOT-89

HBT AMPLIFIERS

WJ's InGaP HBT technology enables these amplifiers to achieve broadband performance at power levels of 0.25–2 watts. The low-cost surface mount package styles provide excellent thermal management while achieving superior linearity at given output power levels. These devices deliver more power while still meeting exceptional ACPR performance. They are ideal for various current and next generation wireless technologies such as GPRS, GSM, CDMA, and W-CDMA where high linearity and high power are required.

HBT Amplifiers	Frequency Range (MHz)	Small Signal Gain (dB)	Noise Figure (dB)	P1dB (dBm)	OIP3 (dBm)	VSWR (I/O)	Device Voltage (V)	Current (mA)	Package Style
AH110 NEW	50-2000	18	5.0	24	39	1.3 / 1.6	8	100	SOT-89
AH115 NEW	1800-2300	15	6.0	28	45	1.4 / 2.3	5	250	SOIC-8 (B)
AH116 NEW	800-1000	17	6.0	28	44	1.4 / 2.0	5	250	SOIC-8 (B)
AH117 NEW	400-2200	19	5.5	24	40	1.6 / 1.8	5	120	SOT-89
AH210 NEW	1700-2200	23	5.5	30	47	1.9 / 1.9	5	400	SOIC-8 (B)
AH215 NEW	400-2300	12	6.5	31	47	1.4 / 1.9	5	450	SOIC-8 (B)
AH312 NEW	400-2300	11	7.0	34	49	1.6 / 1.9	5	800	SOIC-8 (B)

VARIABLE GAIN AMPS

The VG series are high dynamic-range variable gain amplifiers for the cellular, PCS and UMTS bands. The high output compression and output intercept points of the amplifiers are maintained over the entire attenuation range, making them ideal for use in transmitter and receiver AGC circuits or as a variable gain stage following an LNA in high dynamic range receiver front ends. Superior thermal design allows these devices to have minimum MTTF ratings of at least 100 years at a mounting temperature of +85°C.

Variable Gain Amplifiers	Frequency (MHz)	Attenuation Range (dB)	Gain (dB)	OIP3 (dBm)	P1dB (dBm)	Noise Figure (dB)	Current (mA)	Control Voltage (V)	Bias (V)	Package Style
VG024 NEW	50-2200	18	16.6	40	21	5.5	150	0-4.5	5	SOIC-8 (B)
VG101 NEW	750-1000	29	16.0	40	21	4.1	150	0-4.5	5	28-PIN QFN
VG111 NEW	1800-2200	30	14.0	38	21	4.1	150	0-4.5	5	28-PIN QFN

MIXERS

PCS/UMTS MMIC Mixers	Frequency Range (MHz)			LO Power (dBm)	Input P1dB (dBm)	Input IP3 (dBm)	Conversion Loss (dB)	L-I Isolation (dB)	Package Style
	RF	LO	IF						
MH1	1700-2000	1450-1950	50-250	17	18	30	8.8	38	SOIC-8
MH101	1900-2200	1700-2150	50-200	17	16	30	9.0	37	SOIC-8
MH102	1900-2200	1550-2050	150-350	17	16	32	9.0	35	SOIC-8

Cell Band MMIC Mixers	Frequency Range (MHz)			LO Power (dBm)	Input P1dB (dBm)	Input IP3 (dBm)	Conversion Loss (dB)	L-I Isolation (dB)	Package Style
	RF	LO	IF						
MH203 NEW	800-960	1000-1310	200-350	17	16	30	8.5	50	SOIC-8
MH205 NEW	800-915	700-845	70-120	17	16	32	8.5	50	SOIC-8

Quad FET Mixers	Frequency Range (MHz)			LO Power (dBm)	Input P1dB (dBm)	Input IP3 (dBm)	Conversion Loss (dB)	L-I Isolation (dB)	Package Style
	RF	LO	IF						
MH302 NEW	1800-2000	1540-1740	200-300	13	18	27	7.5	32	6-PIN DFN
MH303 NEW	820-920	720-900	20-100	13	17.5	28	7.5	44	6-PIN DFN

MIXERS (continued)

High Intercept FET Mixers	RF	Frequency Range (MHz) LO	IF	LO Power (dBm)	Input P1dB (dBm)	Input IP3 (dBm)	Conversion Loss (dB)	Isolation L-R (dB)	Package Style
HMJ1	800-1000	700-980	20-100	17	23	39	7.7	29	J-PAK-18
HMJ2	1850-1990	1700-1940	50-150	17	23	37	9.0	32	J-PAK-18
HMJ4	1700-1880	1550-1830	50-150	17	23	36	8.8	34	J-PAK-18
HMJ5	40-1000	30-500	5-250	17	23	35	7.5	28	J-PAK-22
HMJ7	1000-2000	1000-2000	10-100	21	23	34	8.5	24	J-PAK-22
HMJ8	2200-2300	2060-2160	50-150	18	23	37	8.0	27	J-PAK-18

Diode Mixers	RF	Frequency Range (MHz) LO	IF	LO Power (dBm)	Input P1dB (dBm)	Input IP3 (dBm)	Conversion Loss (dB)	Isolation L-R (dB)	Package Style
SME1400B-10	1-2200	1-2200	1-2000	10	6	19	6.2	35	S-PAK-3
SME1400B-13	1-2200	1-2200	1-2000	13	9	22	6.5	30	S-PAK-3
SME1400B-17	1-2200	1-2200	1-2000	17	13	27	6.5	30	S-PAK-3
SME1900-17	1600-2400	1400-2390	10-250	17	14	29	7.4	26	S-PAK-3

FETs

WJ's discrete FETs meet today's demand for wireless receiver and transmitter applications. WJ's FETs deliver exceptional performance and high reliability and are the basic building blocks within WJ's amplifier products. WJ's high dynamic range FETs are packaged in low-cost surface mount packages for customized design applications.

MESFETs	Frequency Range (MHz)	Idss (mA)	GMO (mS)	Vp (V)	Gmsg (dB)	Gss (dB)	P1dB (dBm)	OIP3 (dBm)	NF (dB)	Package Style
FH1	50-3000	140	120	-1.5	23	19	21	42	2.0	SOT-89
FH101	50-3000	140	120	-1.5	23	19	18	36	2.0	SOT-89
FP101	100-3000	340	120	-2.3	20.5	13.5	25	39	2.0	SOT-89

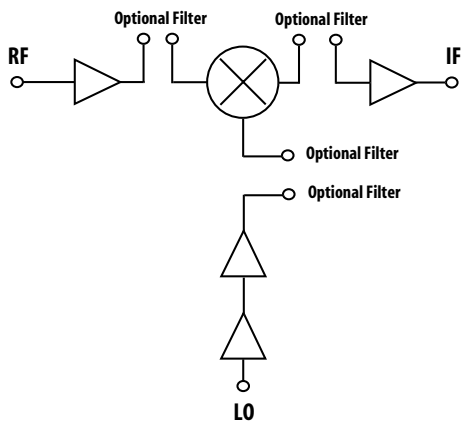
WJ's three Heterostructure-FET devices; the FP1189, FP2189 and FP31QF offer OEM's high-efficiency, high-power and high-quality building blocks for wireless infrastructure applications. These reliable HFETs enable low-cost solutions achieving 0.25-2 Watts of P1dB power. The low-cost, SOT-89 surface mount and 28-PIN QFN packages are optimized to offer excellent thermal efficiency with at least 100 year MTTF values calculated at 85°C operating case temperatures. They are ideal for a multitude of driver amplifier and power amplifier applications in wireless transmission systems.

HFETs	Frequency Range (MHz)	Idss (mA)	GMO (mS)	Vp (V)	Gmsg (dBm)	Gss (dB)	P1dB (dBm)	OIP3 (dBm)	NF (dB)	Package Style
FP1189	50-4000	290	155	-2.1	24	19	27	40	2.7	SOT-89
FP2189	50-4000	615	280	-2.1	24	18	30	44	4.5	SOT-89
FP31QF NEW	50-4000	1170	590	-2.0	24	18	34	46	3.5	28-PIN QFN

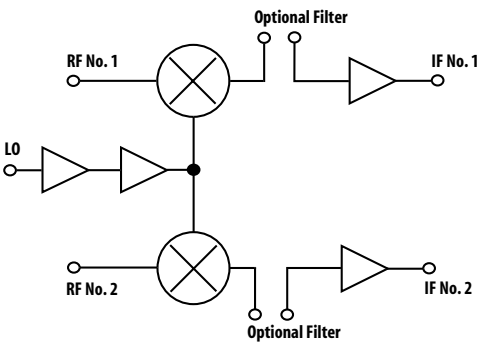
DOWNCONVERTERS

Dual Branch Converters	Frequency Range (MHz)			LO Power (dBm)	Conversion Gain(dB)	Output IP3 (dBm)	Output P1dB(dBm)	NF (dB)	Current (mA)	Bias (V)	Package Style
	RF	IF	LO								
CV210-1	800-915	65-120	680-850	0	10	36	19.5	11.5	430	5	28-PIN QFN
CV210-2	800-925	200-250	550-725	0	10	37	19.5	11.5	430	5	28-PIN QFN
CV210-3	800-925	200-300	1000-1275	0	10	37	19.5	11.5	430	5	28-PIN QFN
CV211-1	1710-2000	65-250	1460-1935	0	10	37	19.5	11.5	430	5	28-PIN QFN
CV211-2	1900-2200	150-300	1600-2050	0	10	37	19.5	11.5	430	5	28-PIN QFN
CV211-3	1900-2200	65-200	1700-2135	0	10	37	19.5	11.5	430	5	28-PIN QFN

Single-branch converter block diagram



Dual-branch converter block diagram



NEW PRODUCTS COMING SOON

WJ is introducing a new line of single-branch multi-chip modules (MCMs); two new CATV amplifiers and a new GaAs MMIC gain block for telecommunication systems. Each product continues WJ's legacy of leading technology, high performance, reliability, value and quality. Please direct your application and availability questions to: applications.engineering@wj.com, and refer to our web site at www.wj.com to view product data sheet specifications on existing products. Contact WJ directly at (800) 951-4401 for preliminary information on the following new products.

DOWNCONVERTERS

WJ expands its CV product family with these single-branch converters. These converters combine all the functions of an LO limiting driver, a MMIC mixer and RF and IF amplifiers in a 6x6 mm QFN package. Typical applications include frequency downconversion used in CDMA/GSM/TDMA, CDMA-2000, W-CDMA, and EDGE 2.5G and 3G mobile base transceiver stations for cellular frequency bands. The CV down converters can also be used in pre-distortion circuitry for high-power amplifier error correction loops.

Single Branch Converters	Frequency Range (MHz)			LO Power (dBm)	Conversion Gain (dB)	Output IP3 (dBm)	Output P1dB (dBm)	NF (dB)	Current (mA)	Bias (V)	Package Style
	RF	IF	LO								
CV110-1	800-915	65-120	680-850	0	22	37	20	5.0	360	5	28-PIN QFN
CV110-3	800-925	200-350	1000-1275	0	22	37	20	5.0	360	5	28-PIN QFN
CV111-1	1710-2000	65-250	1460-1935	0	21	38	21	5.3	360	5	28-PIN QFN
CV111-2	1900-2200	150-300	1620-2050	0	21	38	21	5.0	360	5	28-PIN QFN
CV111-3	1900-2200	150-300	1700-2135	0	21	38	21	5.3	360	5	28-PIN QFN

CATV AMPLIFIERS

WJ is introducing two new amplifiers for CATV: the AG606 and AH123. WJ's AG606 is a dual amplifier configured for push-pull operation. HBT technology is used for cost-effective low distortion amplification. The AG606 is ideal for low to moderate power, outside-plant applications and low-power, headend applications such as linear laser drivers.

The AH123 is a high-dynamic range amplifier for CATV and related applications. This device is ideal for headend applications such as analog or digital channel cards, CMTS, and laser drivers, as well as high-power outside plant devices.

CATV Amplifiers	Frequency Range (MHz)	Small Signal Gain (dB)	Noise Figure (dB)	P1dB (dBm)	Output IP3 (dBm)	Output IP2 (dBm)	CSO/CTB (dBc)	Bias (V)	Current (mA)	Package Style
AG606 –Push-Pull	50-860	13.5	6.5	+21	+36	+70	-71 / -62	+5.1	150	SOIC-8
AH123	50-860	14.0	4.5	+25	+50	+80	-65 / -60	+9.0	500	28-PIN QFN

GaAs MMIC GAIN BLOCK

WJ expands its RF amplifier product family with the AG102. The AG102 is a general-purpose gain block that offers good dynamic range and low noise figure in a low-cost surface-mount package. The combination of flat OIP3 and low noise figure performance over frequency makes it attractive for both narrowband and broadband applications.

	Frequency (MHz)	Gain (dB) 0.9 / 1.9 GHz		P1dB (dBm) 0.9 / 1.9 GHz		OIP3 (dBm) 0.9 / 1.9 GHz		Noise Figure (dB)	Device Voltage (V)	Current (mA)	Package Style
AG102	60 - 3000	14	12.8	18	18	36	36	2.1	4.5	60	SOT -89