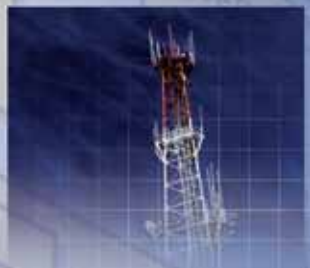

RF/IF IC Selection Guide

November 2012

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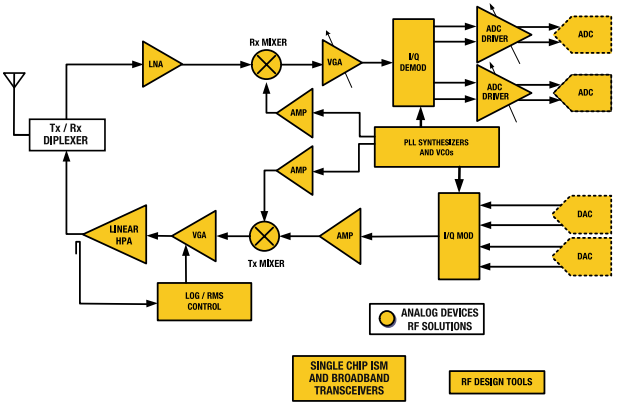
ANALOG DEVICES

ADI's RF IC Portfolio Covers Entire RF Signal Chain

Using a unique combination of design skills, systems understanding, and process technologies, Analog Devices offers the broadest portfolio of RF ICs, covering the entire RF signal chain, from industry-leading high performance RF function blocks to highly integrated ISM band single chip transceiver solutions. The RF function blocks include PLL, integrated PLL/VCO, and DDS synthesizers; TruPwr™ rms power detectors and logarithmic amplifiers; variable gain amplifiers; low noise amplifiers and other amplifiers; RF mixers and direct conversion modulator and demodulator products. In addition, ADI delivers world-leading data converters, amplifiers, MEMS, DSPs (digital signal processors), and power management ICs. Together, these technologies form complete designs and play a fundamental role in converting, conditioning, and processing real-world phenomena in a wide array of applications. These products are supported by a wide range of design resources to ease the development of RF systems, including free design tools, Circuits from the Lab® reference circuits, and the EngineerZone® technical forums. For more information, visit *www.analog.com/rf*.



Contents

Amplifiers

Features

- Broadband and narrow-band RF/IF amplifiers
- High linearity and output power
- Fully characterized over frequency range, temperature, and power supply variation

Gain Blocks

Part Number	RF Frequency (MHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package	Comments
AD8353	1 to 2700	19.8	9.1	23.6	5.3	2.7 to 5.5	41	900	2 mm × 3 mm, 8-lead LFCSP	Low cost gain block
AD8354	1 to 2700	19.5	4.6	19.0	4.2	2.7 to 5.5	23	900	2 mm × 3 mm, 8-lead LFCSP	Low cost gain block
ADL5541	50 to 6000	14.7	16.3	39.2	3.8	4.5 to 5.5	90	2000	3 mm × 3 mm, 8-lead LFCSP	Broadband matched gain block
ADL5542	50 to 6000	18.7	18.0	39.0	3.2	4.5 to 5.5	93	2000	3 mm × 3 mm, 8-lead LFCSP	Broadband matched gain block
ADL5601	50 to 4000	15.3	19.0	43.0	3.7	4.5 to 5.5	83	900	SOT-89	Broadband matched gain block
ADL5602	50 to 4000	19.5	19.3	42.0	3.3	4.5 to 5.5	89	2000	SOT-89	Broadband matched gain block

IF Amplifiers

Part Number	RF Frequency (MHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package	Comments
ADL5530	DC to 1000	16.8	21.8	37.0	3.0	3.0 to 5.5	110	190	3 mm × 2 mm, 8-lead LFCSP	Matched IF amplifier
ADL5531	20 to 500	20.9	20.4	41.0	2.5	4.75 to 5.25	100	70	3 mm × 3 mm, 8-lead LFCSP	Matched IF amplifier
ADL5534	20 to 500	21.0	20.4	40	2.5	4.75 to 5.25	98	70	5 mm × 5 mm, 16-lead LFCSP	Dual ADL5531
ADL5535	20 to 1000	16.1	18.9	45.5	3.2	4.5 to 5.5	97	190	SOT-89	Matched IF amplifier
ADL5536	20 to 1000	19.8	19.6	45	2.6	4.5 to 5.5	105	190	SOT-89	Matched IF amplifier

LNAs

Part Number	RF Frequency (MHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package	Comments
ADL5521	400 to 4000	20.8	21.8	37.0	0.9[1]	3.0 to 5.0	60	900	3 mm × 3 mm, 8-lead LFCSP	Adjustable bias, requires few external components
ADL5523	400 to 4000	21.5	21.0	34.0	0.8[1]	3.0 to 5.0	60	900	3 mm × 3 mm, 8-lead LFCSP	Adjustable bias, requires few external components

[1]Includes external input match

RF/IF Differential Amplifiers

Part Number	–3 dB Bandwidth (MHz)	Gain (dB)	Distortion 2nd/3rd (dBc)	Output IP3 (dBm)	Noise Figure (dB)	Input Noise (nV/√Hz)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD8350-15	900	15	–66/–65 (50 MHz)	28 (50 MHz)	6.8	1.7	4.0 to 11	28	3.1 mm × 5.05 mm, 8-lead SOIC/MSOP	Fixed gain, differential input/output
AD8350-20	700	20	–65/–66 (50 MHz)	28 (50 MHz)	5.6	1.7	4.0 to 11	28	3.1 mm × 5.05 mm, 8-lead SOIC/MSOP	Fixed gain, differential input/output
AD8351	2200 (A_V = 12 dB)	0 to 26	–79/–81 (70 MHz)	31 (70 MHz)	15.5	2.7	3.0 to 5.5	28	3 mm × 4.9 mm, 10-lead MSOP	Gain adjustable with external resistor
AD8352	2200 (A_V = 10 dB)	3 to 25	–83/–82 (100 MHz)	41 (140 MHz)	15.5	2.7	3.0 to 5.5	37	3 mm × 3 mm, 16-lead LFCSP	Gain adjustable with external resistor/ ultralow distortion
AD8375	630	–4 to +20	–85/–92 (200 MHz)	50 (200 MHz)	8.3	1.9	4.5 to 5.5	125	4 mm × 4 mm, 24-lead LFCSP	Differential input/output, digital gain amplifier
AD8376	700	–4 to +20	–82/–91 (200 MHz)	50 (70 MHz)	8.7	2.0	4.5 to 5.5	250	5 mm × 5 mm, 32-lead LFCSP	Differential input/output, dual-channel, digital gain amplifier
AD8369	0.001 to 600	–5 to +40	–68/–64 (70 MHz)	19.5 (70 MHz)	7	2	3.0 to 5.5	37	5.1 mm × 6.4 mm, 16-lead TSSOP	Differential input/output
AD8370	0.001 to 750	–11 to +17, +6 to +34	–65/–62 (70 MHz)	35 (70 MHz)	7.2	2.1	3.0 to 5.5	79	5.1 mm × 6.4 mm, 16-lead TSSOP	Differential input/output
AD8372	1 to 130	–9 to +32	–78/–85 (65 MHz)	35 (65 MHz)	7.9	—	4.5 to 5.5	106/ch	5 mm × 5 mm, 32-lead LFCSP	Differential input/output, dual-channel
ADL5561	2900 (A_V = 6 dB)	Adj 6, 12, 15.5	–95/–87 (140 MHz)	+49 (140 MHz)	8	2.1	3.0 to 3.6	40	3 mm × 3 mm, 16-lead LFCSP	Pin-strappable gain adjust, ultralow distortion
ADL5562	3300 (A_V = 6 dB)	Adj 6, 12, 15.5	–104/–87 (140 MHz)	47 (140 MHz)	7.3	2.1	3.0 to 3.6	80	3 mm × 3 mm, 16-lead LFCSP	Pin-strappable gain adjust, ultralow distortion
ADL5565	6750 (A_V = 6 dB)	Adj 6, 12, 15.5	–108/–103 (100 MHz)	54 (100 MHz)	8.7	1.52	2.8 to 5.2	80	3 mm × 3 mm, 16-lead LFCSP	Pin-strappable gain adjust, ultralow distortion

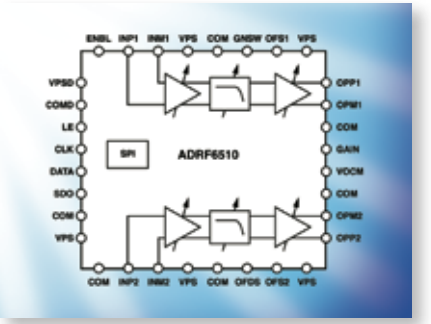
Driver Amplifiers

Part Number	RF Frequency (MHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package	Comments
ADL5320	400 to 2700	13.2	25.7	42.0	4.4	3.3 to 5.0	47 to 104	2140	SOT-89	1/4 W driver
ADL5321	2300 to 4000	14.0	25.7	41.0	4.0	4.5 to 5.5	90	2600	SOT-89	1/4 W driver, operation to 105°C
ADL5322	700 to 1000	19.9	27.9	45.3	5.0	4.75 to 5.25	320	900	3 mm × 3 mm, 8-lead LFCSP	Matched 1/2 W driver
ADL5323	1700 to 2400	19.5	28.0	43.5	5.0	4.75 to 5.25	320	2140	3 mm × 3 mm, 8-lead LFCSP	Matched 1/2 W driver
ADL5324	400 to 4000	14.6	29.1	43.1	3.8	3.15 to 5.25	133	2140	SOT-89	1/2 W driver
ADL5604	700 to 2700	12.2	29.1	42.2	4.6	4.75 to 5.25	318	2630	4 mm × 4 mm, 16-lead LFCSP	1 W driver
ADL5605	700 to 1000	23.0	30.9	44.2	4.8	4.75 to 5.25	307	943	4 mm × 4 mm, 16-lead LFCSP	2-stage, 1 W driver
ADL5606	1800 to 2700	24.3	30.8	45.5	4.7	4.75 to 5.25	362	2140	4 mm × 4 mm, 16-lead LFCSP	2-stage, 1 W driver

Attenuators/VGAs/Filters

Features

- Broad portfolio of RF and IF variable gain control products for communications, instrumentation, and military applications
- Includes continuous analog linear-in-dB products based on X-AMP® interpolation architectures and digital step controlled products providing as fine as 0.25 dB step and linear-in-volts digital control
- Offers innovative integration with digitally controlled multi-pole analog filters integrated within the VGA and single-chip AGC circuits for automatic level control



IF VGAs

Part Number	Control Type	Bandwidth (MHz)	Gain (dB)	Gain Accuracy (dB)	Output IP3 (dBm)	Noise Figure (dB)	Input Noise (nV/√Hz)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD8366	Digital	DC to 600	4.5 to 20.25	±0.25	38 (dBVrms)	11.4	—	4.5 to 5.5	180	5 mm × 5 mm, 32-lead LFCSP	Differential input/output
AD8367	Analog	DC to 500	–2.5 to +42.5	±0.2	36.5 (70 MHz)	6.2	—	2.7 to 5.5	26	5.1 mm × 6.4 mm, 14-lead TSSOP	Single-ended input/output, VGA/AGC operation
AD8368	Analog	LF to 800	–12 to +22	±0.4	33 (70 MHz)	9.5	—	4.5 to 5.5	60	4 mm × 4 mm, 24-lead LFCSP	Single-ended input/output, VGA/AGC operation
AD8369	Digital	0.001 to 600	–5 to +40	±0.05	19.5 (70 MHz)	7	2.0	3.0 to 5.5	37	5.1 mm × 6.4 mm, 16-lead TSSOP	Differential input/output
AD8370	Digital	0.001 to 750	–11 to +17, +6 to +34	±0.2	35 (70 MHz)	7.2	2.1	3.0 to 5.5	79	5.1 mm × 6.4 mm, 16-lead TSSOP	Differential input/output
AD8372	Digital	1 to 130	–9 to +32	±3	35 (65 MHz)	7.9	—	4.5 to 5.5	106/ch	5 mm × 5 mm, 32-lead LFCSP	Differential input/output, dual-channel
AD8375	Digital	630	–4 to +20	—	50 (200 MHz)	8.3	1.9	4.5 to 5.5	125	4 mm × 4 mm, 24-lead LFCSP	Differential input/output
AD8376	Digital	700	–4 to +20	—	50 (70 MHz)	8.7	2.0	4.5 to 5.5	250	5 mm × 5 mm, 32-lead LFCSP	Dual-channel AD8375
ADL5201	Digital	700	–11.5 to +20	—	50 (200 MHz)	7.5	—	4.5 to 5.5	110	4 mm × 4 mm, 24-lead LFCSP	Differential input/output

IF VGAs (Continued)

Part Number	Control Type	Bandwidth (MHz)	Gain (dB)	Gain Accuracy (dB)	Output IP3 (dBm)	Noise Figure (dB)	Input Noise (nV/√Hz)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADL5202	Digital	700	–11.5 to +20	—	50 (200 MHz)	7.5	—	4.5 to 5.5	220	6 mm × 6 mm, 40-lead LFCSP	Dual-channel ADL5201
ADL5336	Analog and digital	1000	–14.6 to +19.5	±0.1	28 (dBVrms)	7.1	—	4.5 to 5.5	80	5 mm × 5 mm, 32-lead LFCSP	Cascadable IF VGAs with rms detectors
ADRF6510	Analog	1 to 30	–5 to +45	±0.1	27 (30 MHz)	—	—	4.75 to 5.25	258	5 mm × 5 mm, 32-lead LFCSP	Dual channel VGAs with programmable filters
ADRF6516	Analog and digital	LF to 31	–5 to +45	±0.2	35 (dBVrms)	—	—	3.15 to 3.45	360	5 mm × 5 mm, 32-lead LFCSP	Dual channel VGAs with programmable filters

RF VGAs

Part Number	Gain Control	RF Frequency (MHz)	Gain (dB)	P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package	Comments
ADL5240	Digital	100 to 4000	–13.1 to +18	19.5	41.0	2.9	4.75 to 5.25	93	2140	5 mm × 5 mm, 32-lead LFCSP	Integrated gain block and 0.5 dB digital step attenuator
ADL5243	Digital	100 to 4000	–1.2 to +31.3	26	41.1	2.9	4.75 to 5.25	175	2140	5 mm × 5 mm, 32-lead LFCSP	Integrated gain block, 0.5 dB digital step attenuator, and 1/4 W driver amplifier
ADL5330	Analog	10 to 3000	–32 to +21	1.3	31.5	9.0	4.75 to 5.25	215	900	4 mm × 4 mm, 24-lead LFCSP	Differential input/output; specs at maximum gain V_{GAIN} = 1.4 V
ADL5331	Analog	1 to 1200	–14 to +17	—	47.0	9.0	4.75 to 5.25	240	100	4 mm × 4 mm, 24-lead LFCSP	Differential input/output; specs at maximum gain V_{GAIN} = 1.4 V
ADL5390	Analog	20 to 2400	–30 to +5	8.5[1]	23.3	—	4.75 to 5.25	135	900	4 mm × 4 mm, 24-lead LFCSP	RF/IF vector multiplier
AD8340	Analog	700 to 1000	–32 to –2	11	24.0	—	4.75 to 5.25	130	880	4 mm × 4 mm, 24-lead LFCSP	Vector modulator 360° phase control
AD8341	Analog	1500 to 2400	–34.5 to –4.5	8.5	17.5	—	4.75 to 5.25	125	1900	4 mm × 4 mm, 24-lead LFCSP	Vector modulator 360° phase control
ADL5592	Digital	250 to 2400	–52.1 to +8.9	—	29.0	4.8	4.5 to 5.5	189[2]	1960	6 mm × 6 mm, 40-lead LFCSP	Single-ended input/output

[1]Gain setpoint = 0.1
[2]Loopback inactive

VGAs with Filters

Part Number	Gain Control	Number of Channels	RF Frequency (MHz)	Gain/Attenuation Range (dB)	Output IP3 (dBV)	Noise (dBV/√Hz)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADRF6510	Analog	2	30	–5 to +45	25	–127	5.25	258	32-lead LFCSP_VQ	IF VGA and filter

Detectors

Features

- Market leading detectors; industry's largest portfolio
- Continuous production since 1999; proven high volume supplier
- Industry's first patented RF true power rms detectors
- Best-in-class frequency range, temperature stability, and operating temperature range
- Single-ended input, no external balun or tuning required

Logarithmic Amplifiers

Part Number	RF Frequency (MHz)	Dynamic Range (dB)	Temp Stability (dB)	Response Time (ns)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD8302	>0 to 2700	60	±1.0	60	2.7 to 5.5	19	5 mm × 6.4 mm, 14-lead TSSOP	Dual-channel gain and phase detector
AD8306	5 to 400	100	±1.0	73	2.7 to 6.5	16	10 mm × 6.2 mm, 16-lead SOIC	Military-specified part available
AD8307	DC to 500	92	±1.0	400	2.7 to 5.5	8	5 mm × 6.2 mm, 8-lead SOIC/DIP	High dynamic range
AD8309	5 to 500	100	±1.0	67	2.7 to 6.5	16	5.1 mm × 6.5 mm, 16-lead TSSOP	Amplitude and limiter outputs
AD8310	DC to 440	95	±1.0	15	2.7 to 5.5	8	3.1 mm × 4.9 mm, 8-lead SOIC	Available in die
AD8311	100 to 2500	50	±0.5	150	2.7 to 5.5	8.5	1.0 mm × 1.5 mm, 6-WLFCSP	Controller/6-ball WLFCSP
AD8312	50 to 3500	45	±0.5	85	2.7 to 5.5	4.2	1.5 mm × 1 mm, 6-WLFCSP	6-ball WLFCSP
AD8313	100 to 2500	70	±1.25	40	2.7 to 5.5	13.7	3 mm × 4.9 mm, 8-lead MSOP	Industry standard
AD8314	100 to 2700	45	±1.0	70	2.7 to 5.5	4.5	2 mm × 3 mm, 8-lead MSOP/LFCSP	Industry standard
AD8315	100 to 2500	50	±1.0	150	2.7 to 5.5	8.5	2 mm × 3 mm, 8-lead MSOP	Controller
AD8317	1 to 10000	55	±0.5	6	3.0 to 5.5	22	2 mm × 3 mm, 8-lead LFCSP	Available in die
AD8318	1 to 8000	70	±0.5	10	4.5 to 5.5	68	4 mm × 4 mm, 16-lead LFCSP	High accuracy, fast responding
AD8319	1 to 10000	45	±0.5	6	3.0 to 5.5	22	2 mm × 3 mm, 8-lead LFCSP	Pin-compatible with AD8317
ADL5513	1 to 4000	80	±0.5	20	2.7 to 5.5	31	3 mm × 3 mm, 16-lead LFCSP_VQ	Next-generation AD8313, operation to 125°C

Logarithmic Amplifiers (Continued)

Part Number	RF Frequency (MHz)	Dynamic Range (dB)	Temp Stability (dB)	Response Time (ns)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADL5519	1 to 10000	62	±0.5	6	3.3 to 5.5	60	5 mm × 5 mm, 32-lead LFCSP	Dual-channel version of the AD8317, operation to 125°C
AD640	350	50	±1.0	10	4.5 to 7.5	44	20-lead DIP/LCC/PLCC	Military specified
AD641	250	44	±1.0	10	4.5 to 7.5	44	20-lead DIP/LCC/PLCC	Military specified

TruPwr™ RMS Detectors

Part Number	RF Frequency (MHz)	Dynamic Range (dB)	Output Response	Response Time	Temp Stability (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD8361	100 to 2500	30	Linear in volts	5 µs	±0.25	2.7 to 5.5	1.1	6-lead SOT-23, 8-lead MSOP	Low power, low cost rms detector
AD8362	>0 to 3800	65	Linear in dB	45 ns	±1.0	4.5 to 5.5	20	5 mm × 6.4 mm, 16-lead TSSOP	Wide dynamic range
AD8363	>0 to 6000	50	Linear in dB	3 µs	<±0.5	4.5 to 5.5	60	4 mm × 4 mm, 16-lead LFCSP	Single-ended drive, operation to 125°C, pin compatible with ADL5902
ADL5902	50 to 9000	65	Linear in dB	3 µs	<±0.3	4.5 to 5.5	73	4 mm × 4 mm, 16-lead LFCSP	Single-ended drive, operation to 125°C, pin compatible with AD8363
AD8364	>0 to 2700	60	Linear in dB	45 ns	±0.5	4.5 to 5.5	70	5 mm × 5 mm, 32-lead LFCSP	Dual channel AD8362
ADL5500	100 to 6000	30	Linear in volts	10 µs	±0.25	2.7 to 5.5	1	1 mm × 1 mm, 4-ball WLCSP	Reduced size, improved temperature stability
ADL5501	50 to 6000	30	Linear in volts	6 µs	±0.25	2.7 to 5.5	1.1	2 mm × 2 mm, 6-lead SC70	Reduced size, improved temperature stability
ADL5502	450 to 6000	30	Linear in volts	15 µs	±0.25	2.5 to 3.3	3	1.5 mm × 1.5 mm, 8-ball WLCSP	Crest factor detector with rms and envelope outputs
ADL5504	450 to 6000	35	Linear in volts	3 µs	±0.25	2.5 to 3.3	1.8	0.8 mm × 1.2 mm, 6-ball WLCSP	Improved rms accuracy, reduced size
ADL5505	450 to 6000	35	Linear in volts	3 µs	±0.25	2.5 to 3.3	1.8	0.8 mm × 0.8 mm, 4-ball WLCSP	Tiny package, low cost detector
ADL5511	DC to 6000	47	Linear in volts	10 µs	±0.25	4.75 to 5.25	21.5	3 mm × 3 mm, 16-lead LFCSP	Envelope and TruPwr rms detector

Direct Digital Synthesis (DDS)

Features

- Incorporates various features (on-board comparators, RAM, PLLs, mixers, and registers)
- Ideal frequency solutions for a variety of systems from communications to test equipment and radar

Direct Digital Synthesis (DDS)

Part Number	Master Clock (MHz)	Tuning Word Width (Bits)	DAC Resolution (Bits)	SFDR (dBc) to Nyquist	Narrow-Band SFDR (dBc)/ F_{OUT} (MHz)/ Window (MHz)	Power Dissipation (mW)	Package	Supply Voltage (V)	I/O Interface	REFCLK Multiplier	On-Board Comparator	Comments
AD9850	125	32	10	54	80/40.1/0.5	480	28-lead SSOP	3.3 to 5.0	Serial or parallel	•	•	
AD9851	180	32	10	53	85/40.1/0.5	650	28-lead SSOP	3.3 to 5.0	Serial or parallel	•	•	
AD9852	300	48	12	48	83/10/1	2200	80-lead LQFP/TQFP_EP	3.3	Serial or parallel	•	•	Chirp function
AD9854	300	48	12	48	83/10/1	2200	80-lead LQFP/TQFP_EP	3.3	Serial or parallel	•	•	Quadrature outputs, chirp function
AD9858	1000	32	10	58	80/40/1	1900	100-lead TQFP_EP	3.3	Serial or parallel			Integrated charge pump, phase detector, analog multiplier
AD9859	400	32	10	56	80/160/0.1	200	48-lead TQFP_EP	1.8	Serial	•		
AD9914	3500	32	12	–50	92/1400/1	3100	88-lead LFCSP	1.8/3.3	Serial or parallel	Yes	No	Programmable modulus
AD9915	2500	32	12	–57	92/980/1	2900	88-lead LFCSP	1.8/3.3	Serial or parallel	Yes	No	Programmable

Direct Digital Synthesis (DDS) (Continued)

Part Number	Master Clock (MHz)	Tuning Word Width (Bits)	DAC Resolution (Bits)	SFDR (dBc) to Nyquist	Narrow-Band SFDR (dBc)/ F_{OUT} (MHz)/ Window (MHz)	Power Dissipation (mW)	Package	Supply Voltage (V)	I/O Interface	REFCLK Multiplier	On-Board Comparator	Comments
AD9951	400	32	14	56	80/160/0.1	200	48-lead TQFP_EP	1.8	Serial	•		
AD9952	400	32	14	56	80/160/0.1	200	48-lead TQFP_EP	1.8	Serial	•	•	
AD9953	400	32	14	56	80/160/0.1	200	48-lead TQFP_EP	1.8	Serial	•		Programmable RAM LUT
AD9954	400	32	14	56	80/160/0.1	200	48-lead TQFP_EP	1.8	Serial	•	•	Programmable RAM LUT, auto-matic frequency sweep
AD9956	400	48	14	56	80/160/0.1	400	48-lead LFCSP	1.8	Serial			On-board 2.7 GHz PLL
AD9958	500	32	10	53	81/200/1	420	56-lead LFCSP	3.3/1.8	Serial	•		2 complete channels
AD9959	500	32	10	53	81/200/1	680	56-lead LFCSP	3.3/1.8	Serial	•		4 complete channels
AD9910	1000	32	14	53	86/300/0.5	800	100-lead TQFP_EP	3.3/1.8	Serial or 16-bit parallel	•		RAM, polar modulation, phase/frequency/ amp ramp
AD9911	500	32	10	53	81/200/1	275	56-lead LFCSP	3.3/1.8	Serial	•		Multimode modulation, targeted spur reduction
AD9912	1000	48	14	58	86/398.7/0.5	800	64-lead LFCSP	3.3/1.8	Serial	•	•	Spur reduction
AD9913	250	32	10	58	88/99.7/0.03	50	32-lead LFCSP	1.8	Serial or parallel	•	•	

Integrated Transceivers, Transmitters, and Receivers

Features

- Best-in-class performance and significant BOM savings
- Full portfolio of ISM band devices optimized for applications such as smart grid/smart meters, point-to-point, and more
- Complete system on a chip, highly integrated RF/IF transceivers for wireless applications including UMTS femtocell base stations, WiMAX, and LTE femtocell and picocell base stations

ISM Transmitters and Receivers

Specifications	ADF7012	ADF7901	ADF7902
Frequency (MHz)	75 to 1000	369.5 to 395.9	369.5 to 395.9
Modulation	GFSK/FSK/ASK/OOK/GOOK	FSK/OOK	FSK
Supply Voltage (V)	2.3 to 3.6	3	5
Rx Current (mA)	N/A	N/A	18.5
Tx Current for 0 dBm Output (mA)	8/16 (315 MHz/915 MHz)	17 (+5 dBm)	N/A
Output Power (dBm)	14	14	N/A
Maximum Data Rate (kbps)	179.2	50	2
Synthesizer Phase Noise Floor (dBc/Hz)	–194	–194	–194
External Components Needed	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching
Package (RoHS-Compliant)	24-lead TSSOP	24-lead TSSOP	24-lead TSSOP

ISM and Licensed Band Transceivers

Specifications	ADF7020	ADF7020-1	ADF7021/7021-N	ADF7021-V	ADF7025	ADF7022	ADF7023	ADF7023-J	ADF7241	ADF7242
Frequency (MHz)	431 to 478; 862 to 956	80 to 650	80 to 650; 842 to 916	80 to 960 (Ext. VCO)	431 to 464; 862 to 870; 902 to 928	868.25 to 869.85	431 to 464; 862 to 928	902 to 958	2400 to 2483.5	2400 to 2483.5
Modulation	GFSK/FSK/ASK/ OOK/GOOK	GFSK/FSK/ASK/ OOK/GOOK	GFSK/FSK/ 2/3/4FSK/MSK	GFSK/FSK/ 2/3/4FSK/MSK	FSK	io-homecontrol® compatible GFSK/FSK	FSK/GFSK/OOK/ MSK/GMSK	FSK/GFSK/MSK/ GMSK	DSSS-OQPSK	DSSS-OQPSK GFSK/FSK
Supply Voltage (V)	2.3 to 3.6	2.3 to 3.6	2.3 to 3.6	2.3 to 3.6	2.3 to 3.6	1.8 to 3.6	1.8 to 3.6	2.2 to 3.6	1.8 to 3.6	1.8 to 3.6
Rx Current (mA)	19	17.6	17.5 @ 426 MHz	16.3 @ 460 MHz	19	13	12.8	12.8	19	19
Tx Current for 0 dBm Output (mA)	19.1	13 @ 433 MHz	13.5 @ 426 MHz	13.8 @ 460 MHz	19.3	13.3	13	13.3	19.6	19.6
Programmable Output Power (dBm)	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13.5 in 64 steps	–16 to +13.5 in 64 steps	–20 to +13.5 in 63 steps	–20 to +4.8 in 2 dB steps	–20 to +4.8 in 2 dB steps
Rx Sensitivity (BER 0.1% @ 1 kbps)	–119 dBm	–119 dBm	–122 dBm	–130 dBm	–104.2 dBm (@ 38.4 kbps)	–107.5 dBm (@ 38.4 kbps)	–116 dBm	–116 dBm (@ 1 kbps), –106.5 dBm (@ 50 kbps)	–95 dBm (@ 250 kbps 1% PER)	–96 dBm (@ 62.5 kbps)
Maximum Data Rate (kbps)	200	200	32.8	24	384	38.4	300	300	250 (IEEE 802.15.4) 2000 (FSK/GFSK)	250 (IEEE 802.15.4) 2000 (FSK/GFSK)
Synthesizer Phase Noise Floor (dBc/Hz)	–196	–196	–203	–203	–196	–196	–196	–196	–145	–145
Automatic Frequency Control	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
7-Bit Digital RSSI Output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Narrow-Band (12.5 kHz/25 kHz)	No	No	Yes	Yes	No	io-homecontrol® compatible	No	No	No	No
External Components Needed	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching/VCO	XTAL/PLL loop filter/matching	XTAL/matching	XTAL/matching	XTAL/matching	XTAL/matching	XTAL/matching
Package (RoHS Compliant)	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	5 mm × 5 mm, 32-lead LFCSP	5 mm × 5 mm, 32-lead LFCSP	5 mm × 5 mm, 32-lead LFCSP	5 mm × 5 mm, 32-lead LFCSP	5 mm × 5 mm, 32-lead LFCSP

Wideband Transceivers

Part Number	Frequency (GHz)	Bandwidth (MHz)	Noise Figure (dB)	Type Rx/Tx	Tx EVM (dB)	Tx Gain Range (dB)	Interface	Package
AD9352	2.3 to 2.7	3.5 to 20	3.7	1 × 1	–38	0 to 58	Digital ADI/Q™	9 mm × 9 mm, 64-lead LFCSP
AD9352-5	4.9 to 6	3.5 to 20	5.5	1 × 1	–33	0 to 58	Digital ADI/Q™	9 mm × 9 mm, 64-lead LFCSP
AD9353	3.3 to 3.8	3.5 to 20	3.7	1 × 1	–38	0 to 58	Digital ADI/Q™	9 mm × 9 mm, 64-lead LFCSP
AD9354	2.3 to 2.7	3.5 to 10	3	2 × 1	–38	0 to 58	JESD207	8 mm × 8 mm, 56-lead LFCSP
AD9355	3.3 to 3.8	3.5 to 10	3	2 × 1	–38	0 to 58	JESD207	8 mm × 8 mm, 56-lead LFCSP
AD9356	2.3 to 2.7	3.5 to 10	3	2 × 2	–38	0 to 58	JESD207	10 mm × 10 mm, 144-ball BGA
AD9357	3.3 to 3.8	3.5 to 10	3	2 × 2	–38	0 to 58	JESD207	10 mm × 10 mm, 144-ball CSP_BGA
ADF4602	Low band: 824 MHz to 960 MHz High band: 1710 MHz to 2170 MHz	Up to 5	4	1 × 1	–26	0 to 60	Analog I/Q	6 mm × 6 mm, 40-lead LFCSP_VQ

Mixers/Multipliers

Features

- High linearity active mixers provide conversion gain
- Broadband portfolio with operation up to 6 GHz
- Integrated LO driver on chip and IF amplifier
- Small footprint packages, single supply

Multipliers

Part Number	RF Frequency (MHz)	IF Frequency (MHz)	LO Frequency (MHz)	LO Drive (dBm)	Power Conversion Gain (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADL5390	20 to 2400	20 to 2400	DC to 230	N/A	4.5	23.3	11.5	21	4.75 to 5.25	135	4 mm × 4 mm, 24-lead LFCSP	Vector multiplier
ADL5391	DC to 2000	DC to 2000	DC to 2000	N/A	Variable	14	15.1	—	4.5 to 5.5	135	3 mm × 3 mm, 16-lead LFCSP	RF/IF multiplier

Mixers

Part Number	RF Frequency (MHz)	IF Frequency (MHz)	LO Frequency (MHz)	LO Drive (dBm)	Power Conversion Gain (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD8342	LF to 3000	LF to 2400	LF to 3000	0	3.7	22.2	8.5	12.2	4.75 to 5.25	97	3 mm × 3 mm, 16-lead LFCSP	RF/IF active mixer
AD8343	DC to 2500	DC to 2500	DC to 2500	–10	7	16.5	2.8	14	5.5	50	5.1 mm × 6.5 mm, 14-lead TSSOP	RF/IF active mixer
AD8344	400 to 1200	70 to 400	470 to 1600	0	4.5	24	8.5	10.5	4.75 to 5.25	84	3 mm × 3 mm, 16-lead LFCSP	RF/IF active mixer

Mixers (Continued)

Part Number	RF Frequency (MHz)	IF Frequency (MHz)	LO Frequency (MHz)	LO Drive (dBm)	Power Conversion Gain (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
AD831	400	200	400	0	0	24	10	10.3	4.5 to 5.5	100	10.02 mm × 8.38 mm, 20-lead PLCC	IF active mixer
ADL5801	10 to 6000	LF to 600	10 to 6000	0	1.8	28.5	13.3	9.75	4.75 to 5.25	130	4 mm × 4 mm, 24-lead LFCSP	RF/IF active mixer
ADL5802	100 to 6000	LF to 600	100 to 6000	0	1.5	26	12	10	4.75 to 5.25	220	4 mm × 4 mm, 24-lead LFCSP	Dual RF/IF active mixer
ADL5811	700 to 2800	30 to 450	250 to 2800	0	7.5	27.5	12.7	10.7	3.6 to 5.5	185	5 mm × 5 mm, 32-lead LFCSP	RF/IF passive mixer
ADL5812	700 to 2800	30 to 450	250 to 2800	0	6.7	27.2	12.5	11.6	3.6 to 5.5	412	6 mm × 6 mm, 40-lead LFCSP	Dual RF/IF passive mixer
ADL5350	LF to 4000	LF to 4000	LF to 4000	4	–6.7	25	19.8	6.4	2.7 to 3.5	16.5	3 mm × 2 mm, 8-lead LFCSP	RF/IF passive mixer
ADL5353	2200 to 2700	30 to 450	2230 to 3150	0	8.7	24.5	10.4	9.8	3.3 to 5.5	190	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5355	1200 to 2500	30 to 450	1230 to 2470	0	8.4	27	10.4	9.2	3.3 to 5.5	190	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5357	500 to 1700	30 to 450	730 to 1670	0	8.6	26.6	10.2	9.1	3.3 to 5.5	190	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5363	2300 to 2900	DC to 450	2330 to 3350	0	–7.7	31	20	7.6	3.3 to 5.5	100	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5365	1200 to 2500	DC to 450	1230 to 2470	0	–7.3	36	25	8.3	3.3 to 5.5	95	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5367	500 to 1700	DC to 450	730 to 1670	0	–7.7	34	25	8.3	3.3 to 5.5	97	5 mm × 5 mm, 20-lead LFCSP	RF/IF passive mixer
ADL5354	2200 to 2700	30 to 450	1750 to 2670	0	8.6	26.1	10.6	10.6	4.75 to 5.25	350	6 mm × 6 mm, 36-lead LFCSP	Dual RF/IF passive mixer

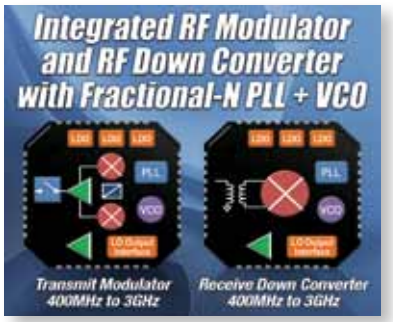
Mixers (Continued)

Part Number	RF Frequency (MHz)	IF Frequency (MHz)	LO Frequency (MHz)	LO Drive (dBm)	Power Conversion Gain (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADL5356	1200 to 2500	30 to 450	1230 to 2470	0	8.2	31	11	9.9	3.3 to 5.25	350	6 mm × 6 mm, 36-lead LFCSP	Dual RF/IF passive mixer
ADL5358	500 to 1700	30 to 450	530 to 1670	0	8.5	25.2	10.6	9.9	3.3 to 5.25	350	6 mm × 6 mm, 36-lead LFCSP	Dual RF/IF passive mixer

Mixers with Integrated LOs

Part Number	RF Frequency (MHz)	IF Frequency (MHz)	LO Frequency (MHz)	LO Drive (dBm)	Power Conversion Gain (dB)	Input IP3 (dBm)	Input P1dB (dBm)	Noise Figure (dB)	Supply Voltage (V)	Supply Current (mA)	Package	Comments
ADRF6601	300 to 2500	DC to 500	750 to 1160	0	6.7	30.9	14.5	13.5	4.75 to 5.25	281	6 mm × 6 mm, 40-lead LFCSP	RF/IF active mixer with integrated PLL and VCO
ADRF6602	1000 to 3100	DC to 500	1550 to 2150	0	6.5	29.5	12	12	4.75 to 5.25	263	6 mm × 6 mm, 40-lead LFCSP	RF/IF active mixer with integrated PLL and VCO
ADRF6603	1100 to 3200	DC to 500	2100 to 2600	0	6.7	29.3	14.9	15.6	4.75 to 5.25	261	6 mm × 6 mm, 40-lead LFCSP	RF/IF active mixer with integrated PLL and VCO
ADRF6604	1200 to 3600	DC to 500	2500 to 2900	0	6.8	27	14.4	15.5	4.75 to 5.25	260	6 mm × 6 mm, 40-lead LFCSP	RF/IF active mixer with integrated PLL and VCO
ADRF6655	100 to 2500	LF to 2200	1050 to 2300	–7	6	29	12	12	4.75 to 5.25	285	6 mm × 6 mm, 40-lead LFCSP	RF/IF active mixer with integrated PLL and VCO

Modulators/Demodulators



Features

- Variety of high performance quadrature modulators and demodulators for operation at frequencies up to 6 GHz
- Offers a combination of high performance, broadband operating frequency, and flexible device architecture
- Ideal for a wide range of wireless infrastructure applications, including 2G, 2.5G, 3G, and 4G cellular base station radios, high-capacity point-to-point and point-to-multipoint radio links, wireless LAN, and wireless local loop equipment

Vector Modulators

Part Number	RF Frequency (MHz)	I/Q 3 dB Bandwidth (MHz)	Carrier Suppression (dBm)	Sideband Suppression (dBc)	Noise Floor (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package
AD8340	700 to 1000	230	N/A	N/A	–149	11.0	24.0	4.75 to 5.25	130	880	4 mm × 4 mm, 24-lead LFCSP
AD8341	1500 to 2400	230	N/A	N/A	–150.5	8.5	17.5	4.75 to 5.25	125	1900	4 mm × 4 mm, 24-lead LFCSP
ADL5390	20 to 2400	230	N/A	N/A	–149.5	11.5	23.3	4.75 to 5.25	135	900	4 mm × 4 mm, 24-lead LFCSP

Modulators

Part Number	RF Frequency (MHz)	I/Q 3 dB Bandwidth (MHz)	Carrier Suppression (dBm)	Sideband Suppression (dBc)	Noise Floor (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package
AD8345	140 to 1000	80	–42	–42	–155	2.5	25.0	2.7 to 5.5	65	800	5.1 mm × 6.4 mm, 16-lead TSSOP
AD8346	800 to 2500	70	–42	–36	–147	–3	20.0	2.7 to 5.5	45	1900	5.1 mm × 6.4 mm, 16-lead TSSOP
AD8349	700 to 2700	160	–45	–35	–155	7.6	21.0	4.75 to 5.5	135	900	5.1 mm × 6.4 mm, 16-lead TSSOP
ADL5370	300 to 1000	350	–50	–41	–160	11.0	24.0	4.75 to 5.25	205	450	4 mm × 4 mm, 24-lead LFCSP

Modulators (Continued)

Part Number	RF Frequency (MHz)	I/Q 3 dB Bandwidth (MHz)	Carrier Suppression (dBm)	Sideband Suppression (dBc)	Noise Floor (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package
ADL5371	500 to 1500	500	–50	–55	–158.6	14.4	27.0	4.75 to 5.25	175	900	4 mm × 4 mm, 24-lead LFCSP
ADL5372	1500 to 2500	500	–45	–45	–158	14.2	27.0	4.75 to 5.25	165	1900	4 mm × 4 mm, 24-lead LFCSP
ADL5373	2300 to 3000	500	–32	–57	–157.1	13.8	26.0	4.75 to 5.25	174	2500	4 mm × 4 mm, 24-lead LFCSP
ADL5374	3000 to 4000	500	–32.8	–50	–159.6	12.0	22.8	4.75 to 5.25	173	3500	4 mm × 4 mm, 24-lead LFCSP
ADL5375-05	400 to 6000	750	–45.1	–52.8	–160	9.6	25.9	4.75 to 5.25	194	900	4 mm × 4 mm, 24-lead LFCSP
ADL5375-15	400 to 6000	750	–39.9	–49.9	–157.1	10.0	23.4	4.75 to 5.25	203	900	4 mm × 4 mm, 24-lead LFCSP
ADL5385	50 to 2200	>500	–46	–50	–159	11.0	26.0	4.75 to 5.5	215	350	4 mm × 4 mm, 24-lead LFCSP_VQ
ADL5386	50 to 2200	700	–38	–46	–160	11.1	25.0	4.75 to 5.5	230	350	6 mm × 6 mm, 40-lead LFCSP_VQ
ADL5590	869 to 960	250		–50	–56.6	16.0	29.0	4.75 to 5.25	170	940	6 mm × 6 mm, 36-lead LFCSP
ADL5591	1805 to 1900	250		–47	–157	16.0	30.0	4.75 to 5.25	170	1850	6 mm × 6 mm, 36-lead LFCSP

Modulators with Integrated LOs

Part Number	RF Frequency (MHz)	I/Q 3 dB Bandwidth (MHz)	Carrier Suppression (dBm)	Sideband Suppression (dBc)	Noise Floor (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package
ADRF6701	400 to 1250	750	–46.2	–40	–157.9	11.2	31.7	4.75 to 5.25	240	950	6 mm × 6 mm, 40-lead LFCSP
ADRF6702	1200 to 2400	750	–40.6	–53.9	–159.6	13.6	30.1	4.75 to 5.25	240	1960	6 mm × 6 mm, 40-lead LFCSP
ADRF6703	1550 to 2650	750	–46	–44	–159.7	13.5	32.7	4.75 to 5.25	240	2300	6 mm × 6 mm, 40-lead LFCSP
ADRF6704	2050 to 3000	750	–40.6	–37.7	–158.3	12.1	27.2	4.75 to 5.25	226	2600	6 mm × 6 mm, 40-lead LFCSP

Modulators with Integrated LOs (Continued)

Part Number	RF Frequency (MHz)	I/Q 3 dB Bandwidth (MHz)	Carrier Suppression (dBm)	Sideband Suppression (dBc)	Noise Floor (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Specs @ (MHz)	Package
ADRF6750	950 to 1575	250	–45	–45	–162	8.5	23.0	4.75 to 5.25	310	1575	8 mm × 8 mm, 56-lead LFCSP
ADRF6755	100 to 2400	600	–45	–45	–161	8.0	20.5	4.75 to 5.25	380	1800	8 mm × 8 mm, 56-lead LFCSP
ADF9010	840 to 960	20	–40	–46	–158	10.0	24.0	3.15 to 3.45	360	900	7 mm × 7 mm, 48-lead LFCSP

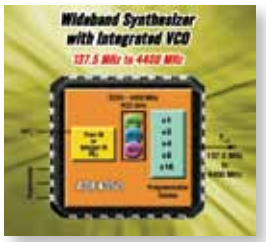
Demodulators

Part Number	RF Frequency (MHz)	VGA Range (dB)	I/Q Frequency (MHz)	Phase Error (deg)	Amplitude Error (dB)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Package
AD8347	800 to 2700	69.5	65	1	0.3	11	–2	11.5	2.7 to 5.5	64	9.8 mm × 6.5 mm, 28-lead TSSOP
AD8348	50 to 1000	45	125	0.5	0.25	10.75	13	28	2.7 to 5.5	48	9.8 mm × 6.4 mm, 28-lead TSSOP
ADL5380	400 to 6000	—	390	0.2	0.07	11.7	11.6	27.8	4.75 to 5.25	245	4 mm × 4 mm, 24-lead LFCSP
ADL5382	700 to 2700	N/A	370	0.2	0.05	15.6	14.4	30.5	4.75 to 5.25	220	4 mm × 4 mm, 24-lead LFCSP
ADL5387	50 to 2000	—	240	0.2	0.5	12	13	31	4.75 to 5.25	180	4 mm × 4 mm, 24-lead LFCSP

Demodulators with Integrated LOs

Part Number	RF Frequency (MHz)	VGA Range (dB)	I/Q Frequency (MHz)	Phase Error (deg)	Amplitude Error (dB)	Noise Figure (dB)	P1dB (dBm)	Input IP3 (dBm)	Supply Voltage (V)	Supply Current (mA)	Package
ADRF6801	750 to 1150	N/A	275	±0.3	±0.05	14.3	12.5	25.0	4.75 to 5.25	262	6 mm × 6 mm, 40-lead LFCSP
ADRF6806	50 to 525	N/A	170	<±0.5	<±0.1	12.2	12.2	28.5	3.1 to 5.25	86	6 mm × 6 mm, 40-lead LFCSP
ADRF6807	700 to 1050	N/A	170	<±0.5	<±0.1	13.1	12.8	26.7	3.1 to 5.25	86	6 mm × 6 mm, 40-lead LFCSP
ADRF6850	100 to 1000	60	300	±0.5	±0.1	11	12	22.5	3.15 to 3.45	350	8 mm × 8 mm, 56-lead LFCSP_VQ

PLL Synthesizers/VCOs



Features

- Industry's lowest phase noise PLLs
- Integer-N PLLs to 8 GHz
- Fractional-N PLLs to 6 GHz
- Integrated PLLs with VCOs

Fractional-N

Part Number	PLL Type	Maximum RF Input (MHz)	Normalized Phase Noise (dBc/Hz)	Maximum REF_{IN} Frequency (MHz)	Current (mA)	Package (RoHS Compliant)	Comments
ADF4150	Integer-N/fractional-N	5000	–223	250	50	24-lead LFCSP	Software compatible with ADF4350
ADF4150HV	High voltage fractional-N/integer-N	3000	–213	300	50	32-lead LFCSP	High voltage charge pump to 30 V
ADF4151	Integer-N/fractional-N	3500	–221	250	40	32-lead LFCSP	Pin and software compatible with ADF4350/ADF4351
ADF4153	Fractional-N	4000	–220	250	20	16-lead TSSOP, 20-lead LFCSP	ADF4113/ADF4106 pin-compatible fractional-N upgrade
ADF4154	Fractional-N	4000	–220	250	20	16-lead TSSOP, 20-lead LFCSP	ADF4153 fractional-N with fastlock feature
ADF4156	Fractional-N	6200	–220	250	26	16-lead TSSOP, 20-lead LFCSP	ADF4153 fractional-N to 6 GHz operation and cycle slip reduction
ADF4157	Fractional-N	6000	–211	300	23	16-lead TSSOP, 20-lead LFCSP	Very fine resolution step size (sub Hz)
ADF4158	Fractional-N	6100	–216	260	23	24-lead LFCSP_VQ	Direct modulation/waveform generating fractional-N PLL
ADF4159	Fractional-N	13000	–222	260	33	24-lead LFCSP	High frequency, high PFD, high resolution, fractional-N PLL
ADF4193	Fractional-N	3500	–216	300	68	32-lead LFCSP	Ultrafast settling PLL
ADF4196	Fractional-N	6000	–216	300	68	32-lead LFCSP	6 GHz ultrafast settling PLL
ADF4350	Integrated fractional-N/ integer-N and VCO	4400	–220	250	110	32-lead LFCSP	Specified frequency range covered without external inductors
ADF4351	Integrated fractional-N/ integer-N and VCO	4400	–221	250	110	32-lead LFCSP_VQ	Extended frequency range and improved 1/f noise version of ADF4350
ADF4252	Fractional-N	3000	–214	250	13	24-lead LFCSP	Fractional-N RF/integer-N IF dual channel PLL

Integer-N

Part Number	PLL Type	Frequency Range (MHz)	Normalized Phase Noise (dBc/Hz)	Maximum REF_{IN} Frequency (MHz)	Current (mA)	Package (RoHS Compliant)	Comments
AD809	Integer-N	155.52	—	19.44	17	16-lead SOIC	SONET/SDH/fiber systems
ADF4002	Integer-N	5 to 400	–222	300	5	16-lead TSSOP, 20-lead LFCSP	High speed clocking applications
ADF4007	Integer-N	1000 to 7000	–219	240	13	20-lead LFCSP	High PFD frequency 120MHz
ADF4106	Integer-N	500 to 6000	–223	300	13	16-lead TSSOP, 20-lead LFCSP	Best integer-N phase noise, recommended for new designs
ADF4107	Integer-N	1000 to 7000	–223	250	15	16-lead TSSOP, 20-lead LFCSP	Best integer-N phase noise, recommended for new designs
ADF4108	Integer-N	1000 to 8000	–223	250	15	20-lead LFCSP	Best integer-N phase noise, recommended for new designs
ADF4110	Integer-N	50 to 550	–215	104	4.5	16-lead TSSOP, 20-lead LFCSP	High performance PLL for 5V systems
ADF4111	Integer-N	80 to 1200	–215	104	4.5	16-lead TSSOP, 20-lead LFCSP	High performance PLL for 5V systems
ADF4113	Integer-N	200 to 3700	–215	104	8.5	16-lead TSSOP, 20-lead LFCSP	High performance PLL for 5V systems
ADF4116	Integer-N	80 to 550	–211	100	4.5	16-lead TSSOP	4 dB to 6 dB better phase noise than competition; replaces LMX2306TM
ADF4117	Integer-N	100 to 1200	–213	100	4.5	16-lead TSSOP	4 dB to 6 dB better phase noise than competition; replaces LMX2316TM
ADF4118	Integer-N	100 to 3000	–216	100	6.5	16-lead TSSOP	4 dB to 6 dB better phase noise than competition; replaces LMX2326TM
ADF4212L	Integer-N	200 to 2400	–215	150	7.5	20-lead TSSOP, 20-lead LFCSP	Dual channel PLL for low power applications
ADF4150	Integer-N/fractional-N	500 to 5000	–223	250	50	24-lead LFCSP	Software compatible with ADF4350
ADF4350	Fractional-N/integer-N with VCO	137.5 to 4400	–220	250	110	32-lead LFCSP	Specified frequency range covered without external inductors
ADF4351	Integrated fractional-N/ integer-N and VCO	35 to 4400	–221	250	110	32-lead LFCSP_VQ	Extended frequency range and improved 1/f noise version of ADF4350

Integer-N (Continued)

Part Number	PLL Type	Frequency Range (MHz)	Normalized Phase Noise (dBc/Hz)	Maximum REF_{IN} Frequency (MHz)	Current (mA)	Package (RoHS Compliant)	Comments
ADF4360-0	Integer-N with VCO	2400 to 2725	–216	250	25 to 50	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-1	Integer-N with VCO	2050 to 2450	–216	250	25 to 50	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-2	Integer-N with VCO	1850 to 2170	–216	250	25 to 50	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-3	Integer-N with VCO	1650 to 1950	–216	250	25 to 50	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-4	Integer-N with VCO	1450 to 1750	–216	250	25 to 50	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-5	Integer-N with VCO	1200 to 1400	–216	250	25 to 45	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-6	Integer-N with VCO	1050 to 1250	–216	250	25 to 45	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-7	Integer-N with VCO	350 to 1800	–216	250	25 to 45	24-lead LFCSP	Center frequency set by external inductors
ADF4360-8	Integer-N with VCO	65 to 400	–216	250	20 to 40	24-lead LFCSP	Center frequency set by external inductors
ADF4360-9	Integer-N with VCO	1.1 to 200	–218	250	20 to 40	24-lead LFCSP	Center frequency set by external inductors and internal divider
ADF4150HV	High voltage fractional-N/ integer-N	500 to 3000	–213	300	50	32-lead LFCSP	High voltage charge pump to 30 V
ADF4113HV	High voltage integer-N	4000	–212	150	11	16-lead TSSOP, 20-lead LFCSP	ADF4113 with high voltage charge pump
ADF41020[1]	Integer-N	4000 to 18000	–221	350	30	20-lead LFCSP	18 GHz microwave PLL

[1]Prerelease

PLLs with VCOs

Part Number	PLL Type	Frequency Range (MHz)	Normalized Phase Noise (dBc/Hz)	Phase Noise @ 1 kHz Offset, 200 kHz Channel Spacing (dBc/Hz)	Open-Loop VCO Phase Noise at 100 kHz Offset (mA)	Phase Noise Frequency (MHz)	Maximum REF_{IN} Frequency (MHz)	Programmable Power Consumption (mA)	Output Power (dBm)	Package (RoHS Compliant)	Comments
ADF4350	Fractional-N/ integer-N	137.5 to 4400	–220	–97	–116	2113	250	110 to 130	–4 to +5	32-lead LFCSP	Specified frequency range covered without external inductors
ADF4351	Integrated fractional-N/ integer-N and VCO	35 to 4400	–221	–99	–116	2113	250	110	–4 to +5	32-lead LFCSP_VQ	Extended frequency range and improved 1/f noise version of ADF4350
ADF4360-0	Integer-N	2400 to 2725	–216	–80	–110	2500	250	25 to 50	–13 to –3	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-1	Integer-N	2050 to 2450	–216	–81	–110	2250	250	25 to 50	–13 to –3	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-2	Integer-N	1850 to 2170	–216	–83	–110	2000	250	25 to 50	–12 to –3	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-3	Integer-N	1600 to 1950	–216	–85	–110	1800	250	25 to 50	–12 to –3	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-4	Integer-N	1450 to 1750	–216	–85	–110	1600	250	25 to 50	–13 to –4	24-lead LFCSP	Specified frequency range covered without external inductors

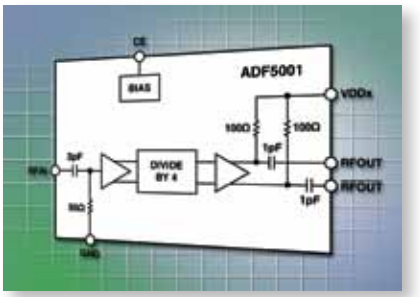
PLLs with VCOs (Continued)

Part Number	PLL Type	Frequency Range (MHz)	Normalized Phase Noise (dBc/Hz)	Phase Noise @ 1 kHz Offset, 200 kHz Channel Spacing (dBc/Hz)	Open-Loop VCO Phase Noise at 100 kHz Offset (mA)	Phase Noise Frequency (MHz)	Maximum REF_{IN} Frequency (MHz)	Programmable Power Consumption (mA)	Output Power (dBm)	Package (RoHS Compliant)	Comments
ADF4360-5	Integer-N	1200 to 1400	–216	–87	–110	1300	250	25 to 45	–13 to –4	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-6	Integer-N	1050 to 1250	–216	–88	–110	1150	250	25 to 45	–13 to –4	24-lead LFCSP	Specified frequency range covered without external inductors
ADF4360-7	Integer-N	350 to 1800	–216	–92	–116	900	250	25 to 45	–13 to –4	24-lead LFCSP	Center frequency set by external inductors
ADF4360-8	Integer-N	65 to 400	–216	–102	–117	200	250	20 to 40	–13 to –4	24-lead LFCSP	Center frequency set by external inductors
ADF4360-9	Integer-N	1.1 to 200	–218	–110	–117	45	250	20 to 40	–13 to –4, CMOS at DIVOUT	24-lead LFCSP	Center frequency set by external inductors and internal divider

Prescalers (Microwave)

Features

- Divide by 2, 4, or 8 options
- Integrated RF decoupling capacitors
- Low power consumption: active mode at 30 mA and power-down mode at 7 mA
- Low phase noise at –150 dBc/Hz
- Single dc supply that is +3 V compatible with ADI's extensive offering of PLLs



Part Number	Max RF Input (MHz)	RF Divide Value	Normalized Phase Noise (dBc/Hz)	Voltage Supply (V)	Supply Current (mA)	Package	Comments
ADF5000	18000	2	–147	3.3	30	16-lead LFCSP	Low current fixed prescaler
ADF5001	18000	4	–150	3.3	30	16-lead LFCSP	Low current fixed prescaler
ADF5002	18000	8	–153	3.3	30	16-lead LFCSP	Low current fixed prescaler

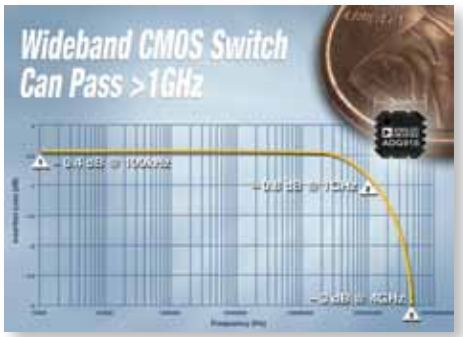
Splitters

Features

- Ideal for distribution of CATV signals
- Differential inputs and outputs
- 1 dB gain flatness to 865 MHz
- 25 dB isolation between channels

Part Number	I/O Configuration	Input: Outputs	1 dB Bandwidth (MHz)	Max Gain (dB)	CSO (dBc)	CTB (dBc)	Noise Figure (dB)	Package
ADA4302-4	Differential	1:4	900	5.7	–73	–66	4.4	3 mm × 3 mm, 20-lead LFCSP
ADA4303-2	Single-ended	1:2	1200	4	–62	–72	4.4	3 mm × 3 mm, 12-lead LFCSP
ADA4304-2	Single-ended	1:2	1000	3	–62	–72	4.6	3 mm × 3 mm, 16-lead LFCSP
ADA4304-3	Single-ended	1:3	1000	3	–62	–72	4.6	3 mm × 3 mm, 16-lead LFCSP
ADA4304-4	Single-ended	1:4	1000	3	–62	–72	4.6	3 mm × 3 mm, 16-lead LFCSP

RF Switches



Features

- Highly integrated solution for low cost portable wireless systems
- Low insertion loss, high isolation between ports, low distortion, and low current consumption
- CMOS design and built-in drivers for TTL compatibility
- Integrated drivers
- Low IDD for portable applications
- Improved ESD performance
- Low-pass filter performance
- Increased power handling using dc bias

Part Number	Configuration	Supply Range (V)	Isolation @ 1 GHz (dB)	Insertion Loss @ 1 GHz (dB)	Termination (R)	Package
ADG901	SPST	1.65 to 2.75	43	1	50	MSOP, 3 mm × 3 mm LFCSP
ADG902	SPST	1.65 to 2.75	43	1	Short	MSOP, 3 mm × 3 mm LFCSP
ADG904	4:1 mux	1.65 to 2.75	37	1.2	50	TSSOP, 4 mm × 4 mm LFCSP
ADG904-R	4:1 mux	1.65 to 2.75	37	1.2	Short	TSSOP, 4 mm × 4 mm LFCSP
ADG918	SPDT	1.65 to 2.75	43	1	50	MSOP, 3 mm × 3 mm LFCSP
ADG919	SPDT	1.65 to 2.75	43	1	Short	MSOP, 3 mm × 3 mm LFCSP
ADG936	Dual SPDT	1.65 to 2.75	36	0.9	50	TSSOP, 4 mm × 4 mm LFCSP
ADG936-R	Dual SPDT	1.65 to 2.75	36	0.9	Short	TSSOP, 4 mm × 4 mm LFCSP

Timing ICs and Clocks

Features

- Low phase noise clock generation with multioutput distribution at subpicosecond jitter levels
- Integrated components: PLL, VCO, dividers, delays, clock drivers
- Precision network clock synchronization with holdover/switchover
- Complete timing solutions for networks, clocking converters, and base stations

Multioutput Clock Generators

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package
AD9510	3.3	1	8	8	2	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	64-lead LFCSP
AD9511	3.3	1	5	5	1	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	48-lead LFCSP
AD9516-0	3.3	2	14	5	4	Yes	2950	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP
AD9516-1							2650				
AD9516-2							2335				
AD9516-3							2250				
AD9516-4							1800				
AD9516-5						No	2400				

Multioutput Clock Generators (Continued)

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package
AD9517-0	3.3	2	12	4	4	Yes	2950	CMOS, LVDS, LVPECL	<0.4	Serial	48-lead LFCSP
AD9517-1							2650				
AD9517-2							2335				
AD9517-3							2250				
AD9517-4							1800				
AD9518-0	3.3	2	6	3	0	Yes	2950	LVPECL	<0.4	Serial	48-lead LFCSP
AD9518-1							2650				
AD9518-2							2335				
AD9518-3							2250				
AD9518-4							1800				
AD9520-0	3.3	2	12/24	4	0	Yes	2950	LVPECL, CMOS	<0.4	Serial with EEPROM	64-lead LFCSP
AD9520-1							2650				
AD9520-2							2335				
AD9520-3							2250				
AD9520-3							1800				
AD9520-5						No	2400				
AD9522-0	3.3	2	12/24	4	0	Yes	800	LVDS, CMOS	<0.4	Serial with EEPROM	64-lead LFCSP
AD9522-1											
AD9522-2											
AD9522-3											
AD9522-4											
AD9522-5						No					
AD9523-0	3.3	2	14	14	0	Yes	1 GHz	CMOS; HSTL; LVDS; LVPECL	225 fs	Serial	72 LFCSP
AD9523-1									187 fs		
AD9524-0	3.3	2	6	6	0	Yes	1 GHz	CMOS; HSTL; LVDS; LVPECL	225 fs	Serial	48 LFCSP

Clock Generators/Synchronizers

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)*	I/O Interface	Package
AD9540	1.8, 3.3	1	1	1	0	Yes	655	CML, PECL-compliant	0.7	Serial	48-lead LFCSP
AD9549	1.8, 3.3	2	2	1	0	Yes	750	CMOS, HSTL	0.6	Serial	64-lead LFCSP
AD9548	1.8, 3.3	8	8	4	1	Yes	450	LVDS, LVPECL,CMOS	0.7	Serial	88-lead LFCSP

*Wideband jitter is from 100 Hz to F_{OUT}/2. AD9548 jitter generation for SONET applications is typically 350fs. See data sheet for details.

Clock Buffers and Dividers

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package
AD9513	3.3	1	3	3	1	No	800	CMOS, LVDS	0.3	Pin select	32-lead LFCSP
AD9515	3.3	1	2	2	1	No	1600	CMOS, LVDS, LVPECL	0.225	Pin select	32-lead LFCSP
ADCLK905	2.5 to 3.3	1	1	—	—	No	6000	ECL, PECL, LVPECL	0.06	N/A	16-lead LFCSP
ADCLK907	2.5 to 3.3	2	2	—	—	No	6000	ECL, PECL, LVPECL	0.06	N/A	16-lead LFCSP
ADCLK925	2.5 to 3.3	1	2	—	—	No	6000	ECL, PECL, LVPECL	0.06	N/A	16-lead LFCSP
ADCLK914	3.3	1	1	0	0	No	7500	HVDS, CML	0.110	N/A	16-lead LFCSP
ADCLK954	3.3	2	12	0	0	No	4800	LVPECL	0.075	N/A	40-lead LFCSP
ADCLK946	3.3	1	6	0	0	No	4800	LVPECL	0.075	N/A	24-lead LFCSP
ADCLK854	1.8	2	12	0	0	No	1200	LVDS, CMOS	0.150	N/A	48-lead LFCSP
ADCLK846	1.8	1	6	0	0	No	1200	LVDS, CMOS	0.150	N/A	24-lead LFCSP

Voltage Controlled Oscillators

Features

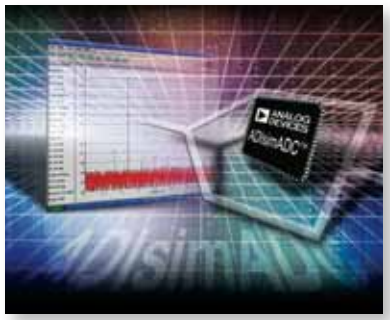
- Family of GaAs VCOs designed utilizing ADI's leading microwave design expertise
- Covers a frequency range from 3.5 GHz up to 13.9 GHz
- Offers the industry's highest performance oscillator phase noise

Part Number	Min Frequency (GHz)	Max Frequency (GHz)	Min V_{TUNE} (V)	Max V_{TUNE} (V)	Phase Noise @ 100k (dBc/Hz)	Phase Noise @ 1M (dBc/Hz)	Output Power (dBm)	I_{DD} @ 5V (mA)	Divider Options	Package
ADF5508	7.0	8.0	2	18	–116	–138	16	310	2	5 mm × 5 mm, 32-lead LFCSP
ADF5509	7.8	8.8	2	18	–115	–137	15	300	2	5 mm × 5 mm, 32-lead LFCSP
ADF5510	8.45	9.65	2	18	–115	–137	15	360	2	5 mm × 5 mm, 32-lead LFCSP
ADF5530	9.4	10.8	2	18	–114	–136	15	350	2	5 mm × 5 mm, 32-lead LFCSP
ADF5582	11.4	12.8	2	18	–111	–134	13	310	2	5 mm × 5 mm, 32-lead LFCSP
ADF5584	12.2	13.9	2	18	–111	–134	13	330	2	5 mm × 5 mm, 32-lead LFCSP

Dual-Channel High Speed Analog-to-Digital Converters

Features

- World leader in data converters and signal conversion technology
- Industry's largest portfolio of high performance analog-to-digital converters
- Deliver unmatched performance and value in communications applications



Dual-Channel Pin-Compatible Family of High Speed Analog-to-Digital Converters

Part Number	Resolution (Bits)	Sample Rate	Full Power BW (MHz)	Total Operating Power Diss	Typical SNR (dB) 70 MHz A_{IN} Max Sample Rate	Typical SFDR (dBc) 70 MHz A_{IN} Max Sample Rate
AD9204	10	20/40/65/80	700	141	61.3	75
AD9608	10	105/125	650	189	61.7	85
AD9231	12	20/40/65/80	700	160	70.8	92
AD9628	12	105/125	650	201	70.2	93
AD9613	12	170/210/250	1000	770	69.8*	89*
AD9251	14	20/40/65/80	700	163	73.6	92
AD9648	14	125/105	650	202	74.5	91
AD9643	14	170/210/250	1000	785	71.7*	88*
AD9269	16	20/40/65/80	700	225	76.3	90

*90 MHz A_{in}

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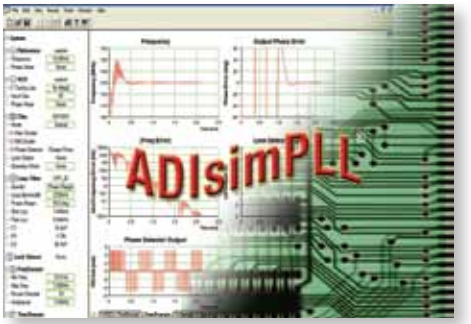

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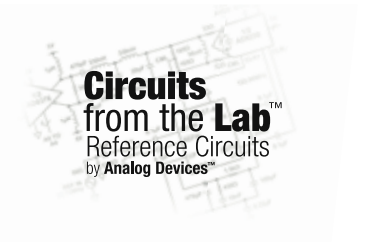
Design Resources

Circuits from the Lab



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