

DATA CONVERTER SOLUTIONS

Analog, Digital & Mixed-Signal ICs, Modules, Subsystems & Instrumentation

High Speed

Analog-to-Digital Converters

and Track-and-Hold Amplifiers

Communications & Microwave Infrastructure

- Point-to-Point Backhauls
- Repeaters & Remote Radio Heads
- Direct Conversion & Diversity (MIMO) Receivers
- Macro BTS & Small Cells

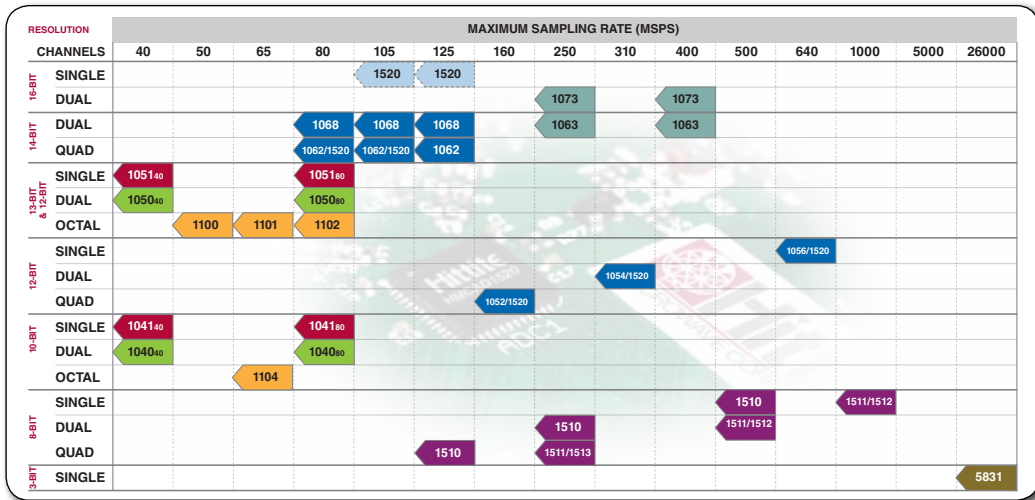
Test & Instrumentation

- Digital Oscilloscopes
- Magnetic Resonance Imaging (MRI) & Ultrasound
- Spectrum Analyzers
- BER Testers

Radar

- Marine & Automotive Radar
- Pulse Detection Systems
- Phased Array Radar
- Radio Astronomy & Atmospheric LIDAR





Standard Converter Products

Hittite offers a wide range of standard High Speed ADCs for Communication, Instrumentation, Industrial & Military applications. Low power consumption and high performance is combined with a high degree of flexibility.

- Sampling Rates: 3 to 1000 MSPS
- Resolution: 8 to 16 Bits
- CMOS & LVDS Interfaces
- Configuration of Power Consumption & Functionality with SPI Settings
- Integrated Instrumentation Functionality



Industry's Best Performing Track-and-Hold Amplifiers

In addition to ADCs, Hittite offers a family of Track-and-Hold Amplifiers (T/H) that provides the capability of sampling ultra high-frequency microwave signals with excellent linearity and low noise. The T/H family is very well suited for use in front of high-speed ADCs and can support signal frequencies up to 18 GHz and sampling rates up to 4 GSPS. These devices have applications in wideband microwave A/D conversion typically employed in radar, communications, electronic surveillance and test & measurement equipment.



Analog Made Easy™

With Hittite's *Analog Made Easy* philosophy, we are committed to user friendly products. We have built multiple features and functionality into our ADCs that make our products easy to use, thus reducing overall cost for the system designer.

- EasySuite™: Evaluation & Prototyping Platform Environment
- EasyBoard™: Supplied Evaluation Board Connected to Xilinx Standard FMC Board
- EasyStack™: Firmware Code Stack Available for Xilinx®



Custom Signal Path Solutions

Hittite also offers signal path solutions for multiple applications.

- LNA, VGAs & Analog Multiplexers (Analog Front End)
- Analog-to-Digital Converters
- LVDS Interface
- MCMs Integrating RF & Microwave Functions with ADCs
- FPGA Code for Multiple Applications, such as: Digital Down Conversion, Image Rejection & Oscilloscope Triggers

Low Power Analog-to-Digital Converters

Sample Rate	Function/Mode	Resolution (bits)	# of Channels	Power Dissipation	SNR (dBFS)	SFDR (dBc)	Package	ECCN Code	Part Number
640 MSPS	High Speed, Single Channel	12	1	490 mW	70	75 ^[1]	LP7DE	3A001.a.5.a.4	HMCAD1520
320 MSPS	High Speed, Dual Channel	12	2	490 mW	70	78 ^[1]		3A001.a.5.a.4	
160 MSPS	High Speed, Quad Channel	12	4	490 mW	70	78 ^[1]		3A001.a.5.a.4	
105 MSPS	Precision, Quad Channel	14	4	603 mW	74	83		3A001.a.5.a.4	
80 MSPS				530 mW	75	85			
NEW! 500 MSPS	High Speed, Dual Channel	8	2	710 mW	49.8	56	LP7DE	3A991.c.1	HMCAD1513
250 MSPS	High Speed, Quad Channel	8	4	710 mW	50	59		3A991.c.1	
900 MSPS	High Speed, Single Channel	8	1	650 mW	49.8	64 ^[1]	LP7DE	3A001.a.5.a.1	HMCAD1512
450 MSPS	High Speed, Dual Channel	8	2	650 mW	49.8	63 ^[1]	LP7DE	3A001.a.5.a.1	
1 GSPS	High Speed, Single Channel	8	1	710 mW	49.8	64 ^[1]	LP7DE	3A001.a.5.a.1	HMCAD1511
500 MSPS	High Speed, Dual Channel	8	2	710 mW	49.8	63 ^[1]		3A001.a.5.a.1	
250 MSPS	High Speed, Quad Channel	8	4	710 mW	49.8	70 ^[1]		3A001.a.5.a.1	
500 MSPS	High Speed, Single Channel	8	1	295 mW	49.8	65 ^[1]	LP7DE	3A991.c.1	HMCAD1510
250 MSPS	High Speed, Dual Channel	8	2	295 mW	49.8	69 ^[1]		3A991.c.1	
125 MSPS	High Speed, Quad Channel	8	4	295 mW	49.7	69 ^[1]		3A991.c.1	
80 MSPS	Octal Channel	13/12	8	59 mW/Channel	70.1	77	LP9E	3A991.c.3	HMCAD1102
65 MSPS	Octal Channel	13/12	8	51 mW/Channel	72.2	82	LP9E	3A991.c.3	HMCAD1101
20/40/50/65 MSPS	Octal Channel	10	8	12/20/25/30 mW/Channel	61.6	81	LP9E	EAR99	HMCAD1104
50 MSPS	Octal Channel	13/12	8	41 mW/Channel	72.2	82	LP9E	3A991.c.3	HMCAD1100
40 MSPS	Octal Channel	13/12	8	35 mW/Channel	72.2	82		3A991.c.3	
20 MSPS	Octal Channel	13/12	8	23 mW/Channel	72.2	82		3A991.c.3	
80 MSPS	Dual Channel	13/12	2	102 mW	72	77	LP9E	3A991.c.3	HMCAD1050-80
65 MSPS	Dual Channel	13/12	2	85 mW	72.6	81		3A991.c.3	
40 MSPS	Dual Channel	13/12	2	55 mW	72.7	81	LP9E	3A991.c.3	HMCAD1050-40
20 MSPS	Dual Channel	13/12	2	30 mW	72.2	85		3A991.c.3	
80 MSPS	Single Channel	13/12	1	60 mW	72	77	LP6HE	3A991.c.3	HMCAD1051-80
65 MSPS	Single Channel	13/12	1	50 mW	72.6	81		3A991.c.3	
40 MSPS	Single Channel	13/12	1	33 mW	72.7	81	LP6HE	3A991.c.3	HMCAD1051-40
20 MSPS	Single Channel	13/12	1	19 mW	72.2	85		3A991.c.3	
80 MSPS	Dual Channel	10	2	78 mW	61.6	75	LP9E	EAR99	HMCAD1040-80
65 MSPS	Dual Channel	10	2	65 mW	61.6	77		EAR99	
40 MSPS	Dual Channel	10	2	43 mW	61.6	81	LP9E	EAR99	HMCAD1040-40
20 MSPS	Dual Channel	10	2	24 mW	61.6	81		EAR99	
80 MSPS	Single Channel	10	1	46 mW	61.6	75	LP6HE	EAR99	HMCAD1041-80
65 MSPS	Single Channel	10	1	38 mW	61.6	77		EAR99	
40 MSPS	Single Channel	10	1	25 mW	61.6	81	LP6HE	EAR99	HMCAD1041-40
20 MSPS	Single Channel	10	1	15 mW	61.6	81		EAR99	
NEW! 160 MSPS	Quad Channel	12	4	490 mW	69	78 ^[2]	LP7DE	3A991.c.2	HMCAD1052
NEW! 320 MSPS	Dual Channel	12	2	490 mW	69	78 ^[2]	LP7DE	3A001.a.5.a.3	HMCAD1054
NEW! 640 MSPS	Single Channel	12	1	490 mW	69	78 ^[2]	LP7DE	3A001.a.5.a.3	HMCAD1056
NEW! 80/105/125 MSPS	Quad Channel	14	4	490/605/765 mW	74	85	LP7DE	3A991.c.3	HMCAD1062
NEW! 80/105/125 MSPS	Dual Channel	14	2	300/380/460 mW	74	85	LP7DE	3A991.c.3	HMCAD1068
NEW! 400 MSPS	Dual Channel	14	2	750 mW/Channel	72	85	LG9E/LP9E	3A001.a.5.a.4	HMCAD1063
NEW! 400 MSPS	Dual Channel	16	2	1100 mW/Channel	76	90	LG9E	3A001.a.5.a.5	HMCAD1073

[1] Excluding interlacing spurs.

[2] For BW <40 MHz. See HMCAD1052/1054/1056 datasheets.

DATA CONVERTER PRODUCTS (CONTINUED)

Ultra High Speed Analog-to-Digital Converters

Input Frequency (GHz)	Function	Sample Rate (GSPS)	Resolution (Bits)	ENOB	SFDR (dBFS)	Package	ECCN Code	Part Number
20	3-Bit ADC with 1:2 Demux	26	3	2.9	26	LP9	3A001.a.11.b	HMCAD5831LP9BE

Multi-GHz Quantizer

Input Frequency (GHz)	Function	Content	Sampling Rate (MSPS)	SFDR	SNR	Input Signal Range (V _{p-p})	Package	ECCN Code	Part Number
DC - 18	High Speed Data Acquisition	HMC6804LC4B T/H, Amplifier, HMCAD8101 ADC	1000	>50 dB @ 7 GHz	>40 dB @ 9 GHz	1	LC4B LP7DE	3A001.a.5.a.1	EKIT01-HMC9000

Track-and-Hold Amplifiers

Input Frequency (GHz)	Function	Single Tone THD/SFDR (dB)	Maximum Clock Rate (GSPS)	Output Noise (mV RMS)	Hold Mode Feed-through Rejection (dB)	Package	ECCN Code	Part Number
DC - 5	Track-and-Hold	-65/67	4.0	0.86	>60	LC4B	3A001.a.11.b	HMC760LC4B
DC - 18	Track-and-Hold	-65/67	4.0	1.05	>60	LC4B	3A001.a.11.b	HMC661LC4B
NEW! DC - 18	Dual Rank Track-and-Hold	-65/67	4.0	1.50	>60	LC5	3A001.a.11.b	HMC1061LC5

NEW!

HMCAD1063 – Dual 14-Bit Data Converter, 250 & 400 MSPS

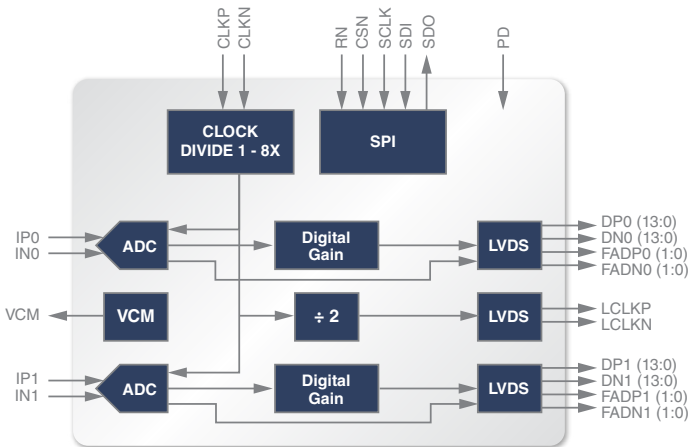
HMCAD1073 – Dual 16-Bit Data Converter, 250 & 400 MSPS



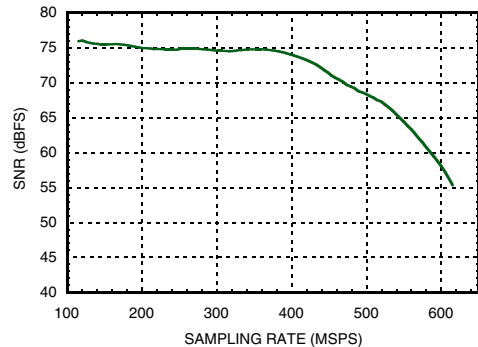
124 Lead ELP-R2 & 64L QFN
9 x 9 mm²

124 Lead ELP-R2
9 x 9 mm²

- 14-Bit, 16-Bit Resolution
- 50 to 400 MSPS Sampling Rate Range
- 14-Bit: 85 dB SFDR & 72 dB SNR @ Fin = 125 MHz, FS = 400 MSPS
- 16-Bit: 90 dB SFDR & 76 dB SNR @ Fin = 125 MHz, FS = 400 MSPS
- Coarse & Fine Gain Control
- Dynamic Power Scaling vs. Sample Rate
- 2 & 4-Bit Fast Amplitude Detect (FAD) Outputs



Signal-to-Noise vs. Sampling Rate for Fin = 30 MHz @ 1 dBFS



NEW!

HMCAD1062 – Quad 14-Bit Data Converter, 80/105/125 MSPS

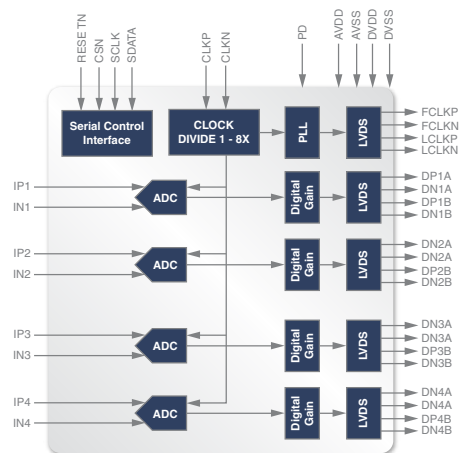
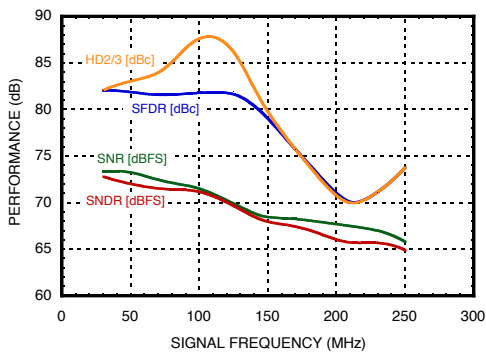
HMCAD1068 – Dual 14-Bit Data Converter, 80/105/125 MSPS



7 x 7 mm QFN-48 (LP7D) Package

- 1.8/1.8/1.9V Single Supply Operation @ 80/105/125 MSPS
- IF Sampling Up to 230 MHz
- SNR = 74 dBFS @ 125 MSPS & SFDR = 82 dBc @ 125 MSPS
- 2 Vp-p Differential Analog Input
- Coarse & Fine Gain Control
- Low Power Dissipation: HMCAD1062 - 760 mW @ 125 MSPS
HMCAD1068 - 455 mW @ 125 MSPS

Performance vs. Fin @ 125 MSPS

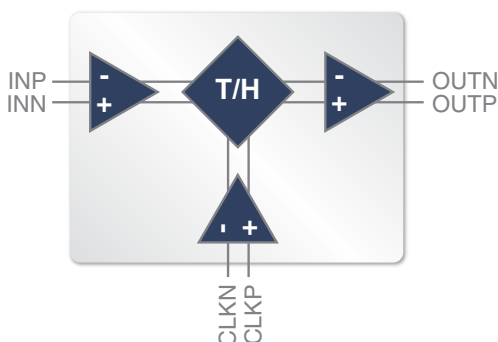


HMC661LC4B – Ultra Wideband 4 GSPS Track-and-Hold Amplifier, DC - 18 GHz

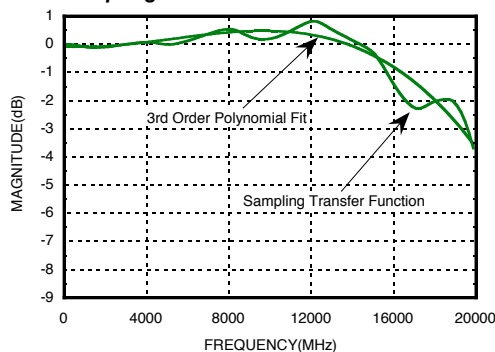


RoHS Compliant, 4 x 4 mm SMT Package

- 18 GHz Input Bandwidth (1 Vp-p Full Scale)
- 4 GSPS Maximum Sampling Rate
- 68 dB SFDR (4 GHz/0.5 Vp-p Input, CLK = 1 GSPS)
- 57 dB SFDR (4 GHz/1 Vp-p Input, CLK = 1 GSPS)
- Ultra-Clean Output Waveforms, Minimal Glitching
- >60 dB Hold Mode Feedthrough Rejection



Sampling Transfer Function

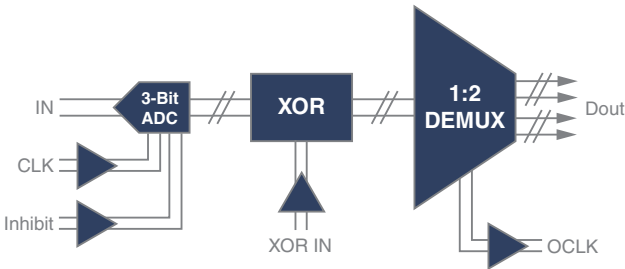


HMCAD5831L9BE – 3-Bit 26 GSPS A/D Converter with Overrange, Inhibit, & 1:2 DEMUX

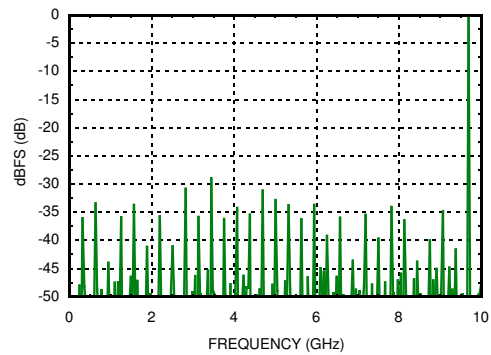


64 Lead, 9 x 9 mm
SMT Package

- Full Flash Architecture
- Over/Under Range Bit
- Data Inhibit Function
- Data XOR Function
- 1:2 DEMUX
- CML Outputs with Programmable Voltage Swing



Spectral Performance FFT
(9.6878 GHz Input, 20 GSPS Clock)

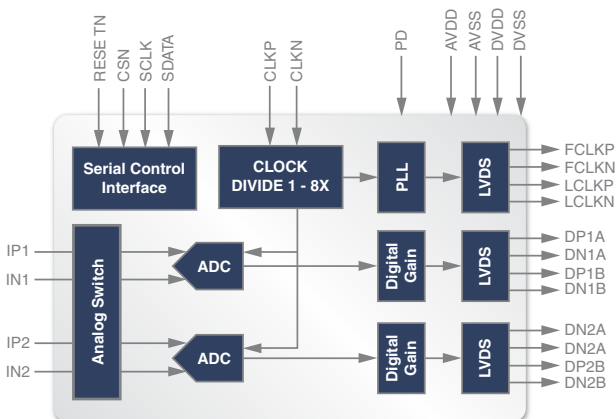


HMCAD1512 – 8-Bit, Dual-Channel 450 MSPS or Single-Channel 900 MSPS A/D Converter

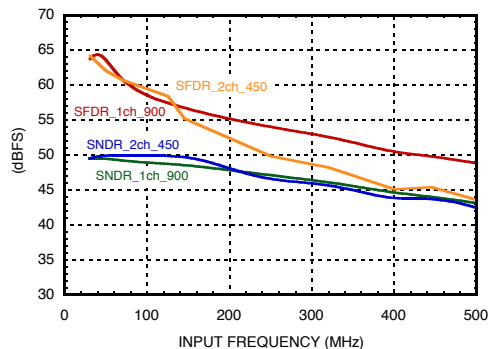


7 x 7 mm 48-Pin
QFN Package

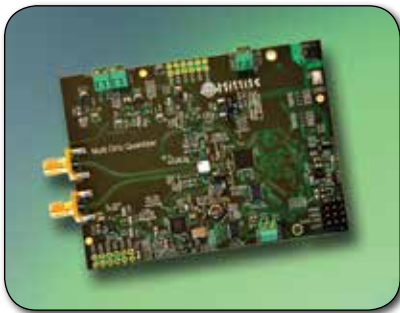
- 8-Bit, Dual Channel 450 MSPS or 8-Bit, Single Channel 900 MSPS
- Internal 13-Bit Resolution Enables Full Scale Range Operation from 2 Vp-p down to 63 mVp-p
- Ultra Low Power Dissipation: 650 mW @ 900 MSPS, including I/O
- 1X Gain: 48.8 dB SNR, 10X Gain: 48.0 dB SNR 650 mW including I/O @ 900 MSPS



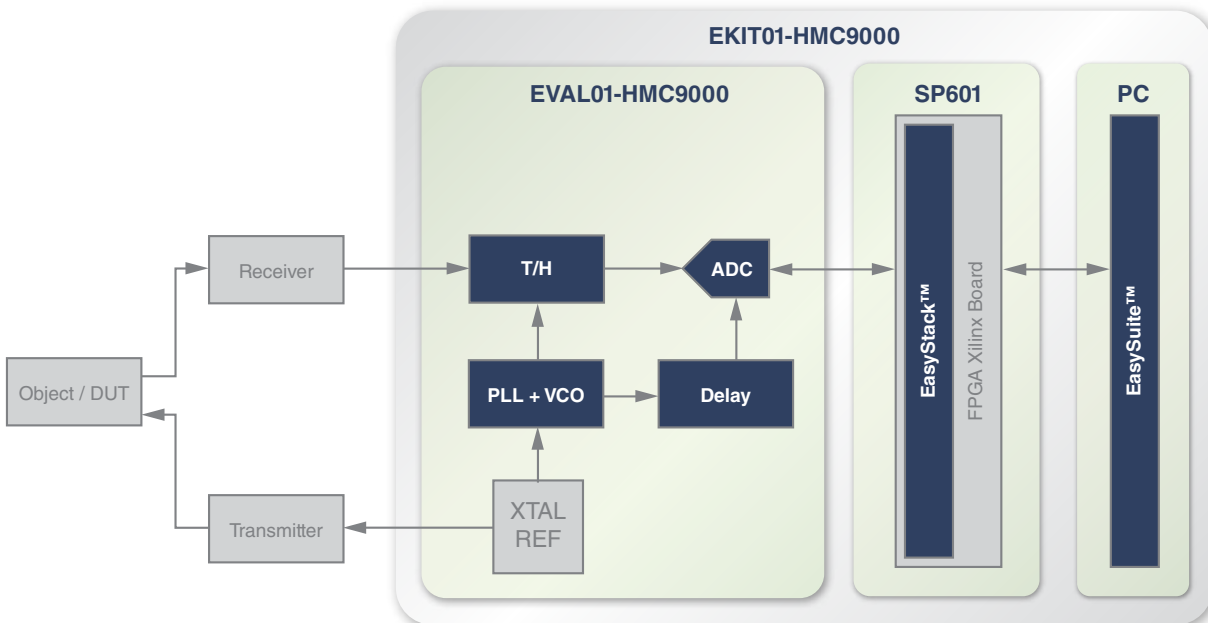
Performance vs. Fin
1 CH: FS = 900 MSPS, 2 CH: 450 = MSPS



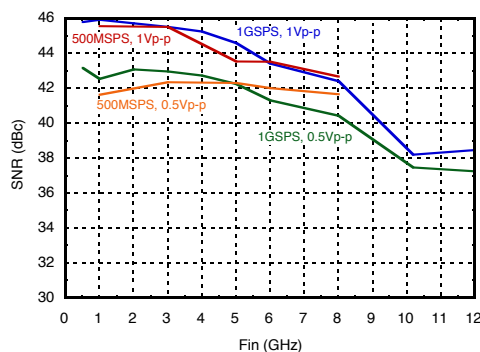
EKIT01-HMC9000 – Multi-GHz Quantizer for High Speed Data Acquisition



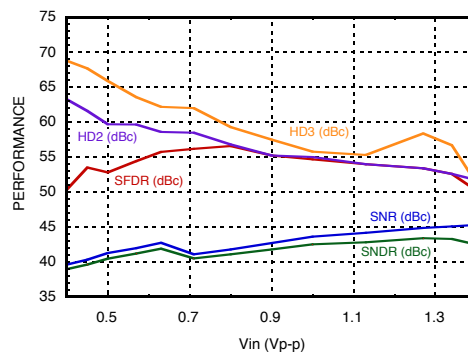
- Pulse Detection & Test Systems
- Direct Quantizer for Equivalent Time Sampling Systems including:
 - Pulse Radars
 - Bit Error Rate Testers (BERT)
 - Optical Time Domain Reflectometers (OTDR)
- Complete Multi-GHz Quantizer Board:
 - DC - 18 GHz Input Band Track-and-Hold
 - 8-Bit 1000 MSPS ADC
 - PLL + VCO
 - Clock Delay Controller
 - FPGA Board with EasyStack™ Firmware CodeStack
 - EasySuite™ GUI



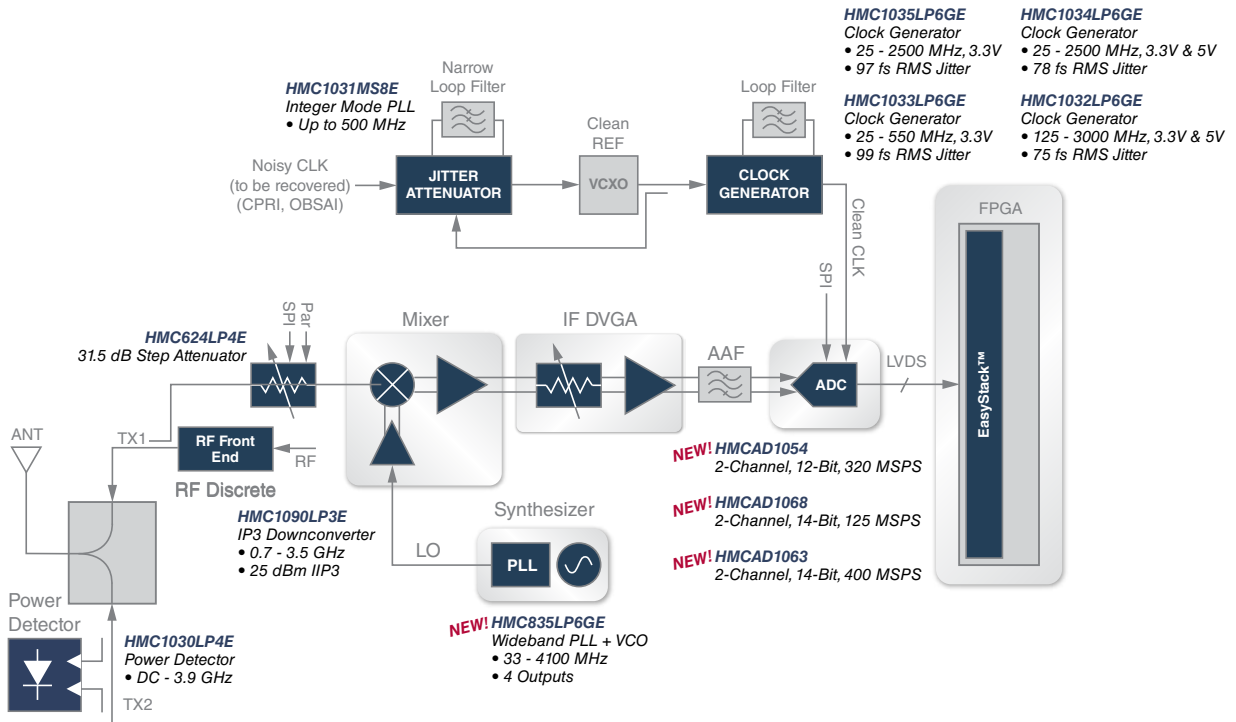
SNR vs. Input Frequency



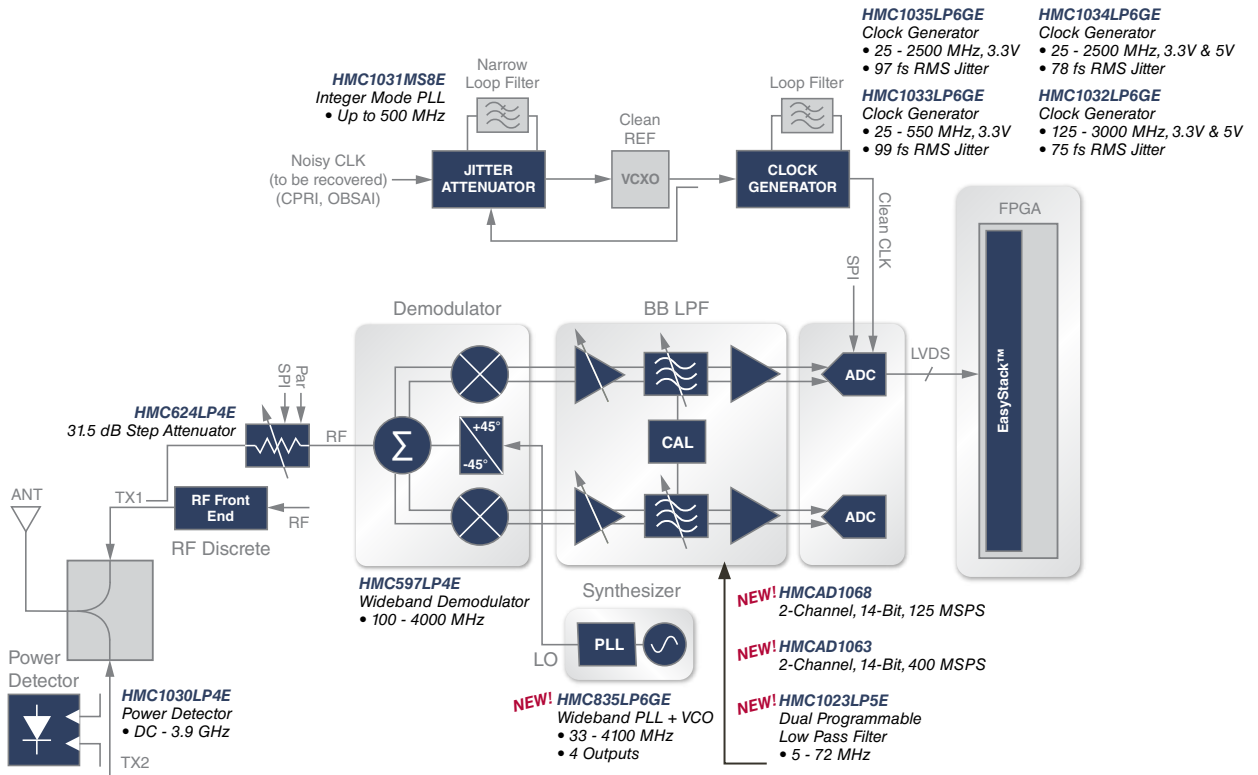
Performance vs. Input Signal Amplitude, Fin = 6 GHz, FS = 1000 MSPS



IF Digital Pre-Distortion (DPD) Remote Radio Head



Baseband Digital Pre-Distortion (DPD) Remote Radio Head

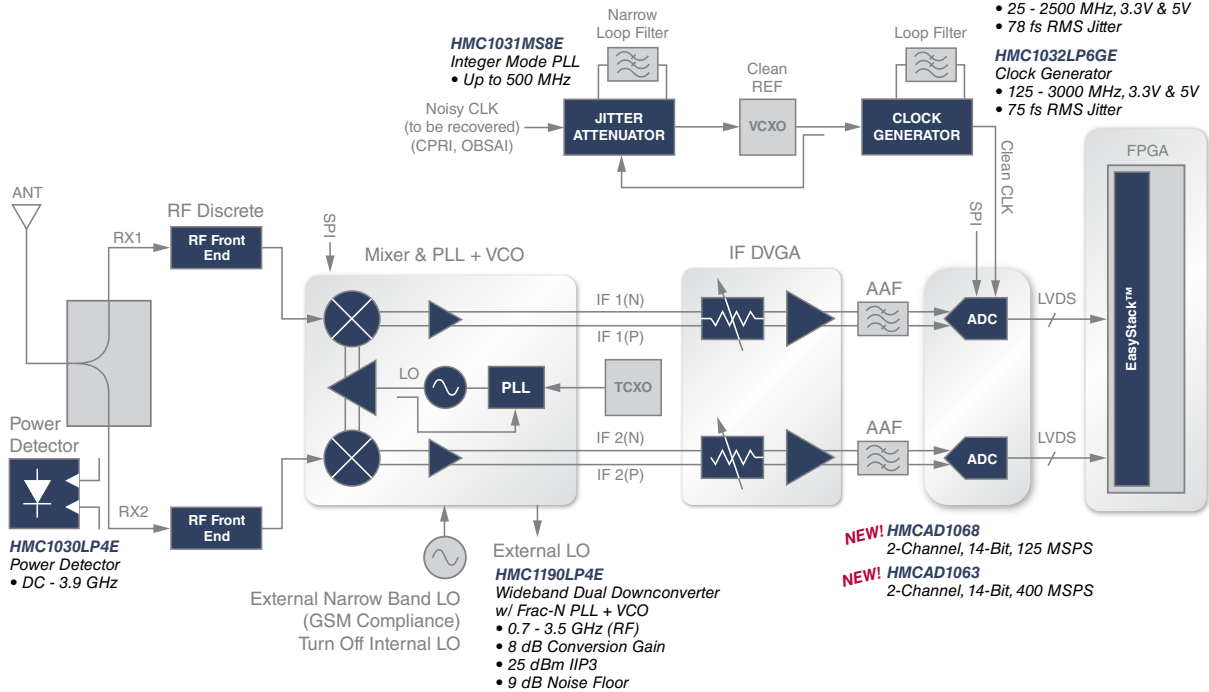


Dual-Channel Receiver Remote Radio Head

- HMC1035LP6GE**
Clock Generator
• 25 - 2500 MHz, 3.3V
• 97 fs RMS Jitter
- HMC1033LP6GE**
Clock Generator
• 25 - 550 MHz, 3.3V
• 99 fs RMS Jitter

- HMC1034LP6GE**
Clock Generator
• 25 - 2500 MHz, 3.3V & 5V
• 78 fs RMS Jitter

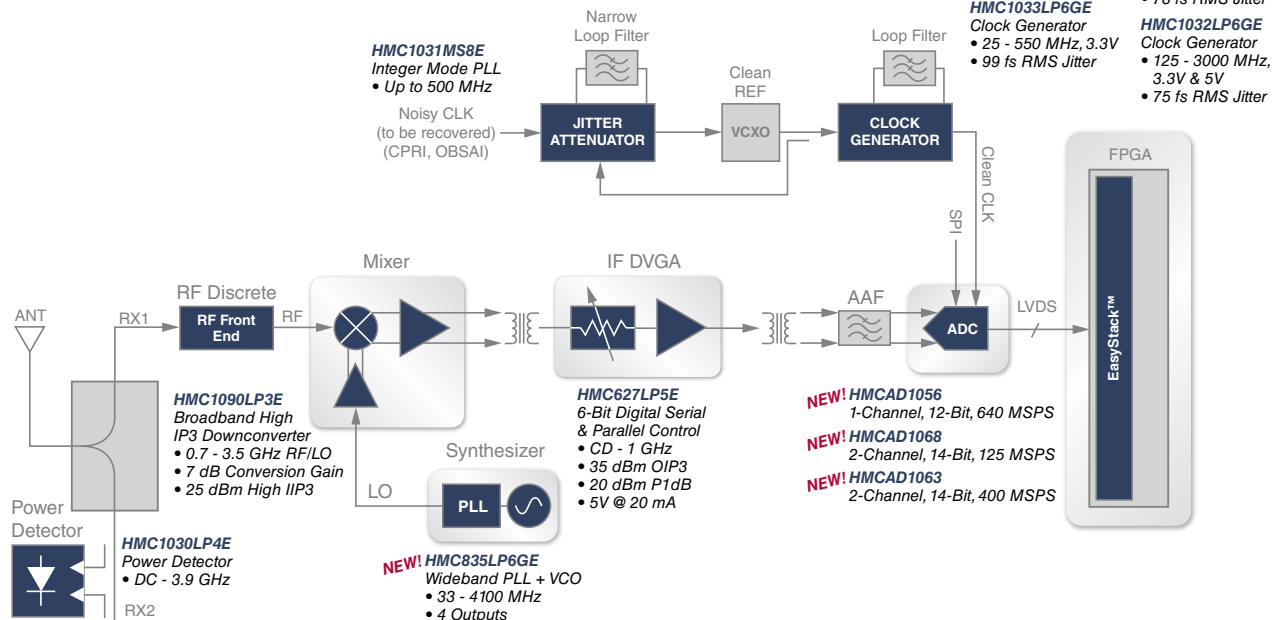
- HMC1032LP6GE**
Clock Generator
• 125 - 3000 MHz, 3.3V & 5V
• 75 fs RMS Jitter



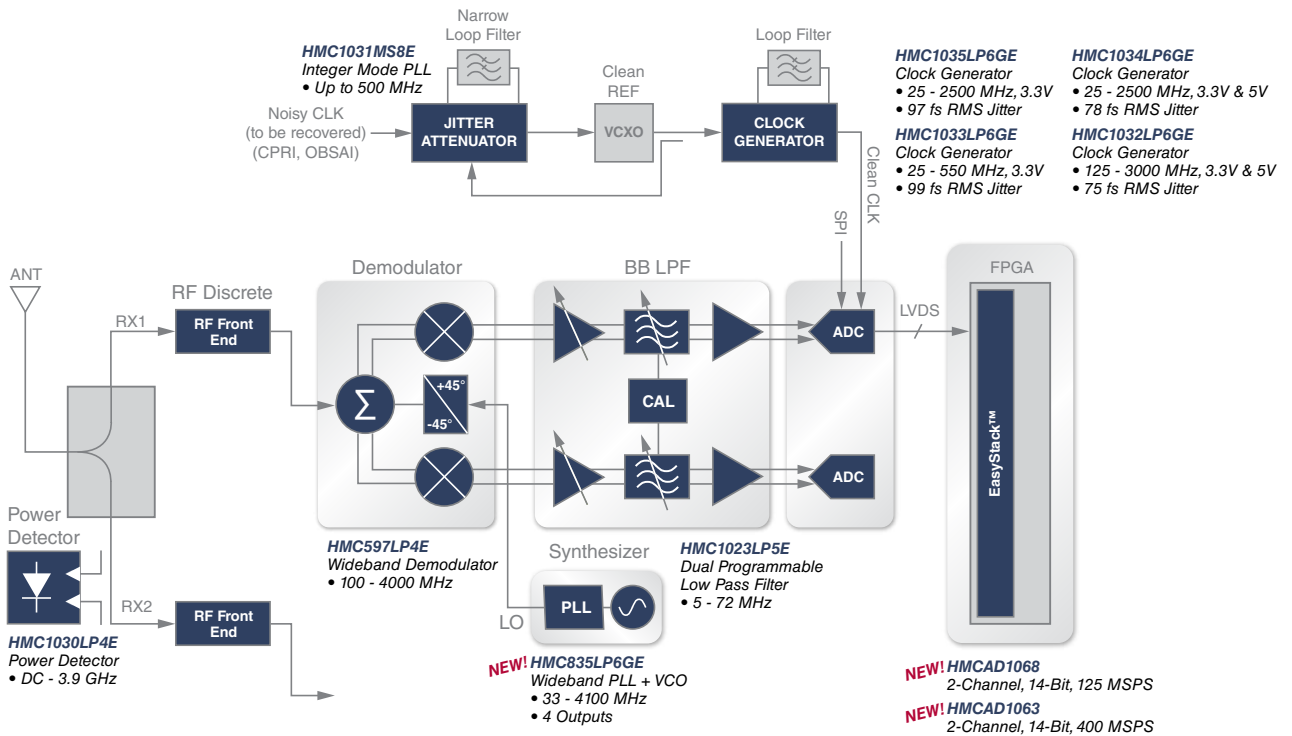
Single-Channel Repeater, Receiver Forward or Reverse

- HMC1035LP6GE**
Clock Generator
• 25 - 2500 MHz, 3.3V
• 97 fs RMS Jitter
- HMC1034LP6GE**
Clock Generator
• 25 - 2500 MHz, 3.3V & 5V
• 78 fs RMS Jitter

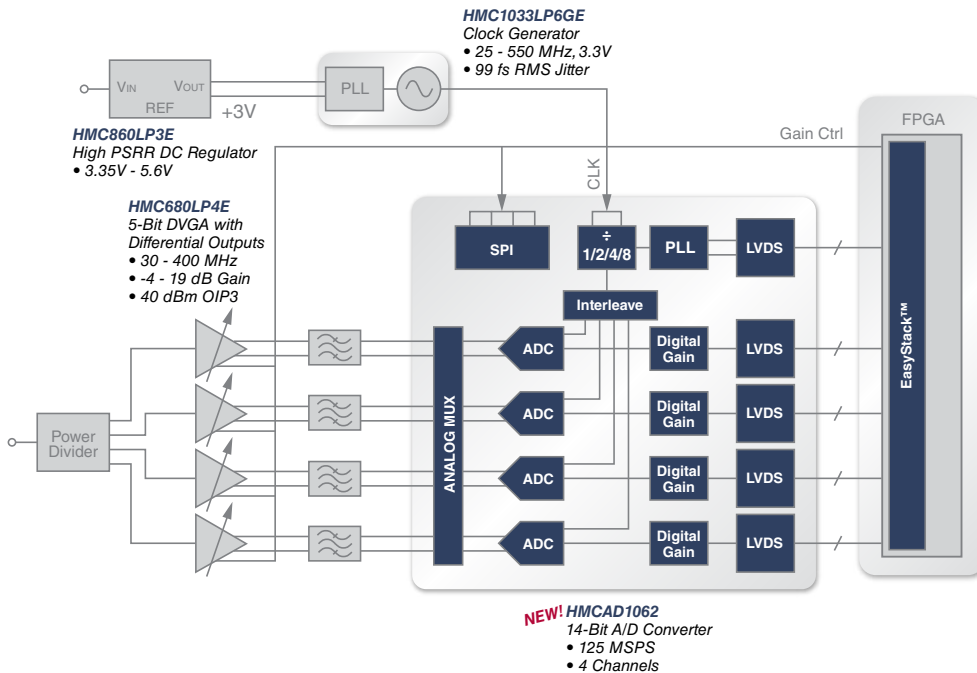
- HMC1033LP6GE**
Clock Generator
• 25 - 550 MHz, 3.3V
• 99 fs RMS Jitter
- HMC1032LP6GE**
Clock Generator
• 125 - 3000 MHz, 3.3V & 5V
• 75 fs RMS Jitter



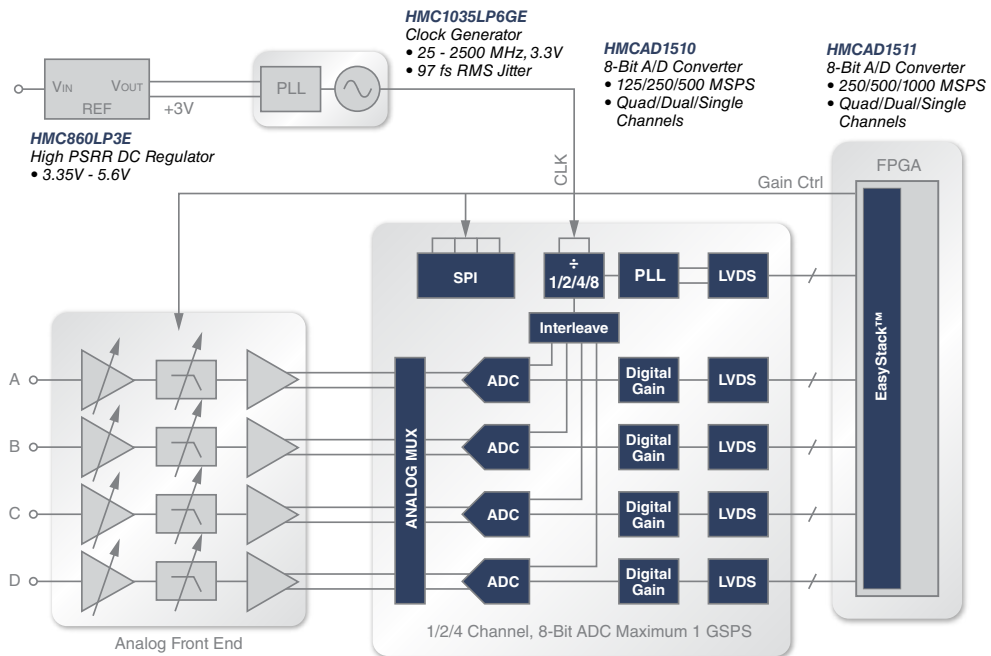
Direct Conversion Receiver (DCR) Remote Radio Head



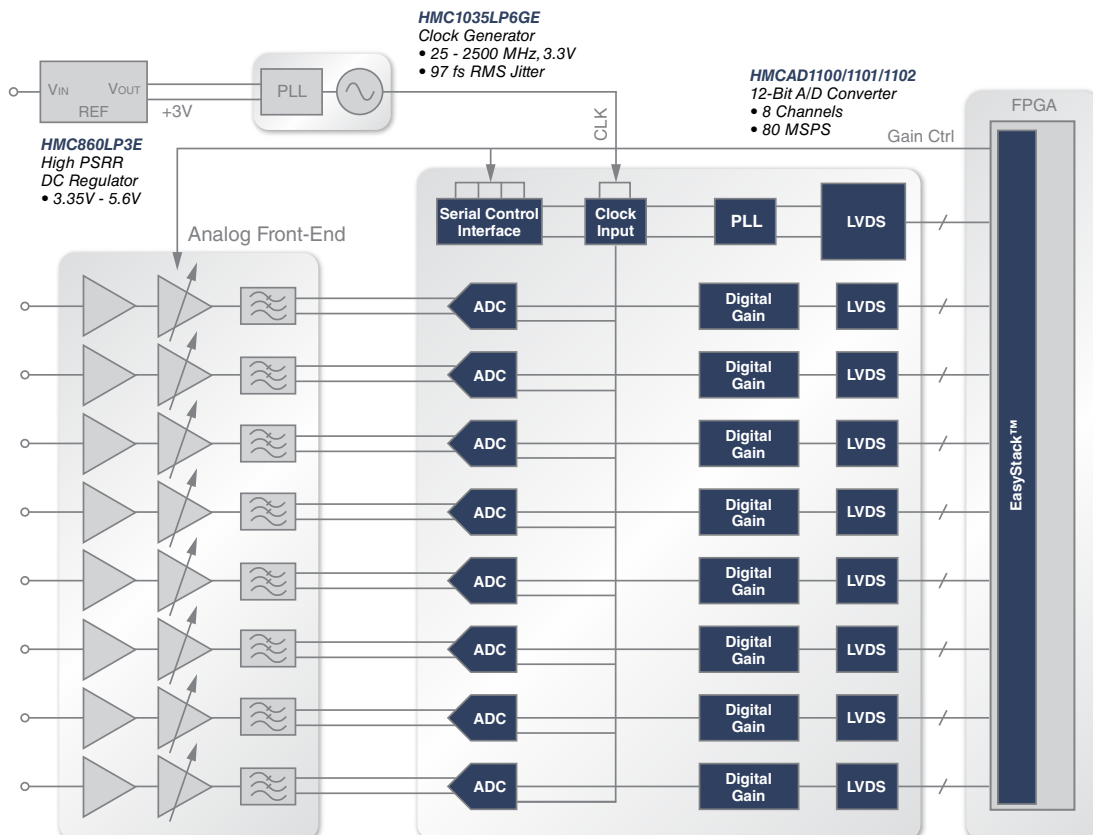
Spectrum Analyzers Featuring the HMCAD1062



Digital Oscilloscopes Featuring the HMCAD1510 & HMCAD1511



Medical & Industrial Imaging (Ultrasound) Featuring the HMCAD1100/1101/1102



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