Preliminary Data Sheet

ADSY1100

4 Tx/4 Rx, 0.1GHz to 20GHz Apollo MxFE 3UVPX Tuner + Digitizer + Processor

FEATURES

- Four Tx channels, up to 28GSPS 16-bit DACs
- Four Rx channels, up to 20GSPS 12-bit ADCs
- High instantaneous bandwidth
  - Up to 4GHz (4Tx4Rx))
  - Over 8GHz in direct sampling mode (2T2R)
- Apollo MxFE™ integrated DSP
  - DDC and DUC Up To 1,536x
  - RX to TX loopback
  - Fractional sample rate converter
  - 512-point FFT sniffer
  - Programmable finite impulse response (PFIR) Filter
  - Complex finite impulse response (CFIR) Filter
- Swappable RF tuner personality cards
  - 0.1GHz to 20GHz tuning
  - Multiple tuner options
  - Phase and hop coherency
- AMD Zynq ZU4EG
- AMD Virtex VU11P
- Memory options
  - 8GB DDR4 data memory
  - 4GB DDR4 processing memory
  - 270Mb ultraRAM
- Offload and control interfaces
  - 1Gb Ethernet
  - 10/25Gb Ethernet
  - 40/100Gb Ethernet
  - 2x100Gb optical Ethernet
  - PCIe Gen. 3 interface × 8 lanes
- SOSA-aligned, 1” pitch 3UVPX form factor
- Fully integrated hardware solution

APPLICATIONS

- Electronic warfare and signal intelligence
- Radar and phase array systems
- Tactical defense radio infrastructure
- Broadband communications systems
- Wireless communications infrastructure
- Wireless communications test
- Electronic test and measurement systems

GENERAL DESCRIPTION

The Analog Devices, Inc., ADSY1100 series is a family of fully integrated ultra-wideband, multichannel, RF transceiver and processing system on modules (SOM) in a 3UVPX SOSA™-aligned format designed to support rapid system integration and development. The SOM is built around Analog Devices next generation Apollo MXFE™ product (AD9084), featuring digital-to-analog converter (DAC) sample rates up to 28GSPS and analog-to-digital converter (ADC) sample rates up to 20GSPS in a 4 transmit (Tx) and 4 receive (Rx) configuration. The ADSY1100 includes the same integrated digital signal processor (DSP) functionality found in the AD9084 such as digital decimation, interpolation, numerically controlled oscillators (NCO), fast Fourier transform (FFT) sniffers, Rx to Tx loopback, fractional rate samplers, and more. These built-in power-efficient DSP features free up the field programmable gate array (FPGA) resources for user-defined mission specific processing using the on-board AMD Virtex™ Ultrascale+ FPGA. By providing a fully integrated SOM, users can focus development efforts on data and signal processing applications, resulting in significantly reduced system development times. Swappable RF and microwave tuner personality cards mate to the digitizer card within a single 1" pitch chassis to allow optimized and expanded performance for a variety of applications. A sensor open systems architecture™ (SOSA™) aligned slot profile is used that allows for a flexible system design that integrates well into customer system architectures. To ensure customer success in system design and integration, Analog Devices provides a board support package that contains an HDL reference design for the Virtex FPGA, in-kernel software drivers, Kuiper Linux and PetaLinux user spaces, bindings and interfaces to third-party tools, configuration and debug tooling, and detailed documentation.

Figure 1. 3D Rendering of ADSY1100

Rev. PrB

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FUNCTIONAL BLOCK DIAGRAM

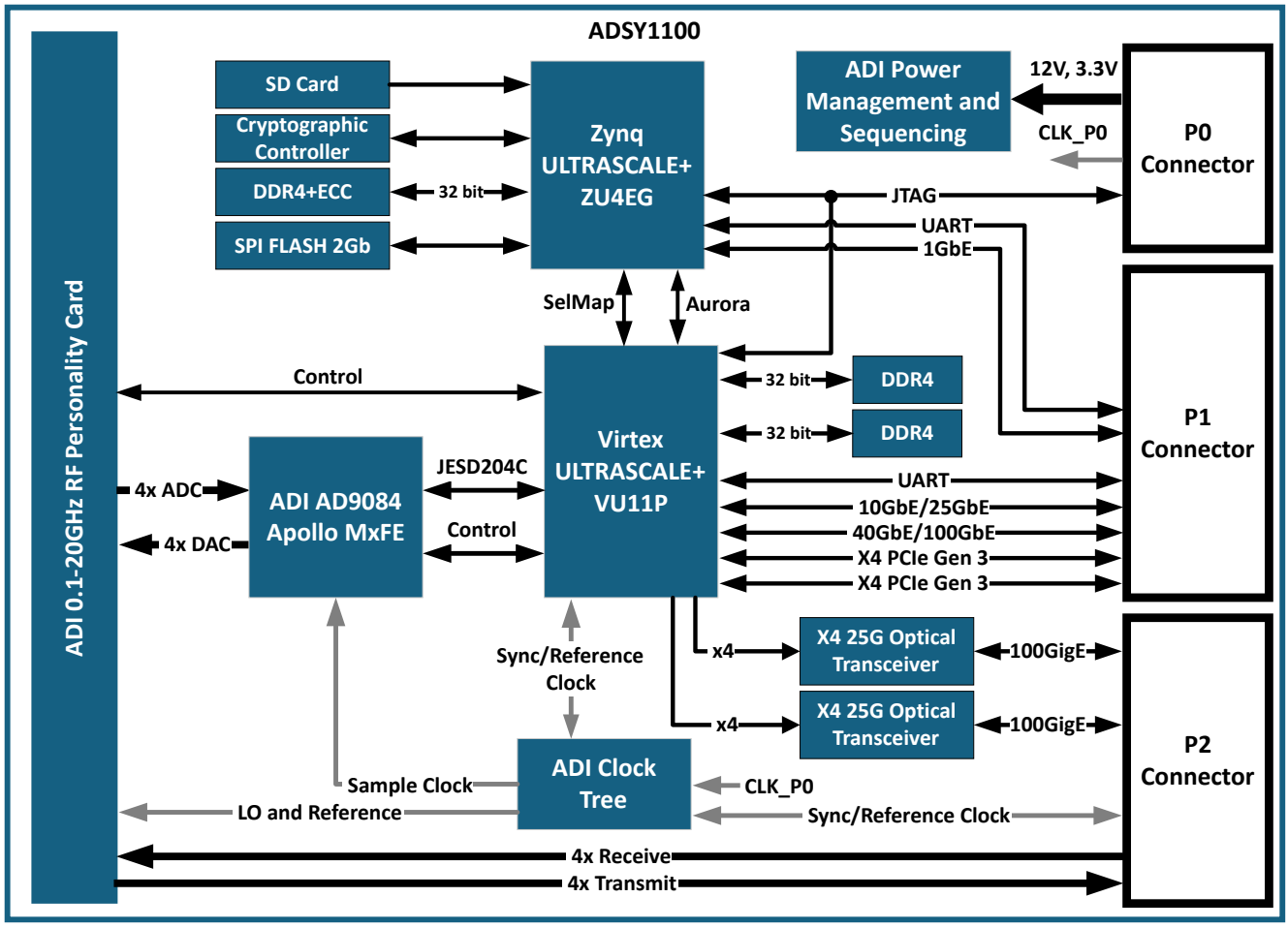

Figure 2. Functional Block Diagram

SPECIFICATIONS

Table 1. Specification for ADSY1100-1xxA, 4Tx/4Rx, 0.1GHz to 20GHz, Heterodyne First Nyquist Digitizer

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
POWER VOLTAGES					
12 SYS		9.2	12	14.2	V
3V3 AUX			3.3		V
12 SYS Current	Dependent on user application/Virtex utilization			TBD	A
3V3 AUX Current				TBD	A
Environmental Class		TBD	32	TBD	°C
Tx Channels			4		
Rx Channels			4		
Reference Frequency		TBD	100	400	MHz
Reference Power	Measured at input of P0 or P2 connector	−8		+9	dBm
Frequency Range					
0.1GHz to 8.5GHz Path		0.1		8.5	GHz
No Filter Path		0.1		20	GHz
X Band Path		8		12	GHz
Ku Band Path		12		18	GHz
TX TOTAL PATH GAIN					
0.1GHz to 8.5GHz Path			TBD		dB
No Filter Path			TBD		dB
X Band Path			TBD		dB
Ku Band Path			TBD		dB
TX PATH NOISE FIGURE	With no attenuation				
0.1GHz to 8.5GHz Path			TBD		dB
No Filter Path			TBD		dB
X Band Path			TBD		dB
Ku Band Path			TBD		dB
Tx DSA Range		0		31.5	dB
Tx DSA Step Size			0.5		dB
DAC Sample Rate				28	GSPS
TX INSTANTANEOUS BANDWIDTH					
0.1GHz to 8.5GHz Path					
No Filter Path				TBD	GHz
X Band Path				TBD	GHz
Ku Band Path				TBD	GHz
TX OUTPUT POWER	DAC Frequency = 20GSPS			TBD	dBm
Ftx = 1.5GHz for −1dBFS				TBD	dBm
Ftx = 3GHz for −1dBFS					
Ftx = 6GHz for −1dBFS				TBD	dBm
Ftx = 10GHz for −1dBFS				TBD	dBm
Ftx = 15GHz for −1dBFS				TBD	dBm
TX RETURN LOSS					
0.1GHz to 8.5GHz Path			TBD		dB
No Filter Path			TBD		dB
X Band Path			TBD		dB

SPECIFICATIONS

Table 1. Specification for ADSY1100-1xxA, 4Tx/4Rx, 0.1GHz to 20GHz, Heterodyne First Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Ku Band Path			TBD		dB
TX CHANNEL TO CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
TX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc

SPECIFICATIONS

Table 1. Specification for ADSY1100-1xxA, 4Tx/4Rx, 0.1GHz to 20GHz, Heterodyne First Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
TX SINGLE SIDEBAND PHASE NOISE OFFSET	20GSPS, 1.6GHz, 0dBFS continuous wave				
1kHz			TBD		dBc/Hz
100kHz			TBD		dBc/Hz
600kHz			TBD		dBc/Hz
1.2MHz			TBD		dBc/Hz
1.8MHz			TBD		dBc/Hz
6MHz			TBD		dBc/Hz
RX TOTAL PATH GAIN					
0.1GHz to 8.5GHz Path	Amplifier enable		TBD		dB
No Filter Path	Amplifier enable		TBD		dB
X Band Path	Amplifier enable		TBD		dB
Ku Band Path	Amplifier enable		TBD		dB
0.1GHz to 8.5GHz Path	Amplifier bypass		TBD		dB
No Filter Path	Amplifier bypass		TBD		dB
X Band Path	Amplifier bypass		TBD		dB
Ku Band Path	Amplifier bypass		TBD		dB
RX PATH NOISE FIGURE					
0.1GHz to 8.5GHz Path	Amplifier enable		TBD		dB
No Filter Path	Amplifier enable		TBD		dB
X Band Path	Amplifier enable		TBD		dB
Ku Band Path	Amplifier enable		TBD		dB
0.1GHz to 8.5GHz Path	Amplifier bypass		TBD		dB
No Filter Path	Amplifier bypass		TBD		dB
X Band Path	Amplifier bypass		TBD		dB
Ku Band Path	Amplifier bypass		TBD		dB
Rx DSA Range		0		31.5	dB
Rx DSA Step Size			0.5		dB
ADC Sample Rate				20	GSPS
ADC INSTANTANEOUS BANDWIDTH					
f_S = 20GSPS	1× decimation and only 2Tx 2Rx		8		GHz
	4× decimation		4		GHz
	16× decimation		1		GHz
RX INPUT POWER	ADC frequency = 20GSPS				
Frx = 1.5GHz	To achieve −1dBFS			TBD	dBm
Frx = 3GHz	To achieve −1dBFS			TBD	dBm
Frx = 6GHz	To achieve −1dBFS			TBD	dBm
Frx = 10GHz	To achieve −1dBFS			TBD	dBm
Frx = 15GHz	To achieve −1dBFS			TBD	dBm
RX RETURN LOSS					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB

SPECIFICATIONS

Table 1. Specification for ADSY1100-1xxA, 4Tx/4Rx, 0.1GHz to 20GHz, Heterodyne First Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RX CHANNEL TO CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX TO RX ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
RX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz)	Random mode, -7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Random mode, -7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Random mode, -7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Random mode, -7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Random mode, -7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	No random mode, -7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No random mode, -7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No random mode, -7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No random mode, -7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No random mode, -7dBFS continuous wave		TBD		dBFS/Hz
RX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS

SPECIFICATIONS

Table 1. Specification for ADSY1100-1xxA, 4Tx/4Rx, 0.1GHz to 20GHz, Heterodyne First Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
DIGITAL COMMUNICATIONS					
1 Gigabit Ethernet			TBD		TBD
10 Gigabit Ethernet and 25 Gigabit Ethernet			TBD		TBD
10 Gigabit Ethernet and 25 Gigabit Ethernet			TBD		TBD
2× 100 Gigabit Ethernet Optical (for ADSY1100-1Bxx Option)			TBD		TBD
PCIe Gen3			TBD		TBD

Table 2. Specification for ADSY1100-1xxD, 4Tx/4Rx, No RF Front-End, First and/or Second Nyquist Digitizer

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
POWER VOLTAGES					
12 SYS			12		V
3V3 AUX			3.3		V
12 SYS Current	Dependent on user application/Virtex utilization	TBD		TBD	A
3V3 AUX Current		TBD		TBD	A
Environmental Class		TBD	32	TBD	°C
Tx Channels			4		
Rx Channels			4		
Reference Frequency		TBD	100	400	MHz
Reference Power	Measured at input of P0 or P2 connector	−8		+9	dBm
Frequency Range		TBD		TBD	GHz
TX TOTAL PATH GAIN					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB
Ku Band (12GHz to 18GHz)					dB
TX PATH NOISE FIGURE					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB
Ku Band (12GHz to 18GHz)					dB
DAC Sample Rate				28	GSPS
TX INSTANTANEOUS BANDWIDTH					
f_S = 28GSPS			TBD		GHz
f_S = 20GSPS			TBD		GHz

SPECIFICATIONS

Table 2. Specification for ADSY1100-1xxD, 4Tx/4Rx, No RF Front-End, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
TX OUTPUT POWER	DAC frequency = 20GSPS				
Ftx = 1.5GHz for −1dBFS				TBD	dBm
Ftx = 3GHz for −1dBFS				TBD	dBm
Ftx = 6GHz for −1dBFS				TBD	dBm
Ftx = 10GHz for −1dBFS				TBD	dBm
Ftx = 15GHz for −1dBFS				TBD	dBm
TX RETURN LOSS					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX CHANNEL-TO-CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz),	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
TX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc

SPECIFICATIONS

Table 2. Specification for ADSY1100-1xxD, 4Tx/4Rx, No RF Front-End, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
TX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX SINGLE SIDEBAND PHASE NOISE OFFSET	20GSPS, 1.6GHz, 0dBFS continuous wave				
1kHz			TBD		dBc/Hz
100kHz			TBD		dBc/Hz
600kHz			TBD		dBc/Hz
1.2MHz			TBD		dBc/Hz
1.8MHz			TBD		dBc/Hz
6MHz			TBD		dBc/Hz
RX TOTAL PATH GAIN					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB
Ku Band (12GHz to 18GHz)					dB
RX PATH NOISE FIGURE					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB
Ku Band (12GHz to 18GHz)					dB
ADC Sample Rate				20	GSPS
ADC INSTANTANEOUS BANDWIDTH					
f_S = 20GSPS	1× decimation and only 2Tx 2Rx		8.5		GHz
f_S = 20GSPS	4× decimation		4		GHz
f_S = 20GSPS	16× decimation		1		GHz
RX INPUT POWER	ADC frequency = 20GSPS				
Frx = 1.5GHz	To achieve −1dBFS			TBD	dBm
Frx = 3GHz	To achieve −1dBFS			TBD	dBm
Frx = 6GHz	To achieve −1dBFS			TBD	dBm
Frx = 10GHz	To achieve −1dBFS			TBD	dBm
Frx = 15GHz	To achieve −1dBFS			TBD	dBm

SPECIFICATIONS

Table 2. Specification for ADSY1100-1xxD, 4Tx/4Rx, No RF Front-End, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RX RETURN LOSS					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
RX CHANNEL-TO-CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX-TO-RX ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
RX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
RX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS

SPECIFICATIONS

Table 2. Specification for ADSY1100-1xxD, 4Tx/4Rx, No RF Front-End, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
DIGITAL COMMUNICATIONS					
1Gigabit Ethernet			TBD		TBD
10 Gigabit Ethernet and 25 Gigabit Ethernet			TBD		TBD
10 Gigabit Ethernet and 25 Gigabit Ethernet			TBD		TBD
2x 100Gigabit Ethernet optical (for ADSY1100-1Bxx Option)			TBD		TBD
PCIe Gen3			TBD		TBD

Table 3. Specifications for ADSY1100-1xxE, 4Tx/4Rx, 0.1GHz to 18GHz, First and/or Second Nyquist Digitizer

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
POWER VOLTAGES					
12 SYS			12		V
3V3 AUX			3.3		V
12 SYS Current	Dependent on user application/Virtex utilization			TBD	A
3V3 AUX Current				TBD	A
Environmental Class		TBD	22	TBD	°C
Tx Channels			4		
Rx Channels			4		
Reference Frequency		TBD		400	MHz
Reference Power	Measured at input of P0 or P2 connector	−8		+9	dBm
Frequency Range		0.1		18	GHz
TX TOTAL PATH GAIN					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB
Ku Band (12GHz to 18GHz)					dB
TX PATH NOISE FIGURE					
L Band (1GHz to 2GHz)					dB
S Band (2GHz to 4GHz)					dB
C Band (4GHz to 8GHz)					dB
X Band (8GHz to 12GHz)					dB

SPECIFICATIONS

Table 3. Specifications for ADSY1100-1xxE, 4Tx/4Rx, 0.1GHz to 18GHz, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
Ku Band (12GHz to 18GHz)					dB
Tx DSA Range		0		30	dB
Tx DSA Step Size			1		dB
DAC Sample Rate				28	GSPS
DAC Instantaneous Bandwidth					
f_S = 28GSPS			14		GHz
f_S = 20GSPS			10		GHz
TX OUTPUT POWER	DAC Frequency = 20GSPS				
Ftx = 1.5GHz for −1dBFS				TBD	dBm
Ftx = 3GHz for −1dBFS				TBD	dBm
Ftx = 6GHz for −1dBFS				TBD	dBm
Ftx = 10GHz for −1dBFS				TBD	dBm
Ftx = 15GHz for −1dBFS				TBD	dBm
TX RETURN LOSS					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX CHANNEL TO CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz),	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Shuffling, −7dBFS continuous wave		TBD		dBFS/Hz
TX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc

SPECIFICATIONS

Table 3. Specifications for ADSY1100-1xxE, 4Tx/4Rx, 0.1GHz to 18GHz, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
TX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, shuffle on				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone				
L Band (1GHz to 2GHz)			TBD		dBc
S Band (2GHz to 4GHz)			TBD		dBc
C Band (4GHz to 8GHz)			TBD		dBc
X Band (8GHz to 12GHz)			TBD		dBc
Ku Band (12GHz to 18GHz)			TBD		dBc
TX SINGLE SIDEBAND PHASE NOISE OFFSET	20GSPS, 1.6GHz, 0dBFS continuous wave				
1kHz			TBD		dBc/Hz
100kHz			TBD		dBc/Hz
600kHz			TBD		dBc/Hz
1.2MHz			TBD		dBc/Hz
1.8MHz			TBD		dBc/Hz
6MHz			TBD		dBc/Hz
RX TOTAL PATH GAIN					
L Band (1GHz to 2GHz)	Amplifier enabled		TBD		dB
S Band (2GHz to 4GHz)	Amplifier enabled		TBD		dB
C Band (4GHz to 8GHz)	Amplifier enabled		TBD		dB
X Band (8GHz to 12GHz)	Amplifier enabled		TBD		dB
Ku Band (12GHz to 18GHz)	Amplifier enabled		TBD		dB
L Band (1GHz to 2GHz)	Amplifier bypass		TBD		dB
S Band (2GHz to 4GHz)	Amplifier bypass		TBD		dB
C Band (4GHz to 8GHz)	Amplifier bypass		TBD		dB
X Band (8GHz to 12GHz)	Amplifier bypass		TBD		dB
Ku Band (12GHz to 18GHz)	Amplifier bypass		TBD		dB
RX PATH NOISE FIGURE					
L Band (1GHz to 2GHz)	Amplifier enabled		TBD		dB
S Band (2GHz to 4GHz)	Amplifier enabled		TBD		dB
C Band (4GHz to 8GHz)	Amplifier enabled		TBD		dB
X Band (8GHz to 12GHz)	Amplifier enabled		TBD		dB
Ku Band (12GHz to 18GHz)	Amplifier enabled		TBD		dB
L Band (1GHz to 2GHz)	Amplifier bypass		TBD		dB
S Band (2GHz to 4GHz)	Amplifier bypass		TBD		dB

SPECIFICATIONS

Table 3. Specifications for ADSY1100-1xxE, 4Tx/4Rx, 0.1GHz to 18GHz, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
C Band (4GHz to 8GHz)	Amplifier bypass		TBD		dB
X Band (8GHz to 12GHz)	Amplifier bypass		TBD		dB
Ku Band (12GHz to 18GHz)	Amplifier bypass		TBD		dB
Rx DSA Range		0		60	dB
Rx DSA Step Size			1		dB
ADC Sample Rate				20	GSPS
ADC INSTANTANEOUS BANDWIDTH					
f_S = 20GSPS	4× decimation		4		GHz
RX INPUT POWER	ADC frequency = 20GSPS				
Frx = 1.5GHz	To achieve −1dBFS			TBD	dBm
Frx = 3GHz	To achieve −1dBFS			TBD	dBm
Frx = 6GHz	To achieve −1dBFS			TBD	dBm
Frx = 10GHz	To achieve −1dBFS			TBD	dBm
Frx = 15GHz	To achieve −1dBFS			TBD	dBm
RX RETURN LOSS					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
RX CHANNEL TO CHANNEL ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
TX TO RX ISOLATION					
L Band (1GHz to 2GHz)			TBD		dB
S Band (2GHz to 4GHz)			TBD		dB
C Band (4GHz to 8GHz)			TBD		dB
X Band (8GHz to 12GHz)			TBD		dB
Ku Band (12GHz to 18GHz)			TBD		dB
RX NOISE SPECTRAL DENSITY (NSD)					
L Band (1GHz to 2GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	Random mode, −7dBFS continuous wave		TBD		dBFS/Hz
L Band (1GHz to 2GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
S Band (2GHz to 4GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
C Band (4GHz to 8GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
X Band (8GHz to 12GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz
Ku Band (12GHz to 18GHz)	No random mode, −7dBFS continuous wave		TBD		dBFS/Hz

SPECIFICATIONS

Table 3. Specifications for ADSY1100-1xxE, 4Tx/4Rx, 0.1GHz to 18GHz, First and/or Second Nyquist Digitizer (Continued)

Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
RX SECOND HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX THIRD HARMONIC DISTORTION	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX SPURIOUS-FREE DYNAMIC RANGE	20GSPS, −7dBFS, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
RX THIRD-ORDER INTERMODULATION DISTORTION	20GSPS, two tone test, −13dBFS per tone, 8× decimation				
L Band (1GHz to 2GHz)			TBD		dBFS
S Band (2GHz to 4GHz)			TBD		dBFS
C Band (4GHz to 8GHz)			TBD		dBFS
X Band (8GHz to 12GHz)			TBD		dBFS
Ku Band (12GHz to 18GHz)			TBD		dBFS
DIGITAL COMMUNICATIONS					
1Gigabit Ethernet			TBD		TBD
10/25 Gigabit Ethernet			TBD		TBD
10/25 Gigabit Ethernet			TBD		TBD
2x 100Gigabit Ethernet Optical (for ADSY1100-1Bxx Option)			TBD		TBD
PCIe Gen3			TBD		TBD

ABSOLUTE MAXIMUM RATINGS

Table 4. Absolute Maximum Rating

Parameter	Rating
Maximum Supply Voltage	TBD
Base Card Maximum ADC Input Power	19dBm
Base Card Maximum Reference Input Power	13dBm
Temperature	TBD

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

ELECTROSTATIC DISCHARGE (ESD) RATINGS

The following ESD information is provided for handling of ESD-sensitive devices in an ESD-protected area only.

Human body model (HBM) per ANSI/ESDA/JEDEC JS-001.

Charged device model (CDM) per ANSI/ESDA/JEDDEC JS-002

ESD Ratings for ADSY1100

Table 5. ADSY1100, 3U VPX

ESD Model	Withstand Threshold (V)	Class
HBM	±TBD	0B
CDM	±TBD	C0B

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

INTERFACE DESCRIPTION

The ADSY1100 family of SOMs uses the VITA 65.0 payload slot profile SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-12.

Additionally, the module profile is MOD3p-PAY-1F1U1S1S1U1U2F1H-16.6.11-11.

Figure 3 illustrates the ADSY1100 backplane interface with labeling to show the breakout of the various connector sections. The P0 connector carries signals assigned primarily to the system power, reference and synch inputs, JTAG interface, and serial interface to the Zynq™ FPGA. The P1 connector supports differential signals and supports the 1GbE, 10/25GbE, 40/100GbE communication ports as well as the PCIE interface. There is also support for a UART channel to the Virtex FPGA. The two P2 connectors are dedicated to RF signal inputs/outputs and optical data transfer. Signals paths utilize nanoRF connectors. The two 100Gb optical data links supporting data transfers externally to the ADSY1100 at rates up to 100Gbps and are available as an option.Figure 4 shows a graphical representation of the pin assignment for the VITA 65 slot profile used in the ADSY1100.

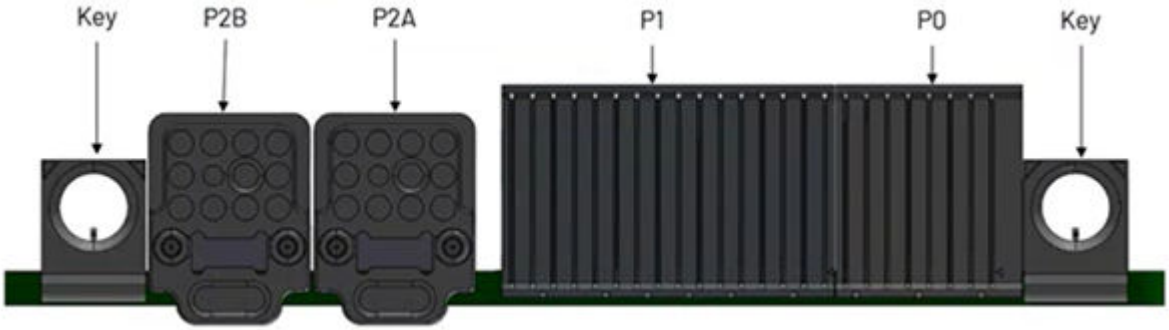

Figure 3. Physical Representation of the ADSY1100 Backplane Interface

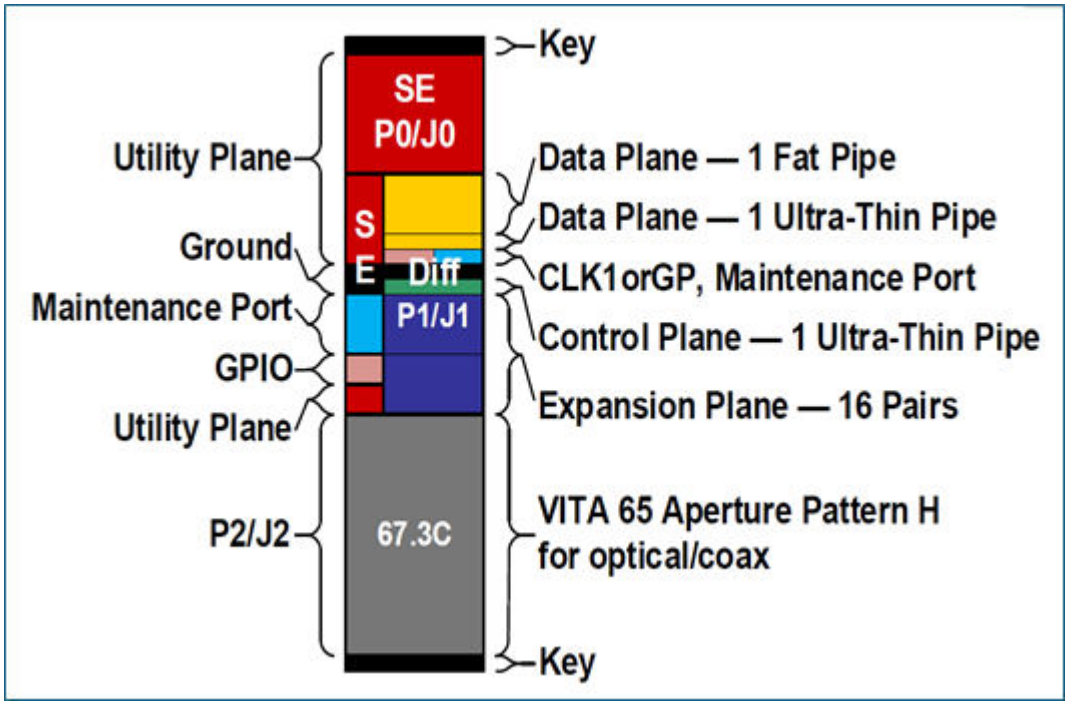

Figure 4. Graphic Representation of the Slot Resource Assignment for the SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-12 Slot Profile

THEORY OF OPERATION

The ADSY1100 digitizer base card houses the AD9084, Virtex™ UltraScale+™ FPGA and Zynq™ UltraScale+™ MPSoC, as well as optical transceivers, on-board memory, a power distribution network, clock conditioning, and more. The P0 and P1 backplane connectors connect directly to the ADSY1100 digitizer base card to provide a 12V power source, clock sources, auxiliary power, UART, JTAG, PCIe Gen3 data plane, 40/100Gb Ethernet data plane, 10/25Gb Ethernet data plane, 1Gb Ethernet SGMII control plane, and more. An on-board phase-locked loop and synthesizer accepts a low-frequency reference clock and synthesizes two 20GHz low phase noise output signals used to serve as the sample clock for the AD9084 and the local oscillator (LO) for some attached tuner personality cards.

A family of tuner personality cards mates to the ADSY1100 digitizer base card to allow for optimized performance based on user case. Typical tuner personality card functions include variable gain and attenuation, RF filtering, optional RF frequency conversion, and switched paths. Among these, the 0.01GHz to 8.5GHz personality card employs a simple RF chain to operate in the first Nyquist. However, if a higher frequency range is required, a 0.01GHz to 18GHz personality card implements a switchable filter bank to operate in the first and second Nyquist. The 0.1GHz to 20GHz personality card uses an integrated upconverter and downconverter to operate in the first Nyquist. Additionally, a pass-thru configuration is available that omits the front-end signal chain and instead enables the direct signal flow into the base card. Detected and synthesized signals arrive on the ADSY1100 digitizer base card via the RF and microwave connectors which are delivered from the tuner personality card.

I/Q data is offloaded from the ADSY1100 Digitizer Base Card through the following:

- 2x 100Gb Ethernet optical transceiver interface via the P2 connectors
- 10/25Gb and 40/100Gb copper Ethernet
- PCIE Gen 3

Additionally, digitized I/Q data can be stored to on-board memory and subsequently querying the memory from the Ethernet plane.

Leveraging the common software architecture from Analog Devices products, the ADSY1100 supports both Linux and No-OS environments. This device includes an open-source reference design that can be utilized in various applications. The default design for the Zynq™ MPSoC and Virtex FPGA is built from the Analog Devices HDL repository. The ADSY1100 leverages SelectMap, allowing the Zynq™ MPSoC to drive the interface and configure the Virtex FPGA.

As part of the system integration, the Apollo AD9084 MxFE chip is supported by a dedicated SPI/HSCI bus driver within the Linux industrial I/O (IIO) subsystem. The application program interface (API) integrated with the user application relies on an SPI or HSCI interface in the host processor to interact with the Apollo AD9084 MxFE chip.

The transmit and receive digital datapaths are highly configurable and support a wide range of single-band and multiband applications with varying RF bandwidth requirements. The ADSY1100 transmit and receive datapaths consist of four main datapaths in support of wideband signals and eight channelizers in support of narrower band signals. For multiband applications with wide separation between RF bands, the channelizers can be used to process the individual RF bands to reduce the overall complex data rate required to support narrow noncontiguous bands. Both the main and channelizer datapath stages offer flexible interpolating and decimation factors to allow a more manageable data interface rate aligned to the actual signal bandwidth requirements. The NCO of each stage can be independently tuned for the flexibility of frequency placement.

These versatile digital features are available to support a wide range of configuration during operation:

- Configurable DDC and DUC
  - 8 fine complex DUCs and 4 coarse complex DUCs
  - 8 fine complex DDCs and 4 coarse complex DDCs
  - Option to bypass fine and coarse DUC and DDC
  - DUC and DDC alias rejection
  - 85dB for interpolation filters, and 100dB for decimation filters
  - Coarse interpolation ratios : 1×, 2×, 3×, 4×, 6×, 8×, 12×
  - Coarse decimation ratios : 1×, 2×, 3×, 4×, 6×, 12×
  - Fine interpolation/decimation ratios: 1×, 2×, 4×, 8×,16×, 32×, 64×
  - Rate change programmable from 1× to 2×

OUTLINE DIMENSIONS

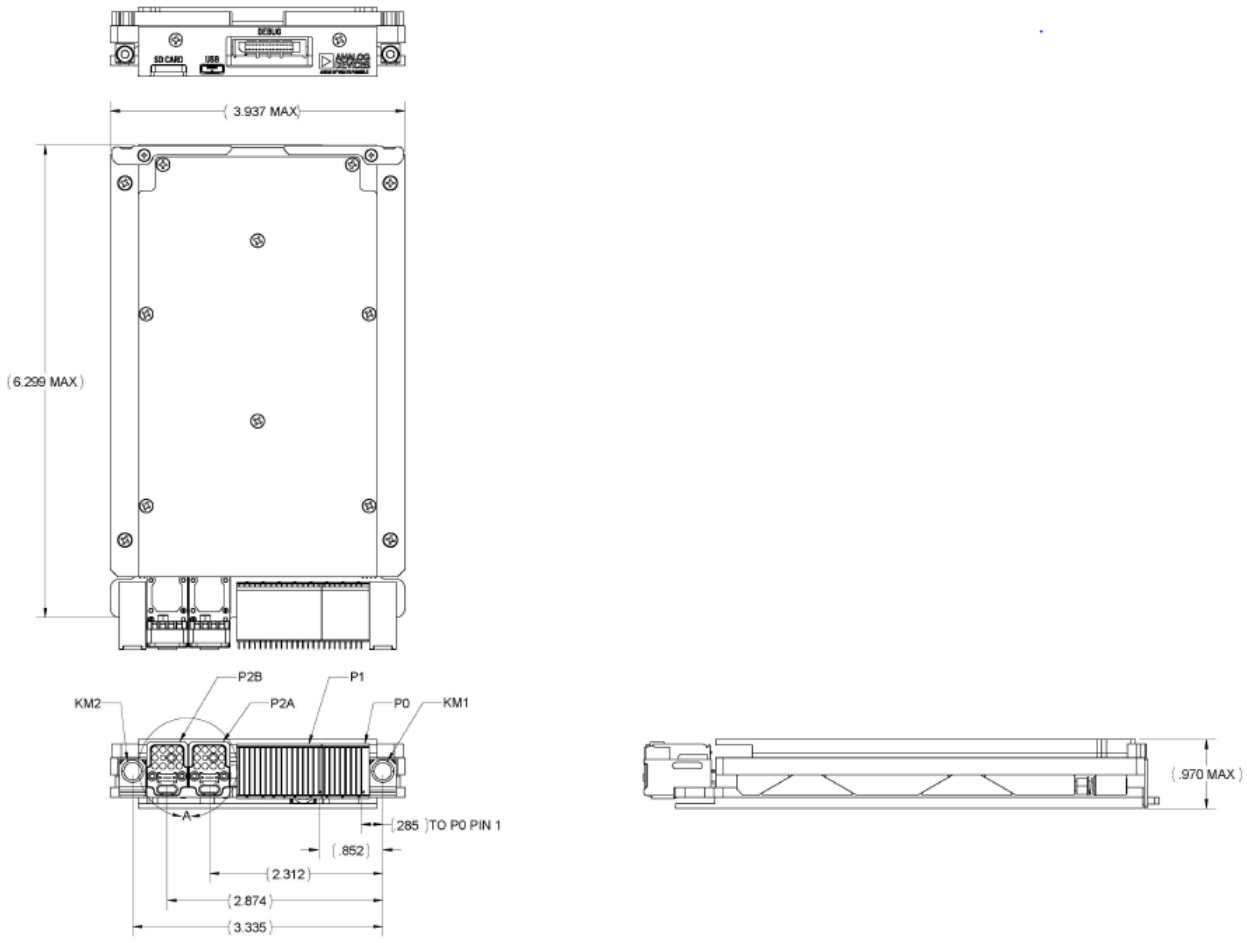

Figure 5. 40-Lead Module with Connector Interface [MODULE]
(ML-40-1)
Dimensions shown in inches

MODEL DESCRIPTIONS

Table 6. Product Listing with Distinguishing Features

Model	Optical Interface	Environmental Class	Tuner Personality Card
ADSY1100-1B0A	2× 100 Gigabit Ethernet optical	Intended for lab use	4Tx/4Rx, 0.1GHz to 20GHz, heterodyne first Nyquist digitizer
ADSY1100-1B0D	2× 100 Gigabit Ethernet optical	Intended for lab use	4Tx/4Rx, No RF front-end, first and/or Second Nyquist digitizer
ADSY1100-1B0E	2× 100 Gigabit Ethernet optical	Intended for lab use	4Tx/4Rx, 0.1GHz to 18GHz, first and/or Second Nyquist digitizer
ADSY1100-1B1A	2× 100 Gigabit Ethernet optical	Ruggedized, VITA 47	4Tx/4Rx, 0.1GHz to 20GHz, heterodyne first nyquist digitizer
ADSY1100-1B1D	2× 100 Gigabit Ethernet optical	Ruggedized, VITA 47	4Tx/4Rx, No RF front-end, first and/or second Nyquist digitizer
ADSY1100-1B1E	2× 100 Gigabit Ethernet optical	Ruggedized, VITA 47	4Tx/4Rx, 0.1GHz to 18GHz, first Nyquist up/down converter digitizer
ADSY1100-1C0A	No optical	Intended for lab use	4Tx/4Rx, 0.1GHz to 20GHz, heterodyne first nyquist digitizer
ADSY1100-1C0D	No optical	Intended for lab use	4Tx/4Rx, No RF front-end, first and/or second Nyquist digitizer
ADSY1100-1C0E	No optical	Intended for lab use	4Tx/4Rx, 0.1GHz to 18GHz, first Nyquist up/down converter digitizer
ADSY1100-1C1A	No optical	Ruggedized, VITA 47	4Tx/4Rx, 0.1GHz to 20GHz, heterodyne first nyquist digitizer
ADSY1100-1C1D	No optical	Ruggedized, VITA 47	4Tx/4Rx, no RF front-end, first and/or second Nyquist digitizer
ADSY1100-1C1E	No optical	Ruggedized, VITA 47	4Tx/4Rx, 0.1GHz to 18GHz, first Nyquist up/down converter digitizer