

AV153

Phased-Array Radar Transceiver
EW-ESM/ECM

3U VPX / SOSA

Altera® Agilex™ 9 AGRW027

Octal 10 bit 64 Gbps ADC

Octal 10 bit 64 Gbps DAC

Analog bandwidth up to 20 GHz

Conduction Cooled



Applications

Phased-Array Radar Transmitter / Receiver

Electronic Warfare ESM /ECM

Broadband Communication

Target Radar Simulator/ Generator

Airbone embedded systems

Features



Direct-RF SOC Intel® Agilex® 9 AGRW027

8 channels 64 Gbps 10-bit ADC

8 channels 64 Gbps 10-bit DAC

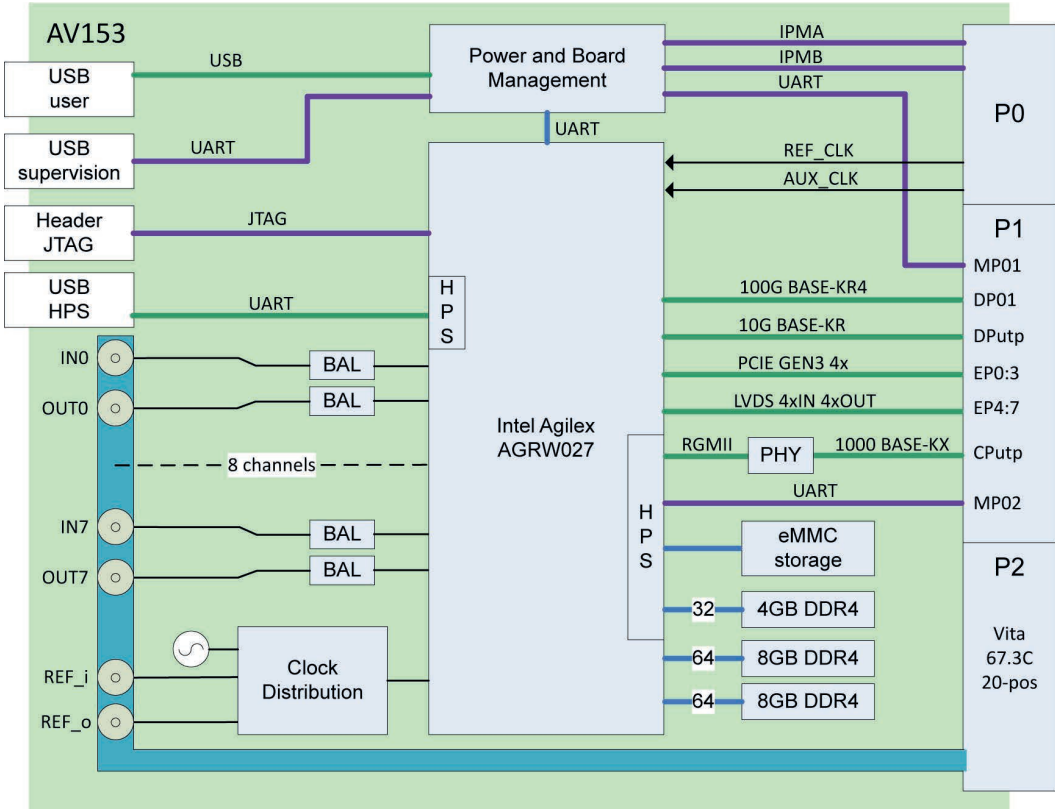
One Ultra Low jitter clock synthesizer

External or internal sampling clock reference

2x 64-bit 8GBytes DDR4 2666 SDRAM (Fabric)

1x 32-bit 4GBytes DDR4 2666 SDRAM (HPS)

SOSA-aligned



Form Factor

3U VPX Conduction cooled Vita 48.2, pitch 1.0" Two Ultra-low jitter clock synthesizers

VPX Profile

SLT3-PAY-1F1U1S1S1U1U2F1H-14.6.11-12

Analog Input/Output

Input coupling: AC
Full power bandwidth: 100MHz to 20 GHz
Full scale: +7dBm @ 5GHz
Output coupling: AC
Full power bandwidth: 100MHz to 20 GHz
Full scale: -7dBm @ 5GHz
Impedance: 50 Ohm
Connectors: Vita 67.3 NanoRF

Analog-Digital Conversion

Eight channels, up to 64Gsps
Resolution: 10 bit
Sampling Performances at 64Gsps
NSD: -150 dBFS/Hz at -3dBFS at 6GHz
SDFR: -55 dBc at -3dBFS at 6GHz

Digital-Analog Conversion

Eight channels, up to 64Gsps
Resolution: 10 bits
Sampling Performances at 64Gsps
NSD: -156 dBFS/Hz at 0dBFS at 6GHz
SDFR: -50 dBc at 0dBFS at 6GHz

Weight

630g

Clock

External or internal sampling clock reference
Impedance: 50 Ohm
Connectors: Vita 67.3 NanoRF

Memory

Two banks 64-bit 8GBytes DDR4 2666 SDRAM (fabric)
One bank 32-bit 4GBytes DDR4 2666 SDRAM (HPS)
One 2 Gbit QSPI FLASH memory
eMMC storage (HPS)
Operating Temperature
ECC3, -40°C to 70°C

VPX interface

P1:
Data plane: one fat pipe DP01 supporting 100GBASE-KR4
Data plane: one ultra-thin pipe DPutp01 supporting 10GBASE-KR
Control plane: one ultra-thin pipe CPutp01 supporting 1000BASE-KX
Expansion plane: one fat-pipe supporting PCIE GEN3 4x
Expansion plane: 8 LVDS differential pairs
P2:
Vita 67.3C Aperture H
NanoRF Contacts-6.4.5.6.10
8xIN, 8xOUT, REFIN, REFOUT

Power dissipation

+12V: 14 A max (170W)
+3.3VAUX: 0.6A max (2W)

Board Support Package

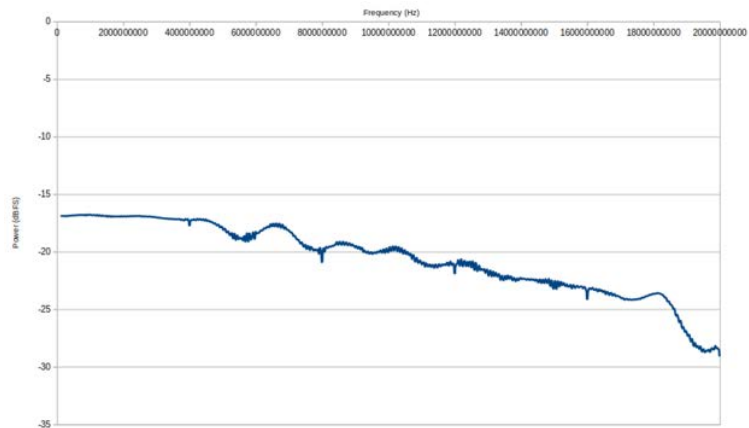
FPGA example design
Communication
Front-Panel USB to Avalon
JTAG to Avalon
Data Conversion
Clock component access
64Gsps support
8x ADC, Decimation x16 support
8x DAC, Interpolation x16 support
ADC acquisition buffers
DAC generation buffers
Memory
DDR4 Avalon access
System management
Avalon access to monitoring infrastructure

HPS example design
Linux distribution built on Yocto
HPS Interfaces:
eMMC 128Gb
RGMII GbE
UART
EMIF (Memory interface)
4GB DDR4 Memory
Services
SSH server only
No direct access to FPGA

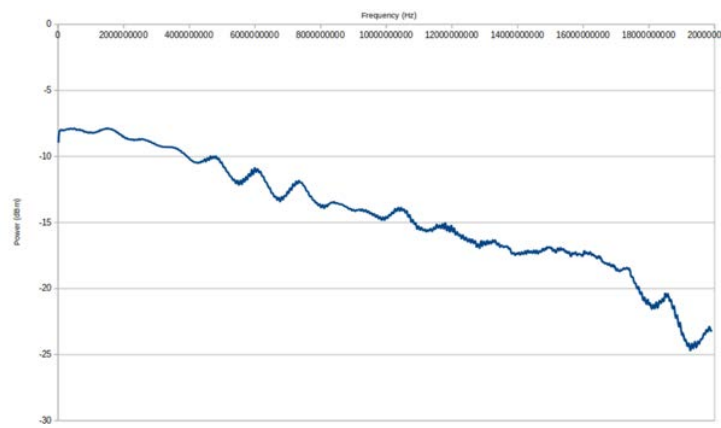
SW API and examples, Windows 10 64-bits / Linux 64-bits
User manuals
Quick start guide

- Analog Bandwidth 100MHz to 20GHz
- ADC typical SFDR (no H2 / H3, level -3dBFS, 64Gsps, no decimation)
 - 6GHz: -55dBc
 - 12GHz: -49dBc
 - 18GHz: -48dBc
- ADC typical NSD: -143dBFS/Hz (12GHz, -3dBFS, 64Gsps, no decimation)
- DAC typical SFDR (no H2 / H3, level 0dBFS, 64Gsps, x16 interpolation)
 - 6GHz: -50dBc
 - 12GHz: -48dBc
 - 18GHz: -45dBc
- DAC typical NSD: -149dBFS/Hz (12GHz, 0dBFS, 64Gsps, x16 interpolation)

Measured Analog Bandwidth (DC – 20GHz)



ADC bandwidth* @ 64Gsps

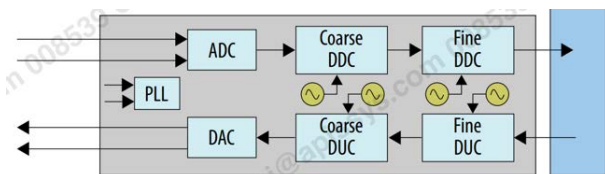


DAC bandwidth* @ 64Gsps

* Test Setup Attenuation not compensated

Sampling mode

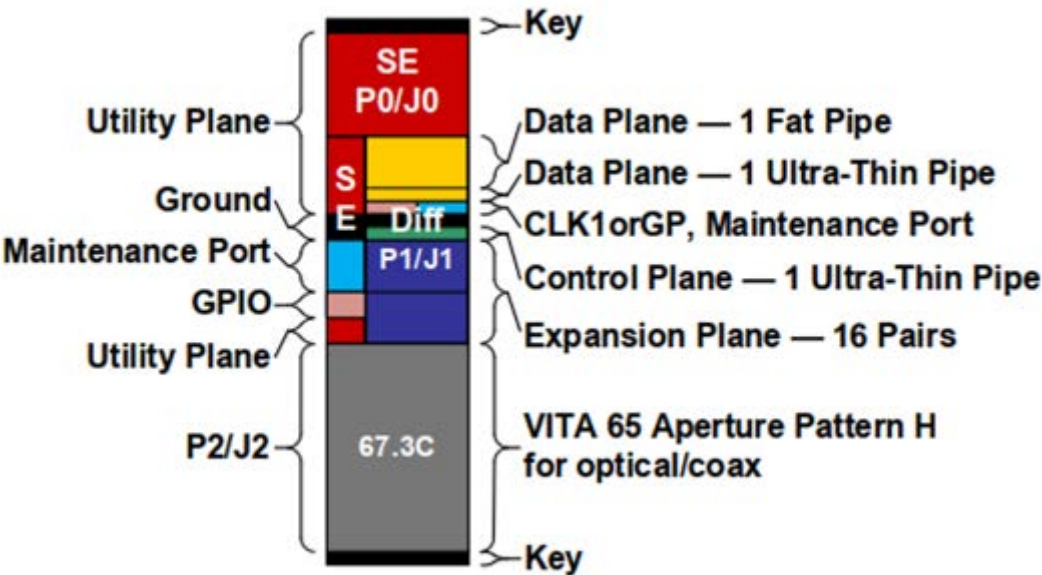
- Up to 32GHz of IBW (ADC only)
- Up to 8 GHz IBW with 8 ADCs and 8 DACs simultaneously
- Independent Coarse and Fine DDC / DUC



Decimation / Interpolation Rate	Max Instantaneous Bandwidth	ADC ports	DAC ports
x1	32GHz	2	0
x8	8GHz	8	8
x16	4GHz	8	8
x32	2GHz	8	8
x64	1GHz	8	8
x128	500MHz	8	8
x256	250MHz	8	8
x512	125MHz	8	8
x1024	62.5MHz	8	8

Conduction-cooled VITA47 class ECC3	
Operating temperature	-40°C to +70°C (card edge)
Non Operating temperature	-50°C to +100°C
Operating vibration	5Hz – 100Hz + 3dB/octave 100Hz – 1kHz = 0.1 g ² /Hz 1kHz – 2kHz -6dB/octave
Operating Shock	40g, 11 millisecond, half-sine
Operating relative humidity	0% to 95% non-condensing
Operating altitude	-1,500 to 60,000 ft

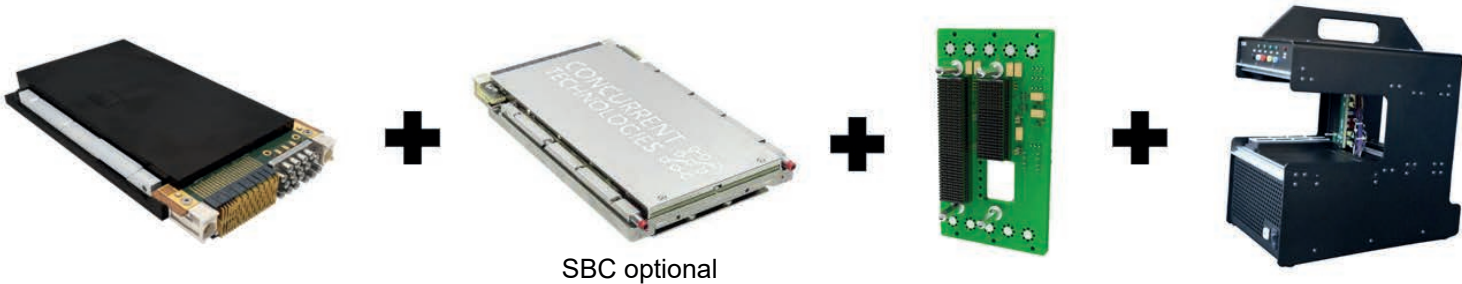
3U SOSA Slot profile - compute payload



Development setup

AV153: 3U SOSA Agilex 9
Chassis: Type 39S CompacFrame

Backplane: 3U 2-Slots 1SVX302AMP-1X31
SBC (optional): TR L98



Ordering information

AV153-CS

Availability : in production