HPx-310

PCIe Radar Signal Output Card

The HPx-310 PCIe Radar Signal Output Card generates representative radar signals for system testing, simulation, training or radar video streaming. Under software control, the card generates radar video, trigger and azimuth signals similar to those generated by real radars. This permits radar display or processing systems to be tested and qualified using laboratory-based equipment before installation with the radar.

The HPx-310 is a single-lane (x1) PCI Express card, which generates radar signals under the control of host application software. Time-stamped radar video data is passed to the card over the PCI express bus and the card generates the appropriate video, trigger and azimuth data signals in real-time. A first-in-first-out (FIFO) buffer on the card allows the host computer to write a number of radar returns into memory, which the HPx-310 card then outputs at the requested times. The typical buffer size is 100ms, which therefore specifies the latency in processing video through the card. Digital adjustments to the output timing are made to ensure that the output rate of video exactly matches the rate of arrival of data from the host computer.

The HPx-310 card is extremely versatile, supporting a broad range of rotation periods, as well as variable and staggered PRF modes (including variable length returns). In addition to emulating conventionally rotating scan radars, the card may also be configured for counter-rotating, sector scanning or random scan modes. The output signal voltages and types are jumper-selectable, providing a wide range of output signal options.

Typical applications of the HPx-310 include:

Radar Simulation
When the HPx-310 card is teamed with the SPx Radar Simulator software application, the result is a highly flexible, configurable and powerful radar simulation tool that can generate analogue radar video, targets, IFF, AIS and navigation data. A key feature of SPx Radar Simulator is the ability to generate synchronised data sets of video, targets and related navigation data when simulating ship-based systems.

Radar Streaming
Radar signals can be moved across an Ethernet network using a server system (SPx Server plus HPx-410 or HPx-346) to digitise the radar signals and distribute the resulting data digitally. The HPx-310 card, along with the SPx software, may then be used to convert the network video back into analogue signals. This approach is applicable if it is desired to input the radar signals into legacy equipment which has an analogue radar interface.

Display Console Testing
Access to live radar signals during console development or testing can be difficult and expensive. HPx-310 provides a convenient and realistic source of radar signals to stimulate display equipment in the absence of a live radar source. ◼
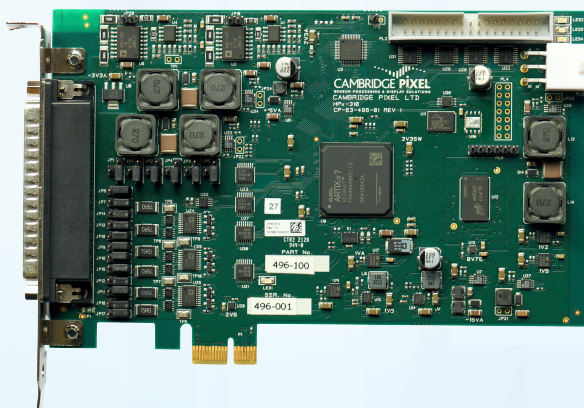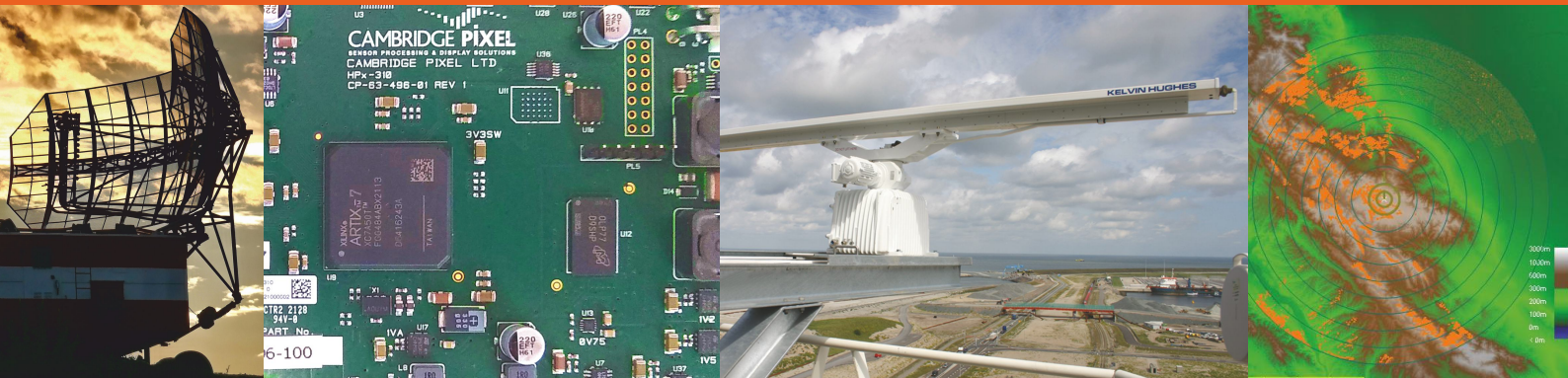
Features:

- PCIe Radar Signal Output Card
- Emulates signals produced by real radars
- Scan modes:
    - Normal rotation
    - Counter-rotation
    - Random scan
    - Sector scan
- Dual analogue radar video output
- Low latency output
- 25MHz output bandwidth
- ACP/ARP or parallel azimuth output
- SHM signal output
- PRF 100Hz to 10kHz
- Configurable output signal voltages
- Variable and staggered PRF support
- Variable (jagged) return length support
- Configurable pre-trigger delay (steps of 8ns)
- Rotation period 0.25 to 60 seconds
- Built-in test pattern
- Configurable output signals
- C/C++ API available
- Compatible with SPx Radar Simulator
- Supported under Windows and Linux
- For simulation, test, training and streaming applications

Architecture

Form factor:	PCI express (x1 lane), full height, half length
Power:	Uses standard PCIe power for low signal outputs. Requires auxiliary power through 6-pin PCIe Power Connector
Platform:	Windows 10/11, Linux
Processor:	x86

Output Signals

Analogue Video:	2x independent analogue video outputs 8-bit DAC output, 25MHz bandwidth limited 50R or 75R output impedance Positive (0 to +5V) or negative (0 to -5V)
Digital Video:	8 bits of digital video + data signal RS-422
Trigger:	Single-ended (3V to 30V configurable peak output, 75R impedance) Differential (RS-422) Open drain
ACP:	Single-ended (3V to 30V configurable peak output, 75R impedance) Differential (RS-422) Open drain
ARP:	Single-ended (3V to 30V configurable peak output, 75R impedance) Differential (RS-422) Open drain
Parallel Azimuth:	12-bit parallel azimuth RS-422
SHM:	Single-ended (3V to 30V configurable peak output, 75R impedance) Differential (RS-422) Open drain

Functional

Scanning Mode:	Normal rotating, counter-rotating, random scan, sector scan
Rotation Period:	Configurable from 0.25 to 60 seconds
PRF:	Configurable from 100Hz to 10kHz
Pre-trigger Delay:	Configurable in units of 8ns
Test Generation:	Built-in test pattern generator
Output:	Radar signals

Connectors

Radar Output:	37W D front panel connector Parallel azimuth signals are available from an IDC header connector
PCI Express:	Standard PCI Express x1 edge connector

Performance

Data transfer rate:	Up to 250 MB/s peak (150 MB/s sustained)
Scan rate:	Up to 240 rpm

Environmental

Cooling:	Forced air cooling
Temperature:	0°C to +55°C

Software Support

Board support library (C/C++)
SPx Development Library
SPx Radar Simulator (application, Windows only)

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