SABRE EXPRESS DIGITIZER

4-CHs @ 250 MS/s, PCIe Gen3 x8

GaGe Digitizers

The Sabre Express is the latest addition to the GaGe line of digitizer cards. The Sabre Express solution set includes:

- PC oscilloscope software
- Powerful SDKs for custom application development
- Turnkey integrated PC-based measurement systems.

Applications

- Wideband Signal Analysis
- Wideband Stimulus/Response Test
- Satellite Communications Test
- Radar Design & Test
- Electronic Warfare (EW) Test
- Signals Intelligence (SIGINT)
- Spectrum Monitoring
- Ultrasonic Imaging
- Non-Destructive Testing (NDT)
- Mass Spectroscopy
- Time of Flight (ToF)
- Light Detection and Ranging (LiDAR)
- Life Sciences
- Particle Physics

Digitizer Features

- 16-Bit Vertical A/D Resolution with 4 Digitizing Input Channels
  250 MS/s Maximum Sampling Rate per Channel
  --18 Software Selectable A/D Sampling Rates: 1 kS/s to 250 MS/s

- Front-End with DC Coupling and 50 Ω Inputs
  150 MHz Bandwidth @ 250 MS/s

- 4 GS (8 GB) Onboard Dual-Port Sample Memory Standard
  6 GB/s PCIe Gen3 x8 Transfer Rate off Onboard Memory

- 2.0 GB/s PCIe Gen3 x8 Real-Time Sustained Streaming Rate to Host
  Stream Acquired Signal Data to GPU for In-Line Processing in Real-Time and/or to Storage for Real-Time Recordings

- Easy Integration with External or Reference Clock In & Clock Out
  External Trigger In & Trigger Out with Advanced Triggering Operations

Software

No programming needed for use with:

- GaGeScope PC Oscilloscope software SDKs for C/C#, Python, LabVIEW, & MATLAB free with hardware purchase

- Windows 11/10 and Linux Operating Systems Supported

Vitrek, LLC | 900 N. State Street • Lockport, IL 60441 | www.Vitrek.com • 815.838.0005 • info@Vitrek.com

SABRE EXPRESS DIGITIZER

4-CHs @ 250 MS/s, PCIe Gen3 x8

Model Specifications:

Model #	CSE250416
Vertical Resolution	16-bit
# of Input Channels	4
Max. Rate per Channel	250 MS/s

Analog Input Channels:

Connectors	SMA Jack (Female)
Impedance	50 Ω
Coupling	DC
Bandwidth - DC	DC to 150 MHz
1x Voltage Range (Hardware Fixed)	±1V (standard) or ±240 mV (low-range option) Note: Use optional inline SMA attenuators for additional effective input ranges.
Flatness @ 250 MS/s	Within ±0.5 dB of Ideal Response to 150 MHz
DC User Offset (Software Selectable	Spans Full Scale Input Range (FSIR)
Absolute Max. Input	±3V (over-voltage protection included

A/D Sampling:

Software Selectable Rates per Channel	250 MS/s, 200 MS/s, 100 MS/s, 50 MS/s, 20 MS/s, 10 MS/s, 5 MS/s, 2 MS/s, 1 MS/s, 500 kS/s, 200 kS/s, 100 kS/s, 50 kS/s, 20 kS/s, 10 kS/s, 5kS/s, 2 kS/s, 1kS/s
Rate Accuracy	±1 part-per-million (0° to 50° C ambient)

Acquisition Memory

Shared and equally divided among all input channels (4, 2 or 1).	
Standard Size	4 GS (8 GB)
Architecture	Dual Port
Data Streaming Support	Yes

Performance

±1 V, DC Coupled, 50 Ω, 16-Bit Sampling Rate 250 MS/s			
Signal Frequency	10 MHz	70 MHz	103 MHz
ENOB	10.6 Bits	10.3 Bits	10.5 Bits
SNR	67.4 dB	66.9 dB	65.6 dB
THD	-66.7 dB	-62.3 dB	-70.0 dB
SINAD	65.8 dB	63.9 dB	65.0 dB
SFDR	66.3 dB	62.8 dB	70.2 dB

RMS Noise	~ 0.7 mV RMS

Triggering

Engines	2 per Channel, 1 for External Trigger
Source	Any Input Channel, External Trigger, Software
Input Combination	All Combinations of Sources Logically OR'ed
Slope (Software Selectable	Positive or Negative
Sensitivity	± 5% of Full-Scale Input Range of Trigger Source. Signal amplitude must be at least 10% of full scale to cause a trigger to occur. Smaller signals are rejected as noise.
Post-Trigger Data	32 points minimum. Can be defined with 32-point resolution.
Pre-Trigger Data	Up to 128 kS Total

External Trigger

Connector	SMA Jack (Female)
Impedance	≈ 1k Ω
Coupling	DC
Bandwidth	>100 MHz
Voltage Range	0-3 V

Trigger Out

Connector	SMA Jack (Female)
Impedance	50 Ω
Amplitude	0-1.8 V

SABRE EXPRESS DIGITIZER

4-CHs @ 250 MS/s, PCIe Gen3 x8

Clock In

Connector	SMA Jack (Female)
Impedance	50 Ω
Coupling	DC
Signal Level	Min. 0.2 V RMS, Max. 0.5 V RMS
Duty Cycle	50% ± 5%
Input Modes	External Clock or 10 MHz Reference Clock
External Clock Mode Input	250 MHz
External Reference Clock Mode Input	10 MHz ±1000 ppm; the external reference time base is used to synchronize the internal sampling clock.

Clock Out

Connector	SMA Jace (Female)
Impedance	50 Ω
Signal Level	0-1.5 V
Duty Cycle	50%
Output Modes	Maximum Sampling Clock Frequency or 10 MHz Reference Clock
Frequency	250 MHz
Ref. Clock Mode Rate	10 MHz from Internal Reference

Multiple Record

Pre-Trigger Data	Up to FPGA Memory Size

Timestamping

Timing Resolution	One Sample Clock Cycle
Counter Rollover	> 48 Hours Continuous
Multiple Record Mode Segment Timestamp Tail Size	Quad Channel Mode: 32 bytes or 16 samples Dual Channel Mode: 64 bytes or 32 samples Single Channel Mide: 128 bytes or 64 samples

Dimensions

Size	Single Slot PCIe, Full Height, 6.7 in (170.18mm) Length

Power

Power Operating	35.106 Watts (typical)
Power Source	Host PCIe Slot; no additional power connectors required.

Multi-Card Operational Modes

Independent	Each card operates independently within the system.
Synchronized Cascade	Each card operates together as a group by cascading the trigger signal via the Trigger Out. The Clock Out can be similarly cascaded if synchronous clocking is required. This mode has a small constant delay between each channel but requires no external clocking source or RF splitters.
Synchronized Split	Each card operates together as a group by splitting the trigger signal to each card's Trigger In using an RF power splitter (not a BNC Tee) and same equal length model cables. This can also be done with the External Clock input if synchronous clocking is required. This mode requires more external hardware but provides the best simultaneity between multiple cards. To further optimize synchronous operations, it is ideal to have the external trigger source be synchronous with the external clock source using a common 10 MHz external reference clock that is supplied to both the external clock source and the external trigger source.

PC System Requirements

PCIe Express (PCIe) Host Slot	1 Free Full-Height PCIe x8 or x16 Gen5, Gen4, Gen3, Gen2 or Gen1 Slot.
PC Host System Cooling	Provide good cooling air flow for installed Sabre Express location with ideally an empty adjacent slot to prevent blockage of card's onboard cooling fan.
PC Operating System	Windows 11/10 (64 bit), Linux Red Had or Ubuntu (64-bit)* Note: In general, the user-mode Linux code can be ported to other Linux distribution releases with possible minor modifications to support.

SABRE EXPRESS DIGITIZER

4-CHs @ 250 MS/s, PCIe Gen3 x8

ORDERING INFORMATION

Model #	A/D Resolution	# of Input Channels	Input Voltage Range	Max. Sampling Rate per Channel	Max. Input Bandwidth	Onboard Memory Size	Order Part #
CSE250416	16-bit	4	± 1 V	250 MS/s	150 MHz	4 GS (8 GB)	SBR-254-160
CSE-250416-LR	16-bit	4	± 240 mV	250 MS/s	150 MHz	4 GS (8 GB)	SBR-254-16L

eXpert FPGA Firmware Options

PCIe Data Streaming	STR-181-000
PCIe Signal Averaging	250-181-001
Fast Fourier Transform (FFT)	250-181-004

SMA Attenuator Options (2 Watts)

3 dB Attenuation	662-3-1
6 dB Attenuation	662-6-1
10 dB Attenuation	662-10-1
20 dB Attenuation	662-20-1

Cable Accessories

1 SMA Plug (Male) to BNC Plug (Male), 36 Inches (914.4 mm Length)	ACC-001-031
4 SMA Plug (Male) to BNC Plug (Male), 36 Inches (914.4 mm Length)	ACC-001-033

Software Development Kits (SDKs)

Compuscope SDKs for C/C#, Python, MATLAB & LabVIEW are all included	Included

GPU CUDA Processing

Requires eXpert PCIe Data Streaming Firmware (STR-181-000) for Digitizer Card, GPU CUDA Examples in CompuScope SDK for C/C# Note: GPU Card NOT Included.	Order STR-181-000 for Digitizer Card

GaGeScope - PC Oscilloscope Software

Lite Edition	Included
Standard Edition with Purchase of Hardware	300-100-351
Standard Edition Purchased Independently	300-100-352
Professional Edition with Purchase of Hardware	300-100-354
Professional Edition Purchased Independently	300-100-355

Warranty

Standard two years parts and labor.

Datasheet Rev 2024-11