EECL
European Engineering & Consultancy Ltd

Easy to Use | Portable | Value for Money | Rugged

Switch Matrix
8x16 Port Solid-State Full Cross-bar Switch Matrix. 16KHz to 12GHz / 30GHz options. Bench Top Version

Introducing the Switch Matrix

SMX-30B816A

SMX-12B816A

EECL RF SWITCH MATRIX 8X16 – 16kHz to 30GHz
PORT A — A1 A2 A3 A4 — 1 2 3 4 — 5 6 7 8 — 9 10 11 12 — 13 14 15 16 — PORT B — B1 B2 B3 B4
⚠ 48VDC, +20dBm MAX

EECL RF SWITCH MATRIX 8X16 – 16kHz to 10GHz
PORT A — A1 A2 A3 A4 — 1 2 3 4 — 5 6 7 8 — 9 10 11 12 — 13 14 15 16 — PORT B — B1 B2 B3 B4
⚠ 48VDC, +20dBm MAX

The switch matrices are high-speed, USB and ethernet controlled RF cross-bar switch matrix, specifically designed for versatile and dynamic routing of RF signals. With a full cross-bar architecture, the switch matrices can switch any of its 8 common ports to any of the 16 I/O ports, offering unparalleled flexibility in routing and signal distribution. This solid-state matrix enables bi-directional RF paths over a broad frequency range of 16 kHz to 12 GHz (or up to 30 GHz), maintaining minimal insertion and return loss. Each port is internally DC-blocked and capable of handling up to 16V, making it durable and resilient for demanding RF environments.

In contrast to mechanical switching solutions, the switch matrices solid-state design ensures each port is permanently matched to 50 ohms, including unselected ports, providing exceptional impedance matching ideal for vector network analyser (VNA) extension applications. The module also integrates a precision-controlled internal oven, which can sustain stability over time, limiting signal drift to less than 0.02 dB, with near-zero drift and exceptional repeatability.

Applications

- Test automation
- Test equipment extender
- Antenna characterization
- 5G & phased arrays
- Cross-correlation

Equipped with SMA on the 12GHz version and 2.92mm connectors for the 30GHz version (other connector types available on request), the switch matrix is suitable for automated test environments, with the added flexibility of USB and Ethernet control interfaces. For time-sensitive applications, the switch matrix supports the loading of predefined switching sequences, which can be triggered by logic signals, achieving rapid switching with microsecond-level timing. The module is also capable of standalone operation, powered directly through USB.
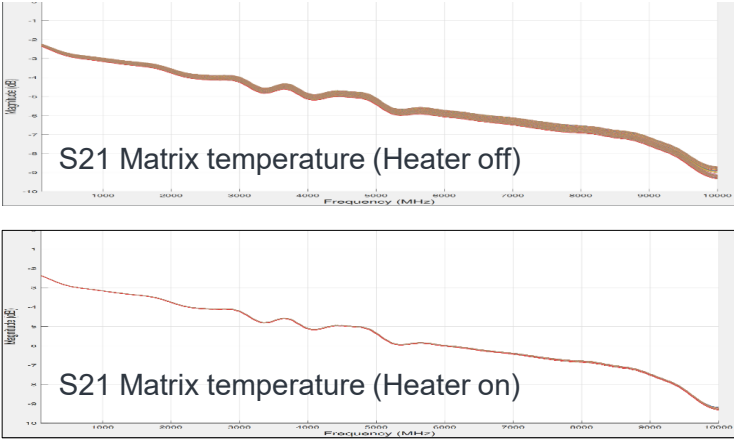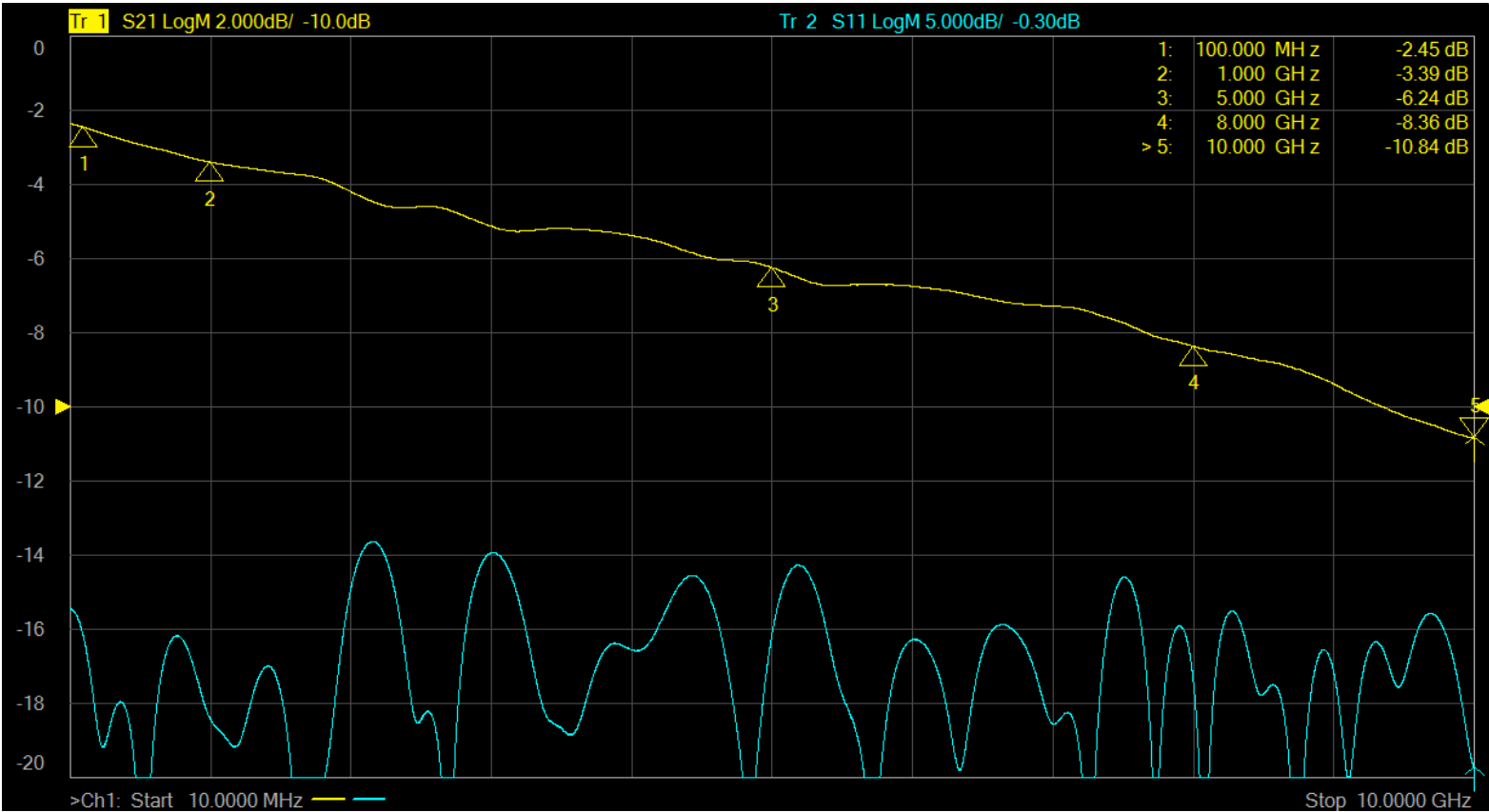
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Typical Measured Performance

S21 & S11 measurement of SMX-12B816A

	SMX-12B816A
1: 100.000 MHz	-2.45 dB
2: 1.000 GHz	-3.39 dB
3: 5.000 GHz	-6.24 dB
4: 8.000 GHz	-8.36 dB
>5: 10.000 GHz	-10.84 dB

Tr 1 S21 LogM 2.000dB/ -10.0dB   Tr 2 S11 LogM 5.000dB/ -0.30dB

>Ch1: Start 10.0000 MHz   Stop 10.0000 GHz

Specification	SMX-12B816A	SMX-30B816A
Operating Frequency	16kHz to 12GHz	16kHz to 30GHz
Configuration	8X16 Full Crossbar (Only 2 switch paths)	8X16 Full Crossbar (Only 2 switch paths)
Isolation (dB) (Between I/O Ports)	16kHz to 2GHz: **105** 2GHz to 6.5GHz: **95** 6.5GHz to 12GHz: **87**	16kHz to 2GHz: **120** 2GHz to 10GHz: **110** 10GHz to 20GHz: **95** 20GHz to 30GHz: **83**
Isolation (dB) (Between Common Ports)	16kHz to 2GHz: **75** 2GHz to 6.5GHz: **65** 6.5GHz to 12GHz: **55**	16kHz to 2GHz: **75** 2GHz to 10GHz: **55** 10GHz to 20GHz: **55** 20GHz to 30GHz: **50**
Insertion Loss (dB)	16kHz to 1GHz: **4.3** 1GHz to 3GHz: **5.6** 3GHz to 6.5GHz: **7.2** 6.5GHz to 12GHz: **10.2**	16kHz to 1GHz: **5.0** 1GHz to 3GHz: **6.4** 3GHz to 6.5GHz: **8.0** 6.5GHz to 10GHz: **10.0** 10GHz to 18GHz: **14.0** 18GHz to 24GHz: **16.5** 24GHz to 30GHz: **20.0**
Return Loss (dB)	16kHz to 1GHz: **17** 1GHz to 3GHz: **13** 3GHz to 6.5GHz: **10** 6.5GHz to 12GHz: **10**	16kHz to 1GHz: **15.0** 1GHz to 3GHz: **12.0** 3GHz to 6.5GHz: **12.0** 6.5GHz to 10GHz: **10.5** 10GHz to 18GHz: **12.0** 18GHz to 24GHz: **11.0** 24GHz to 30GHz: **10.0**

S21 Matrix temperature (Heater off)

S21 Matrix temperature (Heater on)

Specification	Common
Power Handling:	+20dBm, 16VDC MAX
Typical Switch Speed: (10% trigger to 90% output)	10µs
Port Type:	50Ω, SMA (f) on 10GHz, 2.92mm (f) on 30GHz.
Trigger:	TTL 3V3
Control Interface(s):	USB 2.0 (USB C), Ethernet

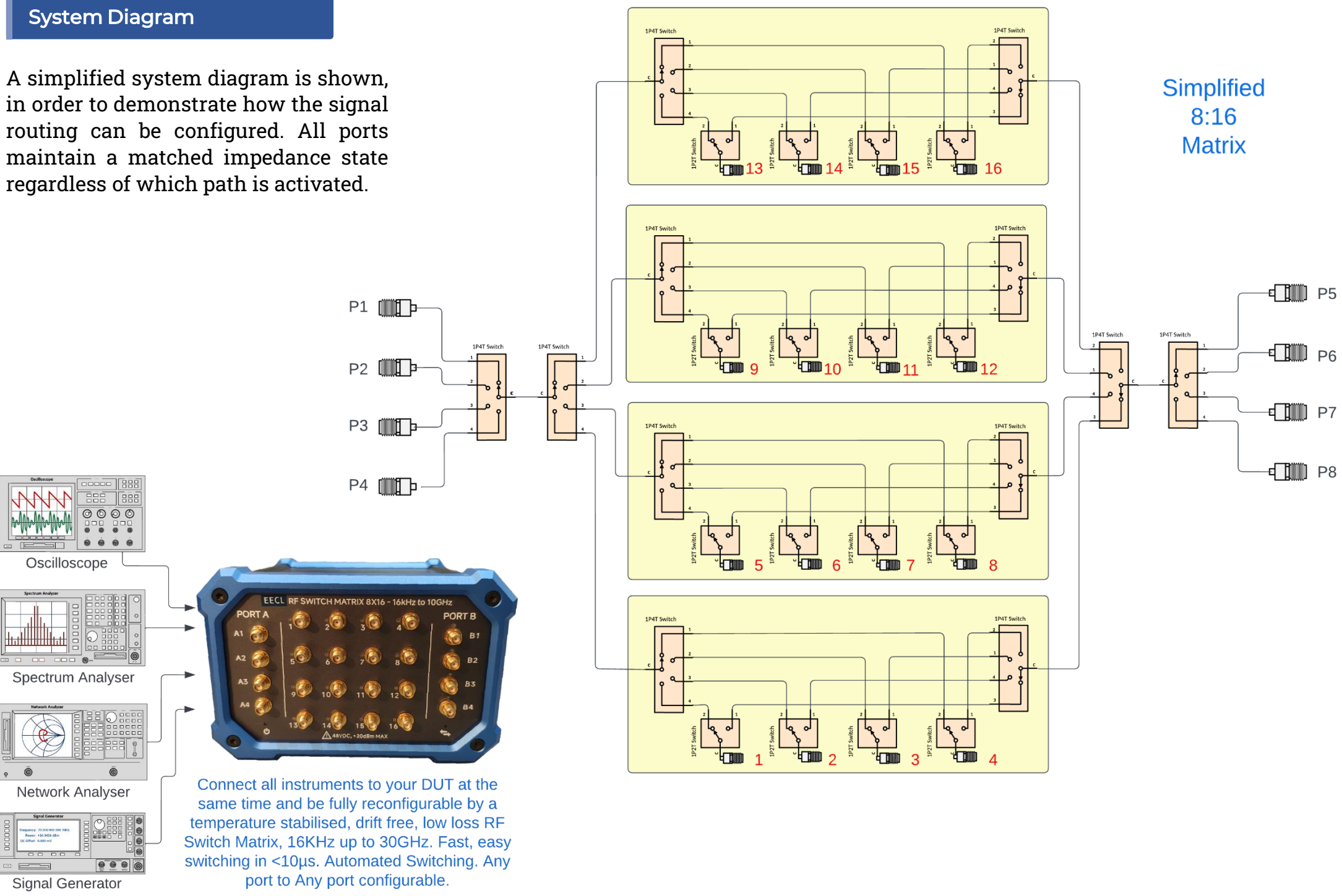| Specification	Common (Benchtop)
Operating Environment:	-20°C to 80°C , 30% to 60% RH
Weight:	4kg
Dimensions: (H x W x D)	125mm x 182mm x 208mm
Power:	24V Max, up to 3A for heaters. Can run off USB alone.

Features

- 8 common ports, 2 switch paths
- 16 I/O ports
- Low loss from 16KHz to 12/30 GHz
- Unselected ports terminated
- High power handling
- High linearity
- High isolation
- Ultra low (near zero) drift
- Oven controlled for repeatable performance
- Fast switching

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System Diagram

A simplified system diagram is shown, in order to demonstrate how the signal routing can be configured. All ports maintain a matched impedance state regardless of which path is activated.

Simplified 8:16 Matrix

Oscilloscope

Spectrum Analyser

Network Analyser

Signal Generator

Connect all instruments to your DUT at the same time and be fully reconfigurable by a temperature stabilised, drift free, low loss RF Switch Matrix, 16KHz up to 30GHz. Fast, easy switching in <10µs. Automated Switching. Any port to Any port configurable.

Control

- Programable and versatile
- Easy to use
- Compatible with LabVIEW, Matlab, C and all other environments
- USB or Ethernet interface
- External and Internal trigger with programable switch sequences
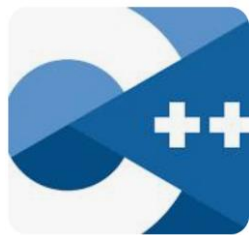
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Software

Our software suite seamlessly integrates with the module, providing a powerful and user-friendly interface for configuring and controlling the system.

Compatible with C, LabView, and MATLAB, the software allows for effortless automation of complex tasks and real-time data acquisition. Users can set up measurement configurations through an intuitive dashboard. Advanced features include automated script execution and customizable trigger conditions for precise timing.

The software also supports remote access via Ethernet or USB, enabling control from any networked location, making it ideal for both lab-based setups and large-scale distributed testing environments.
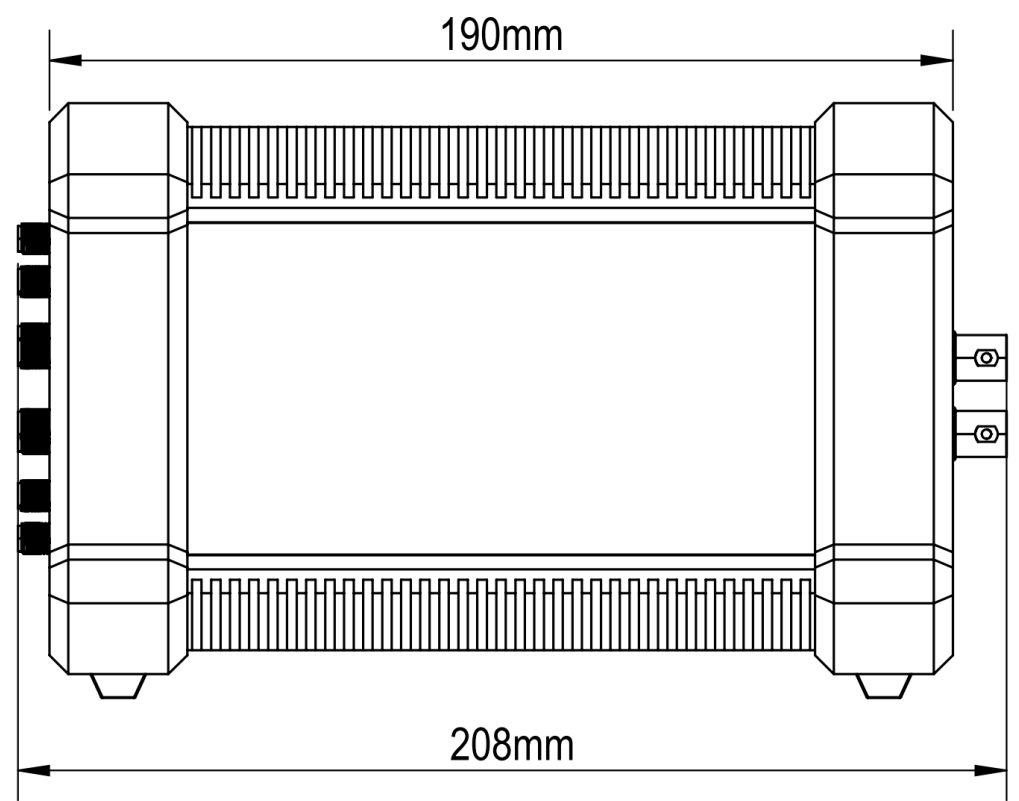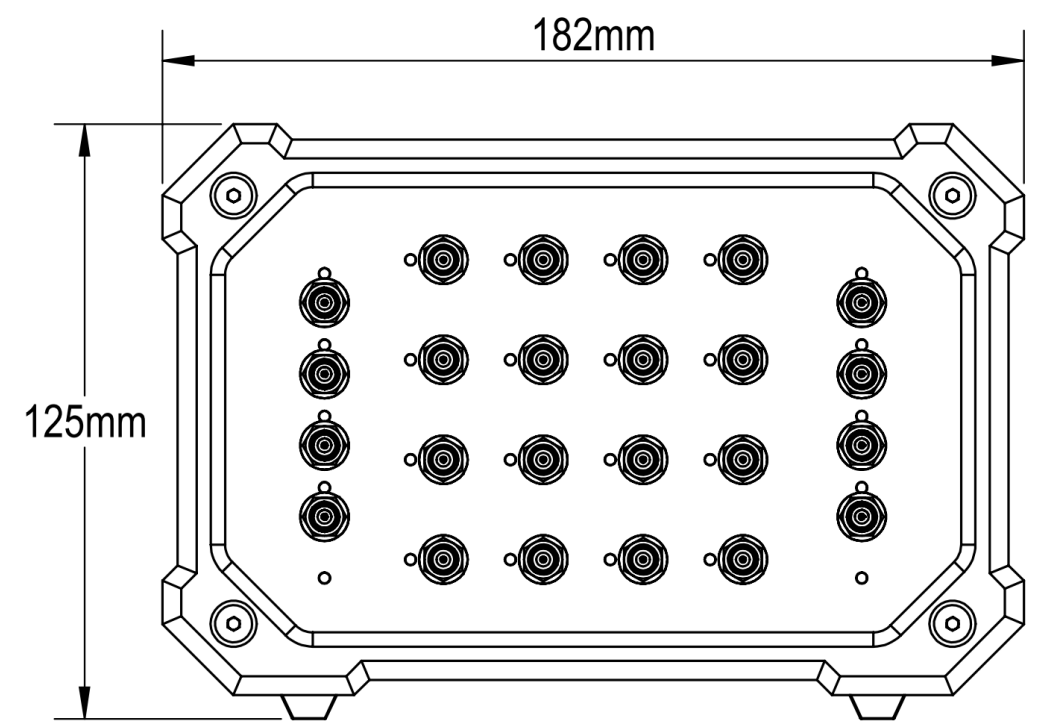

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Unit Dimensions

182mm

125mm

190mm

208mm

Common (Port A/Port B) Port Spacing: 15mm
I/O Ports (1 to 16) Port Spacing: 21mm
Trig In/Out BNC Spacing: 16mm

EECL RF SWITCH MATRIX 8X16 – 16kHz to 10GHz

PORT A

A1
A2
A3
A4

1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16

PORT B

B1
B2
B3
B4

⚠ 48VDC, +20dBm MAX

TRIG OUT

5 - 24V
5A MAX

PD

LAN

TRIG IN

CE