

## KEY FEATURES

- 4 or 8 synchronized channels
- Isolated sourcing
- $\pm 10$ V and 0-40V source/measure ranges
- Up to 3A per channel (5A in pulsed mode)
- 1 $\mu$ V and sub 1pA sense resolution
- Differential (Kelvin) sensing inputs
- Up to 2MSPs sample rates

## PRODUCT DESCRIPTION

EECL's Advanced Source-Measure Unit (SMU) is a 4 or 8 channel SMU. The outputs include a  $\pm 10$ V bipolar mode, and a 0-40V high voltage range. Each channel can supply up to 3A continuous current, and up to 5A in pulsed mode.

Each channel also features Kelvin voltage sensing inputs, and precision current measurement, with 1 $\mu$ V and sub-1pA resolutions (depending on range).

The device can operate in either constant voltage or constant current mode, depending on the measurement required. Each channel also offers an advanced pulse-mode, offering high speed pulses down to 10 $\mu$ s periods, with adjustable slopes.

Fast sampling modes are available, at sample rates up to 2MSPS, allowing for detailed capture of fast pulse waveforms, or other high-speed measurements.

Each supply channel is isolated, helping eliminate ground loops in complex measurement circuits, with available hardware to bridge the isolation if needed.

## APPLICATIONS

- RF Transistor (GaN) biasing and characterization
- Quantum computing
- Semiconductor measurements
- Gate Leakage measurements
- Flying-probe and On-wafer testing
- RF development, board bring-up

The SMU also features an intelligent triggering architecture, allowing individual channels to be triggered and synchronized as required, either between each other, or to external devices, such as VNAs or other automated test equipment.

Preprogrammed test sequences can be implemented, and then synchronously controlled and performed by the device motherboard, significantly simplifying the external control inputs required for complex multichannel measurements.

The SMU can be controlled either via a dedicated graphical interface, or through USB/Ethernet commands allowing easy integration into automated test scripts based on Python, MATLAB, or other scientific scripting languages.

The SMU thus offers a one-product solution for even the most complex measurement problems in semiconductor device characterization, quantum computing, and other electronic automated measurement applications.

### SPECIFICATIONS

#### Voltage Source Specifications

Range	Resolution <sup>(1)</sup>	Accuracy <sup>(1)(2)</sup> ±(% of value + constant)	Peak-to-Peak Noise (<10Hz)
±2V	4 µV	0.02% + 300µV	TBC
±5V	10 µV	0.02% + 750µV	TBC
±10V	20 µV	0.02% + 1.5mV	TBC
0 -40V	100 µV	0.05% + 15mV	TBC

#### Constant Current Source Specifications

Range	Resolution <sup>(1)</sup>	Accuracy <sup>(1)(2)</sup> ±(% of value + constant)	Peak-to-Peak Noise (<10Hz)
±500nA	1 pA	0.06% + 150pA	TBC
±2µA	5 pA	0.06% + 600pA	TBC
±10µA	25 pA	0.03% + 3nA	TBC
±250µA	500 pA	0.03% + 75nA	TBC
±5mA	10 nA	0.03% + 1.5µA	TBC
±150mA	300 nA	0.035% + 45µA	TBC
±3A	6 µA	0.3% + 1mA	TBC

#### Voltage Sense Specifications

Range	Resolution <sup>(1)</sup>	Accuracy <sup>(1)(2)</sup> ±(% of value + constant)	Input Resistance <sup>(3)</sup>
±10V	1 µV	0.02% + 1mV	>10GΩ
0 -40V	6 µV	0.05% + 10mV	>10GΩ

#### Current Sense Specifications

Range	Resolution <sup>(1)</sup>	Accuracy <sup>(1)(2)</sup> ±(% of value + constant)
±500nA	60 fA	0.06% + 100pA
±2µA	300 fA	0.06% + 400pA
±10µA	1.5 pA	0.03% + 2nA
±250µA	30 pA	0.03% + 50nA
±5mA	600 pA	0.03% + 1µA
±150mA	20 nA	0.035% + 30µA
±3A	400 nA	0.03% + 600µA
5A (pulsed only)	600 nA	0.1% + 1mA

(1) Resolution and accuracy are specified as best-achievable at low sample rates (<10Sps). Higher sample rates will degrade performance.

(2) Accuracy specifications are valid if the unit is operating at 21° ± 5°C, and within 1 year of factory calibration date. Specifications are based on a 99% confidence level, i.e. a coverage factor k = 3. Specifications are based on pre-production data. They are subject to change without notice.

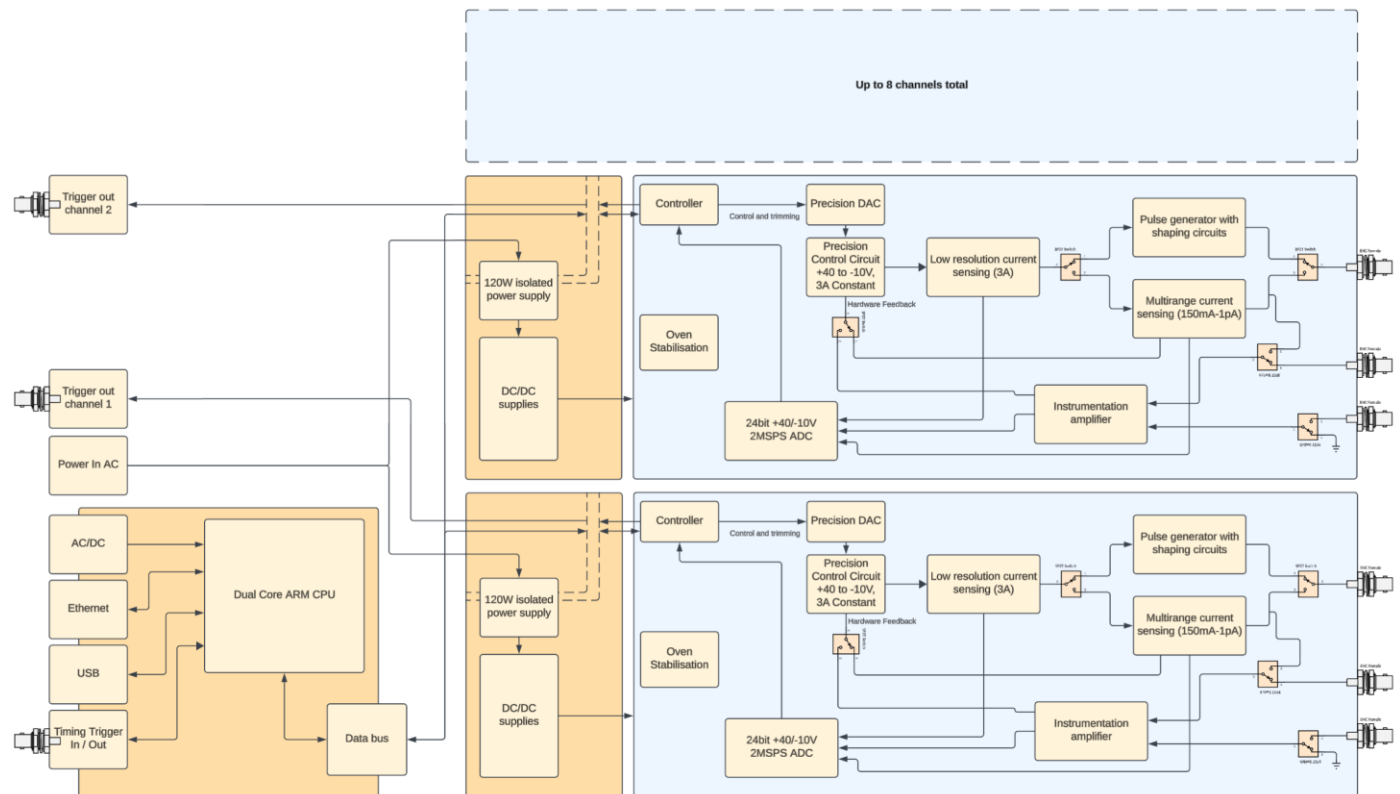
(3) The voltage sense inputs are designed to be used as Kelvin (4-wire) sense lines for the force outputs. Input resistance specification is valid only for this use case. Input resistance may be degraded if voltage difference between force outputs and sense inputs exceeds 0.5V.

## Absolute Maximum Current Source/Sink Limits

Mode (any range)	Maximum Current Source/Sink (per channel) <sup>(4)</sup>
Continuous	3A
Pulsed	5A

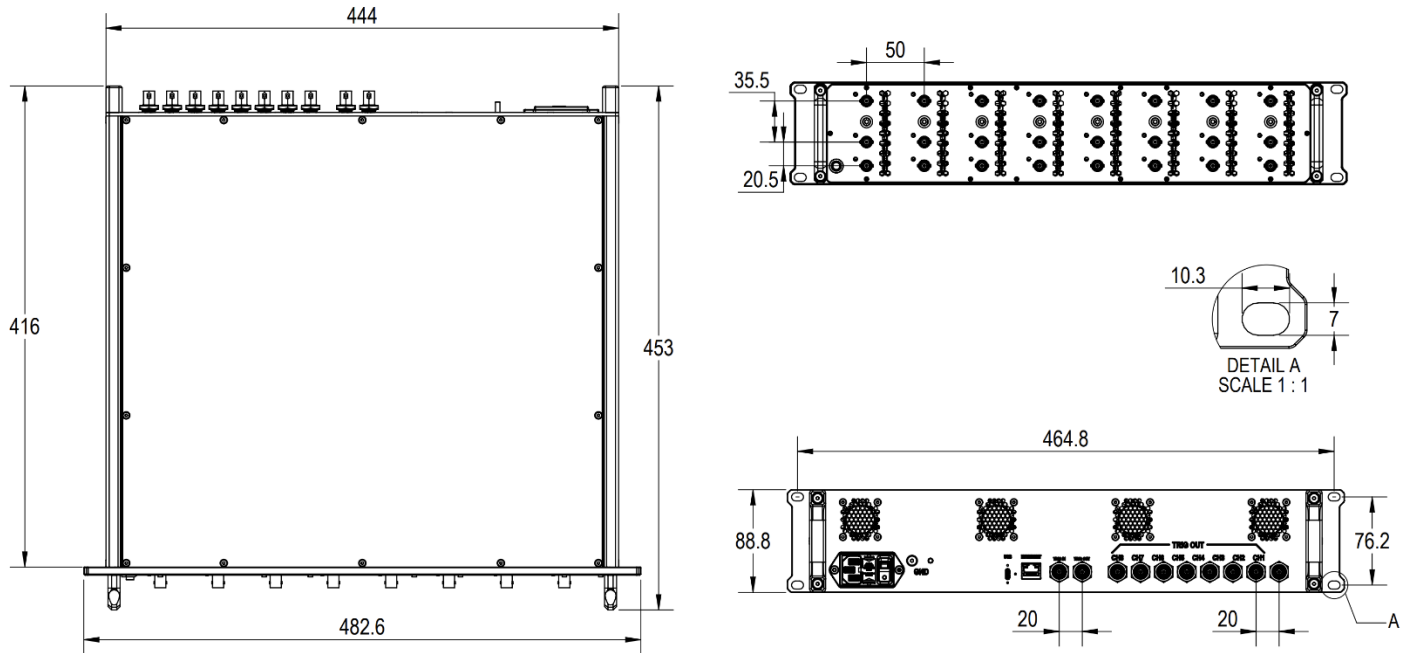
(4) If multiple channels approach maximum current at the same time the unit may automatically reduce limits for thermal protection. Consult directly with EECL if user application requires multiple channels operating at >2.5A concurrently.

## FUNCTIONAL BLOCK DIAGRAM



### MECHANICAL INFORMATION

All dimensions are in mm.



### ELECTROSTATIC DISCHARGE (ESD) CAUTION



**This device is ESD sensitive.** Proper ESD precautions must be observed when storing, handling, and operating the device.

Failure to observe such precautions can result in degraded performance, permanent damage, or failure of the device.