

Isolated Voltage & Current Sensing Module

Features

- ±1000V Voltage Sensing Range
- ±100A Current Sensing Range
- Fully Isolated High Frequency Bandwidth
- Selectable 10X & 100X Voltage Attenuation
- Direct Interface with intelliSENS DAQ
- 3 Voltage & 3 Current Channels
- Bipolar ±10V BNC Output for Oscilloscope & dSPACE Interface
- Selectable 3V/5V Unipolar ADC Interface
- High Performance & 3kV Isolation

Description

The USM Series of Measurement Modules are High Performance, Fully Isolated and Multi-Channel Voltage and Current Sensing Modules. They are designed to be used in wide range of applications such as Feedback Block of Power Electronics Converters & Inverters, 3 Phase Systems Monitoring, Motor Drives and PV Monitoring applications.

The Module have both unipolar and bipolar output IDCs, with configurable 3V/5V unipolar output voltage, which makes it compatible with all type of DSP Controllers and dSPACE Controllers. BNC Output can be used for direct interface with Oscilloscope as well. The Current Sensors are non-intrusive, so they can be used with bus bars. Voltage range can be selected with 10X or 100X attenuation as well.

The USM Module can be used with intelliSENS DAQ to unlock powerful features such as Data Monitoring, Acquisition, Advanced Analysis (Power Factor, THD, etc.) and Recording with Interactive Playback in intelliSENS Software Environment. This eliminates the need for Oscilloscopes, Power Analyzers and Probes for up to 25 kHz Bandwidth applications.

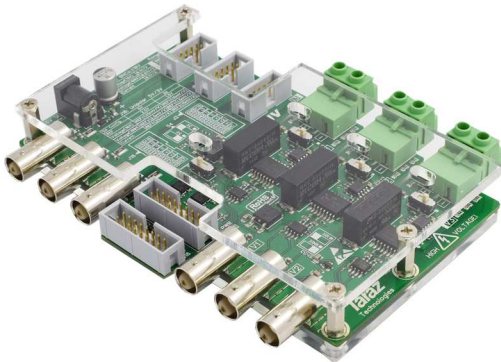
Specifications

*All ratings are given at $V_s=15V$ and 25°C ambient temperature unless otherwise specified.

Characteristics	Test Conditions/ Note	Min.	Typ.	Max.	Unit
Supply Voltage (V_s)		14.5	15	15.5	V_{DC}
Supply Current		-	-	1	A
Operating Temperature		-25	-	50	°C
Weight		-	100	-	g

Characteristics	Test Conditions/ Note	Voltage	Current	Unit
Number of Channels		3	3	-
Frequency Bandwidth		DC-100	DC-200	kHz
Accuracy		1	1	%
Offset		50	25	mV
Rise Time		3.5	1.75	μs
System Voltage (OV CAT III)		600	600	V_{AC}
System Voltage (OV CAT II)		1000	1000	V_{AC}

Sensitivity	Unipolar (J18) (S4: 5V)	Unipolar (J18) (S4: 3V)	Bipolar (BNC & J2)	Range
Voltage (10X)	$2.5 V \pm 25 mV/V$	$1.5 V \pm 15 mV/V$	0.1 V/V	$\pm 100 V$
Voltage (100X)	$2.5 V \pm 2.5 mV/V$	$1.5 V \pm 1.5 mV/V$	0.01 V/V	$\pm 1000 V$
Current (CT100)	$2.5 V \pm 25 mV/A$	$1.5 V \pm 15 mV/A$	0.1 V/A	$\pm 100 A$



Applications

- ❖ Feedback of Power Electronics Converters & Inverters
- ❖ 3 Phase Systems Monitoring
- ❖ Motor Drives Monitoring
- ❖ PV Monitoring Applications

Recommended with

intelliSENS DAQ



Unlock Powerful Features

- Complete Monitoring & Acquisition System
- Advance Analysis (Power Factor, THD, etc.)
- Multi-Channel Measurement
- Unlimited Recording/Logging with Interactive Playback

Ordering Information

USM-XXX

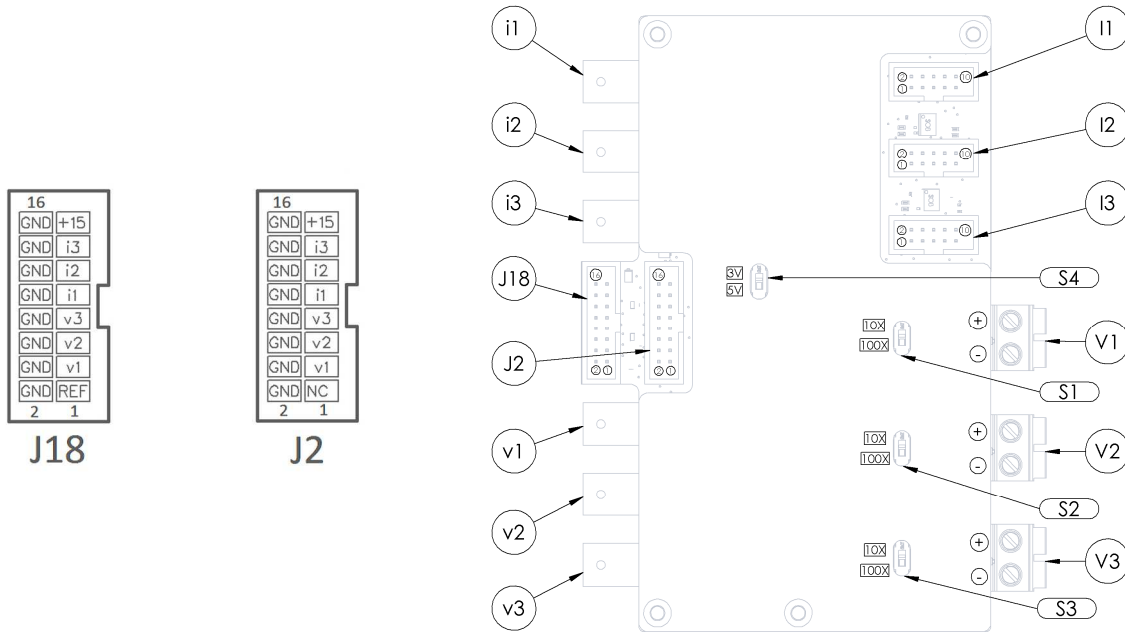
Options

1IV - 1 Voltage & 1 Current

2IV - 2 Voltage & 2 Current

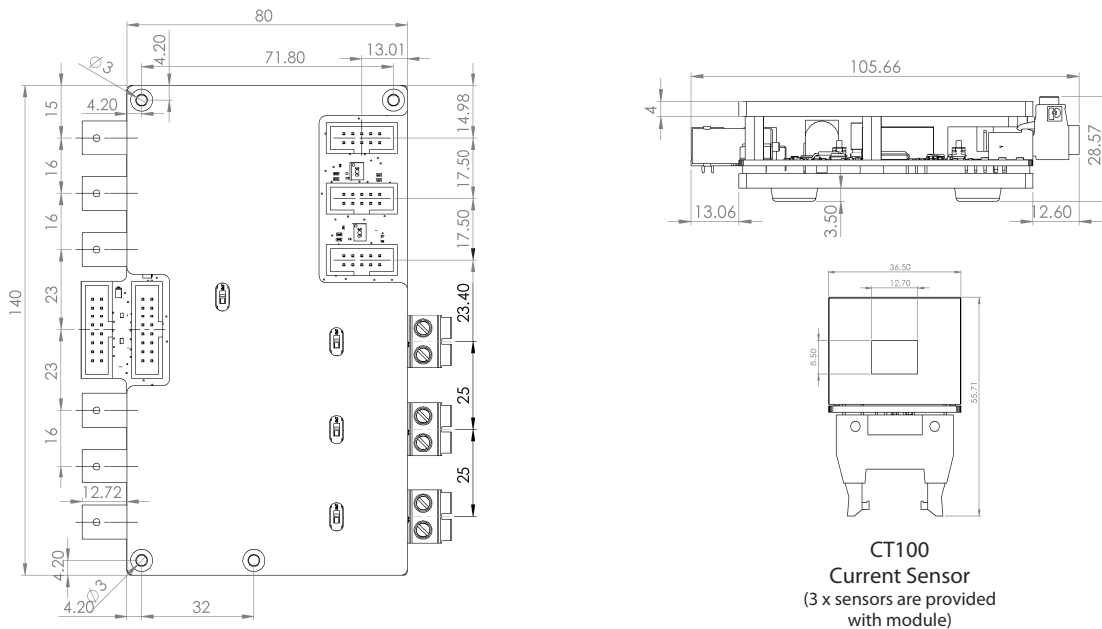
3IV - 3 Voltage & 3 Current

Pin Mapping



Name	Switch/Connector	Description
5V/3V Switch	S4	Unipolar output voltage range selection. 0-5V or 0-3V range can be configured for J18 IDC output connector.
(10/100)X	S1, S2, S3	Voltage sensors attenuation selection. Voltage sensor range at 10X is $\pm 100V$, and at 100X it is $\pm 1000V$
BNCs	i1, i2, i3 v1, v2, v3	Bipolar $\pm 10V$ output BNC connectors which can be interfaced directly to dSPACE or oscilloscope (1M Ω impedance).
Unipolar IDC	J18	IDC connector for unipolar outputs (0 to 5V/3V depending on S4 configuration). Can be interfaced to ADCs having minimum 3k Ω impedance directly.
Bipolar IDC	J2	IDC connector for bipolar outputs ($\pm 10V$). Can be interfaced to intelliSENS DAQ directly.
Voltage Input	V1, V2, V3	Voltage sensor input terminal blocks
Current IDCs	I1, I2, I3	Current sensor interface IDC connectors

Mechanical Drawing



Application Information

Power Supply & Configuration (S1-S4)

USM can be powered by 15V adapter supplied with the module or through +15 pin on J2 & J18 (pin 15). On power up, green LED will be illuminated. For voltage sensing, input range is selected from switches S1-S3. User can select $\pm 1000V$ range by setting 100X attenuation and $\pm 100V$ range by setting 10X attenuation. Unipolar Output voltage level can be configured either 0-5V or 0-3V from switch S4, depending on user's ADC input voltage range.

Output Connectivity

Multiple output options are available from the module. First of all, BNCs carry bipolar output and can be directly connected to oscilloscope or dSPACE. Similarly, IDC connector J2 carries bipolar outputs as well and provide direct connectivity with "intelliSENS DAQ". Additionally, J18 connector outputs unipolar voltage that facilitates direct interfacing with ADC or MCU as shown in figure 1. Since bipolar to unipolar conversion takes place at some midpoint (or offset), that midpoint (REF) is also accessible on J18 so that user may use accurate offset in calculations.

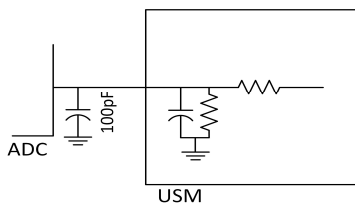


Figure 2: ADC interface with USM

There are two methods to utilize REF. First, if the ADC is differential type, then output signal can be given at one side and reference can be given at another side of differential system. This technique will automatically nullify the offset from the reading giving more reliable value.

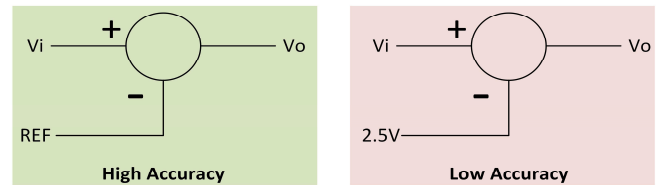


Figure 1: Offset accuracy

Second method is applicable if ADC is single ended. In this case, one channel of the ADC is dedicated to monitor the Reference Voltage and it is sampled along with other measurements, then it is mathematically subtracted. Since both methods subtracts actual offset, both result in lower offset error and hence, higher accuracy.

Another important aspect of interfacing with ADC, is that user must verify allowed source impedance for ADC inputs. USM's unipolar outputs have $3k\Omega$ impedance. If the ADC requires lower impedance source then user must add buffer stage to maintain dynamic response accuracy. However, most DSPs require higher impedance and hence no buffer stage is required.

Mounting and Safety

Since Voltage Sensing section may carry dangerously high voltage, it is not safe to touch the circuit in operation. User must consider proper clearance of stray metallic objects near input side. During wiring, IDC cables that will be used either to interface output or those of current sensors must be kept away from high voltage. IDC cables in general are not high voltage insulated, and hence care must be taken at high voltage ($>150V$) applications. Additional insulating sleeves or clearance is recommended for such applications.

SAFETY NOTICE!

ATTENTION PLEASE! THIS DEVICE IS ESD SENSITIVE AND NEEDS TO BE HANDLED WITH CARE. HIGH VOLTAGE CONDITION MAY OCCUR DURING OPERATION OF THE DEVICE, AND HENCE USER IS SOLELY RESPONSIBLE OF EQUIPMENT AND PERSONNEL SAFETY. TARAZ TECHNOLOGIES SHALL NOT BE HOLD LIABLE FOR ANY DAMAGE TO PERSONNEL AND/OR PROPERTIES AS A RESULT OF USING THIS DEVICE. USER MUST TAKE ADEQUATE STEPS TO ENSURE ELECTRICAL AND MECHANICAL SAFETY OF THE DEVICE IN USE.

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