

**Micro Oscillator's  
sMart shunts**

Endurance Analog Family



[Micro-oscillator.com](http://Micro-oscillator.com)

## High Side Precision Current Sense Amplifier with Built In Shunt Resistor – Voltage Output

MOI-HSCS-20mA5VI, MOI-HSCS-20mA5VE  
MOI-HSCS-20mA40VI, MOI-HSCS-20mA40VE

## General Description

Micro Oscillator Inc.'s patent pending sMart shunt Family, provides a high precision voltage or 20mA current loop output. The **sMart shunt** maintains accuracy over a broader temperature range including  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  in a smaller profile. In most cases, no calibration is required; simply connect the **sMart shunt** output to the DVM or current loop. The accuracy is 100% tested over an extended temperature range and High Side measurements don't require an additional supply. The increased performance and combined functionality in a small profile package comes without increasing system cost.

Custom specified products to meet varying application requirements are available.

## Features and Benefits

- 200mV, & 2 Volt Meter Compatible Versions
- 20ma Current Loop Compatible Version (see High Side Precision Current Sense Amplifier with Built In Shunt Resistor – Current Loop Data Sheet)
- Low Voltage (2.7V-5.5V) & high voltage (5V-40V) Versions
- Customer Specified Variations Available
- Industrial, Military, or Down Hole Environments

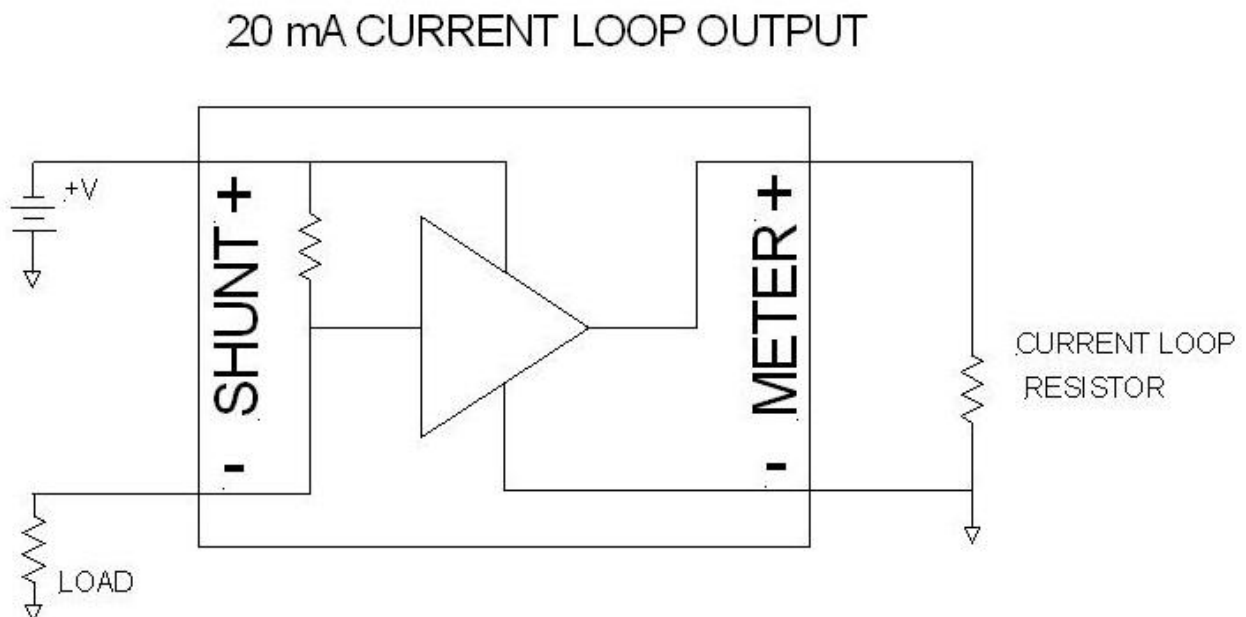
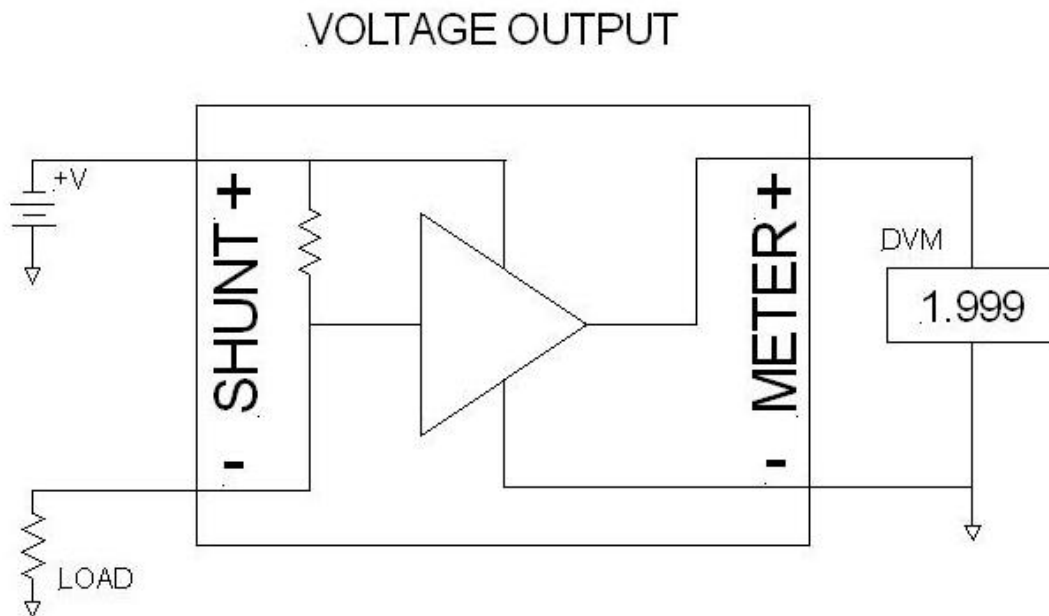
## Applications

- High Side Measurements without an additional supply
- 0.2% Accuracy over the specified temperature range without system calibration
- Broader temperature range than Manganin based shunts
- Total system cost savings

For information on pricing, delivery, and ordering, please email [sales@micro-oscillator.com](mailto:sales@micro-oscillator.com) or contact a Sales Representative for Micro Oscillator at 512-470-2835, or visit Micro Oscillator's website at [www.micro-oscillator.com](http://www.micro-oscillator.com)

HSCS Family Data Sheet Rev. 1 AUG 2012

## Functional Block Diagram



## Absolute Maximum Ratings

- Supply Voltage; 6V Max MOI-HSCS-20mA5VI, MOI-HSCS-20mA5VE  
50V Max MOI-HSCS-20mA40VI, MOI-HSCS-20mA40VE
- Load Current; MOI-HSCS-20mAXXXXXX 22mA Max
- Output Current; 1mA Max
- Storage Temperature; -40°C to 150°C

## Electrical Characteristics

		Min	Typ	Max	Units	Conditions
<b>Internal Shunt Resistor</b>						
MOI-HSCS-20mAXXXXXX	Rs		2.5		Ohms	
<b>Load Current</b>						
	I <sub>L</sub>	0		21	mA	
<b>Transimpedance Gain</b>						
MOI-HSCS-20mAXXXXXX		0.0998	0.1	0.1002		V/mA
<b>Small-Signal Bandwidth</b>						
			1K		Hz	
<b>Output Offset Voltage</b>						
				1	mV	I <sub>L</sub> =0mA
<b>Output Resistance</b>						
			1K		Ohms	
<b>Supply Voltage</b>						
MOI-HSCS-20mA40VI	V <sub>s</sub>	5		40	V	
MOI-HSCS-20mA40VE		5		40	V	
MOI-HSCS-20mA5VI		2.7		5.5	V	
MOI-HSCS-20mA5VE		2.7		5.5	V	
<b>Supply Current</b>						
MOI-HSCS-20mA40VI	I <sub>s</sub>		0.8		mA	I <sub>L</sub> =0mA
MOI-HSCS-20mA40VE			0.8			
MOI-HSCS-20mA5VI			0.03			
MOI-HSCS-20mA5VE			0.03			
<b>Temperature Range</b>						
MOI-HSCS-20mA5VI		-40°		85°	C	
MOI-HSCS-20mA40VI		-40°		85°	C	
MOI-HSCS-20mA5VE		-40°		125°	C	
MOI-HSCS-200mA40VE		-40°		125°	C	

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## Detailed Description

Micro Oscillator Inc. **sMart shunts** provide uni-directional current sensing with a voltage output. The current flowing from the power supply into the external load controls the current flow from the power supply into an internal resistor to produce the output voltage. This circuit operates similar to that of a current mirror. The major advantage of using the Micro Oscillator Inc. **sMart shunt** is that the shunt resistor's temperature coefficient error is electronically reduced to provide greater total accuracy than normally possible.

The meter connected to the **sMart shunt's** meter output should be 1M ohms minimum to reduce measurement error.

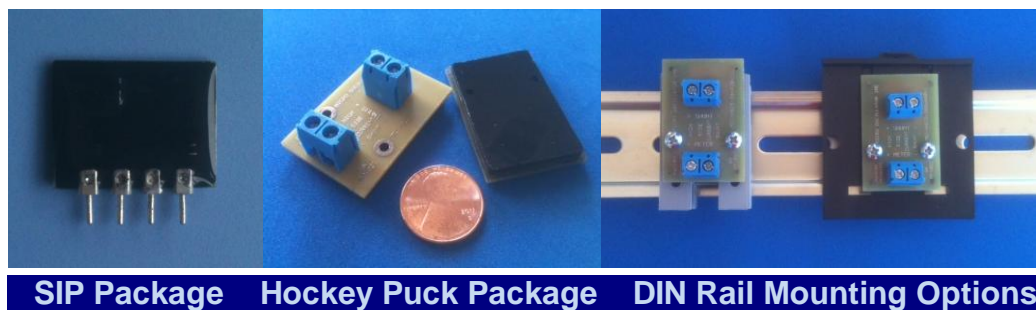
## Device Branding Key

### MOI-HSCS – xxxmAyyVIECL

Product Number	Full Scale Output	Full Scale Input	Shunt Res Voltage	Package	Temp Range	Supply Voltage	Total Accuracy
MOI-HSCS-20mA5VI	2 Volt	20mA	40mV	SIP/Terminals	-40-85 <sup>0</sup> C	2.7-5V	0.2%
MOI-HSCS-20mA5VE	2 Volt	20mA	40mV	SIP/Terminals	-40-125 <sup>0</sup> C	2.7-5V	0.2%
MOI-HSCS-20mA40VI	2 Volt	20mA	40mV	Hockey Puck	-40-85 <sup>0</sup> C	5-40V	0.2%
MOI-HSCS-20mA40VE	2 Volt	20mA	40mV	Hockey Puck	-40-125 <sup>0</sup> C	5-40V	0.2%
MOI-HSCS-20mA30VICL	20mA	20mA	40mV	Hockey Puck	-40-85 <sup>0</sup> C	5-30V	0.2%
MOI-HSCS-20mA30VECL	20mA	20mA	40mV	Hockey Puck	-40-125 <sup>0</sup> C	5-30V	0.2%
MOI-HSCS-200mA30VICL	20mA	200mA	40mV	Hockey Puck	-40-85 <sup>0</sup> C	5-30V	0.4%
MOI-HSCS-200mA30VECL	20mA	200mA	40mV	Hockey Puck	-40-125 <sup>0</sup> C	5-30V	0.4%

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## Package Details



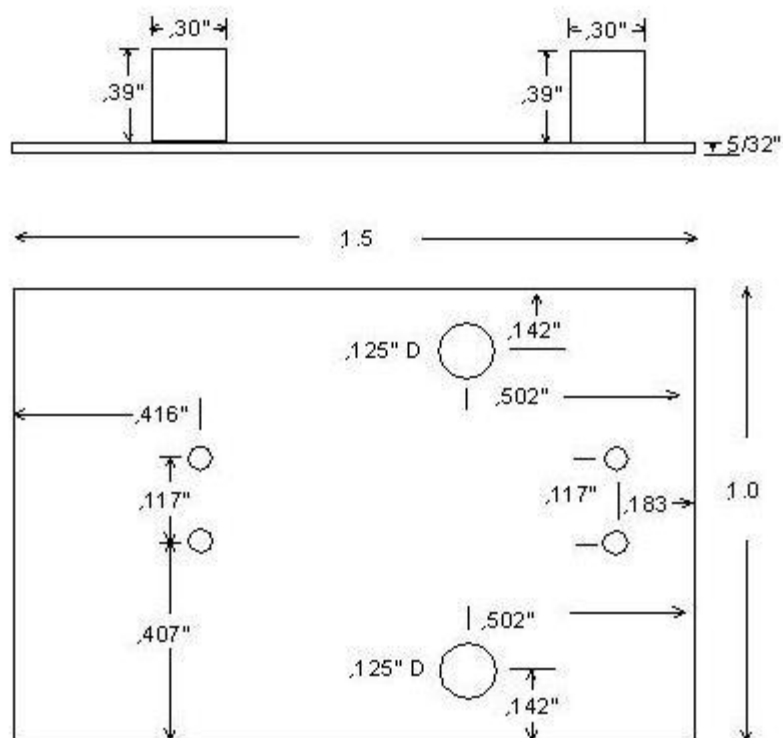
Package contains FR-4 PCB, and UL 94 V-0 flammability rated terminals and flame retardant epoxy.

Recommended #4 machine screws for mounting, not included.

DIN Rail Adapters used in photo are: SSAC SYMCOM INC DIN Rail Mounting Adapter Manufacturer P/N P1023-20 & Eaton/Control Automation ACCESSORY; Kit; DIN Rail Mounting Kit Manufacturer P/N EDINKIT.

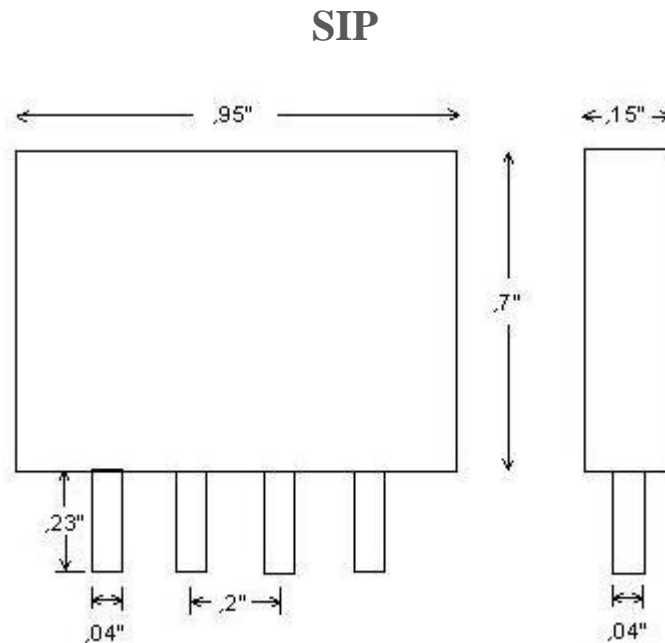
## Dimensions

### HOCKEY PUCK



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## Handling Precautions

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All device pins have limited ESD protection. Normal precautions should be taken to guard against ESD damage.

## Warranty

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