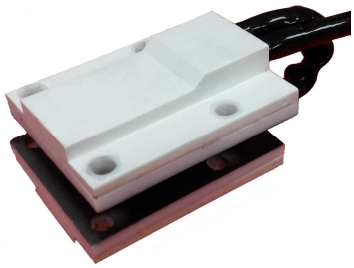
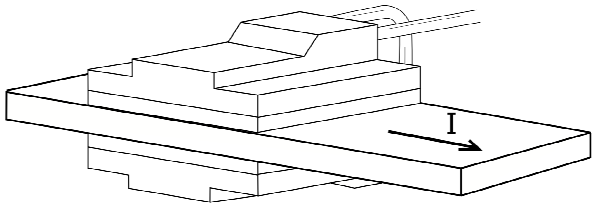
Bus-Bar Magnetic Sensor Module BBM-02

DESCRIPTION:

The bus-bar magnetic sensor module BBM-02 is the magnetic sensor part of a bus-bar current transducer. Attached to a rectangular cross-section current bus-bar, the BBM-02 enables contactless measurement of DC and AC currents in the bus-bar. The BBM-02 incorporates two Hall-effect magnetic field sensors, which shall be located at two opposite sides of a bus bar. The sensors generate an output voltage, which is proportional with the magnetic field produced by the electrical current currying the bus-bar. The signals generated in the two sensors by external magnetic fields are mutually cancelled. The BBM-02 does not contain any ferromagnetic part, so it has no hysteresis. The offset and sensitivity of the BBM-02 are in-factory calibrated.
The current sensitivity and the dynamic response of a current transducer based on the BBM-02 depend on the bus-bar geometry and the position of the BBM-02 relative to the bus bar.





FEATURES:

- For measuring DC & AC currents, the frequency bandwidth from DC up to 100kHz
- Small size, very compact and low profile mechanical package
- Easy to assemble structure: its installation does not require an interrupt of the circuit
- 5Vdc unipolar power supply
- Signal output electrically isolated from primary bus bar
- Differential output
- Clean recovery from very high transient overload
- Improved HV insulation with a 3mm thick layer of the PTFE (PolyTetraFluoroEthylene - Teflon) available on request

TYPICAL APPLICATIONS:

- Power Electronics
- Motor & Generator Control
- Electromechanical Systems
- Battery Charging
- Transit & Off Road Vehicles
- Process control

ABSOLUTE MAXIMUM RATINGS [1] [2] :

In accordance with the absolute maximum rating system (IEC60134).

Symbol	Parameter	Min.	Typ.	Max.	Units	Remarks
T_{stg}	Storage Temperature	-40		+100	°C	
T_{amb}	Ambient Temperature	-40		+85	°C	
T_B	Busbar temperature	-40		+100	°C	
V_{SUP}	Supply Voltage	4.75	5.0	5.25	V_{dc}	±5%
	Duration of output short circuit		1		s	
B	Magnetic Flux Density				T	No limit. The circuit cannot be damaged by magnetic overdrive.
V_D	Voltage for AC Isolation Test		5		kV_{rms}	
I_{OUT}	Continous output current		± 55		mA	R_L = 50Ω

[1] Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not ensure specific performance limits.

[2] The output may be shorted to ground or either power supply.

Stresses beyond those listed under "Absolute maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS:

Symbol	Parameter	Min.	Typ.	Max.	Units	Remarks
T_{amb}	Ambient Temperature	-30	+25	+80	°C	
V_{cc}	Supply Voltage		+5		V_{dc}	
I_{OUT}	Output Current	-1		+1	mA	
C_L	Load Capacitance			1000	pF	

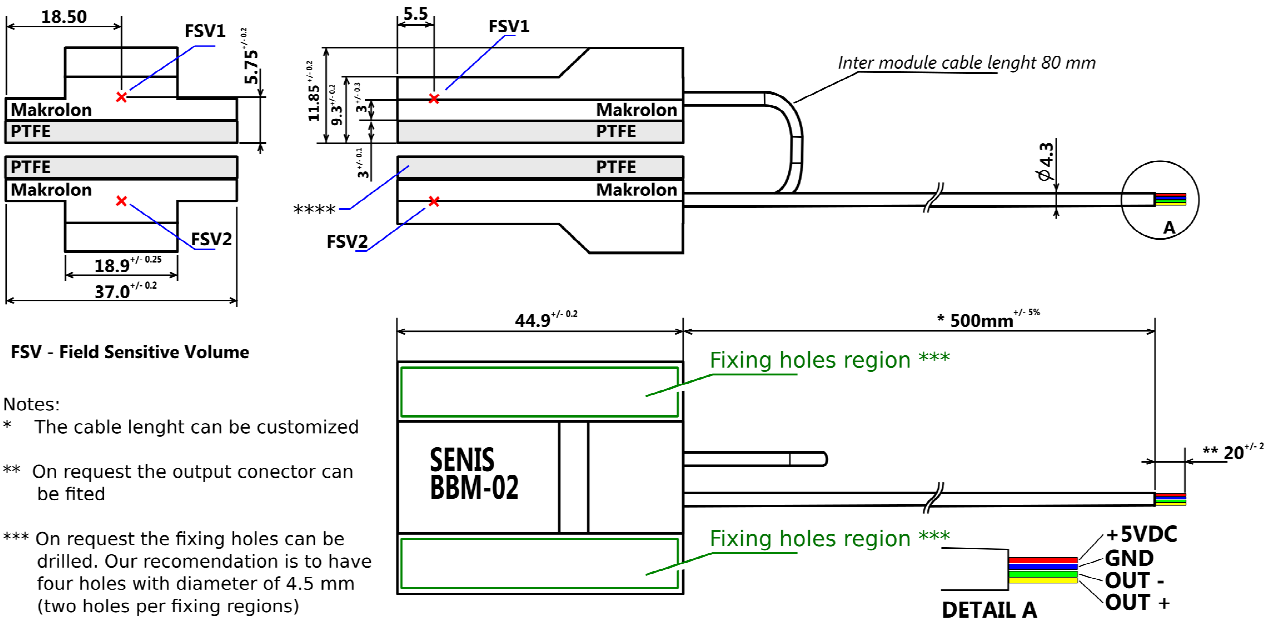
ELECTRICAL CHARACTERISTICS:

Symbol	Parameter	Min.	Typ.	Max.	Units	Remarks
V_{SUP}	Supply Voltage	4.75	5	5.25	V_{dc}	
I_{SUP}	Supply Current	30	35	40	mA	
V_{off}	DC offset voltage		10	25	mV	@ T=+25°C, B=0mT, I_{OUT}=0mA
V_{common}	Common (reference) Output Voltage		2.5		V	I_{OUT}=0mA V_{common} =V_{SUP}/2
V_{out}	Output Voltage	0		4.7	V	RR - 0.3V @ 25°C
V_{iso}	Dielectric isolation		6		kV	
BW	Bandwidth: DC to		100		kHz	@ -3dB
t_{RISE}	Rise Time (from 10% to 90% of a step)			3	µs	1µs Input magnetic field rising/falling
t_{REAC}	Reaction Time (10% input – 10% output)			1	µs	1µs Input magnetic field rising/falling
t_{RES}	Response Time (90% input – 90% output)			1	µs	1µs Input magnetic field rising/falling
t_{SUP}	Start-up Time		15	20	µs	After V_{SUP} applied
t_{REC}	Recovery time		1	1.5	ms	B ≥ 70mT
C_b	Capacitance between the sensor body and bus-bar		13	18	pF	
S	Magnetic Sensitivity	300	350	420	mV/mT	@ +25°C
T_{CS} = $\Delta S/S \cdot \Delta T$	Magnetic Sensitivity Temperature Drift		< ±0.1		%/°C	I_{OUT}=0mA, T=-40°C to +100°C
T_{Coff} = $\Delta V_{off}/\Delta T$	Offset Temperature Drift		< ±1		mV/°C	B=0mT, I_{OUT}=0mA T=-40°C to +100°C
$\|B_{FS}\|$	Full Scale Magnetic Field Range	14	16	18	mT	
$\|B_L\|$	Linear Magnetic Field Range	12	14	16	mT	
NL	Non Linearirty			0.1	%	B = B_L
			0.2			B = B_{FS}
ΔB_{noise}	Input referred magnetic noise spectrum density		22		μT_{p-p}	DC to 100kHz

MECHANICAL CHARACTERISTICS:

Symbol	Parameter	Min.	Typ.	Max.	Units	Remarks
m	Mass		15		g	Without cable
			60			Including cable
l_C	Intermodule cable length		80		mm	
l_M	Module cable lenght		-			On Request

MECHANICAL DIMENSIONS (dimensions are in millimeters):



FSV - Field Sensitive Volume

Notes:

* The cable lenght can be customized

** On request the output conector can be fited

*** On request the fixing holes can be drilled. Our recomendation is to have four holes with diameter of 4.5 mm (two holes per fixing regions)

**** PTFE layer on request

PACKAGING INFORMATION:

Housing of the bus-bar magnetic sensor module BBM-02 is made of Makrolon® 6265 and PTFE (flame retardant, UL 94V-0/1.5 mm).
Fiberglass braided sleeve coated with silicone rubber with high dielectric strength (breakdown strength 3kV) is used for protecting cables.
The product is compliant with EU RoHS directives.