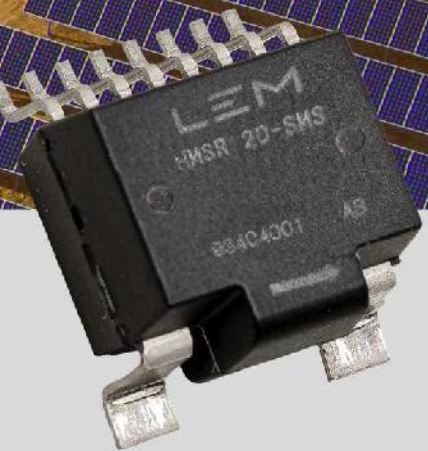


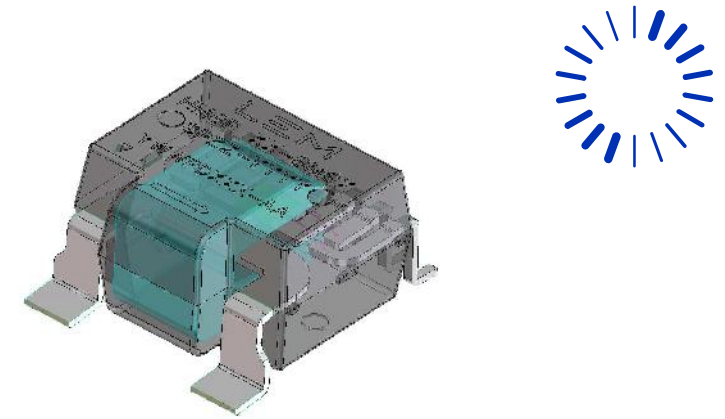
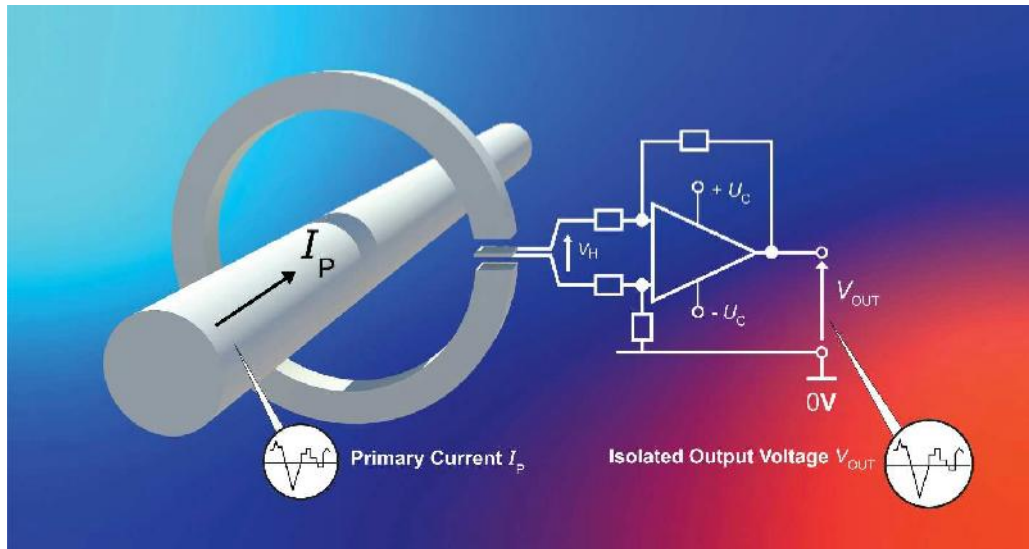
HMSR Series

Miniature current sensors



Market needs & Technology

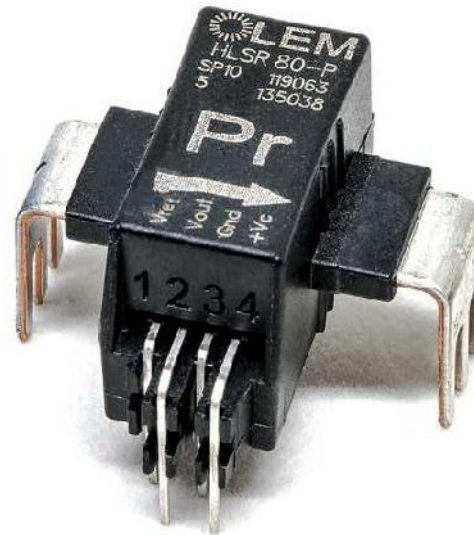
- **Market needs:** Modern power conversion systems need to become more efficient, smaller and cheaper
- **Current sensor technology retained:** Open loop ASIC based



- **Dedicated ASICs** increase the overall accuracy of the system using advanced compensation techniques
- **ASIC technology** evolution allowed the O/L Hall effect sensors approaching the performances of the C/L technology
- **O/L technology** allows reduced size of components & cost improvements thanks to a simpler structure and lower power consumption

HMSR

Miniature Current Sensor



Evolution of the current sensor's size
over the decades

HMSR

Miniature Current Sensor



Main Features:

- 6, 8, 10, 15, 20 or 30 A nominal
- IC SO16 like packaging footprint for SMD automatic assembly
- Low profile: h = 6 mm
- Low foot-print
- Double overcurrent detection
- 8 mm creepage and clearance distances + CTI 600
- Reinforced insulation according to the IEC 60950-1 standard (4950 VRMS isolation test voltage)
- 2 μ s response time
- Cost effective
- Operating temperature range: -40°C to +125°C
- Unique primary conductor included
- Withstands overload current bursts up to 20 kA (8-20 μ s)



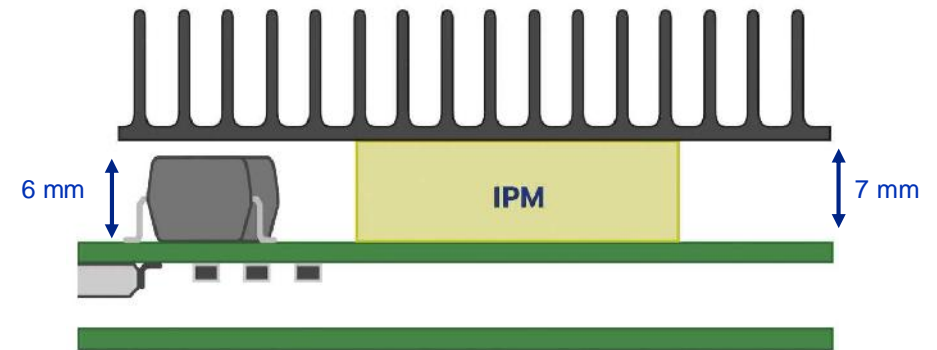
HMSR

Miniature Current Sensor



Advantages:

- IC SO16 like packaging for SMD automatic assembly
 - Low profile: $h = 6 \text{ mm}$
 - Low foot-print
- Reducing manufacturing costs
- Space-saving in applications
- Easy integration into intelligent power modules (IPMs)



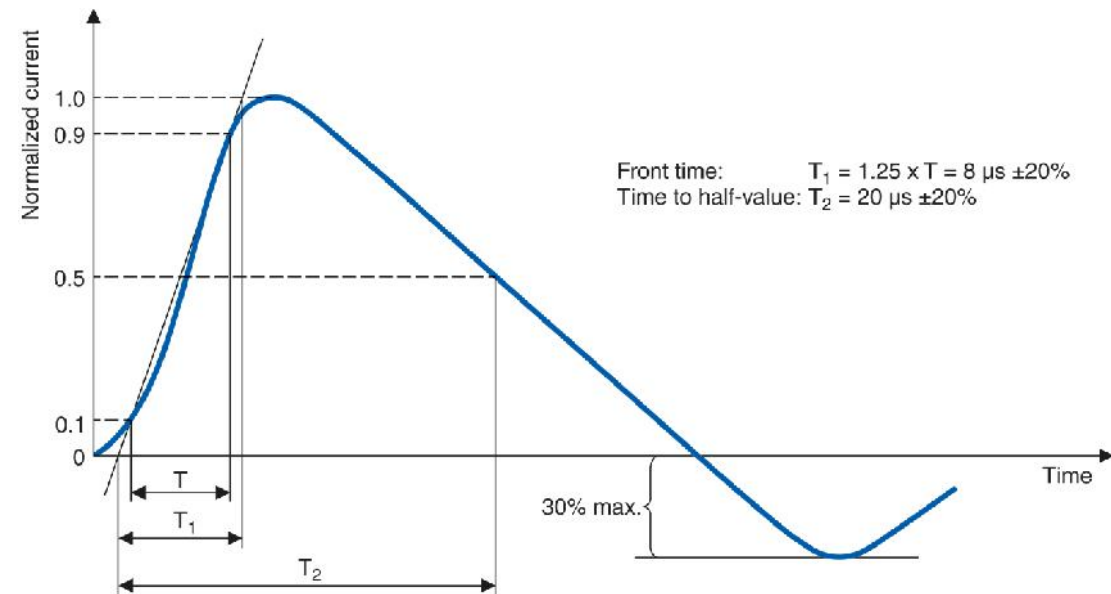
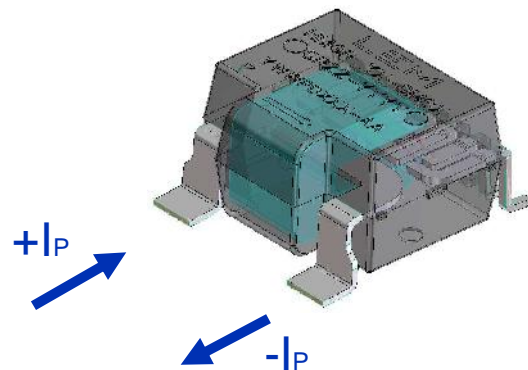
HMSR

Miniature Current Sensor



Advantages:

- Unique low resistance primary conductor included to minimise power losses
- Overload current bursts withstand of up to 20 kA (8-20 us)
- Direct measurement
- Lightning protection met in solar applications (string)



HMSR

Miniature Current Sensor



Advantages:

Double overcurrent detections:

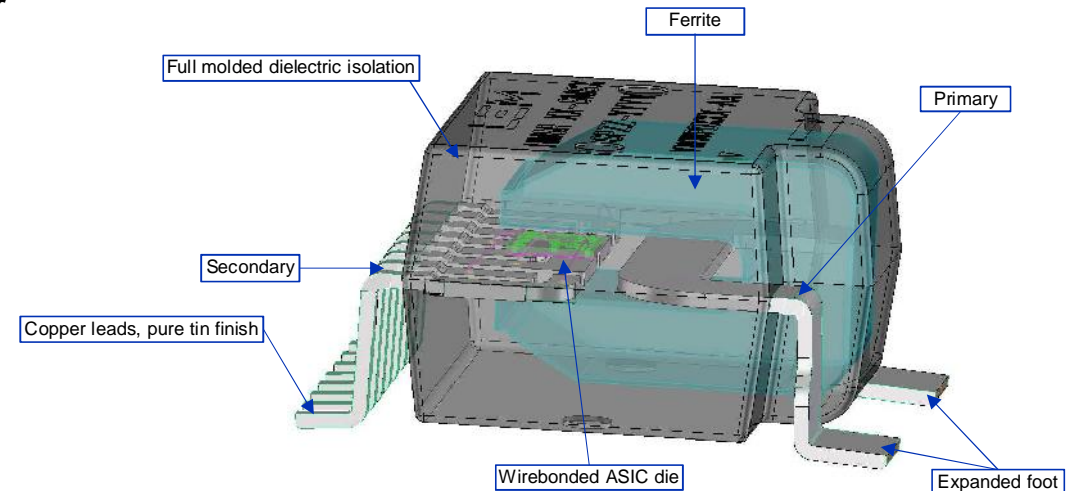
- One threshold is set during manufacturing at $2.93 \times I_{PN}$
- Another one to be adjusted by the user (external resistors)

- Transistors protection in the inverter
- Short-circuiting and overload detections
- Applications interest: HVAC on the DC link or motor drive applications
- Most modern variable-frequency drives incorporate a motor overload algorithm and the OCD function on the HMSR will make detection much easier, preventing the overheating of equipment

Advantages:

Reinforced insulation according to the IEC 60950-1 standard

- 4950 VRMS isolation test voltage
- 8 mm creepage and clearance distances + CTI 600
- 1600 V as working voltage according to IEC 62109-1 (Safety of power converters in PV systems)



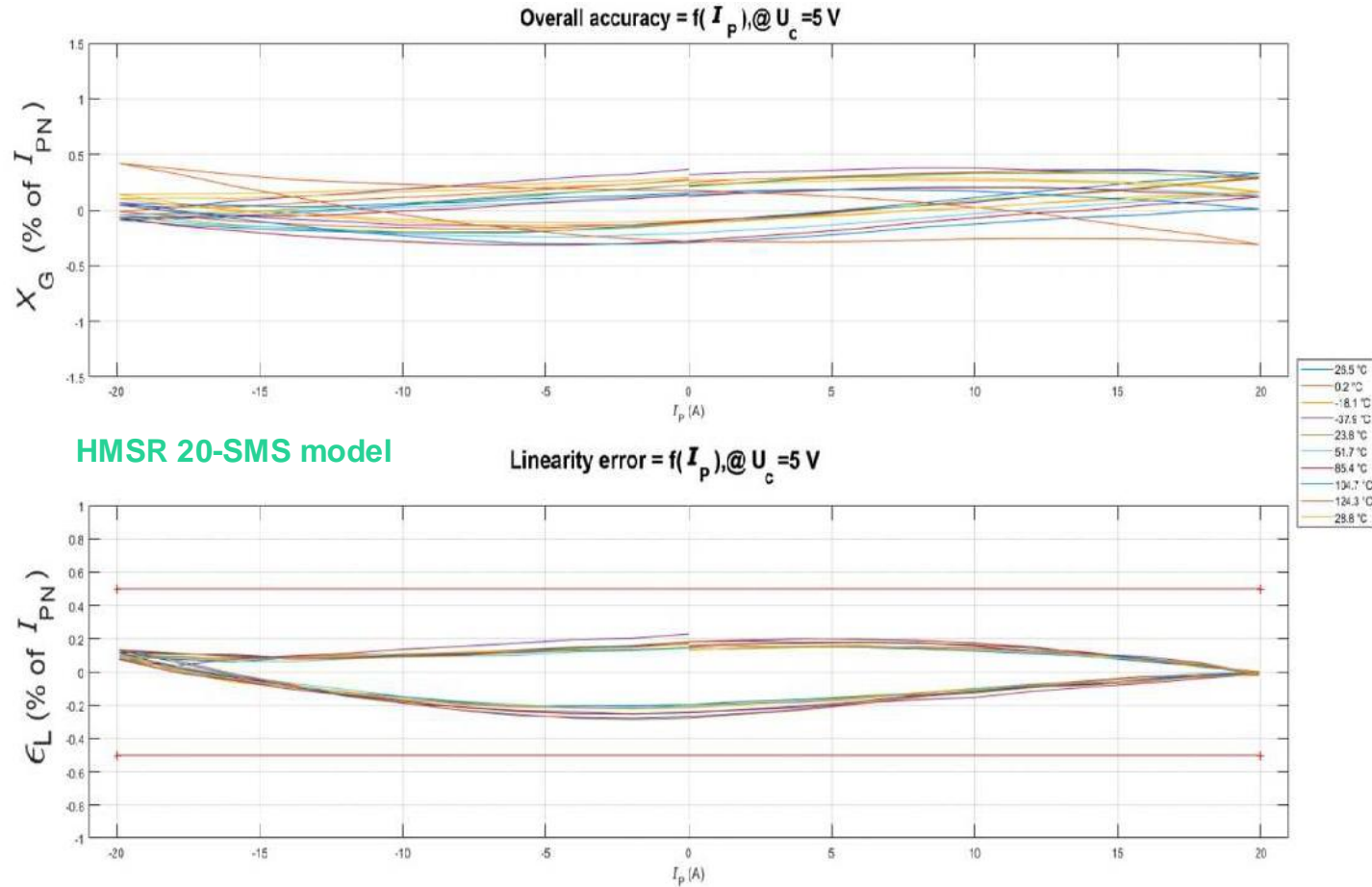
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Advantages:

Dedicated ASIC with spinning techniques, programmable internal temperature and gain stress compensation (EEPROM)

- Improved gain and offset drifts
- 0.5% typical accuracy into the operating temperature range



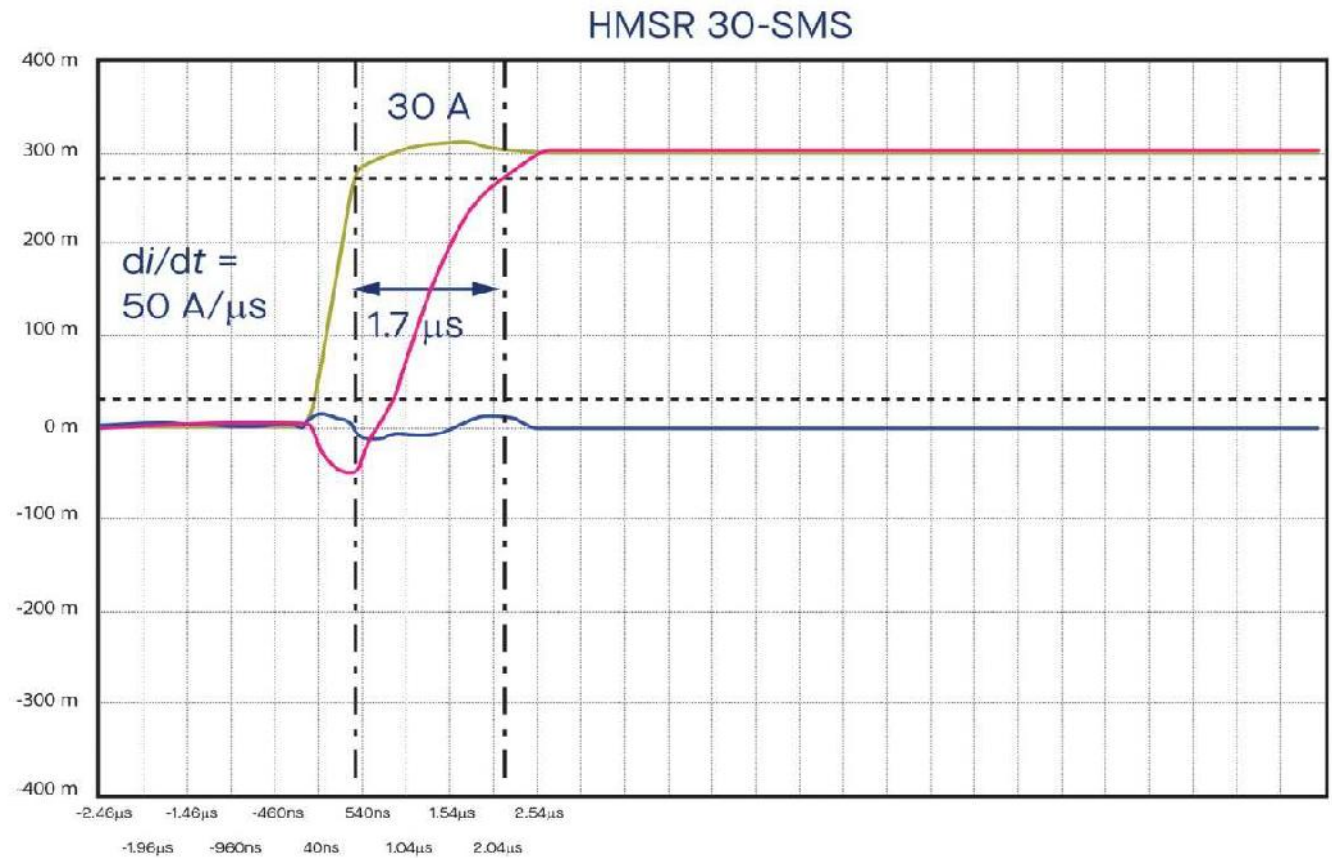
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Miniature Current Sensor



Advantages:

Short response time of 2 μs typical



HMSR

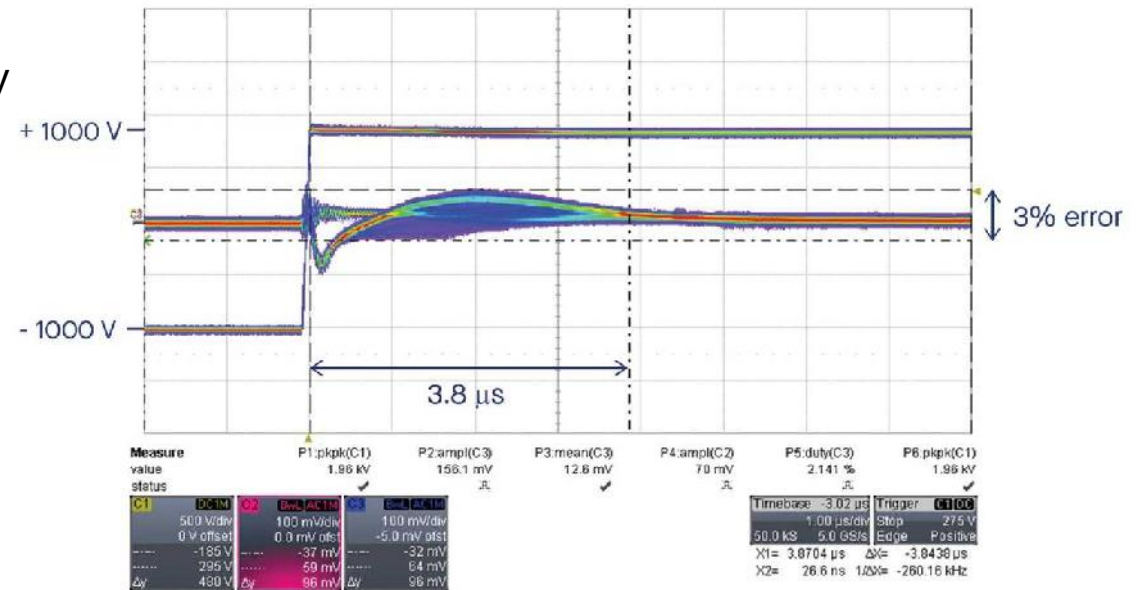
Miniature Current Sensor



Advantages:

Ruggedized design against noisy environment

→ Low disturbance generated due to high dv/dt : only 3% of full scale with a recovery time of 3.8 μs .



HMSR 20-SMS
+/- 1000 V at 20 kV/ μs

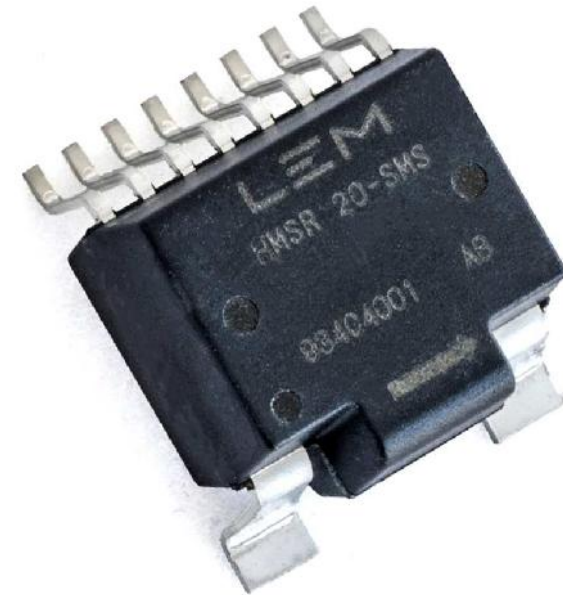
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Other main characteristics:

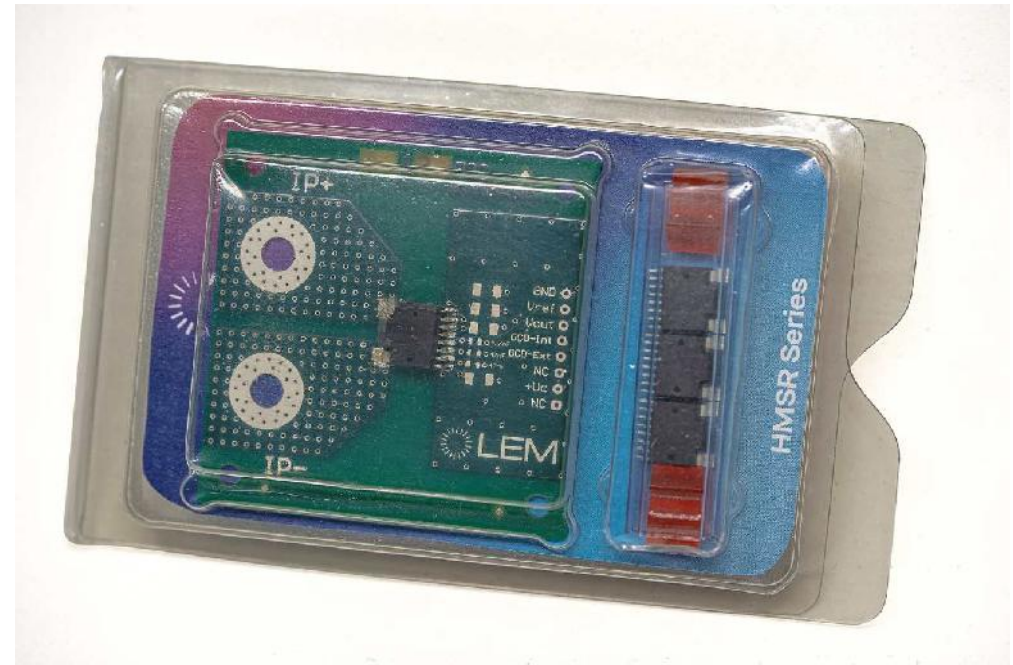
- Analog Voltage output of 800 mV @ I_{PN}
- Single power supply +5 V
- Low power consumption
- Factory calibrated
- High bandwidth, very low loss magnetic core: DC to 300 kHz
- Excellent immunity to external fields



HMSR

Miniature Current Sensor

- Samples kits available for easy evaluation
- One HMSR mounted on LEM designed high current board
- 3 x HMSR for customer board testing



HMSR

Miniature Current Sensor

Applications

- Small drives
- HVAC
- Appliances
- Windows shutters
- Solar
- High switching frequency drives

Standards

- IEC 61800-5-1: 2007
- IEC 62109-1: 2010
- IEC 60950-1: 2005

