**LAMPIRAN**

Current Transducer HX 03 .. 50-P/SP2

For the electronic measurement of currents: DC, AC, pulsed, mixed, with a galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).

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### Electrical data

<table>
<thead>
<tr>
<th>Primary nominal r.m.s. current</th>
<th>Primary current measuring range</th>
<th>Primary Conductor Diameter x Turns</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_{in} (A)</td>
<td>I_p (A)</td>
<td>L_p (mm)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>± 9</td>
<td>0.6 x 27</td>
<td>HX 03-P/SP2</td>
</tr>
<tr>
<td>5</td>
<td>± 15</td>
<td>0.6 x 127</td>
<td>HX 05-P/SP2</td>
</tr>
<tr>
<td>10</td>
<td>± 30</td>
<td>1.1 x 8 T</td>
<td>HX 10-P/SP2</td>
</tr>
<tr>
<td>15</td>
<td>± 45</td>
<td>1.4 x 4 T</td>
<td>HX 15-P/SP2</td>
</tr>
<tr>
<td>20</td>
<td>± 60</td>
<td>1.6 x 2 T</td>
<td>HX 20-P/SP2</td>
</tr>
<tr>
<td>25</td>
<td>± 75</td>
<td>1.6 x 2 T</td>
<td>HX 25-P/SP2</td>
</tr>
<tr>
<td>50</td>
<td>± 150</td>
<td>1.2 x 3 x 1 T</td>
<td>HX 50-P/SP2</td>
</tr>
</tbody>
</table>

**Features**
- Galvanic isolation between primary and secondary circuit
- Half offset measuring principle
- Isolation voltage: 3000V
- Low power consumption
- Extended measuring range (3 x I_{in})
- Single supply from -15V to +15V
- Material according to UL504-V0

**Advantages**
- Low insertion losses
- Easy to mount with automatic handling system
- Small size and space saving
- Only one design for wide current ratings range
- High immunity to external interference

### Accuracy-Dynamic performance data

<table>
<thead>
<tr>
<th>X</th>
<th>Accuracy @ I_{in} = 25°C (without offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{in}$</td>
<td>$\leq \pm 1$ % of $I_{in}$</td>
</tr>
<tr>
<td>$V_{ac}$</td>
<td>Electrical offset voltage: $T_i = 25^\circ$ C</td>
</tr>
<tr>
<td>$V_{oc}$</td>
<td>Hot/hysteresis offset voltage @ $I_i = 0$</td>
</tr>
<tr>
<td>$\Delta V_{ac}$</td>
<td>Thermal drift of $V_{ac}$</td>
</tr>
<tr>
<td>$\Delta V_{oc}$</td>
<td>Thermal drift of the gain (% of reading)</td>
</tr>
<tr>
<td>$I_{n}$</td>
<td>Nominal current (90% of $I_{in}$)</td>
</tr>
<tr>
<td>$f$</td>
<td>Frequency bandwidth (1 kHz)</td>
</tr>
</tbody>
</table>

### General data

| $T_a$ | Ambient operating temperature | $-25 \ldots +85^\circ$ C |
| $T_m$ | Ambient storage temperature | $-25 \ldots +85^\circ$ C |
| Mass | $8 \text{ g}$ |
| Min. internal creepage distance/clearance | $\geq 5.5 \text{ mm}$ |
| Isolation material group | I |
| Standards | EN50178 |

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**Notes**
- With $R_i = 2k\Omega$
- Small signal only to avoid excessive heating of the magnetic core

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LAMPIRAN

LEM Components

www.lem.com

50
dsPIC30F4011/4012 Enhanced Flash
16-bit Digital Signal Controller

High Performance Modified RISC CPU:
• Modified Harvard architecture
• C compiler optimized instruction set architecture with flexible addressing modes
• 84 base instructions
• 24-bit wide instruction, 16-bit wide data path
• 48 KBbytes on-chip Flash program space (16K Instruction words)
• 2 KBbytes of on-chip data RAM
• 1 KBbyte of non-volatile data EEPROM
• Up to 30 MIPS operation:
  - DC to 40 MHz external clock input
  - 4 MHz to 10 MHz oscillator input with PLL active (4x, 6x, 10x)
• 30 interrupt sources
  - 3 external interrupt sources
  - 8 user selectable priority levels for each interrupt source
  - 4 proceedure interrupt sources
• 16 x 16-bit working register array

DSP Engine Features:
• Dual data fetch
• Accumulator write back for DSP operations
• Modulo and Bit-Reversed Addressing modes
• Two, 32-bit wide accumulators with optional saturation logic
• 17-bit x 17-bit single cycle hardware fractional integer multiplier
• All DSP instructions single cycle
• ±16-bit single cycle shift

Peripheral Features:
• High current sink/source I/O pins: 25 mA/25 mA
• Timer module with programmable prescaler:
  - Five 16-bit timers/counters, optionally pair 16-bit timers into 32-bit timer modules
  - 16-bit Capture input functions
• 16-bit Compare/PWM output functions
• 3-wire SPI™ modules (supports 4 Frame modes)
• PC™ module supports Master/Slave mode and 7-bit/10-bit addressing
• 2 UART modules with FIFO Buffers
• 1 CAN modules, 20-bit compliant

Motor Control PWM Module Features:
• 6 PWM output channels
  - Complementary or Independent Output modes
  - Edge and Center Aligned modes
• 3 duty cycle generators
• Dedicated time base
• Programmable output polarity
• Dual-time control for Complementary mode
• Manual output control
• Trigger for A/D conversions

Quadrature Encoder Interface Module Features:
• Pulse A, Pulse B and Index Pulse input
• 16-bit up/down position counter
• Count direction status
• Position Measurement (±2 and ±4) mode
• Programmable digital noise filters on inputs
• Alternate 16-bit Timer/Counter mode
• Interrupt on position counter rollover/underflow

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Preliminary DS70130C-page 1
IR2130/IR2132(J)(S) & (PbF)
3-PHASE BRIDGE DRIVER

Features
- Floating channel designed for bootstrap operation
  Fully operational up to 600V
  Tolerant to negative transient voltage
  dv/dt immune
- Gate drive supply range from 10 to 29V
- Under-voltage lockout for all channels
- Over-current shutdown turns off all six drivers
- Independent half-bridge drivers
- Matched propagation delay for all channels
- 2.5V logic compatible
- Outputs out of phase with inputs
- Cross-conduction prevention logic
- Also available LEAD-FREE

Product Summary

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOFFSET</td>
<td>600V max.</td>
</tr>
<tr>
<td>IO+/–</td>
<td>200 mA / 420 mA</td>
</tr>
<tr>
<td>VOUT</td>
<td>10 - 20V</td>
</tr>
<tr>
<td>tONoff (typ.)</td>
<td>675 &amp; 425 ns</td>
</tr>
<tr>
<td>Deadtime (typ.)</td>
<td>2.5 μs (IR2130)</td>
</tr>
<tr>
<td></td>
<td>0.8 μs (IR2132)</td>
</tr>
</tbody>
</table>

Description
The IR2130/IR2132(J)(S) is a high voltage, high speed power MOSFET and IGBT driver with three independent high and low side referenced output channels. Proprietary HVIC technology enables ruggedized monolithic construction. Logic inputs are compatible with CMOS or LSTTL outputs, down to 2.5V logic. A ground-referenced operational amplifier provides analog feedback of bridge current via an external current-sense resistor. A current trip function which terminates all six outputs is also derived from the resistor. An open drain FAULT signal indicates if an over-current or undervoltage shutdown has occurred. The output drivers feature a high pulse current buffer stage designed for minimum drive cross-conduction. Propagation delays are matched to simplify use at high frequencies. The floating channels can be used to drive N-channel power MOSFETs or IGBTs in the high side configuration which operates up to 600 volts.

Typical Connection

(Refer to lead assignments for correct pin configurations. The line diagram(s) show electrical connections only. Please refer to our Application Notes and Design will for proper circuit board layout.)

www.irf.com
### DC/DC Converter
**B_S-1WR2 & B_D-1WR2 series**

**1W, Fixed input voltage, isolated & unregulated single output**

**FEATURES**
- Continuous short-circuit protection
- Operating temperature range: -40°C to +105°C
- Conversion efficiency high up to 80%
- Miniature SIP/DIP package, International standard pin-out
- Isolation voltage: 1.5kVDC
- EN60950,UL60950 Approval

**B_S-1WR2 & B_D-1WR2 series** are especially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for:
1. Where the voltage of the input power supply is stable (voltage variation ≤10%)
2. Where isolation between input and output is required (isolation voltage <1500VDC)
3. Where the output voltage regulation and the ripple & noise of the output voltage is not strictly required
4. Typical applications: digital circuit conditioning, normal low-frequency digital circuit conditioning, relay drive circuit, and data switching circuit conditioners, etc.

<table>
<thead>
<tr>
<th>Certification</th>
<th>Part No.</th>
<th>Input Voltage (VDC)</th>
<th>Output Voltage (VDC)</th>
<th>Output Current (mA/Max)</th>
<th>Efficiency (%/Min./Max)</th>
<th>Max. Capacitive Load (μF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL/CE</td>
<td>B030WS-1WR2</td>
<td>5.5 (2.75-8.5)</td>
<td>5.5 300/50</td>
<td>3.5 300/50</td>
<td>68/72</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>B031LS-1WR2</td>
<td>6.3 (3.0-12.5)</td>
<td>6.3 300/50</td>
<td>12 8/9</td>
<td>76/80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B030DC-1WR2</td>
<td>6.3 (3.0-12.5)</td>
<td>6.3 300/50</td>
<td>5 200/20</td>
<td>72/76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B031DC-1WR2</td>
<td>6.3 (3.0-12.5)</td>
<td>6.3 300/50</td>
<td>5 200/20</td>
<td>76/80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B030DS-1WR2</td>
<td>6.3 (3.0-12.5)</td>
<td>6.3 300/50</td>
<td>5 200/20</td>
<td>76/80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B031DS-1WR2</td>
<td>6.3 (3.0-12.5)</td>
<td>6.3 300/50</td>
<td>5 200/20</td>
<td>76/80</td>
<td></td>
</tr>
</tbody>
</table>

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FGL60N100BNTD
1000 V, 60 A NPT Trench IGBT

Features
- High Speed Switching
- Low Saturation Voltage: $V_{CEO(sat)} = 2.5$ V @ $I_C = 60$ A
- High Input Impedance
- Built-In Fast Recovery Diode

Applications
- UPS, Welder

General Description
Using Fairchild's proprietary trench design and advanced NPT technology, the 1000V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device offers the optimum performance for hard switching application such as UPS, welder applications.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CEO}$</td>
<td>Collector to Emitter Voltage</td>
<td>1000</td>
<td>V</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>Gate to Emitter Voltage</td>
<td>25</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>Collector Current</td>
<td>60</td>
<td>A</td>
</tr>
<tr>
<td>$I_C$</td>
<td>Collector Current</td>
<td>42</td>
<td>A</td>
</tr>
<tr>
<td>$I_{Cm}$</td>
<td>Pulsed Collector Current</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>$I_D$</td>
<td>Diode Continuous Forward Current</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>$P_J$</td>
<td>Maximum Power Dissipation</td>
<td>180</td>
<td>W</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Maximum Power Dissipation</td>
<td>73</td>
<td>W</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Operating Junction Temperature</td>
<td>$-55$ to $+150$</td>
<td>°C</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Storage Temperature Range</td>
<td>$-55$ to $+150$</td>
<td>°C</td>
</tr>
<tr>
<td>$T_J$</td>
<td>Maximum Lead Temp. for soldering</td>
<td>300</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:
1. Repetitive rating: Pulse width limited by max. junction temperature

Thermal Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{TJ}$</td>
<td>Thermal Resistance, Junction to Case</td>
<td>0.69</td>
<td>°C/W</td>
</tr>
<tr>
<td>$R_{JG}$</td>
<td>Thermal Resistance, Junction to Case</td>
<td>2.08</td>
<td>°C/W</td>
</tr>
<tr>
<td>$R_{JA}$</td>
<td>Thermal Resistance, Junction to Ambient</td>
<td>25</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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