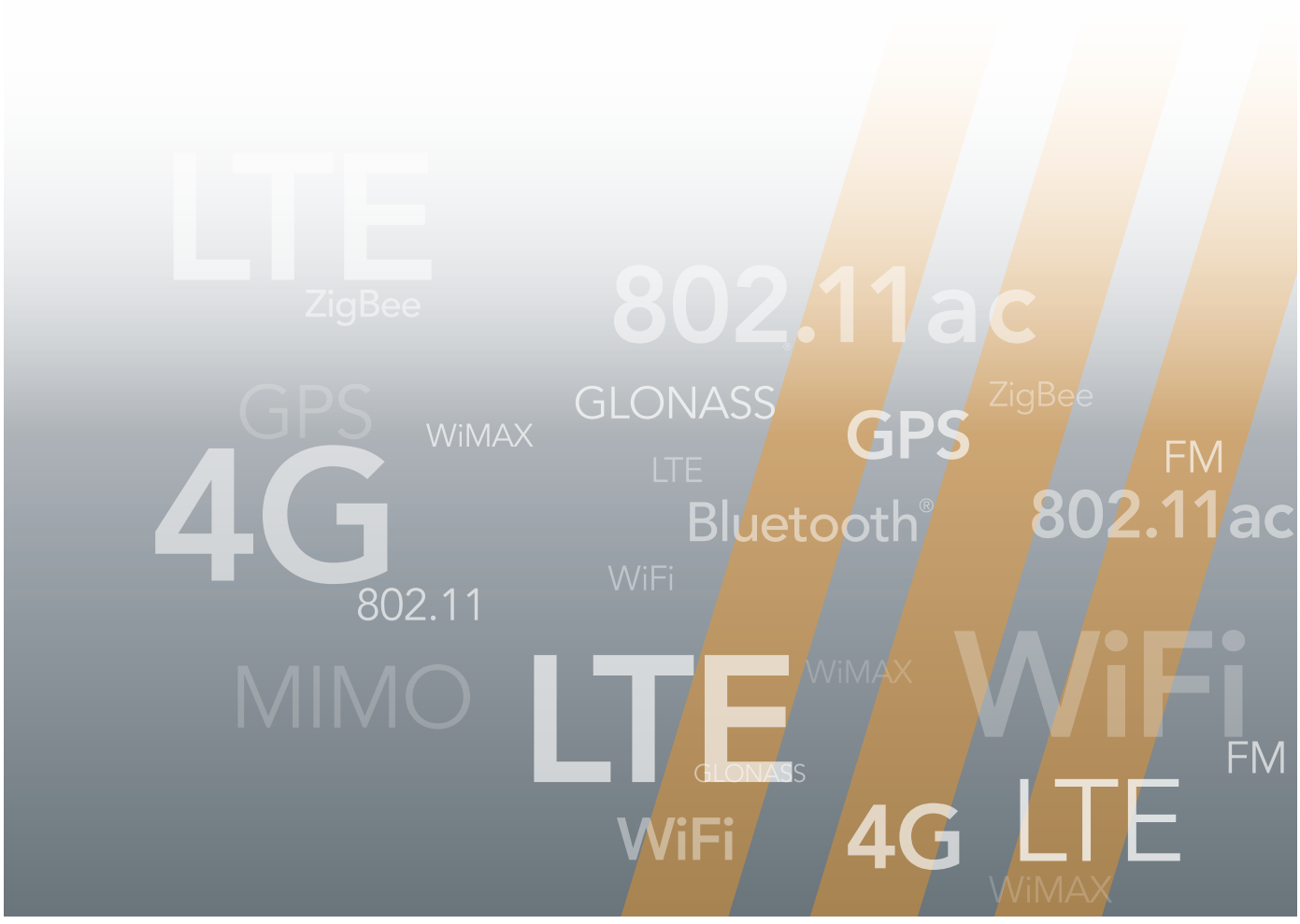
z482

TECHNICAL SPECIFICATIONS

z482
Digital I/O Module
PXI Express



LITEPOINT

Port Description

Pinout Description

Pin	Signal Name (Primary)	Signal Name (MIPI)	Description
1	HV3		High Voltage Driver 3
2			
3	HV5		High Voltage Driver 5
4			
5	HV4		High Voltage Driver 4
6			
7	PIN11_SH		Pin 11 Sense-High
8	PIN10_PIN11_L	VIO3_GND	Pin 10-11 Low
9	PIN11_FH	VIO3	Pin 11 Force-High
10	PIN8_PIN9_L	SCLK3_GND	Pin 8-9 Low
11	PIN9_FH	SCLK3	Pin 9 Force-High
12			
13	PIN7_SH		Pin 7 Sense-High
14	PIN6_PIN7_L	SDATA2_GND	Pin 6-7 Low
15	PIN7_FH	SDATA2	Pin 7 Force-High
16			
17	PIN9_SH		Pin 9 Sense-High
18			
19	HV1		High Voltage Driver 1
20			
21	EXT_TRIGIN0		External Trigger Input 0
22	GND		Ground
23	EXT_TRIGOUT0		External Trigger Output 0
24	GND		Ground
25	PIN5_SH		Pin 5 Sense-High
26	PIN4_PIN5_L	SDATA1_GND	Pin 4-5 Low
27	PIN5_FH	SDATA1	Pin 5 Force-High
28	PIN2_PIN3_L	VIO1_GND	Pin 2-3 Low
29	PIN3_FH	VIO1	Pin 3 Force-High
30	PIN3_SH		Pin 3 Sense-High

31	PIN1_FH	SDATA0	Pin 1 Force-High
32	PIN0_PIN1_L	SDATA0_GND	Pin 0-1 Low
33	PIN1_SH		Pin 1 Sense-High
34			
35	HV0		High Voltage Driver 0
36			
37	HV2		High Voltage Driver 1
38			
39	PIN8_SH		Pin 8 Sense-High
40			
41	PIN10_SH		Pin 10 Sense-High
42	PIN10_PIN11_L	SDATA3_GND	Pin 10-11 Low
43	PIN10_FH	SDATA3	Pin 10 Force-High
44	PIN8_PIN9_L	VIO2_GND	Pin 8-9 Low
45	PIN8_FH	VIO2	Pin 8 Force-High
46			
47	PIN6_SH		Pin 6 Sense-High
48	PIN6_PIN7_L	SCLK2_GND	Pin 6-7 Low
49	PIN6_FH	SCLK2	Pin 6 Force-High
50	GND		Ground
51	EXT_TRIGOUT1		External Trigger Output 1
52	GND		Ground
53	EXT_TRIGIN1		External Trigger Input 1
54			
55			
56			
57			
58			
59	PIN4_SH		Pin 4 Sense-High
60	PIN4_PIN5_L	SCLK1_GND	Pin 4-5 Low
61	PIN4_FH	SCLK1	Pin 4 Force-High
62	PIN2_PIN3_L	VIO0_GND	Pin 2-3 Low
63	PIN2_FH	VIO0	Pin 2 Force-High

64	PIN2_FH		Pin 2 Sense-High
65	PIN0_FH	SCLK0	Pin 0 Force-High
66	PIN0_PIN1_L	SCLK0_GND	Pin 0-1 Low
67	PIN0_SH		Pin 0 Sense-High
68			

Pin Specifications

General

Specification	Value	Comments
Number of data pins	12 pins of Pin Measurement unit (PMU) enabled	
Direction control of data pins	Per pin	
Number of remote sense pins	12	All PMU-enabled pins have remote sense capability

Digital Generation/Output Pins

Specification	Value	Comments
Generation Signal Type	Single-ended, ground reference	
Programmable generation voltage levels	Drive Voltage High Level (VIH) Drive Voltage High Level (VIL) Drive Termination Voltage (VT)	
Generation voltage range	-2 V to 6 V	
Accuracy	0.25% of value + 20 mV	
Generation voltage resolution	100 µV	
Generation voltage swing	400 mV to 8 V	
Output Impedance	50 Ω	Nominal
Maximum allowed DC drive per pin	± 50 mA	Nominal
Data pin tristate control	Per pin, per cycle	
Pin power-on state	Drivers disabled, high impedance (tri-state)	
Output protection	The device can sustain a short to any voltage between -2 V and 6 V provided that you observe the maximum drive strength limitations	

Digital Acquisition/Input Pins

Specification	Value
Acquisition Signal Type	Single-ended, ground reference
Programmable acquisition voltage levels	Compare High Level (VOH) Compare High Level (VOL) Voltage Termination (VT)
Acquisition voltage threshold	-2 V to 7 V
Accuracy (VOH, VOL)	0.25% of value + 20 mV
Accuracy (VT)	0.25% of value + 20 mV
Termination voltage resolution	600 µV
Termination voltage range	0 V to 6.5 V
Minimum detectable voltage swing	10 mV
Input impedance	High Impedance or 50 Ω terminated into VT
Input protection	The device can sustain a short to any voltage between -2 V and 6 V provided that you observe the maximum drive strength limitations

Active Load Pins

Specification	Value	
Programmable levels	Current Source (IOH) Current Sink (IOL)	
Load	Range	Resolution
	-12 mA to +12 mA	7 µA

High Voltage (HV) Pins

Specification	Value	Comments
Generation Signal Type	Single-ended, ground reference	
Number of pins	6	
Programmable levels	Force voltage	HV = (VT + 1) x 2
Force Voltage	Range	Resolution
	0 V to 15 V	1.5% of value + 450 mV

Others

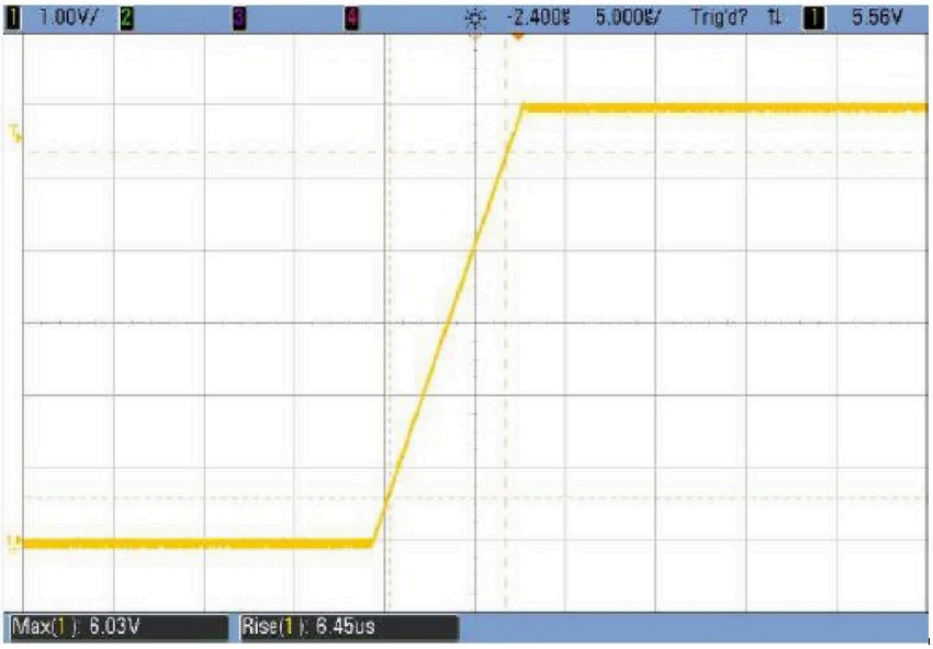
Specification	Value
Clamp Voltage Range High Side (VCH)	-1.0 V to 6.0 V
Clamp Voltage Range Low Side (VCL)	-1.5 V to 5.0 V
Termination Voltage (VT)	-2.0 V to 6.0 V

PPMU Pins

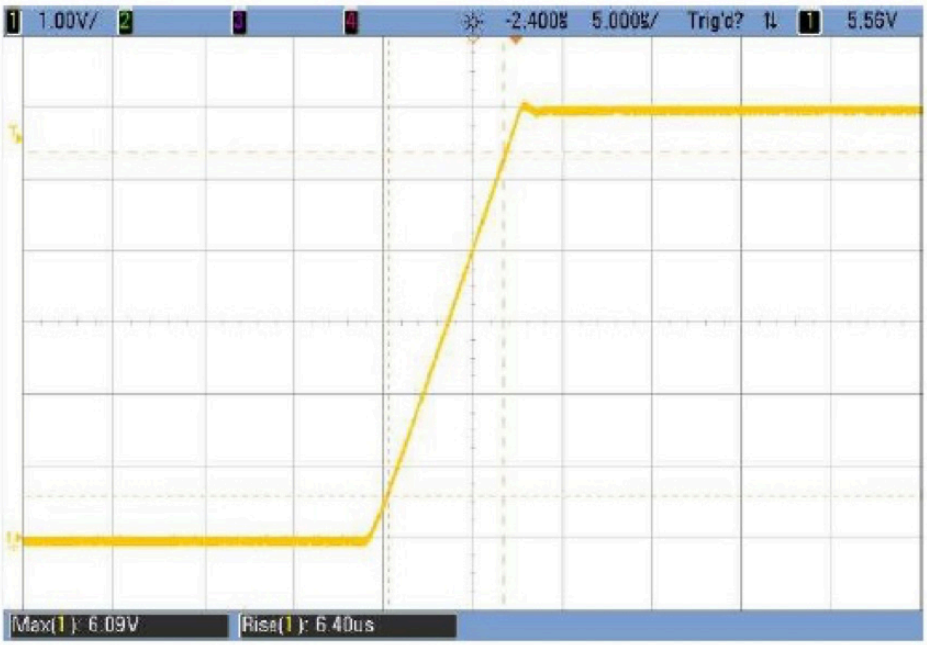
<table>
<tr><th>Specification</th><th colspan="3">Value</th><th>Comments</th></tr>
<tr><td>Programmable levels</td><td colspan="3">Force voltage (FV)
Force current (FI)
Voltage clamp high (VCH)
Voltage clamp low (VCL)</td><td>Voltage clamps are only active when forcing current</td></tr>
<tr><td rowspan="2">Force voltage (FV)</td><td>Range</td><td>Accuracy</td><td>Resolution</td><td rowspan="2">Maximum accuracy at the sense location with 1 50 Hz PLC aperture</td></tr>
<tr><td>-2 V to 6 V</td><td>0.1% of value
+ 0.1% of range</td><td>800 µV</td></tr>
<tr><td rowspan="6">Force voltage rise time (no load)</td><td colspan="2">Range</td><td>Settling time</td><td rowspan="6">Typical rise time from 10% to 90% of the final value, 6 V</td></tr>
<tr><td colspan="2">2 µA</td><td>301 µs</td></tr>
<tr><td colspan="2">20 µA</td><td>27 µs</td></tr>
<tr><td colspan="2">200 µA</td><td>6.6 µs</td></tr>
<tr><td colspan="2">2 mA</td><td>6.24 µs</td></tr>
<tr><td colspan="2">25 mA</td><td>6.55 µs</td></tr>
<tr><td rowspan="5">Force voltage rise time (1 nF load)</td><td colspan="2">Range</td><td>Settling time</td><td rowspan="5">Typical rise time from 10% to 90% of the final value, 6 V</td></tr>
<tr><td colspan="2">20 µA</td><td>264 µs</td></tr>
<tr><td colspan="2">200 µA</td><td>24.4 µs</td></tr>
<tr><td colspan="2">2 mA</td><td>6.6 µs</td></tr>
<tr><td colspan="2">25 mA</td><td>6.46 µs</td></tr>
<tr><td rowspan="5">Load capacitance</td><td colspan="2">Range</td><td>Capacitance</td><td rowspan="5">These value represent the allowed load capacitance through a 1m SHC68-C68-D4 VHDCI cable to ensure a well-behaved transient response, < 300 µs rise time</td></tr>
<tr><td colspan="2">20 µA</td><td>1 nF</td></tr>
<tr><td colspan="2">200 µA</td><td>10 nF</td></tr>
<tr><td colspan="2">2 mA</td><td>50 nF</td></tr>
<tr><td colspan="2">25 mA</td><td>50 nF</td></tr>
</table>

<table>
<tr><td rowspan="6">Force current (FI)</td><td>Range</td><td>Accuracy</td><td>Resolution</td><td rowspan="6">Maximum accuracy at the sense location with 1 50 Hz PLC aperture</td></tr>
<tr><td>±2 µA</td><td rowspan="5">0.25% of value + 0.25% of range</td><td>500 pA</td></tr>
<tr><td>±20 µA</td><td>6.3 nA</td></tr>
<tr><td>±200 µA</td><td>10 nF</td></tr>
<tr><td>±2 mA</td><td>800 nA</td></tr>
<tr><td>±25 mA</td><td>14 µA</td></tr>
<tr><td>Aperture time range</td><td colspan="3">1.25 µs to 200 ms</td><td></td></tr>
<tr><td>Aperture resolution</td><td colspan="3">1.25 µs</td><td></td></tr>
<tr><td rowspan="2">Measure voltage</td><td>Range</td><td>Accuracy</td><td>Resolution</td><td rowspan="2">Maximum accuracy at the sense location with 1 50 Hz PLC aperture</td></tr>
<tr><td>-2 V to 6 V</td><td>0.1% of value + 0.1% of range</td><td>150 µV</td></tr>
<tr><td rowspan="6">Measure current</td><td>Range</td><td>Accuracy</td><td>Resolution</td><td rowspan="6">Maximum accuracy at the sense location with 1 50 Hz PLC aperture</td></tr>
<tr><td>2 µA</td><td rowspan="5">0.25% of value + 0.25% of range</td><td>8 nA</td></tr>
<tr><td>20 µA</td><td>± 8 nA</td></tr>
<tr><td>200 µA</td><td>30 nA</td></tr>
<tr><td>2 mA</td><td>450 nA</td></tr>
<tr><td>25 mA</td><td>9 µA</td></tr>
<tr><td>Voltage clamp high (VCH)</td><td colspan="2">Range</td><td>0 V to 6 V</td><td></td></tr>
<tr><td>Voltage clamp low (VCL)</td><td colspan="2">Range</td><td>-2 V to 4 V</td><td></td></tr>
<tr><td>Maximum temperature at PPMU pin under Full Load</td><td colspan="3">85 °C</td><td>Fan set to HIGH speed.240 Ω / 1 W resistor is connected across each PMU channels FH and FL for all 12 pins. DVCI at 6 V / 25 mA (12 hours duration).</td></tr>
</table>

Typical Step Response



PMU Characteristic Step Response into a Capacitive Load 1 nF in the 25 mA

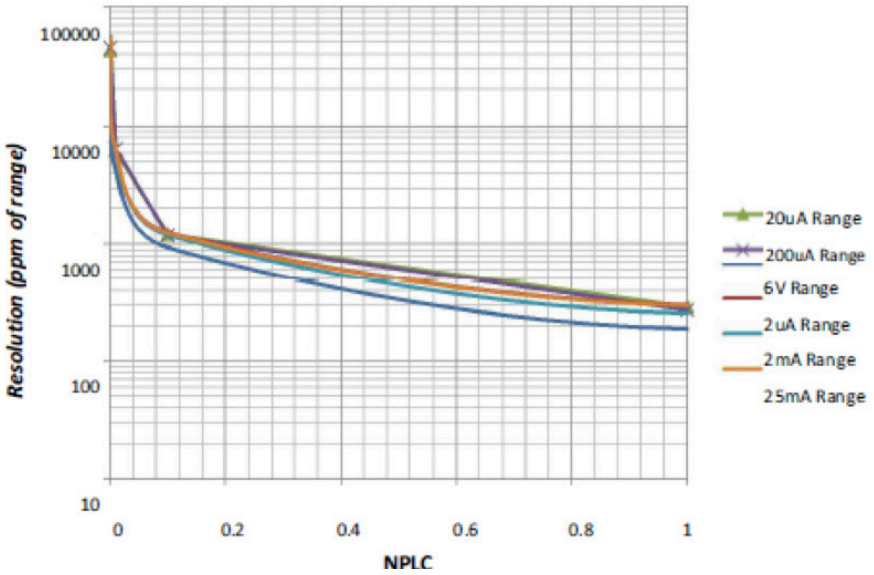


PMU Characteristic Step Response into a Capacitive Load 10 nF in the 25 mA

Noise and Resolution vs. Measurement Aperture

The following figure illustrates typical noise and resolution as a function of measurement aperture for the PMU.

Resolution vs NPLC



Complete the following steps to derive a resolution in absolute units:

- Select a voltage or current range.
- Find the corresponding resolution for a given aperture time.
- Multiply resolution (ppm) by the selected range.

For example, the z482 has a resolution of 200 ppm when set to a 1 PLC. In the 6 V range, multiply 6 V by 200 ppm:
6V * 200 ppm = 6 * 200 * 1×10^{-6}= 1.2 mV

Likewise, in the 2 mA range:
2 mA * 300 ppm = 2 mA * 300 * 1×10^{-6} = 600 nA

Timing Specifications

Vector Rate

Specification	Value
Vector clock source	Onboard Clock
Frequency Range	1 kHz to 200 MHz
Frequency resolution	<0.1 Hz
Frequency accuracy	0.015% of value

Generation/Output Timing

Specification	Value
Maximum data rate per pin	200 Mbps
Maximum data pin toggle rate	100 MHz
Data pin to pin skew	Maximum: ±500 ps
Output self-tune delay	NA

Acquisition/Input Timing

Specification	Value
Maximum data rate per pin	200 Mbps
Maximum data pin toggle rate	100 Mhz
Data position mode	Delay from sample clock rising edge
Input data delay frequency	All supported frequencies
Input delay adjustment	± 25 Sample clock cycles expressed as a time in seconds
Input self-tune delay	1 ns
Input data delay resolution	11 ps

Waveform Specifications

Specification	Value	Comments
On-board memory size (generation)	16 Mbit/pin	
On-board memory size (acquisition)	16 Mbit/pin	History RAM
Generation mode	Clock mode	Generate continuous clock outputs
	Vector mode	Generate a sequence of waveforms. Use vector file (*.vec) to describe the waveforms to be generated, the order in which the waveforms are generated, how many times the waveforms are generated, and how the device responds to output triggers.
Number of vector set	32	
Number of timing set	32	
Maximum data rate	200 Mbps	This applies to all pins

Triggers

Trigger Inputs

Specification	Value	Comments
Sources	PXI trigger lines	PXI_TRIG[0:7] PXI_STAR PXI_LBL6 PXI_LBR6 PXIE_DSTARA PXIE_DSTARB
	Software trigger	
	External trigger 0-1	Can be used to trigger vector engine to start driving vector
Polarity	High, Low, Rising, Falling	Configurable
Pulse Width	≥ 200 ns	

Trigger Outputs

Specification	Value	Comments
Sources	PXI trigger lines	PXI_TRIG[0:7] PXI_STAR PXI_LBL6 PXI_LBR6
	External trigger 0-1	External trigger 0-1 (t0, t1) can be used in vector mode. When running in dual-site mode, trigger 0 is for site 0 whereas trigger 1 is for site 1.
Polarity	Active High	
Pulse Width	1 µs to 10 ms	Configurable

MIPI RFFE

Specification	Value		Comments
Number of MIPI RFFE Controllers	4		2 MIPI RFFE controllers available for each pin group
Full-Speed Clock Frequency	Minimum	32 kHz	
	Maximum	26 kHz	

Physical & Environmental

Specification	Value
Physical size	1 slot 3U PXI Express Instrument
Operating temperature range	23° C ± 10° C
Calibration Interval	6 months
Output Front Panel Connector	68 position VHDCI receptacle

Terminology

Numeric Prefixes

When referring to numeric values, this document will use SI (International System of Units) and IEC (International Electrotechnical Commission) standard prefixes. Prefix definitions are in the following table.

Prefix	Multiplier
n (nano)	1/(1000x1000x1000)
µ (micro)	1/(1000x1000)
m (milli)	1/1000
k/K (kilo)	1000
M (Mega)	1000x1000
G (Giga)	1000x1000x1000
Ki (Kibi)	1024
Mi (Mebi)	1024x1024
Gi (Gibi)	1024x1024x1024

Differential Outputs

Single-Ended is used to refer to the output on either the + or – output pin

Differential is used to refer to the output between the + and- output pins

Vd indicates Volts differential

Vppd indicates Volts peak-to-peak differential

Safety

This product is designed to meet the requirements of the following standard of safety for electrical equipment for measurement, control and laboratory use: EN 61010-1

Electromagnetic Compatibility

CE Marking EN 61326-1:1997 with A1:1998 and A2:2001 Compliant

FCC Part 15 (Class A) Compliant

Emissions

EN 55011	Radiated Emissions, ISM Group 1, Class A, distance 10 m, emissions < 1 GHz
EN 55011	Conducted Emissions, Class A, emissions < 30 MHz Immunity
EN 61000-4-2	Electrostatic Discharge (ESD), 4 kV by Contact, 8 kV by Air
EN 61000-4-3	RF Radiated Susceptibility, 10 V/m
EN 61000-4-4	Electrical Fast Transient Burst (EFTB), 2 kV AC Power Lines
EN 61000-4-5	Surge
EN 61000-4-6	Conducted Immunity
EN 61000-4-8	Power Frequency Magnetic Field, 30 A/m
EN 61000-4-11	Voltage Dips and Interrupts

CE Compliance

This product meets the necessary requirements of applicable European Directives for CE Marking as follows:

73/23/EEC Low Voltage Directive (Safety)
89/336/EEC Electromagnetic Compatibility Directive (EMC)

See Declaration of Conformity for this product for additional regulatory compliance information.

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LITEPOINT TECHNICAL SUPPORT

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