

LGR-5327

Specifications



**MEASUREMENT
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Specifications

All specifications are subject to change without notice.

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input

Table 1. Analog input specifications

Parameter	Condition	Specification
A/D converter		16-bit successive approximation type
Input ranges	Software selectable per channel	± 30 V, ± 10 V, ± 5 V, ± 1 V
Number of channels		8 differential/16 single-ended, software configurable
Input configuration		Multiplexed
<i>Absolute maximum input voltage</i>	<i>CHx_x to AGND</i>	± 38 V maximum (power on and power off)
<i>Input impedance</i>	± 30 V range	1 M Ω (power ON) 1 G Ω (power OFF)
	± 10 V, ± 5 V, ± 1 V range	10 G Ω (power ON) 1 G Ω (power OFF)
<i>Input leakage current</i>		± 100 pA
<i>Input capacitance</i>	± 30 V range	90 pf
	± 10 V, ± 5 V, ± 1 V ranges	55 pf
Maximum working voltage (signal+ common mode)	± 30 V range	± 30.05 V
	± 10 V, ± 5 V, ± 1 V ranges	± 10.2 V
Common mode rejection ratio	$f_{in} = 60$ Hz, ± 30 V ranges	65 dB minimum
	$f_{in} = 60$ Hz, all other ranges	75 dB minimum
Crosstalk	DC to 25 kHz, adjacent differential mode channels	-80 dB
ADC resolution		16 bits
Input bandwidth (-3 dB)	All input ranges	450 kHz minimum
Input coupling		DC
Maximum sampling rate		200 kHz
A/D pacing sources		See input sequencer section
Warm up time		30 minutes, minimum
Absolute accuracy	All ranges	0.07% FSR
Noise	Differential mode	2 LSB rms

Note 1: Unused analog input channels can either be left floating or tied to an AGND pin.

Note 2: When using the ± 30 V input range, keep source impedance and source capacitance as small as possible to minimize settling time, gain and bandwidth errors.

Note 3: When connecting differential inputs to floating voltage sources in the ± 10 V, ± 5 V, ± 1 V ranges, the user must provide a DC return path from each differential input to ground. To do this, simply connect a resistor from each of the differential inputs to AGND. A value of approximately 100 k Ω can be used for most applications. The ± 30 V input range incorporates an input resistor attenuator network, which eliminates the need for external bias return compensation resistors.

Note 4: The LGR-5327 AGND, GND and ENC- pins are tied together internally. These grounds are electrically isolated from the EGND (earth ground) pin.

Analog input calibration

Table 2. Analog input calibration specifications

Parameter	Specifications
Calibration method	Factory calibration
Calibration interval	1 year, factory calibrated

External clock input

Table 3. External clock I/O specifications

Parameter	Condition	Specification
External clock I/O		PACER (pin 75), software programmable as input or output
Input high voltage		2.2 V maximum
Input low voltage		0.6 V minimum
Output high voltage	IOH = -8 mA	3.8 V minimum
Output low voltage	IOL = 8 mA	0.4 V maximum
Pacer rate		200 kHz maximum
Minimum pulse width		2.5 μ s minimum

Input sequencer

Table 4. Input sequencer specifications

Parameter	Specifications
Pacer clock sources: two	<ul style="list-style-type: none"> ▪ Internal: From 5 μs to 85.9 s in 20 ns steps ▪ External (PACER): 5 μs minimum
Programmable parameters per scan	<ul style="list-style-type: none"> ▪ Channel type (differential analog, single ended analog, counter, digital input) ▪ Channel number (random order) ▪ Gain (any channel specified with a ± 30 V range cannot be specified with any other range in the sequence)
Depth	512 locations
Pacer interval	5 μ s minimum (200 kHz maximum pacer rate)
Channel to channel sampling period (scan clock)	<ul style="list-style-type: none"> ▪ 5 μs, fixed (analog inputs) ▪ All specified digital channels (counters, digital inputs) are sampled simultaneously at the beginning of the pacer interval.

Triggering

Table 5. Triggering specifications

Parameter	Condition	Specification
Mode	External digital via DTRIG (pin 76)	Software configurable for rising or falling edge.
	External analog via ATRIG (pin 78)	See Table 6
	Multi-channel analog	Level-sensitive based on acquired data. Up to 16 channels may be used as independent trigger sources.
	Digital pattern trigger	Trigger when a user-defined 1 to 16 bit digital pattern is matched on the DIN0-DIN15 pins. Programmable mask bits.
External digital trigger latency	Non-pretrigger acquisition	100 ns typical, 1 μ s maximum
	Pretrigger acquisition	1 scan period maximum
External trigger pulse width		1 μ s minimum
Internal trigger latency		2* (1/per-channel sample rate)

External analog trigger

Table 6. External trigger specifications

Parameter	Conditions	Specification
External analog trigger source		ATRIG input (pin 78)
Analog trigger input ranges		± 30 V, ± 10 V, software selectable
Absolute maximum input voltage	ATRIG_IN to AGND	± 38 V maximum (power on and power off)
Input impedance	± 30 V range	1 M Ω (power ON/OFF)
	± 10 V range	10 G Ω (power ON) 1 G Ω (power OFF)
Trigger modes		Configurable for: <ul style="list-style-type: none"> ▪ Positive or negative slope ▪ Level
Trigger/Hysteresis resolution		12 bits, 1 in 4096
Trigger/Hysteresis levels		± 10 V/4096 or ± 30 V/4096, software configurable
Trigger/Hysteresis accuracy		$\pm 2\%$ of reading, ± 50 mV offset
Latency		1.5 μ s
Full power bandwidth (-3 dB)		1 MHz

Digital input

Table 7. Digital input specifications

Parameter	Specification
Number of inputs	16 channels
Input voltage range	0 to +28 V
Input type	TTL
Input characteristics	47 k Ω pull-down resistor, 39.2 K Ω series resistor
Maximum input voltage level	+32 V (power on/off)
Minimum high level input voltage threshold	2.0 V maximum
Maximum low level input voltage threshold	0.8 V minimum
Event logging	Change of state, pattern recognition. Event time stamped using real time clock.

Digital output

Table 8. Digital output specifications

Parameter	Specification
Number of outputs	1
Type	Mechanical relay, NEC ED2/EF2 series
Relay configuration	1 Form C
Relay contact resistance	0.075 Ω
Relay contact operate time	3 mS (excluding bounce)
Relay contact release time	2 ms (excluding bounce)
Relay insulation resistance	1000 M Ω at 500 VDC
Relay contact ratings	Maximum switching voltage: 220 VDC/250 VAC
	Maximum switching current: 1.0 A
	Maximum carrying current: 2.0 A

Fault tolerance

Table 9. Fault condition behavior

Condition	Behavior
Power loss	<ul style="list-style-type: none"> ▪ Volatile memory data loss (internal memory) ▪ Data loss if data being written to non-volatile storage. MCC cannot guarantee integrity of existing data on storage device. (Note 5)
Unexpected removal of SD card	<ul style="list-style-type: none"> ▪ Data loss if data being written to non-volatile storage. MCC cannot guarantee integrity of existing data on storage device. (Note 5)
Power on after fault.	<ul style="list-style-type: none"> ▪ Unit will restart with existing configuration.

Note 5: Solid-state memory devices behave differently under fault conditions. MCC cannot guarantee the integrity of data, both new and existing, in the event of power loss, unexpected media removal, or similar actions.

Counters

Table 10. Counter specifications

Parameter	Condition	Specification
Counter type		Quadrature (x1, x2, x4)
Number of channels		4
Inputs		Phase A+/A-, Phase B+/B-, Index +/-
Resolution		Fixed 32-bit or as sized by the modulo register.
Count Modes		Quadrature counting
		Up/down counting
		Period/frequency counting
		Modulo-N
Debounce times (programmable)		16 steps from 500 ns to 25 ms; positive or negative edge sensitive; glitch detect mode or de-bounce mode
Time-base accuracy		50 ppm
Receiver type		Quad differential receiver
Configuration		Each channel consists of Phase A input, Phase B input and Index input; each input switch selectable as single-ended or differential
Differential		<ul style="list-style-type: none"> ▪ Phase A, Phase B and Index (+) inputs at user connector routed to (+) inputs of differential receiver. ▪ Phase A, Phase B and Index (-) inputs at user connector routed to (-) inputs of differential receiver.
Single - ended		<ul style="list-style-type: none"> ▪ Phase A, Phase B and Index (+) inputs at user connector routed to (+) inputs of differential receiver. ▪ Phase A, Phase B and Index (-) inputs at user connector routed to ground. ▪ (-) inputs of differential receiver routed to +3 V reference.
Common mode input voltage range		±12 V maximum
Differential input voltage range		±12 V maximum
Input sensitivity		±200 mV
Input hysteresis		50 mV typical
Input impedance		12 kΩ minimum
Absolute maximum input voltage	Differential	±14 V maximum

Device configuration

Table 11. Configuration

Parameter	Specification
Local	Host PC over USB
Remote	Via configuration file on SD card
Configuration file format	Binary

Controls/indicators

Table 12. Controls/indicators

Parameter	Specification
LOAD button	Loads a configuration from the SD card/enters USB boot loader (hold while applying power)
SAVE button	Saves configuration to the SD card
START button	Starts an acquisition
TRIG/EVENT button	Forces a trigger/logs an event
IND button	Turns LED indicators on/off in 3 steps: All on – Top indicators only – All off
Reset button	Resets the device
SD ACT indicator	Indicates SD card read/write activity
SD STAT indicator	Indicates SD card/device error condition if blinking
LOG indicator	Indicates acquisition in progress
TRIG indicator	Indicates trigger occurred
EVENT indicator	Flashes when an event is logged or configuration is loaded or saved
Power indicator	(Top LED on case end) Indicates power is good and device is ready
USB indicator	(Bottom LED on case end) Indicates USB connection is active, blinks off for USB activity
Analog input indicators	Indicates corresponding analog input is in the acquisition
Digital input indicators	Indicates presence of a voltage at the corresponding digital input pin (not necessarily a high logic level)
Digital output indicator	Indicates relay state
Counter input indicators	Indicates corresponding counter activity

Data Memory

Table 13. Data Memory

Parameter	Specification
Supported removable media	Secure Digital (SD), Secure Digital High Capacity (SDHC)
Data file format	Binary. Data time stamped using real time clock.

Power

Table 14. Power specifications

Parameter	Condition	Specification
External power input		PWR+ (pin 73)/PWR- (pin 74)
External power supply		+9 V minimum +30 V maximum
Power supply fuse		0157002.DRT , - Littelfuse 2A NANO ² [®] Slo-Blo [®] Subminiature surface mount fuse
Power supply current	+9 V input, continuous logging mode	405 mA typical, 655 mA maximum
	+30 V input, continuous logging mode	165 mA typical, 220 mA maximum
Encoder supply		External supply of 1.5 A @ 5 VDC fused up to 42.4 V _{pk} (50 V _{DC}) @ 2 A Protection diodes (30BQ060, 0.5V _{max} drop) protecting against reverse polarity.
Encoder supply fuse		0157002.DRT , - Littelfuse 2A NANO ² [®] Slo-Blo [®] Subminiature Surface Mount Fuse

Note 6: The LGR-5327 AGND, GND and ENC- pins are tied together internally. These grounds are electrically isolated from the EGND (earth ground) pin.

Chassis ground

Table 15. Chassis ground specifications

Parameter	Specification
Number of inputs	Single terminal EGND (pin 80)
Isolation method	10 nF/1000 V ceramic capacitor in parallel with 1 M Ω resistor.

Note 7: The LGR-5327 EGND pin is isolated from the LGR-5327 measurement and I/O circuits. The EGND pin should only be used to connect the LGR-5327 to a local chassis ground connection and should not be used as a return path for any of the analog or digital I/O.

USB specifications

Table 16. USB specifications

Parameter	Specification
USB device type	USB 2.0 (full-speed)
USB device compatibility	USB 1.1, 2.0
USB cable length	3 meters maximum.
USB cable type	A-B cable, UL type AWM 2527 or equivalent

Environmental

Table 17. Environmental specifications

Parameter	Specification
Operating temperature range	0 to 55 °C
Storage temperature range	-40 to 85 °C
Humidity	0 to 90% non-condensing

Mechanical

Table 18. Mechanical specifications

Parameter	Specification
Dimensions	9.5" L x 5.0" W x 1.75" H

Screw terminal connector type

Table 19. Screw terminal connector specifications

Connector type	Detachable type
Wire gauge range	16 AWG to 30 AWG

Screw terminal pin out

Table 20. 8-channel differential mode pin out

Pin	Signal name	Pin description	Pin	Signal name	Pin description
1	CH0H	Channel 0 HI	96	AGND	Analog ground
2	AGND	Analog ground	95	CH7L	Channel 7 LO
3	CH0L	Channel 0 LO	94	AGND	Analog ground
4	AGND	Analog ground	93	CH7H	Channel 7 HI
5	CH1H	Channel 1 HI	92	AGND	Analog ground
6	AGND	Analog ground	91	CH6L	Channel 6 LO
7	CH1L	Channel 1 LO	90	AGND	Analog ground
8	AGND	Analog ground	89	CH6H	Channel 6 HI
9	CH2H	Channel 2 HI	88	AGND	Analog ground
10	AGND	Analog ground	87	CH5L	Channel 5 LO
11	CH2L	Channel 2 LO	86	AGND	Analog ground
12	AGND	Analog ground	85	CH5H	Channel 5 HI
13	CH3H	Channel 3 HI	84	AGND	Analog ground
14	AGND	Analog ground	83	CH4L	Channel 4 LO
15	CH3L	Channel 3 LO	82	AGND	Analog ground
16	AGND	Analog ground	81	CH4H	Channel 4 HI
17	ENC+	Encoder power output	80	EGND	Chassis ground
18	0PHA+	PHASE0A+ input	79	AGND	Analog ground
19	0PHA-	PHASE0A- input	78	ATRIG	Analog trigger input
20	0PHB+	PHASE0B+ input	77	GND	Digital ground
21	0PHB-	PHASE0B- input	76	DTRIG	Digital trigger
22	0IDX+	INDEX0+ input	75	PACER	Pacer I/O
23	0IDX-	INDEX0- input	74	PWR-	Input ground
24	ENC-	Encoder ground	73	PWR+	Input power
25	ENC+	Encoder power output	72	NC	Relay normally closed contact
26	1PHA+	PHASE1A+ input	71	COM	Relay common contact
27	1PHA-	PHASE1A- input	70	NO	Relay normally open contact
28	1PHB+	PHASE1B+ input	69	ENC-I	Encoder ground
29	1PHB-	PHASE1B- input	68	ENC+I	Encoder power input
30	1IDX+	INDEX1+ input	67	GND	Digital ground
31	1IDX-	INDEX1- input	66	GND	Digital ground
32	ENC-	Encoder ground	65	GND	Digital ground
33	ENC+	Encoder power output	64	DIN15	Digital input 15
34	2PHA+	PHASE2A+ input	63	DIN14	Digital input 14
35	2PHA-	PHASE2A- input	62	DIN13	Digital input 13
36	2PHB+	PHASE2B+ input	61	DIN12	Digital input 12
37	2PHB-	PHASE2B- input	60	DIN11	Digital input 11
38	2IDX+	INDEX2+ input	59	DIN10	Digital input 10
39	2IDX-	INDEX2- input	58	DIN9	Digital input 9
40	ENC-	Encoder ground	57	DIN8	Digital input 8
41	ENC+	Encoder power output	56	DIN7	Digital input 7
42	3PHA+	PHASE3A+ input	55	DIN6	Digital input 6
43	3PHA-	PHASE3A- input	54	DIN5	Digital input 5
44	3PHB+	PHASE3B+ input	53	DIN4	Digital input 4
45	3PHB-	PHASE3B- input	52	DIN3	Digital input 3
46	3IDX+	INDEX3+ input	51	DIN2	Digital input 2
47	3IDX-	INDEX3- input	50	DIN1	Digital input 1
48	ENC-	Encoder ground	49	DIN0	Digital input 0

Table 21. 16-channel single-ended mode pin out

Pin	Signal name	Pin description	Pin	Signal name	Pin description
1	CH0	Channel 0	96	AGND	Analog ground
2	AGND	Analog ground	95	CH15	Channel 15
3	CH8	Channel 8	94	AGND	Analog ground
4	AGND	Analog ground	93	CH7	Channel 7
5	CH1	Channel 1	92	AGND	Analog ground
6	AGND	Analog ground	91	CH14	Channel 14
7	CH9	Channel 9	90	AGND	Analog ground
8	AGND	Analog ground	89	CH6	Channel 6
9	CH2	Channel 2	88	AGND	Analog ground
10	AGND	Analog ground	87	CH13	Channel 13
11	CH10	Channel 10	86	AGND	Analog ground
12	AGND	Analog ground	85	CH5	Channel 5
13	CH3	Channel 3	84	AGND	Analog ground
14	AGND	Analog ground	83	CH12	Channel 12
15	CH11	Channel 11	82	AGND	Analog ground
16	AGND	Analog ground	81	CH4	Channel 4
17	ENC+	Encoder power output	80	EGND	Chassis ground
18	0PHA+	PHASE0A+ input	79	AGND	Analog ground
19	0PHA-	PHASE0A- input	78	ATRIG	Analog trigger input
20	0PHB+	PHASE0B+ input	77	GND	Digital ground
21	0PHB-	PHASE0B- input	76	DTRIG	Digital trigger
22	0IDX+	INDEX0+ input	75	PACER	Pacer I/O
23	0IDX-	INDEX0- input	74	PWR-	Input ground
24	ENC-	Encoder ground	73	PWR+	Input power
25	ENC+	Encoder power output	72	NC	Relay normally closed contact
26	1PHA+	PHASE1A+ input	71	COM	Relay common contact
27	1PHA-	PHASE1A- input	70	NO	Relay normally open contact
28	1PHB+	PHASE1B+ input	69	ENC-I	Encoder ground
29	1PHB-	PHASE1B- input	68	ENC+I	Encoder power input
30	1IDX+	INDEX1+ input	67	GND	Digital ground
31	1IDX-	INDEX1- input	66	GND	Digital ground
32	ENC-	Encoder ground	65	GND	Digital ground
33	ENC+	Encoder power output	64	DIN15	Digital input 15
34	2PHA+	PHASE2A+ input	63	DIN14	Digital input 14
35	2PHA-	PHASE2A- input	62	DIN13	Digital input 13
36	2PHB+	PHASE2B+ input	61	DIN12	Digital input 12
37	2PHB-	PHASE2B- input	60	DIN11	Digital input 11
38	2IDX+	INDEX2+ input	59	DIN10	Digital input 10
39	2IDX-	INDEX2- input	58	DIN9	Digital input 9
40	ENC-	Encoder ground	57	DIN8	Digital input 8
41	ENC+	Encoder power output	56	DIN7	Digital input 7
42	3PHA+	PHASE3A+ input	55	DIN6	Digital input 6
43	3PHA-	PHASE3A- input	54	DIN5	Digital input 5
44	3PHB+	PHASE3B+ input	53	DIN4	Digital input 4
45	3PHB-	PHASE3B- input	52	DIN3	Digital input 3
46	3IDX+	INDEX3+ input	51	DIN2	Digital input 2
47	3IDX-	INDEX3- input	50	DIN1	Digital input 1
48	ENC-	Encoder ground	49	DIN0	Digital input 0

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