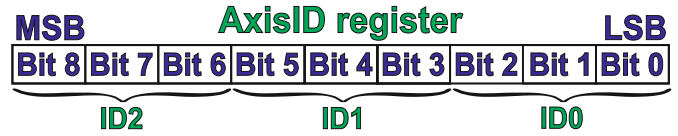


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Pin	Name	Type	Description
1	+Vlog	I	Positive terminal of the logic supply input: 6 to 48 VDC
2	A/A+	O	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
3	GND	-	Ground return for logic supply
4	B/A-	O	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
5	GND	-	Shield for motor windings cable
6	C/B+	O	Phase C for 3-ph motors, B+ for 2-ph steppers
7	+Vmot	I	Positive terminal of the motor supply: 7 to 48 VDC
8	Cr/B-	O	Chopping resistor / Phase B- for 2-ph steppers
9	BFS	-	Connect to GND to perform a firmware update after a critical firmware failure
10	ID2	I	AxisID ² selection pin. See AxisID register settings table
11	...	Rsvd.	Reserved. Do not use.
14	...	Rsvd.	Reserved. Do not use.
15	GND	-	Ground return and shield
16	GND	-	Ground return and shield
17	...	Rsvd.	Reserved. Do not use.
20	...	Rsvd.	Reserved. Do not use.
21	ID0	I	AxisID ⁰ selection pin. See AxisID register settings table
22	ID1	I	AxisID ¹ selection pin. See AxisID register settings table
23	...	Rsvd.	Reserved. Do not use.
24	...	Rsvd.	Reserved. Do not use.
25	CAN Hi	-	CAN-Bus positive line (dominant high)
26	CAN Lo	-	CAN-Bus negative line (dominant low)
27	IN2/LSP	I	5-60V digital NPN input. Positive limit switch input
28	IN3/LSN	I	5-60V digital NPN input. Negative limit switch input
29	IN5/Enable	I	5-60V digital NPN input. Drive Enable input
30	I/O0	I/O	5-50V NPN general-purpose digital programmable input IN0 / or NPN 1.5A output OUT0
31	I/O1	I/O	5-50V NPN general-purpose digital programmable input IN1 / or NPN 0.1A output OUT1
32	I/O4	I/O	5-50V NPN general-purpose digital programmable input IN4 / or NPN 0.1A output OUT4
33	GND	-	Ground return and shield
34	AnalogIn	I	Analog input (range software selectable 0-5V or ±10V)

Pin	Name	Type	Description
1	+V USB	I	5V input from USB
2	GND	-	Ground return for USB
3	Hall1	I	Digital Hall sensor 1
4	Hall2	I	Digital Hall sensor 2
5	Hall3	I	Digital Hall sensor 3
6	GND	-	Ground return and shield
7	+5V	O	Supply for all feedback sensors
8	GND	-	Ground return and shield
9	EncA1+/EncA1	I	Encoder 1 A+ diff. input or single-ended input
10	EncA1-	I	Encoder 1 A- diff. input. Leave open for single-ended; Add externally 120Ω to pin 9 for differential
11	EncB1+/EncB1	I	Encoder 1 B+ diff. input or single-ended input
12	EncB1-	I	Encoder 1 B- diff. input. Leave open for single-ended; Add externally 120Ω to pin 11 for differential
13	...	Rsvd.	Reserved. Do not use.
16	...	Rsvd.	Reserved. Do not use.
17	Z1+	I	Encoder 1 Z+ diff. input or single-ended input
18	Z1-	I	Encoder 1 Z- diff. input. Leave open for single-ended; Add externally 120Ω to pin 17 for differential
19	USB DM	I/O	USB data-
20	USB DP	I/O	USB data+

No.	Name	Color	Description
LED1	TML ERR	RED	Turned on when the drive detects an error condition.
LED3	TML RDY	GREEN	Lit after power-on when the drive initialization ends. Turned off when an error occurs.



Nominal[V]	Minimum[V]	Maximum[V]	IDx* Bits	IDx* Value
0.000	0.00	0.53	000	0
1.057	0.53	1.41	001	1
1.756	1.41	2.01	010	2
2.254	2.01	2.43	011	3
2.600	2.43	2.75	100	4
2.894	2.75	3.01	101	5
3.128	3.01	3.22	110	6
3.319	3.22	3.35	111	7

Remarks:

- If Bit 7 (ID2) = 1 -> TMLCAN mode is selected
- If Bit 7 (ID2) = 0 -> CANopen mode is selected
- Bit 8 (MSB of ID2) is ignored, and always considered as "0"
- The maximum AxisID value is 127 (Bit 0 ... Bit 6)
- TMLCAN mode: $AxisID = (64 * ID2_Value - 128) + (8 * ID1_Value) + ID0_Value$
- CANopen mode: $AxisID = (64 * ID2_Value) + (8 * ID1_Value) + ID0_Value$
- If the AxisID pins are not connected, the AxisID value can't be determined.
- If all "IDx" pins are connected to GND the AxisID value is 255
- If the CANOpen mode is selected and the AxisID value is 255, drive will be in "LS inactive" state and the Green LED will flash at 1 second intervals

* where "x" can be 1, 2 or 3

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified):

- V_{LOG} = 24 VDC; V_{MOT} = 48 VDC; F_{PWM} = 20 kHz
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude) = 4.2A

Operating Conditions		Min.	Typ.	Max.	Units
Ambient temperature		0		40 ¹	°C
Ambient humidity		Non-condensing		90	%Rh
Altitude / pressure ²		Altitude (vs. sea level)		-0.1	0 ÷ 2.5 ² Km
		Ambient Pressure		0 ²	0.75 ÷ 1 10.0 atm
Storage Conditions		Min.	Typ.	Max.	Units
Ambient temperature		-40		100	°C
Ambient humidity		Non-condensing		0	100 %Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)		Not powered; applies to any accessible part		±0.5	kV
		Original packaging		±15	kV
Mechanical Mounting		Min.	Typ.	Max.	Units
Airflow		natural convection ³ , closed box			
Spacing required for horizontal mounting		Between adjacent drives		10	mm
		Between drives and nearby walls		10	mm
		Space needed for drive removal		20	mm
Insertion force		Between drives and roof-top		30	mm
		Using recommended mating connectors		20	N
Extraction force				8	N
Environmental Characteristics		Min.	Typ.	Max.	Units
Size (Length x Width x Height)		Global size		38.35 x 25 x 9.71	mm
				~1.51 x 0.98 x 0.38	inch
Weight				8	g
Cleaning agents		Dry cleaning is recommended		Only Water- or Alcohol- based	
Protection degree		According to IEC60529		IP20	

¹ Operating temperature at higher temperatures is possible with reduced current and power ratings

² Micro 4803 can be operated in vacuum (no altitude restriction), but at altitudes over 2,500m, current and power rating are reduced due to thermal dissipation efficiency.

³ In case of forced cooling (conduction or ventilation) the spacing requirements may drop substantially down to zero as long as the ambient temperature is kept below the maximum operating limit

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Logic Supply Input (+V _{LOG})		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	6	24	48	V _{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	4.9		60	V _{DC}
	Absolute maximum values, continuous	-0.5		63	V _{DC}
Supply current	+V _{LOG} = 12V		90	150	mA
	+V _{LOG} = 24V		60	90	
	+V _{LOG} = 48V		45	60	
Voltage Measurement	Total error			1.5	%
Utilization category	Acc. to 60947-4-1 (I _{PEAK} ≤ 1.05 * I _{NOM})	DC-1			
Motor Supply Input (+V _{MOT})		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	7		48	V _{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	6		60	V _{DC}
	Absolute maximum values, continuous	-0.5		63	V _{DC}
Supply current	Idle		25		mA
	Operating	-15	±3	+15	
	Absolute maximum value, short-circuit condition (Duration ≤ 10ms) [†]			16.5	A
Voltage Measurement	Total error			1.5	%
Utilization category	Acc. to 60947-4-1 (I _{PEAK} ≤ 4.0 * I _{NOM})	DC-3			
Motor Outputs (A/A+, B/A-, C/B+, Cr/B-)		Min.	Typ.	Max.	Units
Nominal current	PMSM motors sinusoidal amplitude			4.2	A
	PMSM motors sinusoidal RMS			3	A _{RMS}
	DC/BLDC/STEP motors continuous ¹			3.65	A
Peak current	maximum 2.5s	-14		+14	A
Short-circuit protection threshold		±16.5		±18	A
Short-circuit protection delay		2		4	µs
On-state voltage drop	Nominal output current; including typical mating connector contact resistance		0.1		V
Off-state leakage current			0.3	1	mA
Voltage Efficiency			92		%
Motor inductance (phase-to-phase)	Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 48 V	F _{PWM}			µH
		20 kHz		900	
		40 kHz		480	
		60 kHz		320	
		80 kHz		240	
	Minimum value, limited by short-circuit protection; +V _{MOT} = 48 V	20 kHz		270	µH
		60 kHz		150	
		40 kHz		100	
		80 kHz		80	
		100 kHz		60	
Motor electrical time-constant (L/R)	Recommended value for ±5% current measurement error	20 kHz		330	µs
		40 kHz		170	
		60 kHz		140	
		80 kHz		80	
		100 kHz		66	
Current measurement	FS = Full Scale accuracy		±2	±3	%FS
Supply Output (+5V)		Min.	Typ.	Max.	Units
Output voltage	Current sourced = 400mA	5.05	5.2	5.25	V
Output current ²	24V motor	650	800		mA
Short-circuit to GND protection	Yes / Drive resets at event				
Over-voltage protection	NOT protected				
ESD protection - Human body model		±1			KV

Digital Inputs (IN0, IN1, IN2/LSP, IN3/LSN, IN4, IN5/ENA)		Min.	Typ.	Max.	Units	
Mode compliance						
NPN						
Default state	Input floating (wiring disconnected)	Logic HIGH				
Input voltage	Logic "LOW"	IN0, IN1, IN4, IN5/ENA	1.4	1.8	V	
	Logic "HIGH"		3.1	2.5		
	Hysteresis		0.9	1.1		
	Logic "LOW"	IN2/LSP, IN3/LSN	1.4	1.6		
	Logic "HIGH"		4	3.5		
	Hysteresis			0.6		
Floating voltage (not connected)			4.5			
Absolute maximum, continuous		-5		+55		
Input current	Logic "LOW"; Pulled to GND		9	10	mA	
	Logic "HIGH"; Pulled to +24V			0.4		
Input frequency		0		500	kHz	
Minimum pulse		1			µs	
ESD protection - Human body model		±2			kV	
Analog Inputs (REF, FDBK)						
0...5V Mode		Min.	Typ.	Max.	Units	
Input voltage	Operational range	0		4.95	V	
	Absolute maximum values, continuous	-12		+18		
	Absolute maximum, surge (duration ≤ 1s)			±36		
Input impedance	To 1.447V		20		kΩ	
Resolution			12		bits	
Integral linearity				±2	bits	
Offset error				±2	bits	
Gain error				±1%	±3% %FS ³	
Bandwidth (-3dB)	Software selectable	0		1.5	kHz	
ESD protection	Human body model			±2	kV	
±10V Mode		Min.	Typ.	Max.	Units	
Differential voltage range						
				±10	V	
Common-mode voltage range	Referenced to GND	-12	0...10	+50	V	
Input impedance	To 1.447V		20		kΩ	
Resolution			12		bits	
Integral linearity				0.036	%FS ³	
Offset error	Common-mode voltage = 0...10 V		±0.2	±0.5	%FS ³	
Gain error	Common-mode voltage = 0...10 V		±0.5	±3	%FS ³	
Bandwidth (-3dB)	Software selectable	0		5.5	kHz	
Digital Outputs (OUT0, OUT1, OUT4)		Min.	Typ.	Max.	Units	
Mode compliance						
All outputs (OUT0, OUT1, OUT4)						
NPN 24V						
Default state	Not supplied (+V _{LOG} floating)	High-Z (floating)				
	Immediately after power-up	Logic "HIGH"				
Output voltage	Logic "LOW"; output current = 1.5A for OUT0/ 0.05A for the other digital outputs			0.4	V	
	Logic "HIGH"; output current = 0, no load	4	4.5	5		
	Logic "HIGH", external load to +V _{LOG}		V _{LOG}			
	Absolute maximum, continuous (free-wheeling diodes to +V _{LOG} to GND)	-0.5		V _{LOG} +0.5		
	Absolute maximum, surge (duration ≤ 1s) [†]	-1		V _{LOG} +1		
Output current	Logic "LOW", sink current, short duration, duty cycle ≤ 1%	5s max	OUT1, OUT4		0.1	A
			OUT0		2	
	0.5s max	OUT1, OUT4		0.15	A	
		OUT0		2.5		
	Logic "HIGH", source current; external load to GND; V _{OUT} ≥ 2.0V				5	mA
	Logic "HIGH", leakage current; external load to +V _{LOG} ; V _{OUT} = V _{LOG} max = 40V			0.05	0.1	mA
Minimum pulse width		0.5			µs	
ESD protection - Human body model		±15			kV	

¹ For current values >3A_{RMS} pins needs to be soldered instead of socketed

² For more details see the "Current de-rating with +5V output current" graph

³ "FS" stands for "Full Scale"

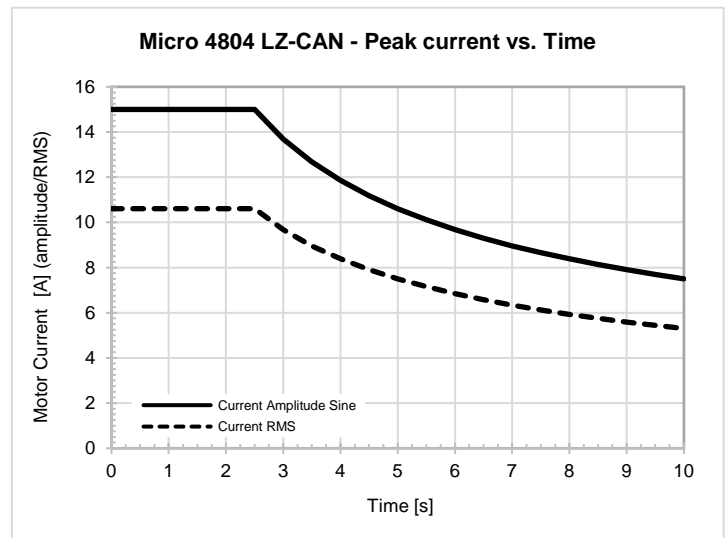
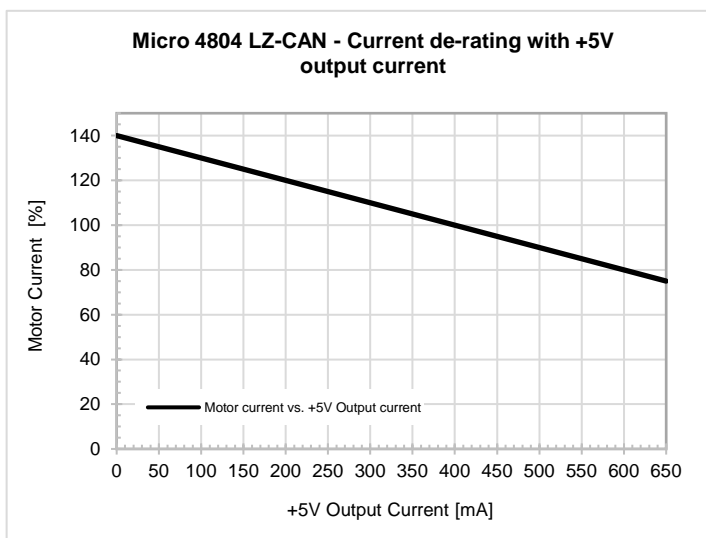
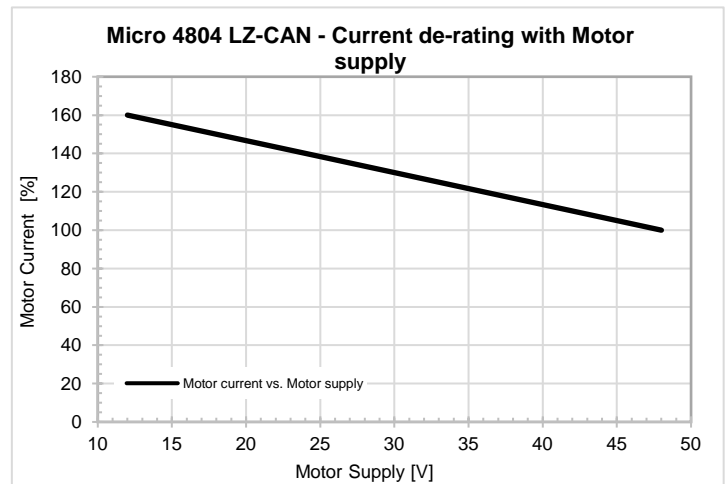
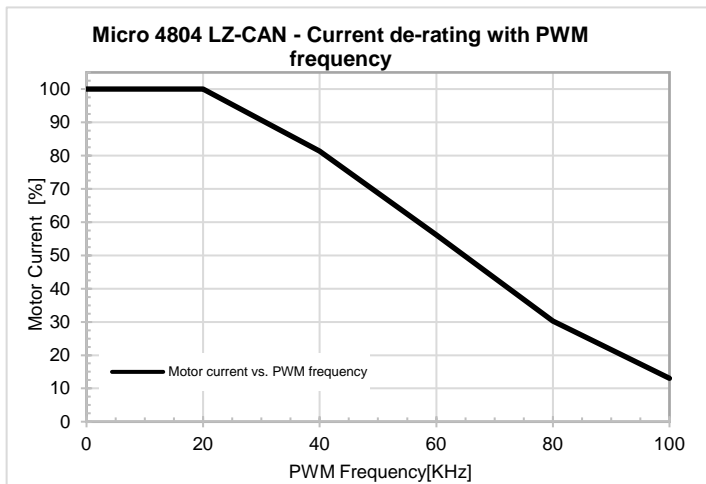
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Hall Inputs (Hall1, Hall2, Hall3)		Min.	Typ.	Max.	Units
Mode compliance	TTL / CMOS / Open-collector (NPN sink) 0...5V				
Default state	Input floating (Wiring disconnected)				
Input voltage	Digital	Logic "LOW"	1.5	1.7	V
		Logic "HIGH"	3	2.5	
		Hysteresis		0.5	
Input current	Logic "LOW"; Pull to GND				mA
Logic "HIGH"; Internal 2.2K Ω pull-up to +5					
Minimum pulse width					μ s
ESD protection	Human body model				kV
CAN-Bus		Min.	Typ.	Max.	Units
Compliance	ISO11898, CiA-301v4.2, CiA 305 v2.2.13, 402v3.0				
Bit rate	Software selectable	125		1000	Kbps
Bus length	1Mbps			25	m
	500Kbps			100	
	\leq 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo none on-board				
Node addressing	Hardware: by "IDx" pins	1-127 & 255			TMLCAN
		1-127 & 255(LSS inactive)			CANopen
	Software	1 \div 127 (CANopen); 1- 255 (TMLCAN)			
Voltage, CAN-Hi or CAN-Lo to GND		-58		+58	V
Voltage, CAN-Hi to CAN-Lo		-45		+45	V
ESD protection	Human body model				kV

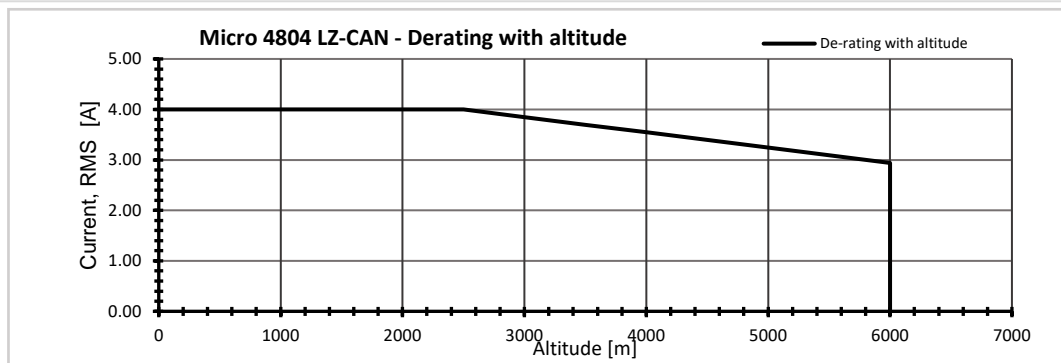
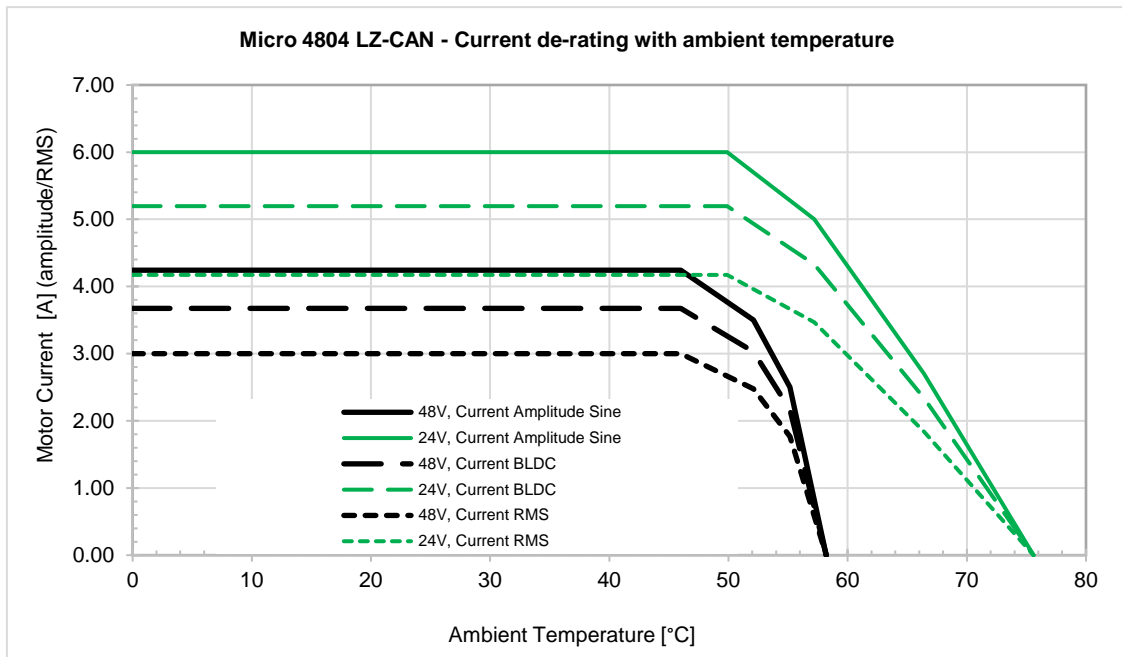
Encoder Inputs(A+, A-, B+, B-, Z+, Z-) [†]		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave A1-, B1-, Z1- floating	TTL/CMOS/Open-collector (NPN)			
Single-ended threshold	A1+, B1+, Z1+	1.2	1.3	1.5	V
Single-ended input current	Input pulled to GND against on-board 2.2 K Ω pull-up to +5V		2.2	2.5	mA
Differential mode compliance	For full RS422 compliance, see [†]	TIA/EIA-422-A			
Input voltage	Hysteresis	\pm 0.03	\pm 0.05	\pm 0.2	V
	Differential mode	-15		+15	
	Common-mode range (A+ to GND, etc.)	-7		+12	
Input impedance, differential	A+, B+, Z+ A-, B-, Z-		2.2 4.4		k Ω
Input frequency	Differential mode	0		15	MHz
Minimum pulse width	Differential mode	33			ns
ESD protection	Human body model				kV

[†] Stresses beyond values listed under "absolute maximum ratings" may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.



[†] Full RS-422 compatibility, as well as noise rejection improvement requires an external 120 Ω resistor connected across each signal pair (A1+/A1-, B1+/ B1-, Z1+/Z1-)

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