


Motor – sensor configurations				
		Motor		
Sensor		PMSM	BLDC	DC BRUSH
Incr. Encoder		Ⓜ		Ⓜ
Incr. Encoder + Dig. Hall		Ⓜ	Ⓜ	
Linear Halls		Ⓜ		
Digital Halls control only		Ⓜ		
SSI / BiSS-C / EnDAT / Tamagawa / Panasonic/ Nikon / Sanyo Denki		Ⓜ	Ⓜ	Ⓜ
Tacho				Ⓜ

Mating Connectors			
Producer	Part No.	Connector	Description
Samtec	SQW-117-01-F-D(-VS)	J1	2x17, 2.0mm THT (SMD) socket
	CLT-117-02-F-D		2x17, 2.0mm SMD pass-through socket
	SQW-111-01-F-D(-VS)	J2	2x10, 2.0mm THT (SMD) socket
	CLT-111-02-F-D		2x10, 2.0mm SMD pass-through socket

- **Features**
 - Motion controller and drive in a single compact unit based on MotionChip™ technology
 - Universal solution for control of rotary and linear brushless and brushed motors
 - Advanced motion control capabilities (CSP, PVT, S-curve, electronic gearing and cam)
- **Motor supply: 48V nominal**
 - Motor output current:
 - Nominal: 3A_{RMS} / 4.2A amplitude;
 - Peak: 10A_{RMS} / 14A amplitude.
- **Logic supply: 24V nominal, 48V max**
 - Feedback Options (up to 1x Hall sensors + 2x encoders)
 - 1 x Hall sensor interface (digital or linear)
 - Feedback#1 and Feedback#2 can be:
 - Incremental A / B (index Z available only for 1 encoder): differential or single-ended.
 - Absolute: differential or single-ended. Supported protocols: SSI, BiSS, EnDAT, Tamagawa, Panasonic, Nikon, Sanyo Denki;
 - 1 x analogue input software selectable: 12-bit 0-5V or ±10V: Reference, Feedback or general purpose
 - 3 x digital inputs: 2 for limit switches + one Enable, NPN, pull-to-GND to activate, pull-up on-board to +5V. Pull to GND to activate
 - 3 x configurable I/Os, each software selectable as:
 - Digital input, NPN, with pull-up on-board to +5V. Pull to GND to activate;
 - Digital output, NPN (open-collector), with pull-up on-board to +5V. Sink current: 1 x 1.5A to drive inductive loads (such as mechanical brake), 2 x 0.1A.
 - Communication interfaces: RS232; USB; TMLCAN and CANopen (CiA 301 v4.2, CiA 305 v.2.2.13 and CiA 402 v3.0) protocols
 - 24k x 16 E²ROM to store setup data, TML motion programs, cam tables and other user data
 - 16k x 16 SRAM memory for data acquisition
 - Operating ambient temperature: 0-40°C (over 40°C with de-rating)
 - Programmable protections: any short-circuit between motor phases, GND and/or supply, over/under-voltage, over-current, I²t, control error
 - >99% voltage efficiency

Name ALN	First edition December 13, 2021	Document template: P099.TQT.564.0001	Last edition November 2, 2023	Visa: AS
		Title of document Micro 4803 MZ-CAN PRODUCT DATA SHEET	N° document P020.001.E102.10D.DSH	
			Page: 1 of 5	

Micro 4803 MZ-CAN DATASHEET P/N: P020.001.E102

Pin	Name	Type	Description
1	+Vlog	I	Positive terminal of the logic supply input: 6 to 48 VDC
2	A	O	Phase A for 3-ph motors, Motor+ for DC brush motors
3	GND	-	Ground return for logic supply
4	B	O	Phase B for 3-ph motors, Motor- for DC brush motors
5	GND	-	Shield for motor windings cable
6	C	O	Phase C for 3-ph motors
7	+Vmot	I	Positive terminal of the motor supply: 7 to 48 VDC
8	Rsvd.	-	Reserved.
9	BFS	-	Connect to GND to perform a firmware update after a critical firmware failure
10	ID2	I	TMLCAN mode: AxisID ² selection pin. See TMLCAN mode: AxisID register settings table
11	TX1-	I/O	Transmit/Receive negative, OUT port.
12	RX1-	I/O	Receive/Transmit negative, OUT port.
13	TX1+	I/O	Transmit/Receive positive, OUT port.
14	RX1+	I/O	Receive/Transmit positive, OUT port.
15	GND	-	Ground shield for port 1
16	GND	-	Ground shield for port 0
17	TX0-	I/O	Transmit/Receive negative, IN port.
18	RX0-	I/O	Receive/Transmit negative, IN port.
19	TX0+	I/O	Transmit/Receive positive, IN port.
20	RX0+	I/O	Receive/Transmit positive, IN port.
21	ID0	I	TMLCAN mode: AxisID ⁰ selection pin. See TMLCAN mode: AxisID register settings table
22	ID1	I	TMLCAN mode: AxisID ¹ selection pin. See TMLCAN mode: AxisID register settings table
23	232TX	O	RS-232 Data Transmission.
24	232RX	I	RS-232 Data Reception.
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/O2	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, or Linear Hall sensor 1
4	Hall2	I	Digital Hall, or Linear Hall sensor 2
5	Hall3	I	Digital Hall, or Linear 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/ Dt1+/Dt1	I	Encoder 1 A+/Data+ diff. input or single-ended input
10	EncA1-/Dt1-	I	Encoder 1 A-/Data- diff. input. Leave open for single-ended; Add externally 120Ω to pin 9 for differential
11	EncB1+/EncB1/ Clk1+/Clk1	I	Encoder 1 B+/Clock+ diff. input or single-ended input
12	EncB1-/Clk1-	I	Encoder 1 B-/Clock- diff. input. Leave open for single-ended; Add externally 120Ω to pin 11 for differential
13	EncA2+/EncA2/ Dt2+/Dt2	I	Encoder 2 A+/Data+ diff. input or single-ended input
14	EncA2-/Dt2-	I	Encoder 2 A-/Data- diff. input. Leave open for single-ended; Add externally 120Ω to pin 13 for differential
15	EncB2+/EncB2/ Clk2+/Clk2	I/O	Encoder 2 B+/Clock+ diff. input or single-ended input
16	EncB2-/Clk2-	I	Encoder 2 B-/Clock- diff. input. Leave open for single-ended; Add externally 120Ω to pin 15 for differential
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
LED2	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.

MSB AxisID register LSB


Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0

ID2 ID1 ID0

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 "LSS inactive" state and the Green LED will flash at 1 second intervals
- * where "x" can be 1, 2 or 3

Name ALN	First edition December 13, 2021	Document template: P099.TQT.564.0001	Last edition November 2, 2023	Visa: AS
		Title of document Micro 4803 MZ-CAN PRODUCT DATA SHEET	N° document P020.001.E102.10D.DSH	
			Page: 2 of 5	

Micro 4803 MZ-CAN DATASHEET P/N: P020.001.E102

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		0		90	%Rh	
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ± 2.5		Km	
	Ambient Pressure	0 ²	0.75 ± 1	10.0	atm	
Storage Conditions		Min.	Typ.	Max.	Units	
Ambient temperature		-40		100	°C	
Ambient humidity		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	
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				
Protection degree		According to IEC60529				
		IP20				
		-				
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	
	Between drives and roof-top	30			mm	
Insertion force		Using recommended mating connectors				
Extraction force		8			N	
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		
Voltage Measurement		Total error				
					1.5	%
Utilization category		Acc. to 60947-4-1 (I _{PEAK} ≤ 4.0 * I _{NOM})				
		DC-3				
RS-232		Min.	Typ.	Max.	Units	
Compliance		TIA/EIA-232-C				
Bit rate		Software selectable		9600	115200	Baud
Short-circuit		232TX short to GND				
ESD protection		Human body model				
		±2			kV	
Supply Output (+5V)		Min.	Typ.	Max.	Units	
Output voltage	Current sourced = 400mA	5.05	5.2	5.25	V	
		650				
Output current ⁴	24V motor		800		mA	
Short-circuit to GND protection		Yes / Drive resets at event				
Over-voltage protection		NOT protected				
ESD protection		Human body model				
		±1			KV	

Motor Outputs (A/A+, B/A-, C)		Min.	Typ.	Max.	Units	
Nominal current	PMSM motors sinusoidal amplitude			4.2	A	
	PMSM motors sinusoidal RMS			3	A _{RMS}	
	DC/BLDC motors continuous ⁵			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	
		40 kHz		150		
		60 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	
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	
Digital Outputs (OUT0, OUT1, OUT4)		Min.	Typ.	Max.	Units	
Mode compliance		All outputs (OUT0, OUT1, OUT4)				
Default state		Not supplied (+V _{LOG} 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		
	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 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

⁴ For more details see the "Current de-rating with +5V output current" graph

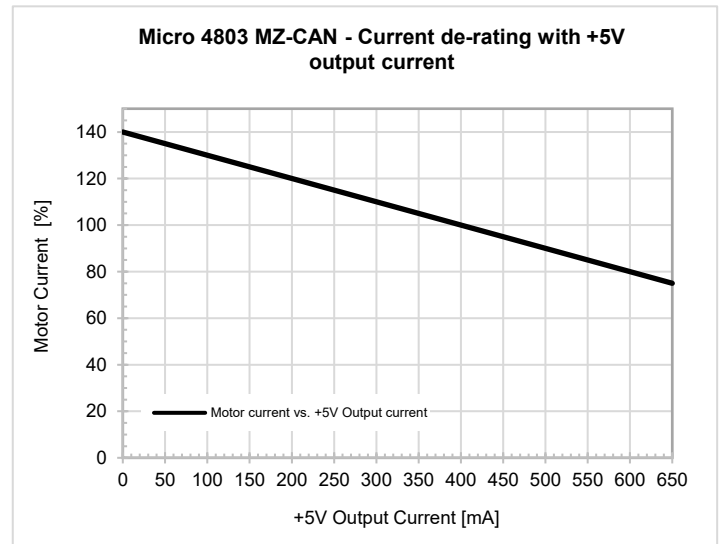
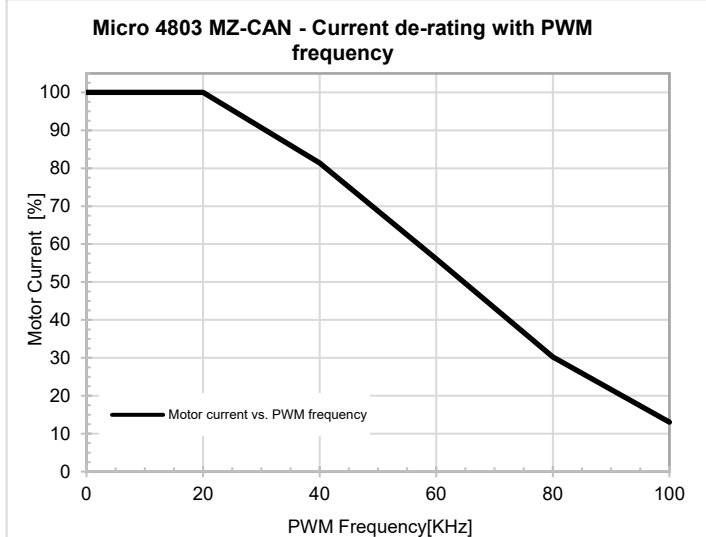
⁵ For current values >3A_{RMS} pins needs to be soldered instead of socketed

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	December 13, 2021		November 2, 2023	AS
		Title of document	N° document	
		Micro 4803 MZ-CAN PRODUCT DATA SHEET	P020.001.E102.10D.DSH	Page: 3 of 5

Micro 4803 MZ-CAN DATASHEET P/N: P020.001.E102

Hall Inputs (Hall1, Hall2, Hall3)		Min.	Typ.	Max.	Units
Mode compliance		TTL / CMOS / Open-collector (NPN sink), or analog (linear) 0...5V			
Default state	Input floating (Wiring disconnected)	4.5	4.7	5	V
Input voltage	Digital		1.5	1.7	
	Logic "LOW"	3	2.5		
	Logic "HIGH"		0.5		
	Hysteresis	0	0.5...4.5	4.95	
Input current	Analog		2.3		mA
	Logic "LOW"; Pull to GND		0		
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5				
Minimum pulse width			70		μs
ESD protection	Human body model		±15		kV
Encoder Inputs (A+, A-, B+, B-, Z+, Z-, A2+, A2-, B2+, B2-) ¹		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave A1-, B1-, Z1-, A2-, B2-floating	TTL/CMOS/Open-collector (NPN)			
Single-ended threshold	A1+, B1+, Z1+, A2+, B2+	1.2	1.3	1.5	V
Single-ended input current	Input pulled to GND against on-board 2.2 KΩ pull-up to +5V		2.2	2.5	mA
Differential mode compliance	For full RS422 compliance, see ²	TIA/EIA-422-A			
Input voltage	Hysteresis	±0.03	±0.05	±0.2	V
	Differential mode	-15		+15	
	Common-mode range (A+ to GND, etc.)	-7		+12	
Input impedance, differential	A+, A2+, B+, B2+, Z+, Z2+ A-, A2-, B-, B2-, Z-, Z2-		2.2 4.4		kΩ
Input frequency	Differential mode	0		15	MHz
Minimum pulse width	Differential mode	33			ns
ESD protection	Human body model	±30			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	
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo	none on-board			
Node addressing	Hardware: by "IDx" pins	1-127 & 255			TMLCAN
	Software	1-127 & 255(LSS inactive)			CANopen
	Software	1 ÷ 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	±15			kV

Absolute encoder interface: SSI, BiSS-C, EnDAT, Tamagawa, Nikon, Sanyo Denki		Min.	Typ.	Max.	Units
Differential mode (CLOCK, DATA)	For full RS422 compliance, see ²	TIA/EIA-422-A			
CLOCK (DATA) Output voltage	Differential; 50Ω differential load	1.5	3.3		V
	Common-mode, referenced to GND	1	1.7	3	
CLOCK frequency	Software selectable	1000, 2000, 3000, 4000			kHz
CLOCK (DATA) Short-circuit protection	Common-mode voltage ±15V	Yes, protected			
DATA format	Software selectable	Binary / Gray			
		Single-turn / Multi-turn			
		Counting direction			
		CRC type			
DATA resolution	Single-turn			56	Bits
	Multi-turn and single-turn			56	
	If total resolution >31 bits, some bits must be ignored by software setting to achieve a max 31 bits resolution				
Analog Inputs (REF, FDBK)		Min.	Typ.	Max.	Units
0...5V Mode					
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	±10	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 ¹
Offset error	Common-mode voltage =		±0.2	±0.5	%FS ¹
Gain error	0...10 V		±0.5	±3	%FS ¹
Bandwidth (-3dB)	Software selectable	0		5.5	kHz

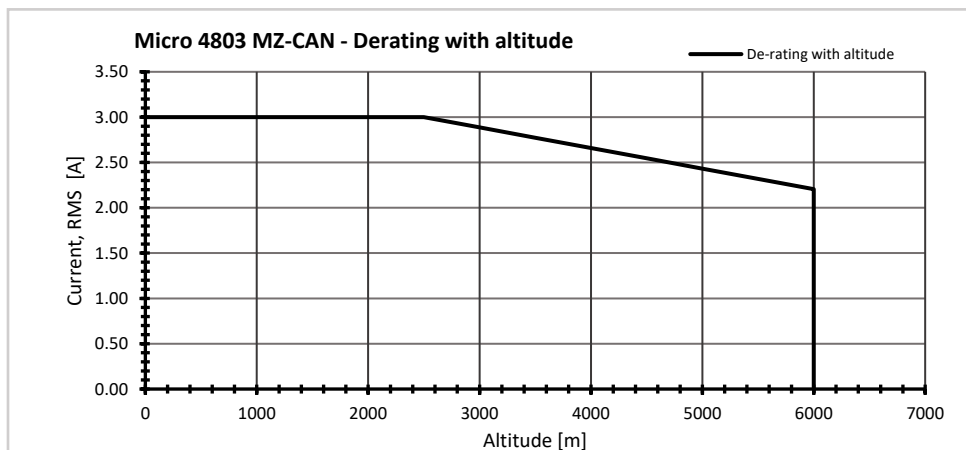
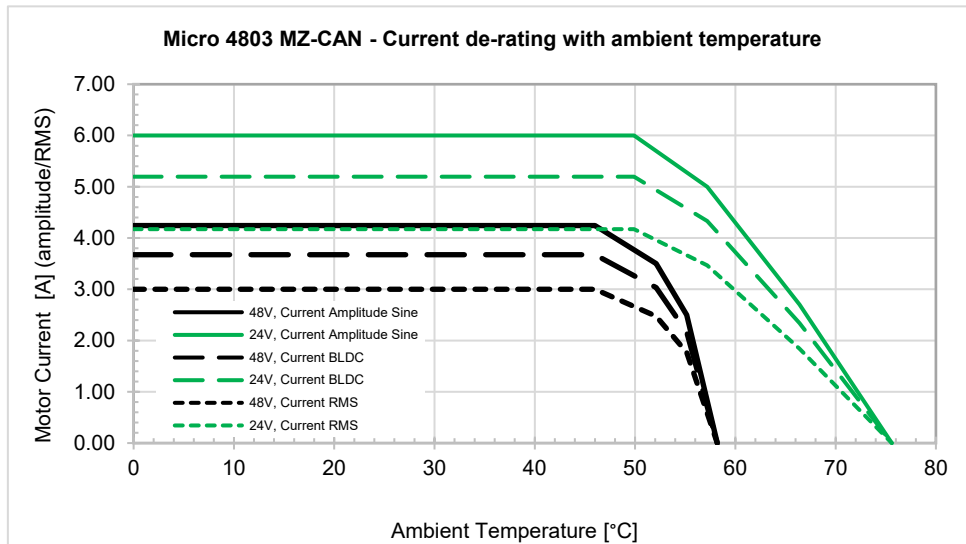
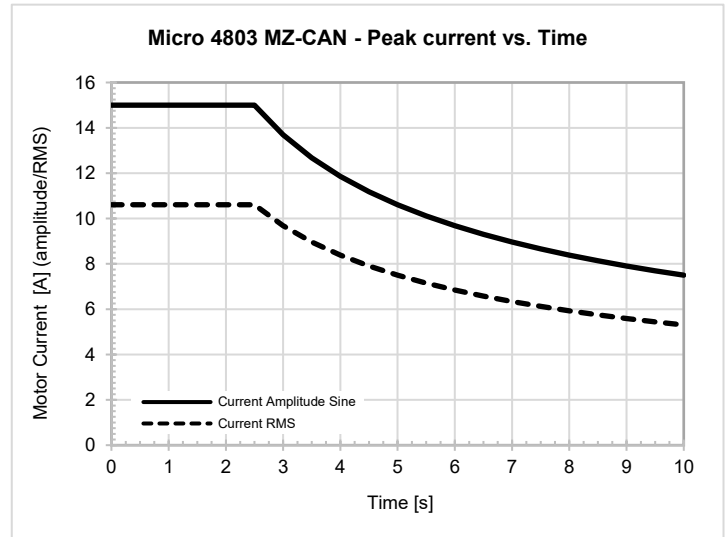
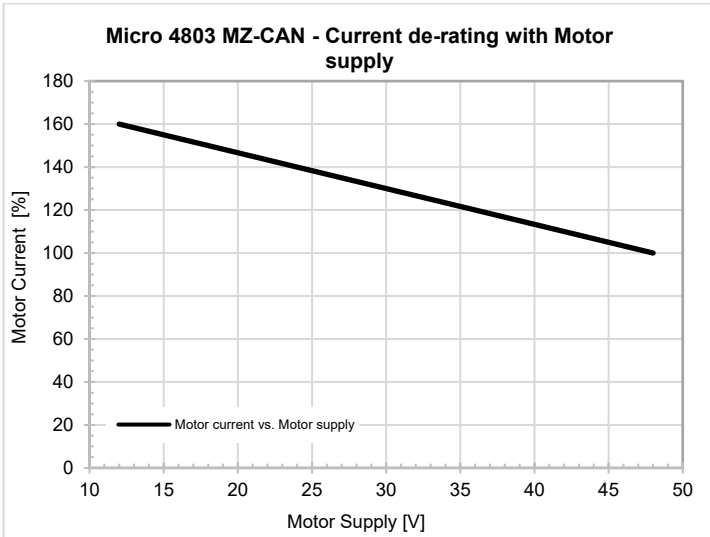



¹ Full RS-422 compatibility, as well as noise rejection improvement requires an external 120Ω resistor connected across each signal pair (A1+/A1-, B1+/ B1-, Z1+/Z1-, A2+/A2-, B2+/B2-)

² Full RS-422 compatibility, as well as noise rejection improvement requires an external 120Ω resistor connected across each signal pair (A1+/A1-, B1+/ B1-, Z1+/Z1-, A2+/A2-, B2+/B2-)

³ "FS" stands for "Full Scale"

Name ALN	First edition December 13, 2021	Document template: P099.TQT.564.0001	Last edition November 2, 2023	Visa: AS
		Title of document Micro 4803 MZ-CAN PRODUCT DATA SHEET	N° document P020.001.E102.10D.DSH	
			Page: 4 of 5	



Name ALN	First edition December 13, 2021	Document template: P099.TQT.564.0001	Last edition November 2, 2023	Visa: AS
		Title of document		N° document
		Micro 4803 MZ-CAN PRODUCT DATA SHEET		P020.001.E102.10D.DSH
				Page: 5 of 5