Top view; Pins facing upward; All dimensions are in mm; Header pitch of J1 & J2 is 1.27mm and for J3 is 2.54 mm. Drawing not to scale.
The free area around the mounting holes (free of components or other copper features) has a 5.5mm diameter.

Features

- Motion controller and drive in a single compact unit based on MotionChip ™ technology
- Universal solution for control of rotary and linear brushless, brushed and 2 or 3-phase step motors
- Advanced motion control capabilities (PVT, S-curve, electronic cam)
- Motor supply: 12-80V; Logic SELV/ PELV supply: 9-36V; STO SELV/ PELV supply: 18-40V
- Motor output current:
  - Nominal*: 15A$_{RMS}$ / 21.2A amplitude;
  - Peak: 28.3A$_{RMS}$ / 40A amplitude.
- Operating ambient temperature: 0-40°C (over 40°C with derating)
- NTC/PTC analogue Motor Temperature sensor input
- Communication interfaces:
  - USB
  - LV-TTL UART (RS-232 with external transceiver)
  - TMLCAN and CANOpen (CiA 301 v4.2, CiA 305 v.2.2.13 and CiA 402 v4.1.1) protocols
- Feedback Devices (dual-loop support)
  1st feedback devices supported:
  - Incremental encoder interface (single ended or differential)
  - Analogue sin/cos encoder interface (differential 1V$_{PP}$)
  - Digital Hall sensor interface (single-ended and open collector)
  - Linear Hall sensors interface
  2nd feedback devices supported:
  - Incremental encoder interface (differential)
  - SSI / BiSS-C/ EnDAT/ TAMAGAWA/ Panasonic/ Nikon/ Sanyo Denki encoder interface
- Pulse & direction reference (single-ended or differential) capability
- STO: 2 safe torque-off inputs, safety integrity level (SIL3/Cat3/PLe) acc. To EN61800-5-1; -2/ EN61508-3; -4/ EN ISO 13849-1.
- 6 x digital inputs, 12-36V, PNP/NPN software selectable: 2 x for limit switches or general-purpose, 4 x general-purpose
- 5 x digital outputs, 5-36V: 0.4A NPN / 0.3A PNP, polarity software selectable: Ready, Error or general-purpose
- 1 x dedicated motor brake or general-purpose output (OUT0): 2A NPN / 1.5A PNP, polarity software selectable
- 2 x analogue inputs software selectable: 12-bit 0-5V: Reference, Feedback or general-purpose
- 128 h/w addresses selectable by h/w pins configuration
- 16k x 16 SRAM memory for data acquisition
- 24k x16 E^{2}ROM to store setup data, TML motion programs, cam tables and other user data

** It is mandatory to mount the iPOS8015 MZ on a metallic support using the provided mounting holes.
To achieve the rated current capability, the heat sink temperature must not exceed **75°C**.*

Motor – sensor configurations

Sensor \ Motor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)
Incr. Encoder	Ⓣ		Ⓣ	Ⓣ	
Incr. Encoder + Dig. Hall	Ⓣ	Ⓣ			
Linear Halls	Ⓣ				
Digital Hall control only	Ⓣ				
Analog Sin/Cos encoder	Ⓣ	Ⓣ	Ⓣ	Ⓣ	
SSI / BiSS-C/ EnDAT/ TAMAGAWA/ Panasonic/ Nikon / Sanyo Denki	Ⓣ	Ⓣ	Ⓣ	Ⓣ	
Tacho			Ⓣ		
Open-loop (no sensor)				Ⓣ	Ⓣ

Mating Connectors

When J3 is plugged into a connector and maximum current should not exceed 18A Sine amplitude

Ref	Producer	Part No.	Description
J1, J2	Harwin	M52-5012045	1x20 contacts, socket 1.27mm-pitch; 4 pcs needed for one drive
	Samtec	SMS-140-01-L-S SMS-140-01-G-S	1x40 contacts, socket 1.27mm-pitch; 2 pcs needed for one drive
J3	Mill-Max	801-47-012-10-001000	1x12 contacts, High-current socket 2.54mm-pitch accepting 0.635mm square pin; 1 pcs is needed for one drive; the current should not exceed 12.7A

When J3 is soldered directly onto a motherboard and the maximum current can exceed 13A Sine amplitude

Ref	Producer	Part No.	Description
J1, J2	Harwin	M52-5012045	1x20 contacts, socket 1.27mm-pitch; 4 pcs needed for one drive
J3			The pins are directly soldered onto a motherboard for increased current capability

Name ALN	First edition June 5, 2024	Document template: P099.TQT.564.0001	Last edition August 7, 2024	Visa:

(T) TECHNOSOFT	Title of document **iPOS8015 MZ-CAN PRODUCT DATA SHEET**	N° document **P022.036.E102.DSH.01A**

J1

Pin	Name	Type	Description
1	Temp Mot	I	NTC/PTC 3.3V input. Used to read an analog temperature value
2	TTL TX	O	Low voltage TTL UART data transmission
3	TTL RX	I	Low voltage TTL UART data reception
4	USB Data-	I/O	USB Data negative
5	USB Data+	I/O	USB Data positive
6	USB V+	I	USB +5V input
7…8	Reserved	O	Reserved. Do not use
9	Axis ID Bit7	I	*TMLCAN* protocol, if pin is left unconnected. *CANopen* protocol, if pin is connected to GND.
10	Axis ID Bit6	I	7-bit H/W Axis ID register. Pin 16 is Bit 0... Pin 10 is Bit 6 of the Axis value. • Bit = 0, if pin is left unconnected. • Bit = 1, if pin is connected to GND. AxisID values: from 1 to 127 and 255 when all pins are left unconnected. In CANopen, when Axis ID is 255, the drive will be in LSS inactive state.
11	Axis ID Bit5	I	
12	Axis ID Bit4	I	
13	Axis ID Bit3	I	
14	Axis ID Bit2	I	
15	Axis ID Bit1	I	
16	Axis ID Bit0	I	
17…18	Reserved	-	Reserved. Do not use
19	Spi2 Clk	O	Reserved. Do not use
20	Spi2 Out	O	Reserved. Do not use
21	Spi2 In	I	Reserved. Do not use
22	Spi2 CS	O	Reserved. Do not use
23	Spi2 Irq	I	Reserved. Do not use
24…35	Reserved	-	Reserved. Do not use
36	GND	-	Return ground. Internally connected to all GND signals except STO GND.
37	STO2-	I	Safe Torque Off input 2, negative return (opto-isolated, 0V)
38	STO2+	I	Safe Torque Off input 2, positive input (opto-isolated, 18÷40V)
39	STO1-	I	Safe Torque Off input 1, negative return (opto-isolated, 0V)
40	STO1+	I	Safe Torque Off input 1, positive input (opto-isolated, 18÷40V)

Apply between both STO1+, STO2+ and STO1-, STO2- 24V DC from SELV/ PELV power supply for motor PWM output operation

J3

Pin	Name	Type	Description
1,2	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
3,4	Cr/B-	O	Chopping resistor / Phase B- for 2-ph steppers
5,6	C/B+	O	Phase C for 3-ph motors, B+ for 2-ph steppers
7,8	B/A-	O	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
9,10	A/A+	O	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
11,12	+V$_{MOT}$	I	Positive terminal of the motor supply: 12 to 80V$_{DC}$.

J2

Pin	Name	Type	Description
1	LH1	I	Linear Hall 1 input
2	LH2	I	Linear Hall 2 input
3	LH3	I	Linear Hall 3 input
4	FDBK	I	Analogue input, 12-bit, 0-5V. Reads analogue feedback (tacho), or general purpose
5	REF	I	Analogue input, 12-bit, 0-5V. Reads analog reference, or general-purpose analogue input
6	Hall 3	I	Digital input Hall 3 sensor
7	Hall 2	I	Digital input Hall 2 sensor
8	Hall 1	I	Digital input Hall 1 sensor
9	GND	-	Return ground. Internally connected to all GND signals except STO GND.
10	IN5	I	12-36V general-purpose digital PNP/NPN input
11	IN4	I	12-36V general-purpose digital PNP/NPN input
12	IN1	I	12-36V general-purpose digital PNP/NPN input
13	IN0	I	12-36V general-purpose digital PNP/NPN input
14	IN2/LSP	I	12-36V digital PNP/NPN input. Positive limit switch input
15	IN3/LSN	I	12-36V digital PNP/NPN input. Negative limit switch input
16	OUT3	O	5-36V general-purpose digital output, 0.3A PNP/ 0.4A NPN, software selectable
17	OUT2	O	5-36V general-purpose digital output, 0.3A PNP/ 0.4A NPN, software selectable
18	OUT5	O	5-36V general-purpose digital output, 0.3A PNP/ 0.4A NPN, software selectable
19	OUT4	O	5-36V general-purpose digital output, 0.3A PNP/ 0.4A NPN, software selectable
20	OUT1	O	5-36V general-purpose digital output, 0.3A PNP/ 0.4A NPN, software selectable
21	OUT0	O	5-36V general-purpose digital output, 1.5A PNP/ 2A NPN, software selectable
22	Z1+	I	Incr. encoder1 Z single-ended, or Z+ diff. input,
23	Z1-	I	Incr. encoder1 Z- diff. input
24	B1+/Cos+	I	Incr. encoder1 B single-ended, or B+ diff. input, or analogue encoder Cos+ diff. input
25	B1-/Cos-	I	Incr. encoder1 B- diff. input, or analogue encoder Cos- diff. input
26	A1+/Sin+	I	Incr. encoder1 A single-ended, or A+ diff. input, or analogue encoder Sin+ diff. input
27	A1- /Sin-	I	Incr. encoder1 A- diff. input, or analogue encoder Sin- diff. input
28	Z2+	I	Incr. encoder2 Z+ diff. input; has 120Ω resistor between pins 28 and 29
29	Z2-	I	Incr. encoder2 Z- diff. input; has 120Ω resistor between pins 28 and 29
30	B2-/Dir-/CLK-/MA-	I/O	Incr. encoder2 B- diff. input, or Dir--, or Clock- for SSI, or Master- for BiSS; has 120Ω resistor between pins 30 and 31
31	B2+/Dir+/CLK+/MA+	I/O	Incr. encoder2 B+ diff. input, or Dir+-, or Clock+ for SSI, or Master+ for BiSS; has 120Ω resistor between pins 30 and 31
32	A2+/Pulse+/ Data+/SL+	I	Incr. encoder2 A+ diff. input, or Pulse+, or Data+ for SSI, or Slave+ for BiSS; has 120Ω resistor between pins 32 and 33
33	A2- /Pulse-/ Data-/SL-	I	Incr. encoder2 A- diff. input, or Pulse-, or Data- for SSI, or Slave- for BiSS; has 120Ω resistor between pins 32 and 33
34	CAN-Lo	I	CAN negative line
35	CAN-Hi	I	CAN positive line
36	Reserved	-	Reserved. Do not use
37	Reserved	-	Reserved. Do not use
38	+5V$_{OUT}$	O	5V output supply for I/O usage
39	-V$_{LOG}$	I	Negative terminal of the logic supply input: 9 to 36V$_{DC}$ from SELV/ PELV type power supply.
40	+V$_{LOG}$	I	Positive terminal of the logic supply input: 9 to 36V$_{DC}$ from SELV/ PELV type power supply.

Electrical characteristics

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

- V_{LOG} = 24 VDC; V_{MOT} = 80VDC; F_{PWM} = 20kHZ
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude) = 21.2 A

Operating Conditions		Min.	Typ.	Max.	Units
Ambient temperature		0		40[1]	ºC
Ambient humidity	Non-condensing	0		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	ºC
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 vertical mounting	Between adjacent drives	30			mm
	Between drives and nearby walls	30			mm
	Between drives and roof-top	20			mm
Spacing required for horizontal mounting	Between adjacent drives	4			mm
	Between drives and nearby walls	5			mm
	Space needed for drive removal	10			mm
	Between drives and roof-top	15			mm
Insertion force	Using recommended mating connectors		12	18	N
Extraction force		8	10		N
Heat sink	mounted	Full current capability			
	not mounted	max 12A output current			

Environmental Characteristics		Min.	Typ.	Max.	Units
Size (Length x Width x Height)	Global size	64 x 43.8 x 15.7			mm
		~2.52 x 1.72 x 0.62			inch
Weight			~34		g
Cleaning agents	Dry cleaning is recommended	Only Water- or Alcohol- based			
Protection degree	According to IEC60529, UL508	IP20			-

Logic Supply Input (+V_LOG)		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	9		36	V_{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	8		40	V_{DC}
	Absolute maximum values, continuous	-0.6		42	V_{DC}
	Absolute maximum values, surge (duration ≤ 10ms) [†]	-1		+45	V
Supply current	+V_{LOG} = 12V		150		mA
	+V_{LOG} = 24V		100		
	+V_{LOG} = 40V		80		
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	12	80	82	V_{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	11		94	V_{DC}
	Absolute maximum values, surge (duration ≤ 10ms) [†]	-1		95	V
Supply current	Idle		1	5	mA
	Operating	-40	±20	+40	A
	Absolute maximum value, short-circuit condition (duration ≤ 10ms) [†]			45	A
Utilization Category	Acc. to 60947-4-1 (I_{PEAK}<=4.0*I_{NOM})	DC-3			

Supply Output (+5V)		Min.	Typ.	Max.	Units
Output voltage	Current sourced = 250mA	4.95	5.11	5.25	V
Output current		360	450		mA
Short-circuit		NOT protected			
Over-voltage		NOT protected			
ESD protection	Human body model	±1			kV
Isolation PE (earth) – GND				±250	V

Motor Outputs (A/A+, B/A-, C/B+, CR/B-)			Min.	Typ.	Max.	Units
Nominal current with heat sink[4]	PMSM motors sinusoidal amplitude			21.2		A
	PMSM motors sinusoidal RMS			15		
	DC/BLDC motors continuous			18.3		
Nominal current without heat sink	PMSM motors sinusoidal amplitude			12		
	PMSM motors sinusoidal RMS			8.5		
	DC/BLDC motors continuous			10.4		
Peak current	maximum 12.5 s		-40		+40	A
Short-circuit protection threshold				70		A
Short-circuit protection delay			1.5		3.3	µs
On-state voltage drop	Nominal output current; including typical mating connector contact resistance			0.15		V
Voltage efficiency				100		%
Off-state leakage current				±0.5	±1	mA
Motor inductance (phase-to-phase)	Recommended value, for current ripple max. ±5% of full range; +V_{MOT} = 80 V	F_{PWM} 20 kHz	400			µH
		40 kHz	200			
		60 kHz	150			
		80 kHz	100			
		100 kHz	80			
	Minimum value, limited by short-circuit protection; +V_{MOT} = 80 V	20 kHz	150			µH
		60 kHz	50			
		40 kHz	40			
		80 kHz	20			
		100 kHz	10			
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		-9.3	+/- 3.4	+9.3	%FS

Digital Hall Inputs (Hall1, Hall2, Hall3)		Min.	Typ.	Max.	Units
Mode compliance		TTL / CMOS / Open-collector			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"		0	0.8	V
	Logic "HIGH"	2	5		
	Floating voltage (not connected)		4.4		
	Absolute maximum, surge (duration ≤ 1s) [†]	-10		+15	
Input current	Logic "LOW"; Pull to GND			1.2	mA
	Logic "HIGH"; Internal 4.7KΩ pull-up to +5	0	0	0	
Minimum pulse width		2			µs
ESD protection	Human body model	±5			kV

Linear Hall Inputs (LH1, LH2, LH3)		Min.	Typ.	Max.	Units
Input voltage	Operational range	0	0.5÷4.5	4.9	V
Input voltage	Absolute maximum values, continuous	-7		+7	V
	Absolute maximum, surge (duration ≤ 1s) [†]	-11		+14	
Input current	Input voltage 0…+5V	0		0.2	mA
Interpolation Resolution	Depending on software settings			11	bits
Frequency		0		1	kHz
ESD protection	Human body model	±1			kV

Digital Inputs (IN0, IN1, IN2/LSP, IN3/LSN, IN4, IN5)[5]		Min.	Typ.	Max.	Units
Mode compliance		PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input voltage	Logic "LOW"	-10	0	2.2	V
	Logic "HIGH"	6.3	24	36	
	Hysteresis	1.2	2.4	2.8	
	Floating voltage (not connected)		0		
	Absolute maximum, continuous	-10		+39	
	Absolute maximum, surge (duration ≤ 1s) [†]	-20		+40	
Input current	Logic "LOW"; pulled to GND		0		mA
	Logic "HIGH"		8	10	

---

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

[2] iPOS8015 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] It is mandatory to mount the iPOS8015 MZ on a metallic support using the provided mounting holes. To achieve the rated current capability, the heat sink temperature must not exceed **75°C**.

[5] The digital inputs and outputs are software selectable as PNP or NPN

		Min.	Typ.	Max.	Units
Mode compliance		NPN			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"		0	2.2	V
	Logic "HIGH"	6.3	24	36	
	Hysteresis	1.2	2.4	2.8	
	Floating voltage (not connected)		15		
	Absolute maximum, continuous	-10		+39	
	Absolute maximum, surge (duration ≤ 1s)†	-20		+40	
Input current	Logic "LOW"; Pulled to GND		8	10	mA
	Logic "HIGH"; Pulled to +24V	0	0	0	
Input frequency		0		10	kHz
Minimum pulse		6			µs
ESD protection	Human body model	±5			kV

Encoder1 Inputs (A1/A1+, A1-, B1/B1+, B1-, Z1/Z1+, Z1-)		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave negative inputs disconnected	TTL / CMOS / Open-collector			
Input voltage, single-ended mode A/A+, B/B+	Logic "LOW"			1.6	V
	Logic "HIGH"	1.8			
	Floating voltage (not connected)		3.3		
Input voltage, single-ended mode Z/Z+	Logic "LOW"			1.2	V
	Logic "HIGH"	1.4			
	Floating voltage (not connected)		4.7		
Input current, single-ended mode A/A+, B/B+, Z/Z+	Logic "LOW"; Pull to GND		5.5	6	mA
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5	0	0	0	
Differential mode compliance	For full RS422 compliance, see [1]	TIA/EIA-422-A			
Input voltage, differential mode	Hysteresis	±0.06	±0.1	±0.2	V
	Common-mode range (A+ to GND, etc.)	-7		+7	
Input impedance, differential	A1+ to A1-, B1+ to B1-		1		kΩ
	Z1+ to Z1-		1		
Input frequency	Single-ended mode, Open-collector / NPN	0		5	MHz
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	0		10	MHz
Minimum pulse width	Single-ended mode, Open-collector / NPN	1			µs
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	50			ns
Input voltage, any pin to GND	Absolute maximum values, continuous	-7		+7	V
	Absolute maximum, surge (duration ≤ 1s)†	-11		+14	
ESD protection	Human body model	±1			kV

Digital Outputs (OUT1, OUT2/Error, OUT3/Ready, OUT4, OUT5)[2]		Min.	Typ.	Max.	Units
Mode compliance		PNP 24V			
Default state	Not supplied (+V$_{LOG}$ floating or to GND)	High-Z (floating)			
	Normal operation	Logic "High"			
Output voltage	Logic "HIGH"; output current = 0.3A		V$_{LOG}$-1.0	V$_{LOG}$-2.0	V
	Logic "LOW"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to GND		0		
	Absolute maximum, continuous	-0.3		V$_{LOG}$+0.3	
	Absolute maximum, surge (duration ≤ 1s)†	-0.5		V$_{LOG}$+0.5	
Output current	Logic "HIGH", source current, continuous			0.3	A
	Logic "HIGH", source current, pulse ≤ 5 s			0.4	A
	Logic "LOW", means High-Z			20	µA
Minimum pulse width		3	1.5		µs
ESD protection Human body model		±15			kV

		Min.	Typ.	Max.	Units
Mode compliance		NPN 24V			
Default state	Not supplied (+V$_{LOG}$ floating or to GND)	High-Z (floating)			
	Normal operation	High-Z			
Output voltage	Logic "LOW"; output current = 0.4A		0.6	1.3	V
	Logic "HIGH"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to +V$_{LOG}$		V$_{LOG}$		
	Absolute maximum, continuous	-0.3		V$_{LOG}$+0.3	
	Absolute maximum, surge (duration ≤ 1s)†	-0.5		V$_{LOG}$+0.5	
Output current	Logic "LOW", sink current, continuous			0.4	A
	Logic "LOW", sink current, pulse ≤ 5 s			0.5	A
	Logic "HIGH", means High-Z			20	µA
Minimum pulse width		5	1.8		µs
ESD protection	Human body model	±15			kV

OUT0 – Brake or general-purpose digital output[2]		Min.	Typ.	Max.	Units
Mode compliance		PNP 24V			
Default state	Not supplied (+VLOG floating or to GND)	High-Z (floating)			
	Normal operation	Logic "High"			
Output voltage	Logic "HIGH"; output current = 1.5A		V$_{LOG}$-0.4	V$_{LOG}$-0.7	V
	Logic "LOW"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to GND		0		
	Absolute maximum, continuous	-0.3		V$_{LOG}$+0.3	
	Absolute maximum, surge (duration ≤ 1s)†	-0.5		V$_{LOG}$+0.5	
Output current	Logic "HIGH", source current, continuous			1.5	A
	Logic "HIGH", source current, pulse ≤ 5 s			2.0	A
	Logic "LOW", means High-Z			50	µA
Minimum pulse width		30	15		µs
ESD protection	Human body model	±15			kV

		Min.	Typ.	Max.	Units
Mode compliance		NPN 24V			
Default state	Not supplied (+V$_{LOG}$ floating or to GND)	High-Z (floating)			
	Normal operation	High-Z			
Output voltage	Logic "LOW"; output current = 2.0A		0.2	0.3	V
	Logic "HIGH"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to +V$_{LOG}$		V$_{LOG}$		
	Absolute maximum, continuous	-0.3		V$_{LOG}$+0.3	
	Absolute maximum, surge (duration ≤ 1s)†	-0.5		V$_{LOG}$+0.5	
Output current	Logic "LOW", sink current, continuous			2.0	A
	Logic "LOW", sink current, pulse ≤ 5 s			2.5	A
	Logic "HIGH", means High-Z			50	µA
Minimum pulse width		30	10		µs
ESD protection	Human body model	±15			kV

---

[1] For full RS-422 compliance, 120Ω termination resistors must be connected across the differential pairs, as close as possible to the drive input pins.

[2] The digital inputs and outputs are software selectable as PNP or NPN

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	June 5, 2024		August 7, 2024	

T TECHNOSOFT

Title of document
iPOS8015 MZ-CAN PRODUCT DATA SHEET

N° document
P022.036.E102.DSH.01A

Page: 4 of 5

Encoder2 Inputs (A2+/Data+, A2-/Data-, B2+/Clk+, B2-/Clk-, Z2+, Z2-)[1]		Min.	Typ.	Max.	Units
Differential mode compliance			TIA/EIA-422-A		
Input voltage	Hysteresis	±0.06	±0.1	±0.2	V
	Differential mode	-14		+14	
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential	A2+, B2+, Z2+ A2-, B2-, Z2-		120		Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns

Sin-Cos Encoder Inputs (Sin+, Sin-, Cos+, Cos-)		Min.	Typ.	Max.	Units
Input voltage, differential	Sin+ to Sin-, Cos+ to Cos-		1	1.25	V_{PP}
Input voltage, any pin to GND	Operational range	-1	2.5	4	V
	Absolute maximum values, continuous	-7		+7	
	Absolute maximum, surge (duration ≤ 1s)[†]	-11		+14	
Input impedance	Differential, Sin+ to Sin-, Cos+ to Cos-[2]	4.2	4.7		kΩ
	Common-mode, to GND		2.2		kΩ
Resolution with interpolation	Software selectable, for one sine/cosine period	2		10	bits
Frequency	Sin-Cos interpolation	0		450	kHz
	Quadrature, no interpolation	0		10	MHz
ESD protection	Human body model	±1			kV

Analog 0…5V Inputs (REF, FDBK)		Min.	Typ.	Max.	Units
Input voltage	Operational range	0		5	V
	Absolute maximum values, continuous	-12		+18	
	Absolute maximum, surge (duration ≤ 1s)[†]			±36	
Input impedance	To GND		28		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	kHz
ESD protection	Human body model	±5			kV

LV-TTL UART (RS-232 with external transceiver)			Min.	Typ.	Max.	Units
TTL TX	Voltage level	Absolute maximum, surge (duration ≤ 1s)[†]	-0.3		+3.6	V
		Logic 0		0	0.4	
		Logic 1	2.4	3.3		
	Output current	Absolute maximum, surge (duration ≤ 1s)[†]	-5		+5	mA
		-		-2	+2	
TTL RX	Voltage level	Absolute maximum, surge (duration ≤ 1s)[†]	-0.3		+3.6	V
		Logic 0		0	0.4	
		Logic 1	2.4	3.3		
	Input current		-0.15		+0.15	mA
Bit rate		Software selectable	9600		115200	Baud
Short-circuit		TTL TX short to GND	-No-			

⚠️ Do not connect directly to standard RS-232 serial connector!

⚠️ Always power-off the drive supplies before inserting/removing the adapter

Safe torque OFF (STO1+, STO1-, STO2+, STO2+)		Min.	Typ.	Max.	Units
Safety function	According to EN61800-5-2	STO (Safe Torque OFF)			
EN 61800-5-1/ -2 and EN 61508-5-3/ -4 Classification	Safety Integrity Level	safety integrity level 3 (SIL3)			
	PFHD (probability of dangerous failures per hour)	$8*10^{-10}$	hour^{-1} (0.8 FIT)		
EN13849-1 Classification	Performance Level	Cat3/PLe			
	MTTFM (meantime to dangerous failure)	377			years
Mode compliance		PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input voltage	Logic "LOW"	-20		5.6	V
	Logic "HIGH"	18		36	
	Absolute maximum, continuous	-20		+40	
Input current	Logic "LOW"; pulled to GND		0		mA
	Logic "HIGH", pulled to +Vlog		5	13	
Repetitive test pulses	Ignored high-low-high			5	ms
	-			20	Hz
Fault reaction time	From internal fault detection to register DER bit 14 =1 and OUT2/Error high-to-low			30	ms
PWM operation delay	From external STO low-high transition to PWM operation enabled			30	ms
ESD protection	Human body model	±2			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 AxisID pins	1 ÷ 127 & LSS non-configured (CANopen); 1 ÷127 & 255 (TMLCAN)			
	Software	1 ÷ 127 (CANopen); 1 ÷ 255 (TMLCAN)			
Voltage, CAN-Hi or CAN-Lo to GND	Absolute maximum, continuous	-36		36	V
ESD protection	Human body model	±15			kV

Conformity		Min.	Typ.	Max.	Units
EU Declaration	2014/30/EU (EMC), 2014/35/EU (LVD), 2011/65/EU (RoHS), 1907/2006/EC (REACH), 93/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, output frequency limited to 590Hz)				

[†] 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.

---

[1] Encoder2 differential input pins have internal 120Ω termination resistors connected across
[2] For many applications, a 120Ω termination resistor should be connected across SIN+ to SIN-, and across COS+ to COS-. Please consult the feedback device datasheet for confirmation.

[3] "FS" stands for "Full Scale"