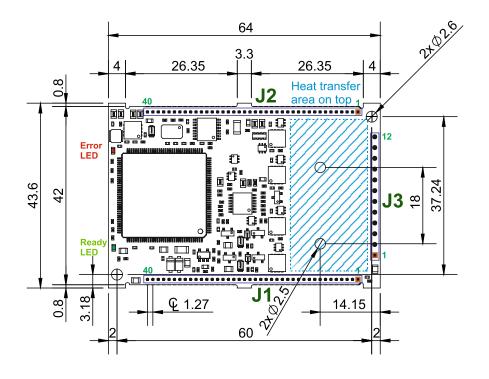
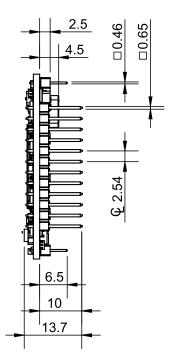
P/N: P022.015.E102

-preliminary-







Top view; Pins facing downward; All dimensions are in mm; Header pitch of J1 & J2 is 1.27mm and for J3 is 2.54 mm. Drawing not to scale.

- Features
- Motion controller and drive in a single compact unit based on MotionChip TM 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: 11-50V; Logic SELV/ PELV supply: 9-36V; STO SELV/ PELV supply: 18-40V
- Output current: 10A¹ RMS cont. (BLDC mode); 28 A_{PEAK} RMS, up to 100kHz PWM
- Operating ambient temperature: 0-40°C (over 40°C with derating)
- NTC/PTC analogue Motor Temperature sensor input
- Communication interfaces:
 - •USB
 - ■RS232
- TMLCAN and CANopen (CiA 301 v4.2, CiA 305 v.2.2.13 and CiA 402 v3.0) 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
 - pulse & direction interface (single ended or differential) for external (master) digital reference
 - 2nd feedback devices supported:
 - Incremental encoder interface (differential)
 - pulse & direction interface (differential) for external (master) digital
 - BISS / SSI / EnDAT / TAMAGAWA / Nikon / Sanyo Denki / Panasonic encoder interface
- 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 digital inputs, 12-36V, PNP/NPN programmable: 2 for limit switches, 4 general-purpose
- 6 digital outputs: 5-36V, programmable polarity: 0.3A sourcing/NPN or 0.2 A sinking/PNP: (Ready, Error and 4 general-purpose)
- 2 analogue inputs: 12-bit, 0-5V: Reference, Feedback or general purpose
- Integrated termination resistors for differential Feedback#2 pairs
- 128 h/w addresses selectable by h/w pins configuration
- 16k x 16 SRAM memory for data acquisition
- 24k x16 E²ROM to store setup data, TML motion programs, cam tables and other user data

Motor – sensor configurations							
Motor Sensor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)		
Incr. Encoder	T		T	T			
Incr. Encoder + Dig. Hall	T	T					
Linear Halls	T						
Digital Hall control only	T						
Analog Sin/Cos encoder	T	T	•	(T)			
BISS / SSI / EnDAT / TAMAGAWA / Nikon / Sanyo Denki / Panasonic	T	T	•	T			
Tacho			T				
Open-loop (no sensor)				T	7		

¹Nominal current can be increased if external cooling is ensured over cooling area

		PRODUCT DATA SHEET		Page: 1 of 6
LE (C)	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		Title of document	N° document	
ALN	May 4, 2021		July 21, 2022	
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:



P/N: P022.015.E102 -preliminary-

	Mating Connectors						
When J3 is plugged into a connector and maximum current should not exceed 12.7A Sine amplitude							
Ref	Producer Part No. Description						
	Harwin	M52-5012045	1x20 contacts, socket 1.27mm-pitch; 4 pcs needed for one drive				
J1, J2	2 Samtec	SMS-140-01-L-S	1x40 contacts, socket 1.27mm-pitch; 2 pcs				
Samtec	SMS-140-01-G-S	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 pc is needed for one drive; the current should not exceed 12.7A				
When			o a motherboard and the maximum d 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						

	Pin	Name	Туре	Description
	1,2	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
	3,4	Cr/B-	0	Chopping resistor / Phase B- for 2-ph steppers
	5,6	C/B+	0	Phase C for 3-ph motors, B+ for 2-ph steppers
73	7,8	B/A-	0	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
	9,10	A/A+	0	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: 11 to $48V_{\text{DC.}}$

	Pin	Name	Туре	Description
	1	Temp Mot	ı	NTC/PTC 3.3V input. Used to read an analog temperature value
	2	232TX	0	RS-232 Data Transmission
	3	232RX	- 1	RS-232 Data Reception
	4	USB Data-	I/O	USB Data negative
	5	USB Data+	I/O	USB Data positive
	6	USB V+	ı	USB +5V input
	7	Reserved	0	Reserved. Do not use
	8	Reserved	0	Reserved. Do not use
	9	Axis ID Bit7	-	8-bit H/W Axis ID register.
	10	Axis ID Bit6	ı	Connect pin to GND to set bit to 1.
	11	Axis ID Bit5	ı	Pin 16 is Bit 0 Pin 9 is Bit 7 of the Axis value. Possible values: from 1 to 128; and 255 when
	12	Axis ID Bit4	ı	all pins OFF.
	13	Axis ID Bit3	ı	When Axis ID is 255 and in CANOpen, the drive will be in LSS inactive state and the GREEN led
	14	Axis ID Bit2	ı	will flash at 1s intervals
	15	Axis ID Bit1	ı	BIT 7 OFF = TMLCAN; BIT 7 ON = CANOpen
	16	Axis ID Bit0	ı	
	17	Reserved	-	Reserved. Do not use
	18	Reserved	-	Reserved. Do not use
	19	Spi2 Clk	0	Reserved. Do not use
	20	Spi2 Out	0	Reserved. Do not use
	21	Spi2 In	l l	Reserved. Do not use
	22	Spi2 CS	0	Reserved. Do not use
5	23	Spi2 Irq	<u> </u>	Reserved. Do not use
•	24	Reserved	-	Reserved. Do not use
	25	Reserved	-	Reserved. Do not use
	26	Reserved		Reserved. Do not use
	27	Reserved	-	Reserved. Do not use
	28	Reserved	-	Reserved. Do not use
	29	Reserved	-	Reserved. Do not use
	30	Reserved	-	Reserved. Do not use
	31	Reserved	-	Reserved. Do not use
	32	Reserved	-	Reserved. Do not use
	33	Reserved	-	Reserved. Do not use
		Reserved	-	Reserved. Do not use
	35	Reserved	-	Reserved. Do not use Return ground. Internally connected to all GND
	36	GND	-	signals except STO GND.
	37	STO2-	ı	Safe Torque Off input 2, negative return (opto-isolated, 0V)
	38	STO2+	I	Safe Torque Off input Apply between both 2, positive input (opto-isolated, 18+40V) STO1-, STO2- 24V DC
	39	STO1-	ı	Safe Torque Off input from SELV/ PELV 1, negative return (opto-isolated, 0V) PWM output operation
	40	STO1+	I	Safe Torque Off input 1, positive input (opto- isolated, 18÷40V)

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	May 4, 2021		July 21, 2022	
		Title of document	N° document	
(2) LE	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		PRODUCT DATA SHEET		Page: 2 of 6



P/N: P022.015.E102

-preliminary-

	Pin	Name	Туре	Description
	1	LH1	I	Linear Hall 1 input
	2	LH2	ı	Linear Hall 2 input
	3	LH3	ı	Linear Hall 3 input
•	4	FDBK	ı	Analogue input, 12-bit, 0-5V. Reads analogue feedback (tacho), or general purpose
	5	REF	1	Analogue input, 12-bit, 0-5V. Reads analog reference, or general-purpose analogue input
	6	Hall 3	ı	Digital input Hall 3 sensor
	7	Hall 2	ı	Digital input Hall 2 sensor
	8	Hall 1	ı	Digital input Hall 1 sensor
	9	GND	-	Return ground. Internally connected to all GND signals except STO GND.
	10	IN5	ı	12-36V general-purpose digital PNP/NPN input
	11	IN4	- 1	12-36V general-purpose digital PNP/NPN input
	12	IN1	- 1	12-36V general-purpose digital PNP/NPN input
	13	IN0	- 1	12-36V general-purpose digital PNP/NPN input
	14	IN2/LSP	1	12-36V digital PNP/NPN input. Positive limit switch input
	15	IN3/LSN	ı	12-36V digital PNP/NPN input. Negative limit switch input
	16	OUT3	0	5-36V general-purpose digital output, 0.2A PNP/ 0.3A NPN, software selectable
	17	OUT2	0	5-36V general-purpose digital output, 0.2A PNP/ 0.3A NPN, software selectable
,	18	OUT5	0	5-36V general-purpose digital output, 0.2A PNP/ 0.3A NPN, software selectable
	19	OUT4	0	5-36V general-purpose digital output, 0.2A PNP/ 0.3A NPN, software selectable
,	20	OUT1	0	5-36V general-purpose digital output, 0.2A PNP/ 0.3A NPN, software selectable 5-36V general-purpose digital output, 0.2A PNP/ 0.3A
	21	OUT0	0	NPN, software selectable
72	22	Z1+ Z1-	<u> </u>	Incr. encoder1 Z single-ended, or Z+ diff. input,
ר י	23			Incr. encoder1 Z- diff. input Incr. encoder1 B single-ended, or B+ diff. input, or
i	24	B1+/Cos+	1	analogue encoder Cos+ diff. input Incr. encoder1 B- diff. input, or analogue encoder Cos-
	25	B1-/Cos-	-	lncr. encoder1 A single-ended, or A+ diff. input, or
	26	A1+/Sin+	ı	analogue encoder Sin+ diff. input
	27	A1-/Sin-	ı	Incr. encoder1 A- diff. input, or analogue encoder Sin- diff. input $% \label{eq:condition}%$
,	28	Z2+	1	Incr. encoder2 Z+ diff. input; has 150Ω resistor between pins 28 and 29
	29	Z2 -	ı	Incr. encoder2 Z- diff. input; has 150 Ω 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 150Ω 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 150Ω resistor between pins 30 and 31
	32	A2+/Pulse+ / Data+/SL+	ı	Incr. encoder2 A+ diff. input, or Pulse+, or Data+ for SSI, or Slave+ for BiSS; has 150Ω resistor between pins 32 and 33
	33	A2- /Pulse-/ Data-/SL-	ı	Incr. encoder2 A- diff. input, or Pulse-, or Data- for SSI, or Slave- for BiSS; has 150 $\!\Omega$ resistor between pins 32 and 33
	34	CAN-Lo	Т	CAN negative line
	35	CAN-Hi	ı	CAN positive line
	36	Reserved	-	Reserved. Do not use
	37	Reserved	-	Reserved. Do not use
	38	+5V _{OUT}	0	5V output supply for I/O usage
	39	-V _{LOG}	ı	Negative terminal of the logic supply input: 9 to $36V_{\text{DC}}$ from SELV/ PELV type power supply.
	40	+V _{LOG}	ı	Positive terminal of the logic supply input: 9 to $36V_{\text{DC}}$ from SELV/ PELV type power supply.

Electrical characteristics

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

- VLOG = 24 VDC; VMOT = 48VDC Supplies start-up / shutdown sequence: -any-

Load current	sinu	soidal amp	litude / cont. E	BLDC, DC, s	tepper) = 10A F	RMS
Operating Conditi	Conditions			Min.	Тур.	Max.	Units
Ambient temperatu	re			0		40 ¹	°C
Ambient humidity		Non-conde		0	0 . 0 5	90	%Rh
Altitude / pressure	2	Altitude (vs. sea level) Ambient Pressure		-0.1 0 ²	0 ÷ 2.5).75 ÷ 1	10.0	Km atm
Storage Conditions			Min.	Typ.	Max.	Units	
Ambient temperature				-40	71	100	°C
Ambient humidity		Non-conde	neina	0		100	%Rh
Ambient Pressure		14011-cond	in sing	0		10.0	atm
ESD capability			ed; applies to			±0.5	kV
(Human body mod	el)	any acces				±15	kV
Mechanical Mounting Original packaging			Min.	Тур.	Max.	Units	
Airflow	9					on ³ , close	
Spacing required		ween adjac		30			mm
for vertical	Bet wal		and nearby	30			mm
mounting	_		and roof-top	20			mm
		ween adjac		4			mm
Spacing required	Bet wal		and nearby	5			mm
for horizontal		ace needed	for drive	40			
mounting	_	noval		10			mm
Insertion force			and roof-top	15	TBD	TBD	mm N
Extraction force		nectors	ended mating	TBD	TBD	100	N
Power dissipation	No		nt, 20KHz,		TBD		Watt
	l	minal	EtherCAT		TBD		%
Global efficiency		rent, KHz	CANbus		TBD		%
Environmental Ch	arac	teristics		Min.	Тур.	Max.	Units
Size (Length x	Glo	bal size		64 x 43.6 x 13.7			mm
Width x Height) Weight				~2.52 x 1.72 x 0.54 20.4			inch g
Cleaning agents		cleaning is ommended		Only Wa			
Protection degree	Acc UL	cording to IE 508	C60529,	IP20			-
Logic Supply Inpu				Min.	Тур.	Max.	Units
		Nominal values Absolute maximum values,		9		36	V _{DC}
	driv	e operating	8		40	1/	
Supply voltage	guaranteed parameters Absolute maximum values, continuous			٥		-10	V _{DC}
ouppry voltage	Abs	solute maxin tinuous	rameters num values,	-0.6		42	V _{DC}
очррну voltage	Abs con Abs	solute maxin tinuous	num values,				
,	Abs con Abs sure	solute maxir itinuous solute maxir ge (duration og = 12V	num values,	-0.6	150	42	V _{DC}
Supply current	Abs con Abs sur +V _L +V _L	solute maxinatinuous solute maxinge (durationon = 12V og = 24V	num values,	-0.6	100	42	V _{DC}
Supply current	Abs con Abs surg +V _L +V _L	solute maxing tinuous solute maxing (duration of 12V of 24V of 40V	num values,	-0.6 -1	100 80	42 +45	V _{DC} V mA
,	Abs con Abs surg +V _L +V _L +V _L	solute maxinatinuous solute maxinage (duration og = 12V og = 24V og = 40V Vмот)	ameters num values, num values, ≤ 10ms) [†]	-0.6	100	42	V _{DC} V mA Units
Supply current Motor Supply Input	Abs con Abs sur +V _L +V _L +V _L Nor Abs driv	colute maxinitinuous colute maxininuous colute maxininge (duration colute = 12V colute = 24V col	ameters num values, num values, ≤ 10ms) inum values, but outside	-0.6 -1 Min.	100 80	42 +45 Max.	V _{DC} V mA
Supply current	Abs con Abs sury +VL +VL +VL (+' Nor Abs driv gua Abs con	colute maxinitinuous colute maxing ge (duration ge = 12V oog = 24V oog = 40V Vmor) minal values colute maxing er operating aranteed pair colute maxing colute maxing colute maxing colute maxing colute maxing colute maxing	ameters num values, sum values, ≤ 10ms) inum values, but outside ameters num values, num values,	-0.6 -1 Min.	100 80	42 +45 Max. 50	V _{DC} V mA Units V _{DC}
Supply current Motor Supply Input	Abscon Abscon Abscon Abscon Abscon Abscon Abscon Abscon	colute maxinationuous colute maxinationuo colute maxinatio	ameters num values, sum values, ≤ 10ms) inum values, but outside ameters num values, num values,	-0.6 -1 Min. 11	100 80	42 +45 Max. 50	V _{DC} V mA Units V _{DC} V _{DC}
Supply current Motor Supply Input	Abscon Abscon Abscon Abscon Abscon Abscon Abscon Abscon	colute maxintinuous colute	ameters num values, sum values, ≤ 10ms) inum values, but outside ameters num values, num values,	-0.6 -1 Min. 11 9 -0.6	100 80	42 +45 Max. 50 52	V _{DC} V mA Units V _{DC} V _{DC} V _{DC}
Supply current Motor Supply Input	Abs con Abs suri Idle Oppo Abs	colute maxintinuous colute	ameters num values, sum values, ≤ 10ms) inum values, but outside tameters num values, num values, sum values, sum values, num values, sum values, sum values, sum values, sum values,	-0.6 -1 Min. 11 9 -0.6	100 80 Typ .	42 +45 Max. 50 52 54	V _{DC} V mA Units V _{DC} V _{DC} V _{DC} V _{DC} V V

 $^{^3}$ 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

		PRODUCT DATA SHEET		Page: 3 of 6
(2) LE	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		Title of document	N° document	
ALN	May 4, 2021		July 21, 2022	
Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:

¹Operating temperature at higher temperatures is possible with reduced current and power ratings Possible with reduced cutent and power to 2 iPOS4810 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.



P/N: P022.015.E102 -preliminary-

Supply Output (+	5\/\		Min.	Tvn	Max.	Units
Output voltage	Current sourced =	250mA	4.8	Typ. 5	5.2	V
Output current	Ourient Sourceu -	20011174	7.0	TBD	0.2	mA
Short-circuit					otected	
Over-voltage				NOT pr	otected	
ESD protection	Human body mode	el	±1			kV
Isolation PE (earth) – GND					±250	V
Motor Outputs (A	/A+, B/A-, C/B+, CF	•	Min.	Тур.	Max.	Units
	for DC brushed, st and BLDC motors				14.3	
	based trapezoidal				14.5	
Nominal output current.	for PMSM motors					
continuous ¹	sinusoidal control	(sinusoidal			14.3	Α
	amplitude value) for PMSM motors	with FOC				
	sinusoidal control				10	
	effective value)	`				
Motor output	maximum TBD s		-40		+40	Α
current, peak Short-circuit	maximani 122 s					- ' '
protection			±43		±43	Α
threshold						, ,
Short-circuit				TBD		μS
protection delay	No. 1			100		μο
On-state voltage	Nominal output cu including typical m			TBD		V
drop	connector contact			100		V
Voltage efficiency				100		%
Off-state leakage				±0.5	±1	mA
current		_				
	Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 48 V	F _{PWM} 20 kHz	400			
		40 kHz	200			
		60 kHz	150			μН
Motor inductance		80 kHz	100			
(phase-to-phase)		100 kHz	80			
. ,	Minimum value,	20 kHz 60 kHz	150 50			
	limited by short- circuit	40 kHz	40			μH
	protection;	80 kHz	20			1
	+V _{MOT} = 48 V	100 kHz	10			
	Recommended	20 kHz	330			
Motor electrical	value for ±5%	40 kHz	170			
time-constant	current	60 kHz	140			μs
						μs
time-constant (L/R)	current measurement error	60 kHz 80 kHz 100 kHz	140 80	TBD		
time-constant (L/R) Current measurement	current measurement error FS = Full Scale ac	60 kHz 80 kHz 100 kHz ccuracy	140 80 66	TBD		%FS
time-constant (L/R) Current measurement Digital Hall Inputs	current measurement error	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Тур.	Max.	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall3	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Typ.	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall3 Input floating	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Typ.		%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall3	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Typ.	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH"	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Typ. / CMOS / Logic	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage	60 kHz 80 kHz 100 kHz ccuracy	140 80 66 Min.	Typ. / CMOS / Logic	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected)	60 kHz 80 kHz 100 kHz ccuracy 3)	140 80 66 Min. TTL	Typ. / CMOS / Logic 0 5	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "LOW" Floating voltage (not connected) Absolute maximur	60 kHz 80 kHz 100 kHz ccuracy 3)	140 80 66 Min.	Typ. / CMOS / Logic 0 5	Open-col	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximur (duration ≤ 1s) [†]	60 kHz 80 kHz 100 kHz ccuracy 3) ed)	140 80 66 Min. TTL	Typ. / CMOS / Logic 0 5	Open-col HIGH 0.8 +15	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "LOW" Floating voltage (not connected) Absolute maximur	60 kHz 80 kHz 100 kHz couracy 3) ed)	140 80 66 Min. TTL	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15	%FS Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "LOW" Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull	60 kHz 80 kHz 100 kHz couracy 3) ed)	140 80 66 Min. TTL	Typ. / CMOS / Logic 0 5	Open-col HIGH 0.8 +15	%FS Units lector V
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte	60 kHz 80 kHz 100 kHz couracy 3) ed)	140 80 66 Min. TTL	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15	%FS Units lector V
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5	60 kHz 80 kHz 100 kHz couracy 3) ed) ed) n, surge to GND rnal 4.7KΩ	140 80 66 Min. TTL 2 -10	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15	%FS Units lector V mA
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5	60 kHz 80 kHz 100 kHz couracy 3) ed) ed) n, surge to GND rnal 4.7KΩ	140 80 66 Min. TTL 2 -10 0 2 ±5	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0	%FS Units lector V mA µs kV
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mode s (LH1, LH2, LH3)	60 kHz 80 kHz 100 kHz couracy 3) ed) ed) n, surge to GND rnal 4.7KΩ	140 80 66 Min. TTL 2 -10 0 2 ±5 Min.	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max.	%FS Units lector V mA µs kV Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod- s (LH1, LH2, LH3) Operational range	60 kHz 80 kHz 100 kHz couracy 3) ed) m, surge to GND mal 4.7KΩ	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9	%FS Units lector V mA µs kV
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod s (LH1, LH2, LH3) Operational range Absolute maximum continuous	60 kHz 80 kHz 100 kHz couracy 33) ed) n, surge to GND rnal 4.7ΚΩ	140 80 66 Min. TTL 2 -10 0 2 ±5 Min.	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max.	%FS Units lector V mA µs kV Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mode s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum Absolute maximum Absolute maximum Absolute maximum	60 kHz 80 kHz 100 kHz couracy 33) ed) n, surge to GND rnal 4.7ΚΩ	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +7	%FS Units lector V mA µs kV Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mode s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum (duration ≤ 1s) duration ≤ 1s)	60 kHz 80 kHz 100 kHz couracy 33) ed) m, surge to GND rnal 4.7KΩ el	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0 -7	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +14	%FS Units lector V mA µs kV Units V
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Lugic "LOW"; Pull Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum (duration ≤ 1s) Input voltage 0+5	60 kHz 80 kHz 100 kHz couracy 3) ed) m, surge to GND rnal 4.7KΩ el	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +7	%FS Units lector V mA µs kV Units
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage Input voltage Input current	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod- s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum (duration ≤ 1s) Input voltage 0+5 Depending on softw	60 kHz 80 kHz 100 kHz couracy 3) ed) m, surge to GND rnal 4.7KΩ el	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0 -7	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +14	%FS Units lector V mA µs kV Units V
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Lugic "LOW"; Pull Logic "LOW"; Pull Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum (duration ≤ 1s) Input voltage 0+5	60 kHz 80 kHz 100 kHz couracy 3) ed) m, surge to GND rnal 4.7KΩ el	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0 -7	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +7 +14 0.2	%FS Units lector V mA µs kV Units V mA
time-constant (L/R) Current measurement Digital Hall Inputs Mode compliance Default state Input voltage Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage Input voltage Input current Input current Input state	current measurement error FS = Full Scale ac s (Hall1, Hall2, Hall: Input floating (wiring disconnect Logic "LOW" Logic "HIGH" Floating voltage (not connected) Absolute maximum (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5 Human body mod- s (LH1, LH2, LH3) Operational range Absolute maximum continuous Absolute maximum (duration ≤ 1s) Input voltage 0+5 Depending on softw	60 kHz 80 kHz 100 kHz 100 kHz scuracy 33) ed) m, surge to GND rnal 4.7KΩ el values, surge	140 80 66 Min. TTL 2 -10 0 2 ±5 Min. 0 -7 -11	Typ. / CMOS / Logic 0 5 4.4	Open-col HIGH 0.8 +15 1.2 0 Max. 4.9 +7 +14 0.2 11	%FS Units lector V mA µs kV Units V where the second of the second

Digital Inputs (IN0, IN1, IN2/LSP,	IN3/LSN, IN4, IN5, IN6) ²	Min.	Тур.	Max.	Units
Mode compliance			F	PNP	
Default state	Input floating (wiring disconnected)		Logi	ic LOW	
	Logic "LOW"	-10	0	2.2	
	Logic "HIGH"	6.3	24	36	
	Hysteresis	1.2	2.4	2.8	
Input voltage	Floating voltage (not connected)		0		V
	Absolute maximum, continuous	-10		+39	
	Absolute maximum, surge (duration ≤ 1s) [†]	-20		+40	
Input current	Logic "LOW"; pulled to GND		0		mA
input current	Logic "HIGH"		8	10	IIIA

Mode compliance		ļ	١	NPN		
Default state	Input floating (wiring disconnected)		Logi	c HIGH		
	Logic "LOW"		0	2.2		
	Logic "HIGH"	6.3	24	36		
	Hysteresis	1.2	2.4	2.8		
Input voltage	Floating voltage (not connected)		15		V	
	Absolute maximum, continuous	-10		+39		
	Absolute maximum, surge (duration ≤ 1s) [†]	-20		+40		
	Logic "LOW"; Pulled to GND		8	10		
Input current	Logic "HIGH"; Pulled to +24V	0	0	0	mA	
Input frequency		0		10	kHz	
Minimum pulse		6			μs	
ESD protection	Human body model	±5			kV	
Encoder1 Inputs (A1/A1+, A1-, B1/E	31+, B1-, Z1/Z1+, Z1-)	Min.	Тур.	Max.	Units	
Single-ended mode compliance	Leave negative inputs disconnected	TTL	CMOS	/ Open-co	ollector	
•	Logic "LOW"			1.6		
Input voltage,	Logic "HIGH"	1.8		1.0	V	
single-ended	Floating voltage (not	1.0				
mode A/A+, B/B+	connected)		3.3			
	Logic "LOW"			1.2		
Input voltage,	Logic "HIGH"	1.4			V	
single-ended mode Z/Z+	Floating voltage (not connected)		4.7		v	
Input current,	Logic "LOW"; Pull to GND		5.5	6		
single-ended mode A/A+, B/B+, Z/Z+	Logic "HIGH"; Internal 2.2KΩ pull-up to +5	0	0	0	mA	
Differential mode compliance	For full RS422 compliance, see ³	TIA/EIA-422-A			l	
	Hysteresis	±0.06	±0.1	±0.2		
Input voltage, differential mode	Common-mode range (A+ to GND, etc.)	-7		+7	٧	
Input impedance,	A1+ to A1-, B1+ to B1- Z1+ to Z1-		1		kΩ	
	Single-ended mode, Open- collector / NPN	0	'	5	MHz	
Input frequency	Differential mode, or Single- ended driven by push-pull (TTL / CMOS)	0		10	MHz	
	Single-ended mode, Open- collector / NPN	1			μs	
Minimum pulse width	Differential mode, or Single- ended driven by push-pull (TTL / CMOS)	50			ns	
	A I I I			+7		
Input voltage any	Absolute maximum values, continuous	-7		l · ′		
Input voltage, any pin to GND		-7 -11		+14	V	

 1 @20kHz $\rm F_{PWM}$ 2 The digital inputs and outputs are software selectable as PNP or NPN

 3 For full RS-422 compliance, 120 $\!\Omega$ termination resistors must be connected across the differential pairs, as close as possible to the drive input pins.

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	May 4, 2021		July 21, 2022	
$\overline{}$		Title of document	N° document	
TECHNOSOFT		iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		PRODUCT DATA SHEET		Page: 4 of 6



P/N: P022.015.E102

-preliminary-

Digital Outputs (OUT0, OUT1, OUT2/Error, OUT3/Ready, OUT4, OUT5) ¹ Min	. Тур.	Max.	Units
---	--------	------	-------

Mode compliance			PNP	24V	
Default	Not supplied (+VLOG floating or to GND)		High-Z (floating)	
state	Normal operation	Logic "High"			
	Logic "HIGH"; output current = 0.2A		V _{LOG} -0.2	V _{LOG} -0.8	
Output	Logic "LOW"; output current = 0, no load	open-collector			
voltage	Logic "HIGH", external load to GND		0		V
	Absolute maximum, continuous	-0.3		V _{LOG} +0.3	
	Absolute maximum, surge (duration ≤ 1s)	-0.5		V _{LOG} +0.5	
	Logic "HIGH", source current, continuous			0.2	Α
Output current	Logic "HIGH", source current, pulse ≤ 5 s			0.4	Α
	Logic "LOW", means High-Z				mΑ
Minimum pulse width		2			μs
ESD protection	Human body model	±15			kV

Mode compliance			NPN	24V		
Default	Not supplied (+VLOG floating or to GND)		High-Z (floating)		
state	Normal operation		High	ı-Z		
	Logic "LOW"; output current = 0.3A		0.2	8.0		
	Logic "HIGH"; output current = 0, no load	open-collector		or		
Output voltage	Logic "HIGH", external load to +V _{LOG}		V_{LOG}		V	
	Absolute maximum, continuous	-0.3		V _{LOG} +0.3		
	Absolute maximum, surge (duration ≤ 1s)	-0.5		V _{LOG} +0.5		
0.11	Logic "LOW", sink current, continuous			0.3	Α	
Output current	Logic "LOW", sink current, pulse ≤ 5 s			0.5	Α	
	Logic "HIGH", means High-Z				mA	
Minimum pulse width		2			μs	
ESD protection	Human body model	±15			kV	
Encoder2 In (A2+/Data+, Z2-) ¹	puts A2-/Data-, B2+/Clk+, B2-/Clk-, Z2+,	Min.	Тур.	Max.	Units	
Differential mode compliance			TIA/EIA	-422-A		
	Hysteresis	±0.06	±0.1	±0.2		
Input voltage	Differential mode	-14		+14	V	
vollage	Common-mode range (A+ to GND, etc.)	-11		+14		
Input impedance, differential	A2+, B2+, Z2+ A2-, B2-, Z2-		150		Ω	
Input frequency	Differential mode	0		10	MHz	
Minimum pulse width	Differential mode	50			ns	

Sin+, Sin-, Cos+, Cos-	Sin-Cos Encoder		Min.	Тур.	Max.	Units
Imput voltage, any pin to GND		Cos-)		136.	mux.	Onne
Input voltage, any pin to GND		Sin+ to Sin-, Cos+ to Cos-		1	1.25	V_{PP}
Input voltage, any pin to GND	amoroma		-1	2.5	4	
pin to GND	Innut voltage any		-7		+7	
Input impedance Cos² Common-mode, to GND Cos² Cos³ Cos						V
Differential, Sin+ to Sin-, Cos+ to Cos-2 Common-mode, to GND Cos-2 Common-mode, to GND Common-mod	•		-11		+14	
Input impedance		Differential, Sin+ to Sin-, Cos+				
Resolution with interpolation Software selectable, for one sine/cosine period Sine/co	Input impedance	to Cos- 2	4.2			KΩ
Interpolation	D 1.0 00			2.2		kΩ
Frequency			2		10	bits
ESD protection Human body model ±1		Sin-Cos interpolation				
Analog 05V Inputs (REF, FDBK) Min. Typ. Max. Units					10	
Input voltage				T		
Input voltage	Analog U5V Inp			тур.		Units
Input voltage			U		5	
Absolute maximum, surge (duration ≤ 1s) 1 ±36 Input impedance Resolution To GND 28 kΩ Resolution 12 bits bits Integral linearity ±2 bits ±2 bits Offset error ±2 ±10 bits 536 542 bits 437 \$652 542 bits 542 b	Innut valtage		-12		+18	.,
Input impedance To GND	input voitage					V
Input impedance To GND 28					±36	
Resolution	Input impedance	To GND		28		kO
Integral linearity						
Sain error Sandwidth (-3Db) Software selectable O					±2	bits
Bandwidth (-3Db) Software selectable D	Offset error			±2	±10	bits
ESD protection				±1%	±3%	% FS ³
RS-232			_		1	
Compliance		Human body model				
Bit rate			Min.			Units
Short-circuit ESD protection Human body model ±2 kV				TIA/EIA		
ESD protection	Bit rate	Software selectable	9600		115200	Baud
Safe torque OFF (ST01+, ST01-, ST02+, ST02+) Min. Typ. Max. Units Safety function EN 61800-5-1/-2 and EN 61508-5 3/-4 Classification According to EN61800-5-2 Safety Integrity Level Safety integrity level 3 (SIL3) STO (Safe Torque OFF) EN13849-1 Classification PFHD (probability of dangerous failures per hour) 8*10 ⁻¹⁰ hour¹ (0.8 FIT) EN13849-1 Classification Performance Level Cat3/PLe MTTFM (meantime dangerous failure) 10 Typ. years Mode compliance Input floating (wiring disconnected) Logic LOW Input voltage Logic "LOW" -20 5.6 Logic "HGH" Absolute maximum, continuous -20 +40 Input current Logic "LOW"; pulled to GND 0 Logic "LOW"; pulled to +Vlog 5 13 Repetitive test pulses (high-low-high) Ignored high-low-high 5 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	a			_		
Safety function			. 0	Guara	nteed	107
EN 61800-5-1/-2 and EN 61508-5-3/-4 FIFD (probability of dangerous failures per hour) Safety Integrity level 3 (SIL3)	ESD protection		±2	Guara	inteed	kV
And EN 61508-5 3/-4 Classification Friction First Part First Part Part First Part	ESD protection Safe torque OFF	Human body model				
3/ -4 Classification PFHD (probability of dangerous failures per hour) 8*10-10 hour¹ (0.8 FIT) EN13849-1 Classification Performance Level Cat3/PLe MTFM (meantime to dangerous failure) 377 years Mode compliance PNP Default state Input floating (wiring disconnected) Logic LOW Input voltage Logic "LOW" -20 5.6 Logic "HIGH" 18 36 V Absolute maximum, continuous -20 +40 V Input current Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog 5 13 mA Repetitive test pulses (high-low-high) Ignored high-low-high 5 ms Hz 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 Safe torque OFF (STO1+, STO1-, S Safety function	Human body model TO2+, STO2+)	Min.	Тур.	Max.	Units
Performance Level Cat3/PLe	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2	Human body model TO2+, STO2+) According to EN61800-5-2	Min.	Typ.	Max.	Units F)
Performance Level	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5-	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level	Min. S	Typ. FO (Safe 1 ty integrity	Max. orque OF	Units F)
EN13849-1 Classification	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4	TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous	Min. S	Typ. FO (Safe 1 ty integrity	Max. orque OF	Units F)
Default state	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour)	Min. S	Typ. FO (Safe 1 ty integrity	Max. Forque OF r level 3 (S	Units F)
Default state	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level	Min. S	Typ. TO (Safe 1 ty integrity hor	Max. Forque OF r level 3 (S	Units F) GIL3) T)
Default state	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to	Min. S	Typ. TO (Safe 1 ty integrity hor	Max. Forque OF r level 3 (S	Units F) GIL3) T)
Logic "LOW" -20 5.6 No.	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to	Min. S	Typ. FO (Safe 1 ty integrity hor Cat3	Max. Forque OF Plevel 3 (S Our 1 (0.8 Fl)	Units F) GIL3) T)
Logic "LOW"	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure)	Min. S	Typ. FO (Safe 1 ty integrity horizontal safe) Cat3 377	Max. Forque OF r level 3 (S ur-1 (0.8 FI)	Units F) GIL3) T)
Absolute maximum, continuous Input current Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Repetitive test pulses (high-low-high) Fault reaction time PWM operation delay Absolute maximum, continuous +40 +40 TM TM TM TM TM TM TM TM TM T	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring	Min. S	Typ. FO (Safe 1 ty integrity horizontal safe) Cat3 377	Max. Forque OF r level 3 (S ur-1 (0.8 FI)	Units F) GIL3) T)
Absolute maximum, continuous Input current Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Repetitive test pulses (high-low-high) Fault reaction time PWM operation delay Absolute maximum, continuous Logic "LOW"; pulled to GND 0 mA Table to GND 0 ms 20 ms 30 ms Tom internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low PWM operation delay Absolute maximum, continuous Table to GND Table to GND	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected)	Min. S ⁻ safe 8*10 ⁻¹⁰	Typ. FO (Safe 1 ty integrity horizontal safe) Cat3 377	Max. orque OF r level 3 (St. 10.0 Mex. 10.0 M	Units F) GIL3) T)
Input current	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH"	Min. S ⁻ safe 8*10 ⁻¹⁰	Typ. FO (Safe 1 ty integrity horizontal safe) Cat3 377	Max. Torque OF I level 3 (S I urr¹ (0.8 FI I/PLe INP LOW 5.6	Units F) III.3) T) years
Repetitive test pulses (high-low-high) Fault reaction time PWM operation delay Input current Logic "HIGH", pulled to +Vlog 5 13 11 13 13 11 13 13 13 11 13	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum,	Min. S safe 8*10 ⁻¹⁰	Typ. FO (Safe 1 ty integrity horizontal safe) Cat3 377	Max. orque OF level 3 (S lur¹ (0.8 FI /PLe NP LOW 5.6 36	Units F) III.3) T) years
Repetitive test pulses (high-low-high)	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hou	Max. orque OF level 3 (S lur¹ (0.8 FI /PLe NP LOW 5.6 36	Units F) III.3) T) years
pulses (high-low-high) Fault reaction time From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low PWM operation delay From external STO low-high transition to PWM operation enabled ms and and and and and and and and and an	ESD protection Safe torque OFF (STO1+, STO1-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF I level 3 (S I level 4 (S I	Units F) ilL3) T) years
Chigh-low-high 20 Hz	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Followell 3 (State of the North Control of the North Cont	Units F) ilL3) T) years
Fault reaction time From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low PWM operation delay From external STO low-high transition to PWM operation enabled 30 ms	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Followell 3 (State of the North Control of the North Cont	Units F) ilL3) T) years V mA
Fault reaction time 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 Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-17-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF relevel 3 (S relevel 3 (S relevel 3 (S relevel 3 (S relevel 4 (S relevel 4 (S relevel 5 (S relevel 5 (S relevel 5 (S relevel 5 (S relevel 6 (S rel	years V mA ms
time register DER bit 14 = 1 and OUT2/Error high-to-low PWM operation delay From external STO low-high transition to PWM operation enabled 30 ms	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-17-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF relevel 3 (S relevel 3 (S relevel 3 (S relevel 3 (S relevel 4 (S relevel 4 (S relevel 5 (S relevel 5 (S relevel 5 (S relevel 5 (S relevel 6 (S rel	years V mA ms
PWM operation delay From external STO low-high transition to PWM operation enabled 30 ms	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high)	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Verel 1 (0.8 Fi Verel 2 (0.8 Fi Verel 3 (5.6 Verel 3 (5.6 Verel 4 (0.8 Fi Verel	years V mA ms Hz
transition to PWM operation and transition to PWM operation enabled 30 ms	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Verel 1 (0.8 Fi Verel 2 (0.8 Fi Verel 3 (5.6 Verel 3 (5.6 Verel 4 (0.8 Fi Verel	years V mA ms Hz
transition to PWM operation and transition to PWM operation enabled 30 ms	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Verel 1 (0.8 Fi Verel 2 (0.8 Fi Verel 3 (5.6 Verel 3 (5.6 Verel 4 (0.8 Fi Verel	years V mA ms Hz
enabled	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction time	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF Verel 1 (0.8 Fi Verel 2 (0.8 Fi Verel 3 (5.6 Verel 3 (5.6 Verel 4 (0.8 Fi Verel	years V mA ms Hz
ESD protection Human body model ±2 kV	ESD protection Safe torque OFF (STO1+, STO1-, S) Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction time	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low From external STO low-high	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF relevel 3 (S ur-1 (0.8 FI /PLe NP LOW 5.6 36 +40 13 5 20 30	years V mA ms Hz ms
	ESD protection Safe torque OFF (STO1+, STO1-, S) Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction time	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low From external STO low-high transition to PWM operation	Min. S safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF relevel 3 (S ur-1 (0.8 FI /PLe NP LOW 5.6 36 +40 13 5 20 30	years V mA ms Hz ms
	ESD protection Safe torque OFF (ST01+, ST01-, S Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification EN13849-1 Classification Mode compliance Default state Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction time PWM operation delay	Human body model TO2+, STO2+) According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure) Input floating (wiring disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low From external STO low-high transition to PWM operation enabled	S: safe 8*10 ⁻¹⁰	Typ. TO (Safe 1 ty integrity hore) Cat3 377 Ph Logic	Max. Forque OF relevel 3 (S ur-1 (0.8 FI /PLe NP LOW 5.6 36 +40 13 5 20 30	years V mA ms Hz ms

3 "FS" stands for "Full Scale"

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	May 4, 2021		July 21, 2022	
		Title of document	N° document	
(3) LE	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		PRODUCT DATA SHEET		Page: 5 of 6

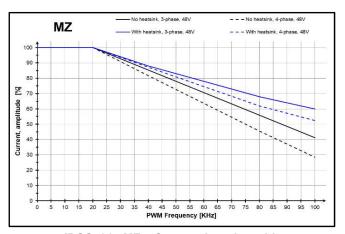
 $^{^1}$ Encoder2 differential input pins have internal 120 Ω termination resistors connected across 2 For many applications, a 120 Ω termination resistor should be connected across SIN+ to SIN-, and across COS+ to COS-. Please consult the feedback device datasheet for confirmation.



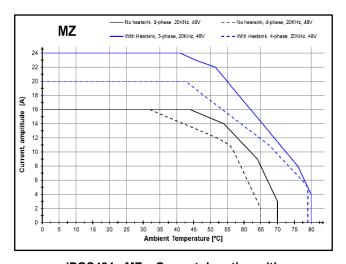
PUZZ.U15.E1UZ-

CAN-Bus			Min	Тур	Max	Units
Compliance				O11898, A 305 v2.:		
Bit rate		Software selectable	125		1000	Kbps
Bus length		1Mbps			25	
		500Kbps			100	m
		≤ 250Kbps			250	
Resistor		Between CAN-Hi, CAN-Lo		none c	n-board	
Node address	ing	Hardware: by Hex switch		127 & LSS (CAN) 127 & 25+	lopen);	Ü
		Software	1 ÷ 127 (CANopen); 1 ÷ 127 & 255 (TMLCAN)			
Voltage, CAN-Hi or CAN-Lo to GND Absolute maximur continuous		Absolute maximum, continuous	-36		36	V
ESD protectio	n	Human body model	±15			kV
Conformity			Min.	Тур.	Max.	Units
EU Declaration	20° 20° 190 93/	14/30/EU (EMC), 14/35/EU (LVD), 11/65/EU (ROHS), 07/2006/EC (REACH), 68/EEC (CE Marking Directive), 428/2009 (non dual-use item, ou	itput frequ	iency limi	ted to 590	OHz)

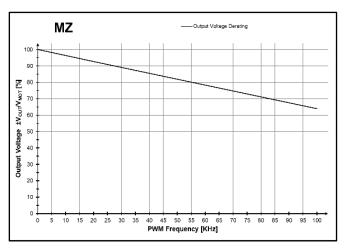
[†] Stresses beyond values listed under "absolute maximum ratings" may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.



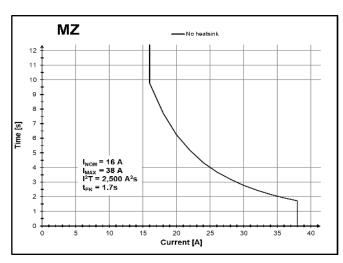
iPOS481x MZ – Current de-rating with PWM frequency, @48V



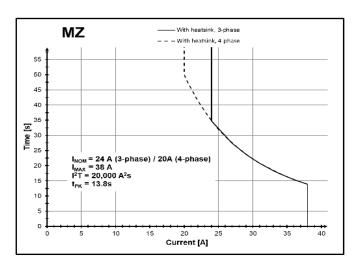
iPOS481x MZ – Current de-rating with ambient temperature



iPOS481x MZ – Output Voltage de-rating with PWM frequency



iPOS481x MZ – Over-current diagram (No heatsink)



iPOS481x MZ – Over-current diagram (With heatsink)

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	May 4, 2021		July 21, 2022	
		Title of document	N° document	
(~~) TE	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01E	
		11 004010 MIZ-OAN		