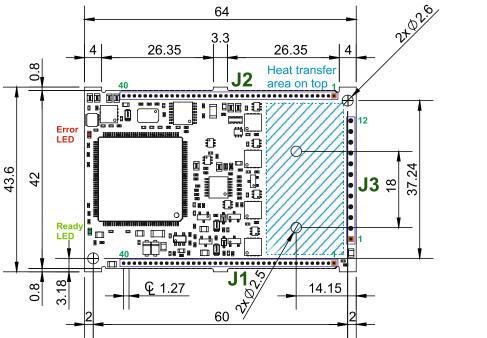
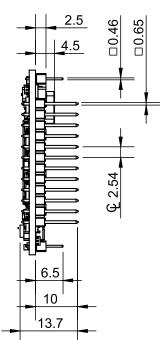


-preliminary-







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.

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

- 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 APEAK 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
 - dual 100Mbps EtherCAT® ports

- 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 reference
 - BISS / SSI / EnDAT / TAMAGAWA / 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, 0.5A, PNP/NPN programmable: Ready, Error, 4 general-purpose
- 2 analogue inputs: 12-bit, 0-5V: Reference, Feedback or general purpose
- Commissioning (set-up) possible through RS232, FoE (file-over-EtherCAT®), EoE (Ethernet-over-EtherCAT®)
- EtherCAT® connection between multiple MZ drives: direct 1:1 without any series components
- EtherCAT® connection to standard RJ45: requires external magnetics (may be integrated into RJ45)
- 255 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

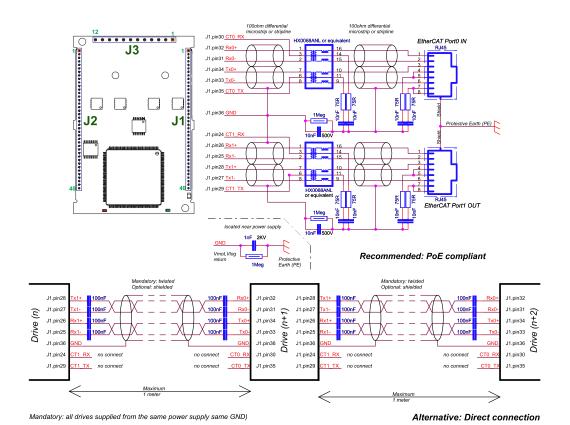
¹Nominal current can be increased if external cooling is ensured over cooling area

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		Mating C	Connectors
When	n J3 is plug	, .	ector and maximum current should 'A Sine amplitude
Ref	Producer	Part No.	Description
	Harwin	M52-5012045	1x20 contacts, socket 1.27mm-pitch; 4 pcs needed for one drive
J1, J2	Samtec	SMS-140-01-L-S	1x40 contacts, socket 1.27mm-pitch; 2 pcs
	Same	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 pcs 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 au capability	re directly soldered	onto a motherboard for increased current

	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
ಬ	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}	ı	Positive terminal of the motor supply: 11 to 48V _{DC} .

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	Pin	Name	Туре	Description
	1	Temp Mot		NTC/PTC 3.3V input. Used to read an analog
		•		temperature value
	2	232TX	0	RS-232 Data Transmission
	3	232RX	<u> </u>	RS-232 Data Reception
	4	USB Data-	I/O	USB Data negative
	5	USB Data+	I/O	USB Data positive
	6	USB V+		USB +5V input
	7	P1 LED	0	ECAT OUT port LED
	8	P0 LED	0	ECAT IN port LED
	9	reserved	-	O hit LIAM Avia ID register
	10	Axis ID Bit6	<u> </u>	8 bit H/W Axis ID register. Connect pin to GND to set bit to 1.
	11	Axis ID Bit5	<u> </u>	Sets hardware Axis ID that is found in the
	12	Axis ID Bit4	<u> </u>	_ECAT register configured station alias
	13	Axis ID Bit3	<u> </u>	Pin 16 is Bit 0Pin 10 is Bit 6 of the Axis value. Possible values: from 1 to 127; and 255 when
	14	Axis ID Bit2	<u> </u>	all pins OFF;
	15	Axis ID Bit1	<u> </u>	-When Axis ID is 255, the EtherCAT register
	16	Axis ID Bit0	<u> </u>	called "configured station alias" will be 0.
	17	RUN	0	Anode of Run LED (EtherCAT status machine).
	18	ERR	0	Anode of Error LED (EtherCAT status machine).
	19	Spi2 Clk	0	Reserved. Do not use
	20	Spi2 Out	0	Reserved. Do not use
	21	Spi2 In	ı	Reserved. Do not use
	22	Spi2 CS	0	Reserved. Do not use
	23	Spi2 Irq	ı	Reserved. Do not use
	24	CT1_Rx	-	Connect to center tap of OUT port magnetics PHY \ensuremath{Rx} .
_	25	RX1-	I/O	Receive/Transmit negative, OUT port. Connect to magnetics PHY RX1.
5	26	RX1+	I/O	Receive/Transmit positive, OUT port. Connect to magnetics PHY RX1.
	27	TX1-	I/O	Transmit/Receive negative, OUT port. Connect to magnetics PHY TX1.
	28	TX1+	I/O	Transmit/Receive positive, OUT port. Connect to magnetics PHY TX1.
	29	CT1_Tx	-	Connect to center tap of OUT port magnetics PHY Tx.
	30	CT0_Rx	-	Connect to center tap of IN port magnetics PHY Rx.
	31	RX0-	1/0	Receive/Transmit negative, IN port. Connect to magnetics PHY RX0.
	32	RX0+	I/O	Receive/Transmit positive, IN port. Connect to magnetics PHY RX0.
	33	TX0-	I/O	Transmit/Receive negative, IN port. Connect to magnetics PHY TX0.
	34	TX0+	I/O	Transmit/Receive positive, IN port. Connect to magnetics PHY TX0.
	35	СТ0_Тх	-	Connect to center tap of IN port magnetics PHY Tx.
	36	GND	-	Return ground. Internally connected to all 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+ and isolated, 18÷40V)
	39	STO1-	I	Safe Torque Off input from SELV/ PELV 1, negative return power supply for motor (opto-isolated, 0V) PWM output operation
	40	STO1+	ı	Safe Torque Off input 1, positive input (opto- isolated, 18÷40V)

	Pin	Name	Туре	Description
	1	LH1	ı ype	Linear Hall 1 input
	2	LH2	i	Linear Hall 2 input
	3	LH3	Ť	Linear Hall 3 input
	4	FDBK	ı	Analogue input, 12-bit, 0-5V. Reads an 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	Т	Digital input Hall 3 sensor
	7	Hall 2	ı	Digital input Hall 2 sensor
	8	Hall 1	ı	Digital input Hall 1 sensor
٠	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	ı	12-36V general-purpose digital PNP/NPN input
	12	IN1	ı	12-36V general-purpose digital PNP/NPN input
	13	IN0	- 1	12-36V general-purpose digital PNP/NPN input
	14	IN2/LSP	ı	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 5-36V general-purpose digital output, 0.2A PNP/ 0.3A
	19	OUT4	0	NPN, software selectable 5-36V general-purpose digital output, 0.2A PNP/ 5-36V general-purpose digital output, 0.2A PNP/
	20	OUT1	0	0.3A NPN, software selectable 5-36V general-purpose digital output, 0.2A PNP/ 0.3A
21	21	OUT0 Z1+	0 I	NPN, software selectable Incr. encoder1 Z single-ended, or Z+ diff. input,
72	23	Z1-	Ť	Incr. encoder1 Z- diff. input
•	24	B1+/Cos+	ı	Incr. encoder1 B single-ended, or B+ diff. input, or analogue encoder Cos+ diff. input
	25	B1-/Cos-	ı	Incr. encoder1 B- diff. input, or analogue encoder Cos- diff. input
	26	A1+/Sin+	ı	Incr. encoder1 A single-ended, or A+ diff. input, or analogue encoder Sin+ diff. input
	27	A1-/Sin-	ı	Incr. encoder1 A- diff. input, or analogue encoder Sindiff. input
i	28	Z2+	ı	Incr. encoder2 Z+ diff. input; has 150Ω resistor between pins 28 and 29
	29	Z2-	ı	Incr. encoder2 Z- diff. input; has 150Ω 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 150 $\!\Omega$ 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 150Ω resistor between pins 32 and 33
	34	Reserved	-	Reserved. Do not use
	35	Reserved	-	Reserved. Do not use
	36	Reserved	-	Reserved. Do not use
	37	Reserved	-	Reserved. Do not use
	38	+5V _{оит}	0	5V output supply for I/O usage
	39	-V _{LOG}	ı	Negative terminal of the logic supply input: 9 to $36\mbox{V}_{DC}$ from SELV/ PELV type power supply.
	40	+V _{LOG}	I	Positive terminal of the logic supply input: 9 to $36\mbox{V}_{DC}$ from SELV/ PELV type power supply.

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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 (sinusoidal amplitude / cont. BLDC, DC, stepper) = 10A RMS

Operating Conditi	Siriu	soldal amplitude / cont. E	LDC, DC	, stepper) = 10A F	CIVIO
	ions		Min.	Тур.	Max.	Units
Ambient temperatu			0	75.	40 ¹	°C
	ii e	Non condensing	0			%Rh
Ambient humidity		Non-condensing Altitude (vs. sea level)		0 ÷ 2.5	90	
Altitude / pressure ²	2		-0.1		40.0	Km
·		Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Condition	าร		Min.	Тур.	Max.	Units
Ambient temperatu	ire		-40		100	°C
Ambient humidity		Non-condensing	0		100	%Rh
Ambient Pressure			0		10.0	atm
		Not powered; applies to				
ESD capability (Human body mode	-1\	any accessible part			±0.5	kV
(Human body mod	ei)	Original packaging			±15	kV
Mechanical Moun	tina		Min.	Тур.	Max.	Units
Airflow	<u>9</u>			al convecti		
	Bet	ween adjacent drives	30	1 001110011	011 , 01000	mm
Spacing required		ween drives and nearby				
for vertical	wal		30			mm
mounting	_	ween drives and roof-top	20			mm
		ween adjacent drives	4			mm
		ween drives and nearby	-			
Spacing required	wal		5			mm
for horizontal		ace needed for drive	10			nc
mounting	rem	noval	10			mm
	Bet	ween drives and roof-top	15			mm
Insertion force	Usi	ng recommended mating		TBD	TBD	N
Extraction force	con	nectors	TBD	TBD		N
Environmental Ch	narac	teristics	Min.	Тур.	Max.	Units
Size (Length x	П		64	x 43.6 x 1	3.7	mm
Width x Height)	Glo	bal size				
3 1,			~2.5	2 x 1.72 x	0.54	inch
Weight				TBD		g
	Dry	cleaning is	0.1.		A1 I I. I	
Cleaning agents		ommended	Only	Water- or	Alconol- I	based
Protection degree	Acc	cording to IEC60529,		IP20		_
1 Totalion daylea	UL	508		11 20		
Logic Supply Inpu	ut (+\	/ _{LOG})	Min.	Тур.	Max.	Units
	Nor	minal values	9		36	V_{DC}
		solute maximum values,				
	driv	e operating but outside	8		40	V_{DC}
		ranteed parameters				
Supply voltage						
Supply voltage	Abs	solute maximum values,	-0.6		42	Vnc
Supply voltage	Abs	solute maximum values, itinuous	-0.6		42	V _{DC}
Supply voltage	Abs	solute maximum values,				-
Supply voltage	Abs con Abs	solute maximum values, tinuous solute maximum values, ge (duration ≤ 10ms)	-0.6 -1		42 +45	V _{DC}
Supply voltage	Abs con Abs	solute maximum values, stinuous solute maximum values,		TBD		-
Supply voltage Supply current	Abs con Abs sure	solute maximum values, tinuous solute maximum values, ge (duration ≤ 10ms)		TBD TBD		-
	Abs con Abs surg +V _L +V _L	solute maximum values, solute maximum values, solute maximum values, ge (duration ≤ 10ms)				V
	Abs con Abs surg +V _L +V _L	solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] ge (3 = 12V ge = 24V ge = 40V		TBD		V
Supply current	Abs con Abs surg +V _L +V _L +V _L	solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] ge (3 = 12V ge = 24V ge = 40V	-1	TBD TBD	+45	V mA
Supply current	Abs con Abs surg +V _L +V _L +V _L Nor	solute maximum values, titinuous solute maximum values, go (duration ≤ 10ms) o _O = 12V o _O = 24V o _O = 40V V _{MoT})	-1	TBD TBD	+45 Max.	V mA
Supply current	Abs con Abs surg +V _L +V _L +V _L Nor Abs	solute maximum values, titinuous solute maximum values, gg (duration ≤ 10ms) OG = 12V OG = 24V OG = 40V VMor) minal values	-1	TBD TBD	+45 Max.	V mA
Supply current Motor Supply Input	Abs con Abs surg +V _L +V _L tr (+' Nor Abs driv gua	solute maximum values, titinuous solute maximum values, solute maximum values, ge (duration ≤ 10ms) [†] ge (3 = 21 v ge = 24 v ge = 40 v VMor) minal values solute maximum values, the operating but outside tranteed parameters	-1 Min. 11	TBD TBD	+45 Max. 50	MA Units
Supply current	Abs con Abs surg +V _L +V _L tr (+' Nor Abs driv gua	solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] oo = 12V oo = 24V oo = 40V Vwor) minal values solute maximum values, e operating but outside	-1 Min. 11	TBD TBD	+45 Max. 50 52	V mA Units Vbc Vbc
Supply current Motor Supply Input	Abs con Abs surg +V _L +V _L ty t (+' Nor Abs driv gua Abs con	solute maximum values, stinuous solute maximum values, solute maximum values, ge (duration ≤ 10ms) og = 12V og = 24V og = 40V Vmor) minal values solute maximum values, e operating but outside uranteed parameters solute maximum values, tinuous	-1 Min. 11	TBD TBD	+45 Max. 50	MA Units
Supply current Motor Supply Input	Abs con Abs surg +V _L +V _L ty t (+' Nor Abs driv gua Abs con	solute maximum values, titinuous solute maximum values, solute maximum values, ge (duration ≤ 10ms) [†] ge (duration ≤ 10ms) [†] go = 12V go = 24V go = 40V VMor) minal values solute maximum values, re operating but outside tranteed parameters solute maximum values, solute maximum values,	-1 Min. 11 9 -0.6	TBD TBD	+45 Max. 50 52 54	V mA Units V _{DC} V _{DC}
Supply current Motor Supply Input	Abs con Abs surg +VL +VL Wt (+V Nor Abs driv gua Abs con Abs	solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) toos = 12V toos = 24V toos = 40V toos timinal values toolute maximum values, the operating but outside tranteed parameters toolute maximum values, titinuous toolute maximum values,	-1 Min. 11	TBD TBD	+45 Max. 50 52	V mA Units Vbc Vbc
Supply current Motor Supply Input	Abs con Abs surg +VL +VL Wt (+V Nor Abs driv gua Abs con Abs	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] ge (duration ≤ 10ms) [†] go = 24V go = 24V vos = 40V Very minal values solute maximum values, re operating but outside raranteed parameters solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†]	-1 Min. 11 9 -0.6	TBD TBD	+45 Max. 50 52 54	V mA Units V _{DC} V _{DC}
Supply current Motor Supply Input	Absscon Absscon Absscon Absscon Absscon Absscon Absscon Absscon Idle	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] ge (duration ≤ 10ms) [†] go = 24V go = 24V vos = 40V Very minal values solute maximum values, re operating but outside raranteed parameters solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†]	-1 Min. 11 9 -0.6	TBD TBD Typ.	+45 Max. 50 52 54	V mA Units VDC VDC VDC VDC
Supply current Motor Supply Input Supply voltage	Absscon	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†] oos = 12V oos = 24V oos = 40V VMort) minal values solute maximum values, the operating but outside uranteed parameters solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) [†]	-1 Min. 11 9 -0.6 -1	TBD TBD Typ.	+45 Max. 50 52 54 57	V mA Units VDC VDC VDC VDC VDC
Supply current Motor Supply Input	Abs con Abs surry +VL +VL ut (+) Nor Abs driv gua Abs con Abs surry Idle Ope Abs	solute maximum values, titinuous solute maximum values, solute maximum values, ge (duration ≤ 10ms) to ge (duration ≤ 10ms) to ge (duration ≤ 12V to ge = 24V to ge = 40V to	-1 Min. 11 9 -0.6 -1	TBD TBD Typ.	+45 Max. 50 52 54 57 5 +40	V mA Units VDC VDC VDC VDC
Supply current Motor Supply Input Supply voltage	Abs con Abs surry +VL +VL Wut (+) Nor Abs drivingua Abs con Abs surry Idle Ope Abs sho	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) to os = 12V os = 24V os = 40V to os = 4	-1 Min. 11 9 -0.6 -1	TBD TBD Typ.	+45 Max. 50 52 54 57	V mA Units VDC VDC VDC VDC VDC
Supply current Motor Supply Inpu Supply voltage Supply current	Abs surr +VL +VL +VL Ut (+' Nor Abs driv gua Abs con Abs surr Idle Ope Abs sho (du	solute maximum values, titinuous solute maximum values, solute maximum values, ge (duration ≤ 10ms) to ge (24V cos = 24V cos = 40V VMor) minal values solute maximum values, re operating but outside tranteed parameters solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) to ge (duration ≤ 10m	-1 Min. 11 9 -0.6 -1 -40	TBD TBD Typ.	+45 Max. 50 52 54 57 5 +40 43	V mA Units Vbc Vbc Vbc V bc A A A
Supply current Motor Supply Input Supply voltage Supply current Supply Output (+8)	Abs surg +VL +VL ut (+) Nor Abs driv gua Abs con Abs surg Idle Ope (du	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) toos = 12V toos = 24V toos = 40V	-1 Min. 11 9 -0.6 -1 -40 Min.	TBD TBD Typ. 1 ±10	+45 Max. 50 52 54 57 5 +40 43 Max.	MA Units VDC VDC VDC V MA A A Units
Supply current Motor Supply Inpr Supply voltage Supply current Supply Output (+: Output voltage	Abs surg +VL +VL ut (+) Nor Abs driv gua Abs con Abs surg Idle Ope (du	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) to os = 12V os = 24V os = 40V to os = 4	-1 Min. 11 9 -0.6 -1 -40	TBD TBD Typ. 1 ±10 Typ. 5	+45 Max. 50 52 54 57 5 +40 43	V mA Units VDC VDC VDC V MA A A Units
Supply current Motor Supply Input Supply voltage Supply current Supply Output (+8 Output voltage Output current	Abs surg +VL +VL ut (+) Nor Abs driv gua Abs con Abs surg Idle Ope (du	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) toos = 12V toos = 24V toos = 40V	-1 Min. 11 9 -0.6 -1 -40 Min.	TBD TBD Typ. 1 ±10 Typ. 5 TBD	+45 Max. 50 52 54 57 5 +40 43 Max. 5.2	MA Units VDC VDC VDC V MA A A Units
Supply current Motor Supply Input Supply voltage Supply Current Supply Output (+8 Output voltage Output current Short-circuit	Abs surg +VL +VL ut (+) Nor Abs driv gua Abs con Abs surg Idle Ope (du	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) toos = 12V toos = 24V toos = 40V	-1 Min. 11 9 -0.6 -1 -40 Min.	TBD TBD Typ. 1 ±10 Typ. 5 TBD NOT pn	+45 Max. 50 52 54 57 5 +40 43 Max. 5.2 ottected	V mA Units VDC VDC VDC V MA A A Units
Supply current Motor Supply Input Supply voltage Supply current Supply Output (+8 Output voltage Output current	Abs surr +VL +VL +VL Worr Abs driv gua Abs con Abs surr Idle Ope Abs sho (du	solute maximum values, titinuous solute maximum values, titinuous solute maximum values, ge (duration ≤ 10ms) toos = 12V toos = 24V toos = 40V	-1 Min. 11 9 -0.6 -1 -40 Min.	TBD TBD Typ. 1 ±10 Typ. 5 TBD	+45 Max. 50 52 54 57 5 +40 43 Max. 5.2 ottected	V mA Units VDC VDC VDC V MA A A Units

Motor Outputs (A	/A+, B/A-, C/B+, CI	R/B-)	Min.	Тур.	Max.	Units
Newton	for DC brushed, st and BLDC motors based trapezoidal	with Hall-			14.3	
Nominal output current, continuous ⁴	for PMSM motors sinusoidal control amplitude value)				14.3	А
	for PMSM motors sinusoidal control effective value)				10	
Motor output current, peak	maximum TBD s		-40		+40	Α
Short-circuit protection threshold			±43		±43	Α
Short-circuit protection delay				TBD		μS
On-state voltage drop	Nominal output cu including typical m connector contact	ating		TBD		٧
Voltage efficiency				100		%
Off-state leakage current				±0.5	±1	mA
	Recommended value, for current ripple max. ±5% of ull range;	F _{PWM} 20 kHz 40 kHz 60 kHz 80 kHz				μН
Motor inductance (phase-to-phase)	+V _{MOT} = 36 V Minimum value, limited by short-circuit protection;	100 kHz 20 kHz 60 kHz 40 kHz 80 kHz				μН
Motor electrical time-constant (L/R)	+V _{MOT} = 36 V Recommended value for ±5% current measurement error	100 kHz 20 kHz 40 kHz 60 kHz 80 kHz 100 kHz				μs
Current measurement	FS = Full Scale ad			TBD		%FS
	s (Hall1, Hall2, Hall	3)	Min.	Тур.	Max.	Units
Mode compliance		-,		/ CMOS /		
Default state	Input floating (wiring disconnect	ed)		Logic		
	Logic "LOW"	/		_	0.8	1
	1:- (111011)			0	0.0	
Input voltage	Logic "HIGH" Floating voltage		2	5 4.4	0.0	· V
Input voltage	Floating voltage (not connected) Absolute maximum	m, surge	-10	5	+15	V
Input voltage	Floating voltage (not connected) Absolute maximum (duration ≤ 1s)	-		5		V
Input current	Floating voltage (not connected) Absolute maximum	to GND		5	+15	V mA
Input current Minimum pulse width	Floating voltage (not connected) Absolute maximur (duration ≤ 1s) [†] Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5	to GND rnal 4.7KΩ	-10	5 4.4	+15	
Input current Minimum pulse width ESD protection	Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5	to GND rnal 4.7KΩ	-10 0 2 ±5	5 4.4	+15 1.2 0	mA μs kV
Input current Minimum pulse width ESD protection Linear Hall Inputs	Floating voltage (not connected) Absolute maximur (duration ≤ 1s) Logic "LOW"; Pull Logic "HIGH"; Inte pull-up to +5	to GND rnal 4.7KΩ	-10 0 2 ±5 Min.	5 4.4 0	+15 1.2 0	mA μs kV Units
Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage	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	to GND rnal 4.7KΩ el	-10 0 2 ±5	5 4.4	+15 1.2 0	mA μs kV Units V
Input current Minimum pulse width ESD protection Linear Hall Inputs	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)	to GND rnal 4.7KΩ el values,	-10 0 2 ±5 Min. 0	5 4.4 0	+15 1.2 0 Max. 4.9	mA μs kV Units
Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage	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	to GND rnal 4.7KΩ el values, , surge	-10 0 2 ±5 Min. 0 -7	5 4.4 0	+15 1.2 0 Max. 4.9 +7	mA μs kV Units V
Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage Input current Interpolation Resolution	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)	to GND rnal 4.7KΩ el values, , surge	-10 0 2 ±5 Min. 0 -7 -11	5 4.4 0	+15 1.2 0 Max. 4.9 +7 +14 0.2	mA µs kV Units V V mA bits
Input current Minimum pulse width ESD protection Linear Hall Inputs Input voltage Input voltage Input current Interpolation	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+€ Depending on softv	to GND rnal 4.7KΩ el values, , surge sv	-10 0 2 ±5 Min. 0 -7 -11	5 4.4 0	+15 1.2 0 Max. 4.9 +7 +14 0.2	mA µs kV Units V V mA

 $^{^3}$ 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 @20kHz $\rm F_{PWM}$

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
EP	February 11, 2021		May 4, 2021	AN
		Title of document	N° document	
(3) LE	CHNOSOFT	iPOS4810 MZ-CAT	P022.015.E122.DSH.01E	
		PRODUCT DATA SHEET		Page: 4 of 6

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



iPOS4810 MZ-CAT DATASHEET P/N: P022.015.E122

-preliminary-

Digital Inputs (IN0, IN1, IN2/LSP Mode compliance	, IN3/LSN, IN4, IN5, IN6) ¹	Min.	Тур.	Max.	Units
Default state	Input floating (wiring disconnected)			c LOW	
	Logic "LOW"	-10	0	2.2	
	Logic "HIGH"	6.3	24	36	
	Hysteresis	1.2	2.4	2.8	
	Floating voltage (not		0		
Input voltage	connected)		U		V
	Absolute maximum,	-10		+39	
	Continuous Absolute maximum, surge				
	(duration ≤ 1s)	-20		+40	
	Logic "LOW"; pulled to GND		0		
Input current	Logic "HIGH"		8	10	mA
Mode compliance			١	IPN	
Default state	Input floating (wiring		Logi	c HIGH	
2 oraun oran	disconnected)		Log.		
	Logic "LOW"	L	0	2.2	
	Logic "HIGH"	6.3	24	36	
					1
	Hysteresis	1.2	2.4	2.8	
Input voltage	Floating voltage (not		15		V
. •	connected)		10		1
	Absolute maximum,	-10		+39	
	continuous				
	Absolute maximum, surge	-20		+40	
	(duration ≤ 1s) ^T				
	Logic "LOW"; Pulled to GND		8	10	
Input current	Logic "HICH": Dulled to 124\/	0	0	0	mA
	Logic "HIGH"; Pulled to +24V		U		
Input frequency					
		0		10	kHz
Minimum pulse	Human hady madel	6		10	μs
Minimum pulse ESD protection	Human body model	6 ±5			μs kV
Minimum pulse ESD protection Encoder1 Inputs		6	Тур.	Max.	μs
Minimum pulse ESD protection Encoder1 Inputs	Human body model 31+, B1-, Z1/Z1+, Z1-) Leave negative inputs	6 ±5 Min.		Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/B	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected	6 ±5 Min.		Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW"	6 ±5 Min. TTL		Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH"	6 ±5 Min.	CMOS	Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW"	6 ±5 Min. TTL		Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+	S1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"	6 ±5 Min. TTL.	CMOS	Max.	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Logic "HIGH"	6 ±5 Min. TTL	CMOS	Max. / Open-co	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended	A1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected)	6 ±5 Min. TTL.	CMOS	Max. / Open-co	μs kV Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode A/A+, B/B+	S1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected)	6 ±5 Min. TTL.	3.3 4.7	Max. / Open-co	us kV Units Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+	Al+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH"	6 ±5 Min. TTL.	CMOS	Max. / Open-co	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+,	S1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ	6 ±5 Min. TTL.	3.3 4.7	Max. / Open-co	us kV Units Units
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5	6 ±5 Min. TTL 1.8	3.3 4.7 5.5	Max. / Open-co	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode	S1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance,	6 ±5 Min. TTL 1.8	3.3 4.7 5.5	Max. / Open-co	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5	6 ±5 Min. TTL 1.8	3.3 4.7 5.5	Max. / Open-cc 1.6 1.2 6	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage,	S1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range	6 ±5 Min. TTL. 1.8 1.4	3.3 4.7 5.5 0	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.)	6 ±5 Min. TTL 1.8	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1-	6 ±5 Min. TTL. 1.8 1.4	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units ollector V
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1-	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units Ollector V mA
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1-	6 ±5 Min. TTL. 1.8 1.4	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units collector V mA
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units Ollector V mA V κΩ MHz
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode Z/Z+ Input vortage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2ΚΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2	μs kV Units Ollector V mA
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode Z/Z+ Input vortage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open- collector / NPN Differential mode, or Single- ended driven by push-pull (TTL / CMOS)	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units Ollector V mA V κΩ MHz
Minimum pulse ESD protection Encoder1 Inputs (Ar)/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode Z/Z+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode compliance Input impedance, differential	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units Ollector V mA V κΩ MHz
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode linput voltage, differential mode Input voltage, differential mode Input impedance, differential	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-collector / NPN Single-ended mode, Open-collector / NPN	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units Ollector V mA V κΩ MHz
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode linput voltage, differential mode Input voltage, differential mode Input impedance, differential	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units Ollector V mA V κΩ MHz
Minimum pulse ESD protection Encoder1 Inputs (An/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode Input impedance, differential	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, or Single-ended driven by push-pull (TTL / CMOS)	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units collector V mA V kΩ MHz μs
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode compliance Input voltage, differential mode Input voltage, differential mode Input voltage, differential mode Input impedance, differential Input impedance, differential Input frequency Minimum pulse width	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Absolute maximum values,	6 ±5 Min. TTL. 1.8 1.4 0 ±0.06 -7	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-co 1.6 1.2 6 0 IA-422-A ±0.2 +7 5 10	μs kV Units collector V mA V kΩ MHz μs
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/E) Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended mode Z/Z+ Input current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input roltage, differential mode Input roltage, differential mode Input impedance, differential Input frequency Minimum pulse width	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Absolute maximum values, continuous	6 ±5 Min. TTL. 1.8 1.4 0 \$\pmu\$0.06 -7\$ 0 1 50	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-cc 1.6 1.2 6 0 IA-422-A ±0.2 +7	μs kV Units collector V mA V kΩ MHz μs
Minimum pulse ESD protection Encoder1 Inputs (A1/A1+, A1-, B1/Is) Single-ended mode compliance nput voltage, single-ended mode A/A+, B/B+ nput voltage, single-ended mode Z/Z+ nput current, single-ended mode A/A+, B/B+, Z/Z+ Differential mode compliance nput voltage, differential mode nput impedance, differential nput impedance, differential nput frequency Minimum pulse width	B1+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ² Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Single-ended mode, Open-collector / NPN Differential mode, or Single-ended driven by push-pull (TTL / CMOS) Absolute maximum values,	6 ±5 Min. TTL. 1.8 1.4 0 \$\pmu\$0.06 -7\$ 0 1 50	3.3 4.7 5.5 0 TIA/E ±0.1	Max. / Open-co 1.6 1.2 6 0 IA-422-A ±0.2 +7 5 10	μs kV Units Ollector V MA V MHz MHz μs

Digital Outp (OUT0, OUT OUT5) ¹	uts 1, OUT2/Error, OUT3/Ready, OUT4,	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		
0.11	Logic "HIGH", source current, continuous			0.2	А	
Output current	Logic "HIGH", source current, pulse ≤ 5 s			0.4	Α	
	Logic "LOW", means High-Z				mA	
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 (f	floating)	
state	Normal operation		High	n-Z	
	Logic "LOW"; output current = 0.3A		0.2	0.8	
	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	
0.1-1	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 Inputs (A2+/Data+, A2-/Data-, B2+/Clk+, B2-/Clk-, Z2+, Z2-) ³		Min.	Тур.	Max.	Units
Differential mode compliance			TIA/EI/	4-422-A	
	Hysteresis	±0.06	±0.1	±0.2	
Input voltage	Differential mode	-14		+14	V
	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

 $^{^3}$ Encoder2 differential input pins have internal 150 $\!\Omega$ termination resistors connected across

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 $^{^1}$ The digital inputs and outputs are software selectable as PNP or NPN 2 For full RS-422 compliance, 120Ω termination resistors must be connected across the differential pairs, as close as possible to the drive input pins.



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-preliminary-

Sin-Cos Encoder (Sin+, Sin-, Cos+,		Min.	Тур.	Max.	Units
Input voltage, differential	Sin+ to Sin-, Cos+ to Cos-		1	1.25	V_{PP}
	Operational range	-1	2.5	4	
Input voltage, any	Absolute maximum values, continuous	-7		+7	V
pin to GND	Absolute maximum, surge (duration ≤ 1s) [†]	-11		+14	
Inna Canada an	Differential, Sin+ to Sin-, Cos+	4.2	4.7		kΩ
Input impedance	to Cos- 1 Common-mode, to GND		2.2		kΩ
Resolution with interpolation	Software selectable, for one sine/cosine period	2	2.2	10	bits
•	Sin-Cos interpolation	0		450	kHz
Frequency	Quadrature, no interpolation	0		10	MHz
ESD protection	Human body model	±1			kV
Analog 05V Inp	uts (REF, FDBK)	Min.	Тур.	Max.	Units
	Operational range	0		5	
Input voltage	Absolute maximum values, continuous	-12		+18	V
	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 ²
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	±5			kV
RS-232		Min.	Тур.	Max.	Units
Compliance			TIA/EIA	1-232-C	,
Bit rate	Software selectable	9600		115200	Baud
Short-circuit	232TX short to GND		Guara	inteed	
ESD protection	Human body model	±2			kV
Safe torque OFF (STO1+, STO1-, S	TO2+ STO2+)	Min.	Тур.	Max.	Units
Safety function	According to EN61800-5-2	S	TO (Safe T	orque OF	F)
EN 61800-5-1/ -2	Safety Integrity Level		ty integrity		
and EN 61508-5- 3/ -4 Classification	PFHD (probability of dangerous failures per hour)	8*10 ⁻¹⁰	ho	ur ⁻¹ (0.8 FI	T)
EN13849-1	Performance Level		Cat3	/PLe	
Classification	MTTFM (meantime to dangerous failure)		377		years
Mode compliance			PI	NP	
		Logic LOW			
Default state	Input floating (wiring disconnected)		Logic		1
Default state	disconnected) Logic "LOW"	-20	Logic	5.6]
Default state Input voltage	disconnected) Logic "LOW" Logic "HIGH" Absolute maximum,	18	Logic	5.6 36	V
Input voltage	disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND		0	5.6 36 +40	
Input voltage	disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	18		5.6 36 +40	mA
Input voltage Input current Repetitive test pulses	disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND	18	0	5.6 36 +40	
Input voltage Input current Repetitive test	disconnected) Logic "LOW" Logic "HIGH" Absolute maximum, continuous Logic "LOW"; pulled to GND Logic "HIGH", pulled to +Vlog	18	0	5.6 36 +40	mA ms
Input voltage Input current Repetitive test pulses (high-low-high) Fault reaction	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	18	0	5.6 36 +40 13 5	mA ms Hz

Ethernet Ports		Min.	Тур.	Max.	Units	
		EtherCAT (IEC61158-3/4/5/6-12)				
Standard		Fast Ethernet 100BASE-TX (IEEE802.3u)				
Compliance		Auto-neg	or 100Mb olex	ps/s full-		
		Auto-detect MDI/MDI-X				
Power over Ethernet	NOT used by the iPOS4810, requires separate +Vlog	compliant to IEEE802.3af mode A "Mixed DC & Data"				
	SELV/ PELV supply	NOT compliant to IEEE8 mode B "DC on Span				
Isolation	Requirement for motherboard	500			V_{rms}	
GND0,GND1	PCB routing	1.5			kV_{peak}	
Maximum cable length	2-pair UTP Cat5	100	150		m	
ESD protection	Human body model	±4			kV	
When the connections between drives are done directly, without magnetics						

When the connections between drives are done directly, without magnetics (nonstandard, not conform to Ethernet IEEE802.3 100BASE-TX), it is imperative that the ground voltage difference between drives is kept to a minimum. The installation must provide a supplementary GND link between the drives. This link must have low inductance. Low inductance is best achieved by using large metal parts, such as a metallic chassis / baseplate, or using copper conductive tape.

LED signals			Min. Typ. Max. Units				
LED				Common cathode to GND			
connection			Direct, no series resistor			tor	
LED current			0.7 1 mA			mA	
Conformity			Min. Typ. Max. Units		Units		
EU Declaration	20 20 19	14/30/EU (EMC), 14/35/EU (LVD), 11/65/EU (ROHS), 07/2006/EC (REACH), /68/EEC (CE Marking Directive),					

EC 428/2009 (non dual-use item, output frequency limited to 590Hz)

 $^{^1}$ 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.

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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.