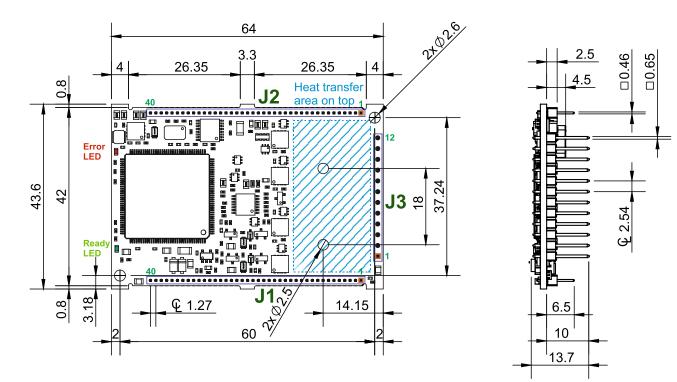
iPOS4810 MZ-CAN DATASHEET P/N: P022.015.E102



-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 [™] 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,
- Output current: 10A' 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
- 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 (single ended or differential) (single ended or differential) for external (single ended or differential) (single
- (master) digital reference 2nd feedback devices supported:
- Incremental encoder interface (differential)
 - pulse & direction interface (differential) for external (master) digital reference
- 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 configu	rations				
Motor Sensor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)
Incr. Encoder	1		5	3	
Incr. Encoder + Dig. Hall	6	6			
Linear Halls	1				
Digital Hall control only	6				
Analog Sin/Cos encoder	1	9	5	3	
BISS / SSI / EnDAT / TAMAGAWA / Nikon / Sanyo Denki / Panasonic	F	T	9	3	
Tacho			5		
Open-loop (no sensor)				3	T

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		Mating (Connectors
Wher	n J3 is plug	50	ector and maximum current should 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	J2 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 a 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
J3	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+	ο	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 _{DC} .

	Pin	Name	Туре	Description
	1	Temp Mot	I	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+	1/0	USB Data positive
	6	USB V+	1	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	1	Connect pin to GND to set bit to 1.
	11	Axis ID Bit5	I	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	I	all pins OFF.
	13	Axis ID Bit3	I	When Axis ID is 255 and in CANOpen, the drive
	14	Axis ID Bit2	I	will be in LSS inactive state and the GREEN led _will flash at 1s intervals
	15	Axis ID Bit1	I	BIT 7 OFF = TMLCAN; BIT 7 ON = CANOpen
	16	Axis ID Bit0	I	
	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	I	Reserved. Do not use
	22	Spi2 CS	0	Reserved. Do not use
~	23	Spi2 Irq	I	Reserved. Do not use
7	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
	34	Reserved	-	Reserved. Do not use
	35	Reserved	-	Reserved. Do not use
	36	GND	-	Return ground. Internally connected to all GND signals except STO GND.
	37	STO2-	I	Safe Torque Off input 2, negative return (opto-isolated, 0V)
	38	STO2+	I	Safe Torque Off input 2, positive input (opto- solated, 18+40V) STO1-, STO2- 24V DC
	39	STO1-	I	Safe Torque Off input 1, negative return (opto-isolated, 0V) PKM output operation
	40	STO1+	I	Safe Torque Off input 1, positive input (opto- isolated, 18+40V)

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Name

Туре

Pin

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. . .

	1	LH1	I	Linear Hall 1 input
	2	LH2	I	Linear Hall 2 input
	3	LH3	1	Linear Hall 3 input
	4	FDBK	I	Analogue input, 12-bit, 0-5V. Reads analogue feedback (tacho), or general purpose
	5	REF	I	Analogue input, 12-bit, 0-5V. Reads analog reference, or general-purpose analogue input
	6	Hall 3	I	Digital input Hall 3 sensor
	7	Hall 2	1	Digital input Hall 2 sensor
	8	Hall 1		Digital input Hall 1 sensor
	9	GND	-	Return ground. Internally connected to all GND signals except STO GND.
	10	IN5		12-36V general-purpose digital PNP/NPN input
	11	IN4	1	12-36V general-purpose digital PNP/NPN input
	12	IN1	I	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	1	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
1	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 5-36V general-purpose digital output, 0.2A PNP/ 0.3A
i	20	OUT1	0	NPN, software selectable 5-36V general-purpose digital output, 0.2A PNP/ 0.3A 5-36V general-purpose digital output, 0.2A PNP/ 0.3A
	21	OUT0	0	NPN, software selectable
	22	Z1+	I	Incr. encoder1 Z single-ended, or Z+ diff. input,
72	23	Z1-	1	Incr. encoder1 Z- diff. input
	24	B1+/Cos+	I	Incr. encoder1 B single-ended, or B+ diff. input, or analogue encoder Cos+ diff. input
	25	B1-/Cos-	Т	Incr. encoder1 B- diff. input, or analogue encoder Cos- diff. input
1	26	A1+/Sin+	I	Incr. encoder1 A single-ended, or A+ diff. input, or analogue encoder Sin+ diff. input
	27	A1- /Sin-	T	Incr. encoder1 A- diff. input, or analogue encoder Sin- diff. input
1	28	Z2+	1	Incr. encoder2 Z+ diff. input; has 150Ω resistor between pins 28 and 29
	29	Z2-	Т	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 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-	T	Incr. encoder2 A- diff. input, or Pulse-, or Data- for SSI, or Slave- for BiSS; has 150Ω resistor between pins 32 and 33
	34	CAN-Lo	T	CAN negative line
	35	CAN-Hi	I.	CAN positive line
	36	Reserved	-	Reserved. Do not use
	37	Reserved	-	Reserved. Do not use
	38	+5V _{OUT}	0	5V output supply for I/O usage
	39	-VLOG	I	Negative terminal of the logic supply input: 9 to $36V_{DC}$ from SELV/ PELV type power supply.
	40	+V _{LOG}	I	Positive terminal of the logic supply input: 9 to 36V _{DC} from SELV/ PELV type power supply.

Description

Electrical characteristics

All parameters measured under the following conditions (unless otherwise specified): VLOG = 24 VDC; VMOT = 48VDC Supplies start-up / shutdown sequence: -anyLoad current (sinusoidal amplitude / cont. BLDC. DC. stepper) = 10A RMS

.....

	(sinusoidal amp					
Operating Condit	ions		Min.	Тур.	Max.	Units
Ambient temperatu			0		401	°C
Ambient humidity	Non-conde		0		90	%Rh
Altitude / pressure		s. sea level)	-0.1 0 ²	0 ÷ 2.5	40.0	Km
Storogo Condition	Ambient P	ressure	-).75 ÷ 1	10.0	atm
Storage Condition	15		Min.	Тур.	Max.	Units
Ambient temperatu	ıre		-40		100	°C
Ambient humidity	Non-conde	ensing	0		100	%Rh
Ambient Pressure			0		10.0	atm
ESD capability		ed; applies to			±0.5	kV
(Human body mod	el) any access Original pa			_	115	LA /
Machanical Marry		ickaging	Min.	Ture	±15 Max.	kV
Mechanical Moun Airflow	ung			Typ.	on ³ , close	Units
	Between adjac	ent drives	30	Jonvecu		mm
Spacing required	Between drives					
for vertical mounting	walls	,	30			mm
mounting	Between drives		20			mm
	Between adjac		4	+		mm
Spacing required	Between drives walls	and nearby	5			mm
for horizontal	Space needed	for drive				
mounting	removal	-	10			mm
	Between drives		15			mm
Insertion force	Using recomme	ended mating		TBD	TBD	N
Extraction force Power	connectors		TBD	TBD		N
dissipation	Nominal curre Vmot=48V	nt, 20KHZ,		TBD		Watt
dissipation	Nominal	EtherCAT		TDD		0/
Global efficiency	current,			TBD		%
- ,	20KHz	CANbus		TBD		%
Environmental Ch	naracteristics		Min.	Тур.	Max.	Units
Size (Length x	Global size		64 x -	43.6 x 13	3.7	mm
Width x Height)	Giobal size		~2.52	x 1.72 x	0.54	inch
Weight	Duralization			20.4		g
Cleaning agents	Dry cleaning is recommended		Only W	ater- or /	Alcohol- b	ased
Desta di se l	According to IE	C60529		IDCC		T
Protection degree	UL508	,		IP20		-
Logic Supply Inp	ut (+V _{LOG})		Min.	Тур.	Max.	Units
	Nominal values		9		36	V _{DC}
	Absolute maxin		<u> </u>		40	
	drive operating	but outside	8	1	40	VDC
Supply voltage	duaranteed nor	ameters				
Sappiy Vollage	guaranteed par Absolute maxir					
Cappiy Voltage	guaranteed par Absolute maxin continuous		-0.6		42	V _{DC}
Cappiy tollage	Absolute maxin	num values,				
Cappiy voltage	Absolute maxin continuous Absolute maxin surge (duration	num values, num values,	-0.6 -1		42 +45	V _{DC}
	Absolute maxin continuous Absolute maxin surge (duration +V _{LOG} = 12V	num values, num values,		150		V
Supply current	Absolute maxin continuous Absolute maxin surge (duration +V _{LOG} = 12V +V _{LOG} = 24V	num values, num values,		100		-
Supply current	Absolute maxin continuous Absolute maxin surge (duration +V _{LOG} = 12V +V _{LOG} = 24V +V _{LOG} = 40V	num values, num values,	-1	100 80	+45	V mA
	Absolute maxir continuous Absolute maxir surge (duration +V _{LOG} = 12V +V _{LOG} = 24V +V _{LOG} = 40V ut (+V _{MOT})	num values, num values, _ ≤ 10ms) [†]	-1 Min.	100	+45 Max.	V mA Units
Supply current	Absolute maxin continuous Absolute maxin surge (duration + $V_{LOG} = 12V$ + $V_{LOG} = 24V$ + $V_{LOG} = 40V$ ut (+ V_{MOT}) Nominal values	num values, num values, ≤ 10ms) [†]	-1	100 80	+45	V mA
Supply current	Absolute maxir continuous Absolute maxir surge (duration + $V_{LOG} = 12V$ + $V_{LOG} = 24V$ + $V_{LOG} = 40V$ ut (+ V_{MOT}) Nominal values Absolute maxir	num values, num values, ≤ 10ms) [†]	-1 Min. 11	100 80	+45 Max. 50	MA MA Units V _{DC}
Supply current Motor Supply Inp	Absolute maxin continuous Absolute maxin surge (duration + $V_{LOG} = 12V$ + $V_{LOG} = 24V$ + $V_{LOG} = 40V$ ut (+ V_{MOT}) Nominal values	num values, num values, ≤ 10ms) [†] s num values, but outside	-1 Min.	100 80	+45 Max.	V mA Units
Supply current	Absolute maxin continuous Absolute maxin $+V_{LOG} = 12V$ $+V_{LOG} = 24V$ $+V_{LOG} = 40V$ ut (+V _{MOT}) Nominal values Absolute maxin drive operating guaranteed par Absolute maxin	num values, num values, ≤ 10ms) [†] s num values, but outside rameters	-1 Min. 11 9	100 80	+45 Max. 50 52	V mA Units V _{DC} V _{DC}
Supply current Motor Supply Inp	Absolute maxir continuous Absolute maxir surge (duration +V _{LOG} = 12V +V _{LOG} = 24V +V _{LOG} = 40V ut (+V _{MOT}) Nominal values Absolute maxir drive operating guaranteed par Absolute maxir continuous	num values, num values, ≤ 10ms) [†] s num values, but outside ameters num values,	-1 Min. 11	100 80	+45 Max. 50	MA MA Units V _{DC}
Supply current	Absolute maxin continuous Absolute maxin surge (duration $+V_{LOG} = 12V$ $+V_{LOG} = 24V$ $+V_{LOG} = 40V$ ut (+V_{MOT}) Nominal values Absolute maxin drive operating guaranteed par Absolute maxin continuous	num values, num values, i ≤ 10ms) [†] s num values, but outside rameters num values, num values,	-1 Min. 11 9	100 80	+45 Max. 50 52 54	V mA Units V _{DC} V _{DC}
Supply current	Absolute maxir continuous Absolute maxir surge (duration +V _{LOG} = 12V +V _{LOG} = 24V +V _{LOG} = 40V ut (+V_{MOT}) Nominal values Absolute maxir drive operating guaranteed par Absolute maxir continuous Absolute maxir surge (duration	num values, num values, i ≤ 10ms) [†] s num values, but outside rameters num values, num values,	-1 Min. 11 9 -0.6	100 80 Typ .	+45 Max. 50 52 54 57	V mA Units VDC VDC VDC VDC VDC VDC
Supply current Motor Supply Inp	Absolute maxin continuous Absolute maxin surge (duration + $V_{LOG} = 12V$ + $V_{LOG} = 24V$ + $V_{LOG} = 40V$ ut (+V_{MOT}) Nominal values Absolute maxin drive operating guaranteed par Absolute maxin continuous Absolute maxin surge (duration Idle	num values, num values, i ≤ 10ms) [†] s num values, but outside rameters num values, num values,	-1 Min. 11 9 -0.6 -1	100 80 Typ .	+45 Max. 50 52 54 57 5	V mA Units V _{DC} V _{DC} V _{DC} V _{DC} V _{DC} V _{DC}
Supply current Motor Supply Inp Supply voltage	Absolute maxin continuous Absolute maxin $VL_{0G} = 12V$ $+VL_{0G} = 24V$ $+VL_{0G} = 40V$ ut (+V _{MOT}) Nominal values Absolute maxin drive operating guaranteed par Absolute maxin continuous Absolute maxin surge (duration Idle Operating	num values, num values, ≤ 10ms) [†] s num values, but outside rameters num values, num values, num values,	-1 Min. 11 9 -0.6	100 80 Typ .	+45 Max. 50 52 54 57	V mA Units V _{DC} V _{DC} V _{DC} V _{DC} V _{DC}
Supply current Motor Supply Inp	Absolute maxir continuous Absolute maxir surge (duration + $V_{LOG} = 12V$ + $V_{LOG} = 24V$ + $V_{LOG} = 40V$ ut (+V_{MOT}) Nominal values Absolute maxir drive operating guaranteed par Absolute maxir surge (duration Idle Operating Absolute maxir	num values, num values, ≤ 10ms) [†] s num values, but outside ameters num values, ≤ 10ms) [†] mum values,	-1 Min. 11 9 -0.6 -1	100 80 Typ .	+45 Max. 50 52 54 57 5 +40	V mA Units V _{DC} V _{DC} V _{DC} V _{DC} V _{DC} V _{DC} N A
Supply current Motor Supply Inp Supply voltage	Absolute maxin continuous Absolute maxin $VL_{0G} = 12V$ $+VL_{0G} = 24V$ $+VL_{0G} = 40V$ ut (+V _{MOT}) Nominal values Absolute maxin drive operating guaranteed par Absolute maxin continuous Absolute maxin surge (duration Idle Operating	num values, num values, ≤ 10ms) [†] num values, but outside ameters num values, ≤ 10ms) [†]	-1 Min. 11 9 -0.6 -1	100 80 Typ .	+45 Max. 50 52 54 57 5	V mA Units V _{DC} V _{DC} V _{DC} V _{DC} V _{DC} V _{DC}

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,

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

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Supply Output (+	5V)		Min.	Тур.	Max.	Units
Output voltage	Current sourced =	250mA	4.8	5	5.2	V
Output current Short-circuit				TBD NOT pr	otected	mA
Over-voltage				NOT pr		
ESD protection	Human body mode		±1			kV
Isolation PE (eart	:h) – GND / A+, B/A-, C/B+, C F		Min.	Tum	±250 Max.	V Units
Motor Outputs (A	for DC brushed, st		WIIII.	Тур.	wax.	Units
	and BLDC motors				14.3	
Nominal output	based trapezoidal for PMSM motors					
current,	sinusoidal control				14.3	А
continuous ¹	amplitude value)					
	for PMSM motors sinusoidal control				10	
	effective value)	(
Motor output current, peak	maximum TBD s		-40		+40	А
Short-circuit						
protection			±43		±43	A
threshold Short-circuit						
protection delay				TBD		μS
On-state voltage	Nominal output cu including typical m			TBD		v
drop	connector contact			TOD		v
Voltage efficiency				100		%
Off-state leakage current				±0.5	±1	mA
	Recommended	FPWM				
	value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V	20 kHz 40 kHz				
		60 kHz				μН
Motor inductance		80 kHz				
(phase-to-phase)	Minimum value, limited by short-	100 kHz 20 kHz				
		60 kHz				
	circuit	40 kHz				μН
	protection; +V _{MOT} = 36 V	80 kHz 100 kHz				
	Recommended	20 kHz				
Motor electrical	value for ±5%	40 kHz				
time-constant (L/R)	current measurement	60 kHz 80 kHz				μs
(2)(1)	error	100 kHz				
Current	FS = Full Scale ac	curacy		TBD		%FS
measurement	s (Hall1, Hall2, Hall3	3)	Min.	Тур.	Max.	Units
Mode compliance	,,,,,,,,,	-,		/ CMOS /		
Default state	Input floating	l)		Logic	HIGH	
	(wiring disconnected	ea)		0	0.8	
	Logic "HIGH"		2	5	0.0	
Input voltage	Floating voltage (not connected)			4.4		v
	Absolute maximun	n, surge				
	$(duration \le 1s)^{\dagger}$	-	-10		+15	
	Logic "LOW"; Pull	to GND			1.2	
Input current	Logic "HIGH"; Inte pull-up to +5	rnal 4.7KΩ	0	0	0	mA
Minimum pulse			2			μs
width ESD protection	Human body mode		±5			μ0 kV
Linear Hall Inputs			±5 Min.	Тур.	Max.	Units
Input voltage	Operational range		0	0.5÷4.5	4.9	V
	Absolute maximum	values,	-7		+7	
	continuous Absolute maximum,	surge				V
	$(duration \le 1s)^{\dagger}$	-	-11		+14	
Input current	Input voltage 0+5	V	0		0.2	mA
	Depending on softw settings	are			11	bits
Frequency			0		1	kHz
ESD protection	Human body model		±1			kV

	, IN3/LSN, IN4, IN5, IN6) ²	Min.	Тур.	Max.	Units	
Mode compliance	Input floating (wiring		F	PNP		
Default state	disconnected)		Logi	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)		0		V	
	Absolute maximum, continuous	-10		+39		
	Absolute maximum, surge					
	$(duration \le 1s)^{\dagger}$	-20		+40		
	Logic "LOW"; pulled to GND		0			
Input current	Logic "HIGH"		8	10	mA	
Mode compliance			1	IPN		
Default state	Input floating (wiring		l ogi	c HIGH		
Bolaaltolato	disconnected)	-	209.		r –	
	Logic "LOW"		0	2.2		
	Logic "HIGH"	6.3	24	36	1	
		0.0			ł	
	Hysteresis	1.2	2.4	2.8		
Input voltage	Floating voltage (not	1	15		v	
input voltage	connected)		15			
	Absolute maximum,	-10		+39		
	continuous	10		.00		
	Absolute maximum, surge	-20		+40		
	(duration ≤ 1s) [†]	-20		.40		
	Logic "LOW"; Pulled to GND		8	10		
Input current					mA	
•	Logic "HIGH"; Pulled to +24V	0	0	0		
Input frequency		0		10	kHz	
Minimum pulse		6			μs	
505 / //						
ESD protection	Human body model	±5			kV	
Encoder1 Inputs		±5 Min.	Тур.	Max.		
Encoder1 Inputs	31+, B1-, Z1/Z1+, Z1-)	Min.			Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected	Min.		Max. / Open-co	Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW"	Min. TTL			Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended	81+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH"	Min.		/ Open-co	Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not	Min. TTL		/ Open-co	Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected)	Min. TTL	CMOS	/ Open-co	Units	
Encoder1 Inputs (A1/A1+, A1-, B1/E 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	Min. TTL	CMOS	/ Open-co	Units ollector V	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected)	Min. TTL / 1.8	3.3	/ Open-co	Units	
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+	31+, 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)	Min. TTL / 1.8	/ CMOS 3.3 4.7	/ Open-co	Units ollector V	
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,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected)	Min. TTL / 1.8	3.3	/ Open-co	Units ollector V	
Encoder1 Inputs (A1/A1+, A1-, B1/E Single-ended mode compliance Input voltage, single-ended mode A/A+, B/B+ Input voltage, single-ended Input current, single-ended	31+, 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 "LOW" Logic "LOW" Logic "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ	Min. TTL . 1.8	2.7 7 CMOS 3.3 4.7 5.5	/ Open-co 1.6 1.2 6	Units ollector V	
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,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Floating voltage (not connected) Logic "LOW"; Pull to GND	Min. TTL / 1.8	/ CMOS 3.3 4.7	/ Open-co	Units bllector V V	
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	31+, 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 "LOW" 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,	Min. TTL . 1.8	2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7	/ Open-ca 1.6 1.2 6 0	Units ollector V	
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+	31+, 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 ³	Min. TTL. 1.8 1.4	(CMOS 3.3 4.7 5.5 0 TIA/E	/ Open-ca 1.6 1.2 6 0 IA-422-A	Units ollector V	
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,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" 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 ³ Hysteresis	Min. TTL . 1.8 1.4 0 ±0.06	2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7 2.7	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2	Units ollector V V mA	
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	31+, 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 "LOW" 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 3 Hysteresis Common-mode range	Min. TTL. 1.8 1.4	(CMOS 3.3 4.7 5.5 0 TIA/E	/ Open-ca 1.6 1.2 6 0 IA-422-A	Units bllector V V	
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	31+, 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 "LOW" Logic "LOW"; Pull to GND Logic "LOW"; Pull to GND Logic "LOW"; Pull to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ Hysteresis Common-mode range (A+ to GND, etc.)	Min. TTL . 1.8 1.4 0 ±0.06	2.000 2.0000 2.00000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.0000 2.00000 2.00000 2.00000000	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2	Units ollector V mA	
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,	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" 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 ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1-	Min. TTL . 1.8 1.4 0 ±0.06	(CMOS 3.3 4.7 5.5 0 TIA/E	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2	Units ollector V V mA	
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 impedance,	31+, 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 "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-	Min. TTL . 1.8 1.4 0 ±0.06 -7	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7	Units ollector V W mA	
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 impedance, differential	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Logic "HIGH" Floating voltage (not connected) Logic "HIGH" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, Open-collector / NPN	Min. TTL . 1.8 1.4 0 ±0.06	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2	Units ollector V W mA	
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 impedance,	31+, 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"; Fluit to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ 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-	Min. TTL. 1.8 1.4 0 ±0.06 -7 0	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz	
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 impedance, differential	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "HIGH", Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ 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	Min. TTL . 1.8 1.4 0 ±0.06 -7	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7	Units ollector V W mA V kΩ MHz	
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 impedance, differential	31+, 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"; Fluit to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ 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-	Min. TTL. 1.8 1.4 0 ±0.06 -7 0 0 0	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz MHz	
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 A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input impedance, differential	31+, 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"; Full to GND Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ 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	Min. TTL. 1.8 1.4 0 ±0.06 -7 0	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz	
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 impedance, differential Input frequency Minimum pulse	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" 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 ³ 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 mode, Open-collector / NPN Single-ended mode, Open-collector / NPN Differential mode, or Single-	Min. TTL ₀ 1.8 1.4 0 ±0.06 -7 0 0 1.1	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz MHz μs	
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 A/A+, B/B+, Z/Z+ Differential mode compliance Input voltage, differential mode Input impedance, differential	31+, B1-, Z1/Z1+, Z1-) Leave negative inputs disconnected Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "LOW" Logic "LOW" Logic "HIGH" Floating voltage (not connected) Logic "HIGH"; Internal 2.2KΩ pull-up to +5 For full RS422 compliance, see ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended mode, or Single- ended driven by push-pull Differential mode, or Single- ended mode, or Single- ended driven by push-pull	Min. TTL. 1.8 1.4 0 ±0.06 -7 0 0 0	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz MHz	
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 impedance, differential Input frequency Minimum pulse	31+, 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 ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended 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) Single-ended mode, or Single-ended driven by push-pull (TTL / CMOS)	Min. TTL ₀ 1.8 1.4 0 ±0.06 -7 0 0 1.1	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V W mA V kΩ MHz MHz μs	
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 Input voltage, differential mode Input voltage, differential Input requency Minimum pulse width	31+, 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 ³ 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,	Min. TTL ₀ 1.8 1.4 0 ±0.06 -7 0 0 1.1	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5	Units ollector V MA MHz MHz μs ns	
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 Input voltage, differential Input impedance, differential Input frequency Minimum pulse width Input voltage, any	31+, 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 ³ Hysteresis Common-mode range (A+ to GND, etc.) A1+ to A1-, B1+ to B1- Z1+ to Z1- Single-ended 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) Single-ended mode, or Single-ended driven by push-pull (TTL / CMOS)	Min. TTL. 1.8 1.8 1.4 0 ±0.06 -7 0 0 1 50 -7	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-ca 1.6 1.2 6 0 IA-422-A ±0.2 +7 5 10 +7 +7	Units ollector V W mA V kΩ MHz MHz μs	
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 Input voltage, differential mode Input voltage, differential Input requency Minimum pulse width	31+, 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 ³ 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 mode, or Single-ended driven by push-pull (TTL / CMOS) Absolute maximum values, continuous	Min. TTL / 1.8 1.4 0 ±0.06 -7 0 0 1.1 0 1.2 0 1.3 1.4 1.4 0 1.4 0 1.4 0 1.4 0 1.4 0 1.4 0 1.4 1.50	/ CMOS 3.3 4.7 5.5 0 TIA/E ±0.1	/ Open-cd 1.6 1.2 6 0 IA-422-A ±0.2 +7 5 10	Units ollector V WA MA MHz MHz μs ns	

¹ @20kHz F _{PWM} ² The digital inpu	its and outputs are software selectable as		Ω termination resistors must be connect ible to the drive input pins.	ed across the
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ALN	May 4, 2021		February 18, 2022	
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	CHNOSOFT	iPOS4810 MZ-CAN	P022.015.E102.DSH.01D	
		PRODUCT DATA SHEET		Page: 4 of 6



iPOS4810	MZ-CAN	DATASHEET
	P/N:	P022.015.E102

-preliminary-

Digital Outputs (OUT0, OUT1, OUT2/Error, OUT3/Ready, OUT4, OUT5) ¹			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		-
	Absolute maximum, continuous	-0.3		V _{LOG} +0.3	
	Absolute maximum, surge $(duration \le 1s)^{\dagger}$	-0.5		V _{LOG} +0.5	
0.4.4	Logic "HIGH", source current, continuous			0.2	А
Output current	Logic "HIGH", source current, pulse ≤ 5 s			0.4	А
	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 (floating)				
state	Normal operation Hig		h-Z			
	Logic "LOW"; output current = 0.3A		0.2	0.8		
	Logic "HIGH"; output current = 0, no load	open-collector				
Output voltage	Logic "HIGH", external load to +V _{LOG}		V_{LOG}		V	
	Absolute maximum, continuous	-0.3		V _{LOG} +0.3		
	Absolute maximum, surge $(duration \le 1s)^{t}$	-0.5		V _{LOG} +0.5		
Output	Logic "LOW", sink current, continuous			0.3	А	
Output current	Logic "LOW", sink current, pulse ≤ 5 s			0.5	А	
	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-		-422-A		
	Hysteresis	±0.06	±0.1	±0.2		
Input voltage	Differential mode	-14		+14	V	
· · ····g·	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-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 $(duration \le 1s)^{\dagger}$	-11		+14	
Input impedance	Differential, Sin+ to Sin-, Cos+ to Cos- ²	4.2	4.7		kΩ
··· [Common-mode, to GND		2.2		kΩ
Resolution with interpolation	Software selectable, for one sine/cosine period	2		10	bits
Frequency	Sin-Cos interpolation	0		450	kHz
	Quadrature, no interpolation	0 ±1		10	MHz kV
ESD protection Human body model Analog 05V Inputs (REF, FDBK)			Turn	Mari	
Analog 05v inp		Min.	Тур.	Max.	Units
	Operational range	0		5	
1	Absolute maximum values, continuous	-12		+18	
Input voltage	Absolute maximum, surge				V
	(duration $\leq 1s$) [†]			±36	
Input impedance	(duration ≤ 1s) To GND		28		kΩ
Resolution	TOGIND		12		bits
Integral linearity			12	±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	% FS ³
Bandwidth (-3Db)	Software selectable	0	11/0	1	kHz
ESD protection	Human body model	±5		· ·	kV
RS-232		Min.	Тур.	Max.	Units
Compliance				-232-C	•
Bit rate	Software selectable	9600		115200	Baud
Short-circuit	232TX short to GND	3000	Guara	inteed	Dauu
ESD protection	Human body model	±2	Ouare	inteeu	kV
Safe torque OFF	Haman body model				
		Min.	Тур.	Max.	Units
(SIU1+, SIU1-, S	TO2+, STO2+)				onnto
(STO1+, STO1-, S Safety function	TO2+, STO2+) According to EN61800-5-2		TO (Safe T	orque OF	
Safety function EN 61800-5-1/ -2		S			F)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4	According to EN61800-5-2	S	TO (Safe 1 ty integrity		F) IL3)
Safety function EN 61800-5-1/-2 and EN 61508-5- 3/-4 Classification	According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour)	S ⁻ safe	TO (Safe 1 ty integrity ho	<u>v level 3 (S</u> ur ¹ (0.8 Fl ⁻	F) IL3)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1	According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level	S ⁻ safe	TO (Safe 1 ity integrity ho Cat3	<u>v level 3 (S</u> ur ¹ (0.8 Fl ⁻	F) iIL3) T)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification	According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour)	S ⁻ safe	TO (Safe 1 ty integrity ho	<u>v level 3 (S</u> ur ¹ (0.8 Fl ⁻	F) IL3)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1	According to EN61800-5-2 Safety Integrity Level PFHD (probability of dangerous failures per hour) Performance Level MTTFM (meantime to dangerous failure)	S ⁻ safe	TO (Safe 1 ty integrity ho Cat3 377	<u>v level 3 (S</u> ur ¹ (0.8 Fl ⁻	F) iIL3) T)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode	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)	S ⁻ safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity ho Cat3 377 Pt	r level 3 (S ur ¹ (0.8 Fl /PLe NP LOW	F) iIL3) T)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode compliance	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"	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity ho Cat3 377 Pt	r level 3 (S ur ¹ (0.8 Fl /PLe NP LOW 5.6	F) iIL3) T)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode compliance	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,	S ⁻ safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity ho Cat3 377 Pt	r level 3 (S ur ¹ (0.8 Fl /PLe NP LOW	F) iIL3) T)
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode compliance Default state	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	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity hoi Cat3 377 Pt Logic	r level 3 (S ur ⁻¹ (0.8 Fl /PLe NP LOW <u>5.6</u> 36	F) IIL3) T) years
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode compliance Default state	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,	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity ho Cat3 377 Pt	r level 3 (S ur ⁻¹ (0.8 Fl /PLe NP LOW <u>5.6</u> 36	F) IIL3) T) years
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	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	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity hoi Cat3 377 Pt Logic	r level 3 (S ur ⁻¹ (0.8 Fl ⁻ /PLe NP LOW 5.6 36 +40	F) F) T) years V mA ms
Safety function EN 61800-5-1/ -2 and EN 61508-5- 3/ -4 Classification EN13849-1 Classification Mode compliance Default state Input voltage	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	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity hoi Cat3 377 Pt Logic	r level 3 (S ur ⁻¹ (0.8 Fl' /PLe NP LOW <u>5.6</u> +40 	F) ilL3) T) years V mA
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	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	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity hoi Cat3 377 Pt Logic	r level 3 (S ur ⁻¹ (0.8 Fl' /PLe NP LOW 5.6 36 +40 	F) F) T) years V mA ms
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	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 "HIGH", pulled to GND Logic "HIGH", pulled to +Vlog Ignored high-low-high From internal fault detection to register DER bit 14 = 1 and	S safe 8*10 ⁻¹⁰	TO (Safe 1 ty integrity hoi Cat3 377 Pt Logic	r level 3 (S ur ⁻¹ (0.8 Fl' /PLe NP LOW 5.6 36 +40 13 5 20	F) iIL3) T) years V mA ms Hz

 1 Encoder2 differential input pins have internal 120Ω termination resistors connected across 2 For many applications, a 120Ω termination resistor should be connected across SIN+ to SIN-, and

³ "FS" stands for "Full Scale"

Name	First edition	Document template: P099.TQT.564.0001	Last edition	Visa:
ALN	May 4, 2021		February 18, 2022	
		Title of document N° document		•
TECHNOSOFT		iPOS4810 MZ-CAN	P022.015.E102.DSH.01D	
\mathbf{v}		IF 034010 WZ-CAN		

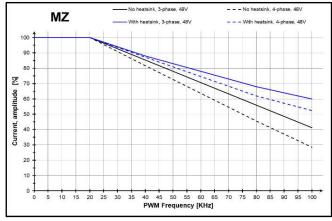


iPOS4810 MZ-CAN DATASHEET P/N: P022.015.E102

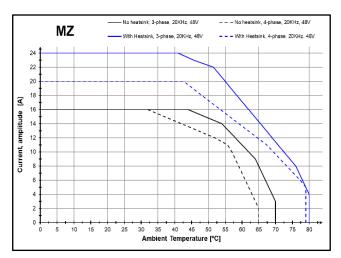
-preliminary-

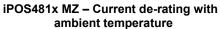
Software selectable 1Mbps 500Kbps ≤ 250Kbps			CiA-301v 2.13, 402 1000 25		
1Mbps 500Kbps	125			Kbps	
500Kbps			25		
			20		
≤ 250Kbps			100	m	
			250		
Between CAN-Hi, CAN-Lo		none c	on-board		
Hardware: by Hex switch	1 ÷ 1127 & LSS non-configured (CANopen); 1 ÷127 & 255 (TMLCAN)				
Software	1 ÷ 127 (CANopen); 1 ÷ 127 & 255 (TMLCAN)				
i Absolute maximum, continuous	-36		36	V	
Human body model	±15			kV	
ESD protection Human body model Conformity		Тур.	Max.	Units	
2014/30/EU (EMC), 2014/35/EU (LVD), EU 2011/65/EU (RoHS), Declaration 1907/2006/EC (REACH), 93/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, output frequency limited to 590Hz)					
	Hardware: by Hex switch Software Absolute maximum, continuous Human body model 2014/30/EU (EMC), 2014/35/EU (LVD), 2011/35/EU (RoHS), 1907/2006/EC (REACH), 33/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, ou	Hardware: by Hex switch 1 + 1: Software 1 Absolute maximum, continuous -36 Human body model ±15 2014/30/EU (EMC), 2014/35/EU (LVD), 2014/35/EU (RoHS), 1907/2006/EC (REACH), 33/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, output frequ	Hardware: by Hex switch 1 + 1127 & LS3 (CAN 1 + 127 & 22 Software Absolute maximum, continuous -36 Human body model ±15 Min. Typ. 2014/30/EU (EMC), 2014/35/EU (LVD), 2014/35/EU (LVD), 2014/35/EU (RoHS), 1907/2006/EC (REACH), 33/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, output frequency limit	Hardware: by Hex switch 1 + 1127 & LSS non-con (CANopen); 1 + 127 & 255 (TMLC, 2014/30/EU (EMC), 2014/30/EU (EMC), 2014/35/EU (LVD), 2014/35/EU (RoHS), 1907/2006/EC (REACH), 30/68/EEC (CE Marking Directive),	

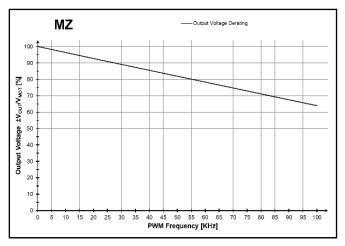
^T Stresses beyond values listed under "absolute maximum ratings" may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.



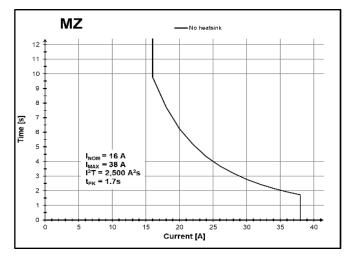
iPOS481x MZ – Current de-rating with PWM frequency, @48V



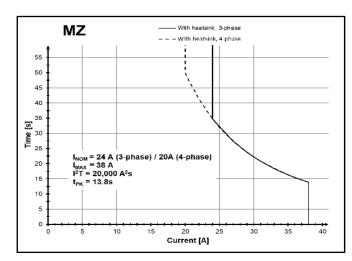




iPOS481x MZ – Output Voltage de-rating with PWM frequency



iPOS481x MZ – Over-current diagram (No heatsink)



iPOS481x MZ – Over-current diagram (With heatsink)

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