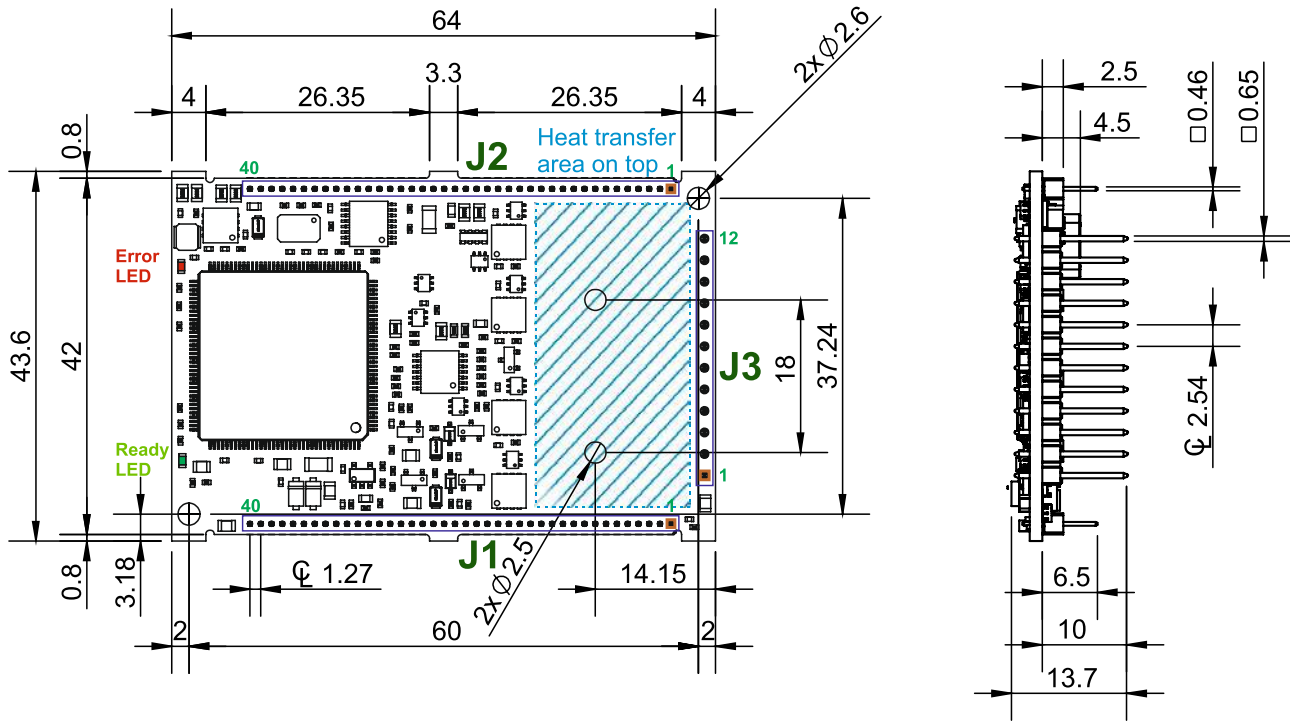




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Top view; Pins facing downward; All dimensions are in mm; Header pitch of J1 & J2 is 1.27mm and for J3 is 2.54 mm. Drawing not to scale.

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

- **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, up to 100kHz PWM
- Operating ambient temperature: 0-40°C (over 40°C with derating)
- NTC/PTC analogue Motor Temperature sensor input
- Communication interfaces:
 - USB
 - RS232
 - TMLCAN and CANopen (CiA 301 v4.2, CiA 305 v.2.2.13 and CiA 402 v3.0) protocols

- **Feedback Devices (dual-loop support)**
- 1st feedback devices supported:
 - Incremental encoder interface (single ended or differential)
 - Analogue sin/cos encoder interface (differential 1V_{pp})
 - Digital Hall sensor interface (single-ended and open collector)
 - Linear Hall sensors interface
 - pulse & direction interface (single ended or differential) for external (master) digital reference
- 2nd feedback devices supported:
 - Incremental encoder interface (differential)
 - pulse & direction interface (differential) for external (master) digital 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, 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 x 16 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 Connectors

When J3 is plugged into a connector and maximum current should not exceed 12.7A Sine amplitude

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


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

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

Pin	Name	Type	Description
1,2	GND	-	Return ground for motor. Internally connected to all GND signals except STO GND.
3,4	Cr/B-	O	Chopping resistor / Phase B- for 2-ph steppers
5,6	C/B+	O	Phase C for 3-ph motors, B+ for 2-ph steppers
7,8	B/A-	O	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
9,10	A/A+	O	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
11,12	+V _{MOT}	I	Positive terminal of the motor supply: 11 to 48V _{DC} .

Pin	Name	Type	Description
1	Temp Mot	I	NTC/PTC 3.3V input. Used to read an analog temperature value
2	232TX	O	RS-232 Data Transmission
3	232RX	I	RS-232 Data Reception
4	USB Data-	I/O	USB Data negative
5	USB Data+	I/O	USB Data positive
6	USB V+	I	USB +5V input
7	Reserved	O	Reserved. Do not use
8	Reserved	O	Reserved. Do not use
9	Axis ID Bit7	-	8 bit H/W Axis ID register.
10	Axis ID Bit6	I	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 all pins OFF.
12	Axis ID Bit4	I	When Axis ID is 255 and in CANOpen, the drive will be in LSS inactive state and the GREEN led will flash at 1s intervals
13	Axis ID Bit3	I	
14	Axis ID Bit2	I	
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	O	Reserved. Do not use
20	Spi2 Out	O	Reserved. Do not use
21	Spi2 In	I	Reserved. Do not use
22	Spi2 CS	O	Reserved. Do not use
23	Spi2 Irq	I	Reserved. Do not use
24	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-isolated, 18÷40V)
39	STO1-	I	Safe Torque Off input 1, negative return (opto-isolated, 0V)
40	STO1+	I	Safe Torque Off input 1, positive input (opto-isolated, 18÷40V)

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

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

Electrical characteristics

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

- V_{LOG} = 24 VDC; V_{MOT} = 48VDC
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude / cont. BLDC, DC, stepper) = 10A RMS

Operating Conditions		Min.	Typ.	Max.	Units
Ambient temperature		0		40 ¹	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure ²	Altitude (vs. sea level)	-0.1	0 ÷ 2.5	²	Km
	Ambient Pressure	0 ²	0.75 ÷ 1	10.0	atm
Storage Conditions		Min.	Typ.	Max.	Units
Ambient temperature		-40		100	°C
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
ESD capability (Human body model)	Not powered; applies to any accessible part			±0.5	kV
	Original packaging			±15	kV
Mechanical Mounting		Min.	Typ.	Max.	Units
Airflow				natural convection ³ , closed box	
Spacing required for vertical mounting	Between adjacent drives	30			mm
	Between drives and nearby walls	30			mm
	Between drives and roof-top	20			mm
Spacing required for horizontal mounting	Between adjacent drives	4			mm
	Between drives and nearby walls	5			mm
	Space needed for drive removal	10			mm
	Between drives and roof-top	15			mm
Insertion force	Using recommended mating connectors		TBD	TBD	N
Extraction force		TBD	TBD	TBD	N
Environmental Characteristics		Min.	Typ.	Max.	Units
Size (Length x Width x Height)	Global size	64 x 43.6 x 13.7			mm
		~2.52 x 1.72 x 0.54			inch
Weight		20.4			g
Cleaning agents	Dry cleaning is recommended	Only Water- or Alcohol- based			
Protection degree	According to IEC60529, UL508	IP20			-
Logic Supply Input (+V _{LOG})		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	9		36	V _{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	8		40	V _{DC}
	Absolute maximum values, continuous	-0.6		42	V _{DC}
	Absolute maximum values, surge (duration ≤ 10ms) [†]	-1		+45	V
Supply current	+V _{LOG} = 12V		TBD		mA
	+V _{LOG} = 24V		TBD		
	+V _{LOG} = 40V		TBD		
Motor Supply Input (+V _{MOT})		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	11		50	V _{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters	9		52	V _{DC}
	Absolute maximum values, continuous	-0.6		54	V _{DC}
	Absolute maximum values, surge (duration ≤ 10ms) [†]	-1		57	V
Supply current	Idle		1	5	mA
	Operating	-40	±10	+40	A
	Absolute maximum value, short-circuit condition (duration ≤ 10ms) [†]			43	A
Supply Output (+5V)		Min.	Typ.	Max.	Units
Output voltage	Current sourced = 250mA	4.8	5	5.2	V
Output current			TBD		mA
Short-circuit		NOT protected			
Over-voltage		NOT protected			
ESD protection	Human body model	±1			kV

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

²iPOS4810 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.

³In 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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Motor Outputs (A/A+, B/A-, C/B+, CR/B-)		Min.	Typ.	Max.	Units
Nominal output current, continuous ¹	for DC brushed, steppers and BLDC motors with Hall-based trapezoidal control			14.3	A
	for PMSM motors with FOC sinusoidal control (sinusoidal amplitude value)			14.3	
	for PMSM motors with FOC sinusoidal control (sinusoidal effective value)			10	
Motor output current, peak	maximum TBD s	-40		+40	A
Short-circuit protection threshold		±43		±43	A
Short-circuit protection delay			TBD		µs
On-state voltage drop	Nominal output current; including typical mating connector contact resistance		TBD		V
Voltage efficiency			100		%
Off-state leakage current			±0.5	±1	mA
Motor inductance (phase-to-phase)	Recommended value, for current ripple max. ±5% of full range; +V _{MOT} = 36 V	F _{PWM}			µH
		20 kHz			
		40 kHz			
	Minimum value, limited by short-circuit protection; +V _{MOT} = 36 V	20 kHz			µH
		60 kHz			
		40 kHz			
Motor electrical time-constant (L/R)	Recommended value for ±5% current measurement error	20 kHz			µs
		40 kHz			
		60 kHz			
		80 kHz			
		100 kHz			
Current measurement	FS = Full Scale accuracy		TBD		%FS
Digital Hall Inputs (Hall1, Hall2, Hall3)		Min.	Typ.	Max.	Units
Mode compliance		TTL / CMOS / Open-collector			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"		0	0.8	V
	Logic "HIGH"	2	5		
	Floating voltage (not connected)		4.4		
	Absolute maximum, surge (duration ≤ 1s) [†]	-10		+15	
Input current	Logic "LOW"; Pull to GND			1.2	mA
	Logic "HIGH"; Internal 4.7KΩ pull-up to +5	0	0	0	
Minimum pulse width		2			µs
ESD protection	Human body model	±5			kV
Linear Hall Inputs (LH1, LH2, LH3)		Min.	Typ.	Max.	Units
Input voltage	Operational range	0	0.5÷4.5	4.9	V
	Absolute maximum values, continuous	-7		+7	V
Input voltage	Absolute maximum, surge (duration ≤ 1s) [†]	-11		+14	
	Input current	Input voltage 0...+5V	0		0.2
Interpolation Resolution	Depending on software settings			11	bits
Frequency		0		1	kHz
ESD protection	Human body model	±1			kV

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

Digital Inputs (INO, IN1, IN2/LSP, IN3/LSN, IN4, IN5, IN6) ²		Min.	Typ.	Max.	Units
Mode compliance		NPN			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"		0	2.2	V
	Logic "HIGH"	6.3	24	36	
	Hysteresis	1.2	2.4	2.8	
	Floating voltage (not connected)		15		
	Absolute maximum, continuous	-10		+39	
	Absolute maximum, surge (duration ≤ 1s) [†]	-20		+40	
Input current	Logic "LOW"; Pulled to GND		8	10	mA
	Logic "HIGH"; Pulled to +24V	0	0	0	
Input frequency		0		10	kHz
Minimum pulse		6			µs
ESD protection	Human body model	±5			kV

Encoder1 Inputs (A1/A1+, A1-, B1/B1+, B1-, Z1/Z1+, Z1-)		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave negative inputs disconnected	TTL / CMOS / Open-collector			
Input voltage, single-ended mode A/A+, B/B+	Logic "LOW"			1.6	V
	Logic "HIGH"	1.8			
	Floating voltage (not connected)		3.3		
Input voltage, single-ended mode Z/Z+	Logic "LOW"			1.2	V
	Logic "HIGH"	1.4			
Input current, single-ended mode A/A+, B/B+, Z/Z+	Logic "LOW"; Pull to GND		5.5	6	mA
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5	0	0	0	
Differential mode compliance	For full RS422 compliance, see ³	TIA/EIA-422-A			
Input voltage, differential mode	Hysteresis	±0.06	±0.1	±0.2	V
	Common-mode range (A+ to GND, etc.)	-7		+7	
Input impedance, differential	A1+ to A1-, B1+ to B1-		1		kΩ
	Z1+ to Z1-		1		
Input frequency	Single-ended mode, Open-collector / NPN	0		5	MHz
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	0		10	
Minimum pulse width	Single-ended mode, Open-collector / NPN	1			µs
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	50			
Input voltage, any pin to GND	Absolute maximum values, continuous	-7		+7	V
	Absolute maximum, surge (duration ≤ 1s) [†]	-11		+14	
ESD protection	Human body model	±1			kV

¹ @20kHz F_{PWM}

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

³ 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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Digital Outputs (OUT0, OUT1, OUT2/Error, OUT3/Ready, OUT4, OUT5) ¹	Min.	Typ.	Max.	Units
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Mode compliance	PNP 24V				
Default state	Not supplied (+VLOG floating or to GND)	High-Z (floating)			
	Normal operation	Logic "High"			
Output voltage	Logic "HIGH"; output current = 0.2A	$V_{LOG}-0.2$	$V_{LOG}-0.8$	V	
	Logic "LOW"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to GND	0			
	Absolute maximum, continuous	-0.3	$V_{LOG}+0.3$		
	Absolute maximum, surge (duration ≤ 1s) [†]	-0.5	$V_{LOG}+0.5$		
Output current	Logic "HIGH", source current, continuous			0.2	A
	Logic "HIGH", source current, pulse ≤ 5 s			0.4	A
	Logic "LOW", means High-Z				mA
Minimum pulse width		2			μs
ESD protection	Human body model	±15			kV

Mode compliance	NPN 24V				
Default state	Not supplied (+VLOG floating or to GND)	High-Z (floating)			
	Normal operation	High-Z			
Output voltage	Logic "LOW"; output current = 0.3A	0.2	0.8	V	
	Logic "HIGH"; output current = 0, no load	open-collector			
	Logic "HIGH", external load to +VLOG	V_{LOG}			
	Absolute maximum, continuous	-0.3	$V_{LOG}+0.3$		
	Absolute maximum, surge (duration ≤ 1s) [†]	-0.5	$V_{LOG}+0.5$		
Output current	Logic "LOW", sink current, continuous			0.3	A
	Logic "LOW", sink current, pulse ≤ 5 s			0.5	A
	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-) ¹	Min.	Typ.	Max.	Units
--	------	------	------	-------

Differential mode compliance	TIA/EIA-422-A				
Input voltage	Hysteresis	±0.06	±0.1	±0.2	V
	Differential mode	-14		+14	
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential	A2+, B2+, Z2+ A2-, B2-, Z2-	150			Ω
Input frequency	Differential mode	0		10	MHz
Minimum pulse width	Differential mode	50			ns

Sin-Cos Encoder Inputs (Sin+, Sin-, Cos+, Cos-)	Min.	Typ.	Max.	Units
--	------	------	------	-------

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

Analog 0...5V Inputs (REF, FDBK)	Min.	Typ.	Max.	Units
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Input voltage	Operational range	0		5	V	
	Absolute maximum values, continuous	-12		+18		
	Absolute maximum, surge (duration ≤ 1s) [†]			±36		
Input impedance	To GND		28		kΩ	
Resolution		12			bits	
Integral linearity				±2	bits	
Offset error				±2	bits	
Gain error				±1%	±3%	% FS ³
Bandwidth (-3Db)	Software selectable	0		1	kHz	
ESD protection	Human body model	±5			kV	

RS-232	Min.	Typ.	Max.	Units
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Compliance	TIA/EIA-232-C				
Bit rate	Software selectable	9600		115200	Baud
Short-circuit	232TX short to GND	Guaranteed			
ESD protection	Human body model	±2			kV

Safe torque OFF (STO1+, STO1-, STO2+, STO2+)	Min.	Typ.	Max.	Units
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Safety function	According to EN61800-5-2	STO (Safe Torque OFF)		
EN 61800-5-1/ -2 and EN 61508-5-3/ -4 Classification	Safety Integrity Level	safety integrity level 3 (SIL3)		
	PFHD (probability of dangerous failures per hour)	8*10 ⁻¹⁰		hour ⁻¹ (0.8 FIT)

EN13849-1 Classification	Performance Level	Cat3/PLe		
	MTTFM (meantime to dangerous failure)	377		years

Mode compliance	PNP			
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Default state	Input floating (wiring disconnected)	Logic LOW		
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Input voltage	Logic "LOW"	-20		5.6	V
	Logic "HIGH"	18		36	
	Absolute maximum, continuous	-20		+40	

Input current	Logic "LOW"; pulled to GND		0		mA
	Logic "HIGH"; pulled to +Vlog		5	13	

Repetitive test pulses (high-low-high)	Ignored high-low-high			5	ms
				20	

Fault reaction time	From internal fault detection to register DER bit 14 = 1 and OUT2/Error high-to-low			30	ms
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PWM operation delay	From external STO low-high transition to PWM operation enabled			30	ms
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ESD protection	Human body model	±2			kV
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¹ Encoder2 differential input pins have internal 120Ω termination resistors connected across

² For many applications, a 120Ω termination resistor should be connected across SIN+ to SIN-, and across COS+ to COS-. Please consult the feedback device datasheet for confirmation.

³ "FS" stands for "Full Scale"

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iPOS4810 MZ-CAN DATASHEET

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

CAN-Bus		Min	Typ	Max	Units
Compliance		ISO11898, CiA-301v4.2, CiA 305 v2.2.13, 402v3.0			
Bit rate	Software selectable	125		1000	Kbps
Bus length	1Mbps			25	m
	500Kbps			100	
	≤ 250Kbps			250	
Resistor	Between CAN-Hi, CAN-Lo	none on-board			
Node addressing	Hardware: by Hex switch	1 ÷ 1127 & LSS non-configured (CANopen); 1 ÷ 127 & 255 (TMLCAN)			
	Software	1 ÷ 127 (CANopen); 1 ÷ 127 & 255 (TMLCAN)			
Voltage, CAN-Hi or CAN-Lo to GND	Absolute maximum, continuous	-36		36	V
ESD protection	Human body model	±15			kV
Conformity		Min.	Typ.	Max.	Units
EU Declaration	2014/30/EU (EMC), 2014/35/EU (LVD), 2011/65/EU (RoHS), 1907/2006/EC (REACH), 93/68/EEC (CE Marking Directive), EC 428/2009 (non dual-use item, output frequency limited to 590Hz)				

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

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