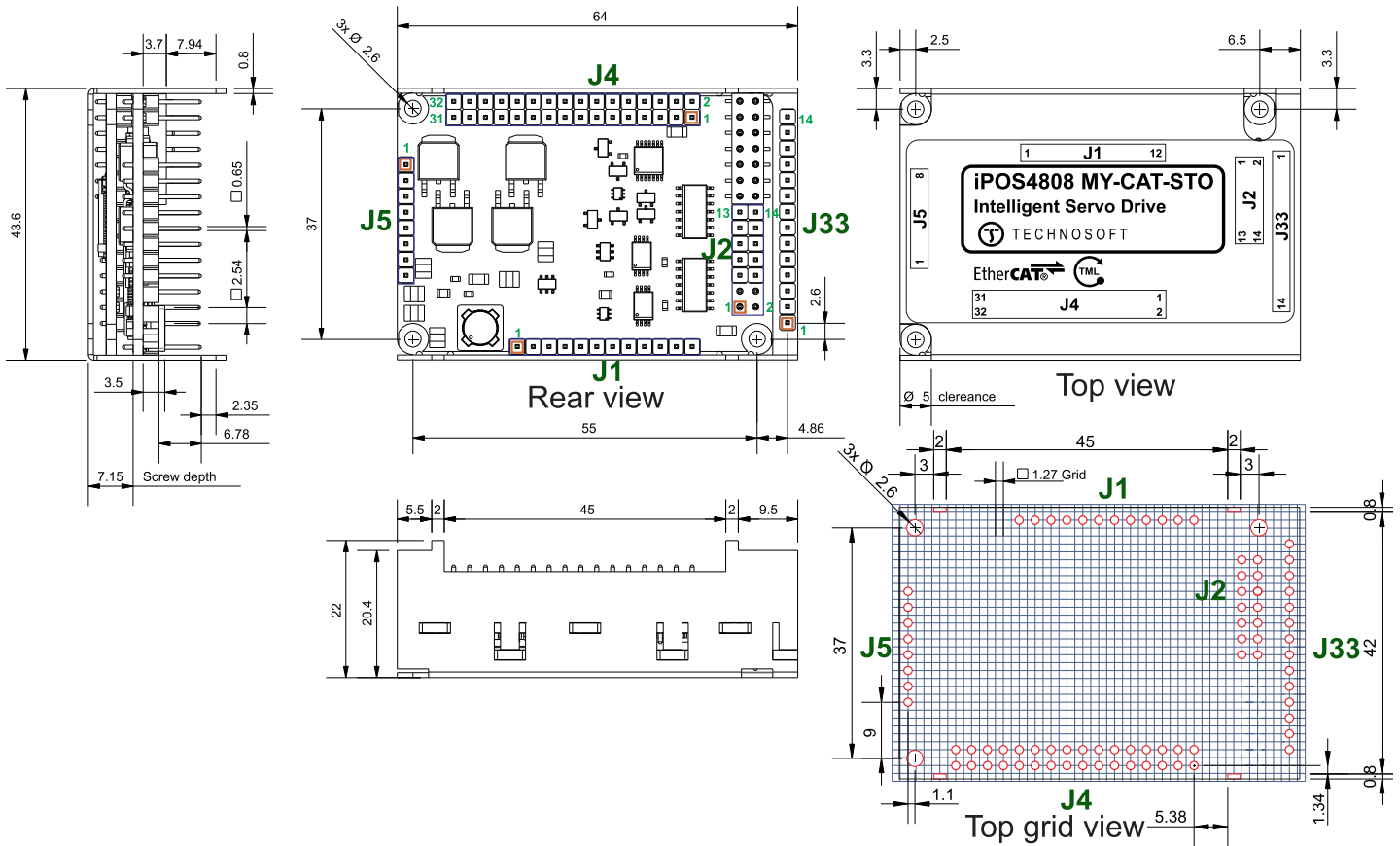


# iPOS4808 MY-CAT-STO DATASHEET

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Rear view; Pins facing upwards; All dimensions are in mm; Header pitch 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 + Hall	Ⓢ	Ⓢ			
Analog Sin/Cos encoder	Ⓢ	Ⓢ	Ⓢ	Ⓢ	
SSI	Ⓢ	Ⓢ	Ⓢ	Ⓢ	
BISS-C	Ⓢ	Ⓢ	Ⓢ	Ⓢ	
Linear Halls	Ⓢ				
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: 8A cont. (BLDC mode); 20A<sub>PEAK</sub>, up to 100kHz PWM
- Feedback Devices (dual-loop support)
  - 1<sup>st</sup> feedback devices supported:
    - Incremental encoder interface (single ended or differential)
    - Analogue sin/cos encoder interface (differential 1V<sub>pp</sub>)
    - Digital Hall sensor interface (single-ended and open collector)
  - Linear Hall sensors interface

- pulse & direction interface (single ended) for external (master) digital reference

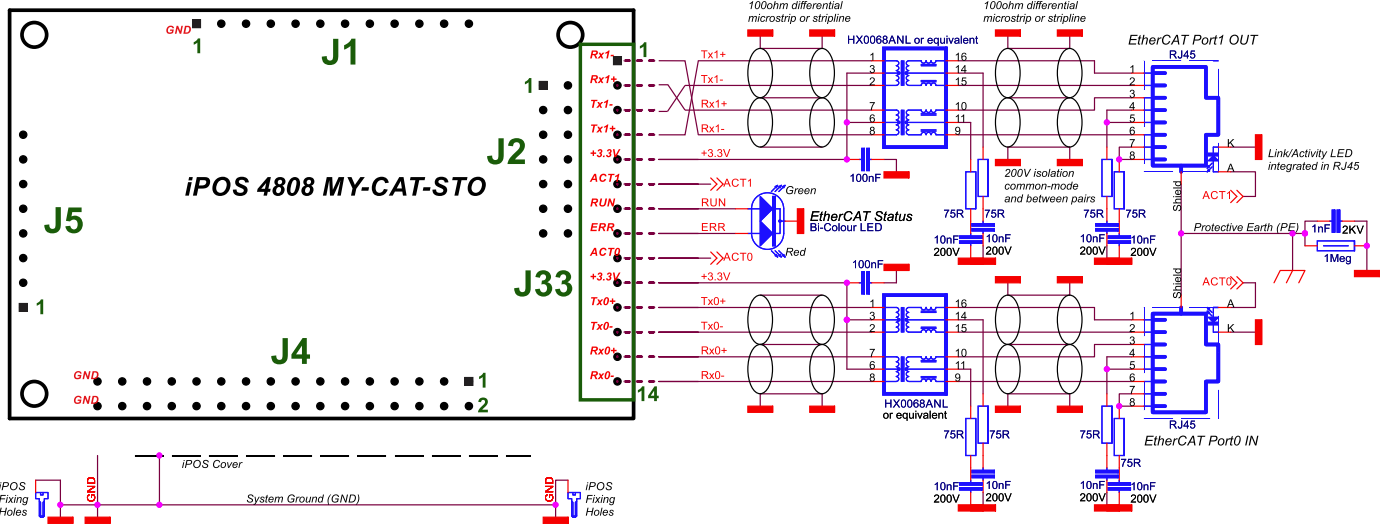
2<sup>nd</sup> feedback devices supported:

- Incremental encoder interface (differential)
  - pulse & direction interface (differential) for external (master) digital reference
- BISS / SSI 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
  - 5 digital outputs, 5-36V, 0.5A, NPN open-collector: Ready, Error, 3 general-purpose
  - 2 analogue inputs: 12-bit, 0-5V: Reference, Feedback or general purpose
- RS-232 serial & dual 100Mbps EtherCAT® interfaces
- EtherCAT® with CAN application protocol over EtherCAT (CoE), File over EtherCAT (FoE) and Ethernet over EtherCAT (EoE)
  - 127 h/w addresses selectable by h/w pins configuration
  - 16k x 16 SRAM memory for data acquisition
  - 16k x 16 E<sup>2</sup>ROM to store setup data, TML motion programs, cam tables and other user data
- Operating ambient temperature: 0-40°C (over 40°C with derating)
- NTC/PTC analogue Motor Temperature sensor input

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Recommended: PoE (Power Over Ethernet) compliant

Mating Connectors			
Ref	Producer	Part No.	Description
J1	Samtec	SSQ-112-01-G-S	1x12 contacts, socket 2.54mm-pitch accepting 0.635mm square pin
J2	FCI	87606-307LF	2x7 contacts, socket, 2.54mm-pitch accepting 0.635mm square pin
	TE Connectivity	534206-7	
J33	Samtec	SSQ-114-01-G-S	1x14 contacts, socket 2.54mm-pitch accepting 0.635mm square pin
J4	Samtec	SSQ-116-01-G-D	2x12 contacts, socket 2.54mm-pitch accepting 0.635mm square pin
J5	Samtec	SSQ-108-01-G-S	1x8 contacts, High-current socket 2.54mm-pitch accepting 0.635mm square pin

Pin	Name	Type	Description
1	GND	-	Return ground for all signals. Internally connected to J4 pins 31 and 32, to metallic cover, and to the 3 fixing screws
2	reserved	-	Reserved
3	Axis ID Bit6	I	8 bit H/W Axis ID register. Connect pin to GND to set bit to 1. Up to 127 H/W axis ID combinations.
4	Axis ID Bit5	I	
5	Axis ID Bit4	I	
6	Axis ID Bit3	I	
7	Axis ID Bit2	I	
8	Axis ID Bit1	I	
9	Axis ID Bit0	I	
10	reserved	-	Reserved for interface extensions†
11	reserved	-	Reserved for interface extensions†
12	reserved	-	Reserved for interface extensions†

Pin	Name	Type	Description
1,2	A/A+	O	Phase A for 3-ph motors, A+ for 2-ph steppers, Motor+ for DC brush motors
3,4	B/A-	O	Phase B for 3-ph motors, A- for 2-ph steppers, Motor- for DC brush motors
5,6	C/B+	O	Phase C for 3-ph motors, B+ for 2-ph steppers
7,8	Cr/B-	O	Chopping resistor / Phase B- for 2-ph steppers

Pin	Name	Type	Description
1	RX1-	I/O	Receive/Transmit negative, OUT port. Connect to magnetics PHY RX1.
2	RX1+	I/O	Receive/Transmit positive, OUT port. Connect to magnetics PHY RX1.
3	TX1-	I/O	Transmit/Receive negative, OUT port. Connect to magnetics PHY TX1.
4	TX1+	I/O	Transmit/Receive positive, OUT port. Connect to magnetics PHY TX1.
5	3.3V	O	Return for center tap of magnetics PHY TX1 and RX1. Internally connected to J33 pin 10.
6	ACT1	O	Anode of Link/Activity LED for port OUT.
7	RUN	O	Anode of Run LED (EtherCAT status machine).
8	ERR	O	Anode of Error LED (EtherCAT status machine).
9	ACT0	O	Anode of Link/Activity LED for port IN.
10	3.3V	O	Return for center tap of magnetics PHY TX0 and RX0. Internally connected to J33 pin 5.
11	TX0+	I/O	Transmit/Receive positive, IN port. Connect to magnetics PHY TX0.
12	TX0-	I/O	Transmit/Receive negative, IN port. Connect to magnetics PHY TX0.
13	RX0+	I/O	Receive/Transmit positive, IN port. Connect to magnetics PHY RX0.
14	RX0-	I/O	Receive/Transmit negative, IN port. Connect to magnetics PHY RX0.

Pin	Name	Type	Description
1	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
2	STO2+	I	
3	STO1-	I	
4	STO2-	I	
5	LH1	I	Linear Hall 1 input
6	LH2	I	Linear Hall 2 input
7	IN4	I	12-36V general-purpose digital PNP/NPN input
8	IN5	I	12-36V general-purpose digital PNP/NPN input
9	OUT0	O	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
10	OUT3/Ready	O	5-36V 0.5A, drive Ready output, active low, NPN open-collector/TTL pull-up. Also drives the green LED.
11	OUT1	O	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
12	OUT2/Error	O	5-36V 0.5A, drive Error output, active low, NPN open-collector/TTL pull-up. Also drives the red LED
13	REF	I	Analogue input, 12-bit, 0-5V. Reads analog reference, or general purpose analogue input
14	FDBK / LH3	I	Analogue input, 12-bit, 0-5V. Reads an analogue feedback (tacho), or general purpose/ or Linear Hall 3

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Pin	Name	Type	Description
1	IN0	I	12-36V general-purpose digital PNP/NPN input
2	IN1	I	12-36V general-purpose digital PNP/NPN input
3	IN2/LSP	I	12-36V digital PNP/NPN input. Positive limit switch input
4	IN3/LSN	I	12-36V digital PNP/NPN input. Negative limit switch input
5	B2-/Dir-/CLK-/MA-	I/O	Incr. encoder2 B- diff. input, or Dir--, or Clock- for SSI, or Master- for BiSS; has 120Ω resistor between pins 5 and 7
6	B1-/Cos-	I	Incr. encoder1 B- diff. input, or analogue encoder Cos- diff. input
7	B2+/Dir+/CLK+/MA+	I/O	Incr. encoder2 B+ diff. input, or Dir+, or Clock+ for SSI, or Master+ for BiSS; has 120Ω resistor between pins 5 and 7
8	B1+/Cos+	I	Incr. encoder1 B single-ended, or B+ diff. input, or analogue encoder Cos+ diff. input
9	A2+/Pulse+/Data+/SL+	I	Incr. encoder2 A+ diff. input, or Pulse+, or Data+ for SSI, or Slave+ for BiSS; has 120Ω resistor between pins 9 and 11
10	A1+/Sin+	I	Incr. encoder1 A single-ended, or A+ diff. input, or analogue encoder Sin+ diff. input
11	A2-/Pulse-/Data-/SL-	I	Incr. encoder2 A- diff. input, or Pulse-, or Data- for SSI, or Slave- for BiSS; has 120Ω resistor between pins 9 and 11
12	A1-/Sin-	I	Incr. encoder1 A- diff. input, or analogue encoder Sin- diff. input
J4 13	Z2+	I	Incr. encoder2 Z+ diff. input ; has 120Ω resistor between pins 13 and 15
14	Z1+	I	Incr. encoder1 Z single-ended, or Z+ diff. input,
15	Z2-	I	Incr. encoder2 Z- diff. input; has 120Ω resistor between pins 13 and 15
16	Z1-	I	Incr. encoder1 Z- diff. input
17	Hall 1	I	Digital input Hall 1 sensor
18	Reserved	-	Reserved. Do not connect.
19	Hall 2	I	Digital input Hall 2 sensor
20	Reserved	-	Reserved. Do not connect.
21	Hall 3	I	Digital input Hall 3 sensor
22	232TX	O	RS-232 Data Transmission
23	+5V <sub>OUT</sub>	O	5V output supply for I/O usage
24	232RX	I	RS-232 Data Reception
25	Temp Mot	I	NTC/PTC input. Used to read an analog temperature value
26	Reserved	-	Reserved. Do not connect.
27	+V <sub>LOG</sub>	I	Positive terminal of the logic supply input: 9 to 36V <sub>DC</sub> from SELV/ PELV type power supply.
28	OUT4	O	5-36V 0.5A, general-purpose digital output, NPN open-collector/TTL pull-up
29	+V <sub>MOT</sub>	I	Positive terminal of the motor supply: 11 to 48V <sub>DC</sub> .
30	+V <sub>MOT</sub>	I	Positive terminal of the motor supply: 11 to 48V <sub>DC</sub> .
31	GND	-	Return ground for all signals. Internally connected to J4 pin 32, to J1 pin 1, to metallic cover, and to the 3 fixing screws
32	GND	-	

† leave unconnected if interface extensions are not used

## Electrical characteristics

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

- V<sub>LOG</sub> = 24 VDC; V<sub>MOT</sub> = 48VDC
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude / continuous BLDC, DC, stepper) = 8A

Operating Conditions		Min.	Typ.	Max.	Units
Ambient temperature		0		40 <sup>1</sup>	°C
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure <sup>2</sup>	Altitude (vs. sea level)	-0.1	0 ± 2.5	2	Km
	Ambient Pressure	0 <sup>2</sup>	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 <sup>3</sup> , 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		N
Environmental Characteristics		Min.	Typ.	Max.	Units
Size ( Length x Width x Height )	Global size			64 x 43.6 x 22	mm
				~2.52 x 1.72 x 0.87	inch
Weight			45		g
Cleaning agents	Dry cleaning is recommended			Only Water- or Alcohol- based	
Protection degree	According to IEC60529, UL508			IP20	-
Logic Supply Input (+V <sub>LOG</sub> )		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	9		36	V <sub>DC</sub>
	Absolute maximum values, drive operating but outside guaranteed parameters	8		40	V <sub>DC</sub>
	Absolute maximum values, continuous	-0.6		42	V <sub>DC</sub>
	Absolute maximum values, surge (duration ≤ 10ms) <sup>†</sup>	-1		+45	V
Supply current	+V <sub>LOG</sub> = 12V		130		mA
	+V <sub>LOG</sub> = 24V		90	280	
	+V <sub>LOG</sub> = 40V		85		
Motor Supply Input (+V <sub>MOT</sub> )		Min.	Typ.	Max.	Units
Supply voltage	Nominal values	11		50	V <sub>DC</sub>
	Absolute maximum values, drive operating but outside guaranteed parameters	9		52	V <sub>DC</sub>
	Absolute maximum values, continuous	-0.6		54	V <sub>DC</sub>
	Absolute maximum values, surge (duration ≤ 10ms) <sup>†</sup>	-1		57	V
Supply current	Idle		1	5	mA
	Operating	-20	±8	+20	
	Absolute maximum value, short-circuit condition (duration ≤ 10ms) <sup>†</sup>			26	
Supply Output (+5V)		Min.	Typ.	Max.	Units
Output voltage	Current sourced = 250mA	4.8	5	5.2	V
Output current		200	250		mA
Short-circuit					NOT protected
Over-voltage					NOT protected
ESD protection	Human body model	±1			kV

<sup>1</sup>Operating temperature at higher temperatures is possible with reduced current and power ratings

<sup>2</sup>iPOS4808 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.

<sup>3</sup> 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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Motor Outputs (A/A+, B/A-, C/B+, CR/B-)		Min.	Typ.	Max.	Units
Nominal output current, continuous <sup>1</sup>	for DC brushed, steppers and BLDC motors with Hall-based trapezoidal control			8	A
	for PMSM motors with FOC sinusoidal control (sinusoidal amplitude value)			8	
	for PMSM motors with FOC sinusoidal control (sinusoidal effective value)			5.66	
Motor output current, peak	maximum 2.5s	-20		+20	A
Short-circuit protection threshold		±22	±26	±30	A
Short-circuit protection delay		5	10		µs
On-state voltage drop	Nominal output current; including typical mating connector contact resistance		±0.3	±0.5	V
Off-state leakage current			±0.5	±1	mA
Motor inductance (phase-to-phase)	Recommended value, for current ripple max. ±5% of full range; +V <sub>MOT</sub> = 36 V	F <sub>PWM</sub>			µH
		20 kHz	330		
		40 kHz	150		
		60 kHz	120		
		80 kHz	80		
	Minimum value, limited by short-circuit protection; +V <sub>MOT</sub> = 36 V	20 kHz	120		µH
		60 kHz	40		
		40 kHz	30		
		80 kHz	15		
		100 kHz	8		
Motor electrical time-constant (L/R)	Recommended value for ±5% current measurement error	20 kHz	250		µs
		40 kHz	125		
		60 kHz	100		
		80 kHz	63		
		100 kHz	50		
Current measurement	FS = Full Scale accuracy		±4	±8	%FS
<b>Digital Inputs (IN0, IN1, IN2/LSP, IN3/LSN, IN4, IN5)<sup>2</sup></b>		<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Units</b>
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	
Input current	Absolute maximum, surge (duration ≤ 1s) <sup>†</sup>	-20		+40	
	Logic "LOW"; pulled to GND		0		
	Logic "HIGH"		8	10	mA
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	
Input current	Absolute maximum, surge (duration ≤ 1s) <sup>†</sup>	-20		+40	
	Logic "LOW"; Pulled to GND		8	10	
	Logic "HIGH"; Pulled to +24V	0	0	0	mA
Input frequency		0		10	kHz
Minimum pulse		6			µs
ESD protection	Human body model	±5			kV

Digital Outputs (OUT0, OUT1, OUT2/Error, OUT3/ Ready, OUT4)		Min.	Typ.	Max.	Units	
Mode compliance	All outputs (OUT0, OUT1, OUT2/Error, OUT3/Ready)	NPN 24V				
Default state	Not supplied (+V <sub>LOG</sub> floating or to GND)	High-Z (floating)				
	Immediately after power-up	OUT0, OUT1, OUT4	Logic "HIGH"			
		OUT2/Error, OUT3/ Ready	Logic "LOW"			
Normal operation		OUT0, OUT1, OUT2/Error	Logic "HIGH"			
		OUT3/Ready	Logic "LOW"			
Output voltage	Logic "LOW"; output current = 0.5A			0.8	V	
	Logic "HIGH"; output current = 0, no load	OUT2/Error, OUT3/ Ready	2.9	3		3.3
		OUT0, OUT1, OUT4	4	4.5		5
	Logic "HIGH", external load to +V <sub>LOG</sub>		V <sub>LOG</sub>			
	Absolute maximum, continuous		-0.5			V <sub>LOG</sub> +0.5
	Absolute maximum, surge (duration ≤ 1s) <sup>†</sup>		-1		V <sub>LOG</sub> +1	
Output current	Logic "LOW", sink current			0.5	A	
	Logic "LOW", sink current, pulse ≤ 5 sec.			1	A	
	Logic "HIGH", source current; external load to GND; V <sub>OUT</sub> ≥ 2.0V	OUT2/Error, OUT3/ Ready			2	mA
		OUT0, OUT1, OUT4			4	mA
	Logic "HIGH", leakage current; external load to +V <sub>LOG</sub> ; V <sub>OUT</sub> = V <sub>LOG</sub> max = 40V			0.1	0.2	mA
Minimum pulse width		2			µs	
ESD protection	Human body model	±15			kV	
<b>Digital Hall Inputs (Hall1, Hall2, Hall3)</b>		<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Units</b>	
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) <sup>†</sup>	-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	
<b>Linear Hall Inputs (LH1, LH2, LH3)</b>		<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Units</b>	
Input voltage	Operational range	0	0.5+4.5	4.9	V	
Input voltage	Absolute maximum values, continuous		-7	+7	V	
	Absolute maximum, surge (duration ≤ 1s) <sup>†</sup>		-11	+14		
Input current	Input voltage 0...+5V		0	0.2	mA	
Interpolation Resolution	Depending on software settings			11	bits	
Frequency			0	1	kHz	
ESD protection	Human body model	±1			kV	

<sup>1</sup> @20kHz F<sub>PWM</sub>

<sup>2</sup> The digital inputs are software selectable as PNP or NPN

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Encoder1 Inputs (A1/A1+, A1-, B1/B1+, B1-, Z1/Z1+, Z1-)		Min.	Typ.	Max.	Units
Single-ended mode compliance	Leave negative inputs disconnected	TTL / CMOS / Open-collector			
Input voltage, single-ended mode A/A+, B/B+	Logic "LOW"			1.6	V
	Logic "HIGH"	1.8			
	Floating voltage (not connected)		3.3		
Input voltage, single-ended mode Z/Z+	Logic "LOW"			1.2	V
	Logic "HIGH"	1.4			
	Floating voltage (not connected)		4.7		
Input current, single-ended mode A/A+, B/B+, Z/Z+	Logic "LOW"; Pull to GND		5.5	6	mA
	Logic "HIGH"; Internal 2.2K $\Omega$ pull-up to +5	0	0	0	
Differential mode compliance	For full RS422 compliance, see <sup>1</sup>	TIA/EIA-422-A			
Input voltage, differential mode	Hysteresis	$\pm 0.06$	$\pm 0.1$	$\pm 0.2$	V
	Common-mode range (A+ to GND, etc.)	-7		+7	
Input impedance, differential	A1+ to A1-, B1+ to B1-		1		k $\Omega$
	Z1+ to Z1-		1		
Input frequency	Single-ended mode, Open-collector / NPN	0		5	MHz
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	0		10	MHz
Minimum pulse width	Single-ended mode, Open-collector / NPN	1			$\mu$ s
	Differential mode, or Single-ended driven by push-pull (TTL / CMOS)	50			ns
Input voltage, any pin to GND	Absolute maximum values, continuous	-7		+7	V
	Absolute maximum, surge (duration $\leq 1$ s) <sup>†</sup>	-11		+14	
ESD protection	Human body model	$\pm 1$			kV
Encoder2 Inputs (A2+/Data+, A2-/Data-, B2+/Clk+, B2-/Clk-, Z2+, Z2-) <sup>2</sup>		Min.	Typ.	Max.	Units
Differential mode compliance	For full RS422 compliance, see <sup>1</sup>	TIA/EIA-422-A			
Input voltage	Hysteresis	$\pm 0.06$	$\pm 0.1$	$\pm 0.2$	V
	Differential mode	-14		+14	
	Common-mode range (A+ to GND, etc.)	-11		+14	
Input impedance, differential	A2+, B2+, Z2+ / A2-, B2-, Z2-		150		$\Omega$
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 <sub>PP</sub>
Input voltage, any pin to GND	Operational range	-1	2.5	4	V
	Absolute maximum values, continuous	-7		+7	
	Absolute maximum, surge (duration $\leq 1$ s) <sup>†</sup>	-11		+14	
Input impedance	Differential, Sin+ to Sin-, Cos+ to Cos- <sup>3</sup>	4.2	4.7		k $\Omega$
	Common-mode, to GND		2.2		k $\Omega$
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	
ESD protection	Human body model	$\pm 1$			kV

Analog 0...5V Inputs (REF, FDBK)		Min.	Typ.	Max.	Units
Input voltage	Operational range	0		5	V
	Absolute maximum values, continuous	-12		+18	
	Absolute maximum, surge (duration $\leq 1$ s) <sup>†</sup>			$\pm 36$	
Input impedance	To GND		28		k $\Omega$
Resolution			12		bits
Integral linearity				$\pm 2$	bits
Offset error				$\pm 10$	bits
Gain error		$\pm 1\%$		$\pm 3\%$	% FS <sup>4</sup>
Bandwidth (-3Db)	Software selectable	0		1	kHz
ESD protection	Human body model	$\pm 5$			kV
RS-232		Min.	Typ.	Max.	Units
Compliance		TIA/EIA-232-C			
Bit rate	Software selectable	9600		115200	Baud
Short-circuit	232TX short to GND	Guaranteed			
ESD protection	Human body model	$\pm 2$			kV
Safe torque OFF (STO1+, STO1-, STO2+, STO2+)		Min.	Typ.	Max.	Units
Safety function	According to EN61800-5-2	STO (Safe Torque OFF)			
EN 61800-5-1/ -2 and EN 61508-5-3/ -4	Safety Integrity Level	safety integrity level 3 (SIL3)			
Classification	PFHD (probability of dangerous failures per hour)	$8 \times 10^{-10}$			hour <sup>-1</sup> (0.8 FIT)
	Performance Level	Cat3/PLe			
EN13849-1 Classification	MTTFM (meantime to dangerous failure)		377		years
Mode compliance		PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input voltage	Logic "LOW"	-20		5.6	V
	Logic "HIGH"	18		36	
	Absolute maximum, continuous	-20		+40	
Input current	Logic "LOW"; pulled to GND		0		mA
	Logic "HIGH"; pulled to +Vlog		5	13	
Repetitive test pulses (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
PWM operation delay	From external STO low-high transition to PWM operation enabled			30	ms
ESD protection	Human body model	$\pm 2$			kV
Ethernet Ports		Min.	Typ.	Max.	Units
Standard Compliance		EtherCAT (IEC61158-3/4/5/6-12)			
		Fast Ethernet 100BASE-TX (IEEE802.3u)			
		Auto-negotiation for 100Mbps/s full-duplex			
		Auto-detect MDI/MDI-X			
Power over Ethernet	NOT used by the iPOS4808MY, requires separate +Vlog SELV/ PELV supply	compliant to IEEE802.3af mode A "Mixed DC & Data" NOT compliant to IEEE802.3af mode B "DC on Spares"			
Isolation GND0,GND1	Requirement for motherboard PCB routing	500			V <sub>rms</sub>
Maximum cable length	2-pair UTP Cat5	100	150		m
ESD protection	Human body model	$\pm 4$			kV
LED signals		Min.	Typ.	Max.	Units
LED connection		Common cathode to GND			
		Direct, no series resistor			
LED current		8	10		mA
3.3 output voltage		3.15	3.3	3.45	V
3.3 output current				60	mA


<sup>†</sup> 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.

<sup>1</sup> For full RS-422 compliance, 120 $\Omega$  termination resistors must be connected across the differential pairs, as close as possible to the drive input pins.

<sup>2</sup> Encoder2 differential input pins have internal 120 $\Omega$  termination resistors connected across

<sup>3</sup> For many applications, a 120 $\Omega$  termination resistor should be connected across SIN+ to SIN-, and across COS+ to COS-. Please consult the feedback device datasheet for confirmation.

<sup>4</sup> "FS" stands for "Full Scale"

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