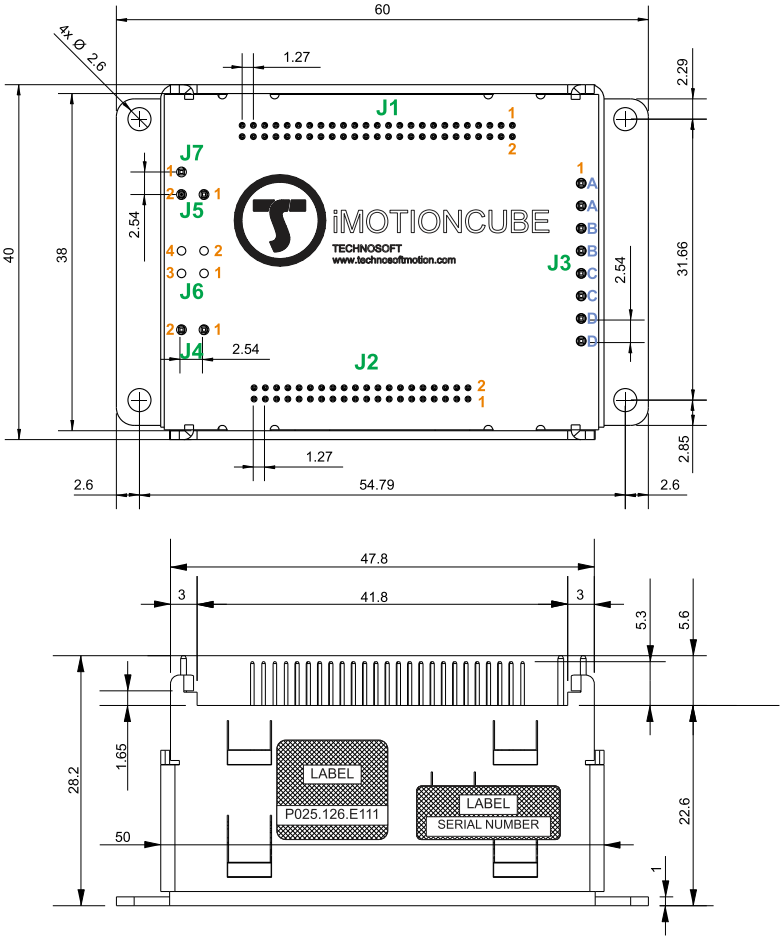

All dimensions are in mm.

Motor – sensor configurations					
Sensor \ Motor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP (3-ph)
Incr. Encoder	✓		✓	✓	
Incr. Encoder + Hall	✓	✓			
Analog Sin/Cos encoder	✓	✓	✓	✓	
Linear Halls	✓				
Tacho			✓		
Open-loop (no sensor)				✓	✓

Mating connectors				
Connector	Description			
J1	Socket 2x27 pins, 1.27x1.27mm pitch, square 0.4 mm pins			
	If J3&J4 are soldered on motherboard		If J3&J4 are used with mating SSQ connectors	
	Harwin	M50-3152742	Harwin	M54-3002745
J2	Socket 2x20 pins, 1.27x1.27mm pitch, square 0.4 mm pins			
	If J3&J4 are soldered on motherboard		If J3&J4 are used with mating SSQ connectors	
	Harwin	M50-3152042	Harwin	M50-3002045
J3	To use full current capabilities of the drive, solder these pins directly to the motherboard without using socket connectors			
	High-current socket 2 pins, 2.54 mm pitch, square 0.635 mm pins -use only if nominal current is < 8A-			SSQ-108-01-G-S
J4	To use full current capabilities of the drive, solder these pins directly to the motherboard without using socket connectors			
	High-current socket 2 pins, 2.54 mm pitch, square 0.635 mm pins -use only if nominal current is < 8A-			SSQ-102-01-G-S
J5+J7	To use full current capabilities of the drive, solder these pins directly to the motherboard without using socket connectors			
	High-current socket 2x2 pins, 2.54 mm pitch, square 0.635 mm pins -use only if nominal current is < 8A-			SSQ-102-01-G-D
J6	Connector Header Through Hole 4 position 0.100" (2.54mm)			TSW-102-14-F-D

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 (CSP, PVT,S-curve, electronic gearing and cam)
- Motor supply: 12-80V; Logic SELV/ PELV supply: 12-36V; STO SELV/ PELV supply: 18-40V
- Output current: 20A cont. (BLDC mode)*; 40A_{PEAK} , up to 120KHz PWM
- Feedback Devices (dual-loop support)
  - 1st feedback devices supported:
    - Incremental encoder interface (single ended or differential)
    - pulse & direction interface (single ended) for external digital reference (from master)
    - Analogue sin/cos encoder interface (differential 1V_{pp})
    - Digital Hall sensor interface (single ended and open collector)
    - Linear Hall sensors interface
  - 2nd feedback devices supported:
    - Incremental encoder interface (single ended)
    - pulse & direction interface (single ended) for external digital reference (from master)
- 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.
- 4 digital inputs, 5-36V, PNP/NPN programmable: 2 for limit switches, 2 general-purpose
- 4 digital outputs, 5-36V, 0.5A, NPN open-collector: Ready, Error, 2 general-purpose
- 2 analogue inputs: 12-bit, 0-5V: Reference, Feedback or general purpose
- RS-232 serial & dual RJ45 CAN connectors
- TMLCAN and CANopen (CiA 301 v4.2, CiA 305 v.2.2.13 and CiA 402 v3.0) protocols selectable by h/w axis ID pin inputs
- 127 h/w addresses in CANopen mode and 196 h/w addresses in TMLCAN mode
- 16k x 16 SRAM memory for data acquisition
- 16k x16 E^2ROM to store setup data, TML motion programs, cam tables and other user data
- NTC/PTC analogue Motor Temperature sensor input
- Operating ambient temperature: 0-40°C (over 40°C with derating)
- Programmable protections: short-circuit between motor phases or motor phases to GND, over/under-voltage, over-current, I^2t, control error

* with external heat sink

Connector Description

	Pin	Name	Type	Description
J2	1..28	Reserved	-	Reserved
	29	CAN-Hi	I/O	CAN-Bus positive line (dominant high)
	30	Reserved	-	Reserved
	31	CAN-Lo	I/O	CAN-Bus negative line (dominant low)
	32	Reserved	-	Reserved
	33	+5V	O	+5V output power supply
	34	GND	-	Ground
	35..39	Reserved	-	Reserved
	40	GND	-	Ground

	Pin	Name	Type	Description
J3	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 step motors

Connector description

	Pin	Name	Type	Description
J1	1	232RX	I	RS232 data reception
	2	Enc1 A+/Sin1+	I	Incr. encoder # A+ diff. input, analogue encoder #1 Sin+ diff. input.
	3	232TX	O	RS232 data transmission
	4	Enc1 A-/Sin1-	I	Incr. encoder #1 A- diff. input, analogue encoder #1 Sin1- diff. input
	5	AxisID 0	I	Axis ID / Address input #0. Analogue input, 0-5V
	6	Enc1 B+/Cos1+	I	Incr. encoder # B+ diff. input, analogue encoder #1 Cos+ diff. input.
	7	AxisID 1	I	Axis ID / Address input #1. Analogue input, 0-5V
	8	ENC1B-/ Cos1-	I	Incr. encoder #1 B- diff. input, analogue encoder Cos1- diff. input
	9	AxisID 2	I	Axis ID / Address input #2. Analogue input, 0-5V
	10	Enc1 Z+	I	Incr. encoder #1 Z+ diff. input.
	11	CAN-Hi	-	CAN-Bus positive line (dominant high)
	12	Enc1 Z-	I	Incr. encoder Z- diff. input
	13	CAN-Lo	-	CAN-Bus negative line (dominant low)
	14	Hall1	I/O	Hall 1 sensor 5V digital input
	15	Reserved	-	Reserved. Do not connect.
	16	Hall2	I/O	Hall 2 sensor 5V digital input
	17	Reserved	-	Reserved. Do not connect.
	18	Hall3	I	Hall 3 sensor 5V digital input
	19	Ref	I	Analogue input, 12-bit, 0-5V. Used to read an analog position, speed or torque reference, or as general purpose analogue input
	20	Fdbk	I	Analogue input, 12-bit, 0-5V. Used to read an analogue position or speed feedback, or as general purpose analogue input
	21	+Vlog	I	Positive terminal of the logic supply input: 9 to 36V_{DC} from SELV/ PELV type power supply
	22	+5V_{OUT}	O	5V output supply. Max 300mA for feedback sensors and I/Os
	23	IN0	I	24V digital input #0, programmable NPN or PNP, general-purpose
	24	OUT0	O	24 digital output #0, NPN, general-purpose
	25	IN1	I	24V digital input #1, programmable NPN or PNP, general-purpose
	26	OUT1	O	24V digital output #1, NPN, general-purpose
	27	IN2/LSP	I	24V digital input #2, programmable NPN or PNP, positive limit switch
	28	Out2/ Error	O	24V digital output #2, NPN, drive error
	29	In3/LSN	I	24V digital input #3, programmable NPN or PNP type, negative limit switch
	30	Out3/ Ready	O	24V digital output 3, NPN type, drive ready
	31	TMOT	I	Motor temperature sensor input. Analogue input, 0-3.3V
	32..34	Reserved	-	Reserved
	35	GND	-	Ground
	36	GND	-	Ground
	37-40	Reserved	-	Reserved
	41	Enc2 A	I	Incr. encoder #2 A digital input, 0-3.3V
	42	SIN2	I	Analogue encoder #2 SIN input, 0-3.3V
	43	Enc2 B	I	Incr. encoder #2 B digital input, 0-3.3V
	44	COS2	I	Analogue encoder #2 COS input, 0-3.3V
	45	Enc2 Z	I	Incr. encoder #2 Z digital input, 0-3.3V
	46	+5Vout	O	5V output supply. Max 300mA for feedback sensors and I/Os
	47..50	Reserved	-	Reserved

	Pin	Name	Type	Description
J4	1,2	+V_{MOT}	I	Positive terminal of the motor supply

	Pin	Name	Type	Description
J5	1,2	GND	-	Negative return (ground) of the motor supply

	Pin	Name	Type	Description	
J6	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	Safe Torque Off input 2, positive input(opto-isolated, 18÷40V)	
	3	STO1-	I	Safe Torque Off input 1, negative return (opto-isolated, 0V)	
	4	STO2-	I	Safe Torque Off input 2, negative return (opto-isolated, 0V)	

	Pin	Name	Type	Description
J7	1	Earth	-	Earth connection

Electrical characteristics

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

- Tamb = 0…40ºC, VLOG = 24 VDC; VMOT = 80VDC
- Supplies start-up / shutdown sequence: -any-
- Load current (sinusoidal amplitude / continuous BLDC, DC, stepper) = 20A

Operating Conditions		**Min**	**Typ**	**Max**	**Units**
Ambient temperature[1]		0		+40	ºC
Ambient humidity	Non-condensing	0		90	%Rh
Altitude / pressure[2]	Altitude (vs. sea level)	-0.1	0 ÷ 2	2	Km
	Ambient Pressure	0 [2]	0.75 ÷ 1	10.0	atm
Storage Conditions		**Min**	**Typ**	**Max**	**Units**
Ambient temperature		-40		+85	ºC
Ambient humidity	Non-condensing	0		100	%Rh
Ambient Pressure		0		10.0	atm
Mechanical Mounting		**Min**	**Typ**	**Max**	**Units**
Airflow		natural convection[3], closed box			
Environmental Characteristics		**Min**	**Typ**	**Max**	**Units**
Size (Length x Width x Height)	Without mating connectors	60 x 40 x 28.2			mm
		~2.36 x 1.58 x 1.11			inch
Weight	Without mating connectors	45			g
Power dissipation	Idle (no load)		3.6		W
	Operating		11		
Efficiency			98		%
Cleaning agents	Dry cleaning is recommended	Only Water- or Alcohol- based			
Protection degree	According to IEC60529, UL508	IP20			-

[1] Operating temperature can be extended up to **+65ºC** with reduced current and power ratings.
[2] iMOTIONCUBE 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.
[3] It is recommended to mount the iMOTIONCUBE on a metallic support using the provided mounting holes, for better reliability and reduced de-rating due to heat dissipation

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, surge (duration ≤ 10ms) †		-1		+45	V
Supply current	No Load on Digital Outputs	+V_{LOG} = 9V		300		mA
		+V_{LOG} = 12V		250		
		+V_{LOG} = 24V		150		
		+V_{LOG} = 36V		100		
Motor Supply Input (+V_{MOT})			**Min**	**Typ**	**Max**	**Units**
Supply voltage	Nominal values		12	80	90	V_{DC}
	Absolute maximum values, drive operating but outside guaranteed parameters		11		94	V_{DC}
	Absolute maximum values, surge (duration ≤ 10ms) †		-1		95	V
Supply current	Idle			1	5	mA
	Operating		-40	±20	+40	A
	Absolute maximum value, short-circuit condition (duration ≤ 10ms) †				45	A
Motor Outputs (A/A+, B/A-, C/B+, CR/B-)			**Min**	**Typ**	**Max**	**Units**
Nominal output current, continuous	for DC brushed, steppers and BLDC motors with Hall-based trapezoidal control				20	A
	for PMSM motors with FOC sinusoidal control (sinusoidal amplitude value)				20	
	for PMSM motors with FOC sinusoidal control (sinusoidal effective value)				14.2	
Motor output current, peak	maximum 10s		-40		+40	A
Short-circuit protection threshold	measurement range				±45	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_{MOT} = 80 V	F_{PWM}				µH
		20 kHz	330			
		40 kHz	150			
		60 kHz	120			
		80 kHz	80			
		100 kHz	60			
	Minimum value, limited by short-circuit protection; +V_{MOT} = 80 V	20 kHz	120			µH
		40 kHz	40			
		60 kHz	30			
		80 kHz	15			
		100 kHz	8			
Motor electrical time-constant (L/R)	Recommended value for ±5% current measure-ment error	20 kHz	250			µs
		40 kHz	125			
		60 kHz	100			
		80 kHz	63			
		100 kHz	50			
Current measurement	FS = Full Scale accuracy			±5	±8	%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"	1.8			
	Floating voltage (not connected)		4.5		
	Absolute maximum, surge (duration ≤ 1s) †	-10		+15	
Input current	Logic "LOW"; Pull to GND		5	3	mA
	Logic "HIGH"; Internal 1KΩ 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	
	Absolute maximum, surge (duration ≤ 1s) †	-11		+14	
Input current	Input voltage 0…+5V	-1	±0.9	+1	mA
Interpolation Resolution	Depending on software settings			10	bits
Frequency		0		1	kHz
ESD protection	Human body model	±1			kV
Encoder #1 Inputs (A2+, A2-, B2+, B2-, Z2+, Z2-)[1]		**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)		4.7		
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		2.5	3	mA
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5	0	0	0	
Differential mode compliance	For full RS422 compliance, see [2]	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	A1+, B1+, Z1+ to GND		2.2		kΩ
	A1-, B1-, Z1- to GND		3.6		
Input frequency	Single-ended mode	0		500	kHz
	Differential mode	0		10	MHz
Input voltage, any pin to GND	Absolute maximum, surge duration ≤1s †	-11		+14	V
ESD protection	human body model	±1			kV
Encoder #2 Inputs (A2, B2, Z2)		**Min**	**Typ**	**Max**	**Units**
Single ended mode compliance		TTL / CMOS / Open collector			
Input voltage, single-ended mode	Logic "LOW"			0.8	V
	Logic "HIGH"	2			
Input current, single-ended mode	Logic "LOW"			0.1	mA
	Logic "HIGH"			0.1	

[1] Encoder #1 differential input pins do not have internal 120Ω termination resistors connected across. Contact Technosoft in case they are needed.

[2] For full RS-422 compliance, 120Ω termination resistors must be connected across the differential pairs

Sin-Cos Encoder Inputs (Sin+, Sin-, Cos+, Cos-)[1]		**Min**	**Typ**	**Max**	**Units**
Input voltage, differential	Sin+ to Sin-, Cos+ to Cos-	0.8	1	1.25	V_{PP}
Input voltage, any pin to GND	Operational range	-1	2.5	4	V
	Absolute maximum values, continuous	-7		+7	
	Absolute maximum, surge (duration ≤ 1s) †	-11		+14	
Input impedance	Differential, Sin+ to Sin-, Cos+ to Cos-		120		Ω
	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	±2			kV

Digital Inputs (IN0, IN1, IN2/LSP, IN3/LSN)[1]		**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		36	
	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"		6	8	

Mode compliance		NPN			
Default state	Input floating (wiring disconnected)	Logic HIGH			
Input voltage	Logic "LOW"	-10		2.2	V
	Logic "HIGH"	6.3		36	
	Floating voltage (not connected)		Vlog-1		
	Absolute maximum, continuous	-10		+36	
	Absolute maximum, surge (duration ≤ 1s) †	-20		+40	
Input current	Logic "LOW"; Pulled to GND		6	8	mA
	Logic "HIGH"; Pulled to +24V		0		

Input frequency			0		150	kHz
Minimum pulse			3.3			µs
ESD protection	Human body model		±2			kV
Digital Outputs (OUT0, OUT1, OUT2/Error, OUT3/ Ready)			**Min**	**Typ**	**Max**	**Units**
Mode compliance	All outputs (OUT0, OUT1, OUT2/Error, OUT3/Ready)		NPN 24V			
Default state	Not supplied (+V_{LOG} floating or to GND)		High-Z (floating)			
	Immediately after power-up	OUT0, OUT1	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", external load to +V_{LOG}			V_{LOG}		
	Absolute maximum, continuous		-0.5		36V	
Output current	Logic "LOW", sink current, continuous				0.5	A
	Logic "HIGH", leakage current; external load to +V_{LOG}; V_{OUT} = V_{LOG} max = 39V				0.2	mA

Minimum pulse width		2			µs
ESD protection	Human body model	±2			kV
Encoder#1 Inputs (A/A+, A-, B/B+, B-, Z/Z+, Z)		**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)		4.5		
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		2.5	3	mA
	Logic "HIGH"; Internal 2.2KΩ pull-up to +5	0	0	0	
Differential mode compliance	For full RS422 compliance, see [2]	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	A+ to A-, B+ to B-	4.2	4.7		kΩ
	Z+ to Z-	6.1	7.2		
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			µs
	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 ≤ 1s) †	-11		+14	
ESD protection	Human body model	±2			kV
Encoder#2 Inputs (A2, B2, Z2)		**Min**	**Typ**	**Max**	**Units**
Single-ended mode compliance		TTL / CMOS / Open-collector			
Input voltage, single-ended mode A2, B2, Z2	Logic "LOW"			0.8	V
	Logic "HIGH"	2			
Input current, single-ended mode A2, B2, Z2	Logic "LOW"			0.1	mA
	Logic "HIGH"			0.1	
Sin-Cos Encoder Inputs (Sin+, Sin-, Cos+, Cos-)[2]		**Min**	**Typ**	**Max**	**Units**
Input voltage, differential	Sin+ to Sin-, Cos+ to Cos-		1	1.25	V_{PP}
Input voltage, any pin to GND	Operational range	-1	2.5	4	V
	Absolute maximum values, continuous	-7		+7	
	Absolute maximum, surge (duration ≤ 1s) †	-11		+14	
Input impedance	Differential, Sin+ to Sin-, Cos+ to Cos-	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	±2			KV

[1] The digital inputs are software selectable as PNP or NPN

[2] For full RS-422 compliance, 120Ω termination resistors must be connected across the differential pairs, as close as possible to the drive input pins.

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 Classification	Safety Integrity Level	safety integrity level 3 (SIL3)			
	PFHd (Probability of Failures per Hour - dangerous)	$8*10^{-10}$	hour^{-1} (0.8 FIT)		
EN13849-1 Classification	Performance Level	Cat3/PLe			
	MTTFd (meantime to dangerous failure)	377			years
Mode compliance		PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input voltage	Logic "LOW" (PWM operation disabled)	-20		5.6	V
	Logic "HIGH" (PWM operation enabled)	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	Hz
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	±2			kV

Analog 0…5V Inputs (REF, FDBK)		**Min**	**Typ**	**Max**	**Units**
Input voltage	Operational range	0		4.95	V
	Absolute maximum values, continuous	-12		+18	
	Absolute maximum, surge (duration ≤ 1s) †			±36	
Input impedance	To GND		8		KΩ
Resolution		12			bits
Integral linearity				±2	bits
Offset error			±2	±10	bits
Gain error			±1%	±3%	% FS[1]
Bandwidth (-3dB)	Software selectable	0		1	KHz
ESD protection	Human body model	±2			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	±2			KV
CAN-Bus		**Min**	**Typ**	**Max**	**Units**
Compliance		ISO11898, CiA-301v4.2 & 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	Strapping option (AxisID0,1,2)	1 ÷ 127 (CANopen); 1-195 & 255 (TMLCAN)			
ESD protection	Human body model	±15			kV
Supply Output (+5V)		**Min**	**Typ**	**Max**	**Units**
Output voltage	Current sourced = 500mA	4.8	5	5.2	V
Output current		600	650		mA
Short-circuit		NOT protected			
Over-voltage		NOT protected			
ESD protection	Human body model	±2			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.

[1] "FS" stands for "Full Scale"