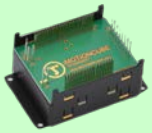
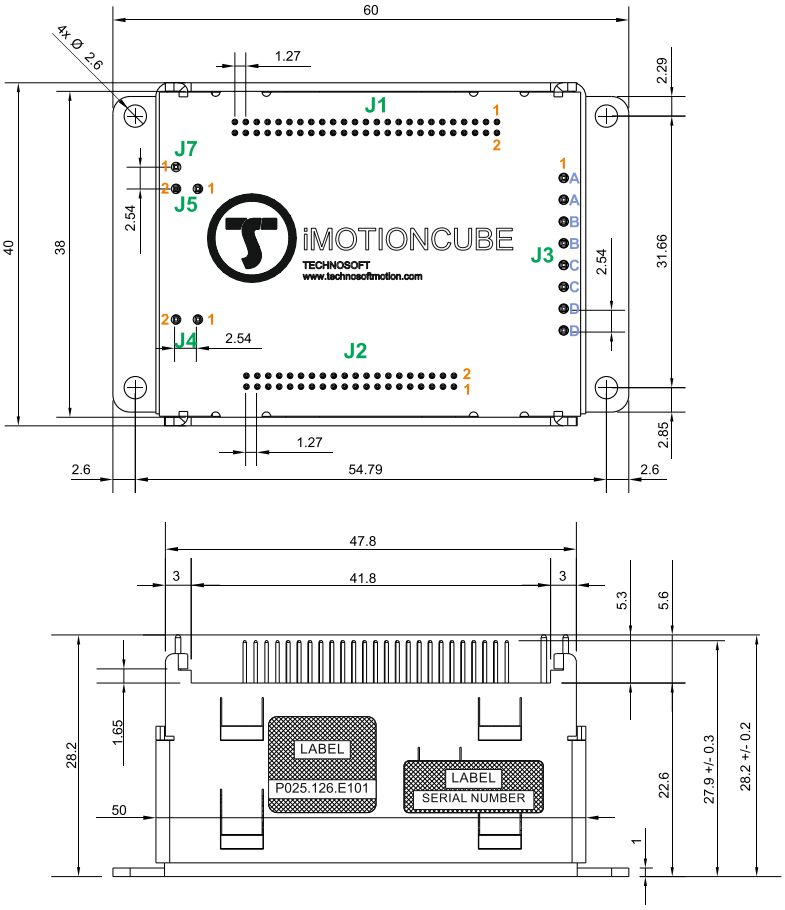


iMOTIONCUBE-CAN DATASHEET
P/N: P025.126.E101



All dimensions are in mm.

Motor – sensor configurations					
Sensor \ Motor	PMSM	BLDC	DC BRUSH	STEP (2-ph)	STEP[3] (3-ph)
Incr. Encoder	✓		✓	✓	✓
Incr. Encoder + Hall	✓	✓			
Analog Sin/Cos encoder	✓	✓	✓	✓	✓
SSI[1]	✓		✓	✓	✓
BiSS-C[1]	✓		✓	✓	✓
EnDAT[1 2]	✓		✓	✓	✓
Linear Halls	✓				
Tacho			✓		
Open-loop (no sensor)				✓	✓

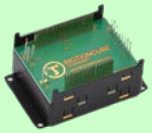
[1] *Only with external circuit*
[2] *Available starting with F514K firmware version*
[3] *Sensors are used only for step loss detection*

Mating connectors				
Connector	Description			
J1	Socket 2x25 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	M50-3152542	Harwin	M50-3002545
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-T-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-T-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	

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 supply 12-36V
- 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)
    - BISS, SSI, EnDAT 2.2 (starting with F514K firmware version) encoder interface capability available only using external circuit
- Separate ENABLE circuit: connect both ENA1 and ENA2 inputs to +24V, to allow motor PWM output operation
- 4 digital inputs, 12-36V, 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



iMOTIONCUBE-CAN DATASHEET
P/N: P025.126.E101

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

	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
	15	ENA1	I	Enable circuit input1; connect ENA1&ENA2 to +24V to activate motor operation
	16	Hall2	I/O	Hall 2 sensor
	17	ENA2	I	Enable circuit input2; connect ENA1&ENA2 to +24V to activate motor operation
	18	Hall3	I	Hall 3 sensor
	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 for logic supply 9-36V_{DC}
	22	+5V_{OUT}	O	5V output supply. Max 300mA for feedback sensors and I/Os
	23	IN0	I	12-36V, digital input #0, programmable NPN or PNP, general-purpose
	24	OUT0	O	24 digital output #0, NPN, general-purpose
	25	IN1	I	12-36V, digital input #1, programmable NPN or PNP, general-purpose
	26	OUT1	O	24V digital output #1, NPN, general-purpose
	27	IN2/LSP	I	12-36V, 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	12-36V, 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
J7	1	Earth	-	Earth connection

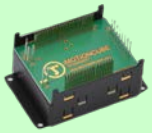
Electrical characteristics

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			

[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



iMOTIONCUBE-CAN DATASHEET
P/N: P025.126.E101

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		-
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		
Utilization Category	Acc. to 60947-4-1 (IPEAK<=1.05*INOM)			DC-1		
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
Utilization Category	Acc. to 60947-4-1 (IPEAK<=4.0*INOM)			DC-3		
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					±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"			
	Immediately after power-up: OUT2/Error, OUT Ready	Logic "LOW"			
	Normal operation: OUT0, OUT OUT2/Error	Logic "HIGH"			
	Normal operation: 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		V_{LOG}+0.5	
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	±15			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.

Enable circuit (ENA1, ENA2)		**Min**	**Typ**	**Max**	**Units**
Enable function	Disables motor power when either ENA1 or ENA2 is disconnected from the power source				
Mode compliance		PNP			
Default state	Input floating (wiring disconnected)	Logic LOW			
Input voltage	Logic “LOW”	-10		2.2	V
	Logic “HIGH”	6.3		36	
	Absolute maximum, continuous	-10		+39	
Input current	Logic “LOW”; pulled to GND		0		mA
	Logic “HIGH”, pulled to +Vlog		9	13	
Pulse duration	Ignored low-high-low			1	ms
	Ignored high-low-high			1.5	
	Accepted pulse	tbd			
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

† 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”