QUANTUMX

MX471C

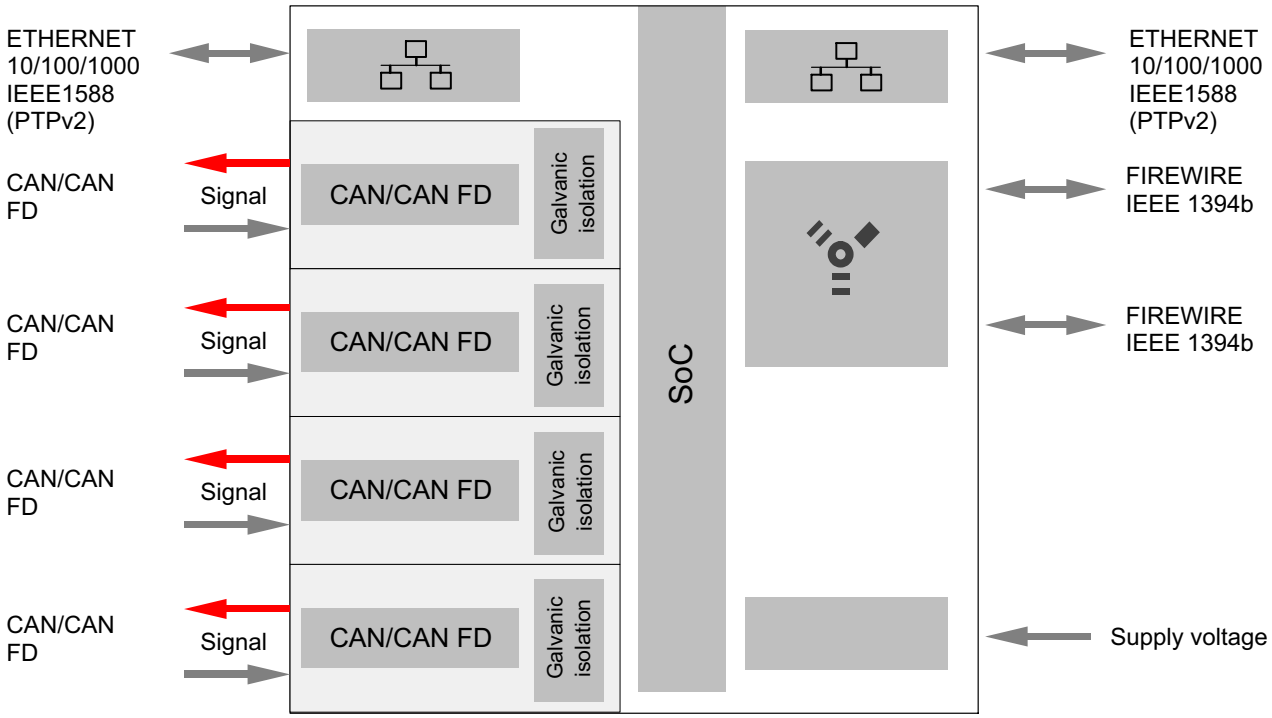
CAN FD module

Data sheet

Special features

- **Four individually configurable channels (galvanically isolated)**
- **Supports CAN FD (ISO 11898-1:2015), CAN 2.0A/B**
- **Receive: raw and decoded (*.dbc)**
- **Transmit: sensor signals or gateway**
- **XCP on CAN/CAN-FD**

Block diagram



Specifications for MX471C

General specifications		
Number of CAN *FD* ports		4, galvanically isolated
Supported protocols		CAN 2.0A (11-bit identifier) CAN 2.0B (29-bit identifier, extended format) ISO CAN FD 11898-1:2015
Bus link		two-wire, as per ISO11898-2
Transducer connection		D-SUB-9
Supply voltage range (DC)	V	10 ... 30 (nominal (rated) voltage 24 V)
Supply voltage interruption max. (at 24 V)	ms	5[1)]
Power consumption	W	< 6
Ethernet (module synchronization, data link)	Mbit/s	10 / 100 / 1000
Protocol (addressing)	-	TCP/IP (direct IP address or DHCP)
Plug connection	-	8P8C plug (RJ-45) with twisted-pair cable (CAT-5)
Max. cable length to module	m	100
Synchronization options		
FireWire IEEE1394b		FireWire-based synchronization
Ethernet PTPv2 IEEE1588		Ethernet-based Precision Time Protocol
Ethernet NTP		Ethernet-based Network Time Protocol
FireWire (module synchronization, data link, optional power supply)		IEEE 1394b (HBM modules only)
Baud rate	MBaud	400 (approx. 50 MBytes/s)
Max. current from module to module	A	1.5
Max. cable length between nodes	m	5 (optical: 100)
Max. number of modules connected in series (daisy chain)	-	12 (= 11 hops[2)])
Max. number of modules in a FireWire system (including hubs[3)], backplane)	-	24
Max. number of hops	-	14
Nominal (rated) temperature range	°C	-20 … +60
Operating temperature range	°C	-20 … +65
Storage temperature range	°C	-40 … +75
Relative humidity	%	5 ... 95 (non-condensing)
Protection class		III[4)]
Equipment protection level		IP20 as per EN 60529
Mechanical tests[5)]		
Vibration (30 min)	m/s^2	50
Impact (6 ms)	m/s^2	350
EMC requirements		per EN 61326
Dimensions, horizontal (H x W x D)	mm	52.5 x 200 x 122 (with case protection)
	mm	44 x 174 x 119 (without case protection)
Weight about (with case protection)	g	850[6)]

1) Uninterruptible power supply (UPS) available as accessory for longer interruptions
2) Hop: transition from module to module/signal conditioning
3) Hub: FireWire node or distributor
4) The DC voltage supply must meet the requirements of IEC 60950-1 on a SELV voltage supply.
5) Mechanical stress is tested in accordance with European standards EN60068-2-6 for vibration and EN60068-2-27 for shock. The devices are exposed to an acceleration of 50 m/s^2 within the frequency range 5...65 Hz in all 3 axes. Duration of this vibration test: 30 minutes per axis. The shock test is implemented at a nominal (rated) acceleration of 350 m/s^2 for a duration of 6 ms, half sine and with shocks in each of the six possible directions.
6) Without case protection: 660 g

CAN bus												
Bit rates[7] (CAN 2.0A, CAN 2.0B, CAN FD arbitration phase)	kBits/s	1000	800	666.6	500	400	250	125	100	50	20	10
Permissible cable lengths	m	25	50	80	100	100	250	500	600	1000	2500	5000
Additional bit rates[7] CAN FD data phase	Mbit/s	4	2.5	2	1.6	1.25	1	0.5				
Bit sequence formats		Motorola Forward MSB, Intel Standard										
Bus terminating impedance (internal; can be connected via software)	Ω	120 (common mode-stabilized, split termination)										
Identifier		11-bit or 29-bit										
Data types		REAL32 and REAL64, BOOL, INT32 and UINT32, INT64 and UINT64										
Receiving raw data stream												
Max. number of messages per port		Unlimited – complete BUS data										
Parameterization		catman										
Receiving decoded signals												
Max. number of input signals per port		250[8]										
CAN signal types for input signal		Standard, mode-dependent, mode signal										
Parameterization		Manually or from CAN database (*.dbc)										
Receiving CCP and XCP on CAN/CAN FD												
Supported protocols		CCP Version 2.1 XCP on CAN Version 1.1 XCP on CAN FD Version 1.1										
Parameterization		*.dbc plus optional *.skb Required step using CANape from Vector Informatik (read *.a2l, generate *.dbc)										
Transmitting CAN messages (dynamic)												
Signal sources		Sensor signals/measured values (MX inputs) CAN signal inputs (CAN gateway) Real-time signals (calculations)										
Parameterization		MX Assistant, including determination of CAN ID and generating *.dbc										
Max. number of messages (IDs) per port		128										
Max. number of different signals per module		200										
Numbers of signals per message		Several signals per message										
Max. number of bytes per message		64										
Message type		CAN or CAN FD										
Transmission type		Timer-controlled (max. 1200/s) On a change of source value (defined delta), isochronous event (with divider) (max. 5000/s)										
Transmitting predefined CAN messages (static)												
CAN messages		Can be used for wake-up, CANopen sensors, OBD-2										
Max. number of messages (IDs) per port		32										
Max. number of bytes per message		8 (CAN) 64 (CAN FD)										
Transmission types		Timer-controlled (max. 1200/s), software control										

[7] Recommended and tested bit rates
[8] catman only supports decoding of max. 128 signals per port

Performance			
Decoding performance			
Max. signal transmission rate (decoding) per module (without Ethernet gateway functionality)	1/s	250,000	
Max. signal transmission rate (decoding) per module (with Ethernet gateway functionality)	1/s	100,000	
Ethernet gateway performance			
Max. signal transmission rate (Ethernet gateway) per module without CAN functionality	1/s	2,000,000	
Max. signal transmission rate (Ethernet gateway) per module with CAN functionality	1/s	1,000,000	
Typical performance[9] **with EVIDAS or catman**[10), 11)]			
Without simultaneous Ethernet gateway functionality		Signal transmission rate (decoding) per module	Signal transmission rate (encoding) per module
Decoding (4 x 128 signals)	1/s	200,000	-
Decoding (1 x 128 signals)	1/s	100,000	-
Decoding (4 x 250 signals)	1/s	100,000	-
Decoding (4 x 128 signals) and raw (2 x)	1/s	180,000	-
Decoding (4 x 128 signals) and raw (4 x)	1/s	160,000	-
Decoding (2 x 128 signals) and encoding[12)] (2 x 125 signals)	1/s	150,000	100,000
Encoding[12)] (4 x 20012) signals)	1/s	-	200,000
With simultaneous Ethernet gateway functionality (1 MS/s)		Signal transmission rate (decoding) per module	Signal transmission rate (encoding) per module
Decoding (4 x 32 signals)	1/s	100,000	-
Decoding (1 x 128 signals)	1/s	100,000	-
Decoding (2 x 64 signals) and raw (2 x)	1/s	80,000	-
Decoding (1 x 100 + 1x 50 signals), raw (2x), and encoding[12)] (1x 100 signals)	1/s	60,000	40,000
Encoding[12)] (4 x 200 signals)	1/s	-	200,000

[9)] Test setup: MX471C with 7 other MX modules
[10)] catman settings for data transfer in DAQ job: max. number of measured values per data rate: 12,000; time between two data transfers in ms: 50; timeout for data transfer in ms: 10,000
[11)] catman only supports decoding of max. 128 signals per port
[12)] The MX Assistant must be used to parametrize encoding

Specifications NTX001 power supply

NTX001		
Nominal (rated) input voltage (AC)	V	100 ... 240 (± 10 %)
No-load power consumption at 230 V	W	0.5
Nominal load		
U_A	V	24
I_A	A	1.25
Static output data		
U_A	V	24 ± 4%
I_A	A	0 / 1.25
U_{Br} (output ripple voltage; peak-to-peak)	mV	≤ 120
Current limiter, typically from	A	1.6
Galvanic isolation		electrical, by optocoupler and transducer
SG creep and clearances	mm	≥ 8
High-voltage test	kV	≥ 4
Ambient temperature	°C	0 ... +40
Storage temperature	°C	-40 ... +70

MX471C accessories:to be ordered separately

MX471C accessories		
Article	**Description**	**Ordering number**
Voltage supply		
AC-DC power supply, 30 W	Input: 100 ... 240 V AC (±10%), 1.5 m cable Output: 24 V DC, max. 1.25 A, 2 m cable with ODU plug	1-NTX001
QuantumX supply cable	3 m cable to supply power to QuantumX modules; suitable plug (ODU Medi-Snap S11M08-P04MJGO-5280) at one end and exposed wires at the other.	1-KAB271-3
Communication		
Ethernet crossover cable	Ethernet crossover cable for direct operation of devices on a PC or notebook, length 2 m, type CAT5+	1-KAB239-2
IEEE1394b FireWire cable (module to module)	FireWire connection cable between QuantumX or SomatXR modules, fitted with suitable plugs on both ends; lengths 0.2 m/2 m/5 m. Note: voltage can also be supplied to the modules via the cable (max. 1.5 A, from source to last acceptor).	1-KAB272-0.2 1-KAB272-W-0.2 1-KAB272-2 1-KAB272-5
IEEE1394b FireWire cable PC to module, IP20/IP68	FireWire connection cable from measurement modules to PC. Fitted with suitable plugs at both ends. Length: 3 m. Module voltage supply not possible via KAB293.	1-KAB293-5
IEEE1394b FireWire cable hub to module, IP68	FireWire connection cable between HUB and module. For transferring data from QuantumX or SomatXR modules to HUB. Fitted with suitable plugs at both ends. Length: 3 m.	1-KAB276-3
IEEE1394b FireWire Extender SCM-FW IP68	Package consisting of two elements for extending the FireWire connection up to 40 m. Also required: 2 x 1 KAB272-x and industrial Ethernet cable (M12, CAT5e/6, up to 40 m).Module voltage supply not possible via KAB270-3.	1-SCM-FW
Mechanical		
Connecting elements for QuantumX modules	Connecting elements (clips) for QuantumX modules; set comprising 2 connecting elements and including assembly material for fast connection of 2 modules.	1-CASECLIP
Connecting elements for QuantumX modules	Mounting plate for installing QuantumX modules using connecting elements (1-CASECLIP), lashing strap or cable ties. Basic fastening by 4 screws	1-CASEFIT
QuantumX backplane (standard)	QuantumX backplane for a maximum of 9 modules - Wall or control cabinet installation (19”) - External modules can be connected via FireWire - 24 V DC / max. 5 A (150 W) power supply	1-BPX001
QuantumX backplane (rack)	QuantumX backplane rack for a maximum of 9 modules; - 19" control cabinet installation with left and right handles; - External modules can be connected via FireWire; - Power supply: 24 V DC / max. 5 A (150 W)	1-BPX002

MX471C accessories		
Article	**Description**	**Ordering number**
Software and product packages		
EVIDAS®	NEW test and measurement software for measurement data recording, analysis, visualization, and storage. Single workstation license Main functions: - Quick, easy parameterization of channels using TEDS chip and sensor database, directly into the channel table and into a separate dialog - Measurement and test task parameterization - Individual visualization (online or inventory data) - Data analysis and calculation - Saving in different formats, such as EVIDAS, Excel, ASCII, MDF, and MATLAB - Data transfer into the HBM cloud Includes software maintenance for 12 months	1-EVIDAS
EVIDAS®	NEW test and measurement software for measurement data recording, analysis, visualization, and storage. Floating network licenses	1-EVIDAS-FN
catman®AP	All-inclusive package, comprising catman®Easy Functionality plus add-on modules such as video camera integration (EasyVideoCam), full post-process analysis (EasyMath), recurrent activity automation (EasyScript), measurement project preparation offline (EasyPlan), and additional functions such as electrical power calculation, special filters, and frequency spectrum. Details at www.hbm.com\catman\	1-CATMAN-AP
catman®Easy	This basic software package for data acquisition includes simple channel parameterization using TEDS or the sensor database, measurement job parameterization, individual visualization, data storage and reporting.	1-CATMAN-EASY
catman®PostProcess	Post Process edition for visualization, analysis and processing of measurement data with many mathematical functions, data export and reporting.	1-CATEASY-PROCESS
LabVIEW™ driver[1)]	Universal driver from HBM for LabVIEW™.	1-LabVIEW-DRIVER
CANape® driver	QuantumX device driver for CANape® software from Vector Informatik. CANape® version 10.0 and higher are supported.	1-CANAPE-DRIVER
DIAdem® driver	QuantumX device driver for the DIAdem® software from National Instruments. German user interface.	1-DIADEM-DRIVER

1) Other drivers and partners at www.hbm.com\quantumX\

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