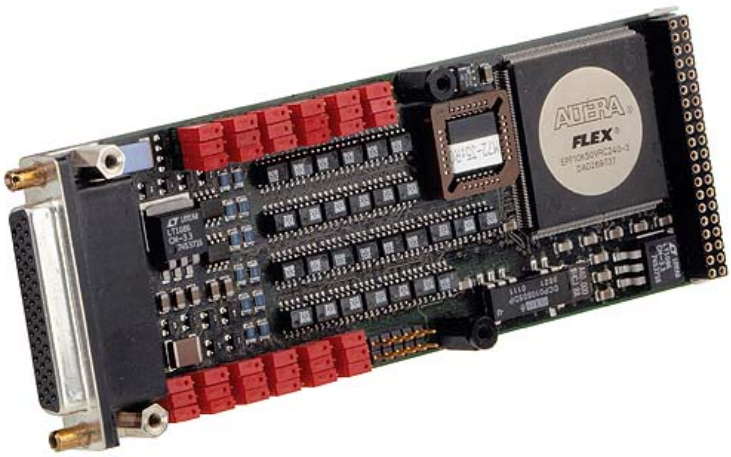
M72 – Motion Counter

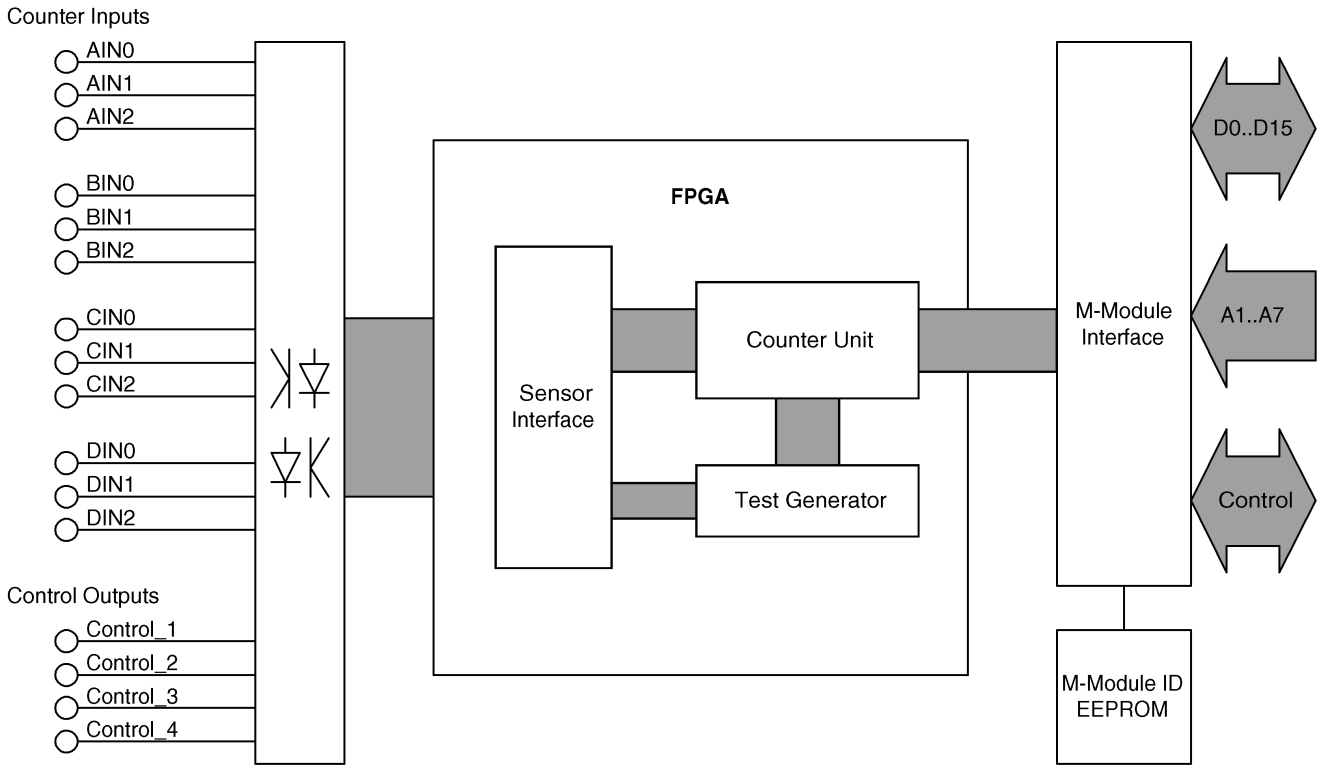
- **4 independent cascadable 32-bit counters**
- **2 comparators per counter**
- **Quadrature incremental encoder interface**
- **Pulse width/frequency measurement**
- **Multimode event generation**
- **Customized counter modes via FPGA**
- **RS422 or TTL or 24V**
- **Optical isolation**
- **-40 to +85°C screened versions**



The M72 M-Module is a timer, counter and comparator with four 32-bit counter units. The four counters work independently in several modes, e.g. counting decoder signals or measuring frequencies. Each counter can be loaded with a preset value and can generate several events. Events can set or reset output signals, which are optically isolated.

The mezzanine card M72 can also be used to generate timed signals. In addition it features line-break detection. The sensor signals are optically isolated and can be used as TTL, RS422 or 24 V inputs.
The M72 is based on the M-Module ANSI mezzanine standard. It can be used as an I/O extension in any type of bus system, i.e. CPCI, VME or on any type of stand-alone SBC. Appropriate M-Module carrier cards in 3U, 6U and other formats are available from MEN or other manufacturers.

Diagram


Counter Inputs
AIN0
AIN1
AIN2
BIN0
BIN1
BIN2
CIN0
CIN1
CIN2
DIN0
DIN1
DIN2
Control Outputs
Control_1
Control_2
Control_3
Control_4
FPGA
Sensor Interface
Counter Unit
Test Generator
M-Module Interface
D0..D15
A1..A7
Control
M-Module ID EEPROM

Technical Data

Four Independent Counters	■ 32-bit up/down counter ■ Two 32-bit comparators ■ One 32-bit preload register ■ Clock frequency 40MHz
Counter Modes	■ Single count ■ 1x quadrature, 2x quadrature, 4x quadrature ■ Frequency measurement ■ Pulse width "high", pulse width "low" ■ Period measurement, timer
Input	■ 3 inputs for each counter ■ RS422, TTL or 24V input ■ Timing characteristics for the different modes: □ Single count: t high > 200ns; t low > 200ns □ Quadrature: time between two active edges (t edges > 400ns) □ Frequency measurement: gating time 10ms, < 2.5MHz □ Pulse width: t high or t low > 15µs □ Period: t high or t low > 15µs, internal frequency 2.5MHz □ Synchronization of input signals with onboard clock (40MHz) ■ Input debouncing time: 100ns ■ RS422 input characteristics: see user manual ■ TTL input characteristics: □ Uin < 0.5V = "low" □ Uin > 2.2V = "high" □ Uin max. = 12V □ Max. input current: ±5mA ■ 24V input characteristics: □ Uin < 1V = "low" □ Uin > 10V = "high" □ Uin max. = 30V □ Max. input current: ±10mA □ Max. frequency measurement: 500kHz
Output	■ 4 TTL outputs (optically isolated) ■ Output current: □ High current: 10mA □ Low current: 15mA
Peripheral Connections	■ Via front panel on a shielded 44-pin HD-Sub receptacle connector
M-Module Characteristics	■ A08, D16, INTA, IDENT
Electrical Specifications	■ Isolation voltage: 500V DC ■ Supply voltage/power consumption: +5V (4.85V..5.25V), 550mA ■ MTBF: 70,000h @ 50°C (derived from MIL-HDBK-217F)
Mechanical Specifications	■ Dimensions: conforming to M-Module Standard ■ Weight: 100g

Technical Data

Environmental Specifications	■ Temperature range (operation): □ 0..+60°C □ Industrial temperature range on request □ Airflow: min. 10m³/h ■ Temperature range (storage): -40..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300m to + 3,000m ■ Shock: 15g/11ms ■ Bump: 10g/16ms ■ Vibration (sinusoidal): 2g/10..150Hz ■ Conformal coating on request
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)
Software Support	■ MEN Driver Interface System (MDIS for Windows®, Linux, VxWorks®, QNX®, OS-9®) ■ For more information on supported operating system versions and drivers see Downloads.

Ordering Information

Standard M72 Models	**04M072-00**	4 x 32-bit motion counter, 0..+60°C
	04M072-02	4x 32-bit motion counter, -40..+85°C screened
Miscellaneous Accessories	**05M000-14**	M-Module cable, 2.5m, with 44-pin HD-Sub plug/housing to pig tail
	05M000-17	25 mounting screw sets to fix M-Modules on carrier boards
	05M000-25	M-Module cable, 2m, with 44-pin half-pitch D-Sub plug/housing to 50-pin D-Sub receptacle/housing, (connecting 1:1)
Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN.	
	13M072-06	MDIS4/2004 / MDIS5 low-level driver sources (MEN) for M72
Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.	
	13M072-70	MDIS4/2004 / MDIS5 Windows® driver (MEN) for M72
Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M072-06	MDIS4/2004 / MDIS5 low-level driver sources (MEN) for M72
Software: QNX®	This product is designed to work under QNX®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M072-06	MDIS4/2004 / MDIS5 low-level driver sources (MEN) for M72
Software: OS-9®	This product is designed to work under OS-9®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	13M072-06	MDIS4/2004 / MDIS5 low-level driver sources (MEN) for M72

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart robotics and motion M-Modules » Download	
	20M000-00	M-Module Draft Specification, Rev. 3.0
	20M072-00	M72 User Manual

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