Embedded Solutions

# M97 - Universal Counter

- **1 channel with 2 input lines**
- **100MHz counter technology**
- **32 bits resolution (9½ digits)**
- **10ns @ ±1LSB**
- **Quartz oscillator better than 1ppM accuracy**
- **Variable conversion**
- **6 measuring functions**
- **0..100MHz, HV input: ±300V, LV input: ±10V**
- **Input voltages over 60V DC and 42V AC only with appropriate additional safety measures according to EN60950!**
- **20mV sensitivity**
- **Programmable switching points and hysteresis**
- **Optical isolation**

The M97 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, PXI, 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.

The M97 is a universal counter that is perfectly suited for automated testing systems. Its extremely accurate time base together with the 100-MHz counter technology guarantee the highest precision. The switching points and hysteresis of the input signals can be programmed in a broad range. Optical isolation permits usage of the M-Module even in critical applications.



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# Technical Data

**Basic Features**
- 100-MHz counter technology
- 32 bits resolution (9 1/2 digits)
- 6 measuring functions
- Programmable switching points and hysteresis

**Measurement Functions**
- Frequency (line A)
- High time
- Low time
- Period
- Totalize (line A) during external gate (line B)
- Time difference (line A to B)

**Input Characteristics (A to B input)**
- 2 input lines
  - 2 high-voltage inputs for ±300V
  - 2 coax inputs for ±10V
- Input voltage range
  - ±10V peak-to-peak, input impedance 100 kOhm, frequency AC: 10Hz..100MHz, DC: 0..100MHz
  - ±300V peak-to-peak, input impedance 2 MOhm, frequency AC: 10Hz..100kHz, DC: 0..100kHz; fully usable only if requirements of EN60950 are fulfilled through additional safety measures (see user manual)
- Maximum input voltage if no further safety measures are taken:
  - 60V DC / 42V AC
- Sensitivity: programmable in steps of
  - 5.37mV @ ±10V
  - 164mV @ ±300V
- Minimum pulse duration: 10ns
- Input noise: < 100µV typ.
- Coupling: AC or DC (programmable)

**Frequency A**
- Resolution: measuring time 10ns @ ±1 LSB
- Measuring times: programmable in steps of 1ms

**High time, Low time, Period**
- Range: 42s
- Resolution: 10ns @ ±1LSB

**Totalize**
- Gate by line B
- Maximum pulse duration: 42s
- Resolution: 10ns @ ±1LSB
- Gate error ±10ns

**Time Difference**
- Maximum time difference: 42s
- Resolution: 10ns @ ±2LSB

**Time Base**
- Frequency: 1kHz, based on 100MHz system clock
- Time range: 1ms..32.767s
- Resolution: 1ms @ ±10ns

**Peripheral Connections**
- Via front panel on a 5-pin DBM 5W5S D-Sub connector with two high-voltage contacts and two coax contacts by FCT
- Via carrier board using 24-pin connector (rear I/O)

**M-Module Characteristics**
- A08, D16, INTA, IDENT

**Electrical Specifications**
- Isolation voltage (inputs): 500V DC
- Absolute maximum input voltages:
  - High-voltage contacts: 500V (only with additional safety measures according to EN60950)
  - Coax contacts: 20V
- Supply voltage/power consumption: +5V (4.85V..5.25V), 750mA
- MTBF: tbd. @ 50°C

**Mechanical Specifications**
- Dimensions: conforming to M-Module Standard
- Weight: 120g

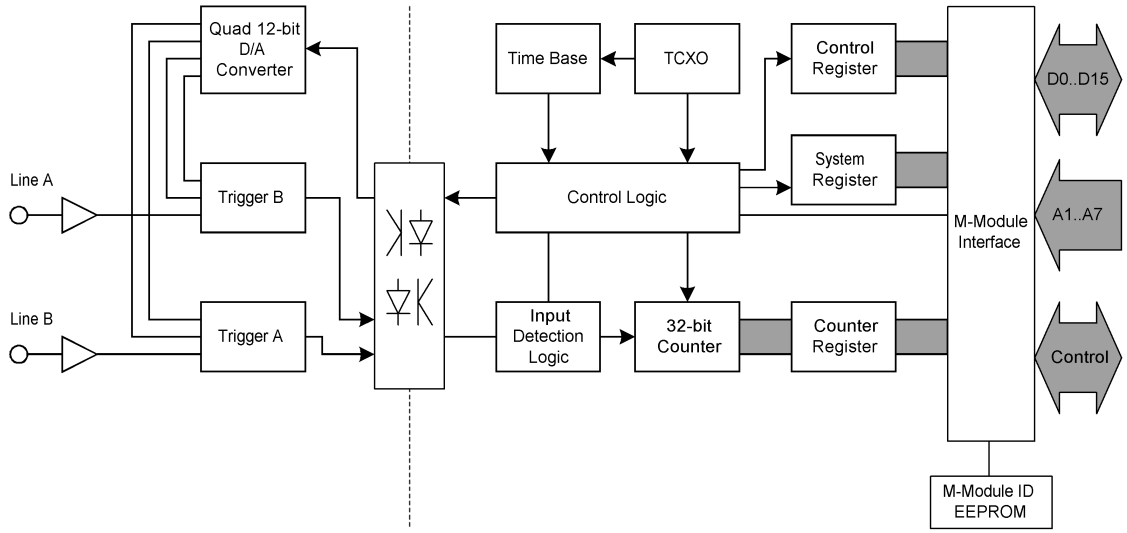
**Environmental Specifications**
- Temperature range (operation):
  - 0..+60°C or -40..+85°C
  - Airflow: min. 10m³/h
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300m to + 3,000m
- Shock: 15g/0.33ms, 6g/6ms
- Vibration: 1g/5..2,000Hz

**Safety**
- THE M97 DOES NOT COMPLY WITH THE REQUIREMENTS OF THE EN60950 STANDARD. THE MAXIMUM INPUT VOLTAGES ARE 60V DC AND 42V AC. HOWEVER, THE M97 WAS DESIGNED TO PROVIDE HIGH-VOLTAGE FUNCTIONALITY. IF YOU NEED TO APPLY VOLTAGES HIGHER THAN 60V DC AND 42V AC, TAKE APPROPRIATE MEASURES TO KEEP THE SAFETY REQUIREMENTS OF EN60950.
- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

**EMC**
- Tested according to EN 55022 / 1999-05 (radio disturbance) and EN 55024 / 1999-05 (immunity) with regard to CE conformity

**Software Support**
- MEN Driver Interface System (MDIS for Windows, Linux, VxWorks, QNX, RTX, OS-9)

# Diagram


Quad 12-bit D/A Converter
Time Base
TCXO
Control Register
D0..D15
Line A
Trigger B
Control Logic
System Register
M-Module Interface
A1..A7
Line B
Trigger A
Input Detection Logic
32-bit Counter
Counter Register
Control
M-Module ID EEPROM

# Related Products

**Standard Hardware**

| | |
|---|---|
| 04M097-00 | M97, M-Module, universal counter, closed metal housing, 0..+60°C |
| 04M097-01 | M97, M-Module, universal counter, closed metal housing, -40..+85°C |
| 04M097-02 | M97, M-Module, universal counter, open metal housing, 0..+60°C |
| 04M097-03 | M97, M-Module, universal counter, open metal housing, -40..+85°C |

M-Modules with closed metal housings can only be used on carrier cards without the 24-pin board-to-board M-Module connector, i.e. 6U carrier cards without rear I/O connection (VME P2, CPCI J4/J5). Please order your carrier cards accordingly!

Please refer to our M-Module compare chart for a selection of further instrumentation functions.

**Accessories**

| | |
|---|---|
| 05M000-17 | 25 mounting screw sets to fix M-Modules on carrier boards |
| 05M000-27 | 5W5 D-Sub plug connector, 3 high-voltage plug contacts, 2 coaxial 50-Ohm plug contacts |

**Software**

| | |
|---|---|
| 13M097-06 | MDIS4/2004 low-level driver sources for M97 |
| 13M097-70 | MDIS4/2004 Windows® NT4/W2K driver for M97 |

To use MDIS4 low-level drivers, you also need one of the MDIS4 system packages available for Windows®, Linux, VxWorks®, QNX®, RTX or OS-9 (MDIS4 = MEN Driver Interface System).

**Documentation**

| | |
|---|---|
| 20M000-00 | M-Module draft specification, Rev. 3.0 |
| 20M097-00 | M97 user manual |
| 21APPN001 | Application Note: MDIS4 under LabWindows®/CVI |

*For the most up-to-date ordering information and direct links to other data sheets and downloads, see the M97 online data sheet under www.men.de. --> Click here!*

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