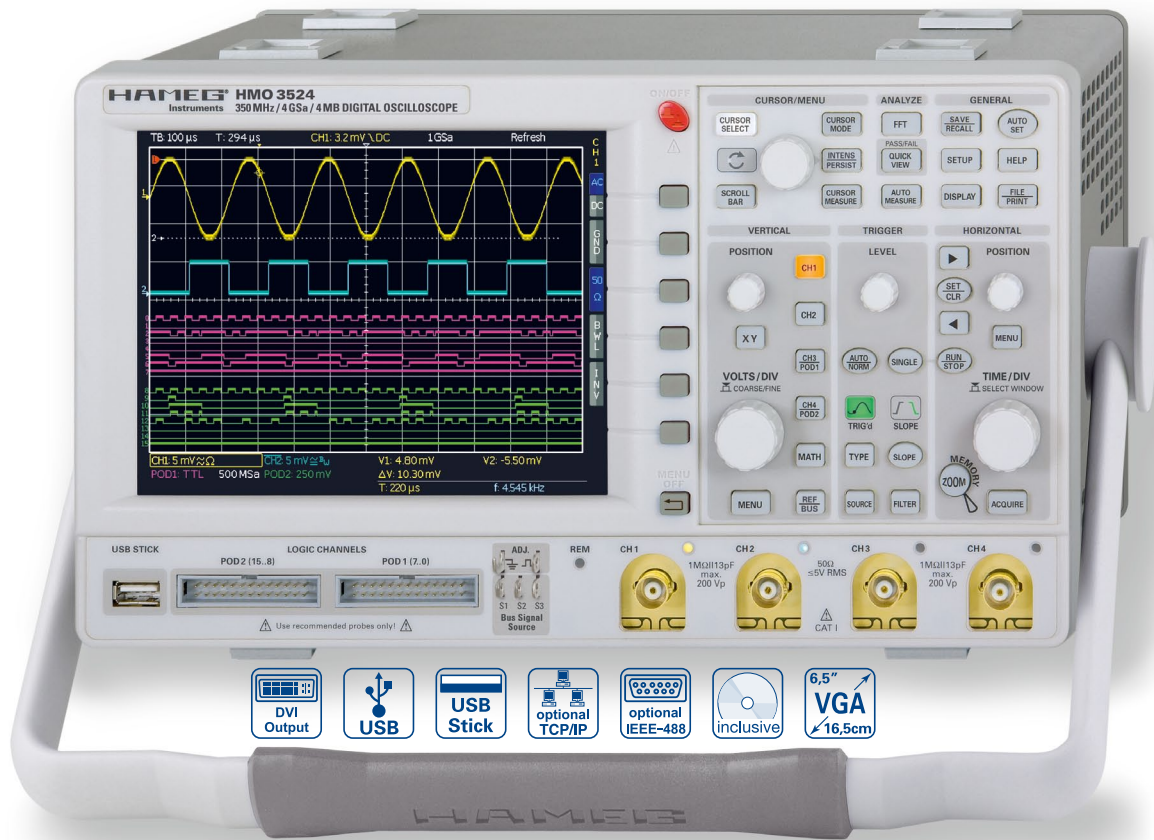


350MHz 2[4] Channel Digital Oscilloscope HM03522 [HM03524]



HM03524

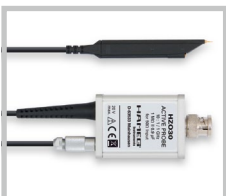
8 Channel
Logic Probe H03508



Carrying Case HZ99



Active Probe HZ030



- ✓ **4GSa/s Real Time, 50GSa/s Random Sampling, Low Noise Flash A/D Converter (Reference Class)**
- ✓ **4MPts Memory, Memory Zoom up to 100,000:1**
- ✓ **MSO (Mixed Signal Opt. H03508 [H03516]) with 8 [16] Logic Channels**
- ✓ **Serial Bus Trigger and Hardware accelerated Decode, I²C, SPI, UART/RS-232 (Opt. H0010)**
- ✓ **8 User definable Markers for easy Navigation**
- ✓ **Pass/Fail Test based on Masks**
- ✓ **Vertical Sensitivity 1mV/div., Offset Control ±0.2...±20V**
- ✓ **12div. x-Axis Display Range, 20div. y-Axis Display Range (VirtualScreen)**
- ✓ **Trigger Modes: Slope, Video, Pulsewidth, Logic, Delayed, Event**
- ✓ **6 Digit Counter, Automeasurement, Formula Editor, Ratiocursor, FFT for Spectral Analysis**
- ✓ **Crisp 16.5cm (6.5") TFT VGA Display, DVI Output**
- ✓ **Lowest Noise Fan**
- ✓ **3 x USB for Mass Storage, Printer and Remote Control optional IEEE-488 (GPIB) or Ethernet/USB**

350 MHz 2 [4] Channel Digital Oscilloscope HM03522 [HM03524]

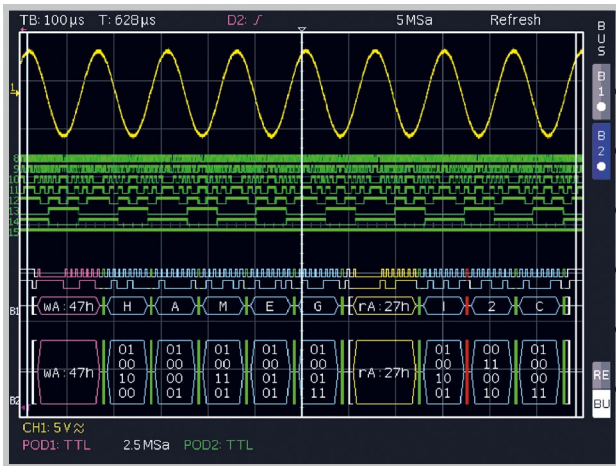
All data valid at 23°C after 30 minute warm-up.

Display	
Display:	16.5 cm (6.5") VGA Color TFT
Resolution:	640 x 480 Pixel
Backlight:	LED 400cd/m ²
Display area for curves:	
without menu	400 x 600 Pixel (8 x 12 div.)
with menu	400 x 500 Pixel (8 x 10 div.)
Color depth:	256 colors
Intensity steps per channel:	0...31
Vertical System	
Channels:	
DSO mode	CH 1, CH 2 [CH 1...CH 4]
MSO mode	CH 1, CH 2, LCH 0...15 (logic channels) with 2 x Option H03508
Auxiliary input:	Frontside [Rear side]
Function	Ext. Trigger
Impedance	1 MΩ 13 pF ±2 pF
Coupling	DC, AC
Max. input voltage	100V (DC + peak AC)
XYZ-mode:	All analog channels on individual choice
Invert:	CH 1, CH 2 [CH 1...CH 4]
Y-bandwidth (-3 dB):	350 MHz (5 mV...5V)/div. 100 MHz (1 mV, 2 mV)/div.
Lower AC bandwidth:	2 Hz
Bandwidth limiter (switchable):	approx. 20 MHz
Rise time (calculated):	<1 ns
DC gain accuracy	2%
Input sensitivity:	12 calibrated steps
CH 1, CH 2 [CH 1...CH 4]	1 mV/div...5V/div. (1-2-5 Sequence)
Variable	Between calibrated steps
Inputs CH 1, CH 2 [CH 1...CH 4]:	
Impedance	1 MΩ 13 pF ±2 pF (50 Ω switchable)
Coupling	DC, AC, GND
Max. input voltage	200V (DC + peak AC), 50 Ω <5V _{rms}
Measuring circuits:	Measuring Category I (CAT I)
Position range	±10 Divs
Offset control:	
1 mV, 2 mV	±0.2V
5...50 mV	±1V
100 mV...5V	±20V
Logic channels	With Option H03508
Select. switching thresholds	TTL, CMOS, ECL, 2x User -2...+8V
Impedance	100 kΩ <4 pF
Coupling	DC
Max. input voltage	40V (DC + peak AC)
Triggering	
Analog channels:	
Automatic:	Linking of peakdetection and triggerlevel
Min. signal height	0.8 div; 0.5 div typ.
Frequency range	5 Hz...400 MHz
Level control range	From peak- to peak+
Normal (without peak):	
Min. signal height	0.8 div; 0.5 div typ.
Frequency range	0...400 MHz
Level control range	-10...+10 div.
Operating modes:	Slope/Video/Logic/Pulse/Busses (optional)
Slope:	Rising, falling, both
Sources:	CH 1, CH 2, Line, Ext., LCH 0...15 [CH 1...CH 4, Line, Ext., LCH 0...15]
Coupling:	AC: 5 Hz...400 MHz DC: 0...400 MHz HF: 30 kHz...400 MHz LF: 0...5 kHz Noise rejection: 100 MHz LPF switchable
Video:	
Standards	PAL, NTSC, SECAM, PAL-M, SDTV 576i, HDTV 720p, HDTV 1080i, HDTV 1080p
Fields	Field 1, field 2, both
Line	All, selectable line number
Sync. Impulse	Positive, negative
Source	CH 1, CH 2, Ext. [CH 1...CH 4]
Logic:	AND, OR, TRUE, FALSE
Source	LCH 0...15
State	LCH 0...15 X, H, L
Indicator for trigger action:	LED
Ext. Trigger via:	Auxiliary input 0,3V...10V _{pp}
2nd Trigger:	
Slope	Rising, falling, both
Min. signal height	0.8 div.; 0.5 div. typ.
Frequency range	0...400 MHz
Level control range	-10...+10 div.

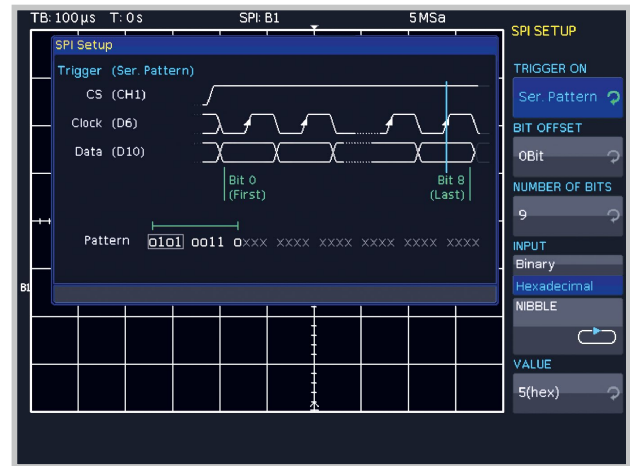
Operating modes:	
after time	20 ns...0.1 s
after incidence	1...2 ¹⁶
Refresh operating modes	1 ns/div...20 ms/div.
Roll operating modes	50 ms/div...50 s/div.
Digital Storage	
Sampling rate (real time):	2 x 2 GSa/s, 1 x 4 GSa/s [4 x 2 GSa/s, 2 x 4 GSa/s] Logic channels: 16 x 1 GSa/s
Sampling rate (random):	50 GSa/s (n/a to logic channels)
Memory:	2 x 2 MPts, 1 x 4 MPts [4 x 2 MPts, 2 x 4 MPts]
Operation modes:	Refresh, Average, Envelope, Peak-Detect Roll: free run/triggered, Smooth
Resolution (vertical)	8 Bit
Resolution (horizontal)	
Yt Mode	50 Pts./div.
XY Mode	8 Bit
Interpolation:	Sinx/x (CH 1...CH 4), Pulse (LCH 0...15)
Persistence:	Off, 50 ms...∞
Delay pretrigger:	0...2 Million x (1/samplerate)
posttrigger:	0...8 Million x (1/samplerate)
Display refresh rate:	Up to 2500 waveforms/s
Display:	Dots, vectors (interpolation), „persistence“
Reference memories:	typ. 10 Traces
Operation/Measuring/Interfaces	
Operation:	Menu-driven (multilingual), Autoset, help functions (multilingual)
Save/Recall memories:	typ. 10 complete instrument parameter settings
Frequency counter:	
0.5 Hz...350 MHz	6 Digit resolution
Accuracy	15 ppm
Auto measurements:	Frequency, Period, pulse count, V _{pp} , V _{p+} , V _{p-} , V _{rms} , V _{avg} , V _{top} , V _{base} , t _{width+} , t _{width-} , t _{dutycycle+} , t _{dutycycle-} , t _{rise} , t _{fall} , pos. edge count, neg. edge count, pos. pulse count, neg. pulse count
Cursor measurements:	ΔV, Δt, 1/Δt (f), V to Gnd, Vt related to Trigger point, ratio X and Y, pulse count, peak to peak, peak+, peak-
Interface:	Dual-Interface USB/RS-232 (H0720) USB-Stick (frontside) USB-Printer (rear side) for Postscript Printer DVI-D for ext. monitor
Optional:	IEEE-488 (H0740), Ethernet/USB (H0730)
Display functions	
Marker:	up to 8 user definable marker for easy navigation
VirtualScreen:	virtual Display with 20 div. vertical for all Math-, Logic-, Bus- and Reference Signals
Busdisplay:	up to 2 busses, user definable, parallel or serial busses (option), decode of the bus value in ASCII, binary, decimal or hexadecimal, up to 4 lines
Parallel	logic channels can also be used as source for bus definition
Mathematic functions	
Number of formula sets:	5 formula sets with up to 5 formulas each
Sources:	All channels and math. memories
Targets:	Math. memories
Functions:	ADD, SUB, 1/X, ABS, MUL, DIV, SQ, POS, NEG, INV, INTG, DIFF, SQR, MIN, MAX, LOG, LN
Display:	Up to 4 math. memories with label
Pass/Fail functions	
Sources:	Analog channels
Type of test:	Mask around a signal, userdefined tolerance
Functions:	Stop, Beep, screen shot (screen print-out) and/or output to printer for pass or fail, event counting up to 4 billion, including the number and the percentage of pass and fail events
General Information	
Probe ADJ Output:	1 kHz/1 MHz square wave signal ~0.2V _{pp} (ta <4 ns)
Internal RTC (Realtime clock):	Date and time for stored data
Line voltage:	105...253V, 50/60 Hz, CAT II
Power consumption:	Max. 70 Watt at 230V, 50 Hz
Protective system:	Safety class I (EN61010-1)
Operating temperature:	+5...+40 °C
Storage temperature:	-20...+70 °C
Rel. humidity:	5...80 % (non condensing)
Dimensions (W x H x D):	285 x 175 x 220 mm
Weight:	3.6 kg
Accessories supplied:	Line cord, Operating manual, 2 [4] Probes, 10:1 with attenuation ID (HZ350), CD
Optional accessories you can find at	www.hameg.com/HM03524

H0010 Serial Bus

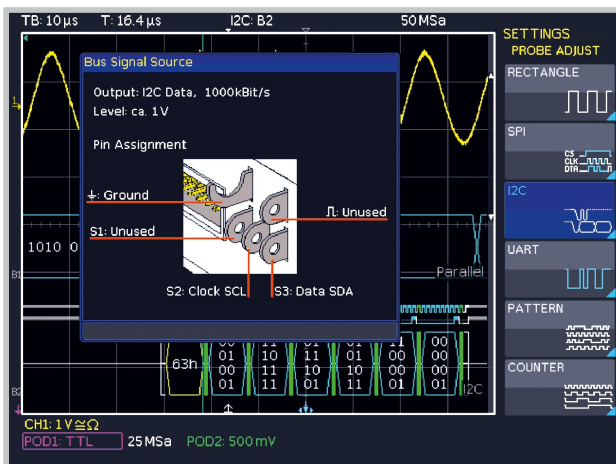
for all Oscilloscopes of the HMO Series



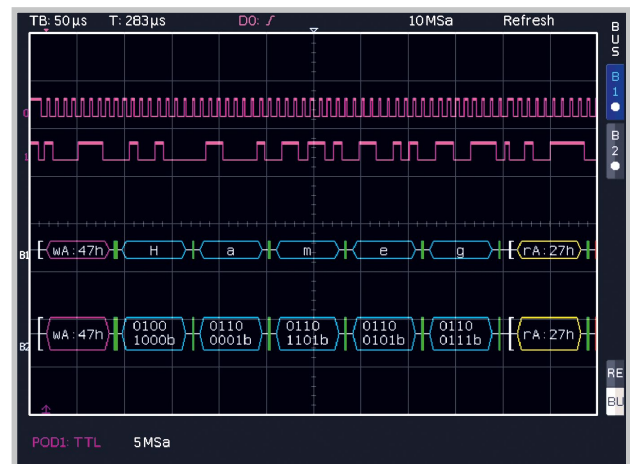
Mixed Signal and Bus Display



SPI Bus Trigger Setup



Setting of the internal Bus Signal Source of the HM02524



I²C Bus ASCII and Binary

- ☑ I²C, SPI, UART/RS-232 Bus Trigger and Decode
- ☑ Hardware accelerated Decode in Realtime
- ☑ Color Coded Display of the Content for intuitive Analysis and easy Overview
- ☑ More Details of the decoded Values come visible with increasing Zoom Factor
- ☑ Bus Display with synchronous Display of the Data and may be Clock Signal
- ☑ Decode into ASCII, Binary, Hexadecimal or Decimal Format
- ☑ Up to four Lines to show the decoded Values Comfortably
- ☑ Powerful Trigger to isolate specific Messages
- ☑ Option for all Oscilloscopes of the HMO Series, retrofittable

H0010

H0010 Serial Bus

H0010 Serial Bus					
I ² C Bus		SPI Bus		UART/RS-232 Bus	
Bus Configuration					
Baud rates	up to 10Mb/s	up to 25 Mb/s		300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud, up to 62.5 Mb/s	
Number of Bit's	7 or 10Bit for Address ID 8Bit for Data	32Bit for Data		8Bit for Data 1, 1.5, 2Bit for Stop Bit	
Polarity	n/a	Chip select, positive or negative, or without Chipselect (2-wire SPI) Clock rising or falling edge Data High or Low active		High or Low active	
Parity	n/a	n/a		none, odd or even	
Trigger					
Source	digital Channel LCH0...15 (Opt. H03508)	digital Channel LCH0...15 (Opt. H03508)		digital Channel LCH0...15 (Opt. H03508)	
Event	7 or 10Bit Address ID 7 or 10Bit Address ID with 8Bit Data Start Stop Restart missing Acknowledge Address ID without Acknowledge	Data packets up to 32Bit with positive or negative Chip Select or without Chip Select, (2-wire SPI)		Data packets up to 8Bit	
Input format	Hexadecimal or Binary	Hexadecimal or Binary		Hexadecimal or Binary	
Hardware accelerated Decode					
Source	digital Channel LCH0...15 (Opt. H03508)	digital Channel LCH0...15 (Opt. H03508)		digital Channel LCH0...15 (Opt. H03508)	
Display	Bus display, color coded for Read Address ID: Yellow Write Address ID: Magenta Date: Cyan Start: White Stop: White ACK/NACK: Green/Red Error: Red Trigger Condition: Green up to four lines for decoded values, synchronous display of the Bit lines	Bus display, color coded for Date: Cyan Start: White Stop: White Error: Red Trigger Condition: Green up to four lines for decoded values, synchronous display of the Bit lines		Bus display, color coded for Date: Cyan Start: White Stop: White Error: Red Trigger Condition: Green up to four lines for decoded values, synchronous display of the Bit lines	
Format	Address ID: hexadecimal Data ASCII, binary, decimal, hexadecimal	n/a Data ASCII, binary, decimal, hexadecimal		n/a Data ASCII, binary, decimal, hexadecimal	