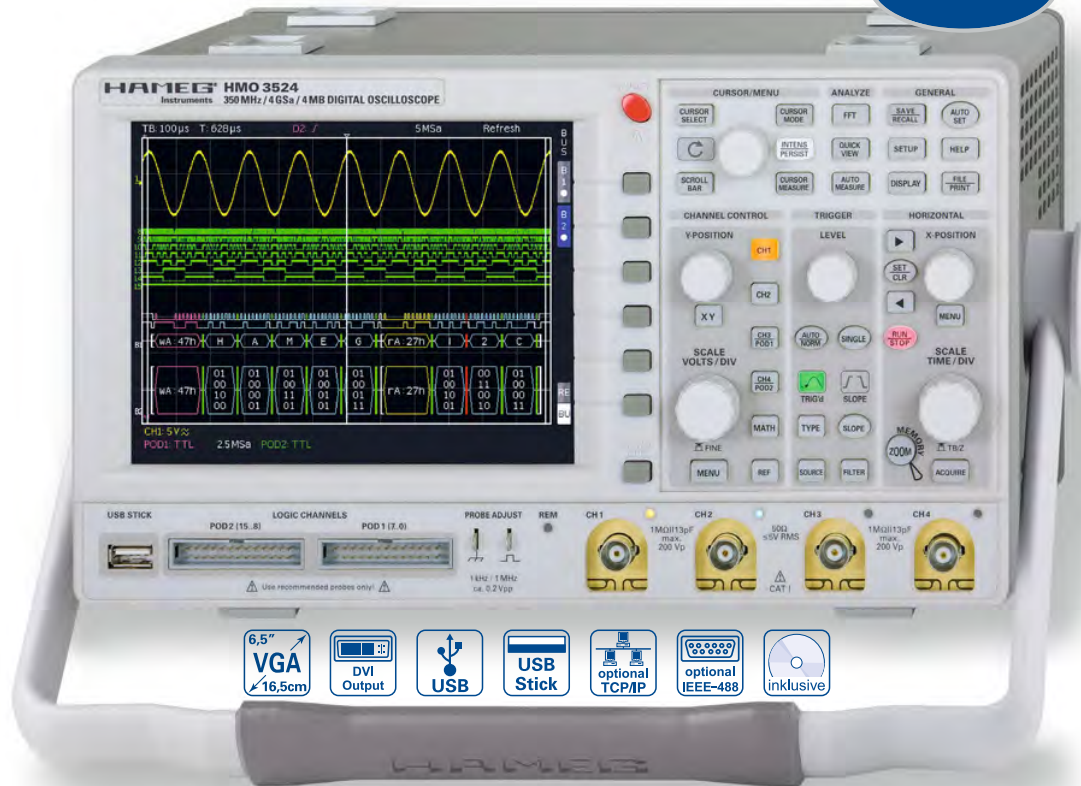


350 MHz 2/4 Channel Digital Oscilloscope HM03522 / HM03524

NEW

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 **Z**oom 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 marker for easy navigation
- ✓ Pass/Fail Test based on masks
- ✓ Vertical sensitivity 1mV/div., Offset control $\pm 0.2... \pm 20V$
- ✓ 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
- ✓ 3xUSB for mass storage, printer and remote control optional IEEE-488 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:	16.5cm [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	CH1, CH2 [CH1...CH4]
MSO mode	CH1, CH2, LCH0...15 (logic channels) with 2 x Option HO3508
Auxiliary input: Frontside [Rear side]	
Function	Ext. Trigger
Impedance	1M Ω 13pF \pm 2pF
Coupling	DC, AC
Max. input voltage	100V (DC + peak AC)
XYZ-mode:	All analog channels on individual choice
Invert:	CH 1, CH 2 [CH1...CH4]
Y-bandwidth [-3dB]:	350MHz [5mV...5V]/div. 100MHz [1mV, 2mV]/div.
Lower AC bandwidth:	2Hz
Bandwidth limiter [switchable]: approx. 20MHz	
Rise time [calculated]:	< 1ns
DC gain accuracy	2%
Input sensitivity: 12 calibrated steps	
CH1, CH2 [CH1...CH4]	1mV/div...5V/div. [1-2-5 Sequence]
Variable	Between calibrated steps
Inputs CH1, CH2 [CH1...CH4]:	
Impedance	1M Ω 13pF \pm 2pF [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	\pm 10Divs
Offset control:	
1 mV, 2 mV	\pm 0.2V
5...50 mV	\pm 1V
100 mV...5V	\pm 20V
Logic channels With Option HO3508	
Select. switching thresholds	TTL, CMOS, ECL, 2 x User -2...+8V
Impedance	100k Ω < 4pF
Coupling	DC
Max. input voltage	40V [DC + peak AC]
Triggering	
Analog channels:	
Automatic: Linking of peakdetection and triggerlevel	
Min. signal height	0.8div; 0.5div typ.
Frequency range	5Hz...400MHz
Level control range	From peak- to peak+
Normal (without peak):	
Min. signal height	0.8div; 0.5div typ.
Frequency range	0...400MHz
Level control range	-10...+10div.
Operating modes: Slope/Video/Logic/Pulse/Busses [optional]	
Slope: Rising, falling, both	
Sources:	CH1, CH2, Line, Ext., LCH0...15 [CH1...CH4, Line, Ext., LCH0...15]
Coupling:	
AC:	5Hz...400MHz
DC:	0...400MHz
HF:	30kHz...400MHz
LF:	0...5kHz
Noise rejection: 100MHz LPF switchable	
Video: Pos./neg. sync. impulse	
Standards	525 Line/60Hz systems 625 Line/50Hz systems
Fields	Field 1, field 2, both
Line	All, selectable line number
Source	CH1, CH2, Ext. [CH1...CH4]
Logic: AND, OR, TRUE, FALSE	
Source	LCH0...15
State	LCH0...15 X, H, L
Indicator for trigger action: LED	
Ext. Trigger via:	Auxiliary input [Aux. input at rear side] 0.3V...10V _{ss}
2nd Trigger:	
Slope	Rising, falling, both

Min. signal height	0.8div.; 0.5div. typ.
Frequency range	0...400MHz
Level control range	-10...+10div.
Operating modes:	
after time	20ns...0.1s
after incidence	1...2 ¹⁴
Busses [Opt. HO010]:	I ² C/SPI/UART/RS-232
Source	LCH 0...LCH 15
Format	hexadecimal, binary
I ² C	Trigger on Start, Stop, Restart, ACK, NACK, Adress (7 or 10 Bit), Data, Address and Data, up to 10 Mb/s
SPI	up to 32 Bit Data, Chip select [CS] pos. or neg., without CS, up to 25 Mb/s
UART/RS-232	up to 8 Bit Data, up to 1 Mb/s

Horizontal System	
Domain representation:	Time, Frequency [FFT], Voltage [XY]
Representation Time Base:	Main-window, main- and zoom-window
Memory Zoom:	Up to 100.000:1
Accuracy:	15ppm
Time Base:	
Refresh operating modes	1ns/div...20ms/div.
Roll operating modes	50ms/div...50s/div.

Digital Storage	
Sampling rate [real time]:	2 x 2GSa/s, 1 x 4GSa/s [4 x 2GSa/s, 2 x 4GSa/s] Logic channels: 16 x 1GSa/s
Sampling rate [random]:	50GSa/s [n/a to logic channels]
Memory:	2 x 2MPts, 1 x 4MPts [4 x 2MPts, 2 x 4MPts]
Operation modes: Refresh, Average, Envelope, Peak-Detect Roll: free run/triggered, Smooth	
Resolution [vertical]	8Bit
Resolution [horizontal]	
Yt Mode	50 Pts./div.
XY Mode	8Bit
Interpolation:	Sinx/x [CH1...CH4], Pulse [LCH0...15]
Persistence:	Off, 50ms... ∞
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:	
0.5Hz...350MHz	6 Digit resolution
Accuracy	15ppm
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:	
Δ V, Δ t, 1/ Δ t [f], V to Gnd, V _i related to Trigger point, ratio X and Y, pulse count, peak to peak, peak+, peak-	
Interface:	
Dual-Interface USB/RS-232 [HO720] USB-Stick [frontside] USB-Printer [rear side] for Postscript Printer DVI-D for ext. monitor	
Optional:	IEEE-488 [HO-740], Ethernet/USB [HO-730]

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	
I ² C [Opt. HO010]	color coded Read-, Write Adress, Data, Start, Stop, missing acknowledge, Errors and Trigger condition
SPI [Opt. HO010]	color coded Read-, Write Adress, Data, Start, Stop, Errors and Trigger condition
UART/RS-232 [Opt. HO010]	color coded Read-, Write Adress, Data, Start, Stop, Errors and Trigger condition

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:	1kHz/1MHz square wave signal ~0.2V _{pp} (t _a < 4ns)
Internal RTC (Realtime clock):	Date and time for stored data
Line voltage:	105...253V, 50/60Hz, CAT II
Power consumption:	Max. 70Watt at 230V, 50Hz
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), Dual-Interface USB/RS-232 (H0720), CD

Optional accessories:	
H0010	Serial bus trigger and hardware accelerated decode, I ² C, SPI, UART/RS-232 on Logic channels
H03508	active 8 Channel Logic Probe
H03516	2x H03508, active 8 Channel Logic Probes
H0730	Dual-Interface Ethernet/USB
H0740	Interface IEEE-488 (GPIB) galvanically isolated
HZ355	Stimline Probe 10:1 with automatic identification
HZ355DU	Upgrade from 2x HZ350 to 2x HZ355
HZ46	4RU 19" Rackmount Kit
HZO20	High Voltage probe 1000:1 (400 MHz)
HZO30	single ended active probe (1GHz)
HZO50	AC/DC Currentprobe 20A, DC...100 kHz
HZO51	AC/DC Currentprobe 1000A, DC...20 kHz

additional accessories you can find at www.hameg.com/HM03524

H0010 Serial Bus for all Oscilloscopes of the HMO Series

Analog meets digital and serial

The option H0010 for the HAMEG oscilloscopes of the HMO series is a tool set to support and simplify the development and debug of embedded systems. Hardware accelerated decode for the widely used serial busses I²C, SPI and UART/RS-232 shows the messages in ASCII, binary, hexadecimal or even decimal format in realtime. Color coding of the different parts of the messages (f.e. Address ID, Data, Start etc.) makes the analysis very intuitive. The wide range of flexible trigger functions make sure that all relevant messages can be acquired. For example you can trigger on a specific write address ID with a specific data value on a I²C message. These makes the H0010 a powerful and meaningful option for any mixed signal scope of the HMO series.

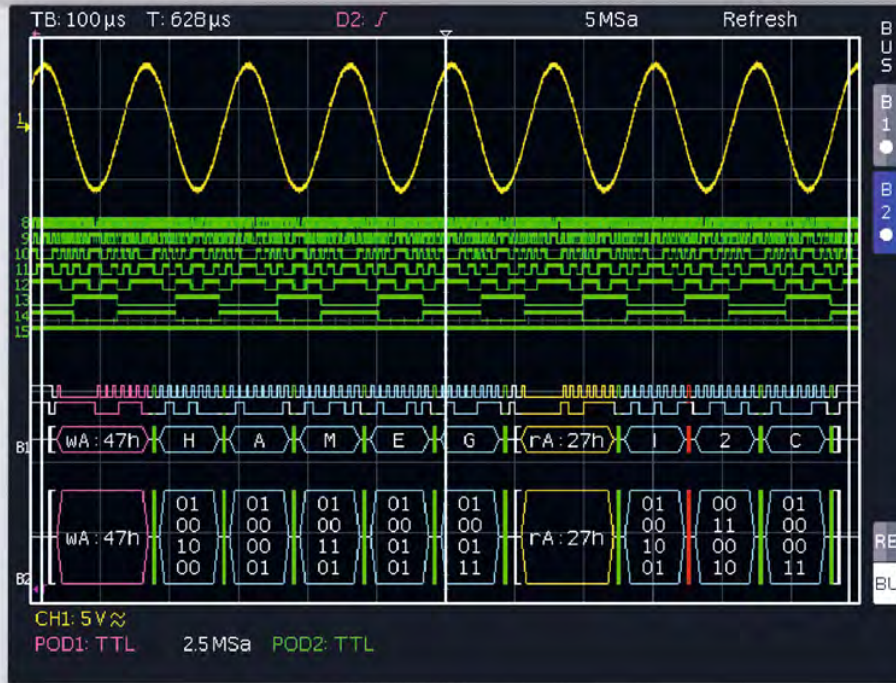
	I ² C Bus	SPI Bus	UART/RS-232 Bus
Bus Configuration			
Baud rates	up to 10 Mb/s	up to 25 Mb/s	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud, up to 62,5Mb/s
Number of Bit's	7 or 10 Bit for Address ID 8 Bit for Data	32 Bit for Data	8 Bit for Data 1, 1.5, 2 Bit for Stop Bit
Polarity	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 10 Bit Address ID 7 or 10 Bit Address ID with 8 Bit Data Start Stop Restart missing Acknowledge Address ID without Acknowledge	Data packets up to 32 Bit with positive or negative Chip Select or without Chip Select, (2-wire SPI)	Data packets up to 8 Bit
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

H0010 Serial Bus for all Oscilloscopes of the HMO Series

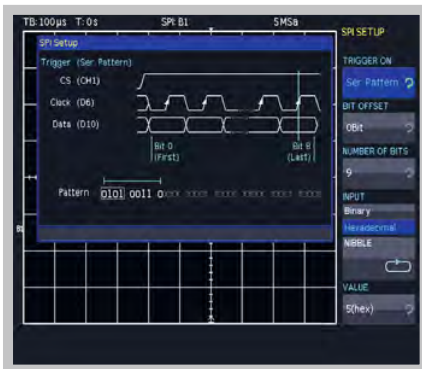
HAMEG® HMO 2524
Instruments 250 MHz / 2,5 GSa / 4 MB DIGITAL OSCILLOSCOPE

NEW

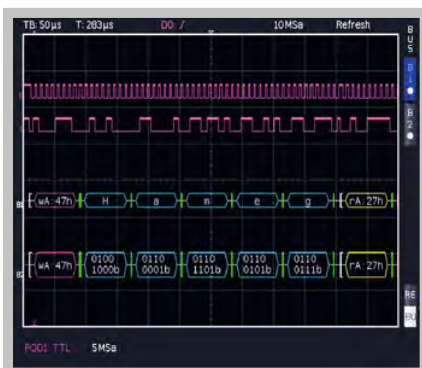
H0010



SPI Bus Trigger Setup



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 comfortable
- Powerful trigger to isolate specific messages
- Option for all HMO Scopes, retrofittable