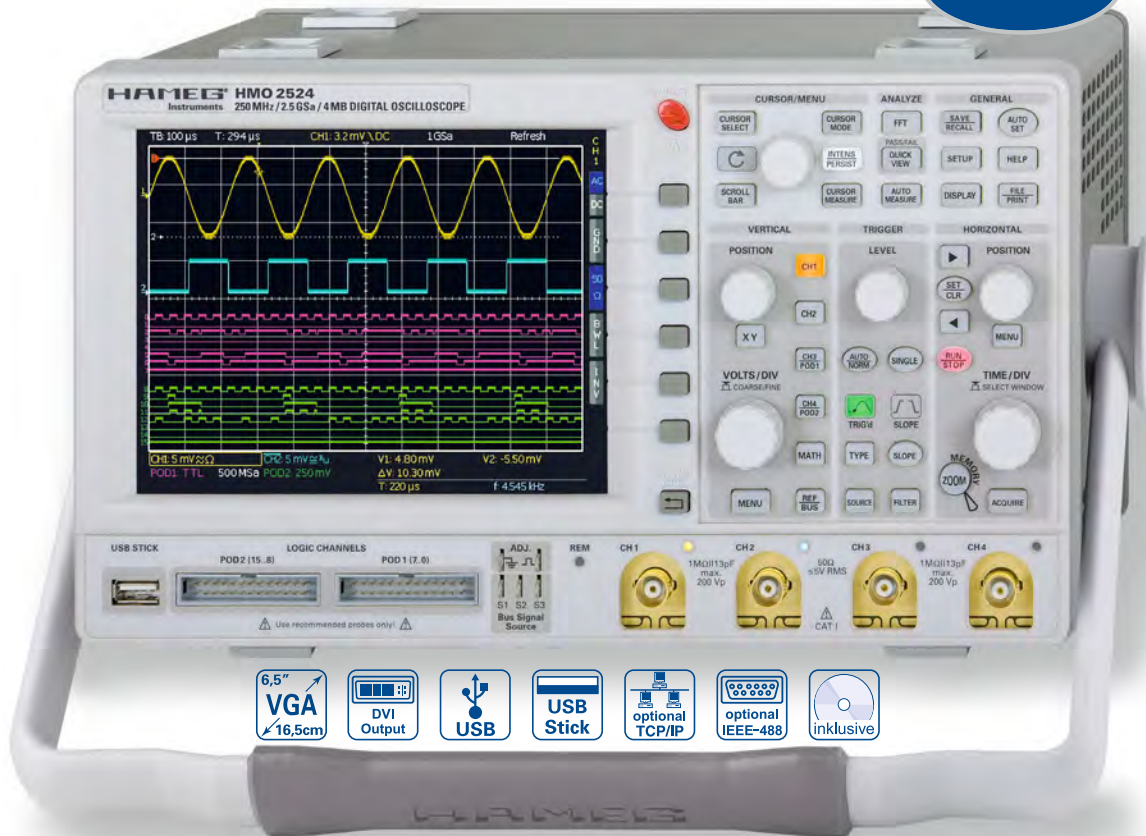


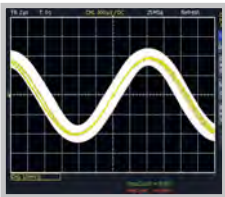
# 250MHz 4 Channel Digital Oscilloscope HMO2524

**NEW**

HMO2524



Mask test



Passive Probe 1000:1  
HZ020



AC/DC Current Probe  
100/1000A HZ051



- ☑ 2.5GSa/s Real time, 25GSa/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, I<sup>2</sup>C, 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 ±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 16.5 cm (6.5") TFT VGA display, DVI output
- ☑ Lowest noise fan
- ☑ 3xUSB for mass storage, printer and remote control optional IEEE-488 or Ethernet/USB

# 250 MHz 4 Channel Digital Oscilloscope HMO2524

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

## Display

Display:	6,5" VGA Color TFT
Resolution:	640 x 480 Pixel
Backlight:	LED 400cd/m <sup>2</sup>
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...CH4
MSO mode	CH1...CH3 LCH0...7 (with 1 x Option HO3508) CH1, CH2, LCH0...15 (with 2 x Option HO3508)
Auxiliary input:	Rear side
Function	Ext. Trigger
Impedance	1MΩ    13pF ± 2pF
Coupling	DC, AC
Max. input voltage	100V [DC + peak AC]
XYZ-mode:	All analog channels on individual choice
Invert:	CH1...CH4
Y-bandwidth [-3dB]:	250MHz (5mV...5V)/div. 100MHz (1mV, 2mV)/div.
Lower AC bandwidth:	2Hz
Bandwidth limiter (switchable):	approx. 20MHz
Rise time (calculated):	< 1,5 ns
DC gain accuracy	2%
Input sensitivity:	12 calibrated steps
CH1...CH4	1mV/div...5V/div. [1-2-5 Sequence]
Variable	Between calibrated steps
Inputs CH1...CH4:	
Impedance	1MΩ    13pF ± 2pF [50Ω switchable]
Coupling	DC, AC, GND
Max. input voltage	200V [DC + peak AC], 50Ω < 5V <sub>rms</sub>
Measuring circuits:	Measuring Category I [CAT I]
Position range	± 10Divs
Offset control:	
1mV, 2mV	± 0,2V
5...50mV	± 1V
100mV...5V	± 20V
Logic channels	With Option HO3508
Select. switching thresholds	TTL, CMOS, ECL, 2 x User -2...+8V
Impedance	100kΩ    < 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...300MHz
Level control range	From peak- to peak+
Normal (without peak):	
Min. signal height	0.8div; 0.5div typ.
Frequency range	0...300MHz
Level control range	-10...+10div.
Operating modes:	Slope/Video/Logic/Pulse/Busses (optional)
Slope:	Rising, falling, both
Sources:	CH1...CH4, Line, Ext., LCH0...15
Coupling:	AC: 5Hz...300MHz DC: 0...300MHz HF: 30kHz...300MHz 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...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 <sub>SS</sub>
2nd Trigger:	
Slope	Rising, falling, both
Min. signal height	0.8div.; 0.5div. typ.
Frequency range	0...300MHz

Level control range	-10...+10 div.
Operating modes:	
after time	20 ns...0.1 s
after incidence	1...2 <sup>16</sup>
Busses [Opt. HO010]:	I <sup>2</sup> C/SPI/UART/RS-232
Source	LCH0...LCH15
Format	hexadecimal, binary
I <sup>2</sup> C	Trigger on Start, Stop, Restart, ACK, NACK, Address (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	2ns/div...20ms/div.
Roll operating modes	50ms/div...50s/div.

## Digital Storage

Sampling rate (real time):	4 x 1,25 GSa/s, 2 x 2,5 GSa/s Logic channels: 16 x 1,25GSa/s
Sampling rate (random):	25GSa/s [n/a to logic channels]
Memory:	4 x 2 MPts, 2 x 4 MPts
Operation modes:	Refresh, Average, Envelope, Peak-Detect Roll: free run/triggered, Smooth
Resolution (vertical)	8Bit
Resolution (horizontal)	
Yt Mode	50 Pts./div.
XY Mode	8 Bit
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 set- tings
Frequency counter:	
0.5Hz...300MHz	6 Digit resolution
Accuracy	15ppm
Auto measurements:	Frequency, Period, pulse count, V <sub>pp</sub> , V <sub>p+</sub> , V <sub>p-</sub> , V <sub>RMS</sub> , V <sub>Avg</sub> , V <sub>top</sub> , V <sub>base</sub> , t <sub>width+</sub> , t <sub>width-</sub> , t <sub>dutycycle+</sub> , t <sub>dutycycle-</sub> , t <sub>Rise</sub> , t <sub>Fall</sub> , pos. edge count, neg. edge count, pos. pulse count, neg. pulse count
Cursor measurements:	ΔV, Δt, 1/Δt (f), V to Gnd, V <sub>t</sub> 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 navi- gation
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 hexadeci- mal, up to 4 lines
Parallel	logic channels can also be used as source for bus definition
I <sup>2</sup> 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

<b>Functions:</b>	ADD, SUB, 1/X, ABS, MUL, DIV, SQ, POS, NEG, INV, INTG, DIFF, SQR, MIN, MAX, LOG, LN
<b>Display:</b>	Up to 4 math. memories with label

<b>Storage temperature:</b>	-20...+70°C
<b>Rel. humidity:</b>	5...80% (non condensing)
<b>Dimensions (W x H x D):</b>	285x175x220mm
<b>Weight:</b>	3.6 kg

### Pass/Fail functions

<b>Sources:</b>	Analog channels
<b>Type of test:</b>	Mask around a signal, userdefined tolerance
<b>Functions:</b>	Stop, Beep, screen shot, (screen print-out), output to printer and/or pulse on the Y output for pass or fail, event counting up to 4 billion, including the number and the percentage of pass and fail events.

### General Information

<b>Probe ADJ Output:</b>	1kHz/1MHz square wave signal ca. 1 V <sub>pp</sub> (t <sub>a</sub> < 4ns)
<b>Bus Signal Source:</b>	Three outputs (frontside) which generates a selection of serial or parallel data for test and training purposes
<b>Internal RTC (Realtime clock):</b>	Date and time for stored data
<b>Line voltage:</b>	105...253V, 50/60Hz, CAT II
<b>Power consumption:</b>	Max. 70Watt at 230V, 50Hz
<b>Protective system:</b>	Safety class I (EN61010-1)
<b>Operating temperature:</b>	+5...+40°C

<b>Accessories supplied:</b> Line cord, Operating manual, 4 Probes, 10:1 with attenuation ID (HZ350), Dual-Interface USB/RS-232 (HO720), CD	
<b>Optional accessories:</b>	
HO010	Serial bus trigger and hardware accelerated decode, I <sup>2</sup> C, SPI, UART/RS-232 on Logic channels
HO3508	active 8 Channel Logic Probe
HO3516	2x HO3508, active 8 Channel Logic Probes
HO730	Dual-Interface Ethernet/USB
HO740	Interface IEEE-488 (GPIB) galvanically isolated
HZ355	Slimline Probe 10:1 with automatically 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
<b>additional accessories you can find at <a href="http://www.hameg.com/HM02524">www.hameg.com/HM02524</a></b>	

## HO010 Serial Bus for all Oscilloscopes of the HMO Series

### Analog meets digital and serial

The option HO010 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 I<sup>2</sup>C, 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 datavalue on a I<sup>2</sup>C message. These makes the HO010 a powerful and meaningful option for any mixed signal scope of the HMO series.

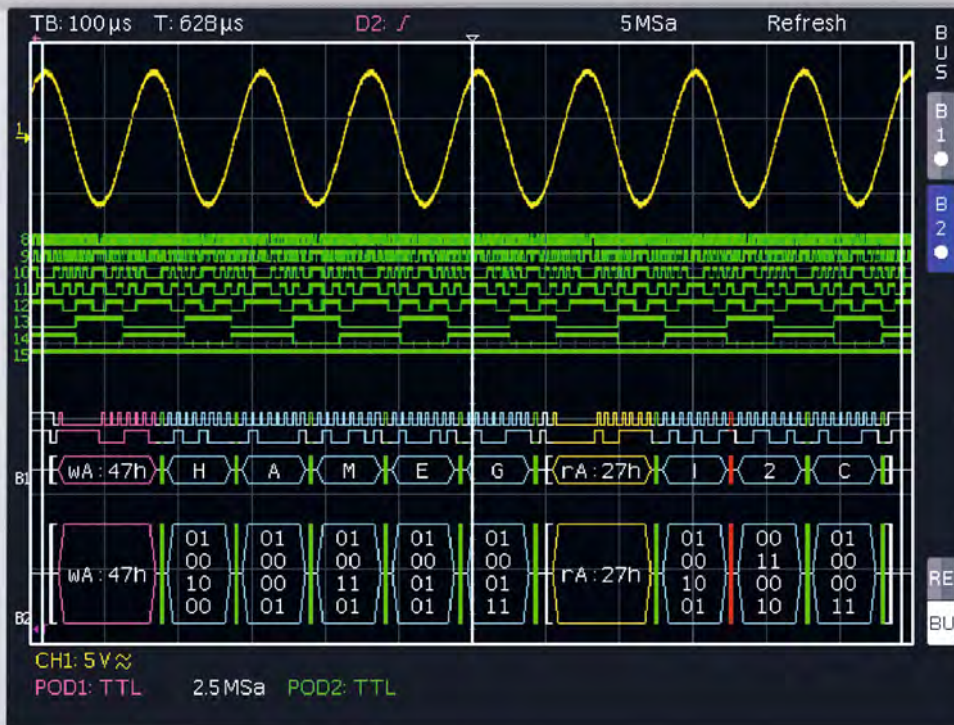
	I <sup>2</sup> C Bus	SPI Bus	UART/RS-232 Bus
<b>Bus Configuration</b>			
<b>Baud rates</b>	up to 10 Mb/s	up to 25 Mb/s	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud, up to 62,5 Mb/s
<b>Number of Bit's</b>	7 or 10 Bit for Adress ID 8 Bit for Data	32 Bit for Data	8 Bit for Data 1, 1,5, 2 Bit for Stop Bit
<b>Polarity</b>	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
<b>Parity</b>	n/a	n/a	none, odd or even
<b>Trigger</b>			
<b>Source</b>	digital Channel LCH0...15 (Opt. HO3508)	digital Channel LCH0...15 (Opt. HO3508)	digital Channel LCH0...15 (Opt. HO3508)
<b>Event</b>	7 or 10 Bit Address ID 7 or 10 Bit Address ID with 8 Bit Data Start Stop Restart missing Acknowledge Adress 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
<b>Input format</b>	Hexadecimal or Binary	Hexadecimal or Binary	Hexadecimal or Binary
<b>Hardware accelerated Decode</b>			
<b>Source</b>	digital Channel LCH0...15 (Opt. HO3508)	digital Channel LCH0...15 (Opt. HO3508)	digital Channel LCH0...15 (Opt. HO3508)
<b>Display</b>	Bus display, color coded for Read Adress ID: Yellow Write Adress 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
<b>Format</b>	Adress 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

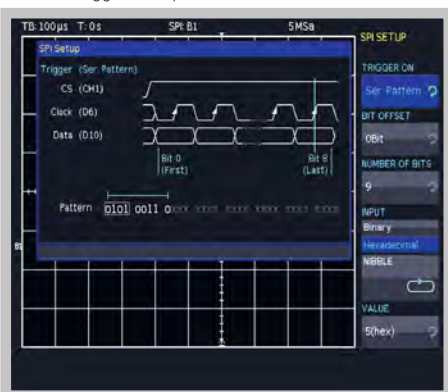
**HAMEG® HMO 2524**  
Instruments 250 MHz / 2,5 GSa / 4 MB DIGITAL OSCILLOSCOPE

**NEW**



H0010

SPI Bus Trigger Setup



I<sup>2</sup>C Bus ASCII and binary



- I<sup>2</sup>C, 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