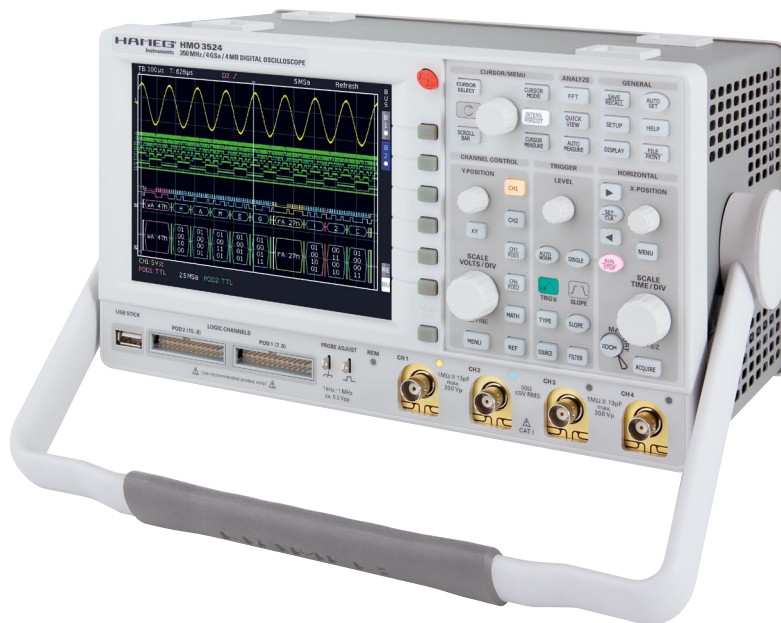


HAMEG Oscilloscopes

Analogue meets Digital – HAMEG Instruments introduces new family of 350 MHz DSO/MSO oscilloscopes

Featuring up to 4 GSa/s and 4 MByte of memory per channel, the brand new HMO series of 350MHz DSOs can easily be upgraded to MSO functionality with up to 16 active logic channels by simply plugging in an optional logic probe.



The steadily increasing requirements, calling for more bandwidth, sampling rate and storage depth, are predetermined by the latest designs to be developed in record time. Complex bus systems and high clock rates put great demands on the measurement equipment. Signal slopes to be characterized demand sufficient margins in bandwidth and sampling rate.

More and more designs, e.g. embedded systems, contain analogue as well as digital signals, and raise the demand for MSOs (Mixed Signal Oscilloscopes). Countless designs use serial or parallel bus systems (SPI, UART, SSP, I²C, I²S, JTAG, 8 Bit, 16 Bit etc.). Taking additional control signals into account (e.g. CS, RD, WR etc.), often only MSOs are considered when it comes to purchase of new oscilloscopes. Mere DSOs with up to 4 analogue channels simply can't meet the requirements. Recognising this trend, HAMEG introduces its new family of DSO/MSO scopes in the 350 MHz/4GSa/s class. Each logic channel provides a memory depth of 2 Meg sampling points, acquired with low capacity active logic probes (100 kOhm || 4 pF) with up to 1 GSa/s.

Simplicity

The operational concept of the new HMO family perfectly reflects the proven HAMEG philosophy for user interfaces:

frequently used functions as RUN/STOP, SINGLE, NORM-Trigger, SLOPE or SOURCE are directly accessible via dedicated buttons - no need to dig in deep menus (figure 1). Meaningful illuminated keys clearly indicate the current state of the instrument. The adjustment of many settings, e.g. logic trigger or measurement functions, are graphical-



Figure 1: Frequently used functions are directly accessible via dedicated buttons.

ly supported. If assistance is needed, pressing a help button provides for detailed explanations in several languages.

Inside the HMO - inner values

Besides the real time sampling rate of 4GSa/s, the oscilloscopes capture periodic signals in random mode at a sampling rate of up to 50GSa/s. The low noise flash A/D converters establish a new reference in its class, enabling a clear examination of fine signal details - even at the 1mV/Div setting. To account for DC coupled signals, each channel is provided with an individual selectable DC offset. Numerous auto measurement functions, including a 6 digit hardware counter as well as comfortable cursor measurement functions, meet even the most advanced requirements. The HMO series features an electronically realised persistence which can also be found in some competitor scopes. HAMEG extended this functionality and added an inverse luminosity to emphasize seldom occurring signal details.

FFT

Many products on the market provide access to the FFT function only through the mathematics menu. The HMO series is equipped with a dedicated button to start FFT: The frequency domain main pane shows the signal spectrum together with typical measurement functions. A small time domain pane is shown in parallel to indicate the amplitude and the currently selected sampling interval. In FFT context the Autoset button provides for a signal based adjustment of amplitude and frequency resolution.

X-Y-Z operation

The X-Y-(Z) operation can also be directly accessed via a dedicated key, so no entering of display menus is necessary. The X-Y-(Z) curves (see figure 2) are displayed in a square main pane, whereas the X, Y and Z signals are shown in additional small preview panes as curves in the time domain. On closer examination of figure 2, the persistence of X and Y signals can be seen in the Lissajous diagram. Controlling the Z channel (e.g. CH 3) provides for an additional luminosity modulation as used e.g. in constellation diagrams. Of course, cursor measurements are also available in X Y Z mode of operation.

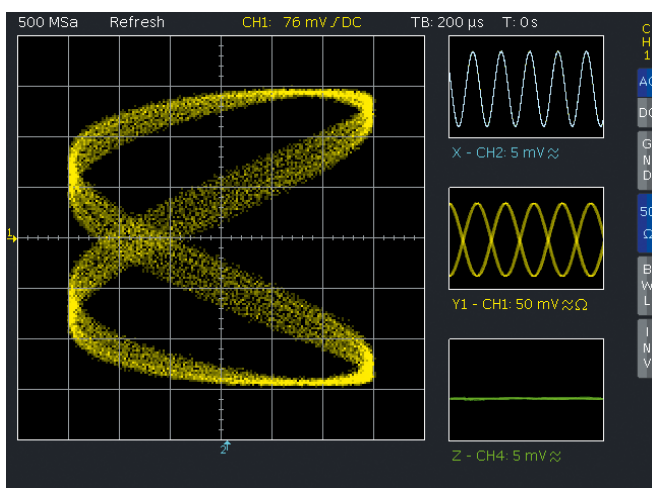


Figure 2: Persistence as a function of writing speed can be seen in the Lissajous curves. Luminance modulation via Z channel is set up to 100%.

Navigation features for time domain display

The memory depth of 2MPts per channel, an outstanding feature in this price range, together with the MemoryZoom function, enables users to benefit from a horizontal magnification of 100,000:1. This aids users in cutting down times for diagnosis of complex faults, where the cause often is far away from the trigger point. The VGA resolution (640x480) of the 6.5" TFT display enables a horizontal signal presentation in 12 Divs. Using the MemoryZoom mode, users benefit from a split screen representation. Above the main zoom pane a small survey pane will display the complete signal. Due to the large memory depth the selection of the proper zoom position via rotary knob can be a really tiring job. Therefore, configurable navigation buttons close to the rotary knob will considerably ease operations. Users can choose to move screenwise, go to the trigger point, jump to the start/end point, set/reset position markers or simply scroll along.

QuickView

Pressing the QuickView button will display and permanently refresh all internally available readings for a selected signal such as Max, Min, V_{peak} , RMS, Mean, t_r , t_f or f. So users can forget about the widely known table or list representations found in many competitor scopes. The newly introduced HMO series, assisted by auxiliary lines and markers in the display, writes the read out values close to the signal curve. The clarity of the display is remarkably enhanced - no need to consult the manual.

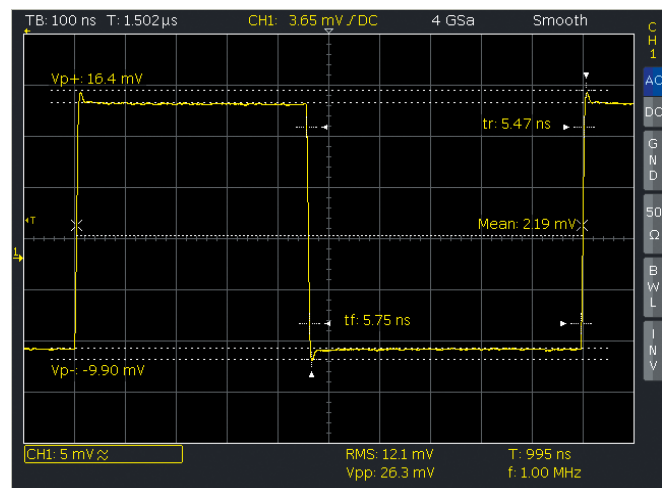


Figure 3: QuickView provides for permanently refreshed display of all internally available readings.

Display and connectivity

There are several scopes out in the market which rely on QVGA (320x240) or WQVGA (480x234) displays. Taking into account that readout values and soft keys eat up some pixels, there is very little left to represent 4 analogue signal curves and up to 16 logic channels. Investing in a 640x480 VGA TFT display, the HMO series delivers pin sharp pictures. Using VirtualScreen, the well known 8 Div display for analogue signals can be extended to 10 Divs. Alternatively a full screen representation of 16 logic channels is possible (figure 4). The DVI output can be used for an external TFT monitor to support 19" rack mount applications. For

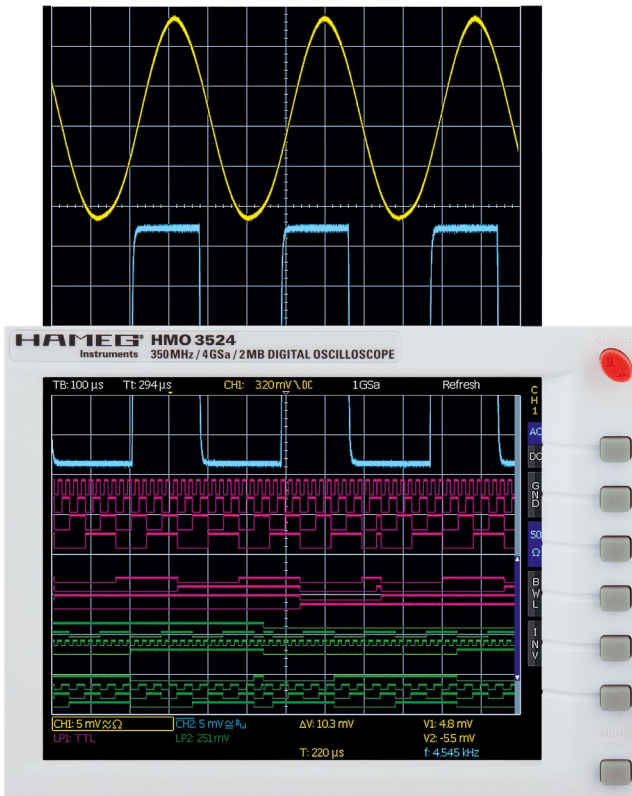


Figure 4: VirtualScreen enables the extension of the signal display beyond the classical 8 Div range in vertical direction.

presentation purposes a projector can be connected. 3 USB interfaces are provided for mass memory, printer and remote control. Optionally a IEEE-488 (H0740) or a Ethernet/USB (H0730) plug-in with integrated web server can be added.

Setup of tricky trigger criteria

In addition to standard trigger criteria such as Slope, Line and Video, the HMO series provides Pulse width and B

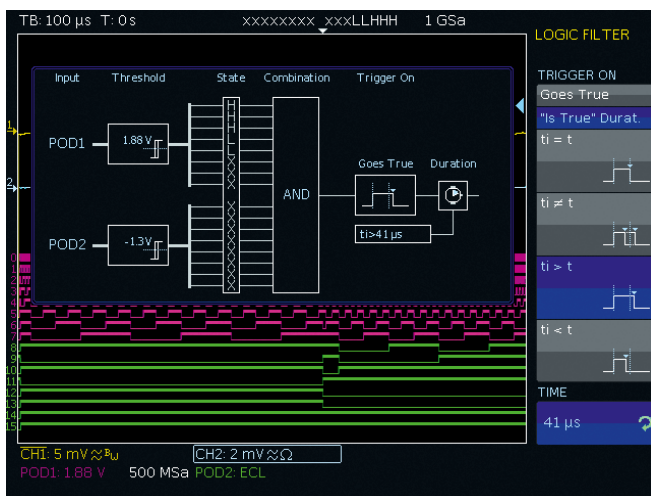


Figure 5: Graphically supported entry of logic trigger conditions.

trigger (two stage trigger) with event or time delayed final trigger with separate selection of slope or level as trigger condition. Besides capturing the analogue curve shapes of critical signals like "chip select" or "read/write", the

two-channel HM03522 and the four channel HM03524 are capable of recording up to 16 additional digital signals with 1 GSa/s and 2MPts using the active logic probe. By logically combining up to 16 logic channels, it's easy to set up trigger conditions to drill down to fault conditions of interest (figure 5).

Conclusion

Launching the HMO series of 350 MHz TFT DSO/MSO with up to 4GSa/s and 4MByte memory per channel, HAMEG introduces a series of state of the art digital scopes that even meet the constraints of limited budgets. Due to their stackability on other HAMEG instruments, they take up only very little footprint. The HMO series is priced starting at 3,100€ and is available from March 2009.

Please find more details at <http://www.hameg.com/HM03524>.