HAMEG Oscilloscopes

Serial Bus Analysis for the Broad Market
The New HMO Series: The Reference in the Lower Price Class

Widespread use of embedded systems started many years ago; nowadays, few areas of electronics can do without them. Following this trend, oscilloscope buyers now demand the appropriate measuring functions. The price is still significantly determined by the bandwidth. However, neither the MIxed Signal function nor the analysis of the serial and parallel buses in embedded systems require bandwidths of several hundred MHz.

The HMO series oscilloscopes of 250 and 350MHz bandwidth, introduced in 2009, have already set a new standard thanks to their numerous functions and features. Consequently, HAMEG designed a new series of oscilloscopes with bandwidths of 70, 100, 150 and 200MHz which are based on the above types and are again more compact in order to address the broad market with a starting price of only £1,025.00.

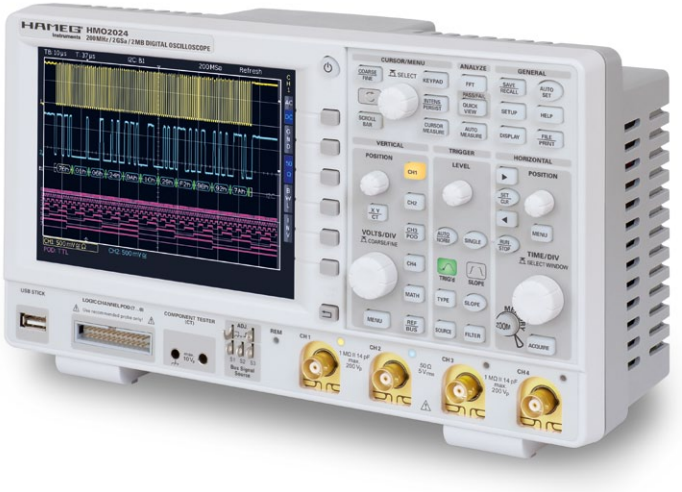
The New HMO Series: Compact, Powerful and Scaleable

In spite of their 14cm depth the instruments feature the same 16.5cm VGA display with LED background lighting and an extra wide viewing angle as the established HMO3524. The presentation concentrates on a signal display; and the use of short menus allows comfortable operation and the display of 12 horizontal divisions. As the new instruments are brought to the market as MSO Ready, easily more than 10 signals can be displayed; hence it was appropriate to implement „VirtualScreens" to complement these instruments. This virtual extension to 20 vertical divisions (of which always 8 are visible, selectable with the universal knob) enables the handling of many signals simultaniously, without the need to switch channels on and off frequently just in order to keep track.

In addition, frequently used functions can be addressed by just pushing a button, including Zoom, FFT, XY, QuickView (allows the measurement of up to 11 parameters of a signal), auto and cursor measurements as well as mathematical functions. Thus the menu depth remains low and the operation simple. Also trigger functions can be quickly selected via dedicated pushbuttons: source, mode and condition.

The New HMO Series: unbeatable for memory depth and sensitivity

When judging oscilloscopes, apart from subjective criteria like display and operation, the hardware specifications are



important. All instruments in the new HMO series sport a sampling rate of 1GS/s and a memory depth of 1Mpts per channel; both values can be doubled to 2GS/s and 2Mpts by cascading channels. These high (real time) sampling rates and memory depths ensure correct signal capture which is by no means standard for this price category. Savings in the wrong place are frequent regarding the memory depth – which is not easily obvious to the interested buyer. The exact wording has to be watched; sampling rate and memory depth are not always specified. These specifications can only be found later in the manual, even with brand name instruments.

With regards to the manual: it is a matter of opinion whether a manual should (only) be available as a pdf file for downloading, HAMEG decided to continue delivering a printed manual with each instrument.

The actual sampling rate depends on the size of the memory installed and the time base selected and can be calculated from the formula: Actual sampling rate = memory depth/time base. In practice, the HMO holds its maximum sampling rate down to a time base of 1ms which is two decades better than competitive products offer.

Many applications, e.g. measuring the residual ripple on power supply voltages, require a high sensitivity. The new HMO series features like all HAMEG scopes 1mV/div. The meticulously designed expensive analog input stage with high performance allows for extremely low noise; a/d converters yield an intrinsic noise of considerably less than 0.5mV!

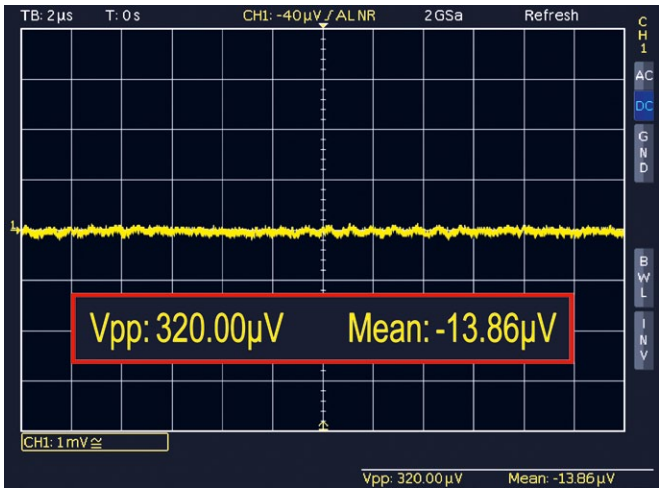


Fig. 1: Intrinsic noise of the HMO724 at 1mV/div.

No competitor can meet this performance in this class. In the following picture the HMO724 is compared to two competitive instruments made by brand name manufacturers. All instruments were operated with the same settings. As both competitors only offer 2mV/div. maximum sensitivity, the HMO724 was also set to this sensitivity. The result is clear – the HMO features lower noise by a factor of 4.

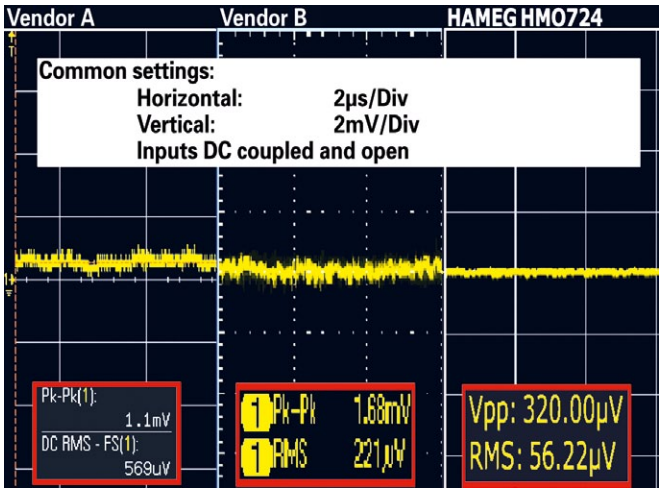


Fig. 2: Intrinsic noise of oscilloscopes of 3 manufacturers

This low intrinsic noise in conjunction with the powerful FFT function with up to 65,000 points opens up entirely new possibilities in the frequency domain. When designing circuits, the source of an interference is an important information. The measurement of the residual ripple is an example which shows that the HMO can still display signals which competitive instruments are unable to show. The reasons are lack of sensitivity and the number of FFT points. The number of FFT points is a direct measure of the resolution of the frequency axis. Additionally, averaging can be switched in the frequency domain which further minimizes noise so interference frequencies will emerge. The Peak Search function known from spectrum analysis is unique: by pushing a button the cursor will be moved from one peak to the next while frequency and amplitude are displayed simply, and can be reproduced.

The New HMO Series: with high grade analysis functions

Stored signals may also be analysed – unique in this class – with the aid of the included extended mathematical functions. 5 sets of formulae with up to 5 equations are available. The result of an equation may be used as an operand in a new calculation, this allows chained functions. The simplest (and most used) example is the calculation of energy with power semiconductors. Current and voltage are measured and stored, both are multiplied and the result integrated. In total there are 19 mathematical functions available including IIR low and high pass filters.

All HMO instruments feature an integrated mask test for long term measurements. Masks can be construed quite simply. If the limits are transgressed, a variety of actions are selectable, e.g. a screen shot may be stored each time. When running such a test, each violation of a limit will be documented. This means one may conclude from the total duration and number of tests, along with the nature and time of occurrence of the failures, what the causes were.

The new HMO series with all these features, as a pure DSO, is already available from £1,008. And this is not all. For a small increase in price, these instruments are, of course, prepared for the future of the Embedded World – this sets a new standard, to which all competing scopes of this class will have to be compared in the future.

The New HMO Series: MSO – Ready and serial protocols included

All oscilloscopes of the HMO series are MSO Ready. Buying an optional active logic probe HO3508 (£255) allows to capture 8 digital signals, also with up to 1GS/s and 1Mpts memory. The necessary software for combining these logic channels with parallel buses and decoding them is already implemented. The logic probe is not bound to any serial number of an instrument . If a lab e.g. has 5 scopes and only needs the MSO functionality infrequently, one may connect the HO3508 to any of the HMO's and start work immediately.

In addition to the parallel signals there are also serial protocols in embedded systems in order to e.g. control sensors, keyboards or displays. For the HMO series there are 2 software options available which allow hardware-supported triggering and decoding of the protocols I^2C, SPI and UART/RS-232. HO010 allows the analysis of two serial protocols simultaniously – if necessary of the same type – as well via the analog or digital inputs. The entry option HO011 allows the decoding of one of the 3 serial protocols in the package via the analog inputs. In case of the SPI with 3 signals the two-channel instruments use the rear panel external trigger input for the chip select. During the year of introduction 2011 this option will be installed at no cost in all HMO72X, 102X, 152X and 202X. The extended features of the HO010 may be added any time for £255.00.

As a standard, all new instruments feature an internal signal source which delivers square wave signals, also 4 bit

parallel data (random patterns or counter) as well as I^2C, SPI or UART protocols.

Another unique feature of the new HMO series is the built-in component tester. This allows – like a „Curve Tracer Light" – to display the V-I characteristics of components such as resistors, capacitors or semiconductors. In service work, the possibilty to look at certain points in a complete (but deenergized) circuit and to display the V-I characteristic there and to compare this with a functioning circuit is highly appreciated, as this allows fast localization of failures.

The new HMO series offers with its bandwidths from 70 to 200MHz an unequalled combination of technical features: 1Mpts memory per channel, up to 2GS/s sampling rate, minimal noise, bright and clear VGA display with VirtualScreen, ext. DVI monitor output, FFT with 65,000 points with Peak Search, extended mathemaitcal functions including digital filters and standard mask test. In conjunction with the Mixed Signal capability and the analysis of serial protocols these whispering 2 – and 4 – channel instruments are unique at their prices of £1,008.00 to £1,950.00. Deliveries of the HMO724 and the HMO1024 will start at the end of May, the other instruments will follow 8 weeks later.