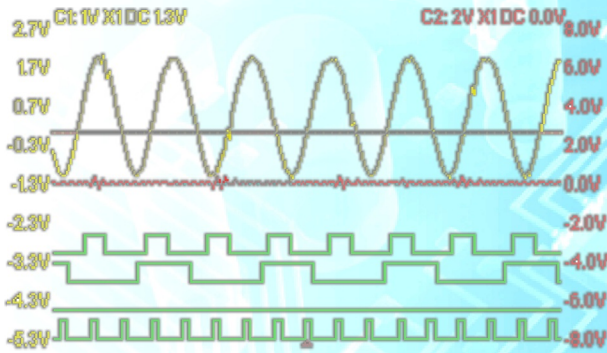
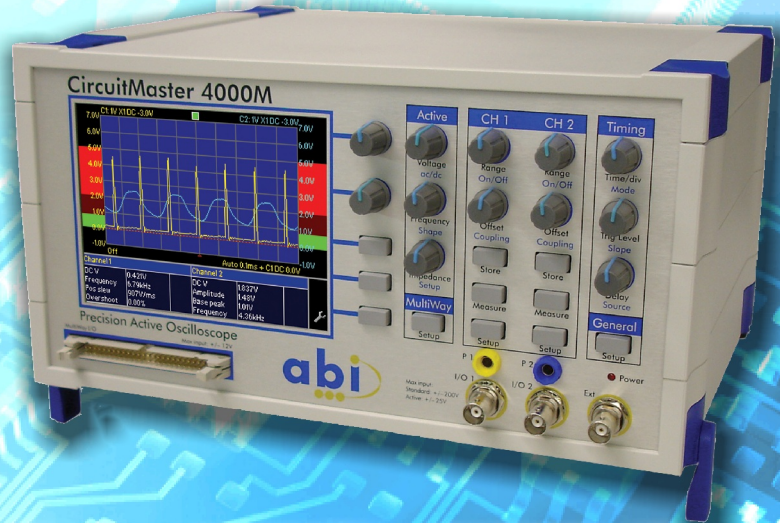


TAKE YOUR TESTING CAPABILITIES TO THE NEXT LEVEL !

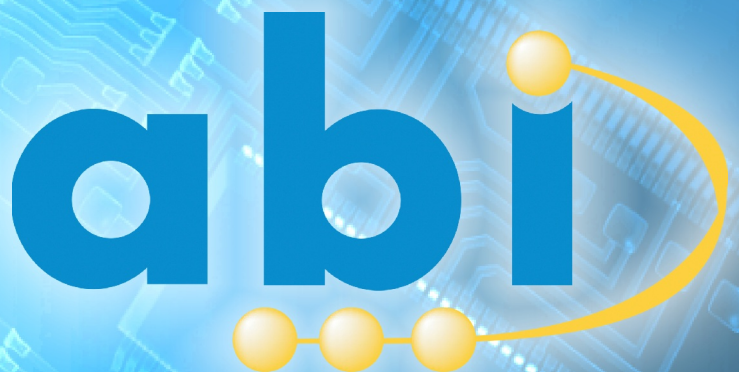


- Simultaneous DC Voltage/AC Waveform
- DC and AC Function Generator
- V-I Tester with Pulse Outputs
- Drive Strength Checker (FirmFlex)
- 4 Logic Inputs (LogicView)
- 40 Channels Acquisition
- Multi-Function Footswitch
- Automatic Setup (with AIMS)
- Test Sequences (with AIMS)
- Multi-Language Interface

CircuitMaster 4000M Precision Active Oscilloscope

The CircuitMaster 4000M Precision Active Oscilloscope combines the power of a 100 MHz DSO, 0.1% accurate DC measurement and VI signature capability with unique test techniques (active mode, firmflex) to provide a wealth of circuit diagnostics.

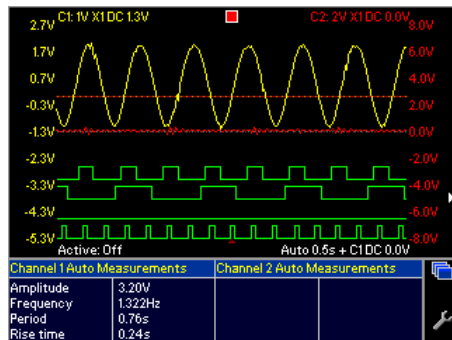
Designed to simplify the safe probing of fine pitch PCBs and to reduce the time required to set up, the CircuitMaster 4000M is at the heart of today's technology for all your needs in test and measurement.



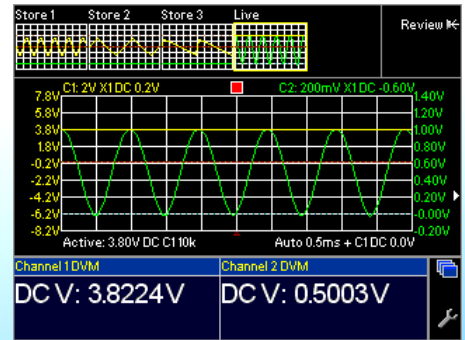
www.abielectronics.co.uk

Standard Mode

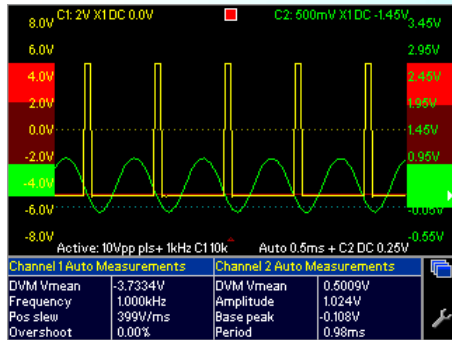
In standard mode, the CircuitMaster 4000M behaves like a conventional oscilloscope and retains the standard capabilities of acquisition and measurements. However, the accurate voltmeter (0.1% 24bit) offers a precise reading of the voltage whilst simultaneously displaying the waveform. This removes the need for a separate voltmeter and enables noise or oscillations to be checked. Features such as the footswitch were designed to make probing quicker and safer. Other display options also improve signal analysis.



With two analogue input channels (and external trigger), the CircuitMaster also offers 4 digital inputs with adjustable thresholds for logic signals, making the unit ideal for mixed signals applications. For multiple signal acquisition, a 40 channel connector is located at the front to clip onto ICs or complete PCB connectors. The cable can be split in 2x20 channels for live acquisition and comparison of signals.



Active Mode



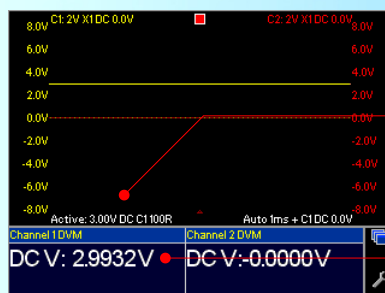
Active mode is a unique feature of the CircuitMaster 4000M. In this configuration, the unit is able to output DC or AC signals on the same channel it uses to measure an input signal. This duality allows users to detect circuit conditions which are not visible with conventional instruments (see example below).

This mode can be used to measure the active response of a test point to a stimulus generated by the CircuitMaster. Alternatively, it can be used as a function generator to inject signals into a board, the second channel being used to monitor the response at a different point in the circuit (phase lag, for instance, will be visible).

Open or Short Circuit

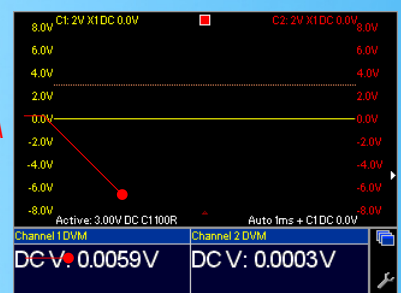
It is a known fact that, on a powered board, a short circuit and an open circuit will both return a voltage measurement of 0V with any voltmeter or oscilloscope. However, with active mode, injecting a small DC signal (eg 3V) into the circuit and measuring the response will give the user a clear indication of the condition. In an open circuit, with the absence of current flow, the voltage output by the CircuitMaster will remain unchanged, thus displaying the same reading as the set voltage (Fig 1). In a short circuit however, the voltage will drop almost completely and the voltage read back by the unit will be close to 0V (Fig 2).

The applications of active mode are endless but some of the common uses include pull up voltages on outputs, voltage regulation checks, threshold voltage measurements and phase shifting.



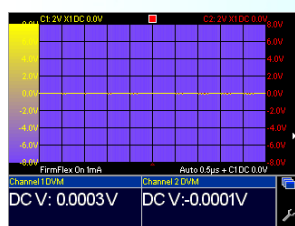
(Fig 1)

Active: 3.00V DC C1100R
Voltage output to circuit
from CircuitMaster 4000M
Accurate voltage reading
measured from the circuit



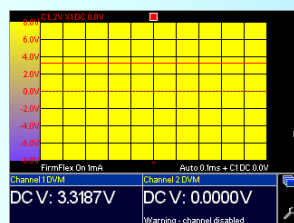
(Fig 2)

FirmFlex Mode



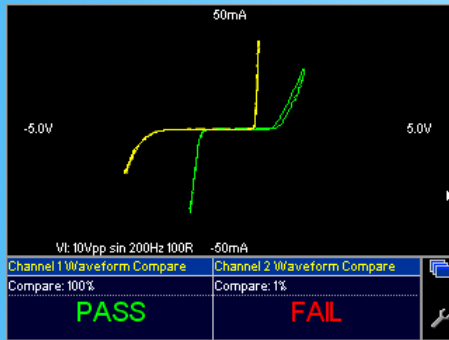
(Fig 3)

FirmFlex is another unique test technique used by technicians to assess the strength of a node (its ability to sink or source current in a circuit). In some cases, devices may be functionally working in circuit but lack the strength to drive several other devices on output. This can be caused by aging or minor damages to the device and can be assessed with FirmFlex. This problem also applies to weakened power rails. The CircuitMaster can test and report this effect by altering the background colour from purple for a weak point (Fig 3) to yellow for a strong point (Fig 4).

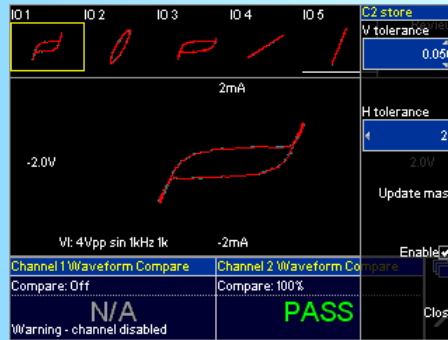


(Fig 4)

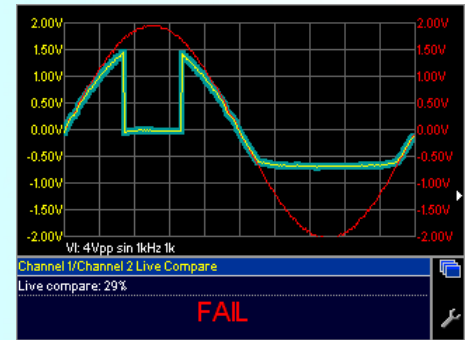
All the features of waveform display, DC measurement, storage and analysis are still available in FirmFlex mode.



(Fig 5)



(Fig 6)



(Fig 7)

Analogue signature analysis (or VI test) is a technique used to acquire the voltage-current characteristics of devices in unpowered conditions. The resulting curve is typical of a component category or can be, particularly in-circuit, a combination of the four main categories: resistor, capacitor, inductor and semiconductor. The analysis of these characteristics can lead to the detection of faults in components (eg. leaky diode). However, VI is also used as a comparison tool between a known good component and a suspect one (Fig 5). The CircuitMaster offers complete VI capabilities with adjustable test parameters and automatic comparison. Multiple acquisitions, through the MultiWay connector, are also available as well as a 2x20 way live compare option. Scan mode is used to automatically change the applied voltage in a set sequence so that no part of the curve is missed.

This mode of measurement can also be used to test gate-activated devices. The display of the CircuitMaster can be changed to represent the voltage over time (instead of voltage over current) and the separate pulse outputs can be used to trigger the gate of a device. In most cases, the device then becomes activated (shorted) for the duration of the pulse which is represented by the notch in figure (Fig 7). The amplitude, polarity and phase of the pulse can be changed, allowing the user to work out activation thresholds.

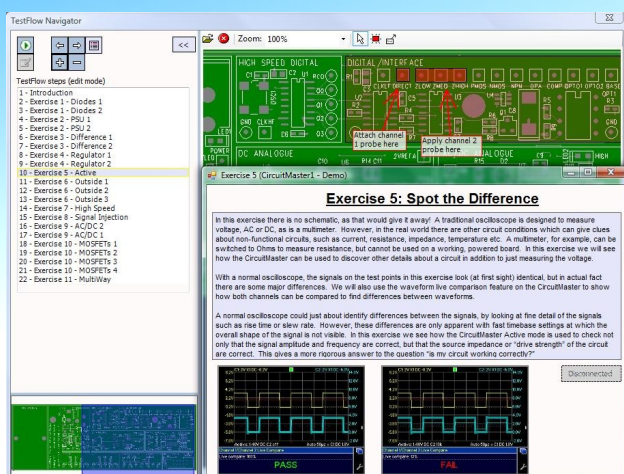
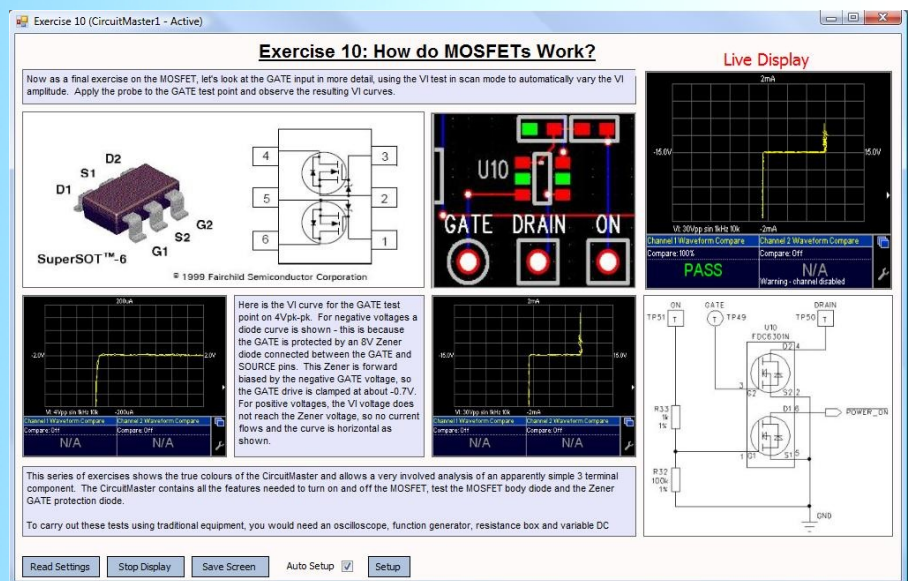
ABI Interface Manager software (AIMs - Optional)

AIMs is a powerful and flexible software platform designed for the control and operation of the CircuitMaster 4000M (when linked to a PC via USB). The display of the CircuitMaster can be transferred to the PC screen and data as well as settings can be stored. Layouts can be rearranged and instructions, photos or schematics can be added. Access levels can be easily managed through usernames and passwords.

Auto-Setup: The 80/20 Rule

It was established by technicians and engineers that most of the time required to make a given measurement is spent setting up the instrument (80%). This means that only 20% of the user's time is dedicated to acquiring and analysing the measurement.

AIMs is capable of saving ALL the test parameters (timebase, trigger level, active voltage etc...) as well as comparison masks. At the touch of a button, or even automatically if the settings are saved as part of a TestFlow, the CircuitMaster can be reset to exactly the same conditions as previously saved. This is particularly helpful with repetitive measurements and gives 80% of time back!



What is TestFlow?

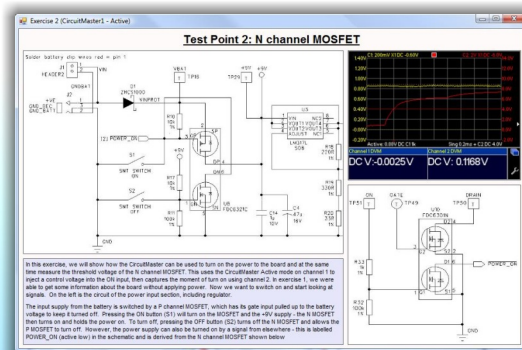
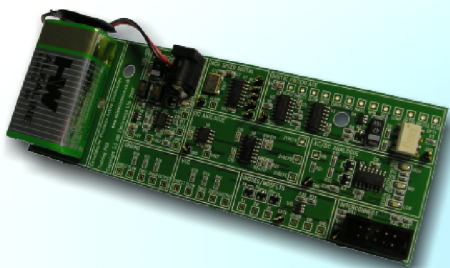
A core feature of the AIMs software, the TestFlow Manager allows users to create automated test sequences in a simple, step by step structure. Each step may be customised with photos, schematics, instructions or even PDF and Web material. A more graphical option can also be used to direct users in their work, as in shown in the picture to the left. In this case, clicking on a red test point will automatically open the appropriate test step and, if selected, will place the CircuitMaster in the right testing conditions. Each step of the TestFlow retains the information, the settings and the master data for direct comparison.

At any point during a TestFlow run, users can enter their own comments which will be included in a final test report.

Training Package (Optional)

The ABI CircuitMaster 4000M Training Board is a self-contained PCB equipped with its own power supply for ease of use. The board is designed with simple circuits which are notoriously difficult to analyse, even with the best instruments. A range of exercises is available to the user in a detailed manual organised in a background/procedure/results/analysis format. Circuit diagrams and screen shots complete the structure to make it easier to follow and understand. The training package is supplied with a manual or, for users with the AIMs software, a complete TestFlow of the exercises.

Each exercise shows the testing and measuring capabilities of the CircuitMaster4000M which are just beyond any instrument on the market. The training package is widely used in the industry as it allows new users to train on their own and at their own pace, thus freeing advanced users for other tasks.



The training package is particularly useful to new and experienced electronics technicians as it uses common circuit designs which are used in a wide variety of applications. Learning how to test these circuits with the CircuitMaster is a particular advantage when faced with real life situations.

Applications

The CircuitMaster 4000M is widely used in the electronics sector with direct applications in repair & diagnostics, either within a manufacturing environment or in field service, and in research & development. Its versatility make it an instrument of choice for engineers and technicians alike particularly in the telecomms, audio-visual, automotive, avionics, military, medical and navy sectors. The capabilities for saving and sharing test procedures and data (with the AIMs software) make the CircuitMaster 4000M a popular choice for businesses with multiple stations and several geographical sites.

Technical Specifications

Supply voltage	230/240V AC or 110V AC (auto switch) 50/60Hz
Interfaces	USB, footswitch, BNC, MultiWay, 4mm
Display type	Colour LCD 320 x 240 pixel
DSO bandwidth	100MHz
DSO sample rate	50MS/s single shot, 250MS/s – 25GS/s in ERS mode
DSO resolution	10 bits maximum, 8 bits on 10mV/div and 20mV div ranges
Maximum input	+/-200V DC or peak AC, +/-25V in VI or FirmFlex mode, +/-12V LogicView and MultiWay inputs
AC accuracy	1% of full scale, 5% on 10mV and 20mV ranges
Channels	2 analogue, 4 digital, 40 way MultiWay, external trigger
Input impedance	1M // 50pF
Timebase	1ns/div to 2s/div in 1-2-5 sequence
Sensitivity	10mV/div to 10V/div in 1-2-5 sequence
Input coupling	DC, AC, ground
Trigger coupling	DC, AC, LF reject, HF reject from ch1, ch2, ext or FG (internal)
Trigger mode	Auto, normal, single shot
DVM resolution	24 bits (approx 0.1uV on 10mV/div, 162uV on 100V/div)
DVM accuracy	0.1% of range full scale +/-1LSB
Active and VI output	-10V to +10V DC, 0.5Vpp to 50Vpp AC
Active and VI frequency	10Hz to 100kHz in 1-2-5 sequence
Active and VI waveforms	Sine, triangle, ramp, square, pulse
Active and VI source resistance	100R to 1M in decade sequence
Pulse output	-10V to +10V in 0.1V steps
LogicView threshold	-4V to +4V in 0.1V steps

CircuitMaster Package includes :



- CircuitMaster unit
- 2x Oscilloscope Probes X10/X1
- MultiWay cable assembly with LogicView clips
- 40 way, 0.6" DIL test clip
- 16 way, 0.3" DIL test clip
- BNC to 4mm adapter
- Red/Black 4mm probe set
- USB cable
- Footswitch
- Operator's manual
- CircuitLink software (for firmware updates)
- Training package (optional)
- AIMs software (optional)
- Split cable 2x20 way (optional)
- SOIC test clip set (optional)



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