QD-1020HC
Product Highlights

Advanced High Current Multi-site IDDQ Measurement Instrument Supporting Various Test Applications

FEATURES

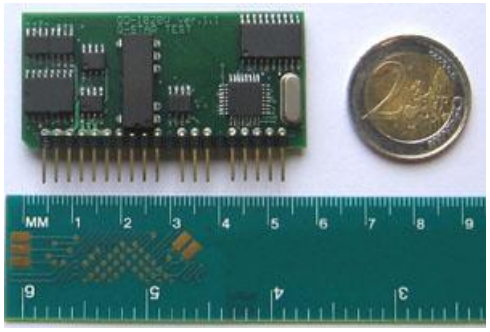
- Wide DUT Supply range: VDUT = 0.5V to 7V
- Wide measurement ranges up to 200A
- Typical measurement time: 100 µs
- High capacitive driving capability: up to 100µF
- High resolution: 150nARMS
- 16 or 24-bit digital resolution
- 3-Wire Serial Configuration/Read out Interface
- Cascadable up to 8 QD-1020 units
- On-board data processing capabilities

APPLICATIONS

- Multi-site Applications
- ATE Load Board Applications
- ATE Probe Card Applications
- Delta IDDQ Measurements
- Pre & Post Stress Delta IDDQ
- IDDQ Pass/Fail Measurements
- IDDQ Read Out Measurements
- IDDQ Window Comparisons

DESCRIPTION

The QD-1020HC is a full featured, configurable quiescent supply high current (IDDQ) instrument, designed for multi-site applications, serving both probe and final test. Up to 8 QD-1020HC units can be cascaded, sharing the same control resources. To save ATE I/O pins, a 3-wire serial control/configuration/read out interface is used to control all instruments. All units can be addressed globally or individually. When sufficient ATE resources are available, instruments can be controlled with independent data outputs as well.



On-board memory and data processing capabilities allow implementing a wide range of basic and advanced current based test strategies and allow offloading the IDDQ data processing and decision making from the ATE to the instrument. The QD-1020HC is offered either with a 16 or 24 bit architecture and related measurement resolution/repeatability, and can have a horizontal or a vertical form factor.

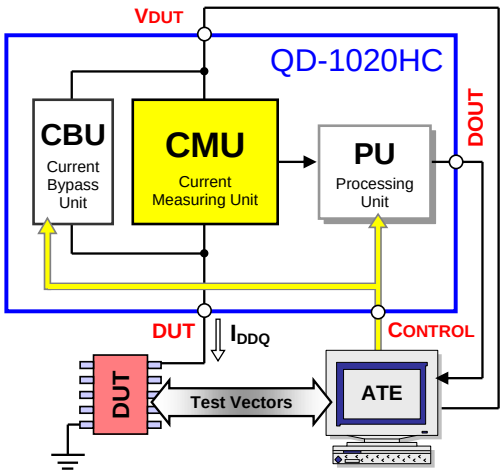


Figure 1. QD-1020HC Application

The QD-1020HC is designed to be inserted between the Automated Test Equipment (ATE) device power supply and the supply pin(s) of the Device Under Test (DUT). There is no need to remove the local decoupling capacitors. Its unique design ensures transparency to both the ATE and DUT, under all conditions. The unit can drive high capacitive loads (up to several tens of µF). The QD-1020HC offers the capability to perform accurate and highly repeatable high-speed (up to 10kHz) quiescent supply current measurements with sub-µA resolution/repeatability.

The instrument can have measurement ranges up to 2A when used without external sense element or up to 200A when used in combination with an external sense element. The serial output provides the Pass/Fail flag and/or the measured or processed IDDQ value with a 16 or 24-bit resolution. The QD-1020HC requires only a single positive supply, and allows a user programmable (0.5 to 7V) DUT supply level.

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OPERATING MODES

The QD-1020HC has two main operating modes: ***bypass mode*** and ***measurement mode***. During bypass, the instrument provides a low resistance path between ATE supply and DUT. During measurement, the actual measurement(s) take(s) place. The instrument can be programmed during bypass mode. The programming operation allows selecting the measurement approach and to set the pass/fail level(s). A simple programming protocol is used.

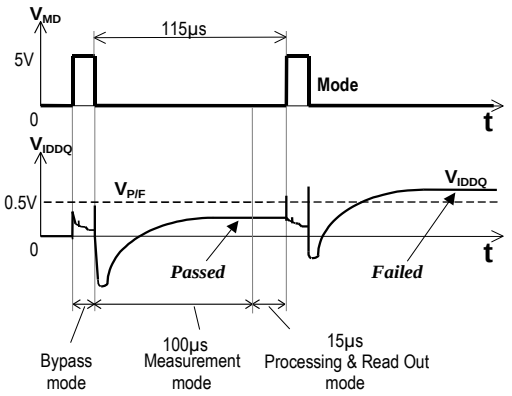

Figure 2. QD-1020HC Measurement Cycle

The normal measurement cycle consists of a settling period (typ. 100µs) followed by a capture, processing and read-out period (typ. 15µs). When in measurement mode the instrument is acting as DUT power supply. When during measurement mode the measured current is out of the instrument's measurement range, then the QD-1020HC automatically switches back to bypass mode, meanwhile indicating a fail situation. Figures 1 and 2 show a general application diagram as well as a typical measurement cycle.

TYPICAL APPLICATIONS

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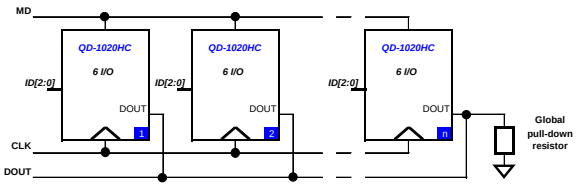
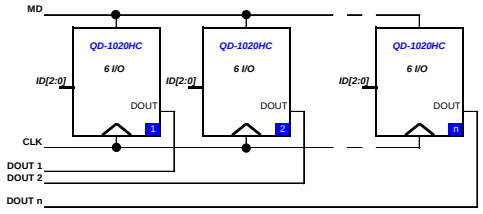


The QD-1020HC is designed for multi-site I_{DDQ} instrument applications. Each instrument has a 3-bit hardware address (hardwired on the DUT loadboard) that allows assigning a unique address to each instrument. As such, each instrument can be accessed individually for setting references and for data readout. Up to 8 instruments can be cascaded (connected in parallel) and can all be controlled using one 3-wire serial interface. All control lines are connected in parallel. This application mode saves ATE tester channels but causes additional readout time as the data stream is provided sequentially on the data output line DOUT.



The instrument can also be configured to provide the data of all instruments simultaneously independent of its hardware address. This requires that all instrument data outputs be connected to separate ATE channels.

ELECTRICAL SPECIFICATIONS

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
V_{CC}	Positive Supply Voltage	+4.5	+5.0	+5.5	V
CMR	Current Measurement Range	50	500	2000	mA
V_{DUT}	DUT Supply Voltage	0.5	3 - 5	7	V
ΔI_{DDQ}	Single Sample Resolution (1)	2	20	80	μA_{RMS}
	Measurement Time (2)		116		µs
C_L	Loading Capacitance	0	1	100	µF
VI_{VIDDQ}	V/I Conversion Ratio	2.5	10	100	V/A
I_{DDT}	Transient Current in Bypass Mode			30	A
V_{INT}	Voltage drop between VDUT and DUT pins			50	mV

(1) Configuration dependant, the values listed are for a C_L=1µF optimised unit.
(2) The maximum measurement time is dependent on the number of samples taken: 116µs @ 1 sample, 146µs @ 4 samples, 260µs @ 16 samples.