QA-1000HC
Product Highlights

Configurable High Current Analog Supply/Ground Current Measurement Instrument

FEATURES

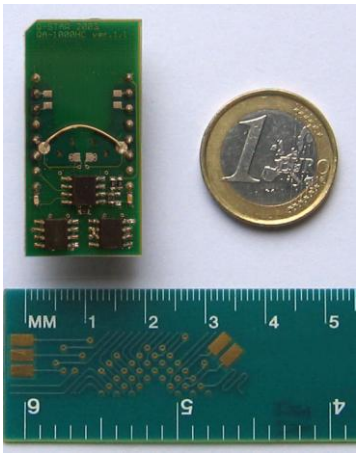
- Wide I_{DDX} Measurement BW: 0 – 5 MHz
- High I_{DDX} resolution: 300 μA_{RMS}
- High I_{DDX} Measurement Range: 0 – 5 A
- High Loading Capacitance: 0 – 100 µF
- Low internal resistance: 25mΩ

APPLICATIONS

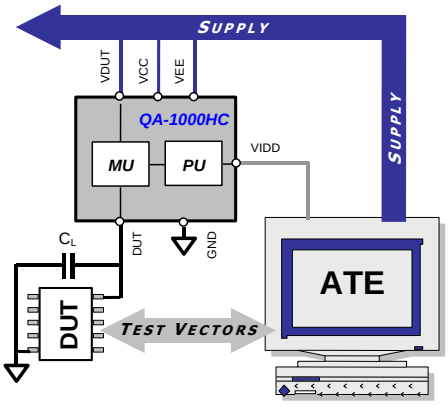
- Continuous Analog Current Measurements
- Static and dynamic Analog Supply/Ground Current Measurements
- Positive and Negative Supply and Ground Current Measurements
- Analog Current Measurements

DESCRIPTION

The QA-1000HC is a configurable high current analog supply current measurement instrument, designed for probe and final test and continuous current measurement applications. Its low internal resistance ensures its transparency. The instrument is designed to be inserted between the DUT supply provided by the ATE and the supply pin of the DUT or between ground and DUT ground. The VDUT supply can be positive or negative (VDD/VCC or VSS/VEE).



The QA-1000HC is designed to accurately measure analog (supply) currents up to 2A (upon demand the range can be adapted to 100mA, 200mA, 500mA, 1A or 5A), thereby providing a high measurement repeatability. The measurement instrument has a bandwidth of 5MHz, offers a resolution of 300µA @2A, and is capable of driving high capacitive loads (up to 100uF). The resolution and performance of the measurement instrument are function of the selected bandwidth and the amount of loading capacitance C_L (the DUT local on-pin supply decoupling capacitance).



The QA-1000HC has no digital control pins. It measures continuously and relies for further signal processing and decision making on the capabilities of the mixed-signal ATE or test control equipment to which it is connected. The QA-1000HC provides an analog output voltage, corresponding to the measured current. The figure shows a block diagram of the QA-1000HC as well as a typical application diagram.

The QA-1000HC consists of 2 active units, a measurement unit (MU) and a processing unit (PU). The measurement unit is a fast and sensitive current measurement device that converts the measured analog current in a corresponding voltage. The processing unit is configurable and provides amplification and filtering functionality. The QA-1000HC has a low internal resistance between its VDUT and DUT terminals, therefore the voltage at the DUT terminal closely follows the supply voltage applied at its VDUT terminal within a -7V to +7V range. The QA-1000HC has a broad application range. Examples are the application to high-power ICs and during voltage stress test applications. By using two QA-1000HC measurement instruments, supply currents of analog DUTs with (symmetrical) +/- supply can also be measured simultaneously.

Parameter	*Min.*	*Typ.*	*Max.*	*Unit*
Positive supply		12		V
Negative supply		-12		V
DUT Supply	-7.0		+7.0	V
Measurement Range		0 – 2		A
Resolution	2	1	0.3	mA_{RMS}
Bandwidth	50	500	5000	kHz
Capacitive Load	0.01	1.0	100	µF
Rin		25		mΩ

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CONFIGURING THE QA-1000HC

The processing unit of the QA-1000HC is configurable by making the proper pin (jumper) connections. A set of jumpers (JP2&3) determines the filter characteristics, allowing to select the actual bandwidth (5MHz, 500kHz or 50kHz) in function of desired speed and accuracy. These configurations can be changed upon request. More information on how to configure the QA-1000HC can be found in application note AN0024.

State / JP	ON	OFF
JP2 (1) (2)	500 kHz	5 MHz
JP3 (1) (2)	50 kHz	

(1) Setting of bandwidth
(2) JP2 and JP3 must be closed exclusively, only one of them might be closed for a given configuration.

APPLICATION

The QA-1000HC can be used to perform static, transient and continuous (supply) current measurements on either the positive supply or the negative supply or circuit ground. The bandwidth is programmable and can be set to 5MHz, 500kHz and 50kHz by making the proper module connections on the JP2-3 pins. Three typical application diagrams are shown in figures 1-3.

The QA-1000HC should be placed as close as possible to the DUT. All connections to the QA-1000HC should be well designed not to degrade the measurement instrument's accuracy. The QA-1000HC's power-on delay time is about 1 second. The VDUT pin must be permanently connected to a voltage source and not left floating. Although the instrument has a very high ripple rejection ratio even at RF, the ATE should deliver a good quality VDUT reference signal (DUT supply voltage reference) for the DUT.

The value of the on-pin decoupling capacitance (C_L) is preferable in the 100pF – 1uF range, higher values can be handled but decrease the measurement instrument's measurement bandwidth. Global decoupling capacitors should be placed at the VDUT side of the measurement instrument if RF operation of VDUT is not needed. All possible application diagrams are shown in figures 1-3.

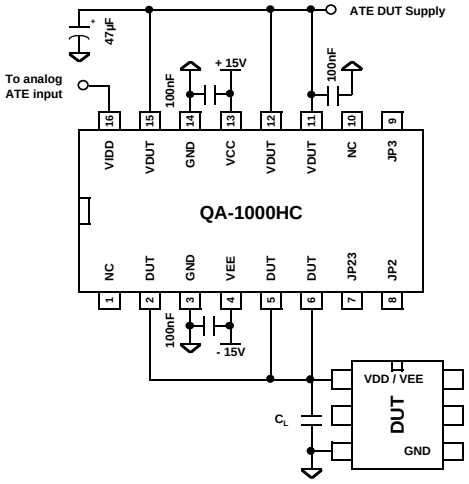

Figure 1. BW = 5MHz

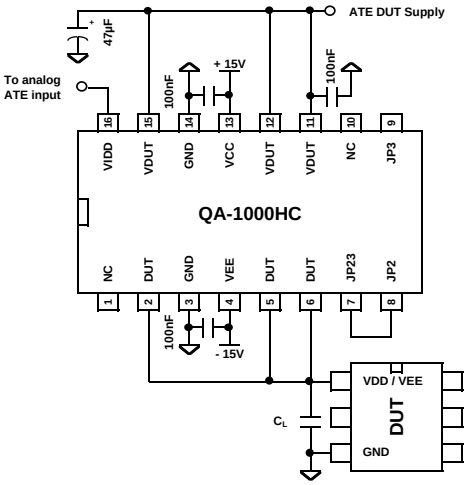

Figure 2. BW = 500kHz

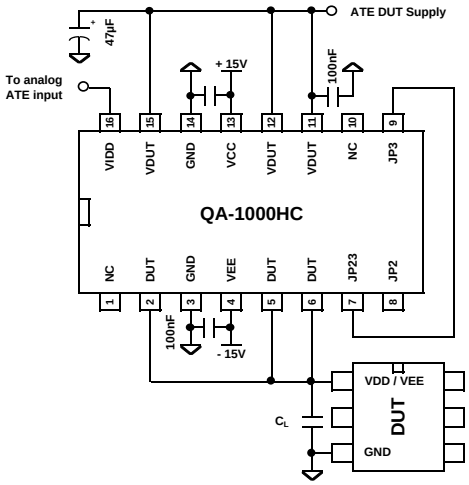

Figure 3. BW = 50kHz