KEITHLEY

3706A

The Keithley 3706A is a high-performance system switch and 7.5-digit digital multimeter (DMM) mainframe. Designed for multi-channel measurement and data acquisition applications, it features six slot positions for plug-in switch and control cards, a highly accurate internal DMM, and comprehensive connectivity options including LAN, USB, and GPIB. Utilizing Keithley's Test Script Processor (TSP) technology, the 3706A supports onboard execution of complex test sequences without requiring real-time PC control, making it ideal for automated production testing and high-density laboratory measurements.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE-488.2), LAN (LXI Core 2011), USB 2.0 Device, USB 2.0 Host
Display	2-line Vacuum Fluorescent Display (VFD)

Physical

Power Supply	100 V to 240 V AC ±10%, 50 Hz or 60 Hz (45 Hz to 66 Hz, 360 Hz to 440 Hz), 110 VA max
Operating Temperature	0 °C to 50 °C °C
Dimensions (W×H×D)	483 mm × 89 mm × 457 mm mm
Weight	7.33 kg kg

Mainframe Configuration

Mainframe Slots	6 plug-in card slots
Maximum Multiplexer Channels	Up to 576 2-wire channels

DC Voltage

DCV Measurement Ranges	100 mV, 1 V, 10 V, 100 V, 1000 V
DCV Best 1-Year Accuracy	±0.0018% of reading + 0.0004% of range (10 V range)
DCV Best Resolution	10 nV (on 100 mV range)
DCV Input Impedance	>10 GOhm (100 mV to 10 V ranges); 10 MOhm ±1% (100 V to 1000 V ranges)
DCV Common Mode Rejection Ratio (CMRR)	140 dB (DC, 50 Hz or 60 Hz, with 1 kOhm unbalance in LO)
DCV Normal Mode Rejection Ratio (NMRR)	60 dB (at 1 PLC or greater, 50 Hz or 60 Hz)
DCV Maximum Input Voltage	1000 V peak

AC Voltage

ACV Measurement Ranges	100 mV, 1 V, 10 V, 100 V, 750 V RMS
ACV Best 1-Year Accuracy	±0.05% of reading + 0.015% of range (10 Hz to 20 kHz, 10 V range)
ACV Best Resolution	100 nV (on 100 mV range)
ACV Frequency Range	3 Hz to 300 kHz
ACV Input Impedance	1 MOhm ±1% in parallel with <100 pF
ACV Maximum Input Voltage	750 V RMS, 1000 V peak

Resistance

Resistance Measurement Ranges	10 Ohm, 100 Ohm, 1 kOhm, 10 kOhm, 100 kOhm, 1 MOhm, 10 MOhm, 100 MOhm, 1 GOhm
Resistance Measurement Configurations	2-wire and 4-wire ohms
Resistance Best 1-Year Accuracy	±0.002% of reading + 0.0005% of range (on 10 kOhm range)
Resistance Best Resolution	1 uOhm (on 10 Ohm range)
Resistance Offset Compensation	Selectable on 10 Ohm, 100 Ohm, 1 kOhm, 10 kOhm ranges
Resistance Source Current	100 nV to 10 mA (range-dependent)
Dry Circuit Ohms Range	10 Ohm, 100 Ohm, 1 kOhm

DC Current

DCI Measurement Ranges	10 uA, 100 uA, 1 mA, 10 mA, 100 mA, 1 A, 3 A
DCI Best 1-Year Accuracy	±0.015% of reading + 0.005% of range (10 mA range)
DCI Best Resolution	1 pA (on 10 uA range)
DCI Shunt Resistance	0.1 Ohm to 10 kOhm (range-dependent)
DCI Maximum Burden Voltage	<0.15 V (on uA and mA ranges), <1.2 V (on 3 A range)

AC Current

ACI Measurement Ranges	1 mA, 10 mA, 100 mA, 1 A, 3 A
ACI Frequency Range	3 Hz to 10 kHz
ACI Best 1-Year Accuracy	±0.1% of reading + 0.04% of range (for 10 Hz to 5 kHz)
ACI Best Resolution	1 nV (on 1 mA range)

Temperature

Thermocouple Types	J, K, T, E, R, S, B, N
Thermistor Types	2.2 kOhm, 5 kOhm, 10 kOhm
RTD Measurement Accuracy	±0.06 °C (excluding probe errors)
Thermistor Measurement Accuracy	±0.08 °C (excluding probe errors)

System Scanning & Speed

A/D Converter Resolution	26-bit (7.5 digits)
Integration Time	0.0005 PLC to 15 PLC
Reading Speed to Memory	Up to 14,100 readings/second (at 3.5 digits, DCV)
Reading Speed to GPIB/LAN	Up to 13,000 readings/second (at 3.5 digits)
Scanning Speed to Memory	Up to 650 channels/second
Relay Drive Power	16 W maximum (integrated power supply for driving relays)

Triggering & Synchronization

Trigger Sources	Hardware, Software, GPIB, LAN (LXI), Front Panel, External Trigger, TSP-Link
External Trigger Pulse Width	Minimum 2 us
LXI Compliance	LXI Core 2011 compliant
Synchronization Bus	TSP-Link (allows multi-chassis connection)
Inter-Unit Jitter	<100 ns (via TSP-Link)

Memory & Storage

Volatile Reading Buffer	Up to 650,000 readings (with timestamp)
Script Memory Capacity	TSP (Test Script Processor) engine for onboard script execution and storage
External Storage Support	USB Host port on front panel for flash drives

Environmental & Safety

Storage Temperature Range	-40 °C to 70 °C
Operating Altitude	Up to 2,000 meters (6,561 feet) above sea level
Vibration & Shock	MIL-PRF-28800F Class 3
Safety Standards	Conforms to European Union Low Voltage Directive, UL 61010-1
EMC Standards	Conforms to European Union EMC Directive, EN 61326-1

Card Compatibility

Compatible Multiplexer Cards	3720, 3721, 3722, 3723, 3724
Compatible Matrix Cards	3730, 3731, 3732
Compatible General Purpose/Control Cards	3740, 3750

Digital I/O

Digital I/O Connector	25-pin female D-sub
Digital I/O Lines	14 digital I/O lines
Digital I/O Sink Current	250 mA maximum per output
Digital I/O Source Current	10 mA maximum per output
Digital I/O External Power Output	+5 V, 500 mA maximum

TSP-Link

TSP-Link Connector	2 × RJ-45
TSP-Link Maximum Nodes	Up to 32 instruments
TSP-Link Cable Type	Category 5e (or higher) UTP

Analog Backplane

Analog Backplane Configuration	6-wire analog backplane
Analog Backplane Voltage Rating	300 V DC or RMS
Analog Backplane Current Rating	1 A continuous

DMM Measurement - DC Voltage

DCV Input Bias Current	<30 pA at 23 °C

DMM Measurement - AC Voltage

ACV Crest Factor	5:1 at full scale

DMM Measurement - Temperature

Temperature Resolution	0.001 °C / °F / K
Cold Junction Compensation	Internal, External, or Simulated

Software & Control

Command Languages	TSP (Test Script Processor), SCPI
Software Drivers	IVI-COM, IVI-C, LabVIEW
Web Interface	Integrated LXI Web Browser Interface

Power and General

Power Consumption	110 VA maximum
Real-Time Clock	Built-in with battery backup
Reading Timestamp Resolution	1 µs
Relay Cycle Counters	Built-in relay odometer for each slot
Warm-up Time	2 hours

Environmental

Operating Humidity	Maximum 80% R.H. up to 35 °C, derating to 35% R.H. at 50 °C

Safety & Interfaces

Interlock Connector	3-pin terminal block

Frequency & Period

Frequency Measurement Range	3 Hz to 300 kHz
Period Measurement Range	3.3 µs to 333 ms
Frequency Best 1-Year Accuracy	±0.01% of reading
Frequency Gate Times	10 ms, 100 ms, 1 s
Frequency Input Impedance	1 MΩ ± 2% in parallel with <150 pF

Diode Test

Diode Test Source Current	1 mA, 100 µA, or 10 µA
Diode Test Voltage Range	10 V

Performance

A/D Converter Type	Multi-slope integrating

Safety & Isolation

Maximum Common Mode Voltage	300 V DC or RMS

TECHNOLOGY

Solid-State / Electromagnetic Relay Switching with Integrated 7.5-Digit DMM

APPLICATIONS

Data Acquisition & Automated Testing