Series 3700A

System Switch/Multimeter and Plug-In Cards

- **Six slot system switch mainframe with optional high performance multimeter**
- **Multi-processor architecture optimized for high throughput scanning and pattern switching applications**
- **Remote PC control via Ethernet, USB, and GPIB interfaces**
- **Up to 576 two-wire or 720 one-wire multiplexer channels in one mainframe**
- **Up to 2,688 one-pole matrix crosspoints in one mainframe**
- **Embedded Test Script Processor (TSP®) offering unparalleled system automation, throughput, and flexibility**
- **TSP-Link® master/slave connection provides easy system expansion and seamless connection to Series 2600 and 2600A SourceMeter® instruments**
- **Capable of over 14,000 readings per second to memory with optional high performance multimeter**
- **LXI Class B Version 2 with embedded Web browser interface for test setup, maintenance, and basic application control**

The Series 3700A offers scalable, instrument grade switching and multi-channel measurement solutions that are optimized for automated testing of electronic products and components. The Series 3700A includes four versions of the Model 3706A system switch mainframe along with a growing family of plug-in switch and control cards. When the Model 3706A mainframe is ordered with the high performance multimeter, you receive a tightly integrated switch and measurement system that can meet the demanding application requirements in a functional test system or provide the flexibility needed in stand-alone data acquisition and measurement applications.

Maximizes system control and flexibility

To provide users with greater versatility when designing test systems, the Series 3700A mainframes are equipped with many standard features. For example, easy connectivity is supported with three remote interfaces: LXI/Ethernet, General Purpose Interface Bus (GPIB), and Universal Serial Bus (USB). Fourteen digital I/O lines are also included, which are programmable and can be used to control external devices such as component handlers or other instruments. Additionally, system control can be greatly enhanced by using our Test Script Processor (TSP) technology. This technology provides "smart" instruments with the ability to perform distributed processing and control at the instrument level versus a central PC.

High quality switching at a value price

The Series 3700A builds upon Keithley's tradition of producing innovative, high quality, precise signal switching. This series offers a growing family of high density and general purpose plug-in cards that accommodates a broad range of signals at very competitive pricing. The Series 3700A supports applications as diverse as design validation, accelerated stress testing, data acquisition, and functional testing.

Model 3706A mainframe

The Series 3700A includes the base Model 3706A system switch/multimeter mainframe with three options for added flexibility. This mainframe contains six slots for plug-in cards in a compact 2U high (3.5 inches/89mm) enclosure that easily accommodates the needs of medium to high channel count applications. When fully loaded, a mainframe can support up to 576 two-wire multiplexer channels or 2,688 one-pole matrix crosspoints for unrivaled density and economical per channel costs.

High performance, 7½-digit multimeter (DMM)

The high performance multimeter option provides up to 7½-digit measurements, offering 26-bit resolution to support your ever-increasing test accuracy requirements. This flexible resolution supplies a DC reading rate from >14,000 readings/second at 3½ digits to 60 readings/second at 7½ digits to accommodate a greater span of applications. The multimeter does not use a card slot, so you maintain all six slots in your mainframe. In addition, the multimeter is wired to the mainframe's analog backplane, ensuring a high quality signal path from each card channel to the multimeter.

Single Channel Reading Rates

NPLC	DCV/ 2 Wire Ohms	4 Wire Ohms
1.0	60	29
0.2	295	120
0.06	935	285
0.006	6,200	580
0.0005	14,100	650

The multimeter supports 13 built-in measurement functions, including: DCV, ACV, DCI, ACI, frequency, period, two-wire ohms, four-wire ohms, three-wire RTD temperature, four-wire RTD temperature, thermocouple temperature, thermistor temperature, and continuity. In addition, the multimeter offers extended low ohms (1Ω) and low current (10μA) ranges. In-rack calibration is supported, which reduces both maintenance and calibration time.

Series 3700A

System Switch/Multimeter and Plug-In Cards

Ordering Information

Mainframes

3706A Six-slot system switch with high performance DMM

3706A-NFP Six-slot system switch with high performance DMM, without front panel display and keypad

3706A-S Six-slot system switch

3706A-SNFP Six-slot system switch, without front panel display and keypad

Plug-in Cards

3720 Dual 1×30 multiplexer card (auto CJC when used with 3720-ST)

3721 Dual 1×20 multiplexer card (auto CJC when used with 3721-ST)

3722 Dual 1×48, high density, multiplexer card

3723 Dual 1×30, high speed, reed relay multiplexer card

3724 Dual 1×30 FET multiplexer card

3730 6×16, high density, matrix card

3731 6×16 high speed, reed relay matrix card

3732 Quad 4×28, ultra-high density, reed relay matrix card

3740 32 channel isolated switch card

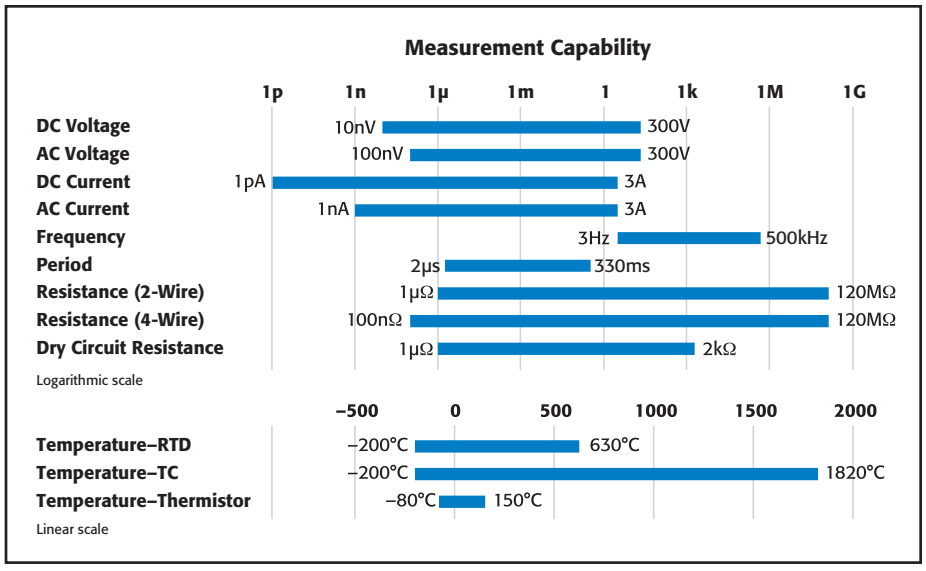
3750 Multifunction control card

Accessories Supplied

Test Script Builder Software Suite CD

Ethernet Crossover Cable (CA-180-3A)

Series 3700A Product CD (includes LabVIEW®, IVI C, and IVI.COM drivers)



Measurement capabilities of the high performance multimeter

ACCESSORIES AVAILABLE

GPIB INTERFACES AND CABLES

7007-1	Shielded GPIB Cable, 1m (3.5ft)
7007-2	Shielded GPIB Cable, 2m (6.6ft)
KPCI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

DIGITAL I/O, TRIGGER LINK, AND TSP-LINK

2600-TLINK	Trigger I/O to Trigger Link Interface Cable, 1m (3.3 ft)
CA-126-1	Digital I/O and Trigger Cable, 1.5m (4.9 ft)
CA-180-3A	CAT5 Crossover Cable for TSP-Link

MULTIMETER CONNECTORS

3706-BAN	DMM Adapter Cable, 15-pin D-sub to banana jacks, 1.4m (4.6 ft)
3706-BKPL	Analog Backplane Extender Board, 15-pin D-sub to terminal block
3706-TLK	Test Lead Kit, includes 3706-BAN and plug-in test lead accessories
8620	Shorting Plug

RACK MOUNT KIT

4288-10	Fixed Rear Rack Mount Kit

SERVICES AVAILABLE

Mainframe Models 3706A and 3706A-NFP

3706A-3Y-EW	1 Year Factory Warranty Extended to 3 Years
3706A-5Y-EW	1 Year Factory Warranty Extended to 5 Years
C/3706A-3Y-STD	Calibration Contract, 3 Years, Standard Calibration*
C/3706A-3Y-DATA	Calibration Contract, 3 Years, Z540 Compliant Calibration with Data*
C/3706A-3Y-ISO	Calibration Contract, 3 Years, ISO 17025 Accredited Calibration*
C/3706A-5Y-STD	Calibration Contract, 5 Years, Standard Calibration*
C/3706A-5Y-DATA	Calibration Contract, 5 Years, Z540 Compliant Calibration with Data*
C/3706A-5Y-ISO	Calibration Contract, 5 Years, ISO 17025 Accredited Calibration*

Mainframe Models 3706A-S and 3706A-SNFP

3706A-S-3Y-EW	1 Year Factory Warranty Extended to 3 Years
3706A-S-5Y-EW	1 Year Factory Warranty Extended to 5 Years

SOFTWARE SERVICES
SYSTEM DEVELOPMENT OR IMPLEMENTATION

Other service contracts are available; please contact us for details.

*Not available in all countries.

SWITCHING AND CONTROL

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A GREATER MEASURE OF CONFIDENCE

Series 3700A

System Switch/Multimeter and Plug-In Cards

TSP distributed control increases test speed and lowers test cost

TSP technology enhances instrument control by allowing users the choice of using standard PC control or of creating embedded test scripts that are executed on microprocessors within the instrument. By using TSP test scripts instead of a PC for instrument control, you avoid communication delays between the PC controller and instrument, which results in improved test throughput. Test scripts can contain math and decision-making rules that further reduce the interaction between a host PC and the instrument.

This form of distributed control supports the autonomous operation of individual instruments or groups of instruments and can possibly remove the need for a high level PC controller, which lowers test and ownership costs. This is the same proven TSP technology found in our innovative Series 2600A System SourceMeter instruments.

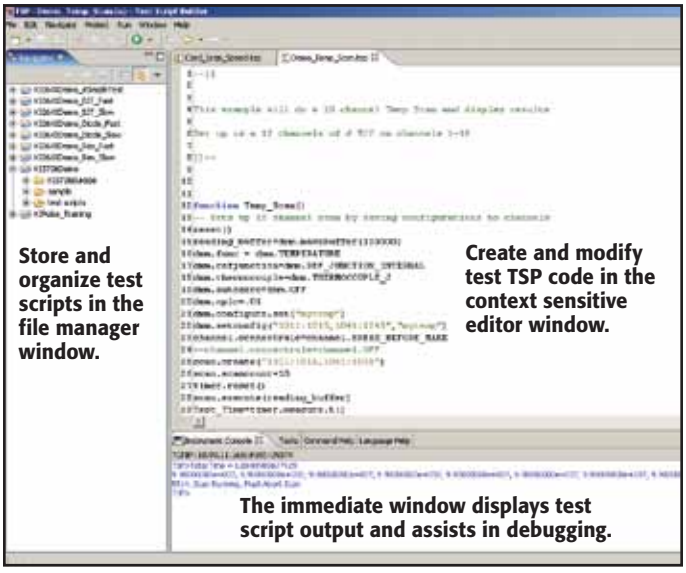
TSP-Link technology for easy and seamless system coordination and expansion

If your channel density requirements grow or if you need to process more signal types, use TSP-Link technology to expand your system. The TSP-Link master/slave connection offers easy system expansion between Series 3700A mainframes. You can also use TSP-Link technology to connect to other TSP-Link enabled instruments such as Series 2600A SourceMeter instruments. Everything connected with TSP-Link can be controlled by the master unit, just as if they were all housed in the same chassis.

This high speed system expansion interface lets users avoid the complex and time consuming task of expanding their remote interfaces to another mainframe. There is no need to add external triggers and remote communication cables to individual instruments, since all TSP-Link connected devices can be controlled from a single master unit.

Test Script Builder software suite

Test Script Builder is a software tool that is provided with all Series 3700A instruments to help users easily create, modify, debug, and store TSP test scripts. It supplies a project/file manager window to store and organize test scripts, a text-sensitive program editor to create and modify test TSP code, and an immediate instrument control window to send Ethernet, GPIB, and USB commands and to receive data from the instrument. The immediate window also allows users to see the output of a given test script and simplifies debugging.



Test Script Builder Software Suite

LXI Class B Version 2

Series 3700A mainframes are LXI Class B Version 2 compliant instruments. The features include a 10/100M Base-T Ethernet connection, graphical Web server, LAN based instrument triggering, and IEEE 1588 precision time protocol (PTP) synchronization. PTP time synchronization provides a standard method to synchronize devices on an Ethernet network with microsecond precision for time/event based programming.

Transportable memory, USB 2.0 device port

All Model 3706A mainframes contain a USB device port for easy transfer of readings, configurations, and test scripts to memory sticks. This port, which is located on the front panel, provides you with easy access to and portability of measurement results. Simply plug in a memory stick and, with a few simple keystrokes, gain access to virtually unlimited memory storage. Additional capabilities include: saving and recalling system configurations and storage for TSP scripts.

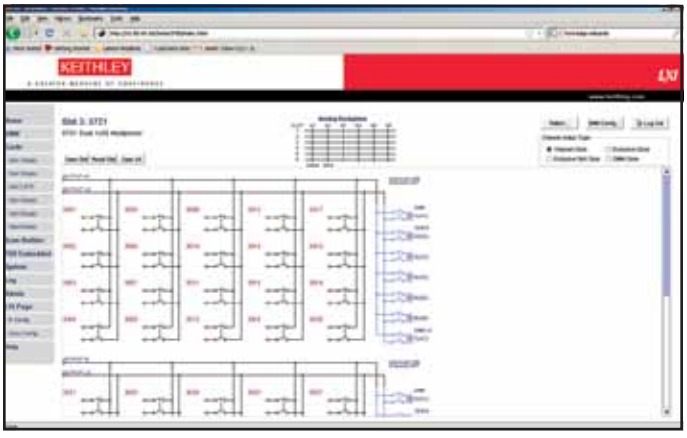
Series 3700A

System Switch/Multimeter and Plug-In Cards

Embedded Web server

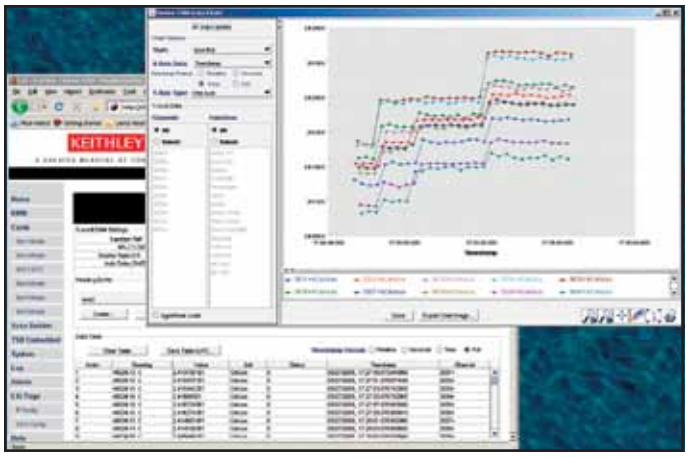
The built-in Web interface offers a quick and easy method to control and analyze measurement results. Interactive schematics of each card in the mainframe support point-and-click control for opening and closing switches. A scan list builder is provided to guide users through the requirements of a scan list (such as trigger and looping definitions) for more advanced applications. When the mainframe is ordered with the multimeter, additional Web pages are included for measurement configuration and viewing, including a graphing toolkit.

Built-in Web server interface



1. Configure your switch channels and measurement functions. Configure the DMM to make your measurements at the desired speed, resolution, etc. and assign them to the desired channels.

2. Build and run your automated scan list. The toolkit makes it easy to build and execute an automated sequence of channel-open and channel-close commands and triggered multimeter measurements.



3. Analyze your data. View your results in real-time or historical mode with point-and-click simplicity. Data can be exported directly to your PC in either numerical or graphical formats for presentation or other applications.

Model 3706A front panel

Model 3706A-S front panel

Model 3706A-NFP and Model 3706A-SNFP front panel

Model 3706A rear panel

Series 3700A

System Switch/Multimeter and Plug-In Cards

High Performance Multimeter Specifications (Rev. A)

DC Specifications

CONDITIONS: 1 PLC or 5 PLC.

For <1PLC, add appropriate "ppm of range" adder from "RMS Noise" table.
Includes rear panel Analog Backplane connector and transducer conversion. Refer to DC Notes for additional card uncertainties.

Function	Range[1]	Resolution	Test Current or Burden Voltage	Input Resistance or Open Circuit Voltage[2]	Accuracy: ±(ppm of reading + ppm of range) (ppm = parts per million) (e.g., 10ppm = 0.001%) 24 Hour[3] 23°C ± 1°C	90 Day 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°–18°C and 28°–50°C
Voltage[4]	100.00000 mV[19]	0.01 µV		>10 GΩ or 10 MΩ ±1%	10 + 9	25 + 9	30 + 9	(1 + 5)/°C
	1.0000000 V[19]	0.1 µV		>10 GΩ or 10 MΩ ±1%	7 + 2	25 + 2	30 + 2	(1 + 1)/°C
	10.000000 V	1 µV		>10 GΩ or 10 MΩ ±1%	7 + 2	20 + 2	25 + 2	(1 + 1)/°C
	100.00000 V	10 µV		10 MΩ ±1%	15 + 6	35 + 6	40 + 6	(5 + 1)/°C
	300.00000 V	100 µV		10 MΩ ±1%	20 + 6	35 + 6	40 + 6	(5 + 1)/°C
Resistance[4, 5, 6, 7]	1.0000000 Ω	0.1 µΩ	10 mA	8.2 V	15 + 80	40 + 80	60 + 80	(8 + 1)/°C
	10.000000 Ω	1 µΩ	10 mA	8.2 V	15 + 9	40 + 9	60 + 9	(8 + 1)/°C
	100.00000 Ω	10 µΩ	1 mA	13.9 V	15 + 9	45 + 9	65 + 9	(8 + 1)/°C
	1.0000000 kΩ	100 µΩ	1 mA	13.9 V	20 + 4	45 + 4	65 + 4	(8 + 1)/°C
	10.000000 kΩ	1 mΩ	100 µA	9.1 V	15 + 4	40 + 4	60 + 4	(8 + 1)/°C
	100.00000 kΩ	10 mΩ	10 µA	14.7 V	20 + 4	45 + 5	65 + 5	(8 + 1)/°C
	1.0000000 MΩ	100 mΩ	10 µA	14.7 V	25 + 4	50 + 5	70 + 5	(8 + 1)/°C
	10.000000 MΩ	1 Ω	0.64 µA//10 MΩ	6.4 V	150 + 6	200 + 10	400 + 10	(70 + 1)/°C
	100.00000 MΩ	10 Ω	0.64 µA//10 MΩ	6.4 V	800 + 30	2000 + 30	2000 + 30	(385 + 1)/°C
Dry Circuit Resistance[6, 8]	1.0000000 Ω	1 µΩ	10 mA	27 mV	25 + 80	50 + 80	70 + 80	(8 + 1)/°C
	10.000000 Ω	10 µΩ	1 mA	20 mV	25 + 80	50 + 80	70 + 80	(8 + 1)/°C
	100.00000 Ω	100 µΩ	100 µA	20 mV	25 + 80	90 + 80	140 + 80	(8 + 1)/°C
	1.0000000 kΩ	1 mΩ	10 µA	20 mV	25 + 80	180 + 80	400 + 80	(8 + 1)/°C
	2.0000000 kΩ	10 mΩ	5 µA	20 mV	25 + 80	320 + 80	800 + 80	(8 + 1)/°C
Continuity (2W)	1.000 kΩ	100 mΩ	1 mA	13.9 V	40 + 100	100 + 100	100 + 100	(8 + 1)/°C
Current[9]	10.000000 µA	1 pA	<61 mV		40 + 50	300 + 50	500 + 50	(35 + 9)/°C
	100.00000 µA	10 pA	<105 mV		50 + 9	300 + 30	500 + 30	(50 + 5)/°C
	1.0000000 mA	100 pA	<130 mV		50 + 9	300 + 30	500 + 30	(50 + 5)/°C
	10.000000 mA	1 nA	<150 mV		50 + 9	300 + 30	500 + 30	(50 + 5)/°C
	100.00000 mA	10 nA	<0.4 V		50 + 9	300 + 30	500 + 30	(50 + 5)/°C
	1.0000000 A	100 nA	<0.6 V		200 + 60	500 + 60	800 + 60	(50 + 10)/°C
	3.0000000 A	1 µA	<1.8 V		1000 + 75	1200 + 75	1200 + 75	(50 + 10)/°C

TEMPERATURE

(Displayed in °C, °F, or K. Exclusive of probes errors.)

THERMOCOUPLES (Accuracy based on ITS-90):

Type	Range	Resolution	90 Day/1 Year, 23°C ± 5°C Simulated reference junction	90 Day/1 Year, 23°C ± 5°C Using 3720, 3721, or 3724 Cards	Range	90 Day/1 Year, 23°C ± 5°C Using 3720, 3721, or 3724 Cards	Temperature Coefficient 0°–18°C and 28°–50°C
J	–150 to + 760°C	0.001°C	0.2°C	1.0°C	–200 to –150°C	1.5°C	0.03°C/°C
K	–150 to +1372°C	0.001°C	0.2°C	1.0°C	–200 to –150°C	1.5°C	0.03°C/°C
N	–100 to +1300°C	0.001°C	0.2°C	1.0°C	–200 to –100°C	1.5°C	0.03°C/°C
T	–100 to +400°C	0.001°C	0.2°C	1.0°C	–200 to –100°C	1.5°C	0.03°C/°C
E	–150 to +1000°C	0.001°C	0.2°C	1.0°C	–200 to –150°C	1.5°C	0.03°C/°C
R	+400 to +1768°C	0.1°C	0.6°C	1.8°C	0 to +400°C	2.3°C	0.03°C/°C
S	+400 to +1768°C	0.1°C	0.6°C	1.8°C	0 to +400°C	2.3°C	0.03°C/°C
B	+1100 to +1820°C	0.1°C	0.6°C	1.8°C	+350 to +1100°C	2.8°C	0.03°C/°C

4-WIRE RTD OR 3-WIRE RTD (100Ω platinum [PT100], D100, F100, PT385, PT3916, or user 0Ω to 10kΩ) (Selectable Offset compensation On or Off):
For 3-wire RTD, dmm.connect=dmm.CONNECT_FOUR_WIRE, ≤0.1Ω lead resistance mismatching in Input HI and LO. Add 0.25°C/0.1Ω of lead resistance mismatch.

4-Wire RTD	–200 to +630°C	0.01°C	0.06°C	0.003°C/°C
3-Wire RTD	–200 to +630°C	0.01°C	0.75°C	0.003°C/°C

THERMISTOR: 2.2kΩ, 5kΩ, and 10kΩ. Not recommended with Model 3724 card. See Model 3724 manual for "Measurement Considerations."

	–80 to +150°C	0.01°C	0.08°C	0.002°C/°C

Series 3700A System Switch/Multimeter and Plug-In Cards

DC SPEEDS vs. RMS NOISE

Single Channel, 60Hz (50Hz) Operation.

1PLC and 5PLC RMS noise are included in DC specifications.

RMS Noise[16], PPM of Range

RMS Noise Calculator:
Add 2.5 × "RMS Noise" to "ppm of range"
(e.g., 10V @ 0.006 PLC)
"ppm of range" = 2.5 × 7.0 ppm + 2 ppm

Function	NPLC	Aperture (ms)	Digits	100mV	1V	10V	100V	300V	Measurements into Buffer (rdgs/s)[13] Azero On	Azero Off	Measurement to PC (ms/rdg) Azero Off[13] Ethernet	GPIB	USB
	5[14]	83.3 (100)	7½	1.0	0.07	0.05	0.7	0.2	9.5 (8)	12 (10)	86.3 (104)	86.1 (102.8)	86.3 (103.1)
	1[14]	16.7 (20)	7½	0.9	0.12	0.1	0.8	0.35	42 (33)	59.8 (49.5)	19.4 (22.7)	19.5 (22.8)	19.9 (23.2)
	0.2[12, 14]	3.33 (4.0)	6½	2.5	0.32	0.3	2.5	1.0	50 (40)	60 (50)	19.4 (22.7)	19.5 (22.8)	19.9 (23.2)
DCV	0.2[14]	3.33 (4.0)	6½	3.5	1.7	0.7	3.5	1.5	120 (100)	295 (235)	7.6 (8.3)	6.2 (6.8)	6.4 (7.0)
	0.06[15]	1.0 (1.2)	5½	12	3.0	1.5	8.0	3.5	205 (165)	935 (750)	1.40 (1.80)	1.50 (1.80)	1.60 (2.30)
	0.006[15]	0.100 (0.120)	4½	55	15	7.0	70	35	218 (215)	6,200 (5,500)	0.55 (0.57)	0.65 (0.67)	0.75 (0.77)
	0.0005[15]	0.0083 (0.001)	3½	325	95	95	900	410	270 (270)	14,600 (14,250)	0.50 (0.5)	0.60 (0.60)	0.70 (0.70)
				10–100Ω	**1kΩ**	**10kΩ**							
	5[14]	83.3 (100)	7½	2.0	0.5	0.4	—	—	9.5 (8)	12 (10)	87.0 (105)	86.1 (103)	86.5 (104)
	1[14]	16.7 (20)	7½	3.5	0.8	0.6	—	—	42 (33)	59.8 (49.5)	21.0 (24.3)	19.5 (22.8)	19.9 (23.2)
2WΩ	0.2[12, 14]	3.33 (4.0)	6½	6.5	1.7	1.5	—	—	50 (40)	60 (50)	21.0 (24.3)	19.5 (22.8)	19.9 (23.2)
(≤10kΩ)	0.2[14]	3.33 (4.0)	6½	8.0	4.5	5.5	—	—	120 (100)	295 (235)	7.6 (8.3)	6.2 (6.8)	6.4 (7.0)
	0.06[15]	1.0 (1.2)	5½	15	6	6.5	—	—	205 (165)	935 (750)	1.40 (1.80)	1.50 (1.80)	1.60 (2.30)
	0.006[15]	0.100 (0.120)	4½	60	15	15	—	—	218 (215)	6,200 (5,500)	0.55 (0.57)	0.65 (0.67)	0.75 (0.77)
	0.0005[15]	0.0083 (0.001)	3½	190	190	190	—	—	270 (270)	14,100 (13,700)	0.50 (0.5)	0.60 (0.60)	0.70 (0.70)
				10µA	**100µA**	**1mA–100mA**	**1A**	**3A**					
	5[14]	83.3 (100)	7½	3.5	1.6	1.6	2.9	2.0	9.5 (8)	12 (10)	88 (103)	86.1 (102.8)	86.3 (103.1)
	1[14]	16.7 (20)	6½	3.5	1.1	1.1	2.2	1.8	42 (33)	59.8 (49.5)	21.0 (22.7)	19.5 (22.8)	19.8 (23.1)
DCI	0.2[12, 14]	3.33 (4.0)	5½	50	5.0	3.0	4.0	8.0	50 (40)	60 (50)	19.4 (22.7)	19.5 (22.8)	19.8 (23.1)
	0.2[14]	3.33 (4.0)	4½	100	35	12	4.0	8.0	120 (100)	295 (235)	7.6 (8.3)	6.2 (6.8)	6.4 (7.0)
	0.06[15]	1.0 (1.2)	4½	350	35	20	8.0	20	205 (165)	935 (750)	1.40 (1.80)	1.50 (1.80)	1.60 (2.30)
	0.006[15]	0.100 (0.120)	4½	400	200	40	50	100	218 (215)	6,200 (5,500)	0.55 (0.57)	0.65 (0.67)	0.75 (0.77)
	0.0005[15]	0.0083 (0.001)	3½	2500	450	250	325	750	270 (270)	14,100 (13,700)	0.50 (0.5)	0.60 (0.60)	0.70 (0.70)
				1Ω	**10–100Ω**	**1kΩ**	**10kΩ**						
	5[14]	83.3 (100)	7½	5.5	0.8	0.5	0.5	—	5 (4)	5.9 (4.7)	173 (206)	173 (206)	173 (206)
	1[14]	16.7 (20)	7½	15	1.4	0.5	0.7	—	23.5 (18.5)	29 (23)	39 (46)	39 (46)	39 (46)
4WΩ	0.2[12, 14]	3.33 (4.0)	5½	100	30	10	50	—	26.5 (21)	30 (24)	39 (46)	39 (46)	39 (46)
	0.2[14]	3.33 (4.0)	5½	300	50	10	63	—	80 (60)	120 (95)	12.3 (14.5)	11.3 (13.3)	11.7 (13.7)
	0.06[15]	1.0 (1.2)	4½	500	50	15	70	—	140 (110)	285 (225)	6.2 (7.2)	6.3 (7.3)	6.5 (7.6)
	0.006[15]	0.100 (0.120)	4½	750	75	30	100	—	200 (195)	580 (565)	4.2 (4.4)	4.3 (4.5)	4.6 (4.8)
	0.0005[15]	0.0083 (0.001)	3½	3500	450	250	250	—	210 (205)	650 (645)	4.2 (4.4)	4.3 (4.5)	4.6 (4.8)
				1Ω	**10–100Ω**	**1kΩ**	**10kΩ**						
	5[14]	83.3 (100)	7½	5.5	0.8	0.5	0.5	—	2.5 (2.0)	2.9 (2.3)	343 (427)	341 (425)	342 (426)
4WΩ	1[14]	16.7 (20)	7½	16	1.5	0.7	1.5	—	12.7 (10)	14 (11.2)	77 (95)	74 (92)	75 (93)
OCOMP	0.2[12, 14]	3.33 (4.0)	6½	45	4.5	2.1	3.5	—	14 (11.2)	15 (12)	70 (86.5)	70 (86.5)	70 (86.5)
	0.2[14]	3.33 (4.0)	5½	500	50	13	30	—	46.5 (37)	56 (44)	22.7 (25)	20.5 (23)	21.1 (24)
	0.0005[15]	0.0083 (0.001)	3½	4500	650	400	400	—	129 (125)	215 (210)	6.7 (6.7)	6.8 (6.8)	7 (7)
				1–10Ω	**100Ω**	**1kΩ**	**2kΩ**						
	5[14]	83.3 (100)	6½	8.0	10	10	8.0	—	2.5 (2.0)	2.9 (2.3)	347 (430)	345 (428)	346 (429)
Dry-CktΩ	1[14]	16.7 (20)	5½	17	22	25	28	—	12 (9.5)	13 (10)	80 (99)	77 (95)	78 (97)
OCOMP	0.2[12, 14]	3.33 (4.0)	4½	50	50	50	50	—	14 (11.2)	15 (12)	70 (86.5)	70 (86.5)	70 (86.5)
	0.2[14]	3.33 (4.0)	3½	500	1000	1000	1500	—	35 (30)	45 (36)	27 (33)	25 (31)	26 (32)
	0.0005[15]	0.0083 (0.001)	2½	8500	8500	8500	8500	—	84 (84)	115 (110)	10.7 (10.7)	10.7 (10.7)	11 (11)

RTD SPEEDS vs. NOISE

1 PLC and 5 PLC Noise are included in RTD Specifications.

Function	NPLC	Aperture (ms)	Digits	Add °C to Reading[16] 4-Wire	3-Wire	Measurements into Buffer[13] (rdg/s) Azero On	Azero Off	Measurement to PC[13] (ms/rdg) Azero Off Ethernet	GPIB	USB
		Single Channel, 60Hz (50Hz) Operation								
	5[14]	83.3 (100)	7½	0	0	5 (4)	5.9 (4.7)	173 (206)	173 (206)	173 (206)
	1[14]	16.7 (20)	7½	0	0	23.5 (18.5)	29 (23)	39 (46)	39 (46)	39 (46)
	0.2[12, 14]	3.33 (4.0)	5½	0.01	0.01	26.5 (21)	30 (24)	39 (46)	39 (46)	39 (46)
OCOMP OFF	0.2[14]	3.33 (4.0)	5½	0.18	0.18	80 (60)	120 (95)	12.3 (14.5)	11.3 (13.3)	11.7 (13.7)
	0.06[15]	1.0 (1.2)	4½	0.24	0.24	140 (110)	285 (225)	6.2 (7.2)	6.3 (7.3)	6.5 (7.6)
	0.006[15]	0.100 (0.120)	4½	0.37	0.37	200 (195)	580 (565)	4.2 (4.4)	4.3 (4.5)	4.6 (4.8)
	0.0005[15]	0.0083 (0.001)	3½	3.10	3.10	209 (205)	650 (645)	4.2 (4.4)	4.3 (4.5)	4.6 (4.8)
	5[14]	83.3 (100)	7½	0	0	2.5 (2.0)	2.9 (2.3)	343 (427)	341 (425)	342 (426)
	1[14]	16.7 (20)	7½	0	0	12.7 (10)	14 (11.2)	77 (95)	74 (92)	75 (93)
OCOMP ON	0.2[12, 14]	3.33 (4.0)	6½	0.02	0.02	14 (11.2)	15 (12)	70 (86.5)	70 (86.5)	70 (86.5)
	0.2[14]	3.33 (4.0)	5½	0.38	0.38	46.0 (37)	56 (44)	22.7 (25)	20.5 (23)	21.1 (24)
	0.0005[15]	0.0083 (0.001)	3½	4.67	4.67	128 (125)	215 (210)	6.7 (6.7)	6.8 (6.8)	7 (7)

Series 3700A

System Switch/Multimeter and Plug-In Cards

SYSTEM PERFORMANCE [13, 14]

3½-Digit Mode, Azero off, nPLC = 0.0005. Time includes function change from either DCV or 2WΩ to listed function.

Function	Function Change (ms)	Range Change (ms)	Auto-range (ms)
DCV or 2WΩ (<10kΩ)	10	10	10
4WΩ (<10kΩ)	20	20	20
DCI	10	10	10
Frequency or Period [17]	110	10	—
ACV or ACI [17]	20	85	300

Buffer Transfer Speed	Ethernet	GPIB	USB
Average for 1000 readings	2450/s	2000/s	1800/s
Average for 1000 readings with timestamp	2300/s	1800/s	1600/s

Card	Command	Single Command Excecution Time (ms) Ethernet	GPIB	USB
3720, 3721, 3722, 3730	channel.close (ch_list) or channel.open (ch_list)	5.7	5.8	6.1
3723, 3724 3731, 3732 [18]	channel.close (ch_list) or channel.open (ch_list)	2.3	2.4	2.7
3740	channel.close (ch_list 1-28) or channel.open (ch_list 1-28)	10.7	10.8	11.1
	channel.close (ch_list 29-32) or channel.open (ch_list 29-32)	22.7	22.8	23.1

DC MEASUREMENT CHARACTERISTICS

DC VOLTS

A-D LINEARITY: 1.0ppm of reading + 2.0 ppm of range.

INPUT IMPEDANCE: 100mV–10V Ranges: Selectable >10GΩ // <400pF or 10MΩ ±1%.
100V–300V Ranges: 10MΩ ±1%.

INPUT BIAS CURRENT: <50pA at 23°C with dmm.autozero=dmm.OFF or dmm.inputdivider=dmm.ON.

COMMON MODE CURRENT: <500nA p-p for ≤1MHz.

AUTOZERO OFF ERROR: For DCV ±1°C and ≤10 minutes, add ±(8ppm of reading + 5μV).

INPUT PROTECTION: 300V all ranges.

COMMON MODE VOLTAGE: 300V DC or 300Vrms (425V peak for AC waveforms) between any terminal and chassis.

RESISTANCE

MAX. 4WΩ LEAD RESISTANCE: 5Ω per lead for 1Ω range; 10% of range per lead for 10Ω–1kΩ ranges; 1kΩ per lead for all other ranges.

MAX. 4WΩ LEAD RESISTANCE (DRY CKT): 0.5Ω per lead for 1Ω range; 10% of range per lead for 10Ω–100Ω ranges; 50Ω per lead for 1kΩ–2kΩ ranges.

INPUT IMPEDANCE: 1Ω–10Ω Ranges: 99kΩ ±1% // <1μF.
100Ω–2kΩ Ranges: 10MΩ ±1% // <0.015μF.

OFFSET COMPENSATION: Selectable on 4WΩ 1Ω–10kΩ ranges.

OPEN LEAD DETECTOR: Selectable per channel. 1.5μA, ±20% sink current per DMM SHI and SLO lead. Default on.

CONTINUITY THRESHOLD: Adjustable 1 to 1000Ω.

AUTOZERO OFF ERROR: For 2WΩ ±1°C and ≤10 minutes, add ±(8ppm of reading + 0.5mΩ) for 10Ω and 5mΩ for all other ranges.

INPUT PROTECTION: 300V all ranges.

DC MEASUREMENT CHARACTERISTICS (continued)

DC CURRENT

AUTOZERO OFF ERROR: For ±1°C and ≤10 minutes, add ±(8ppm of reading + range error). Refer to table below.

Range	3 A	1 A	100 mA	10 mA	1 mA	100 μA	10 μA
Shunt Resistance guaranteed by design	0.05 Ω	0.05 Ω	1 Ω	10 Ω	100 Ω	1 kΩ	6 kΩ
Burden Voltage	<1.75 V	<0.55 V	<0.4 V	<150 mV	<130 mV	<105 mV	<61 mV
Burden Voltage with 3721 card	<2.35 V	<1.15 V	<0.4 V	<150 mV	<130 mV	<105 mV	<61 mV
Autozero OFF "of range" Error	100 μA	100 μA	5 μA	0.5 μA	50 nA	5 nA	0.85 nA
For each additional amp after ±1.5A input, add the following to ppm of range:	—	120	60	60	60	60	95

INPUT PROTECTION: 3A, 250V fuse.

THERMOCOUPLES

CONVERSION: ITS-90.

REFERENCE JUNCTION: Internal, External, or Simulated (Fixed).

OPEN LEAD DETECTOR: Selectable per channel. Open >1.15kΩ ±50Ω. Default on.

COMMON MODE ISOLATION: 300V DC or 300Vrms (425V peak for AC waveforms), >10GΩ and <350pF any terminal to chassis.

DC NOTES

1. 20% overrange on DC functions except 1% on 300V range and 3.33% on 3A range.
2. ±5% (measured with 10MΩ input resistance DMM, >10GΩ DMM on 10MΩ and 100MΩ ranges). Refer to table for other 2W/4W configurations. For Dry Circuit, +20%, <1mV with dmm.offsetcompensation=ON for 100Ω–2kΩ ranges.

Range	2W	4W	4W–Kelvin	Ocomp 4W	Ocomp 4W–Kelvin
1, 10Ω	8.2 V	8.2 V	8.2 V	12.1 V	12.1 V
100, 1kΩ	13.9 V	14.1 V	13.9 V	15.0 V	12.7 V
10kΩ	9.1 V	9.1 V	9.1 V	0.0 V	0.0 V
100k, 1MΩ	12.7 V	14.7 V	12.7 V	—	—
10M, 100MΩ	6.4 V	6.4 V	6.4 V	—	—

3. Relative to calibration accuracy.
4. Add the following additional uncertainty with -ST accessory:

Card	±(ppm of range) 100 mV	1 V	10 V	±(ppm of reading + ppm of range) 100 kΩ	1 MΩ	10 MΩ	100 MΩ
3720, 3721, 3722, and 3730	45	4.5	–	8 + 5	8 + 0.5	—	—
3723	60	6.0	–	8 + 6	8 + 0.5	—	—
3724	45	4.5	–	8 + 5	80 + 0.5	250 + 1	5000 + 1
3731	800	80	8	8 + 80	40 + 8	0 + 25	0 + 15
3732 (Quad 4×28)	200	20	2	8 + 20	40 + 2	0 + 7	0 + 4

5. Specifications are for 4-wire Ω, 1Ω–1kΩ with offset compensation on. For Series 3700A plug-in cards, L_{SYNC} and offset compensation on. 1Ω range is 4-wire only. Model 3724 card: 1kΩ–100MΩ ranges only. Model 3731 card: 100Ω–100MΩ ranges only.
For 2-wire Ω specifications, add the following to "ppm of range" uncertainty:

DMM Connect Relays	Rel Enable	Rear Panel Connector or 3700 Card	3724 Card	3731 Card
CONNECT_ALL	ON	100 mΩ	500 mΩ	900 mΩ
CONNECT_ALL	OFF	1.5 Ω	64 Ω	2.3 Ω
CONNECT_TWO_WIRE	ON	700 mΩ	1.2 Ω	1.5 Ω
CONNECT_TWO_WIRE	OFF	1.5 Ω	64 Ω	2.3 Ω

6. Test current with dmm.offsetcompensation=OFF, ±5%.
7. Add the following to "ppm of reading" uncertainty when using Series 3700A Plug-in Cards in Operating Environment ≥50%RH.

Card	10 kΩ	100 kΩ	1 MΩ	10 MΩ	100 MΩ
3720, 3721, 3724, 3730, 3731, 3732 (Quad 4×28) with MTC D-Shell connector	1 ppm	10 ppm	0.01%	0.1%	1%
3720, 3721, 3724, 3730, 3731, 3732 (Quad 4×28) with -ST screw terminal module	10 ppm	100 ppm	0.1%	1%	10%
3722 and 3723	10 ppm	100 ppm	0.1%	1%	10%

Series 3700A Plug-in Cards Operating Environment: Specified for 0° to 50°C, ≤70%RH at 35°C.

8. Dry-Ckt Ω is 4-wire only. Specifications with offset compensation and L_{SYNC} on.

Card	Ranges
3720, 3721, and 3730	1 Ω – 2 kΩ
3722, 3723, and 3732	10 Ω – 2 kΩ
3724	1 kΩ – 2 kΩ
3731	100 Ω – 2 kΩ

Series 3700A System Switch/Multimeter and Plug-In Cards

DC NOTES (continued)

9. Includes Analog Backplane 15-pin rear panel connector. For 3721, refer to DC Current table for additional uncertainties.
10. For L_{SYNC} On, line frequency ±0.1%.

	nPLC	5	1	<0.2	<0.01
L_{SYNC} On	NMRR	110 dB	90 dB	45 dB	—
L_{SYNC} Off	NMRR	60 dB, ±2 dB	60 dB, ±2 dB	—	—

11. For 1kΩ unbalance in LO lead. AC CMRR is 70dB.

nPLC	5	1	0.2 [12]	≤0.2
CMRR	140 dB	140 dB	120 dB	80 dB

12. For L_{SYNC} On.
13. Reading rates are for 60Hz (50Hz) operation using factory defaults operating conditions dmm.reset("all"), Autorange off, dmm.autodelay=dmm.OFF, dmm.opendetector=dmm.OFF, format.data.=format.SREAL. Ranges as follows: DCV = 10V, 2WΩ/4WΩ = 1kΩ, DCI = 1mA, Dry-Ckt Ω = 10Ω, ACI = 1mA, and ACV = 1V. For Dry-Ckt Ω with Offset Comp OFF 2kΩ, 60 rdg/s max. Dry-Ckt Ω with Offset Comp ON 2kΩ, 29.5 rdg/s max. For temperature reading rates use DCV for T/C and 2WΩ for Thermistor. Speeds are typical and include measurements and data transfer out the Ethernet, GPIB, or USB.
14. DMM configured for single reading, dmm.measurecount=1, and print(dmm.measure()). May require additional settling delays for full accuracy, depending on measurement configuration.
15. DMM configured for multisample readings and single buffer transfer, dmm.measurecount=1000, buf=dmm.makebuffer(1000), dmm.measure(buf), and printbuffer(1,1000,buf).
16. dmm.autozero=dmm.ON. RMS noise using low thermal short for DCV, 2WΩ, 4WΩ, and Dry-Ckt Ω. For DCI, dmm.connect=dmm.CONNECT_NONE or 0. For RTD, noise using low thermal 190Ω precision resistor. Includes Model 3721 card accuracies. RMS noise values are typical.
17. For DCV or 2WΩ to Frequency or Period, dmm.nplc=0.2 and dmm.aperture=0.01 sec. For ACI or ACV, dmm.detectorbandwidth=300. For ACI or ACV with dmm.autodelay=dmm.ON, best speed is 65ms.
18. Speeds are within same multiplexer bank. Add an additional 8ms when changing banks or slots.
19. When properly zeroed using REL function.

AC Specifications

Function	Range[1]	Resolution	Calibration Cycle	Accuracy: ±(% of reading + % of range) 23°C ± 5°C					
				3 Hz–5 Hz	5 Hz–10 Hz	10 Hz –20 kHz	20 kHz–50 kHz	50 kHz–100 kHz	100 kHz–300 kHz
Voltage[2]	100.0000 mV	0.1 µV	90 Day (100mV–100V)	1.0 + 0.03	0.30 + 0.03	0.05 + 0.03	0.11 + 0.05	0.6 + 0.08	4.0 + 0.5
	1.000000 V	1 µV							
	10.00000 V	10 µV	1 Year (100mV–100V)	1.0 + 0.03	0.30 + 0.03	0.06 + 0.03	0.12 + 0.05	0.6 + 0.08	4.0 + 0.5
	100.0000 V	100 µV							
	300.0000 V	1 mV	90 Day	1.0 + 0.05	0.30 + 0.05	0.05 + 0.05	0.11 + 0.08	0.6 + 0.11	4.0 + 0.8
	300.0000 V	1 mV	1 Year	1.0 + 0.05	0.30 + 0.05	0.06 + 0.05	0.12 + 0.08	0.6 + 0.11	4.0 + 0.8
			Temp. Coeff. /°C[3] (all ranges)	0.010 + 0.003	0.030 + 0.003	0.005 + 0.003	0.006 + 0.005	0.01 + 0.006	0.03 + 0.01

Current[2]				3 Hz–5 Hz	5 Hz–10 Hz	10Hz –2 kHz	2 kHz –5 kHz	5 kHz –10 kHz
	1.000000 mA[7]	1 nA	90 Day/1 Year	1.0 + 0.04	0.30 + 0.04	0.08 + 0.03	0.09 + 0.03	0.09 + 0.03
	10.00000 mA	10 nA		1.0 + 0.04	0.30 + 0.04	0.08 + 0.03	0.09 + 0.03	0.09 + 0.03
	100.0000 mA	100 nA		1.0 + 0.04	0.30 + 0.04	0.08 + 0.03	0.09 + 0.03	0.09 + 0.03
	1.000000 A	1 µA		1.0 + 0.04	0.30 + 0.04	0.20 + 0.04	0. 88 + 0.04	2.0 + 0.04
	3.000000 A	10 µA		1.0 + 0.05	0.30 + 0.05	0.20 + 0.05	0. 88 + 0.05	2.0 + 0.05
			Temp. Coeff. /°C[3] (all ranges)	0.10 + 0.004	0.030 + 0.004	0.005 + 0.003	0.006 + 0.005	0.006 + 0.005

Frequency[4] and Period				Accuracy: ±(ppm of reading + offset ppm)		
				3 Hz–500 kHz	3 Hz–500 kHz	333 ms–2 µs
	100.0000 mV to 300.0000 V	0.333 ppm	90 Day/1 Year (all ranges)	80 + 0.333	80 + 0.333	(0.25 s gate)
		3.33 ppm		80 + 3.33	80 + 3.33	(100 ms gate)
		33.3 ppm		80 + 33.3	80 + 33.3	(10 ms gate)

ADDITIONAL UNCERTAINTY ±(% of reading)

Low Frequency Uncertainty	Detector Bandwidth		
	3 (3 Hz–300 kHz)	30 (30 Hz–300 kHz)	300 (300 Hz–300 kHz)
20 Hz–30 Hz	0	0.3	–
30 Hz–50 Hz	0	0	–
50 Hz–100 Hz	0	0	4.0
100 Hz–200 Hz	0	0	0.72
200 Hz–300 Hz	0	0	0.18
300 Hz–500 Hz	0	0	0.07
>500 Hz	0	0	0

Additional Uncertainty ±(% of reading)	Detector Bandwidth	Crest Factor[5] Maximum Crest Factor: 5 at full-scale			
		1–2	2–3	3–4	4–5
5 Hz–10 Hz	3	0.50	1.20	1.30	1.40
10 Hz–30 Hz	3	0.20	0.30	0.60	0.90
30 Hz–100 Hz	3 or 30	0.20	0.30	0.60	0.90
>100 Hz	3 or 30	0.05	0.15	0.30	0.40
300 Hz–500 Hz	300 only	0.50	1.20	1.30	1.40
≥500 Hz	300 only	0.05	0.15	0.30	0.40

Series 3700A

System Switch/Multimeter and Plug-In Cards

AC SPEEDS Single Channel, 60Hz (50Hz) Operation

Function	Detector Bandwidth	NPLC	Aperture (ms)	Measurements into Buffer[9] (rdg/s) Digits	Azero On	Azero Off	Measurement to PC[9] (ms/rdg) Ethernet	GPIB	USB
ACI / ACV	3	N/A	N/A	6½	0.45 (0.45)	N/A	2150 (2150)	2150 (2150)	2150 (2150)
	30	N/A	N/A	6½	2.5 (2.5)	N/A	400 (400)	400 (400)	400 (400)
	300	1.0[10]	16.67 (20)	6½	42 (33)	59.5 (50)	19.4 (22.7)	19.5 (22.8)	19.8 (23.1)
	300	0.2[10]	3.33 (4.0)	6½	120 (100)	295 (235)	7.6 (8.3)	6.2 (6.8)	6.4 (7.0)
	300	0.06[11]	1.0 (1.2)	5½	170 (165)	935 (750)	1.40 (1.80)	1.50 (1.80)	1.60 (2.30)
	300	0.006[11]	0.100 (0.120)	4½	218 (215)	6,200 (5,500)	0.55 (0.57)	0.65 (0.67)	0.75 (0.77)
	300	0.0005[11]	0.0083 (0.001)	3½	218 (215)	14,600 (14,250)	0.50 (0.5)	0.60 (0.60)	0.70 (0.70)
Frequency/Period	N/A	N/A	10–273	N/A	2× input period + gate time	N/A	2× input period + gate time + 2.7ms	2× input period + gate time + 2.8ms	2× input period + gate time + 3.1ms

AC MEASUREMENT CHARACTERISTICS

AC VOLTS

MEASUREMENT METHOD: AC-coupled, True RMS.

INPUT IMPEDANCE: 1MΩ ±2% // by <150pF.

INPUT PROTECTION: 300VDC or 300Vrms rear inputs or 37xx cards.

AC CURRENT

MEASUREMENT METHOD: AC-coupled, True RMS.

Range	3 A	1 A	100 mA	10 mA	1 mA
Shunt Resistance guaranteed by design	0.05 Ω	0.05 Ω	1.0 Ω	10 Ω	100 Ω
Burden Voltage Rear Panel	<1.75 V rms	<0.55 V rms	<0.4 V rms	<150 mV rms	<125 mV rms
Burden Voltage 3721 Card	<2.4 V rms	<1.0 V rms	<0.6 V rms	<200 mV rms	<130 mV rms

INPUT PROTECTION: 3A, 250V fuse.

FREQUENCY AND PERIOD

MEASUREMENT METHOD: Reciprocal Counting technique.

GATE TIME: dmm.aperture=0.273→0.01. Default 0.01s.

AC GENERAL

AC CMRR[6]: 70dB.

VOLT·HERTZ PRODUCT: ≤8×10^7 Volt·Hz (guaranteed by design), ≤2.1×10^7 Volt·Hz verified. Input frequency verified for ≤3×10^5 Hz.

AC NOTES

1. 20% overrange on AC functions except 1% on 300V and 3.33% on 3A. Default resolution is 5½ digits, maximum useable resolution is 6½ with 7½ digits programmable.
2. Specification are for Detector Bandwidth 3 and sinewave inputs >5% of range. Detector Bandwidth 3 and 30 are multi-sample A/D conversions. Detector bandwidth 300 is a single A/D conversion, programmable from 0.0005PLC to 15PLC. Default condition set to 1PLC.
3. Applies to 0°–18°C and 28°–50°C.
4. Specified for square wave inputs. Input signal must be >10% of ACV range. If input is <20mV on the 100mV range then the frequency must be >10Hz. For sinewave inputs, frequency must be >100Hz.
5. Applies to non-sinewave inputs 5Hz–>10kHz, and DC content ≤3% of range..
6. For 1kΩ unbalance in LO lead.
7. For Model 3721, 1mA ACI, add 0.05% to "of reading" uncertainty from 250Hz → 10kHz.
8. Shunt resistance guaranteed by design.
9. Reading rates are for 60Hz (50Hz) operation using factory defaults operating conditions dmm.reset("all"), Autorange off, dmm.autodelay=dmm.OFF, dmm.opendetector=dmm.OFF, format.data.=format.SREAL. Ranges as follows: DCV = 10V, 2WΩ/4WΩ = 1kΩ, DCI = 1mA, Dry-Ckt Ω = 10Ω, ACI = 1mA, and ACV = 1V. For Dry-Ckt Ω with Offset Comp OFF 2kΩ, 60 rdg/s max. Dry-Ckt Ω with Offset Comp ON 2kΩ, 29.5 rdg/s max. For temperature reading rates use DCV for T/C and 2WΩ for Thermistor. Speeds are typical and include measurements and data transfer out the Ethernet, GPIB, or USB.
10. DMM configured for single reading, dmm.measurecount=1, and print(dmm.measure()). May require additional settling delays for full accuracy, depending on measurement configuration.
11. DMM configured for multisample readings and single buffer transfer, dmm.measurecount=1000, buf=dmm.makebuffer(1000), dmm.measure(buf), and printbuffer(1,1000,buf).

Series 3700A

System Switch/Multimeter and Plug-In Cards

GENERAL

EXPANSION SLOTS: 6.

POWER LINE: Universal, 100V to 240V.

LINE FREQUENCY: 50Hz and 60Hz, automatically sensed at power-up.

POWER CONSUMPTION: 28VA with DMM and display, up to 140VA with six 37xx cards.

REAL TIME CLOCK: Battery backed, 10 years typical life.

EMC: Conforms to European Union EMC Directive.

SAFETY: Conforms to European Union Low Voltage Directive.

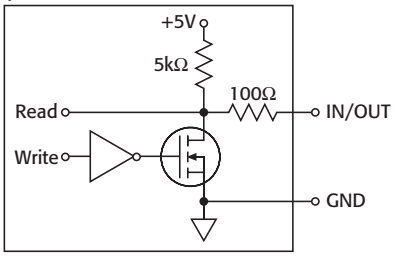
VIBRATION: MIL-PRF-28800F Class 3, Random.

WARM-UP: 2 hours to rated accuracy.

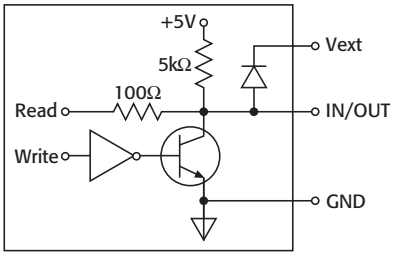
DIGITAL I/O: 25-pin female D-shell.

	I/O 1–9	I/O 10–14	Vext
I_{SINK}, max.	5 mA	250 mA	—
Absolute V_{IN}	5.25 V to –0.25 V	5.25 V to –0.25 V	5 V to 33 V
V_{IH} min	2.2 V	2.2 V	—
V_{IL} max	0.7 V	0.7 V	—
V_{OL} max at 5mA I_{sink}	0.7 V	0.7 V	—
V_{OL} max at I_{sink} max	—	2.3 V	—
V_{OH} min, 0.4mA source	2.7 V	2.4 V	—
Min V_{IN} pulse	2 µs	10 µs	—
Min V_O pulse	1 µs	50 µs	—

I/O 1–9



I/O 10–14



TRIGGERING AND MEMORY:

Window Filter Sensitivity: 0.01%, 0.1%, 1%, 10%, or full-scale of range (none).

Trigger Delay: 0 to 99 hrs. (10µs step size).

External Trigger Delay: <10µs.

Memory: Up to 650,000 time-stamped readings with Web page disabled. Additional memory available with external "thumb drive."

Non-volatile Memory: Single user save setup, with up to 75 DMM configurations and ≥600 channel patterns (dependent on name length, DMM function and configuration, and pattern image size). Additional memory available with external "thumb drive."

MATH FUNCTIONS: Rel, dB, Limit Test, %, 1/x, and mX+b with user defined displayed.

REMOTE INTERFACE:

Ethernet: RJ-45 connector, LXI Class B Version 2, 10/100BT, no auto MDIX.

GPIB: IEEE-488.1 compliant. Supports IEEE-488.2 common commands and status model topology.

USB Device (rear panel, type B): Full speed, USBTMC compliant.

USB Host (front panel, type A): USB 2.0, support for thumb drives.

LXI COMPLIANCE: LXI Class B Version 2 with IEEE 1588 precision time protocol.

LXI TIMING (applies to scanning) and SPECIFICATION:

Receive LAN[0–7] Event Delay: n/s (not specified) min., 800µs typ., n/s max.

Alarm to Trigger Delay: 25µs min., 50µs typ., n/s max.

Generate LAN[0–7] Event: n/s min., 800µs typ., n/s max. (minimums are probabilistic and represent a 95% confidence factor).

Clock Accuracy: 25ppm.

Synchronization Accuracy: <150ns (probabilistic and represents a 95% confidence factor).

Timestamp Accuracy: 100µs.

Timestamp Resolution: 20ns.

LANGUAGE: Embedded Test Script Processor (TSP) accessible from any host interface. Responds to individual Instrument Control Library (ICL) commands. Responds to high-speed test scripts comprised of ICL commands and Test Script Language (TSL) statements (e.g., branching, looping, math, etc.). Able to execute high-speed test scripts stored in memory without host intervention.

IP CONFIGURATION: Static or DHCP.

PASSWORD PROTECTION: 11 characters

MINIMUM PC HARDWARE: Intel Pentium 3, 800MHz, 512Mbyte RAM, 210Mbyte disk space or better.

OPERATING SYSTEMS/SOFTWARE: Windows® 2000 and XP compatible, supports Web browsers with Java plug-in (requires Java plug-in 1.6 or higher). Web pages served by 3706A.

OPERATING ENVIRONMENT: Specified for 0° to 50°C, ≤80%RH at 35°C, altitude up to 2000 meters.

STORAGE ENVIRONMENT: –40° to 70°C.

DIMENSIONS:

Rack Mounted: 89mm high × 483mm wide × 457mm deep (3.5 in. × 19 in. × 18 in.).

Bench Configuration (includes handle and feet): 104mm high × 483mm wide × 457mm deep (4.125 in. × 19 in. × 18 in.)

SHIPPING WEIGHT: 13kg (28 lbs).

Series 3700A

System Switch/Multimeter and Plug-In Cards

Specifications for Plug-In Cards

Additional Series 3700A cards are currently in development. For a current list of cards and specifications, visit www.keithley.com.

	No. of Channels	Card Configuration	Type of Relay	Contact Configuration	Max. Voltage	Max. Current Switched	Comments
3720	60 (Dual 1×30)	Multiplexer	Latching electromechanical	2 Form A	300 V	1 A	2 independent 1×30 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3720-ST)
3721	40 (dual 1×20)	Multiplexer	Latching electromechanical	2 Form A	300 V (ch 1–40), 60 V (ch 41–42)	2 A (ch 1–40), 3 A (ch 41–42)	2 independent 1×20 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3721-ST)
3722	96 (dual 1×48)	Multiplexer	Latching electromechanical	2 Form A	300 V	1 A	2 independent 1×48 multiplexers
3723	60 (dual 1×30) or 120 single pole (dual 1×60)	Multiplexer	Dry reed	1 Form A	200 V	1 A	2 independent 1×30 multiplexers
3724	60 (dual 1×30)	Multiplexer	FET solid-state	2 Form A	200 V	0.1 A	2 independent 1×30 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3724-ST)
3730	6×16	Matrix	Latching electromechanical	2 Form A	300 V	1 A	Columns can be expanded through the backplane or isolated by relays
3731	6×16	Matrix	Dry reed	2 Form A	200 V	1 A	Relay actuation time of 0.5ms. Columns can be expanded through the backplane or isolated by relays
3732	448 crosspoints (Quad 4×28)	Matrix	Dry reed	1 Form A	200 V	0.75 A	Banks can be connected together via bank configuration relays to create a single 4×112 or dual 4×56 matrix. Analog backplane relays also included for card to card expansion. Row expansion with 3732-ST-R accessory to create a dual 8×28 or single 16×28 matrix.
3740	32	Independent	Latching electromechanical	28 Form C, 4 Form A	300 VDC/250 VAC (Form A)	2 A (Form C), 7 A (Form A)	32 general purpose independent channels.
3750	40 digital I/O, 4 counter/ totalizers, and 2 isolated analog outputs	Independent	N/A	N/A	N/A	N/A	All in one card design. 40 bidirectional I/O. Four 32-bit counter/totalizers. 2 programmable analog (V or I) outputs.

Plug-in Card Accessories

	Cables	Screw Terminal Block	Connector Kits	Tools
3720	3720-MTC-1.5, 3720-MTC-3	3720-ST	3791-KIT78-R	3791-CIT
3721	3721-MTC-1.5, 3721-MTC-3	3721-ST	3790-KIT50-R	
3722	3722-MTC-1.5, 3722-MTC-1.5/MM, 3722-MTC-3, 3722-MTC-3/MM		3792-KIT104-R, 3792-KIT104-R/F	3791-CIT
3723	3720-MTC-1.5, 3720-MTC-3	3723-ST, 3723-ST-1	3791-KIT78-R	3791-CIT
3724	3720-MTC-1.5, 3720-MTC-3	3724-ST	3791-KIT78-R	3791-CIT
3730	3721-MTC-1.5, 3721-MTC-3	3730-ST	3790-KIT50-R	
3731	3721-MTC-1.5, 3721-MTC-3	3731-ST	3790-KIT50-R	
3732	3732-MTC-1.5, 3732-MTC-3	3732-ST-C, 3732-ST-R	3791-KIT78-R	3791-CIT
3740	3721-MTC-1.5, 3721-MTC-3	3740-ST	3790-KIT50-R	
3750	3721-MTC-1.5, 3721-MTC-3	3750-ST	3790-KIT50-R	

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SWITCHING AND CONTROL

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Series 3700A

Plug-in Cards for Series 3700A Mainframes

Plug-in cards for Series 3700A mainframes

SWITCHING AND CONTROL

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Series 3700A

- Multiplexer, matrix, and I/O cards
- Relay closures automatically counted and stored in each card's onboard memory
- Unlimited contact life with solid-state relay (Model 3724)
- Automatic CJC for temperature measurements when used with screw terminal accessory (Models 3720, 3721, 3724)

Ordering Information

Plug-in Cards for Series 3700A Mainframes

Specifications for Plug-In Cards

Additional Series 3700A cards are currently in development. For a current list of cards and specifications, visit www.keithley.com.

	3720	3721	3722
Page	4	6	8
No. of Channels	60 (Dual 1×30)	40 (dual 1×20)	96 (dual 1×48)
Card Config.	Multiplexer	Multiplexer	Multiplexer
Type of Relay	Latching electromechanical	Latching electromechanical	Latching electromechanical
Contact Configuration	2 Form A	2 Form A	2 Form A
Max. Voltage	300 V	300 V (ch 1–40), 60 V (ch 41–42)	300 V
Max. Current Switched	1 A	2 A (ch 1–40), 3 A (ch 41–42)	1 A
Comments	2 independent 1×30 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3720-ST)	2 independent 1×20 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3721-ST)	2 independent 1×48 multiplexers

Plug-in Card Accessories

	3720	3721	3722
Cables	3720-MTC-1.5, 3720-MTC-3	3721-MTC-1.5, 3721-MTC-3	3722-MTC-1.5, 3722-MTC-1.5/MM, 3722-MTC-3, 3722-MTC-3/MM
Screw Terminal Block	3720-ST	3721-ST	
Connector Kits	3791-KIT78-R	3790-KIT50-R	3792-KIT104-R, 3792-KIT104-R/F
Tools	3791-CIT		3791-CIT

Series 3700A Plug-in Cards for Series 3700A Mainframes

	3723	3724	3730	3731	3732	3740	3750
	10	12	15	17	19	23	25
	60 (dual 1×30) or 120 single pole (dual 1×60)	60 (dual 1×30)	6×16	6×16	448 crosspoints (Quad 4×28)	32	40 digital I/O, 4 counter/totalizers, and 2 isolated analog outputs
	Multiplexer	Multiplexer	Matrix	Matrix	Matrix	Independent	Independent
	Dry reed	FET solid-state	Latching electromechanical	Dry reed	Dry reed	Latching electromechanical	N/A
	1 Form A	2 Form A	2 Form A	2 Form A	1 Form A	28 Form C, 4 Form A	N/A
	200 V	200 V	300 V	200 V	200 V	300 VDC/250 VAC (Form A)	N/A
	1 A	0.1 A	1 A	1 A	0.75 A	2 A (Form C), 7 A (Form A)	N/A
	2 independent 1×30 multiplexers	2 independent 1×30 multiplexers. Automatic temperature reference when used with screw terminal accessory (Model 3724-ST)	Columns can be expanded through the backplane or isolated by relays	Relay actuation time of 0.5ms. Columns can be expanded through the backplane or isolated by relays	Banks can be connected together via bank configuration relays to create a single 4×112 or dual 4×56 matrix. Analog backplane relays also included for card to card expansion. Row expansion with 3732-ST-R accessory to create a dual 8×28 or single 16×28 matrix.	32 general purpose independent channels.	All-in-one card design. 40 bidirectional I/O. Four 32-bit counter/totalizers. 2 programmable analog (V or I) outputs.

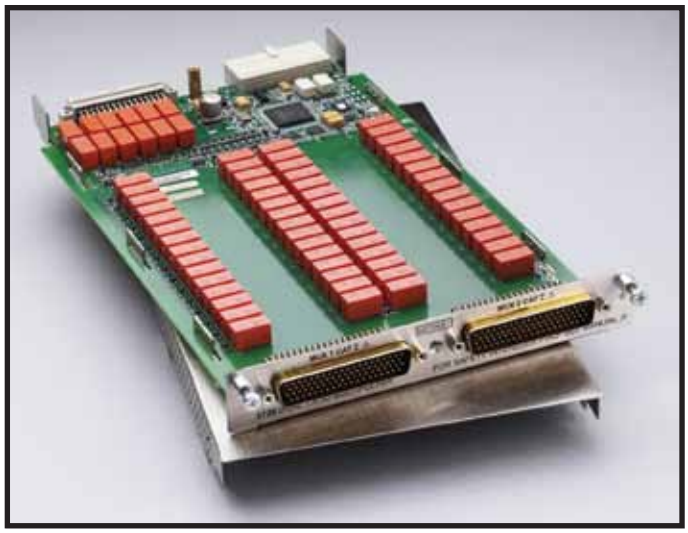
	3723	3724	3730	3731	3732	3740	3750
	3720-MTC-1.5, 3720-MTC-3	3720-MTC-1.5, 3720-MTC-3	3721-MTC-1.5, 3721-MTC-3	3721-MTC-1.5, 3721-MTC-3	3732-MTC-1.5, 3732-MTC-3	3721-MTC-1.5, 3721-MTC-3	3721-MTC-1.5, 3721-MTC-3
	3723-ST, 3723-ST-1	3724-ST	3730-ST	3731-ST	3732-ST-C, 3732-ST-R	3740-ST	3750-ST
	3791-KIT78-R	3791-KIT78-R	3790-KIT50-R	3790-KIT50-R	3791-KIT78-R	3790-KIT50-R	3790-KIT50-R
	3791-CIT	3791-CIT			3791-CIT		

3720

Dual 1×30 Multiplexer Card

60 differential channels, automatic CJC w/3720-ST accessory

- 60 two-pole channels or 30 four-pole channels for general purpose switching
- Automatic CJC for temperature measurements when used with 3720-ST accessory
- Analog backplane connection relays provide easy bank and card interconnections
- 300V, 1A switched or 2A carry signal capacity; 60W, 125VA
- Screw terminal connections provided with removable 3720-ST accessory
- Relay closures stored in onboard memory
- Latching electromechanical relays



The Model 3720 offers two independent banks of 1×30 two-pole multiplexers. It is ideal for general purpose switching, including temperature measurements. The two banks can automatically be connected to the Series 3700A mainframe backplane and optional DMM through the analog backplane connection relays. This connection allows the mainframe to reconfigure the card to a single 1×60 two-pole multiplexer or to enable card-to-card expansion for even larger configurations.

Other features of the Model 3720 include its ability to be reconfigured to coordinated four-pole operation for additional measurement flexibility. Furthermore, the Model 3720 supports thermocouple-type temperature measurements when used with the Model 3720-ST (screw terminal) accessory providing automatic cold junction compensation (CJC).

The Model 3720 uses two 78-pin male D-sub connectors for signal connections. For screw terminal or automatic CJC, use the detachable Model 3720-ST accessory.

Ordering Information

3720 **Dual 1×30 Multiplexer Card**

ACCESSORIES AVAILABLE

3720-MTC-1.5	78 Pin D-sub Female to Male Cable, 1.5m (5 ft.)
3720-MTC-3	78 Pin D-sub Female to Male Cable, 3m (10 ft.)
3720-ST	Screw Terminal Block (required for auto CJC thermocouple measurements)
3791-CIT	Contact Insertion and Extraction Tool
3791-KIT78-R	78 Pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 156 solder-cup contacts)
7401	Type K Thermocouple Wire (100 ft.)

SERVICES AVAILABLE

3720-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3720-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3720-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

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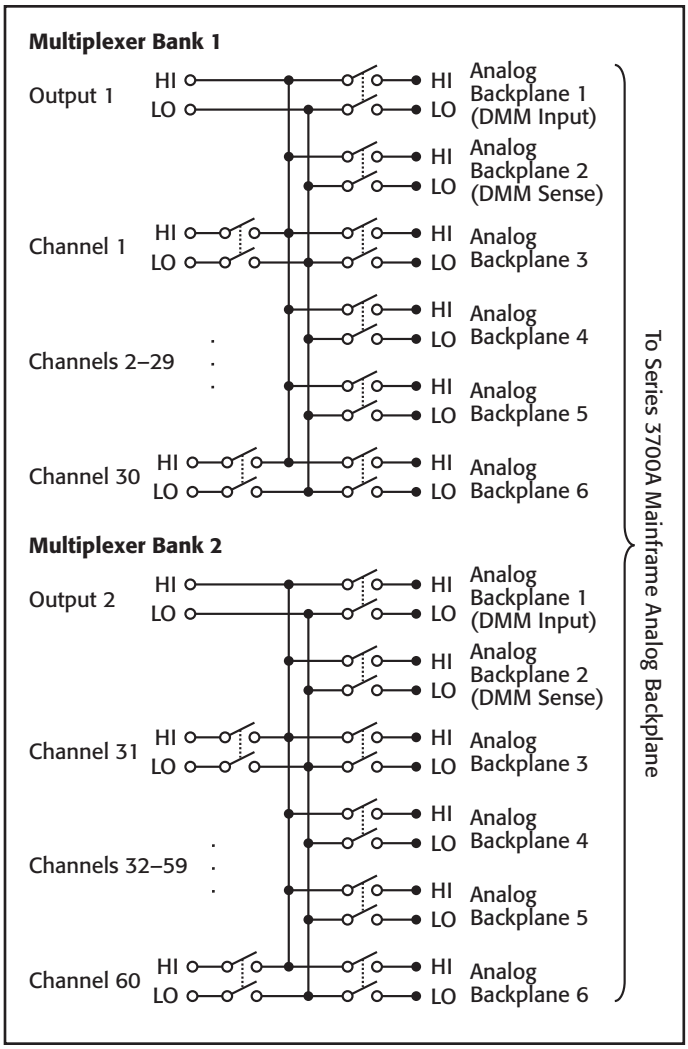
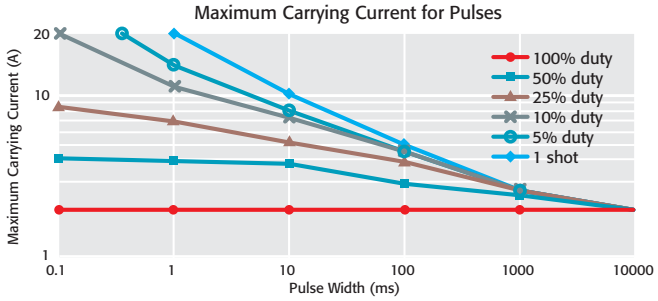
3720

Dual 1×30 Multiplexer Card

60 differential channels, automatic CJC w/3720-ST accessory





1. Model 3706A ambient temperature <28°C.
2. One shot repetition rate > 10 seconds.
3. Signal path routed only through one card (not through backplane).
4. Only one channel closed at a time.
5. Contact life specification unaffected if pulse width and carry current are not exceeded.

MULTIPLEXER CONFIGURATION: Two independent 1×30 2-pole multiplexers. Banks can be isolated from the backplane by relays. Card can be configured for 2 and 4 wire.

CONTACT CONFIGURATION: 2 pole form A.

CONNECTOR TYPE: Two 78 pin male D-shells.

MODEL 3720-ST SCREW TERMINAL OPTION: #22 AWG typical wire size with 0.062 inch O.D. 124 conductors maximum. #16 AWG maximum wire size with 0.092 inch O.D. 36 conductors per card maximum.

MAXIMUM SIGNAL LEVEL: Channels 1–60: 300V DC or RMS, 1A switched (2A carry), 60W, 125VA.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: $>10^5$ operations at maximum signal level. $>10^8$ operations no load.[1]

	Dual 1×30[3]	Single 1×60[2, 3]
Channel Resistance (end of contact life)	<1.0 Ω	<1.5 Ω
Contact Potential (differential)	<±1 μV	<± 3 μV
Offset Current	<±250 pA	<±250 pA
Isolation		
Differential	10^9 Ω, 250 pF	10^9 Ω, 450 pF
Bank-Bank	10^{10} Ω, 75 pF	—
Channel-channel	10^9 Ω, 75 pF	10^9 Ω, 75 pF
Common Mode	10^9 Ω, 200 pF	10^9 Ω, 400 pF
Crosstalk Channel-channel		
300kHz	<–60 dB	<–55 dB
1MHz	<–50 dB	<–50 dB
20MHz:	<–25 dB	<–20 dB
Bandwidth	30 MHz	10 MHz

TYPICAL SCANNING SPEEDS:

Switch Only[4]: Sequential scanning, single channel, immediate trigger advance: >120 ch/s.

With Measurements Into Memory[5]:
DCV (10V range) or 2W Ohms (1kΩ range): >110 ch/s.
Thermocouple: >110 ch/s.
3- or 4-Wire RTD: >100 ch/s.
4-Wire Ohms (1kΩ range): >100 ch/s.
ACV (10V range): >110 ch/s.

GENERAL

ACTUATION TIME: 4ms.

TEMPERATURE ACCURACY using Automatic CJC with 3720-ST accessory: 1°C for J, K, T and E types (see mainframe specification for details).

RELAY TYPE: Latching electromechanical.

RELAY DRIVE SCHEME: Matrix.

INTERLOCK: Backplane relays disabled when interlock connection is removed.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.5 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

NOTES

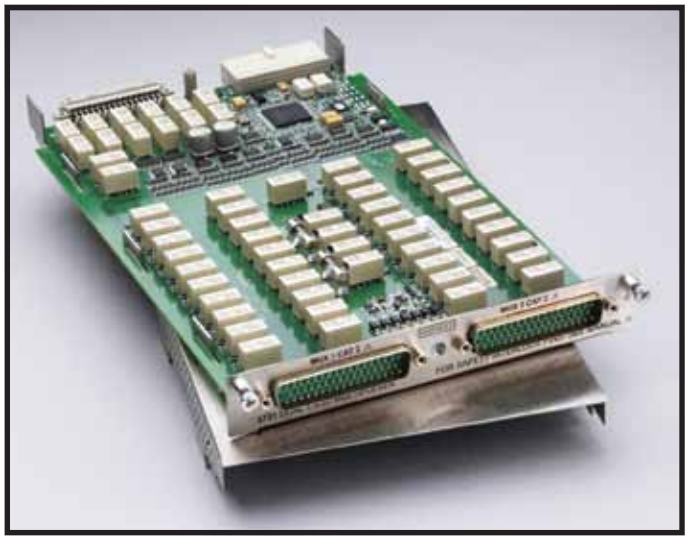
1. Open detector enabled during thermocouple measurements. Minimum signal level 10mV, 10μA.
2. 3706A mainframe with all DMM backplane relays disconnected. Maximum two card backplane relays closed.
3. Connections made using 3720-ST accessory.
4. Scanning script local to 3706A mainframe, within same bank, and break before make switching.
5. 3706A mainframe with autorange off, limits off, dmm.autozero=0, dmm.autodelay=0, 4½ digits (NPLC=0.006), for ACV dmm.detectorbandwidth=300, for OHMs dmm.offsetcompensation=off, dmm.opendetector=off. Scanning script local to mainframe, sequential scan within same bank (2 pole) or card (4 pole), and break before make switching.

3721

Dual 1×20 Multiplexer Card

40 differential channels, automatic CJC w/3721-ST accessory

- 40 two-pole or 20 four-pole channels for general purpose switching
- 2 dedicated channels for current measurements, 3A capacity
- Automatic CJC for temperature measurements when used with 3721-ST accessory
- 4-wire common side ohms input supports 40 channels of 4-wire ohms measurements
- Analog backplane connection relays provide easy bank and card interconnections
- 300V, 2A switched or 3A carry signal capacity; 60W, 125VA
- Latching electromechanical relays



The Model 3721 offers two independent banks of 1×20 two-pole multiplexers that are ideal for general purpose switching, including temperature measurements. The two banks can automatically be connected to the Series 3700A mainframe backplane and optional DMM through the analog backplane connection relays. This connection allows the mainframe to reconfigure the Model 3721 as a single 1×40 two-pole multiplexer or to enable card-to-card expansion for even larger configurations.

The Model 3721 provides a number of other features. In addition to the 40 channels, two fused channels are supplied for current measurements. Also, the Model 3721 includes dedicated inputs that enable 40 channels of four-wire common side ohms measurements. For thermocouple type measurements, automatic cold junction compensation (CJC) is supported when used with the Model 3721-ST (screw terminal) accessory.

The Model 3721 uses two 50-pin male D-sub connectors for signal connections. For screw terminal or automatic CJC, use the detachable Model 3721-ST accessory.

Ordering Information

3721 **Dual 1×20 Multiplexer Card**

ACCESSORIES AVAILABLE

3721-MTC-1.5	50 Pin D-sub Female to Male Cable, 1.5m (5 ft.)
3721-MTC-3	50 Pin D-sub Female to Male Cable, 3m (10 ft.)
3721-ST	Screw Terminal Block (required for auto CJC thermocouple measurements)
3790-KIT50-R	50 Pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 100 solder-cup contacts)
7401	Type K Thermocouple Wire (100 ft.)

SERVICES AVAILABLE

3721-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3721-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3721-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

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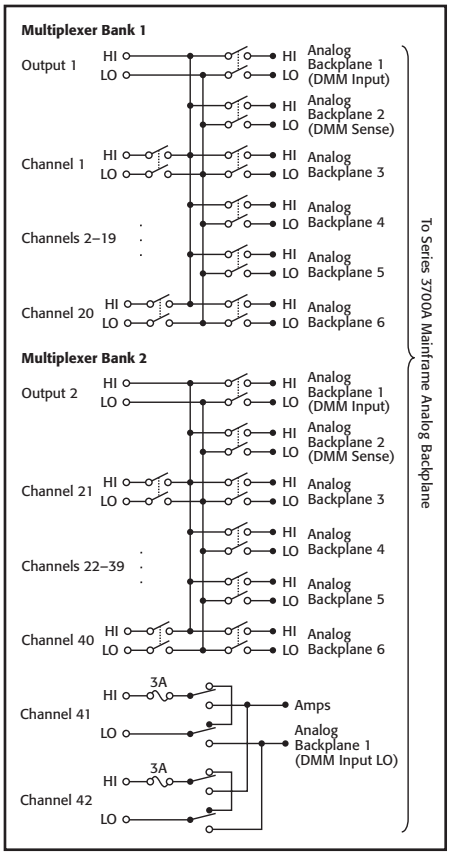
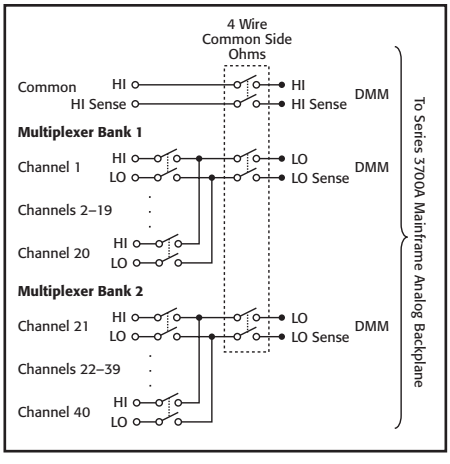
3721

Dual 1×20 Multiplexer Card

40 differential channels, automatic CJC w/3721-ST accessory



Two pole mode



Four-wire common side ohm mode

MULTIPLEXER CONFIGURATION: Two independent 1×20 2-pole multiplexers. Banks can be connected together via relay creating a single 1×40 multiplexer. Banks can be isolated from the backplane by relays. Card can be configured for common side Ohms measurement via backplane relays. **Channel 41–42:** Multiplex one of two 2-pole current signals into DMM.

CONTACT CONFIGURATION: 2 pole form A.

CONNECTOR TYPE: Two 50 pin male D-shells. Removable screw terminal option.

MAXIMUM SIGNAL LEVEL: Channels 1–40: 300V DC or RMS, 2A switched (3A carry), 60W, 125VA maximum. **Channels 41–42:** 60V DC or 30V RMS, 3A switched, 60W, 125VA maximum. Fused 3A, 250V RMS.

COMMON MODE VOLTAGE: Channels 1–40: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: $>10^5$ operations at maximum signal level. $>10^8$ operations no load.[1]

TYPICAL SCANNING SPEEDS:

Switch Only [4]: Sequential scanning, single channel, immediate trigger advance: >120 ch/s.

With Measurements Into Memory [5]:
DCV (10V range) or 2W Ohms (1kΩ range): >110 ch/s
Thermocouple: >110 ch/s.
3- or 4-Wire RTD: >100 ch/s.
4-Wire Ohms (1kΩ range): >100 ch/s.
ACV (10V, 400Hz range) or ACI (1A, 400Hz range): >110 ch/s.

NOTES

1. Open detector enabled during thermocouple measurements. Minimum signal level 10mV, 10μA.
2. 3706A mainframe with all DMM backplane relays disconnected. Maximum two card backplane relays closed.
3. Connections made using 3721-ST accessory.
4. Scanning script local to 3706A mainframe, within same bank, and break before make switching.
5. 3706A mainframe with autorange off, limits off, dmm.autozero=0, dmm.autodelay=0, 4½ digits (NPLC=0.006), for ACV dmm.detectorbandwidth=300, for OHMs dmm.offsetcompensation=off, dmm.opendetector=off. Scanning script local to mainframe, sequential scan within same bank (2 pole) or card (4 pole), and break before make switching.

	Dual 1×20 [3]	Single 1×40 [2, 3]
Channel Resistance (end of contact life)	<1.0 Ω	<1.5 Ω
Contact Potential (differential)	<±1 μV	<±3 μV
Offset Current	<±250 pA	<±250 pA
Isolation		
Differential	10^9 Ω, 280 pF	10^9 Ω, 530 pF
Bank-Bank	10^{11} Ω, 60 pF	—
Channel-channel	10^9 Ω, 50 pF	10^9 Ω, 50 pF
Common Mode	10^9 Ω, 180 pF	10^9 Ω, 480 pF
Crosstalk Channel-channel		
300kHz	<–60 dB	<–60 dB
1MHz	<–50 dB	<–50 dB
20MHz:	<–25 dB	<–15 dB
Bandwidth	28 MHz	9 MHz

GENERAL

ACTUATION TIME: 4ms.

TEMPERATURE ACCURACY using Automatic CJC with 3721-ST accessory: 1°C for J, K, T, and E types (see mainframe specification for details).

RELAY TYPE: Latching electromechanical.

RELAY DRIVE SCHEME: Direct.

INTERLOCK: Backplane relays disabled when interlock connection is removed.

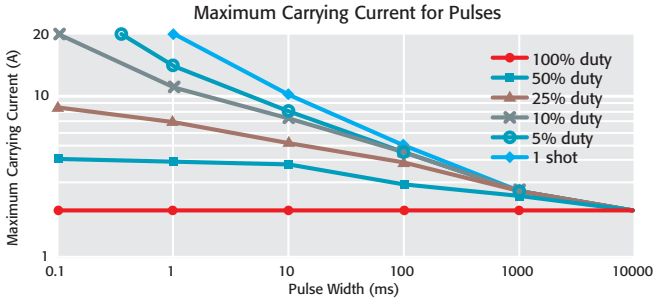
OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.25 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.



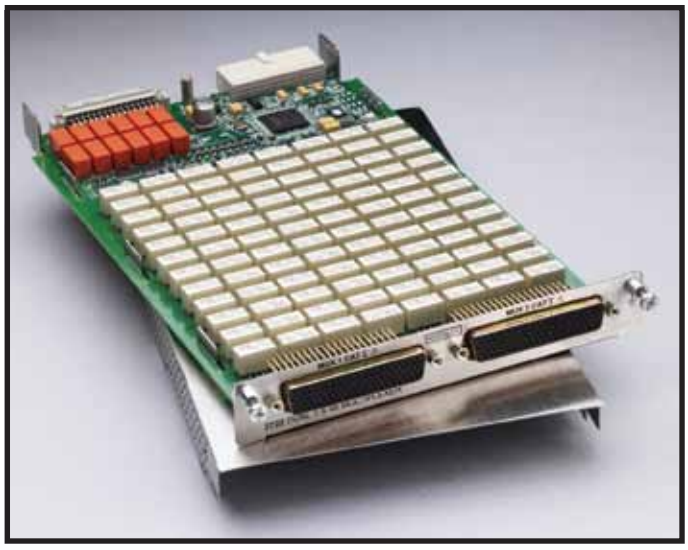
1. Model 3706A ambient temperature <28°C.
2. One shot repetition rate > 10 seconds.
3. Signal path routed only through one card (not through backplane).
4. Only one channel closed at a time.
5. Contact life specification unaffected if pulse width and carry current are not exceeded.

3722

Dual 1×48, High Density, Multiplexer Card

96 differential channels, 300 Volts/1 Amp

- 96 two-pole or 48 four-pole channels for general purpose measurements
- Analog backplane connection relays provide easy bank and card interconnections
- 300V, 1A switched or 2A carry signal capacity; 60W, 125VA
- 1µV and 100pA offsets
- 25MHz bandwidth
- Relay closures stored in onboard memory
- Latching electromechanical relays
- Scan and measure over 110 channels/second



The Model 3722 offers two independent banks of 1×48 two-pole multiplexers, which is ideal for applications that require a high channel count. The two banks can automatically be connected to the Series 3700A mainframe backplane and optional DMM through the analog backplane connection relays. This connection allows the mainframe to reconfigure the card as a single 1×96 two-pole multiplexer or to enable card-to-card expansion for even larger configurations. Another feature of this card is the latching electromechanical relays. They can accommodate 300V, 1A switched signal levels.

The Model 3722 uses two 104-pin D-sub connectors for signal connections. A solder style connector kit (Model 3792-KIT104-R) and pre-assembled cables (Model 3722-MTC-1.5 and 3722-MTC-3) are available for card connections.

Ordering Information

3722 Dual 1×48, High Density, Multiplexer Card

ACCESSORIES AVAILABLE

3722-MTC-1.5	104-pin D-sub Male to Female Cable, 1.5m (5 ft.)
3722-MTC-1.5/MM	104-pin D-sub Male to Male Cable, 1.5m (5 ft.)
3722-MTC-3	104-pin D-sub Male to Female Cable, 3m (10 ft.)
3722-MTC-3/MM	104-pin D-sub Male to Male Cable, 3m (10 ft.)
3791-CIT	Contact Insertion and Extraction Tool
3792-KIT104-R	104-pin Male D-sub Connector kit (contains 2 male D-sub connectors with housings and 208 solder-cup contacts)
3792-KIT104-R/F	104-pin Female D-sub Connector kit (contains 2 female D-sub connectors with housings and 208 solder-cup contacts)

SERVICES AVAILABLE

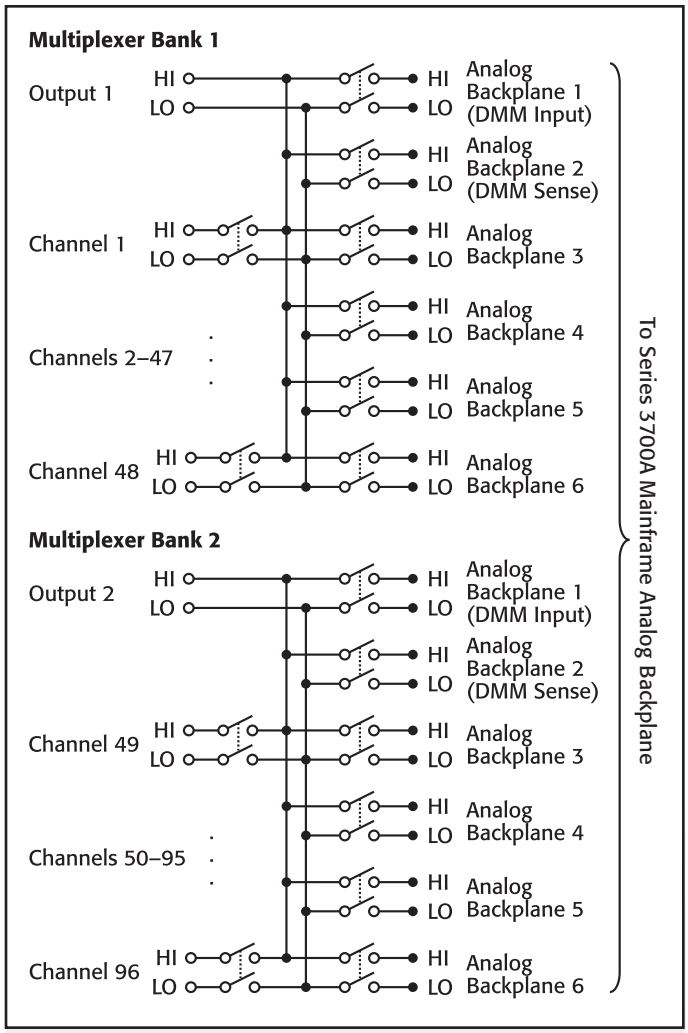
3722-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3722-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3722-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

3722

Dual 1×48, High Density, Multiplexer Card

96 differential channels, 300 Volts/1 Amp



MULTIPLEXER CONFIGURATION: Two independent 1×48 2-pole multiplexers. Banks can be connected together via relays creating a single 1×96 multiplexer. Banks can be isolated from the backplane by relays. Card can be configured for 2- and 4-wire mode.

CONTACT CONFIGURATION: 2 pole form A.

CONNECTOR TYPE: Two 104 pin female D-shells.

MAXIMUM SIGNAL LEVEL: 300V DC or RMS, 1A switched (2A carry), 60W, 125VA.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: $>10^5$ operations at maximum signal level. $>10^8$ operations no load.[1]

	Dual 1×48[2]	Single 1×96
Channel Resistance (end of contact life)	<1.5 Ω	<2.5 Ω
Contact Potential (differential)	<±1 μV	<± 2 μV
Offset Current	<100 pA	<100 pA
Isolation		
Differential	5×10^9 Ω, 200 pF	5×10^9 Ω, 400 pF
Bank-Bank	10^9 Ω, 50 pF	—
Channel-channel	10^9 Ω, 50 pF	10^9 Ω, 50 pF
Common Mode	10^{10} Ω, 200 pF	10^{10} Ω, 400 pF
Crosstalk Channel-channel		
300kHz	<–65 dB	<–65 dB
1MHz	<–55 dB	<–55 dB
20MHz	<–30 dB	<–30 dB
Bandwidth	25 MHz	15 MHz

TYPICAL SCANNING SPEEDS:

Switch Only[3]: Sequential scanning, single channel, immediate trigger advance: >120 ch/s.

With Measurements Into Memory[4]:
DCV (10V range) or 2W Ohms (1kΩ range): >110 ch/s.
3- or 4-Wire RTD: >100 ch/s.
4-Wire Ohms (1kΩ range): >100 ch/s.
ACV (10V, 400Hz range): >110 ch/s.

GENERAL

ACTUATION TIME: 4ms.

RELAY TYPE: Latching electromechanical.

RELAY DRIVE SCHEME: Matrix.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.5 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

NOTES

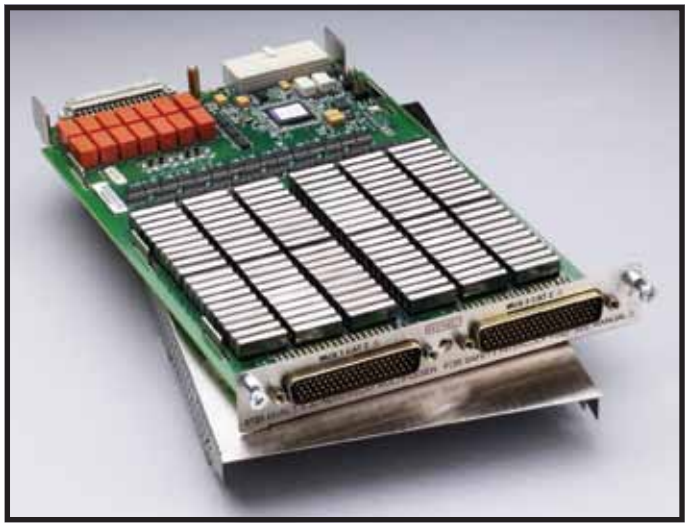
1. Minimum signal level 10mV, 10μA.
2. 3706A mainframe with all DMM backplane relays disconnected. Maximum two card backplane relays closed.
3. Scanning script local to 3706A mainframe, within same bank, and break before make switching.
4. 3706A mainframe with autorange off, limits off, dmm.autozero=0, dmm.autodelay=0, 4½ digits (NPLC=.006), for ACV dmm.detectorbandwidth=300, for OHMs dmm.offsetcompensation=off. Scanning script local to mainframe, sequential scan within same bank (2 pole) or card (4 pole), and break before make switching.

3723

Dual 1×30, High Speed, Multiplexer Card

60 differential channels, long life reed relays

- 60 two-pole or 30 four-pole channels for high speed scanning
- 120 channel single-pole mode for one-wire (common side) measurements
- Analog backplane connection relays provide easy bank and card interconnections
- 200V, 1A switched or 1.25A carry signal capacity; 15W
- Relay actuation time <0.5ms
- 20MHz bandwidth
- Ideal for multi-channel I-V testing with Series 2600A SourceMeter® instruments
- Long life dry reed relays (>10^9 operations)



The Model 3723 offers two independent banks of high speed 1×30 two-pole multiplexers that are ideal for high speed scanning applications. The two banks can automatically be connected to the Series 3700A mainframe backplane and optional DMM through the analog backplane connection relays. This connection allows the mainframe to reconfigure the Model 3723 as a single 1×60 two-pole multiplexer or as a single 1×120 single-pole multiplexer. It also enables card-to-card expansion for even larger configurations.

By using high speed reed relays with actuation times of less than 0.5ms, this card can meet demanding throughput applications. Another feature of the Model 3723 is its single-ended, one-pole mode, which supports up to 120 channels of single-wire measurements.

The Model 3723 uses two 78-pin D-sub connectors for signal connections. For screw terminal connections, use the Model 3723-ST for two- and four-pole configurations or the Model 3723-ST-1 for single-wire applications.

Ordering Information

3723	**Dual 1×30, High Speed, Reed Relay, Multiplexer Card**

ACCESSORIES AVAILABLE

3720-MTC-1.5	78 Pin D-sub Female to Male Cable, 1.5m (5 ft.)
3720-MTC-3	78 Pin D-sub Female to Male Cable, 3m (10 ft.)
3723-ST	Screw Terminal Block
3723-ST-1	Screw Terminal Block for single-pole applications
3791-CIT	Contact Insertion and Extraction Tool
3791-KIT78-R	78 Pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 156 solder-cup contacts)

SERVICES AVAILABLE

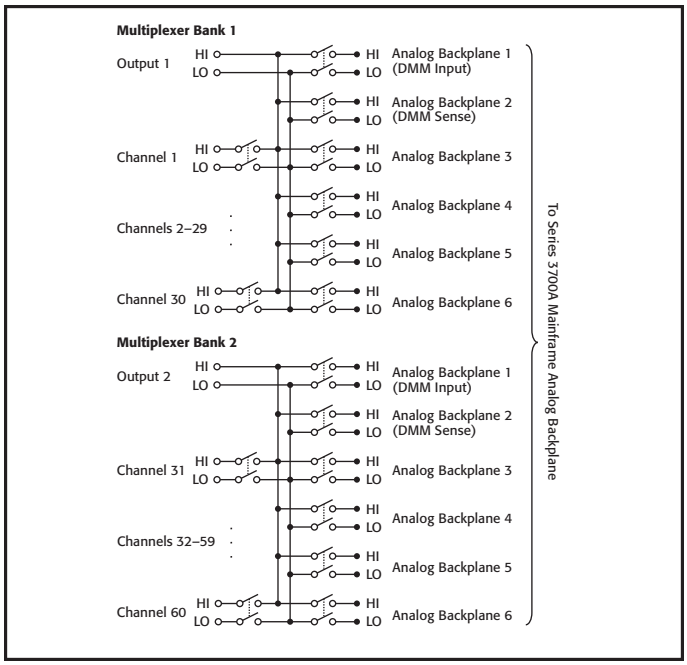
3723-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3723-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3723-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

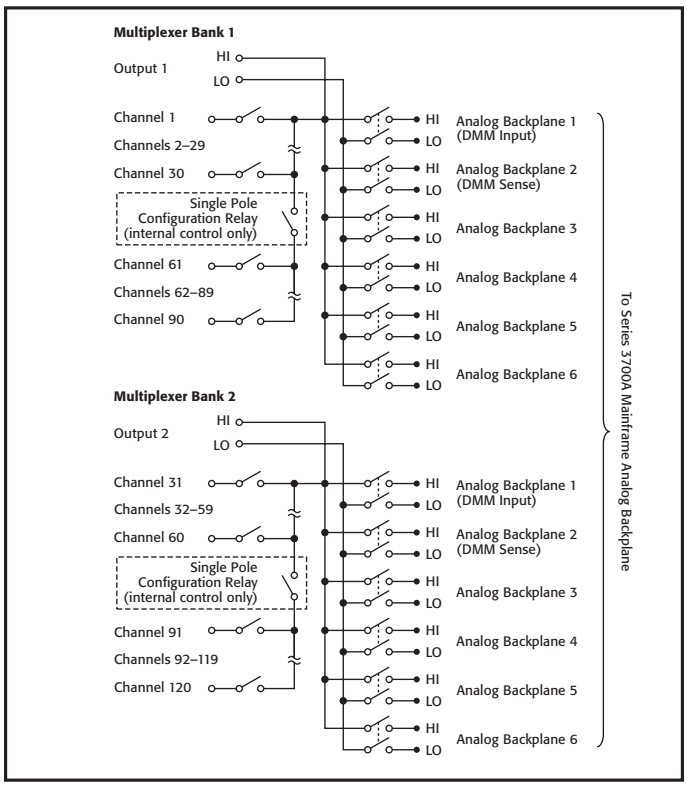
3723

Dual 1×30, High Speed, Multiplexer Card

60 differential channels, long life reed relays



Two-pole mode



Single-pole mode

MULTIPLEXER CONFIGURATION: Two independent 1×30 2-pole multiplexers. Banks can be connected together via relay creating a single 1×60 multiplexer. Banks can be isolated from the backplane by relays. Card can be configured for 1-, 2-, and 4-wire.

CONTACT CONFIGURATION: 2 pole form A.

CONNECTOR TYPE: Two 78-pin male D-shells.

MODEL 3723-ST SCREW TERMINAL OPTION: #22 AWG typical wire size with 0.062 inch O.D. 124 conductors maximum. #16 AWG maximum wire size with 0.092 inch O.D. 36 conductor per card maximum.

MAXIMUM SIGNAL LEVEL: 200V DC or RMS, 1A switched (1.25A carry), 15W.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: Reed: $>10^9$ operations, no load. 10^7 operations @100V, 10mA.
EMR: $>10^8$ operations @ 5V, 10mA. 10^5 operations @ maximum signal level.

	Dual 1×30 [1]	Single 1×60 [1,2]
Channel Resistance (end of contact life)	<1.5 Ω	<2.0 Ω
Contact Potential: Differential	<±6 μV	<±6 μV
Single-Ended	<±12 μV	<±12 μV
Offset Current	<250 pA	<250 pA
Isolation		
Differential	10^{10} Ω, 260 pF	10^{10} Ω, 500 pF
Bank-Bank	10^{10} Ω, 75 pF	—
Channel-channel	10^{10} Ω, 75 pF	10^{10} Ω, 75 pF
Common Mode	10^{10} Ω, 280 pF	10^9 Ω, 625 pF
Crosstalk Channel-channel		
300kHz	<–55 dB	<–55 dB
1MHz	<–50 dB	<–45 dB
20MHz	<–20 dB	<–20 dB
Bandwidth	20 MHz	10 MHz

TYPICAL SCANNING SPEEDS:

Switch Only [3]: Sequential scanning, single channel, immediate trigger advance: >1000 ch/s.

With Measurements Into Memory [4]:
DCV (10V range) or 2W Ohms (1kΩ range): >800 ch/s.
3- or 4-Wire RTD: >450 ch/s.
4-Wire Ohms (1kΩ range): >450 ch/s.
ACV (10V, 400Hz range): >800 ch/s.

GENERAL

ACTUATION TIME: <0.5ms.

RELAY TYPE: Dry reed.

RELAY DRIVE SCHEME: Direct.

RELAY DRIVE CURRENT: 10mA.

INTERLOCK: Backplane relays disabled when interlock connection is removed.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 3.0 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

NOTES

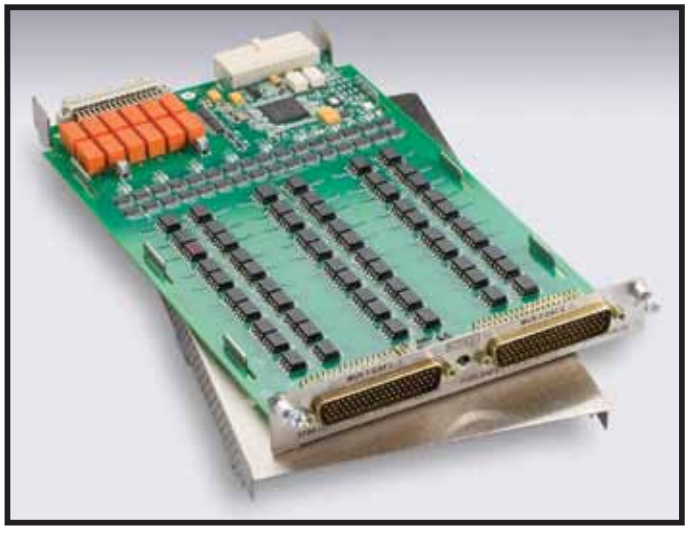
1. Connections made using 3723-ST accessory.
2. 3706A mainframe with all DMM backplane relays disconnected. Maximum two card backplane relays closed.
3. Scanning script local to 3706A mainframe, within same bank, and break before make switching.
4. 3706A mainframe with autorange off, limits off, dmm.autozero=0, dmm.autodelay=0, 4½ digits (NPLC=0.006), for ACV dmm.detectorbandwidth=300, for OHMs dmm.offsetcompensation=off. Scanning script local to mainframe, sequential scan within same bank (2 pole) or card (4 pole), and break before make switching.

3724

Dual 1×30 FET Multiplexer Card

60 differential channels, automatic CJC with 3724-ST accessory

- 60 two-pole or 30 four-pole solid-state channels
- Scanning speeds greater than 1250 channels/second (switch only)
- Optically isolated, solid-state FET relays provide unlimited contact life
- 200V, 0.1A switch/carry signal capacity; 800mW
- Automatic CJC for temperature measurements when used with 3724-ST accessory
- Analog backplane connection relays provide easy bank and card interconnections
- Screw terminal connections provided with removable 3724-ST accessory
- Ideal for maintenance-free, long-life thermocouple temperature measurements



The Model 3724 provides two independent banks of solid-state relays arranged as 1×30 two-pole multiplexers that are ideal for high reliability, high speed multipoint measurement applications including temperature. The two banks can automatically be connected to the Series 3700A mainframe backplane and optional DMM through the analog backplane connection relays. This connection allows the mainframe to reconfigure the card to a single 1×60 two-pole multiplexer or to enable card-to-card expansion for even larger configurations.

The solid-state FET relay technology supports fast switching times with scanning rates of greater than 1250 channels/second and provides unlimited contact life. In addition, the Model 3724 supports thermocouple temperature measurements when used with the Model 3724-ST (screw terminal) accessory providing automatic cold junction compensation (CJC).

The Model 3724 uses two 78-pin male D-sub connectors for signal connections. For screw terminal or automatic CJC, use the detachable Model 3724-ST accessory.

Ordering Information

3724	**Dual 1×30 FET Multiplexer Card**

ACCESSORIES AVAILABLE

3720-MTC-1.5	78-pin female-to-male D-sub Cable Assembly, 1.5m (4.9 ft)
3720-MTC-3	78-pin female-to-male D-sub Cable Assembly, 3m (9.8 ft)
3724-ST	Screw Terminal Block (required for auto CJC thermocouple measurements)
3791-CIT	Contact Insertion and Extraction Tool
3791-KIT78-R	78-pin female D-sub Connector Kit (contains 2 female D-sub connectors and 156 solder-cup contacts)

SERVICES AVAILABLE

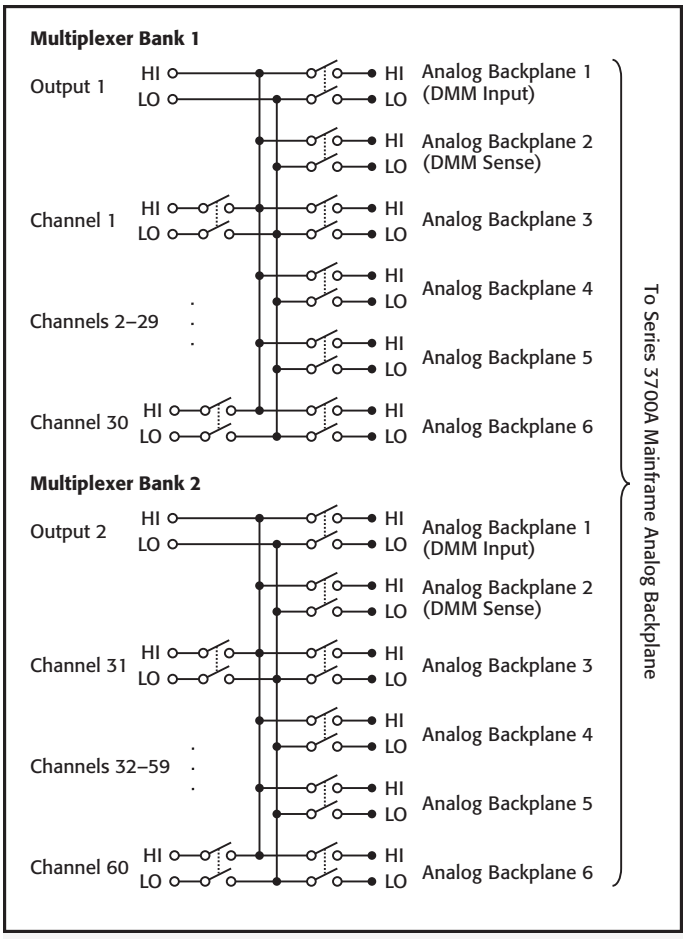
3724-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3724-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3724-3Y-DATA	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

3724

Dual 1×30 FET Multiplexer Card

60 differential channels, automatic CJC with 3724-ST accessory



Model 3724 Specifications

MULTIPLEXER CONFIGURATION: Two independent 1×30, 2-pole multiplexers. Banks can be connected together via relay creating a single 1×60 multiplexer. Banks can be isolated from the backplane by relays. Card can be configured for 2- and 4-wire.

CONTACT CONFIGURATION: 2-pole form A.

CONNECTOR TYPE: Two 78-pin male D-shells.

MODEL 3724-ST SCREW TERMINAL OPTION: #22AWG typical wire size with 0.062 inch O.D. 124 conductors maximum. 16 AWG maximum wire size with 0.092 inch O.D. 36 conductor per card maximum.

MAXIMUM SIGNAL LEVEL: 200V DC or 141V RMS between any terminal, 0.1A switched (0.1A carry), 800mW.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 10^7.

CONTACT LIFE:

Solid State: > unlimited.

EMR (Backplane): >1×10^8 operations @ 5V, 10mA.
1×10^5 operations @ max. signal level.

	Dual 1×30[1]	Single 1×60[1, 2]
Channel Resistance	<62Ω (54Ω @ 23°C)	<64Ω (58Ω @ 23°C)
Contact Potential (differential)	<±2 μV	<±2.5 μV
Offset Current	<10 nA (<±100 pA @ 23°C/60% R.H.)	<10 nA (<±100 pA @ 23°C/60% R.H.)
Isolation		
Differential	10^9Ω, 500 pF	10^9Ω, 1100 pF
Bank-Bank	10^9Ω, 100 pF	—
CH–CH	10^9Ω, 125 pF	10^9Ω, 125 pF
Common Mode	10^9Ω, 150 pF	10^9Ω, 700 pF
Crosstalk CH-CH		
300 kHz	–40 dB	–40 dB
1 MHz	–30 dB	–30 dB
Bandwidth	2 MHz	1 MHz

NOTES

1. Connections made using 3724-ST.
2. 3706A mainframe with all DMM backplane relays disconnected. Maximum two card backplane relays closed.

3724

Dual 1×30 FET Multiplexer Card

60 differential channels, automatic CJC with 3724-ST accessory

3724 Card/3706A Multimeter Condensed Specifications

TEMPERATURE

Displayed in °C, °F, or K. Exclusive of probe errors.

THERMOCOUPLES (accuracy based on ITS-90)

Type	Range	Resolution	90 Day/1 Year 23°C ± 5°
J	–150 to +760°C	0.001°C	1.0°C
K	–150 to +1372°C	0.001°C	1.0°C
N	–100 to +1300°C	0.001°C	1.0°C
T	–100 to +400°C	0.001°C	1.0°C
E	–150 to +1000°C	0.001°C	1.0°C
R	+400 to +1768°C	0.1°C	1.8°C
S	+400 to +1768°C	0.1°C	1.8°C
B	+1100 to +1820°C	0.1°C	1.8°C

DC SPECIFICATIONS

3724 CARD/3706A MULTIMETER UNCERTAINTY SPECIFICATIONS:

Function	Range	Notes
Voltage	All	Add 4.5 μV to PPM "of range"
Resistance	100 kΩ	Add 8 PPM to "of reading"
Resistance	1 MΩ	Add 80 PPM to "of reading"
Resistance	10 MΩ	Add 250 PPM to "of reading"
Resistance	100 MΩ	Add 5000 PPM to "of reading"
Resistance 2-wire	1 kΩ through 100 MΩ	Add 1.2 Ω (with REL) to PPM "of range" Add 64Ω (without REL) to PPM "of range"
Resistance 4-wire and Dry Circuit	1 Ω, 10 Ω, and 100 Ω	Ranges Not Available (maximum lead resistance exceeded, see manual for measurement considerations)

CONDITIONS: 1 PLC or 5 PLC.

ACCURACY: ±(ppm of reading + ppm of range) (ppm = parts per million; e.g., 10ppm = 0.001%).

GENERAL

ACTUATION TIME: <0.2ms.

TEMPERATURE ACCURACY USING AUTOMATIC CJC WITH 3724-ST ACCESSORY: 1°C for J, K, T, and E type (see mainframe specification for details).

RELAY TYPE: Optically isolated FET.

RELAY DRIVE SCHEME: Direct.

INTERLOCK: Backplane relays disabled when interlock connection removed.

RELAY DRIVE CURRENT: 4mA.

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 1.13 kg (2.5 lbs.).

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

TYPICAL SCANNING SPEEDS, SWITCH ONLY[1]:

Sequential scanning, single channel, immediate trigger advance: >1250 ch/s.

TYPICAL SCANNING SPEEDS, WITH MEASUREMENTS INTO MEMORY[2]:

DCV (10V range) or 2WΩ (1kΩ range): >1000 ch/s.
Thermocouple: >1000 ch/s.
3- or 4-Wire RTD: >450 ch/s.
4-Wire Ω (1kΩ range): >450 ch/s.
ACV (10V, 400Hz range): >1000 ch/s.

POWER BUDGET INFORMATION:

Quiescent Power (mW): 1150.
Channel Relay Power (mW) Each: 20.
Backplane Relay Power Consumption (mW) Each: 100.

See Chapter 8 of the Series 3700A user's manual for more detailed information.

NOTES

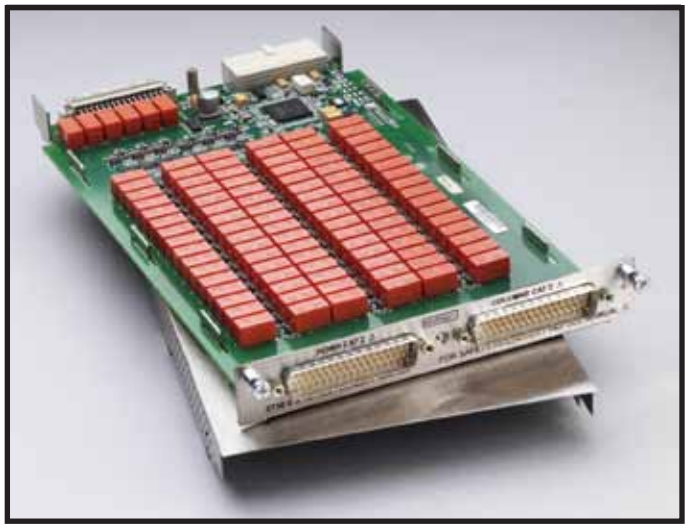
1. Scanning script local to mainframe, within same bank, break before make.
2. 3706A mainframe with autorange off, limits off, dmm.autodelay=0, dmm.autozero=0, 4½ digits (NPLC=.006), for ACV dmm.detectorbandwidth=300, for OHMs dmm.offsetcompensation=off, dmm.opendetector=off. Scanning script local to mainframe, sequential scan within same bank (2 pole) or card (4 pole), and break before make switching.

3730

6×16, High Density, Matrix Card

96 two-pole crosspoints with column expansion relays

- 6 row by 16 column matrix (2-pole)
- Analog backplane connection relays provide easy column expansion
- 300V, 1A switched or 2A carry signal capacity; 60W, 125VA
- Screw terminal connections provided on removable 3730-ST accessory
- 2µV and 100pA offsets
- Relay closures stored in onboard memory
- Latching electromechanical relays



The Model 3730 is a two-pole, 6 row by 16 column matrix card. It can connect up to six differential instrument channels to any combination of 16 DUTs (devices under test). Any row can be connected to the Series 3700A mainframe backplane by using the analog backplane connection relays. This allows for easy matrix column expansion. A matrix of up to 6 rows by 96 columns can be supported within a single Model 3706A mainframe (with six Model 3730 cards).

The Model 3730 uses two 50-pin male D-sub connectors for signal connections. For screw terminal connections, use the detachable Model 3730-ST accessory.

Ordering Information

3730	6×16, High Density, Matrix Card

ACCESSORIES AVAILABLE

3721-MTC-1.5	50 Pin D-sub Female to Male Cable, 1.5m (5 ft.)
3721-MTC-3	50 Pin D-sub Female to Male Cable, 3m (10 ft.)
3730-ST	Screw Terminal Block
3790-KIT50-R	50 Pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 100 solder-cup contacts)

SERVICES AVAILABLE

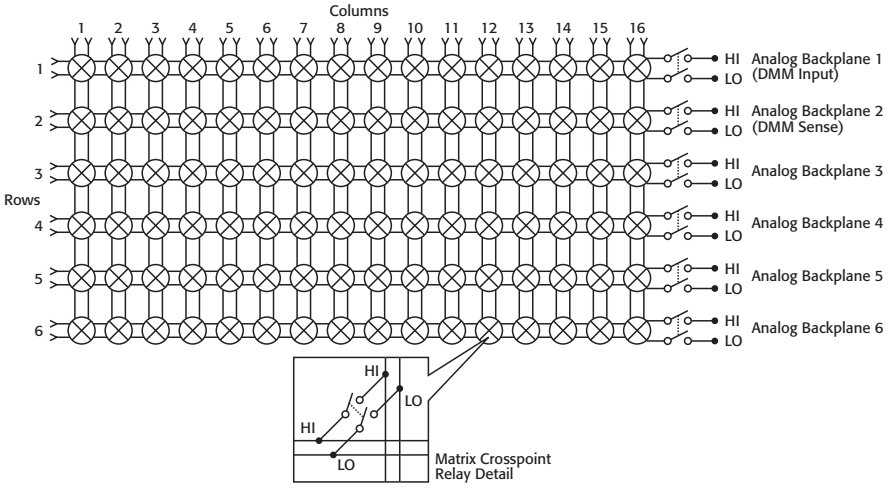
3730-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3730-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3730-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

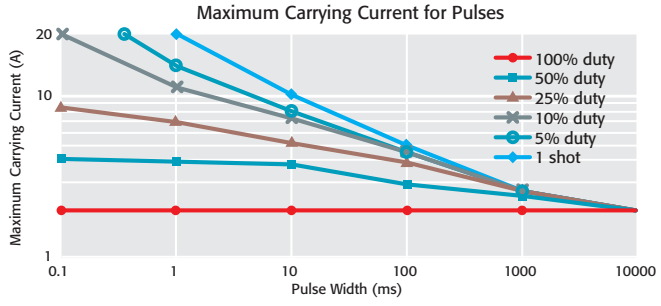
*Not available in all countries

3730

6×16, High Density, Matrix Card

96 two-pole crosspoints with column expansion relays





1. Model 3706A ambient temperature <28°C.
2. One shot repetition rate > 10 seconds.
3. Signal path routed only through one card (not through backplane).
4. Only one channel closed at a time.
5. Contact life specification unaffected if pulse width and carry current are not exceeded.

MATRIX CONFIGURATION: 6 row by 16 column matrix. Columns can be expanded using the backplane or isolated by relays.

CONTACT CONFIGURATION: 2 pole form A.

CONNECTOR TYPE: Two 50 pin male D-shells.

MODEL 3730-ST SCREW TERMINAL OPTION: #22 AWG typical wire size with 0.062 inch O.D. 88 conductors maximum. #16 AWG maximum wire size with 0.092 inch O.D. 44 conductor per card maximum.

MAXIMUM SIGNAL LEVEL: 300V DC or RMS, 1A switched (2A carry), 60W, 125VA.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: $>10^5$ operations @ maximuum signal level. $>10^8$ operations no load.[1]

	6×16[2,3]
Channel Resistance (end of contact life)	<1.0 Ω
Contact Potential (differential)	<±2 μV
Offset Current	<±100 pA
Isolation	
Differential	10^{10} Ω, 250 pF
Channel-channel	10^{10} Ω, 75 pF
Common Mode	10^{10} Ω, 150 pF
Crosstalk Channel-channel	
300kHz	<–65 dB
1MHz	<–55 dB
20MHz	<–30 dB
Bandwidth	27 MHz

GENERAL

ACTUATION TIME: 4ms.

RELAY TYPE: Latching electromechanical.

RELAY DRIVE SCHEME: Hybrid Matrix.

INTERLOCK: Backplane relays disabled when terminal assembly is removed.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.5 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

NOTES

1. Minimum signal level 10mV, 10μA.
2. Connections made using 3730-ST accessory.
3. 3706A mainframe with all DMM backplane relays disconnected.

3731

6×16 High Speed, Reed Relay, Matrix Card

96 two-pole crosspoints with column expansion relays

- 6 row by 16 column matrix (2-pole) using high speed, long life reed relays
- Analog backplane connection relays provide easy column expansion
- 200V, 1A switched or 2A carry signal capacity; 10W, 10VA
- Screw terminal connections provided on removable 3731-ST accessory
- Relay actuation time of 0.5ms
- Ideal for multi-channel I-V testing with Series 2600A System SourceMeter® Instruments
- Long life dry reed relays (>10^9 operations)

The Model 3731 is a two-pole, 6 row by 16 column reed relay matrix card. By using high speed reed relays with actuation times of 0.5ms, this card meets the requirements of demanding throughput applications while offering users the additional benefit of long life, exceeding one billion operations. The card can connect up to six differential instrument channels to any combination of 16 DUTs (devices under test). Any row can be connected to the Series 3700A mainframe backplane by using the analog backplane connection relays. This allows for easy matrix column expansion. A matrix of up to 6 rows by 96 columns can be supported within a single 3706A mainframe (with six Model 3731 cards).

The Model 3731 uses two 50-pin male D-sub connectors for signal connections. For screw terminal connections, use the detachable Model 3731-ST accessory.

Ordering Information

3731 6×16 High Speed, Reed Relay, Matrix Card

ACCESSORIES AVAILABLE

3721-MTC-1.5	50-pin D-sub Female to Male Cable, 1.5m (5 ft.)
3721-MTC-3	50-pin D-sub Female to Male Cable, 3m (10 ft.)
3731-ST	Screw Terminal Block
3790-KIT50-R	50-pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 100 solder-cup contacts)

SERVICES AVAILABLE

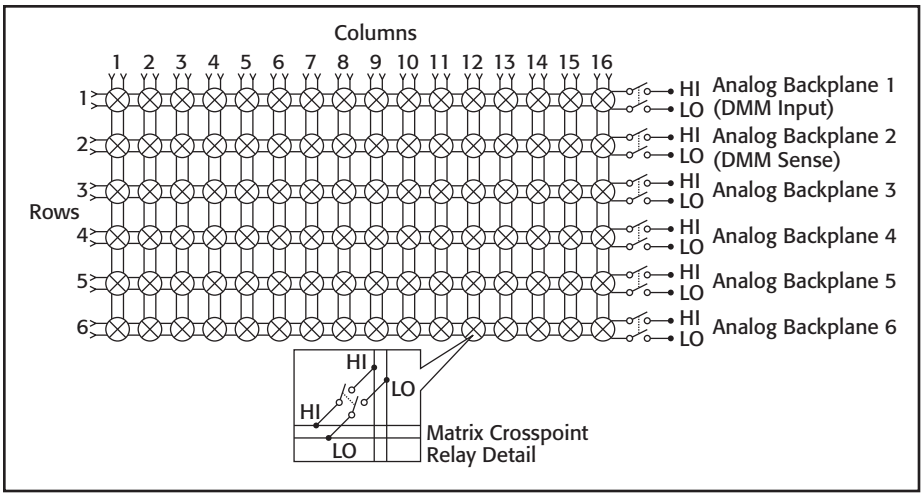
3731-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3731-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3731-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

3731

6×16 High Speed, Reed Relay, Matrix Card

96 two-pole crosspoints with column expansion relays



96 Two-Pole Crosspoints with Column Expansion Relays

MATRIX CONFIGURATION: 6 row by 16 column matrix. Columns can be expanded using the backplane or isolated by relays.

CONTACT CONFIGURATION: 2-pole form A.

CONNECTOR TYPE: Two 50-pin male D-shells.

MODEL 3731-ST SCREW TERMINAL OPTION:
Typical wire size: #22 AWG with .062 inch O.D.; 88 conductors maximum
Maximum wire size: #16 AWG with .092 inch O.D.; 44 conductors per card maximum.

MAXIMUM SIGNAL LEVEL: 200V DC or peak AC, 1A switched (2A carry), 10W, 10VA.

COMMON MODE VOLTAGE: 200V DC or peak AC between any signal path to a signal path or ground.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE:
Reed: $>10^9$ operations no load. $>8\times10^6$ operations @ 100V, 10mA.
EMR (Backplane): $>10^8$ operations @ 5V, 10mA and 10^5 operations @ maximum signal level.

	6×16 [1,2]
Channel Resistance (end of contact life)	<1.5 Ω
Contact Potential (differential)	<±80 μV
Offset Current	<±500 pA
Isolation	
Differential	3×10^9 Ω, 300 pF
Channel-channel	3×10^9 Ω, 100 pF
Common Mode	3×10^9 Ω, 150 pF
Crosstalk Channel-channel	
300kHz	<–60 dB
1MHz	<–50 dB
15MHz	<–20 dB
Bandwidth	19 MHz

GENERAL

ACTUATION TIME: 0.5ms.

RELAY TYPE: Reed.

RELAY DRIVE SCHEME: Direct drive.

INTERLOCK: Backplane relays disabled when terminal assembly is removed.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.2 lbs.

SAFETY: Compliant with European Union Low Voltage Directive

EMC: Compliant with European Union EMC Directive 2004/108/EC, EN61326-1.

NOTES

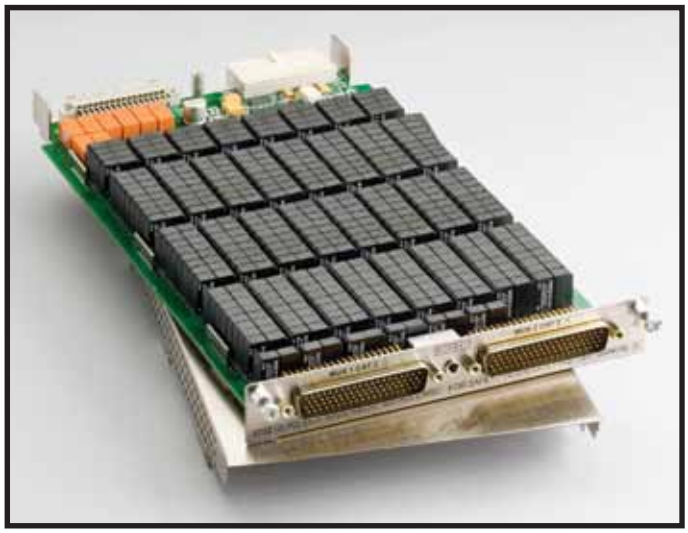
1. Connections made using 3731-ST.
2. 3706A mainframe with all DMM backplane relays disconnected.

3732

Quad 4×28, Ultra-High Density, Reed Relay Matrix Card

448 one-pole crosspoints with bank configuration and backplane connection relays

- **Four independent banks of 4×28 single pole matrices**
- **200V, 1.2A carry or 0.75A switched signal capacity; 15W, 15VA**
- **Bank configuration relays enable alternative matrix sizes, including:**
  - **Dual 4×56 (1 wire)**
  - **Single 4×112 (1 wire)**
  - **Single 4×56 (2 wire)**
- **Optional accessory, Model 3732-ST-R, enables screw terminal access and additional matrix sizes including:**
  - **Dual 8×28 (1 wire)**
  - **Single 16×28 (1 wire)**
  - **Single 8×28 (2 wire)**
- **Analog backplane connection relays provide easy card-to-card column expansion**
- **Long life dry reed relays (>10^9 operations)**
- **Ideal for high channel count I-V testing with Series 2600A System SourceMeter® Instruments**



The ultra-high density Model 3732 matrix card is comprised of four banks, each with 4 rows by 28 columns of reed relays. This provides 448 single-pole crosspoints for maximum connection versatility in high channel count applications. For even greater flexibility, bank configuration relays are mounted on the card. They offer an automated method of connecting banks to enable two additional matrix configurations: single 4×112 and dual 4×56. This feature allows the matrix size to be easily adapted to existing or future applications. For differential (2-wire) measurements, a two-pole mode can be selected that enables automatic pairing of crosspoints to create a dual 4×28 or single 4×56 configuration. For larger matrix sizes, analog backplane relays are provided that enable rows to connect to the Series 3700A mainframe backplane. This allows, for example, a matrix of up to 4 rows by 672 columns within a single 3706A mainframe using six Model 3732 cards.

The card uses optimized reed relays that offer both low contact potential and low current offset to minimize the switching errors that often accompany this relay technology. Additionally, these relays provide greater signal voltage (200V) and current (1.2A carry) dynamic range while supporting the long life and fast actuation times necessary in many automated test applications.

The Model 3732 uses two 78-pin male D-sub connectors for signal and configuration connections. For screw terminal connections, two accessories are offered. Use the 3732-ST-R for the 16×28 or dual 8×28 matrix configurations. Use the 3732-ST-C for the 4×112, dual 4×56, or base quad 4×28 matrix configurations.

Ordering Information

3732	**Quad 4×28, Ultra-High Density, Reed Relay Matrix Card**

ACCESSORIES AVAILABLE

3732-ST-C	Screw Terminal Block for matrix configurations: Quad 4×28 (1 wire) Dual 4×28 (2 wire) Single 4×56 (2 wire) Dual 4×56 (1 wire) Single 4×112 (1 wire)
3732-ST-R	Screw Terminal Block for matrix configurations: Dual 8×28 (1 wire) Single 8×28 (2 wire) Single 16×28 (1 wire)
3732-MTC-1.5	78-pin, D-sub Female-to-Male Cable, 1.5m (5 ft.)
3732-MTC-3	78-pin, D-sub Female-to-Male Cable, 3m (10 ft.)
3791-CIT	Contact Insertion and Extraction Tool
3791-KIT78-R	78-pin, Female D-sub Connector Kit (contains 2 female D-sub connectors and 156 solder-cup contacts)

SERVICES AVAILABLE

3732-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3732-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3732-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

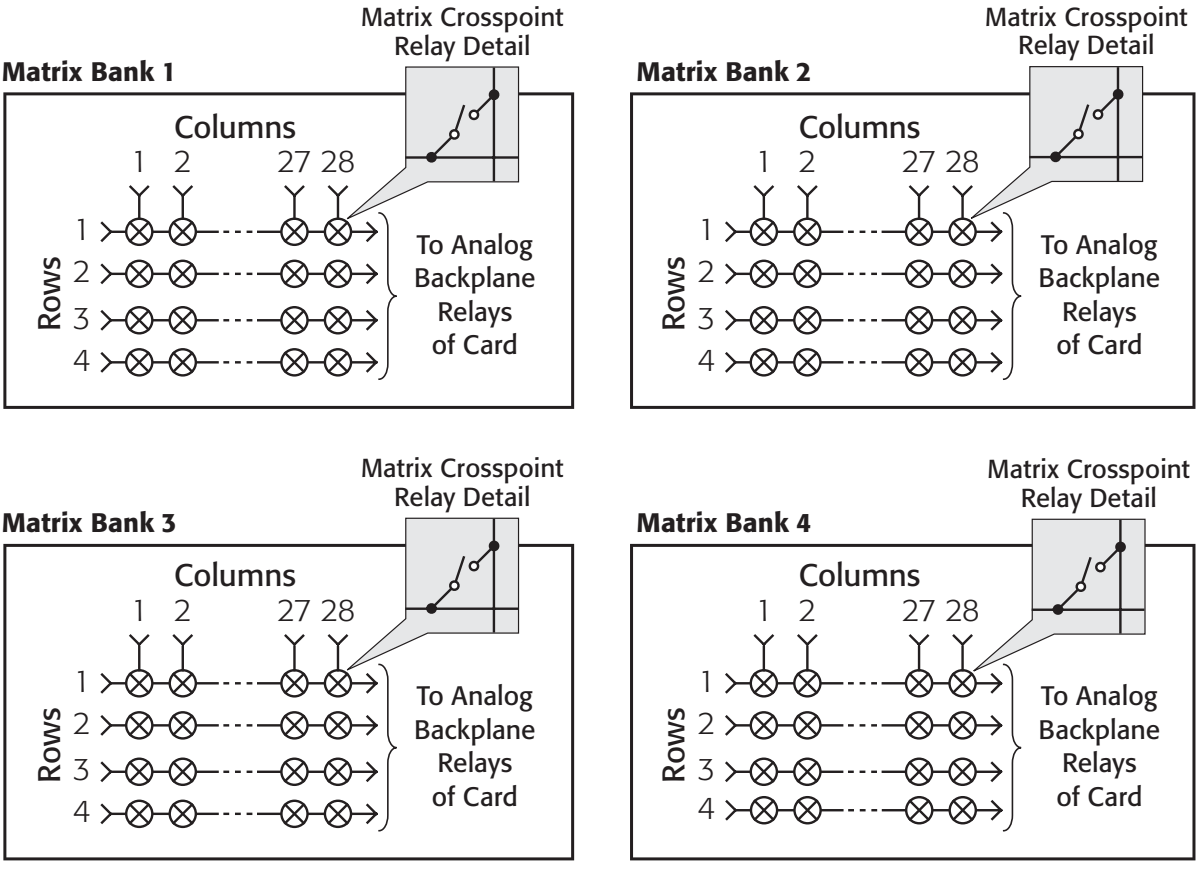
*Not available in all countries

3732

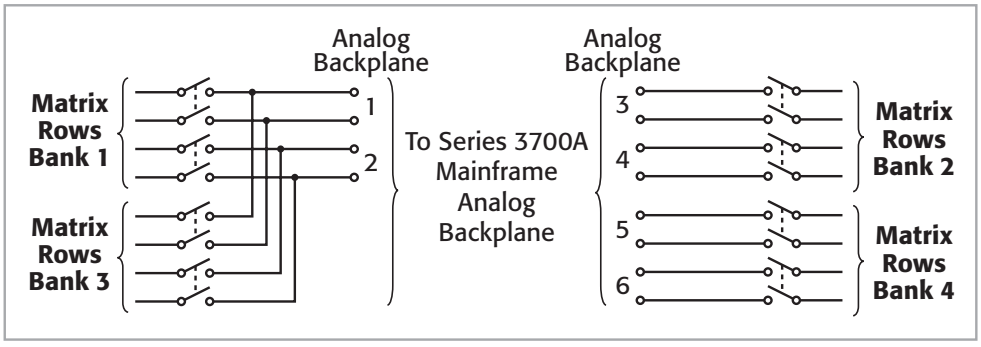
Quad 4×28, Ultra-High Density, Reed Relay Matrix Card

448 one-pole crosspoints with bank configuration and backplane connection relays

Quad 4×28 (1-wire) or Dual 4×28 (2-wire) Matrix Configuration



Analog Backplane Connection Relays

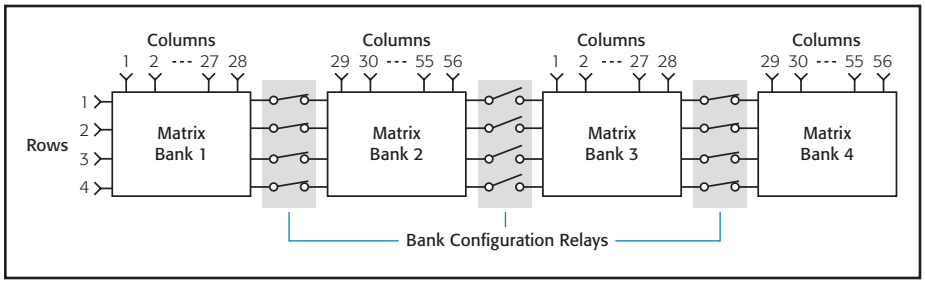


3732

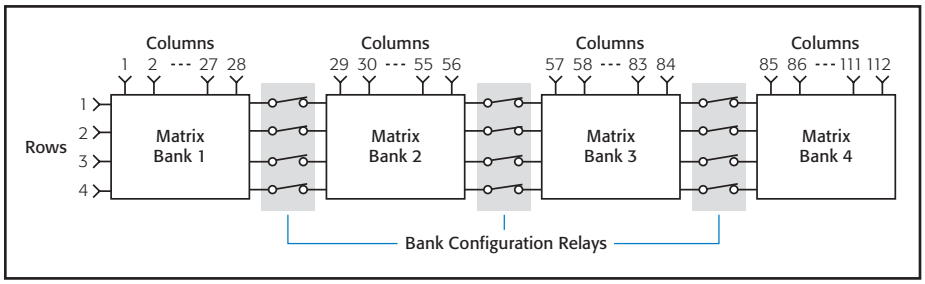
Quad 4×28, Ultra-High Density, Reed Relay Matrix Card

448 one-pole crosspoints with bank configuration and backplane connection relays

Additional Matrix Configurations Using Bank Configuration Relays

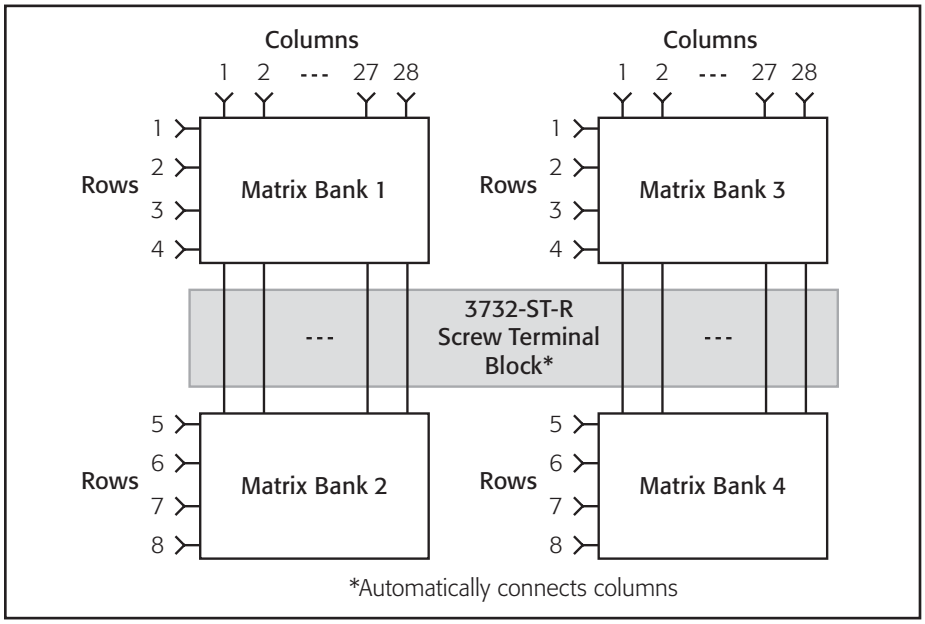


Dual 4×56 (1-wire) or single 4×56 (2-wire) matrix configuration using bank configuration relays

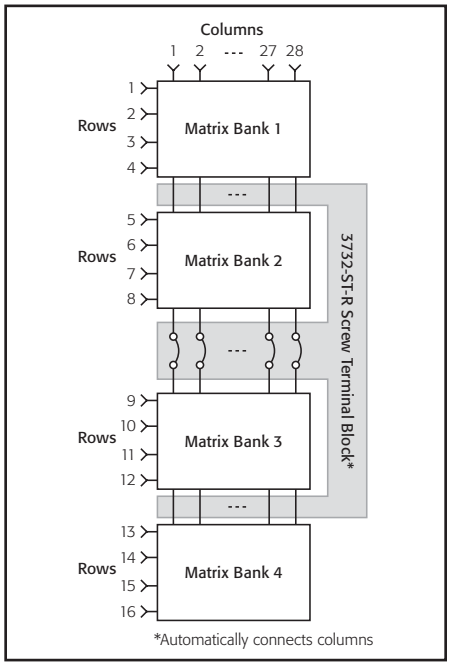


Single 4×112 (1-wire) matrix configuration using bank configuration relays

Additional Matrix Configurations Using the Model 3732-ST-R Screw Terminal Block



Dual 8×28 (1-wire) or single 8×28 (2-wire) matrix configuration using one Model 3732-ST-R screw terminal block



Single 16×28 (1-wire) matrix configuration using one Model 3732-ST-R screw terminal block

3732

Quad 4×28, Ultra-High Density, Reed Relay Matrix Card

448 one-pole crosspoints with bank configuration and backplane connection relays

MATRIX CONFIGURATION: Four banks, each with 4 rows by 28 columns of reed relays. Bank configuration and analog backplane relays are included for additional matrix configurations. Banks can be connected together via relays creating dual 4×56 matrices or a single 4×112 matrix. Row expansion is available using optional screw terminal accessories.

CONTACT CONFIGURATION: Single-pole form A.

CONNECTOR TYPE: Two 78-pin male D-shells.

MODEL 3732-ST-R SCREW TERMINAL OPTION: Provides terminal block access and column jumper blocks for extended row configurations including Dual 8×28 (1W), Single 8×28 (2W), and Single 16×28 (1W).

Typical Wire Size: #22 AWG with 0.062 inch O.D.; 88 conductors per card maximum.

Maximum Wire Size: #16 AWG with 0.092 inch O.D.; 44 conductors per card maximum.

MODEL 3732-ST-C SCREW TERMINAL OPTION: Provides terminal block access for Quad 4×28 (1W), Dual 4×28 (2W), Dual 4×56 (1W), Single 4×56 (2W), and Single 4×112 (1W) matrix configurations.

Typical Wire Size: #22 AWG with 0.062 inch O.D.; 88 conductors per card maximum.

Maximum Wire Size: #16 AWG with 0.092 inch O.D.; 44 conductors per card maximum.

MAXIMUM SIGNAL LEVEL: 200VDC or peak AC, 0.75A switched (1.2A carry), 15W/15VA max. switch power.

COMMON MODE VOLTAGE: 200VDC or peak AC between any signal path to a signal path or ground.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: Reed: $>10^9$ operations no load, $>8\times10^6$ operations @ 100V, 10mA.

EMR (Backplane): $>10^8$ operations @ 5V, 10mA and 10^5 operations at maximum signal level.

MODEL 3732 PARAMETERS

Parameter	Quad 4×28 [1,2]	Dual 4×56 [1,2]	Single 4×112 [1,2]	Dual 8×28 [2,3]	Single 16×28 [2,3]
Channel Resistance (end of life)	<1.5 Ω	<2.0 Ω	<2.5 Ω	<1.6 Ω	<2.0 Ω
Contact Potential (differential)	<±10 μV	<±20 μV	N/A	<±15 μV	N/A
Contact Potential (single ended)	<±20 μV	<±40 μV	<±65 μV	<± 20 μV	<±20 μV
Offset Current	<±0.5 nA	<±1.0 nA	<±2.0 nA	<±1.0 nA	<±2.0 nA
Isolation					
CH-CH	3×10^9 Ω/150 pF	1.5×10^9 Ω/300 pF	7.5×10^8 Ω/600 pF	2×10^9 Ω/200 pF	1.5×10^9 Ω/300 pF
Common mode	1.5×10^9 Ω/300 pF	1.5×10^9 Ω/300 pF	7.5×10^8 Ω/600 pF	2×10^9 Ω/200 pF	1.5×10^9 Ω/300 pF
Crosstalk Ch-Ch					
300 kHz	<–37 dB	<–37 dB	<–37 dB	<–37 dB	<–37 dB
1 MHz	<–26 dB	<–26 dB	<–26 dB	<–26 dB	<–26 dB
15 MHz	< –7 dB	< –7 dB	< –7 dB	< –7 dB	< –7 dB
Bandwidth	15 MHz	15 MHz	10 MHz	15 MHz	15 MHz

1. Connections made using Model 3732-ST-C.
2. Model 3706A mainframe with all DMM backplane relays disconnected.
3. Connections made using Model 3732-ST-R.

GENERAL SPECIFICATIONS

POWER BUDGET INFORMATION:

Quiescent Power Usage:

Mode	Quiescent Power
Quad 4×28	780 mW
Dual 4×56	916 mW
Single 4×112	984 mW
Dual 8×28	780 mW
Single 16×28	780 mW

Channel Relay Power Consumption (each): 17mW.

Backplane Relay Power Consumption (each): 100mW.

For additional power-budgeting information, refer to the Series 3700A Module Schematics and Connections section in the Series 3700A User's Manual (part no. 3700S-900-01).

ACTUATION TIME: 0.6ms.

RELAY TYPE: Reed (signal relays); EMR (backplane relays)

RELAY DRIVE SCHEME: Direct drive.

RELAY DRIVE CURRENT: 3.2mA.

INTERLOCK: Backplane relays disabled when terminal assembly interlock signal removed. When asserted allows system to read and save ID configuration bits.

EMC: Compliant with European Union EMC Directive.

SAFETY: Compliant with European Union Law Voltage Directive.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% relative humidity at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

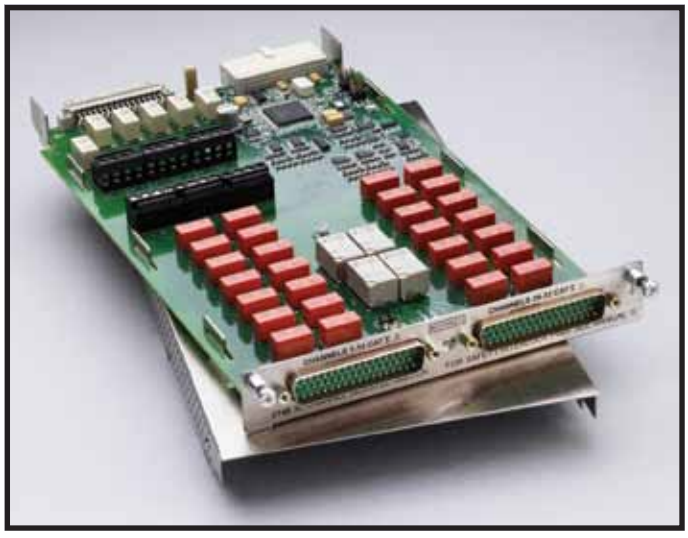
WEIGHT: 3.40 lbs (1.54kg).

3740

32-channel Isolated Switch Card

28 Form C relays and 4 high power Form A relays

- **28 general purpose Form C relays rated for 300V, 2A switched or 3A carry signal capacity; 60W, 125VA**
- **4 high current Form A relays rated for 250VAC, 7A or 30VDC, 7A switched capacity; 210W**
- **Analog backplane connection relays provided for user interconnections**
- **Screw terminal connections provided on removable 3740-ST accessory**
- **Relay closures stored in onboard memory**
- **Latching electromechanical relays**



The Model 3740 offers 28 general-purpose form C channels that are ideal for routing power or other control devices. For higher power applications of up to 7A, four additional high current form A channels are provided.

If any general purpose signal requires routing to the Series 3700A mainframe backplane, terminal blocks are located on the card, which are enabled with jumpers. Custom configurations can be created with the user accessible terminal blocks. For additional protection, an onboard temperature sensor will notify the mainframe when the card's operating temperature exceeds 70°C, compromising system specifications.

The Model 3740 uses two 50-pin male D-sub connectors for signal connections. For screw terminal connections, use the detachable Model 3740-ST accessory.

Ordering Information

3740 **General Purpose Card with 32 Independent Channels**

ACCESSORIES AVAILABLE

3721-MTC-1.5	50 Pin D-sub Female to Male Cable, 1.5m (5 ft.)
3721-MTC-3	50 Pin D-sub Female to Male Cable, 3m (10 ft.)
3740-ST	Screw Terminal Block
3790-KIT50-R	50 Pin Female D-sub Connector Kit (contains 2 female D-sub connectors and 100 solder cup contacts)

SERVICES AVAILABLE

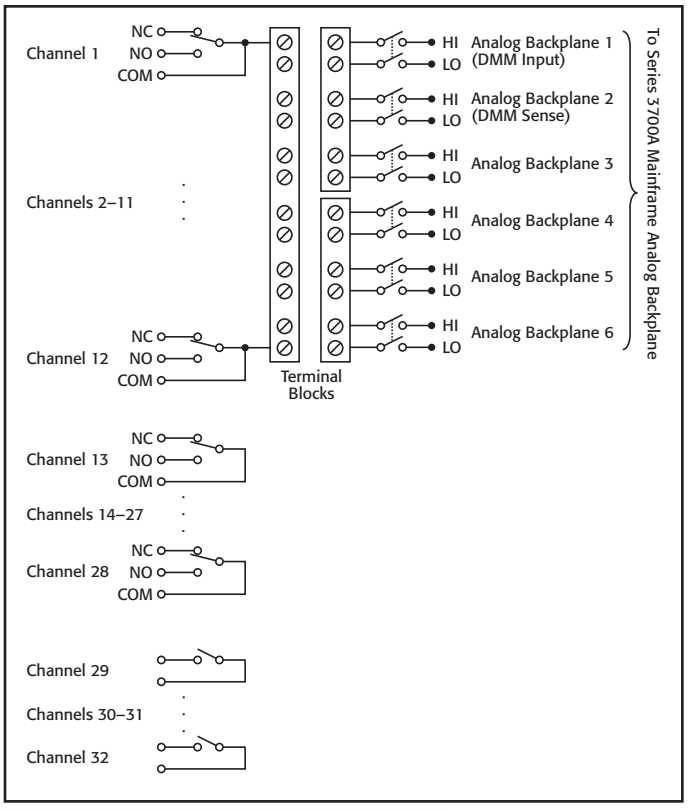
3740-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3740-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3740-3Y-STD	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

3740

32-channel Isolated Switch Card

28 Form C relays and 4 high power Form A relays



RELAY SWITCH CONFIGURATION: 32 general purpose independent channels. 28 channels of Form C switching at 2A and 4 channels of Form A switching at 7A. Relays can be connected to each other and backplane via removable terminal blocks.

CONTACT CONFIGURATION: General Purpose: 1 pole Form C. **High Current**: 1 pole Form A.

CONNECTOR TYPE: Two 50 pin male D-shells.

MODEL 3740-ST SCREW TERMINAL OPTION: #22 AWG typical wire size with 0.062 inch O.D. 84 conductors maximum. #16 AWG maximum wire size with 0.092 inch O.D. 44 conductors per card maximum.

MAXIMUM SIGNAL LEVEL: **Form C:** 300V DC or RMS, 2A switched (3A carry), 60W, 125VA. **Form A:** 250VAC 7A, 30VDC 7A, 210W.

COMMON MODE VOLTAGE: 300V DC or RMS between any terminal and chassis.

VOLT-HERTZ LIMIT: 8×10^7.

CONTACT LIFE: **Form** C: $>10^5$ operations at maximum signal level. $>10^8$ operations no load.[1] **Form** A: $>10^5$ operations at maximum signal level, $>5\times10^7$ operations no load.[1]

CHANNEL RESISTANCE (end of contact life): <0.5Ω.

CONTACT POTENTIAL: <±3μV typical per contact.

ISOLATION: Channel-channel: 10^9Ω, <200pF. **Common Mode: >**10^{10}Ω, <150pF.

Crosstalk (Channel-channel, 50Ω load–50Ω source): 100kHz: <–50dB. **1MHz:** <–35dB. **10MHz:** <–15dB.

BANDWIDTH: 30MHz.

GENERAL

OVER-TEMPERATURE: Temperature sensor indicates over temperature.

ACTUATION TIME: Form C: 4ms. **Form A:** 10ms.

RELAY TYPE: Form C: Latching electromechanical. **Form A:** Nonlatching electromechanical.

RELAY DRIVE SCHEME: Direct.

INTERLOCK: Backplane relays disabled when interlock connection is removed.

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 2.5 lbs.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

NOTES

1. Minimum signal level 10mV, 10μA.

3750

Multifunction Control Card

40 digital I/O bits, 2 analog output channels, and 4 counters

- **40 bidirectional digital input/output bits**
- **High current driver outputs for sinking (300mA)**
- **Internal 5V, 50mA logic supply for powering external logic circuits**
- **2 isolated analog output channels, programmable to ±12V, 0–20mA, or 4–20mA**
- **4 gated 32-bit counters with 1MHz input rate**
- **Screw terminal connections provided with removable 3750-ST accessory**
- **External supply voltage supported on digital I/O**

Use the Model 3750 to monitor and control your automated test system. The flexibility and speed provided by the 40 digital I/O bits, four counters, and two analog outputs make it well-suited for a wide variety of system control applications.

Digital I/O

The Model 3750 offers 40 digital I/O bits arranged in five banks. Each bank is comprised of eight bits each, and each bank can be programmed as either input or output. Digital I/O is often used to control processes and monitor the status of switches, contacts, and other control points. Additional features include scanning capabilities, such as writing a unique output pattern or reading banks of inputs at rates up to 1000 rdgs/second. Also, pattern matching is available, making it ideal for complex event algorithms.

Further versatility is provided by supporting external voltage levels of up to 30V and output current sink levels of 300mA for control of external devices like RF/microwave relays.

Analog Outputs

The two analog outputs of the Model 3750 are designed for general purpose applications such as setpoint control or as bias supplies to your device under test. For maximum utility, these outputs are programmable as voltage (±12V) or current (0–20mA or 4–20mA). A number of protection features are provided, including monitoring for current and/or voltage compliance and the ability to disconnect automatically during fault conditions. Output relays are supplied for each channel, ensuring mechanical isolation between your control device and the analog output.

Counters

Four 32-bit counters are provided with a maximum input rate of 1MHz. Each counter has a gate input that offers precise control of event counting and totalizing for a broad range of system components, such as: fixtures, limit switches, pass/fail indicators, revolutions, or time-related quantities. The counters, like the digital I/O, can be used in scanning operations and pattern matching as well as supporting reading rates of up to 1000 rdgs/second.

Self-calibration

When your Model 3706A mainframe is equipped with the high performance multimeter option, hardware and software is provided for self-calibration of analog outputs (voltage and current) and counter thresholds.

Ordering Information

3750 **Multifunction Control Card**

ACCESSORIES AVAILABLE

3721-MTC-1.5	50-pin female-to-male D-sub Cable Assembly, 1.5m (4.9 ft)
3721-MTC-3	50-pin female-to-male D-sub Cable Assembly, 3m (9.8 ft)
3750-ST	Screw Terminal Block
3790-KIT50-R	50-pin female D-sub Connector Kit (contains 2 D-sub connectors and 100 solder cup contacts)

SERVICES AVAILABLE

3750-3Y-EW-STD	1-year factory warranty extended to 3 years from date of shipment
3750-5Y-EW-STD	1-year factory warranty extended to 5 years from date of shipment
C/3750-3Y-DATA	3 (Z540-1 compliant) calibrations within 3 years of purchase*

*Not available in all countries

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3750 Multifunction Control Card

40 digital I/O bits, 2 analog output channels, and 4 counters

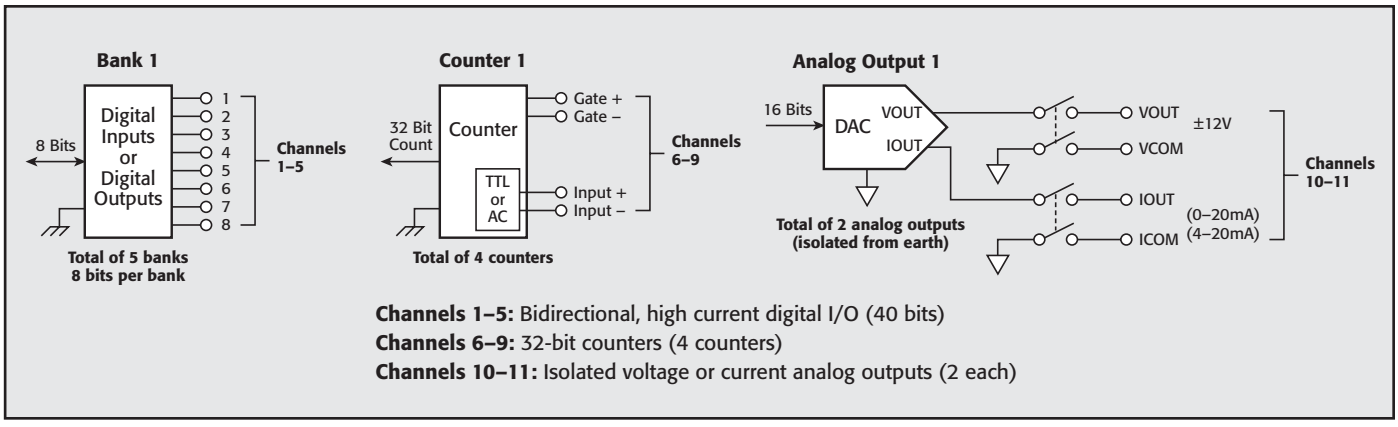

Figure 1. Block diagram

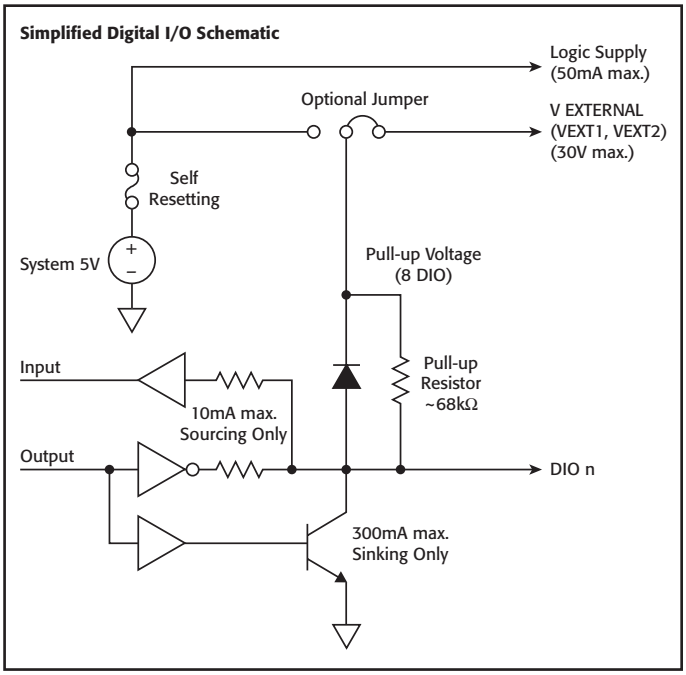

Figure 2. Simplified I/O schematic

Specifications

DIGITAL I/O[1]

CONFIGURATION: 40 bidirectional digital I/O bits arranged in 5 banks of 8 bits each. Each bank can be configured for either input or output capability. 1 bank of I/O is equivalent to 1 system channel.

DIGITAL INPUT SPECIFICATIONS

An internal weak pull-up resistor of approximately 68kΩ is provided on the card for each I/O. This pull-up resistor can be removed via onboard jumper on a channel (8 bit) basis. The pull-up voltage can either connect to the internally supplied 5V or an externally supplied voltage of up to 30V via onboard jumper. An internal 5V supply connection is separately available to run external logic circuits.

DIGITAL INPUT LOGIC LOW VOLTAGE: 0.8V max.

DIGITAL INPUT LOGIC HIGH VOLTAGE: 2V min.

DIGITAL INPUT LOGIC LOW CURRENT: –600μA max @ 0V.

DIGITAL INPUT LOGIC HIGH CURRENT: 50μA max @ 5V.

LOGIC: Positive true.

SYSTEM INPUT MINIMUM READ SPEED[2]: 1000 readings/second.

MAXIMUM EXTERNALLY SUPPLIED PULL-UP VOLTAGE: 30V.

MAXIMUM EXTERNALLY SUPPLIED VOLTAGE TO ANY DIGITAL I/O LINE: Pull-up voltage (5V internal or up to 30V external).

DIGITAL OUTPUT SPECIFICATIONS

Each output has an internal fly-back diode for driving inductive loads. Each output is protected against continuous short circuits and over temperature. An internal 5V supply connection is separately available to run external logic circuits.

DIGITAL OUTPUT LOGIC HIGH VOLTAGE: 2.4V minimum @ Iout = 10mA, sourcing only.

DIGITAL OUTPUT LOGIC LOW VOLTAGE: 0.5V maximum @ Iout = -300mA, sinking only.

MAXIMUM OUTPUT SINK CURRENT: 300mA per output, 3.0A total per card.

LOGIC: Positive true.

SYSTEM OUTPUT MINIMUM WRITE SPEED[3]: 1000 readings/second.

MAXIMUM EXTERNALLY SUPPLIED VOLTAGE TO ANY DIGITAL I/O LINE: Pull-up voltage (5V internal or up to 30V external).

ALARM: Trigger generation is supported for a maskable pattern match or state change on any of channels 1 through 5.

PROTECTION: Optional disconnect (set to inputs) during output fault conditions.

INTERNAL 5V LOGIC SUPPLY: The internal logic supply is designed for powering external logic circuits of up to 50mA maximum. The logic supply is internally protected with a self-resetting fuse. Fuse reset time < 1 hour.

NOTES

1. All channels power up configured as inputs.
2. All channels configured as inputs.
3. All channels configured as outputs.

3750 Multifunction Control Card

40 digital I/O bits, 2 analog output channels, and 4 counters

COUNTER/TOTALIZER INPUT

MAXIMUM COUNT: $2^{32} - 1$.

MAXIMUM INPUT RATE: 1MHz, rising or falling edge, programmable.

MINIMUM INPUT PULSE WIDTH: 500ns.

INPUT SIGNAL LEVEL: 200mV p-p (minimum), 42V peak (maximum).

THRESHOLD: AC (0V) or TTL logic level.

GATE INPUT: TTL–HI (Gate+), TTL–LO (Gate–) or NONE.

MINIMUM GATE INPUT SETUP TIME: 1µs.

COUNT RESET: Manual or Read + Reset.

SYSTEM INPUT MINIMUM READ SPEED: 1000 readings/second.

ALARM: Trigger generation is supported for a count match or counter overflow on any of channels 6 though 9.

ANALOG VOLTAGE OUTPUT

The isolated analog voltage output is designed for general purpose, low power applications.

OUTPUT AMPLITUDE[1]: ±12V up to 10mA.

OVERLOAD CURRENT: 21mA minimum.

RESOLUTION: 1mV.

FULL SCALE SETTLING TIME[2]: 1ms to 0.1% of output.

DC ACCURACY[3] ±(% of output + mV):
1 Year 23° ±5°C: 0.15% + 16mV.
90 Day 23° ±5°C: 0.1% + 16mV.
24 Hour 23° ±5°C: 0.04% + 16mV.

TEMPERATURE COEFFICIENT: ±(0.02% + 1.2mV)/°C.

10mV MAXIMUM UPDATE RATE: 350µs to 1% accuracy. System limited.

OUTPUT FAULT DETECTION: System fault detection is available for short circuit output/current compliance.

ISOLATION: 300V peak channel to channel or channel to chassis.

PROTECTION: Optional disconnect during output fault conditions.

MINIMUM GUARANTEED STABLE CAPACITIVE LOAD: 10nF.

NOTES

1. Programming up to 1% over full scale range is supported.
2. Measured with standard load shown in Figure 3.
3. Measured with >10MΩ input DMM (DCV, filter, 1 PLC rate). Warm-up time is 1 hour @ 10mA load with 3750-ST.

ANALOG CURRENT OUTPUT

The isolated analog current output is designed for 0–20mA or 4–20mA unipolar modes of operation.

OUTPUT AMPLITUDE: 0 to 20mA or 4 to 20mA.

COMPLIANCE VOLTAGE: 11V minimum.

MAXIMUM OPEN CIRCUIT VOLTAGE: 16V.

RESOLUTION: 1µA.

FULL SCALE SETTLING TIME[1]: 1ms to 0.1% of output.

DC ACCURACY[2] ±(% of output + µA):
1 Year 23° ±5°C: 0.15% + 18µA.
90 Day 23° ±5°C: 0.1% + 18µA.
24 Hour 23° ±5°C: 0.04% + 18µA.

TEMPERATURE COEFFICIENT: ±(0.02% + 1.6µA)/°C.

OUTPUT FAULT DETECTION: System fault detection is available for open circuit output/voltage compliance.

ISOLATION: 300V peak channel to channel or channel to chassis.

PROTECTION: Optional disconnect during output fault conditions.

NOTES

1. Measured with standard load shown in Figure 3.
2. Measured with <2Ω shunt DMM (DCI, filter, 1 PLC rate). Warm-up time is 1 hour with 3750-ST.

GENERAL

CONNECTOR TYPE: Two 50-pin male D-shells.

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 70% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 1.27kg (2.80 lbs.).

SAFETY: Conforms to European Union Directive 73/23/EEC, EN61010-1.

EMC: Conforms to European Union Directive 2004/108/EC, EN61326-1.

POWER BUDGET INFORMATION:
Quiescent Power: 3300mW.
Digital Outputs Each Channel (1 through 5): 325mW.
Analog Channel Each (10 and 11): 820mW.
Totalizer Channel All (6 through 9): 730mW.

Analog channels and counter channels may optionally be turned off to conserve system power.

See Chapter 8 of the Series 3700A user's manual for more detailed information.

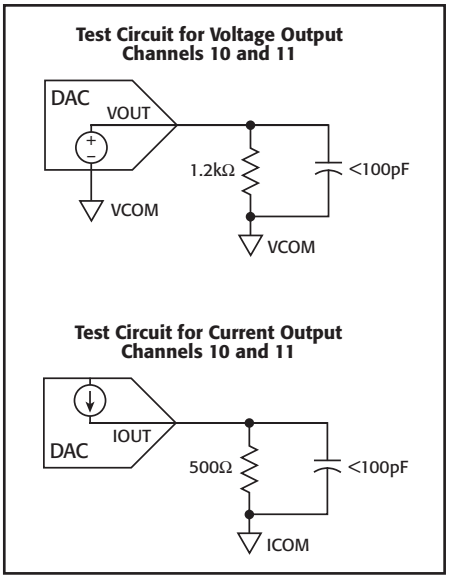

Figure 3. Standard load test circuits

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