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Introduction

This instruction sheet contains information about the Keithley Instruments Model Series 3700 Dual 1x30 FET Multiplexer Card connector pins, safety precautions, and product specifications.

WARNING	*The following information is intended for qualified service personnel. Do not make module connections unless qualified to do so.*
	To prevent electric shock that could result in serious injury or death, adhere to the following safety precautions:
	Before removing or installing a switch module in the mainframe, make sure the mainframe is turned off and disconnected from line power.
	Before making or breaking connections, make sure the power is removed from all external circuitry.
	Do not connect signals that may exceed the maximum specifications of the model or external wiring. Specifications for each circuit board are provided in the Series 3700 User's Manual.

WARNING	*All wiring must be rated for the maximum voltage in the system. For example, if 300V is applied to the backplane connector, all module wiring must be rated for 300V.*

Information related to reading, writing, and controlling channels, as well as scanning, can be found in the Series 3700 System Switch/Multimeter User's Manual. Detailed information about controlling the Series 3700 from a remote interface can be found in the Series 3700 System Switch/Multimeter Reference Manual.
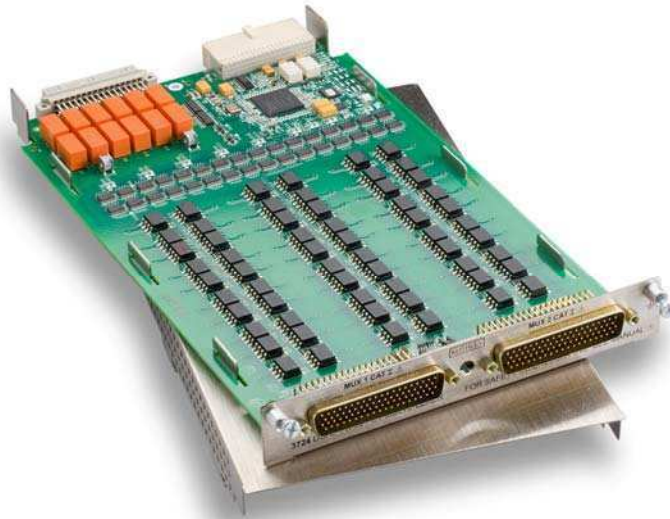
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Model 3724 Dual 1x30 FET Multiplexer Specifications

The Model 3724 has 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 3700 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 3724 include its ability to be reconfigured to coordinated four-pole operation for additional measurement flexibility. Furthermore, the Model 3724 supports thermocouple-type temperature measurements 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.

Figure 1: Model 3724 Dual 1x30 FET Multiplexer

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Model 3724 pin connections

Figure 2: Model 3724 connection information

NOTE

Connector location: [MUX 1]   [MUX 2]

○ = reserved
○ = unavailable.
Backplane interlock satisfied by connecting +ILK and –ILK

Measurement considerations

The Model 3724 Dual 1x30 FET Multiplexer card uses FET relays for switching; FETs have considerably larger path resistance than that of mechanical relays (typically 58Ω versus a mechanical relay's nominal 2Ω).

The Model 3724 card is specified for ranges 1KΩ or greater in 4-wire ohms mode. The 100Ω range can still be used in 4-wire mode, provided the measured value is less than approximately 50% of range.

The Model 3724 card is not recommended for thermistor measurements. The Model 3706 handles thermistors as two leaded devices and is unable to compensate for the additional path resistance of the Model 3724 card.

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Specifications

DUAL 1X30 MULTIPLEXER CARD

MULTIPLEXER CONFIGURATION: Two independent 1x 30 2-pole Multiplexers. Banks can be connected together via relay creating a single 1 x 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 .062 inch O.D 124 conductors maximum. 16 AWG maximum wire size with .092 inch O.D. 36 conductor per card maximum.

MAXIMUM SIGNAL LEVEL: 200V DC or 141V RMS between any terminal, .1A switched (.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 1x30[1]	Single 1x60[1, 2]
Channel Resistance (HI and LOW Path)	<62Ω (54Ω@23ºC)	<64Ω (58Ω @23ºC)
Contact Potential (differential)	<±2µV	<±2.5µV
Offset Current	<10nA (<±100pA@23ºC/60% R.H.)	<10nA (<±100pA@23ºC/60% R.H.)
Isolation		
Differential	10^9Ω, 500pF	10^9Ω, 1100pF
Bank-Bank	10^9Ω, 100pF	▬
CH –CH	10^9Ω, 125pF	10^9Ω, 125pF
Common mode	10^9Ω, 150pF	10^9Ω, 700pF
Crosstalk CH-CH (50Ω Source, 50 Ω Load) 300KHz: 1MHz:	-40 dB -30 dB	-40 dB -30 dB
Bandwidth (50Ω Source, 50 Ω Load)	2MHz	1MHz

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

GENERAL:

ACTUATION TIME: <0.2ms

TEMPERATURE ACCURACY USING Automatic CJC with 3724-ST accessory:

1ºC 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 0ºC to 50ºC.
Specified to 70% R.H. at 35ºC

STORAGE ENVIRONMENT: -25ºC to 65ºC

WEIGHT: 2.5lb

FIRMWARE: Requires main revision to be 1.20 or above (Applies to all 3706 series mainframes)

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[3]

	Ch/Sec
Sequential scanning, single channel, Immediate Trigger Advance	> 1250

TYPICAL SCANNING SPEEDS, WITH MEASUREMENTS INTO MEMORY[4]

	Ch/Sec
DCV (10V range) or 2W Ohms (1KΩ range)	>1000
Thermocouple	>1000
3 or 4 Wire RTD	>450
4 Wire Ohms1KΩ range)	>450
ACV (10V, 400Hz range)	>1000

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[3] Scanning script local to mainframe, within same bank, break before make.

[4] 3706 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.

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Power Budget Information:

Quiescent Power (milliwatts): 1150
Channel Relay Power (milliwatts) each: 20
Backplane Relay Power Consumption (milliwatts) each: 100
See Chapter 8 of the series 3700 user's manual for more detailed information.

ACCESSORIES AVAILABLE:

3791-KIT78-R 78 pin female D-sub connector kit (Contains 2 female D-sub connectors and 156 solder cups)
3720-MTC-3 78 pin D-sub female to male cable, 3m.
3720-MTC-1.5 78 pin D-sub female to male cable, 1.5m.
3724-ST screw terminal block
3791-CIT Contact insertion and extraction tool.