7700

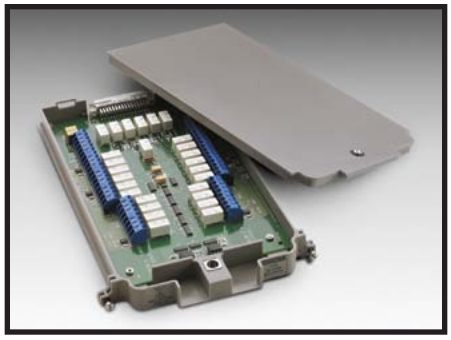
20-channel, Differential Multiplexer Module

with Automatic CJC, Screw Terminals, and up to 50MHz Bandwidth

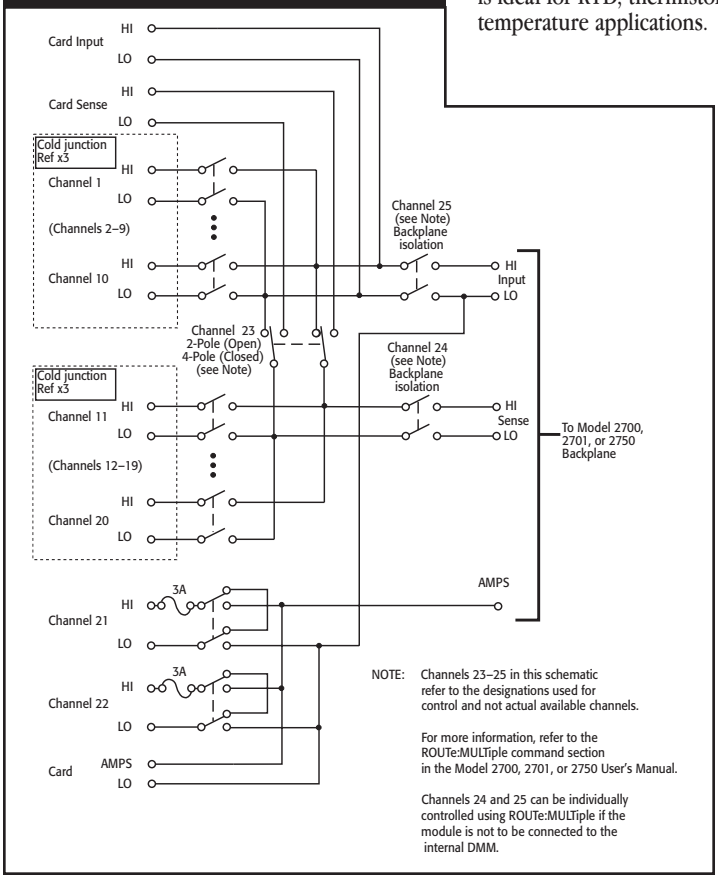
- **20 channels for general-purpose measurements, plus two channels to measure current**
- **Oversize screw terminal connection blocks are standard for easier connections**
- **50MHz bandwidth**
- **300V, 1A capacity for voltage channels; 60W, 125VA**
- **3A capacity for current channels**
- **Low insertion loss of up to 50MHz**
- **Relay closures stored in onboard memory**

Ordering Information

7700 **20-channel, Differential Multiplexer Module with Automatic CJC and Screw Terminals**



The Model 7700 plug-in module offers 20 channels of 2-pole or 10 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. There are two additional protected channels for current measurements. Automatic CJC is provided so that no other accessories are required to make thermocouple temperature measurements. In addition, the Model 7700 contains latching electromechanical relays that enable signal bandwidths of up to 50MHz. The Model 7700 is ideal for RTD, thermistor, and thermocouple temperature applications.



CAPABILITIES

CHANNELS 1-20: Multiplex one of 20 2-pole or one of 10 4-pole signals into DMM.

CHANNELS 21-22: Multiplex one of 2 2-pole current signals into DMM.

INPUTS

MAXIMUM SIGNAL LEVEL:

Channels (1-20): 300V DC or 300V rms (425V peak) for AC waveforms, 1A switched, 60W, 125VA maximum.

Channels (21-22): 60V DC or 30V rms, 3A switched, 60W, 125VA maximum.

CONTACT LIFE (typ.): $>10^5$ operations at max. signal level. $>10^8$ operations no load[1].

[1] Open thermocouple detector on during thermocouple measurements. Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω at end of contact life.

CONTACT POTENTIAL: <±500nV typical per contact, 1μV max. <±500nV typical per contact pair, 1μV max.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: Screw terminal, #20 AWG wire size.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^{10}$Ω, <100pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9$Ω, <200pF.

INSERTION LOSS (50Ω Source, 50Ω Load):

	w/Internal DMM	w/o Internal DMM*
<0.1 dB:	1 MHz	1 MHz
<3 dB:	2 MHz	50 MHz

CROSSTALK (50Ω Load):

	w/Internal DMM	w/o Internal DMM*
10 MHz:	<–40 dB	<–40 dB
25 MHz:	**	<–25 dB

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

TEMPERATURE ACCURACY USING INTERNAL CJC: 1.0°C (see mainframe specification for details).

* Channels 24 and 25 are open. Refer to ROUTe:MULTiple command in 27XX User Manual.

** Not valid.

GENERAL

20 CHANNELS: 20 channels of 2-pole relay input. All channels configurable to 4-pole.

2 CHANNELS: 2 channels of current only input.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. A01, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 0.45kg (1 lb).

ACCESSORY AVAILABLE: Model 7401 Type K Thermocouple Wire, 30.5m (100 ft).

SERVICES AVAILABLE

7700-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

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7701

32-channel Differential Multiplexer Module

- **Configurable for 32 channels of differential measurements, with up to 16 channels of 4-pole measurements**
- **Two female D-shell connectors are standard for secure hook-up and quick teardown**
- **150V, 1A capacity for voltage channels; 60W, 125VA**
- **Relay closures stored in onboard memory**
- **Screw terminal jumpers allow user-configurable DMM connections**

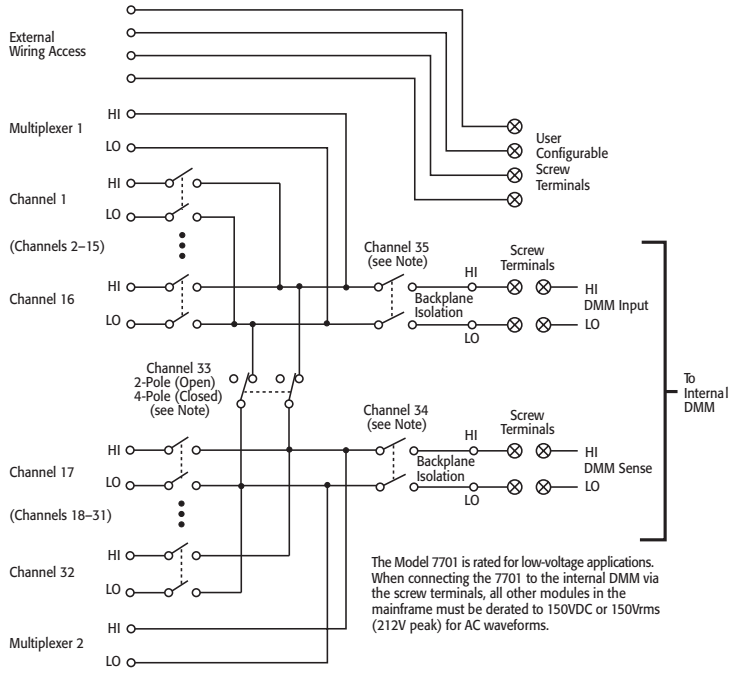
Ordering Information

7701 **32-channel, Differential Multiplexer Module**

Accessories Supplied

Two mating IDC connectors for ribbon cable

The Model 7701 plug-in module offers 32 channels of 2-pole or 16 channels of 4-pole multiplexer switching. Its 32 channels can be configured for common-side 4-wire ohms. They can also be configured as two independent banks of multiplexers. It is ideal for RTD or thermistor temperature applications.



The Model 7701 is rated for low-voltage applications. When connecting the 7701 to the internal DMM via the screw terminals, all other modules in the mainframe must be derated to 150VDC or 150Vrms (212V peak) for AC waveforms.

NOTE: Channels 33–35 in this schematic refer to the designations used for control and not actual available channels.

For more information, refer to the ROUTE:MULT command section in the Model 2700, 2701, or 2750 User's Manual.

CAPABILITIES

CHANNELS 1–32: Multiplex one of 32 2-pole or one of 16 4-pole signals into DMM. Configuration supports dual 1×16 independent multiplexers.

INPUTS

MAXIMUM SIGNAL LEVEL: Any channel to Any Channel (1–32): 150V DC or 150Vrms (212V peak) for AC waveforms, 1A switched, 60W, 125VA maximum.

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

CONTACT LIFE (typ): $>10^5$ operations at max. signal level. $>10^8$ operations no load[1].

[1] Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω any path and additional 1Ω at end of contact life.

CONTACT POTENTIAL: <6μV per contact pair.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: 50-pin female D-shell, Channels 1–24. 25-pin female D-shell, Channels 25–32. Supplied with male IDC ribbon cable connectors.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9\Omega$, <200pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9\Omega$, <400pF.

CROSS TALK (1MHz, 50Ω Load): <–35dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.35dB below 1MHz. <3dB below 2MHz.

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

GENERAL

32 CHANNELS: 32 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. B03, Model 2701 rev. A01, and Model 2750 rev. A01 or higher.

DMM CONNECTIONS: Screw terminals provide internal DMM connections to channels 34 and 35 and connections to external wiring access.

ENVIRONMENTAL

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

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: <0.52kg (1.16 lb).

ACCESSORIES AVAILABLE

7789	50/25 Pin Male D-Shell Solder Cup Connectors
7790	50/50/25 Pin Female/Male D-Shell IDC Connectors
7705-MTC-2	50 Pin Male to Female DSUB Cable, 2m (6.6 ft).
7707-MTC-2	25 Pin Male to Female DSUB Cable, 2m (6.6 ft).

SERVICES AVAILABLE

7701-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

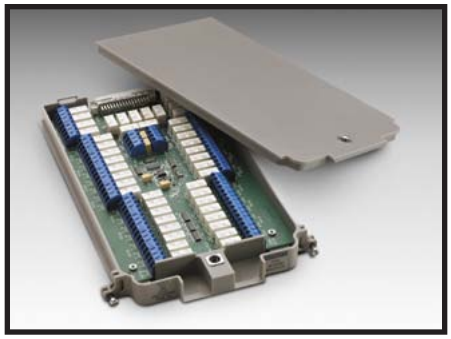
7702

40-channel Differential Multiplexer Module with Screw Terminals

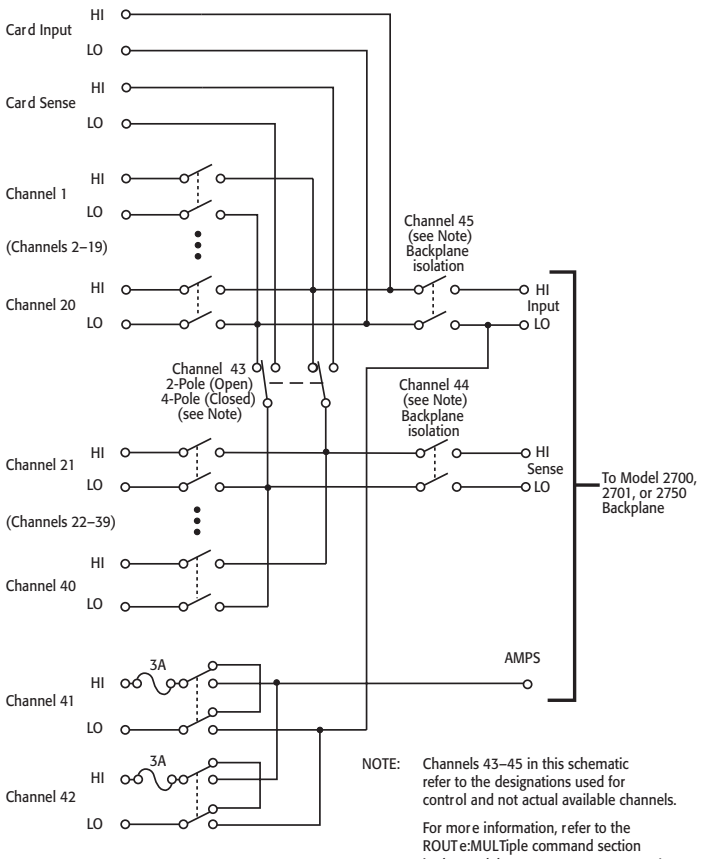
- **40 channels for general-purpose measurements, plus 2 channels to measure current**
- **Two- or four-wire measurement**
- **Oversize screw terminal connection blocks are standard for easier connection**
- **300V, 1A capacity for voltage channels; 60W, 125VA**
- **3A capacity for current channels**
- **Relay closures stored in onboard memory**

Ordering Information

7702 **40-channel Differential Multiplexer Module with Screw Terminals**



The Model 7702 plug-in module offers 40 channels of 2-pole or 20 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. The Model 7702 provides two additional protected channels for current measurements. It is ideal for RTD, thermistor, and thermocouple temperature applications.



NOTE: Channels 43–45 in this schematic refer to the designations used for control and not actual available channels.

For more information, refer to the ROUTe:MULTiple command section in the Model 2700, 2701, or 2750 User's Manual.

Channels 44 and 45 can be individually controlled using ROUTe:MULTiple if the module is not to be connected to the internal DMM.

CAPABILITIES

CHANNELS 1-40: Multiplex one of 40 2-pole or one of 20 4-pole signals into DMM.

CHANNELS 41-42: Multiplex one of 2 2-pole current signals into DMM.

INPUTS

MAXIMUM SIGNAL LEVEL:

Channels (1-40): 300V DC or rms, 1A switched, 60W, 125VA maximum.

Channels (41-42): 60V DC or 30V rms, 3A switched, 60W, 125VA maximum.

CONTACT LIFE (typ): >10^5 operations at max. signal level. >10^8 operations no load[1].

[1] Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω at end of contact life.

CONTACT POTENTIAL:
<±500nV typical per contact, 1μV max.
<±500nV typical per contact pair, 1μV max.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: Screw terminal, #20 AWG wire size.

ISOLATION BETWEEN ANY TWO TERMINALS: >10^{10}Ω, <100pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: >10^9Ω, <200pF.

CROSS TALK (10MHz, 50Ω Load): <–40dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.1dB below 1MHz. <3dB below 2MHz.

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

GENERAL

40 CHANNELS: 40 channels of 2-pole relay input. All channels configurable to 4-pole.

2 CHANNELS: 2 channels of current only input.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. A01, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 0.5kg (1.1 lb).

SERVICES AVAILABLE

7702-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

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7703

32-channel, High Speed, Differential Multiplexer Module

- **32 channels for general purpose measurements**
- **Relay actuation time of less than 1ms for high-speed scanning**
- **Two- or four-wire measurement**
- **Two 50-pin female D-sub connectors are standard for secure hook-up and quick teardown**

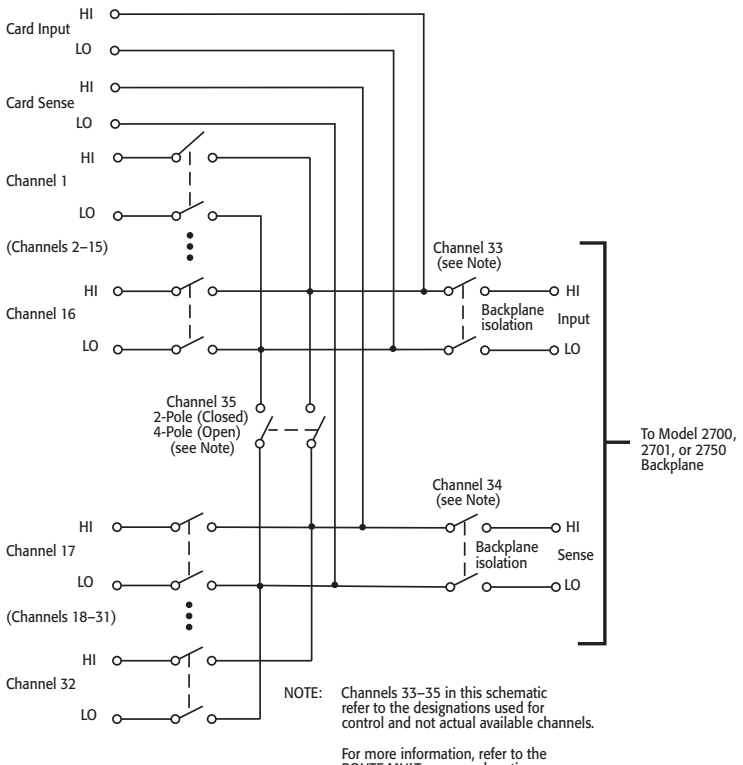
Ordering Information

7703 **32-channel, High Speed, Differential Multiplexer Module**

Accessories Supplied

Two mating connectors with solder cup (Model 7788)

The Model 7703 plug-in module offers 32 channels of 2-pole or 16 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. The non-latching reed relays provide high speeds and are designed for 300 volt, 500mA; 10VA. The relay closures are stored in onboard memory. The Model 7703 is ideal for RTD and thermistor temperature applications.



NOTE: Channels 33–35 in this schematic refer to the designations used for control and not actual available channels.

For more information, refer to the ROUTE:MULT command section in the Model 2700, 2701, or 2750 User's Manual.

CAPABILITIES

CHANNELS 1–32: Multiplex one of 32 2-pole or one of 16 4-pole signals into DMM.

INPUTS

MAXIMUM SIGNAL LEVEL:

Channels (1–32): 300V DC or rms, 0.5A switched, 10W maximum.

Contact Life (typ): $>5\times10^4$ operations at max. signal level. $>10^8$ operations cold switching.

CONTACT RESISTANCE: <1Ω at end of contact life.

CONTACT POTENTIAL:
<±3μV typical per contact, 6μV max.
<±3μV typical per contact pair, 6μV max.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: 50 pin D-sub ×2.

RELAY DRIVE CURRENT: 20mA per channel.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9\Omega$, <200pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9\Omega$, <400pF.

CROSS TALK (1 MHz, 50Ω Load): <–40dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.35dB below 1MHz. <3dB below 2MHz.

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

GENERAL

32 CHANNELS: 32 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Reed.

ACTUATION TIME: <1ms.

FIRMWARE: Specified for Model 2700 rev. A01, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 0.8kg (1.75 lbs).

ACCESSORIES AVAILABLE

7705-MTC-2	50 Pin Male to Female DSUB Cable, 2m (6.6 ft).

SERVICES AVAILABLE

7703-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

7705

40-channel, Single-pole Control Module

- **300V, 2A capacity**
- **Two 50-pin female D-sub connectors are standard for secure hook-up and quick teardown**
- **Relay closures stored in onboard memory**

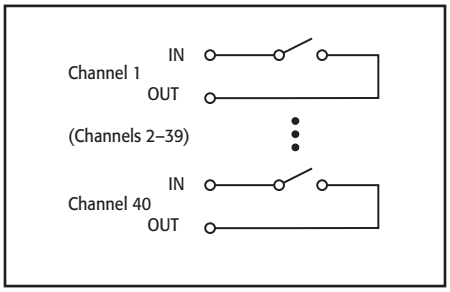
Ordering Information

7705 **40-channel, Single-pole Control Module**

Accessories Supplied

Two mating connectors with solder cup (Model 7788)

The Model 7705 plug-in module offers 40 channels of independent switching. These channels are designed to control power to the DUT and switching loads. They can also directly control light indicators, relays, etc.



INPUTS

MAXIMUM SIGNAL LEVEL: 300VDC or rms, 2A switched, 60W (DC, resistive), 125VA (AC, resistive).

CONTACT LIFE: No Load[1]: 10^8 closures.
At Maximum Signal Levels: 10^5 closures.

[1] Minimum signal level 10mV, 10μA.

CHANNEL RESISTANCE (per conductor): <1Ω.

CONTACT POTENTIAL: ≤4μV per contact.

OFFSET CURRENT: <100pA.

ACTUATION TIME: 3ms.

ISOLATION: Channel to Channel: $>10^9\Omega$, <50pF.
Common Mode: $>10^9\Omega$, <100pF.

CROSSTALK (1MHz, 50Ω load): <–35dB.

INSERTION LOSS (50Ω source, 50Ω load): <0.3dB below 1MHz, <3dB below 10MHz.

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

GENERAL

RELAY SWITCH CONFIGURATION: 40 independent channels of 1-pole switching. Isolated from internal DMM.

CONTACT CONFIGURATION: 1 pole Form A.

RELAY TYPE: Latching electromechanical.

CONNECTOR TYPE: Two 50-pin female D-sub connectors.

FIRMWARE: Specified for Model 2700 rev. A01, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C.
Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 0.45kg (1 lb).

ACCESSORIES AVAILABLE

7705-MTC-2	50 Pin Male to Female DSUB Cable, 2m (6.6 ft).

SERVICES AVAILABLE

7705-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

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7706

All-in-One I/O Module

20-channel Differential Multiplexer w/Automatic CJC, 16 Digital Outputs, 2 Analog Outputs, a Counter/Totalizer, and Screw Terminals

- **20 channels of analog input (w/automatic CJC) for general-purpose measurements**
- **16 channels of digital output**
- **2 analog outputs (±12V, 5mA)**
- **300V, 1A capacity; 60W, 125VA maximum**
- **Configurable as two independent banks of multiplexers**
- **Relay closures stored in onboard memory**

Ordering Information

7706 **All-in-One I/O Module**

SERVICES AVAILABLE

7706-3Y-EW 1-year factory warranty extended to 3 years from date of shipment

The Model 7706 plug-in module offers 20 channels of 2-pole or 10 channels of 4-pole multiplexer switching with automatic CJC, as well as two analog output channels, 16 digital outputs, and one event counter/totalizer. The event counter/totalizer can be used to monitor and control system components, such as fixtures, limit switches, pass/fail indicators, external voltage sources, loads, door closures, revolutions, etc., while performing mixed signal measurements. The Model 7706 is ideal for RTD, thermistor, and thermocouple temperature applications.

CAPABILITIES

CHANNELS 1–20: Multiplex one of 20 2-pole or one of 10 4-pole signals into DMM.

Channels 21–25 are referenced to chassis ground.

CHANNELS 21–22: 16 Digital Outputs.

CHANNELS 23–24: Analog Voltage Output (2).

CHANNELS 25: Totalize Input.

INPUTS

MAXIMUM SIGNAL LEVEL (Channels 1–20): 300V DC or rms, 1A switched, 60W, 125VA maximum.

CONTACT LIFE (typ.): $>10^5$ operations at max. signal level; $>10^8$ operations no load[1].

[1] Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω at end of contact life.

CONTACT POTENTIAL: <±2μV typical per contact, 3μV max.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: Screw terminal, #20 AWG wire size.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9$Ω, <100pF.

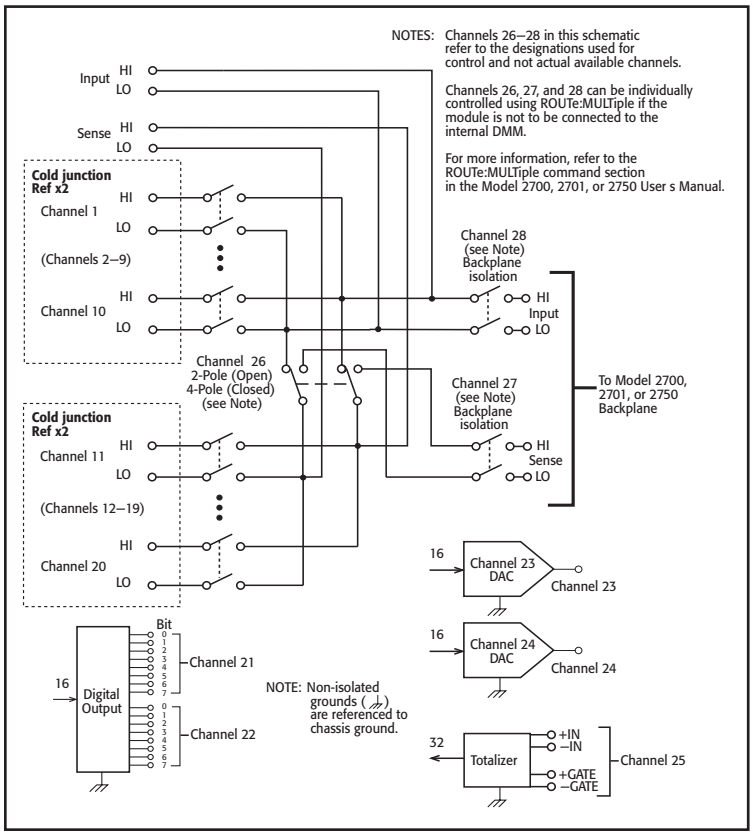
ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9$Ω, <200pF.

CROSS TALK (10MHz, 50Ω Load): <–35dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.1dB below 1MHz. <3dB below 2MHz.

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

TEMPERATURE ACCURACY USING INTERNAL CJC: 1.0°C (see mainframe specification for details).



TOTALIZE INPUT

MAXIMUM COUNT: 2^{32}–1.

TOTALIZE INPUT: 100kHz (max), rising or falling edge, programmable.

SIGNAL LEVEL: 1Vp-p (min), 42Vpk (max).

THRESHOLD: 0V or TTL, jumper selectable.

GATE INPUT: TTL-Hi, TTL-Lo, or none.

COUNT RESET: Manual or Read+Reset.

READ SPEED: 50/s.

ANALOG VOLTAGE OUTPUT

DAC 1, 2: ±12V in 1mV increments, non-isolated.

RESOLUTION: 1mV.

I_{OUT}: 5mA max.

SETTLING TIME: 1ms to 0.01% of output.

ACCURACY ±(% of output + mV):
1 year ±5°C: 0.15% + 19mV;
90 day ±5°C: 0.1% + 19mV;
24 hour ±1°C: 0.04% + 19mV.

TEMPERATURE COEFFICIENT: ±(0.015% + 1mV)/°C.

DIGITAL OUTPUT

V_{OUT}(L): <0.8V @ I_{out} = 400mA.

V_{OUT}(H): >2.4V @ I_{out} = 1mA.

V_{OUT}(H)MAX.: <42V with external open drain pull-up.

WRITE SPEED: 50/s.

GENERAL

20 CHANNELS: 20 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. A02 or B01, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25° to 65°C.

WEIGHT: 0.5kg (1.1 lbs).

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7707

32-channel Digital I/O Module
with 10-channel Differential Multiplexer

- **300V, 1A capacity; 60W, 125VA maximum (analog)**
- **33V, 100mA capacity (digital)**
- **Digital outputs are short circuit protected**
- **Relay closures stored in onboard memory**

Ordering Information

7707 **32-channel Digital I/O Module with 10-channel Differential Multiplexer**

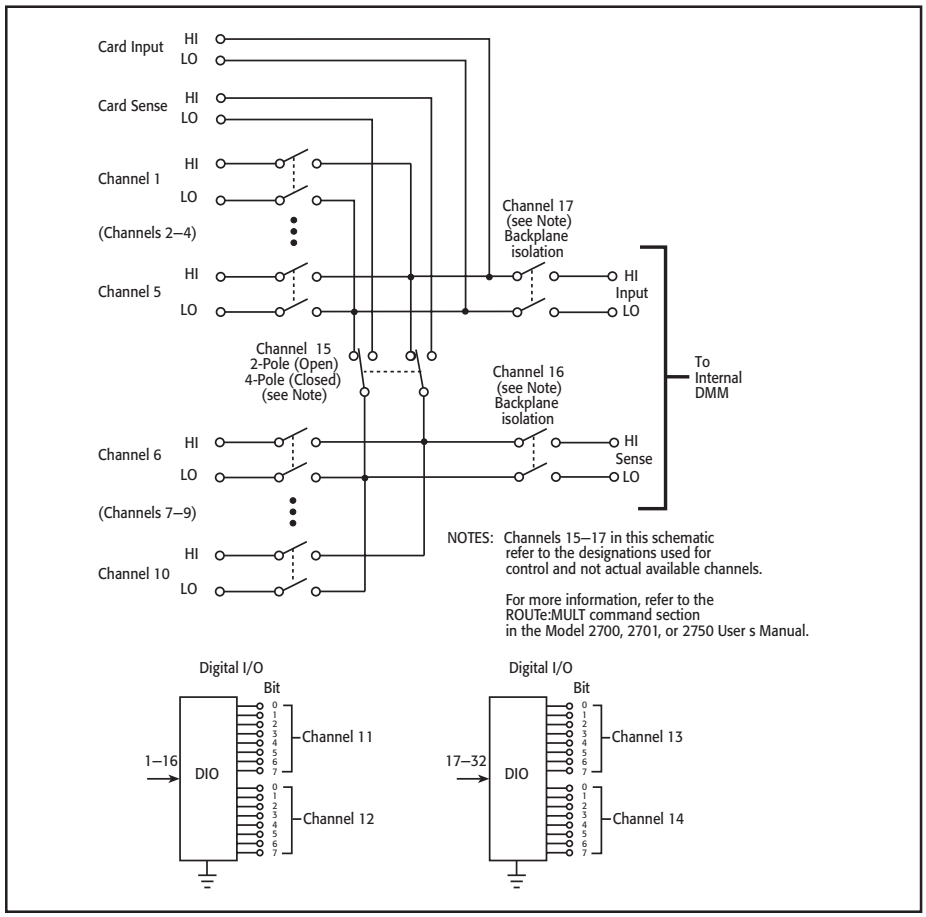
Accessories Supplied

Two mating IDC connectors

The Model 7707 plug-in module offers 10 channels of 2-pole or 5 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. The Model 7707 also provides 32 digital input/output channels (four 8-bit ports) for I/O control. Connect the Model 7707 to industry standard solid-state relays to switch up to 980VA.

SERVICES AVAILABLE

7707-3Y-EW	1-year factory warranty extended to 3 years from date of shipment



CAPABILITIES

CHANNELS 1–10: Multiplex one of 10 2-pole or one of 5 4-pole signals into DMM.

CHANNELS 11–14: 32 Digital Inputs/Outputs referenced to chassis ground.

THERMAL PROTECTION: Channels 11–14 are thermally protected to 1A.

INPUTS (Channels 1–10)

MAXIMUM SIGNAL LEVEL: Any Channel to Any Channel (1–10): 300VDC or 300Vrms (425V peak) for AC waveforms, 1A switched, 60W, 125VA maximum.

SAFETY CATEGORY: Conforms to European Union Directive 73/23/EEC EN 61010-1, CAT I.

CONTACT LIFE (typ.): $>10^5$ operations at max. signal level: $>10^8$ operations no load[1].

[1] Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω any path and additional 1Ω at end of contact life.

CONTACT POTENTIAL: <6μV typical per contact pair and additional 5μV with Channels 11–14 at rate $V_{OUT}(L)$.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: 50-pin male D-shell, Channels 11–14. 25-pin female D-shell, Channels 1–10. Supplied with female and male IDC ribbon cable connectors.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9\Omega$, <100pF with isolation channels 16 and 17 open.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9\Omega$, <200pF.

CROSS TALK (10MHz, 50Ω Load): <–35dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.1dB below 1MHz. <3dB below 2MHz.

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

DIGITAL INPUT/OUTPUT (Channels 11–14)

$V_{IN}(L)$: <0.8V (TTL).

$V_{IN}(H)$: >2V (TTL).

$V_{OUT}(L)$: <1.0V @ I_{OUT} = 100mA.

$V_{OUT}(H)$: >2.4V @ I_{OUT} = 1mA.

$V_{OUT}(H)MAX.$: <40V with external open drain pull-up.

READ/WRITE SPEED: 50/s.

GENERAL

10 CHANNELS: 10 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. B03, 2701 rev. A01, and 2750 rev. A01 or higher.

CAPACITY: Model 2700: (1) 7707 and (1) 77XX, except 7706. **Model 2701:** Any combination of 77XX modules. **Model 2750:** (4) 7707 and (1) 77XX, except 7706. A 7706 module may be substituted for a 7707 module.

ENVIRONMENTAL

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

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: <0.5kg (1.1 lbs).

ACCESSORIES AVAILABLE

7790	50/50/25 Pin Female/Male D-Shell IDC Connectors
7705-MTC-2	50 Pin Male to Female DSUB Cable, 2m (6.6 ft).
7707-MTC-2	25 Pin Male to Female DSUB Cable, 2m (6.6 ft).

7708

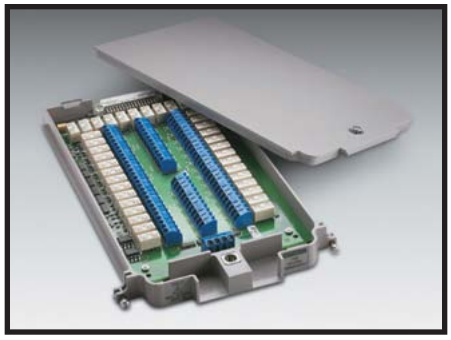
40-channel Differential Multiplexer Module

with Automatic CJC and Screw Terminals

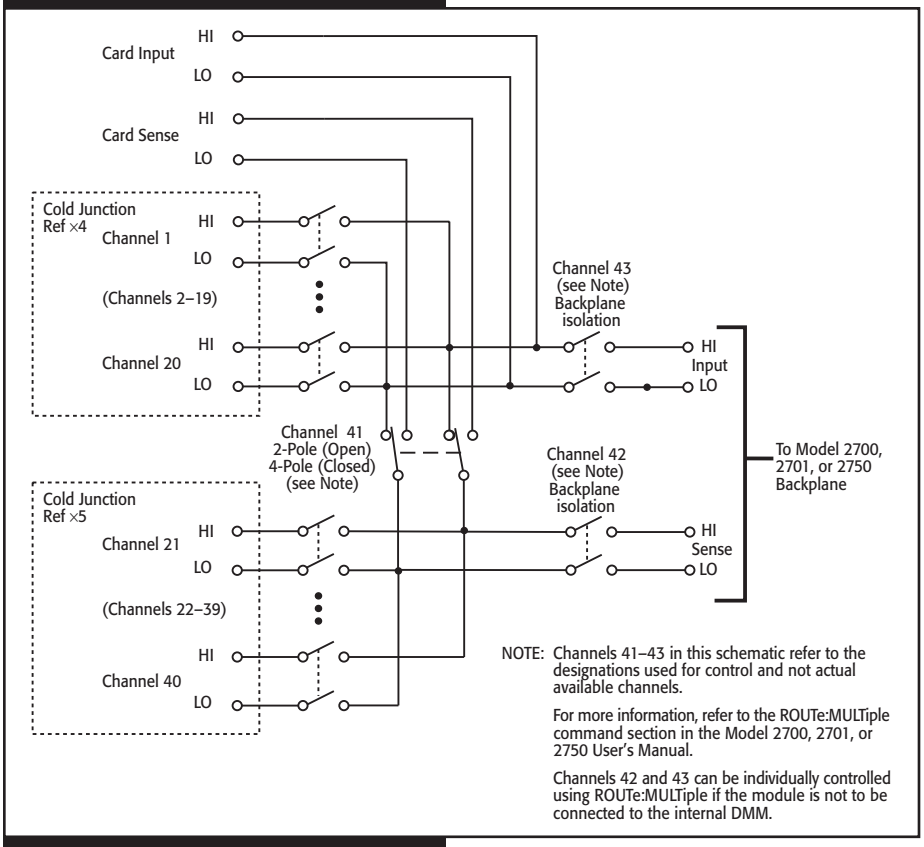
- **40 differential channels for general-purpose measurements**
- **Two- or four-wire measurements**
- **300V, 1A capacity for voltage channels; 60W, 125VA**
- **Oversize screw terminal connection blocks are standard for easier connection**
- **Relay closures stored in onboard memory**

Ordering Information

7708 **40-channel Differential Multiplexer Module with Automatic CJC and Screw Terminals**



The Model 7708 plug-in module offers 40 channels of 2-pole or 20 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. The built-in CJC sensors automatically linearize thermocouples, making the Model 7708 ideal for RTD, thermistor, and thermocouple temperature applications. It is also well suited for mixed-signal measurement applications that require multi-point monitoring, such as environmental stress screening.



NOTE: Channels 41–43 in this schematic refer to the designations used for control and not actual available channels.

For more information, refer to the ROUTe:MULTiple command section in the Model 2700, 2701, or 2750 User's Manual.

Channels 42 and 43 can be individually controlled using ROUTe:MULTiple if the module is not to be connected to the internal DMM.

CAPABILITIES

CHANNELS 1–40: Multiplex one of 40 2-pole or one of 20 4-pole signals into DMM.

INPUTS

MAXIMUM SIGNAL LEVEL:

Channels (1–40): 300V DC or rms, 1A switched, 60W, 125VA maximum.

CONTACT LIFE (typ): $>10^5$ operations at max. signal level. $>10^8$ operations no load[1].

[1] Open thermocouple detector on during thermocouple measurements. Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω at end of contact life.

CONTACT POTENTIAL:
<±500nV typical per contact, 1μV max.
<±500nV typical per contact pair, 1μV max.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: Screw terminal, #20 AWG wire size.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^{10}\Omega$, <100pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9\Omega$, <200pF.

CROSS TALK (10MHz, 50Ω Load): <–40dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.1dB below 1MHz. <3dB below 2MHz.

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

TEMPERATURE ACCURACY USING INTERNAL CJC: 1.0°C (see mainframe specification for details).

GENERAL

40 CHANNELS: 40 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

FIRMWARE: Specified for Model 2700 rev. B02, 2701 rev. A01, and 2750 rev. A01 or higher.

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: 0.52kg (1.16 lb).

ACCESSORIES AVAILABLE

7401	Type K Thermocouple Wire, 30.5m (100 ft).

SERVICES AVAILABLE

7708-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

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A GREATER MEASURE OF CONFIDENCE

7709

6×8 Matrix Module

- **Automatic two- or four-wire connection to DMM**
- **6 row × 8 column matrix**
- **Expandable to larger switch configurations by daisy-chaining or cascading multiple modules**
- **Two female D-sub connectors are standard for secure hook-up and quick teardown**
- **300V, 1A capacity**
- **Relay closures stored in onboard memory**

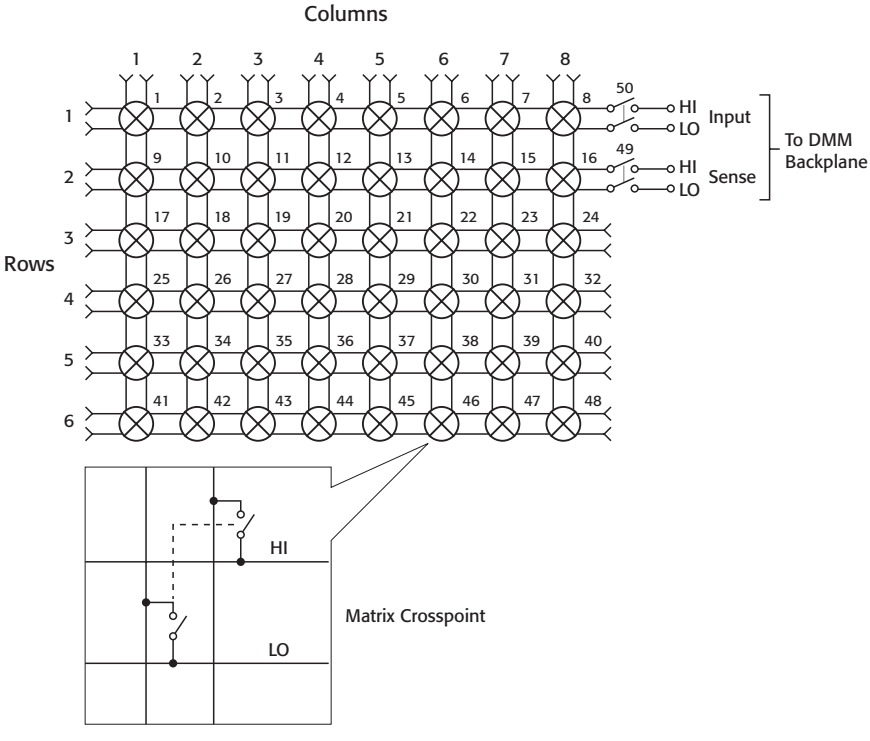
Ordering Information

7709 **6×8 Matrix Module**

Accessories Supplied

Two mating IDC connectors

The Model 7709 plug-in module is a two-pole, 6×8 matrix module. It can connect any combination of six differential channels of instrumentation to any combination of eight differential device-under-test channels. The instrumentation can be AC and DC sources, internal or external meters, oscilloscopes, etc. This matrix configuration allows wide flexibility for complex test systems.



CAPABILITIES

DMM CONNECTION:

2-Wire Functions

Row 1, channels 1–8, through channel 50.

4-Wire Functions

Row 1, channels 1–4 (Source) through channel 50 and Row 2, channels 13–16 (Sense), through channel 49.

CLOSE CHANNEL: CLOSE command connects channels 1–8 to DMM. For 4-wire, channels 1–4 are automatically paired with channels 13–16. ROUTe:MULTiple allows any combination of rows and columns to be connected at the same time.

INPUTS

MAXIMUM SIGNAL LEVEL: Any Channel to Any Channel (1–48): 300VDC or 300Vrms (425V peak) for AC waveforms, 1A switched, 60W, 125VA maximum.

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

CONTACT LIFE (typ): $>10^5$ operations at max. signal level. $>10^8$ operations no load[1].

[1] Minimum signal level 10mV, 10μA.

CONTACT RESISTANCE: <1Ω any path and additional 1Ω at end of contact life.

CONTACT POTENTIAL: <3μV per contact pair.

OFFSET CURRENT: <100pA.

CONNECTOR TYPE: 50-pin female D-shell for rows and columns. 25-pin female D-shell for "daisy-chain" rows. Supplied with male IDC ribbon cable connectors.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9\Omega$, <200pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9\Omega$, <400pF.

CROSS TALK (1MHz, 50Ω Load): <–35dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.35dB below 1MHz. <3dB below 2MHz.

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

GENERAL

MATRIX CONFIGURATION: 6 rows × 8 columns.

CONTACT CONFIGURATION: 2 pole Form A.

FIRMWARE: Specified for Model 2700 rev. B03, Model 2701 rev. A01, and Model 2750 rev. A01 or higher.

RELAY TYPE: Latching electromechanical.

ACTUATION TIME: <3ms.

ENVIRONMENTAL

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

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: <0.52kg (1.16 lb).

ACCESSORIES AVAILABLE

7789	50/25 Pin Male D-Shell Solder Cup Connectors
7790	50/50/25 Pin Female/Male D-Shell IDC Connectors
7705-MTC-2	50 Pin Male to Female DSUB Cable, 2m (6.6 ft).
7707-MTC-2	25 Pin Male to Female DSUB Cable, 2m (6.6 ft).

SERVICES AVAILABLE

7709-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

Use with Integra Series mainframes: 2700, 2701, 2750

DIGITAL MULTIMETERS & SYSTEMS

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A GREATER MEASURE OF CONFIDENCE

7710

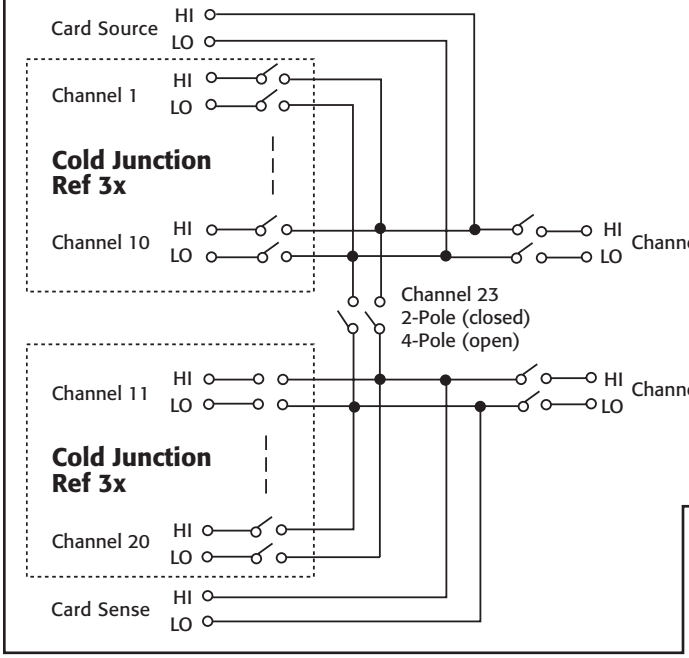
20-channel Solid-state Differential Multiplexer with Automatic CJC

- **20 channels for general purpose measurements**
- **Scanning speeds of up to 500 channels/second**
- **High speed production or ATE testing up to 500 channels/s**
- **Long lifetime solid state relay**
- **Removable screw terminals for simple, quick connections**

Ordering Information

7710 **20-channel Solid-state Differential Multiplexer Module**

The Model 7710 plug-in module offers 20 channels of 2-pole or 10 channels of 4-pole relay input that can be configured as two independent banks of multiplexers. The relays are solid state, providing long life and low maintenance. Solid-state relays usually have 100 times longer life than mechanical relays. It is ideal for long-term data logging applications as well as for demanding high-speed applications.



CAPABILITIES

CHANNELS 1–20: Multiplex one of 20 2-pole or one of 10 4-pole signals into DMM.

INPUTS

MAXIMUM SIGNAL LEVEL: Any channel to any channel (1–20): 60VDC or 42V rms, 100mA switched, 6W, 4.2VA maximum.

COMMON MODE VOLTAGE: 300VDC or 300Vrms (425V peak) maximum between any terminal and chassis.

RELAY LIFE (TYP): $>10^5$ operational hours max. signal level or 10^{10} operations (guaranteed by design).

RELAY DRIVE CURRENT: 6mA per channel continuous, 25mA during initial pulse.

CHANNEL RESISTANCE (per conductor): <5Ω.

CONTACT POTENTIAL: <1μV per pair.

OFFSET CURRENT: <3nA @ 23°C (per channel); additional 0.13nA/°C >23°C.

CONNECTOR TYPE: 3.5mm removable screw terminals, #20 AWG wire size.

ISOLATION BETWEEN ANY TWO TERMINALS: $>10^9$Ω, <100pF.

ISOLATION BETWEEN ANY TERMINAL AND EARTH: $>10^9$Ω, <100pF.

CROSSTALK (CH-CH, 300kHz, 50Ω Load): <–40dB.

INSERTION LOSS (50Ω Source, 50Ω Load): <0.5dB below 100kHz, <3dB below 2MHz.

TEMPERATURE ACCURACY USING INTERNAL CJC: 1°C for K type (see mainframe specifications for details).

GENERAL

CHANNELS: 20 channels of 2-pole relay input. All channels configurable to 4-pole.

RELAY TYPE: Solid State Opto-Coupled FET.

ACTUATION TIME: <0.5ms (100mA load).

FIRMWARE: Specified for Model 2700 Rev. B05, Model 2750 Rev. A04, and Model 2701 Rev. A01.

ENVIROMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified for 80% R.H. at 35°C.

STORAGE ENVIROMENT: –25° to 65°C.

WEIGHT: 0.45kg (1 lb).

ACCESSORIES AVAILABLE

7401	Type K Thermocouple Wire, 30.5m (100 ft).

SERVICES AVAILABLE

7710-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

SCANNING SPEEDS (see mainframe specifications for details)

Multiple Channels, Into Memory

	Channels/s		
	2700	2701	2750
7710 Scanning DCV	180/s	500/s	230/s
7710 Scanning DCV with Limits or Time Stamp On	170/s	500/s	230/s
7710 Scanning DCV alternating 2WΩ	45/s	130/s	60/s

Multiple Channels, Into and Out of Memory to GPIB or Ethernet

	Channels/s		
	2700	2701	2750
7710 Scanning DCV	145/s	440/s	210/s
7710 Scanning DCV with Limits or Time Stamp On	145/s	440/s	210/s
7710 Scanning DCV alternating 2WΩ	40/s	130/s	55/s

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A GREATER MEASURE OF CONFIDENCE

7711

2GHz 50Ω RF Module

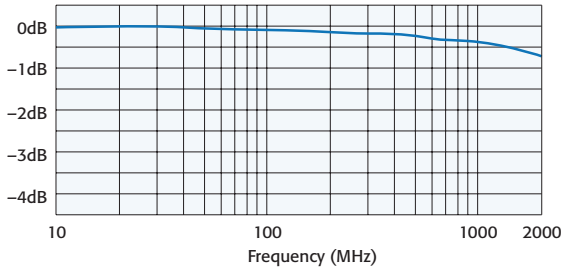
- **Signal routing performance to 2GHz**
- **Switches up to 60VDC**
- **Rear panel SMA connections**
- **Onboard switch closure counter**
- **Onboard S parameter storage**

The Model 7711 plug-in module provides an economical, wideband signal routing solution that complements the DC/low frequency switching and measurement capability of the Integra Series systems. The Model 7711 offers dual 1×4 configurations and can interface with a wide range of external AC instruments, including oscilloscopes, pulse generators, and signal analysis tools. One channel in each multiplex bank is always closed to the corresponding OUT connector. All connections are easily accessible from the rear panel.

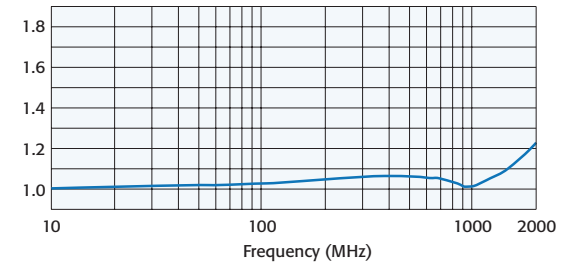
Ordering Information

7711 **2GHz 50Ω RF Module**

Typical Insertion Loss



Typical VSWR



AC PERFORMANCE (END OF LIFE)

For $Z_{load} = Z_{source} = 50\Omega$

	<100 MHz	500 MHz	1 GHz	1.5 GHz	2 GHz
Insertion Loss Max.	<0.4 dB	<0.6 dB	<1.0 dB	<1.2 dB	<2.0 dB
VSWR Max.	<1.1	<1.2	<1.2	<1.3	<1.7 [2]
Ch-Ch Crosstalk[1] Max.	–85 dB	–65 dB	–55 dB	–45 dB	–35 dB

[1] Specification assumes 50Ω termination.
[2] Add 0.1VSWR after 5×10^5 closures (no load).

INPUTS (Channels 1–8)

MAXIMUM SIGNAL LEVEL: Any channel to any channel or chassis (1–8): 30Vrms (42V peak for AC waveforms) or 60VDC, 0.5A.

MAXIMUM POWER: 20W per module, 10W per channel (refer to 7711/7712 Manual PA-818 for measurement considerations).

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

EMC: Conforms with European Union Directive 89/336/EEC; EN61326-1.

ISOLATION: **Multiplexer to Multiplexer:** >1GΩ.
Center to Shield: >1GΩ, <25pF.
Channel to Channel: >100MΩ.

CONTACT LIFE: 1×10^6 no load, 1×10^5 rated load (resistive load).

CONTACT POTENTIAL: <6μV.

CONTACT RESISTANCE: <0.5Ω (initial), <1Ω (end of life).

RISE TIME: <300ps (guaranteed by design).

SIGNAL DELAY: <3ns.

GENERAL

RELAY TYPE: High frequency electromechanical.

CONTACT CONFIGURATION: Dual 1×4 multiplexer, single pole four throw, Channels 1 and 5 are normally closed. **NOTE:** One channel in each multiplex bank is always closed to the corresponding OUT connector.

CLOSE CHANNEL: ROUTe:CLOSe allows a single channel in a multiplex bank to be closed. ROUTe:MULTiple:CLOSe allows two channels (one in each bank) to be closed at one time.

OPEN CHANNEL: ROUTe:OPEN:ALL closes CH1 and CH5 to OUT A and OUT B respectively.

ACTUATION TIME: <10ms.

FIRMWARE: Specified for Model 2700 rev. B04, 2701 rev. A01, and 2750 rev. A03 or higher.

CONNECTOR TYPE: Ten external rear panel SMA connectors.

MATING TORQUE: 0.9 N·m (8 in-lb).

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified for 80% RH at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: <0.5kg (1.1 lb).

SERVICES AVAILABLE

7711-3Y-EW	1-year factory warranty extended to 3 years from date of shipment

ACCESSORIES AVAILABLE

7051-2	BNC Cable, male to male, 0.6m (2 ft.)
7051-5	BNC Cable, male to male, 1.5m (5 ft.)
7051-10	BNC Cable, male to male, 3.0m (10 ft.)
7711-BNC-SMA	Male SMA to female BNC Cables (5), 0.15m (0.5 ft)
7712-SMA-1	SMA Cable, male to male, 1m (3.3 ft)
7712-SMA-N	Female SMA to Male N-Type Adapter
S46-SMA-0.5	SMA Cable, male to male, 0.15m (0.5 ft.)
S46-SMA-1	SMA Cable, male to male, 0.3m (1 ft.)

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A GREATER MEASURE OF CONFIDENCE

7712

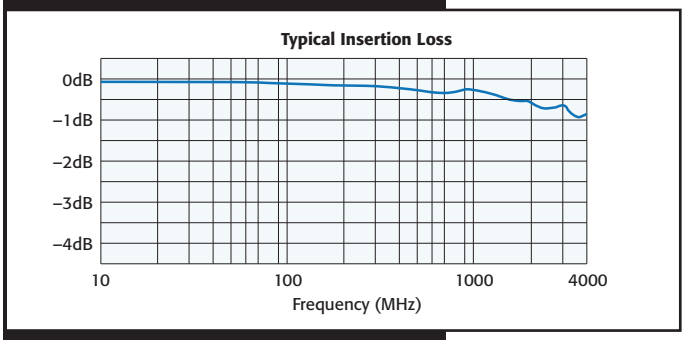
3.5GHz 50Ω RF Module

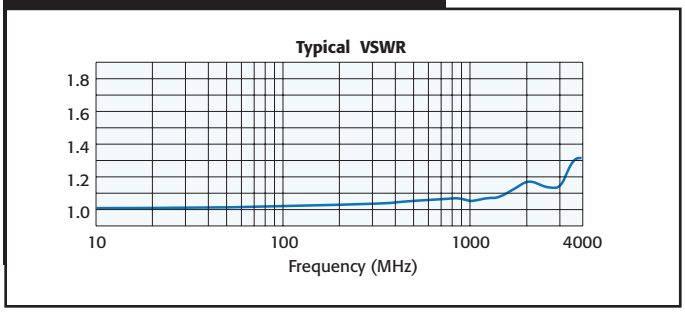
- 3.5GHz bandwidth
- Dual 1x4 configuration
- Onboard switch closure counter
- Onboard S parameter storage

Ordering Information

7712 **3.5GHz 50Ω RF Module**

The Model 7712 plug-in module offers a 50Ω dual 1⁄4 multiplexer configuration with rear panel SMA 1⁄4 connectors. Multiple multiplexers can be cascaded to build scalable matrix and multiplexer systems for a large number of devices under test and RF source/measurement instruments. One channel in each multiplex bank is always closed to the corresponding OUT connector. The 3.5GHz RF switching capability of the Model 7712 makes it ideal for applications such as 3G telecom, wireless LAN, and Bluetooth module testing.





AC PERFORMANCE (End of Life)

For $Z_{load} = Z_{source} = 50\Omega$

	<500 MHz	1 GHz	2.4 GHz	3.5 GHz
Insertion Loss Max.	<0.5 dB	<0.65 dB	<1.1 dB	<1.3 dB
VSWR MAX	<1.15	<1.2	<1.45[2]	<1.45
Ch-Ch Crosstalk[1] Max.	–75 dB	–70 dB	–50 dB	–45 dB

[1] Specification assumes 50Ω termination.
[2] Add 0.1VSWR after 5×10^5 closures (no load).

INPUTS (Channels 1–8)

MAXIMUM SIGNAL LEVEL: Any channel to any channel or chassis (1–8): 30Vrms (42V peak for AC waveforms) or 42VDC, 0.5A.

MAXIMUM POWER: 20W per module, 10W per channel (refer to 7711/7712 Manual PA-818 for measurement considerations).

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

EMC: Conforms with European Union Directive 89/336/EEC; EN61326-1.

ISOLATION: **Multiplexer to Multiplexer:** >1GΩ.
Center to Shield: >1GΩ, <20pF.
Channel to Channel: >100MΩ.

CONTACT LIFE: 5×10^6 no load, 1×10^5 rated load (resistive load).

CONTACT POTENTIAL: <12μV.

CONTACT RESISTANCE: <0.5Ω (initial), <1Ω (end of life).

RISE TIME: <200ps (guaranteed by design).

SIGNAL DELAY: <1.5ns.

GENERAL

RELAY TYPE: High frequency electromechanical.

CONTACT CONFIGURATION: Dual 1×4 multiplexer, single pole four throw, Channels 1 and 5 are normally closed.

NOTE: One channel in each multiplex bank is always closed to the corresponding OUT connector.

CLOSE CHANNEL: ROUTe:CLOSe allows a single channel in a multiplex bank to be closed. ROUTe:MULTiple:CLOSe allows two channels (one in each bank) to be closed at one time.

OPEN CHANNEL: ROUTe:OPEN:ALL closes CH1 and CH5 to OUT A and OUT B respectively.

ACTUATION TIME: <10ms.

FIRMWARE: Specified for Model 2700 rev. B04, 2701 rev. A01, and 2750 rev. A03 or higher.

CONNECTOR TYPE: Ten external rear panel SMA connectors.

MATING TORQUE: 0.9 N·m (8 in-lb).

ENVIRONMENTAL

OPERATING ENVIRONMENT: Specified for 0°C to 50°C. Specified for 80% RH at 35°C.

STORAGE ENVIRONMENT: –25°C to 65°C.

WEIGHT: <0.5kg (1.1 lb).

ACCESSORIES AVAILABLE

7712-SMA-1	SMA Cable, male to male, 1m (3.3 ft)
7712-SMA-N	Female SMA to Male N-Type Adapter
S46-SMA-0.5	SMA Cable, male to male, 0.15m (0.5 ft.)
S46-SMA-1	SMA Cable, male to male, 0.3m (1 ft.)

SERVICES AVAILABLE

7712-3Y-EW	1-year factory warranty extended to 3 years from date of shipment