7700 20-channel, Differential Multiplexer Module with Automatic CJC, Screw Terminals, and up to 50MHz Bandwidth

Datasheet

Specifications

Capabilities
- Channels 1–20: Multiplex one of twenty 2-pole or one of ten 4-pole signals into DMM.
- Channels 21–22: Multiplex one of two 2-pole current signals into DMM.

Inputs
- Maximum Signal Level
  - Channels (1–20): 300 V DC or 300 V rms (425 V peak) for AC waveforms, 1 A switched, 60 W, 125 VA maximum.
  - Channels (21–22): 60 V DC or 30 V rms, 3 A switched, 60 W, 125 VA maximum.

- Contact Life (typ.)
  - >10⁶ operations at max. signal level. >10⁶ operations no load:
  1. Open thermocouple detector on during thermocouple measurements. Minimum signal level 10 mV, 10 μA.

- Contact Resistance <1 Ω at end of contact life.
- Contact Potential ±500 nV typical per contact, 1 μV max. ±500 nV typical per contact pair, 1 μV max.
- Offset Current ≤100 pA.
- Connector Type Screw terminal, #20 AWG wire size.
- Isolation Between Any Two Terminals: >10⁶ Ω, <100 pF.
- Isolation Between Any Terminal and Earth: >10⁶ Ω, <200 pF.

Insertion Loss (50 Ω Source, 50 Ω Load)

<table>
<thead>
<tr>
<th>Insertion Loss</th>
<th>w/Internal DMM</th>
<th>w/o Internal DMM*</th>
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<tbody>
<tr>
<td>&lt;0.1 dB</td>
<td>1 MHz</td>
<td>1 MHz</td>
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<tr>
<td>&lt;3 dB</td>
<td>2 MHz</td>
<td>50 MHz</td>
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Crosstalk (50 Ω Load):

<table>
<thead>
<tr>
<th>Crosstalk</th>
<th>w/Internal DMM</th>
<th>w/o Internal DMM*</th>
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<tbody>
<tr>
<td>10 MHz</td>
<td>&lt;-40 dB</td>
<td>&lt;-40 dB</td>
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<tr>
<td>25 MHz</td>
<td>**</td>
<td>&lt;-25 dB</td>
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</tbody>
</table>

Common Mode Voltage

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

* 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: <3 ms.

Environmental

- Operating Environment: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
- Storage Environment: –25° to 65°C.
- EMC: Conforms to European Union EMC Directive.
- Safety: Conforms to European Union Low Voltage Directive.
- RoHS: Conforms to European Union RoHS Directive.
- Warranty: 1 year

Weight

0.45 kg (1 lb).

Supplied Accessories

CC-92-1 Set of 20 Cable Ties
TL-23 Screwdriver

Available Services

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

Ordering Information

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

Key Features
- 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
- 150 V, 1 A capacity for voltage channels; 60 W, 125 VA maximum
- Relay closures stored in onboard memory
- Screw terminal jumpers allow user-configurable DMM connections

Specifications

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): 150 V DC or 150 Vrms (212 V peak) for AC waveforms, 1 A switched, 60 W, 125 VA maximum.
- Contact Life (typ): >10^6 operations at max. signal level, >10^9 operations no load².
  1. Minimum signal level 10 mV, 10 μA.
- Contact Resistance: <1 Ω any path and additional 1 Ω at end of contact life.
- Contact Potential: <5 μV per contact pair.
- Offset Current: <100 pA.
- Isolation Between Any Two Terminals: >10^9 Ω, <200 pF.
- Isolation Between Any Terminal and Earth: >10^9 Ω, <400 pF.
- Cross Talk (1 MHz, 50 Ω Load): <-35 dB.
- Insertion Loss (50 Ω Source, 50 Ω Load): <0.35 dB below 1 MHz, <3 dB below 2 MHz.
- Common Mode Voltage: 300 VDC or 300 Vrms (425 V 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: <3 ms.
- 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° to 50°C. Specified to 80% R.H. at 35°C.
- Storage Environment: –25° to 65°C.
- EMC: Conforms to European Union EMC Directive.
- Safety: Conforms to European Union Low Voltage Directive RoHS: Conforms to European Union RoHS Directive
- Warranty: 1 year
- Weight: <0.52 kg (1.16 lb).

Supplied Accessories
- 7709-306A: 50-pin D-Shell Male IDC Connector Kit
- 7709-307A: 25-pin D-Shell Male IDC Connector Kit
- J-15: Jumper Wires, quantity 4

Available Accessories
- 7789: 50-pin male, 25-pin male D-shell solder cup connectors
- 7790: 50-pin male, 50-pin female, 25-pin male D-shell IDC connectors

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

Ordering Information
- 7701: 32-channel, Differential Multiplexer Module
7702 40-channel, Differential Multiplexer Module with Screw Terminals

**Datasheet**

The 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 7702 provides two additional protected channels for current measurements. It is ideal for RTD, thermistor, and thermocouple temperature applications.

**Key Features**

- 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
- 300 V, 1 A capacity for voltage channels; 60 W, 125 VA
- 3 A capacity for current channels
- Relay closures stored in onboard memory

**Specifications**

**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): 300 V DC or rms, 1 A switched, 60 W, 125 VA maximum.
  - Channels (41-42): 60 V DC or 30 V rms, 3 A switched, 60 W, 125 VA maximum.

- **Contact Life (typ.)**
  - >10⁵ operations at max. signal level.
  - >10⁸ operations no load¹.

  ¹. Minimum signal level 10 mV, 10 μA.

- **Contact Resistance**
  - <1 Ω at end of contact life.

- **Contact Potential**
  - <=500 mV typical per contact, 1 μV max.
  - <=500 mV typical per contact pair, 1 μV max.

- **Offset Current**
  - <100 pA.

- **Connector Type**
  - Screw terminal, #20 AWG wire size.

- **Isolation Between Any Two Terminals**
  - >10¹⁰ Ω, <100 pF.

- **Isolation Between Any Terminal and Earth**
  - >10⁹ Ω, <200 pF.

- **Cross Talk (10 MHz, 50 Ω Load)**
  - <–40 dB.

- **Insertion Loss (50 Ω Source, 50 Ω Load)**
  - <0.1 dB below 1 MHz, <3 dB below 2 MHz.

- **Common Mode Voltage**
  - 500V 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**
  - <3 ms.

- **Environmental**
  - **Operating Environment**: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
  - **Storage Environment**: -25° to 65°C.

- **EMC**: Conforms to European Union EMC Directive.

- **Safety**: Conforms to European Union Low Voltage Directive.

- **RoHS**: Conforms to European Union RoHS Directive.

- **Warranty**: 1 year

- **Weight**
  - 0.5 kg (1.1 lb).

**Supplied Accessories**

- **CC-92-1**: Set of 20 Cable Ties
- **TL-23**: Screwdriver

**Available Services**

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

**Ordering Information**

- **7702**: 40-channel Differential Multiplexer Module with Screw Terminals
The 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, 500 mA; 10 VA. The relay closures are stored in onboard memory. The 7703 is ideal for RTD and thermistor temperature applications.

Key Features
- 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

Specifications

Specifications

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): 300 V DC or rms, 0.5 A switched, 10 W maximum.
  - Contact Life (typ.): \( >6 \times 10^6 \) operations at max. signal level.
  - \( >10^6 \) operations cold switching.
- Contact Resistance: \(<1 \Omega\) at end of contact life.
- Contact Potential: \(<<3 \mu V \text{ typical per contact}, 6 \mu V \text{ max.}
  - \(<<3 \mu V \text{ typical per contact pair, } 6 \mu V \text{ max.}
- Offset Current: \(<100 \text{ pA.}

Connector Type
- 50 pin D-sub x2.

Relay Drive Current
- 20 mA per channel.

Isolation Between Any Two Terminals
- \( >10^9 \Omega, <200 \text{ pF.}

Isolation Between Any Terminal and Earth
- \( >10^9 \Omega, <400 \text{ pF.}

Cross Talk (1 MHz, 50 \( \Omega \) Load)
- \(<-40 \text{ dB.}

Insertion Loss (50 \( \Omega \) Source, 50 \( \Omega \) Load)
- \(<0.35 \text{ dB below } 1 \text{ MHz, } <3 \text{ dB below } 2 \text{ MHz.}

Common Mode Voltage
- 300 V 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: \(<1 \text{ ms.}

Environmental
- Operating Environment: Specified for 0° to 50°C. Specified to 40% R.H. at 35°C.
- Storage Environment: -25° to 65°C.
- EMC: Conforms to European Union EMC Directive.
- Safety: Conforms to European Union Low Voltage Directive
- RoHS: Conforms to European Union RoHS Directive
- Warranty: 1 year

Weight
- 0.8 kg (1.75 lbs).

Supplied Accessories
- 7703-306A: 50-pin D-Sub Male Shell Connector Kit, quantity 2

Available Accessories
- 7705-MTC-2: 50 Pin Male to Female D-Sub Cable, 2 m (6.6 ft).
- 7788: 50-pin D-Sub male connector kit, quantity 2
- 7790: 50-pin male, 50-pin female, 25-pin male D-shell IDC connectors

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

Ordering Information
- 7703: 32-channel, High Speed, Differential Multiplexer Module
The 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.

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

**Specifications**

- **Inputs**
  - Maximum Signal Level: 300 VDC or rms, 2 A switched, 60 W (DC, resistive), 125 VA (AC, resistive).
  - Contact Life: No Load: $10^9$ closures. At Maximum Signal Levels: $10^9$ closures.
  - Minimum signal level: 10 mV, 10 μA.
  - Channel Resistance (per conductor): <1 Ω.
  - Contact Potential: ≤4 μV per contact.
  - Offset Current: <100 pA.
  - Actuation Time: 3 ms.
  - Isolation: Channel to Channel: >$10^9$ Ω, <50 pF. Common Mode: >$10^9$ Ω, <100 pF.
  - Crosstalk (1 MHz, 50 Ω load): ≤–35 dB.
  - Insertion Loss (50 Ω source, 50 Ω load): <0.3 dB below 1 MHz, <3 dB below 10 MHz.
  - Common Mode Voltage: 300 V 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.
  - Operating Environment: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
  - Storage Environment: -25° to 65°C.
  - EMC: Conforms to European Union EMC Directive.
  - Safety: Conforms to European Union Low Voltage Directive.
  - RoHS: Conforms to European Union RoHS Directive.
  - Warranty: 1 year

- **Weight**: 0.45 kg (1 lb).

**Supplied Accessories**
- 7703-306A: 50-pin D-Sub Male Shell Connector Kit, quantity 2

**Available Accessories**
- 7705-MTC-2: 50 Pin Male to Female D-sub Cable, 2 m (6.6 ft).
- 7788: 50-pin D-Sub male connector kit, quantity 2
- 7790: 50-pin male, 50-pin female, 25-pin male D-shell IDC connectors

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

**Ordering Information**
- 7705: 40-channel, Single-pole Control Module
The 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 7706 is ideal for RTD, thermistor, and thermocouple temperature applications. It is also suitable for purpose measurements.

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

### Specifications

#### Capabilities
- **Channels 1–20:** Multiplex one of 20 2-pole or one of 10 4-pole signals into DMM.
- **Channels 21–22:** 16 Digital Outputs.
- **Channels 23–24:** Analog Voltage Output (2).
- **Channels 25:** Totalize Input.
- **Channels 21–25** are referenced to chassis ground.

#### Inputs (Channels 1–20)
- **Maximum Signal Level (Channels 1–20):** 300 V DC or rms, 1 A switched, 60 W, 125 VA maximum.
- **Safety Category:** CAT 1
- **Contact Life (typ.):** >10^6 operations at max. signal level; >10^5 operations at no load.
- **Contact Resistance:** <1 Ω at end of contact life.
- **Contact Potential:** <1 ±2 μV typical per contact, 3 μV max.
- **Offset Current:** <100 pA.
- **Connector Type:** Screw terminal, #22 AWG wire size.
- **Isolation Between Any Two Terminals:** >10^9 Ω, <100 pF.
- **Isolation Between Any Terminal and Earth:** >10^12 Ω, <200 pF.
- **Cross Talk (10MHz, 50 Ω Load):** <–35 dB.
- **Insertion Loss (50 Ω Source, 50 Ω Load):** <0.1 dB below 1 MHz, <3 dB below 2 MHz.

#### Analog Output Voltage (Channels 21 and 22)
- **DAC 1, 2:** ±12 V @ 1 mA max, non-isolated, ±10 V @ 5 mA max.
- **Resolution:** 1 mV.
- **Iout:** 5 mA max.
- **Settling Time:** 1 ms to 0.01% of output.
- **Accuracy ±(of output + mV):**
  - 1 year ±5°C: 0.15% + 19 mV;
  - 20 day ±5°C: 0.1% + 19 mV;
  - 24 hour ±1°C: 0.04% + 19 mV.
- **Temperature Coefficient:** ±0.015%/°C.
- **Write Speed:** 50/s.

#### Analog Voltage Output (Channels 23 and 24)
- **Vout(H) Max.:** <2.4 V @ Iout = 1 mA.
- **Vout(H) Ref.:** >2.4 V @ Iout = 1 mA.
- **Vout(L) Max.:** <42 V with external open drain pull-up.
- **Write Speed:** 50/s.

#### Totalize Input (Channel 25)
- **Maximum Count:** 232–1.
- **Totalize Input:** 100 kHz (max), rising or falling edge, programmable.
- **Signal Level:** 1 Vp-p (min), 42 Vp-p (max).
- **Threshold:** 0 V or TTL, jumper selectable.
- **Gate Input:** TTL-HI, TTL-LO, or none.
- **Count Reset:** Manual or Read-Reset.
- **Read 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:** <3 ms.

#### Environmental
- **Operating Environment:** Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
- **Storage Environment:** –25° to 65°C.
- **EMC:** Conforms to European Union EMC Directive.
- **Safety:** Conforms to European Union Low Voltage Directive.
- **RoHS:** Conforms to European Union RoHs Directive.
- **Warranty:** 1 year

#### Weight
- 0.5 kg (1.1 lbs).

#### Supplied Accessories
- **GC–92–1:** Set of 20 Cable Ties
- **TL–23:** Screwdriver

#### Available Services
- **7706–3Y–EW:** 1-year factory warranty extended to 3 years from date of shipment

#### Ordering Information
- **7706:** All-in-One I/O Module
The 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 7707 also provides 32 digital input/output channels (four 8-bit ports) for I/O control. Connect the 7707 to industry standard solid-state relays to switch up to 980 VA.

Key Features
- 300 V, 1 A capacity; 60 W, 125 VA maximum (analog)
- 33 V, 100 mA 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

**Specifications**

**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 1 A up to 25 V.

**Inputs (Channels 1–10)**
- Maximum Signal Level: Any Channel to Any Channel (1–10): 300 VDC or 300 Vrms (425 V peak) for AC waveforms, 1 A switched, 60 W, 125 VA maximum.
- Contact Life (typ.): >10¹⁰ operations at max. signal level
- Contact Life (load): >10⁴ operations no load
- Contact Resistance: <1 Ω any path and additional 1 Ω at end of contact life.
- Contact Potential: <6 μV typical per contact pair and additional 5 μV with Channels 11–14 at rate V<sub>out</sub>(L).
- Offset Current: <100 pA.

**Isolation Between Any Two Terminals**
- >10¹⁰ Ω, <100 pF with isolation channels 16 and 17 open.
- Isolation Between Any Terminal and Earth: >10¹⁰ Ω, <200 pF.
- Cross Talk (1 MHz, 50 Ω Load): <-35 dB.
- Insertion Loss (50 Ω Source, 50 Ω Load): <-0.1 dB below 1 MHz, <3 dB below 2 MHz.
- Common Mode Voltage: 300 VDC or 300 Vrms (425 V peak) for AC waveforms between any terminal and chassis.

**Digital Input/Output (Channels 11–14)**
- V<sub>in</sub>(L): <0.8 V (TTL).
- V<sub>in</sub>(H): >2 V (TTL).
- V<sub>out</sub>(L): <1.0 V @ I<sub>out</sub> = 100 mA.
- V<sub>out</sub>(H): <2.4 V @ I<sub>out</sub> = 1 mA.
- V<sub>out</sub>(H)/MAX.: <40 V with external open drain pull-up.
- Read/Write Speed: 50/50.

**General**
- 10 Channels: 10 channels of 2-pole relay input. All channels configurable to 4-pole.
- Relay Type: Latching electromechanical.
- Actuation Time: <3 ms.
- Capacity: 2700: (1) 7707 and (1) 77XX, except 7706.
- 2701: Any combination of 77XX modules. 2760: (6) 7707 and (1) 77XX, except 7706. A 7706 module may be substituted for a 7707 module.
- Environmental Operating Environment: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
- Storage Environment: –25° to 65°C.
- EMC: Conforms to European Union EMC Directive.
- Safety: Conforms to European Union Low Voltage Directive
- RoHS: Conforms to European Union RoHS Directive
- Warranty: 1 year
- Weight: <0.5 kg (1.1 lbs).

**Supplied Accessories**
- 7707-306A: 50 pin D-Sub Female IDC Connector Kit
- 7709-307A: 25-pin D-Sub Male IDC Connector Kits

**Available Accessories**
- 7790: 50-pin Male, 50-pin Female, 25-pin Male D-shelf IDC Connectors
- 7705-MTC-2: 50 Pin Male to Female D-sub Cable, 2 m (6.6 ft).
- 7707-MTC-2: 25 Pin Male to Female D-sub Cable, 2 m (6.6 ft).

**Available Services**
- 7707-3Y-EW: 1-year factory warranty extended to 3 years from date of shipment
The 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 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.

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

Specifications

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) 300 V DC or rms, 1 A switched, 60 W, 125 VA maximum.

Contact Life (typ.) >10⁶ operations at max. signal level.
>10⁴ operations no load¹.

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

Contact Resistance <2 Ω at end of contact life.

Contact Potential <±500 mV typical per contact, 1 μV max.
<±500 mV typical per contact pair, 1 μV max.

Offset Current <100 pA.

Connector Type Screw terminal, #20 AWG wire size.

Isolation Between Any Two Terminals >10¹⁰ Ω, <200 pF.

Isolation Between Any Terminal and Earth >10¹⁰ Ω, <600 pF.

Cross Talk (1 MHz, 50 Ω Load) <–40 dB.

Insertion Loss (50 Ω Source, 50 Ω Load) <0.1 dB below 1 MHz, <3 dB below 2 MHz.

Common Mode Voltage 300 V between any terminal and chassis.

General

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

Relay Type Latching electromechanical.

Actuation Time <3 ms.

Environmental

Operating Environment: Specified for 0° to 50°C.
Specified to 80% R.H. at 35°C.

Storage Environment: -25° to 65°C.

EMC: Conforms to European Union EMC Directive.

Safety: Conforms to European Union Low Voltage Directive.

RoHS: Conforms to European Union RoHS Directive.

Warranty: 1 year

Weight 0.52 kg (1.16 lb).

Supplied Accessories
CC-92-1 Set of 20 Cable Ties
TL-23 Screwdriver

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

Ordering Information
7708 40-channel Differential Multiplexer Module with Automatic CJC and Screw Terminals
The 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.

Key Features
- 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
- 300 V, 1 A capacity
- Relay closures stored in onboard memory

Ordering Information
7709 6×8 Matrix Module

Specifications
Capabilities
DMM Connection
- 2-Wire Functions: Row 1, channels 1–8, through channel 50.
- 4-Wire Functions: Row 1, channels 1–4 (Source to Input) 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. ROUTeMULtiple 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): 300 VDC or 300 Vrms (425 V peak) for AC waveforms, 1 A switched, 60 W, 125 VA maximum.
- Contact Life (typ.) >10^5 operations at max. signal level.
- Contact Resistance <1 Ω any path and additional 1 Ω at end of contact life.
- Contact Potential <3 μV per contact pair.
- Offset Current <100 pA.
- 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 Ω, <200 F.
- Isolation Between Any Terminal and Earth >10^9 Ω, <400 pF.
- Cross Talk (1 MHz, 50 Ω Load) <–35 dB.
- Insertion Loss (50 Ω Source, 50 Ω Load) <0.35 dB below 1 MHz, <3 dB below 2 MHz.
- Common Mode Voltage 300 VDC or 300 Vrms (425 V peak) for AC waveforms between any terminal and chassis.

General
- Matrix Configuration: 6 rows × 8 columns.
- Contact Configuration: 2 pole Form A.
- Relay Type: Latching electromechanical.
- Actuation Time: <3 ms.
- Environmental
  Operating Environment: Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
  Storage Environment: –25° to 65°C.
  EMC: Conforms to European Union EMC Directive.
  Safety: Conforms to European Union Low Voltage Directive.
  RoHS: Conforms to European Union RoHS Directive.
  Warranty: 1 year.
- Weight: 0.52 kg (1.16 lb).

Supplied Accessories
- 7709-306A: 50-pin D-Shell Male IDC Connector Kit
- 7709-307A: 25-pin D-Shell Male IDC Connector Kit

Available Accessories
- 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 D-sub Cable, 2m (6.6 ft).
- 7707-MTC-2: 25 Pin Male to Female D-sub Cable, 2m (6.6 ft).

Available Services
- 7709-3Y-EW: 1-year factory warranty extended to 3 years from date of shipment
The 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.

Key Features
- 20 channels for general purpose measurements with scanning speeds up to 800 channels/s
- High speed production or ATE testing up to 500 channels/s
- Long lifetime solid state relay
- Removable screw terminals

Specifications

<table>
<thead>
<tr>
<th>Capabilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Signal Level</td>
<td>Any channel to any channel (1–20) 60 VDC or 42 Vrms, 100 mA switched, 6 W, 4.2 VA maximum.</td>
</tr>
<tr>
<td>Common Mode Voltage</td>
<td>300 VDC or 300 Wrms (425 V peak) maximum between any terminal and chassis.</td>
</tr>
<tr>
<td>Contact Life</td>
<td>&gt;10¹⁰ operations at cold switching or max signal level (guaranteed by design).</td>
</tr>
<tr>
<td>Relay Drive Current</td>
<td>6 mA per channel continuous, 25 mA during initial pulse.</td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>&lt;10 Ω per channel or &lt;5 Ω per conductor. Refer to the 7710 User’s Guide for measurement considerations when used on the instrument 1 Ω or 10 Ω ranges.</td>
</tr>
<tr>
<td>Contact Potential</td>
<td>&lt;3 μV per pair.</td>
</tr>
<tr>
<td>Offset Current</td>
<td>&lt;3 nA @ 23°C (per channel); additional 0.13 nA/°C &gt;23°C.</td>
</tr>
<tr>
<td>Connector Type</td>
<td>3.5 mm removable screw terminals, #20 AWG wire size.</td>
</tr>
<tr>
<td>Isolation Between Any Two Terminals:</td>
<td>&gt;10¹⁰ Ω @ 23°C, &gt; 8 x 10⁹ Ω @ 50°C, &lt;100 pF.</td>
</tr>
<tr>
<td>Isolation Between Any Terminal and Earth:</td>
<td>&gt;10¹⁰ Ω, &lt;100 pF.</td>
</tr>
<tr>
<td>Crosstalk (CH-CH, 500 kHz, 50 Ω Load):</td>
<td>&lt;–40 dB.</td>
</tr>
<tr>
<td>Insertion Loss (50 Ω Source, 50 Ω Load)</td>
<td>&lt;1 dB below 500 kHz.</td>
</tr>
</tbody>
</table>

Scanning Speeds (see mainframe specifications for details)

- **Multiple Channels, Into Memory**
  - 7710 Scanning DCV: >800.
  - 7710 Scanning DCV alternating 2Wi: >400.

General

- **Channels**: 20 channels of 2-pole relay input. All channels configurable to 4-pole.
- **Relay Type**: Solid state opto-coupled FET.
- **Actuation Time**: <0.5 ms (100 mA load).
- **Environmental**: Operating Environment: Specified for 0° to 50°C. Storage Environment: -25° to 65°C.
- **EMC**: Conforms to European Union EMC Directive.
- **Safety**: Conforms to European Union Low Voltage Directive
- **RoHS**: Conforms to European Union RoHS Directive
- **Warranty**: 1 year

**Weight**: 0.45 kg (1 lb).

Supplied Accessories

- CC-92-1: Set of 20 Cable Ties
- TL-23: Screwdriver

Available Services

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

Ordering Information

- 7710: 20-channel Solid-state Differential Multiplexer Module
The 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 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.

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

### Specifications

#### Inputs (Channels 1–8)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Signal Level</td>
<td>Any channel to any channel or chassis (1–8): 30 Vrms (42 V peak for AC waveforms) or 60 VDC, 0.5 A.</td>
</tr>
<tr>
<td>Maximum Power</td>
<td>20 W per module, 10 W per channel (refer to 7711/7712 Manual PA-818 for measurement considerations).</td>
</tr>
<tr>
<td>Isolation</td>
<td>Multiplexer to Multiplexer: &gt;1 GΩ. Center to Shield: &gt;1 GΩ, &lt;25 pF. Channel to Channel: &gt;100 MHz.</td>
</tr>
<tr>
<td>Contact Life</td>
<td>1×10⁶ no load, 1×10⁵ rated load (resistive load).</td>
</tr>
<tr>
<td>Contact Potential</td>
<td>&lt;6 μV.</td>
</tr>
<tr>
<td>Contact Resistance</td>
<td>&lt;0.5 Ω (initial), &lt;1 Ω (end of life).</td>
</tr>
<tr>
<td>Rise Time</td>
<td>&lt;300 ps (guaranteed by design).</td>
</tr>
<tr>
<td>Signal Delay</td>
<td>&lt;3 ns.</td>
</tr>
</tbody>
</table>

#### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay Type</td>
<td>High frequency electromechanical.</td>
</tr>
<tr>
<td>Contact Configuration</td>
<td>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.</td>
</tr>
<tr>
<td>Close Channel</td>
<td>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.</td>
</tr>
<tr>
<td>Open Channel</td>
<td>ROUTe:OPEN:ALL closes CH1 and CH5 to OUT A and OUT B respectively.</td>
</tr>
<tr>
<td>Actuation Time</td>
<td>&lt;10 ms.</td>
</tr>
<tr>
<td>Connector Type</td>
<td>Ten external rear panel SMA connectors.</td>
</tr>
<tr>
<td>Mating Torque</td>
<td>0.9 N·m (8 in-lb).</td>
</tr>
<tr>
<td>Environmental Operating Environment</td>
<td>Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.</td>
</tr>
<tr>
<td>Storage Environment</td>
<td>–25° to 65°C.</td>
</tr>
<tr>
<td>EMC</td>
<td>Conforms to European Union EMC Directive.</td>
</tr>
<tr>
<td>Safety</td>
<td>Conforms to European Union Low Voltage Directive.</td>
</tr>
<tr>
<td>RoHS</td>
<td>Conforms to European Union RoHS Directive.</td>
</tr>
<tr>
<td>Warranty</td>
<td>1 year</td>
</tr>
<tr>
<td>Weight</td>
<td>0.5 kg (1.1 lb).</td>
</tr>
</tbody>
</table>

#### Available Accessories

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7051-2</td>
<td>BNC Cable, male to male, 0.6 m (2 ft.)</td>
</tr>
<tr>
<td>7051-5</td>
<td>BNC Cable, male to male, 1.5 m (5 ft.)</td>
</tr>
<tr>
<td>7051-10</td>
<td>BNC Cable, male to male, 3.0 m (10 ft.)</td>
</tr>
<tr>
<td>7711-BNC-SMA</td>
<td>Male SMA to female BNC Cables (5), 0.15 m (0.5 ft)</td>
</tr>
<tr>
<td>7712-SMA-1</td>
<td>SMA Cable, male to male, 1 m (3.3 ft)</td>
</tr>
<tr>
<td>7712-SMA-N</td>
<td>Female SMA to Male N-Type Adapter</td>
</tr>
<tr>
<td>S46-SMA-0.5</td>
<td>SMA Cable, male to male, 0.15 m (0.5 ft)</td>
</tr>
<tr>
<td>S46-SMA-1</td>
<td>SMA Cable, male to male, 0.3 m (1 ft)</td>
</tr>
<tr>
<td>S46-SMA-1.7</td>
<td>SMA Cable, Male to Male, 0.58 m (1.7 ft)</td>
</tr>
</tbody>
</table>

#### Available Services

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7711-3Y-EW</td>
<td>1-year factory warranty extended to 3 years from date of shipment</td>
</tr>
</tbody>
</table>

#### Ordering Information

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7711</td>
<td>2 GHz 50 Ω RF Module</td>
</tr>
</tbody>
</table>
The 7712 plug-in module offers a 50W dual 1×4 multiplexer configuration with rear panel SMA 14 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 3.5 GHz RF switching capability of the 7712 makes it ideal for testing wireless modules operating in the 2.4 GHz and lower industrial, scientific, and medical (ISM) radio bands.

### Key Features
- 3.5 GHz bandwidth
- Dual 1×4 configuration
- Onboard switch closure counter
- Onboard S parameter storage

### Specifications

#### Inputs (Channels 1–8)

- **Maximum Signal Level**
  - Any channel to any channel or chassis (1–8): 30 VRms (42 V peak for AC waveforms) or 42 VDC, 0.5 A.
- **Maximum Power**
  - 20 W per module, 10 W per channel (refer to 7711/7712 Manual PA-818 for measurement considerations).
- **Contact Life**
  - 5x10⁶ no load, 1x10⁵ rated load (resistive load).
- **Contact Potential**
  - <12 μV.
- **Contact Resistance**
  - <0.5 Ω (initial), <1 Ω (end of life).
- **Rise Time**
  - <200 ps (guaranteed by design).
- **Signal Delay**
  - <1.5 ns.

#### 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**
  - <10 ms.
- **Connector Type**
  - Ten external rear panel SMA connectors.
- **Mating Torque**
  - 0.9 N·m (8 in-lb).
- **Isolation**
  - Multiplexer to Multiplexer: >1 GΩ.
  - Center to Shield: >1 GΩ, <20 pF.
  - Channel to Channel: >100 MΩ.
- **Environmental**
  - **Operating Environment:** Specified for 0° to 50°C. Specified to 80% R.H. at 35°C.
  - **Storage Environment:** –25° to 65°C.
  - **EMC:** Conforms to European Union EMC Directive.
  - **Safety:** Conforms to European Union Low Voltage Directive.
  - **RoHS:** Conforms to European Union RoHS Directive.
  - **Warranty:** 1 year.
- **Weight**
  - 0.5 kg (1.1 lb).

#### Available Accessories

- **7712-SMA-1**
  - SMA Cable, male to male, 1 m (3.3 ft)
- **7712-SMA-N**
  - Female SMA to Male N-Type Adapter
- **S46-SMA-0.5**
  - SMA Cable, male to male, 0.15 m (0.5 ft.)
- **S46-SMA-1**
  - SMA Cable, male to male, 0.3 m (1 ft.)
- **S46-SMA-1.7**
  - SMA Cable, Male to Male, 0.58 m (1.7 ft.)

#### Available Services

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

#### Ordering Information

- **7712** 3.5 GHz 50 Ω RF Module
Contact Information:

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