

Agilent E5250A Low Leakage Switch Mainframe

Technical Data



Introduction

Basic Functions

Agilent E5250A Low Leakage Switch Mainframe functions:

- Switches DC current, DC voltage, capacitance and pulse with DC instruments and LCR meters
- Controls switching through builtin GPIB
- Performs self test using Option 301 relay function test adapter

Configurations

Option 001 10 x 12 matrix switch: From 10×12 to 10×48 matrix per frame. (Option 001×1 to 4) Option 501 24-channel (8 x 3) multiplexer:

From 24 to 96 channels per frame (Option 501×1 to 4)

Required cables and connector plates are available.

Furnished Program Disk

The E5250A includes a program disk (3.5-inch LIF format) that contains two utility and three sample programs.

Utility programs:

Virtual front panel, self test (IBASIC)

Sample programs and routines: C compensation using Agilent 4284A application samples for this matrix switch and multiplexer. (HP BASIC) VFP setup data upload (HP BASIC)

Specification Condition

The Supplemental Information and Typical Data entries in the following specifications are not warranted but they provide useful information about the functions and performance of the instruments. Specifications, typical data, and supplemental information are defined at 23° C \pm 5° < 60% relative humidity (RH).



General Specifications

Temperature Range

Operating: 5° C to 40° C Storage: -40° C to 70° C

Humidity Range

Operating: 5% to 80% (no condensation) Storage: 5% to 90% RH at 65° C

Altitude

Operating: 0 to 2000 m (6500 ft) Storage: 0 to 15,240 m (50,000 ft)

Regulatory Compliance

 $\begin{array}{lll} & & & \text{CSA C22.2 No. } 1010.1/\text{IEC } 1010\text{-}1 \\ & & \text{EMC:} & & \text{CISPR } 11 \text{ Group } 1 \text{ class } A\&\text{EN50082-}1 \\ & \text{Power Requirements:} & & 100/120/220/240 \text{ V} \pm 10\%, 47 \text{ Hz to } 63 \text{ Hz} \\ \end{array}$

Maximum VA: 100 VA

No. of Slots: 4 slots for 30-mm height switch cards

Size

Mainframe: 230 mm H x 430 mm W x 600 mm D
Option 001: 30 mm H x 395 mm W x 424 mm D
Option 501: 30 mm H x 395 mm W x 424 mm D

Weight (approx.)

Mainframe: 11.2 kg
Option 001: 2.0 kg
Option 501: 2.1 kg

No. of Ports (with option 001)

Low Leakage I-V Port: 2
General I-V Port: 4
C-V Port: 2
HF Port: 2
Output Channels: 12
No. of Ports (with option 501)
Low Leakage I-V port: 3

Bias Port: 3

Output Channels: 24 (8 x 3)

Option 001 10 x 12 Matrix Switch

Switch Specification*

Condition	\mathbf{A}	${f B}$	\mathbf{C}
Max. Current rating (A):	1.0	-	-
Max. Voltage rating (V)			
Channel to Ground:	200	-	-
Channel to Channel:	300	-	-
Close Ch Residual R (Ω)			
Low Leakage I-V Port:	0.6	-	-
General I-V Port:	1.0	-	-
C-V, HF Port:	1.0	-	-
Ch Isolation R (Ω)			
Low Leakage I-V Port:	10^{13}	5×10^{12}	2×10^{12}
General I-V Port:	10^{12}	5×10^{11}	2×10^{11}
C-V, HF Port:	10^{9}	5×10^8	2×10^8
Condition A:	23° C ± 5° C, 5% to 60% RH		
Condition B:	5° C to 18° C, 28° C to 40° C, 5% to 60% RH		
Condition C:	28° C to 40° C, 60% to 80% RH		

^{*}This specification is defined with the module plugged into the mainframe.

Typical Data

Offset current:	$< 0.1 \mathrm{pA^{1}}$	(Low Leakage I-V Port)
	$< 1000 \text{ pA}^{1}$	(General I-V Port)
Channel Crosstalk Capacitance:	< 0.3 pF/ch	
Offset voltage, Electro Motive		
Force (EMF) at 5 min.:	$< 80 \mu\mathrm{V}$	(Low Leakage I-V Port)
	$< 110 \mu V$	(General I-V Port)
	$< 110 \mu\text{V}$	(C-V, HF Port)
Guard Capacitance:	$< 145 \mathrm{\ pF^2}$	(Low Leakage I-V Port)
	$< 123 \mathrm{pF^2}$	(General I-V Port)
Additional C measurement Error	$< \pm 1\% \pm 0.5 \ pF^{3}$	(C-V Port)

Supplemental Information

Bandwidth (at -3 dB) < 10 MHz (C-V, HF Port)

 $\begin{array}{lll} \mbox{Relay Contact Life:} & > 10^8 \mbox{ times} & (\mbox{Dry Switching Mode}) \\ \mbox{Settling Time:} & < 3.5 \mbox{ sec to} < 0.4 \mbox{ pA} & (\mbox{Low Leakage I-V Port}) \end{array}$

after 10 V applied

E5250A Option 501 24-Channel (8x3) Multiplexer

Switch Specification*

Ovvicon Opourioution			
Condition	A	В	C
Max. Current rating (A):	1.0	-	-
Max. Voltage rating (V)			
Channel to Ground:	200	-	-
Channel to Channel:	300	-	-
Close Ch Residual R (Ω)			
Low Leakage I-V Port:	0.6	-	-
Bias Port:	1.0	-	-
Ch Isolation R (Ω)			
Low Leakage I-V Port:	10^{13}	5×10^{12}	2×10^{12}
Bias Port:	10^9	5×10^8	2×10^8
Condition A:	23° C ±	23° C ± 5° C, 5% to 60% RH	
Condition B:	5° C to	5° C to 18° C, 28° C to 40° C, 5% to 60% RH	
Condition C:	$28^{ m o}{ m C}$ to	28° C to 40° C, 60% to 80% RH	

^{*}This specification is defined with the module plugged into the mainframe.

Typical Data

Offset current: $< 0.1 \text{ pA}^4$ (Low Leakage I-V Port) Channel Crosstalk Capacitance: < 0.4 pF/ch (Low Leakage I-V Port) $<5 \,\mathrm{pF/ch}$ (Bias Port) Offset voltage (EMF) at 5 min.: $< 80 \,\mu\text{V}$ (Low Leakage I-V Port) $< 180 \text{ pF}^5$ (Low Leakage I-V Port) Guard Capacitance: $< 60 \,\mathrm{pF}$ (Low Leakage I-V Port, when the port is open)

Supplemental Information

 $\begin{array}{lll} \mbox{Relay Contact Life:} & > 10^8 \mbox{ times} & (\mbox{Dry Switching Mode}) \\ \mbox{Settling Time} & < 3.5 \mbox{ sec to} < 0.4 \mbox{ pA} & (\mbox{Low Leakage I-V Port}) \end{array}$

after 10 V applied

¹The offset current when zero volts are applied to all input and output channels

 $^{^{2}}$ The guard capacitance of the closed port on input and output ports when one module per frame is installed

 $^{^3}$ The additional error using the C-Compensation program at 1 kHz \sim 1 MHz, < 1000 pF

⁴When zero volts are applied to all input and output channels

 $^{^5}$ The guard capacitance of the closed port on input and output ports when one module per frame is installed

Accessory Specifications

16494A Triaxial Cable 16494B Kelvin Triaxial Cable 16494C Kelvin Triaxial Cable for 4142 16494D 8 ch Shielded Coaxial Cable 16495A Connector Plate w/12 Triax. Intlk/GNDU 16495B Connector Plate w/24 Triax, Intlk/GNDU Connector Plate w/6 8 ch SHLD conn 16495C 16495D Connector Plate w/128 ch SHLD conn 16495E Half Size Blank Plate

General Specifications

Temperature Range

Operating: 5° C to 40° C Storage: -40° C to 70° C

Humidity Range

Operating: 5% to 80% (no condensation)

Storage: 5% to 90% RH at 65° C

16494E Wide Temperature 8 ch shielded Coaxial Cable General Specifications

Temperature Range

Operating: 5° C to 40° C

-50° C to 200° C (for cable only)

Storage: -40° C to 70° C

Humidity Range

Operating: 5% to 80% (no condensation)

Storage: 5% to 90% RH at 65° C

4155C and 4156C Supplemental Information

4155C Supplemental Information

Data shows the degradation when using the 4155C with Low Leakage I-V Port.

Voltage Range and Offset Accuracy (with MPSMU)

Range	Setting	Measurement
2 V	960 μV + (0.5 x Iout) V	780 μV + (0.5 x Iout) V

Current Range and Offset Accuracy (with MPSMU)

Range	Setting	Measurement
1 nA	3 pA + (0.2 x Vout) pA	3 pA + (0.2 x Vout) pA
10 nA	7 pA + (0.2 x Vout) pA	5 pA + (0.2 x Vout) pA
100 nA	50 pA + (0.4 x Vout) pA	30 pA + (0.4 x Vout) pA

4156C Supplemental Information

Data shows the degradation when using the $4156\mathrm{C}$ with Low Leakage I-V Port with non-kelvin connection.

Voltage Range and Offset Accuracy (with HRSMU)

Range	Setting	Measurement
2 V	$500 \mu V + (0.5 x Iout) V$	280 μV + (0.5 x Iout) V

Current Range and Offset Accuracy (with HRSMU)

		- /
Range	Setting	Measurement
10 pA	0.4 pA + (0.2 x Vout) pA	0.1 pA + (0.2 x Vout) pA
100 pA	0.4 pA + (0.2 x Vout) pA	0.1 pA + (0.2 x Vout) pA
1 nA	0.7 pA + (0.2 x Vout) pA	0.5 pA + (0.2 x Vout) pA
10 nA	4 pA + (0.2 x Vout) pA	2 pA + (0.2 x Vout) pA
100 nA	40 pA + (0.3 x Vout) pA	20 pA + (0.3 x Vout) pA

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