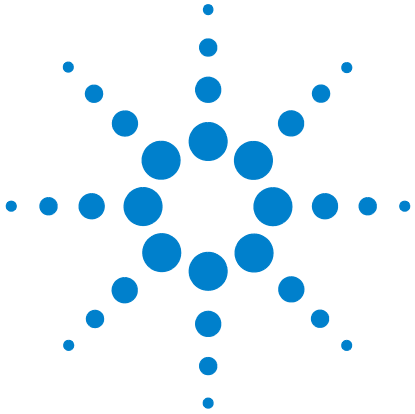

Agilent U8101A
Display Tester

User's Guide

Agilent Technologies

Notices

Trademark Acknowledgements

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Manual Part Number

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Equipment protected throughout by double insulation or reinforced insulation
	Alternating current (AC)		Off (supply)
	Both direct and alternating current		On (supply)
	Three-phase alternating current		Caution, risk of electric shock
	Earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Protective conductor terminal		Caution, hot surface
	Frame or chassis terminal		Out position of a bi-stable push control
	Equipotentiality		In position of a bi-stable push control

General Safety Information

WARNING

- **Do not use the device if it is damaged. Before you use the device, inspect the casing. Look for cracks or missing plastic. Do not operate the device around vapor, dust, or explosive gas.**
- **Always use the device with the cables provided.**
- **Observe all markings on the device before establishing any connection.**
- **Turn off the device and application system power before connecting to the I/O terminals.**
- **When servicing the device, use only the specified replacement parts.**
- **Do not operate the device with the cover removed or loosened.**
- **Do not connect any terminal block or cables prior to performing the self test process.**
- **Use only the power adapter provided by the manufacturer to avoid any unexpected hazards.**

CAUTION

- If the device is used in a manner not specified by the manufacturer, the device protection may be impaired.
- Always use dry cloth to clean the device. Do not use ethyl alcohol or any other volatile liquid to clean the device.
- Do not permit any blockage of the ventilation holes of the device.

Environmental Conditions

This instrument is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental conditions	Requirements
Operating temperature	0 °C to 40 °C
Operating humidity	20% to 80% RH non condensing
Storage temperature	–40 °C to 70 °C
Storage humidity	5% to 90% RH non condensing
Operating altitude	Up to 3000 m

NOTE

The U8101A display tester complies with the following safety and EMC requirements.

- IEC 61326-2002/EN 61326:1997+A1:1998+A2:2001+A3:2003
- CISPR 11:1990/EN55011:1990
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004
- IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition)
- Canada: CAN/CSA-C22.2 No. 61010-1-04
- USA: ANSI/UL 61010-1:2004

Regulatory Markings

CE ISM 1-A	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.	N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
ICES/NMB-001	ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est confomre a la norme NMB-001 du Canada.		This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.
C SA US	The CSA mark is a registered trademark of the Canadian Standards Association.		

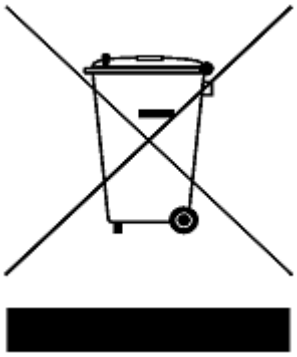
Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a "Monitoring and Control Instrument" product.

The affixed product label is shown as below.



Do not dispose in domestic household waste

To return this unwanted instrument, contact your nearest Agilent Technologies, or visit:

www.agilent.com/environment/product

for more information.

Agilent Technologies	**DECLARATION OF CONFORMITY** According to EN ISO/IEC 17050-1:2004	CE

Manufacturer's Name: Agilent Technologies Microwave Products (M) Sdn. Bhd
Manufacturer's Address: Bayan Lepas Free Industrial Zone,
11900, Bayan Lepas, Penang, Malaysia

Declares under sole responsibility that the product as originally delivered

Product Name: Display Tester
Models Number: U8101A
Product Options: This declaration covers all options of the above product(s)

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

Low Voltage Directive (2006/95/EC)
EMC Directive (2004/108/EC)

and conforms with the following product standards:

EMC

Standard	Limit
IEC 61326:2002 / EN 61326:1997+A1:1998+A2:2001+A3:2003	
CISPR 11:1990 / EN55011:1990	Class A Group 1
IEC 61000-4-2:1995 / EN 61000-4-2:1995	4 kV CD, 8 kV AD
IEC 61000-4-3:1995 / EN 61000-4-3:1996	3 V/m, 80-1000 MHz
IEC 61000-4-4:1995 / EN 61000-4-4:1995	0.5 kV signal lines, 1 kV power lines
IEC 61000-4-5:1995 / EN 61000-4-5:1995	0.5 kV line-line, 1 kV line-ground
IEC 61000-4-6:1996 / EN 61000-4-6:1996	3 V, 0.15-80 MHz
IEC 61000-4-11:1994 / EN 61000-4-11:1994	1 cycle / 100%

Canada: ICES-001:2004
Australia/New Zealand: AS/NZS CISPR11:2004

The product was tested in a typical configuration with Agilent Technologies test systems.

Safety IEC 61010-1:2001 / EN 61010-1:2001
Canada: CAN/CSA-C22.2 No. 61010-1-04
USA: ANSI/UL 61010-1:2004

206349

This DoC applies to above-listed products placed on the EU market after:

20 June 2008
Date

Tay Eng Su
Quality Manager

For further information, please contact your local Agilent Technologies sales office, agent or distributor, or Agilent Technologies Deutschland GmbH, Herrenberger Straße 130, 71034 Böblingen, Germany.

Template: A5971-5302-2, Rev. E U8101A DoC Revision 1.0

Product Regulations

EMC

	Performance Criteria
IEC 61326-1:2002 / EN 61326-1:1997+A1:1998+A2:2001+A3:2003	
CISPR 11:1990 / EN 55011:1990 – Group 1 Class A	
IEC 61000-4-2:1995 / EN 61000-4-2:1995 (ESD 4kV CD, 8kV AD)	A
IEC 61000-4-3:1995 / EN 61000-4-3:1996 (3V/m, 80% AM)	A
IEC 61000-4-4:1995 / EN 61000-4-4:1995 (EFT 0.5kV line-line, 1kV line-earth)	B
IEC 61000-4-5:1995 / EN 61000-4-5:1995 (Surge 0.5kV line-line, 1kV line-earth)	A
IEC 61000-4-6:1996 / EN 61000-4-6:1996 (3V, 0.15~80 MHz, 80% AM, power line)	A
IEC 61000-4-11:1994 / EN 61000-4-11:1994 (Dips 1 cycle, 100%)	A
Canada: ICES-001:2004	
Australia/New Zealand: AS/NZS CISPR11:2004	

Safety IEC 61010-1:2001 / EN 61010-1:2001
Canada: CAN/CSA-C22.2 No. 61010-1-04
USA: ANSI/UL 61010-1:2004

Additional Information:

The product herewith complies with the essential requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC and carries the CE Marking accordingly (European Union).

[1]Performance Criteria:

A Pass - Normal operation, no effect.
B Pass - Temporary degradation, self recoverable.
C Pass - Temporary degradation, operator intervention required.
D Fail - Not recoverable, component damage.
N/A – Not applicable

Notes:

Regulatory Information for Canada

ICES/NMB-001:2004
This ISM device complies with Canadian ICES-001.
Cet appareil ISM est confomre à la norme NMB-001 du Canada.

Regulatory Information for Australia/New Zealand

This ISM device complies with Australian/New Zealand AS/NZS CISPR11:2004

N10149

In This Guide...

1 Getting Started

This chapter provides an overview of the U8101A display tester, which includes the product outlook, product dimensions, and product layout. This chapter also contains instructions on how to install and configure the U8101A.

2 Operation and Features

This chapter describes the operation and features that are offered by the U8101A.

3 Pattern Editing and Operation

This chapter describes the common steps for editing and generating the patterns for display testing.

4 File and System Maintenance

This chapter provides instructions on how to import and export customized images, EDID data, and test sequences. It also provides instructions on how to run run self-test, calibration and perform firmware updates.

5 EDID Editing and Operation

This section describes how to read, modify, and write EDID information to a display.

6 Optional Plug-in Cards

This chapter provides on overview of the plug-in cards available for the U8101A.

7 Remote Interface Reference

This chapter describes how to configure and program the U8101A over a remote interface.

8 Specifications

This chapter covers the characteristics and specifications of the U8101A and all the optional plug-in cards available.

9 SCPI Command List

The summary of the SCPI commands is listed in this chapter.

10 Error Messages List

The U8101A SCPI command errors are summarized in this chapter.

A Supported Formats and Images

This appendix provides a list of all groups, formats, and images supported by the U8101A.

Contents

List of Figures

List of Tables

1 Getting Started

This chapter provides a quick overview of the U8101A display tester, covering the product outlook, installation procedure, power-on sequence, and access to the help system.

Introduction

This user's guide describes the features, functions, and operating procedures of the Agilent U8101A Display Tester.

The U8101A can test a broad range of analog and digital video displays such as CRT and LCD.

The U8101A provides a quick and easy means to test video displays using a pattern or sequence of patterns. Its functions can be customized to support display tests in various applications.

The U8101A can either be operated from its front panel knobs and keys, or via GPIB (IEEE-488), USB, or LAN.

The U8101A can also be operated via a web-based interface.

Product at a Glance

Front panel

This section describes the U8101A front panel.

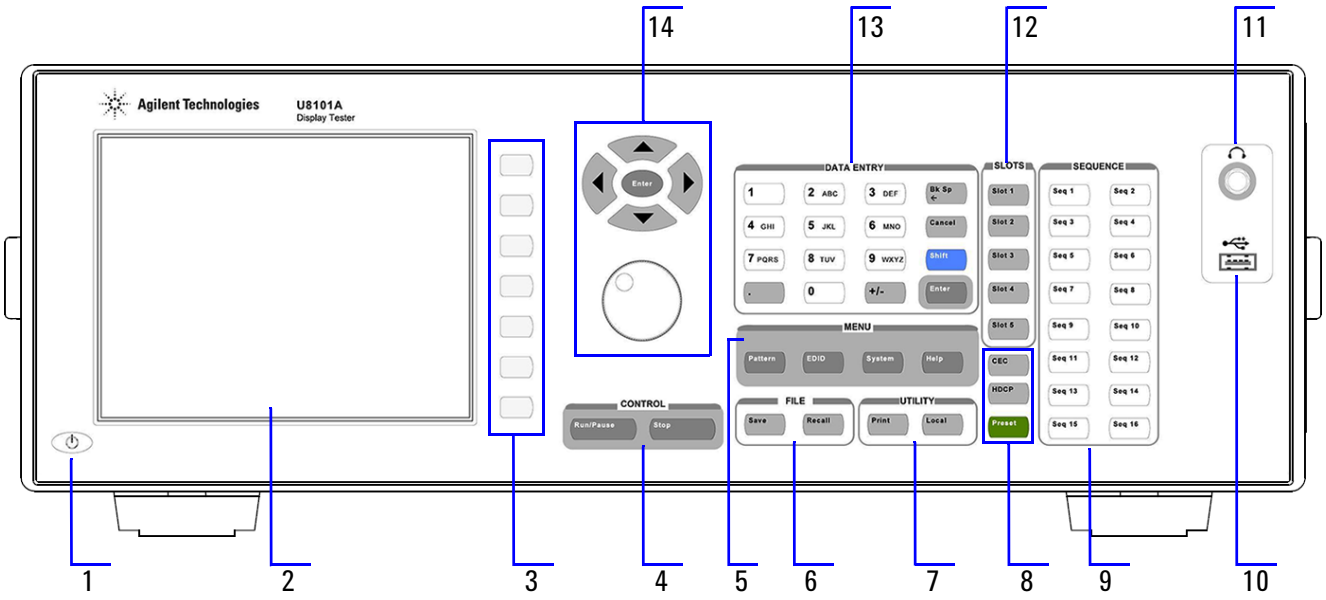


Figure 1-1 U8101A front panel

Table 1-1 U8101A front panel description

Item	Key	Description
1	Power switch	Power-on or power-off the U8101A
2	Display	Displays information on the current setup, which includes status indicators, settings, error messages, and softkey labels
3	Softkeys 1 to 7	Activates the function indicated by the label to the left of each key
4	**Control:**	
	Run/Pause	Runs or pauses the test sequences
	Stop	Stops the test sequences
5	**Menu:**	
	Pattern	Activates the Pattern menu
	EDID	Activates the EDID menu
	System	Activates the System menu
	Help	Displays the description of any key or softkey. See "Help" on page 12 for more information.

Table 1-1 U8101A front panel description

Item	Key	Description
6	**File:**	
	Save	Stores the current setting
	Recall	Loads a saved setting
7	**Utility:**	
	Print	Captures the instrument front panel screenshot and saves it into an external USB flash storage device
	Local	Switches from remote mode to front panel access
8	CEC	Activates the CEC menu which is only applicable for HDMI 1.3 cards
	HDCP	Activates the HDCP menu
	Preset	Resets the U8101A to its factory default configuration
9	**Sequence:**	
	Sequence 1 to 16	Loads the test sequence assigned to the key
10	USB host	Connects to an external USB flash storage device
11	Audio jack (headset)	Enables the audio connection
12	**Slots:**	
	Slots 1 to 5	Selects the appropriate slot
13	**Data Entry:**	Enter or edit numbers and text. See "Editing keys" on page 33 for more information.
14	Navigation keys and knob	Navigate through the items and enter the selection. The knob is used to increase or decrease a numeric value, change a highlighted digit or character, step through a list, or select an item in a row. See "Editing keys" on page 33 and "Control navigation" on page 34 for more information.

Rear panel

The U8101A rear panel is described in this section.

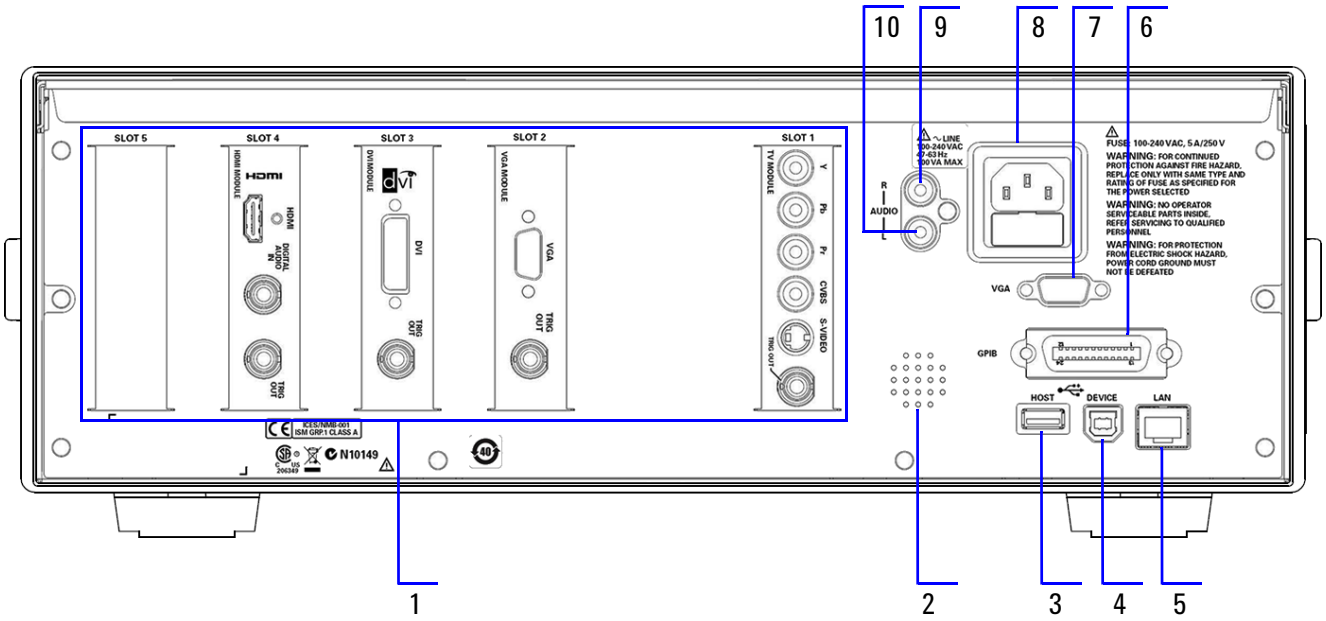


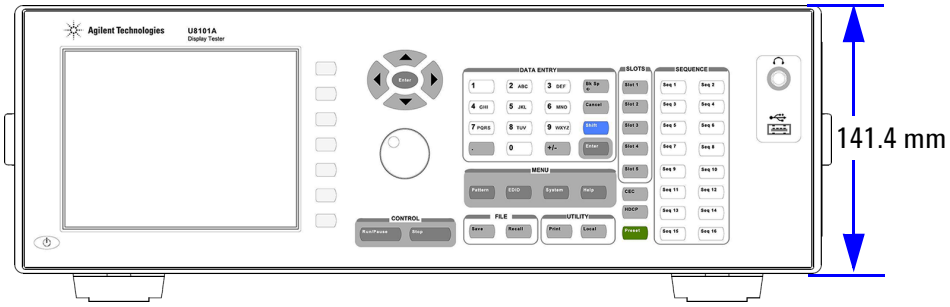
Figure 1-2 U8101A rear panel

Table 1-2 U8101A rear panel description

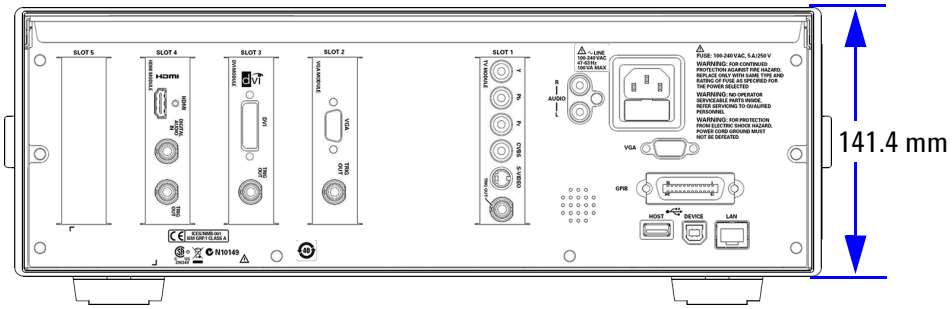
Item	Key	Description
1	Slots 1 to 5	For installation of optional plug-in cards
2	Speaker	Rear panel audio output
3	USB host	USB host interface
4	USB device	USB device interface
5	LAN interface	For Ethernet LAN communication through a 10/100 Base-T LAN cable
6	GPIB interface	General Purpose Interface Bus (IEEE-488) standard interface
7	VGA interface	Video Graphics Array, an interface to the PC monitor
8	AC power inlet	For AC line voltage connection
9	Audio jack (Right)	Audio out for right stereo channel connection using RCA cable
10	Audio jack (Left)	Audio out for left stereo channel connection using RCA cable

Product Dimensions

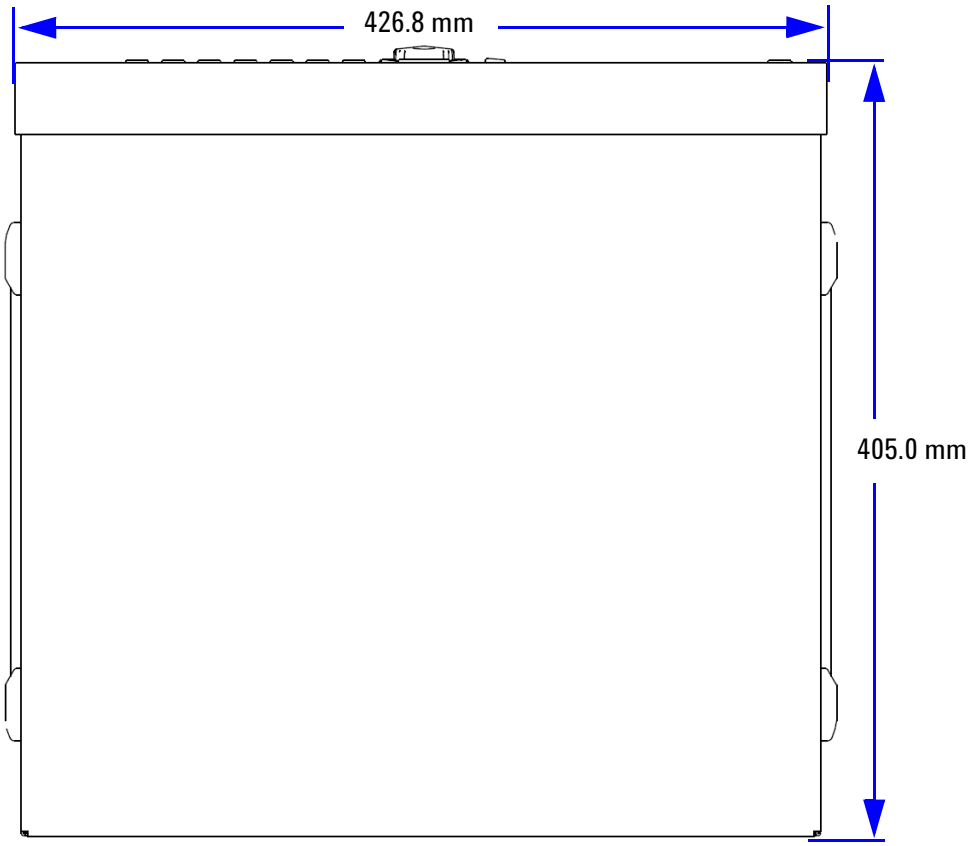
Front view



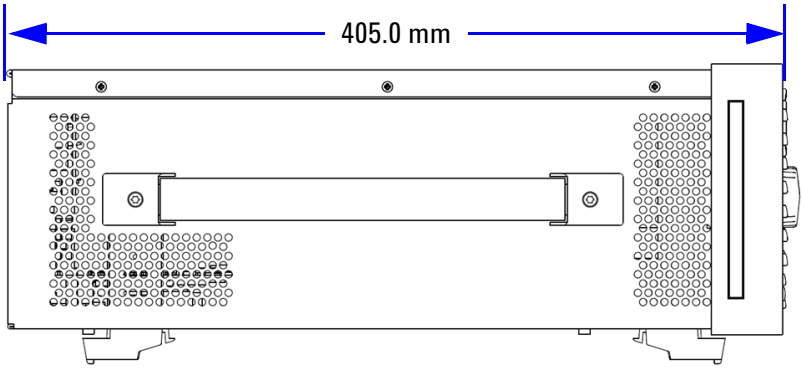
Rear view



Top view



Side view



Standard Purchase Items

Verify that you have received the following items with your unit. If anything is missing or damaged, please contact the nearest Agilent Sales Office.

- ✔ LAN cable
- ✔ USB cable
- ✔ Power cord
- ✔ Agilent U8101A Display Tester Product Reference CD-ROM
- ✔ Agilent U8101A Display Tester Quick Start Guide
- ✔ Certificate of Calibration
- ✔ Audio cable: 2x male RCA to 2x male RCA cable (2 m)

Optional accessories

- Rack mount kit and rack mount filler
- 75 Ω male BNC to male BNC cable (2 m)
- Male S-Video to male S-Video cable (2 m)
- Composite (CVBS) cable: 1x male RCA to 1x male RCA cable (2 m)
- Component (YPbPr) cable: 3x male RCA to 3x male RCA cable (2 m)
- Male HDMI to male HDMI cable (2 m)
- Male DVI to male HDMI cable (2 m)
- S/PDIF cable: Male BNC to male RCA cable (2 m)
- Male VGA to male VGA cable (2 m)
- Male DVI to male DVI cable (2 m)

Optional Plug-in Cards

The rear of the U8101A has five slots available for the installation of any combination of plug- in cards. Refer to Chapter 6, "Optional Plug-in Cards" on page 71 for more information.

Installation and Configuration

Initial inspection

When you receive your U8101A, inspect the unit for any obvious damage such as broken terminals or cracks, dents, and scratches on the chassis that may occur during shipment. If any damage is found, contact the nearest Agilent Sales Office immediately.

Keep the original packaging in case the U8101A has to be returned to Agilent in the future. If you return the U8101A for service, attach a tag identifying the owner and the model number. Also include a brief description of the problem.

Ventilation

The U8101A can operate within the temperature range of 0 °C to 40 °C. The U8101A must be installed in a location that allows sufficient space at the sides of the U8101A for adequate air circulation.

Rack mounting

The U8101A can be fitted into a standard industrial rack using the rack mount flange kit (Agilent part number: 5063-9214) together with the rack panel filler (Agilent part number: U8101-00026). Refer to "Product Dimensions" on page 6 for the dimensions of the U8101A.

How to Power-on the U8101A

Connect one end of the power cord to the AC power inlet of the U8101A, and the other end to an AC voltage source. Ensure that the provided power cord plug matches the country of origin as shown in Table 1-3 on page 11.

The U8101A will automatically adjust to the correct line voltage in the range of 100 VAC to 240 VAC.

To turn the instrument on or off, press  located on the lower left corner of the front panel.

WARNING **Always use a grounded power cord.**

Power-on sequence

Once the U8101A is powered up, it will load the default power-on sequence and the last configuration state from its nonvolatile memory.

Table 1-3 Power cord plug types

Plug type	Cable part number	Plug type	Cable part number
Opt 900 (U.K.) 	8120-1703	Opt 918 (Japan) 	8120-4754
Opt 901 (Australia) 	8120-0696	Opt 919 (Israel) 	8120-6799
Opt 902 (Europe) 	8120-1692	Opt 920 (Argentina) 	8120-6871
Opt 903 (U.S.A.) 	8120-1521	Opt 921 (Chile) 	8120-6979
Opt 906 (Switzerland) 	8120-2296	Opt 922 (China) 	8120-8377
Opt 912 (Denmark) 	8120-2957	Opt 927 (Thailand) 	8120-8871
Opt 917 (South Africa) 	8120-4600		

Help

Help allows you to obtain help information on the key or softkey on the screen.

Press and hold Help for three seconds to activate or deactivate the Help mode.

NOTE The normal functions will not be functional until you exit from the Help mode.

Preset

To preset the U8101A, you can either do one of the following:

- Send the SCPI command `SYSTem:PRESet` from the PC via the GPIB, USB, or LAN interface
- Press Preset on the front panel

Preset will restore the U8101A to its factory default settings. The U8101A will automatically reboot.

2 Operation and Features

This chapter describes the test capabilities, key features, and front panel menu operation of the U8101A.

Test Capabilities

The U8101A contains features for the testing of video displays, video display-related components, and video interfaces. It can also test other consumer electronics products listed below for R&D, manufacturing, and quality assurance applications.

The U8101A can test a broad range of products and components, as follows:

- Flat panel display TV (LCD, plasma display panel)
- CRT TV
- Projector
- Flat panel display PC monitor (LCD)
- CRT monitor

The U8101A is capable of testing the following parameters:

- Resolution
- Photometry (chrominance, contrast, level)
- Luminance
- Gamma correction
- Centering
- Electromagnetic Interference (EMI)
- High voltage regulation
- Pixel anomalies or bad pixels
- Geometry and linearity
- Focus
- Speaker functionality
- HDCP 1.1 (HDMI interface only)
- CEC (HDMI 1.3 interface only)
- EDID 1.4/Display Data Channel (DDC) for HDMI, DVI, or VGA interface

Key Features

Universal platform to support new video technologies

The U8101A comes with five slots that can support future expansion of video interfaces.

Built-in test patterns and formats

The U8101A provides a library of over 200 well-designed test images and formats allowing comprehensive tests of video color, size, linearity, convergence, focus, and persistence. Users are able to create their own customized images and formats, and upload them into the U8101A. See “Creating a Pattern” on page 39 and “Creating a Customized Image” on page 50 for more information.

Self-calibration

The instrument is able to perform self-calibration of RGB output levels for the VGA card and luminance output levels for the TV card. The video output level is automatically adjusted against an internal reference to ensure that the video signal levels are produced correctly for the VGA and TV card. See “Self calibration” on page 60 for more information.

Pixel rate

The U8101A is capable of generating high pixel rates based on the various plug-in cards used as listed below.

- DVI - up to 165 MHz
- HDMI - up to 165 MHz
- TV - up to 75 MHz
- VGA - up to 205 MHz

USB interface

The U8101A USB interface allows you to remotely control the unit using SCPI commands. It also allows you to perform instrument application upgrades, pattern upgrades, or the cloning of one generator state to another via an external USB flash storage device. You can store and recall instrument files using an external USB flash storage device. See “Export sequence file/EDID data” on page 56 and “Import sequence file/EDID data” on page 57 for more information.

GPIB interface

The U8101A GPIB interface allows you to remotely control the unit using SCPI commands. See “Interface configuration” on page 58 for more information.

LAN interface

The U8101A LAN interface allows you to remotely control the unit using SCPI commands. It also allows you to modify the U8101A LAN configuration through a web page. See “Interface configuration” on page 58 for more information.

Internal audio source

The U8101A provides two audio sources which are independent from all plug-in cards.

Triggering out

The trigger output connector is located on each module card. The trigger signals on the different cards can be configured differently depending on the function of the plug-in cards. You can therefore easily identify which video interface is to be triggered.

The trigger pulse is used to trigger an oscilloscope or to synchronize an inspection camera. The visibility feature allows you to locate a trigger pulse at any location within the video frame. This feature greatly facilitates troubleshooting by enabling you to focus on specific video signal problems occurring at any position within the video signal.

Most of the U8101A cards are equipped with a BNC trigger connector labeled as **TRIG OUT**. The trigger can be configured to synchronize with the frame, line, composite, or a specific position in the video signal.

The trigger configuration features can be set using either the U8101A front panel or through the PC remotely.

The following parameters can be configured:

- Pulse polarity
- Pulse pixel width (applicable by module card)
- Pulse delay (applicable by module card)
- Visibility of the trigger pulse position on a display

- Trigger mode
  - Trigger pulse occurs once per frame
  - Trigger pulse occurs on every active line in the frame
  - Trigger pulse occurs on every line in the frame
- Trigger source
  - Frame synchronization
  - Line synchronization
  - Specific position in the video signal
  - Digital composite synchronization

Test sequence

Test sequences provide a way to progress through a predefined format and images sequence, either manually or automatically.

The U8101A supports user test sequences that enable you to quickly save and recall predefined test configurations. For example, you can create different sequences for each operator, production line and different display types under test.

New test sequences are created and stored via the front panel or PC using SCPI commands. Existing sequences can be modified and replaced. Test sequences can be activated (run) or deactivated via the U8101A front panel or the PC interface. You are able to create a customized sequence and store it in the instrument.

See “Creating a Sequence” on page 42 for more information.

File management

The U8101A has a file management system. The file management operation consists of **Copy**, **Delete**, **Move**, **Rename,** and **Export/Import** which can be operated from the front panel or the PC using SCPI commands.

Please refer to the next section, “Front Panel Operation” on page 18 for more information.

Front Panel Operation

The keys under the Menu section are organized in a left-to-right tree structure. The U8101A allows you to quickly navigate between menus by pressing the various function keys located on the front panel. To navigate away from a submenu, simply press another main menu key.

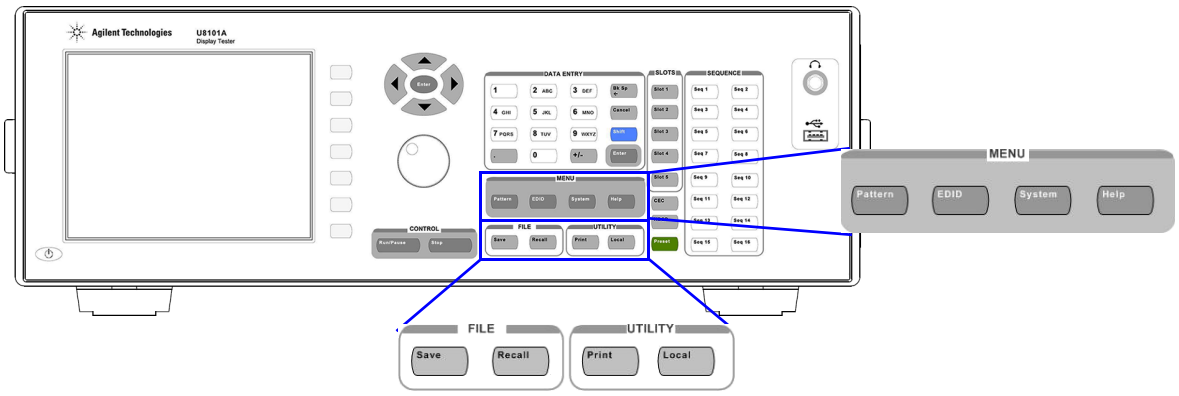


Figure 2-1 Front panel operation

Menu section

There are four operation menu keys (Pattern, EDID, System, and Help) under the Menu section. The hierarchical tree of these menu keys and their functions are described in the following pages.

Pattern menu

The pattern menu allows you to create and edit a pattern or a sequence, and configure the color and motion aspect of the pattern sequence. See Chapter 3, “Pattern Editing and Operation” on page 37 for more information.

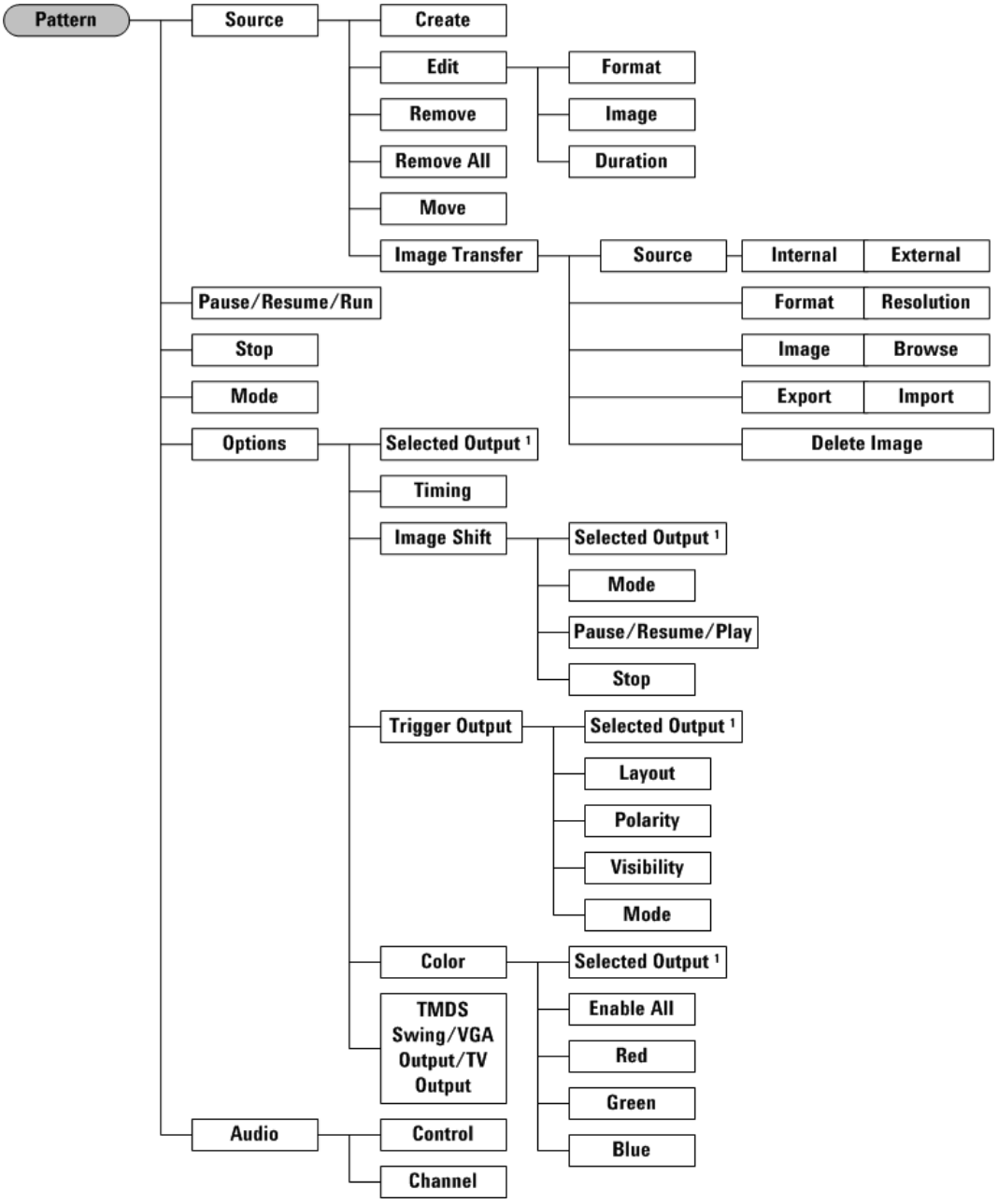


Figure 2-2 Pattern menu tree

[1] The Selected Output function appears for Image Shift, Trigger Output, and Color functions.

Table 2-1 Pattern menu command description

Level 1	Level 2	Level 3	Description
Source	Create		Creates a new pattern source
	Edit	Format	Sets the format
		Image	Sets the image
		Duration	Sets the duration
	Remove		Removes current pattern source
	Remove all		Removes all patterns sources
	Move		Moves a pattern to the left or right using the key knob
	Image Transfer	Source (Internal/External)	Selects the source of image to be exported or imported • Internal - The **Format, Image, Export** and **Delete Image** softkeys will appear on the screen • External - The **Resolution, Browse, Import** and **Delete Image** softkeys will appear on the screen
		Format/Resolution	• Format: Select an image format • Resolution: Select a image resolution
		Image/Browse	• Image: Select an image • Browse: Locate an image from external USB flash drive
		Export/Import	• Export: Exports selected image to external USB flash storage device • Import: Imports selected image from external USB flash drive
		Delete Image	Deletes selected image
Pause/Resume/Run			Pauses, resumes, or runs the pattern
Stop			Stops the pattern
Mode			Sets Auto, Repeat, or Normal mode

Table 2-1 Pattern menu command description

Level 1	Level 2	Level 3	Description
Options	Selected Output		Displays the current playing output module card
	Timing		Sets the timing
	Image Shift	Selected Output	Selects the output module card
		Mode	Sets Repeat or Reverse mode
		Pause/Resume/ Play	Pauses, resumes, or plays the image shift
		Stop	Stops the image shift
	Trigger Output	Selected Output	Selects the output module card
		Layout	Sets Frame synchronization, Line synchronization, Probe synchronization, or Composite synchronization
		Polarity	Sets Positive or Negative polarity
		Visibility	Selects between making the trigger point visible, or hiding it in the display under test
		Mode	Sets the trigger output mode to Once Per Frame, Every Active Line, or Every Line
	Color	Enable All	Enables all color components
		Red	Enables or disables red component
		Green	Enables or disables green component
		Blue	Enables or disables blue component
	TMDS Swing/VGA Output/ TV Output		Sets the output level for TMDS Swing or VGA Output or TV Output
Audio	Control		Turns the audio control on or off. Default: On • On - Outputs a continuous tone to the rear panel audio output; mutes internal system audio. • Off - Stops playing continuous tone output to rear panel audio output; enables the internal system audio.
	Channel		Select the desired channel for audio output • Stereo - Enables left and right channel • Left - Enables left channel only • Right - Enables right channel only

EDID menu

Enhanced Extended Display Identification Data (E-EDID) defines a data structure used to carry configuration information for optimal use of a display. The EDID menu is based on the EDID structure with CEA Extension Version 3 that allows additional data to be stored as an EDID Extension. The EDID menu allows you to read and write E-EDID information from and to an external display, store E-EDID information to file, and display and edit the EDID information. See Chapter 5, "EDID Editing and Operation" on page 63 for more information.

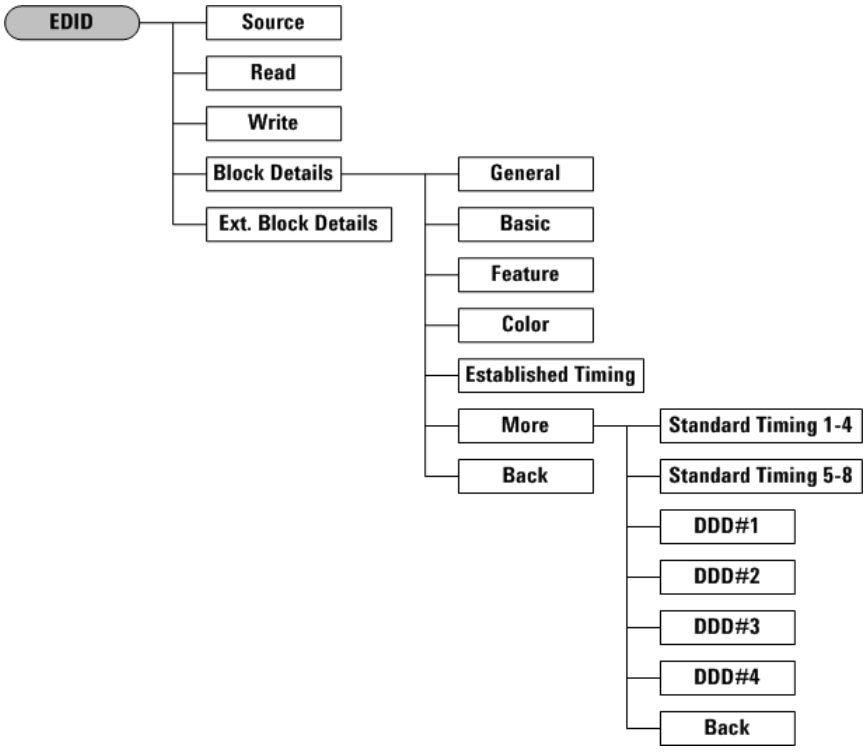


Figure 2-3 EDID menu tree

Table 2-2 EDID menu command description

Level 1	Level 2	Level 3	Description
Source			Sets the EDID source
Read			Reads the EDID from source
Write			Writes the EDID to source
Block Details	General		Sets the general parameters
	Basic		Sets the basic display parameters
	Features		Sets the features parameters
	Color		Sets the color parameters
	Established Timing		Sets the established timing
	More	Standard Timing 1-4	Sets the standard timing ID 1, 2, 3, 4
		Standard Timing 5-8	Sets the standard timing ID 5, 6, 7, 8
		DDD #1	Sets the detailed timing #1
		DDD #2	Sets the detailed timing #2
		DDD #3	Sets the detailed timing #3
		DDD #4	Sets the detailed timing #4
		Back	Returns to the previous menu
	Back		Returns to the previous menu
Ext Block Details			Access the extension block information in hexadecimal format

System menu

The System menu provides access for remote operation preferences and to the menus in which you can enable the U8101A options.

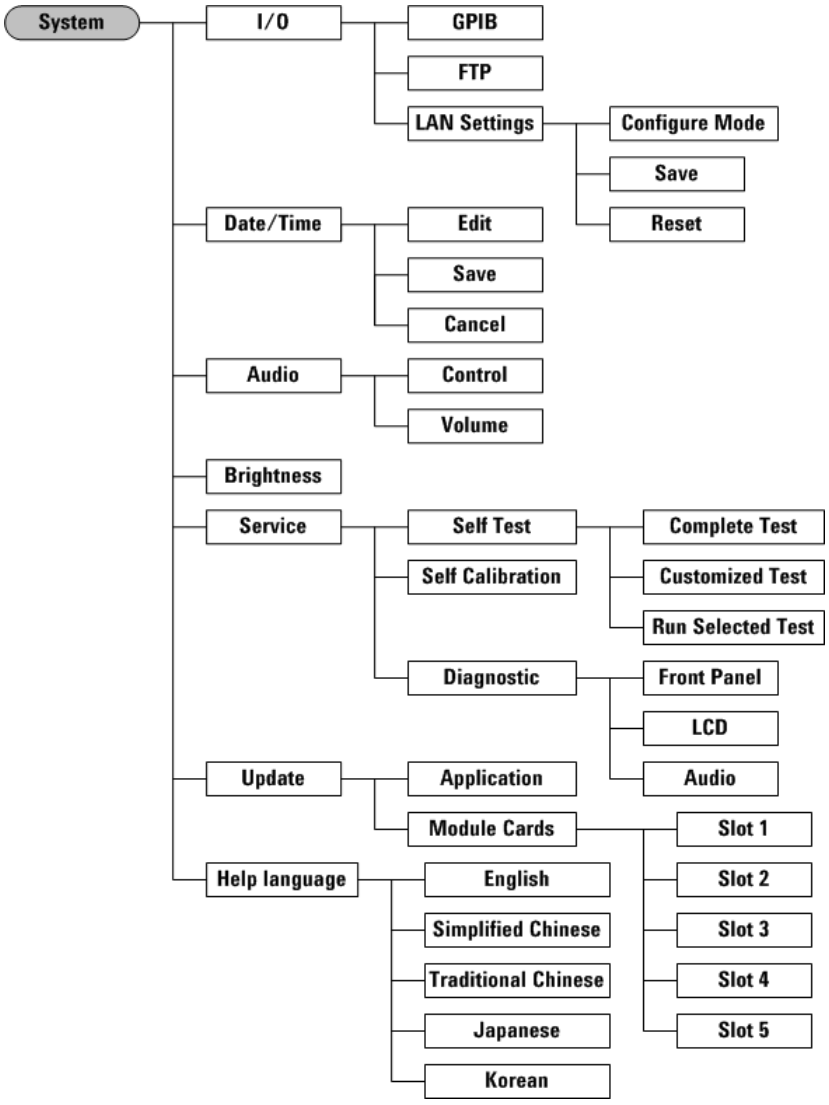


Figure 2-4 System menu tree

Table 2-3 System menu command description

Level 1	Level 2	Level 3	Description
About			Displays the instrument information
I/O	GPIB		Sets the GPIB address
	FTP		Enables or disables the FTP control
	LAN Settings	Configure Mode	Configures the LAN settings
		Save	Saves the configured LAN settings
		Reset	Resets the LAN settings to default
Date/Time	Edit		Sets the date and time
	Save		Saves the configured time settings
	Cancel		Cancels the changes made
Audio	Control (On/Off)		Enables or disables the audio
	Volume		Sets the audio volume level (0 to 15)
Brightness			Sets the brightness level (0 to 6)
Service	Self Test	Complete Test	Runs a complete self test.
		Customized Test	Selects a customized self test
		Run Selected Test	Runs a selected customized test
	Self Calibration		Automatically calibrates Y-luminance output level for TV card and RGB output level for VGA
	Diagnostic	Front Panel	Checks if the front panel keys are working properly
		LCD	Checks if the LCD display panel is working properly
		Audio	Checks if the speaker is operating properly
Update	Application		Updates the application firmware
	Module Cards	Slot 1	Selects Slot 1 to be updated
		Slot 2	Selects Slot 2 to be updated
		Slot 3	Selects Slot 3 to be updated
		Slot 4	Selects Slot 4 to be updated
		Slot 5	Selects Slot 5 to be updated
Help language	English		Sets the language to English
	Simplified Chinese		Sets the language to Simplified Chinese
	Traditional Chinese		Sets the language to Traditional Chinese
	Japanese		Sets the language to Japanese
	Korean		Sets the language to Korean

File menu

The instrument recognizes several types of files, such as the U8101A state files, sequence files, and EDID files. Files can be stored in the U8101A internal memory or on the external USB flash storage device. This section provides an overview of the procedure to navigate the U8101A File menus and also to view, store, recall, export, and import files.

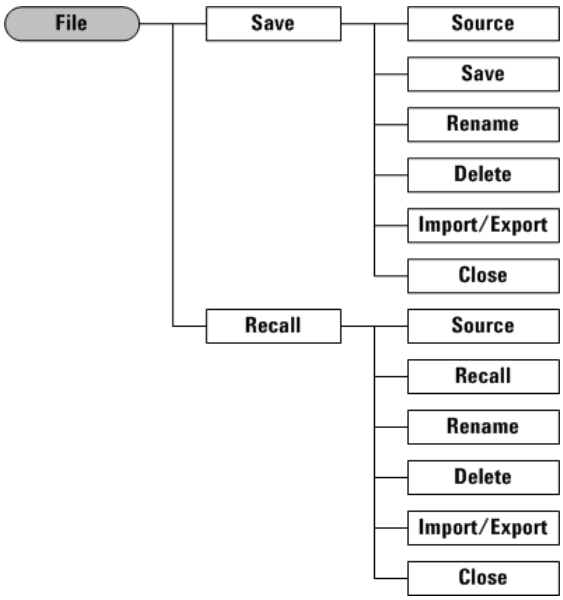


Figure 2-5 File menu tree

Table 2-4 File menu command description

File Menu	Sub Menu	Description
Save	Source	Selects the source of the displayed file list from internal storage or external USB flash storage device
	Save	Saves the selected file in the file list
	Rename	Renames the selected file in the file list
	Delete	Deletes the selected file in the file list
	Export/Import	Imports selected file from external USB flash storage device or exports selected file to external USB flash storage device
	Close	Closes the current menu

Table 2-4 File menu command description

File Menu	Sub Menu	Description
Recall	Source	Selects the source of the displayed file list from internal storage or external USB flash storage device
	Recall	Recalls the selected file in the file list
	Rename	Renames the selected file in the file list
	Delete	Deletes the selected file in the file list
	Import/Export	Imports selected file from external USB flash storage device or exports selected file to external USB flash storage device
	Close	Closes the current menu

Utility menu

The Utility menu allows you to capture screenshots and to switch to local operation from remote mode.

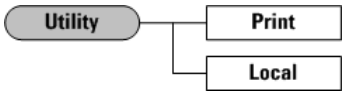


Figure 2-6 Utility menu tree

Table 2-5 Utility menu command description

Utility Menu	Description
Print	Captures screenshot and saves it into the external USB flash storage device
Local	Switches from remote mode to local operation

HDCP menu

HDCP allows you to enable and disable the HDCP feature on HDMI/DVI plug-in cards.

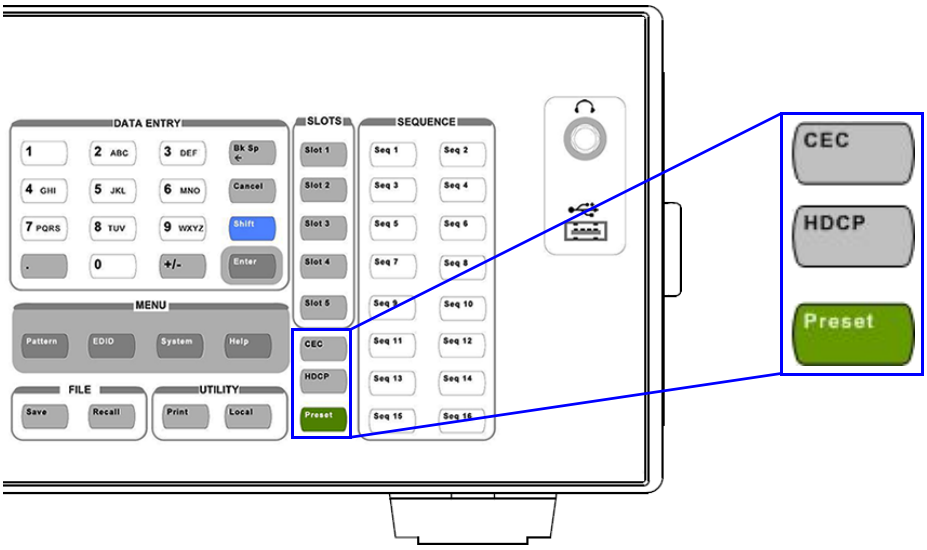


Figure 2-7 HDCP key

For DVI, the default setting for HDCP is disabled.

For HDMI, the default setting for HDCP is enabled.

NOTE CEC is only applicable for HDMI 1.3 cards.

Control menu

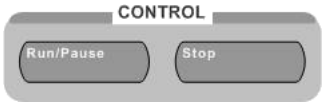


Figure 2-8 Control menu

In the Control menu, Run/Pause allows you to run a test sequence if no test sequence is running or pause a test sequence if a test sequence is running. Stop allows you to stop the test sequence execution. See Chapter 3, "Pattern Editing and Operation" on page 37 for more information.

Slots menu

The Slot 1 (Slot 1) to Slot 5 (Slot 5) keys allow you to select slot 1 to 5 as the output, as shown in Figure 2-9. See Chapter 6, "Optional Plug-in Cards" on page 71 for more information on plug-in cards available.

Sequence menu

The Seq 1 (Seq 1) to Seq 16 (Seq 16) key allows you to quickly recall any of the 16 preset pattern sequences, as shown in Figure 2-9. See "Recalling a Sequence" on page 45 for more information.

Figure 2-9 Slots and Sequence menu

Front panel LCD display

Upon the U8101A power up, , the default start-up sequence will be loaded on the front panel as shown in Figure 2-10.

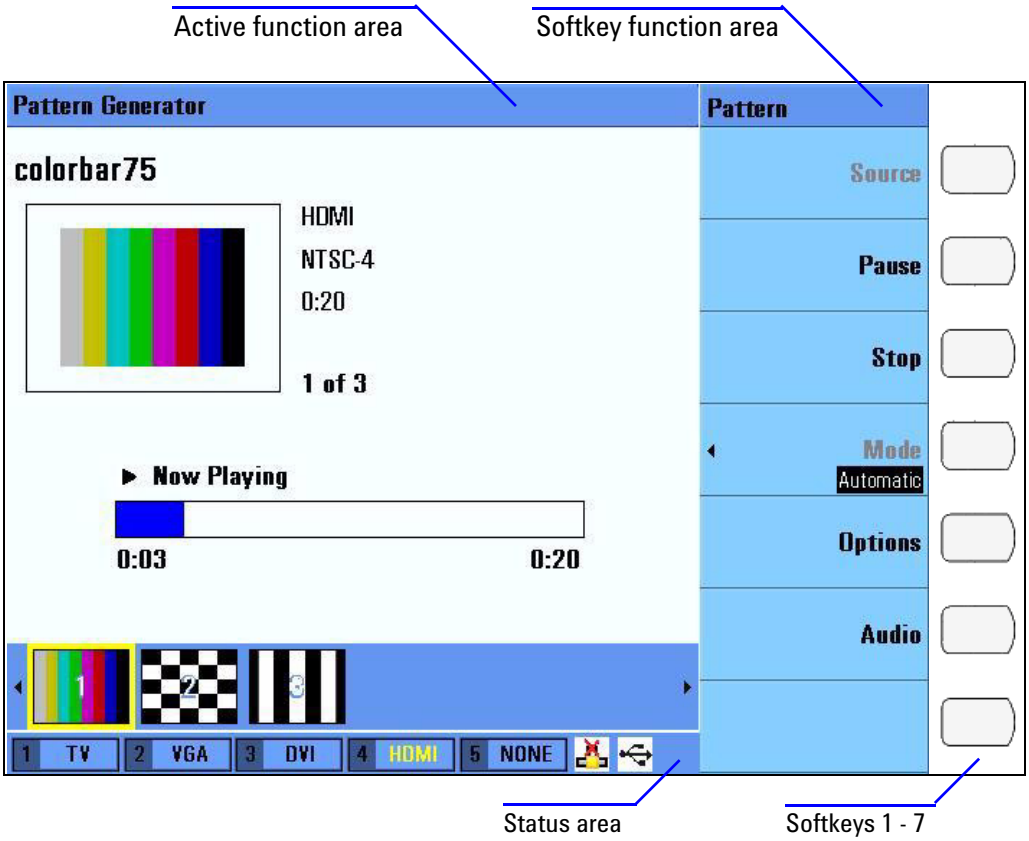


Figure 2-10 Front panel LCD display

Table 2-6 Front panel field description

Field	Description
Active function area	Displays the currently active function
Softkey function area	Displays the labels that define the function of the softkeys located immediately to the right of the display. The softkey labels change, depending on the function selected.
Status area	Displays the U8101A status
Softkeys 1 - 7	Press to select a function. See Table 2-7 for examples on how to use the assigned functions.

Table 2-7 Front panel softkey description

Softkey	Description
	Press a softkey to go one menu level deep if there is a submenu for the selected softkey. For example, selecting the Source softkey will allow access to the Source submenu.
	Press a softkey to execute a function. For example, selecting the Run softkey will start the test sequence.
	Press a softkey to insert/modify a data value. For example, selecting the Duration softkey will allow you to use the alphanumeric keypad, knob, or arrow keys to change the data value.
	Press a softkey to modify a data value from the pop-up menu. For example, selecting the Timing softkey will allow you to use the knob or arrow keys to change the data value from the pop-up menu.
	Press a softkey to select an item from the pop-up menu. For example, selecting the Mode softkey will allow you to use the knob or arrow keys to select either Automatic, Normal, or Repeat from the pop-up menu.
	Inactive softkey. Assigned function cannot be selected.
	Empty softkey. No functions assigned.

Status area

Table 2-8 Status area field description

Field	Description
Slot1	Module card detected in slot 1
Slot2	Module card detected in slot 2
Slot3	Module card detected in slot 3
Slot4	Module card detected in slot 4
Slot5	Module card detected in slot 5
USB status	Shows USB state - active or inactive
LAN status	Shows LAN state - active or inactive

NOTE

See Chapter 6, "Optional Plug-in Cards" on page 71 for more information on compatible optional plug-in cards.

Editing keys

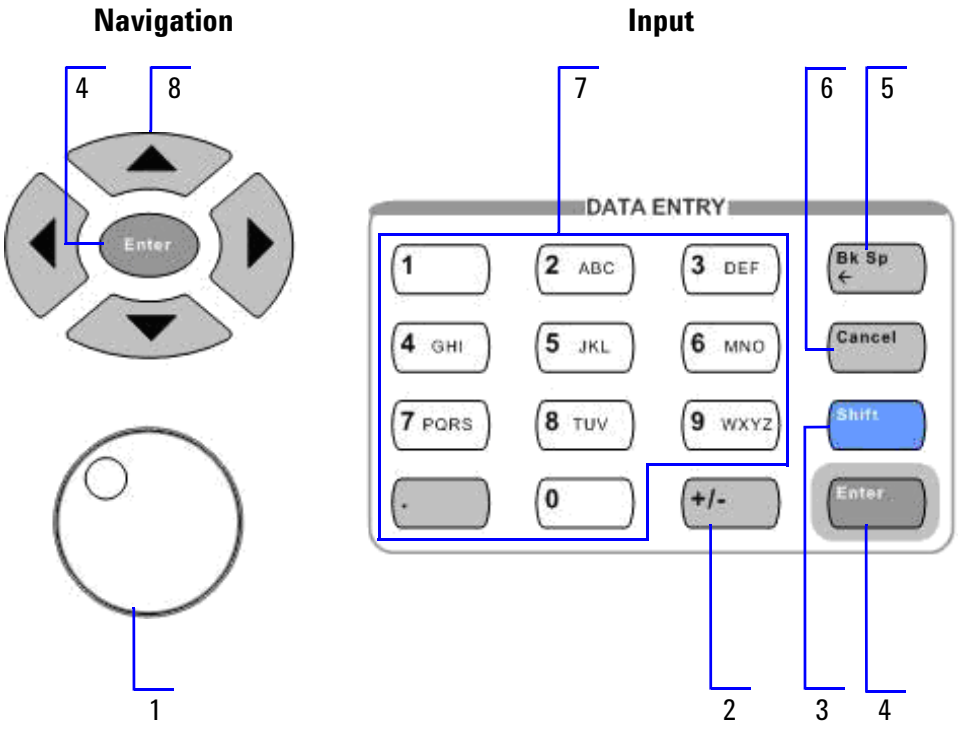


Figure 2-11 Alphanumeric keypad

Table 2-9 U8101A alphanumeric keypad description

Item	Key	Description
1	Knob	Turn the knob to increase or decrease a numeric value, change a highlighted digit or character, or step through a list or items in a row
2	+/–	Specifies a negative value by entering the negative sign before or after the numeric value (this is a toggle key)
3	Shift	Use the Shift key to type capital letters (this is a toggle key)
4	Enter	Use the Enter key to choose a part of an entry, when entering alphanumeric characters. In some menus, the Enter key also acts as a terminator, which is equivalent to the **[Enter]** softkey.
5	Backspace	Moves the cursor one position backwards, deletes the preceding character
6	Cancel	Cancels a selected action
7	Alphanumeric keys	Use the alphanumeric keys and decimal point to type alphanumeric data
8	Arrow	Use the arrow keys to highlight items on the U8101A display. These keys can also be used to change the numeric values or to step through a list or items in a row.

Control navigation

Use softkey 1 to 7 ( ) to select softkey functions to navigate the controls.

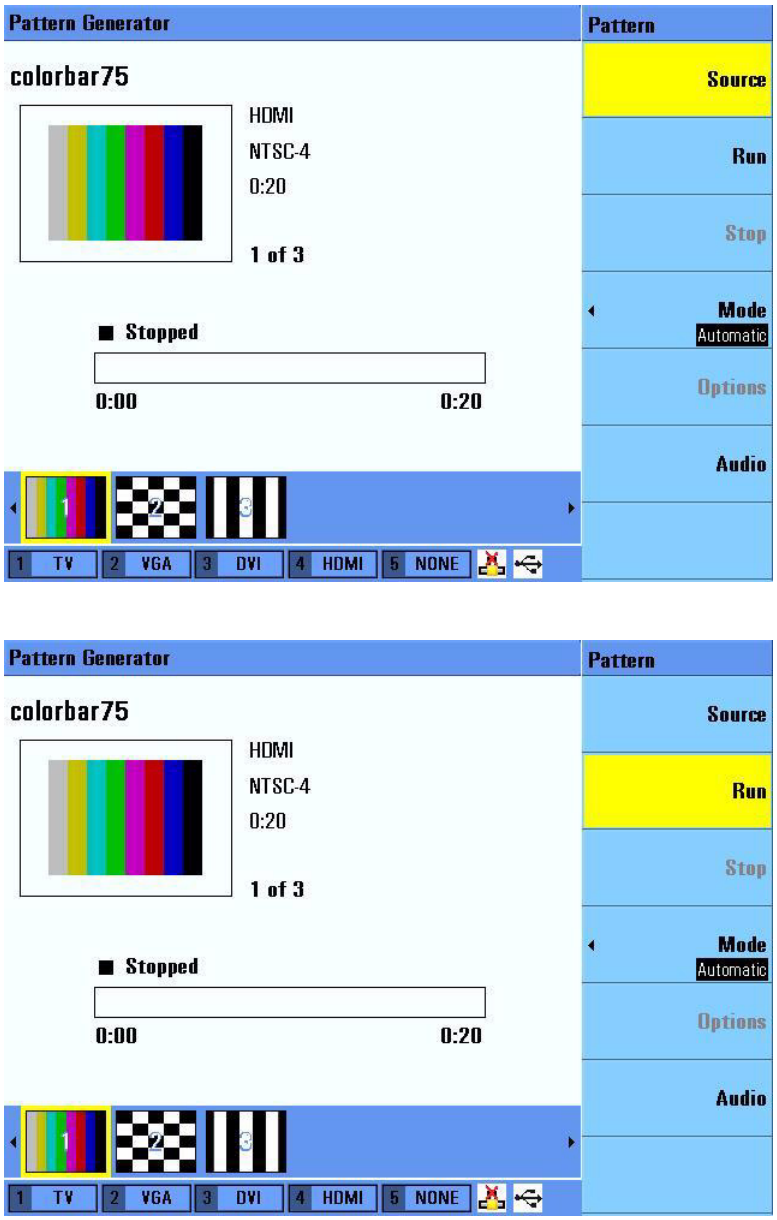


Figure 2-12 Example 1 of navigation control on the U8101A

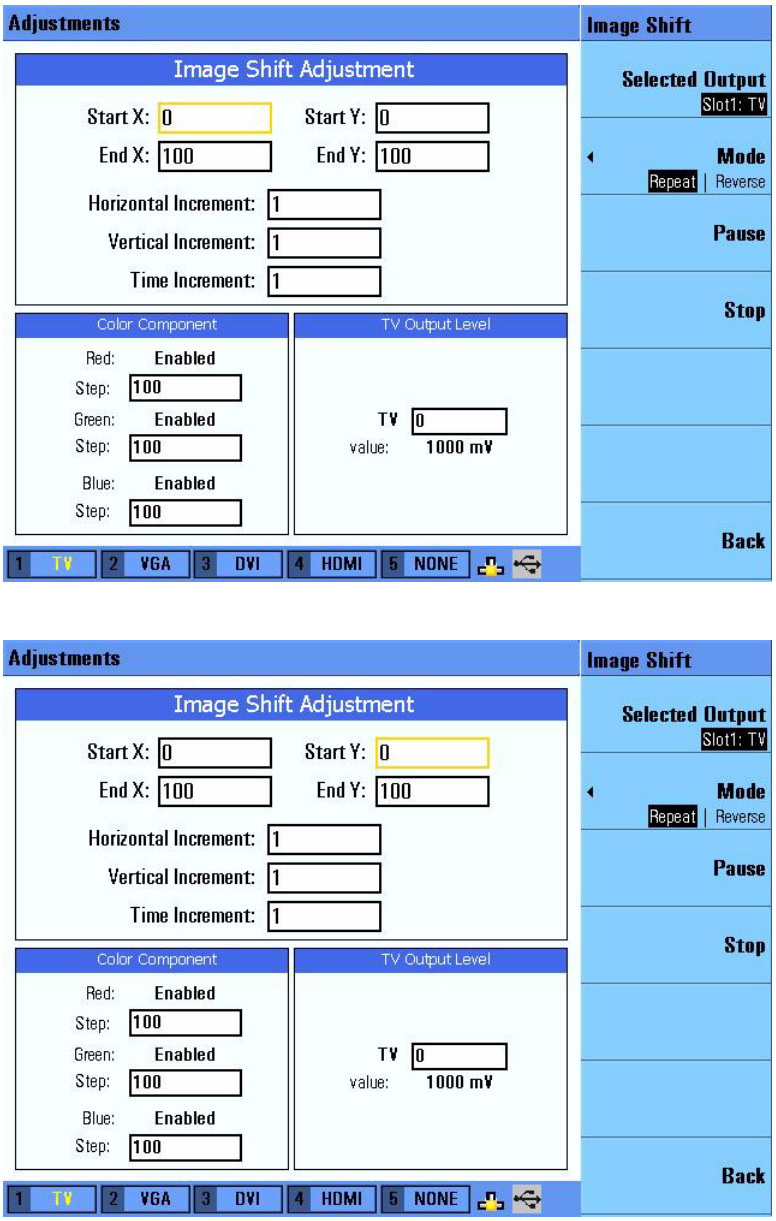


Figure 2-13 Example 2 of navigation control on the U8101A

Use the knob or arrow keys to select a specific control in the active function area. If the highlighted control is a text box, press Enter and use the **Alphanumeric Keypad** to type the value. If the highlighted control is a list, combo box or numeric entry, use the knob or arrow keys to change its value.

3
Pattern Editing and Operation

This chapter describes the common steps for editing and generating the patterns for display testing.

Introduction

This chapter provides a step-by-step guide on how to create, edit, or remove a pattern or sequence. It also provides instructions on how to store and subsequently restore the pattern from the U8101A or an external USB flash storage device. It also provides information on various options available with the U8101A. Figure 3-1 shows the U8101A front panel LCD display when it is initially powered-on.

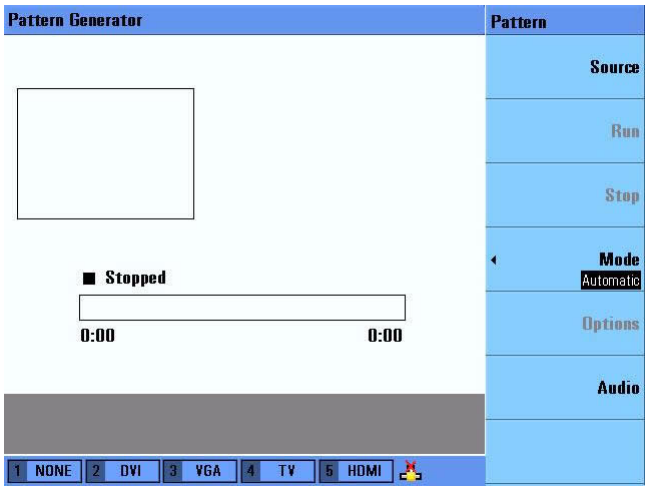


Figure 3-1 Pattern page display

Creating a Pattern

The U8101A allows the creation of customized patterns for display tests. To create a pattern, proceed as follows.

1 Press Pattern to activate the Pattern menu.

2 Press **[Source]** to access the Source submenu.

3 Press **[Create]** to insert a blank pattern.

4 Press **[Edit]** to access the Edit submenu. The Edit submenu allows further customization of your created pattern. See "Selecting a format" on page 39, "Selecting an image" on page 40, and "Selecting the duration" on page 41 for more information.

Selecting a format

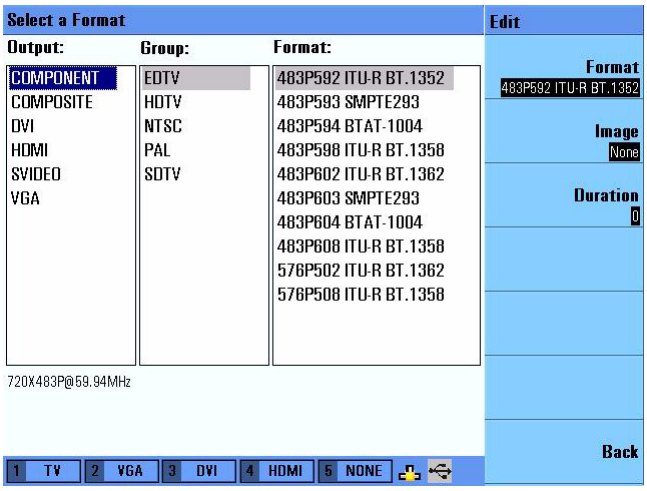
To select a particular display format for your pattern, proceed as follows.

1 Press Pattern to activate the Pattern menu. To create a new pattern, see "Creating a Pattern" on page 39.

2 Press **[Source]** to access the Source submenu.

3 Press **[Edit]** to access the Edit submenu.

4 Press **[Format]** to select an output type, a display group, and a specific format. Compatible formats are displayed according to the selected output and group. Use the knob or arrow keys to select a format and press Enter.



Selecting an image

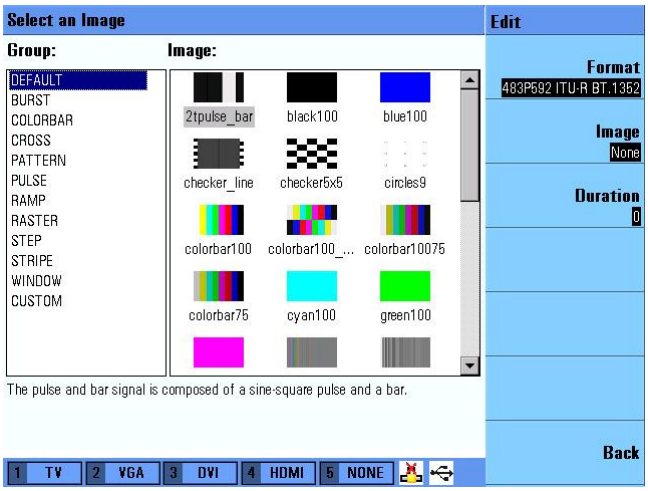
To select a particular image for your pattern, proceed as follows.

1 Press Pattern to activate the Pattern menu. To create a new pattern, see "Creating a Pattern" on page 39.

2 Press **[Source]** to access the Source submenu.

3 Press **[Edit]** to access the Edit submenu.

4 Press **[Image]** to select an image. Compatible images are displayed according to the selected group. Use the knob or arrow keys to select an image and press Enter.



Selecting the duration

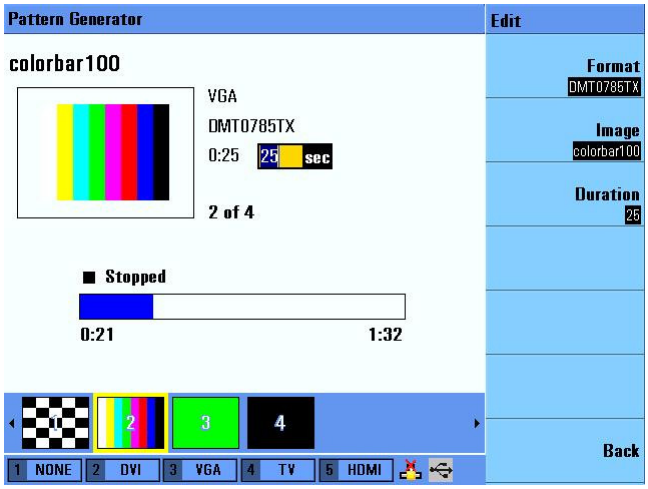
To select the display duration for your pattern, proceed as follows.

1 Press Pattern to activate the Pattern menu. To create a new pattern, see "Creating a Pattern" on page 39.

2 Press **[Source]** to access the Source submenu.

3 Press **[Edit]** to access the Edit submenu.

4 Press **[Duration]** to change the pattern display duration. Select your desired duration (in seconds) and press Enter.



NOTE Select 0 as your desired duration for the pattern to be played continuously.

Creating a Sequence

The U8101A allows the creation of of a sequence of patterns for display test. A sequence can be created from either the front panel or via the PC using SCPI commands. Each step specifies the output type, display format, image to be displayed, and the duration of the step. To create a sequence, proceed as follows.

1 Press Pattern to activate the Pattern menu.

2 Press **[Source]** to access the Source submenu.

3 See "Creating a Pattern" on page 39 to create a new pattern if there are no previous patterns available.

4 To insert a step, press **[Create]**. The new step is inserted after the previous step and becomes the selected step. This new step inherits the **Output**, **Format**, **Image**, and **Duration** properties from the previous step.

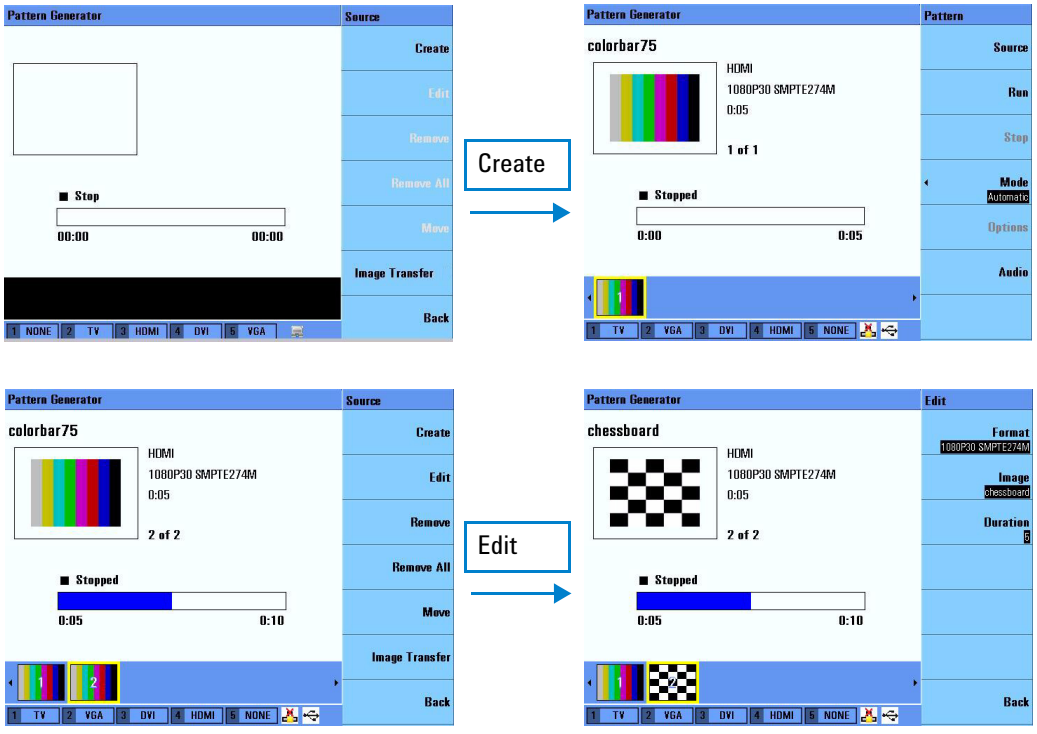


Figure 3-2 Inserting steps in a particular sequence

5 Press **[Edit]** to customize the properties of the new step. See "Selecting a format" on page 39, "Selecting an image" on page 40, and "Selecting the duration" on page 41 for more information.

6 To remove an existing step, select a step and press **[Remove]** in the Source submenu. To remove all steps in a sequence, press **[Remove All]** in the Source submenu.

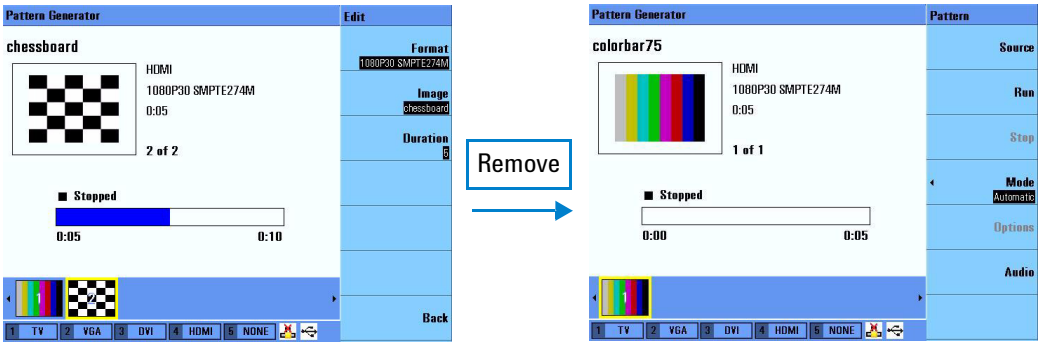


Figure 3-3 Removing steps in a particular sequence

Storing a Sequence

The U8101A allows the storage of customized sequences in its internal memory or as an external XML file. Sequences stored in the internal memory can be assigned a shortcut key, accessible through the front panel. To store a sequence, proceed as follows.

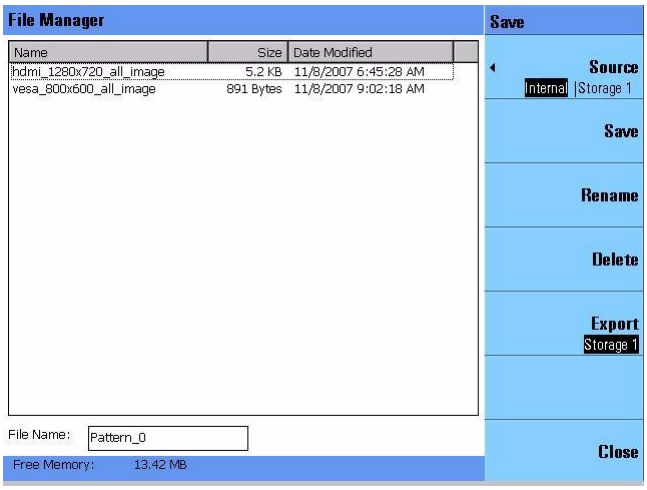
Storing a sequence and assigning a shortcut key to a sequence

To store a customized sequence, press any one of the Seq 1 to Seq 16 keys on the front panel for 3 seconds. This action will store the sequence as well as assign the selected shortcut key to the sequence.

NOTE This action will overwrite the previous sequence assigned to the selected shortcut key.

Storing a sequence as an XML file

1. Press Save.
2. Select the desired location by pressing **[Source]**. You can choose to save the XML file to the U8101A internal memory or to an external storage device.
3. Press **[Save]** to save the sequence as an XML file.



Recalling a Sequence

To recall a stored sequence, proceed as follows.

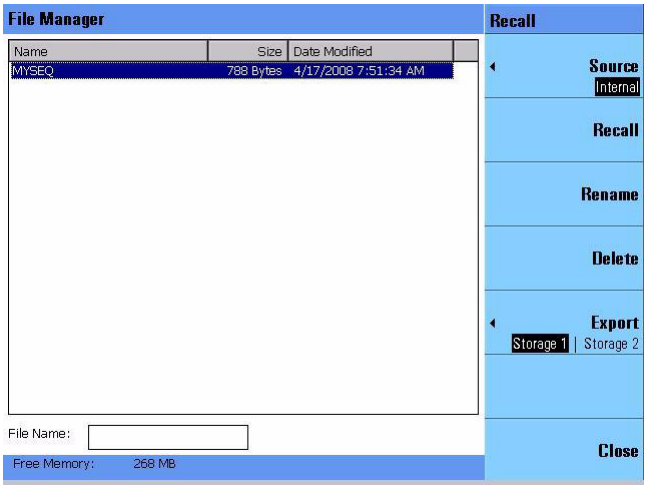
Recalling a sequence from an assigned shortcut key

1 Press any one of the Seq 1 to Seq 16 keys on the front panel to recall the sequence assigned to the key.

2 Press Run/Pause to run the sequence.

Recalling a sequence from an external storage device

1 Press Recall.



2 Select the file location by pressing **[Source]**.

3 Select a sequence from the file list to recall.

4 Press **[Recall]**.

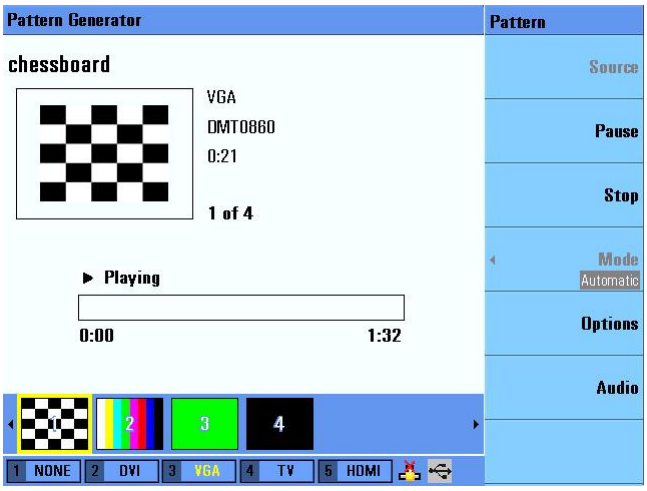
5 Press Run/Pause to run the sequence.

Running a Sequence

Before you run a sequence, ensure that you have created or recalled a sequence. To run a sequence, proceed as follows.

1 Select a sequence and press Run/Pause or **[Run]**.

2 To run a specific part of a sequence, use the knob or arrow keys to select a specific step and press Run/Pause to run the sequence.



3 To pause a sequence, press Run/Pause or **[Pause]** when it is running.

4 Press Stop or **[Stop]** to stop a sequence when it is running.

Setting a Particular Mode

A sequence can be executed in one of the three modes.

Normal mode

The progress of the sequence is under your control. It will progress in a step-by-step manner until the end of the sequence. Press Run/Pause to start the next step.

Auto mode

The sequence is executed automatically. It will stop after the final step is executed.

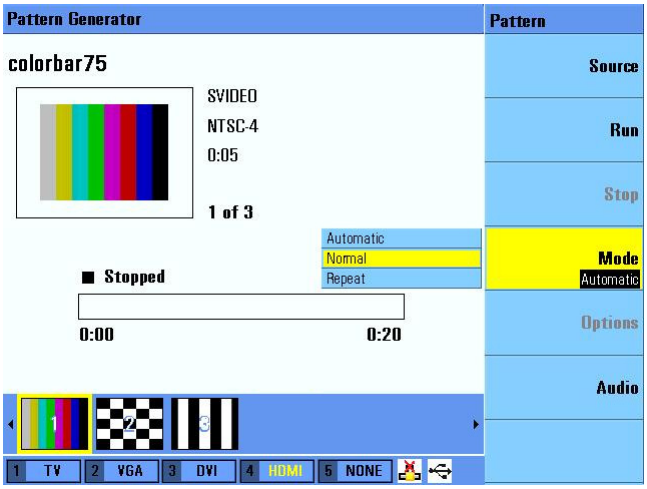
Repeat mode

The sequence is executed automatically in a continuous loop. Press Stop to stop the sequence.

To set a particular mode, proceed as follows.

1 Press Pattern to activate the Pattern menu.

2 Press **[Mode]**. Use the knob or arrow keys to select a specific mode and press Enter.



Customizing Image Shift

The U8101A allows the customizing of an image motion.

1 Press Pattern to activate the Pattern menu.

2 Select a sequence and press Run/Pause or **[Run]**.

3 To access the Image Shift submenu, press **[Options]** → **[Image Shift]**.

4 Press **[Mode]** to select a specific display mode. Use the knob or arrow keys to select a specific display mode and press Enter.

5 To adjust the horizontal increment, use the knob or arrow keys to select **Horizontal Increment** and press Enter. Select your desired value and press Enter.

6 To adjust the vertical increment, use the knob or arrow keys to select **Vertical Increment** and press Enter. Select your desired value and press Enter.

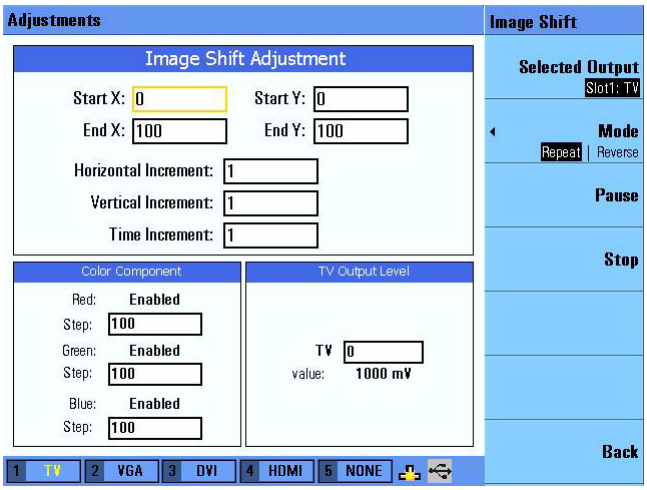
7 To adjust the time increment, use the knob or arrow keys to select **Time Increment** and press Enter. Select your desired value and press Enter.

8 To adjust the starting point X value, use the knob or arrow keys to select **Start X** and press Enter. Select your desired value and press Enter.

9 To adjust the starting point Y value, use the knob or arrow keys to select
Start Y and press Enter. Select your desired value and press Enter.

10 To adjust the end point X value, use the knob or arrow keys to select **End X** and press Enter. Select your desired value and press Enter.

11 To adjust the end point Y value, use the knob or arrow keys to select **End Y** and press Enter. Select your desired value and press Enter.



Customizing Color Components

The U8101A allows the customizing of color components for an image.

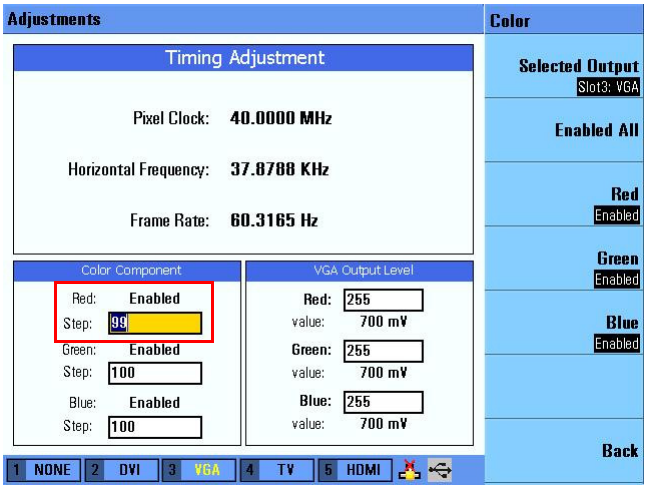
1 Press Pattern to activate the Pattern menu.

2 Select a sequence and press Run/Pause or **[Run]**.

3 To access the Color submenu, press **[Options]** → **[Color]**.

4 Use the knob or arrow keys to select a specific color component and press Enter.

5 Select your desired color component value and press Enter.



6 To enable or disable the red component, press **[Red]**.

7 To enable or disable the green component, press **[Green]**.

8 To enable or disable the blue component, press **[Blue]**.

9 To enable all color components, press **[Enable All]**.

Creating a Customized Image

The U8101A allows you to import your own customized images. To create your own customized image you can use any image editing tool, for example, Microsoft® Paint to create an image. To successfully create a U8101A compatible image, you must ensure that

- the resolution of the image created matches the U8101A compatible resolutions listed in Table 3-1, and
- the image file format is saved as a 24-bit Bitmap (BMP) file.

See "Import image from external USB flash storage" on page 55 for more information on how to import your customized image to the U8101A.

Table 3-1 U8101A compatible resolutions

U8101A Compatible display resolutions	
1024 × 768	1920 × 1080
1152 × 864	1920 × 1200
1280 × 1024	640 × 350
1280 × 720	640 × 400
1280 × 768	640 × 480
1280 × 960	720 × 400
1360 × 768	720 × 480
1400 × 1050	720 × 483
1440 × 900	720 × 576
1600 × 1200	768 × 576
1680 × 1050	800 × 600
1920 × 1035	848 × 480

Testing Multiple Displays Simultaneously

The U8101A can be used to test multiple display devices simultaneously. In order to test the multiple devices simultaneously, the duration set for each pattern must be set to 0 seconds for each slot.

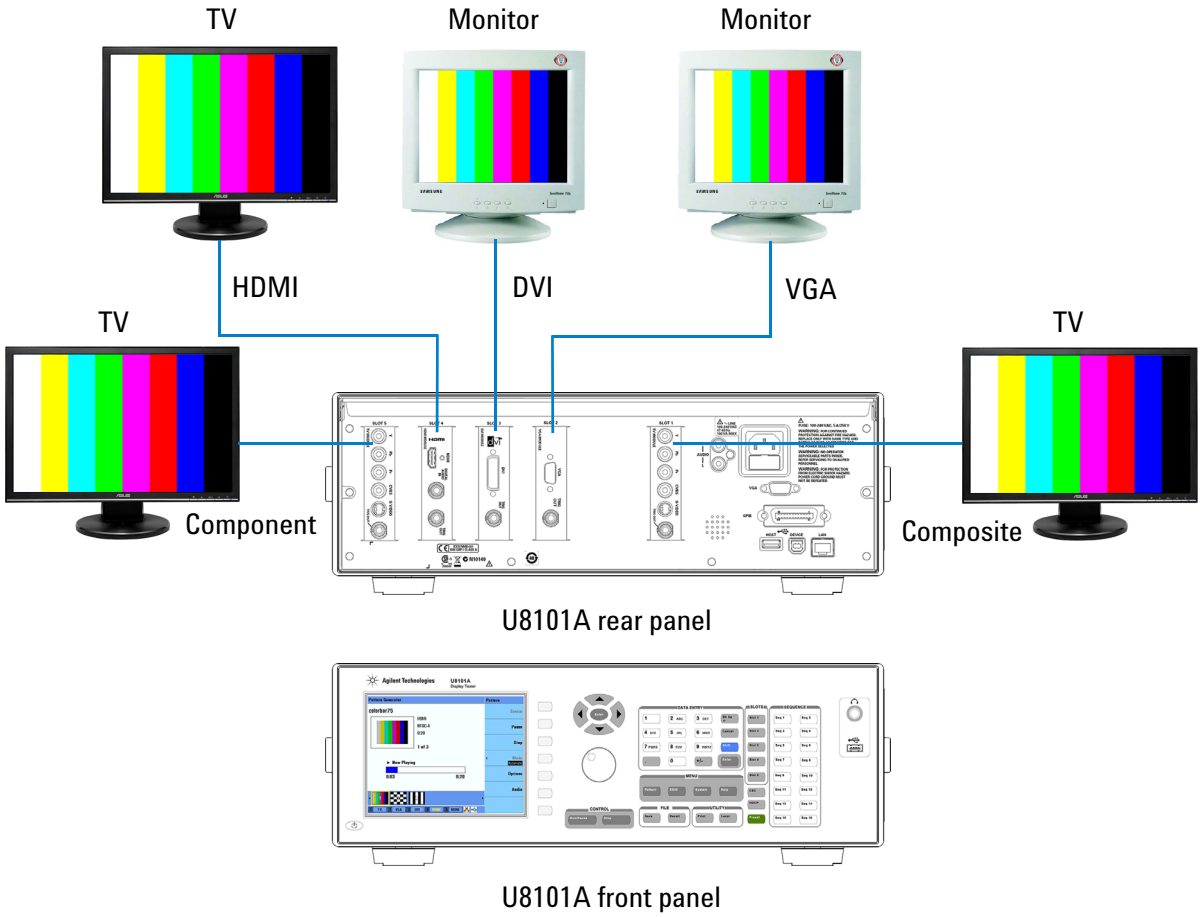


Figure 3-4 Simultaneous test setup example

In the example above, there are five cards available, where

- Slot 1 is fitted with a TV card,
- Slot 2 with a VGA card,
- Slot 3 with a DVI card,
- Slot 4 with a HDMI card, and
- Slot 5 with a TV card.

To test the connected display devices simultaneously, proceed as follows.

Refer to “Creating a Pattern” on page 39 and “Creating a Sequence” on page 42 for more information on pattern and sequence creation.

1 Create a pattern (Pattern 1) from the Composite group and format with duration set to 0 seconds.

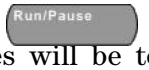
2 Create a pattern (Pattern 2) from the VGA group and format with duration set to 0 seconds.

3 Create a pattern (Pattern 3) from the DVI group and format with duration set to 0 seconds.

4 Create a pattern (Pattern 4) from the HDMI group and format with duration set to 0 seconds.

5 Create a pattern (Pattern 5) from the Component group and format with duration set to 0 seconds.

NOTE Selecting 0 as your desired duration will set the pattern to play continuously.

6 Press 

or **[Run]** to run the sequence. The connected display devices will be tested simultaneously.

4 File and System Maintenance

This chapter provides instructions on how to import and export customized images, EDID data, and test sequences. It also provides instructions on how to run run self-test, calibration and perform firmware updates.

File Maintenance

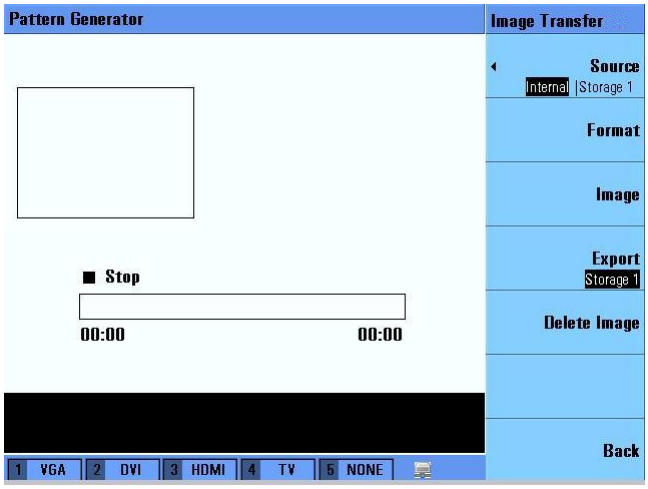
Export image to external USB flash storage

To export an image from the U8101A to an external USB flash storage device, proceed as follows.

1 Press Pattern to activate the Pattern menu.

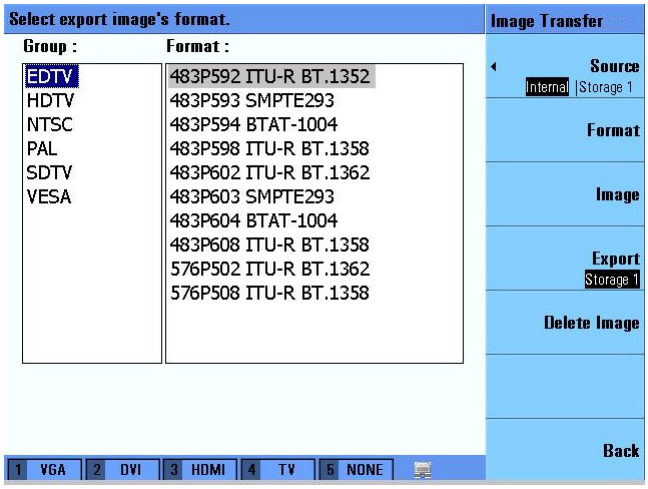
2 Press **[Source]** to access the Source submenu.

3 Press **[Image Transfer]** to access the Image Transfer submenu.

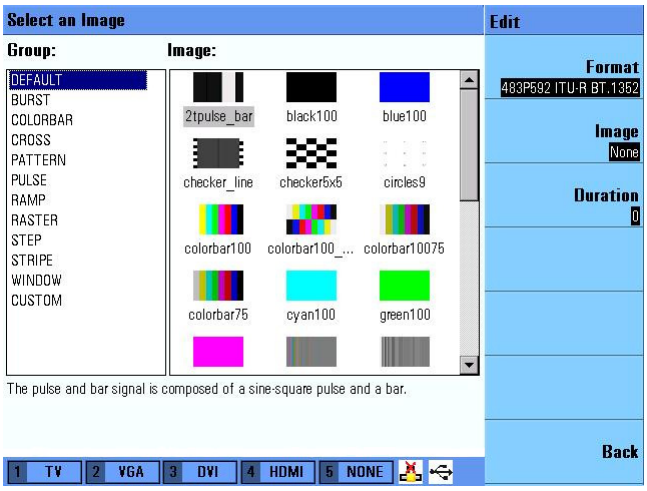


4 Press **[Source]** and select **[Internal]**.

5 Press **[Format]** to select the format of the image to be exported.



6 Press **[Image]** to select an image to be exported.



7 Press **[Export]** to export it to USB external flash storage.

NOTE You will need to insert your external USB flash storage device into the USB host interface in order to save or export a file. Press **Enter** to proceed if you observe a pop-up error message box.

8 The exported image will be saved as a Bitmap (BMP) format file.

Import image from external USB flash storage

To import a user defined image from an external USB flash storage device to the U8101A, proceed as follows.

1 Press Pattern to activate the Pattern menu.

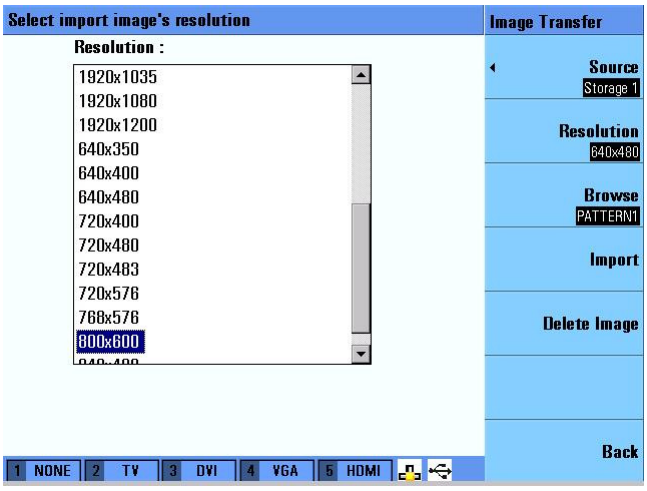
2 Press **[Source]** to access the Source submenu.

3 Press **[Image Transfer]** to access the Image Transfer submenu.

4 Ensure that your external USB flash storage device is connected to the U8101A. Press **[Source]** and select an appropriate external storage source.

5 Press **[Resolution]** to select the resolution of the Bitmap (BMP) file to be imported to the internal memory.

NOTE Only bitmap images located in the root directory of the external USB flash storage can be selected for import.



6 Press **[Browse]** to locate the Bitmap (BMP) file from your external USB flash storage device.

7 Press **[Import]** to import the Bitmap (BMP) file to the U8101A internal memory.

Export sequence file/EDID data

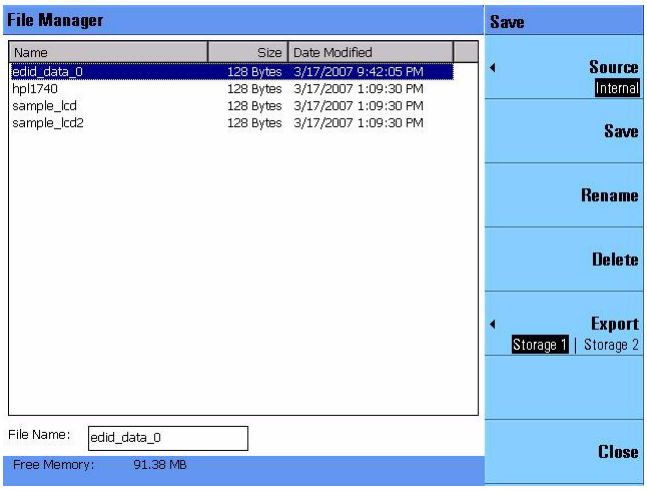
To export a sequence file or EDID data from the U8101A internal memory to an external USB flash storage device, proceed as follows.

1 In the Pattern or EDID menu, press Save or Recall to activate the File Manager.

2 Press **[Source]** and select **[Internal]** to select the U8101A internal memory.

3 Use the knob or arrow keys to select a specific file from the file list.

4 Press **[Export]** and select an appropriate external storage source to export the selected file.



5 The sequence file will be saved in an Extensible Markup Language (XML) file format while the EDID file will be saved in a Binary (.bin) file format.

Import sequence file/EDID data

To import a sequence file or EDID data from an external USB flash storage device to the U8101A internal memory, proceed as follows.

1 In the Pattern or EDID menu, press Save or Recall to activate the File Manager.

2 Press **[Source]** and select an appropriate external storage source.

3 Use the knob or arrow keys to select a specific file from the file list.

4 Press **[Import]** to import the selected file to the U8101A internal memory.

System Maintenance

Interface configuration

To configure the LAN settings and GPIB address for remote control, proceed as follows.

GPIB

1 Press System to activate the System menu.

2 Press **[I/O]** to access the I/O submenu.

3 Press **[GPIB]** to change the GPIB address.

4 Use the alphanumeric keys, knob, or arrow keys to select a new GPIB address.

LAN

1 Press System to activate the System menu.

2 Press **[I/O]** to access the I/O submenu.

3 Press **[LAN Settings]** to access the LAN Settings submenu.

4 Press **[Configure Mode]** and select **[Automatic]** or **[Manual].**

- Select **[Automatic]** to allow the U8101A to automatically configure the LAN settings.
- Select **[Manual]** to manually configure the LAN settings. Use the alphanumeric keys, knob, or arrow keys to select your new LAN settings.

NOTE USB host and interface settings requires no configuration.

Instrument service

To perform self test or self calibration on the U8101A, proceed as follows.

Self test

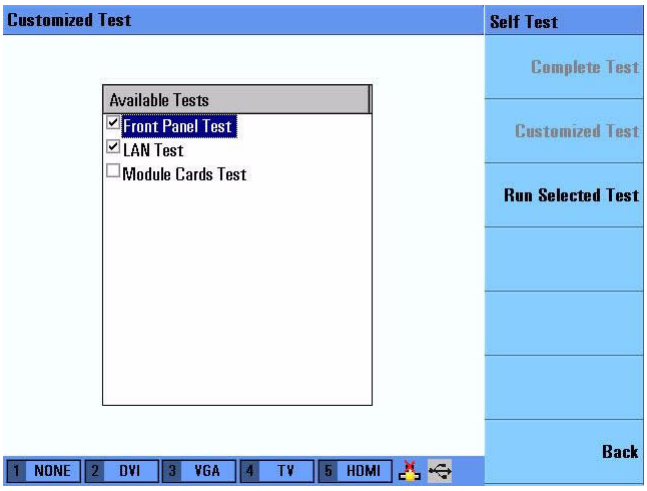
1 Press System to activate the System menu.

2 Press **[Service]** to access the Service submenu.

3 Press **[Self Test]** to access the Self Test submenu.

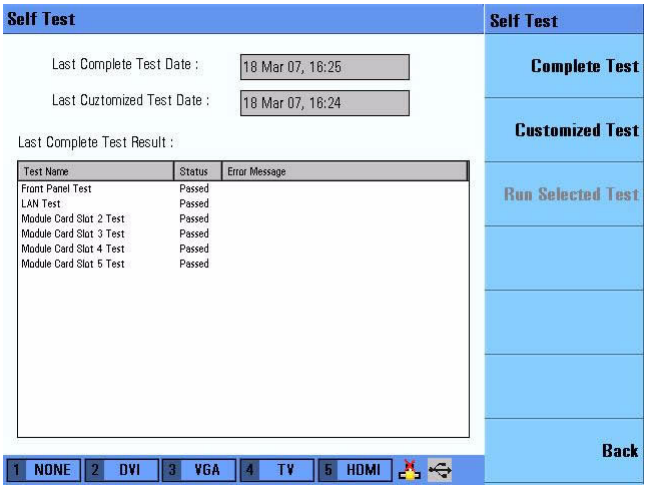
4 Press **[Complete Test]** to run a complete self test on the U8101A.

5 Press **[Customized Test]** to access the available tests. Select your desired test(s) from the available options.



6 Select **[Run Selected Test]** to run the selected custom test(s).

7 The status of the tests will be displayed in the test result panel.



Self calibration

1 Press System to activate the System menu.

2 Press **[Service]** to access the Service submenu.

3 Press **[Self Calibration]** to start the U8101A self calibration.

Instrument update

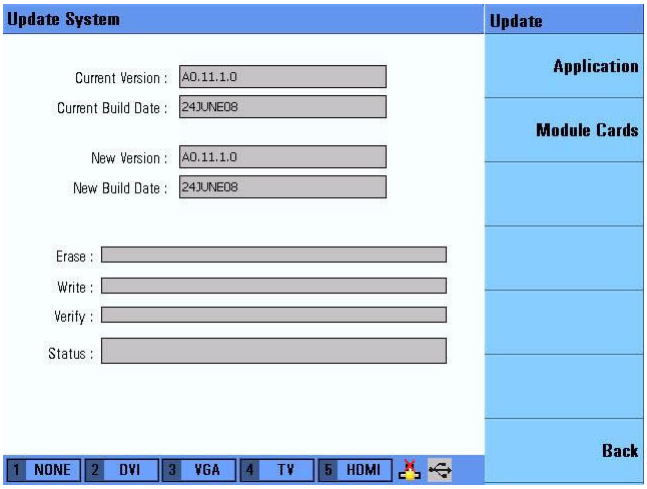
To perform an instrument application update, proceed as follows.

Application

1 Press System to activate the System menu.

2 Press **[Update]** to access the Update submenu.

3 Press **[Application]** to update the U8101A firmware. The U8101A will automatically detect available updates in the external USB flash storage device.



CAUTION The U8101A cannot be powered off and the external USB flash storage device cannot be unplugged while the system is being updated as it may cause a fatal error or an instrument malfunction. You may need to contact the Agilent support team to recover from this problem.

NOTE Ensure that the firmware update file is located in your external USB flash storage device root directory. Refer to www.agilent.com/find/displaytester for the latest firmware revision.

Module cards

1 Press System to activate the System menu.

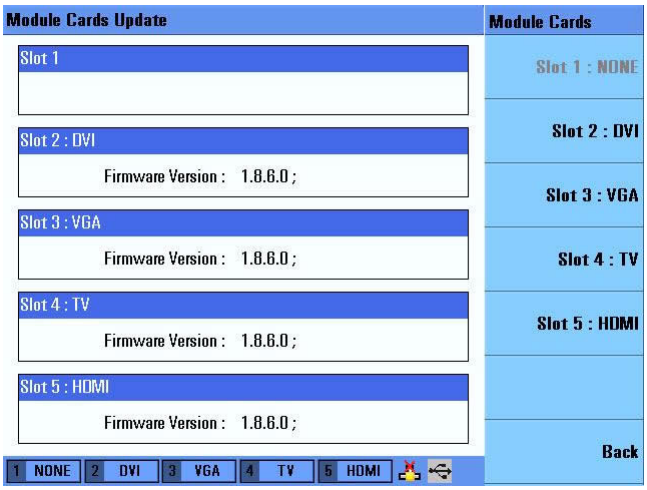
2 Press **[Update]** to access the Update submenu.

3 Press **[Module Cards]** to access the Module Cards submenu.

4 Select a module card slot to update.

5 In the File Manager, press **[Source]** and select an appropriate external storage source.

6 Locate your module card firmware update file and press **[Recall]**.



CAUTION The U8101A cannot be powered off and the external USB flash storage device cannot be unplugged while the system is being updated as it may cause a fatal error or an instrument malfunction. You may need to contact the Agilent support team to recover from this problem.

NOTE Ensure that the module cards firmware update file is located in your external USB flash storage device local drive. Refer to www.agilent.com/find/displaytester for the latest firmware revision.

5
EDID Editing and Operation

This section describes how to read, modify, and write EDID information to a display.

Introduction

Extended Display Identification Data (EDID) is a VESA standard data format that contains basic information about a monitor and its capabilities, including vendor information, maximum image size, color characteristics, frequency range limits, and character strings for the monitor name and serial number. This section describes how to read, modify, and write EDID information to a display.

Press EDID to access the EDID menu. Press **[Source]** to select the display source.

NOTE The display source must be connected to U8101A plug-in cards for the EDID function to be executed.

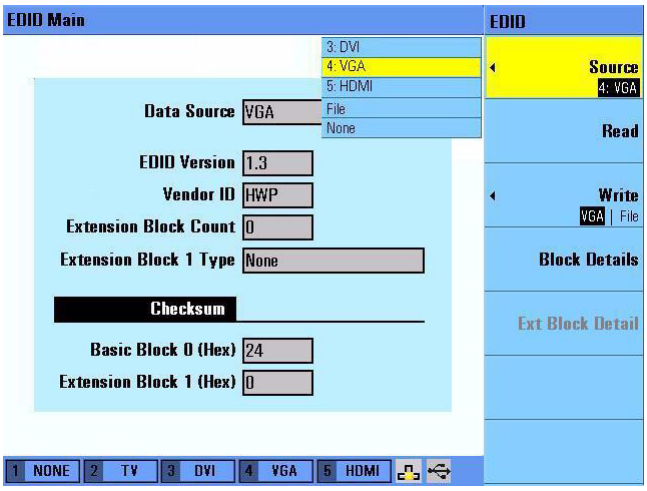


Figure 5-1 EDID page display

Reading the EDID Information

To read the EDID data from a display or a file, proceed as follows.

1 Press EDID to activate the EDID menu.

2 Press **[Source]** to select the source of the EDID data.

3 Press **[Read]** to read the EDID data from the display.

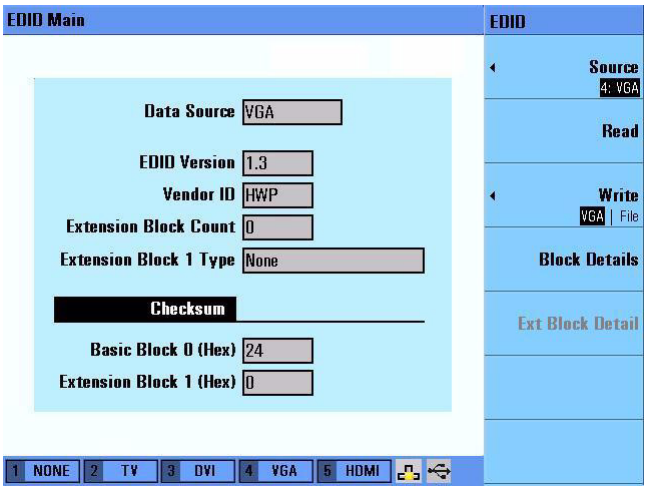


Figure 5-2 Reading EDID information

Writing the EDID Information

To write the EDID data to an external display or a file, proceed as follows.

1 Press EDID to activate the EDID menu.

2 Press **[Source]** to select the source of the EDID data.

3 Press **[Write]** to select and write the EDID data to a display or a file.

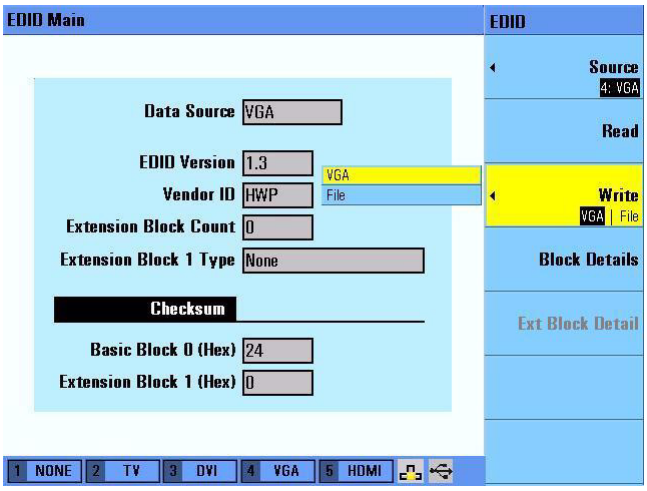


Figure 5-3 Writing EDID information

Modifying the EDID Parameters

To access and modify the EDID parameters, proceed as follows.

1 Press EDID to activate the EDID menu.

2 Press **[Block Details]** to access the Block Details submenu.

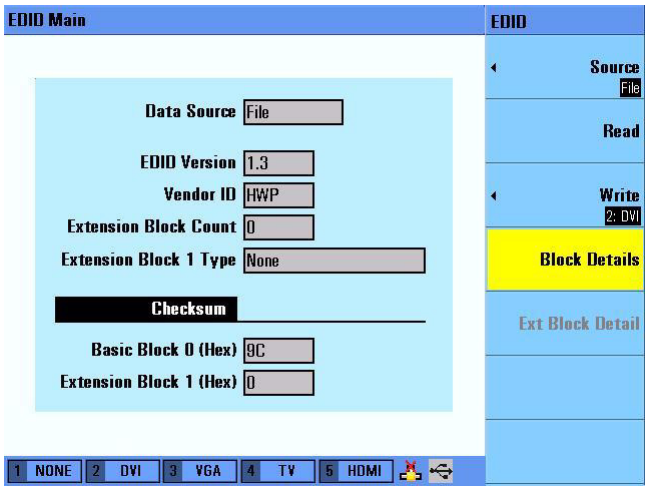


Figure 5-4 EDID block details

3 To access the General EDID Information page, press **[General]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

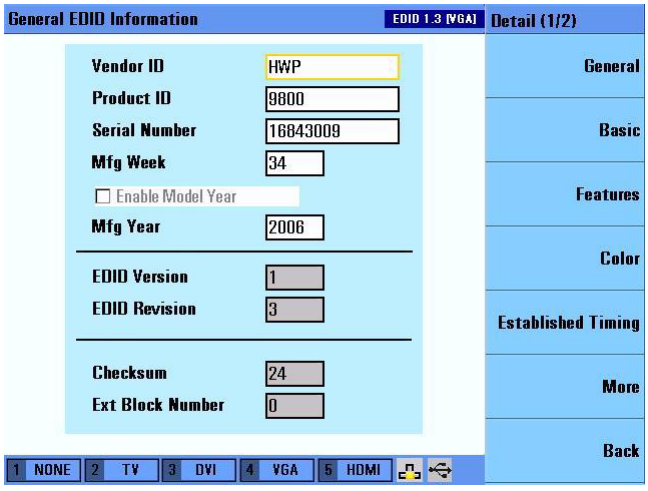


Figure 5-5 EDID general information

4 To access the Basic Display Parameter page, press **[Basic]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

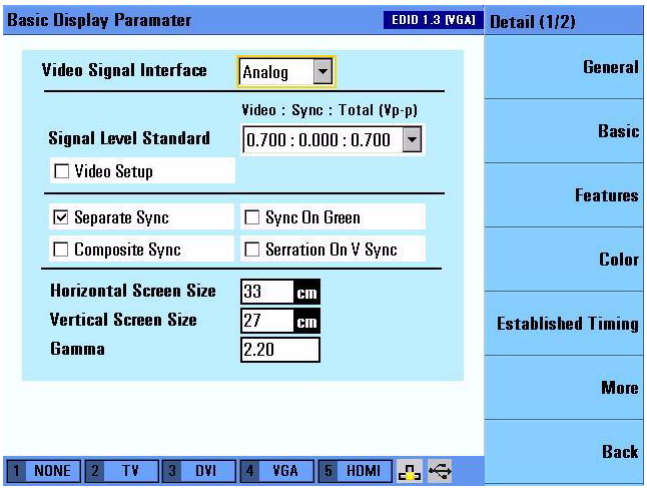


Figure 5-6 EDID basic information

5 To access the Basic Features page, press **[Features]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

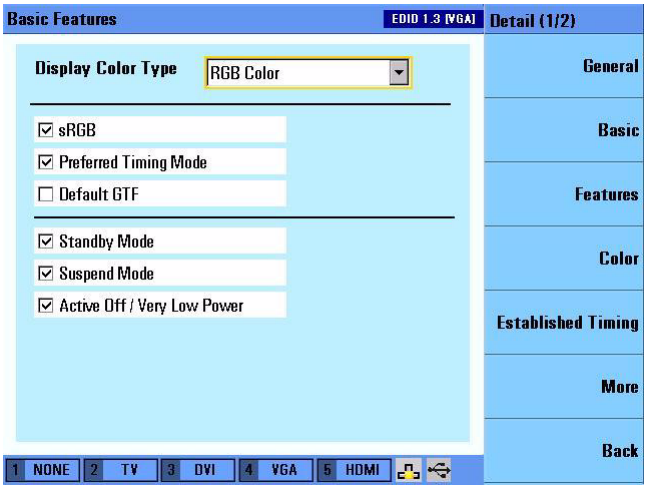


Figure 5-7 EDID basic features information

6 To access the Color Characteristics page, press **[Color]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

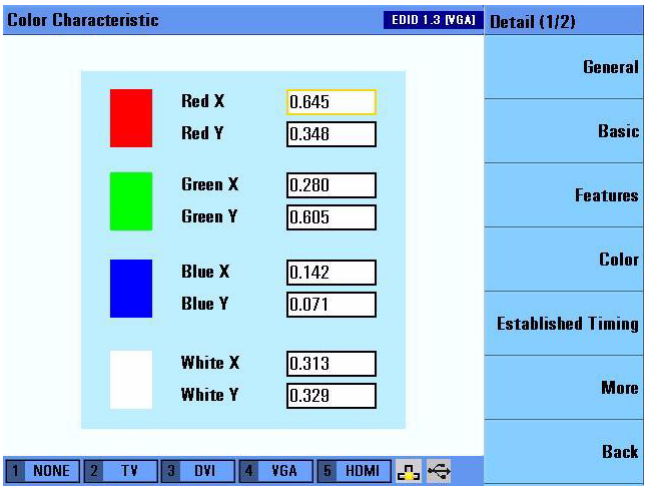


Figure 5-8 EDID color characteristics

7 To access the Established Timings page, press **[Established Timings]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

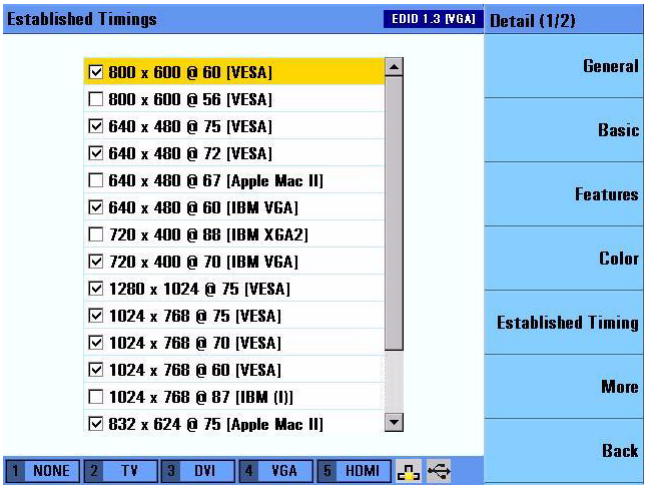


Figure 5-9 EDID established timing information

8 To access the standard timings and data block information, press **[More]**. Use the knob or arrow keys to select a parameter and press Enter to modify the values.

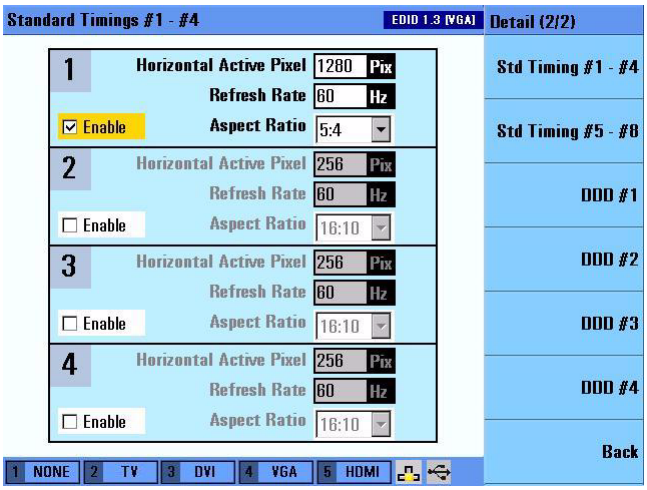


Figure 5-10 More information for EDID

6
Optional Plug-in Cards

This chapter provides on overview of the plug-in cards available for the U8101A.

Introduction

The U8101A has five slots located at the rear for the insertion of up to five plug-in cards to test various display applications. See “Product at a Glance" on page 3 for more information on the location of the slots. You can plug in any combination of the four optional cards into the five slots.

The four optional plug-in cards available are:

- Analog TV Card
- Analog RGB Card (VGA Card)
- DVI Card (Single Link)
- HDMI 1.2 Generator Card

Refer to www.agilent.com for more information on the plug-in cards.

Contact the nearest Agilent Service Center for installation or reconfiguration of the plug-in cards.

Analog TV Card

The analog TV card is designed to test displays that uses only analog video interfaces. This card is able to generate all commonly used analog video signals for CRT or flat panel TV displays and other analog video products.

Key features

The analog audio signal may be used to test display speakers. The U8101A is able to output two-channel analog audio from its rear panel.

Available connectors

There are six connectors available for this card (Figure 6-1):

- **YPbPr analog component video output (3 × RCA)**: Outputs HDTV, SDTV, and EDTV formats.
- **CVBS connector**: Outputs an analog composite video baseband signal (RCA).
- **S-Video connector**: Outputs an S-Video split luminance (Y) and chrominance (C) analog video signal.
- **Trigger out:** BNC connector, outputs a trigger signal to an external device (for example: an oscilloscope or a camera).

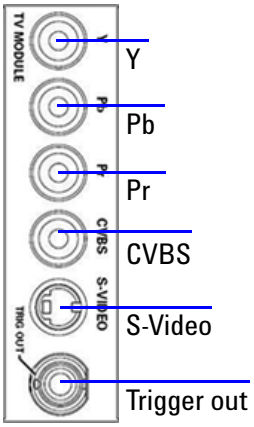


Figure 6-1 Analog TV card rear panel

Accessories

Accessories available with this card:

- Component (YPbPr) cable: 3x male RCA to 3x male RCA cable (2 m)
- Composite (CVBS) cable: 1x male RCA to 1x male RCA cable (2 m)
- Male S-Video to male S-Video cable (2 m)

Analog RGB Card (VGA Card)

The analog RGB card (VGA card) is designed for PC displays, TV displays or any other products with a VGA interface. This card is able to generate analog RGB video signals for CRT or flat panel PC monitors and other VGA video products.

Key features

- The analog RGB card is able to read and write all bytes of any block within the EDID. The U8101A is able to present the EDID contents to you in a user-friendly format. See Chapter 5, “EDID Editing and Operation,” starting on page 63 for more information on EDID.
- The analog audio signal may be used to test display speakers. The U8101A is able to output two-channel analog audio from its rear panel.

Available connectors

There are two connectors available for this card (Figure 6-2). They are:

- **VGA output:** 15-pin DSub connector, outputs an analog component video RGB signal.
- **Trigger out:** BNC connector, outputs a trigger signal to an external device (for example: an oscilloscope or a camera).

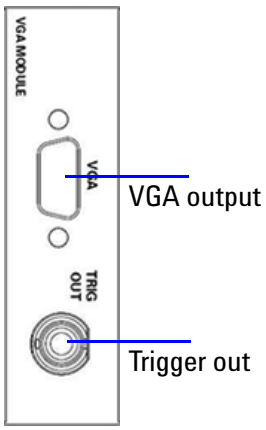


Figure 6-2 Analog RGB card (VGA card) rear panel

Accessory

The accessory available with this card is a 15-pin DSub male VGA to male VGA cable (2 m).

DVI Card (Single Link)

The DVI card outputs digital video signals for the testing of DVI-compliant video displays such as flat panel TV displays and PC monitors.

Key features

- The DVI card is able read and write all bytes of any block within the EDID. The U8101A is able to present the EDID contents to you in a user-friendly format. See Chapter 5, “EDID Editing and Operation,” starting on page 63 for more information on EDID.
- The DVI card outputs a DVI signal carrying a valid digital video signal using RGB pixel encoding. The video signal is configurable to any CEA video format timing supported by the sink display.
- The analog audio signal may be used to test display speakers. The U8101A is able to output two-channel analog audio from its rear panel.

Available connectors

There are two connectors available for this card (Figure 6-3). They are:

- **DVI output:** DVI 1.0 connector, outputs a full single link DVI digital video signal.
- **Trigger out:** BNC connector, outputs a trigger signal to an external device (for example: an oscilloscope or a camera).

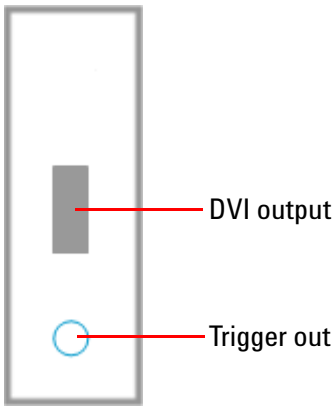


Figure 6-3 DVI card (single link) rear panel

Accessory

The accessory available with this card is a DVI-D connector, male DVI to male DVI cable (2 m)

HDMI 1.2 Generator Card

The HDMI 1.2 generator card outputs HDMI 1.2 or DVI 1.0 video signals to test HDMI/DVI-compliant displays such as flat panel TV displays and PC monitors. This card has additional features over the DVI card.

This card supports HDMI protocol test of HDMI CTS, EDID/DDC, and allows turning on or off content protection with HDCP 1.1.

Key features

The HDMI 1.2 generator card has the following key features:

- Generates HDMI signals with a variety of patterns and amplitude levels.
- Reads and writes all bytes of any block within the EDID. The U8101A is able to present the EDID contents to you in a user-friendly format. See Chapter 5, "EDID Editing and Operation," starting on page 63 for more information on EDID.
- Supports HDMI Deep Color test. It outputs 8 bit, 10 bit, and 12 bit digital video signals presented as patterns.
- Emulates any HDMI transmitter product when performing HDMI 1.2, HDCP 1.1, and E-EDID/DDC tests.
- Capable of operating in two modes:
  - HDMI mode: Outputs a HDMI signal carrying a valid video signal using RGB/YCbCr pixel encoding, a valid IEC60958 audio signal, and a valid Audio InfoFrame signal.
  - DVI mode: Outputs a DVI signal carrying a valid video signal using RGB pixel encoding, without the audio signal. A HDMI to DVI cable is required.
- Outputs a video signal that is configurable to any CEA video format timing supported by the sink display.
- The digital audio signal (consisting of sine waves or other readily identifiable test signals) is configurable to use any of the following formats supported by the sink display:
  - L-PCM at 32 kHz, 44.1 kHz, 48 kHz (for internal audio source) and L-PCM at 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, and 192 kHz (for external audio source). The digital audio signal generated by the internal audio source can be routed to the HDMI 1.2 generator card internally.
  - Dolby Digital (AC-3) at 44.1 kHz and 48 kHz (from an external audio source).
- The analog audio signal may be used to test display speakers. The U8101A is able to output two-channel analog audio from its rear panel.

Available connectors

There are three connectors available for this card (Figure 6-4). They are:

- **HDMI output:** HDMI connector, outputs a full single link HDMI video signal, as well as a DVI digital video signal.
- **Audio in:** Standard S/PDIF, RCA connector, inputs digital audio signals from an external digital audio source (for example: DVD source).
- **Trigger out:** BNC connector, outputs a trigger signal to an external device (for example: an oscilloscope or a camera).

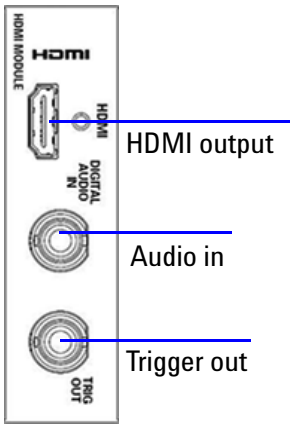


Figure 6-4 HDMI 1.2 generator card rear panel

Accessories

Accessories available with this card:

- Type A connector, male HDMI to male HDMI cable (2 m)
- DVI-D to HDMI Type A connector, male DVI to male HDMI cable (2 m)
- S/PDIF cable: Male BNC to male RCA cable (2 m)

7
Remote Interface Reference

This chapter describes how to configure and program the U8101A over a remote interface.

Remote Interface Configuration

This section describes how to configure the GPIB (IEEE-488), LAN, and USB remote interfaces.

NOTE

- For more information on configuring the remote interface connectivity, refer to the *Agilent Technologies USB/LAN/GPIB Interfaces Connectivity Guide*.
- If you have installed the IO Libraries Suite, you can access the Connectivity Guide via the Agilent IO Libraries Control icon. Alternatively, you can access the Connectivity Guide via the Web at www.agilent.com/find/connectivity.
- Changes to the U8101A settings executed via the remote interface will not be reflected in the front panel display.

Interface selection

You can choose to control the U8101A remotely using the GPIB, LAN, or USB interfaces.

GPIB address

Each device on the GPIB interface must have a unique address. You can set the U8101A address to any value between 0 and 30. The U8101A is shipped with a default address of 19. The GPIB address is stored in nonvolatile memory, and does not change when the U8101A is switched off, or after a remote interface reset.

The GPIB bus controller has its own address. Avoid using the bus controller address for any instrument on the interface bus. Agilent controllers generally use address 21.

- To set the GPIB address from the remote interface use this command:

```
SYSTem:COMMunicate:GPIB:ADDRess
```

- To query the GPIB address from the remote interface use this command:

```
SYSTem:COMMunicate:GPIB:ADDRess?
```

LAN configuration

The U8101A has three LAN operating modes:

- Dynamic IP (Dynamic Host Configuration Protocol or DHCP)
- Auto IP (local PC control or isolated LAN)
- Static IP (manual configuration)

Configuring the LAN remotely

The IP address, subnet mask, and default gateway can be changed manually or remotely. To remotely specify the LAN settings, use the following commands:

- IP Address: `SYSTem:COMMunicate:LAN:ADDRess`
- Subnet Mask: `SYSTem:COMMunicate:LAN:SMASk`
- Default Gateway: `SYSTem:COMMunicate:LAN:DGATeway`

The values for the IP address, subnet mask, and default gateway can range between `0.0.0.0` and `255.255.255.255`.

NOTE If you set an invalid IP address or an IP address that is used by another device or host, an error message is generated. This error can be read by using the SYSTem:ERRor? command.

The LAN setting values are stored in nonvolatile memory.

USB interface

The USB interface does not require front panel or remote configuration. The USB address cannot be changed as it is set at the factory and is unique for each display tester.

NOTE

- Before connecting the USB cable, make sure that the Agilent IO Libraries software is installed on your PC.
- For more information about Agilent IO Libraries software refer to the *Agilent Technologies USB/LAN/GPIB Interfaces Connectivity Guide*. If you have installed other I/O software, refer to the documentation that accompanies the software.

Introduction to the SCPI Language

SCPI, also known as Standard Commands for Programmable Instruments, is an ASCII-based instrument command language designed for test and measurement instruments. SCPI commands are based on a hierarchical structure, also known as a tree system. In this system, associated commands are grouped together under a common node or root, thus forming subsystems. A portion of the SOURce subsystem is shown below to illustrate the tree system.

```
SOURce:
  VIDeo:
      TIMing <step>, <card>
```

SOURce is the root keyword of the command, VIDeo is the second-level keyword, and TIMing is the third-level keyword. A colon (:) separates a command keyword from a lower-level keyword.

Throughout this guide, the following conventions are used for SCPI command syntax for remote interface programming:

- Braces ({ }) enclose the parameter choices for a given command string. The braces are not sent with the command string.
- A vertical bar (|) separates multiple parameter choices for a given command string.
- Triangle brackets (< >) indicate that you must specify a value for the enclosed parameter. The brackets are not sent with the command string.
- Some parameters are enclosed in square brackets ([ ]). This indicates that the parameter is optional and can be omitted. The brackets are not sent with the command string. If you do not specify a value for an optional parameter, the instrument chooses a default value.

SCPI Parameter Types

The SCPI language defines several different data formats to be used in program messages and response messages.

Numeric Commands that require numeric parameters accept all commonly used decimal representations of numbers including optional signs, decimal points, and scientific notation. You can also send engineering unit suffixes with numeric parameters (example, MHz or kHz).

Discrete Discrete parameters are used to program settings that have a limited number of values (for example, BUS, IMMediate, EXTernal). They have a short form and a long form just like command keywords. You can mix upper- and lower-case letters. Query responses will always return the short form in all upper-case letters.

Boolean Boolean parameters represent a single binary condition that is either true or false. For a false condition, the U8101A will accept OFF or 0. For a true condition, the U8101A will accept ON or 1. When you query a boolean setting, the U8101A will always return 0 or 1.

String String parameters can contain virtually any set of ASCII characters. A string must begin and end with matching quotes; either with a single quote or a double quote. You can include the quote delimiter as part of the string by typing it twice without any characters in between.

Block The Block parameter allows binary data (including extended ASCII codes) to be transmitted as a sequence of bytes. This is more efficient than the text format when transferring large amounts of data. Either definite length or indefinite length arbitrary data may be transmitted or returned.

SCPI Status Model

This section describes the structure of the SCPI status system used by the U8101A. The status system records various conditions and states of the U8101A in several register groups as shown in Figure 7-1. Each register group is made up of several low level registers called Condition registers, Event registers, and Enable registers which control the action of specific bits within the register group.

What is a Condition Register?

A condition register continuously monitors the state of the instrument. The bits in the condition register are updated in real time and the bits are not latched or buffered. This is a read-only register and the bits are not cleared when you read the register. A query of a condition register returns a decimal value which corresponds to the binary-weighted sum of all bits set in that register.

What is an Event Register?

An event register latches the various events from the changes in the condition register. There is no buffering in this register; while an event bit is set, subsequent events corresponding to that bit are ignored. This is a read-only register. Once a bit is set, it remains set until cleared by a query command or a clear status (`*CLS`) command. A query of this register returns a decimal value which corresponds to the binary-weighted sum of all bits set in that register.

What is an Enable Register?

An enable register defines which bits in the event register will be reported to the Status Byte register group. You can write to or read from an enable register. A clear status (`*CLS`) command will not clear the enable register but it does clear all bits in the event register. A `STAT:PRES` command clears all bits in the enable register. To enable bits in the enable register to be reported to the Status Byte register, you must write a decimal value which corresponds to the binary-weighted sum of the corresponding bits.

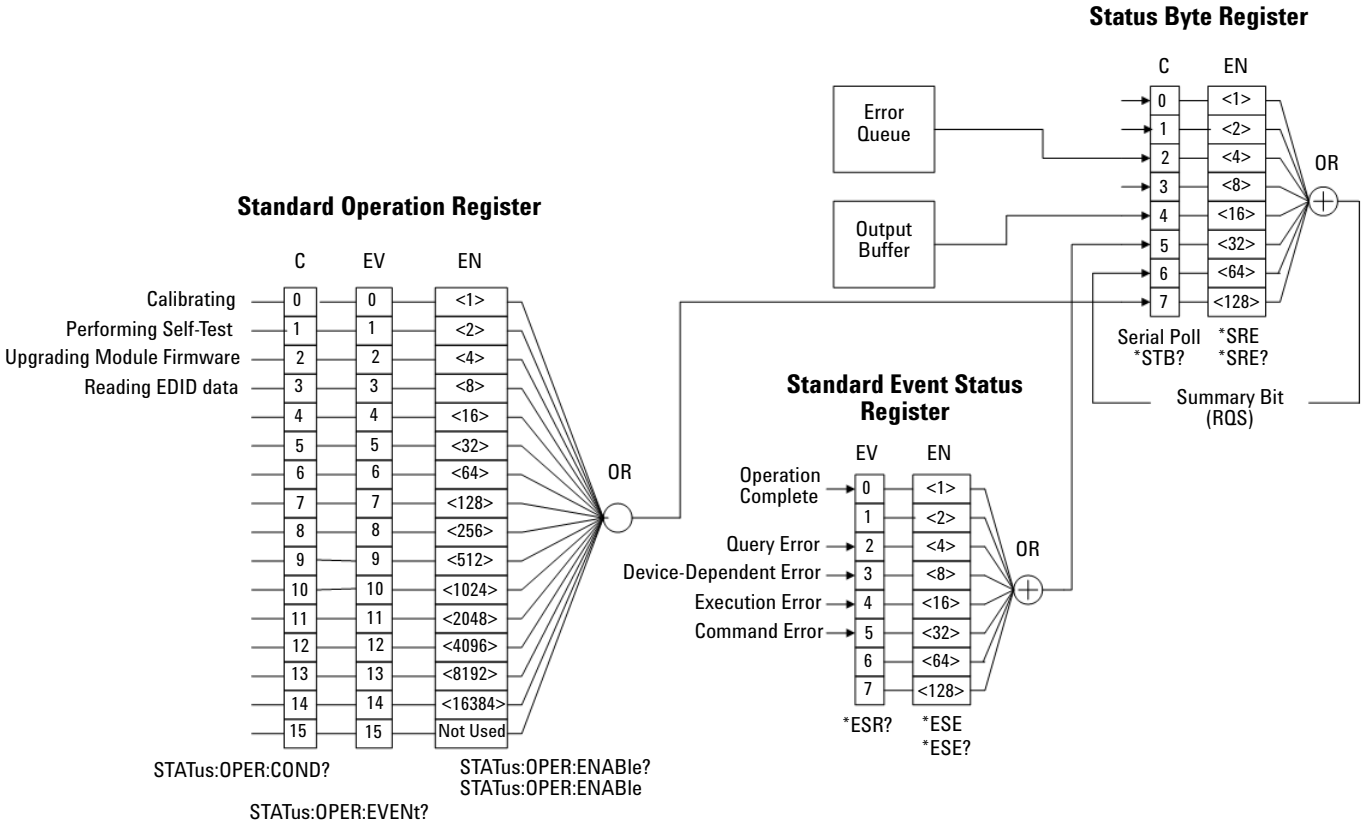


Figure 7-1 Status system diagram

IEEE-488.2 Common Commands

The IEEE-488.2 standard defines a set of common commands that perform functions such as reset, self-test, and status operation. Common commands always begin with an asterisk (*), are three characters in length, and may include one or more parameters. The command keyword is separated from the first parameter by a blank space. A semicolon is used (;) to separate multiple commands as shown below:

```
*RST; *CLS; *ESE 32; *OPC?
```

*CLS

Syntax

```
*CLS
```

Description

This command clears the event registers in all register groups and also clears the error queue.

Example

This command is used to clear all event registers and the error queue.

```
*CLS
```

*ESE/*ESE?

Syntax

```
*ESE <value>
```

```
*ESE?
```

Description

```
*ESE <value>
```

This command sets the bits in the Standard Event enable register. The selected bits are then reported to bit 5 of the Status Byte register.

```
*ESE?
```

This command queries the Standard Event enable register and returns a decimal value that corresponds to the binary-weighted sum of all bits set in the register.

Parameter

Name	Type	Range of values	Default value
<value>	Numeric	A decimal value (0 to 255) which corresponds to the binary-weighted sum of the bits in the register (see Table 7-1)	This is a required parameter

Remarks

The following table lists the bit definitions for the Standard Event register.

Table 7-1 Standard Event register bit definition table

Bit number	Definition	Decimal value	Description
0	Operation Complete	1	All commands prior to and including *OPC have been executed
1	Not Used	Not Used	0 is returned
2	Query Error	4	The instrument tried to read the output buffer but it was empty, or a new command line was received before a previous query has been read, or both the input and output buffers are full
3	Device-Dependent Error	8	A device-specific error, including a self-test error or calibration error, occurred (an error in the –300 range or any positive error has been generated). For a complete listing of the error messages, see SCPI Error Messages.
4	Execution Error	16	An execution error occurred (an error in the –200 range has been generated)
5	Command Error	32	A command syntax error occurred (an error in the –100 range has been generated)
6	Not Used	Not Used	0 is returned
7	Not Used	Not Used	0 is returned

- Use the <value> parameter to specify which bits to enable. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 2 (decimal value = 4), bit 3 (decimal value = 8), and bit 7 (decimal value = 128), the corresponding decimal value would be 140 (4 + 8 + 128).
- The clear status (*CLS) command does not clear the enable register but clears all bits in the event register.
- The STATus:PRESet command does not clear the bits in the Status Byte enable register.
- The setting enabled by this command is not affected by *RST or instrument preset (SYSTem:PRESet). However, cycling the instrument power will reset this register to 0.

Examples

The following command enables bit 4 (decimal value = 16) in the enable register. If an Execution Error occurs, this condition will be reported to the Status Byte register (bit 5 will be set high).

```
*ESE 16
```

The following query returns the bits set in the register.

```
*ESE?
```

Typical Response: 16

*ESR?

Syntax

```
*ESR?
```

Description

This query returns a decimal value that corresponds to the binary-weighted sum of all bits set in the Standard Event register.

Remarks

- Refer to Table 7-1 for the Standard Event register bit definitions.
- In order to be reported to the Standard Event register, the corresponding bits in the event register must be enabled using the *ESE command.
- Once a bit is set, it remains set until cleared by a clear status (*CLS) command or queried by this command.

Example

The following query returns the bits set in the register.

```
*ESR?
```

Typical Response: `16`

*IDN?

Syntax

```
*IDN?
```

Description

This query reads the U8101A identification string which contains four comma-separated fields. The first field is the manufacturer's name, the second field is the U8101A model number, the third field is the serial number, and the fourth field is the firmware revision.

Agilent Technologies	Manufacturer
U8101A	Instrument model number
MY xxxxxxxx	Instrument serial number if available, or 0
x.x.x.x	Firmware revision

Example

The following query returns the U8101A identification string.

```
*IDN?
```

Typical Response: `AGILENT TECHNOLOGIES, U8101A, MY48180001, 1.0.0.0`

*OPC/*OPC?

Syntax

```
*OPC
```

```
*OPC?
```

Description

```
*OPC
```

This command sets the “Operation Complete” bit (bit 0) in the Standard Event register after all of the previous commands have been completed.

```
*OPC?
```

This command returns `1` to the output buffer when all pending operation has completed.

Remarks

- The purpose of this command is to synchronize your application with the U8101A.
- Note the difference between the `*OPC` command and the `*OPC?` query command. `*OPC` sets the "Operation Complete" bit (bit 0) in the Standard Event register when all pending operation has completed. `*OPC?` returns `1` to the output buffer when all pending operation has completed.

Examples

The following command sets the "Operation Complete" bit.

```
*OPC
```

The following command waits until the completion of the current command and then sends 1 to the output buffer.

```
*OPC?
```

Typical Response: `1`

*RST

Syntax

```
*RST
```

Description

This command resets the U8101A to its factory default settings.

Remark

This command does not affect any user-defined files in the U8101A memory.

Example

The following command resets the U8101A.

```
*RST
```

*SRE/*SRE?

Syntax

```
*SRE <value>
```

```
*SRE?
```

Description

```
*SRE <value>
```

This command enables the bits in the Status Byte enable register. The selected enabled bits are summarized in the “Master Summary” bit (bit 6) of the Status Byte Register. If any of the selected bit condition change from 0 to 1, a Service Request is generated.

```
*SRE?
```

The query command reads the enable register and returns a decimal value that corresponds to the binary-weighted sum of all bits set in the register.

Parameter

Name	Type	Range of values	Default value
<value>	Numeric	A decimal value (0 to 255) which corresponds to the binary-weighted sum of the bits in the register (see Table 7-2).	This is a required parameter

Remarks

- Table 7-2 lists the bit definitions for the Status Byte register.

Table 7-2 Status Byte register bit definition table

Bit number	Definition	Decimal value	Description
0	Not Used	Not Used	Always zero
1	Not Used	Not Used	Always zero
2	Query Error	4	One or more errors have been stored in the Error Queue. Use the `SYSTem:ERRor?` command to read and delete errors
3	Not Used	Not Used	Always zero
4	Message Available	16	Data is available in the U8101A output buffer
5	Standard Event Summary	32	One or more bits are set in the Standard Event register (bits must be enabled, see `*ESE` command)
6	Master Summary	64	One or more bits are set in the Status Byte register and may generate a Service Request (SRQ). Bits must be enabled using the `*SRE` command.
7	Standard Operation Summary	128	One or more bits are set in the Standard Operation register (bits must be enabled, see `STATus:OPERation:ENABle` command)

- Use the `<value>` parameter to specify which bits to enable. The decimal value specified corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 2 (decimal value = 4) and bit 5 (decimal value = 32), the corresponding decimal value would be 36 (4 + 32).
- The clear status (`*CLS`) command will not clear the enable register but it does clear all bits in the event register.

- A `STATus:PRESet`, `SYSTem:PRESet`, `*CLS`, or `*RST` command does not clear the bits in the Status Byte enable register.
- Cycling the U8101A power will reset it to 0.

Examples

The following command enables bit 4 (decimal value = 16) in the enable register.

```
*SRE 16
```

The following query returns which bits are enabled in the register.

```
*SRE?
```

Typical Response: `16`

*STB?

Syntax

```
*STB?
```

Description

This command queries the condition register for the Status Byte register group. This command is similar to a Serial Poll but it is processed like any other instrument command. This is a read-only register and the bits are not cleared when you read the register.

Remarks

- Refer to Table 7-2 for the bit definitions for the Status Byte register.
- This command returns the same results as a Serial Poll but the Request Service bit (bit 6) is not cleared if a Serial Poll has occurred.
- A power-on cycle will clear all bits in the condition register.

Example

The following command reads the condition register (bits 2 and 5 are set).

```
*STB?
```

Typical Response: `36`

*TST?

Syntax

```
*TST?
```

Description

This command initiates an internal self-test of the U8101A and returns a pass or fail indication. The self-test runs a series of tests and will take several seconds to complete.

Remark

If one or more tests fail, `1` is returned and an error is stored in the error queue. For a complete listing of the error messages related to self-test failures, see SCPI Error Messages. Use the `SYSTem:ERRor?` command to read the error queue.

NOTE Do not operate the U8101A while the self-test is in progress as doing so might cause unexpected results.

Example

The following command performs a self-test and returns a pass or fail indication.

```
*TST?
```

Typical Response: `0`

*WAI

Syntax

```
*WAI
```

Description

The Wait-to-Continue (WAI) command causes the U8101A to wait until all pending commands have completed, before executing any other command.

Example

The following command waits until all pending operation has completed.

```
*WAI
```

Selecting a Card

This section explains how to identify a particular card in the U8101A mainframe. A card is identified by `<card name><i>`, where `<i>` is 1 if only one card of its type is installed in the mainframe. If more than one card of the same type is installed, then `<i>` is 2 for the second card, 3 for the third card and so on, in ascending slot order.

Example 1

In this example, the U8101A mainframe has these five cards installed: one TV, one VGA, one HDMI, and two DVI, as shown in the following figure.

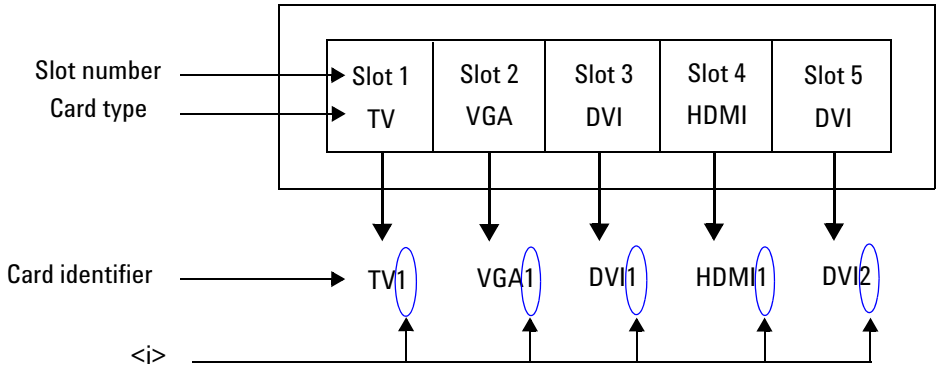


Figure 7-2 Card configuration for Example 1

There are two DVI cards in this example. The DVI card in Slot 3 is identified as DVI1, while the Slot 5 card is DVI2. The cards in Slots 1, 2, and 4 are identified as TV1, VGA1, and HDMI1 respectively.

Example 2

In this example, the U8101A mainframe has four HDMI cards installed. To control the card at Slot 4, you identify it as HDMI4.

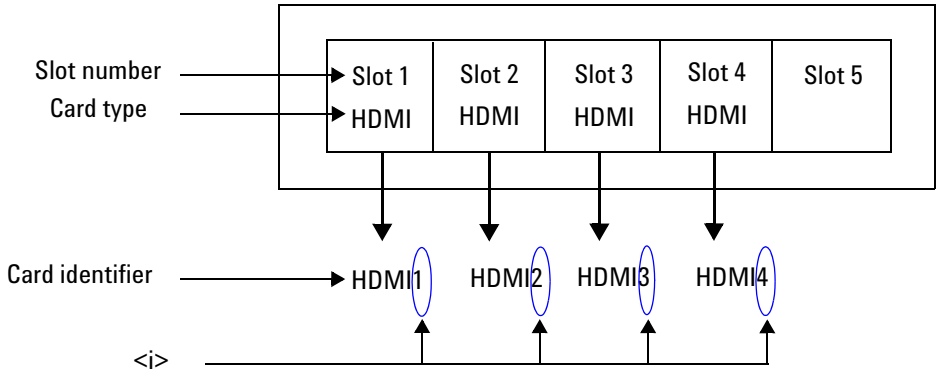


Figure 7-3 Card configuration for Example 2

Example 3

There are two VGA and two TV cards installed in this example. The VGA card at Slot 3 is identified as VGA2, while the TV card at Slot 4 is identified as TV2.

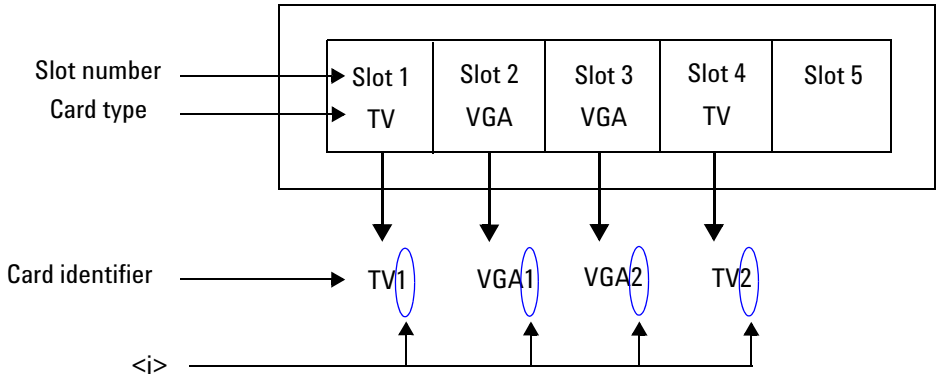


Figure 7-4 Card configuration for Example 3

NOTE You must specify only cards that are installed in the mainframe. If there are only two DVI cards installed, specifying DVI3 will return an error.

Calibration Subsystem

The CALibration commands are used to calibrate the U8101A. Improper use of the CALibration commands can adversely affect the accuracy and reliability of the U8101A.

CALibration[:ALL]?

Syntax

```
CALibration[:ALL]?
```

Description

This command performs an autocalibration of all VGA and TV cards installed in the instrument. The calibration constants will be automatically stored in nonvolatile memory after the autocalibration process. Since calibration might take approximately 10 s to complete per card, you may want to increase the timeout value of your program prior to sending this command.

Remarks

- Please ensure you stop all other operation before you start the self- calibration.
- If a calibration fails, `1` is returned and an error is stored in the error queue.

Example

The following command performs a calibration and returns a pass indication.

```
CAL?
```

Typical Response: `0`

EDID Subsystem

This subsystem provides the capability for writing and reading the EDID data to and from a display.

EDID:DATA[:BLOCk]

Syntax

```
EDID:DATA[:BLOCk] <data>
EDID:DATA[:BLOCk]?
```

Description

This command allows you to transfer binary blocks of EDID data into the U8101A volatile memory.

Parameter

Item	Type	Range of values	Default value
<data>	Block	The data block is in IEEE-488.2 block format	This is a required parameter

Remarks

- In the binary block format, a block header precedes the waveform data. The block header has the following format.

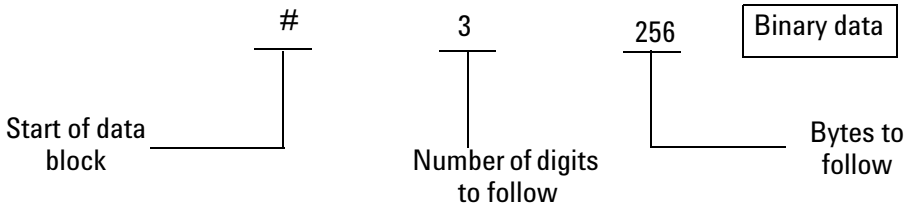


Figure 7-5 Binary block header format

- The length of the EDID data is either 128 or 256 bytes.

- This command is used together with the `EDID:WRITe[:BLOCk]` command to write EDID data from your PC to a display connected to the U8101A. To do this, you need to send the `EDID:DATA[:BLOCk]` command to transfer EDID data to the U8101A volatile memory, then send the `EDID:WRITe[:BLOCk]` command to write EDID data to the display connected to the card that you have specified.
- The EDID data in the U8101A volatile memory will be overwritten each time the U8101A receives the `EDID:DATA[:BLOCk]` or `EDID:READ[:BLOCk]` command.

EDID:WRITe[:BLOCk]

Syntax

```
EDID:WRITe[:BLOCk] <card>
```

Description

This command writes the EDID data from the U8101A volatile memory to the display connected to the specified card.

Parameter

Name	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Example

The following command writes the EDID data to the display connected to the first VGA card.

```
EDID:WRIT VGA1
```

EDID:READ[:BLOCk]

Syntax

```
EDID:READ[:BLOCk] <card>
```

Description

This command reads the EDID data from the display connected at the specified card.

Parameter

Name	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Example

The following command reads the EDID data from the display connected to the first VGA card.

```
EDID:READ VGA1
```

HDCP Subsystem

High-bandwidth Digital Content Protection (HDCP) is a form of digital copy protection to protect digital audio and video content as it travels across video interfaces such as the Digital Visual Interface (DVI) and High-Definition Multimedia Interface (HDMI).

This subsystem is used to enable content protection on the digital video signals generated from the U8101A cards.

HDCP:STATe

Syntax

```
HDCP:STATe <state>, <card>
HDCP:STATe? <card>
```

Description

This command turns on or off content protection on the digital video signal generated from the specified card.

Parameters

Name	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1}	OFF for DVI cards ON for HDMI cards
<card>	Discrete	{DVI|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Examples

The following command turns on content protection for the digital video generated from the second DVI card.

```
HDCP:STAT ON, DVI2
```

The following query returns the content protection state of the second DVI card.

```
HDCP:STAT? DVI2
```

Typical Response: `1`

Mass Memory Subsystem

MMEMory commands provide mass storage capability for the programmed pattern sequence list and EDID data. The mass storage may be either internal or external to the U8101A.

MMEMory:CATalog?

Syntax

```
MMEMory:CATalog? <location>, <directory>
```

Description

This command returns the memory usage information (total amount of storage currently used and free space available) in bytes and a list of files and directories in a specified parent directory. The specified parent directory can reside in the U8101A internal memory or in an external memory location, for example, an external USB flash storage device.

Parameters

Item	Type	Range of values	Default value
<location>	Discrete	{INTernal | EXTernal}	This is a required parameter
<directory>	String	The desired parent directory	This is a required parameter

Remarks

- `INTernal` indicates the U8101A internal memory and `EXTernal` indicates an external memory location such as an external USB flash storage device.
- When `INTernal` is selected, only two directories can be specified: `EDID` and `Sequence`.

Examples

1 The following command queries for the file listing in the '`Sequence`' folder in U8101A memory.

```
MMEM:CAT? INT, "\Sequence"
```

2 The following command queries for the file listing in the '`EDID`' folder in the U8101A memory.

```
MMEM:CAT? INT, "\EDID"
```

3 The following command queries for the file listing in a folder named 'MySequence' in the external USB flash storage device.

```
MMEM:CAT? EXT, "\Storage 1\MySequence"
```

MMEMory:DELete

Syntax

```
MMEMory:DELete <location>, <directory>, <filename>
```

Description

This command deletes the specified file in the selected directory.

Parameters

Name	Type	Range of values	Default value
<location>	Discrete	{INTernal | EXTernal}	This is a required parameter
<directory>	String	The desired directory	This is a required parameter
<filename>	String	Can be any letters(A to Z), numbers (0 to 9) or underscore character ("_"). Blank spaces are not allowed.	This is a required parameter

Remarks

- `INTernal` indicates the U8101A internal memory and `EXTernal` indicates an external memory location such as an external USB flash storage device.
- When `INTernal` is selected, only two directories can be specified: `EDID` and `Sequence`.
- The file specified must reside in the selected folder, otherwise an error will be generated. You can check whether the file is available in the `'Sequence'` folder with the command `MMEM:CATalog? INTernal, "\Sequence"` or in the `'EDID'` folder with the command `MMEMory:CATalog? INTernal, "\EDID"`.

Examples

1 The following command is used to delete the file named `'MyMonitor.bin'` from the directory `'EDID'` in the U8101A internal memory.

```
MMEM:DEL INT, "\EDID", "MyMonitor.bin"
```

2 The following command is used to delete the file named `'MySeq.xml'` from the directory `'\Storage 1\Sequence'` in the external USB flash storage device.

```
MMEM:DEL EXT, "\Storage 1\Sequence", "MySeq.xml"
```

MMEMory:LOAD:EDID

Syntax

```
MMEMory:LOAD:EDID EDID, <filename>
```

Description

This command loads the EDID data from the specified file into the U8101A internal memory.

Parameter

Item	Type	Range of values	Default value
<filename>	String	Can be any letters (A to Z), numbers (0 to 9) or underscore character ("_"). Blank spaces are not allowed.	This is a required parameter

Examples

1 The following command loads the EDID data from a file named `MyMonitor.bin` from the U8101A internal memory.

```
MMEM:LOAD:EDID EDID, "\EDID\MyMonitor.bin"
```

2 The following command loads the EDID data from a file named `Lcd1.bin` from the external USB flash storage device.

```
MMEM:LOAD:EDID EDID, "\Storage 1\Lcd1.bin"
```

MMEMory:STORe:EDID

Syntax

```
MMEMory:STORe:EDID EDID, <filename>
```

Description

This command stores the EDID data from the U8101A internal memory to the file specified as `<filename>`.

Parameter

Item	Type	Range of values	Default value
<filename>	String	Can be any letters (A to Z), numbers (0 to 9) or underscore character ("_"). Blank spaces are not allowed.	This is a required parameter

Examples

1 The following command stores the EDID data into a file named `MyMonitor.bin` to the U8101A internal memory.

```
MMEM:STOR:EDID EDID, "\EDID\MyMonitor.bin"
```

2 The following command stores the EDID data into a file named `Lcd1.bin` to the external USB flash storage device.

```
MMEM:STOR:EDID EDID, "\Storage 1\Lcd1.bin"
```

MMEMory:LOAD:SEQuence

Syntax

```
MMEMory:LOAD:SEQuence SEQuence, <filename>
```

Description

This command loads the pattern sequence list from the file as specified by `<filename>`.

Parameter

Item	Type	Range of values	Default value
<filename>	String	Can be any letters (A to Z), numbers (0 to 9) or underscore character ("_"). Blank spaces are not allowed.	This is a required parameter

Remarks

If a sequence is running, sending this command will stop the sequence.

Examples

1 The following command loads the pattern sequence list from the sequence file named `'MySeq.xml'` from the U8101A internal memory.

```
MMEM:LOAD:SEQ SEQ, "\Sequence\MySeq.xml"
```

2 The following command loads the pattern sequence list from the memory location accessible by the U8101A front panel key named `"Seq1"`. The filename that corresponds to the `"Seq1"` key is `"Sequence1.xml"`, `"Seq2"` key is `"Sequence2.xml"` and so forth.

```
MMEM:LOAD:SEQ SEQ, "\Shortcut\Sequence1.xml"
```

3 The following command loads the pattern sequence list from the sequence file named `'userSeq.xml'` in the external USB flash storage device.

```
MMEM:LOAD:SEQ SEQ, "\Storage 1\userSeq.xml"
```

MMEMory:STORe:SEQuence

Syntax

```
MMEMory:STORe:SEQuence SEQuence, <filename>
```

Description

This command stores the pattern sequence list as defined using the `[SOURce:]LIST:PATTern<i>` commands to the file as specified by `<filename>`.

Parameter

Item	Type	Range of values	Default value
<filename>	String	Can be any letters (A to Z), numbers (0 to 9) or underscore character ("_"). Blank spaces are not allowed.	This is a required parameter

Remarks

If a sequence is running, sending this command will stop the sequence.

Examples

1 The following command stores the pattern sequence list to the sequence file named `'MySeq.xml'` in the U8101A internal memory.

```
MMEM:STOR:SEQ SEQ, "\Sequence\MySeq.xml"
```

2 The following command stores the pattern sequence list to the memory location accessible by the U8101A front panel key named `"Seq1"`. The filename which corresponds to the `"Seq1"` key is `"Sequence1.xml"`, `"Seq2"` key is `"Sequence2.xml"`, and so forth.

```
MMEM:STOR:SEQ SEQ, "\Shortcut\Sequence1.xml"
```

3 The following command stores the pattern sequence list to the sequence file named `'userSeq.xml'` in the external USB flash storage device.

```
MMEM:STOR:SEQ SEQ, "\Storage 1\userSeq.xml"
```

Output Subsystem

This subsystem is used to turn the video pattern generation on or off. It is also used to control the "trigger out" signal. A "trigger out" signal is produced on the rear panel TRIG OUT connector. The "trigger out" signal is a trigger signal to the external device.

NOTE Sending any command from this subsystem, with the exception of the OUTPut:VIDeo:STATe query, will pause the pattern sequence. You need to resume the sequence manually after sending any command from this subsystem.

OUTPut:TTLTrg:DELay

Syntax

```
OUTPut:TTLTrg:DELay <numeric>, <card>
OUTPut:TTLTrg:DELay? <card>
```

Description

This command sets the trigger out signal delay (in pixels) for the specified card. When the trigger out signal is enabled using the `OUTPut:TTLTrg[:STATe]` command, a pulse will be produced from the rear panel TRIG OUT connector for the selected card after the specified delay.

Parameters

Item	Type	Range of values	Default value
<delay>	Numeric	• Min: 0 • Max: H_{Total} – Width – 1	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- H_{Total} is the total number of pixels per horizontal line of the video format for the selected card.
- Width refers to the pulse width of the trigger out signal in pixels.
- This setting is not applicable when you select digital composite (DCOM) as your trigger source.

Examples

This command is used to set the trigger out signal delay to 10 pixels for the first DVI card.

```
OUTP:TTLT:DEL 10, DVI1
```

This command is used to query the delay of the trigger out signal for the first DVI card.

```
OUTP:TTLT:DEL? DVI1
```

Typical Response: `10`

OUTPut:TTLTrg:POLarity

Syntax

```
OUTPut:TTLTrg:POLarity <polarity>, <card>
```

```
OUTPut:TTLTrg:POLarity? <card>
```

Description

This command selects the polarity of the trigger out signal. When the trigger out signal is enabled using the `OUTPut:TTLTrg[:STATe]` command, a pulse with the specified polarity will be produced from the rear panel TRIG OUT connector for the selected card.

`POSitive` – Select `"POSitive"` to output a normal pulse.

`NEGative` – Select `"NEGative"` to output an inverted pulse.

Parameters

Item	Type	Range of values	Default value
<polarity>	Discrete	{POSitive|NEGative}	POSitive
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Examples

This command is used to set the trigger out signal to the positive polarity for the first HDMI card.

```
OUTP:TTLT:POL POS, HDMI1
```

This command is used to query the polarity of the trigger out signal for the first HDMI card.

```
OUTP:TTLT:POL? HDMI1
```

Typical Response: `POS`

OUTPut:TTLTrg:SOURce

Syntax

```
OUTPut:TTLTrg:SOURce <trigger source>, <card>
OUTPut:TTLTrg:SOURce? <card>
```

Description

This command selects the trigger out signal source for the specified card. When the trigger out signal is enabled using the `OUTPut:TTLTrg[:STATe]` command, a pulse will be produced from the rear panel TRIG OUT connector for the selected card.

The following sources can be selected:

- `FRAMe` (Frame Synchronization)
- `LINE` (Line Synchronization)
- `SPOS` (Specific Position in the video signal)
- `DCOM` (Composite Synchronization)

Parameters

Item	Type	Range of values	Default value
<trigger source>	Discrete	{FRAMe|LINE|SPOS|DCOM}	FRAMe
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Examples

The following command is used to select the frame synchronization as the source of trigger for the second VGA card.

```
OUTP:TTLT:SOUR FRAM, VGA2
```

The following command is used to query the trigger source for the second VGA card.

```
OUTP:TTLT:SOUR? VGA2
```

Typical Response: `FRAM`

OUTPut:TTLTrg:SPOS:MODE

Syntax

```
OUTPut:TTLTrg:SPOS:MODE <mode>, <card>
OUTPut:TTLTrg:SPOS:MODE? <card>
```

Description

This command selects the trigger mode for the trigger out signal when the specific position trigger source is selected.

There are three modes that you can select:

- `ONCE` – once per frame
- `ACTive` – every active scan line in a frame
- `ALL` – every scan line in a frame

Parameters

Item	Type	Range of values	Default value
<trigger mode>	Discrete	{ONCE|ACTive|ALL}	ONCE
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

This setting is only applicable when you select Specific Position (SPOS) as your trigger source.

Examples

This command is used to set the trigger out to occur once per frame for the second VGA card.

```
OUTP:TTLT:SPOS:MODE ONCE, VGA2
```

This command is used to query the trigger mode for the second VGA card.

```
OUTP:TTLT:SPOS:MODE? VGA2
```

Typical Response: `ONCE`

OUTPut:TTLTrg:SPOS:POSition:X

Syntax

```
OUTPut:TTLTrg:SPOS:POSition:X <x>, <card>
OUTPut:TTLTrg:SPOS:POSition:X? <card>
```

Description

This command specifies the X-axis point for the trigger out signal to be generated when Specific Position in video signal is selected.

Parameters

Item	Type	Range of values	Default value
<x>	Numeric	• Min: 0 • Max: $H_{Total} - 1$	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remark

- H_{Total} is the total number of pixels per horizontal line of the video format for the selected card.
- This setting is only applicable when you select Specific Position (SPOS) as your trigger source.

Examples

This command is used to configure the trigger out signal to be generated when the X-axis point is 200.

```
OUTP:TTLT:SPOS:POS:X 200, DVI1
```

This command is used to query the point at the X-axis for the first DVI card.

```
OUTP:TTLT:SPOS:POS:X? DVI1
```

Typical Response: `200`

OUTPut:TTLTrg:SPOS:POSition:Y

Syntax

```
OUTPut:TTLTrg:SPOS:POSition:Y <y>, <card>
OUTPut:TTLTrg:SPOS:POSition:Y? <card>
```

Description

This command specifies the Y-axis point for the trigger out signal to be generated when Specific Position in video signal is selected.

Parameters

Item	Type	Range of values	Default value
<x>	Numeric	• Min: 0 • Max: $V_{Total} - 1$	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remark

- V_{Total} is the total number of lines per vertical frame of the video format for the selected card.
- This setting is only applicable when you select Specific Position (SPOS) as your trigger source.

Examples

This command is used to configure the trigger out signal to be generated when the Y-axis point is 200.

```
OUTP:TTLT:SPOS:POS:Y 200, DVI1
```

This command is used to query the point at the Y-axis for the first DVI card.

```
OUTP:TTLT:SPOS:POS:Y? DVI1
```

Typical Response: `200`

OUTPut:TTLTrg:SPOS:VISible

Syntax

```
OUTPut:TTLTrg:SPOS:VISible <state>, <card>
OUTPut:TTLTrg:SPOS:VISible? <card>
```

Description

This command makes the trigger point visible on the display under test.

`ENABled` – Makes the trigger point visible

`DISabled` – Hides the trigger point

Parameters

Item	Type	Range of values	Default value
<state>	Discrete	{ENABled|DISabled}	ENABled
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remark

This command is only available when the trigger source is set to SPOS (Specific Position in video signal).

Examples

This command is used to enable the SPOS cursor display for the second VGA card.

```
OUTP:TTLT:SPOS:VIS ENAB, VGA2
```

To query the cursor display status for the second VGA card.

```
OUTP:TTLT:SPOS:VIS? VGA2
```

Typical Response: `ENAB`

OUTPut:TTLTrg[:STATe]

Syntax

```
OUTPut:TTLTrg[:STATe] <trigger state>, <card>
OUTPut:TTLTrg[:STATe]? <card>
```

Description

This command is used to turn on or off the trigger out signal. When turned on, a trigger out signal is generated from the rear panel BNC connector for the specified card when the trigger out conditions set by the `OUTP:TTLT:` commands are fulfilled. When turned off, no trigger out signal will be generated even though the trigger out conditions set in the `OUTP:TTLT:` commands are fulfilled.

Parameters

Item	Type	Range of values	Default value
<trigger state>	Boolean	{OFF|0|ON|1}	OFF
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Examples

This command is used to turn on the trigger out signal for the first DVI card.

```
OUTP:TTLT ON, DVI1
```

This command is used to query for the trigger out state for the first DVI card.

```
OUTP:TTLT? DVI1
```

Typical Response: `1`

OUTPut:TTLTrg:WIDTh

Syntax

```
OUTPut:TTLTrg:WIDTh <numeric>, <card>
OUTPut:TTLTrg:WIDTh? <card>
```

Description

This command specifies the pulse width of the trigger out signal in pixels. When the trigger out signal is enabled using the `OUTPut:TTLTrg[:STATe]` command, a pulse with the specified width will be produced from the rear panel TRIG OUT connector for the selected card.

Parameters

Item	Type	Range of values	Default value
<numeric>	Numeric	• Min: 1 line • Max: $H_{Total} - 1$	1
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- H_{Total} is the total number of pixels per horizontal line of the video format for the selected card.
- This setting is not applicable when you select digital composite (DCOM) as your trigger source.

Examples

This command is used to set the width of the trigger out pulse to 10 pixels for the first DVI card.

```
OUTP:TTLT:WIDT 10, DVI1
```

This command is used to query the width of the trigger out signal for the first DVI card.

```
OUTP:TTLT:WIDT? DVI1
```

Typical Response: `10`

OUTPut:VIDeo[:STATe]?

Syntax

```
OUTPut:VIDeo[:STATe]? <card>
```

Description

This command returns the video generation state of the U8101A for the specified card.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Example

The following query returns the video generation state of the VGA1 card.

```
OUTP:VID? VGA1
```

Typical Response: `1`

Source Subsystem

This subsystem is used to set up the source for the U8101A. This subsystem is divided into three main groups consisting of List, Video, and Audio.

The List group allows you to create and manipulate the pattern sequence list, and control the generation of the video patterns in the sequence. The Video group provides you the flexibility to adjust the video settings such as output voltage levels, video timing, color component values, video pattern movement, and so on for the video patterns being generated. The Audio group is used to control the U8101A audio settings.

[SOURce:]LIST:PATTern<i>

Syntax

```
[SOURce:]LIST:PATTern<i> <card>, <format>, <image>, <duration>,
<video interface>

[SOURce:]LIST:PATTern<i>?
```

Description

This command defines a sequence of video patterns to be generated. Use this command to add or insert the video pattern sequence with the specified format, image, duration, and video interface to the list. You can add a maximum of 25 video patterns to the list.

Parameters

Parameter	Data types	Range of value	Default value
<i>	Numeric	This is the index of the list to add the video pattern Range: 1 to 25	1
<card>	Discrete	This is the card used to output the video pattern with the specified format, image, duration, and video interface for that particular index list Range: {VGA | DVI | TV | HDMi}<i> where <i > can range from 1 to 5	This is a required parameter
<format>	String	This is the format of the video pattern that you want to generate for that particular index list. Refer to "Supported Formats" on page 208 for the available formats.	This is a required parameter
<image>	String	This is the image that you want to generate for that particular index list. Refer to "Supported Images" on page 211 for the available images.	This is a required parameter
<duration>	Numeric	This is the duration for the video pattern to be generated for that particular index list. Range: 0 s to 3600 s If the duration is 0 s, it will generate the video pattern for that particular index list indefinitely. If the duration is > 0 s, it will generate the video pattern for that particular index list for that specified period.	This is a required parameter
<video interface>	Discrete	{SVIDeo | CVBS | COMPonent | VGA | HDMI | DVI} • If a HDMI card is selected, the video interface is HDMI. • If a DVI card is selected, the video interface is DVI. • If a VGA card is selected, the video interface is VGA. • If a TV card is selected, you can select three types of interface consisting of SVIDeo, CVBS, or COMPonent.	This is a required parameter

Remark

If the sequence is running, sending this command will stop this sequence before adding the pattern to the list.

Examples

To create a sequence with the following requirements:

- The first video pattern to be generated is `colorbar75` with the `NTSC-S` format. This video pattern is to be generated from the first TV card with the S-Video interface for 15 s.
- The second video pattern to be generated is `checker5×5` with the `DMT0860` format. This video pattern is to be generated from the first DVI card for 10 s.
- The third video pattern to be generated is `colorbar100` with the `DMT0860` format. This video pattern is to be generated from the first VGA card for 20 s.

The following commands define the sequence as described above.

```
LIST:PATT1 TV1, "NTSC-S", "colorbar75", 15, SVID
LIST:PATT2 DVI1, "DMT0860", "checker5×5", 10, DVI
LIST:PATT3 VGA1, "DMT0860", "colorbar100", 20, VGA
```

This query returns the information of the video pattern in the sequence list at index 2.

```
LIST:PATT2?
```

Typical Response:

```
Module = DVI1 Format = DMT0860 Image = checker5×5 Duration = 10
Video Interface = DVI
```

[SOURce:]LIST:PATTern:CLEar[:ALL]

Syntax

```
[SOURce:]LIST:PATTern:CLEar[:ALL]
```

Description

This command clears all the video pattern elements in the list.

Remark

If the sequence is running, sending this command will stop the sequence before allowing you to clear the list.

Example

The following command clears all the video pattern elements in the list.

```
LIST:PATT:CLE
```

[SOURce:]LIST:PATTern:COUNt?

Syntax

```
[SOURce:]LIST:PATTern:COUNt?
```

Description

This query returns the number of video pattern elements stored in the list.

Example

This query returns the number of video pattern elements in the list.

```
LIST:PATT:COUN?
```

Typical Response: `3`

[SOURce:]LIST:PATTern<i>:DURation?

Syntax

```
[SOURce:]LIST:PATTern<i>:DURation?
```

Description

This query returns the duration of the video pattern element at the specified index `<i>`.

Example

The query returns the duration of the video pattern element at index 2 in the list.

```
LIST:PATT2:DUR?
```

Typical Response: `10`

[SOURce:]LIST:PATTern<i>:FORMat?

Syntax

```
[SOURce:]LIST:PATTern<i>:FORMat?
```

Description

This query returns the format of the video pattern element at the specified index `<i>`.

Example

The query returns the format of the video pattern element at index 2 in the list.

```
LIST:PATT2:FORM?
```

Typical Response: `"DMT0860"`

[SOURce:]LIST:PATTern<i>:IMAGe?

Syntax

```
[SOURce:]LIST:PATTern<i>:IMAGe?
```

Description

This query returns the image type of the video pattern element at the specified index `<i>`.

Example

The query returns the image type of the video pattern element at index 2 in the list.

```
LIST:PATT2:IMAG?
```

Typical Response: `"checker5×5"`

[SOURce:]LIST:PATTern<i>:MODule?

Syntax

```
[SOURce:]LIST:PATTern<i>:MODule?
```

Description

This query returns the card of the video pattern element at the specified index <i>.

Example

This query returns the card of the video pattern element at index 2 in the list.

```
LIST:PATT2:MOD?
```

Typical Response: DVI1

[SOURce:]LIST:PATTern<i>:REMove

Syntax

```
[SOURce:]LIST:PATTern<i>:REMove
```

Description

This command removes the video pattern element in the list at the specified index <i>.

Parameter

Parameter	Type	Range of values	Default value
<i>	Numeric	The index of the pattern list to remove	1

Remarks

If the sequence is running, sending this command will stop the sequence before allowing you to remove the pattern from the list.

Example

The following command removes the video pattern defined at index 2.

```
LIST:PATT2:REM
```

[SOURce:]LIST:PATTern<i>:VINTerface?

Syntax

```
[SOURce:]LIST:PATTern<i>:VINTerface?
```

Description

This query returns the video interface of the video pattern element at the specified index `<i>`.

Example

This query returns the video interface of the video pattern element at index 2 in the list.

```
LIST:PATT2:VINT?
```

Typical Response: `DVI`

[SOURce:]LIST:SEQuence:INDex?

Syntax

```
[SOURce:]LIST:SEQ:IND?
```

Description

This query returns the current playing index of the video pattern sequence.

Example

This query returns the index of the video pattern being played.

```
LIST:SEQ:IND?
```

Typical Response: `3`

[SOURce:]LIST:SEQuence:MODE

Syntax

```
[SOURce:]LIST:SEQuence:MODE <mode>

[SOURce:]LIST:SEQuence:MODE?
```

Description

This command selects the defined pattern list generated in a particular instrument. The U8101A supports three generation modes consisting of normal, automatic, and repeat.

- Selecting `NORMal` causes the U8101A to generate a single selected pattern from the pattern list.
- Selecting `AUTO` causes the U8101A to run sequentially through the complete pattern list once.
- Selecting `REPeat` causes the U8101A to cycle sequentially through the complete pattern list repeatedly.

Parameter

Parameter	Type	Range of values	Default value
<mode>	Discrete	{NORMal|AUTO|REPeat}	AUTO

Remark

The value after `*RST` or instrument preset (`SYSTem:PRESet`) is AUTO.

Examples

The following command causes the U8101A to run sequentially through the complete pattern list once.

```
LIST:SEQ:MODE AUTO
```

The following query returns the sequence mode.

```
LIST:SEQ:MODE?
```

Typical Response: `AUTO`

[SOURce:]LIST:SEQuence:PAUSe

Syntax

```
[SOURce:]LIST:SEQuence:PAUSe
```

Description

This command is used to pause a running video pattern sequence.

Example

The following command pauses the running video pattern sequence.

```
LIST:SEQ:PAUS
```

[SOURce:]LIST:SEQuence:RESume

Syntax

```
[SOURce:]LIST:SEQuence:RESume
```

Description

This command resumes the paused video pattern sequence.

Example

The following command resumes the paused video pattern sequence.

```
LIST:SEQ:RES
```

[SOURce:]LIST:SEQuence:STARt

Syntax

```
[SOURce:]LIST:SEQuence:STARt <start index>
```

Description

This command starts a programmed video pattern sequence.

Parameter

Item	Type	Range of values	Default value
<start index>	Numeric	The index of the pattern list where you want the pattern sequence to start playing from Range: 1 to 25	1

Remarks

- The `<start index>` is optional. If you leave this parameter blank, it will start playing the video pattern at index 1.
- If you want to start from a specific pattern in the list, you must specify the index of the pattern to start.

Example

The following command is used to start playing the video pattern sequence from the second element in the pattern list.

```
LIST:SEQ:STAR 2
```

[SOURce:]LIST:SEQuence:STOP

Syntax

```
[SOURce:]LIST:SEQuence:STOP
```

Description

This command stops the running video pattern sequence.

Example

The following command stops the running video pattern sequence.

```
LIST:SEQ:STOP
```

[SOURce:]AUDio:ANALog:STATe

Syntax

```
[SOURce:]AUDio:ANALog:STATe <state>
[SOURce:]AUDio:ANALog:STATe?
```

Description

This command is used to turn on or off the analog audio output at the rear panel.

Parameter

Item	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1}	OFF

Examples

The following command is used to turn on the analog audio output at the rear panel.

```
AUD:ANAL:STAT ON
```

The following command is used to query the analog audio output state at the rear panel.

```
AUD:ANAL:STAT?
```

Typical Response: `1`

[SOURce:]AUDio:ANALog:CHANnel

Syntax

```
[SOURce:]AUDio:ANALog:CHANnel <channel>
[SOURce:]AUDio:ANALog:CHANnel?
```

Description

This command is used to select the analog audio channel at the rear panel.

Parameter

Item	Type	Range of values	Default value
<channel>	Discrete	{LEFT|RIGHt|STEReo}	STEReo

Examples

The following command is used to select the left channel analog audio output.

```
AUD:ANAL:CHAN LEFT
```

The following command is used to query the analog audio channel.

```
AUD:ANAL:CHAN?
```

Typical Response: `LEFT`

[SOURce:]VIDeo:COLor:RED[:STATe]

Syntax

```
[SOURce:]VIDeo:COLor:RED[:STATe] <state>, <card>
[SOURce:]VIDeo:COLor:RED[:STATe]? <card>
```

Description

This command enables or disables the red color component of the video being generated from the specified card.

Parameters

Item	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1}	ON
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The follwing command is used to disable the red color component of the video being generated for the first DVI card.

```
VID:COL:RED OFF, DVI1
```

The following command is used to query the state of the red color component of the video being generated for the first DVI card.

```
VID:COL:RED? DVI1
```

Typical Response: `0`

[SOURce:]VIDeo:COLor:GREen[:STATe]

Syntax

```
[SOURce:]VIDeo:COLor:GREen[:STATe] <state>, <card>
[SOURce:]VIDeo:COLor:GREen[:STATe]? <card>
```

Description

This command enables or disables the green color component of the video being generated from the specified card.

Parameters

Item	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1}	ON
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be done when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to disable the green color component of the video being generated for the first DVI card.

```
VID:COL:GRE OFF, DVI1
```

The following command is used to query the state of the green color component of the video being generated for the first DVI card.

```
VID:COL:GRE? DVI1
```

Typical Response: `0`

[SOURce:]VIDeo:COLor:BLUE[:STATe]

Syntax

```
[SOURce:]VIDeo:COLor:BLUE[:STATe] <state>, <card>
[SOURce:]VIDeo:COLor:BLUE[:STATe]? <card>
```

Description

This command enables or disables the blue color component of the video being generated from the specified card.

Parameters

Parameter	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1}	ON
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter.

Remarks

- This setting can only be done when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to disable the blue color component of the video being generated for the first DVI card.

```
VID:COL:BLUE OFF, DVI1
```

The following command is used to query the state of the blue color component of the video being generated for the first DVI card.

```
VID:COL:BLUE? DVI1
```

Typical Response: `0`

[SOURce:]VIDeo:COLor:RED:VALue

Syntax

```
[SOURce:]VIDeo:COLor:RED:VALue <color value>, <card>
[SOURce:]VIDeo:COLor:RED:VALue? <card>
```

Description

This command sets the value of the red color component of the video generated at the specified card.

Parameters

Name	Type	Range of values	Default value
<color value>	Numeric	0 to 100	100
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be done when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the red color component value of the video being generated to 50 for the first DVI card.

```
VID:COL:RED:VAL 50, DVI1
```

The following command is used to query the value of the red color component of the video being generated for the first DVI card.

```
VID:COL:RED:VAL? DVI1
```

Typical Response: `50`

[SOURce:]VIDeo:COLor:GREen:VALue

Syntax

```
[SOURce:]VIDeo:COLor:GREen:VALue <color value>, <card>
[SOURce:]VIDeo:COLor:GREen:VALue? <card>
```

Description

This command sets the value of the green color component of the video generated at the specified card.

Parameters

Parameter	Type	Range of values	Default value
<color value>	Numeric	0 to 100	100
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be done when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the green color component value of the video being generated to 50 for the first DVI card.

```
VID:COL:GRE:VAL 50, DVI1
```

The following command is used to query the value of the green color component of the video being generated for the first DVI card.

```
VID:COL:GRE:VAL? DVI1
```

Typical Response: `50`

[SOURce:]VIDeo:COLor:BLUE:VALue

Syntax

```
[SOURce:]VIDeo:COLor:BLUE:VALue <color value>, <card>
[SOURce:]VIDeo:COLor:BLUE:VALue? <card>
```

Description

This command sets the value of the blue color component of the video generated at the specified card.

Parameters

Name	Type	Range of values	Default value
<color value>	Numeric	0 to 100	100
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be done when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the blue color component value of the video being generated to 50 for the first DVI card.

```
VID:COL:BLUE:VAL 50, DVI1
```

The following command is used to query the value of the blue color component of the video being generated for the first DVI card.

```
VID:COL:BLUE:VAL? DVI1
```

Typical Response: `50`

[SOURce:]VIDeo:FRATe?

Syntax

```
[SOURce:]VIDeo:FRATe? <card>
```

Description

This command returns the frame rate in kHz of the video signal being generated for the specified card.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the frame rate of the video pattern being generated from the first DVI card.

```
VID:FRAT? DVI1
```

Typical Response: `6.03E-02`

[SOURce:]VIDeo:TIMing

Syntax

```
[SOURce:]VIDeo:TIMing <step>, <card>
```

```
[SOURce:]VIDeo:TIMing? <card>, [MINimum|MAXimum]
```

Description

This command controls the pixel clock speed of the video signal generated from the specified card. You can increase or decrease the video signal pixel clock speed by adjusting the timing step.

Parameters

Parameter	Type	Range of values	Default value
<step>	Numeric	Min to Max	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- Min is the minimum value allowed for the timing step. This value depends on the video format selected, and can be queried with the `[SOURce:]VIDeo:TIMing? <card>, MINimum` command.
- Max is the maximum value allowed for the timing step. This value depends on the video format selected, and can be queried with the `[SOURce:]VIDeo:TIMing? <card>, MAXimum` command.
- This adjustment can only be done when the video pattern is being generated at the specified card.
- Adjusting the video timing step will also affect the horizontal frequency and frame rate of the generated video signal.
- Each step represents a 1% change of the pixel clock value.

Examples

The following command is used to set the video timing step to 3 for the first DVI card.

```
VID:TIM 3, DVI1
```

The following command is used to query the video timing step for the first DVI card.

```
VID:TIM? DVI1
```

Typical Response: `3`

The following command is used to query the maximum allowable video timing step for the first DVI card.

```
VID:TIM? DVI1, MAX
```

Typical Response: `10`

[SOURce:]VIDeo:HTOTal?

Syntax

```
[SOURce:]VIDeo:HTOTal? <card>
```

Description

This query returns the total number of pixels per horizontal line of the video being generated for the selected card.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the total number of pixels per horizontal line of the video pattern being generated from the first DVI card.

```
VID:HTOT? DVI1
```

Typical Response: `1056`

[SOURce:]VIDeo:VTOTal?

Syntax

```
[SOURce:]VIDeo:VTOTal? <card>
```

Description

This query returns the total number of lines per vertical frame of the video format for the selected card.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the total number of lines per vertical frame of the video pattern being generated from the first DVI card.

```
VID:VTOT? DVI1
```

Typical Response: `628`

[SOURce:]VIDeo:HACTive?

Syntax

```
[SOURce:]VIDeo:HACTive? <card>
```

Description

This query returns the total number of active pixels per line of the video pattern being generated for the specified card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the total number of active pixels per line of the video pattern being generated from the first DVI card.

```
VID:HACT? DVI1
```

Typical Response: `800`

[SOURce:]VIDeo:VACTive?

Syntax

```
[SOURce:]VIDeo:VACTive? <card>
```

Description

This query returns the total number of active lines per frame of the video pattern being generated at the selected card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

TThe following command is used to query the total number of active lines per frame of the video pattern generated from the first DVI card.

```
VID:VACT? DVI1
```

Typical Response: `600`

[SOURce:]VIDeo:HFRequency?

Syntax

```
[SOURce:]VIDeo:HFRequency? <card>
```

Description

This query returns the horizontal frequency of the video signal for the corresponding card in kHz.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the horizontal frequency of the video pattern being generated from the first DVI card.

```
VID:HFR? DVI1
```

Typical Response: `3.78788E+01`

[SOURce:]VIDeo:PCLock?

Syntax

```
[SOURce:]VIDeo:PCLock? <card>
```

Description

This query returns the pixel clock of the video signal being generated in kHz for the specified card.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query is only applicable when the video pattern is being generated at the specified card.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to query the pixel clock of the video pattern being generated from the first DVI card.

```
VID:PCL? DVI1
```

Typical Response: `4.00000000E+04`

[SOURce:]VIDeo:SHIFt:MODE

Syntax

```
[SOURce:]VIDeo:SHIFt:MODE <mode>, <card>
```

```
[SOURce:]VIDeo:SHIFt:MODE?
```

Description

This command sets the image shift mode. The image shift mode defines how the movement of an image will occur.

There are two types of movement consisting of repeat and reverse.

`REPeat` – Selecting this mode causes the image to move between the start and end points, and then restart at the start point

`REVerse` – Selecting this mode causes the image to move between the start and end points, and then move back from the end point to the start point

Parameters

Parameter	Type	Range of values	Default value
<mode>	Discrete	{REPeat|REVerse}	REPeat
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift mode to reverse for the first DVI card.

```
VID:SHIF:MODE REV, DVI1
```

The following command is used to query the image shift mode for the first DVI card.

```
VID:SHIF:MODE? DVI1
```

Typical Response: `REV`

[SOURce:]VIDeo:SHIFt:PAUSe

Syntax

```
[SOURce:]VIDeo:SHIFt:PAUSe <card>
```

Description

This command is used to pause the image shift action.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This command can only be executed when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to pause the image shift for the first DVI card.

```
VID:SHIF:PAUS DVI1
```

[SOURce:]VIDeo:SHIFt:RESume

Syntax

```
[SOURce:]VIDeo:SHIFt:RESume <card>
```

Description

This command resumes the image shift action.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This command can only be executed when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to resume the image shift for the first DVI card.

```
VID:SHIF:RES DVI1
```

[SOURce:]VIDeo:SHIFt:STARt

Syntax

```
[SOURce:]VIDeo:SHIFt:STARt <card>
```

Description

This command starts the image shift.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This command can only be executed when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to start the image shift for the first DVI card.

```
VID:SHIF:STAR DVI1
```

[SOURce:]VIDeo:SHIFt:STOP

Syntax

```
[SOURce:]VIDeo:SHIFt:STOP <card>
```

Description

This command stops the image shift.

Parameter

Item	Type	Range of values	Default value
<card>	Discrete	{VGA|DVI|TV|HDMi} <i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This command can only be executed when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to stop the image shift for the first DVI card.

```
VID:SHIF:STOP DVI1
```

[SOURce:]VIDeo:SHIFt:SPOint:X

Syntax

```
[SOURce:]VIDeo:SHIFt:SPOint:X <x>, <card>
```

```
[SOURce:]VIDeo:SHIFt:SPOint:X? <card>
```

Description

This command is used to specify the image shift start point X-coordinate value, where the start point is given as (x, y).

Parameters

Item	Type	Range of values	Default value
<x>	Numeric	Min: 0 Max: $H_{Active} - 1$	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- H_{Active} is the total number of active pixels per line of a video pattern.
- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift start point X-coordinate value to 300 for the first DVI card.

```
VID:SHIF:SPO:X 300, DVI1
```

The following command is used to query the image shift start point X-coordinate value of the first DVI card.

```
VID:SHIF:SPO:X? DVI1
```

Typical Response: `300`

[SOURce:]VIDeo:SHIFt:SPOint:Y

Syntax

```
[SOURce:]VIDeo:SHIFt:SPOint:Y <y>, <card>
```

```
[SOURce:]VIDeo:SHIFt:SPOint:Y? <card>
```

Description

This command specifies the image shift start point Y-coordinate value, where the start point is given as (x, y).

Parameters

Item	Type	Range of values	Default value
<y>	Numeric	Min: 0 Max: $V_{Active} - 1$	0
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- V_{Active} is the total number of active lines per frame of a video pattern.
- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift start point Y-coordinate value to 300 for the first DVI card.

```
VID:SHIF:SPO:Y 300, DVI1
```

The following command is used to query the image shift start point Y-coordinate value of the first DVI card .

```
VID:SHIF:SPO:Y? DVI1
```

Typical Response: `300`

[SOURce:]VIDeo:SHIFt:EPOint:X

Syntax

```
[SOURce:]VIDeo:SHIFt:EPOint:X <x>, <card>
```

```
[SOURce:]VIDeo:SHIFt:EPOint:X? <card>
```

Description

This command specifies the image shift end point X-coordinate value, where the end point is given as (x, y).

Parameters

Parameter	Type	Range of values	Default value
<x>	Numeric	Min: 0 Max: $H_{Active} - 1$	100
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- H_{Active} is the total number of the active pixel per line of a video pattern.

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift end point X-coordinate value to 600 for the first DVI card.

```
VID:SHIF:EPO:X 600, DVI1
```

The following command is used to query the image shift end point X-coordinate value of the first DVI card.

```
VID:SHIF:EPO:X? DVI1
```

Typical Response: `600`

[SOURce:]VIDeo:SHIFt:EPOint:Y

Syntax

```
[SOURce:]VIDeo:SHIFt:EPOint:Y <y>, <card>
```

```
[SOURce:]VIDeo:SHIFt:EPOint:Y? <card>
```

Description

This command specifies the image shift end point Y-coordinate value, where the end point is given as (x, y).

Parameters

Item	Type	Range of values	Default value
<y>	Numeric	Min: 0 Max: $V_{Active} - 1$	100
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- V_{Active} is the total number of the active lines per frame of a video pattern.
- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift end point Y-coordinate value to 500 for the first DVI card.

```
VID:SHIF:EPO:Y 500, DVI1
```

The following command is used to query the image shift end point Y-coordinate value of the first DVI card.

```
VID:SHIF:EPO:Y? DVI1
```

Typical Response: `500`

[SOURce:]VIDeo:SHIFt:HINCrement

Syntax

```
[SOURce:]VIDeo:SHIFt:HINCrement <inc>, <card>
```

```
[SOURce:]VIDeo:SHIFt:HINCrement? <card>
```

Description

This command specifies the image shift horizontal increment. The horizontal increment indicates the number of pixels the image travels in a horizontal direction per time period.

Parameters

Parameter	Type	Range of values	Default value
<inc>	Numeric	Min: 1 Max: 65535	1
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following command is used to set the image shift horizontal increment to 10 for the first DVI card.

```
VID:SHIF:HINC 10, DVI1
```

The following command is used to query the image shift horizontal increment for the first DVI card.

```
VID:SHIF:HINC? DVI1
```

Typical Response: `10`

[SOURce:]VIDeo:SHIFt:TINCrement

Syntax

```
[SOURce:]VIDeo:SHIFt:TINCrement <N>, <card>
```

```
[SOURce:]VIDeo:SHIFt:TINCrement? <card>
```

Description

This command sets the time increment. Time increment is one of the parameters used to control the image shift which indicates movement to occur per N number of frames.

Parameters

Parameter	Type	Range of values	Default value
<N>	Numeric	Min: 1 Max: 65535	1
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift time increment to 2 for the first DVI card.

```
VID:SHIF:TINC 2, DVI1
```

The following command is used to query the image shift time increment for the first DVI card.

```
VID:SHIF:TINC? DVI1
```

Typical Response: `2`

[SOURce:]VIDeo:SHIFt:VINCrement

Syntax

```
[SOURce:]VIDeo:SHIFt:VINCrement <inc>, <card>
[SOURce:]VIDeo:SHIFt:VINCrement? <card>
```

Description

This command specifies the image shift vertical increment. Vertical increment indicates the number of lines the image travels in a vertical direction per time period.

Parameters

Parameter	Type	Range of values	Default value
<inc>	Numeric	Min: 1 Max: 65535	1
<card>	Discrete	{VGA|DVI|TV|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the image shift vertical increment to 10 for the first DVI card.

```
VID:SHIF:VINC 10, DVI1
```

The following command is used to query the image shift vertical increment for the first DVI card.

```
VIDEO:SHIFT:VINCREMENT? DVI1
```

Typical Response: `10`

[SOURce:]VIDeo:TMDS:SWINg:VOLTage

Syntax

```
[SOURce:]VIDeo:TMDS:SWINg:VOLTage <voltage>, <card>
```

```
[SOURce:]VIDeo:TMDS:SWINg:VOLTage? <card>
```

Description

To set the TMDS differential voltage level for the specified card.

Parameters

Parameter	Type	Range of values	Default value
<voltage>	Numeric	76 mVp-p to 1810 mVp-p	1000 mV
<card>	Discrete	{DVI|HDMi}<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- This setting is only applicable for the DVI and HDMI card types.
- When you set the voltage value in milivolts, you must specify the unit as mV, for example, 1000 mV, otherwise, the U8101A will assume the unit is V.
- The TDMS voltage must be set in increments of 6 mV. For example, if the original TDMS voltage is 1000 mV, the next highest value is 1006 mV. If you send a command specifying a new value of 1005 mV, the TDMS voltage will remain unchanged at 1000 mV.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

This command is used to set the TMDS differential voltage level of the video being generated to 1000 mV for the first DVI card.

```
VID:TMDS:SWIN:VOLT 1000mV, DVI1
```

or

```
VID:TMDS:SWIN:VOLT 1V, DVI1
```

The following query returns the TMDS differential voltage level of the video being generated for the first DVI card.

```
VID:TMDS:SWIN:VOLT? DVI1
```

Typical Response: `1.0000E+00`

[SOURce:]VIDeo:TV:SWINg[:STEP]

Syntax

```
[SOURce:]VIDeo:TV:SWINg[:STEP] <step>, <card>

[SOURce:]VIDeo:TV:SWINg[:STEP]? <card>
```

Description

This command sets the step that controls the TV output level of the TV video signal being generated for the specified card.

Parameters

Name	Type	Range of values	Default value
<step>	Numeric	Min: –44 Max: 44	0
<card>	Discrete	TV<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- The value of 0 corresponds to a 1000 mV swing voltage.
- This setting can only be applied when the video pattern is being generated at the specified card.
- This setting is only applicable for the TV card type.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the step that corresponds to the TV output level of the video being generated to 30 for the first TV card.

```
VID:TV:SWIN 30, TV1
```

The following command is used to query the step that corresponds to the TV output level of the video being generated for the first TV card.

```
VID:TV:SWIN? TV1
```

Typical Response: `30`

[SOURce:]VIDeo:TV:SWINg:VOLTage?

Syntax

```
[SOURce:]VIDeo:TV:SWINg:VOLTage? <card>
```

Description

This query returns the TV output voltage level for the specified card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	TV<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query can only be applied when the video pattern is being generated at the specified card.
- This query is only applicable for the TV card type.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following query returns the TV output voltage level of the video being generated for the first TV card

```
VID:TV:SWIN:VOLT? TV1
```

Typical Response: `1.0000000E+03`

[SOURce:]VIDeo:VGA:SWINg:RED[:STEP]

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:RED[:STEP] <step>, <card>
```

```
[SOURce:]VIDeo:VGA:SWINg:RED[:STEP]? <card>
```

Description

This command sets the step that controls the red color output voltage levels of a VGA video output for a specified VGA card.

Parameters

Parameter	Type	Range of values	Default value
<step>	Numeric	0 to 255	255
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- This setting is only applicable for the VGA card type.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the step that controls the red color output voltage levels to 200 for the first VGA card.

```
VID:VGA:SWIN:RED 200, VGA1
```

The following command is used to query the step for the first VGA card.

```
VID:VGA:SWIN:RED? VGA1
```

Typical Response: `200`

[SOURce:]VIDeo:VGA:SWINg:GREen[:STEP]

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:GREen[:STEP] <step>, <card>
```

```
[SOURce:]VIDeo:VGA:SWINg:GREen[:STEP]? <card>
```

Description

This command sets the step that controls the green color output voltage levels of a VGA video output for the specified VGA card.

Parameters

Parameter	Type	Range of values	Default value
<step>	Numeric	0 to 255	255
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- This setting is only applicable for the VGA card type.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the step that controls the green color output voltage levels to 200 for the first VGA card.

```
VID:VGA:SWIN:GRE 200, VGA1
```

The following command is used to query the step for the first VGA card.

```
VID:VGA:SWIN:GRE? VGA1
```

Typical Response: `200`

[SOURce:]VIDeo:VGA:SWINg:BLUE[:STEP]

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:BLUE[:STEP] <step>, <card>
```

```
[SOURce:]VIDeo:VGA:SWINg:BLUE[:STEP]? <card>
```

Description

This command sets the step that controls the blue color output voltage levels of a VGA video output for a specified VGA card.

Parameters

Parameter	Type	Range of values	Default value
<step>	Numeric	0 to 255	255
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This setting can only be applied when the video pattern is being generated at the specified card.
- This setting is only applicable for the VGA card type.
- Sending this command will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Examples

The following command is used to set the step that controls the blue color output voltage levels to 200 for the first VGA card.

```
VID:VGA:SWIN:BLUE 200, VGA1
```

The following command is used to query the step for the first VGA card.

```
VID:VGA:SWIN:BLUE? VGA1
```

Typical Response: `200`

[SOURce:]VIDeo:VGA:SWINg:RED:VOLTage?

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:RED:VOLTage? <card>
```

Description

This query returns the VGA red color component output voltage level of the video being generated at the specified card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query can only be applied when the video pattern is being generated at the specified card.
- This query is only applicable for the VGA card type.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following query returns the VGA red color component output voltage level of the video being generated for the first VGA card.

```
VID:VGA:SWIN:RED:VOLT? VGA1
```

Typical Response: `7.000000E+02`

[SOURce:]VIDeo:VGA:SWINg:GREen:VOLTage?

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:GREen:VOLTage? <card>
```

Description

This query returns the VGA green color component output voltage level of the video being generated at the specified card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query can only be applied when the video pattern is being generated at the specified card.
- This query is only applicable for VGA card type.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following query returns the VGA green color component output voltage level of the video being generated for the first VGA card.

```
VID:VGA:SWIN:GRE:VOLT? VGA1
```

Typical Response: `7.000000E+02`

[SOURce:]VIDeo:VGA:SWINg:BLUE:VOLTage?

Syntax

```
[SOURce:]VIDeo:VGA:SWINg:BLUE:VOLTage? <card>
```

Description

This query returns the VGA blue color component output voltage level of the video being generated at the specified card.

Parameter

Parameter	Type	Range of values	Default value
<card>	Discrete	VGA<i> where <i> can range from 1 to 5	This is a required parameter

Remarks

- This query can only be applied when the video pattern is being generated at the specified card.
- This query is only applicable for the VGA card type.
- Sending this query will cause the pattern sequence to pause. You will need to resume the sequence after performing this setting.

Example

The following query returns the VGA blue color component output voltage level of the video being generated for the first VGA card.

```
VID:VGA:SWIN:BLUE:VOLT? VGA1
```

Typical Response: `7.000000E+02`

Status Subsystem

Status register programming lets you determine the operating condition of the U8101A at any time. The U8101A has two groups of status registers; Operation and Standard Event. The Operation status group consists of the Condition, Enable, and Event registers as well as NTR and PTR filters. The Status subsystem is also programmed using Common commands. Common commands control additional status functions such as the Service Request Enable and the Status Byte registers.

STATus:PRESet

Syntax

```
STATus:PRESet
```

Description

This command sets all defined bits in the Status subsystem PTR registers and clears all bits in the NTR and Enable registers.

Operation register	Preset setting
STAT:OPER:ENAB	0 – all bits disabled
STAT:OPER:NTR	0 – all bits disabled
STAT:OPER:PTR	32767 – all defined bits enabled

Example

The following command presets the Operation status registers.

```
STAT:PRES
```

STATus:OPERation:CONDition?

Syntax

```
STATus:OPERation:CONDition?
```

Description

This command queries the condition register for the Standard Operation register group. This is a read-only register and the bits are not cleared when you read the register.

Remarks

- The condition register bits reflect the current condition. If the condition is removed, the corresponding bit is cleared in the condition register.
- The bit definitions for the Standard Operation register are listed in the following table.

Table 7-3 Bit definitions for the Standard Operation register

Bit number		Decimal value	Definition
0	Calibration in Progress	1	The U8101A is being calibrated
1	Self-Test in Progress	2	Self-test is being performed
2	Upgrading Firmware in Progress	4	The firmware is being upgraded
3	Reading EDID data	8	The U8101A is reading the EDID data from the display-under-test
4 – 15	Not Used	Not Used	0 is returned

Example

The following command reads the condition register while the U8101A is reading the EDID data.

```
STAT:OPER:COND?
```

Typical Response: `8`

STATus:OPERation:ENABle

Syntax

```
STATus:OPERation:ENABle <enable value>
STATus:OPERation:ENABle?
```

Description

This command enables bits in the enable register for the Standard Operation register group. The selected bits are then reported to the Status Byte.

Parameter

Item	Type	Range of values	Default value
<enable value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register	This is a required parameter

Remarks

- Refer to Table 7-3 for the bit definitions of the Standard Operation register.
- Use the `<enable value>` parameter to specify which bits to report to the Status Byte. The specified decimal value corresponds to the binary-weighted sum of the bits you wish to enable in the register. For example, to enable bit 1 (decimal value = 2) and bit 3 (decimal value = 8), a decimal value of 10 (2 + 8) should be specified.
- The clear status (`*CLS`) command does not clear the enable register but it clears all bits in the event register.
- The `STATus:PRESet` command clears all bits in the enable register.
- The `*RST` and instrument preset (`SYSTem:PRESet`) commands have no effect on this register.

Examples

The following command enables bit 3 (decimal value of 8) in the enable register.

```
STAT:OPER:ENAB 8
```

The following query returns the bits that are enabled in the register.

```
STAT:OPER:ENAB?
```

Typical Response: `8`

STATus:OPERation[:EVENt]?

Syntax

```
STATus:OPERation[:EVENt]?
```

Description

This command queries the event register for the Standard Operation register group. This is a read-only register and the bits are cleared when you read the register.

Remarks

- Refer to Table 7-3 for the bit definitions of the Standard Operation register.
- Once a bit is set, it remains set until cleared by reading the event register or the clear status (`*CLS`) command.
- The `*RST`, instrument preset (`SYSTem:PRESet`), and `STATus:PRESet` commands have no effect on this register.

Example

The following command reads the event register (bit 3 is set).

```
STAT:OPER?
```

Typical Response: `8`

STATus:OPERation:NTRansition

Syntax

```
STATus:OPERation:NTRansition <value>
```

```
STATus:OPERation:NTRansition?
```

Description

This command sets and reads the value of the Operation Negative-Transition (NTR) register. This register serves as a polarity filter between the Operation Condition and Operation Event registers.

When a bit in the Operation NTR register is set to 1, then a 1-to-0 transition of the corresponding bit in the Operation Condition register causes that bit in the Operation Event register to be set.

Parameter

Name	Type	Range of values	Default value
<value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register	0

For example, to enable bit 1 (decimal value = 2) and bit 3 (decimal value = 8), the corresponding decimal value would be 10 (2 + 8).

Remarks

- Refer to Table 7-3 for the bit definition of the Standard Operation register.
- If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Operation Condition register sets the corresponding bit in the Operation Event register.
- If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Operation Condition register can set the corresponding bit in the Operation Event register.
- The `STATus:PRESet` command will set all bits in the NTR register to 0.
- The `*RST` and instrument preset (`SYSTem:PRESet`) commands have no effect on this register.

Examples

The following command enables bits 0 and 1 (decimal value = 3) in the NTR register.

```
STAT:OPER:NTR 3
```

The following query returns the bits enabled in the register.

```
STAT:OPER:NTR?
```

Typical Response: `3`

STATus:OPERation:PTRansition

Syntax

```
STATus:OPERation:PTRansition <value>
```

```
STATus:OPERation:PTRansition?
```

Description

This command sets and reads the value of the Operation Positive-Transition (PTR) register. This register serves as a polarity filter between the Operation Condition and Operation Event registers.

When a bit in the Operation PTR register is set to 1, then a 0-to-1 transition of the corresponding bit in the Operation Condition register causes that bit in the Operation Event register to be set.

Parameter

Name	Type	Range of values	Default value
<value>	Numeric	A decimal value which corresponds to the binary-weighted sum of the bits in the register	0

For example, to enable bit 2 (decimal value = 4) and bit 3 (decimal value = 8), the corresponding decimal value would be 12 (4 + 8).

Remarks

- Refer to Table 7-3 for the bit definition of the Standard Operation register.
- If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Operation Condition register sets the corresponding bit in the Operation Event register.
- If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Operation Condition register can set the corresponding bit in the Operation Event register.
- The `STATus:PRESet` command will set all bits in the PTR register to 1.
- The `*RST` and instrument preset (`SYSTem:PRESet`) commands have no effect on this register.

Examples

The following command enables bits 0 and 1 (decimal value = 3) in the PTR register.

```
STAT:OPER:PTR 3
```

The following query returns the bits enabled in the register.

```
STAT:OPER:PTR?
```

Typical Response: `3`

System Subsystem

This subsystem is used to set up the system configuration.

SYSTem:ERRor[:NEXT]?

Syntax

```
SYSTem:ERRor[:NEXT]?
```

Description

This query returns the error number and its corresponding message string from the U8101A error queue. A record of up to 20 errors can be stored in the U8101A error queue. The format of the response is:

```
<error number>, <error string>
```

where the error number is defined in Chapter 10, “Error Messages List” on page 199.

Remarks

- Errors are retrieved in the first-in, first-out (FIFO) order where the first error returned is the first error that has been stored.
- If more than 20 errors have occurred, the last error stored in the queue (the most recent error) is replaced with **–350, "Queue overflow"**. No additional errors are stored until you remove errors from the queue. If no errors occur when you read the error queue, the U8101A responds with **0, "No error"**.
- The error queues are cleared by the clear status (`*CLS`) command and when power is cycled. The errors are also cleared when you read the error queue. The error queue is not cleared by factory reset (`*RST`) or `SYSTem:PRESet` command.
- The command reads and clears one error string from the error queue. The error string may contain up to 255 characters and consists of an error number and an error string enclosed in double quotes. For example:

```
–113, "Undefined header"
```

Example

The following query reads and clears one error.

```
SYST:ERR?
```

Typical Response: `-101, "Invalid character"`

SYSTem:DATE

Syntax

```
SYSTem:DATE <yyyy>, <mm>, <dd>
SYSTem:DATE?
```

Description

This command sets the date of the real time clock in year (yyyy), month (mm), and day (dd) format.

Parameters

Item	Type	Range of values	Default value
<yyyy>	Numeric	A four-digit integer representing the year. The value is in the range of 2000 to 2099.	This is a required parameter
<mm>	Numeric	An integer from 1 to 12	This is a required parameter
<dd>	Numeric	An integer from 1 to 31	This is a required parameter

Examples

The following command sets the date (April 1, 2008).

```
SYST:DATE 2008, 4, 1
```

The following query returns the date.

```
SYST:DATE?
```

Typical Response: `2008, 4, 1`

SYSTem:MDEScription?

Syntax

```
SYSTem:MDEScription? <slot no>
```

Description

This command queries the identity of the plug-in cards in the specified slot. If there is no plug-in card at the specified slot, `NONE` will be returned.

Parameter

Item	Type	Range of values	Default value
<slot no>	Discrete	{1|2|3|4|5}	This is a required parameter

Example

If a U8101A have five slots with five plug-in cards (counted from slot 1) consisting of TV, VGA, HDMI, DVI, and VGA.

The following query returns the identity of slot 5.

```
SYST:MDES? 5
```

Typical Response: `VGA2`

The following table shows the returned identity of the corresponding slot:

<slot no>	Card type	Return
1	TV	TV1
2	VGA	VGA1
3	HDMI	HDM1
4	DVI	DVI1
5	VGA	VGA2

SYSTem:TIME

Syntax

```
SYSTem:TIME <hh>, <mm>, <ss>
SYSTem:TIME?
```

Description

This command sets the real time clock in hours (hh), minutes (mm), and seconds (ss).

Parameters

Item	Type	Range of values	Default value
<hh>	Numeric	An integer from 0 to 23	This is a required parameter
<mm>	Numeric	An integer from 0 to 59	This is a required parameter
<ss>	Numeric	An integer from 0 to 59	This is a required parameter

Examples

The following command sets the time.

```
SYST:TIME 13, 30, 10
```

The following query returns the time of the clock in the U8101A.

```
SYST:TIME?
```

Typical Response: `13, 30, 10`

SYSTem:VERSion?

Syntax

```
SYSTem:VERSion?
```

Description

This query returns the version of the SCPI standard with which the U8101A is in compliance. The U8101A complies with the rules and conventions of the indicated version of the SCPI standard.

The response is in the form of XXXX.Y, where XXXX represents the year and Y represents the version number for that year.

Example

The following query returns the SCPI version.

```
SYST:VERS?
```

Typical Response: `1999.0`

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess

Syntax

```
SYSTem:COMMunicate:GPIB[:SELF]:ADDRess <address>

SYSTem:COMMunicate:GPIB[:SELF]:ADDRess?
```

Description

This command assigns the U8101A GPIB (IEEE-488) address. Each device on the GPIB interface must have a unique address.

Parameter

Parameter	Type	Range of values	Default value
<address>	Numeric	An integral value between 0 and 30	This is a required parameter

Remarks

- The factory GPIB address setting is 19.
- The GPIB interface card of your PC has its own address. Be sure to avoid using the PC address for any instrument on the interface bus.
- The GPIB address is stored in nonvolatile memory, and does not change when power has been turned off, after a factory reset (`*RST` command).

Examples

The following command sets the GPIB address.

```
SYST:COMM:GPIB:ADDR 19
```

The following query returns the GPIB address currently being used by the U8101A.

```
SYST:COMM:GPIB:ADDR?
```

Typical Response: `19`

SYSTem:COMMunicate:LAN:ADDRess

Syntax

```
SYSTem:COMMunicate:LAN:ADDRess <address>

SYSTem:COMMunicate:LAN:ADDRess?
```

Description

This command assigns a static Internet Protocol (IP) address for the U8101A.

Parameter

Name	Type	Range of values	Default value
<address>	String	<address> can be up to 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces)	This is a required Parameter

Remark

- Sending this command will automatically disable DHCP and switch to static IP.
- The IP address is stored in nonvolatile memory, and does not change when power has been turned off, after a factory reset (`*RST` command), or after an instrument preset (`SYSTem:PRESet` command).

Examples

The following command sets the IP address.

```
SYST:COMM:LAN:ADDR "169.254.149.35"
```

The following query returns the IP address currently being used by the U8101A (the quotes are also returned).

```
SYST:COMM:LAN:ADDR?
```

Typical Response: `"169.254.149.35"`

SYSTem:COMMunicate:LAN:DGATeway

Syntax

```
SYSTem:COMMunicate:LAN:DGATeway <gateway>

SYSTem:COMMunicate:LAN:DGATeway?
```

Description

This command assigns the static default gateway for the U8101A.

Parameter

Name	Type	Range of values	Default value
<gateway>	String	<gateway> can be up to 15 characters formatted as follows: A.B.C.D where A,B,C,D = 0 to 255 (no embedded spaces)	This is a required parameter

Remark

- Sending this command will automatically disable DHCP and switch to static IP.
- The default gateway is stored in nonvolatile memory, and does not change when power has been turned off, after a factory reset (`*RST` command), or after an instrument preset (`SYSTem:PRESet` command).

Examples

The following command sets the default gateway address.

```
SYST:COMM:LAN:DGAT "255.255.20.11"
```

The following query returns the default gateway address currently being used by the U8101A (the quotes are also returned).

```
SYST:COMM:LAN:DGAT?
```

Typical Response: `"255.255.20.11"`

SYSTem:COMMunicate:LAN:DHCP:ENABled

Syntax

```
SYSTem:COMMunicate:LAN:DHCP:ENABled
```

Description

This command enables the Dynamic Host Configuration Protocol (DHCP) for the U8101A. When the DHCP is enabled (factory setting), the U8101A will try to obtain an IP address from a DHCP server. If a DHCP server is found, it will assign a dynamic IP address, subnet mask, and default gateway to the U8101A.

Example

The following command enables the DHCP.

```
SYST:COMM:LAN:DHCP:ENAB
```

SYSTem:COMMunicate:LAN:HNAMe

Syntax

```
SYSTem:COMMunicate:LAN:HNAMe?
```

Description

This command queries the LAN hostname for the U8101A.

Example

The following query returns the hostname currently being used by the U8101A (the quotes are also returned).

```
SYST:COMM:LAN:HNAM?
```

Typical Response: `"U8101A"`

SYSTem:COMMunicate:LAN:SMASk

Syntax

```
SYSTem:COMMunicate:LAN:SMASk <subnet mask>
```

```
SYSTem:COMMunicate:LAN:SMASk?
```

Description

This command sets the static subnet mask.

Parameter

Name	Type	Range of values	Default value
<subnet mask>	String	<subnet mask> can be up to 15 characters formatted as follows: A.B.C.D where A, B,C,D = 0 to 255 (no embedded spaces)	`"255.255.0.0"`

Remarks

- Sending this command will automatically disable DHCP and switch to static IP.
- The subnet mask is stored in nonvolatile memory, and does not change when power has been turned off, after a factory reset (`*RST` command), or after an instrument preset (`SYSTem:PRESet` command).

Examples

The following command sets the subnet mask.

```
SYST:COMM:LAN:SMAS "255.255.20.11"
```

The following query returns the subnet mask currently being used by the U8101A (the quotes are also returned).

```
SYST:COMM:LAN:SMAS?
```

Typical Response: `"255.255.0.11"`

SYSTem:COMMunicate:LAN:MAC?

Syntax

```
SYSTem:COMMunicate:LAN:MAC?
```

Description

This command reads the U8101A Media Access Control (MAC) address, also known as the link-layer address, the Ethernet (station) address, LANIC ID, or hardware address. This is an unchangeable 48-bit address assigned by the manufacturer to each unique Internet device.

NOTE Your network administrator may need the MAC address if they are assigning a static IP address for this device.

Remarks

- The U8101A MAC address is set at the factory and cannot be changed.
- The MAC address is stored in nonvolatile memory, and does not change when power has been turned off, after a factory reset (`*RST` command), or after an instrument preset (`SYSTem:PRESet` command).
- The command reads the MAC address and returns an ASCII string enclosed in double quotes. The MAC address is represented as 12 hexadecimal characters.

Example

The following query returns the MAC address (the quotes are also returned).

```
SYST:COMM:LAN:MAC?
```

Typical Response: `"0003D3041075"`

SYSTem:SPEaker:STATe

Syntax

```
SYSTem:SPEaker:STATe <state>
```

```
SYSTem:SPEaker:STATe?
```

Description

This command enables or disables the sound of the speaker.

Parameter

Name	Type	Range of values	Default value
<state>	Boolean	{OFF|0|ON|1)	This is a required parameter

Examples

The following command disables the speaker state.

```
SYST:SPE:STAT OFF
```

The following query returns the speaker state.

```
SYST:SPE:STAT?
```

Typical Response: `0`

SYSTem:SPEaker:VOLume

Syntax

```
SYSTem:SPEaker:VOLume <value>
SYSTem:SPEaker:VOLume?
```

Description

This command sets the volume of audible tones. The parameter range is from 0 to 15, with 15 indicating the maximum volume that the U8101A can produce and 0 indicating minimum volume.

Parameter

Name	Type	Range of values	Default value
<value>	Numeric	0 to 15	This is a required parameter

Examples

The following command sets the speaker volume.

```
SYST:SPE:VOL 8
```

The following query returns the speaker volume.

```
SYST:SPE:VOL?
```

Typical Response: `8`

SYSTem:PRESet

Syntax

```
SYSTem:PRESet
```

Description

This command resets the U8101A to the factory configuration and deletes all the user-defined files.

Examples

The following command presets the instrument.

```
SYST:PRES
```

8 Specifications

This chapter covers the characteristics and specifications of the U8101A and all the available optional plug-in cards.

U8101A Display Tester

Parameter	Specification
Display	5.7-inch color LCD
Pattern file types	BMP, TIFF
Power supply	100 V to 240 V ± 10% (47 Hz to 63 Hz)
Power usage	< 100 VA
Surge power	3 kV, 6 A (per IEC61000-4-5)
Ambient temperature	Operating: 0 °C to 40 °C Non-operating: –40 °C to 70 °C
Humidity	Operating: 20% to 80% RH non-condensing Non-operating: 5% to 90% RH non-condensing
Altitude	Operating up to 3000 m (10,000 ft) at 40 °C
Internal memory	4 GB flash memory
External memory interface	USB 2.0
Control interface	GPIB, LAN
Programming language	SCPI
Storage interface	USB
Dimensions (W×H×D)	426.8 mm × 141.4 mm × 405.0 mm
Weight	7.5 kg (15.5 lbs)
Safety and EMC compliance	• IEC 61326-2002/EN 61326:1997+A1:1998+A2:2001+A3:2003 • CISPR 11:1990/EN55011:1990 • Canada: ICES-001:2004 • Australia/New Zealand: AS/NZS CISPR11:2004 • IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition) • Canada: CAN/CSA-C22.2 No. 61010-1-04 • USA: ANSI/UL 61010-1:2004
Calibration interval	1 year
Warranty	1 year

Analog TV Card

Analog composite

Parameter	Specification
Connector types	CVBS (RCA) S-Video (4-pin mini-DIN)
Display format	NTSC, PAL SDTV, EDTV (S-Video only)
Full-scale amplitude	1000 mV ± 50 mV
Pixel clock Pixel rate Step Accuracy	 24.55 MHz to 29.50 MHz ± 10% range at 1% step 50 ppm
Horizontal timing Frequency Total pixels Blank pixels	 15.625 kHz to 15.75 kHz 2640 (max) 0 (min)
Vertical timing Frequency Total lines Blank lines Scan mode	 25 Hz to 30 Hz 1125 (max) 1 (min) Progressive and interlaced

Analog component

Parameter	Specification
Connector type	YPbPr (RCA)
Display format	NSTC, PAL, SDTV, EDTV, HDTV
Full-scale amplitude	Adjustable simultaneously for all three components: 1000 mV ± 50 mV for Y 350 mV ± 15 mV for Pb and Pr
Pixel clock	
Pixel rate	24.55 MHz to 74.25 MHz
Step	± 10% range at 1% step
Accuracy	50 ppm
Horizontal timing	
Frequency	15.625 kHz to 45 kHz
Total pixels	2640 (max)
Blank pixels	0 (min)
Vertical timing	
Frequency	23 Hz to 60 Hz
Total lines	1125 (max)
Blank lines	1 (min)
Scan mode	Progressive and interlaced

Analog RGB Card (VGA Card)

Analog component

Parameter	Specification
Connector type	15-pin DSub (VGA)
Display format	VESA DMT/CVT
Full-scale amplitude	700 mV ± 35 mV
E-EDID	Read/Write (ver 1.4)
Pixel clock	
Pixel rate	10 MHz to 205 MHz
Step	1 % of pixel clock
Accuracy	3 ppm
Horizontal timing	
Total pixels	8192 (max)
Blank pixels	0 (min)
Step	1
Vertical timing	
Total lines	2048 (max)
Blank lines	1 to Total-1 (min)
Step	1
Scan mode	Progressive and interlaced

DVI Card

DVI interface

Parameter	Specification
Version	DVI 1.0
Connector type	DVI-D (single link)
Display format	VESA DMT/CVT
Encoding	RGB
Sampling modes	4:4:4
Bits/component	8
E-EDID	Read/Write (ver 1.4)
HDCP	HDCP 1.0
TMDS output	
Amplitude	76 mVp-p to 1810 mVp-p
Step	6 mV
Pixel clock	
Pixel rate	25 MHz to 165 MHz
Step	1 % of pixel clock
Accuracy	3 ppm
Horizontal timing	
Total pixels	4095 (max)
Blank pixels	128 (min)
Step	1
Vertical timing	
Total lines	2047 (max)
Blank lines	1 (min)
Step	1
Scan mode	Progressive and interlaced

HDMI Card

HDMI 1.2 interface

Parameter	Specification
Version	HDMI 1.2
Connector type	Video out: HDMI Type A (single link) Audio In: S/PDIF (BNC)
Video	
Display format	SDTV, EDTV, HDTV, VESA DMT/CVT
Encoding	RGB or YCbCr (only RGB in DVI mode)
Sampling modes	4:4:4 or 4:2:2 YCbCr (only 4:4:4 in DVI mode)
Bits/component	8
E-EDID	Read/Write (ver 1.4)
HDCP	HDCP 1.0
TMDS output	
Amplitude	76 mVp-p to 1810 mVp-p
Step	6 mV
Pixel clock	
Pixel rate	25 MHz to 165 MHz
Step	1 % of pixel clock
Accuracy	3 ppm
Horizontal timing	
Frequency	126 kHz (max)
Total pixels	4095 (max)
Blank pixels	138 (min)
Step	1
Vertical timing	
Frequency	240 kHz (max); supports CEA-861-D standard
Total lines	2047 (max)
Blank lines	1 (min)
Step	1
Scan mode	Progressive and interlaced
External audio input	
Connector type	S/PDIF (BNC)
Amplitude	As received
Sampling rate	2 kHz to 192 kHz
Input Impedance	75 Ω

Audio out

Parameter	Specification
Channel	2 (L/R)
Connector	RCA
Waveform	Per WinCE sound file
Frequency range	20 Hz to 20 kHz
Output amplitude	0 Vp-p to 2 Vp-p
Output impedance	75 Ω

External Trigger Out

Parameter	Specification
Availability	TV, VGA, DVI, and HDMI cards
Output connector	BNC
Trigger Type	Frame Sync, Line Sync, and Composite Sync
Trigger point	Position at any pixel
Trigger delay	In multiples of pixel width
Trigger pulse width	1 pixel-clock cycle
Polarity	Positive-edge (default) and negative-edge; selectable
Output level	> 2 V, 5 V TTL compatible using 75 Ω, BNC cable

9 SCPI Command List

The summary of the SCPI commands is listed in this chapter.

SCPI Command List

IEEE-488.2 common commands

*CLS	Clears the event registers in all register groups and the error queue
*ESE <value>	Enables bits in the enable register for the Standard Event register group
*ESE?	Returns the value of the Standard Event Status Enable register
*ESR?	Returns the value of the event register of the Standard Event group
*IDN?	Reads the U8101A identification string which contains four comma-separated fields
*OPC	Sets the "Operation Complete" bit (bit 0) in the Standard Event register when all pending operation have completed
*OPC?	Queries the "Operation Complete" bit (bit 0) in the Standard Event register
*RST	Resets the U8101A to to its factory default state
*SRE <value>	Enables the bits in the Status Byte enable register
*SRE?	Returns the value of the Service Request Enable register
*STB?	Reads the summary (condition) of the Status Byte register
*TST?	Performs a self-test; then returns a pass or fail indication
*WAI	Sets the U8101A to wait for the completion of all pending operation before executing any additional commands over the interface

Calibration commands

CALibration

[:ALL]?	Performs an autocalibration of all VGA and TV cards installed in the U8101A

EDID commands

EDID

:DATA[:BLOCk] <data>	Allows you to transfer the binary blocks of EDID data into the U8101A volatile memory
:WRITe[:BLOCk] <card>	Writes the EDID data from the U8101A volatile memory into the monitor connected at the specified card
:READ[:BLOCk] <card>	Reads the EDID data from the monitor connected at the specified card

HDCP commands

HDCP

:STATe <state>, <card>	Turns on or off the content protection of the digital video signal generated from the specified card

Mass Memory commands

MMEMory

:CATalog? <location>, <directory>	Returns the memory usage information and obtains a list of files and directories in a specified directory
:DELete <location>, <directory>, <filename>	Deletes the specified file in the selected directory
:LOAD:EDID EDID, <filename>	Loads the EDID data from the specified file into the U8101A internal memory
:STORe:EDID EDID, <filename>	Stores the EDID data from the U8101A internal memory to the file specified as <filename>
:LOAD:SEQuence SEQuence, <filename>	Loads the pattern sequence list from the file as specified in the <filename>
:STORe:SEQuence SEQuence, <filename>	Stores the programmed sequence list as defined using the [SOURce:]LIST:PATTern<i> commands to the file as specified in the <filename>

Output commands

OUTPut

:TTLTrg:DELay <numeric>, <card>	Sets the trigger out signal delay (in pixels) for the specified card
:TTLTrg:POLarity <polarity>, <card>	Selects the polarity of the trigger out signal
:TTLTrg:SOURce <trigger source>, <card>	Selects the trigger out signal source for the specified card
:TTLTrg:SPOS:MODE <mode>, <card>	Selects the trigger mode for the trigger out signal when the specific position trigger source is selected
:TTLTrg:SPOS:POSition:X <x>, <card>	Specifies the X-axis point for the trigger out signal to be generated when Specific Position in video signal is selected
:TTLTrg:SPOS:POSition:Y <y>, <card>	Specifies the Y-axis point for the trigger out signal to be generated when Specific Position in video signal is selected
:TTLTrg:SPOS:VISible <state>, <card>	Makes the trigger point visible on the display under test
:TTLTrg[:STATe] <trigger state>, <card>	Turns on or off the trigger out signal
:TTLTrg:WIDTh <numeric>, <card>	Specifies the pulse width of the trigger out signal in pixels
:VIDeo[:STATe]? <card>	Returns the video generation state of the U8101A for the specified card

Source commands

`[SOURce:]`	
`LIST:PATTern<i> <card>, <format>, <image>, <duration>, <video interface>`	Defines a sequence of video patterns to be generated
`LIST:PATTern:CLEar[:ALL]`	Clears all the video pattern elements in the list
`LIST:PATTern:COUNt?`	Returns the number of video pattern elements stored in the list
`LIST:PATTern<i>:DURation?`	Returns the duration of the video pattern element at the specified index `<i>`
`LIST:PATTern:FORMat?`	Returns the format of the video pattern element at the specified index `<i>`
`LIST:PATTern<i>:IMAGe?`	Returns the image of the video pattern element at the specified index `<i>`
`LIST:PATTern<i>:MODule?`	Returns the card of the video pattern element at the specified index `<i>`
`LIST:PATTern<i>:REMove`	Removes the video pattern element in the list at the specified index `<i>`
`LIST:PATTern<i>:VINTerface?`	Returns the video interface of the video pattern element at the specified index `<i>`
`LIST:SEQuence:INDex?`	Returns the current playing index of the video pattern sequence
`LIST:SEQuence:MODE <mode>`	Selects the defined pattern list generated in a particular instrument
`LIST:SEQuence:PAUSe`	Pauses a running video pattern sequence
`LIST:SEQuence:RESume`	Resumes the paused video pattern sequence
`LIST:SEQuence:STARt <start index>`	Starts a programmed video pattern sequence
`LIST:SEQuence:STOP`	Stops the running video pattern sequence
`AUDio:ANALog:STATe`	Turns on or off the analog audio output at the rear panel
`AUDio:ANALog:CHANnel`	Selects the analog audio channel at the rear panel
`VIDeo:COLor:RED[:STATe] <state>, <card>`	Enables or disables the red color component of the video being generated from the specified card

`VIDeo:COLor:GREen[:STATe] <state>, <card>`	Enables or disables the green color component of the video being generated from the specified card
`VIDeo:COLor:BLUE[:STATe] <state>, <card>`	Enables or disables the blue color component of the video being generated from the specified card
`VIDeo:COLor:RED:VALue <color value>, <card>`	Sets the value of the red color component of the video generated at the specified card
`VIDeo:COLor:GREen:VALue <color value>, <card>`	Sets the value of the green color component of the video generated at the specified card
`VIDeo:COLor:BLUE:VALue <Color value>, <card>`	Sets the value of the blue color component of the video generated at the specified card
`VIDeo:FRATe? <card>`	Returns the frame rate in kHz of the video signal being generated for the specified card
`VIDeo:TIMing <step>, <card>`	Controls the pixel clock speed of the video signal generated from the specified card
`VIDeo:HTOTal? <card>`	Returns the total number of pixels per horizontal line of the video being generated for the selected card
`VIDeo:VTOTal? <card>`	Returns the total number of lines per vertical frame of the video format for the selected card
`VIDeo:HACTive? <card>`	Returns the total number of active pixels per line of the video pattern being generated for the specified card
`VIDeo:VACTive? <card>`	Returns the total number of active lines per frame of the video pattern being generated at the selected card
`VIDeo:HFRequency? <card>`	Returns the horizontal frequency of the video signal for the corresponding card in kHz.
`VIDeo:PCLock? <card>`	Returns the pixel clock of the video signal being generated in kHz for the specified card
`VIDeo:SHIFt:MODE <mode>, <card>`	Sets the image shift mode
`VIDeo:SHIFt:PAUSe <card>`	Pauses the image shift action
`VIDeo:SHIFt:RESume <card>`	Resumes the image shift action
`VIDeo:SHIFt:STARt <card>`	Starts the image shift
`VIDeo:SHIFt:STOP <card>`	Stops the image shift
`VIDeo:SHIFt:SPOint:X <x>, <card>`	Specifies the image shift start point X-coordinate value
`VIDeo:SHIFt:SPOint:Y <y>, <card>`	Specifies the image shift start point Y-coordinate value

`VIDeo:SHIFt:EPOint:X <x>, <card>`	Specifies the image shift end point X-coordinate value
`VIDeo:SHIFt:EPOint:Y <y>, <card>`	Specifies the image shift end point Y-coordinate value
`VIDeo:SHIFt:HINCrement <inc>, <card>`	Specifies the image shift horizontal increment
`VIDeo:SHIFt:TINCrement <N>, <card>`	Sets the time increment
`VIDeo:SHIFt:VINCrement <inc>, <card>`	Specifies the image shift vertical increment
`VIDeo:TMDS:SWINg:VOLTage <voltage>, <card>`	Sets the TMDS differential voltage level for the specified card
`VIDeo:TV:SWINg[:STEP] <step>, <card>`	Sets the step that controls the TV output level of the TV video signal being generated for the specified card
`VIDeo:TV:SWINg:VOLTage? <card>`	Returns the TV output voltage level for the specified card
`VIDeo:VGA:SWINg:RED[:STEP] <step>, <card>`	Sets the step that controls the red color output voltage levels of a VGA video output for a specified VGA card
`VIDeo:VGA:SWINg:GREen[:STEP] <step>, <card>`	Sets the step that controls the green color output voltage levels of a VGA video output for the specified VGA card
`VIDeo:VGA:SWINg:BLUE[:STEP] <step>, <card>`	Sets the step that controls the blue color output voltage levels of a VGA video output for a specified VGA card
`VIDeo:VGA:SWINg:RED:VOLTage? <card>`	Returns the VGA red color component output voltage level of the video being generated at the specified card
`VIDeo:VGA:SWINg:GREen:VOLTage? <card>`	Returns the VGA green color component output voltage level of the video being generated at the specified card
`VIDeo:VGA:SWINg:BLUE:VOLTage? <card>`	Returns the VGA blue color component output voltage level of the video being generated at the specified card

Status commands

`STATus`	
`:PRESet`	Sets all defined bits in the Status subsystem PTR registers and clears all bits in the NTR and Enable registers
`:OPERation:CONDition?`	Queries the condition register for the Standard Operation register group
`:OPERation:ENABle <enable value>`	Enables bits in the enable register for the Standard Operation register group
`:OPERation[:EVENt]?`	Queries the event register for the Standard Operation register group
`:OPERation:NTRansition <value>`	Sets and reads the value of the Operation Negative-Transition (NTR) register
`STATus:OPERation:PTRansition <value>`	Sets and reads the value of the Operation Positive-Transition (PTR) register

System commands

SYSTem	
:ERRor[:NEXT]?	Returns the error number and its corresponding message string from the U8101A error queue
:DATE <yyyy>, <mm>, <dd>	Sets the date of the real time clock in year (yyyy), month (mm), and day (dd)
:MDEScription? <slot no>	Queries the identity of the plug-in cards in the specified slot
:TIME <hh>, <mm>, <ss>	Sets the real time clock in hours (hh), minutes (mm), and seconds (ss)
:VERSion?	Returns the version of the SCPI standard with which the U8101A is in compliance
:COMMunicate:GPIB[:SELF]: ADDRess {<address>}	Assigns the U8101A GPIB (IEEE-488) address
:COMMunicate:LAN:ADDRess <address>	Assigns a static Internet Protocol (IP) address for the U8101A
:COMMunicate:LAN:DGATeway <gateway>	Assigns the static default gateway for the U8101A
:COMMunicate:LAN:DHCP:ENABled	Enables the Dynamic Host Configuration Protocol (DHCP) for the U8101A
:COMMunicate:LAN:HNAMe?	Queries the LAN hostname for the U8101A
:COMMunicate:LAN:SMASk <subnet mask>	Sets the static subnet mask
:COMMunicate:LAN:MAC?	Reads the U8101A Media Access Control (MAC) address, the Ethernet (station) address, LANIC ID, or hardware address
:SPEaker:STATe <state>	Enables or disables the sound of the speaker
:SPEaker:VOLume <value>	Sets the volume of audible tones
:PRESet	Resets the U8101A to the factory configuration and deletes all the user-defined files

10
Error Messages List

The U8101A SCPI command errors are summarized in this chapter.

Error Messages

Error messages are created once a command error or an erroneous condition has been detected.

- Errors are retrieved in the first-in-first-out (FIFO) order. The first error returned is the first error that has been stored. Errors are cleared as you read them. When you have read all errors from the queue, the ERROR annunciator turns off and the errors are cleared. The U8101A beeps once each time an error is generated.
- If more than 10 errors have occurred, the last error stored in the queue (the most recent error) is replaced with **–350,"Error queue overflow"**. No additional errors are stored until you remove all the errors from the queue. If no errors occur when you read the error queue, the U8101A responds with **0,No error**.
- The error queue is cleared by the clear status (`*CLS`) command or when the power is cycled. The errors are also cleared when you read the queue. The error queue *is not* cleared by a factory reset (`*RST` command) or an instrument preset (`SYSTem:PRESet` command).
- *Remote Interface Operation*: `SYSTem:ERRor?` *Reads one error from the error queue.*
  - Errors have the following format (the error string may contain up to 255 characters). Example:

    –113,"Undefined header"

Error list

The following is returned when there are no errors in the queue.

Table 10-1 No error

Error		Description
0	No error	The queue is completely empty. Every error or event in the queue has been read or the queue has been purposely cleared by power-on, `*CLS`, and so forth.

The table below contains the list of command errors.

Table 10-2 Command errors

Error		Description
–100	Command error	Generic syntax error
–101	Invalid character	An invalid character was found in the command string
–102	Syntax error	An invalid syntax was found in the command string. Check for blank spaces.
–103	Invalid separator	An invalid separator was found in the command string. Check for proper use of , ; :
–104	Data type error	A different data type than the one allowed was found in the command string
–108	Parameter not allowed	More parameters were received than expected
–109	Missing parameter	Fewer parameters were received than expected
–110	Command header error	An error was detected in the header
–111	Header separator error	A character that was not a valid header separator was found in the command string
–112	Program mnemonic too long	The header contains more than 12 characters
–113	Undefined header	A command was received that was not valid for the U8101A
–114	Header suffix out of range	The value of the numeric suffix is not valid
–120	Numeric data error	Generic numeric data error
–121	Invalid character in number	An invalid character for the data type was found in the command string
–123	Exponent too large	The magnitude of the exponent was larger than 32000
–124	Too many digits	The mantissa of a numeric parameter contained more than 255 digits, excluding leading zeros
–128	Numeric data not allowed	A numeric parameter was received but a character string was expected
–130	Suffix error	Generic suffix error
–131	Invalid suffix	A suffix was incorrectly specified for a numeric parameter
–134	Suffix too long	The suffix contains more than 12 characters
–138	Suffix not allowed	A suffix is not supported for this command
–140	Character data error	Generic character data error
–141	Invalid character data	Either the character data element contains an invalid character, or the element is not valid
–144	Character data too long	The character data element contains more than 12 characters
–148	Character data not allowed	A discrete parameter was received, but a string or numeric parameter was expected
–150	String data error	Generic string data error

Table 10-2 Command errors

Error		Description
–151	Invalid string data	An invalid character string was received. Ensure that the string is enclosed in quotation marks
–158	String data not allowed	A character string was received, but is not allowed for this command
–160	Block data error	Generic block data error
–161	Invalid block data	The number of data bytes sent does not match the number of bytes specified in the header
–168	Block data not allowed	Data was sent in the arbitrary block format but is not allowed for this command
–170	Expression error	Generic expression error
–171	Invalid expression data	The expression data element was invalid
–178	Expression data not allowed	Expression data element was sent but is not allowed for this command

The table below contains the list of execution errors.

Table 10-3 Execution errors

Error		Description
–200	Execution error	Generic syntax error
–200	Execution error; This module is not playing currently	The action could not be completed as the selected module is not playing any patterns
–200	Execution error; This function is not supported by this module card type	The action is not supported by the selected module card
–200	Execution error; This module type is not HDMI or DVI	The action is only supported by the HDMI and DVI cards
–200	Execution error; This module type is not TV	The action is only supported by the TV card
–200	Execution error; This module type is not VGA	The action is only supported by the VGA card
–200	Execution error; Image shift parameters not set	This occurs when you directly start the image shift without setting the image shift parameters
–200	Execution error; Changing parameters not allowed when trigger output is on	This occurs when you try to set the trigger output parameters while the trigger is in the ON state. To set the trigger parameters, the trigger output must be set to OFF.
–200	Execution error; Operation time out	This occurs when the system is busy processing other operation (such as calibration) and unable to process your command. You may need to resend your command if you encounter this error

Table 10-3 Execution errors

Error		Description
–220	Parameter error	A data element related error occurred
–221	Settings conflict	A data element could not be executed because of the present U8101A state
–222	Data out of range	A data element could not be executed because the value was out of the valid range
–223	Too much data	A data element was received that contains more data than the U8101A can handle
–224	Illegal parameter value	An exact value was expected but not received
–225	Out of memory	The U8101A has insufficient memory to perform the requested operation
–241	Hardware missing	The command could not be executed due to missing hardware, such as an option
–250	Mass storage error	Generic error relating with mass storage
–251	Missing mass storage	The mass storage is not available
–255	Directory full	The specified directory is full
–256	File name not found	The selected file not found
–257	File name error	The file name is invalid

The table below contains the list of query errors.

Table 10-4 Query errors

Error		Description
–400	Query Error	Generic query error
–410	Query INTERRUPTED	A condition causing an interrupted query error occurred
–420	Query UNTERMINATED	A condition causing an unterminated query error occurred
–430	Query DEADLOCKED	A condition causing a deadlocked query error occurred
–440	Query UNTERMINATED after indefinite response	A query was received in the same program message after a query indicating an indefinite response was executed

The table below contains the list of device-specific errors.

Table 10-5 Device-specific errors

Error		Description
–300	Device Specific Error	This is the generic device-dependent error for devices that cannot detect more specific errors. This code indicates only that a Device-Dependent Error as defined in IEEE 488.2, 11.5.1.1.6 has occurred.
–310	System error	Indicates that some error, termed "system error" by the U8101A, has occurred. This code is device-dependent.
–311	Memory error	Indicates that an error was detected in the U8101A memory. The scope of this error is device-dependent.
–330	Self-test failed	The self-test fails
–340	Calibration failed	Indicates that the U8101A calibration has failed
–350	Error Queue Overflow	The error queue is full because more than 20 errors have occurred. No additional errors are stored until you remove errors from the queue.

The table below contains the list of self-test errors.

Table 10-6 Self-test errors

Error		Description
601	Front panel not found	Possible cause: Unable to communicate with the front panel. The front panel firmware may be corrupted or the hardware may have malfunctioned.
602	Front panel bootloader not found	Possible cause: The front panel firmware (bootloader) may be corrupted or the microchip may be spoiled
603	Unable to run front panel normal code	Possible cause: The front panel firmware (normal code) may be corrupted or the microchip may be spoiled
604	Front panel microchip test failed	Possible cause: Unable to reconnect to the front panel after reset. The front panel firmware may be corrupted or the microchip may be spoiled.
605	Unable write to front panel's CPLD	Possible cause: The CPLD may be spoiled
606	Unable read from front panel's CPLD	Possible cause: The CPLD may be spoiled
607	Front panel CPLD test failed	Possible cause: The readback value does not match with the written value. The CPLD may be spoiled.
608	GPIB test failed	Possible cause: The GPIB device is not found or spoiled
609	LAN test failed	Possible cause: The LAN adapter is not found or spoiled
610	LAN device faulty	Possible cause: The LAN adapter is found but has malfunctioned

Table 10-6 Self-test errors

Error		Description
611	USB device interface test failed	Possible cause: The USB (device interface) device is not found or spoiled
612	Read secure storage failed	Possible cause: Unable to retrieve the firmware information from secure storage. The secure storage may be corrupted or spoiled.
613	Invalid firmware information	Possible cause: Retrieved firmware information are invalid. The secure storage may be corrupted or contained errors during saving mechanism when firmware is being upgraded.
614	Unable to read front panel firmware	Possible cause: The front panel firmware may be corrupted or the hardware may have malfunctioned
615	Front panel firmware integrity test failed	Possible cause: The bootloader/Normal/Key map code may be corrupted or the microchip may be spoiled
616	Unable to read application firmware	Possible cause: The flash driver may be corrupted
617	Temporary application firmware not found	Possible cause: Insufficient free space in RAM to read back the firmware for further test
618	Application firmware integrity test failed	Possible cause: The hash value of the readback firmware does not match with the original firmware
619	Unable to get free space of flash	Possible cause: The flash ROM may be spoiled
620	Not enough free space of flash	Possible cause: Insufficient free space in the flash ROM to perform Flash ROM test
621	Unable write to flash	Possible cause: Insufficient free space in the flash ROM due to bad sectors
622	Unable read from flash	Possible cause: The flash ROM may be spoiled
623	Read/Write of flash failed	Possible cause: The readback value does not match with the written value. The flash ROM may be spoiled.
624	Flash ROM test failed	Possible cause: Unable to delete the test file. The flash ROM may be spoiled.
651	Module Card <Slot> <Type> Module Card Self Test error	Possible cause: Unknown errors during module cards self-test
652	Module Card <Slot> <Type> FPGA error	Possible cause: The module card FPGA may be spoiled
653	Module Card <Slot> <Type> PLL error	Possible cause: The module card PLL may be spoiled
654	Module Card <Slot> <Type> Encoder error	Possible cause: The TV card Encoder may be spoiled
655	Module Card <Slot> <Type> Filter 1 error	Possible cause: The TV card Filter 1 may be spoiled

Table 10-6 Self-test errors

Error		Description
656	Module Card <Slot> <Type> Filter 2 error	Possible cause: The TV card Filter 2 may be spoiled
657	Module Card <Slot> <Type> D/A Converter error	Possible cause: The VGA card D/A Converter may be spoiled
658	Module Card <Slot> <Type> Filter error	Possible cause: The VGA card Filter may be spoiled
659	Module Card <Slot> <Type> HDMI Transmitter error	Possible cause: The HDMI/DVI card HDMI Transmitter may be spoiled
660	Module Card <Slot> <Type> TMDS scaler error	Possible cause: The HDMI/DVI card TMDS Scaler may be spoiled
661	Module Card <Slot> <Type> Altera Cyclone error	Possible cause: The HDMI card Altera Cyclone FPGA may be spoiled
662	Module Card <Slot> <Type> Unable to communicate with module card	Possible cause: The processor is not responding and may be spoiled
663	Module Card <Slot> <Type> Invalid ACK	Possible cause: The microchip bootloader may be corrupted or the microchip may be spoiled
698	Self Test Time Out	Possible cause: No response within the estimated period
699	Unknown Error	Possible cause: Unknown error

The following table shows the self-calibration errors.

Table 10-7 Self-calibration errors

Error		Description
701	Self Calibration Failed	The self-calibration fails
702	Self Calibration value is out of range	The self-calibration value is out of the allowable range

A
Supported Formats and Images

This appendix provides a list of all groups, formats, and images supported by the U8101A.

Supported Formats

Table A-1 Predefined format list

Image Group	Format ID	
VESA		
	DMT0685EG	DMT1285
	DMT0685D	DMT1360AB
	DMT0660	DMT1660
	DMT0672	DMT1665
	DMT0675	DMT1670
	DMT0685	DMT1675
	DMT0785TX	CVT1260E
	DMT0856	CVT1260E-R
	DMT0860	CVT1275E
	DMT0872	CVT1285E
	DMT0875	CVT1460
	DMT0885	CVT1460-R
	DMT0860AD	CVT1475
	DMT1060	CVT1485
	DMT1070	CVT1460D
	DMT1075	CVT1460D-R
	DMT1085	CVT1475D
	DMT1043	CVT1485D
	DMT1175	CVT1660D
	DMT1260G	CVT1660D-R
	DMT1275G	CVT1675D
	DMT1285G	CVT1960D
	DMT1260	CVT1960D-R

Image Group	Format ID	
HDTV		
	720P23 SMPTE296M	1035I30 SMPTE240M
	720P24 SMPTE296M	1080I25 SMPTE274M
	720P25 SMPTE296M	1080I29 SMPTE274M
	720P29 SMPTE296M	1080I30 SMPTE274M
	720P30 SMPTE296M	1080P23 SMPTE274M
	720P50 SMPTE296M	1080P24 SMPTE274M
	720P59 SMPTE296M	1080P25 SMPTE274M
	720P60 SMPTE296M	1080P29 SMPTE274M
	1035I29 SMPTE240M	1080P30 SMPTE274M
SDTV		
	NTSC-S	PAL-D
	480I30S	PAL-G
	480I29S	PAL-H
	NTSC-M	PAL-I
	NTSC-J	576I25 ITU-R BT.656
	NTSC-4	PAL-N
	PAL-60	PAL-3
	PAL-M	PAL-S
	NTSC-N	576I25S
	PAL-B	
EDTV		
	483P593 SMPTE293	483P604 BTAT-1004
	483P598 ITU-R BT	483P602 ITU-R BT
	483P594 BTAT-1004	483P603 SMPTE293
	483P592 ITU-R BT	576P508 ITU-R BT.1358
	483P608 ITU-R BT	576P502 ITU-R BT.1362

Image Group	Format ID	
NTSC		
	NTSC-S	NTSC-4
	NTSC-M	NTSC-N
	NTSC-J	
PAL		
	PAL-60	PAL-I
	PAL-B	PAL-N
	PAL-D	PAL-3
	PAL-G	PAL-S
	PAL-H	

Supported Images

Table A-2 Predefined image list

Image ID	Thumbnail	Image ID	Thumbnail
2tpulse_bar		step5_modulated_horizontal	
checker_line		ramp_modulated_horizontal	
checker5x5		step5_vertical	
circles9		step10_vertical	
colorbar_rp219_even100		stripe1_horizontal	
colorbar_rp219_even75		stripe1_vertical	
colorbar_rp219_eveni		stripe3_vertical	
colorbar_rp219_ideal100		window_black_white	
colorbar_rp219_ideal75		window_line	
colorbar_rp219_ideali		window_white10	
colorbar_rp219_modified100		window_white20	
colorbar_rp219_modified75		window_white30	
colorbar_rp219_modifiedi		window_white40	

Image ID	Thumbnail	Image ID	Thumbnail
colorbar100		window_white50	
colorbar100_horizontal		window_white60	
colorbar75		window_white70	
colorbar10075		window_white80	
cross_black		window_white90	
cross_white		window_white100	
crosshatch_black		wide_window_white10	
crosshatch_white		wide_window_white20	
grayscale16		wide_window_white30	
grayscale8		wide_window_white40	
halfclock		wide_window_white50	
multiburst_pbpr		wide_window_white60	
multiburst_y		wide_window_white70	
multiresolution_bar		wide_window_white80	

Image ID	Thumbnail	Image ID	Thumbnail
ramp_blue_horizontal		wide_window_white90	
ramp_green_horizontal		wide_window_white100	
ramp_red_horizontal		yellow100	
ramp_horizontal		black100	
ramp_horizontal_reverse		blue100	
ramp_vertical		cyan100	
ramp_vertical_reverse		green100	
ramp_wrgb_horizontal		magenta100	
ramp_wrgb_vertical		red100	
sinwave_500khz		white100	
step5_horizontal		white50	
step10_horizontal			
step5_alp0			
step5_apl10			
step5_apl20			

Image ID	Thumbnail	Image ID	Thumbnail
step5_apl30			
step5_apl40			
step5_apl50			
step5_apl60			
step5_apl70			
step5_apl80			
step5_apl90			
step5_apl100			

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