KEITHLEY

3402-F

The Keithley Model 3402-F is a high-performance 165 MHz Dual-Channel Pulse/Pattern Generator featuring fixed transition times of <1.6 ns. Combining precise timing, versatile pattern generation capabilities up to 165 Mbit/s, and a clean, low-jitter output, the 3402-F is designed for high-speed digital characterization, serial data simulation, semiconductor testing, and nanotechnology research. Dual-channel synchronization, full SCPI programmability via GPIB/USB, and independently controlled delay, amplitude, and width configurations make it a flexible powerhouse in advanced test environments.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE-488.2), USB 2.0 (Device)
Display	Backlit graphic LCD
Instrument State Storage	Up to 10 complete setups

Physical

Power Supply	100 V to 240 V AC (±10%), 47 Hz to 63 Hz, 120 VA maximum
Operating Temperature	0 °C to 50 °C °C
Dimensions (W×H×D)	439 mm × 89 mm × 390 mm mm
Weight	5.9 kg kg
Connector Location	Front panel

Output and Channel Characteristics

Number of Channels	2
Output Impedance	50 Ω nominal
Amplitude Range (into 50 Ω)	100 mV to 5.0 V
Amplitude Range (into Open Circuit)	200 mV to 10.0 V
Amplitude Accuracy	±(1% of setting + 20 mV)
Amplitude Resolution	3 digits or 10 mV
High Level Limits (into 50 Ω)	-4.90 V to +5.00 V
Low Level Limits (into 50 Ω)	-5.00 V to +4.90 V
High Level Accuracy	±(1% of setting + 20 mV)
Low Level Accuracy	±(1% of setting + 20 mV)
Transition Time (Rise/Fall)	Fixed, < 1.6 ns (< 1.5 ns typical)
Channel-to-Channel Skew	Typical < 100 ps
Output Connectors	Front panel BNC (2)

Timing and Pulse Control

Frequency Range	1 mHz to 165 MHz
Frequency Resolution	1 mHz
Frequency Accuracy	±0.01% of setting
Period Range	6.06 ns to 1000 s
Period Resolution	10 ps or 4 digits
Period Accuracy	±0.01% of setting
Pulse Width Range	3.0 ns to 1000 s
Pulse Width Resolution	10 ps or 4 digits
Pulse Width Accuracy	±(0.5% of setting + 250 ps)
Pulse Delay Range	0.0 ns to 1000 s
Pulse Delay Resolution	10 ps or 4 digits
Pulse Delay Accuracy	±(0.5% of setting + 250 ps)
Operating Modes	Continuous, Triggered, Gated, Burst
Pulse Modes	Single Pulse, Double Pulse

Pattern and Data Generation

Maximum Data Rate	165 Mbit/s
Data Formats	NRZ, RZ, R1
Pattern Length	Up to 16,384 bits per channel
PRBS Polynomial Types	2^7-1, 2^9-1, 2^11-1, 2^15-1, 2^23-1, 2^31-1
Pattern Loop Count	1 to 65,535 or infinite
Marker Outputs	1 per channel
Marker Delay Control	Independent marker delay
Marker Connectors	Front panel BNC (2)
User-Defined Pattern Support	Yes

Trigger and Synchronization

Trigger Source	Internal, External, Manual
External Trigger Input Range	-10 V to +10 V
External Trigger Impedance	10 kΩ nominal
External Trigger Threshold	Adjustable from -10 V to +10 V
External Trigger Slope	Rising, Falling, or Both
External Trigger Input Connector	Rear panel BNC
Trigger Output Amplitude	1 V nominal into 50 Ω
Trigger Output Connector	Rear panel BNC
External Reference Input Frequency	10 MHz (±10 kHz)
External Reference Input Connector	Rear panel BNC
Reference Output Frequency	10 MHz
Reference Output Connector	Rear panel BNC

Connectivity and System Interfaces

GPIB Interface	IEEE-488.2 compatible
USB Interface (Device)	USB 2.0 device port
Programming Commands	SCPI-1992
Drivers Supported	LabVIEW, IVI-C, IVI-COM

Physical and Mechanical Properties

Width	439 mm
Height	89 mm
Depth	390 mm
Rackmount Size	2U, full-rack width
Cooling	Forced air (fan)

Power and Environmental Specifications

Line Voltage Range	100 V to 240 V AC (±10%)
Line Frequency Range	47 Hz to 63 Hz
Maximum Power Consumption	120 VA
Storage Temperature Range	-20 °C to 65 °C
Operating Humidity Range	0% to 80% R.H. (non-condensing)
Operating Altitude Rating	Up to 2,000 meters
Warm-up Time	30 minutes

Standards and Compliance

Safety Certifications	EN 61010-1
EMC/EMI Compliance	EN 61326-1
CE Mark	Yes
RoHS Compliance	Yes
Recommended Calibration Interval	1 year

Pulse Characteristics

Overshoot and Ringing	< 10% of amplitude ± 10 mV
Source Impedance Accuracy	±1% (typical)

Triggering

External Trigger Delay	55 ns (typical)
External Trigger Minimum Pulse Width	3 ns
External Trigger Threshold Resolution	10 mV
Trigger Output Impedance	50 Ω
Trigger Output Level (into 50 Ω)	1 V
Marker Output Impedance	50 Ω
Marker Output Level (into 50 Ω)	1 V

Clocking & Reference

External Reference Input Level	100 mV to 5 V RMS
External Reference Input Impedance	50 Ω (AC coupled)
Reference Output Impedance	50 Ω (AC coupled)
Reference Output Level	> 1 V p-p into 50 Ω

Software & Control

Command Language	SCPI-1993, IEEE-488.2
Included Software	KiPattern Pattern Design Software

TECHNOLOGY

High-Speed Pulse & Pattern Generation

APPLICATIONS

Semiconductor characterization, nanotechnology research, serial data pattern simulation, and high-speed digital circuit testing