

Data Pattern Generator

► DG2020A



► DG2000 Series.

The DG2020A pattern generator provides digital designers with the high performance tools needed to evaluate digital semiconductors and logic circuits. Whatever you call your design process – characterization, debug, validation or verification – as a digital designer you must have a state-of-the-art digital pattern generation as you push the edge of the technology envelope and race to market.

The DG2020A is an appropriate instrument for a wide variety of digital design applications. The table illustrates the principal specifications for the DG2020A.

Critical Timing

The DG2020A is the ideal solution for applications where you must characterize device or circuit timing and amplitude margins. The DG2020A graphical user interface allows you to quickly create complex data patterns with a few keystrokes on the front panel. Use the advanced sequence editing capability to insert infrequent faults or glitches in your data patterns to verify device or circuit recovery. The DG2020A is an invaluable tool, allowing you to simulate missing system functionality while meeting critical market windows.

► DG2020A

Data Rate	200 Mb/s
Pattern Depth	64 K/CH
Rise and Fall Time (20% to 80%)	2 ns at 5 V _{p-p}
Number of Channels	12, 24 or 36
Features	Bus wide testing

► Features & Benefits

Data Rate to 200 Mb/s

Data Pattern Depth 64 K/Channel
Speeds Characterization

Multiple Output Channels

Increase Flexibility

– DG2020A: 12, 24 or 36

Precise Control of Output
Parameters Include:

– Variable Output Delay

– Variable Output Level

– Tri-state Output Control

Transition Times 2 ns at 5 V_{p-p}

Flexible Sequence Control with
Jump, Event and Nested Loops

Large Display for Easy-to-Use
Data Editing

Import Pattern Data with DG-link
Software Utility

Integrate into ATE Systems via
GPIO/RS-232-C Interface

► Applications

Low Jitter for Clock Substitution

Characterize Device Timing

Simulate Missing Functions in
System or Subsystem Evaluation

Create Complex Data Patterns
with Sophisticated Sequence,
Looping, Jump on Event and
Tri-state Output Control

Characterize and Verify ASIC,
FPGA and DACs

Test Printer Engines or LCD
Display Drivers

Construct Logic Verification
Systems Utilizing Tektronix
Oscilloscopes or Logic Scopes

Use in Conjunction with
TLA Logic Analyzer to Provide
Digital Stimulus

Data Pattern Generator

► DGA2020A

► Characteristics

Output Data

Data Rate – 0.1 b/s to 200 Mb/s.

Sampling Rate – 0.1 Hz to 200 MHz.

Resolution – 4 digits.

Clock Output Period Jitter –

<50 ps_{p-p} at 200 MHz. Typical.

CH0 Period Jitter (Clock Pattern) –

<35 ps_{p-p} at 200 MHz. Typical.

Accuracy – PLL On, ±0.005%; PLL Off, ±3%.

Pattern Depth – 64 to 64 Kbits (1 increment).

Data Width –

Standard: 12-Bits.

Optional: 24- or 36-Bits.

Sequencer

Maximum Number of Blocks – 256.

Maximum Number of Sequence Steps – 2048.

Block Repeats Per Line – 1 to 65536 or infinite.

Auxiliary Inputs

Clock – Rear-panel SMB connector.

Frequency: DC to 200 MHz.

Impedance: 50 Ω, terminated to +0.5 V.

Delay to Clock Out: 36 ns (typical).

Trigger – Front-panel BNC connector.

Level: –5.0 V to +5.0 V.

Resolution: 0.1 V.

Threshold Accuracy: ±(5% of setting) ±0.1 V.

Minimum Pulse Width: 10 ns.

Sensitivity: >0.5 V_{p-p}.

Impedance: 1 kΩ or 50 Ω.

Maximum Input: ±10 V into 1 kΩ, ±5 V into 50 Ω.

Polarity: Positive or negative.

Hold Off: 500 ns minimum.

Auxiliary Outputs

SYNC – Front-panel BNC connector.

Level:

V_{OH}: 2.5 V into 50 Ω.

V_{OL}: 0 V into 50 Ω.

Pulse Width: 6 clocks.

Impedance: 50 Ω.

EVENT – Front-panel BNC connector.

Level: Positive TTL pulse, 50 Ω.

Output Term: DG2020A: 8 clocks.

Delay Time: 22 clocks before data output change.

Impedance: 50 Ω.

CLOCK – Rear-panel SMB connector.

Level: 1 V (typical) into 50 Ω.

Delay From Trigger Input:

PLL On:

>6.25 MHz: 15 to 40 ns.

<6.25 MHz: 25 to 60 ns.

PLL Off:

>6.25 MHz: 15 to 45 ns.

<6.25 MHz: 25 to 60 ns.

External: 7 ns + 1 clock to 20 ns + 0.5 clock.

Programmable Interface –

GPIO: ANSI/IEEE 488.2-1987.

RS-232-C: 19.2 Kb/s, D-sub 9-Pin connector.

P3420 Variable Data Output Pod Characteristics

Data Output

Channels – 12.

Connector – SMB.

VOH – –2.0 V to +7.0 V into 1 M Ω.

VOL – –3.0 V to +6.0 V into 1 M Ω.

Resolution – 0.1 V.

Maximum Swing – 9.0 V_{p-p}.

Minimum Swing – 0.5 V_{p-p}.

Output Current –

Total Output Current: <500 mA.

Sink: <–30 mA/CH.

Source: >+30 mA/CH.

Rise/Fall Time –

<2 ns into 1 M Ω, 10 pF, 5 V_{p-p} swing

(20% to 80%).

Internal Clock Out to Data Delay – 20 ns.

External Clock Input to Data Output Delay –

20 to 40 ns.

Trigger Input to Data Output Delay –

Internal Clock:

>6.25 MHz: 30 to 60 ns.

<6.25 MHz: 40 to 70 ns.

External Clock: 20 ns + 0.5 clock to 40 ns +

1.5 clock.

Delayed Channels

Delay Channel – CH 8, CH 9, CH 10, CH 11.

Delay Time – 0 to 20 ns.

Delay Resolution – 0.1 ns.

Channel Skew –

CH 0 and other channels, same pod: <3 ns.

CH 0 and CH 0, two pods of same type: <2 ns.

Event Input

Threshold Level – –5.0 V to +5.0 V.

Resolution – 0.1 V.

Delay to Data Output – 45 ns + 50 clock.

Set-up Time to Next Block – 47 to 54 clocks.

Inhibit Input

Threshold Level – –5.0 V to +5.0 V, 1 kΩ.

Resolution – 0.1 V.

Delay to Data Output – 16 ns.

Internal Inhibit Delay – –2 ns.

Physical Characteristics

Dimensions	mm	in.
Height ^{*1}	51	2
Width	255	10
Depth	161	6.3
Weight	kg	lb.
Net	1	2.2

*1 Including feet.

General Characteristics

Environmental

Temperature –

Operating: +10 °C to +40 °C.

Nonoperating: –20 °C to +60 °C.

Humidity –

Operating: 20% to 80% (no condensation).

Nonoperating: 5% to 90% (no condensation).

Altitude –

Operating: Up to 4.5 km (15,000 ft.).

Nonoperating: Up to 15 km (50,000 ft.).

Vibration –

Operating: 0.33 mm_{p-p}, 10 to 55 Hz, 15 minutes.

Shock –

Nonoperating: 294 m/s² (30 g), half-sine,

11 ms duration.

Certification and Compliance

EC Declaration of Conformity –

Meets intent of Directive 89/336/EEC for electromagnetic compatibility.

Safety –

UL1244, CSA231, EN61010-1, IEC61010-1.

Power

AC Line Power –

Voltage Ranges: 90 to 250 VAC.

Nominal Voltage: 100 V, 115 V, 200 V, 230 V, 240 V.

Line Frequency:

90 to 250 VAC: 48 to 63 Hz.

90 to 127 VAC: 48 to 440 Hz.

Power Consumption – 300 W maximum.

Maximum Current – 4 A.

Physical Characteristics

DG2000 Series Main Frame

Dimensions	mm	in.
Height ^{*1}	164	6.4
Width ^{*2}	362	14.3
Depth ^{*3}	491	8.25
Weight	kg	lb.
Net	9.7	21.4

*1 Including feet.

*2 Including handle.

*3 Including front cover. 576 mm (22.2 in.) with handle extended.

Characteristics shown are typical. Please refer to individual product user manuals for complete specifications.

► Ordering Information

DG2020A

Data Generator.

Includes: User Manual (071-0053-50), Programmer Manual (071-0054-50), 3.5 in. Performance Check Disk (063-2918-50), GPIB Sample Program (063-2919-50), DG-Link Application Software (063-2920-50), Pod Connection Cable (174-3548-00), Power Cord, ISO-qualified Inspection Passed Certificate. Order P3420 Pod separately.

Please specify power plug when ordering.

Options

Opt. 01 – Adds a 12-Bit digital port for a total of 24 output channels. Includes pod connection cables (174-3548-00). Order P3420 pod separately.

Opt. 02 – Adds two 12-Bit digital ports for a total of 36 output channels. Includes two pod connection cables (174-3548-00). Order P3420 pod separately.

Opt. 1R – Rack mount. Floppy drive moved to front panel.

Recommended Accessories

P3420

Variable-level Pod with 12 Output Channels.

Includes: SMB-to-Pin Header Output Cable Set (012-1504-00) for 12 output channels, ISO Qualified Inspection Passed Certificate.

DG2020A

Power Plug Options

Opt. A0 – US Plug, 115 V, 60 Hz.

Opt. A1 – Euro Plug, 220V, 50 Hz.

Opt. A2 – UK Plug, 240V, 50 Hz.

Opt. A3 – Australian Plug, 240V, 50 Hz.

Opt. A4 – N. American Plug, 240V, 50 Hz.

Opt. A5 – Swiss Plug, 220V, 50 Hz.

Service

Opt. C3 – Calibration Service 3 Years.

Opt. D1 – Calibration Data Report.

Opt. D3 – Calibration Data Report 3 Years (with Opt. C3).

Opt. R3 – Repair Service 3 Years.

P3420 POD

Service

Opt. D1 – Calibration Data Report.

Opt. R3 – Repair Service 3 Years.

Recommended Accessories

P3420 POD

Cables, Adapters and Connectors

SMB-to-Pin Header Cable (20 in.) – 012-1503-00.

SMB-to-Pin Header Cable (50 in.) – 012-1506-00.

Pin Header-to-Pin Header Cable – 012-1505-00.

SMB-to-SMB Cable (40 in.) – 012-1458-00.

50 Ω BNC-to-BNC Cable (Single shield) – 012-1342-00.

50 Ω BNC-to-BNC Cable (Double shield) – 012-1256-00.

50 Ω BNC-to-SMB Cable (40 in.) – 012-1459-00.

50 Ω BNC Male-to-SMB Female Adapter – 015-0671-00.

One-channel Pin Lead Set (Set of 5) – 012-1508-00.

Four-channel Pin Lead set (Set of 3) – 012-1509-00.

Connector (for Pin-header) – 131-5919-00.

GPIB Cable – 012-0991-00.

Replacement 1.2 m POD Connection Cable (standard accessory) – 174-3548-00.

50 Ω SMA Male to SMA Male; 12 in. – 174-1364-00.

50 Ω SMA Male to SMA Male; 20 in. – 174-1427-00.

50 Ω SMA Male to SMA Male; 60 in. – 174-1428-00.

50 Ω SMA Male to SMA Male; 2 m – 174-0679-00.

50 Ω SMA Male to SMA Male; 8.5 in. – 174-1120-00.

50 Ω SMA Male to SMA Male; 1 m – 174-1341-00.

Documentation

DG2020A Service Manual – 071-0055-50.

DG2020A Twelve-channel Upgrade Kit (provides same function as DG2020A Opt. 01) – 040-1556-50.

Warranty – One year parts and labor.

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Our most up-to-date product information is available at:

www.tektronix.com

Product(s) complies with
IEEE Standard 488.1-1987,
RS-232-C, and with

Tektronix Standard Codes and Formats.

Product Area Assessed: The planning, design/development and manufacture
of electronic Test and Measurement instruments.



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