



RIGOL

DG800 Pro Series

Function/Arbitrary Waveform Generator

Data Sheet

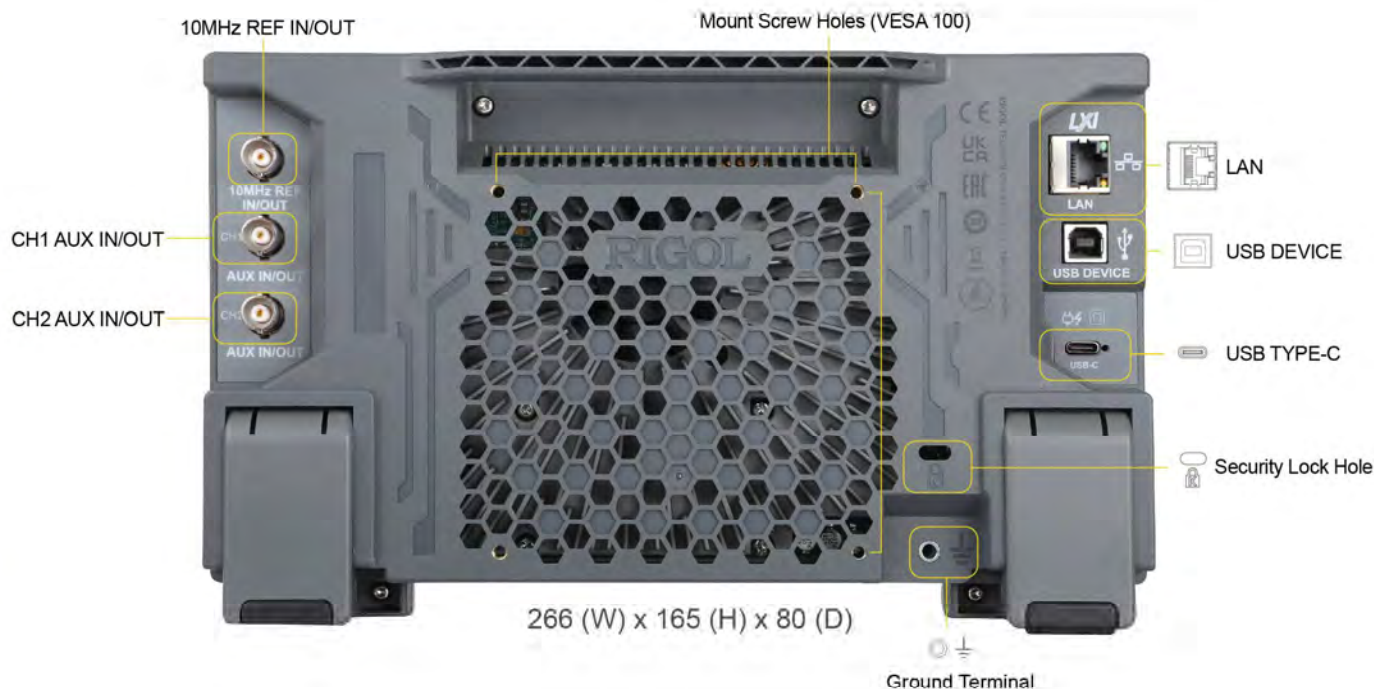
DSB14102-1110

Mar. 2024

DG800 Pro Series

Function/Arbitrary Waveform Generator

Delicate Design, Full Functionality





Application Scenarios

With a compact size, this series is highly portable for use in various working environments, either on your workbench, in the classroom, or in the field.

The rear-panel mount screw holes (VESA 100×100) allow you to fix the instrument to a compatible bracket, saving valuable space on your bench.

It can be powered by the mobile power source via its Type-C power interface, satisfying your testing requirements in the field.



Product Features

● High Cost Performance

It provides 16-bit vertical resolution, up to 625 MSa/s sample rate and 50 MHz output frequency. The rise time is as low as 3 ns. It is a cost-effective choice among entry-level signal generators.

● Frequency Counter

It provides a standard 7-digit counter with a max. frequency of 500 MHz. Equipped with an independent input connector for counter measurements, it provides a more simplified and accurate way to measure frequencies.

● Various Modulation Types

It supports various analog and digital modulation types including AM, FM, PM, ASK, FSK, PSK, and PWM. Both internal and external modulation sources are available for different test scenarios.

● Multiple Built-in Waveforms

It has multiple built-in waveforms, covering the frequently used signals in engineering, medical electronics, mathematics, and other fields.

● Standard Sequence Mode

It supports a sequence that is a combination of multiple waveforms (1 to 64). The total length is up to 2 Mpts/CH (8 Mpts/CH optional).

● Multiple Connectivity Options

It provides various interfaces including USB Host, USB Device, and LAN (LXI Core 2011 Device). Besides, it allows you to control the instrument remotely via Web Control.



Applications



Electronic Experiment



System Integration



Field Test



Floating Ground Test

Product Features

Product Features

- Max. sample rate: 625 MSa/s
- Max. output frequency: 50 MHz
- 16-bit vertical resolution
- Arbitrary waveform editing function with a max. Arb waveform length of 2 Mpts/CH (8 Mpts/CH optional)
- Built-in high-order harmonic generator (max. 20th order)
- Independent signal frequency measurement channel with a max. frequency of 500 MHz
- USB and LAN interfaces for remote connection
- Type-C power interface for powering the instrument with mobile power source, satisfying testing requirements in the field
- Standard Web Control function for easier remote cooperation

DG800 Pro series Function/Arbitrary Waveform Generator provides up to 625 MSa/s sample rate and 2 Mpts/CH memory depth (standard). It is a cost-effective function/arbitrary waveform generator that combines multiple functions including Function Generator, Arbitrary Waveform Generator, Noise Generator, Pulse Generator, Harmonic Generator, Analog/Digital Modulator and Counter.

Specifications

Specifications are valid under the following conditions:

The instrument is within the calibration period and has been running ceaselessly for over 20 minutes under the specified operating temperature ($23^{\circ}\text{C} \pm 5^{\circ}\text{C}$).

All specifications are guaranteed except the parameters marked with "Typical".

Technical Specifications

| Technical Specifications | | | |
|--------------------------|--|-----------|-----------|
| Model | DG821 Pro | DG822 Pro | DG852 Pro |
| Max. Frequency | 25 MHz | 25 MHz | 50 MHz |
| No. of Channels | 1 | 2 | 2 |
| Sample Rate | 625 MSa/s | | |
| Vertical Resolution | 16 bits | | |
| Waveform Memory Depth | 2 Mpts/CH (standard), 8 Mpts/CH (optional) | | |

Waveform Output

| Waveform Output | |
|-----------------------|--|
| Output Mode | Continuous, Modulation, Sweep, Burst, Sequence |
| Standard Waveform | Sine, Square, Ramp, Pulse, Noise, Arb, Harmonic |
| Built-in Arb Waveform | 148 types of waveforms, including Sinc, Exponential Rise, Exponential Fall, ECG, Gaussian, HaverSine, and Lorentz. |

Frequency Characteristics

| Frequency Characteristics | | | |
|---------------------------|----------------------------|----------------------------|----------------------------|
| | DG821 Pro | DG822 Pro | DG852 Pro |
| Sine | 1 μHz to 25 MHz | 1 μHz to 25 MHz | 1 μHz to 50 MHz |
| Square | 1 μHz to 20 MHz | 1 μHz to 20 MHz | 1 μHz to 40 MHz |
| Ramp | 1 μHz to 1 MHz | | |
| Pulse | 1 μHz to 10 MHz | 1 μHz to 10 MHz | 1 μHz to 25 MHz |

| Frequency Characteristics | | | |
|-----------------------------|--|----------------------|----------------------|
| | DG821 Pro | DG822 Pro | DG852 Pro |
| Arb | 1 μ Hz to 10 MHz | 1 μ Hz to 10 MHz | 1 μ Hz to 15 MHz |
| Harmonic | 1 mHz to 10 MHz | 1 mHz to 10 MHz | 1 mHz to 25 MHz |
| Sequence | 1 μ Sa/s to 312.5 MSa/s | | |
| Noise (-3 dB) | Typical (0 dBm), >250 MHz bandwidth | | |
| Output Frequency Resolution | 1 μ Hz or 12 digits | | |
| Accuracy | $\pm 10^{-6}$ of the setting (except Arb and sequence), 0°C to 40°C $\pm 10^{-6}$ of the setting ± 1 μ Hz (Arb and sequence), 0°C to 40°C | | |

Output Characteristics

| Output Characteristics | |
|-------------------------------------|---|
| Amplitude Range (into 50 Ω) | 1 mVpp to 10 Vpp |
| Amplitude Range (into HighZ) | 2 mVpp to 20 Vpp |
| Amplitude Accuracy ^[1] | $\pm(1\% \text{ of setting} + 2 \text{ mVpp})$ (into 50 Ω) $\pm(1\% \text{ of setting} + 5 \text{ mVpp})$ (into HighZ) |
| Amplitude Resolution | 0.1 mVpp, 0.1 mVrms, 1 mV, 0.1 dBm or 4 digits (whichever is lower) |
| Amplitude Unit ^[2] | Vpp, Vrms, dBm, V |
| Offset Range | $\pm 5 \text{ Vpk}$ (ac + dc) (into 50 Ω) $\pm 10 \text{ Vpk}$ (ac + dc) (into HighZ) |
| Offset Accuracy | $\pm(1\% \text{ of } \text{setting} + 2 \text{ mV} + 0.5\% \text{ of amplitude (Vpp)})$ (into 50 Ω) $\pm(1\% \text{ of } \text{setting} + 5 \text{ mV} + 1\% \text{ of amplitude (Vpp)})$ (into HighZ) |
| Offset Resolution | 1 mV or 4 digits |
| Output Impedance | Typical (0 dBm, 0 Vdc), 50 $\Omega \pm 1\%$ |
| Protection | Waveform outputs are automatically disabled when overloaded |

Signal Characteristics

| Signal Characteristics | | |
|------------------------|---------------------------------|---|
| Sine (50 Ω) | Harmonic Distortion | Typical (0 dBm) 10 Hz to <10 MHz: <-55 dBc ≥ 10 MHz: <-50 dBc |
| | Total Harmonic Distortion (THD) | Typical (1 Vpp) 10 Hz to 20 kHz: <0.1% |
| | Spurious (non-harmonic) | Typical (1 Vpp) 10 Hz to <10 MHz: <-65 dBc ≥ 10 MHz: <-60 dBc |
| | Phase Noise | Typical (1 Vpp, 10 kHz) 20 MHz: <-110 dBc/Hz |
| | Residual Clock Noise | Typical (0 dBm), -60 dBm |
| | Interchannel Crosstalk | Typical (1 Vpp, 0 V) <-75 dBc |
| | Amplitude Flatness | Typical (relative to 1 kHz Sine, 0 dBm) <10 MHz: ± 0.1 dB ≥ 10 MHz: ± 0.2 dB |
| | Phase | -360° to +360°, 0.01° resolution |
| Square | Rise/Fall Time | Typical (≤ 2 Vpp amplitude, 50 Ω load), ≤ 3 ns |
| | Overshoot | Typical (0 dBm amplitude, >1 kHz frequency), <5% |
| | Jitter (rms) | Typical (0 dBm amplitude, >1 kHz frequency), 200 ps |
| | Phase | -360° to +360°, 0.01° resolution |
| Ramp | Linearity | Typical (1 kHz frequency, 1 Vpp amplitude, 100% symmetry) $\leq 0.1\%$ of peak output (10% to 90% amplitude) |
| | Symmetry | 0% to 100% |
| | Phase | -360° to +360°, 0.01° resolution |

| Signal Characteristics | | |
|------------------------|------------------------|---|
| Pulse | Pulse Width | 9 ns to (pulse period - 9 ns) |
| | Pulse Width Resolution | 100 ps or 5 digits |
| | Duty Cycle | 0.01% to 99.99% |
| | Rise/Fall Time | 3 ns to 0.625*pulse period |
| | Delay Time | 0 ps to period – [pulse width + 0.8*(Leading Edge Time + Trailing Edge Time)] (Continuous mode) |
| | Overshoot | Typical (0 dBm amplitude, >1 kHz frequency), <5% |
| | Jitter (rms) | Typical (0 dBm amplitude, >1 kHz frequency), 200 ps |
| | Phase | -360° to +360°, 0.01° resolution |
| Noise | Type | White noise |
| Arb | Rise/Fall Time | Typical (<1 Vpp amplitude), ≤5 ns |
| | Jitter (rms) | Typical (0 dBm amplitude, >1 kHz frequency), 200 ps |
| | Phase | -360° to +360°, 0.01° resolution |
| Harmonic Output | Harmonic Order | ≤20 |
| | Harmonic Type | Order, Combine |
| | Harmonic Amplitude | The amplitude of each order of the harmonic can be set. |
| | Harmonic Phase | The phase of each order of the harmonic can be set. |

Modulation Characteristics

| Modulation Characteristics | |
|----------------------------|-------------------------------------|
| Modulation Type | AM, FM, PM, ASK, FSK, PSK, PWM, SUM |

Modulation Characteristics

| | | |
|-------------|-------------------------------|--|
| AM | Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| | Modulation Source | Internal/External |
| | Internal Modulating Waveform | Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb |
| | Modulation Depth | 0% to 120% |
| | Internal Modulation Frequency | 1 mHz to 1 MHz |
| FM | Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| | Modulation Source | Internal/External |
| | Internal Modulating Waveform | Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb |
| | Internal Modulation Frequency | 1 mHz to 1 MHz |
| PM | Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| | Internal Modulation Source | Internal/External |
| | Internal Modulating Waveform | Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb |
| | Internal Modulation Frequency | 1 mHz to 1 MHz |
| | Phase Deviation | 0° to 360°, 0.01° resolution |
| ASK/FSK/PSK | Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| | Modulation Source | Internal/External |
| | Internal Keying Frequency | 1 mHz to 1 MHz |
| | No. of Levels | 2 |

| Modulation Characteristics | | |
|----------------------------|-------------------------------|--|
| PWM | Carrier Waveform | Pulse |
| | Modulation Source | Internal/External |
| | Internal Modulating Waveform | Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb |
| | Internal Modulation Frequency | 1 mHz to 1 MHz |
| | Width Deviation | 0% to 49.99% of the pulse period |
| SUM | Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| | Sum Source | Sine, Square, Ramp, Noise, Arb, channel waveform |
| | Sum Ratio | 0% to 100% of the amplitude setting (Vpp) |

Burst Characteristics

| Burst Characteristics | |
|-----------------------|---|
| Carrier Waveform | Sine, Square, Ramp, Noise, Arb (except DC) |
| Burst Count | 1 to 1,000,000/Infinite |
| Internal Burst Period | 4 μ s to 8000 s |
| Burst Phase | -360° to +360°, 0.01° resolution |
| Trigger Delay | 0 ns to 20 s |
| Gate Source | External trigger |
| Trigger Source | Internal, External leading edge, external trailing edge, Manual |

Sweep Characteristics

| Sweep Characteristics | |
|-----------------------|-------------------------------------|
| Type | Linear, Log, Step |
| Carrier Waveform | Sine, Square, Ramp, Arb (except DC) |
| Sweep Time | 1 ms to 250,000 s |

Sweep Characteristics

| | |
|----------------------|--|
| Start/Stop Frequency | Consistent with the upper/lower limit of the corresponding carrier frequency |
| Hold/Return Time | 0 s to 3600 s |
| Orientation | Up/Down |
| Trigger Source | Internal, External leading edge, external trailing edge, Manual |
| Mark | Falling edge of the sync signal (programmable) |

Sequence Characteristics

Sequence Characteristics

| | |
|-------------------------|--|
| Sample Rate | 1 μ Sa/s to 312.5 MSa/s |
| Sample Rate Accuracy | 10^{-6} Sa/s |
| Sample Rate Resolution | 1 μ Sa/s or 12 digits |
| Sequence Length | 32 pts/CH to 2 Mpts/CH (8Mpts/CH optional) |
| No. of Waveform Entries | 64 |
| Loop | 0 to 256 |
| Filter Mode | Normal, Step, Interpolation |

Frequency Counter

Frequency Counter

| | |
|----------------------|---|
| Measurement Function | Frequency, period, positive pulse width, negative pulse width, duty cycle |
| Input Impedance | $50\ \Omega \pm 2\%$, $1\ \text{M}\Omega \pm 5\%$ |
| Counter Accuracy | 0 to 250 MHz: 7 digits 250 MHz to 500 MHz: 6 digits |
| Trigger Level | 0 V |

| Frequency Counter | | |
|----------------------------|-------------------|--|
| Input Coupling Mode | 50 Ω Load | DC coupling |
| | 1 M Ω Load | AC/DC coupling |
| Input Amplitude | 50 Ω Load | 100 mVpp to 2 Vpp |
| | 1 M Ω Load | 500 mVpp to 5 Vpp (Vac + dc) |
| Input Disruptive Level | 50 Ω Load | 4 Vpp |
| | 1 M Ω Load | 5 Vpp |
| Input Frequency Range Mode | 50 Ω Load | 0 to 250 MHz 250 MHz to 500 MHz |
| | 1 M Ω Load | 0 to 250 MHz |
| Effective Signal Frequency | 50 Ω Load | DC to 500 MHz |
| | 1 M Ω Load | DC to 250 MHz (DC coupling) |
| HF Reject | | 60 kHz/None (available only for 1 M Ω load) |
| Connector | | BNC, on the rear panel |

AUX IN/OUT Characteristics

| AUX IN/OUT Characteristics | | |
|----------------------------|-----------------|--------------------------------------|
| External Modulation Input | Input Range | ASK, FSK, PSK: 3.3 V logic level |
| | | AM, FM, PM, PWM: $\pm 5V$ full range |
| | Frequency Range | DC to 100 kHz (1 MSa/s) |
| | Input Impedance | 10 k Ω \pm 10% |

AUX IN/OUT Characteristics

| | | |
|--|-----------------------------|--|
| External Trigger/ Gated Burst Input | Level | TTL-compatible |
| | Impedance | 10 k Ω \pm 10% |
| | Edge | Positive/negative(selectable) |
| | Min. Pulse Width | 100 ns |
| | Trigger Delay Range | 0 ns to 20 s |
| | Trigger Delay Resolution | 100 ps or 5 digits |
| | Jitter (rms) | Typical (trigger input to signal output, Burst mode), 1.5 ns |
| Trigger Output | Level | TTL-compatible |
| | Output Impedance | 50 Ω \pm 5% |
| | Jitter (rms) | Typical (Continuous mode), 1.5 ns |
| Sync Output | Level | TTL-compatible |
| | Impedance | 50 Ω \pm 5% |

10 MHz Reference In/Out Characteristics

10 MHz In/Out Characteristics

| | | |
|------------------------------|---------------------------|-------------------------------------|
| External Reference Input | Impedance | 1 k Ω |
| | Input Coupling | AC coupling |
| | Required Input Voltage | 100 mVpp to 5 Vpp |
| | Lock Range | 10 MHz \pm 100 Hz |
| Internal Reference Output | Impedance | 50 Ω |
| | Output Coupling | AC coupling |
| | Level | Typical (50 Ω Load), 1.2 Vpp |

Protection

Protection

| | |
|------------------------|--|
| Overvoltage Protection | Occurred when: |
| | The instrument amplitude setting is greater than 4 Vpp or the output AC + DC is greater than $ 2 \text{ Vdc} $ and the input voltage is greater than $\pm 12 \times (1 \pm 5\%)V$ (<10 kHz). Disruptive voltage: $\pm 18(V_{ac} + dc)$ |
| | The instrument amplitude setting is less than or equal to 4 Vpp or the output AC + DC is less than $ 2 \text{ Vdc} $ and the input voltage is greater than $\pm 2.5 \times (1 \pm 5\%)V$ (<10 kHz). Disruptive voltage: $\pm 3.5(V_{ac} + dc)$ |

NOTE:

[1]: 1 kHz Sine, amplitude > 1 mVpp, 0 V offset, unit: Vpp

[2]: dBm is available only when the load impedance is not set to HighZ; Vrms is not available for Arb; Vpp and V (high level and low level) are available for all waveform types.

General Specifications

Characteristics

| Characteristics | |
|------------------------------|--|
| Display | 7-inch touch screen, 1024 x 600 resolution |
| Stabilization Time | At least 20-minute warm-up |
| Internal Non-volatile Memory | 32 GB |

Power Supply

| Power Supply | |
|-----------------|----------------------|
| Power Interface | USB Type-C Interface |
| Input Voltage | USB PD 15 V, 3 A |
| Consumption | 45 W (max.) |

Interface

| Interface | |
|-------------|--|
| LAN | 1 at rear panel, 10/100 BASE-T port, supporting LXI-C |
| Web Control | Support Web Control (input the IP address of the instrument into the Web browser to display the operation interface) |
| USB Host | 1 at front panel |
| USB Device | 1 at rear panel, supporting TMC |

Mechanical Characteristics

| Mechanical Characteristics | |
|----------------------------|-------------------------------------|
| Dimension | 266 mm (W) x 165 mm (H) x 80 mm (D) |
| Weight | Package excluded: <1.78 kg |
| | Package included: <2.78 kg |

Environment

| Environment | | |
|-------------------|---------------|---|
| Temperature Range | Operating | 0°C to +40°C |
| | Non-operating | -20°C to +60°C |
| Humidity Range | Operating | 0°C to +40°C, ≤80% RH (without condensation) |
| | Non-operating | -20°C to 40°C, ≤90% RH (without condensation) |
| | | below 60°C, ≤80% RH (without condensation) |
| Altitude | Operating | Below 3,000 m |
| | Non-operating | Below 12,000 m |

Regulation Standards

| Regulation Standards | | |
|-------------------------------|---|--|
| Electromagnetic Compatibility | Compliant with EMC Directive (2014/30/EU), compliant with or higher than the standards specified in EN 61326-1: 2013, EN 61326-2-1:2013, EN IEC 61000-3-2:2019+A1, EN 61000-3-3:2013+A1:2019 | |
| | CISPR 11:2009+A1 Class A | |
| | EN IEC 61000-3-2:2019+A1 | Harmonics, Class A |
| | EN 61000-3-3:2013+A1:2019 | Voltage flicker |
| | EN 61000-4-2:2009 | ±4.0 kV (contact discharge), ±8.0 kV (air discharge) |
| | EN 61000-4-3:2006+A1+A2 | 10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 6 GHz) |
| | EN 61000-4-4:2004+A1 | 2 kV power cord |
| | EN 61000-4-5:2006 | 1 kV (phase-to-neutral voltage); 2 kV (phase-to-earth voltage); 2 kV (neutral-to-earth voltage) |
| | EN 61000-4-6:2009 | 10 V, 0.15 MHz to 80 MHz |
| | EN 61000-4-11:2004 | Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle; 70% UT during 25 cycles Short interruption: 0% UT during 250 cycles |
| | | |
| | | |
| | | |
| Safety | EN 61010-1:2010+A1:2019 IEC 61010-1:2010+A1:2016 UL 61010-1: 2012 R7.19 CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1 | |
| Vibration | Meets GB/T 6587; class 2 random Meets MIL-PRF-28800F and IEC60068-2-6; class 3 random | |
| Shock | Meets GB/T 6587-2012; class 2 random Meets MIL-PRF-28800F and IEC 60068-2-27; class 3 random (in non-operating conditions: 30 g, half sine, 11 ms duration, 3 shocks along the main axis, a total of 18 vibrations) | |

Warranty and Calibration Interval

Warranty and Calibration Interval

| | |
|----------|-------------------------------------|
| Warranty | 3 years (excluding the accessories) |
|----------|-------------------------------------|

| | |
|-------------------------------------|-----------|
| Recommended Calibration Interval | 12 months |
|-------------------------------------|-----------|

Order Information and Warranty Period

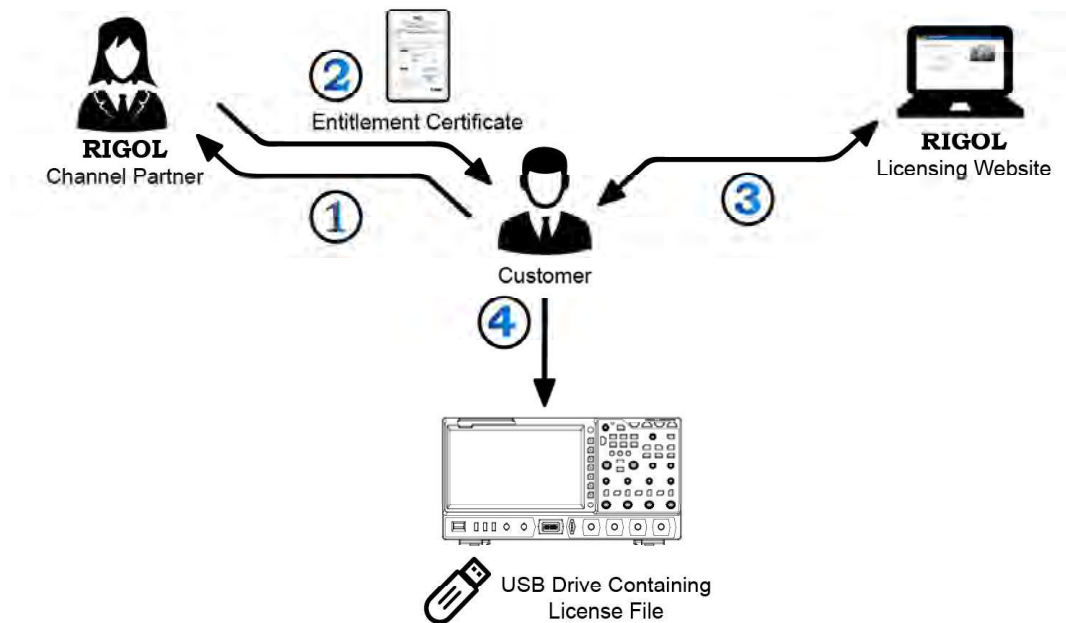
Order Information

| Order Information | Order No. |
|---|-------------------|
| Model | |
| 25 MHz Bandwidth, 625 MSa/s Sample Rate, Single-channel | DG821 Pro |
| 25 MHz Bandwidth, 625 MSa/s Sample Rate, Dual-channel | DG822 Pro |
| 50 MHz Bandwidth, 625 MSa/s Sample Rate, Dual-channel | DG852 Pro |
| Standard Accessories | |
| Power Adaptor Conforming to the Standard of the Destination Country | — — |
| USB Cable | — — |
| One BNC Cable | CB-BNC-BNC-MM-100 |
| Upgrade Options | |
| 8 Mpts/CH Memory Depth Upgrade Option | DG800Pro-3RL |
| Two-channel Upgrade Option (for DG821 Pro only) | DG800Pro-DCH |
| Optional Accessories | |
| 40 dB Attenuator (50 Ω , 1 W) | RA5040K |

Warranty Period

Three years for the mainframe, excluding the accessories.

Option Ordering and Installation Process



1. According to the usage requirements, please purchase the specified function options from **RIGOL Sales Personnel**, and provide the serial number of the instrument that needs to install the option.
2. After receiving the option order, the **RIGOL** factory will mail the paper software product entitlement certificate to the address provided in the order.
3. Log in to **RIGOL** official website for registration. Use the software key and instruments serial number provided in the entitlement certificate to obtain the option license code and the option license file.
4. Download the option license file to the root directory of the USB storage device, and connect the USB storage device to the instrument properly. After the USB storage device is successfully recognized, the **Option install** menu is activated. Press this menu key to start installing the option.

HEADQUARTER

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