

# DS 6000 Specifications

All the specifications are guaranteed except the parameters marked with "Typical" and the oscilloscope needs to operate for more than 30 minutes under the specified operation temperature.

## Sample

|                        |                                                                                                                                                                          |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample Mode            | Real-time Sample, Equivalent Sample                                                                                                                                      |
| Real Time Sample Rate  | 5 GSa/s (single-channel)<br>2.5 Gsa/s (dual-channel)                                                                                                                     |
| Equivalent Sample Rate | 100 Gsa/s                                                                                                                                                                |
| Peak Detect            | 200 ps (single-channel)<br>400 ps (dual-channel)                                                                                                                         |
| Averaging              | After all the channels finish N samples at the same time, N can be 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096 or 8192.                                         |
| High Resolution        | 12 bits of resolution when $\geq 5 \mu\text{s}/\text{div}$ @ 5 GSa/s (or $\geq 10 \mu\text{s}/\text{div}$ @ 2.5 GSa/s).                                                  |
| Memory Depth           | single-channel: Auto, 14k pts, 140k pts, 1.4M pts, 14M pts and 140M pts are available<br>dual-channel: Auto, 7k pts, 70k pts, 700k pts, 7M pts and 70M pts are available |

## Input

|                    |                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------|
| Number of Channels | DS6XX4: four channels<br>DS6XX2: two channels                                                        |
| Input Coupling     | DC, AC or GND                                                                                        |
| Input Impedance    | $(1 \text{ M}\Omega \pm 1\%) \parallel (14 \text{ pF} \pm 3 \text{ pF})$<br>or $50 \Omega \pm 1.5\%$ |

|                                      |                                                                                                                                                                                                                                                                                               |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Probe Attenuation Coefficient        | 0.001X, 0.01X, 0.1X, 1X, 10X, 100X, 1000X                                                                                                                                                                                                                                                     |
| Maximum Input Voltage (1M $\Omega$ ) | Maximum Input Voltage of the Analog Channel<br>CAT I 300 Vrms, CAT II 100 Vrms,<br>Transient Overvoltage 1000V pk<br>with RP2200 10:1 probe: CAT II 300 Vrms<br>with RP3300 10:1 probe: CAT II 300 Vrms<br>with RP3500 10:1 probe: CAT II 300 Vrms<br>with RP5600 10:1 probe: CAT II 300 Vrms |

## Horizontal

|                                    |                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| Timebase Scale                     | DS606X: 1 ns/div to 50 s/div<br>DS610X: 500 ps/div to 50 s/div                                      |
| Timebase Accuracy                  | $\leq \pm(15 + 2 \times \text{instrument age in years})$ ppm                                        |
| Delay Range                        | Pre-trigger (negative delay): $\geq 1$ screen width<br>Post-trigger (positive delay): 1 s to 1000 s |
| Timebase Mode                      | Y-T, X-Y, Roll, Time Delayed                                                                        |
| Number of XYs                      | 2 simultaneously                                                                                    |
| Waveform Capture Rate <sup>1</sup> | 150,000 wfms (vector display); 180,000 wfms (dots display)                                          |

## Vertical

|                       |                                                                                                                                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bandwidth (-3dB)      | DS606X: DC to 600 MHz<br>DS610X: DC to 1 GHz                                                                                                               |
| Single-shot Bandwidth | DS606X: DC to 600 MHz<br>DS610X: DC to 1 GHz (each channel)                                                                                                |
| Vertical Resolution   | 8bits, two channels sample at the same time                                                                                                                |
| Vertical Scale        | 2 mV/div to 5 V/div (1 M $\Omega$ )<br>2 mV/div to 1 V/div (50 $\Omega$ )                                                                                  |
| Offset Range          | 2 mV/div to 120 mV/div: $\pm 1.2$ V (50 $\Omega$ )<br>125 mV/div to 1 V/div: $\pm 12$ V (50 $\Omega$ )<br>2 mV/div to 225 mV/div: $\pm 2$ V (1M $\Omega$ ) |

|                                              |                                                                                                                                           |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | 230 mV/div to 5 V/div: $\pm 40V (1M\Omega)$                                                                                               |
| Bandwidth Limit <sup>2</sup>                 | 20 MHz or 250 MHz                                                                                                                         |
| Low Frequency Response<br>(AC Coupling -3dB) | $\leq 5$ Hz (on BNC)                                                                                                                      |
| Calculated Rise Time <sup>2</sup>            | DS606X: 600 ps<br>DS610X: 400 ps                                                                                                          |
| DC Gain Accuracy                             | $\pm 2\%$ full scale                                                                                                                      |
| DC Offset Accuracy                           | 200 mV/div to 5 V/div: 0.1 div $\pm 2$ mV $\pm 0.5\%$ offset value<br>2 mV/div to 195 mV/div: 0.1 div $\pm 2$ mV $\pm 1.5\%$ offset value |
| ESD Tolerance                                | $\pm 2$ kV                                                                                                                                |
| Channel to Channel Isolation                 | DC to maximum band width: $>40$ dB                                                                                                        |

## Trigger

|                                       |                      |                                |
|---------------------------------------|----------------------|--------------------------------|
| Trigger Level Range                   | Internal             | $\pm 6$ div from center screen |
|                                       | EXT                  | $\pm 0.8$ V                    |
| Trigger Mode                          | Auto, Normal, Single |                                |
| Holdoff Range                         | 100 ns to 10 s       |                                |
| High Frequency Rejection <sup>2</sup> | 50 kHz               |                                |
| Low Frequency Rejection <sup>2</sup>  | 5 kHz                |                                |

### Edge Trigger

|           |                                 |
|-----------|---------------------------------|
| Edge Type | Rising, Falling, Rising&Falling |
|-----------|---------------------------------|

### Pulse Trigger

|                   |                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pulse Condition   | Positive Pulse Width (greater than, lower than, within specific interval)<br>Negative Pulse Width (greater than, lower than, within specific interval) |
| Pulse Width Range | 4 ns to 4 s                                                                                                                                            |

### Slope Trigger

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| Slope Condition | Positive Slope (greater than, lower than, within specific interval) |
|-----------------|---------------------------------------------------------------------|

|                                            |                                                                                                                                                |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            | Negative Slope (greater than, lower than, within specific interval)                                                                            |
| Time Setting                               | 10 ns to 1 s                                                                                                                                   |
| <b>Video Trigger</b>                       |                                                                                                                                                |
| Signal Standard<br>Line Frequency<br>Range | Support standard NTSC, PAL and SECAM broadcasting standards, the range of the number of lines is from 1 to 525 (NTSC) and 1 to 625 (PAL/SECAM) |
| <b>Pattern Trigger</b>                     |                                                                                                                                                |
| Pattern Setting                            | H, L, X, Rising Edge, Falling Edge                                                                                                             |
| <b>RS232/UART Trigger</b>                  |                                                                                                                                                |
| Trigger Condition                          | Start, Error, Check Error, Data                                                                                                                |
| Baud Rate                                  | 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps, User                                                                       |
| Data Bits                                  | 5 bit, 6 bit, 7 bit, 8 bit                                                                                                                     |
| <b>I2C Trigger</b>                         |                                                                                                                                                |
| Trigger Condition                          | Start, Restart, Stop, Missing ACK, Address, Data, A&D                                                                                          |
| Address Bits                               | 7 bit, 10 bit                                                                                                                                  |
| Address Range                              | 0 to 119, 0 to 1023                                                                                                                            |
| Byte Length                                | 1 to 5                                                                                                                                         |
| Data Qualifier                             | Equal to, Greater than, Less than                                                                                                              |
| <b>SPI Trigger</b>                         |                                                                                                                                                |
| Trigger Condition                          | CS, Timeout                                                                                                                                    |
| Timeout Value                              | 100 ns to 1 s                                                                                                                                  |
| Data Bits                                  | 4 bit to 32 bit                                                                                                                                |
| Data Line Setting                          | H, L, X                                                                                                                                        |
| Clock Edge                                 | Rising Edge, Falling Edge                                                                                                                      |
| Signal Type                                | Rx, Tx, CAN_H, CAN_L, Differential                                                                                                             |
| <b>CAN Trigger</b>                         |                                                                                                                                                |
| Trigger Condition                          | SOF, EOF, Frame Type                                                                                                                           |
| Baud Rate                                  | 10kbps, 20kbps, 33.3kbps, 50kbps, 62.5kbps, 83.3kbps, 100kbps, 125kbps, 250kbps, 500kbps, 800kbps, 1Mbps, User                                 |
| Sample Point                               | 5% to 95%                                                                                                                                      |
| Frame Type                                 | Data, Remote, Error, OverLoad                                                                                                                  |
| <b>USB Trigger</b>                         |                                                                                                                                                |
| Signal Speed                               | Low Speed, Full Speed                                                                                                                          |

|                   |                                         |
|-------------------|-----------------------------------------|
| Trigger condition | SOP, EOP, RC, Suspended, Exit Suspended |
|-------------------|-----------------------------------------|

## Measure

|                        |                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                     |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Cursor                 | Manual Mode                                                                                                                                                                                                                                                                                                                                                                                  | Voltage Deviation between Cursors ( $\Delta V$ )<br>Time Deviation between Cursors ( $\Delta T$ )<br>Reciprocal of $\Delta T$ (Hz) ( $1/\Delta T$ ) |
|                        | Track Mode                                                                                                                                                                                                                                                                                                                                                                                   | Voltage and Time Values of the Waveform Point                                                                                                       |
|                        | Auto Mode                                                                                                                                                                                                                                                                                                                                                                                    | Allow to display cursors during auto measurement                                                                                                    |
| Auto Measurement       | Measurements of Maximum, Minimum, Peak-Peak Value, Top Value, Bottom Value, Amplitude, Average, Mean Square Root, Overshoot, Pre-shoot, Frequency, Period, Rise Time, Fall Time, Positive Pulse Width, Negative Pulse Width, Positive Duty Cycle, Negative Duty Cycle, Delay A $\rightarrow$ B $f$ , Delay A $\rightarrow$ B $t$ , Phase A $\rightarrow$ B $f$ , Phase A $\rightarrow$ B $t$ |                                                                                                                                                     |
| Number of Measurements | Display 5 measurements at the same time.                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                     |
| Measurement Range      | Screen or cursor.                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                     |
| Measurement Statistic  | Average, Max, Min, Standard Deviation, Number of Measurements                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                     |
| Frequency Counter      | Hardware 6 bits frequency counter<br>(channels available: DS606x, CH1/CH2; DS610x, CH1/CH2/CH3/CH4)                                                                                                                                                                                                                                                                                          |                                                                                                                                                     |

## Math Operation

|                     |                                                                                |
|---------------------|--------------------------------------------------------------------------------|
| Waveform Operation  | A+B, A-B, A $\times$ B, A/B, FFT, Editable Advanced Operation, Logic Operation |
| FFT Window Function | Rectangle, Hanning, Blackman, Hamming                                          |
| FFT Display         | Split, Full Screen                                                             |

|                                              |                                                                                                                                           |
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| Low Frequency Response<br>(AC Coupling -3dB) | $\leq 5$ Hz (on BNC)                                                                                                                      |
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