MODELS 5251/5351

250MS/s PXIBus / PCIBus Arbitrary Waveform / Function Generators

Specification

CONFIGURATION

Output Channels	1
Interface:	
5251	PXIBus
5351	PCIBus

STANDARD WAVEFORMS

Waveforms:	Sine, Triangle, Square, Pulse, Ramp, Sine(x)/x, Gaussian, Exponential, Repetitive Noise and DC
Frequency Range:	
Sine	100µHz to 100MHz
Square, Pulse	100µHz to 62.5MHz
All others	100µHz to 31.25MHz

SINE

Start Phase:	0-360°
Phase Resolution:	0.01°
Harmonics Distortion, 3Vp-p (typ.):	
DC to 2.5MHz	<-55dBc
2.5MHz to 25MHz	<-50dBc
25MHz to 40MHz	<-40dBc
40MHz to 50MHz	<-35dBc
50MHz to 100MHz	<-28dBc
Non-Harmonic Distortion:	
DC to 50MHz	<-70dBc
50MHz to 100MHz	<-65dBc
Total Harmonic Distortion:	
DC to 100kHz	0.1%
Flatness (1kHz):	
DC to 1MHz	1%
1MHz to 10MHz	3%
10MHz to 25MHz	5%
25MHz to 80MHz	10%
80MHz to 100MHz	15%
Phase Noise (8 points Sine, Max. SCLK)	
100Hz Offset	-80dBc/Hz
1kHz Offset	-89dBc/Hz
10kHz Offset	-92dBc/Hz
100kHz Offset	-112dBc/Hz
1MHz Offset	-140dBc/Hz

TRIANGLE

Start Phase Range:	0-360°
Phase Resolution:	0.01°
Timing Ranges:	0%-99.9% of period

SQUARE

Duty Cycle Range:	0% to 99.9%
Timing Ranges:	0%-99.9% of period
Rise/Fall Time:	<4ns (typ.)
Aberration:	<5%+10mV

SINC (Sine(x)/x)

"0 Crossings":	4-100

GAUSSIAN

Time **Constant**:	10-200

EXPONENTIAL PULSE

Time Constant:	-100 to 100

DC

Range:	-5V to 5V, standard

PULSE

Pulse Mode:	Single or double, programmable
Polarity:	Normal, inverted or complement
Period:	16ns to 1000s
Resolution:	4ns
Pulse Width:	8ns to 1000s
Rise/Fall Time:	
Fast	<4ns (typ.)
Linear	4ns to 1000s
High Time, Delay & Double Pulse Delay:	4ns to 1000s
Impedance:	50Ω
Amplitude Window:	100mVp-p to 10Vp-p(1)
Low Level	-5V to +4.950V (1)
High Level	-4.950V to +5V (1)

(1) Double into high impedance

NOTES:

1. All pulse parameters, except rise and fall times, may be freely programmed within the selected pulse period provided that the ratio between the period and the smallest incremental unit does not exceed the ratio of 2,000,000 to 1.
2. Rise and fall times, may be freely programmed provided that the ratio between the rise/fall time and the smallest incremental unit does not exceed the ratio of 100,000 to 1.
3. The sum of all pulse parameters must not exceed the pulse period setting

HALF-CYCLE WAVEFORMS

Function Shape:	Sine, Triangle, Square
Frequency Range:	0.01Hz to 1MHz
Phase (Sine/triangle):	0 to 360°
Phase Resolution:	0.01°
Duty Cycle Range:	0% to 99.9%
Run Modes:	Continuous, Triggered
Delay Between Half Cycles (Continuous only):	200ns to 20s
Delay Resolution	20ns

ARBITRARY WAVEFORMS

Sample Rate:	1.5S/s to 250MS/s
Vertical Resolution:	16 Bits
Waveform Memory:	2M points
Min. Segment Size:	16 points
Resolution:	4 points
No. of Segments:	1 to 10k

SEQUENCED WAVEFORMS

Operation:	Segments may be linked and repeated in a user-selectable order to generate extremely long waveforms. Segments are advanced using either a command or a trigger
Multi Sequence:	1 to 10, Selectable
Sequencer Steps:	1 to 4k
Segment Duration:	600ns min.
Segment Loops:	1 to 1M

ADVANCE MODES

Automatic:	No triggers required to step from one segment to the next. Sequence is repeated continuously through a pre-programmed sequence table
Stepped:	Current segment is sampled continuously, external trigger advances to next programmed segment.
Single:	Current segment is sampled to the end of the segment including repeats and idles there. Next trigger advances to next segment
Mixed:	Each step of a sequence can be programmed to advance either: a) automatic (Automatic mode), or b) with a trigger (Stepped mode)
Advance Source:	External (TRIG IN), Internal or software

MODULATION

COMMON CHARACTERISTICS

Carrier Waveform:	Sinewave
Carrier Frequency:	10Hz to 100MHz
Modulation Source:	Internal
Run Modes:	Off (Outputs CW), Continuous, Triggered, Delayed Trigger, Burst, Timer and Gated
Advance Source:	Front panel button, Software commands, TRIG IN
Carrier Idle Mode:	On or Off, programmable
Marker Position:	TTL, Programmable at selectable frequency

FM

Modulating Shape:	Sine, square, triangle, ramp
Modulation Freq.:	10mHz to 100kHz
Deviation Range:	Up to 50MHz

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ARBITRARY FM

Modulating Shape:	Arbitrary waveform
Modulating SCLK:	1S/s to 2.5MS/s
Freq. Array Size:	4 to 10,000 frequencies

AM

Envelope Freq.:	10mHz to 100kHz
Envelope Shape:	Sine, square, triangle, ramp
Modulation Depth:	0% to 100%

FSK

Baud Rate Range:	1bits/sec to 10Mbits/sec
Data Bits Length:	2 to 4,000

PSK

Carrier Phase:	0 to 360°
Baud Rate Range:	1bits/sec to 10Mbits/sec
Data Bits Length:	2 to 4,000

FREQUENCY HOPPING

Hop Table Size:	2 to 1,000
Dwell Time Mode:	Fixed / Programmable per step
Dwell Time:	200ns to 20s
Time Resolution:	20ns

ASK

Start/Shift Amp.:	16mVp-p to 16Vpp into 50Ω
Resolution:	Maximum amplitude/4096
Baud Rate Range:	1Bits/s to 10MBits/s
Data Bits Length:	2 to 4,000

AMPLITUDE HOPPING

Range:	16mVp-p to 16Vpp into 50Ω
Resolution:	Maximum amplitude/4096
Dwell Time Mode:	Fixed / Programmable per step
Dwell Time:	200ns to 20s
Time Resolution:	20ns

ARBITRARY 3D

Modulating Shape:	Arbitrary waveform
Modulating Type:	Amplitude CH1, Amplitude CH2, Frequency and Phase
Modulating SCLK:	1S/s to 2.5MS/s
Memory Size:	4 to 30,000

SWEEP

Sweep Step:	Linear or log
Sweep Direction:	Up or Down
Sweep Range:	10Hz to 100MHz
Sweep Time:	1.4s to 40s

COMMON CHARACTERISTICS

FREQUENCY

Resolution:	14 digits (limited by 1µHz)
Accuracy/Stability:	Same as reference

ACCURACY REFERENCE CLOCK

Internal	0.0001% (1 ppm TCXO) initial tolerance over a 19°C to 29°C temperature range; 1ppm/°C below 19°C and above 29°C; 1ppm/year aging rate
External	10MHz TTL, 50% ±2%, or 50Ω ±5% 0dBm (jumper)

AMPLITUDE

Range:	100mV to 10Vpp, into 50Ω; 200mV to 20Vpp, into open Z
Resolution:	4 digits
Accuracy (1kHz):	
100mV to 1Vp-p	±(1% + 10mV)
1V to 10Vp-p	±(1% + 70mV)

OFFSET

Range:	0 to ±4.950V, into 50Ω
Resolution:	1mV
Accuracy:	±(1%+1% of Amplitude +5mV)

FILTERS

Type:	
Bessel	25MHz or 50MHz
Elliptic	60MHz or 120MHz

OUTPUTS

MAIN OUTPUT

Coupling:	DC coupled
Connector:	Front panel BNC
Impedance:	50Ω ±1%
Protection:	Short Circuit to Case Ground, 10s max

SYNC OUTPUT

Connector:	Front panel BNC
Level:	TTL
Sync Type:	
Pulse	Arbitrary and Standard waves
LCOM	Sequence and Burst modes
Position:	0 to 2M
Resolution:	4 points

INPUTS

TRIGGER INPUT

Connector:	**Rear panel BNC**
Input Impedance:	10kΩ
Polarity:	Positive or negative, selectable
Level:	±5V
Sensitivity:	100mV
Damage Level:	±12V
Min. Pulse Width:	10ns

EXTERNAL REFERENCE INPUT

Connector:	Rear panel SMB
Frequency:	10MHz
Impedance & Level:	
Default	10kΩ ±5%, TTL, 50% ±2%
Option	50Ω ±5%, 0dBm Sinewave

SAMPLE CLOCK INPUT

Connector:	Rear panel SMB
Input Level:	300mVp-p to 1Vp-p
Impedance:	50kΩ
Range:	1.5Hz to 250MHz
Min. Pulse Width:	4 ns

RUN MODES

Continuous:	Free-run output of a waveform.
Triggered:	Upon trigger, outputs one waveform cycle. Last cycle always completed.
Gated:	External signal transition enables or disables generator output. Last cycle always completed
Burst:	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.
Mixed:	First output cycle is initiated by a software trigger. Consequent output requires external triggers through the rear panel TRIG IN

TRIGGER CHARACTERISTICS

System Delay:	6 SCLK+150ns
Trigger Delay:	[(0; 200ns to 20s)+system delay]
Trigger Resolution:	20ns
Trigger Delay Error:	6 SCLK+150ns

EXTERNAL

Source:	Rear panel BNC
Trigger Level:	±5V
Resolution:	1mV
Input Frequency:	DC to 2.5MHz
Min. Pulse Width:	10ns
Slope:	Positive/Negative, selectable
Trigger Jitter:	±1 sample clock period

INTERNAL / TIMER

Range:	200ns to 20s
Resolution:	20ns
Error:	3 sample clock cycles+20ns

MANUAL

Source:	Soft trigger command from the front panel or remote

Specification

FREQUENCY COUNTER / TIMER

Measurements:	Frequency, Period, Averaged Period, Pulse Width & Totalize
Source:	Trigger Input
Range:	10Hz to 100MHz (typ.120MHz)
Sensitivity:	500mVpp
Accuracy:	1ppm
Slope:	Positive/Negative transitions
Gate Time:	100µSec to 1 Sec
Input Range:	±5V
Trigger Modes:	Continuous, Hold and Gated
Period Averaged:	
Range	10ns to 50ms
Resolution	7 digits / Sec
Period and Pulse Width:	
Range	500ns to 50ms
Resolution	100ns
Totalize:	
Range	10^{12}-1
Overflow	Led indication

MULTI-INSTRUMENT SYNCHRONIZATION

Initial Skew:	<25 ns + 1 SCLK
Waveform Types:	Standard, Arbitrary and Sequenced using the automatic sequence advancemodeonly
Run Modes:	Continuous, Triggered, Gated and Counted Burst

LEADING EDGE OFFSET

Run Mode:	Continuous run mode only
Offset Range:	200 ns to 20 s
Resolution:	20 ns

GENERAL

Power Consumption:	10W max
Current Consumption:	
+3.3V	2.6A max.
+5V	185mA max.
+12V	900mA max.
Interfaces:	
5251	PXIBus
5351	PCIBus
Dimensions:	Single Slot
Weight:	
Without Package	0.5Kg
Shipping Weight	1Kg
Temperature:	
Operating	0°C - 50°C
Storage	-40°C to + 70°C.
Humidity:	
11°C - 30°C	85%
31°C - 40°C	75%
41°C - 50°C	45%
Safety:	EN61010-1, 2nd revision
Calibration:	1 year
Warranty (1):	3 years standard

ORDERING INFORMATION

MODEL	DESCRIPTION
5251	250MS/s Single Channel PXIBus Arbitrary Waveform Generator
5351	250MS/s Single Channel PCIBus Arbitrary Waveform Generator

(1) Standard warranty in India is 1 year.