

WS8351A/WS8352A/WS8354A

350MHz Single, Dual & Four Channel Arbitrary Function Generators

Specifications

CONFIGURATION	
Output Channels:	1, 2 or 4, semi-independent
STANDARD WAVEFORMS	
Frequency Range:	
Sine:	1μHz to 500MHz
Square, Pulse:	1μHz to 350MHz
All Others:	1μHz to 125MHz
SINE	
Start Phase:	0-360°
Phase Resolution:	0.01°
Harmonics Distortion @1Vp-p (Typ.):	
5MHz to 200MHz:	<-40dBc
200MHz to 350MHz:	<-50dBc
Non-Harmonics Distortion @1Vp-p (Typ.):	
1MHz to 100MHz:	<-80dBc
100MHz to 250MHz:	<-75dBc
250MHz to 350MHz:	<-70dBc
THD:	0.1% (DC to 100kHz)
Flatness:	±0.5dB cross range
SSB Phase Noise (10kHz offset) typ.:	
1MHz Carrier:	<-120dBc/Hz
10MHz Carrier:	<-118dBc/Hz
100MHz Carrier:	<-115dBc/Hz
250MHz Carrier:	<-110dBc/Hz
350MHz Carrier:	<-100dBc/Hz
TRIANGLE / RAMP (SAW-TOOTH)	
Start Phase:	0-360°
Phase Resolution:	0.01°
Timing Ranges:	1.0%-99.9% of period
SQUARE	
Duty Cycle Range:	1.0% to 99.9%
Resolution:	0.1%
Rise/Fall Time:	<1ns
Overshoot (typ.):	<5% (typ)
Jitter (rms):	<10ps
GAUSSIAN	
Time Constant:	10-200
EXPONENTIAL PULSE	
Type:	Rise or Decay, selectable
Time Constant:	-100 to 100
REPETITIVE NOISE	
Bandwidth:	125MHz
DC	
Range:	
WS8101/2:	-8V to 8V
WS8104:	-5V to 5V
PULSE	
Pulse Mode:	Single or double, programmable
Polarity:	Normal, inverted or complement
Period:	4ns to 1.6s
Parameters Ratio:	16,000,000 to 1
Resolution:	1ns
Pulse Width:	2ns to 1.6s
Resolution:	5ns
Accuracy:	<2% (typ.)
Rise/Fall Time:	
Fast:	<1ns
Linear:	1ns to 1.6s
Double Pulse Delay:	4ns to 1000s
Impedance:	50Ω
Amplitude Window:	100mVp-p to 4Vp-p ⁽¹⁾
Low Level:	-2V to +1.95V ⁽¹⁾
High Level:	-1.95V to +2V ⁽¹⁾
⁽¹⁾ Double into option impedance	
PULSE / PATTERN COMPOSER	
Number of Levels:	1 to 1000
Dwell Time:	500ps to 10s
Transition type:	Fast or Linear
Memory:	100k
Amp. Resolution:	4 points
Time Resolution:	1 to 1k
Waveform Granularity:	500ps to 100ns (auto or user)
PATTERN	
Pattern Source:	PRBS or user-defined
PRBS Type:	PRBS7, PRBS9, PRBS11, PRBS15, PRBS23, PRBS31, USER
Data Rate:	10Bit/s to 350MBit/s
Number of Levels:	2, 3, 4, 5
High/Low Levels:	±2.5V
Resolution:	4 digits
Loops:	1 to 1e6
Preamble:	1 to 512e3
Length:	1 to 512e3
ARBITRARY WAVEFORMS	
Sample Rate:	10MS/s to 2GS/s
Vertical Resolution:	14 bits
Waveform Memory:	16Mpts
Min. Segment Size:	192 points
Resolution:	16 points
No. of Segments:	1 to 1k
Waveform Granularity:	1 point
SEQUENCED WAVEFORMS	
Sequencer Steps:	1 to 1k
Segment Loops:	1 to 1M
Advanced Modes:	Continuous, once (x"N"), stepped
Advance Source:	External, internal or software
MODULATION	
Carrier Waveform:	Sine wave
Carrier Frequency:	1μHz to 350MHz
Source:	Internal
FM	
Modulating Shape:	Sine, square, triangle, ramp
Modulating Freq.:	100Hz to 35MHz
Deviation Range:	10mHz to 175MHz
FSK / FREQUENCY HOPPING	
FSK Baud Rate:	10mbps to 350Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	2ns to 10s
Resolution:	2ns
SWEEP	
Sweep Step:	Linear or log
Sweep Direction:	Up or Down
Sweep Time:	1μs to 10ms
CHIRP	
Modulation Shape:	Pulse
Pulse Repetition:	
Range:	200ns to 20s
Resolution:	3 digits
Accuracy:	100ppm
AM	
Envelope Waveform:	Sine, square, triangle, ramp
Envelope Freq.:	100Hz to 1MHz
Modulation Depth:	0.1% to 200%
ASK / AMPLITUDE HOPPING	
ASK Baud Rate:	10mbps to 350Mbps
Hop Table Size:	2 to 256
Hop Type:	Fast or Linear
Dwell Time Mode:	Fixed or programmable per step
Dwell Time:	2ns to 10s
Resolution:	2ns
COMMON CHARACTERISTICS	
FREQUENCY	
Resolution:	8 digits
Accuracy/Stability:	Same as reference

For more information or to schedule a demo call today, or visit our website www.taborelec.com

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ACCURACY REFERENCE CLOCK	
Internal:	1ppm/year aging rate
External (10MHz):	-5dBm to 5dBm, 50Ω
AMPLITUDE	
Range:	
Single-ended:	50mV to 4Vp-p into 50Ω ⁽¹⁾
Differential:	100mV to 8Vp-p into 50Ω ⁽¹⁾
Resolution:	4 digits
Accuracy (1kHz):	±(3% +5mV)
Rise/Fall Time:	<1ns, typ.
Overshoot:	5%, typ.
OFFSET	
Range:	-1.5V to + 1.5V into 50Ω
Resolution:	4 digits
Accuracy:	±(5% +5mV)

OUTPUTS

MAIN OUTPUTS	
Connectors:	Front panel SMA
Type:	Single-ended or differential
Impedance:	50Ω ±1%
Protection:	Short Circuit to Ground, 10s max
SYNC OUTPUT	
Connector:	Front panel SMA
Source:	Channel 1 or channel 2
Type:	Single ended
Waveform Type:	
Pulse:	16 points width
WCOM:	Waveform complete
Impedance:	50Ω
Amplitude:	1V; doubles into high Z
Variable Position Control:	
Range:	0 to segment length
Resolution:	16 points
Rise/Fall Time:	2ns, typ.
Variable Width Control:	
Range:	16 points to segment length
Resolution:	16 points
MARKER OUTPUTS	
Number of Markers:	4, Differentials
Connectors:	Rear panel SMB
Amplitude Voltage:	
Window:	0V to 1.25V, single-ended; 0V to 2.5V, differential
Low Level:	0V to 0.8V, single-ended; 0V to 1.6V, differential
Low Level:	0.5 V to 1.25V, single-ended; 0V to 2.5V, differential

Resolution:	10mV
Accuracy:	10% of setting
Width Control:	2 SCLK to segment length
Position Control:	
Range:	0 to segment length
Resolution:	2 points
Resolution:	4 digits
Initial Delay:	4ns±½ clock (Output to marker)
Variable Delay:	
Control:	0 to segment length
Range:	2 points
Resolution:	0 to segment length
Accuracy:	2 points
Skew Between Mrk:	10ps, typ.
Rise/Fall Time:	<1ns, typ.

INPUTS

TRIGGER & EVENT INPUTS	
Connector:	
Trigger In:	Front panel SMA
Event In:	Rear panel BNC
Frequency Range:	0 to 15MHz
Input Impedance:	10kΩ
Polarity:	Positive or negative, selectable
Damage Level:	±20V
Sensitivity:	100mV
Trigger Level Control:	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
Min. Pulse Width:	10ns
EXTERNAL REFERENCE INPUT	
Connector:	Rear panel SMB
Input Frequency:	10MHz / 100MHz
Impedance:	50Ω
Voltage Swing:	-5dBm to 5dBm
Damage Level:	10dBm
EXTERNAL SAMPLE CLOCK INPUT	
Connector:	Rear panel SMA
Voltage Swing:	0dBm to 10dBm
Input Impedance:	50Ω
Input Frequency:	1GHz to 4GHz (Double the internal clock)
Clock Divider:	1/1, 1/2, 1/4, 1/256, separate for each channel
Damage Level:	15dBm

RUN MODES

Type:	Continuous, self armed, armed, triggered, normal, override, gated, burst
Continuous:	A selected output function shape is output continuously.
Self Armed:	No start commands are required to generate waveforms.
Armed:	The output dwells on a DC level and waits for an enable command and then the output waveform is output continuously; An abort command turns off the waveform.
Triggered:	A trigger signal activates a single-shot or counted burst of output waveforms and then the instrument waits for the next trigger signal.
Normal Mode:	The first trigger signal activates the output; consecutive triggers are ignored for the duration of the output waveform.
Override Mode:	The first trigger signal activates the output; consecutive triggers restart the output waveform regardless if the current waveform has been completed or not.
Gated:	A waveform is output when a gate signal is asserted. The waveform is repeated until the gate signal is de-asserted. Last period is always completed.
Burst:	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.

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TRIGGER CHARACTERISTICS

EXTERNAL

Source:	Channel 1, channel 2, or both
Slope:	Positive/Negative, selectable
Damage Level:	±20V
Input Frequency:	DC to 15MHz

Trigger Level Control:

Range:	-5V to 5V
Resolution:	12 bit (2.5mV)
Accuracy:	±(5% of setting + 2.5mV)
Sensitivity:	0.2Vp-p

Min. Pulse Width: 10ns, min.

System Delay: 200 SCLK periods + 50ns

Trigger Jitter: Separate for each channel

Range:	0 to 8M SCLK periods
Resolution:	4 points
Accuracy:	Same as SCLK accuracy

Smart Trigger: Detects a unique pulse width

Conditioned Trigger: < pulse width, > pulse width or < > pulse width

PW Range:	50ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)

Trigger Jitter: Ignores triggers for a hold-off

Hold-off Range:	100ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)

Trigger Jitter: 2ns at max. SCLK (4 SCLK)

INTERNAL / TIMER

Range:	200ns to 20s
Resolution:	20ns
Error:	3 SCLK + 20ns

MANUAL

Source:	Soft trigger command from the front panel or remote
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INTER-CHANNEL SKEW CONTROL

Initial skew:	200ps
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COURSE TUNING

Control:	
Range	0 to waveform-length points
Resolution	4 points
Accuracy:	Same as SCLK accuracy

FINE TUNING

Control:	
Range	-3ns to +3ns
Resolution	10ps
Accuracy:	(10% of setting + 20ps)

GENERAL

Voltage:	100 to 240VAC, 50-60Hz
Power Consumption:	150W max.
Display Type:	TFT, Color LCD
Size:	4"
Resolution:	320 x 240 pixels
Interfaces:	
USB 2.0:	
Host:	1 x Front, USB type A
Device:	1 x Rear, USB type B
LAN:	1 x Rear, 1000/100 BASE-T
GPIO:	1 x Rear, IEEE-488.2
Dimensions (WxHxD):	
With Feet:	315 x 102 x 395 mm
Without Feet:	315 x 88 x 395 mm
Weight:	
Without Package:	4.5 Kg
Shipping Weight:	6 Kg
Temperature:	
Operating:	0°C to +40°C
Storage:	-40°C to +70°C
Warm up time:	30 minutes
Humidity:	85% , non-condensing
Safety:	CE Marked, IEC61010-1-1:2008
EMC:	IEC 61326-1:2006
Calibration:	2 years
Warranty:	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
WS8351A-DST	350MHz Single Channel Arbitrary Function Generator
WS8352A-DST	350MHz Dual Channel Arbitrary Function Generator
WS8354A-DST	350MHz Four Channel Arbitrary Function Generator

ACCESSORIES

S-Rack Mount:	19" Single Rack Mount Kit
Case Kit:	Professional Carrying Bag

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