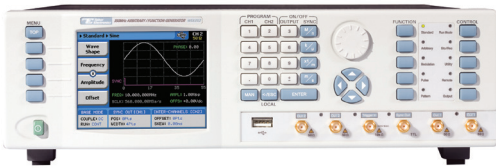
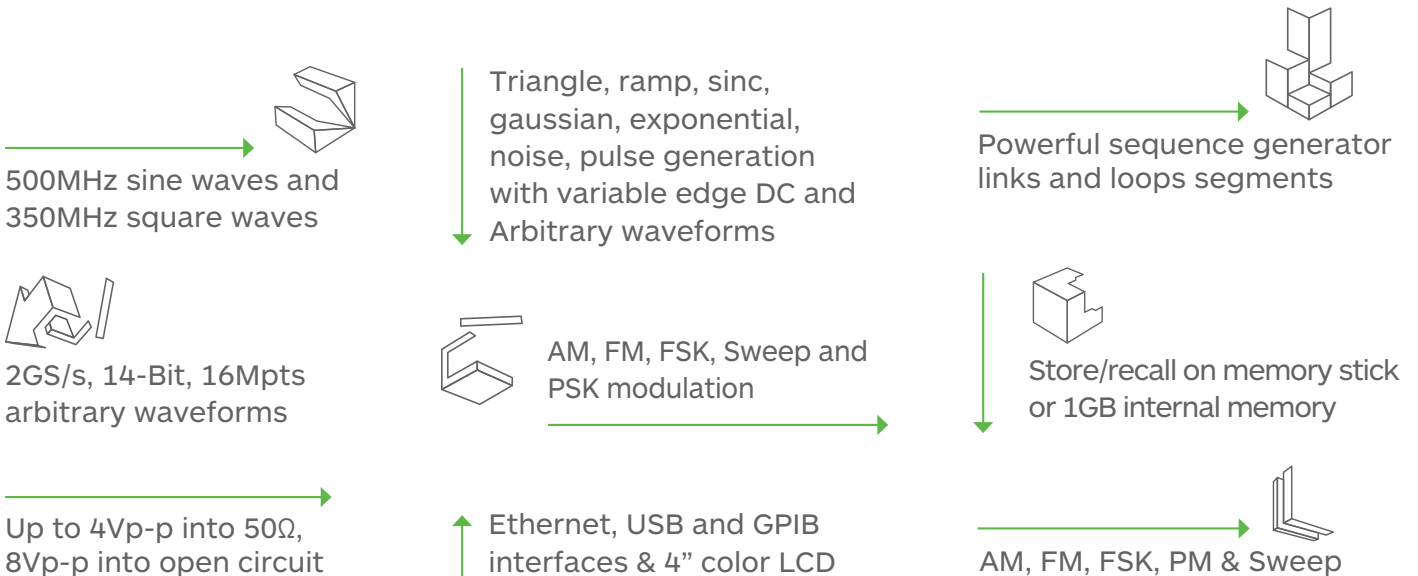


## WS8351A/WS8352A/WS8354A-DST

350MHz Single, Dual & Four Channel Arbitrary Function Generators



Tabor's WS835x is a 350MHz single, dual & four channel generator with the functionality of a function, arbitrary, modulation and pulse/pattern generator, all in one easy to use, high performance, compact stand alone bench top, which enables engineers to test analog, digital and mixed signals devices with a single instrument.



### Standard Waveforms

The WS835xA-DST has 11 built-in functions for quick and easy waveform generation. Front panel operations allows for easy selection and editing of all waveform parameters. All the standard waveforms can reach up to 125MHz with Sine and Square going as high as 350MHz.

### User Defined Waveforms

For more advanced users the WS835xA-DST with its 14-bit vertical resolution offers a standard 16Mpts memory depth and a 2GS/s sample clock for designing waveforms, with the ability to control and edit the value of each and every point any wave is possible.

### Modulation Waveforms

In addition to the capability of generating any shape and style of waveform with the arbitrary waveform generation power, the series can also do standard modulation schemes such as FM, AM, FSK, sweep and PSK, without sacrificing the power of the instrument control and output run modes.

### Pulse / Pattern Creation

Generating complex pulse trains has never been easier. The Pulse Composer is a powerful built-in tool that converts the WS835xA-DST to a very sophisticated Pulse/Pattern Generator, allowing to create literally any complex pulse train / pattern, whether it's a single pulse, multi-level, linear-points, initialization or preamble pattern definition, arbitrary bit design, user-defined or even standard random patterns with programmable resolution, so it doesn't matter if your application is radar communications, nanotechnology or serial bus testing, the pulse/pattern composer is the right tool for your application. Moreover, all the WS835xA-DST advanced trigger modes are applicable, hence one can choose to use the "step" mode to advance every bit independently or the "once" mode to advance a complete data block in one trigger event, enabling even more applications, such as trigger, clock and data protocols.

**WS8351A/WS8352A/WS8354A-DST**

## 350MHz Single, Dual &amp; Four Channel Arbitrary Function Generators

## Specifications

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

**WS8351A/WS8352A/WS8354A-DST**

## 350MHz Single, Dual &amp; Four Channel Arbitrary Function Generators

## Specifications

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

### OUTPUTS

#### MAIN OUTPUTS

<b>Connectors:</b>	Front panel SMA
<b>Type:</b>	Single-ended or differential
<b>Impedance:</b>	50Ω ±1%
<b>Protection:</b>	Short Circuit to Ground, 10s max

#### SYNC OUTPUT

<b>Connector:</b>	Front panel SMA
<b>Source:</b>	Channel 1 or channel 2
<b>Type:</b>	Single ended
<b>Waveform Type:</b>	
Pulse:	16 points width
WCOM:	Waveform complete
<b>Impedance:</b>	50Ω
<b>Amplitude:</b>	1V; doubles into high Z

#### Variable Position Control:

<b>Range:</b>	0 to segment length
<b>Resolution:</b>	16 points
<b>Rise/Fall Time:</b>	2ns, typ.

#### Variable Width Control:

<b>Range:</b>	16 points to segment length
<b>Resolution:</b>	16 points

#### MARKER OUTPUTS

<b>Number of Markers:</b>	4, Differentials
<b>Connectors:</b>	Rear panel SMB
<b>Amplitude Voltage:</b>	
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

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

### INPUTS

#### TRIGGER & EVENT INPUTS

<b>Connector:</b>	
Trigger In:	Front panel SMA
Event In:	Rear panel BNC
<b>Frequency Range:</b>	0 to 15MHz
<b>Input Impedance:</b>	10kΩ
<b>Polarity:</b>	Positive or negative, selectable
<b>Damage Level:</b>	±20V
<b>Sensitivity:</b>	100mV
<b>Trigger Level Control:</b>	
Range	-5V to 5V
Resolution	12 bit (2.5mV)
Accuracy	±(5% of setting + 2.5mV)
Sensitivity	0.2Vp-p
<b>Min. Pulse Width:</b>	10ns

#### EXTERNAL REFERENCE INPUT

<b>Connector:</b>	Rear panel SMB
<b>Input Frequency:</b>	10MHz / 100MHz
<b>Impedance:</b>	50Ω
<b>Voltage Swing:</b>	-5dBm to 5dBm
<b>Damage Level:</b>	10dBm

#### EXTERNAL SAMPLE CLOCK INPUT

<b>Connector:</b>	Rear panel SMA
<b>Voltage Swing:</b>	0dBm to 10dBm
<b>Input Impedance:</b>	50Ω
<b>Input Frequency:</b>	1GHz to 4GHz (Double the internal clock)
<b>Clock Divider:</b>	1/1, 1/2, 1/4, 1/256, separate for each channel
<b>Damage Level:</b>	15dBm

### RUN MODES

<b>Type:</b>	Continuous, self armed, armed, triggered, normal, override, gated, burst
<b>Continuous:</b>	A selected output function shape is output continuously.
<b>Self Armed:</b>	No start commands are required to generate waveforms.
<b>Armed:</b>	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.
<b>Triggered:</b>	A trigger signal activates a single-shot or counted burst of output waveforms and then the instrument waits for the next trigger signal.
<b>Normal Mode:</b>	The first trigger signal activates the output; consecutive triggers are ignored for the duration of the output waveform.
<b>Override Mode:</b>	The first trigger signal activates the output; consecutive triggers restart the output waveform regardless if the current waveform has been completed or not.
<b>Gated:</b>	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.
<b>Burst:</b>	Upon trigger, outputs a Dual or multiple pre-programmed number of waveform cycles from 1 through 1M.

**WS8351A/WS8352A/WS8354A-DST**

## 350MHz Single, Dual &amp; Four Channel Arbitrary Function Generators

## Specifications

TRIGGER CHARACTERISTICS	
<b>EXTERNAL</b>	
<b>Source:</b>	Channel 1, channel 2, or both
<b>Slope:</b>	Positive/Negative, selectable
<b>Damage Level:</b>	±20V
<b>Input Frequency:</b>	DC to 15MHz
<b>Trigger Level Control:</b>	
Range:	-5V to 5V
Resolution:	12 bit (2.5mV)
Accuracy:	±(5% of setting + 2.5mV)
Sensitivity:	0.2Vp-p
<b>Min. Pulse Width:</b>	10ns, min.
<b>System Delay:</b>	200 SCLK periods + 50ns
<b>Trigger Jitter:</b>	Separate for each channel
Range:	0 to 8M SCLK periods
Resolution:	4 points
Accuracy:	Same as SCLK accuracy
<b>Smart Trigger:</b>	Detects a unique pulse width
<b>Conditioned Trigger:</b>	< pulse width, > pulse width or < > pulse width
PW Range:	50ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)
<b>Trigger Jitter:</b>	Ignores triggers for a hold-off
Hold-off Range:	100ns to 2s
Resolution:	2ns
Accuracy:	±(5% of setting +20ns)
<b>Trigger Jitter:</b>	2ns at max. SCLK (4 SCLK)
<b>INTERNAL / TIMER</b>	
Range:	200ns to 20s
Resolution:	20ns
Error:	3 SCLK + 20ns
<b>MANUAL</b>	
<b>Source:</b>	Soft trigger command from the front panel or remote

INTER-CHANNEL SKEW CONTROL	
<b>Initial skew:</b>	200ps
<b>COURSE TUNING</b>	
<b>Control:</b>	
Range	0 to waveform-length points
Resolution	4 points
Accuracy:	Same as SCLK accuracy
<b>FINE TUNING</b>	
<b>Control:</b>	
Range	-3ns to +3ns
Resolution	10ps
Accuracy:	(10% of setting + 20ps)

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

ORDERING INFORMATION	
MODEL	DESCRIPTION
<b>WS8351A-DST</b>	350MHz Single Channel Arbitrary Function Generator
<b>WS8352A-DST</b>	350MHz Dual Channel Arbitrary Function Generator
<b>WS8354A-DST</b>	350MHz Four Channel Arbitrary Function Generator
ACCESSORIES	
<b>S-Rack Mount:</b>	19" Single Rack Mount Kit
<b>Case Kit:</b>	Professional Carrying Bag

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