

## Indirect Synthesizers

### Features

- ◆ Broad band coverage
- ◆ Step sizes from 2 Hz
- ◆ Low phase noise
- ◆ Standard models
  - BBS-100: 750 to 1000 MHz and 1500 to 2000 MHz
  - BBS-200: 10 to 2200 MHz
  - BBS-400: 10 to 4400 MHz
  - BBS-500: 10 to 5120 MHz
- ◆ Low spurious
- ◆ 3-Wire serial frequency control
- ◆ Locks to an external 10 MHz reference

### Options

- ◆ Frequency extension to 20.48 GHz
- ◆ Custom bands
- ◆ Custom step sizes
- ◆ External reference 5 to 100 MHz
- ◆ Faster switching speed
- ◆ Parallel control interface up to 21 bits
- ◆ Optimization of weighted integrated phase noise

### Description

Herley-CTI (HCTI) series BBS synthesizers offer broadband frequency coverage with very fine frequency resolution and low phase noise in a compact package. Several standard models are available that provide high quality signals for a wide variety of applications.

The standard BBS synthesizers feature low phase noise both close in and far out from the carrier. For example, a 1 GHz output signal from the BBS-200 or BBS-400 typically has phase noise of -130 dBc/Hz at 100 kHz and -93 dBc/Hz at 100 Hz offset from the carrier. At 4 GHz, the phase noise is typically -118 dBc/Hz at 100 kHz and -81dBc/Hz at 100 Hz offset.

The synthesizer locks to an external 10 MHz reference and are simply programmed with several bits using a 3-wire enable/clock/data protocol that can be easily generated from the parallel printer port of



- ◆ VXI interface
- ◆ Mute
- ◆ Output power control
- ◆ PECL or CMOS output
- ◆ Additional fixed LO output
- ◆ I/Q modulation 0.8 to 2.5 GHz
- ◆ Clean up loop for external reference

a PC. The units operate from +5.1 volt DC and +8 to +20 volt DC supplies. For applications with larger step size requirements, a lower power version of the BBS (BBS-100 L), can be provided with only slight degradation in close in phase noise.

The BBS synthesizers are well suited for use as synthesized local oscillators in communication system applications from cellular radio to SatCom, especially where fine frequency resolution is required. The broad frequency coverage, low phase noise and small size make the BBS an ideal synthesizer for instrumentation and automated test applications.

In addition, with the many options available, Herley-CTI can custom tailor the BBS the customer's specific application. Contact the factory to discuss your special requirements.

**Typical Performance Specifications**

Frequency Range	Standard Units BBS-100: 750 to 1000 MHz and 1500 to 2000 MHz BBS-200: 10 to 2200 MHz BBS-400: 10 to 4400 MHz BBS-500: 10 to 5120 MHz		
Custom Bandwidths	Any bandwidth within the 5 to 20,480 MHz range		
Step Size	From 2 Hz to 10 MHz		
Switching Speed	60 milliseconds max; 30 ms typical		
Output Power	+13 dBm to +17 dBm		
Supply Voltage	+5.1 to 5.4 Vdc @ 700 mA typ +10 to +20 Vdc @ 200 mA typ		
Optional Single Supply	+10 to +20 Vdc @ 900 mA typ		
Spurious (excluding reference spurs)	<u>Output Frequency</u>	<u>offsets &lt;30 kHz</u>	<u>Other</u>
BBS-100	750 to 1000 MHz 1500 to 2000 MHz	<-76 dBc <-70 dBc	<-85 dBc <-80 dBc
BBS-200 and BBS-400	<272 MHz 272 to 544 MHz 544 to 1088 MHz 1088 to 2200 MHz	<-85 dBc <-82 dBc <-76 dBc <-70 dBc	<-85 dBc <-85 dBc <-85 dBc <-80 dBc
BBS-400	10 to 2200 MHz	<-65 dBc	<-74 dBc
BBS-500	<320 MHz 320 to 640 MHz 640 to 1280 MHz 1280 to 2560 MHz 2560 to 5120 MHz	<-85 dBc <-80 dBc <-74 dBc <-68 dBc <-62 dBc	<-85 dBc <-85 dBc <-84 dBc <-78 dBc <-72 dBc
Harmonics	<-20 dBc		
Sub-harmonics	<u>Output Frequency</u>	<u>Sub-harmonics</u>	
BBS-400	2200 to 4400 MHz	<-65 dBc	
BBS-500	2360 to 5120 MHz	<-65 dBc	
Alarm	TTL Hi - Locked		
External Reference	10 MHz @ +3 +/-3 dBm standard; other references optional		
Frequency Accuracy	Same as reference +/-2 x 10 <sup>-11</sup>		
Frequency Control	Standard: 3-wire serial Enable/Clock/Data TTL Optional: Parallel 21 bits TTL (2 million frequencies max) Internal MCU has EEPROM and can be custom programmed		
Operating Temperature	0° C to +60° C standard, consult factory for extended ranges		
Connectors:			
RF Out / Ref In / IFLO Out Connectors	SMA-F		
Frequency Control, Alarm, Supply Voltage	Protected header (3M 25XX); 10 pin for serial 30/26 pin for parallel		

Note: All specifications subject to change without notice.

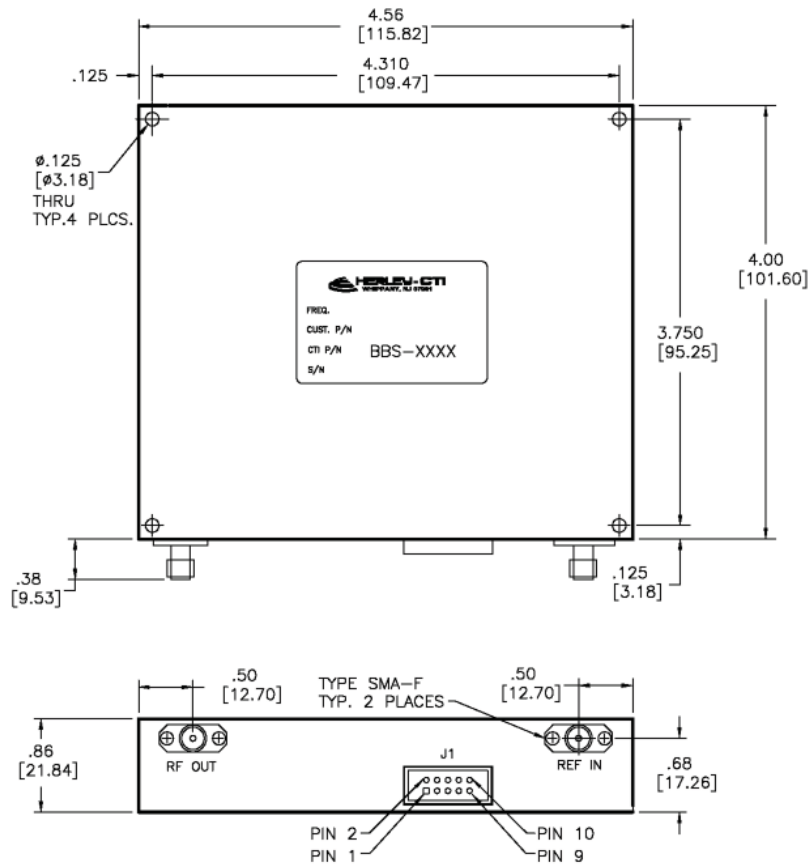
### Typical Phase Noise Performance

Model	Freq (MHz)	*100 Hz	*1 kHz	*10 kHz	100 kHz	1 MHz
BBS-100	1000	-87	-88	-112	-136	-143
	2000	-81	-82	-106	-130	-150
BBS-200 and 400	10	-133	-134	-144	-153	-155
	100	-113	-114	-124	-150	-153
	1000	-93	-94	-104	-130	-143
	2000	-87	-88	-98	-124	-145
BBS-400	4000	-81	-82	-92	-118	-139
BBS-500	10	-132	-133	-143	-153	-153
	100	-112	-113	-123	-149	-153
	1000	-92	-93	-103	-129	-143
	2000	-85	-87	-97	-123	-143
	5000	-77	-78	-88	-114	-134
BBS-100 L - 5 kHz step - 10 kHz step	1000	-64	-76	3 -114	4 -136	1 -
	2000	-58	-70	-108	-130	-150

\*Phase noise on the external reference must be increased by  $20 \times \text{Log}_{10}(f/\text{Fref})$  dB and added to the listed synthesizer phase noise on a power basis for offsets up to and including 10 kHz.

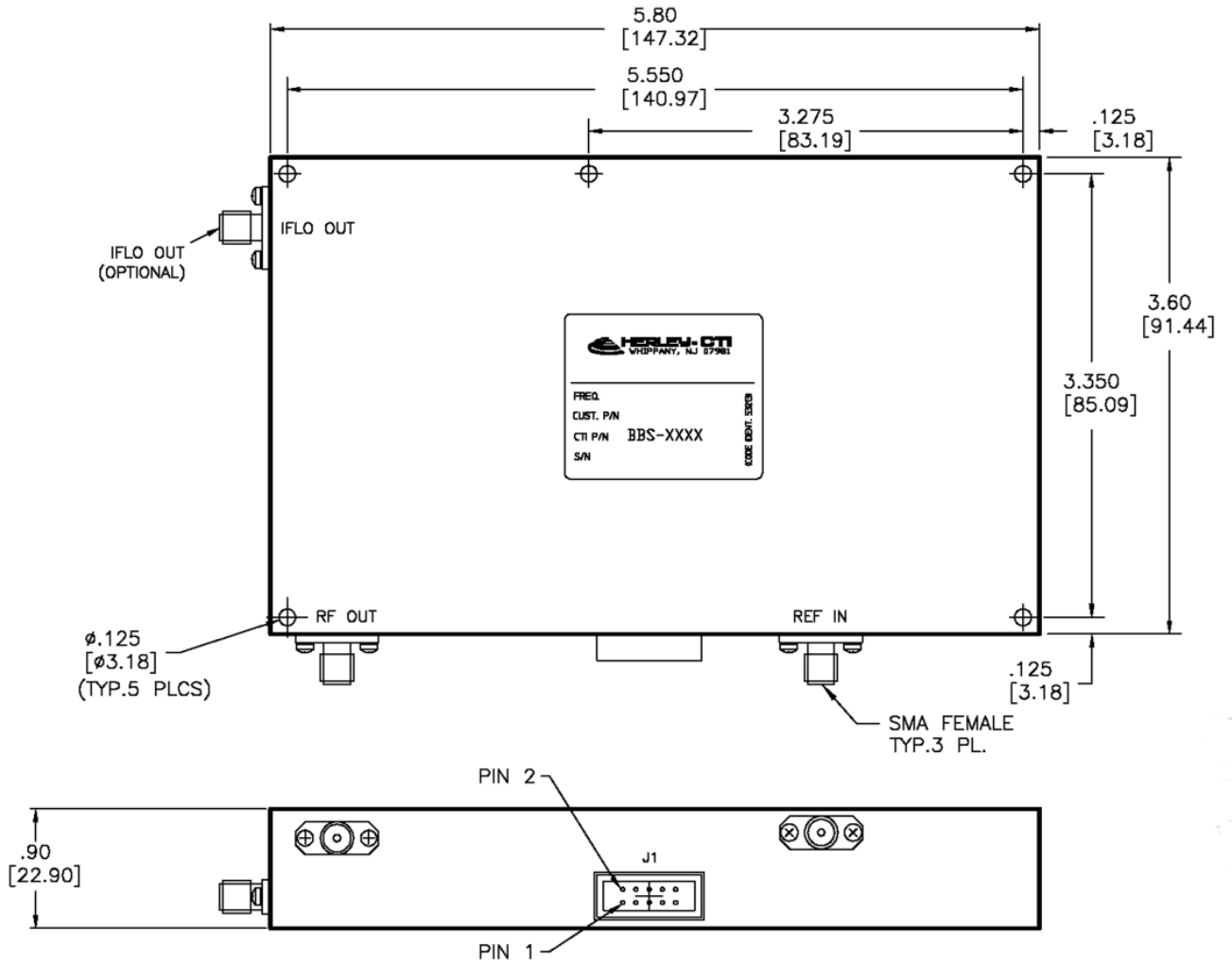
Note: All specifications subject to change without notice.

### Outline Drawing - L Version



Dimensions are in Inches/mm, Tol. .xx = +/- .02, .xxx = +/- .005

Outline Drawing - Standard Version



Dimensions are in Inches/mm, Tol. .xx = +/- .02, .xxx = +/- .005