



Phase Matrix, Inc.[®]
A National Instruments Company

QuickSyn[®] Lite

MICROWAVE FREQUENCY SYNTHESIZER

Model FSL-0020



Features

- 0.65 to 20 GHz coverage
- 0.001 Hz resolution
- 100 μ s frequency switching
- Instrument-grade spectral purity
- Frequency sweep & list mode
- USB & SPI control interface
- Compact size (4 x 4 x 0.8 in.)

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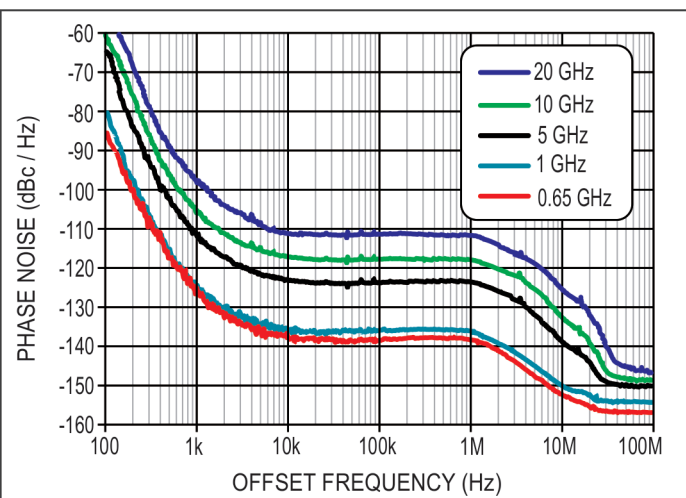
Model FSL-0020

Specifications and ordering information subject to change without notice.

Specifications

FREQUENCY

DESCRIPTION	SPECIFICATION
Frequency Range ❶	0.65 to 20 GHz
Frequency Resolution	0.001 Hz
Frequency Stability	Same as reference
Frequency Accuracy	Reference \pm 0.1 ppb
Frequency Switching Time ❷	100 μ s (triggered list mode) 200 μ s (individual SPI commands)
List Mode	32,000 points
Power	+10 dBm min.
RF Output On/Off Ratio	> +60 dB min.
Output Return Loss	-10 dB nom.
Harmonics ❸	-12 dBc typ.
Sub-Harmonics	-50 dBc typ.
Non-Harmonic Spurious	-60 dBc max.
Phase Noise dBc / Hz	
	0.65 GHz typ (max.) 1 GHz typ (max.) 5 GHz typ (max.) 10 GHz typ (max.) 20 GHz typ (max.)
100 Hz	-83 (-77) -80 (-74) -66 (-60) -60 (-54) -54 (-48)
1 kHz	-126 (-120) -124 (-118) -110 (-104) -104 (-98) -98 (-92)
10 kHz	-138 (-132) -136 (-130) -123 (-117) -117 (-111) -111 (-105)
100 kHz	-138 (-132) -136 (-130) -123 (-117) -117 (-111) -111 (-105)
1 MHz	-138 (-132) -136 (-130) -123 (-117) -117 (-111) -111 (-105)
Floor	-155 (-149) -153 (-147) -150 (-144) -147 (-141) -141 (-135)



Phase Noise

REFERENCE

DESCRIPTION	SPECIFICATION
Internal Reference	
Output Frequency	10 MHz nom.
Output Power	+5 \pm 2 dBm
Reference Mute	-60 dBm max.
Frequency Temp. Stability	\pm 1 ppm
Aging ❹	\pm 1 ppm / year
Locking Range	\pm 5 ppm
Output Impedance	50 Ω nom.
External Reference	
Input Frequency	10 MHz
Input Power	+5 \pm 10 dBm
Absolute Max. Input Level	+15 dBm
Input Impedance	50 Ω nom.

ELECTRICAL

DESCRIPTION	SPECIFICATION
Supply Voltage	+12 V DC \pm 5%
Absolute Max. Supply Voltage	+15 V DC
Power Consumption	12 W nom.

GENERAL & ENVIRONMENTAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Temperature Range ❺	0° to +50° C (operating) -40° to +70° C (non-operating)
Warm-up Time	1 minute

MECHANICAL SPECIFICATIONS

Size (W x L x H)	4 x 4 x 0.8 in. (10.2 x 10.2 x 2 cm)
Weight	0.8 lb. (0.36 kg)

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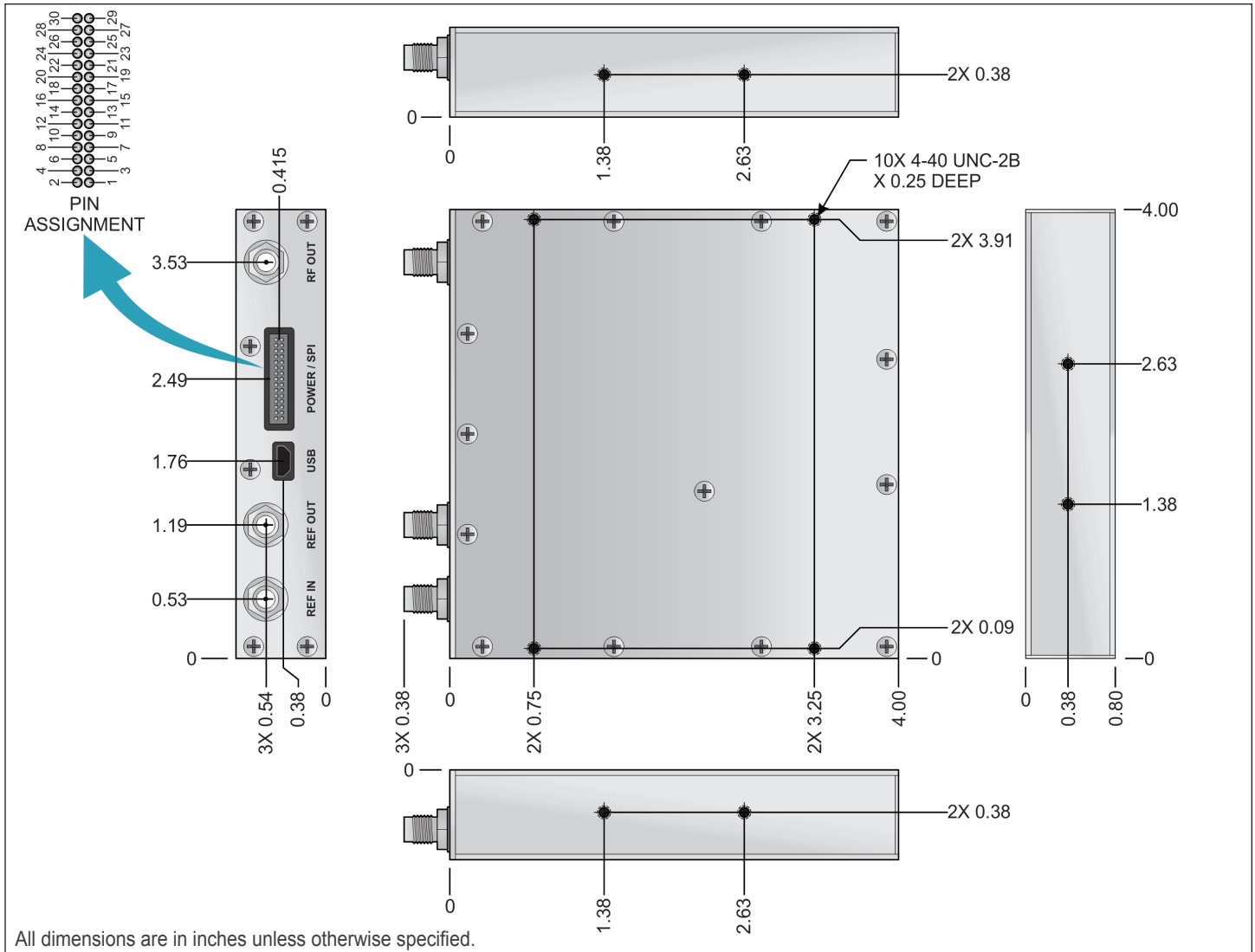
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Specifications (continued)

CONNECTORS	
LABEL	TYPE
RF OUT	SMA-F
REF OUT	SMA-F
REF IN	SMA-F
SPI	30 pin, 0.05 in. spaced double-row header ⓐ (See SPI interface details on next page.)
USB	Mini-AB receptacle (USB 2.0). Provides access to soft front panel via PC. USB drivers must be installed prior to use.



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Specifications (continued)

SPI INTERFACE		
SIGNAL	PIN	DESCRIPTION
SPI_CLK	20	SPI clock. Supplied by the controlling computer (not the synthesizer). The controlling computer is the SPI master; the synthesizer is the SPI slave.
SPI_SS	18	SPI Slave Select. This signal is an active low input to the synthesizer. It frames command communications. For each command, SPI_SS goes low before the first bit is sent and goes high after the last bit is sent.
SPI_MISO	24	Master In/Slave Out. Status and other returned information from the synthesizer to the controlling computer.
SPI_MOSI	22	Master Out/Slave In. Command data from the controlling computer to the synthesizer.
TRIGGER	14	Rising edge active input. When enabled, the trigger signal of +3.3 V can initiate freq. change or step through lists or sweeps.
LOCK	16	Output indicates the synthesizer is locked on its current setting (+3.3 V locked, 0 V unlocked).
REF_LOCK	13	Output indicates the synthesizer has detected an external or internal reference signal and locked on that signal (+3.3 V locked, 0 V unlocked).
RESET	1	Internally pulled up to +3.3 V with 100 k Ω resistor. Active "low" signal, which has a minimum width of 1 ms, will reset the synthesizer to a default state.
PWR_+12V	26, 28, 30	External +12V DC supply.
GND	2, 15, 25, 27, 29	Ground.
N/C	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 17, 19, 21, 23	Do not use. Reserved for factory use.

Notes:

- ① Tested to 20.8 GHz.
- ② Full band step to ± 5 ppm of final frequency.
- ③ Measured between 2 and 20 GHz.
- ④ Self calibration with USB command is available for in-field calibration.
- ⑤ Adequate heat sinking must be provided in order to prevent permanent damage.
- ⑥ Phase Matrix recommends Samtec manufactured mating socket assembly SFSD-15-28-G-XXX series.
- ⑦ "Typ." means approximately 2/3 of all units meet these characteristics at room temperature. Characteristics identified by typ. and nom. are by design and are not normally verified on every unit during production.
- ⑧ Communication specifications are available from the Phase Matrix website (www.phasematrix.com)

Warranty

Phase Matrix, Inc. has a proven commitment to quality and reliability in instrumentation. This commitment is demonstrated in the QuickSyn[®] series of synthesizers with a full one-year standard warranty. Parts, labor, and even shipping are all included at no cost to you.