Phase Matrix, Inc.®
A National Instruments Company

QuickSyn® Lite

Model FSL-0020

MICROWAVE FREQUENCY SYNTHESIZER

Features

- 0.65 to 20 GHz coverage
- 0.001 Hz resolution
- 100 µs 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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Specifications and ordering information subject to change without notice.

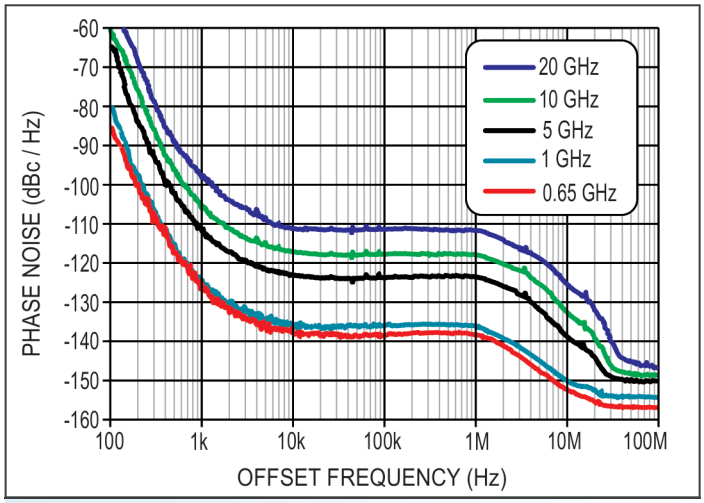
Specifications

FREQUENCY

DESCRIPTION	SPECIFICATION
Frequency Range ❶	0.65 to 20 GHz
Frequency Resolution	0.001 Hz
Frequency Stability	Same as reference
Frequency Accuracy	Reference ± 0.1 ppb
Frequency Switching Time ❷	100 µs (*triggered list mode*) 200 µs (*inidividual 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 ± 2 dBm
Reference Mute	-60 dBm max.
Frequency Temp. Stability	± 1 ppm
Aging ❹	± 1 ppm / year
Locking Range	± 5 ppm
Output Impedance	50 Ω nom.
External Reference	
Input Frequency	10 MHz
Input Power	+5 ± 10 dBm
Absolute Max. Input Level	+15 dBm
Input Impedance	50 Ω nom.

ELECTRICAL

DESCRIPTION	SPECIFICATION
Supply Voltage	+12 V DC ± 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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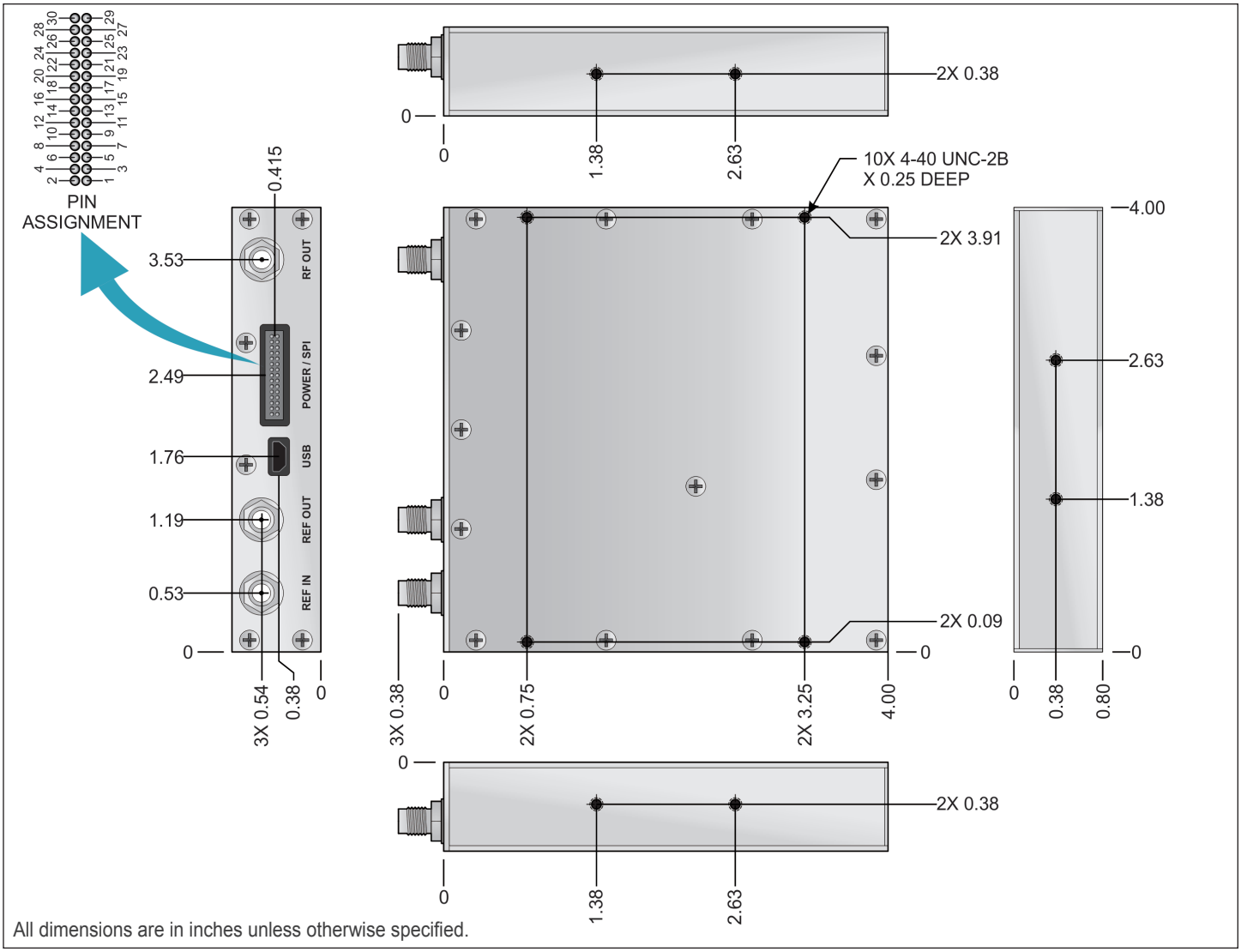
Specifications (continued)

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 ❻ (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.



All dimensions are in inches unless otherwise specified.

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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 kΩ 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:

❶ Tested to 20.8 GHz.

❷ Full band step to ±5 ppm of final frequency.

❸ Measured between 2 and 20 GHz.

❹ Self calibration with USB command is available for in-field calibration.

❺ Adequate heat sinking must be provided in order to prevent permanent damage.

❻ 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.

Data sheet PN: DS_FSL-0020 Rev. 1