

275 to 550 MHz Frequency Synthesizer

Low Phase Noise in a Lower Cost Package



Features

- Low Phase Noise: -116 dBc/Hz (100 kHz offset)
- Fast 80 μ sec Settling Speed
- **External Reference Oscillator (Internal Ref. Option at No Extra Charge)**
- No User Programming Required
- Integrated Microcontroller Look-up Table
- Customized Parallel or Serial Programming Available
- Additional Complementary Output Line is Available

API Technologies' Model LCFS1068 frequency synthesizer combines a monolithic integer-n microwave synthesizer, and a microcontroller to provide an economical frequency source solution. Complex serial register programming is not required. A built-in lookup table in the microcontroller allows for simplified frequency programming with a dual 8-bit binary frequency selection word. Either parallel or serial programming can be accommodated.

Technical Specifications

Parameter	Typical	Min/Max
Frequency Range	275 to 550 MHz	275 to 550 MHz
Output Power (Pin 15)	+13 dBm	-
External Reference Input Power Requirement (CW)	0 to +13 dBm	0 to +13 dBm
Step Size	5 MHz	-
SSB Phase Noise	-108 dBc/Hz @ 1 kHz -113 dBc/Hz @ 10 kHz -116 dBc/Hz @ 100 kHz -145 dBc/Hz @ 1 MHz -150 dBc/Hz @ 10 MHz	-
Digital Lock Indicator	3.3 volt logic	-
Locking Speed	80 μ sec	-
Spurious	-40 dBc	-
Harmonics	-20 dBc	-
Output VSWR	1.75:1	2.0:1
DC Supply Voltage	+3.3 volts	(+/- 2%) volts
DC Supply Current*	200 mA*	---

Note: SSB phase noise dependent on the input reference performance.

Maximum (No Damage) Ratings

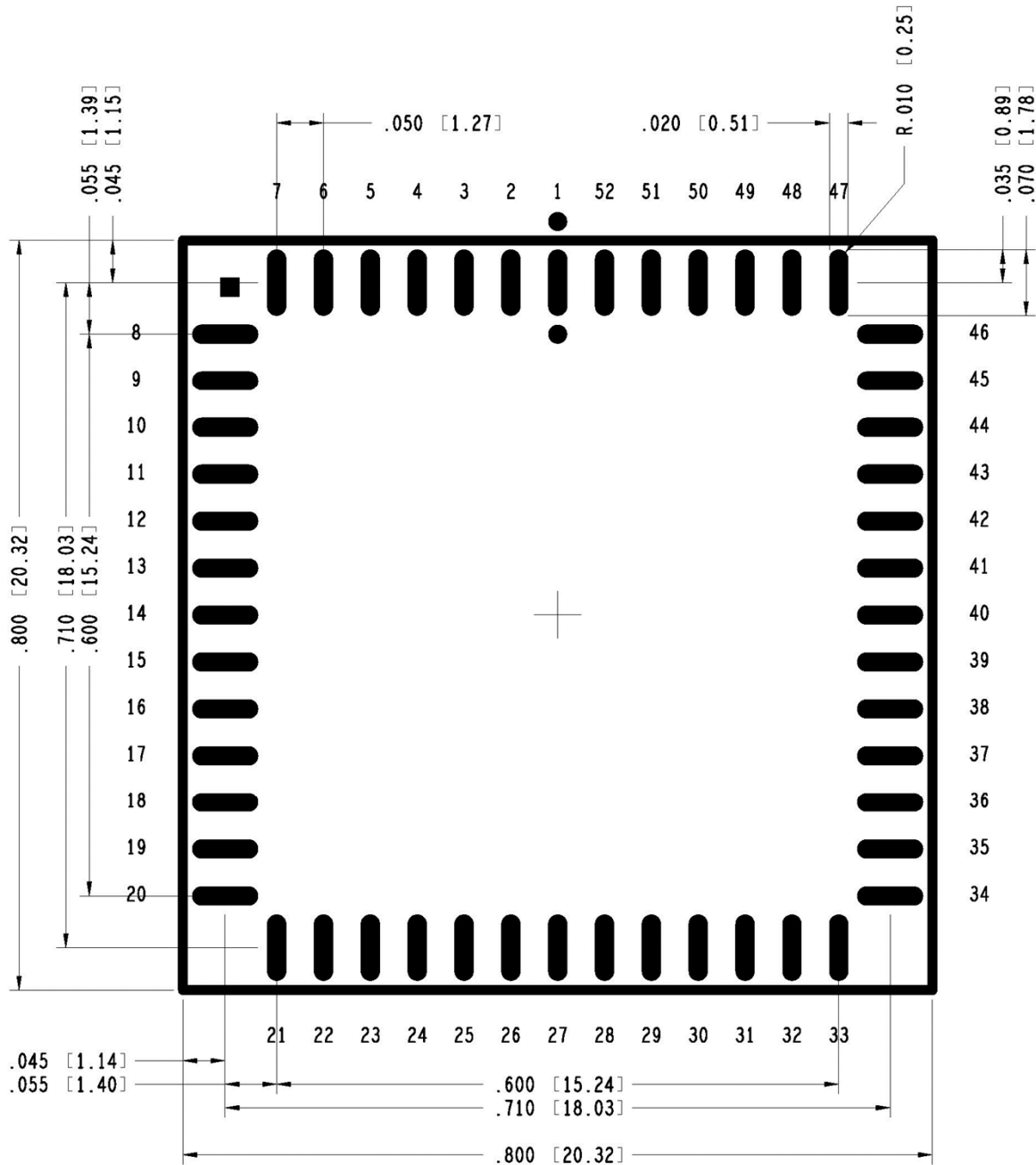
Storage Temperature	-55°C to +125°C
Operating Temperature	-40°C to +85°C
DC Voltage	+5 volts

Note: Typical values are measured at 25°C, but not guaranteed.

Mechanical & Electrical

Parameter	Specification
Specification Temperatures (Min/Max)	-20°C to +70°C
Housing Size	0.800" L x 0.800" W x 0.130" H
Housing Drawing	LC800
Package Type	Surface Mount

Outline Drawing
(LC800 Package)



Application Notes:

LCFS synthesizer control protocol

The LCFS synthesizer is controlled by a 16 bit binary ($2^{16}=65536$) frequency control. Interface logic is LV (3.3 V cmos).

The control word addresses a custom lookup table in the built in microcontroller for the desired output frequency.

As an example a control word of all zeroes would address the first (lowest) frequency. By default upon power up this frequency will be loaded.

The next location would address the next higher frequency (lowest frequency + 1 frequency step).

The frequency control word is split into (2) 8 bit words along with a latch signal that differentiates between the low 8 bits and the high 8 bits.

This control structure allows the synthesizer to be controlled by an 8 bit parallel port plus an additional latch control line (9 bits).

Programming example: This spreadsheet calculates the control word and low and high 8 bits from the desired output frequency 275 to 550 MHz with a 5 MHz step

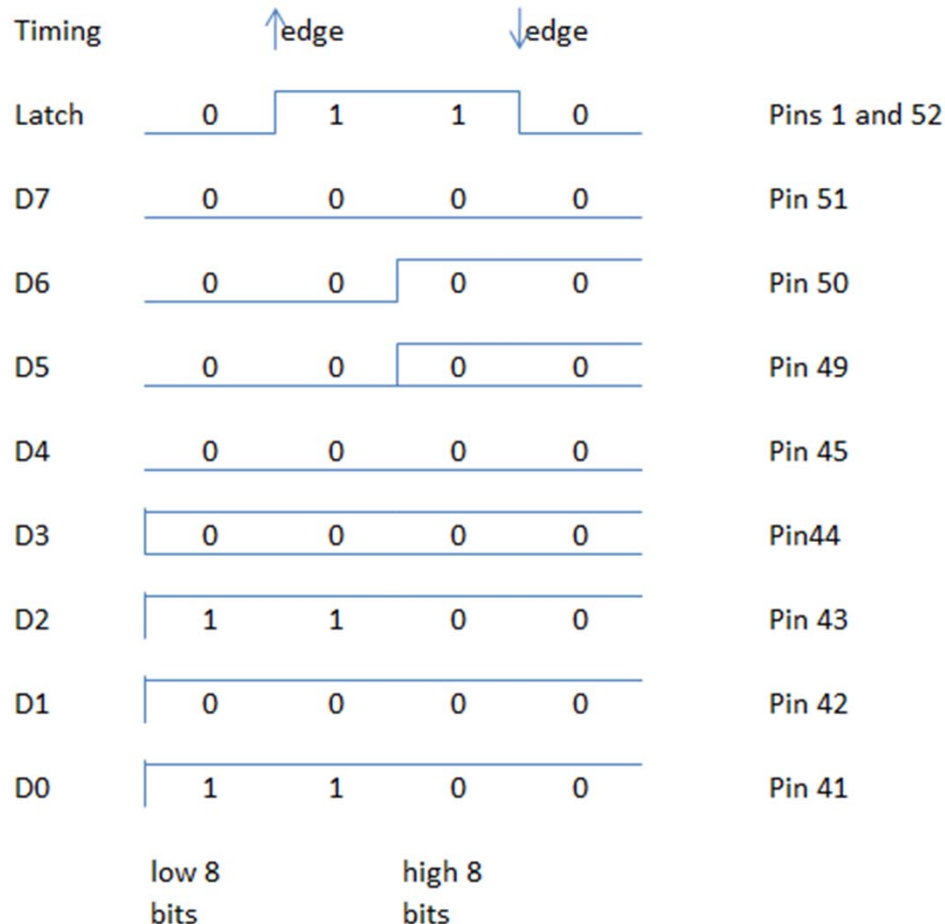
Fout	Control word = (Fout - 275)/5	Leading zeroes suppressed
Desired frequency: 300 MHz	Control word = 5 (base 10)	binary
Low 8 bits = the remainder of control word /256	Low 8 bits = 5 (base 10)	101
High 8 bits = int(control word/256)	High 8 bits: 0 (base 10)	0

IF the synthesizer is programmed with a control word that is beyond the highest step, the highest frequency will be output.

The additional bit is the latching signal. The rising edge latches the Low 8 bits and the falling edge latches the High 8 bits.

Programming sequence:

		(base 10)	
1 Program	5	Low 8 bits	output the low 8 bits
2 Program	5	Latch signal goes high	
3 Program	0	Latch signal still is high	
4 Program	0	Latch signal goes low	Causes the latch signal to fall, storing the High 8 bits. The output of the synthesizer will now change to the new frequency.



The demo board will be supplied with a similar spreadsheet along with some visual basic code that transfers . The frequency entered in the yellow cell to the USB to parallel converter located on the demo board.

Pinout Description

Pin 1 and 52	Latch 1 and Latch 2 Normally tied together. A rising edge on these pins latches the low control byte. A falling edge latches the High control byte.
Pins 2,3 and 40	No connection. Leave these pins open. (used for factory programming)
Pin 4	DC ground
Pins 5 and 6	+3.3 V dc power input
Pin 8-11	DC ground
Pin 12	RF ground
Pin 13	RF ground
Pin 14	RF ground
Pin 15	RF2A output
Pin 16	RF ground
Pin 17	RF ground
Pin 18	RF ground
Pin 19	RF ground
Pin 20	RF ground
Pins 21-34	DC ground
Pin 35	Lock detect output (High when locked/ low unlocked) internal 240 ohm series resistor can directly drive a lock LED to ground (5 mA source current).
Pin 36	DC ground
Pin 37	RF disable normally open. Ground this pin to blank the RF output.
Pin 38	Reference oscillator in/out (one or the other depending on model option) output 1k impedance. Input 50 ohms (1 dBm nominal)
Pin 39	Signal ground for Reference
Pin 40	No connection. Leave this pins open. (used for factory programming)
Pin 41	Data 0 LSB of the upper or lower 8 bit control word
Pin 42	Data 1
Pin 43	Data 2
Pin 44	Data 3
Pin 45	Data 4
Pin 46-48	Data ground
Pin 49	Data 5
Pin 50	Data 6
Pin 51	Data 7 MSB of the upper or lower 8 bit control word

Note: Ground unused RF outputs