M/A-COM

Surface Mount Frequency Synthesizer
IF 109 - 111 MHz

Features

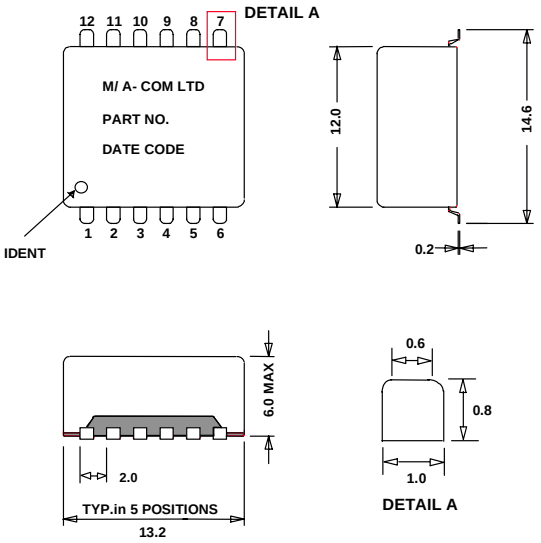
- Integrated VCO/PLL
- Miniature SMT Package
- Low Phase Noise
- +5V Operation

Description

The MLS9037-00110 synthesizer design integrates a high performance buffered VCO, PLL circuit and discrete loop filter in a surface mount package. The SMT packaging provides electrical shielding, easy PCB assembly and repeatable performance. The synthesizer is designed for use in CDMA base stations and is optimised for 115 MHz IF at the cellular Tx frequency with 20 kHz, step size and low phase noise.

M/A-COM synthesizers are manufactured in an ISO 9001 certified facility, incorporating surface mount assembly and automated electrical testing. This ensures consistent electrical performance and quality over volume production quantities.

12 Lead Package



Electrical Specifications[1], T_A = +25°C, V_{CC} = +5V , ΔF = 20 kHz, F_R = 15 MHz (unless otherwise stated)

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Frequency Range (F_{OUT})[2]	Over T_{OP}	MHz	109	—	111
RF Output Power (P_{OUT})[3]	Over T_{OP}	dBm	-3.0	—	+3.0
Harmonic Output	—	dBc	—	-35	-20
Spurious Output	Phase comparison frequency ($F_{OUT} \pm \Delta F$)	dBc	—	-85	-70
	Reference breakthrough ($F_{OUT} \pm F_R$)	dBc	—	-95	—
Phase Noise[4]	SSB at 100 Hz offset from carrier	dBc/Hz	—	-73	—
	SSB at 1 kHz offset from carrier	dBc/Hz	—	-92	-85
	SSB at 10 kHz offset from carrier	dBc/Hz	—	-112	-107
	SSB at 100 kHz offset from carrier	dBc/Hz	—	-134	—
Integrated Phase Noise	300 Hz to 3 kHz bandwidth	mrad rms	—	4	9
Frequency Switching Time[5,6]	Over F_{OUT}, measured to within ± 500 Hz	ms	—	30	—
VCO Supply Current (I_{CC1})	—	mA	—	15	20
PLL Supply Current (I_{CC2})	—	mA	—	7	10
VCO Supply Voltage (V_{CC1})	Recommended operating limit	V	+4.75	—	+5.25
PLL Supply Voltage (V_{CC2})	Recommended operating limit	V	+4.75	—	+5.25
Step Size (ΔF)[7]	Recommended operating limit	kHz	—	20	—
Reference Frequency (F_R)[8]	0.5 to 2.0 Vpp sine wave into a.c. coupled CMOS. Recommended operating limit	MHz	3	—	20

1. All specification limits are indicated values and apply over F_{OUT} and for 50 Ω load impedance.
2. Programming control is 3 wire serial CMOS or TTL levels, in accordance with National Semiconductor LMX 1511.
3. Output power window includes variation over operating temperature range (T_{OP}) -40°C to +85°C and output frequency range (F_{OUT}).
4. See plot for typical phase noise at other frequency offsets.
5. See plot for typical full band switching time measured to within other offsets from final frequency.
6. Integral PLL lock monitor output, TTL high locked, TTL low unlocked.
7. Device designed for loop bandwidth of 150 Hz.
8. Reference frequency input impedance 10 kΩ min.

V2.00

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Functional Configuration

Lead	Function	Lead	Function
1	Ground	7	Ground
2	Clock Input	8	Reference Frequency Input
3	V_{CC1} (VCO)	9	V_{CC2} (PLL)
4	PLL Lock Monitor Output	10	Data Input
5	RF Output	11	Strobe/Enable Input
6	Ground	12	Ground

Environmental Specifications

Devices are designed to function over the operating temperature range (T_{OP}) of -40°C to +85°C and after exposure to the shock, vibration, thermal shock and moisture conditions typically encountered in base station and other infrastructure environments.

Absolute Maximum Ratings[1, 2]

Parameter	Absolute Maximum
VCO Supply Voltage (V_{CC1})[3]	+6.5V
PLL Supply Voltage (V_{CC2})[3]	+6.5V
Reference Frequency Voltage	-0.3V to +6.5V
Data, Clock, Strobe Voltages	-0.3V to +6.5V
Storage Temperature (T_{STOR})	-45°C to +125°C
Solder Assembly Temperature	See App Note M2032

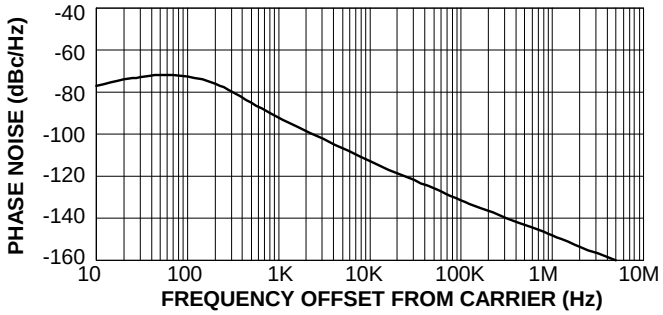
1. Exceeding these limits may cause permanent damage.
2. Static sensitive, observe appropriate handling precautions.
3. An external series resistor and bypass capacitor will allow operation at higher supply voltage and will improve power supply decoupling and noise suppression.

Ordering Information

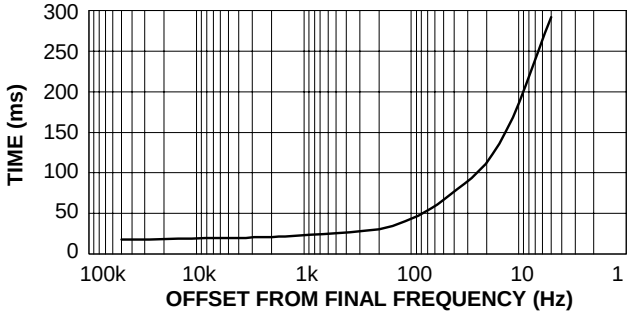
Synthesizers are available in either tape and reel or tube packaging. To order devices in tape and reel requires the suffix TR be added to the part number, i.e. MLS9037-00110TR. Quantity 500 per 13 inch reel, see Application Note M2030.

Typical Performance

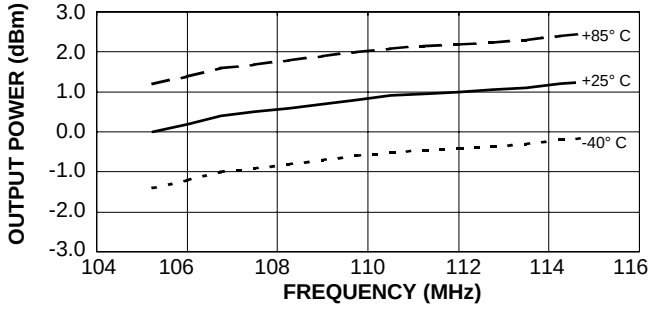
Phase Noise



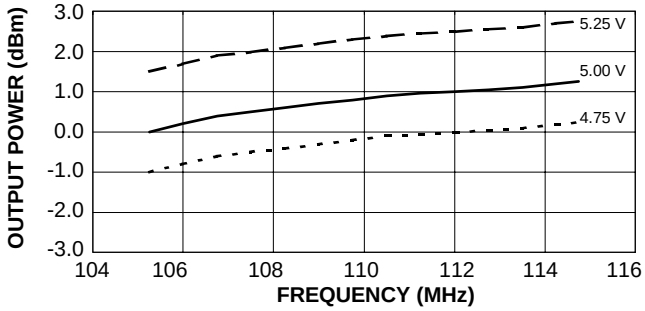
Full Band Switching Time



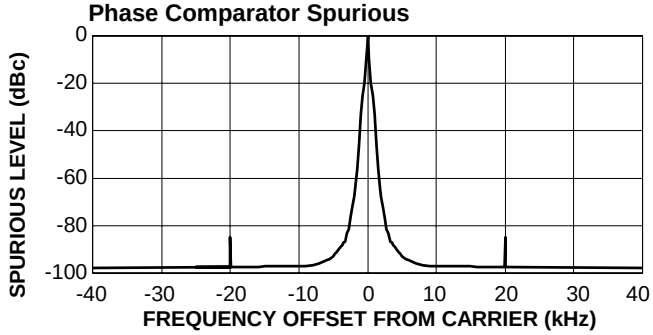
Output Power vs Temperature



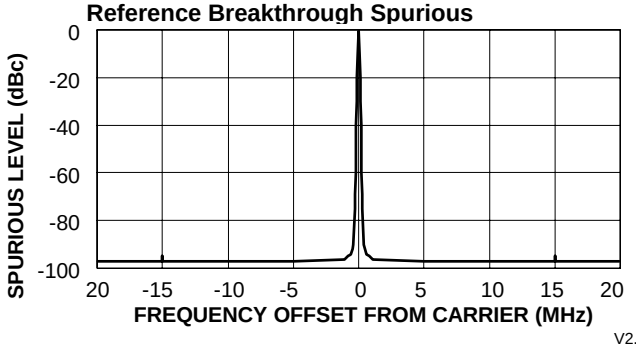
Output Power vs Supply Voltage (Vcc1)



Phase Comparator Spurious



Reference Breakthrough Spurious



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