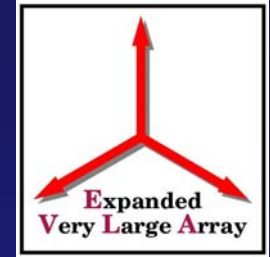


EVLA Synthesizers

Terry Cotter
LO/IF Group Leader



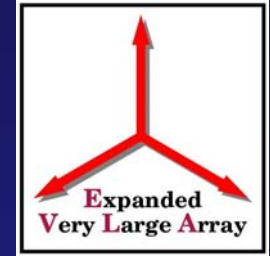
Local Oscillators



-
- 2 – 12-20 GHz per antenna
 - 4 – 10-15 GHz per antenna
 - Identical “Mother Boards”
 - Daughter cards
-

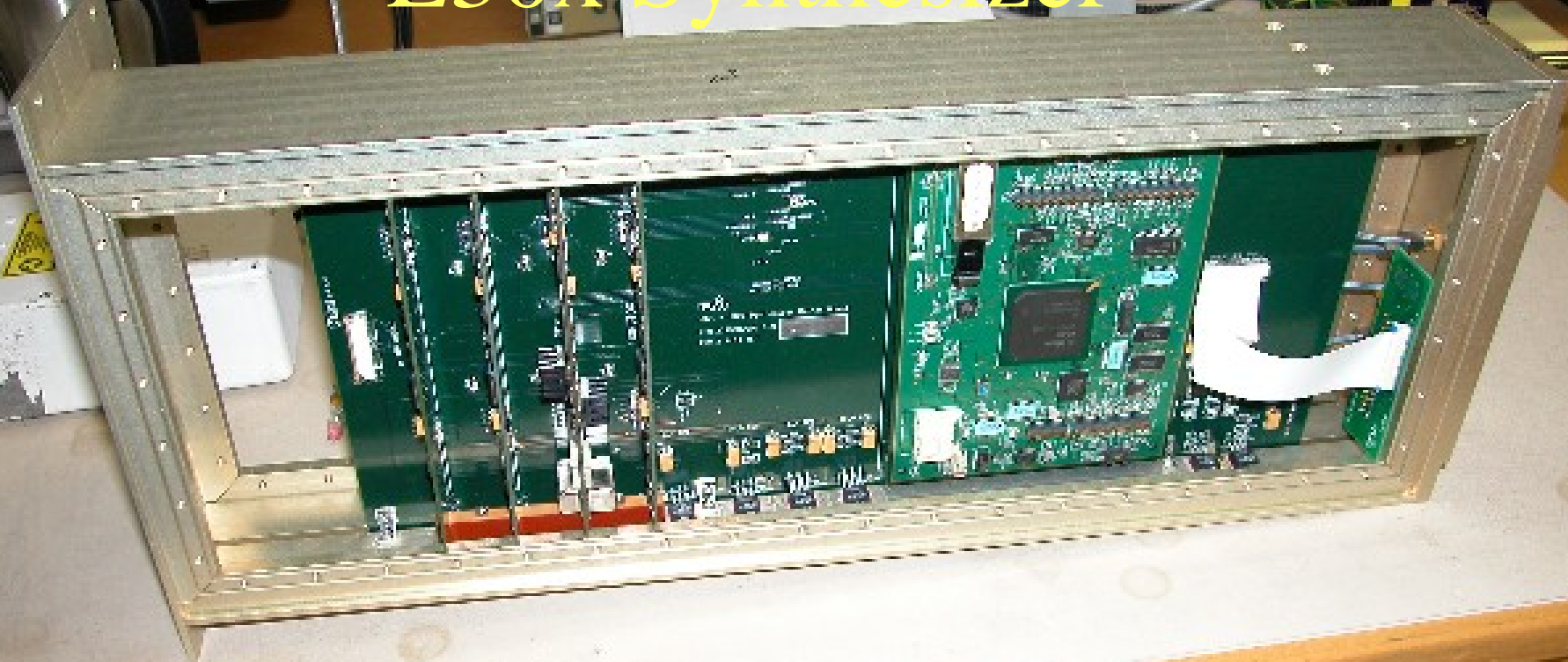


Module Features



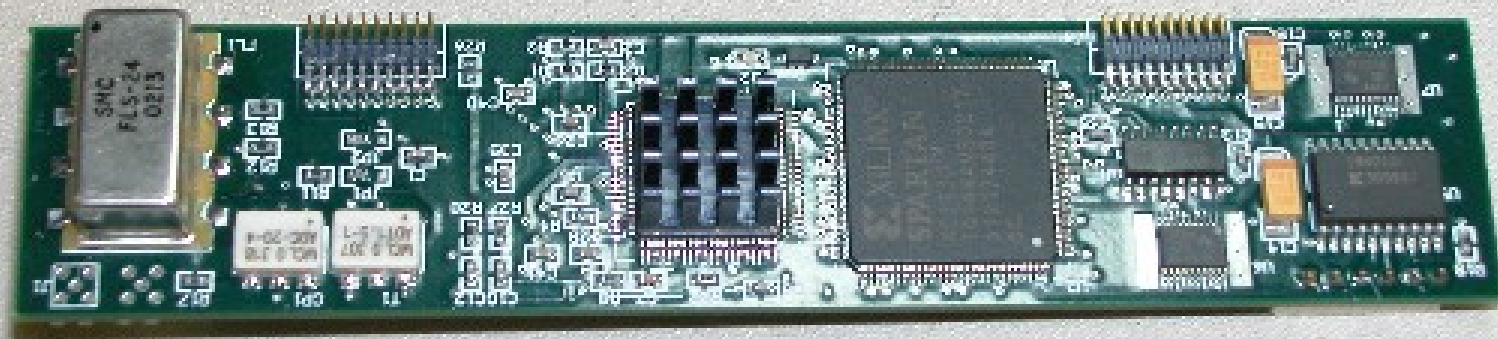
-
- Emphasis on Manufacturability
 - Emphasis on servicing
 - Labview to Calibrate / Troubleshoot

L30x Synthesizer



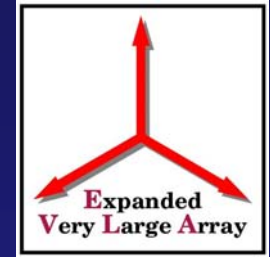
L30x Synthesizer showing Daughter Cards and MIB

Dual DDS Daughter Card





L301

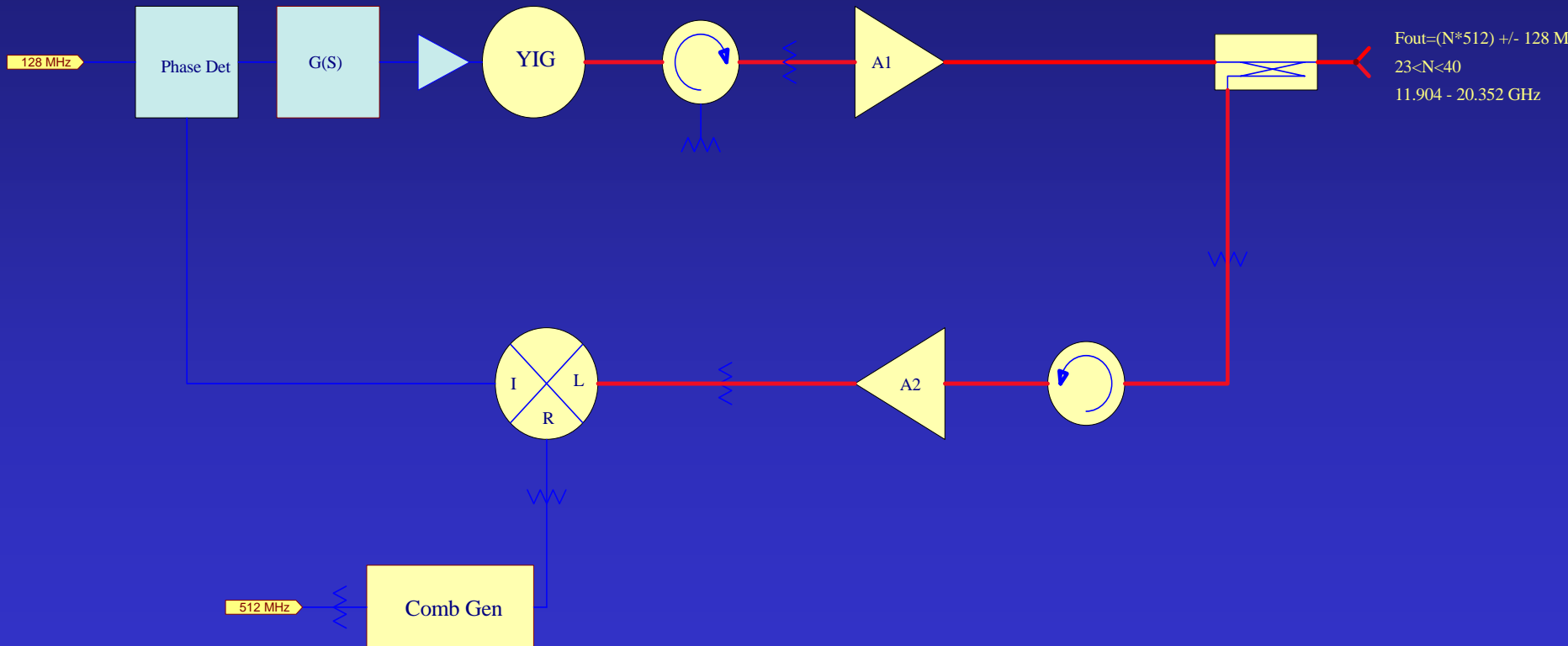
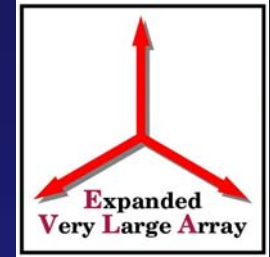


L301 Main Features

- 12 – 20 GHz EM YIG (18W @ 20 GHz)
- 256 MHz Step
- 128 MHz IF
- 512 / 128 Mhz Reference
- Phase Noise -115 dBc @ 100 kHz @ 14 Ghz
- ~ 13 fs 100 kHz to 1 Mhz

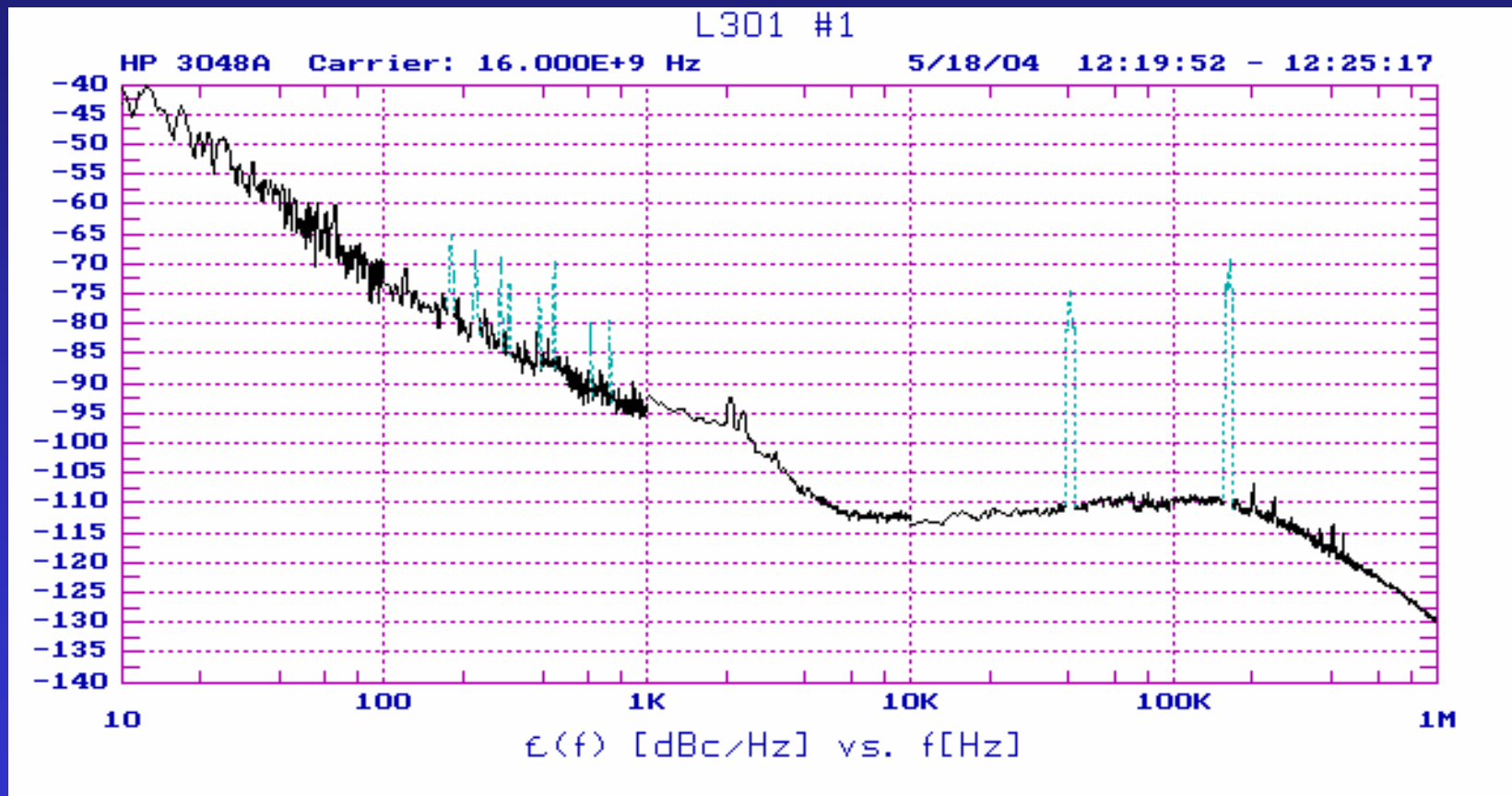
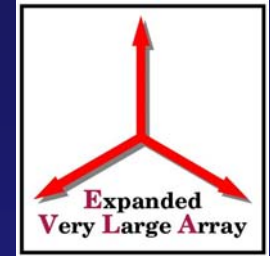


L301 Block



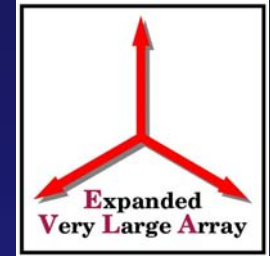


L301 Phase Noise





L301 Integrations



- 100 KHz – 1 Mhz
- 0.124 deg
- 21 fs
- -110 dBc @ 100 KHz
- 16 GHz
- “Bargain” reference source

Trace Integration

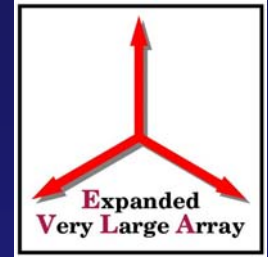
| Data Type | Start Freq (Hz) | Stop Freq (Hz) | Value of Definite Integral |
|-----------------|-----------------|----------------|-------------------------------------|
| 1. S ϕ (f) | 1 | 1.E+6 | -6.962 dB, 448.6E-3 Rad, 25.704035° |
| 2. S ϕ (f) | 100.E+3 | 1.E+6 | -53.32 dB, 2.156E-3 Rad, 123.5E-3° |
| 3. L(f) | | | |
| 4. L(f) | | | |
| 5. L(f) | | | |
| 6. L(f) | | | |
| 7. L(f) | | | |
| 8. L(f) | | | |
| 9. L(f) | | | |
| 10. L(f) | | | |

F1-List To Printer F3-Evaluate F5-*Omit Spurs F7-Data Type

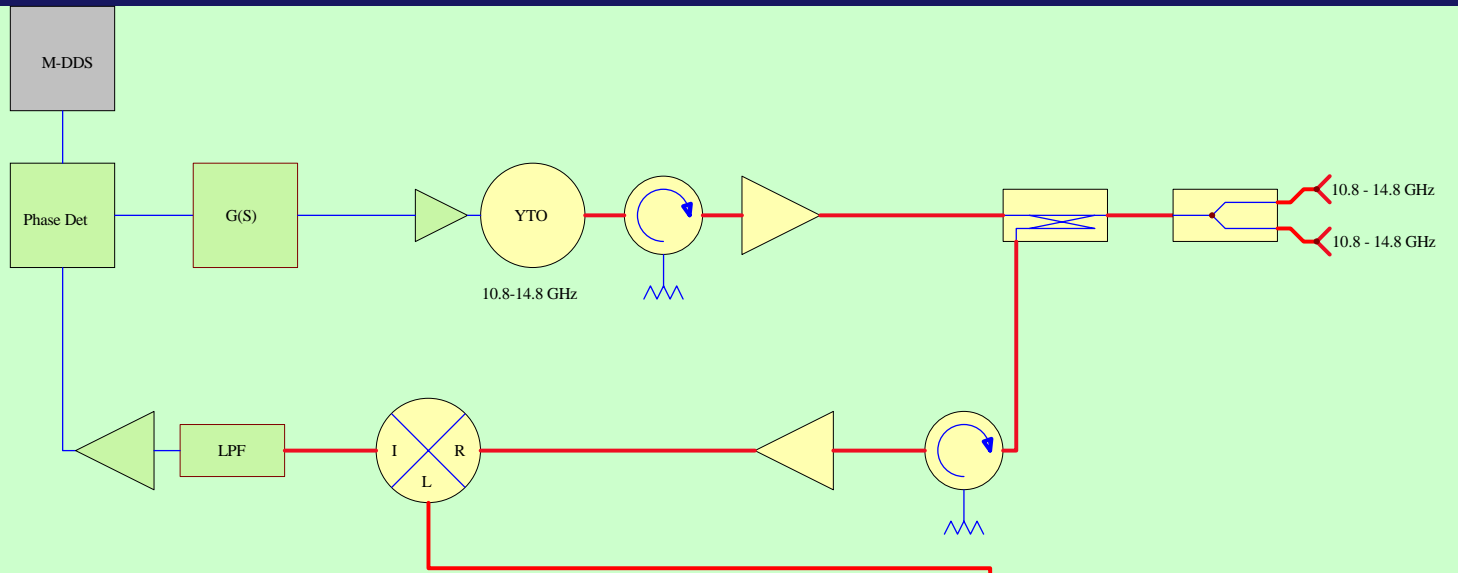
HP 3048A A.01.01 Copyright (c) Hewlett-Packard Co., 1990 - 1994



L302

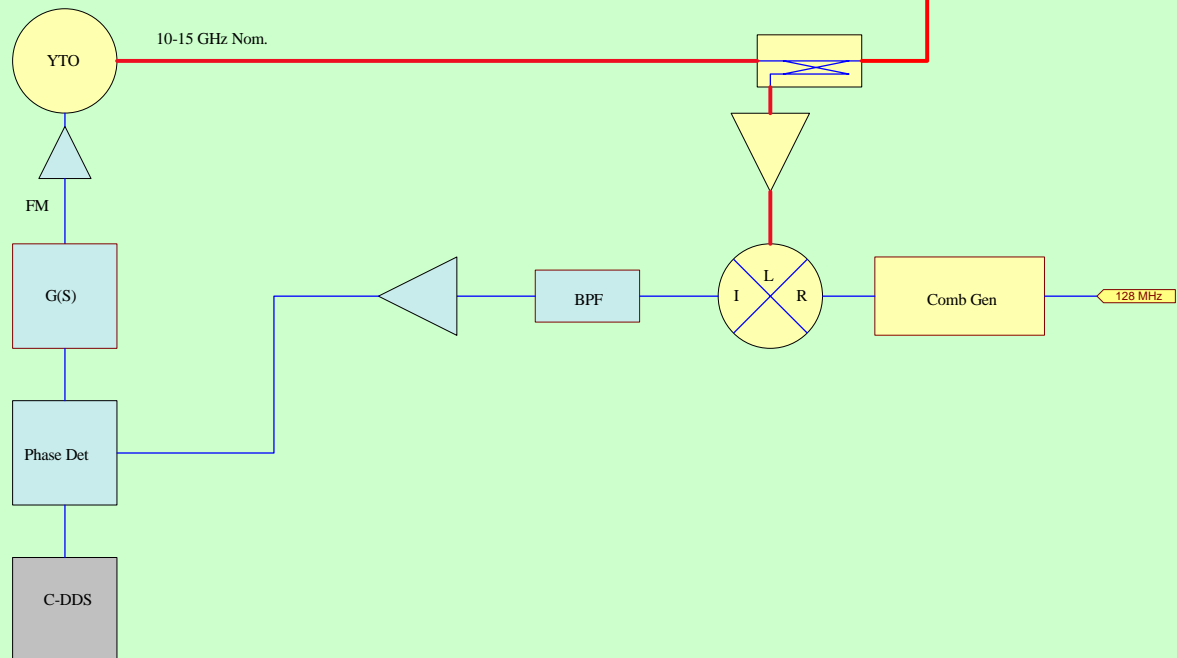


-
- 10.8 – 14.8 GHz PM YIG (3W @ 10 GHz)
 - Dual Loop
 - Continuous Tuning (DDS Resolution)
 - 128 MHz Reference
 - Phase Noise -104 @ 100 kHz @ 12 GHz
 - 38 fs (100 kHz to 1 MHz)
-



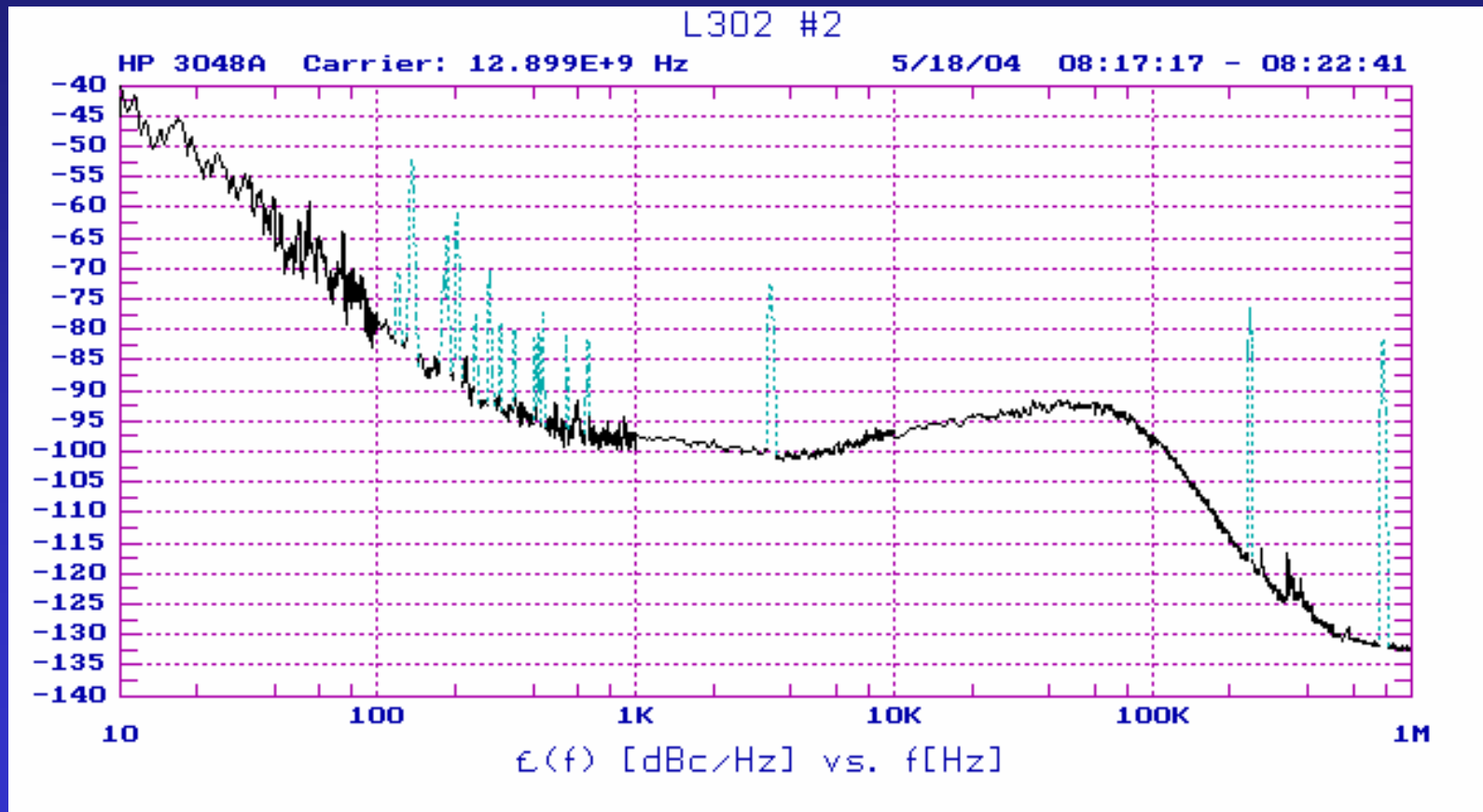
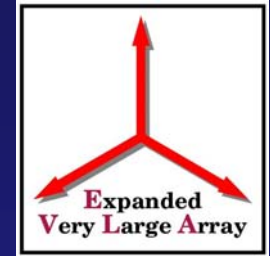
"MAIN LOOP"

"CONTROL LOOP"



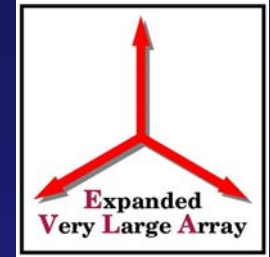


L302 Phase Noise





L302 Integrations



- 100KHz - 1MHz
- 0.172 deg
- 37 fS
- -97 dBc @ 100 KHz
- 12.9 GHz
- “Bargain” reference source

Trace Integration

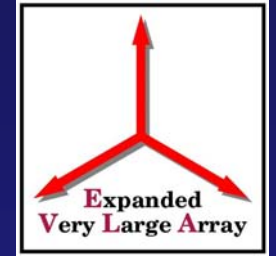
| Data Type | Start Freq (Hz) | Stop Freq (Hz) | Value of Definite Integral |
|-----------------|-----------------|----------------|-------------------------------------|
| 1. S ϕ (f) | 1 | 1.E+6 | -7.733 dB, 410.4E-3 Rad, 23.519242° |
| 2. S ϕ (f) | 100.E+3 | 1.E+6 | -50.42 dB, 3.012E-3 Rad, 172.5E-3° |
| 3. L(f) | | | |
| 4. L(f) | | | |
| 5. L(f) | | | |
| 6. L(f) | | | |
| 7. L(f) | | | |
| 8. L(f) | | | |
| 9. L(f) | | | |
| 10. L(f) | | | |

F1-List To Printer F3-Evaluate F5-Omit Spurs F7-Data Type

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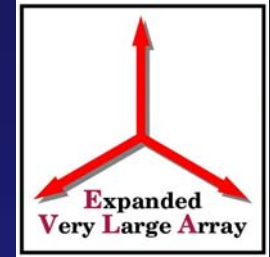
Software



-
- Common Tasks
 - “Smart” Image Loading
 - Cal factors stored in synth EEPROM

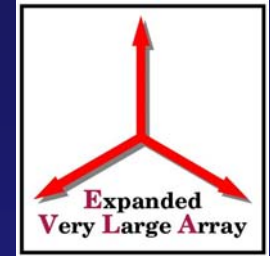


Phase v. Temp L302's v. 128 ref





Integrated Module



- Cost reduction ~\$3 - \$4K in quantity
- Integrated RF “Output” module.
- Sampling Mixer v. Comb gen / Mixer
- Ability to monitor actual frequencies of DDS and Microwave in L302.
- Ability to monitor frequency to ≥ 18 GHz in L301.
(Prescaler not spec'd, but probably functional)