Preliminary Design Review

EVLA

1st and 2nd Local Oscillators
Specifications – 1st LO

• 12-20 GHz
  – $F_o = (n \times 512 \text{ MHz} +/- \text{FTS})$ where $23 \leq n \leq 40$
  – Tuning Span $F_o +/- \text{TBD}$

• Phase Noise
  – -90 dBc @ 10 kHz @ 20 GHz (x fs)
  – -107 dBc @ 100kHz @ 20 GHz (x fs)

• Output Power
  – +14 dBm +/- 0.5 db
1st LO YIG

- Electromagnetically Tuned YIG oscillator by Micro-Lambda
- Integrated Drivers
- Requires +15 VDC @ 700mA and +24 VDC @ 50 mA
- 1.75” Cylinder
Specifications - 2nd LO

- 10.8 – 14.8 GHz
  - \( F_o = n \times 128 \pm \text{FTS} \) where \( 84 \leq n \leq 116 \)
  - Tuning Span: \( F_o \pm \text{TBD} \) (almost continuous)
- Phase Noise
  - -90 dBc @ 10 kHz @ 14.8 GHz
  - -105 dBc @ 100 kHz @ 14.8 GHz
- Output Power
  - +14 dBm +/- 0.5 dB
2nd LO YIG

- Permanent Magnet YIG Oscillator by Micro-Lambda
- Integrated Drivers
- Requires +/- 12 VDC @ 365 & 165 mA and +15 VDC @ 50 mA
- ~ 7.2 Watts

1” Cube
General Functional Description

- Power on reset – report back “OK”
- MIB Frequency command
- Coarse tune loop (prescaler + MIB)
- AGC DAC set to cal data
- Loop Closes, Lock to comb +/- FTS
- Output tracks FTS
- Only monitor data reported back, FTS operates “autonomously” reducing M/C load & RFI
• Herotek Comb Generator
  – 128 or 512 MHz @ 0 dBm input
  – Integrated driver amplifier, +15 VDC @ 200mA
  – “Like” GC526, GC100
• Equalizer (Custom Matched)
• Band Pass Filter
• Splitter (2 or 4-way)
Block Diagram

- YIG
- Isolator
- Prescaler Coupler
- AGC Amplifier
- Output Coupler
- Output Splitter
- Mixer L port

- Mixer R Port
  - Comb Generator
  - Equalizer
  - BPF
  - Splitter (2 or 4 Way)
Block Diagram

- Mixer I port
- Band Pass Filter (128 MHz)
- IF Amplification
- Band Pass Filter
- Divider
  - Lock Detector
  - Phase Detector
- Phase Detector
- Loop Filter
- FM Coil Driver
- (Loop Closed)
Design Considerations

- MIB handles most functions
- Onboard SRAM holds cal data, etc.
- No Mechanical Adjustments
- SPI bus devices – DAC’s, ADC’s and digital potentiometers
- Design in flexibility in prototype – “EVB”
RFI Considerations

- Comb line filtered at source
- Continuous wire mesh gaskets
- Front panel ??
- Prescaler
- Non–RF connectors minimally sized
Monitor and Control Points

• Monitor
  – O/P Power
  – FTS Power
  – Lock
  – YIG Heater I
  – PLL V and I
  – Frequency (1 MHz)
  – Temperature

• Control
  – YIG Main Tune
  – AGC
  – Reset
  – FTS Parameters
  – Various Calibration capabilities (NO MECHANICAL!)
Front Panel

- Lock indicator (not uP dependant)
- Frequency
- FTS Sample
- Reference / Clock Sample
- FM coil Voltage / (selectable)
Questions