

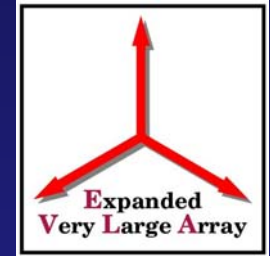
EVLA IF/LO

EVLA “LOW BAND” CONVERTERS

For 4/P/L/S/C and Ku Bands



Low-Band Converter Modules

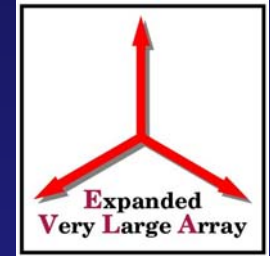


Module

L301	4/P-Band Converter
L302	L/S/C-Band Converter
L303	Ku-Band Converter
L310	Converter Interface Module
L320?	Phase Cal (PCAL) Generator
ASSY	20dB Solar Attenuators



Converter Frequencies



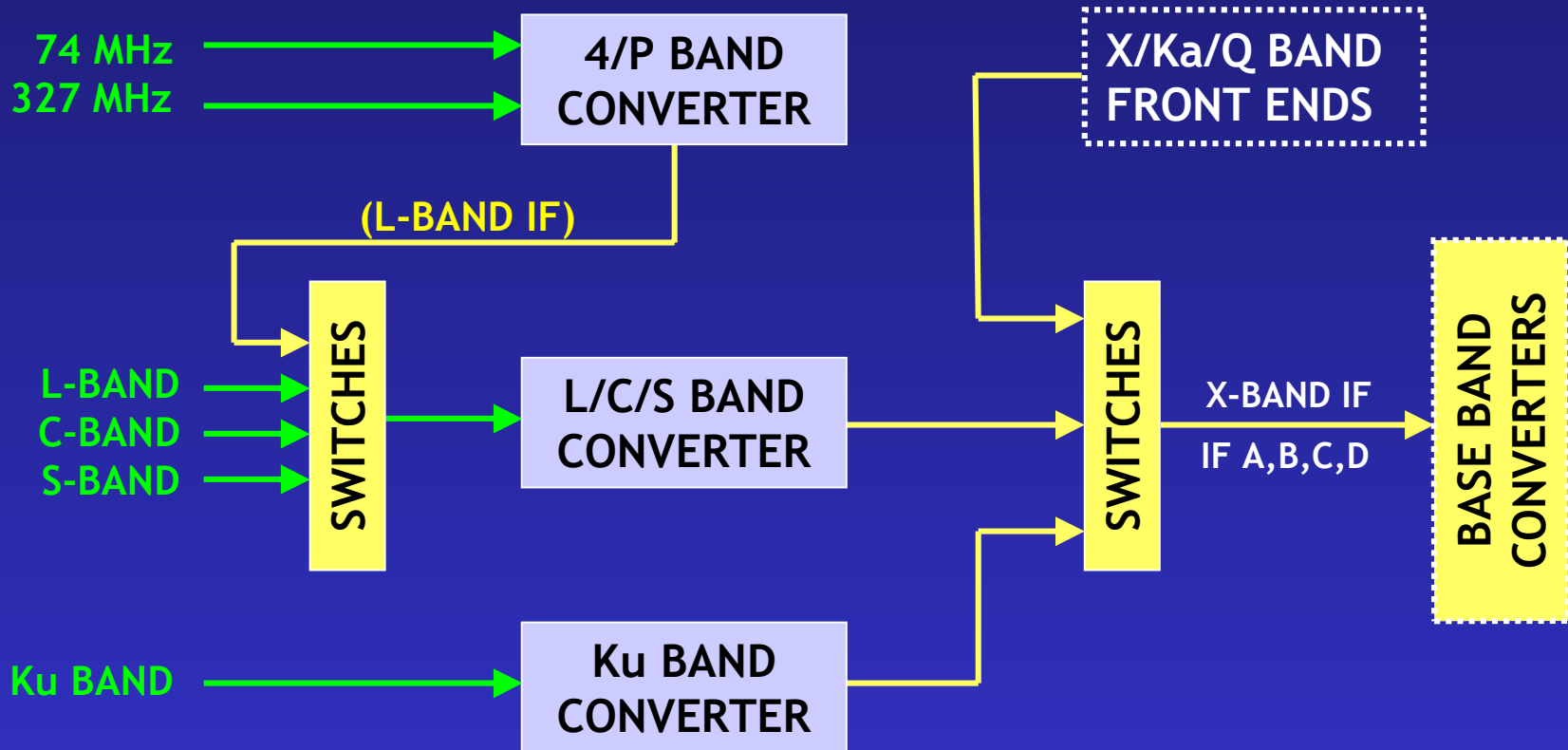
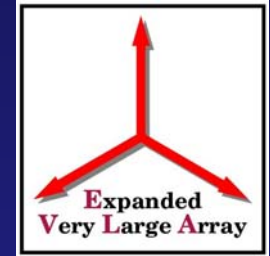
		RF	1st IF
L301 (L)	(4)	73 – 75 MHz	1097–1099 MHz
(L)	(P)	308–348 MHz	1332–1372 MHz
L302 (X)	(L)	1 – 2 GHz	12–11 GHz
(X)	(S)	2 – 4 GHz	11 – 9 GHz

~~(C) 4 – 8 GHz 12 – 8 GHz~~



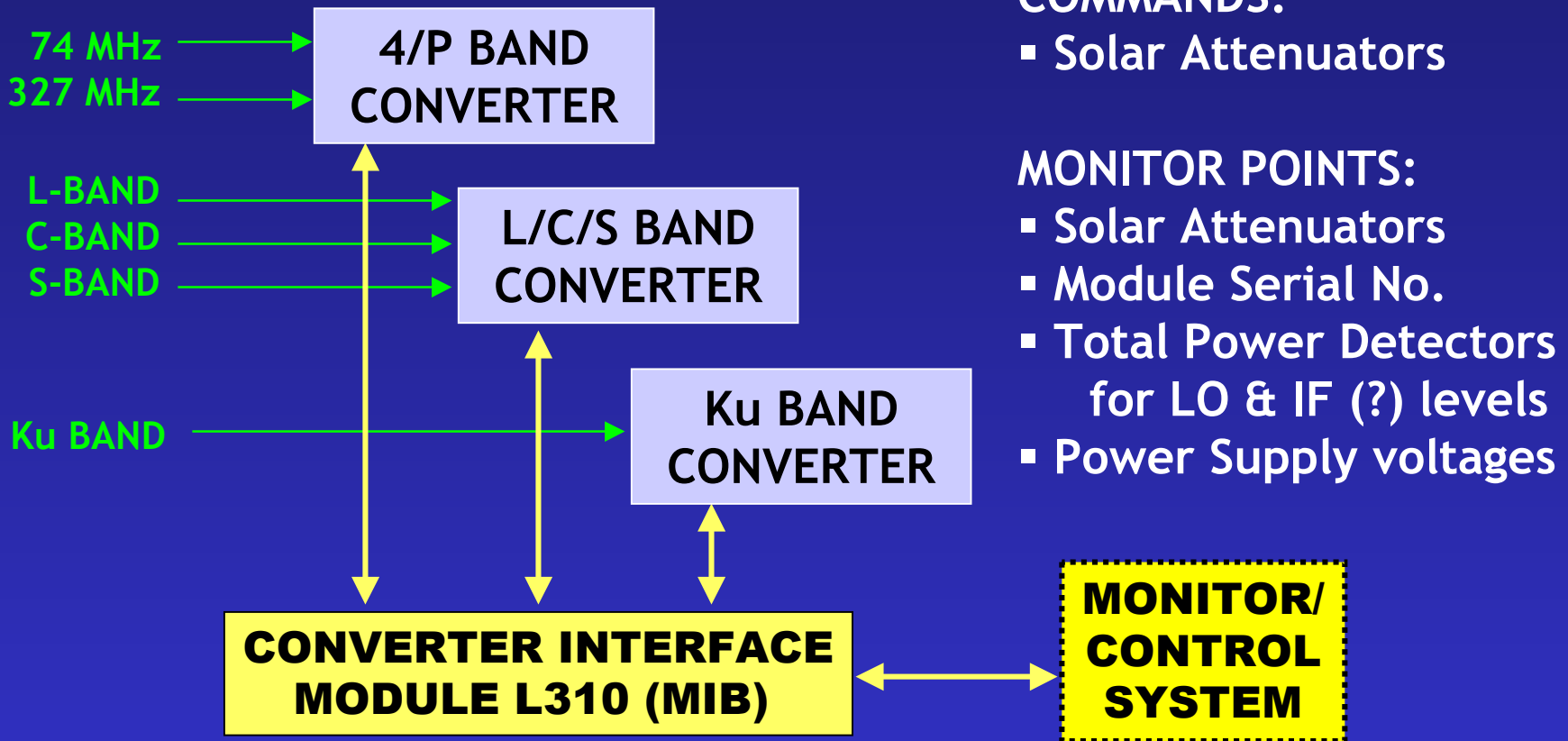
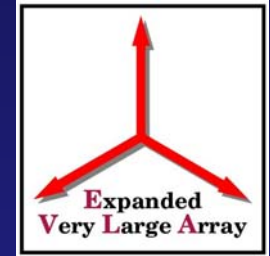
Low Band Converters

RF/IF Signal Flow





Low Band Converters Monitor/Control



COMMANDS:

- Solar Attenuators

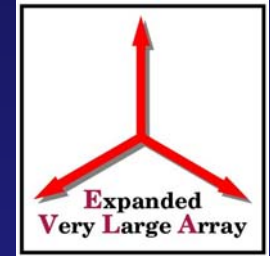
MONITOR POINTS:

- Solar Attenuators
- Module Serial No.
- Total Power Detectors for LO & IF (?) levels
- Power Supply voltages



L301 4/P-Band Converter

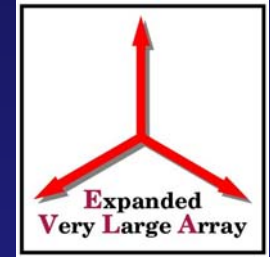
4-Band Specs



- Input Frequency: 74 MHz (73-75 MHz)
- Bandwidth: 2 MHz *Narrow Band*
- Input Power: -35 dBm/2 MHz
-62 dBm/GHz
- P1dB of Converter: +12 dBm
- Headroom: ~74 dB



L301 4/P-Band Converter 4-Band Specs

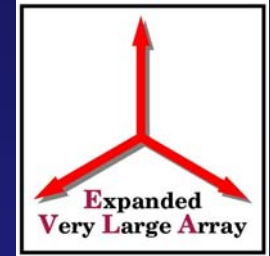


- LO: 1024 MHz @ +3dBm
- IF Frequency: 1097-1099 MHz
Narrow Band
- IF Output Power: -47 dBm/GHz
(To be compatible with L-Band Converter input)
- IF flatness: $\ll 1$ dB/2 MHz
- IF-IF Isolation: >65 dB



L301 4/P-Band Converter

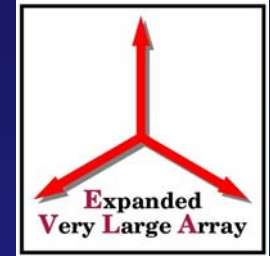
P-Band Specs



- Input Frequency: 308-348 MHz
- Bandwidth: 40 MHz *Narrow Band*
- Input Power: -35 dBm/40 MHz
-50 dBm/GHz
- P1dB of Converter: +12 dBm
- Headroom: ~62 dB



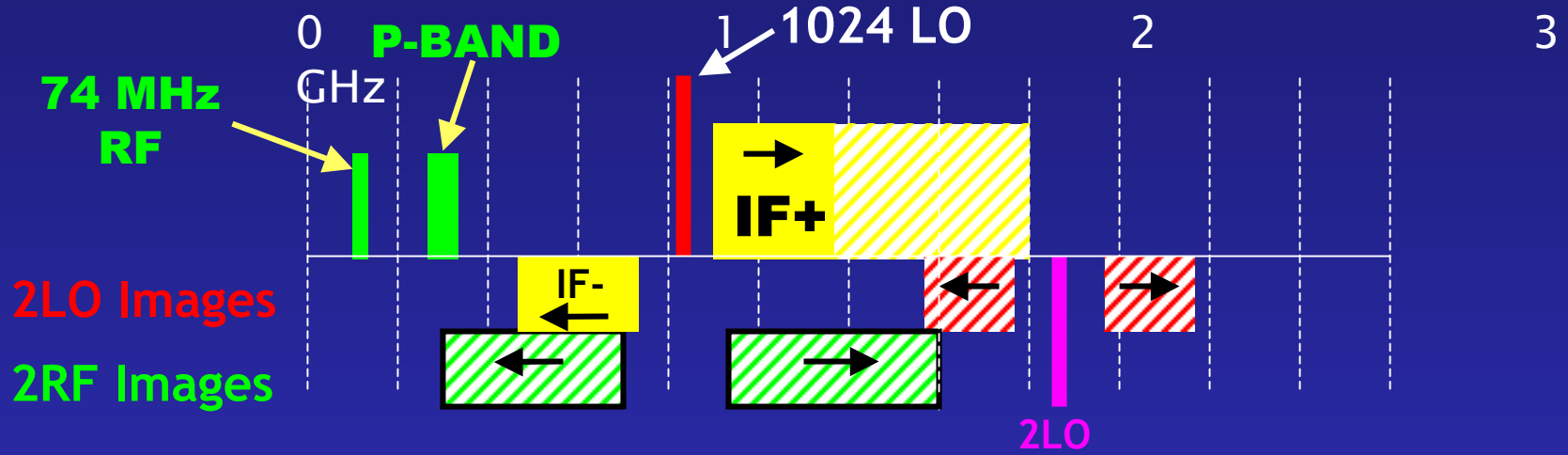
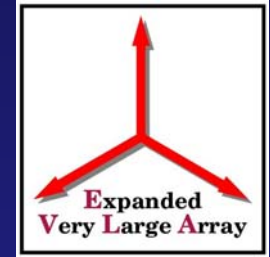
L301 4/P-Band Converter P-Band Specs



- LO: 1024 MHz @ +3dBm
- IF Frequency: 1332-1372 MHz
Narrow Band
- IF Output Power: -47 dBm/GHz
(To be compatible with L-Band Converter input)
- IF flatness: <1 dB/40 MHz
- IF-IF Isolation: >65 dB



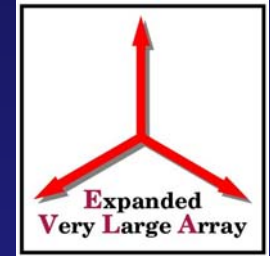
L301 4/P-Band Converter RF-LO-IF Elements



LO:	← 1024 MHz →	
RF:	73 - 75 MHz	308 - 348 MHz
IF:	1097 - 1099 MHz	1332 - 1372 MHz



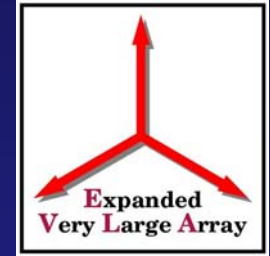
L301 4/P-Band Converter Design Notes



- 2-wide module (high RF connector count)
- Surface mount components on a PCB (filters are thru-hole devices), mounted in RFI enclosures within the module
- Coaxial components: Solar attenuators and additional LO reject filters (if req'd)
- Simultaneous 4- and P-Band observing



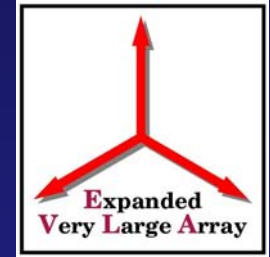
L301 4/P-Band Converter Design Notes



- Amplifiers are new GAL-series high-isolation ($>20\text{dB}$) DC-8 GHz SMC devices, inexpensive.
- IF bandpass from high-pass and low-pass filters for better flatness and roll-off; 50% the cost of a 1-2 GHz BPF, and to customize BW if req'd.



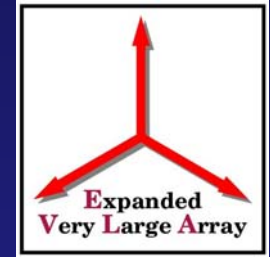
L302 L/S/C-Band Converter Specs



- Input Frequency: 1 – 8 GHz
(L, S or C-Band singly)
- Input powers:
 - 46 dBm/GHz *L-Band*
 - 51 dBm/GHz *S-Band*
 - 50 dBm/GHz *C-Band*
- P1dB of converter: +10 dBm
(Miteq JN2 amplifiers)
- Headroom: >60 dB



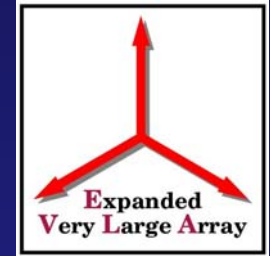
L302 L/S/C-Band Converter Specs



- LO Frequencies: 13 (*L/S*) & 16 (*C*) GHz
- LO Power: +3dBm (+14 available)
- IF Frequencies:
(inverted) 12-11 GHz (*L-Band*)
11- 9 GHz (*S-Band*)
12- 8 GHz (*C-Band*)
- Output IF Power: -51 dBm/GHz
- IF Flatness: <1 dB/200 MHz



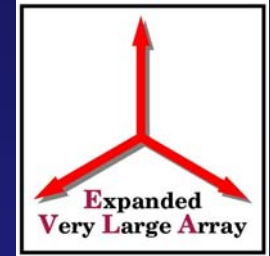
L302 L/S/C-Band Converter Design Notes



- 2-wide module (high RF connector count)
- Most components are coaxial (SMA's)
- No front panel controls or monitors for RFI
- Coordinating with FE lab for selection of COTS amplifiers/isolators for cost savings
- Provision for solar attenuators if required
- Single band selected by external switches



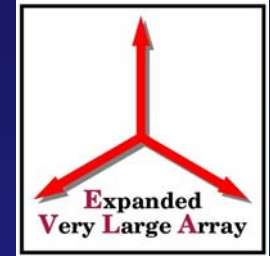
L303 Ku-Band Converter Specs



- Input Frequency: 12-18 GHz
 - > 12-16 GHz (*Ku-LO*)
 - > 14-18 GHz (*Ku-HI*)
- Input powers: -71 dBm/GHz *Transition*
-50 dBm/GHz *Final*
- P1dB of converter: +5 dBm (JN4 amplifiers)
- Headroom: >55 dB *Final*



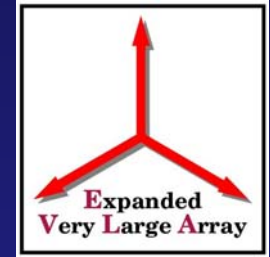
L303 Ku-Band Converter Specs



- LO Frequencies: 12 x2= 24 GHz (*Ku-LO*)
13 x2= 26 GHz (*Ku-HI*)
- IF Frequencies: 12- 8 GHz (*Ku-LO*)
12- 8 GHz (*Ku-HI*)
- Output IF Power: -51 dBm/GHz
- IF Flatness: <1 dB/200 MHz



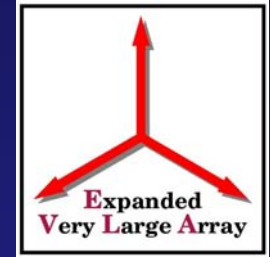
L303 Ku-Band Converter Design Notes



- *Transition Phase:* L303 2-wide module
- *Final Phase:* on-receiver converter plate
- All components are coaxial (no waveguide)
- Coordinating with FE lab for selection of COTS amplifiers/isolators for cost savings
- RF connectors 2mm (?) on back panel
- Includes Solar Attenuator assembly if req'd



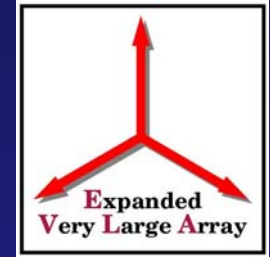
L303 Ku-Band Converter Transition Phase



- Uses existing VLA Ku front end (Dewar)
- Bypass existing 14 GHz mixer, use output of RF LNA directly (-77dBm)
- Add 20dB amplifier to Ku FE at Dewar
- Heliax run from Dewar to L303 converter
- L303 converter built as 2-wide VLA module



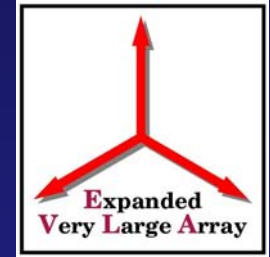
L303 Ku-Band Converter Final Phase



- Uses new Ku front end (VLBA style)
- L303 module will be dismantled and reassembled as an on-receiver converter plate
- Amplifiers and Heliax runs removed
- Amplifier gains adjusted to maintain -51 dBm/GHz X-band output



L310 Converter Interface Module



- Will contain monitor and control functions of the L301, L302 and L303 Converters.
- Monitor/control requirements are very light, requiring only one MIB; mostly analog
- MIB in interface module reduces digital and processor RFI in the converter modules.
- Design pending MIB specifications.



CROCK

