**Appendix 1:**

**Monitor Channel Filtering:**



Figure :IN to INPUT Mon

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Figure : In to OUtput Mon

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Figure : Output Adjust to VCO

**Appendix 2: Harmonic Distortion**

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Figure : Harmonic Distortion In to VCO out

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Figure : Harmonic Distortion In to f/phi out

**Appendix 3: Noise Measurements**

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Figure : VCO out noise spectra, log space

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Figure :f/φ Out noise spectra, log space on frequency axis

**Appendix 3: Transfer Functions**

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Figure : IN 1 to VCO out, D3 down transfer function

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Figure : Transfer Function: In to f/φ: D2, D12, D13, and D14 down

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Figure : In to f/φD2 and D15 down transfer function

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Figure : transfer function from IN to INMON DAQ channel

Figure : In to Control mon TF

 **High frequency transfer functions**

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Figure : IN to VCO out



Figure : IN to f/phi high frequency transfer function

Appendix 3: Closed loop transfer functions

Figure : Two frequency difference dividers, PLL in default configuration (all swtiches up)



Figure : Two frequency difference dividers, +32dB of gain and both compensation filters engaged (LF+HF)



Figure : One frequency difference divider (normal VCO) and default settings on PLL



Figure : Normal VCO (1 FDD) +16dB of gain, LF and HF compensation filters on