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Measurements of Crosstalk and High Frequency Signal Suppression for the Main Injector BPM Transition Board

Setup:

A network analyzer 8751A was used to measure the high frequency signal suppression and crosstalk between channels of the Main Injector transition board. Transition board 555738 was used for all measurements. The board was set to gains of 25dB (0X7F05) for the 2.5MHz channel and 28dB (0XFF05) for the 53MHz channel. The port power of the network analyzer was set to -46dBm to avoid saturation of channels and exceeding the acceptable input power of the network analyzer. The sweep range for all discussed measurements is 200kHz to 500MHz.

Summary:

Each channel of the board was examined for crosstalk to the neighboring channels. Reference $|S_{21}|$ measurements were made on each A channel and stored in memory. Then, measurements were made of the two closest channels to the A channel under examination. Graphs of all the measurements are included at the end of this document.

Conclusions:

The measurements revealed that the worst crosstalk occurs during the pass-band of the 53MHz filter. It is interesting to note that the crosstalk is not the same for all channels on the transition board. The first channels on the board have the best isolation and the isolation gets progressively worse as we measure down the rest of the channels on the board. The best isolation between a pair of A and B channels is channel 1 with 72.3dB at 52.7MHz and the worst isolation is channel 4 with 35.24dB at 52.7MHz.

The suppression of high frequency signals was found to be more than adequate for the Main Injector BPM system. Using 52.7MHz as a reference, the signal is attenuated 56.2dB at 100MHz, 75.2dB at 200MHz, and 89.1dB at 300MHz. See Figure 5 at the end of this document for these measurements.

Figure 1

MI BPM Transition Board Crosstalk: Channel 1

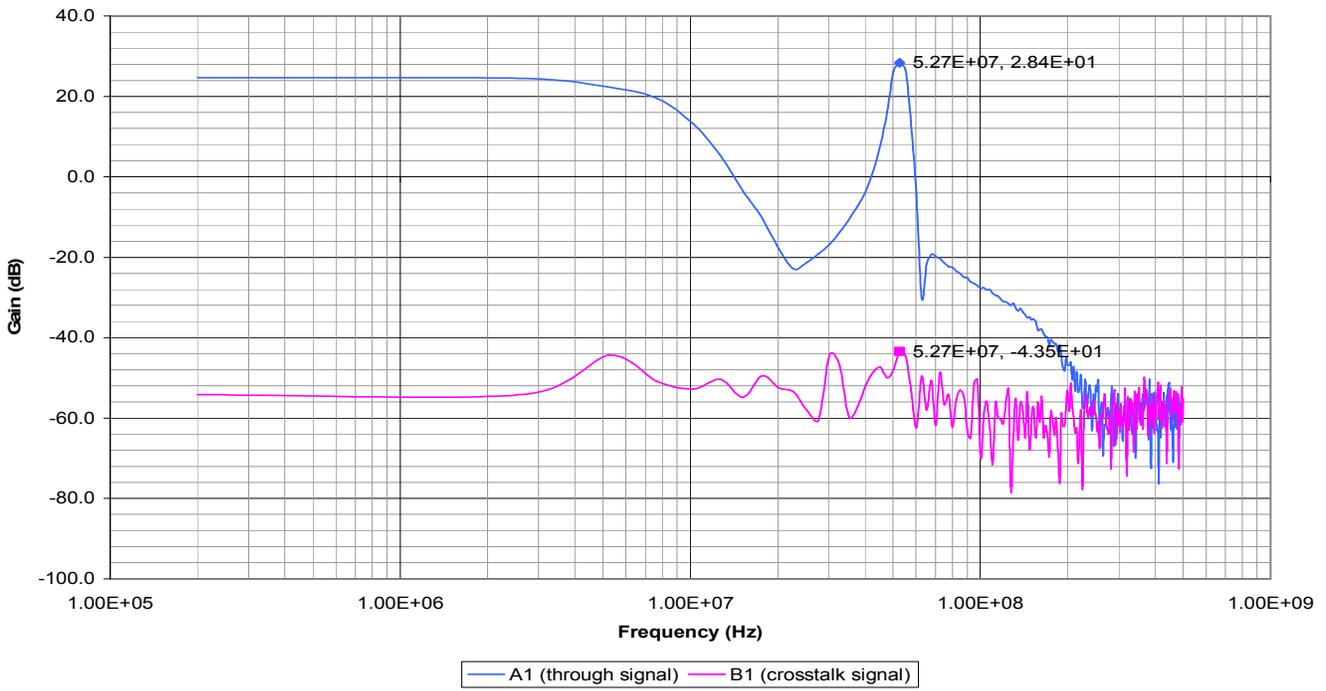


Figure 2

MI BPM Transition Board Crosstalk: Channel 2

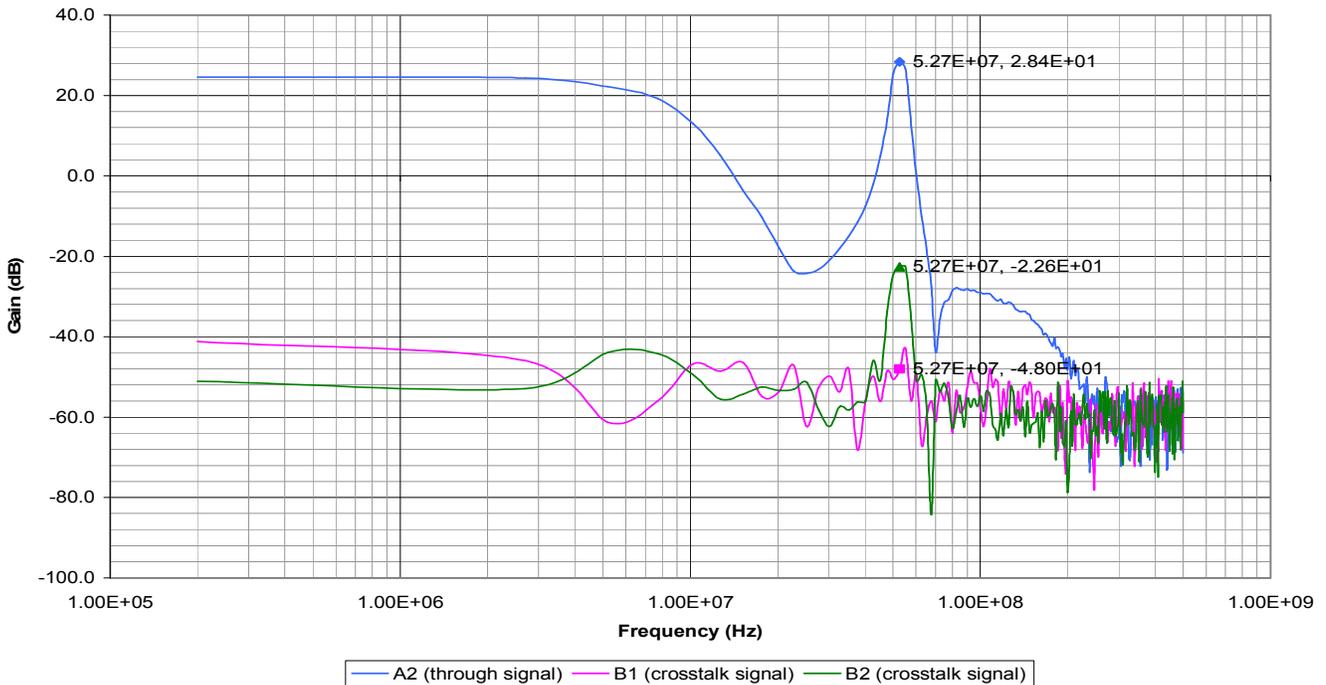


Figure 3

MI BPM Transition Board Crosstalk: Channel 3

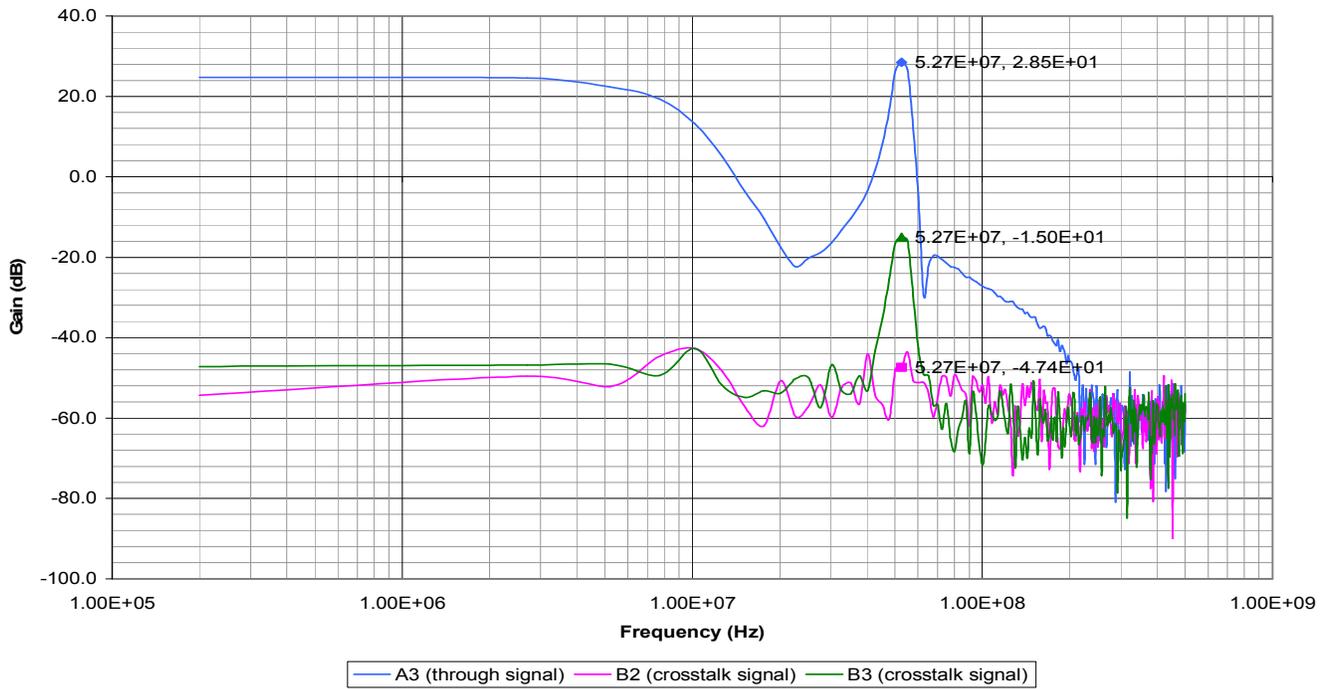


Figure 4

MI BPM Transition Board Crosstalk: Channel 4

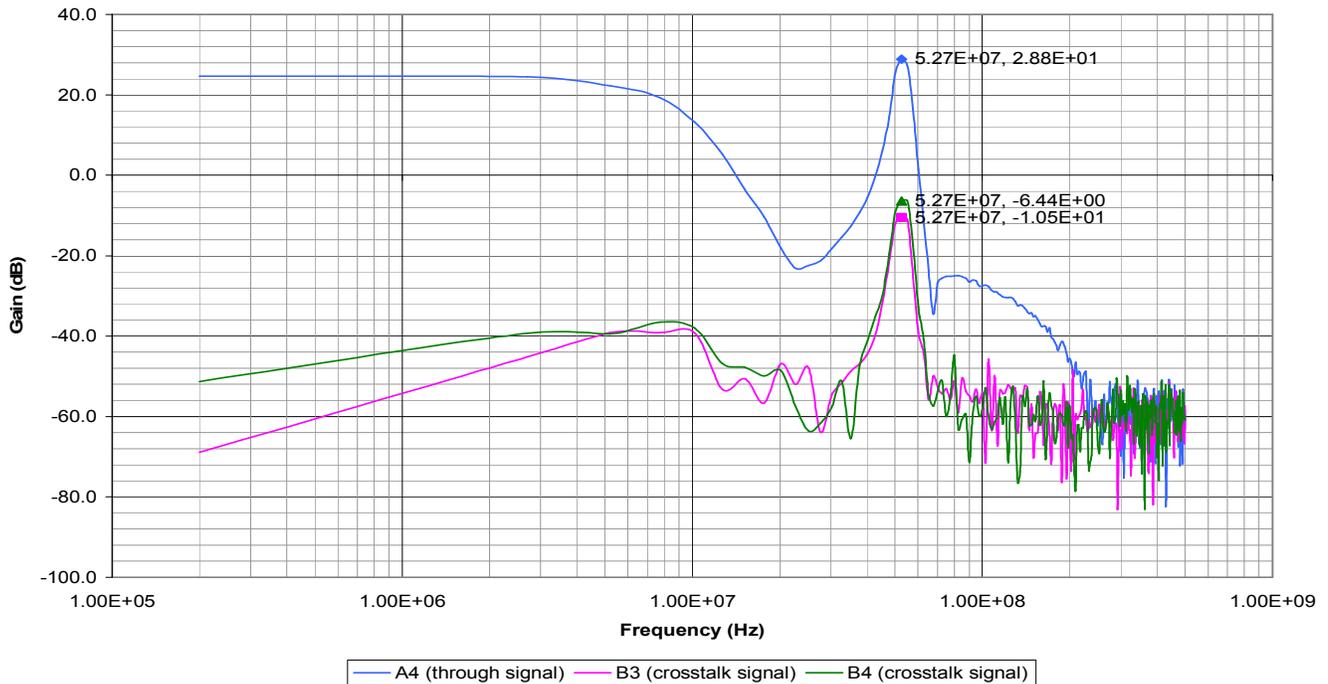


Figure 5

MI BPM Transition Board High Frequency Signal Suppression: S21 of Channel A1

