ADC12J4000 Spectrum Evaluation

Harmonic/spur behavior of folding-interpolating ADC core

Setup

- Fs = 2700 MSPS
- DDC Bypass Mode
- Foreground Calibration Mode with Timing Calibration Enabled
- Fin = 2026, 2027, … 2050, 2362.5 etc. MHz
- Tones around 3/4Fs aliase to 675MHz

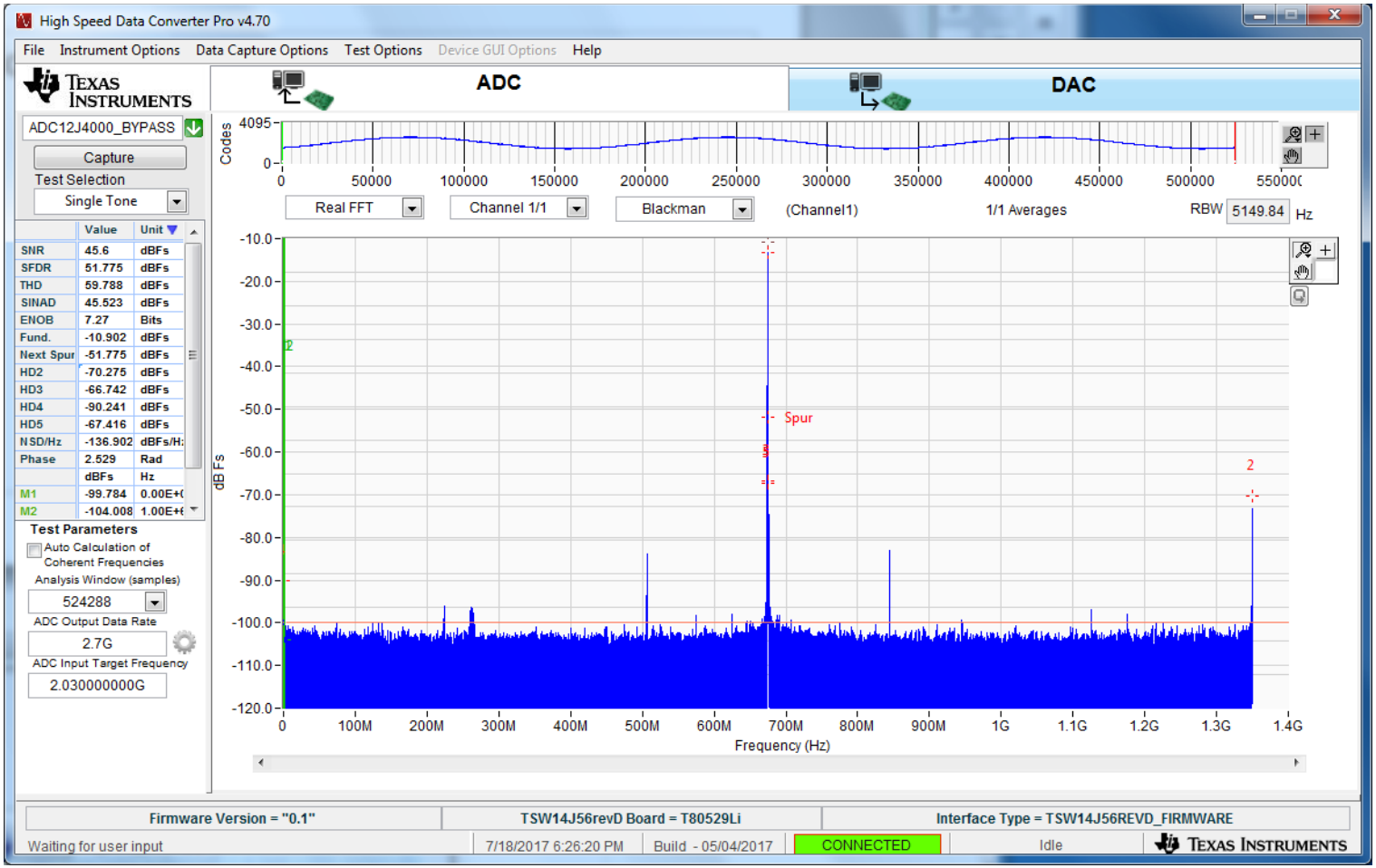
Summary

- The ADC12J4000 family devices use an interleaved calibrated folding-interpolating core also known as an interleaved folding flash
- This ADC architecture provides very high sample rate and relatively low power consumption compared to pipeline ADC cores
- The tradeoff is some additional spurs due to the following:
  - Interleaving can result in sample rate and input frequency dependent spurs
  - Folding-interpolating core results in high order harmonic spurs
- Please refer to the following application note for more details regarding spur sources in this architecture:

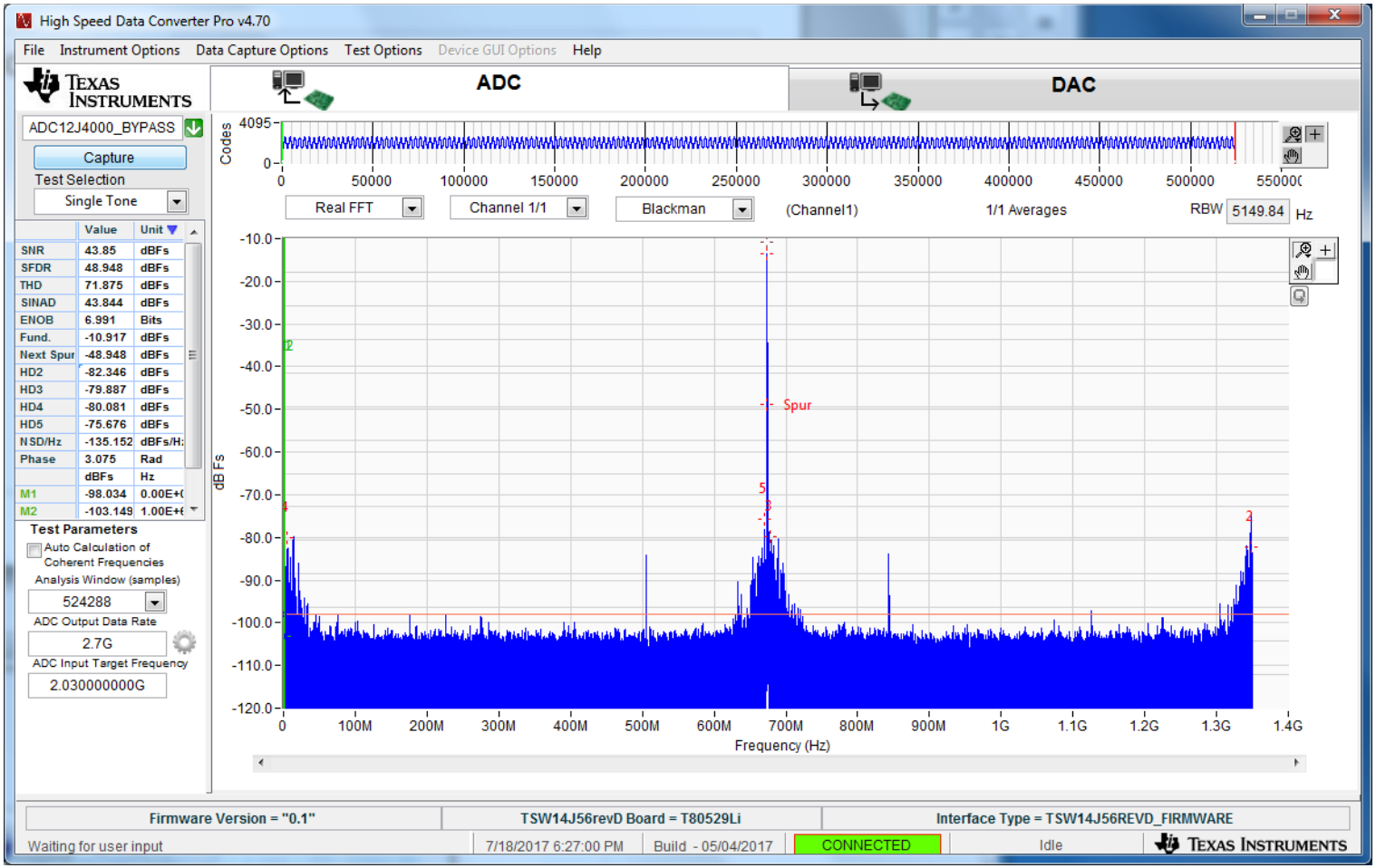
  http://www.ti.com/analog/docs/litabsmultiplefilelist.tsp?literatureNumber=slaa617&docCategoryId=1&familyId=82

FULL NYQUIST FFT

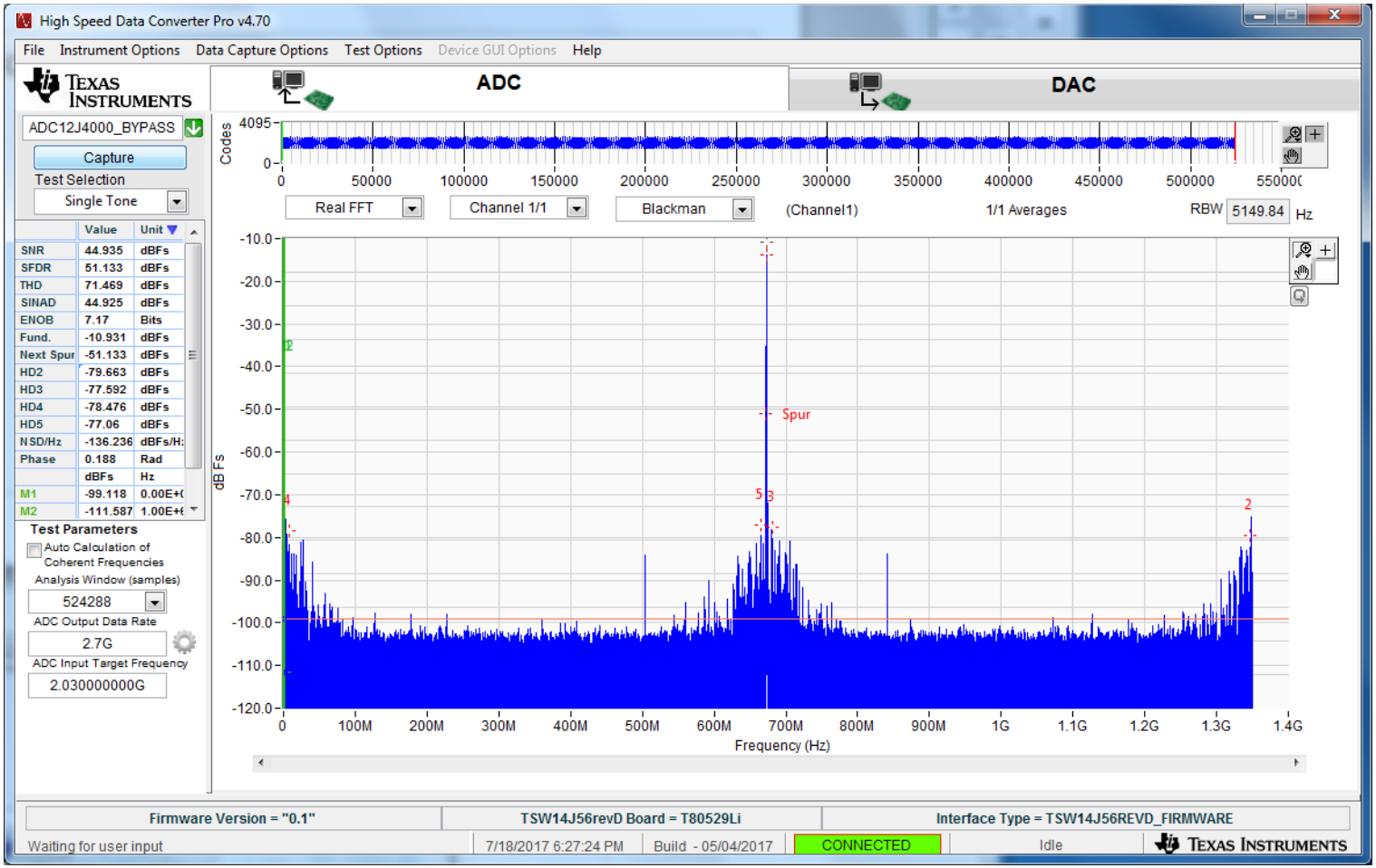
Fin = 2025M at -10.9dBFS



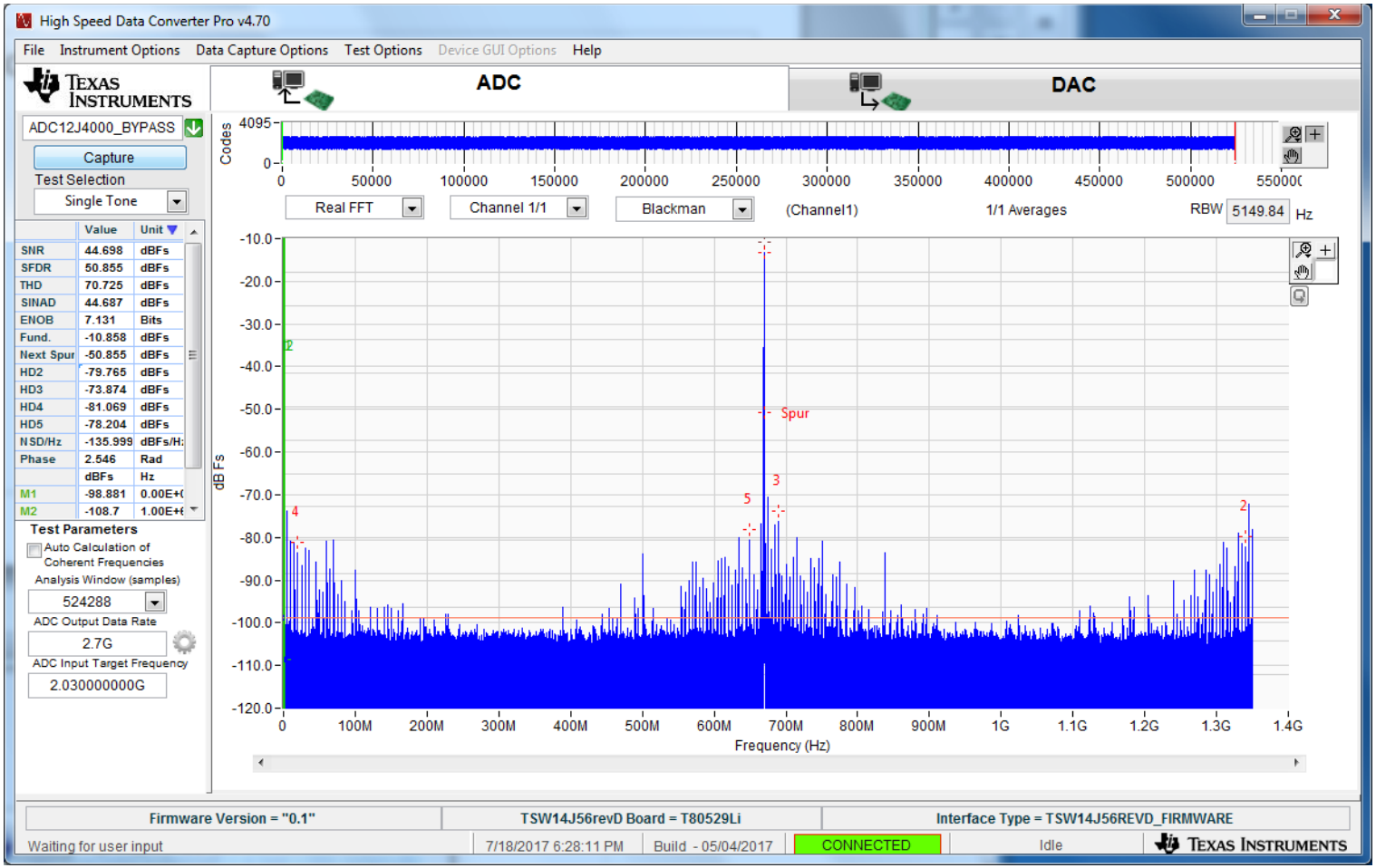
Fin = 2026 MHz at -10.9dBFS



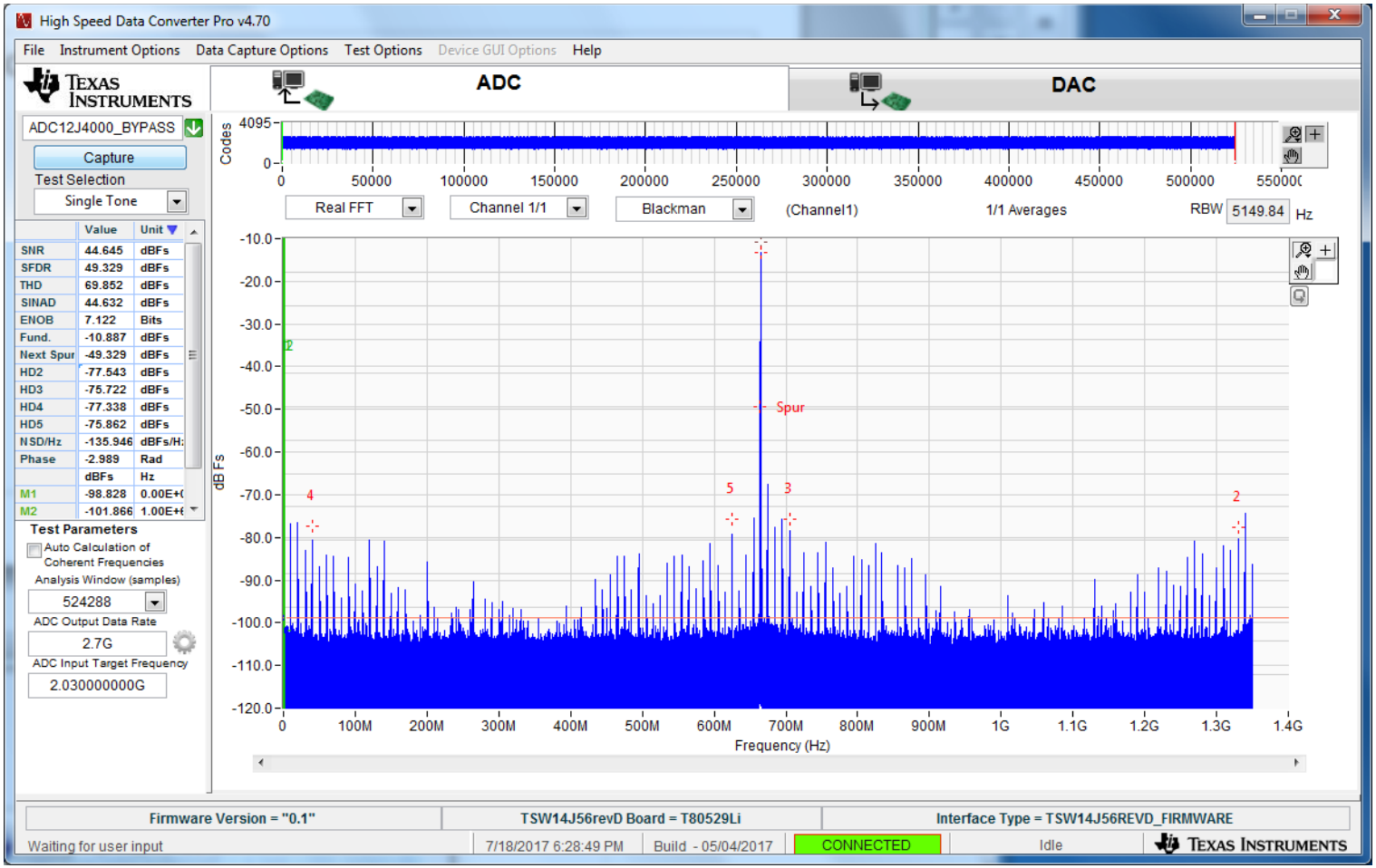
Fin = 2027 MHz at -10.9dBFS



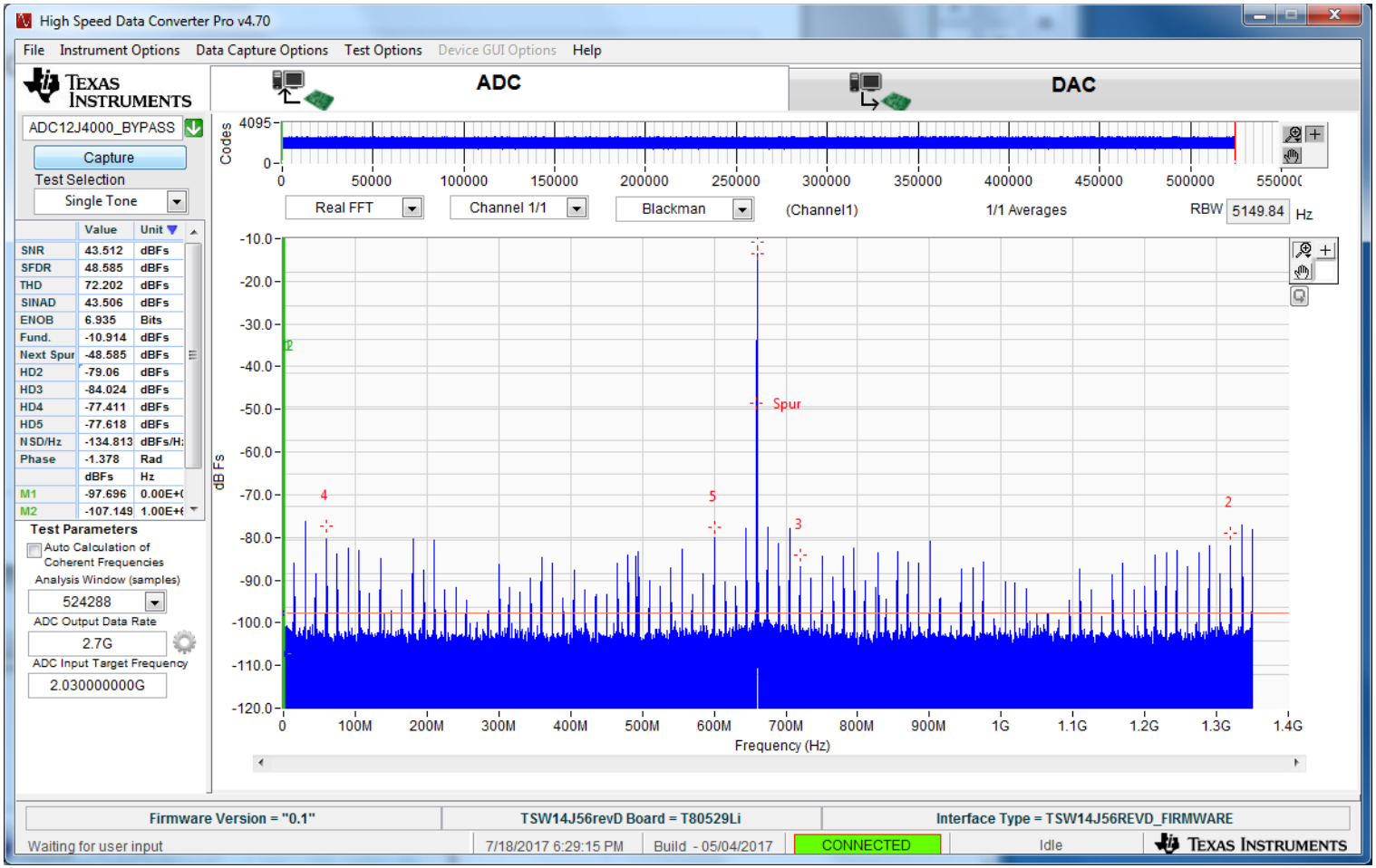
Fin = 2030 MHz at -10.9dBFS



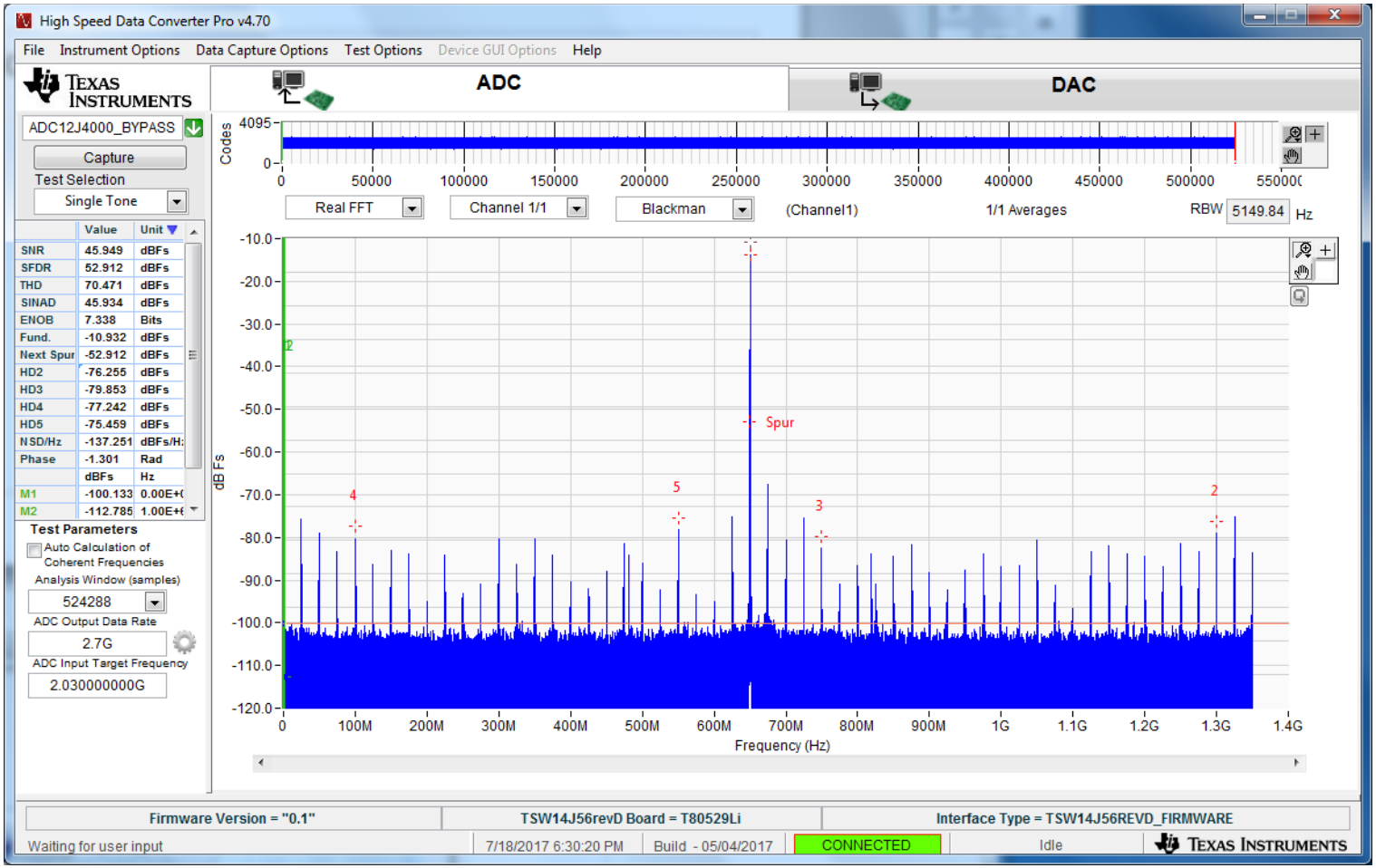
Fin = 2035 MHz at -10.9dBFS



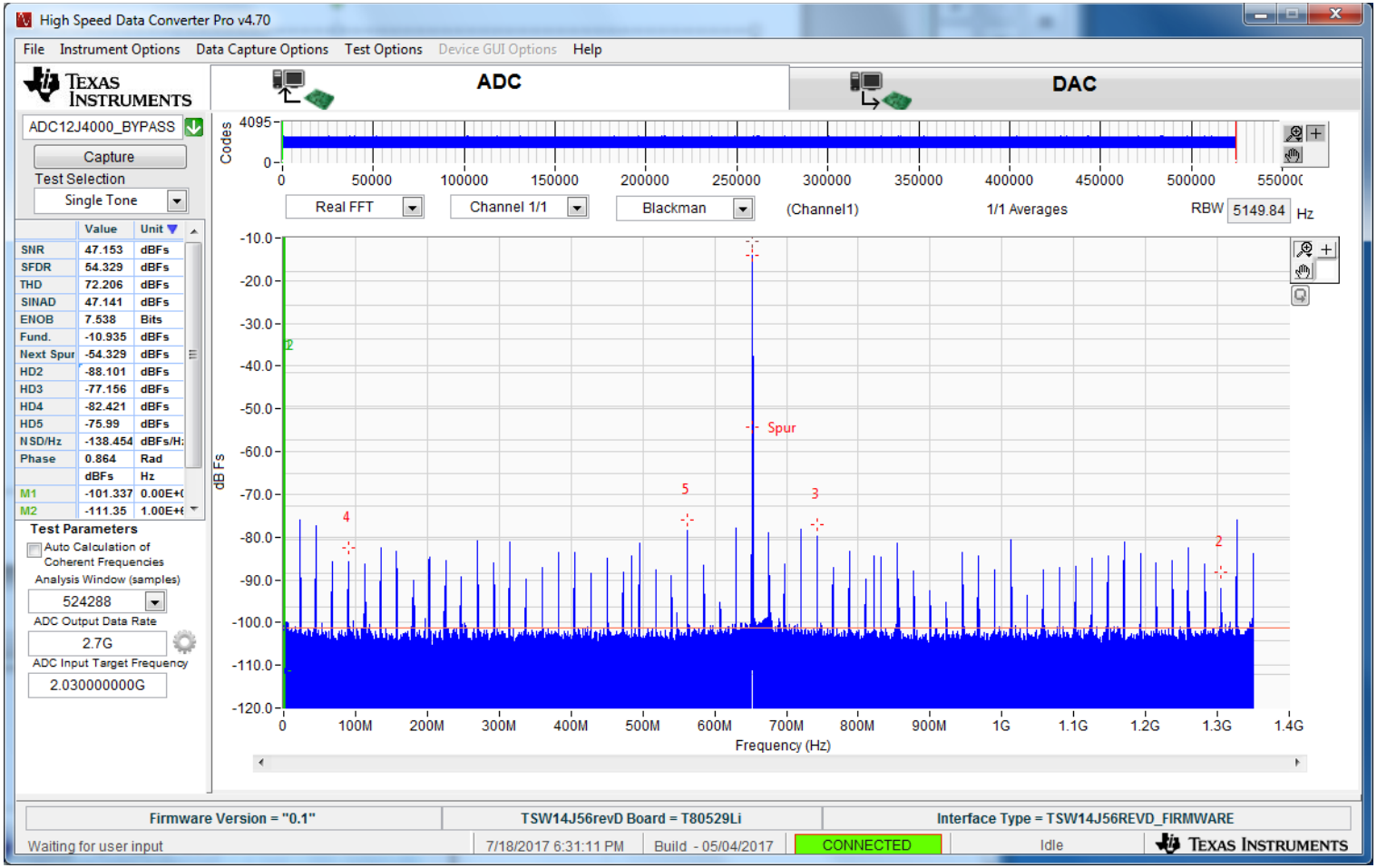
Fin = 2040 MHz at -10.9dBFS



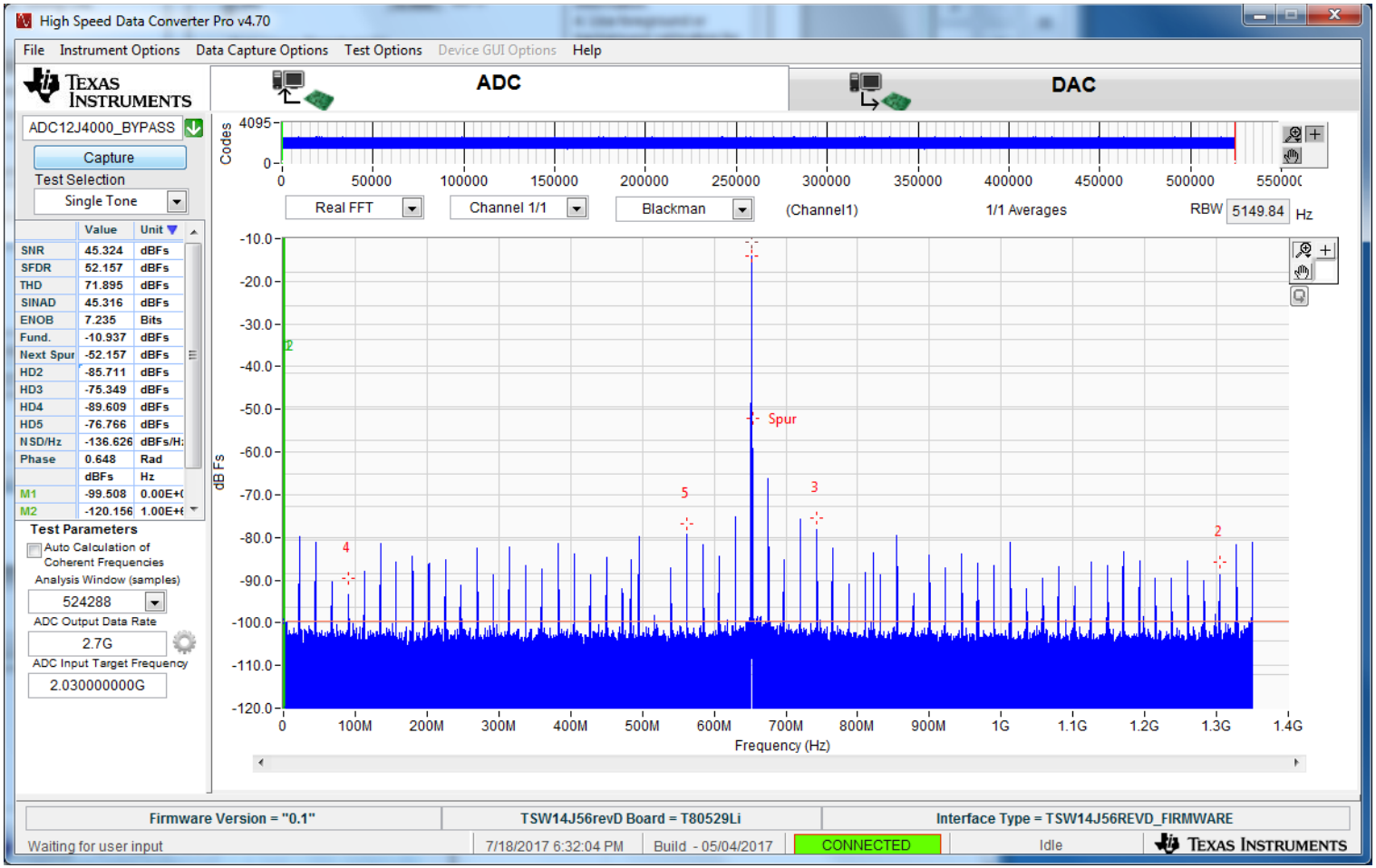
Fin = 2050 MHz at -10.9dBFS



Fin = 2047.47 MHz at -10.9dBFS



Fin = 2047.47 MHz at -10.9dBFS recalibrated

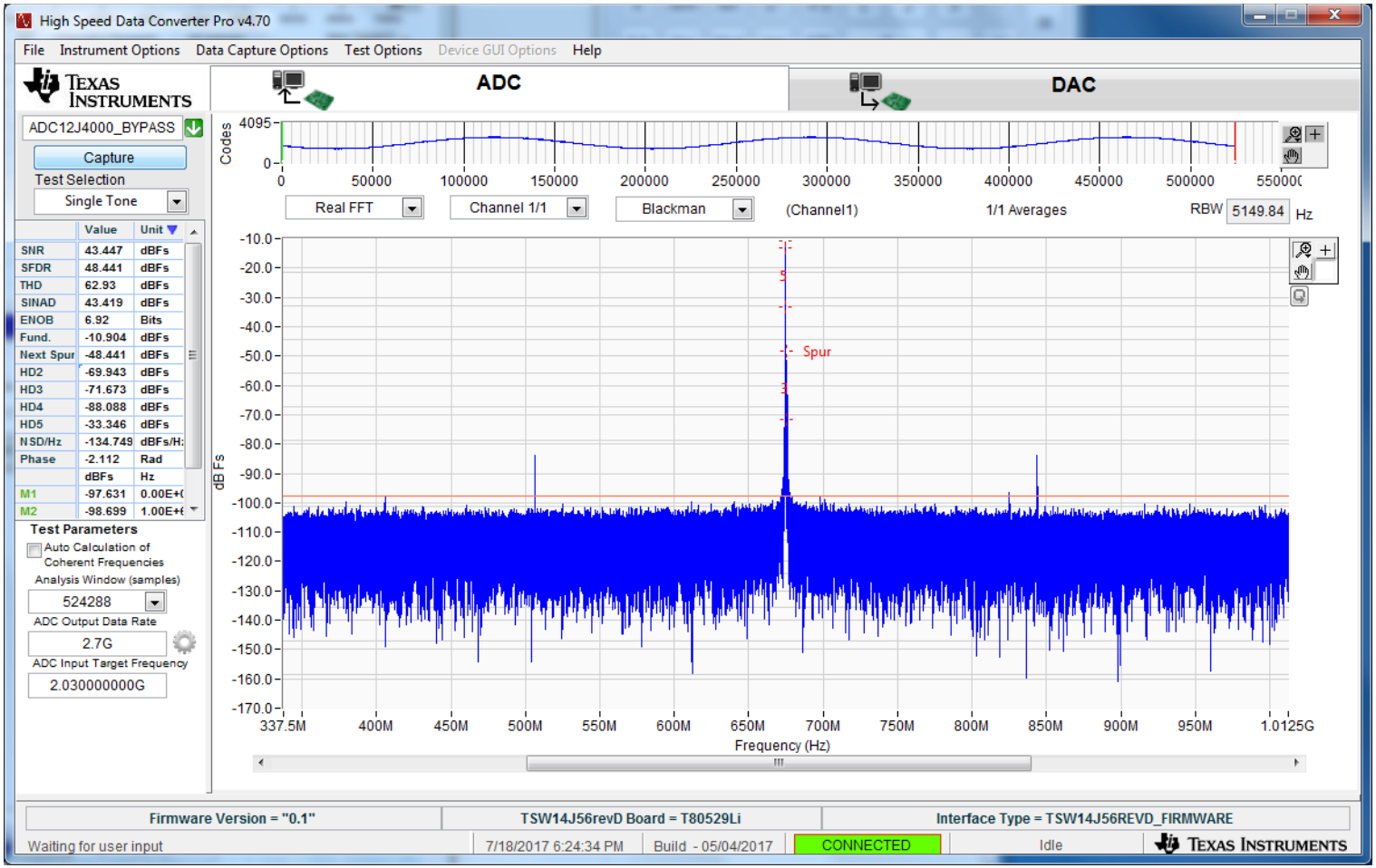


Simulating DDC and Decimation Output

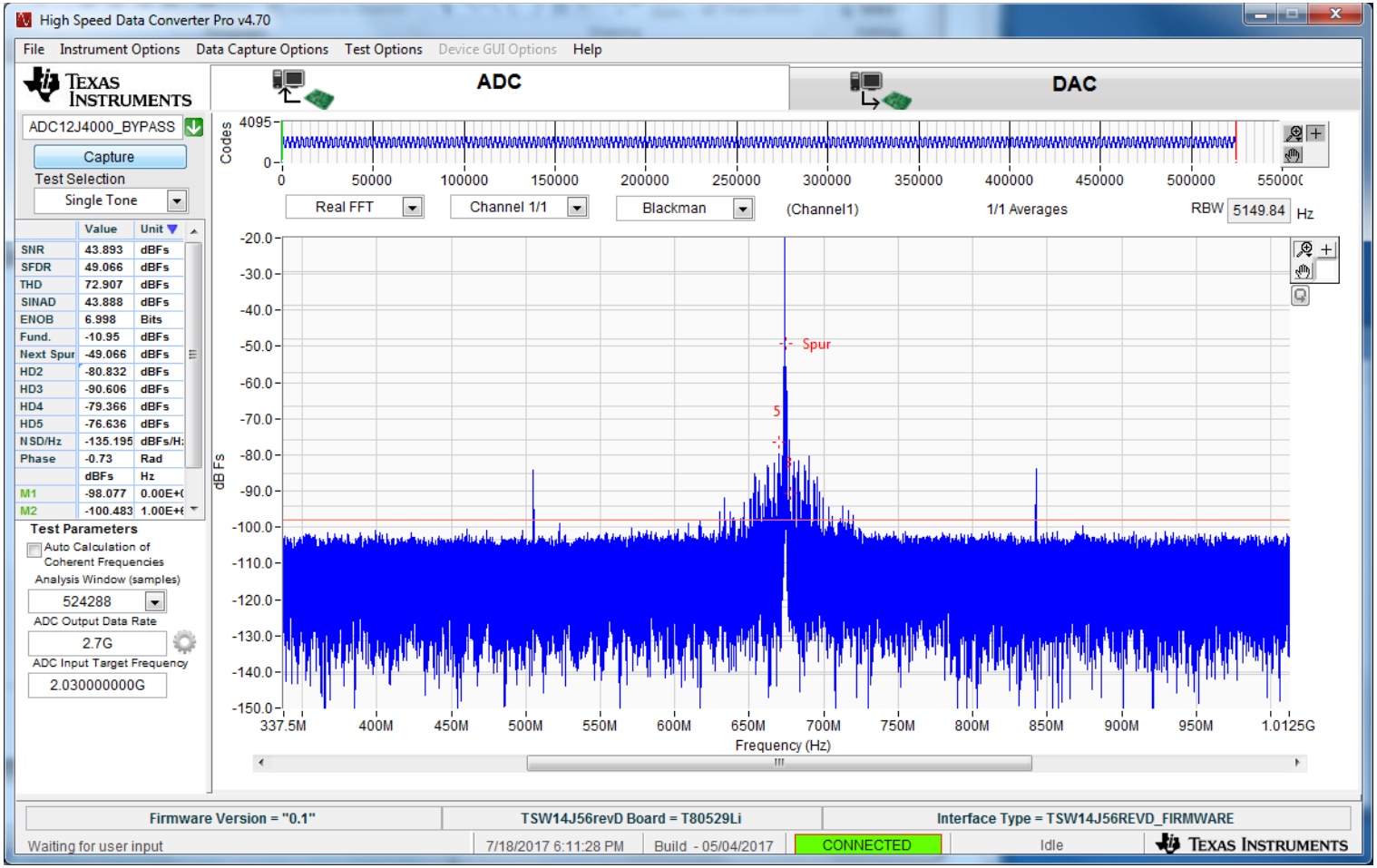
- The following plots show the spectrum that would be output if Decimate-by-4 mode with particular NCO settings was utilized.
- The Min and Max frequency limits of the plot are set equivalent to those of
  - F_NCO = 2025 MHz (default for F_CLK = 2700 MHz)
  - F_NCO = 2075 MHz
- These results are effectively a snapshot of the earlier full Nyquist plots, just excluding the frequencies outside the Min and Max frequency bounds

FMIN AND FMAX EQUIVALENT TO DECIMATE BY 4 MODE AND FNCO = 2025 MHZ

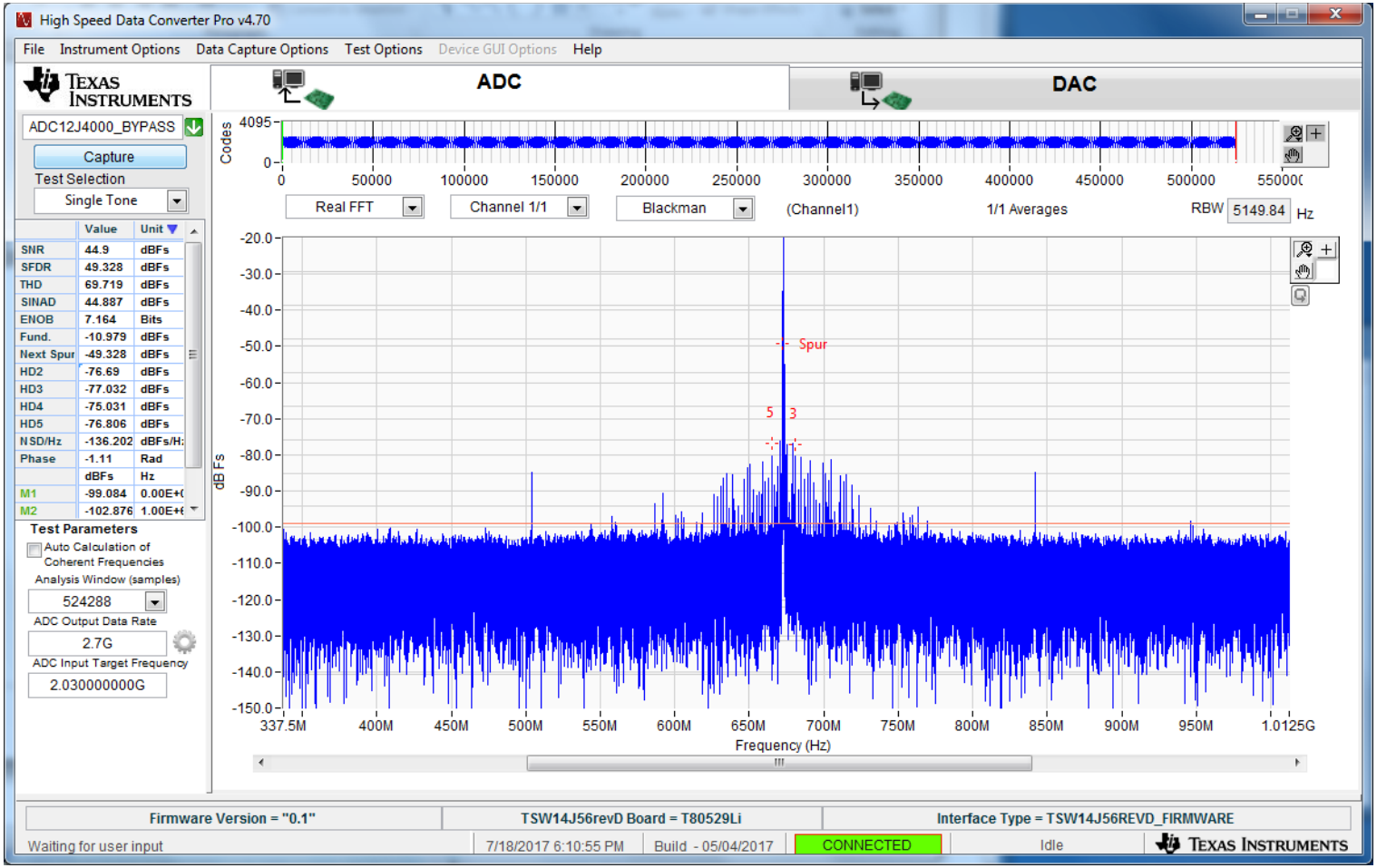
Fin = 2025M at -10.9dBFS



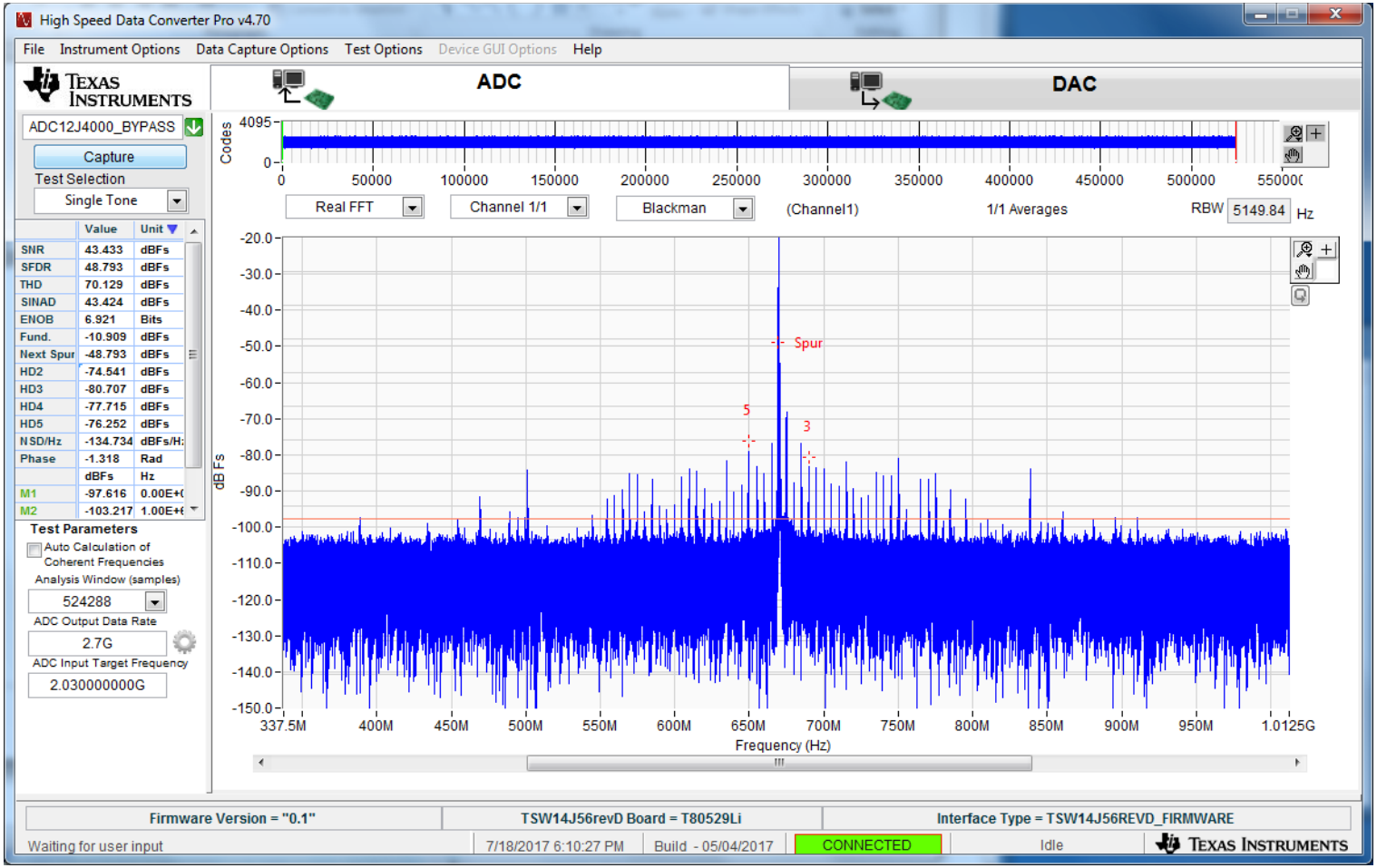
Fin = 2026 MHz at -10.9dBFS



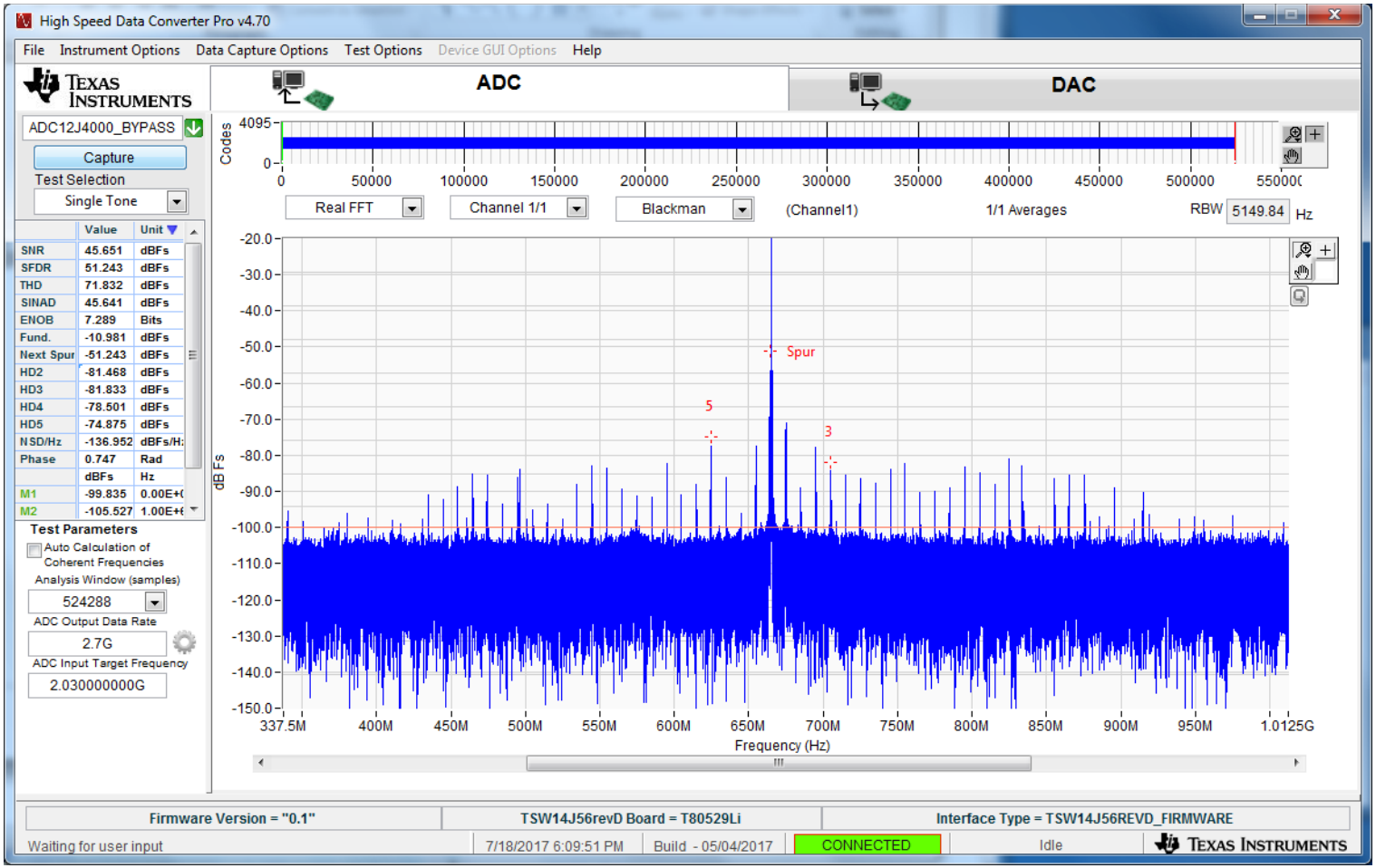
Fin = 2027 MHz at -10.9dBFS



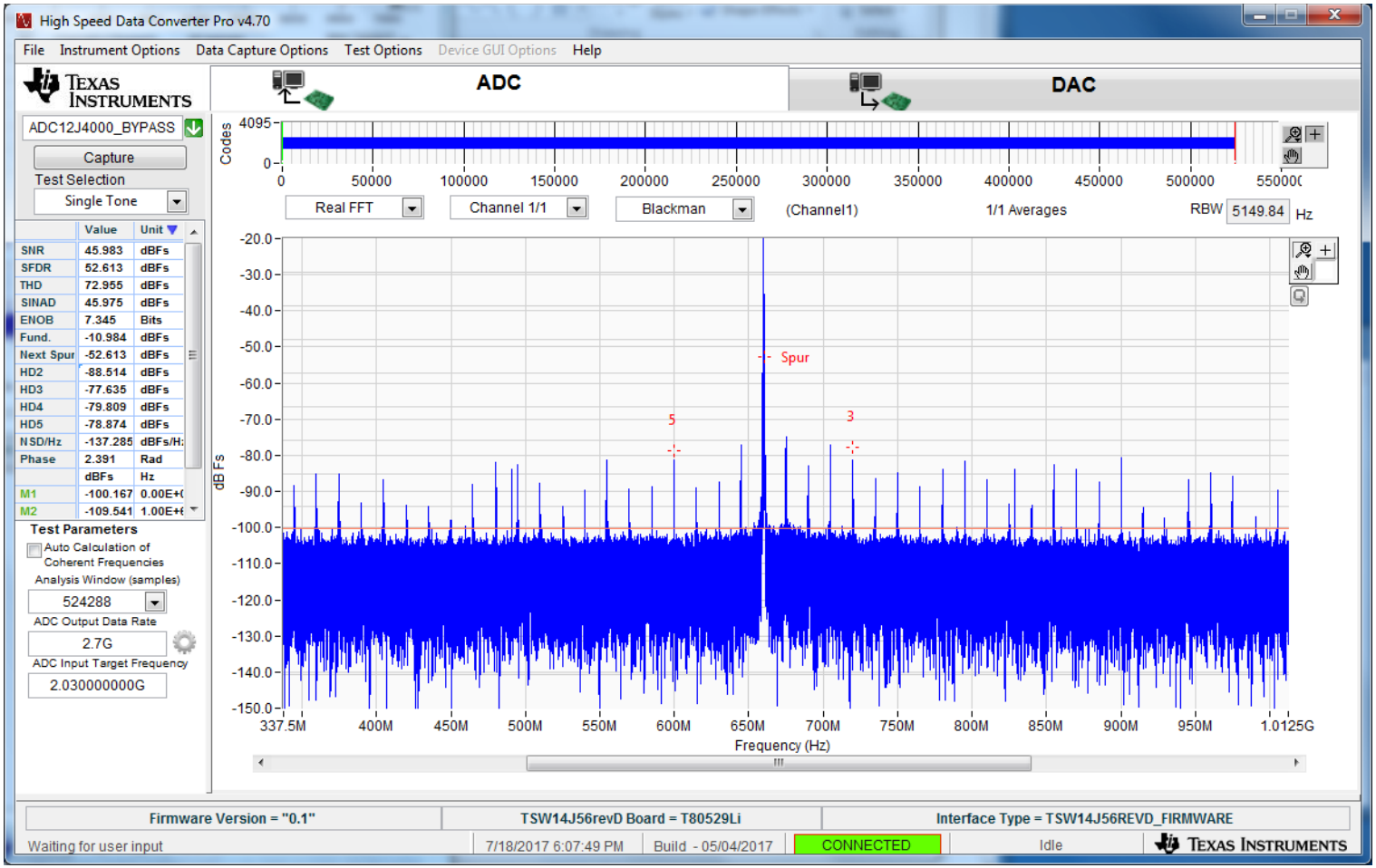
Fin = 2030 MHz at -10.9dBFS



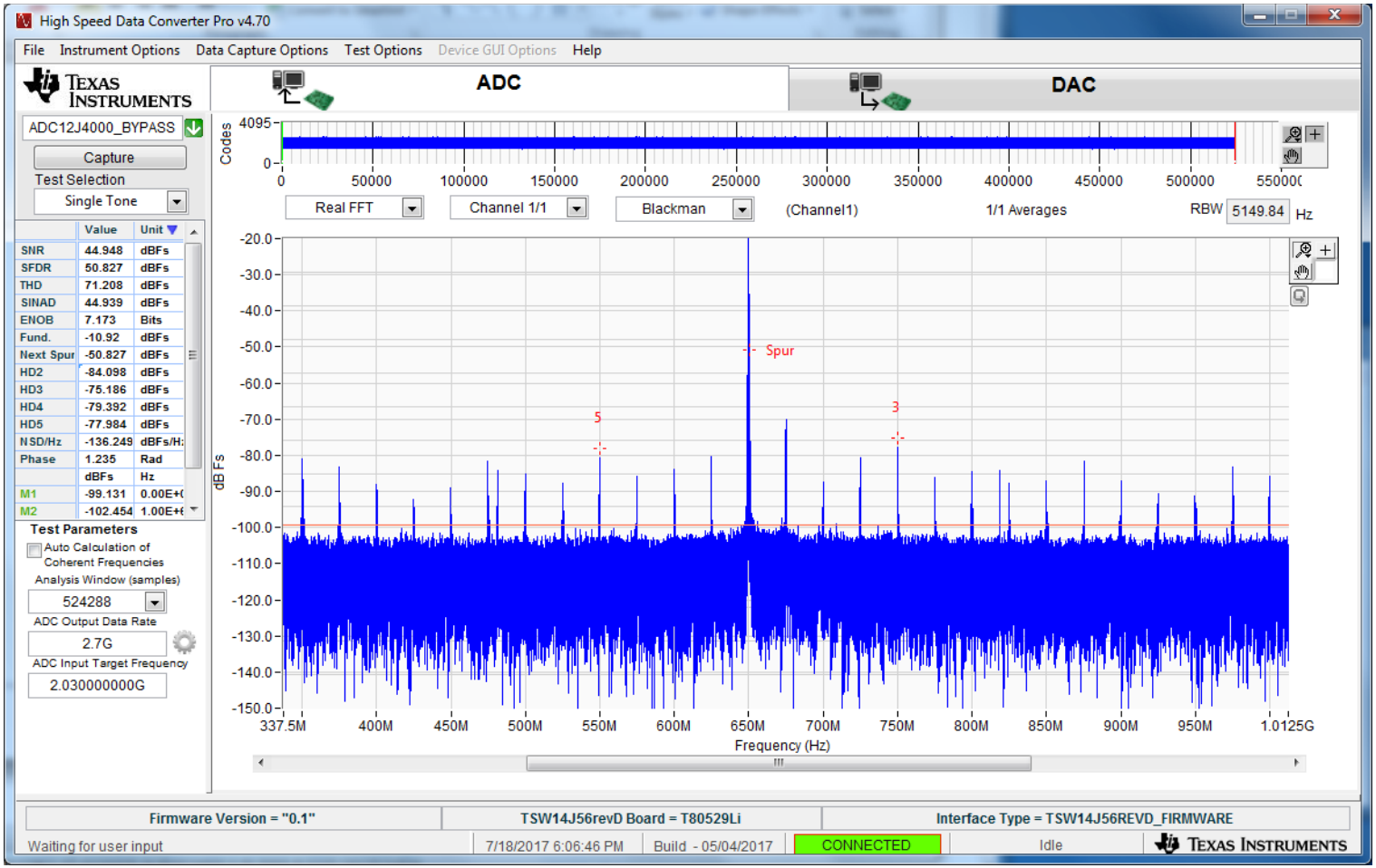
Fin = 2035 MHz at -10.9dBFS



Fin = 2040 MHz at -10.9dBFS

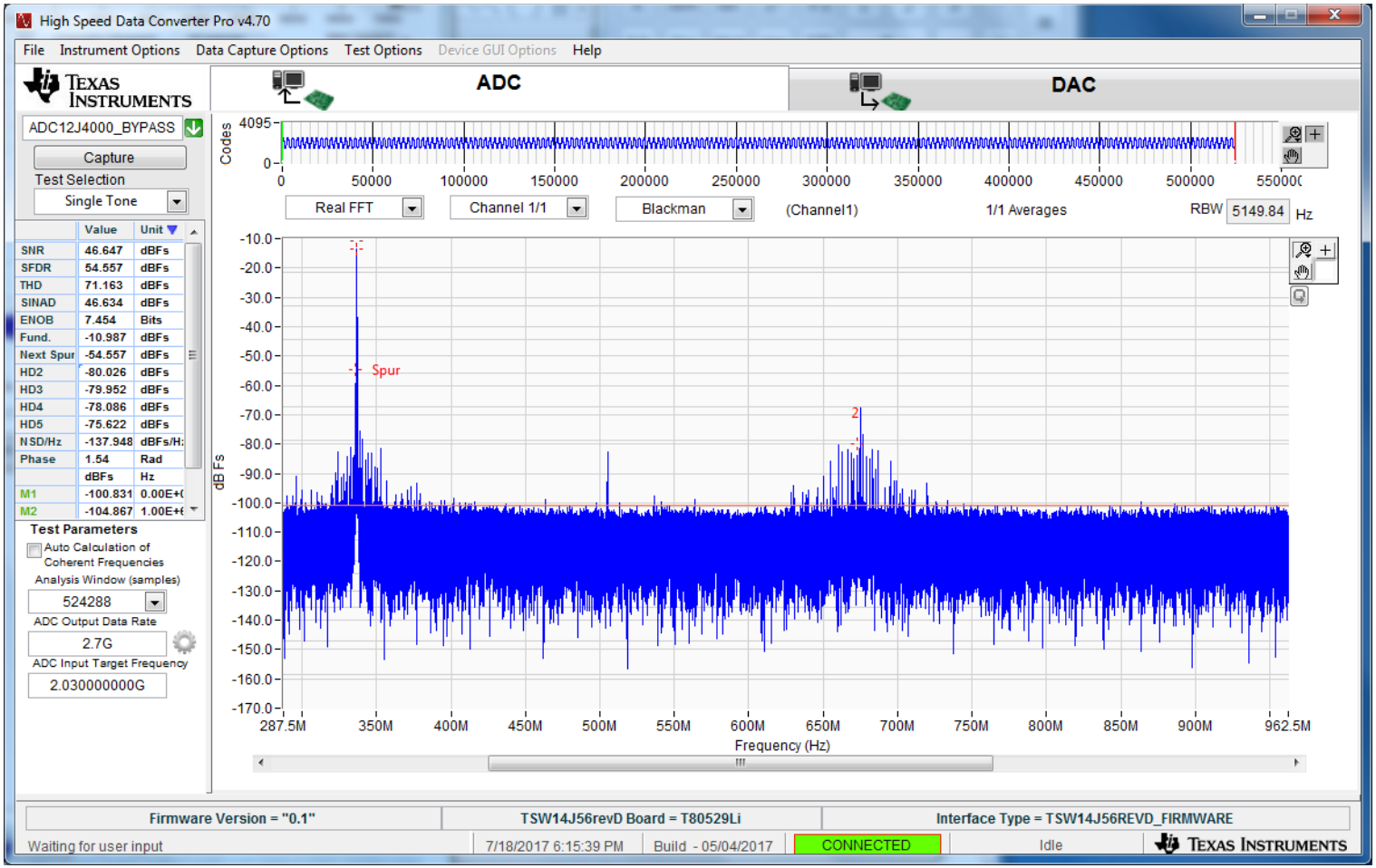


Fin = 2050 MHz at -10.9dBFS

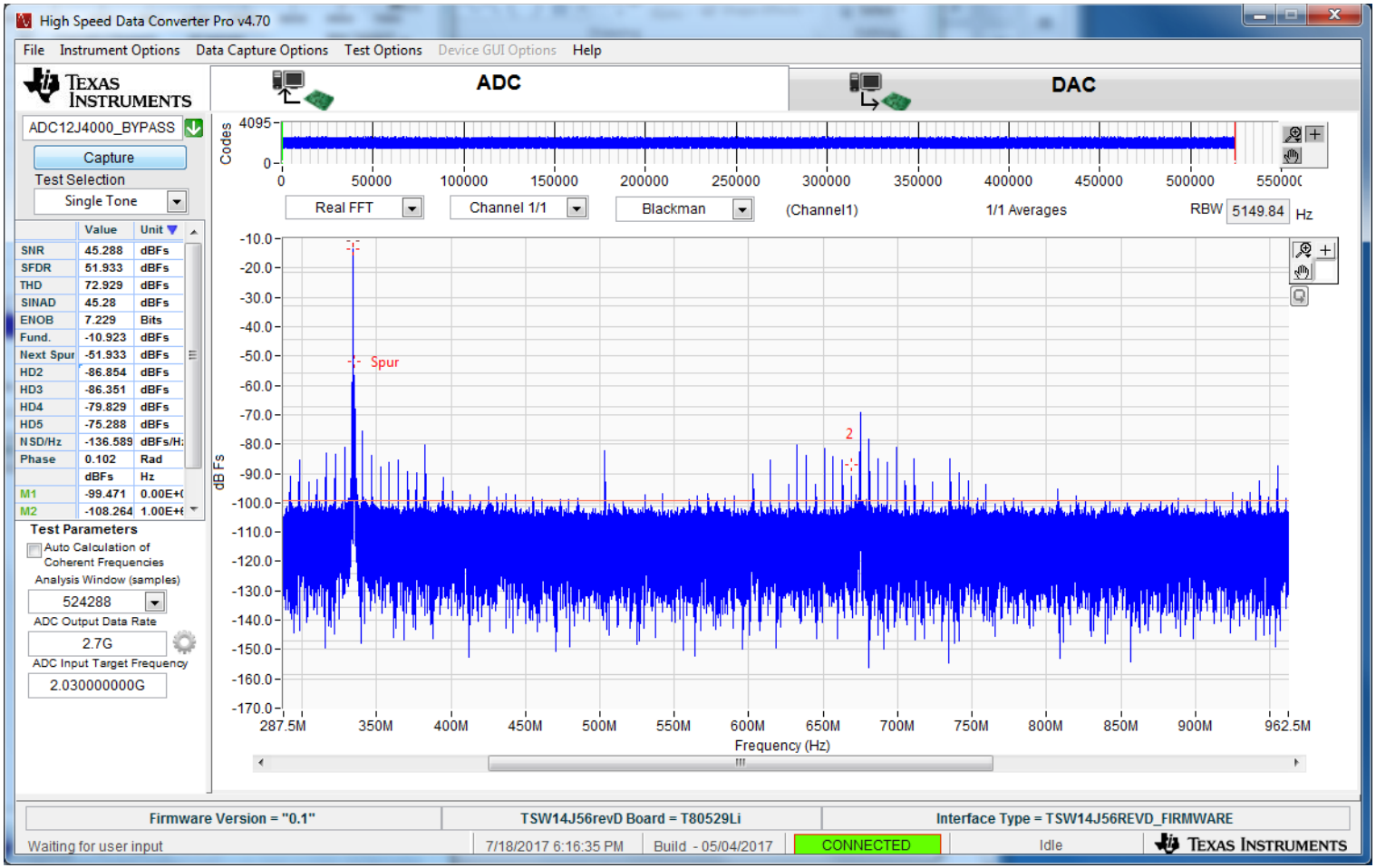


FMIN AND FMAX EQUIVALENT TO DECIMATE BY 4 MODE AND FNCO = 2075 MHZ

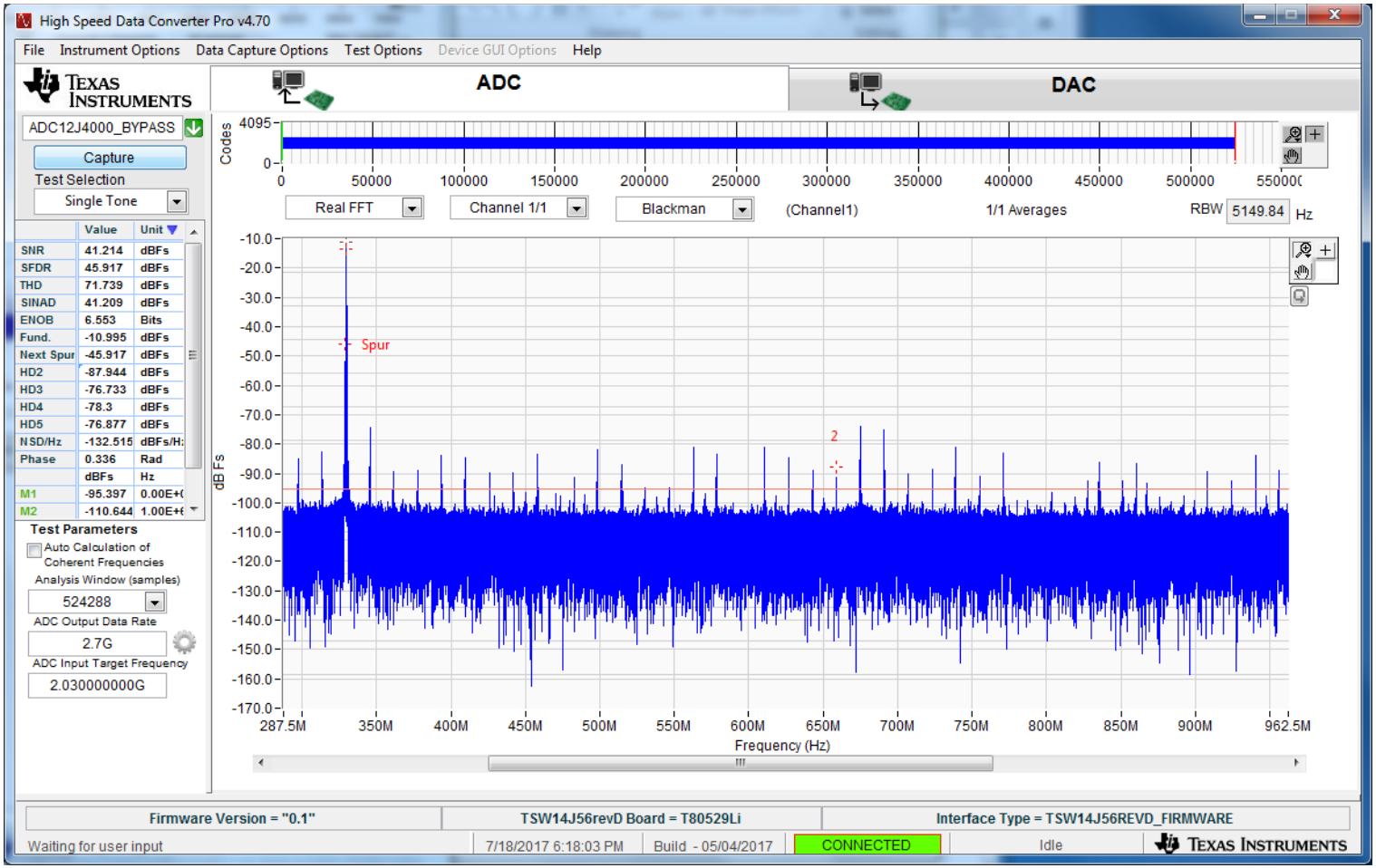
Fin = 2363.5M at -10.9dBFS



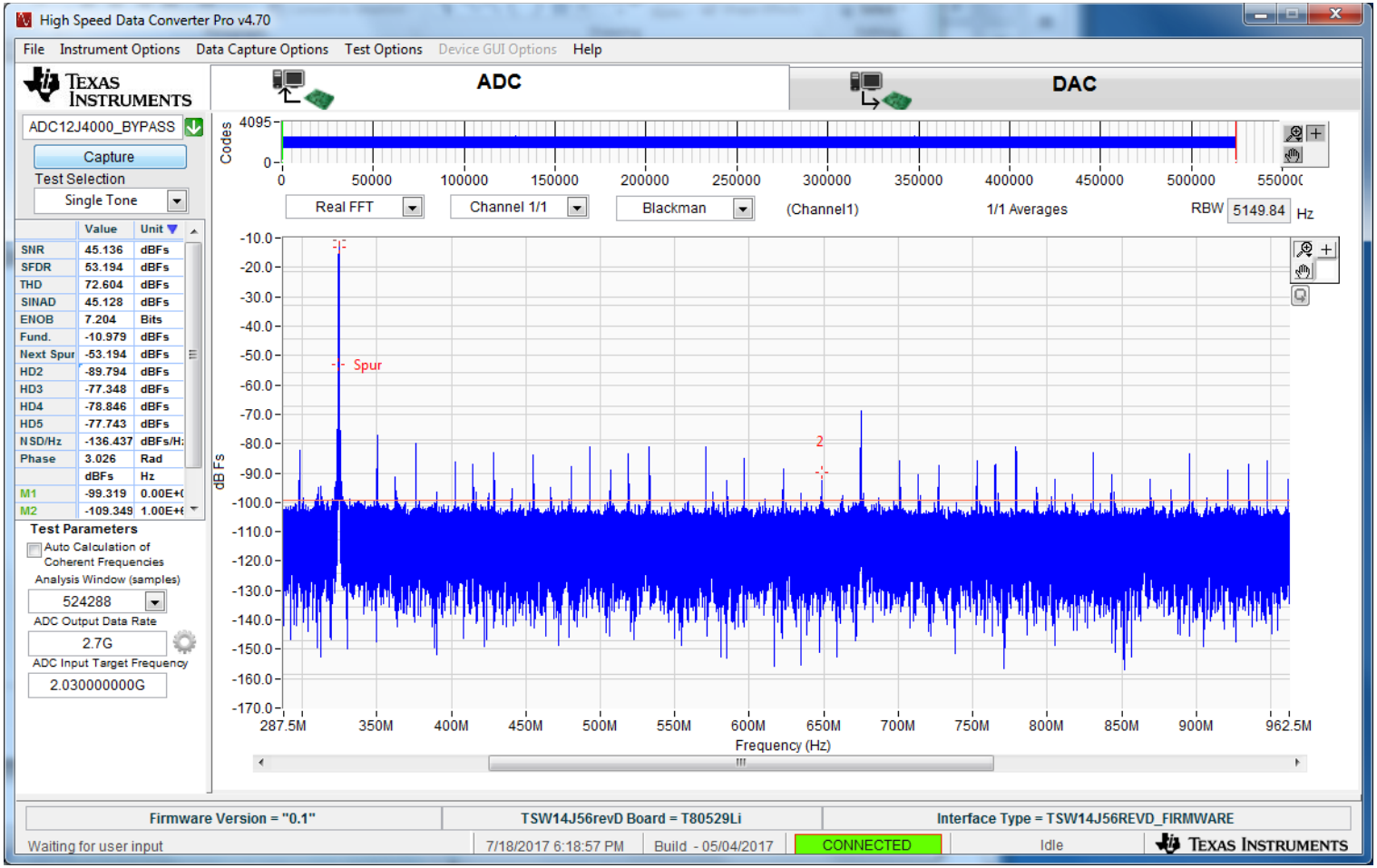
Fin = 2365.5M at -10.9dBFS



Fin = 2370.5M at -10.9dBFS



Fin = 2375.5M at -10.9dBFS



Fin = 2362.5M at -10.9dBFS