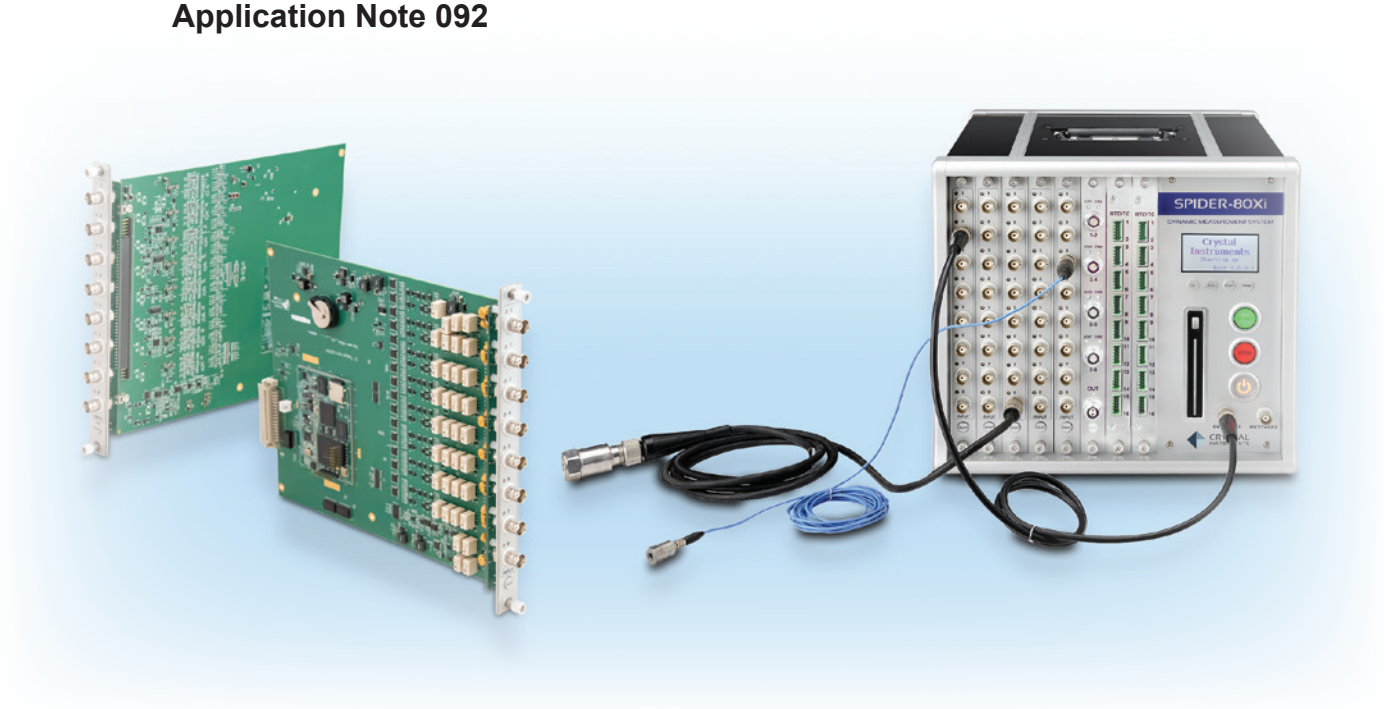
Spider-80Hi Compared With Spider-80Xi

Application Note 092



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April 2026 | © Crystal Instruments Corporation

The Spider-80Xi was first released in 2015. Crystal Instruments leveraged all the latest advances in electronics to develop the Spider-80Hi with major component upgrades, completed and released in 2025, delivering the following major upgrades:

- Sampling rate increased from 102.4 kHz (Spider-80Xi) to 512 kHz (Spider-80Hi)
- Spider-80Hi has ultra-low noise floor and significantly higher dynamic range of 175 dB
- Substantial performance improvements on both input and output channels
- Output DAC upgraded to 32-bit output at up to 768 kHz sampling rate, yielding very low output noise and high amplitude accuracy
- Amplitude linearity refined to 0.05 dB across the entire frequency range
- Additional signal integrity and noise improvements include:
- Isolation of digital and analog circuitry, combined with input channel front-end enhancements, minimizes ground loops for higher signal integrity
- Refinements in the IEPE constant current power supply significantly reduce noise at low frequencies

Together, these enhancements improve the system's precision and overall performance, making it well-suited for even the most demanding measurement applications.

Given the significant improvements across all performance specifications, Crystal Instruments chose to implement the best possible hardware — even though the upgrades make the new hardware incompatible with older counterparts. Existing customers and those looking to add channels are encouraged to upgrade to the v8.9 Spider-80Hi to take full advantage of the v8.9 hardware's performance and efficiency gains.

Spectrum plots regarding the improvements to noise floor and THD can be found in the next page. Full details regarding all specifications can be available upon request.

Specification	Spider-80Xi Version 7.7		Spider-80Hi Version 8.9	
Maximum Sampling Rate	102.4 kHz		512 kHz	
Noise (at 1 kHz)	80 nV/√Hz		23.9 nV/√Hz	
Dynamic Range	160 dBFs		175 dBFs	
Harmonic Distortion (2 V Input Signal)	Frequency	THD	Frequency	THD
	1 kHz	-94 dB	1 kHz	-105 dB
	8 kHz	-83 dB	8 kHz	-97 dB
Crosstalk	-100 dB		-120 dB	
Common Mode Rejection Ratio	-70 dB		-120 dB	
Amplitude Linearity	Amplitude Range (dBFS)	Amplitude Error	0.05 dB for entire amplitude range	
	0 to -80	0.1 dB		
	-20 to -100	0.25 dB		
	-120 to -120	0.5 dB		
	-120 to -140	1 dB		

Table 1. Input Channel Specifications

Specification	Spider-80Xi Version 7.7		Spider-80Hi Version 8.9	
Maximum Sampling Rate	102.4 kHz		512 kHz	
Output Resolution	24 bit		32 bit	
Dynamic Range	120 dB		127 dB	
Harmonic Distortion (1V output)	Frequency	THD	Frequency	THD
	1 kHz	-91 dB	1 kHz	-97 dB
	8 kHz	-78 dB	8 kHz	-94 dB
Crosstalk	120 dB		132 dB	

Table 2. Output Channel Specifications

Comparison of Noise Floor:

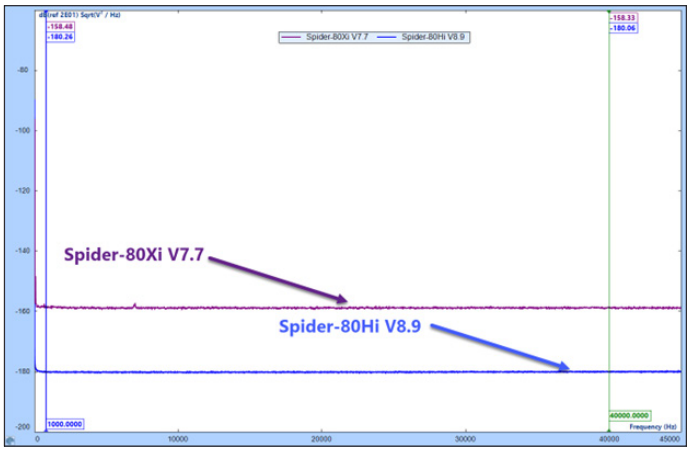

Figure 1. Noise floor with the Spider-80Xi V7.7 and the Spider-80Hi V8.9. The 80Xi is in purple and 80Hi is in blue. dB reference is set to 20V (the full range of input)

Comparison of Total Harmonic Distortion:

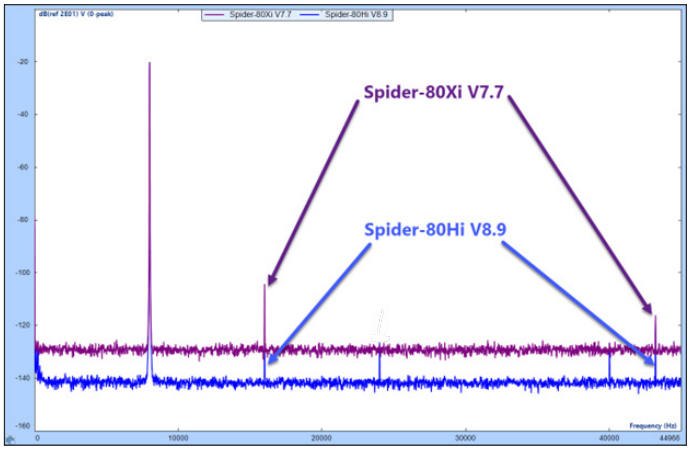

Figure 2. THD with the Spider-80Xi V7.7 and the Spider-80Hi V8.9. The 80Xi is purple and the 80H is in blue.

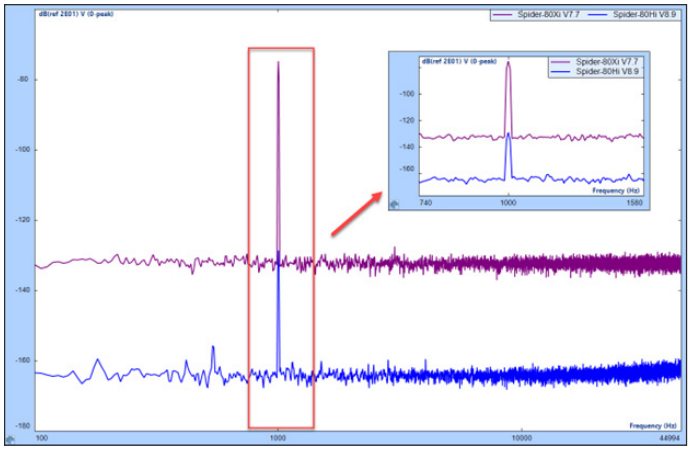

Figure 3. CMMR at 1kHz with the Spider-80Xi V7.7 and the Spider-80Hi V8.9. The 80Xi is purple and the 80Hi is in blue.

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