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FR3 Signal Chain for Wireless Test Applications

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Increased Test & Measurement Complexities

- Newer wireless technologies like **6G**, Wi-Fi 7 and 8, and UWB address the need for ubiquitous connectivity and high speed data
- Newer standards bring increased electronic testing complexities and longer time
  - Higher frequencies
  - Wider bandwidths and faster data rates
  - Complex modulations
  - Signals with high PAR
- ADI's wireless test signal chain addresses these challenges for **6G FR3** test
- Supports other standards—5G, Wi-Fi 6

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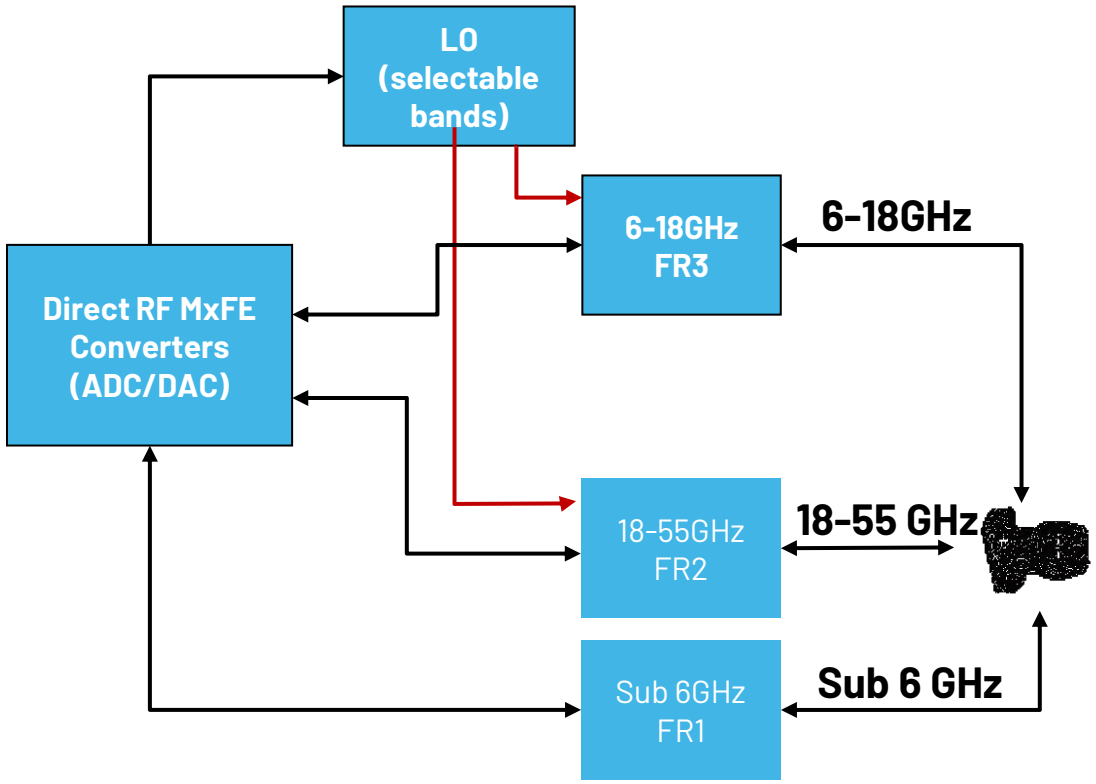
Instrument Grade Millimeter Wave Signal Chains

- Instrument grade performance for wireless test systems
- Supports 5G, 6G, Wi-Fi 7 & 8, UWB
- RF carrier frequency up to 55GHz
  - Implemented using 3 RF front ends
- Instrument Grade EVM
  - <-50dB (Wi-Fi waveform)
- Single, low phase noise LO generator that supports RF carrier frequencies up to 55GHz
  - -156dBc/Hz (@10MHz offset from 4GHz carrier)
- Includes RF, LO, clocking, power and Direct RF Apollo/ MxFE converters

TX/RX Functional Block Diagram



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FR3 RFFE for Wireless Test Applications

RFFE Features

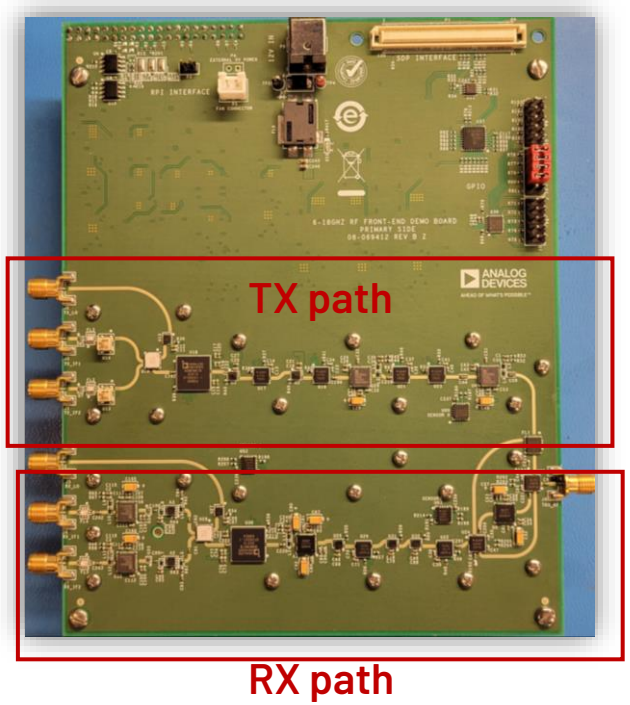
- **FR3** Frequency Range: 6-18GHz
- **Bi-directional** for Signal Generation and Spectrum Analysis applications
- EVM <-50dB (Wi-Fi waveform)
- SPI Programmable
- **Spur Rejection** for better SNR
- On board temp sensors for calibration
- Includes Power management

TX Features

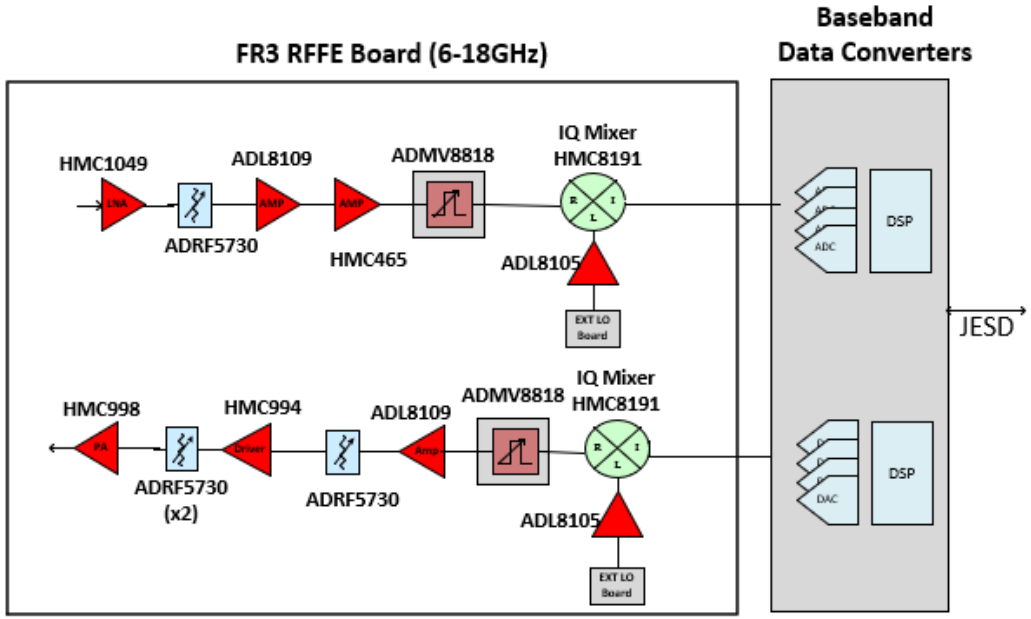
- P1dB: 27dBm
- Transmitter LO nulling capability

RX Features

- Noise figure: 3.5 dB
- High Gain & Dynamic Range



Block Diagram



Key RF components

- RF Mixer: HMC8191
- Tunable Filter ADMV8818
- LO Driver: ADL8105

Data Converters:

- RFFE board is independent of the Data Converters
- Suggested Data Converters are Apollo, MxFE

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FR3 **TX** Measurement Results

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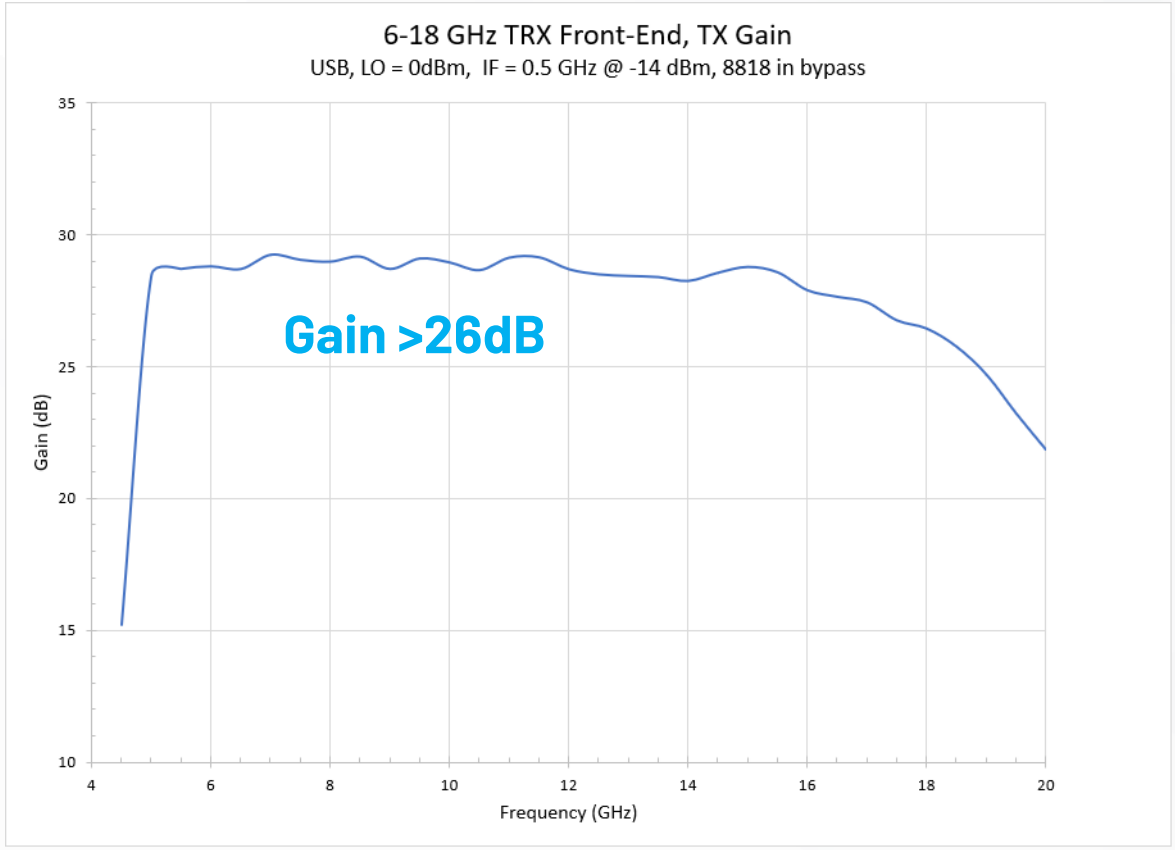
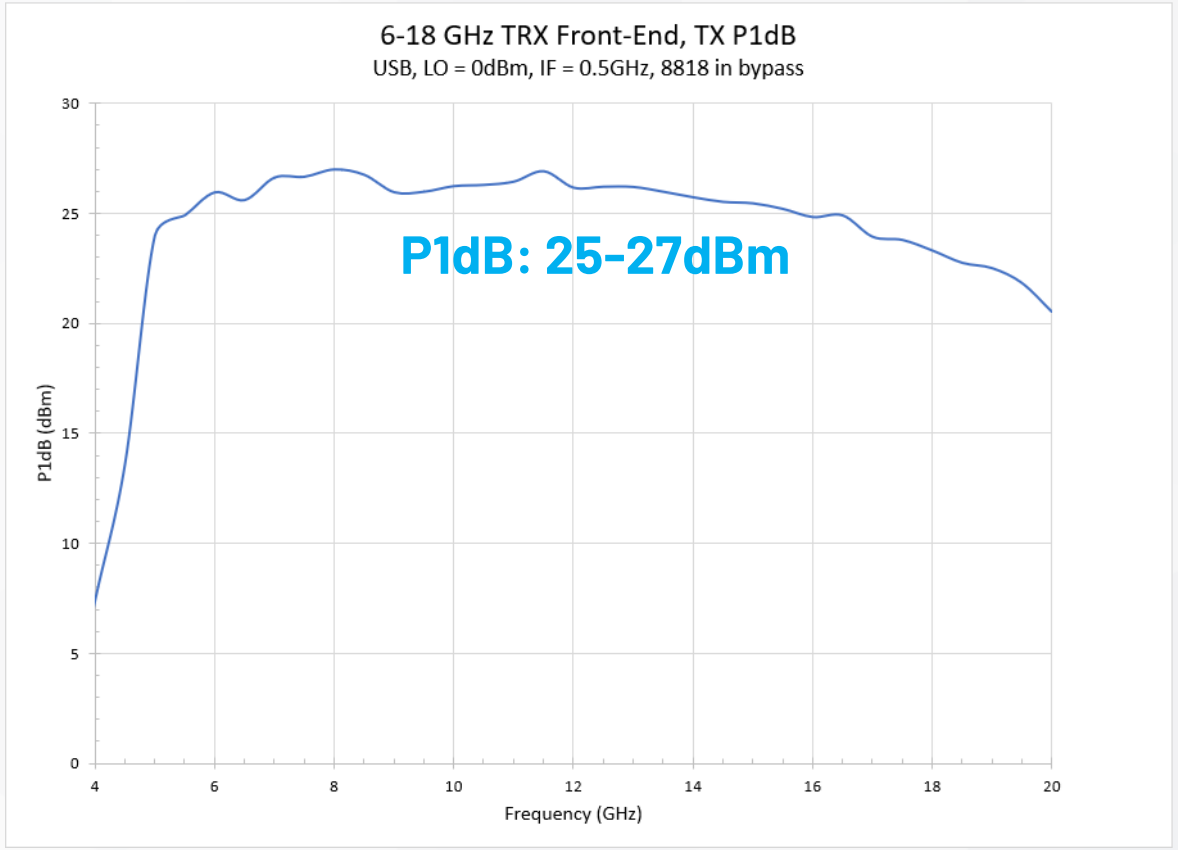
TX Gain – Standalone FR3 RFFE

Broadband Gain



P1dB



Measurement data on RFFE board; without data converter

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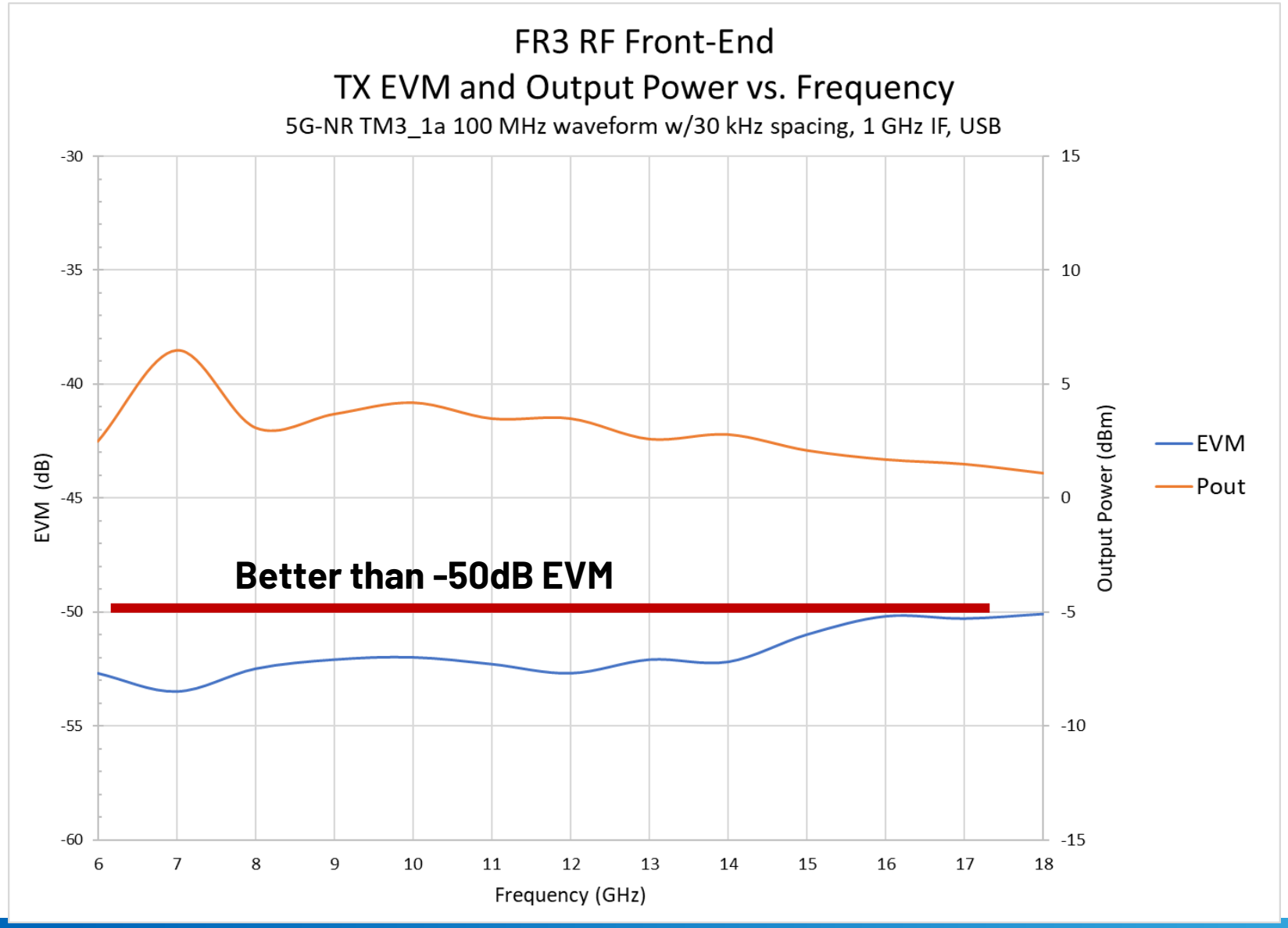
TX EVM – Standalone FR3 RFFE



- 100MHz 5G NR waveform
- TX Only (w/o DAC)

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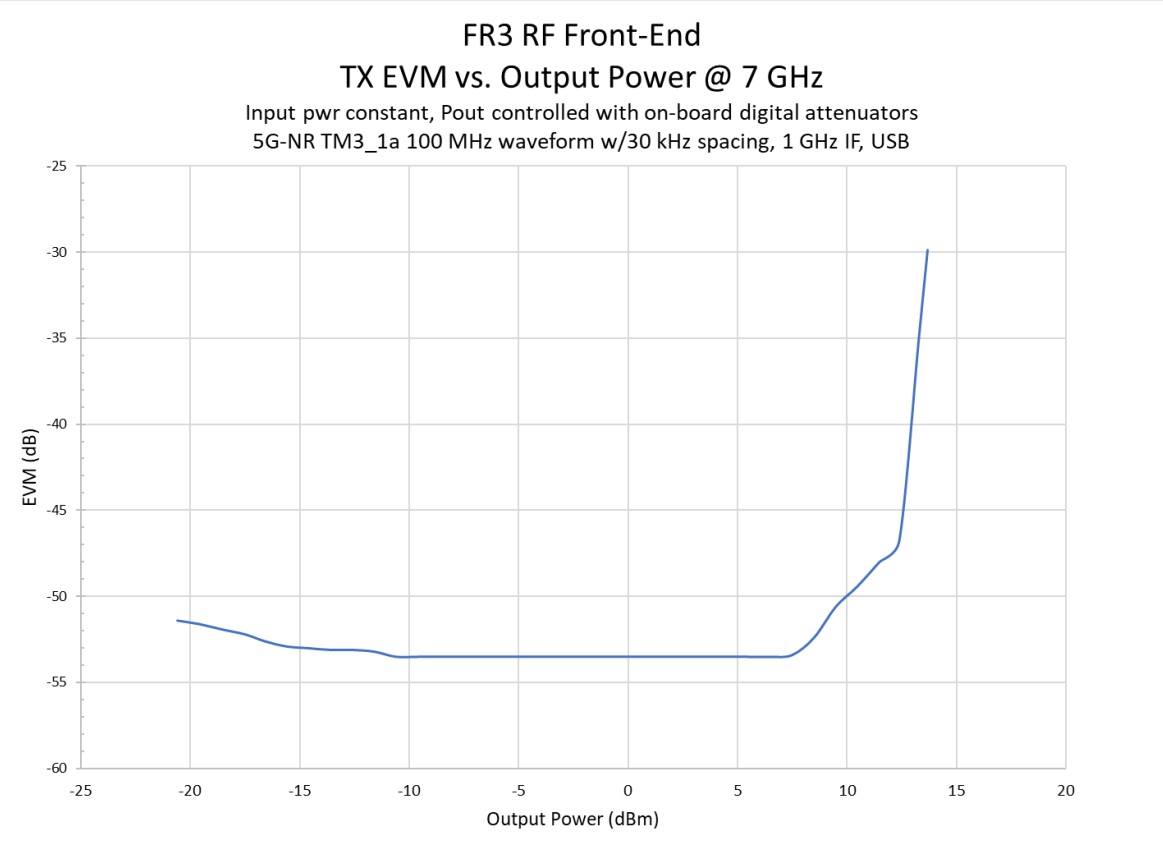
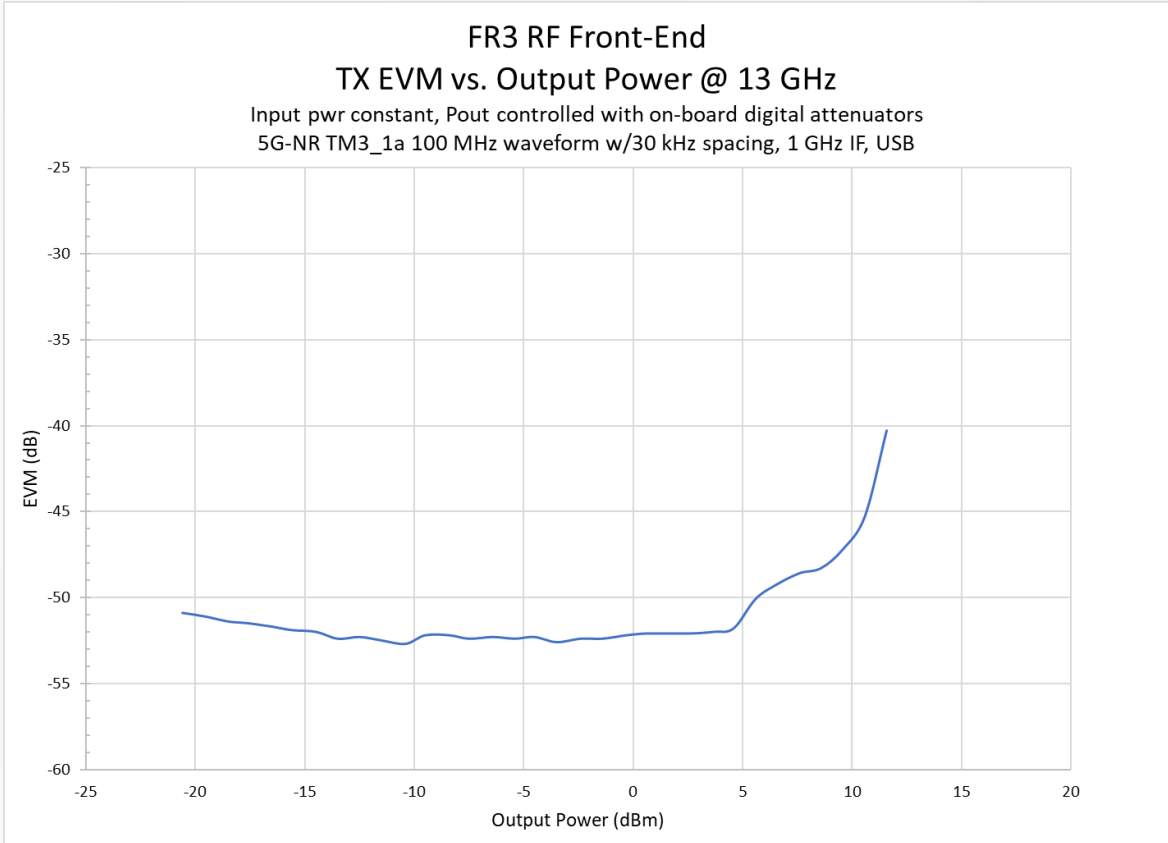
EVM vs. Pout (Standalone TX RFFE)

7 GHZ



13 GHZ



- Measurement made on FR3 RFFE (w/o DAC)
- 100MHz 5G NR waveform

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TX EVM with Apollo DAC

- **-50dB EVM**
  - 7.1GHz Carrier @ Pout 5dBm
  - 80 MHz, 801.11ax 1024QAM

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FR3 RX Measurement Results

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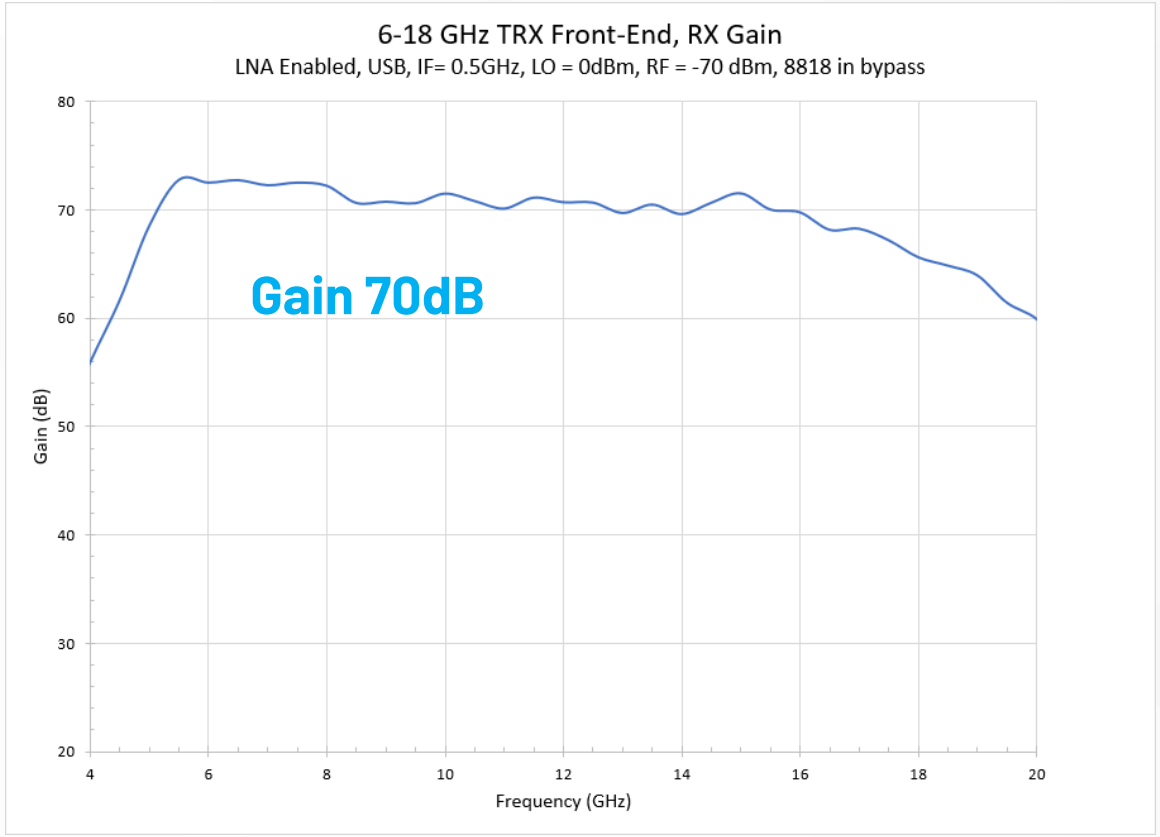
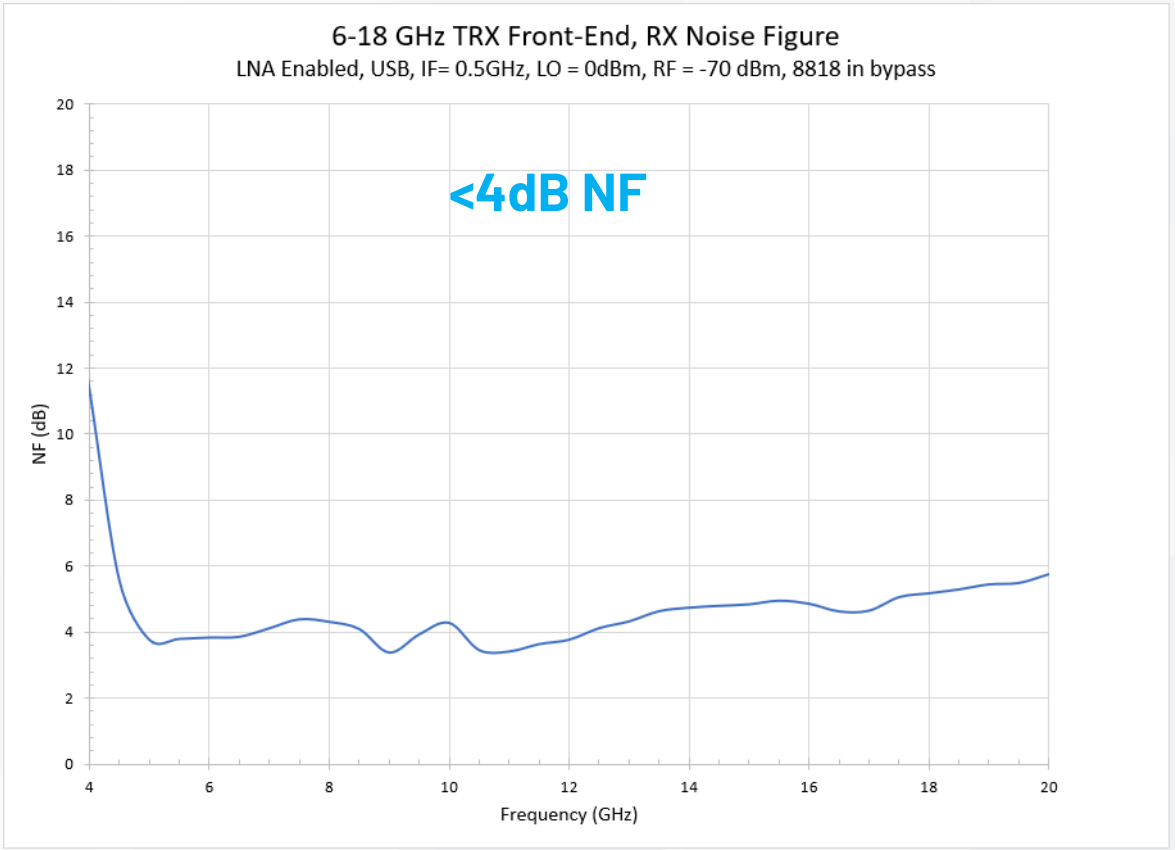
RX Gain – Standalone FR3 RFFE

Broadband Gain



Noise Figure



Measurement data on RFFE board; without data converter

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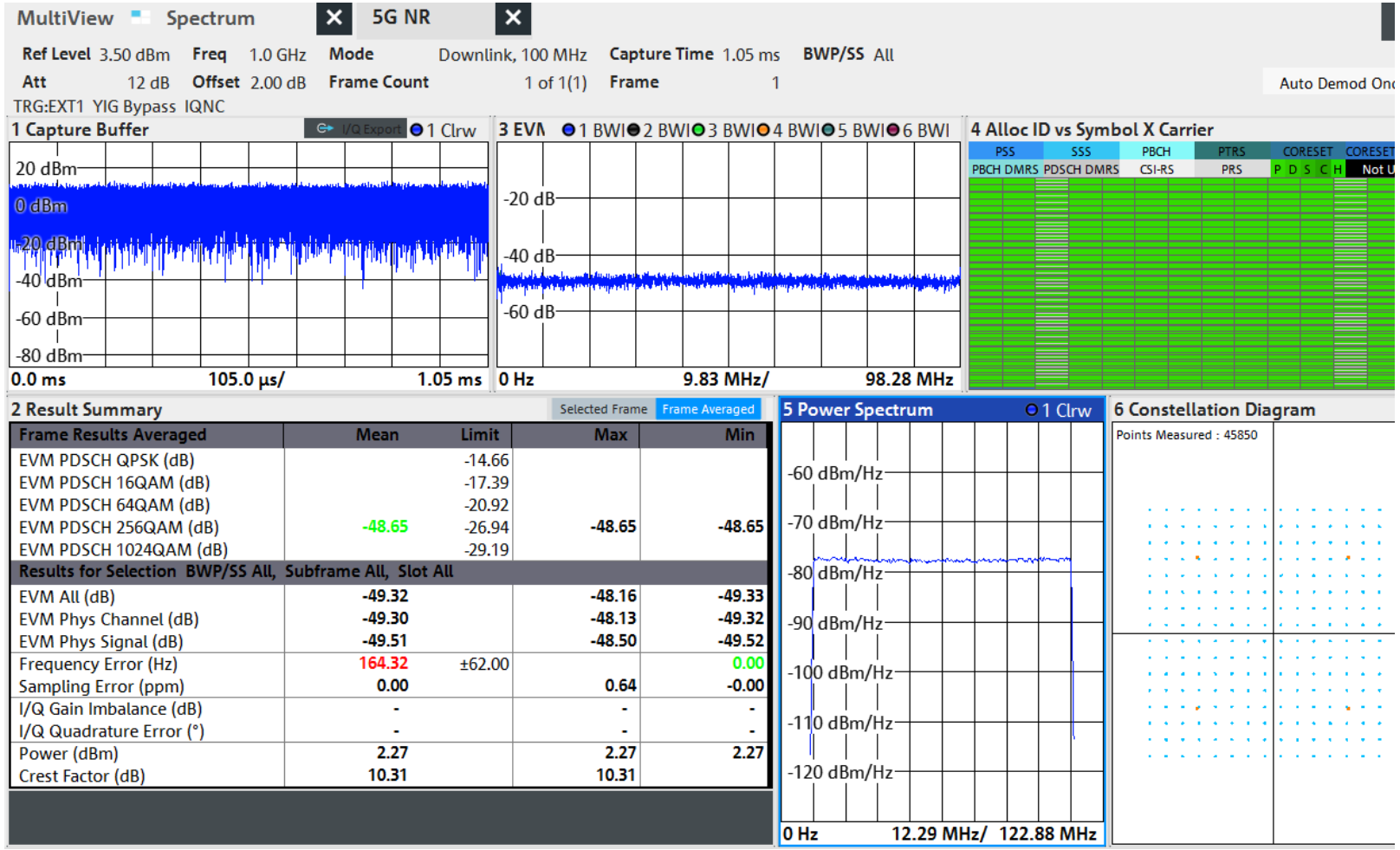
RX FR3 RFFE Spectrum (Standalone)



EVM <-49dB

- RF = 13GHz; IF out= 1GHz
- 100MHz 5G NR waveform
- RX Only (w/o DAC)

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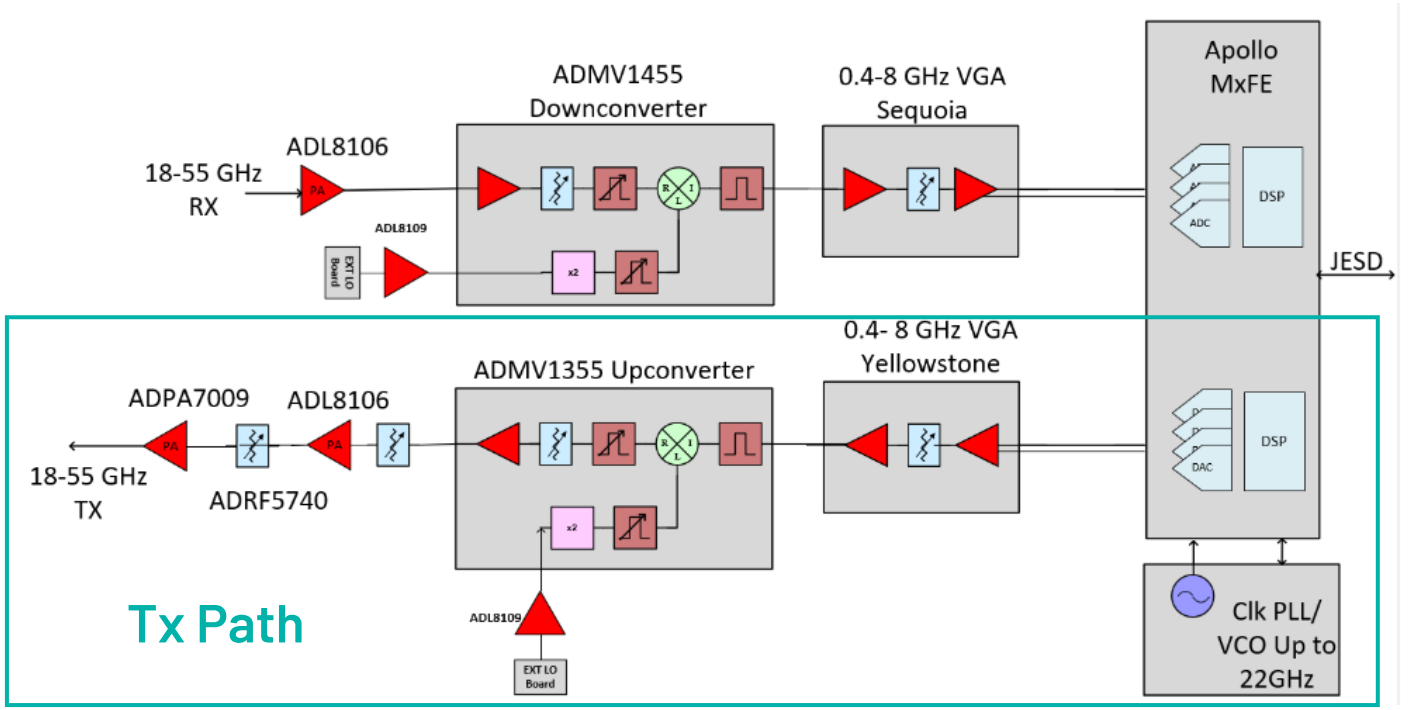
FR2 RFFE with Apollo MxFE

- RF carriers 18-55GHz
- Bi-directional (TX & RX)
- 4GHz iBW (tunable filter enabled)
- EVM < –45 dB (40GHz, 5GNR)
- Transmitter filtering
- Spur rejection capability
- Calibration using temperature sensors
- Programmable using SPI

Block Diagram



Data Converters:

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Contact Information

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- Mark D'Amato - Mark.Damato@analog.com

Visit ADI booth (#1239) for the FR3 and FR2 Wireless Test demos

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Thank You!

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