

Experience A New Level of Flexibility with the M8198A AWG

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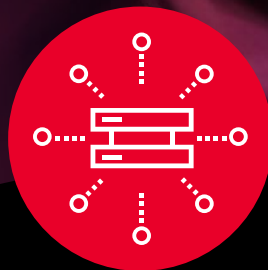
Accelerate Innovation with Flexible Waveform Generation



Greatest flexibility for
all your application
needs



Deep memory for the
most realistic
waveforms



Flexible testing with
wide bandwidth for
your system



Customizable testing
across applications



6G testing with state-
of-the-art PathWave
Software

M8198A Arbitrary Waveform Generator

- Up to 8 GSa/channel memory
- 58 GHz analog bandwidth
- 128 GSa/s sample rate
- 1.66 V_{pp,diff} output amplitude
- Storing and playing of long, detailed waveforms
- Flexibility to address different modulation schemes



Keysight's High-Speed AWG Portfolio



Specifications	M8190A	M8195A	M8198A	M8196A	M8194A	M8199A	M8199B
Max. sample rate	8 / 12 GSa/s	65 GSa/s	128 GSa/s	92 GSa/s	120 GSa/s	128 GSa/s	256 GSa/s
Bandwidth (incl. sinc roll-off)	3 / 5 GHz @-3dB (sinc roll-off compensated)	23 GHz @-3dB	58 GHz @-3dB	26 GHz @-3dB	45 GHz @-3dB	50 / 55 GHz @-3dB	75 GHz @-3dB 80/90 GHz @-6/-10dB
DAC Resolution	14 / 12 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
Max. Amplitude (diff.)	2 Vpp	2 Vpp	1.66 Vpp	2 Vpp	1.6 Vpp	1.66 Vpp	5.0 Vpp
Memory	1536 / 2048 MSa per channel	16 GSa per module	Up to 8 GSa per channel	256 kSa per channel	512 kSa per channel	512 / 1024 kSa per channel	1024 kSa per channel
Random jitter (RMS)	5 ps	200 fs	75 fs	130 fs	125 fs	75 fs	75 fs
Rise / fall time (20%/80%)	< 60 ps (typ)	18 ps (typ)	7 ps	9 ps (typ) corrected	6 ps (typ) corrected	5 ps	3 ps
Max. ENOB (Chart in datasheets)	11.7 / 10.8 bits	6.4 bits	6.0 bits	6.3 bits	5.8 bits	6.0 bits	6.1 bits
Max. SFDR (Chart in datasheets)	-90 dBc (DC to 2 GHz)	-80 dBc (DC to 1 GHz)	-54 dBc (DC to 5 GHz)	-57 dBc (DC to 4 GHz)	-35 dBc (DC to 10 GHz)	-48 dBc (DC to 20 GHz)	See datasheet
Channels per module	1 or 2	1, 2, or 4	1 or 2	1, 2 or 4	1, 2 or 4	1, 2, or 4 / 1 or 2	1 or 2
Synchronization	Up to 12 channels	Up to 16 channels	Up to 2 channels	Using a scope for time alignment	Up to 16 channels	Up to 16 / 8 channels	Up to 8 channels
Sequencing	Yes	Yes	No	N/A	N/A	N/A	N/A
Triggering	Yes	Yes	Coming Soon	No	No	No	No
Form-factor	2-slot AXIe	1-slot AXIe	3-slot AXIe	1-slot AXIe	1-slot AXIe	2-slot AXIe	2-slot AXIe

System Components

The M8198A is a 3-slot module and uses the M9505A AXIe chassis and M8008A clock module, the same as the M8199A and M8199B

M9505A AXIe 5-Slot Chassis



M8198A



2 channels @ 128 GSa/s
8 Gsa memory per channel
58 GHz analog Bandwidth

M8008A Clock Module



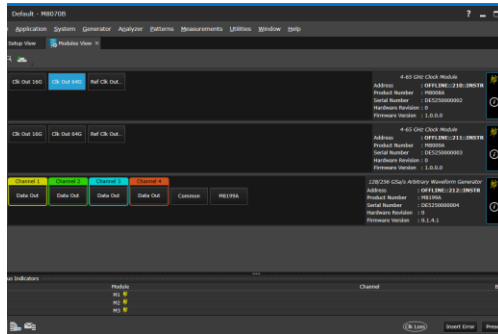
+
optional

M9537A Embedded Controller



Integrated into Industry-Leading Software

Multiple Keysight-custom software options



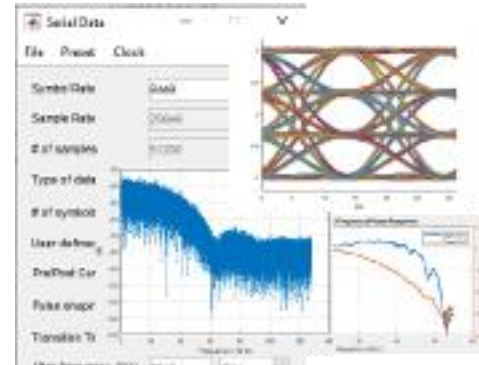
M8070B System Software

- Baseline software for AWG control
- Provides a SCPI interface for additional programming



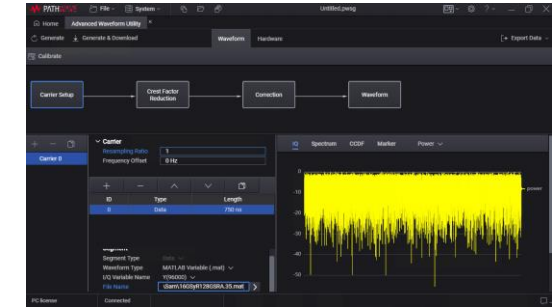
SCPI Programming

- Versatile and customizable to your application
- MATLAB, C/C++, Python



IQTools

- MATLAB based and open source
- Generate NRZ, PAMx, QAMx, and more waveforms
- In-System calibration and waveform pre-distortion
- Load waveform files



PathWave Signal Generation Advance Waveform Utility (PWSG AWU)

- Generate multiple types of waveforms
- Perform calibration and waveform correction
- Combine multiple waveforms
- Improve Adjacent Channel Power Ratio (ACPR) measurement with Crest Factor Reduction (CFR)

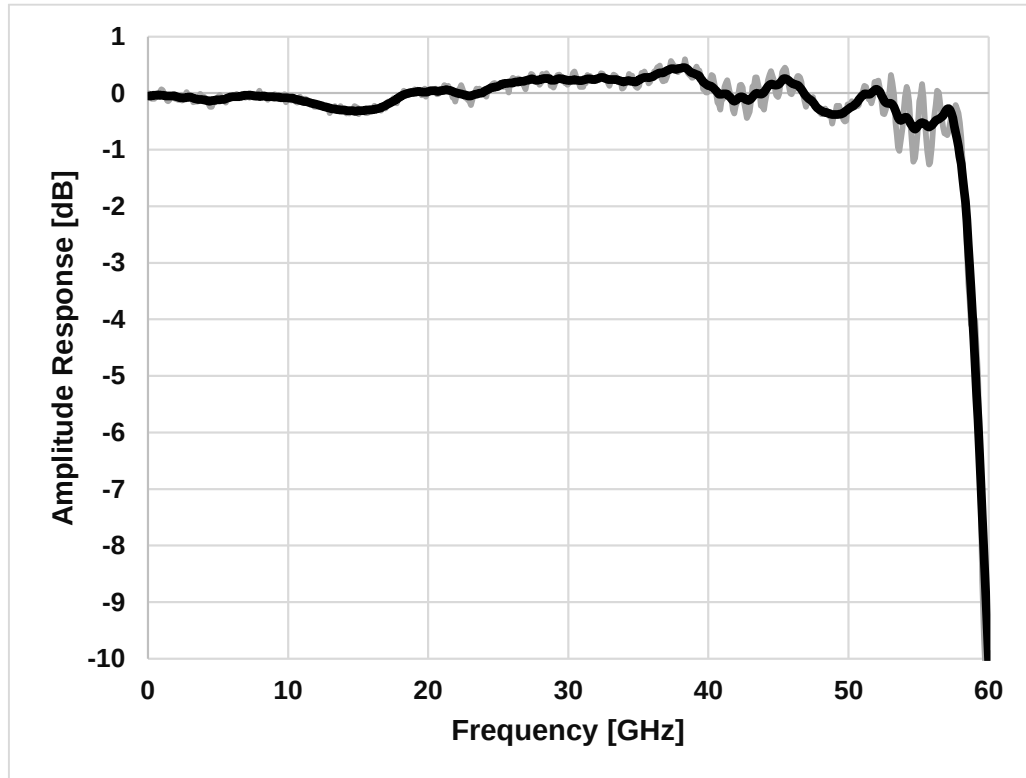


Key Features

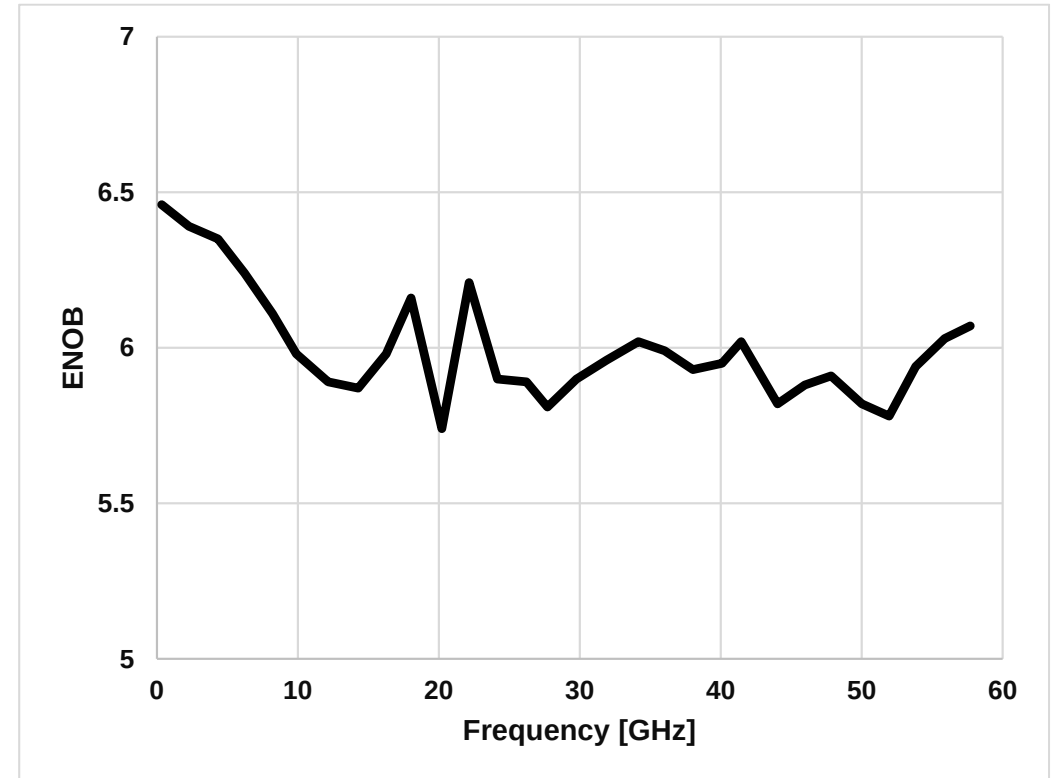
- The industry's deepest memory AWG with wide-bandwidth and high sample rate
- Deep memory, wide bandwidth and high sample rate to ensure:
 - The best signal fidelity
 - Error-free advanced modulation testing
 - Accurate representation of signals
 - Minimal truncation errors from high resolution, detailed waveforms

Frequency Response and ENOB

58 GHz Analog Bandwidth



≥ 5 ENOB in the Frequency Range



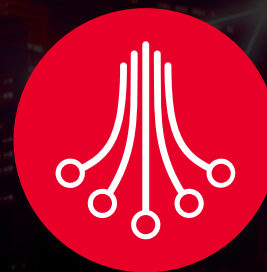
Be Ready for Next-Gen Design



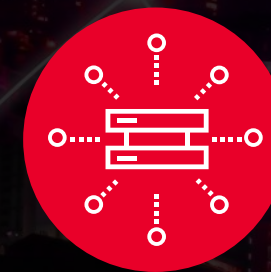
6G



Aerospace/Defense



High-Speed Digital



General Testing

6G Research

Wireless Testing for 6G

- Get the most realistic view of your waveforms for 6G and mobile networks
- Configurable testing for your system with very wide bandwidth schemes for mobile networks
- Customize your testing with integrated firmware and IQ tools



M8198A Leads the Way for 6G Testing

Performance Comparison



M8198A



M8199A

Single Carrier QAM

64QAM, 10GSymR
Alpha 0.35, 128GSa/s, PAR 6.5dB
EVM Norm: Ref RMS
F = 15GHz

-36.7dB (ccEVM)

-35dB (ccEVM)

Custom OFDM

16QAM, OBW =10GHz, PAR 10.5dB
14 symbols
Equalize Use Data, Avg mode: Least Squares
F = 8GHz

-36.3dB (ccEVM)

Not measured

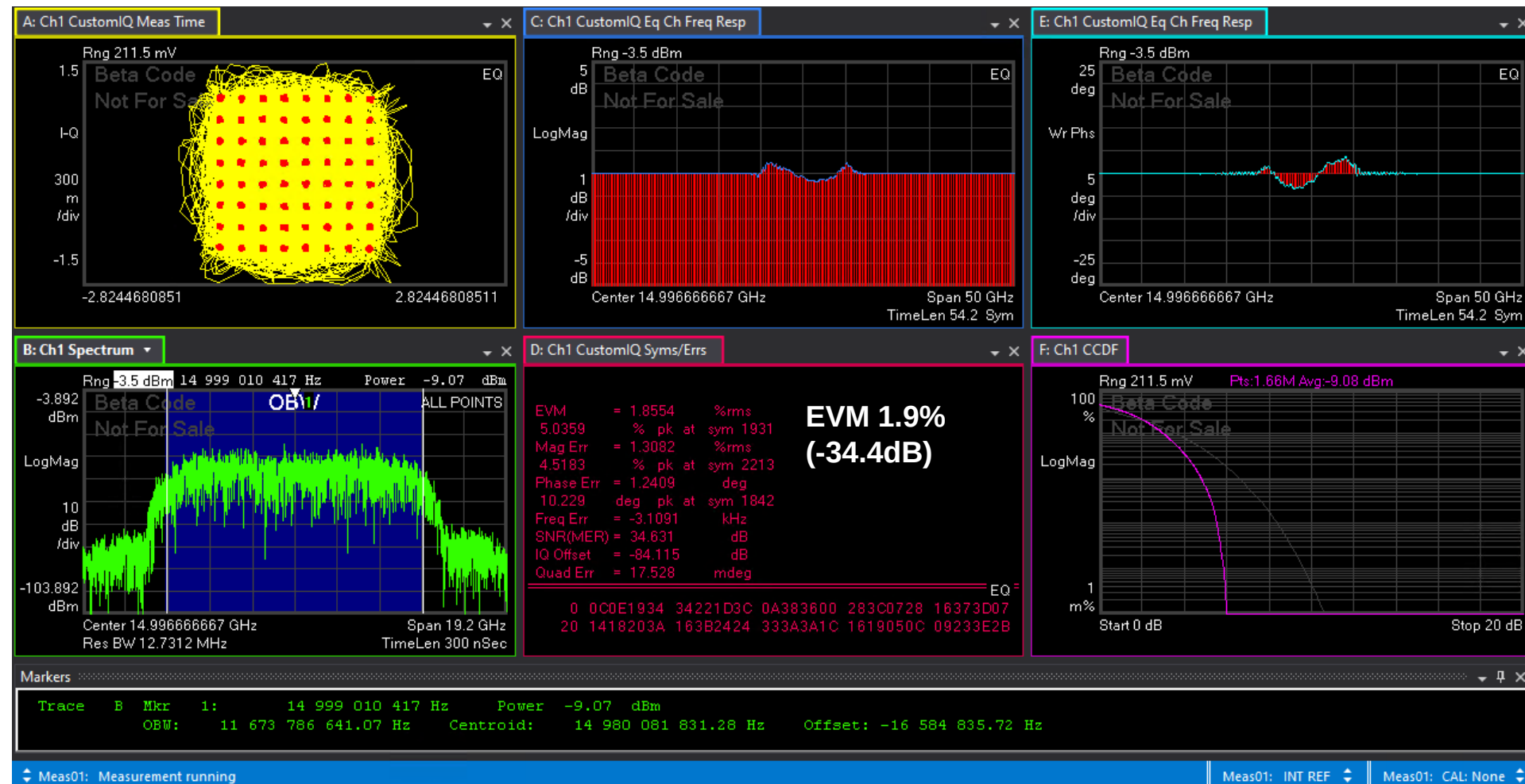
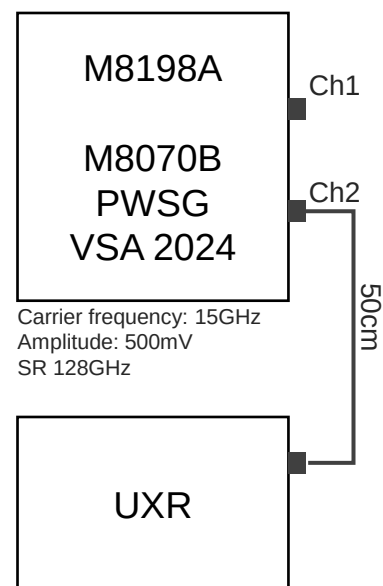
6G Testing for sub-THz Applications

Single Carrier 64QAM 10GSymR, $F_c = 15\text{GHz}$

Generated .mat by IQTools, then used AWU to upload waveform. No correction applied.

Waveform:
16QAM, 10GSymR
Alpha 0.35, 128GSa/s, PAR 6.5dB

Equalization:
Eq: 50 Sym, 1e-6
EVM Norm: Ref RMS



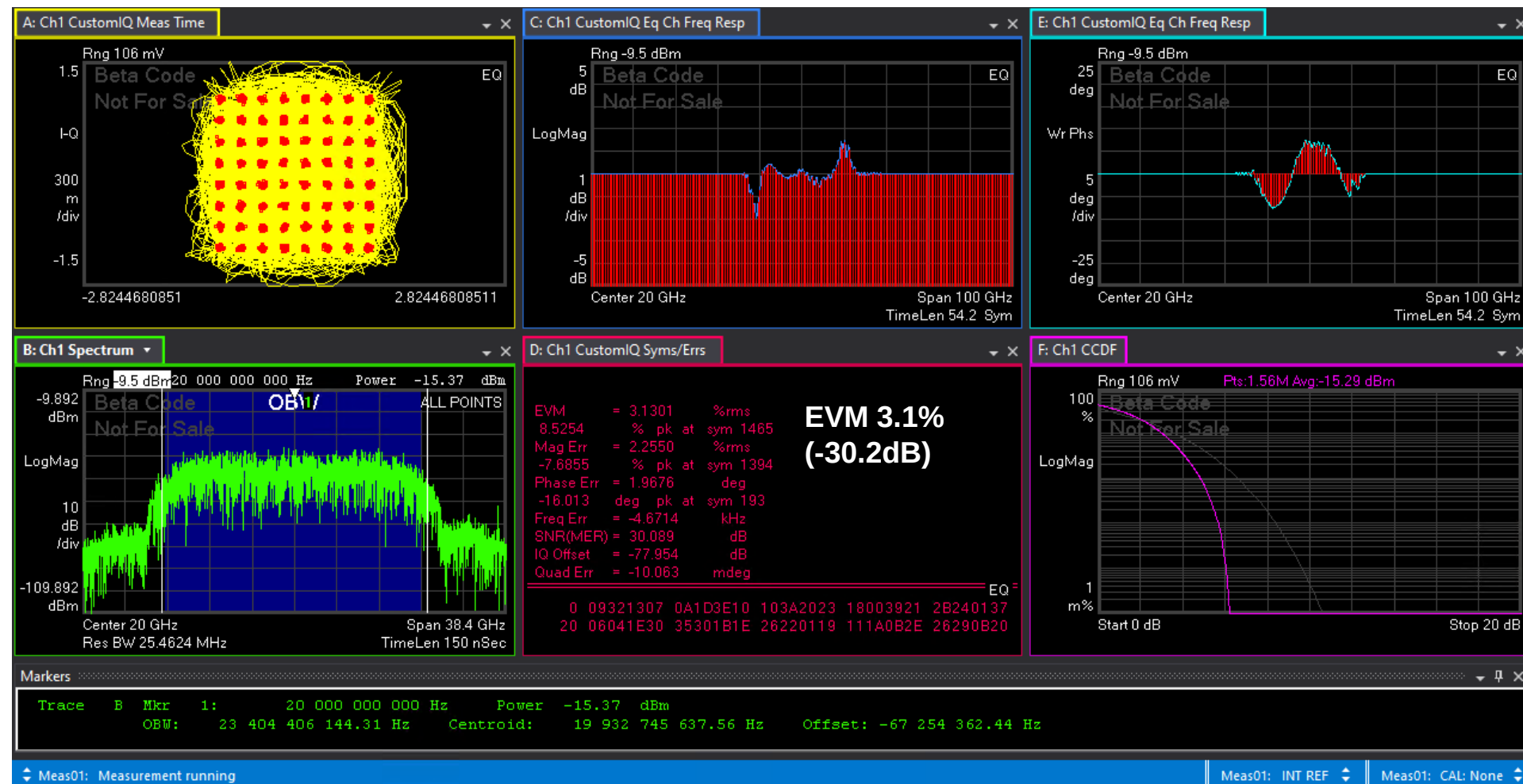
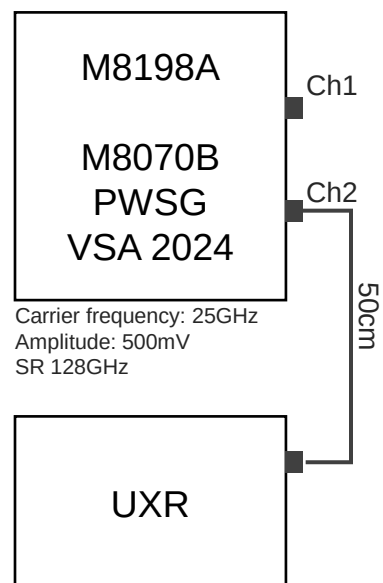
6G Testing for sub-THz Applications

Single Carrier 64QAM 20GSymR, $F_c = 20\text{GHz}$

Generated .mat by IQTools, then used AWU to upload waveform. No correction applied.

Waveform:
16QAM, 20GSymR
Alpha 0.35, 128GSa/s, PAR 6.5dB

Equalization:
Eq: 50 Sym, 1e-6
EVM Norm: Ref RMS



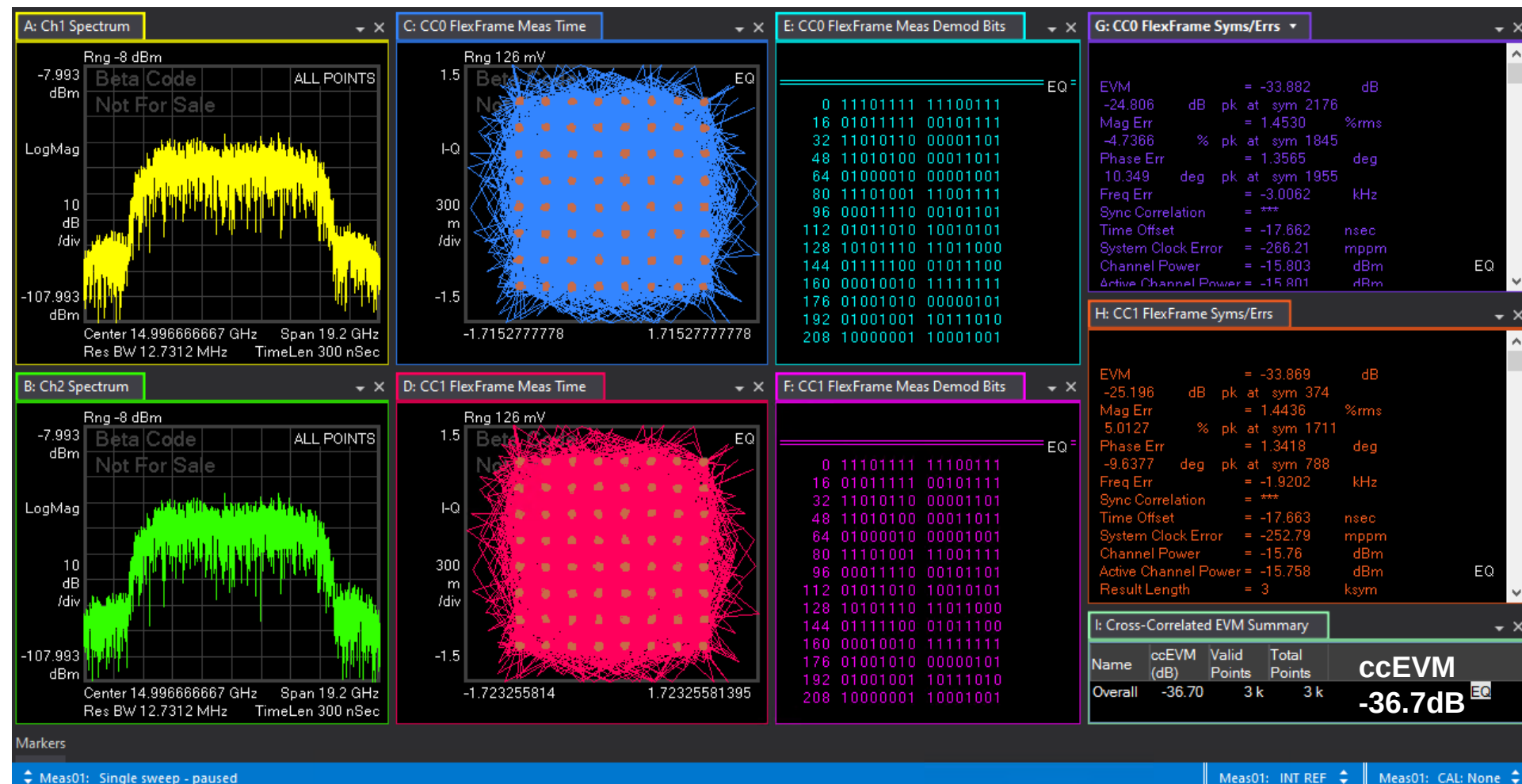
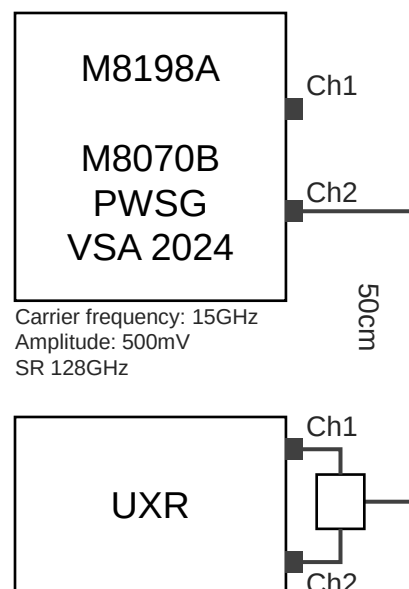
6G Testing for sub-THz Applications

Single Carrier 64QAM 10GSymR, $F_c = 15\text{GHz}$, cross-correlation EVM

Generated .mat by IQTools, then used AWU to upload waveform. No correction applied.

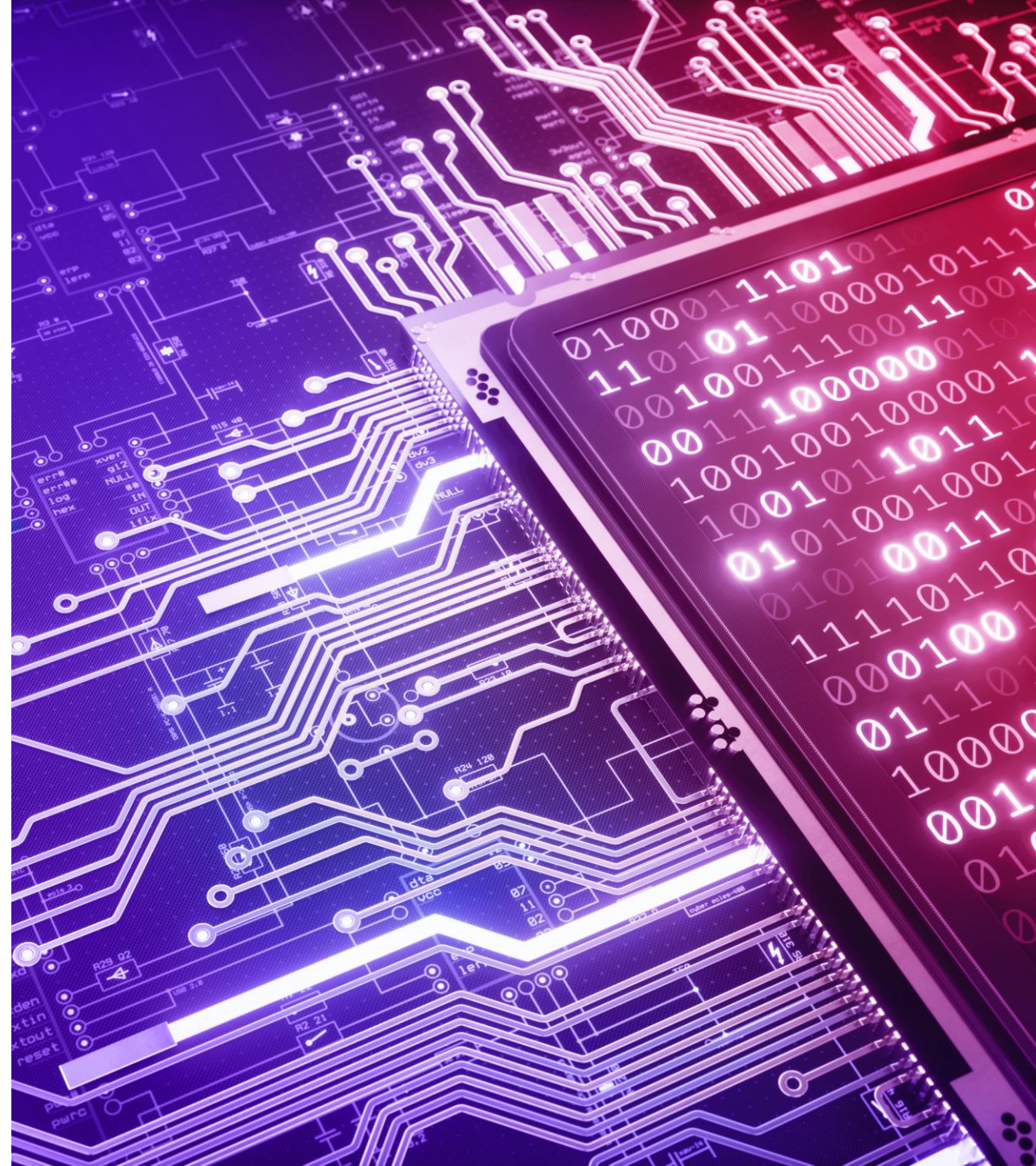
Waveform:
16QAM, 10GSymR
Alpha 0.35, 128GSa/s, PAR 6.5dB

Equalization:
Zero-forcing
Eq: 99 Sym, 1e-6
EVM Norm: Ref RMS



High Speed Digital

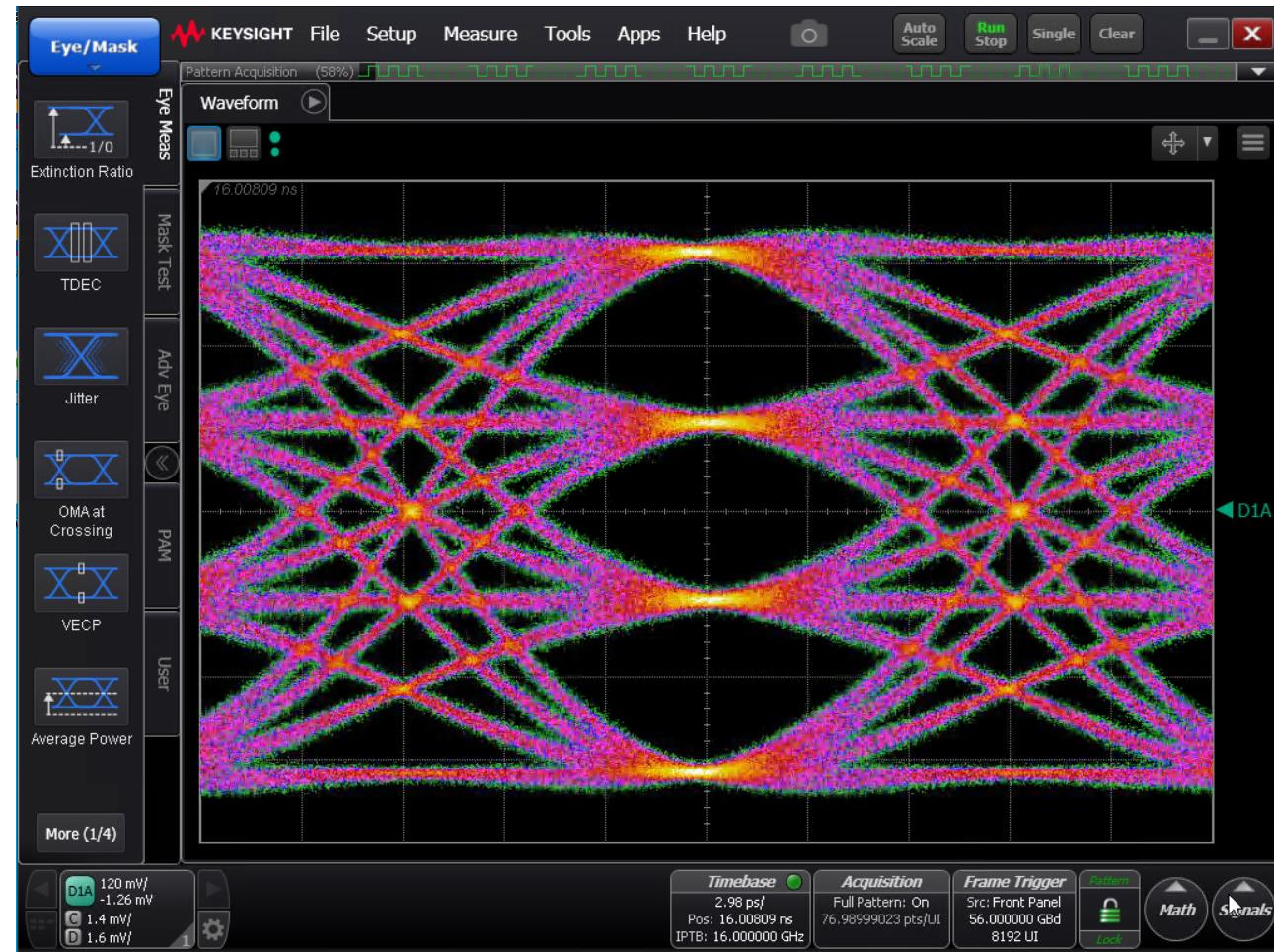
- Enable high-speed testing for designing products or components with high-speed serial links at up to 100 GBd



High Speed Digital

56 GBd PAM4

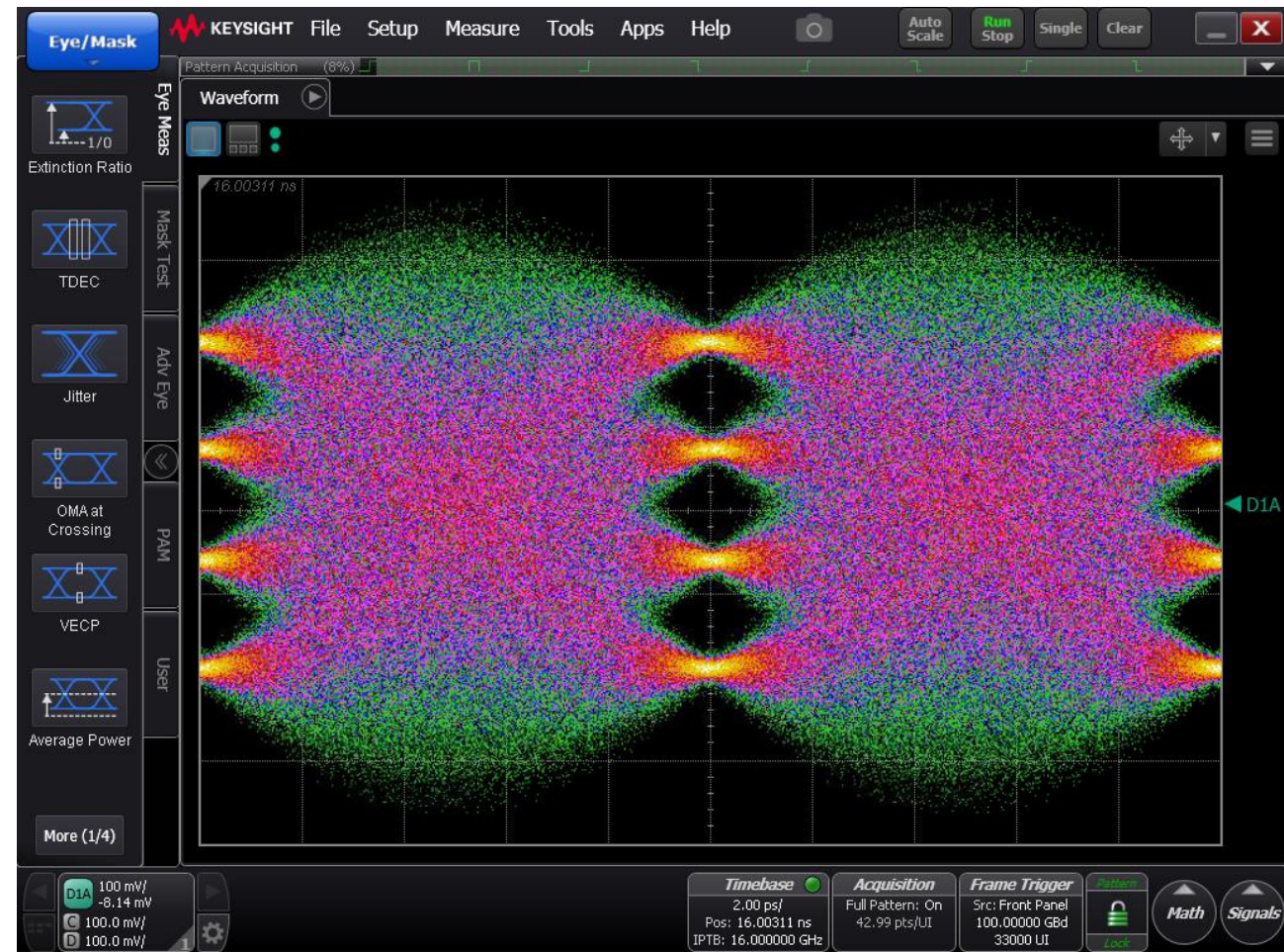
- Flexibility
- High speeds digital to analog converter
- Deep Memory
- Customization of modulation formats and data patterns



High Speed Digital

100 GBd PAM4

- Flexibility
- High speeds digital to analog converter
- Deep memory
- Customization of modulation formats and data patterns
- Digital correction techniques for frequency- and phase-response compensation



Aerospace/Defense

Modern EW Testing Solution

- Utilize the deep memory to:
 - store and playback configurable waveforms,
 - play very long, complex waveforms
- Configurable testing for your system with very wide bandwidth schemes



General Testing

- Generate any arbitrary waveform that can be mathematically described
- Achieve the most accurate generation of your waveforms
- Improve your measurement signal fidelity
- Reduce distortion
- Store and retrieve detailed waveforms



Product Options and Configuration

Product numbers	Description	Comments
M8198A-001	Arbitrary waveform generator module, 1 channel, 128 GSa/s, 3-slot AXIe module	Number of channels from 1 to 2 is upgradeable with the option M8198AU-U02
M8198A-002	Arbitrary waveform generator module, 2 channel, 128 GSa/s, 3-slot AXIe module	
M8198A-08G	8 GSa memory per channel	One M8008A clock generator module required to operate up to four M81998A
M8008A-064	Clock generator 32-64 GHz, 1-slot AXIe module	One M8008A clock generator module required to operate up to four M81998A
M9505A-U20	5-slot AXIe chassis with USB option	Compatible with: M8199A, M8199B, and M8198A
M9537A	AXIe embedded controller	Optional
Upgrade options	Description	Comments
M8198AU-U02	Upgrade from 1-channel to 2-channels	Software license
M8198AU-U8G	Upgrade from 1 GSa to 8 GSa Memory per channel	Software license

KTI-0570

Credit Up To

Trade-In Model	M8198A
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Keysight

M8199A	55%
M8196A	35%
M8195A	30%
M8195A	30%

Tektronix

AWG70001A	12%
AWG70002A	15%
AWG70001B	17%
AWG70002B	22%

Trade In for Large Discounts!

Receive up to 55% when you trade-in Keysight and Tektronix AWG models

Why Upgrade?

- Receive up to a 55% trade-in credit towards the M8198A
- Upgrade your existing products to the most flexible AWG for all your application needs
- Get the deepest-memory, wide-bandwidth AWG with 8 GSa/Channel and 58 GHz

