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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Thermometer	Omega Engineering, Inc.	HH311	DUI	2021-02-02	2024-02-02
Meter - Multimeter	Fluke	77 IV	MLT	2020-10-15	2023-10-15
Spectrum Analyzer	Keysight	N9020A	R316	2021-08-19	2023-08-19
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBH	NCR	NCR

TEST DESCRIPTION

The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously operating.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -30 ° to +50° C and at 10°C intervals.

FCC Part 27.54 defines the frequency deviation limit as follows: “The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation."

FCC Part 24.235 defines the frequency deviation limit as follows: “The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block"
RSS 133 6.3 frequency stability requirement for base stations is 1.0 ppm. In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS Gen.
RSS-139 6.4 and RSS-170 5.2 defines frequency stability as follows: “The frequency stability shall be sufficient to ensure that the occupied/emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen”.

Results with a frequency error of less than 1000 Hz will show the carrier to be operating within the band. The frequency stability/accuracy radio design is the same for all radio technologies and modulation types. The radio was configured for 4G LTE to show compliance.

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EUT:	AHFII Remote Radio Head	Work Order:	NOKI0037
Serial Number:	YK214000036	Date:	18-Mar-22
Customer:	Nokia Solutions and Networks	Temperature:	22.6 °C
Attendees:	David Le, John Rattanavong	Humidity:	23.7% RH
Project:	None	Barometric Pres.:	1026 mbar
Tested by:	Marty Martin	Power: 48 VDC	Job Site: TX05

TEST SPECIFICATIONS	Test Method
FCC 24E:2022	ANSI C63.26:2015
RSS-133 Issue 6:2013+A1:2018	RSS-133 Issue 6:2013+A1:2018

COMMENTS

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The EUT temperature was stabilized at each temperature step (for a minimum of 30 minutes) prior to measurements.

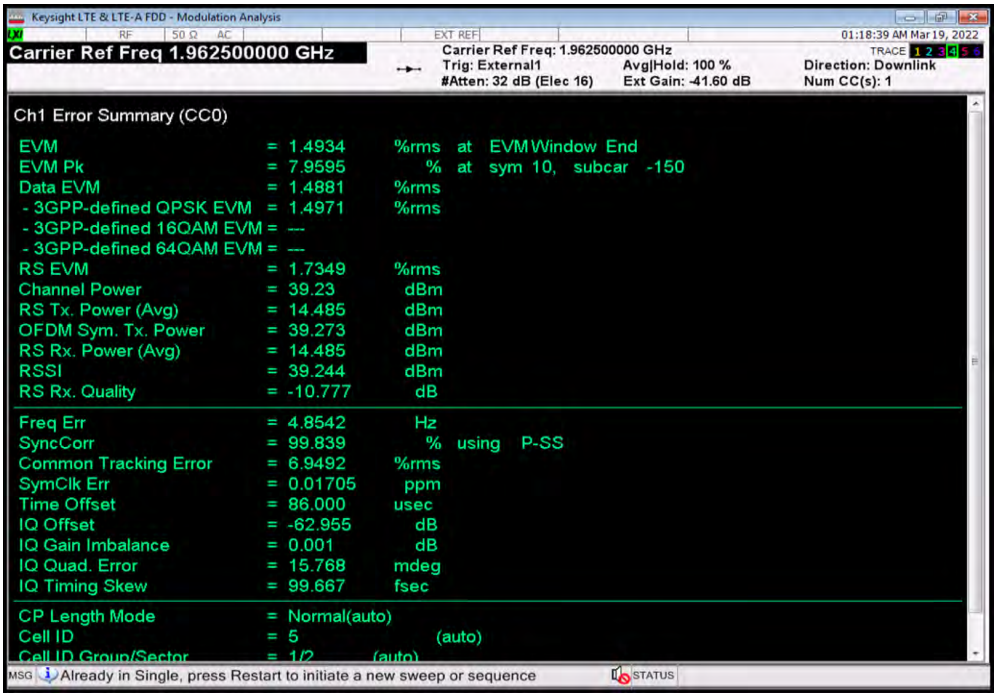
DEVIATIONS FROM TEST STANDARD

None

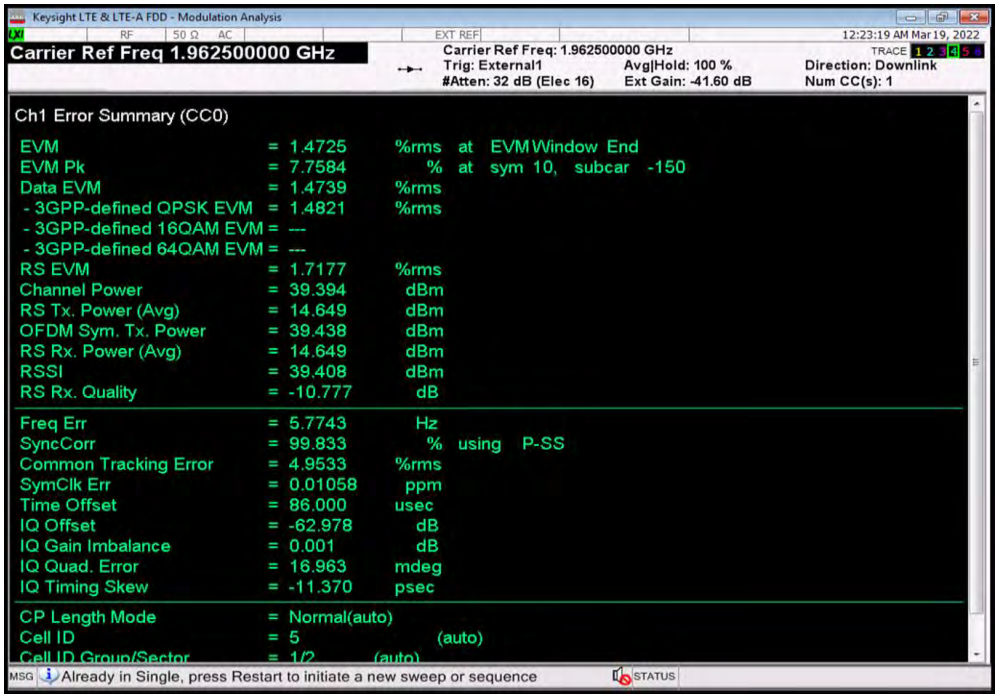
Configuration #	6	Signature

	Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
band 25, 1930 MHz - 1995 MHz, LTE Single Carrier			
Port 1, 5 MHz Bandwidth, QPSK Modulation			
48 VDC Nominal Voltage Conditions			
-30°C Temperature Conditions			
Mid CHannel 1962.5 MHz	4.85	1000	Pass
-20°C Temperature Conditions			
Mid CHannel 1962.5 MHz	5.78	1000	Pass
-10°C Temperature Conditions			
Mid CHannel 1962.5 MHz	4.23	1000	Pass
0° C Temperature Conditions			
Mid CHannel 1962.5 MHz	4.30	1000	Pass
10° C Temperature Conditions			
Mid CHannel 1962.5 MHz	6.39	1000	Pass
20° C Temperature Conditions			
Mid CHannel 1962.5 MHz	3.95	1000	Pass
30° C Temperature Conditions			
Mid CHannel 1962.5 MHz	6.89	1000	Pass
40° C Temperature Conditions			
Mid CHannel 1962.5 MHz	4.12	1000	Pass
50° C Temperature Conditions			
Mid CHannel 1962.5 MHz	4.93	1000	Pass
40.8 VDC Extreme Low Voltage Conditions			
20° C Temperature Conditions			
Mid CHannel 1962.5 MHz	3.68	1000	Pass
55.2 VDC Extreme High Voltage Conditions			
20° C Temperature Conditions			
Mid CHannel 1962.5 MHz	3.97	1000	Pass

1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -30°C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				4.85	1000	Pass



1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -20°C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.78	1000	Pass



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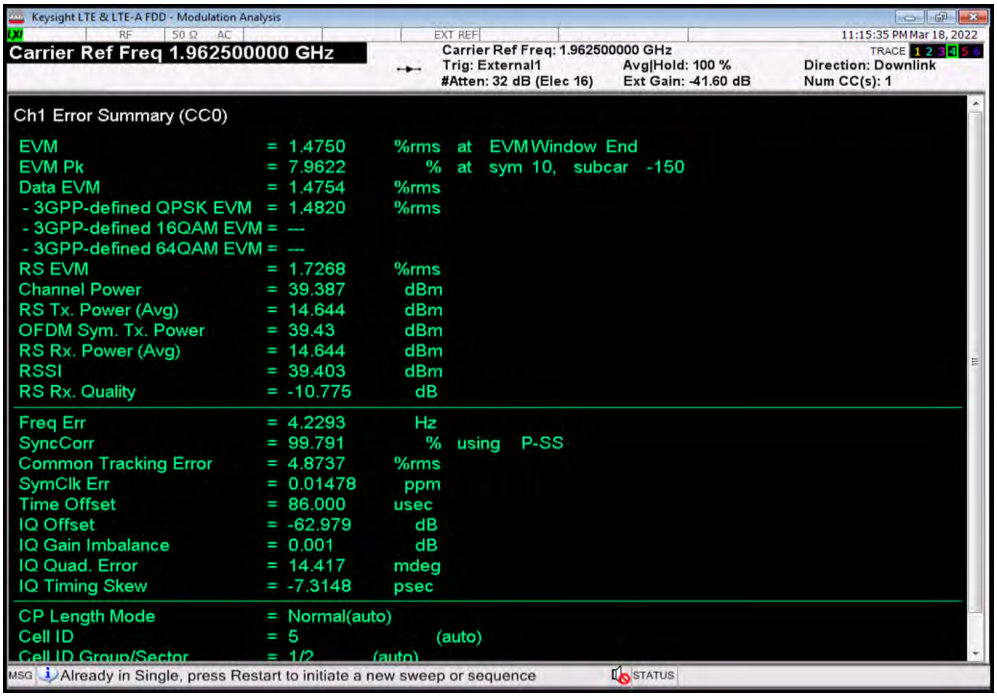
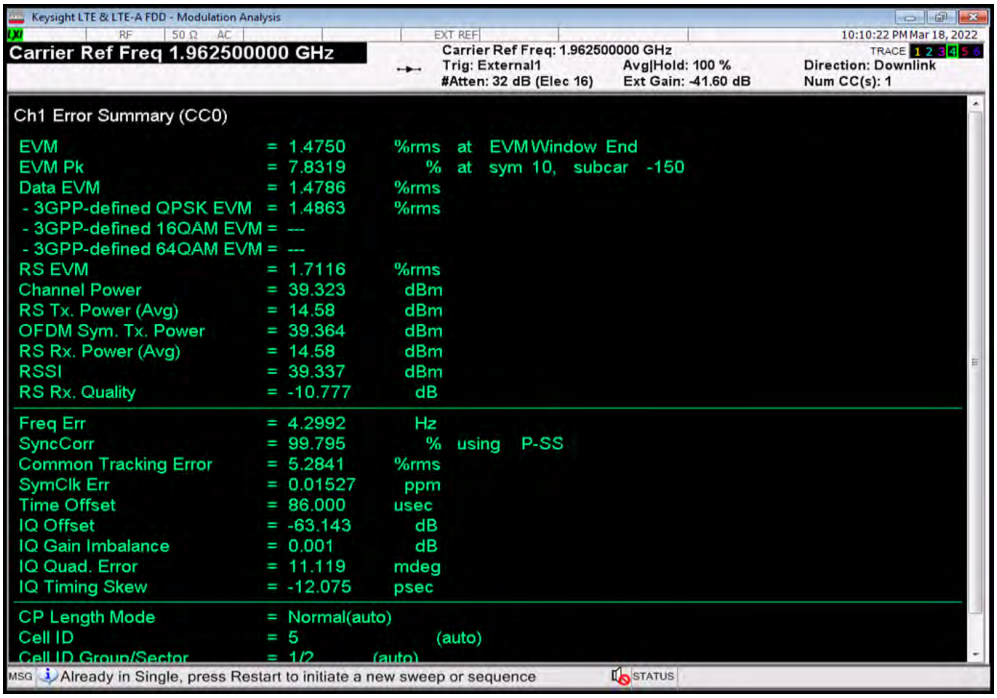
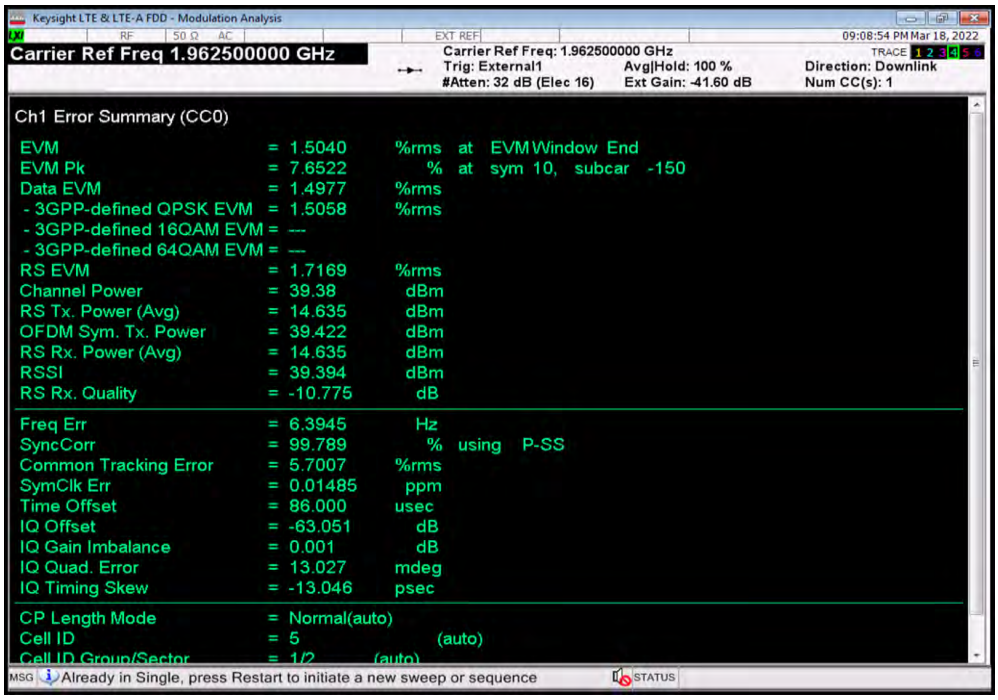
1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -10°C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				4.23	1000	Pass



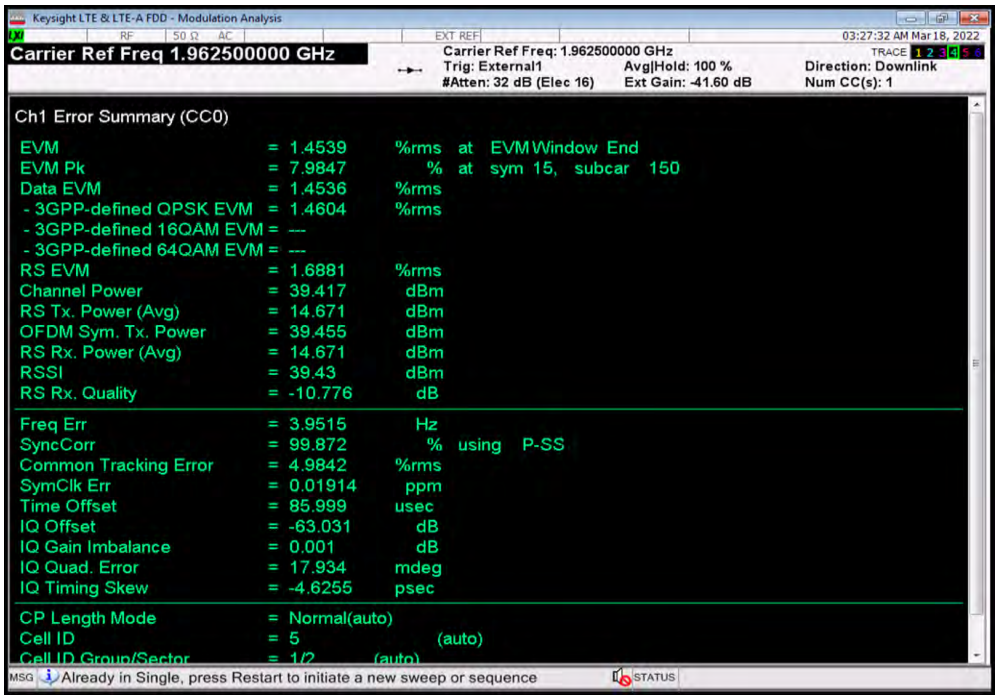
, 1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 0° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				4.3	1000	Pass



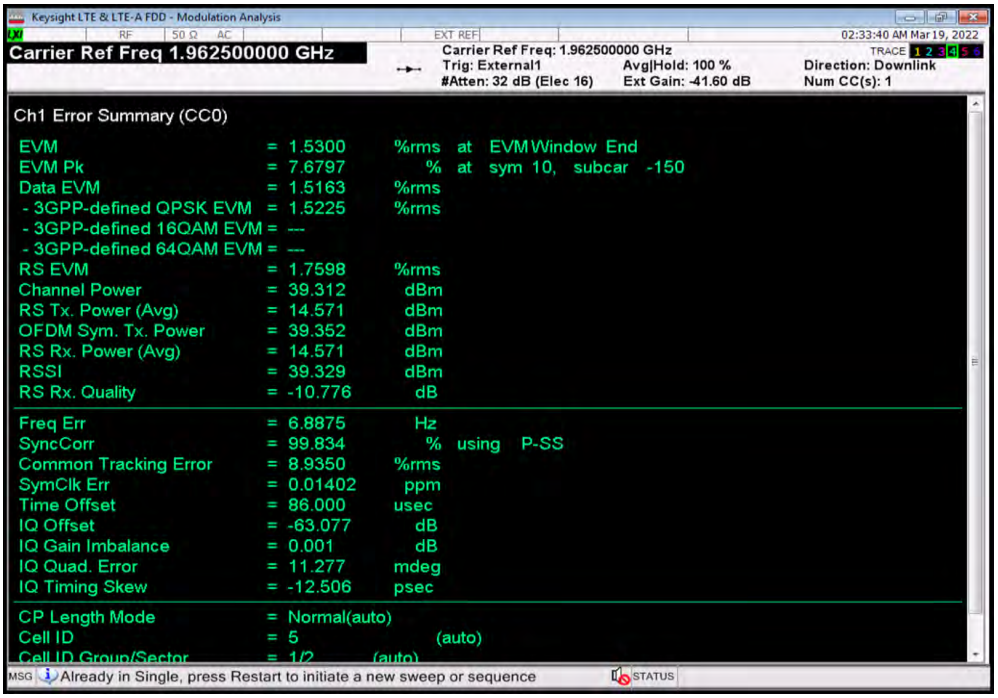
1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 10° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				6.39	1000	Pass



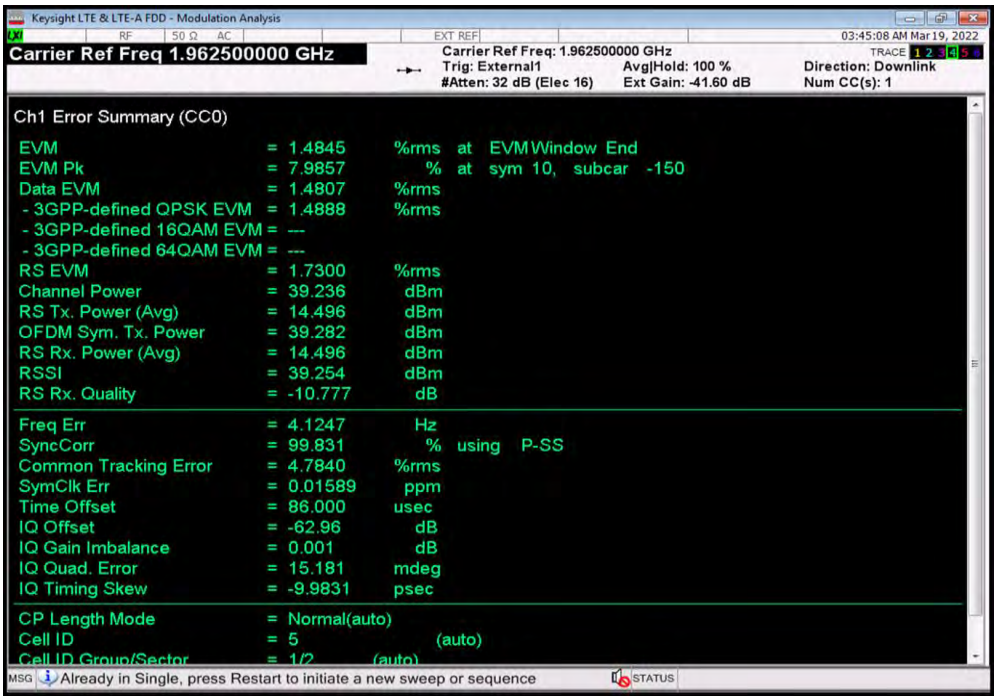
1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 20° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				3.95	1000	Pass



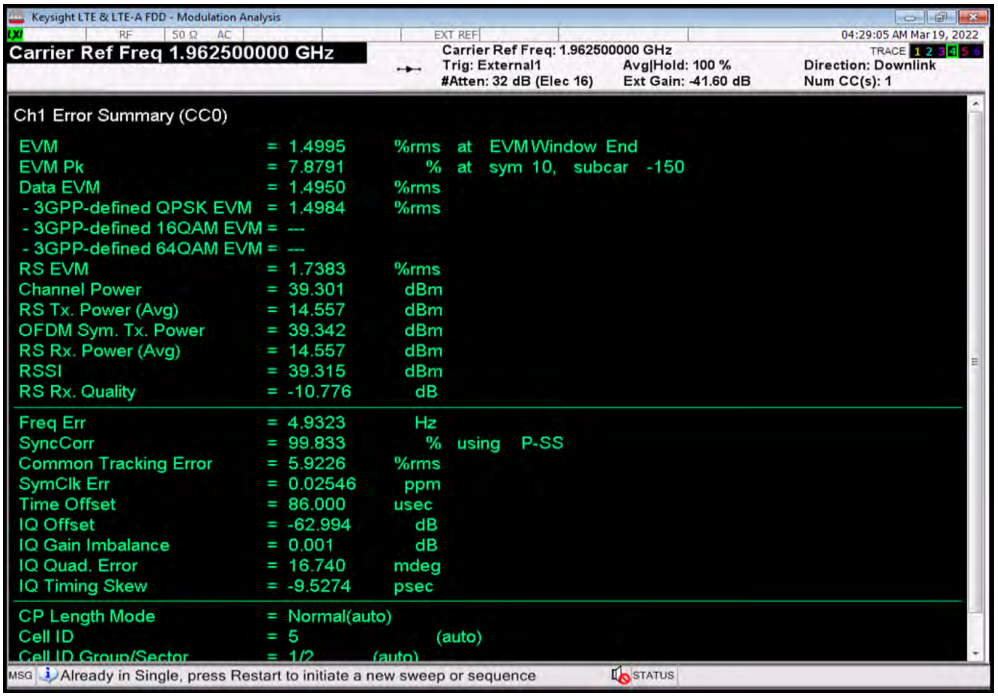
1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 30° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				6.89	1000	Pass



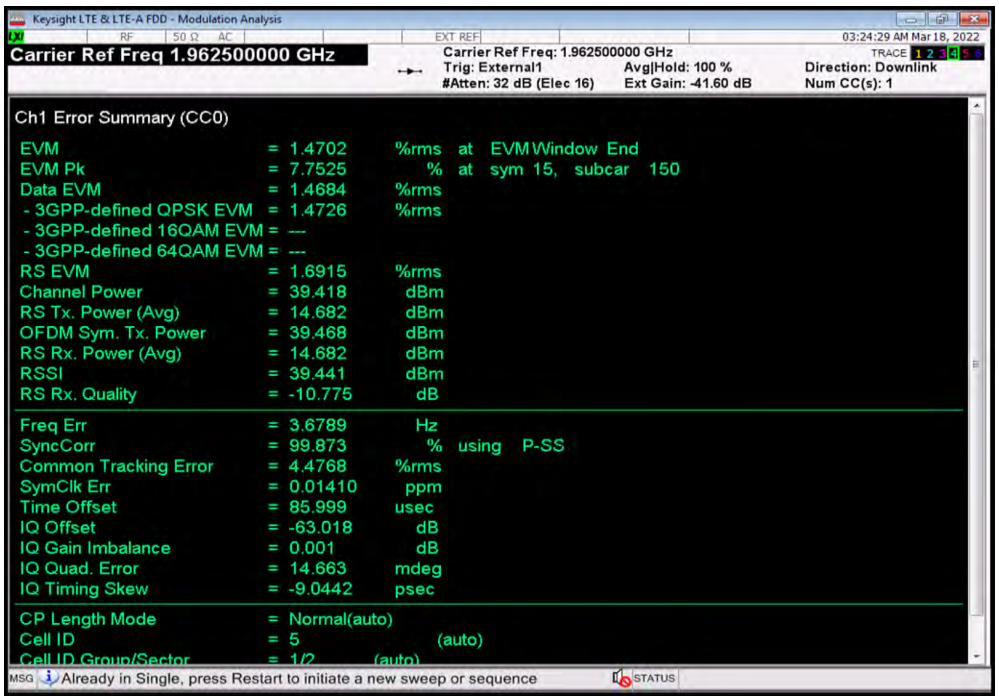
1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 40° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				4.12	1000	Pass



1930 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 50° C Temperature Conditions, Mid CHannel 196						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				4.93	1000	Pass



30 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 40.8 VDC Extreme Low Voltage Conditions, 20° C Temperature Conditions, Mid CHannel						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				3.68	1000	Pass



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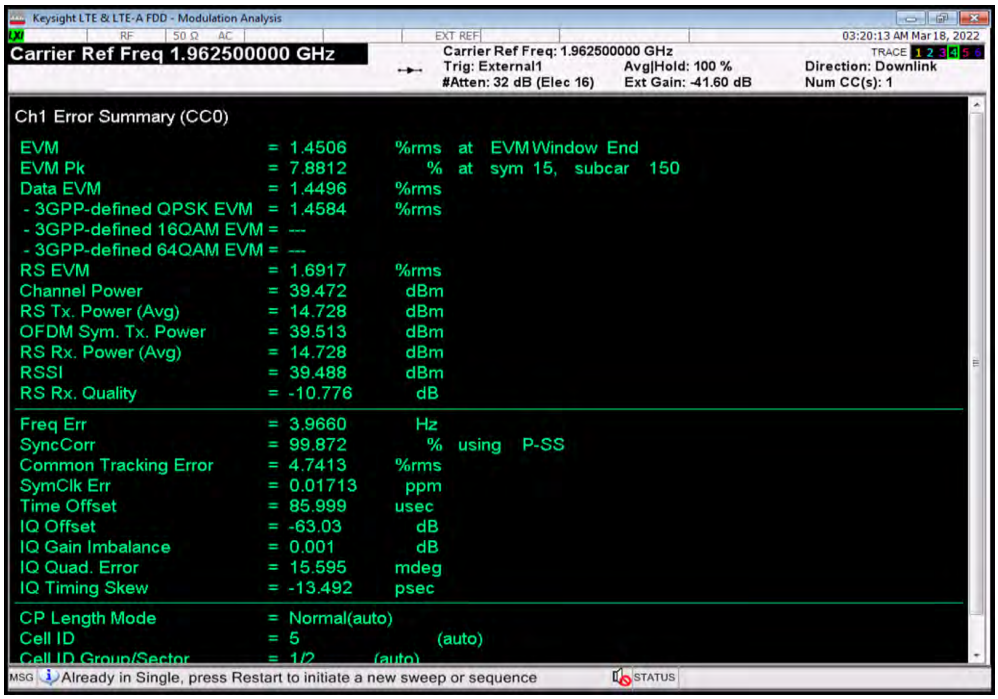
30 MHz - 1995 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 55.2 VDC Extreme High Voltage Conditions, 20° C Temperature Conditions, Mid CHannel						
				Absolute Value Frequency Δ (Hz)	**Limit Δ (Hz)**	**Result**
				3.97	1000	Pass



FREQUENCY STABILITY

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XMit 2020.12.30.0

EUT:	AHFII Remote Radio Head	Work Order:	NOKI0037
Serial Number:	YK214000036	Date:	18-Mar-22
Customer:	Nokia Solutions and Networks	Temperature:	22.6 °C
Attendees:	David Le, John Rattanavong	Humidity:	23.7% RH
Project:	None	Barometric Pres.:	1026 mbar
Tested by:	Marty Martin	Power: 48 VDC	Job Site: TX05

TEST SPECIFICATIONS	Test Method
FCC 27:2022	ANSI C63.26:2015
RSS-139 Issue 3:2015	RSS-139 Issue 3:2015
RSS-170 Issue 3:2015	RSS-170 Issue 3:2015

COMMENTS

All measurement path losses were accounted for in the reference level offest including any attenuators, filters and DC blocks. The EUT temperature was stabilized at each temperature step (for a minimum of 30 minutes) prior to measurements.

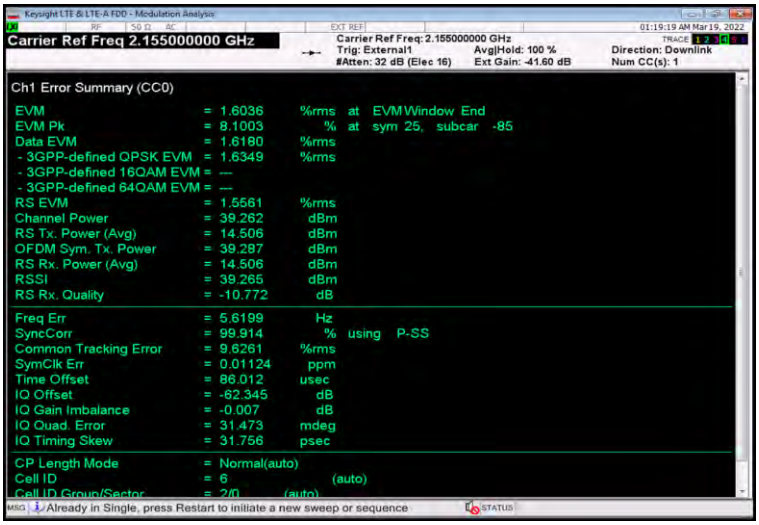
DEVIATIONS FROM TEST STANDARD

None

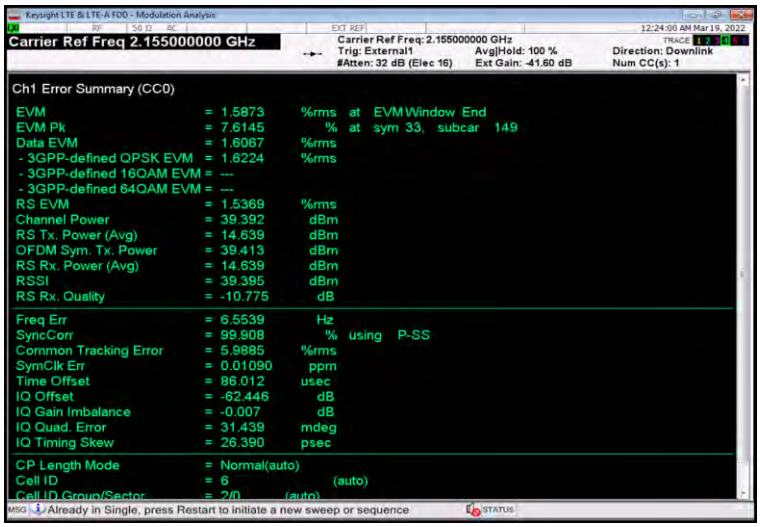
Configuration #	6	Signature

	Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier			
Port 1, 5 MHz Bandwidth, QPSK Modulation			
48 VDC Nominal Voltage Conditions			
-30°C Temperature Conditions			
Mid CHannel 2155 MHz	5.62	1000	Pass
-20°C Temperature Conditions			
Mid CHannel 2155 MHz	6.55	1000	Pass
-10°C Temperature Conditions			
Mid CHannel 2155 MHz	5.83	1000	Pass
0° C Temperature Conditions			
Mid CHannel 2155 MHz	5.68	1000	Pass
10° C Temperature Conditions			
Mid CHannel 2155 MHz	6.05	1000	Pass
20° C Temperature Conditions			
Mid CHannel 2155 MHz	5.80	1000	Pass
30° C Temperature Conditions			
Mid CHannel 2155 MHz	5.33	1000	Pass
40° C Temperature Conditions			
Mid CHannel 2155 MHz	5.33	1000	Pass
50° C Temperature Conditions			
Mid CHannel 2155 MHz	5.64	1000	Pass
40.8 VDC Extreme Low Voltage Conditions			
20° C Temperature Conditions			
Mid CHannel 2155 MHz	5.08	1000	Pass
55.2 VDC Extreme High Voltage Conditions			
20° C Temperature Conditions			
Mid CHannel 2155 MHz	3.70	1000	Pass

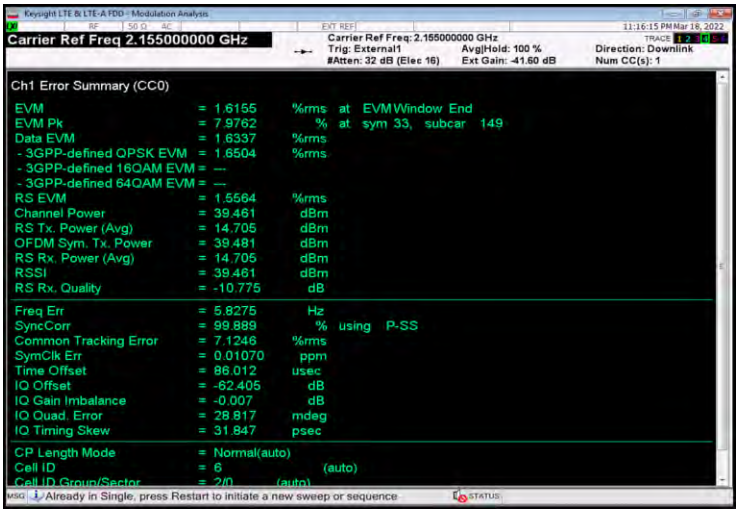
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -30°C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.62	1000	Pass



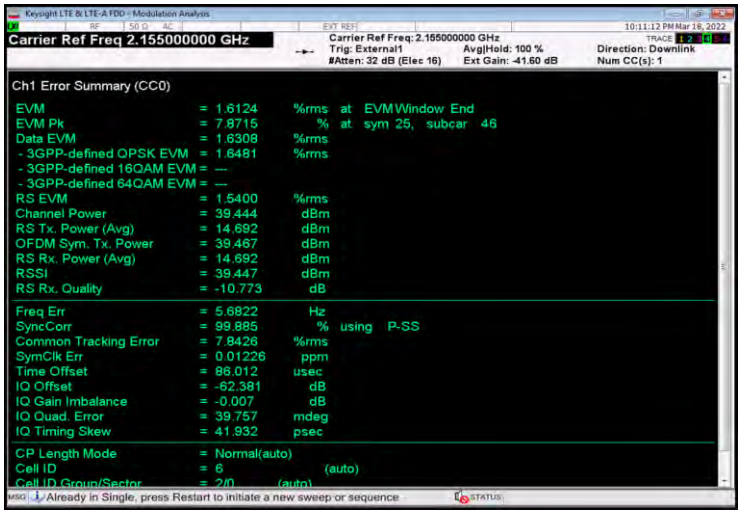
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -20°C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				6.55	1000	Pass



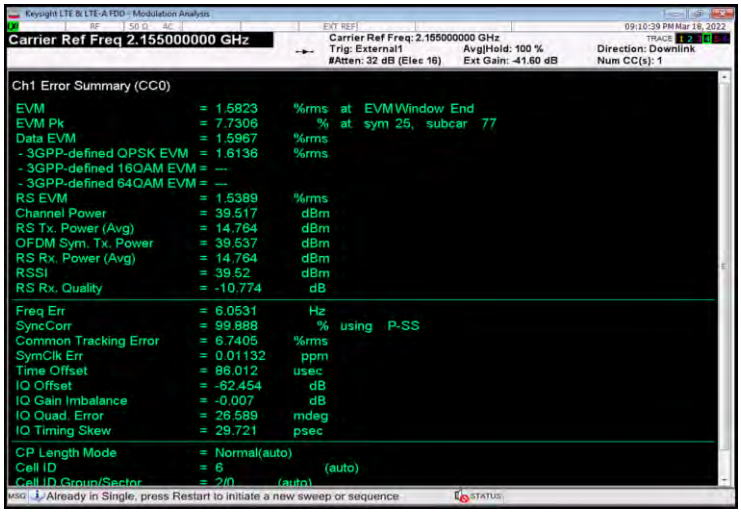
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, -10°C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.83	1000	Pass



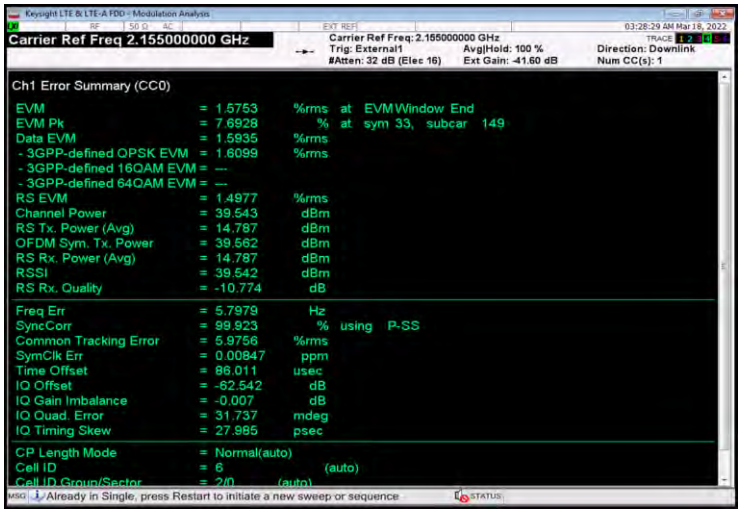
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 0° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.68	1000	Pass



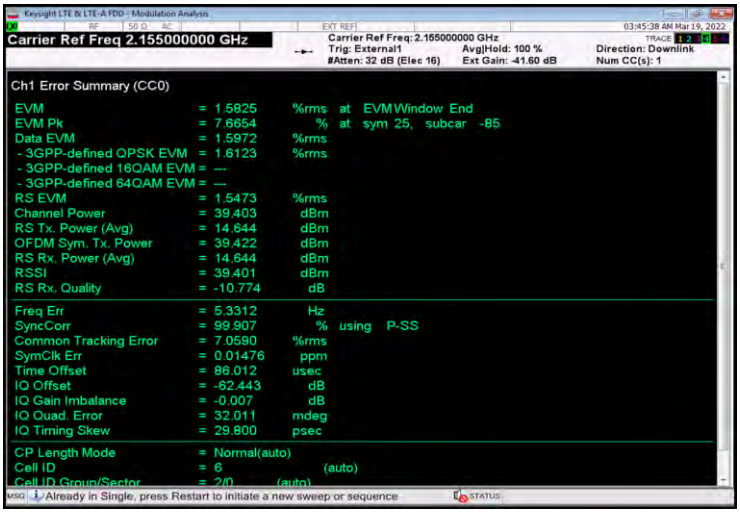
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 10° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				6.05	1000	Pass



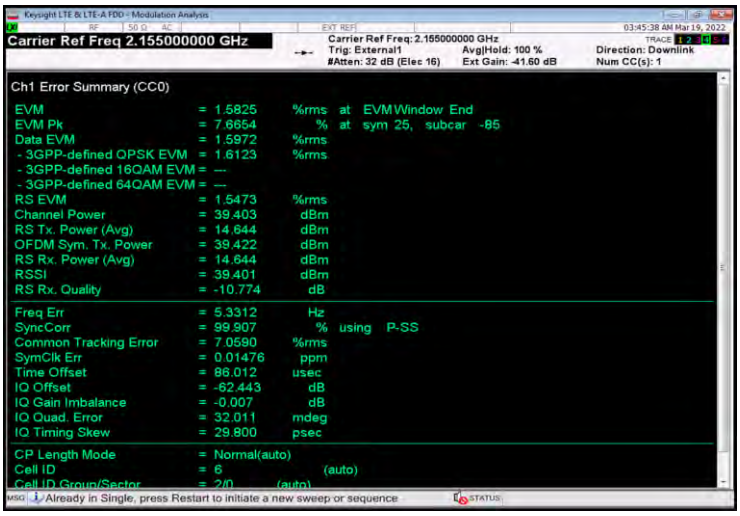
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 20° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.8	1000	Pass



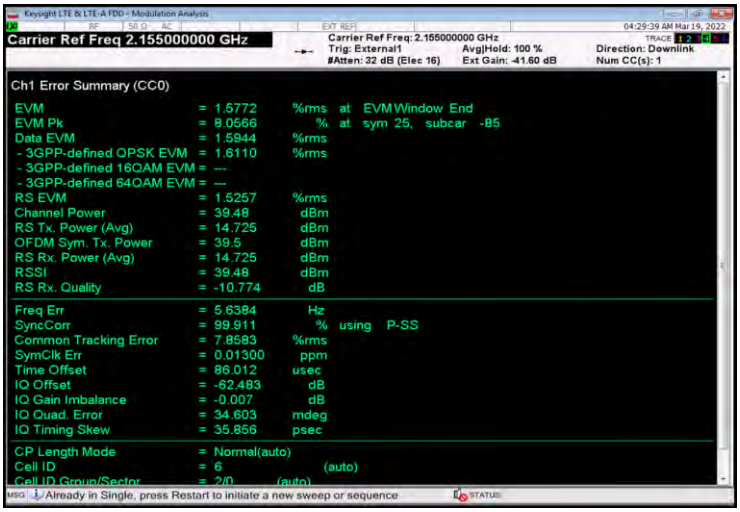
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 30° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.33	1000	Pass



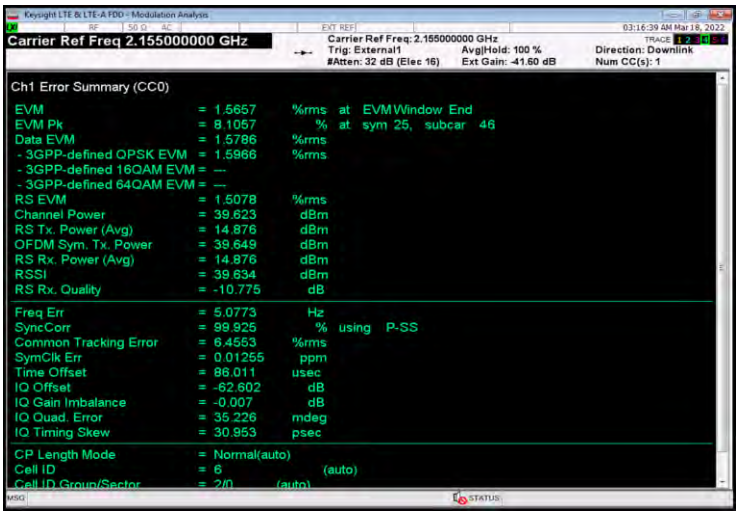
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 40° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.33	1000	Pass



Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 48 VDC Nominal Voltage Conditions, 50° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.64	1000	Pass



Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 40.8 VDC Extreme Low Voltage Conditions, 20° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				5.08	1000	Pass



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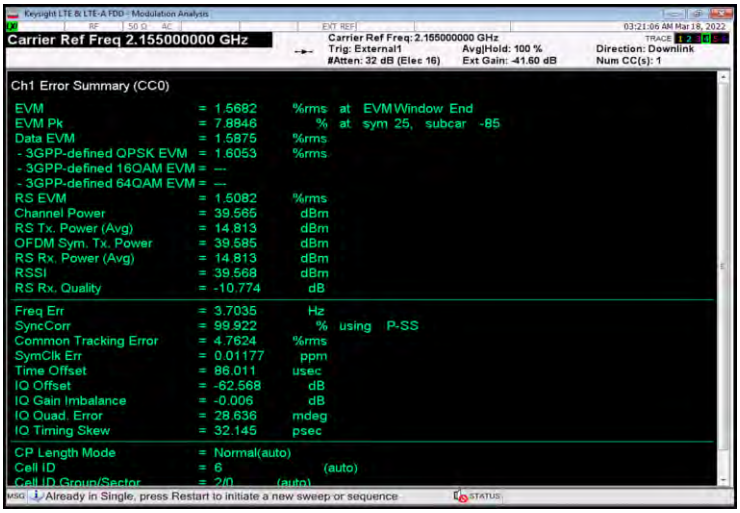
Band 66, 2110 MHz - 2200 MHz, LTE Single Carrier, Port 1, 5 MHz Bandwidth, QPSK Modulation, 55.2 VDC Extreme High Voltage Conditions, 20° C Temperature Conditions, Mid CHannel 2155 MHz						
				Absolute Value Frequency Δ (Hz)	Limit Δ (Hz)	Result
				3.7	1000	Pass