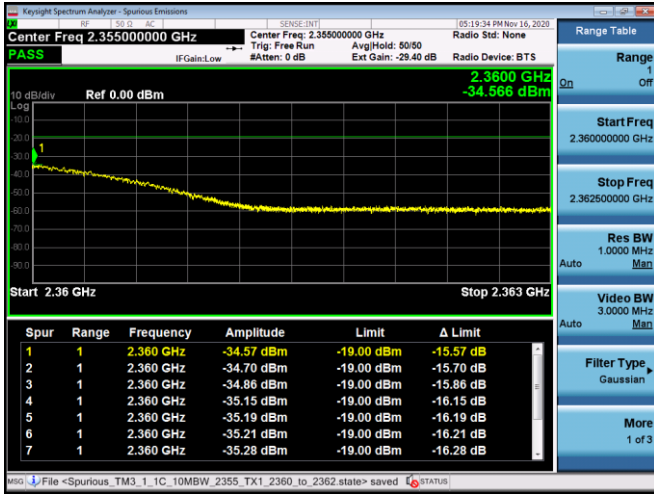
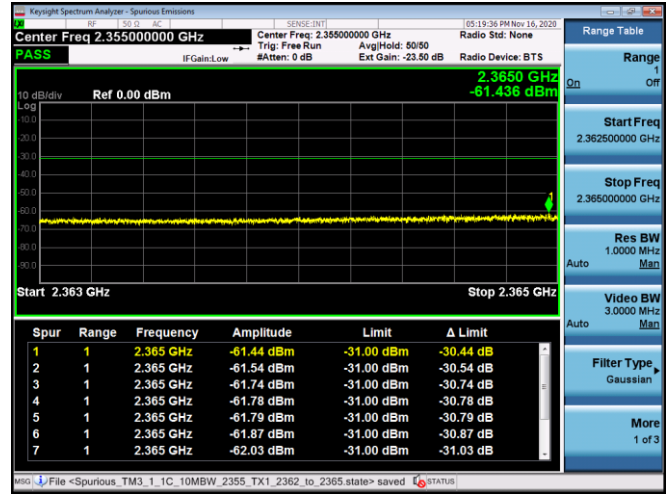


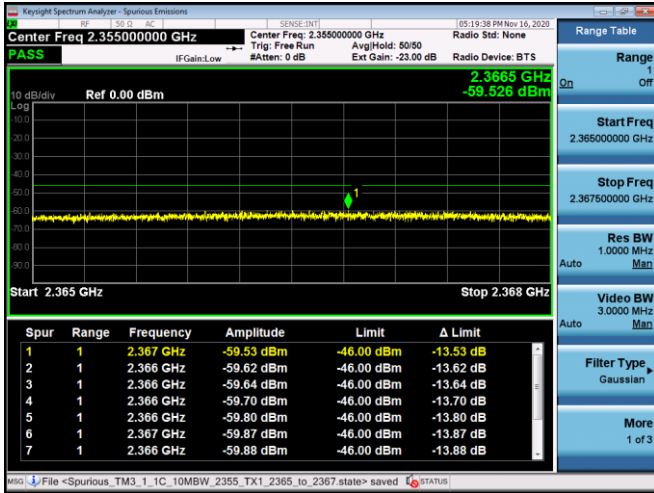
2.36GHz – 2.363GHz



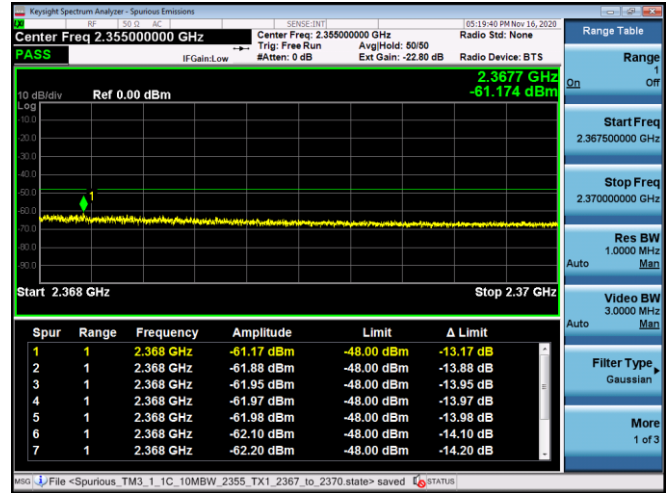
2.363GHz – 2.365GHz



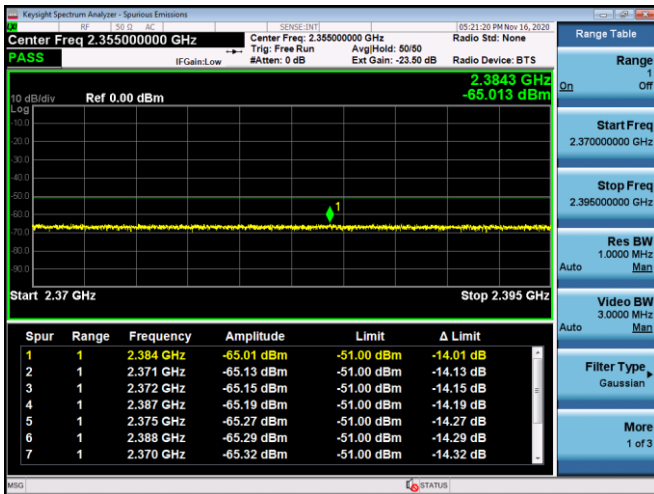
2.365GHz – 2.368GHz



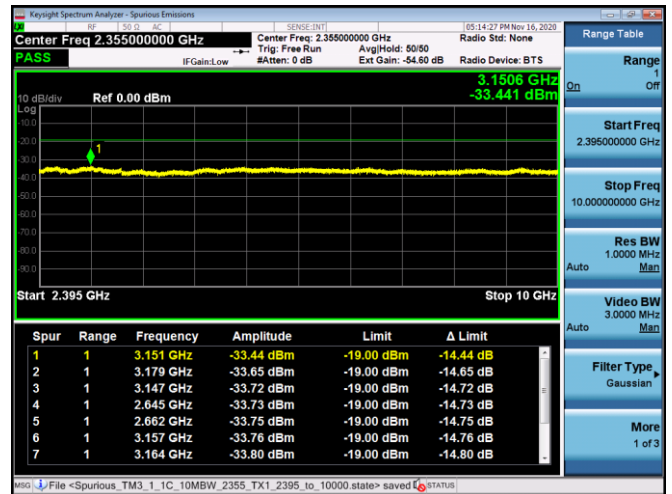
2.368GHz – 2.37GHz



2.37GHz – 2.395GHz



2.395GHz – 10GHz

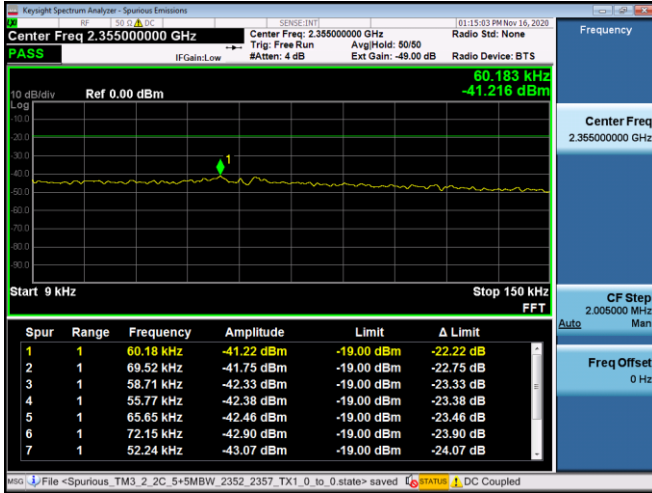


10GHz – 24GHz

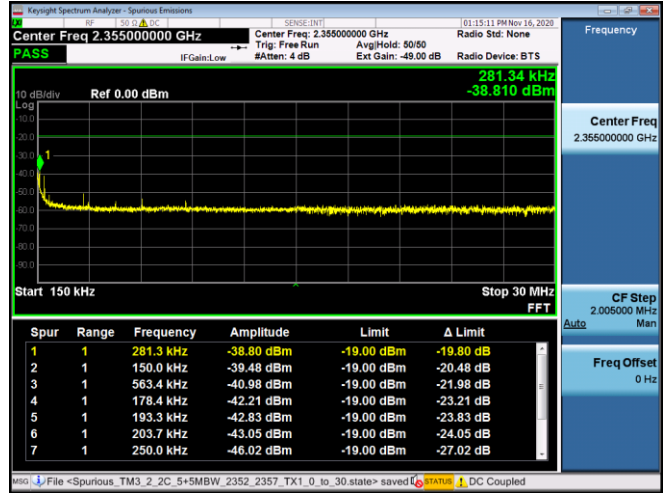


Dual Carrier – 5 + 5 MHz BW
 Test Model 3.2
 Modulation QPSK/16QAM
 Channel Frequency 2352.5 + 2357.5 MHz
 TX1

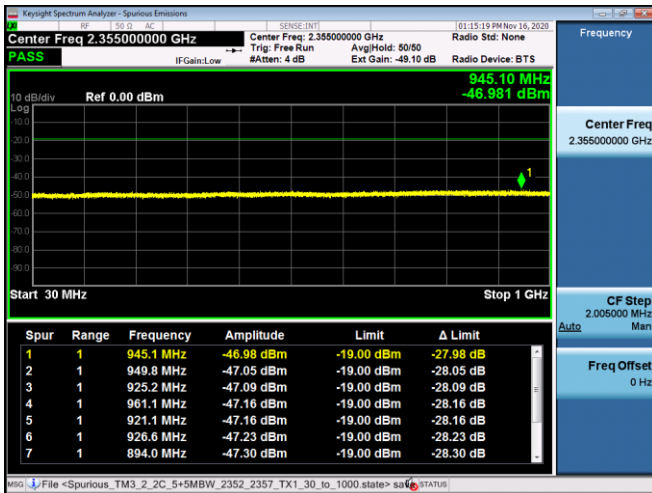
9KHz – 150kHz



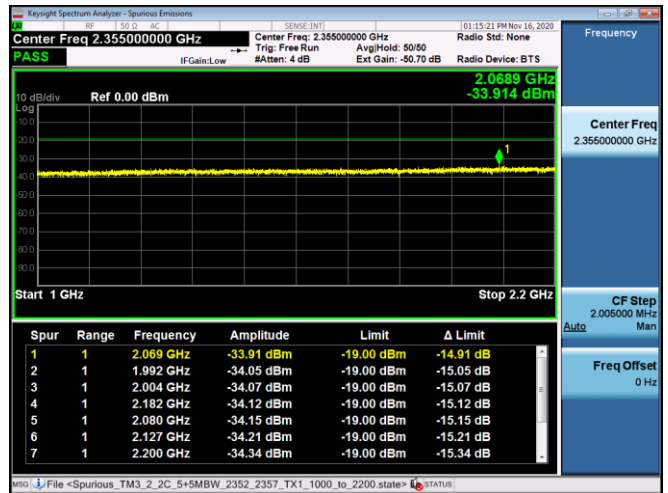
150kHz – 30MHz



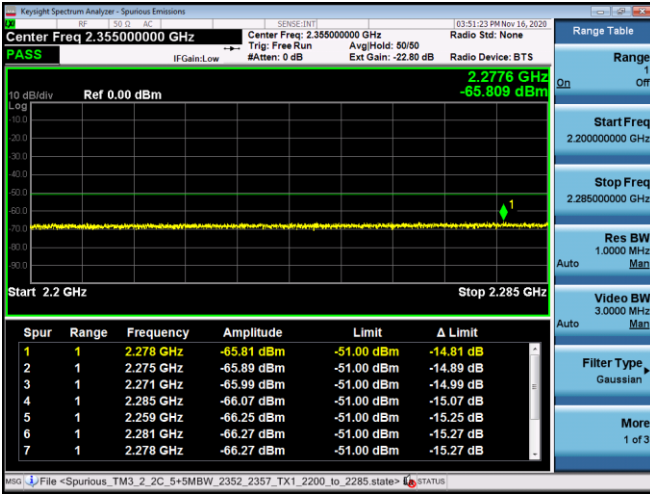
30MHz – 1GHz



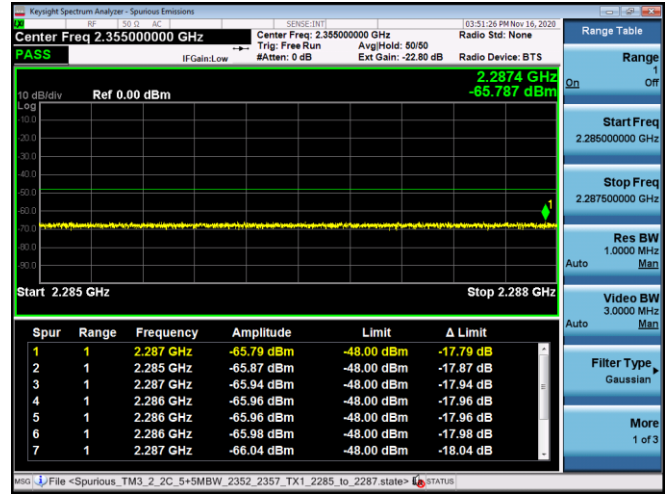
1GHz – 2.2GHz



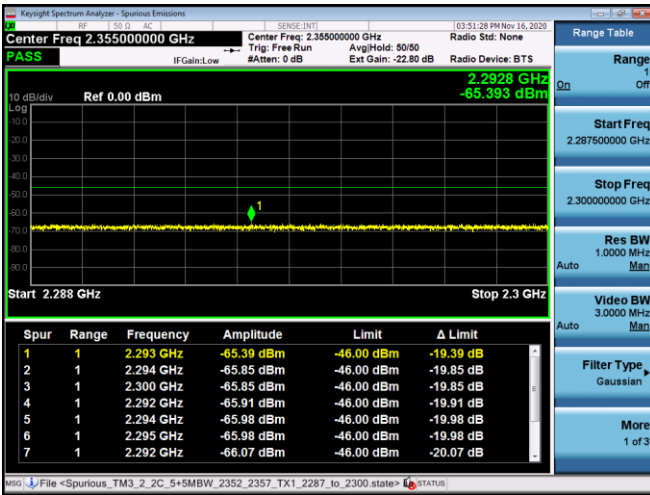
2.2GHz – 2.285GHz



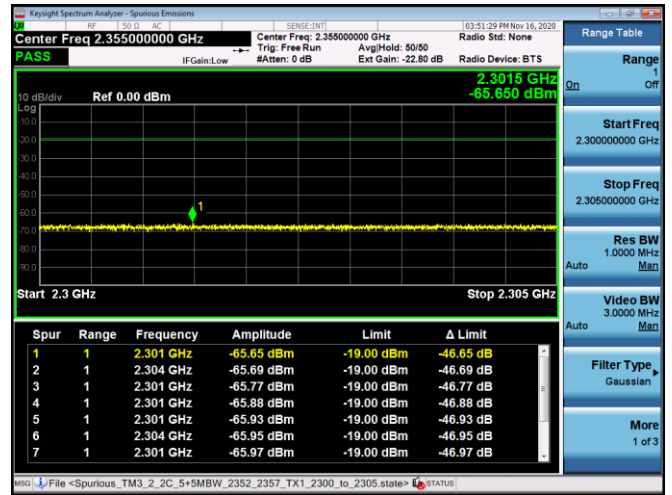
2.285GHz – 2.288GHz



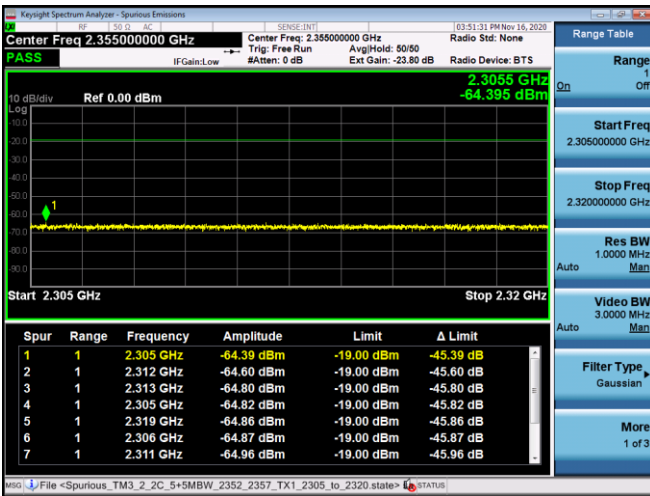
2.288GHz – 2.3GHz



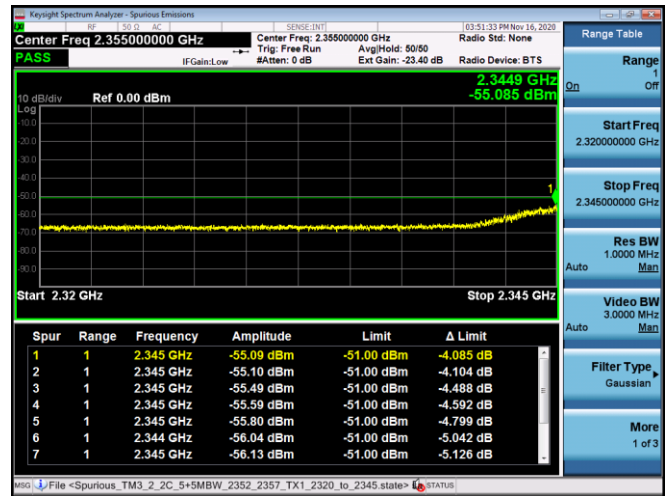
2.3GHz – 2.305GHz



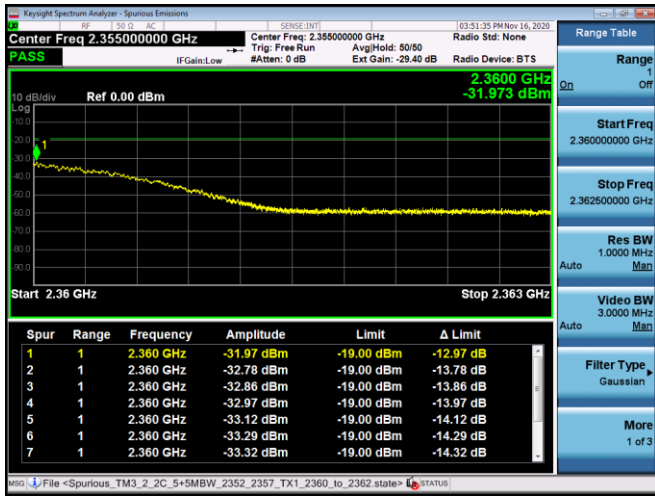
2.305GHz – 2.32GHz



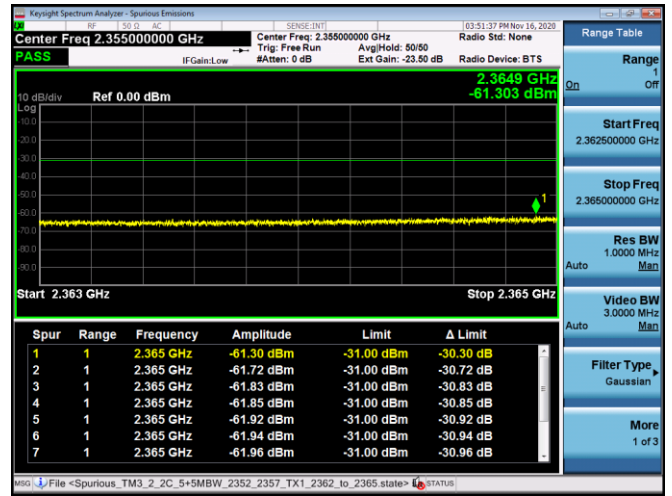
2.32GHz – 2.345GHz



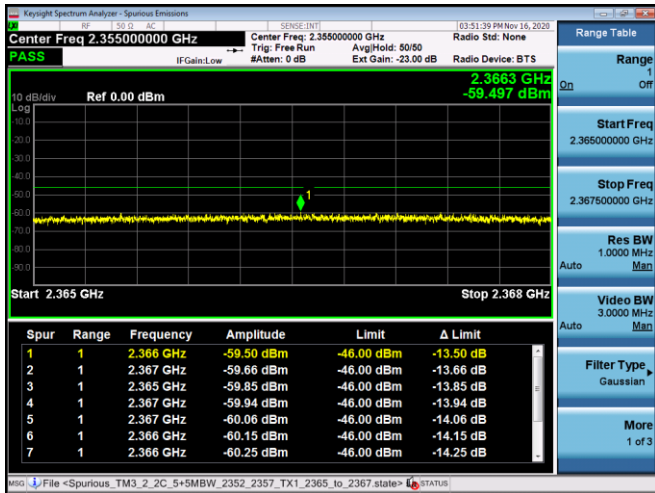
2.36GHz – 2.363GHz



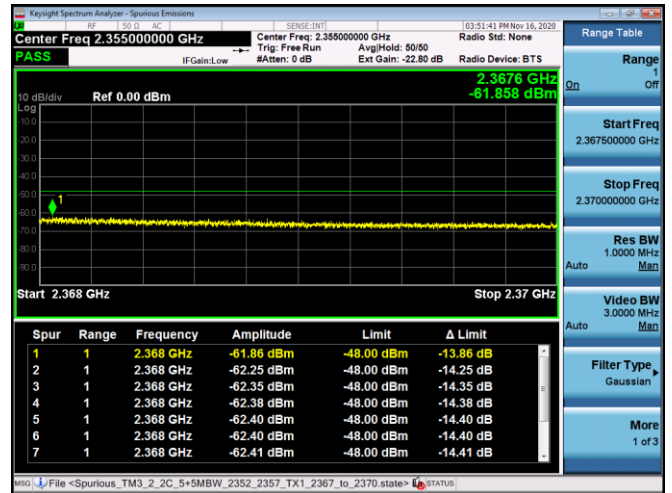
2.363GHz – 2.365GHz



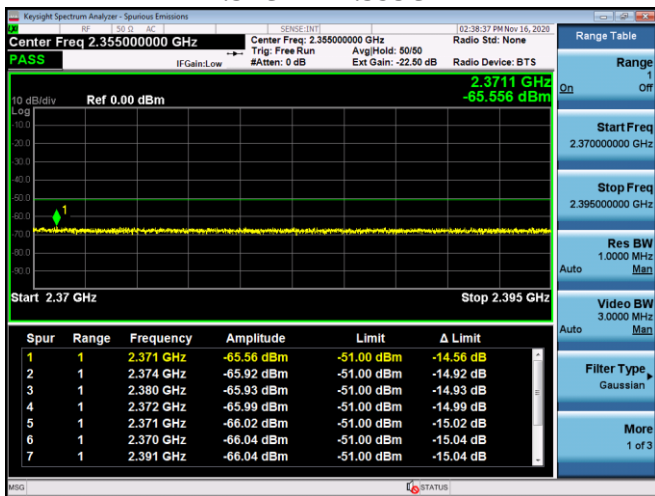
2.365GHz – 2.368GHz



2.368GHz – 2.37GHz



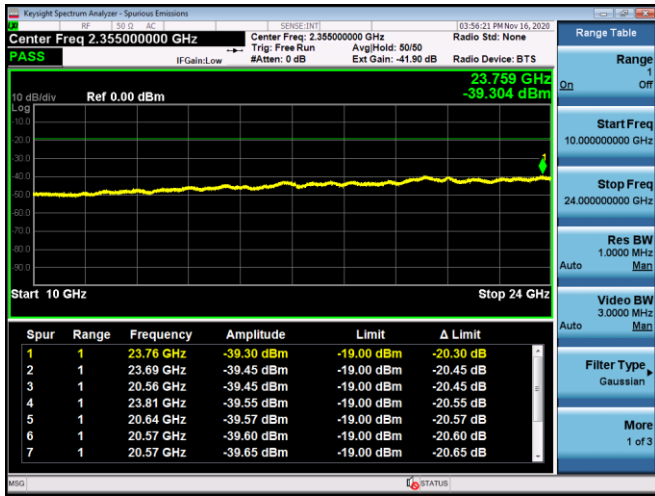
2.37GHz – 2.395GHz



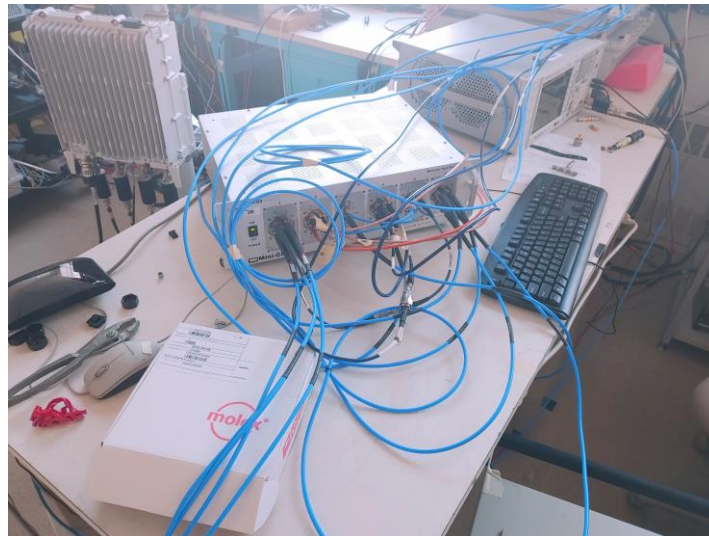
2.395GHz – 10GHz



10GHz – 24GHz



Photographs



Test Equipment

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
E831	Agilent Technologies	MXA Signal Analyzer	20Hz-26.5GHz	N9020A	MY48011791	2020-06-16	2022-06-16
E896	Agilent Technologies	Network Analyzer	10 MHz - 40 GHz	N5230C	MY49000897	2019-01-31	2021-01-31
E1263	Hewlett Packard	Filter, High Pass	8.2 - 18 GHz	84300-80039	001	CNR-V	CNR-V
E1238	K & L Microwave	Filter, Notch	1.5 to 3.0 GHz Notch filter	3TNF-1500/3000-N/N	166	CNR-V	CNR-V
E1239	K & L Microwave	Filter, Notch	1.5 to 3.0 GHz Notch filter	3TNF-1500/3000-N/N	167	CNR-V	CNR-V
E1508	Weinschel	Attenuator	DC - 18 GHz, 20 dB, 100 W, N-Male - N-Female	48-20-43	BC5416	CNR-V	CNR-V
E1445	Weinschel	Attenuator	DC - 8.5GHz, 30dB, 50W	24-30-43	BC3981	CNR-V	CNR-V

CNR-V: Calibration Not Required, Must Be Verified

6. FCC Section 2.1053 - Field strength of spurious radiation

6.1 Section 2.1053 Field Strength of Spurious Emissions

Field strength measurements of radiated spurious emissions were made in an FCC registered 3m Semi-Anechoic Chamber which is maintained by Nokia Bell Labs in Murray Hill, New Jersey. A complete description and full measurement data for the site is on file with the Commission (Site Registration Number: 515091).

The spectrum from 30 MHz to beyond the tenth harmonic of the carrier, 24 GHz, was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Per FCC regulations, the comparison of out of band spurious emissions directly to the limit is appropriately made using the substitution method. However, when the emissions are more than 20 dB below the specification limit, the use of field strength measurements for compliance determination is acceptable and those emissions are considered not reportable (Section 2.1053 and the FCC Interpretive database for 2.1053). For this case the evaluation of acceptable radiated field strength is as follows.

6.2 Field Strength of Spurious Emissions - Limits

Sections 2.1053 and 27.53 contain the requirements for the levels of spurious radiation as a function of the level of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an ideal dipole excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 676, 4th edition, IT&T Corp.

$$E = [(30 \cdot P)^{1/2}] / R$$

$$20 \log (E \cdot 10^6) - (43 + 10 \log P) = 82.23 \text{ dB}\mu\text{V}/\text{meter}$$

Where:

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

R = Measurement distance in meters = 3 m

The Part 27 Limit is 82.23 dB μ V/m at 3m and 91.77 dB μ V/m at 1m

The Part 27 non-report level is 62.23 dB μ V/m at 3m.

The calculated emission levels were found by:

$$\text{Measured level (dB}\mu\text{V)} + \text{Cable Loss(dB)} + \text{Antenna Factor(dB)} = \text{Field Strength (dB}\mu\text{V}/\text{m)}$$

RESULTS:

For compliance with 47CFR Parts 2 and 27, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dB μ V/meter (82.23 @ 3m). Emissions equal to or less than 62.23 dB μ V/meter at 3m are not reportable and may be verified using field strength measurements and broadband antennas. Over the out of band spectrum investigated from 30 MHz to beyond the tenth harmonic of the carrier (up to 24 GHz), no reportable spurious emissions were detected. Refer to TR-2020-0157-FCC15 for Radiated Emissions test results.

7. FCC Section 2.1055 - Measurement of Frequency Stability

Frequency Stability testing was completed on AHNA Unit with Center Frequency 2355 MHz. Testing was performed from 12/08/2020 through 12/09/2020 on the radio, which was located in the T-16 Thermal chamber of the Global Product Compliance Laboratory (GPCL) test facility located in Building 4, Room 4-280, Murray Hill, NJ, by Joe Bordonaro from GPCL.

The temperatures to which the UUT were subjected ranged from a high temperature of +50°C system ambient to a low temperature of -30°C system ambient with measurements recorded at +20°C, +50°C, and -30°C.

Frequency Stability performance was verified by measuring Frequency Tolerance using an MXA Signal Analyzer. Frequency Tolerance is a measurement of the difference between the actual transmit frequency and the assigned frequency (2355 MHz).

Baseline Measurement at +20°C

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.2550
0.5	-0.4560
1.0	-0.7260
1.5	-0.3069
2.0	-0.03775
2.5	-0.5715
3.0	-0.3720
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.4876
0.5	-0.1858
1.0	-0.1610
1.5	-0.4042
2.0	-0.2984
2.5	-0.3033
3.0	-0.5475
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.1859
0.5	-0.3028
1.0	-0.4970
1.5	-0.3135
2.0	-0.08020
2.5	-0.6104
3.0	-0.14687
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Supply Voltage Variations

Upon return to +20°C, vary voltage to +15% and -15% of nominal and record frequency difference. freq = 2355MHz

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.2120
0.5	-0.6041
1.0	-0.4455
1.5	-0.09523
2.0	-0.4195
2.5	-0.3649
3.0	-0.1778
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Transmit Frequency Deviation at +20°C at 115% of Nominal Voltage, -55.20VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.4160
0.5	-0.2527
1.0	0.4021
1.5	-0.3313
2.0	-0.5112
2.5	-0.04118
3.0	-0.02837
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48.0VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.1430
0.5	+0.21533
1.0	-0.6403
1.5	-0.3701
2.0	-0.1019
2.5	-0.2637
3.0	+0.08954
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Transmit Frequency Deviation at +20°C at -15% of Nominal Voltage, -40.80VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	-0.2012
0.5	-0.5024
1.0	-0.1280
1.5	-0.4464
2.0	-0.1722
2.5	-0.06616
3.0	-0.5010
SPECIFICATION	±2355 MHz (±0.05ppm) ±0.05ppm = ±118 Hz
RESULT	PASS

Photographs

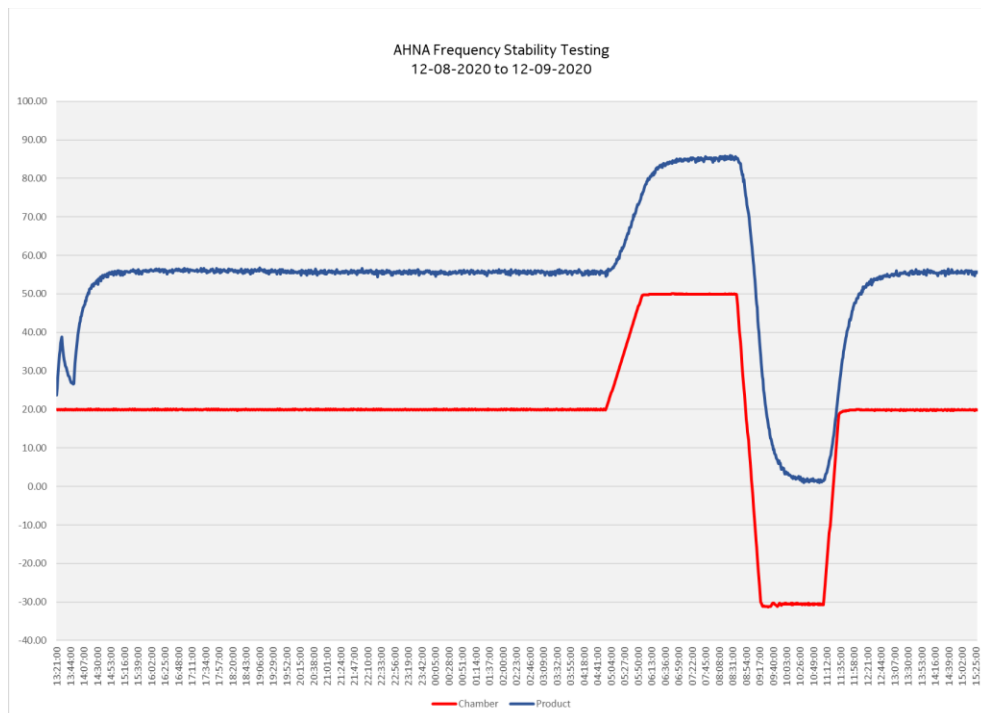


Test Equipment

Asset ID	Manufacturer	Type	Description	Model	Serial	Calibration Date	Calibration Due
TH514-T16	Envirotronics	Controller		Envirotronics SPPCM	SP000637	2019-05-22	2021-05-22
TH-T16	Envirotronics	Thermal Chamber		N/A	3015243	CNR	CNR
TH069	Extech	Data Logger	Barometric Pressure/Humidity/Temperature	SD700	Q690305	2019-06-20	2021-06-20
TH073	Fluke	Multimeter	Digital	87V	25910080	2020-02-25	2022-02-25
TH288	Yokogawa	Data Acquisition Unit	Recorder	MV2048-2-4-2-1-1D	S5JC04071	2019-02-26	2021-02-26
MY57431033	KeySight Technologies	EMI Receiver	MXA EMI Receiver	N9020B	MY57431033	2020-07-08	2022-07-08

CNR – Calibration Not Required

Chamber Plot



8. NVLAP Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology




Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 100275-0

Nokia, Global Product Compliance Lab
Murray Hill, NJ

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2020-09-25 through 2021-09-30

Effective Dates





For the National Voluntary Laboratory Accreditation Program