

Port 13, Channel Position T, 10MHz + 60MHz + 60MHz



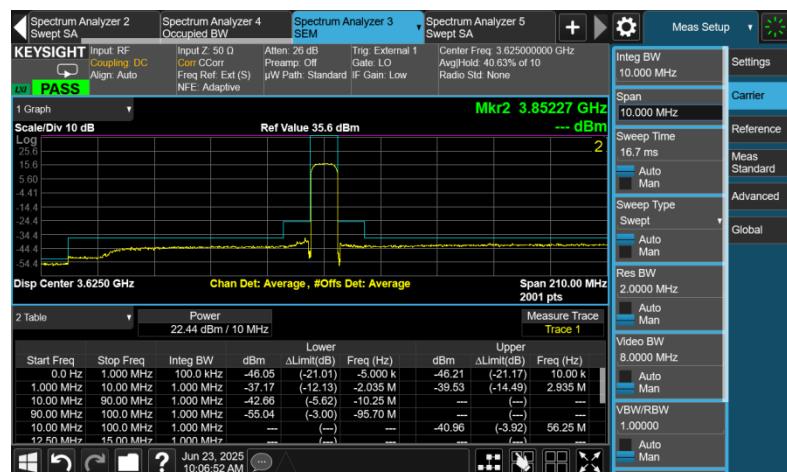
3520MHz -3730MHz



3730MHz -4000 MHz

Configuration NR-MIMO-1C, B48, QPSK

Port 13, Channel Position M, 10MHz

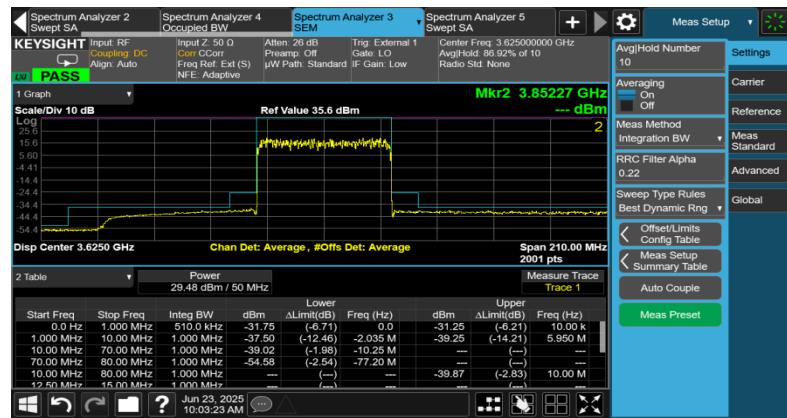


3520MHz-3730MHz



3730MHz-4000MHz

Port 13, Channel Position M, 50MHz

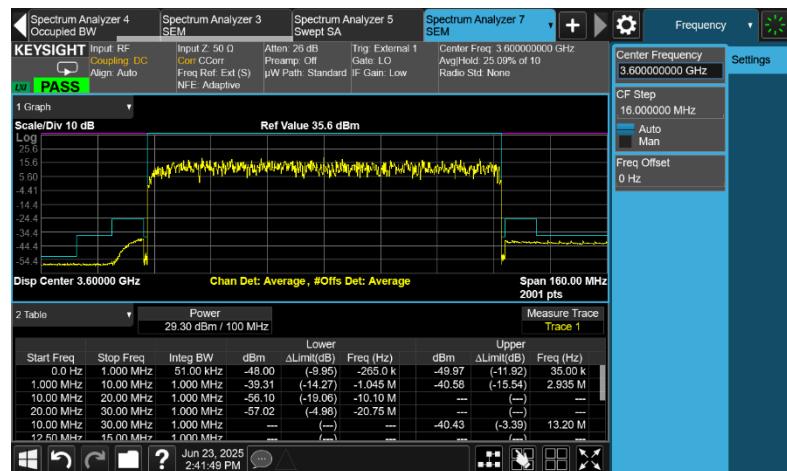


3520MHz-3730MHz



3730MHz-4000MHz

Port 13, Channel Position B, 100MHz

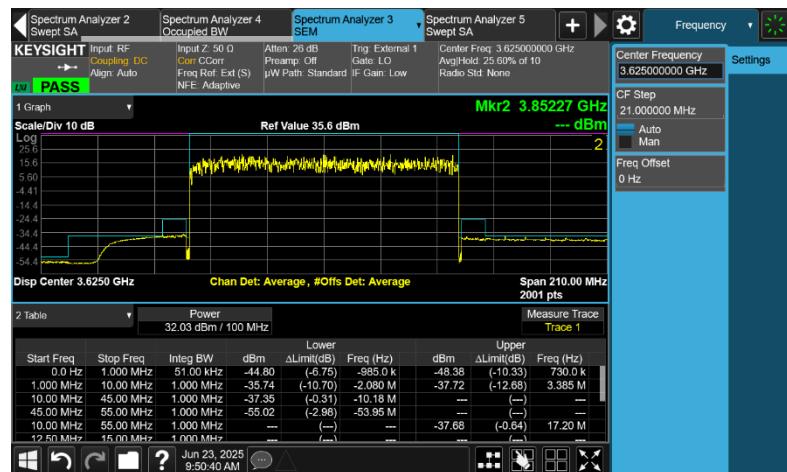


3520MHz-3680MHz



3680MHz-4000MHz

Port 13, Channel Position M, 100MHz

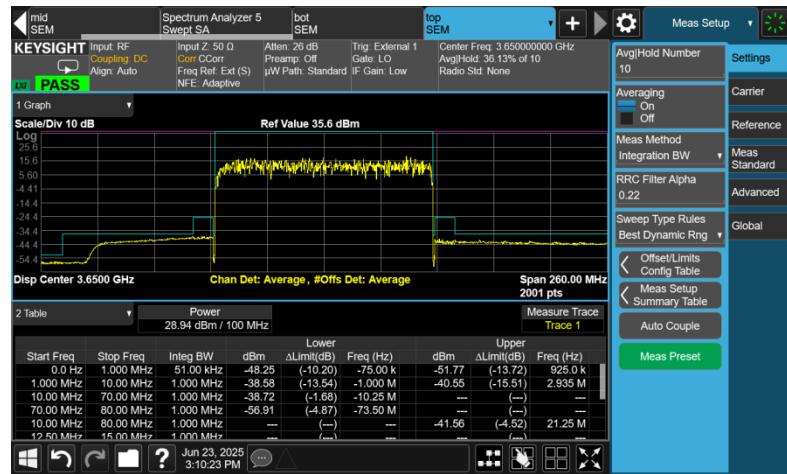


3520MHz-3730MHz



3730MHz-4000MHz

Port 13, Channel Position T, 100MHz



3520MHz-3780MHz



3780MHz-4000MHz

A.4 Transmitter unwanted emissions - Conducted Spurious Emission

A.4.1 Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53(l)
FCC Part 96, Clause 96.41(e)
FCC Waiver DA 25-387

A.4.2 Method of measurement

For MIMO mode configurations, the limit was adjusted with a correction of -12.04dB [10Log16] by using the Measure and Add 10Log(N) dB technique according to FCC KDB 662911 D01 Multiple Transmitter Output accounting for simultaneous transmission from antenna ports. Then the limit -40dBm was adjusted to -52.04dBm.

The spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a high-pass filter and attenuator and the frequency spectrum investigated from 20MHz to 40GHz. The resolution bandwidth of 1MHz was employed. The spectrum analyzer detector was set to RMS.

A.4.3 Measurement limit

Dual-band mode:

The conducted power of emissions below 3530 MHz shall not exceed -40dBm/MHz, above 4GHz shall not exceed -13dBm/MHz.

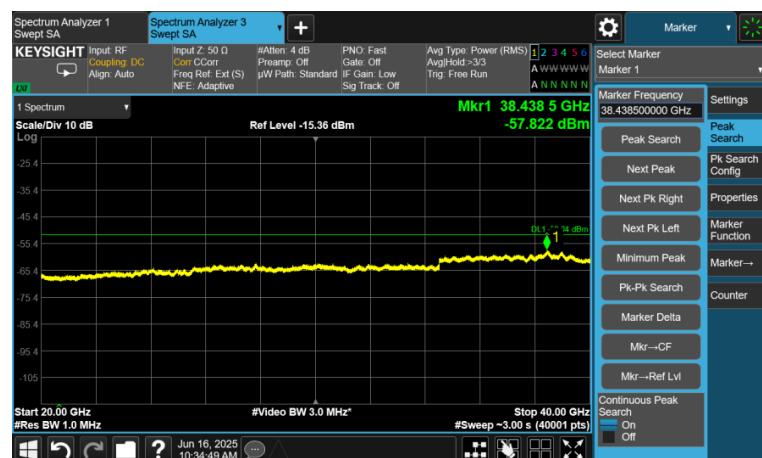
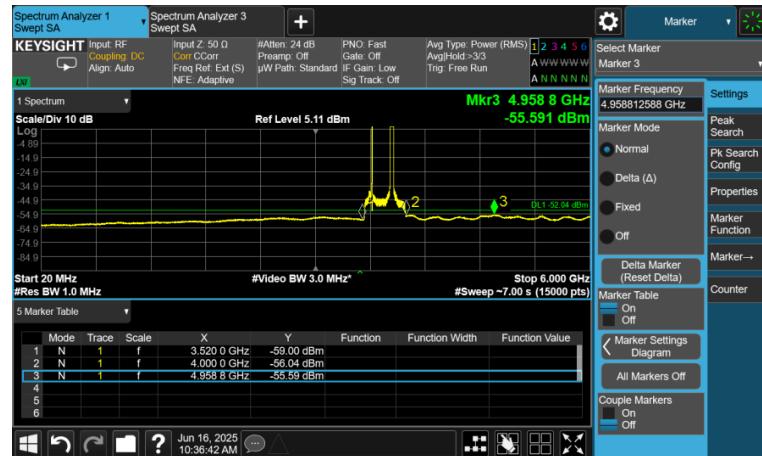
Single B48 mode:

The conducted power of emissions below 3530 MHz or above 4GHz shall not exceed -40dBm/MHz.

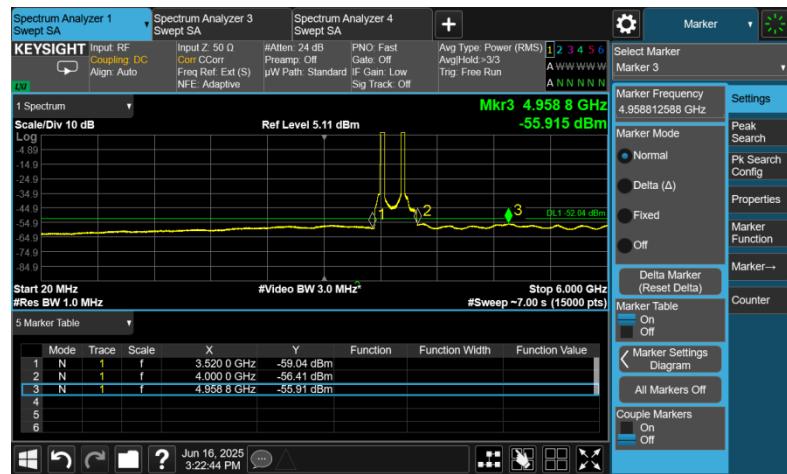
A.4.4 Measurement results

Mode	Channel Bandwidth (MHz)	RBW (MHz)	Limit (dBm)
Dual-band	10+40 / 50+40 / 100+20 / 10+10+20+20	1.0	below 3530 MHz: ≤ -52.04 Above 4GHz: ≤ -25.04
Single B48	100	1.0	-52.04

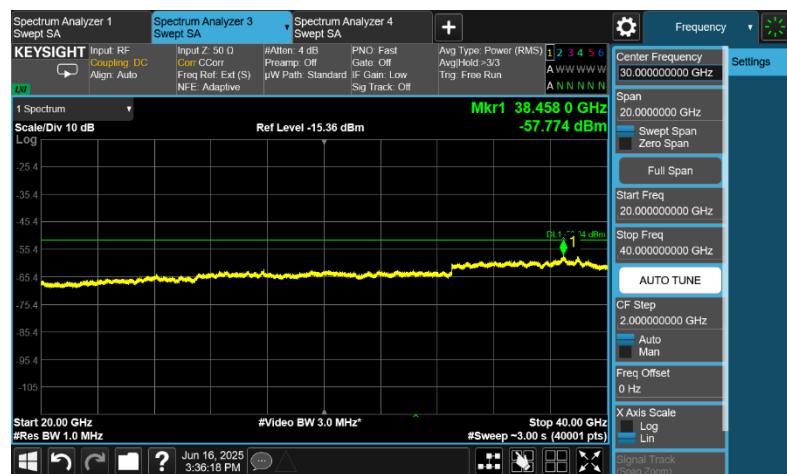
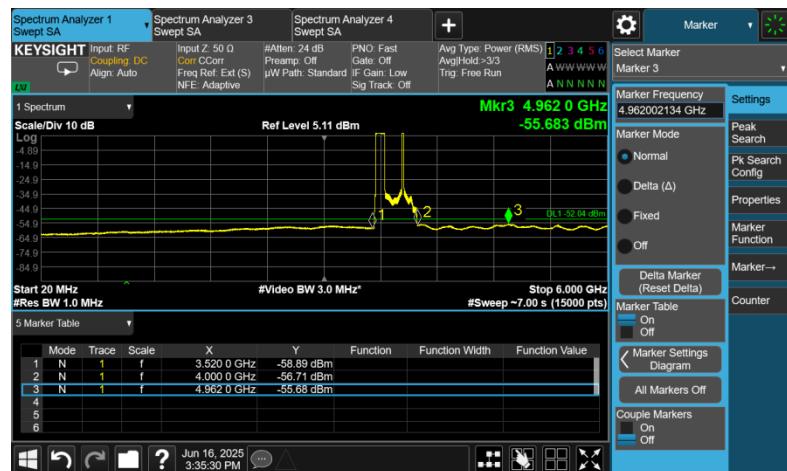
Configuration NR-MIMO-2C 10+40MHz, Port 13, Channel Position M, QPSK



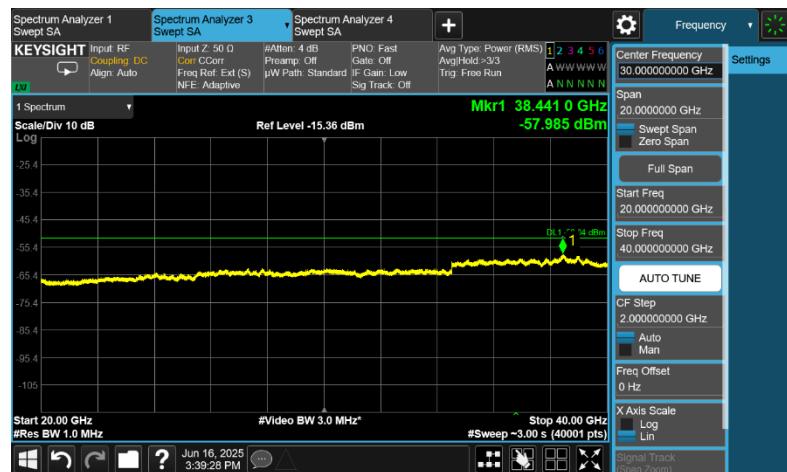
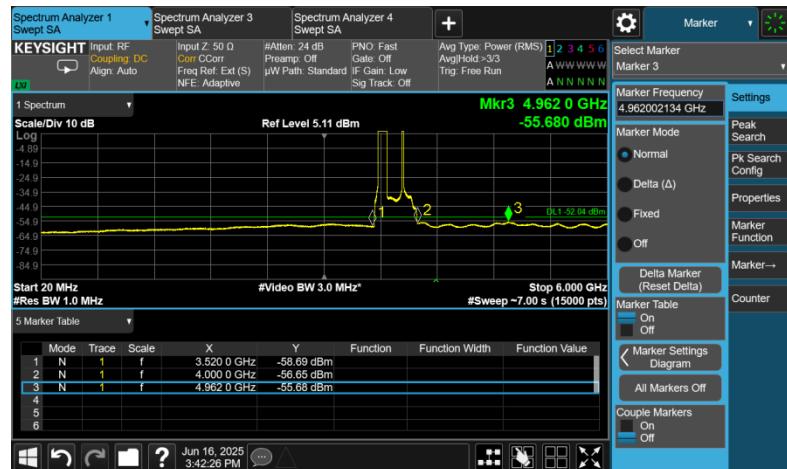
Configuration NR-MIMO-2C 50+40MHz, Port 13, Channel Position M, QPSK



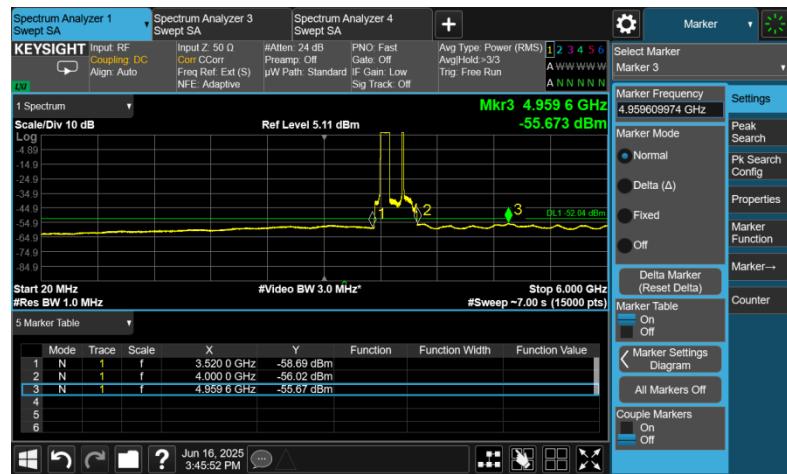
Configuration NR-MIMO-2C 100+20MHz, Port 13, Channel Position B, QPSK



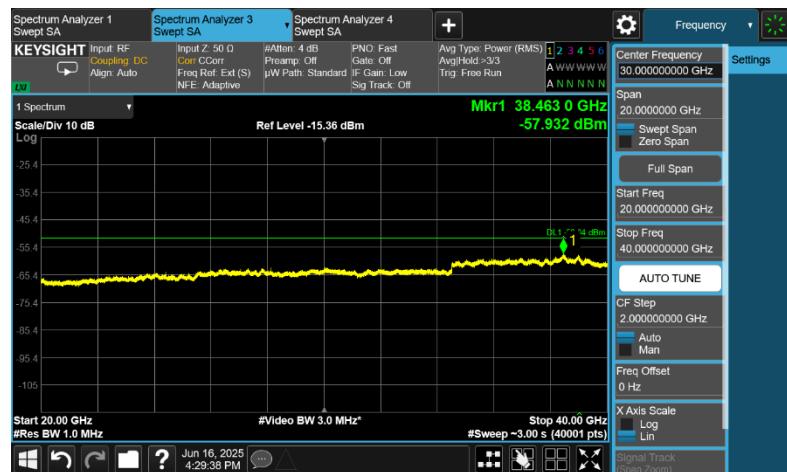
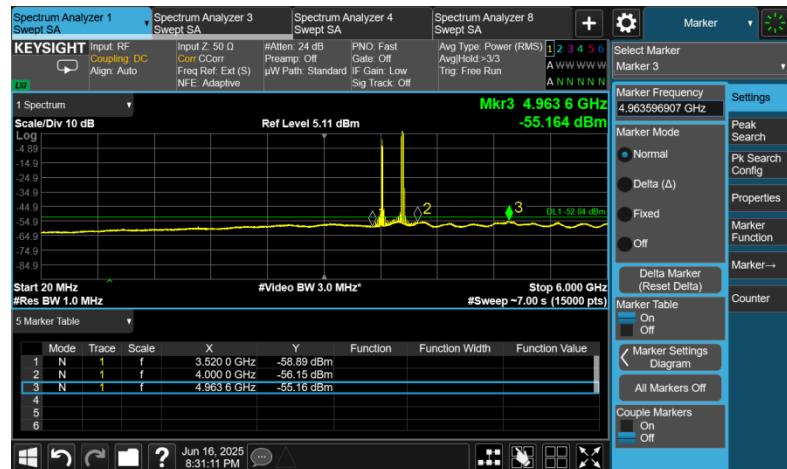
Configuration NR-MIMO-2C 100+20MHz, Port 13, Channel Position M, QPSK



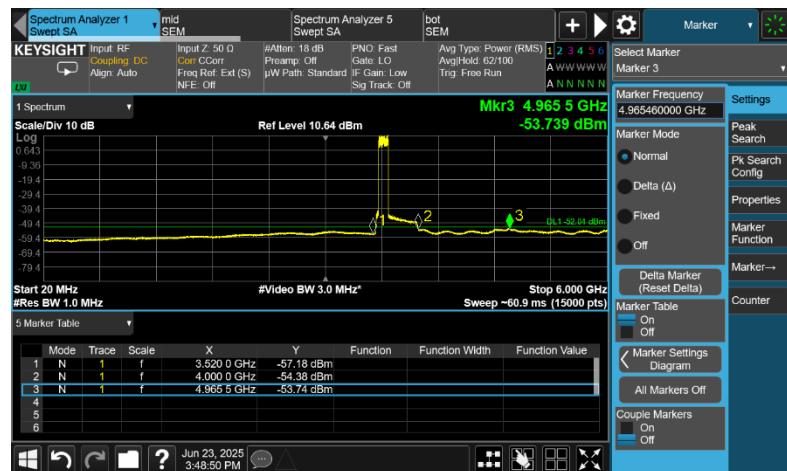
Configuration NR-MIMO-2C 100+20MHz, Port 13, Channel Position T, QPSK



Configuration NR-MIMO-4C 10+10+20+20MHz, Port 13, Channel Position M, QPSK



Configuration NR-MIMO-1C 100M, Port 13, Channel Position M, QPSK, B48



A.5 Radiated Spurious Emission

A.5.1 Reference

FCC CFR 47 Part 2, Clause 2.1046

FCC CFR 47 Part 27, Clause 27.53(l)

FCC CFR 47 Part 96, Clause 96.41(e)(1), 96.41(e)(2)

FCC Waiver DA 25-387

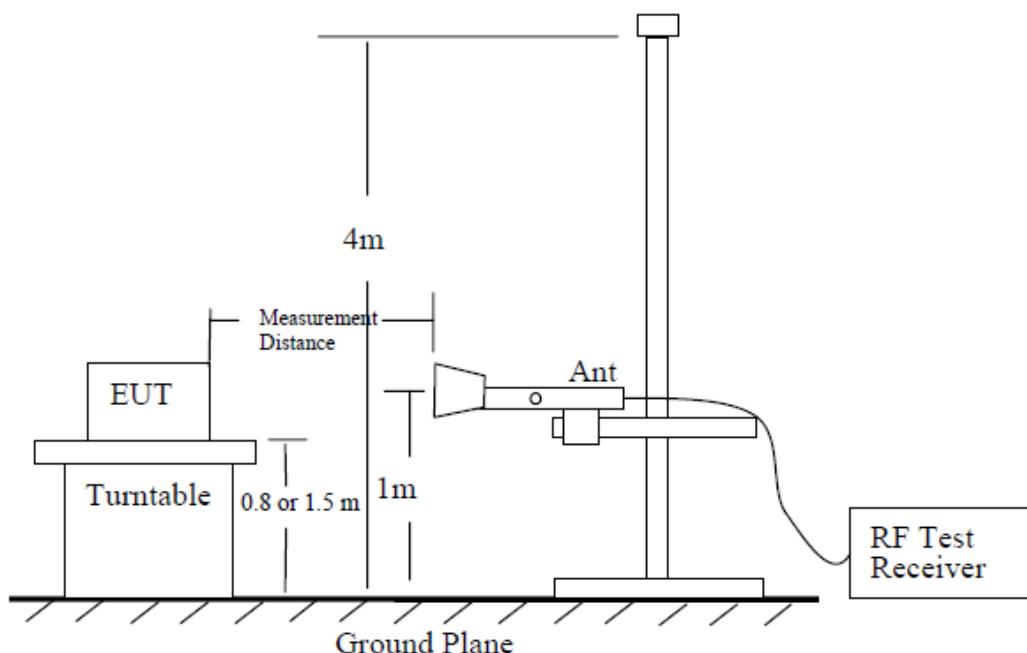
A.5.2 Measurement Method

The measurements procedures in C63.26 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The procedure of radiated spurious emissions is as follows:

Using the test configuration as follow, measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits.



The emission characteristics of the EUT can be identified from the pre-scan measurement information.

Exploratory radiated measurements (pre-scans) may be performed to determine the general EUT radiated emissions characteristics and, when necessary, the EUT-to-measurement antenna orientation that produces the maximum emission amplitude. Pre-scans shall only be used to determine the emission frequencies (i.e., not amplitude levels). The information garnered from a pre-scan can then be used to perform final compliance measurements using either the substitution or direct field strength method.

For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table or support at a nominal height of 80 cm above the reference ground plane. Radiated measurements shall be made with the measurement

antenna positioned in both horizontal and vertical polarization. The measurement antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level (i.e., field strength or received power). When orienting the measurement antenna in vertical polarization, the minimum height of the lowest element of the antenna shall clear the site reference ground plane by at least 25 cm.

The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.

For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table or support at a nominal height of 1.5 m above the ground plane. When maximizing the emissions from the EUT for measurement, the EUT and its transmitting antenna(s) shall be rotated through 360°. For each mode of operation to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored.

Final measurements shall be performed for the worst case combination(s) of variable technical parameters that result in the maximum measured emission amplitude, record the frequency and amplitude of the highest fundamental emission (if applicable), and the frequency and amplitude data for the six highest-amplitude spurious emissions.

The measurements in the frequency range 30 to 1000MHz was performed with a RBW of 100kHz. The measurements in the frequency range 1 to 40GHz was performed with a RBW of 1MHz. Emissions identified within the range 30MHz to 40GHz were then formally measured using a peak detector as the worst case.

A.5.3 Measurement limit

As Clause ANSI C63.26 5.2.7, the following relationships can be used to facilitate using such radiated measurement data to demonstrate compliance to the relevant conducted output power limits:

$$E (\text{dB}\mu\text{V/m}) = \text{EIRP (dBm)} - 20\log(D) + 104.8;$$

where D is the measurement distance (in the far field region) in m.

As Clause 96.41(e)(1) : Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge.

As Clause 96.41(e)(2) : Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

As Clause 27.53(l)(1) For operations in the 3700-3980 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) For base station operations in the 3700–3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz

Above 3540 MHz

Field Strength of Carrie = $-13\text{dBm} - 20 \log (3) + 104.8 = -13\text{dBm} - (-95.2) = 82.2 \text{ dB}\mu\text{V/m}$

For 3530MHz- 3540 MHz

Field Strength of Carrie = $-25\text{dBm} - 20 \log (3) + 104.8 = -25\text{dBm} - (-95.2) = 70.2 \text{ dB}\mu\text{V/m}$

For below 3530 MHz

Field Strength of Carrie = $-40\text{dBm} - 20 \log (3) + 104.8 = -40\text{dBm} - (-95.2) = 55.2 \text{ dB}\mu\text{V/m}$

These limits have been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

A.5.4 Measurement results

Dual-band mode

Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W

Channel Position	Channel Frequencies(MHz)
Channel position B	3600.00 + 3840.00
Channel position M	3625.02 + 3840.00
Channel position T	3649.98 + 3840.00

Channel Position B

No emissions were detected within 20dB of the limit.

Channel Position M

No emissions were detected within 20dB of the limit.

Channel Position T

No emissions were detected within 20dB of the limit.

Dual-band mode

Configuration NR-MIMO-3C, QPSK, 40MHz+40MHz+40MHz, 16W+16W+48W

Channel Position	Channel Frequencies(MHz)
Channel position B	/
Channel position M	3575.01 + 3675.00 + 3840.00
Channel position T	/

Channel Position M

No emissions were detected within 20dB of the limit.

Dual-band mode

Configuration NR-MIMO-4C-CA, QPSK, 50MHz + 50MHz + 40MHz + 60MHz,

20W+20W+20W+20W

Channel Position	Channel Frequencies(MHz)
Channel position B	/
Channel position M	3575.01 + 3675.00 + 3840.00
Channel position T	/

Channel Position M

No emissions were detected within 20dB of the limit.

Waiver DA-25-387:

each radio, when operated in 3.5 GHz band-only mode for equipment authorization testing, must comply with section 96.41(e)(2) in its entirety, except the radio's OOB may be limited to a conducted power level of no greater than -25 dBm/MHz for frequencies between 3.72 and 4.0 GHz;

0-10MHz from channel edge:

Field Strength of Carrie = $-13\text{dBm} - 20 \log (3) + 104.8 = -13\text{dBm} - (-95.2) = 82.2 \text{ dB}\mu\text{V/m}$

>10MHz from channel edge:

Field Strength of Carrie = $-25\text{dBm} - 20 \log (3) + 104.8 = -25\text{dBm} - (-95.2) = 70.2 \text{ dB}\mu\text{V/m}$

For 3530MHz-3540MHz and 3710MHz-4GHz

Field Strength of Carrie = $-25\text{dBm} - 20 \log (3) + 104.8 = -25\text{dBm} - (-95.2) = 70.2 \text{ dB}\mu\text{V/m}$

For below 3530 MHz and above 4 GHz

Field Strength of Carrie = $-40\text{dBm} - 20 \log (3) + 104.8 = -40\text{dBm} - (-95.2) = 55.2 \text{ dB}\mu\text{V/m}$

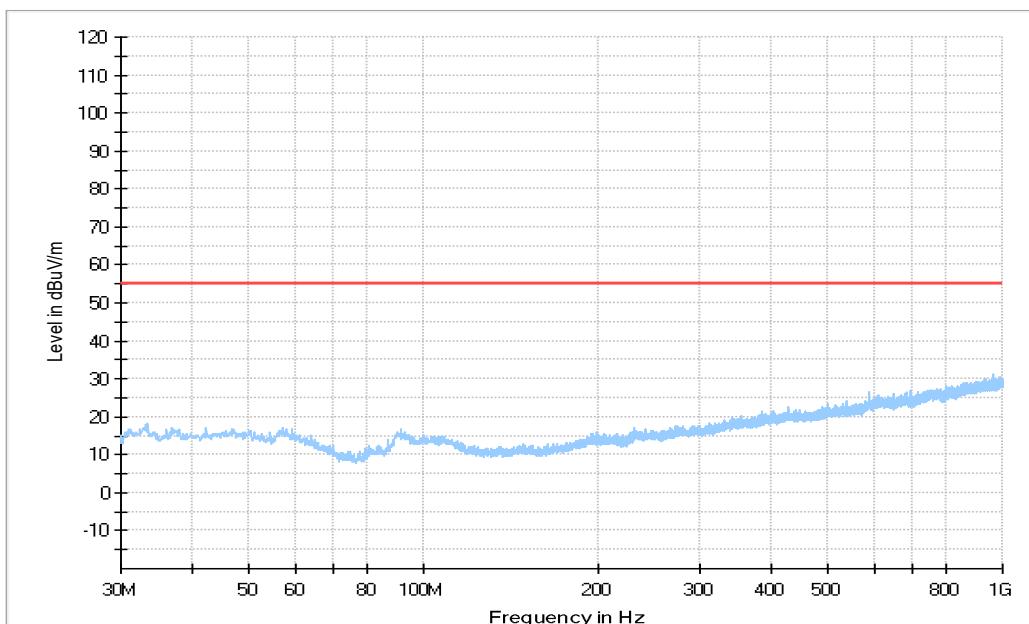
Configuration b48, QPSK, 50MHz

Channel Position	Channel Frequencies(MHz)
Channel position B	/
Channel position M	3625.00
Channel position T	/

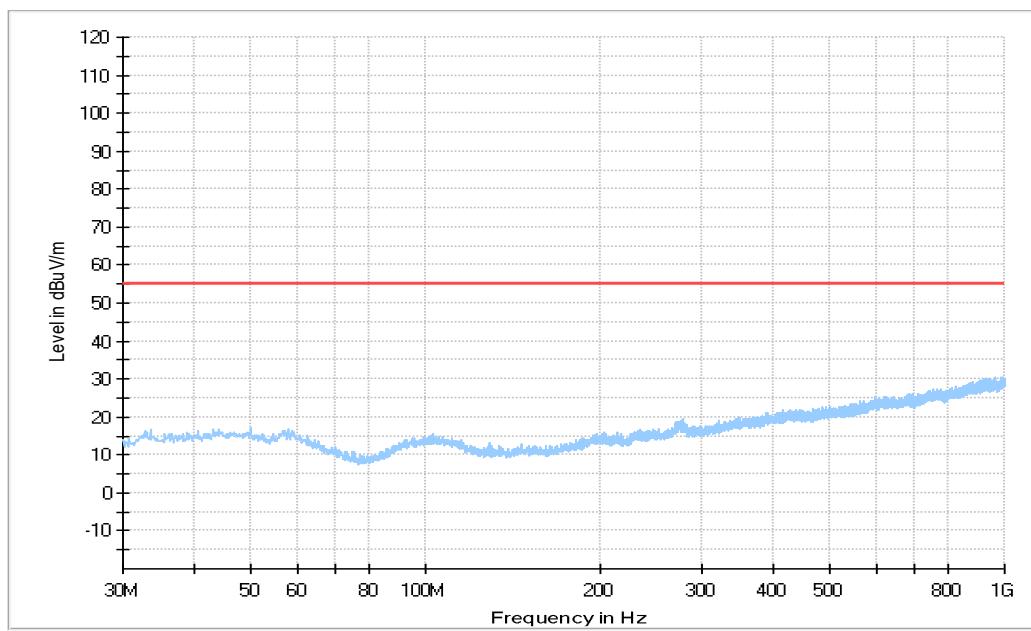
Channel Position M

No emissions were detected within 20dB of the limit.

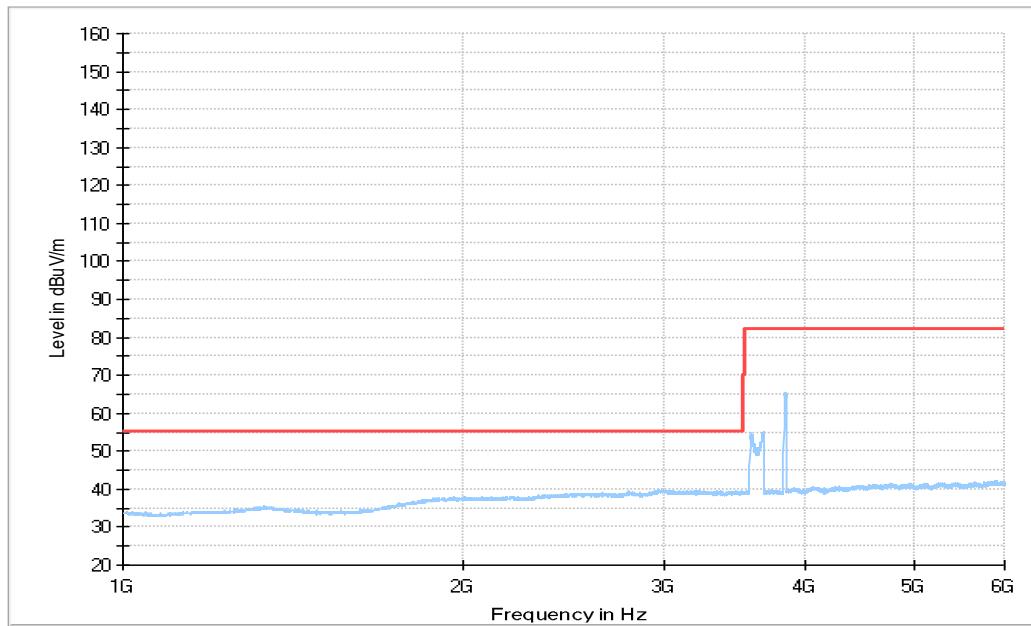
Note: Only the worst cases were reported.



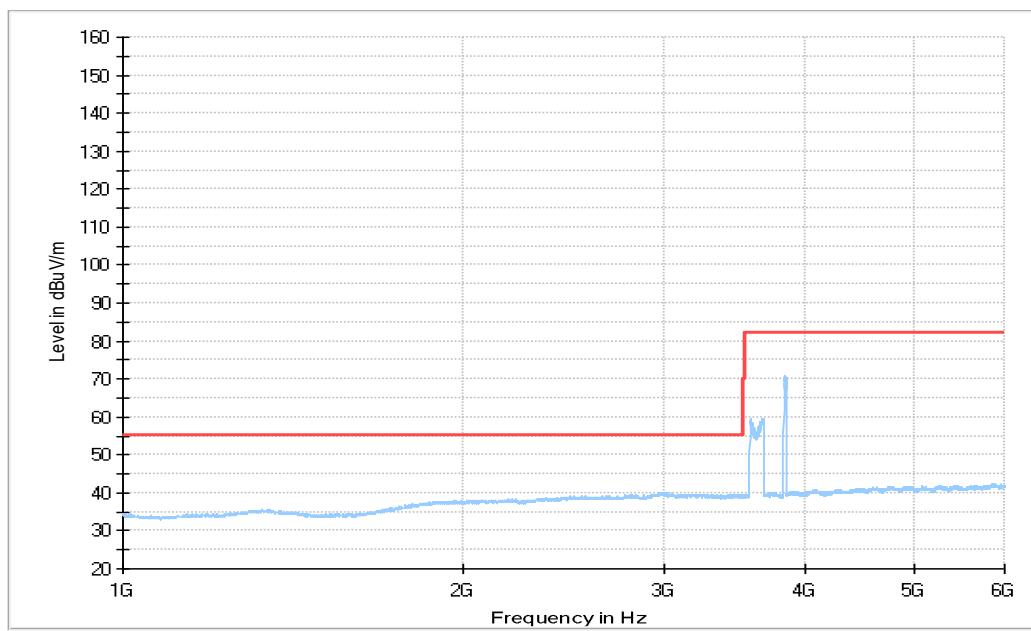
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Vertical, 30MHz-1GHz



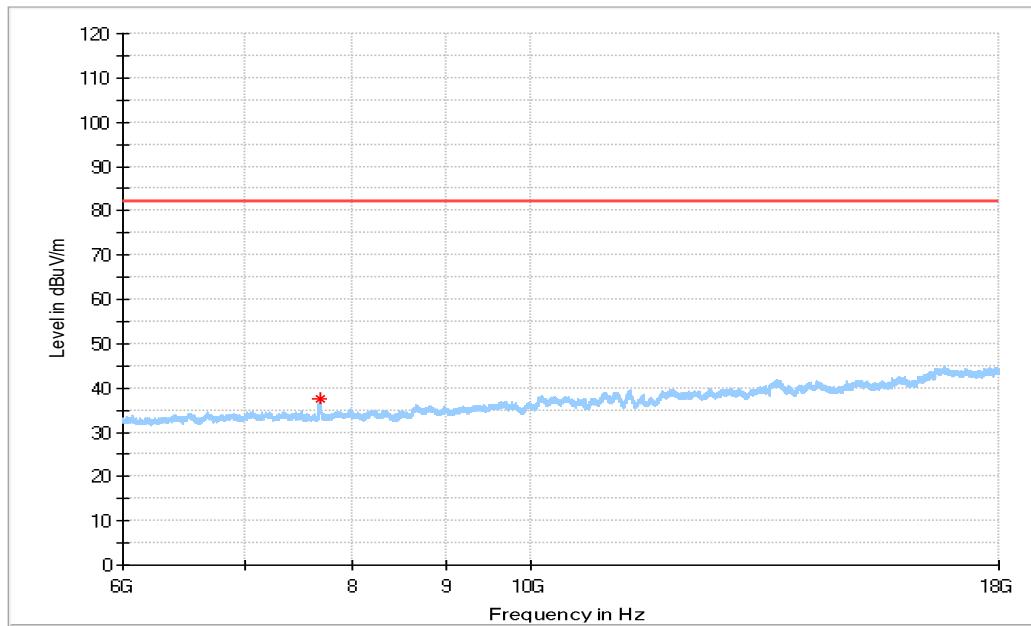
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Horizontal, 30MHz-1GHz



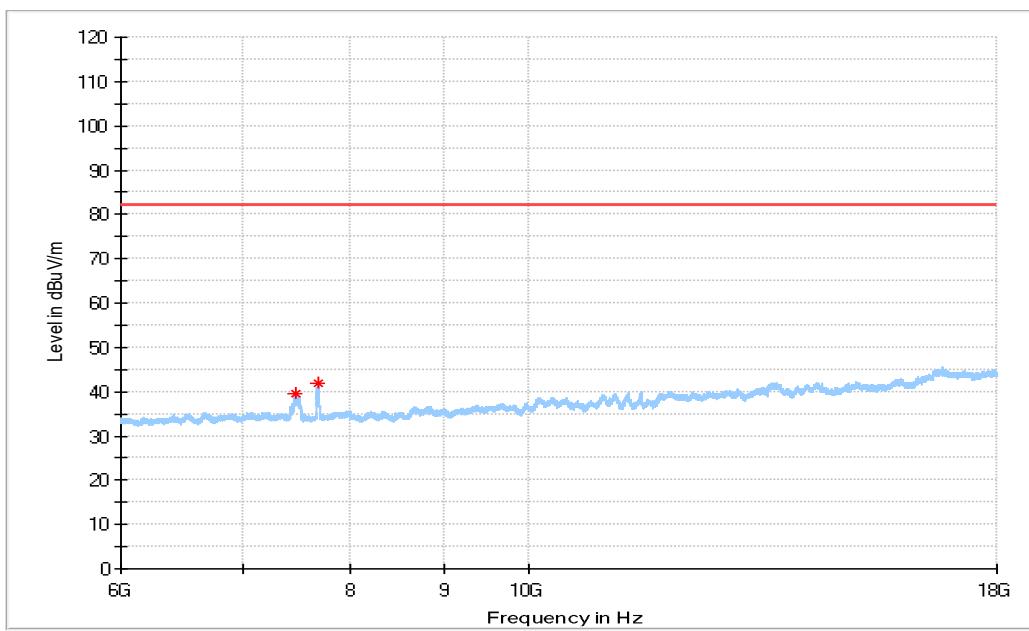
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Vertical, 1GHz-6GHz



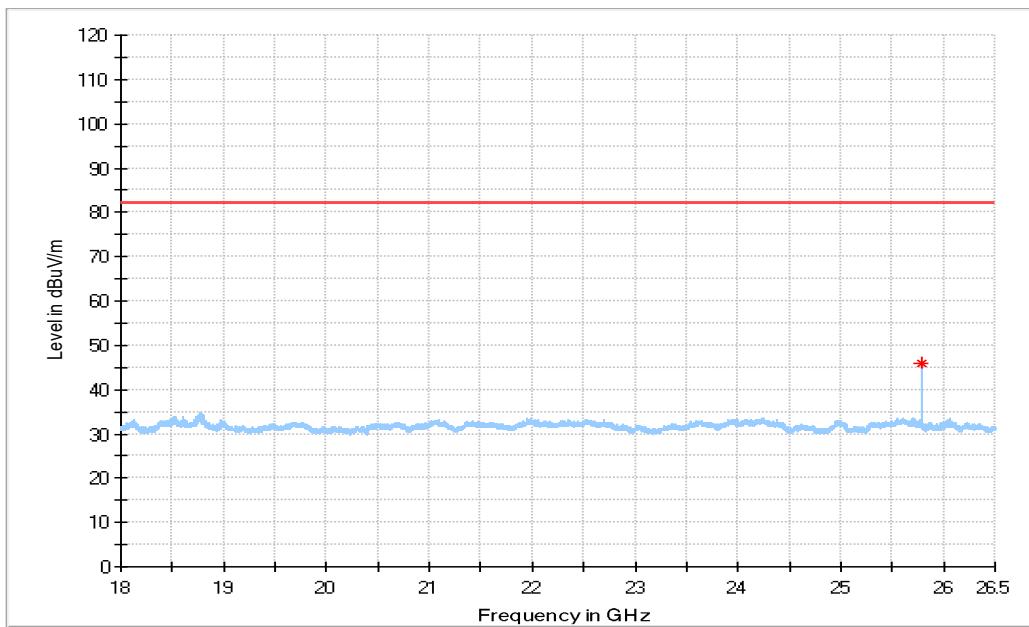
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Horizontal, 1GHz-6GHz



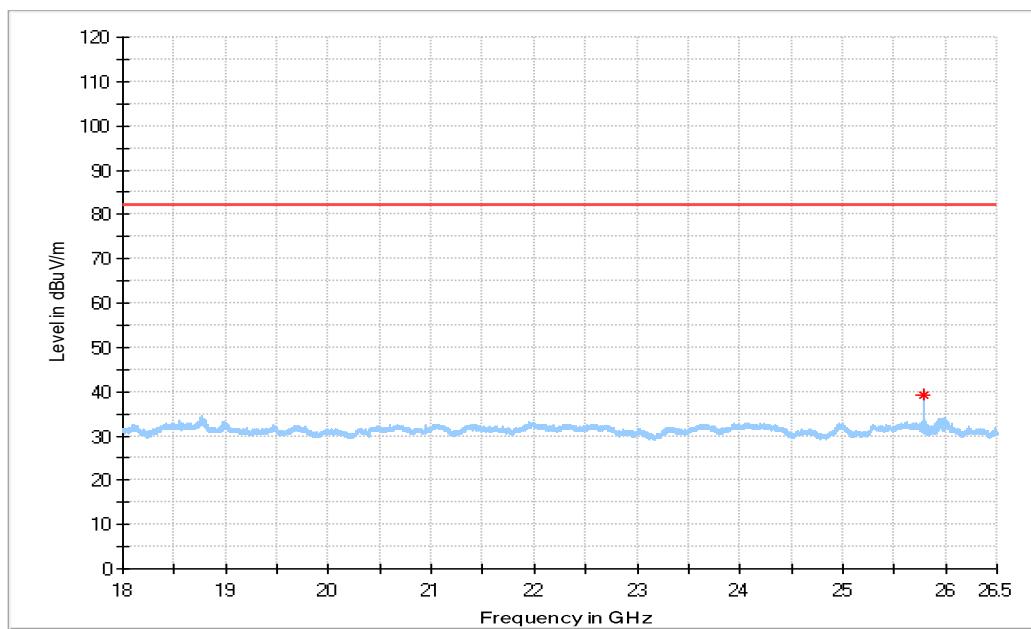
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Vertical, 6GHz-18GHz



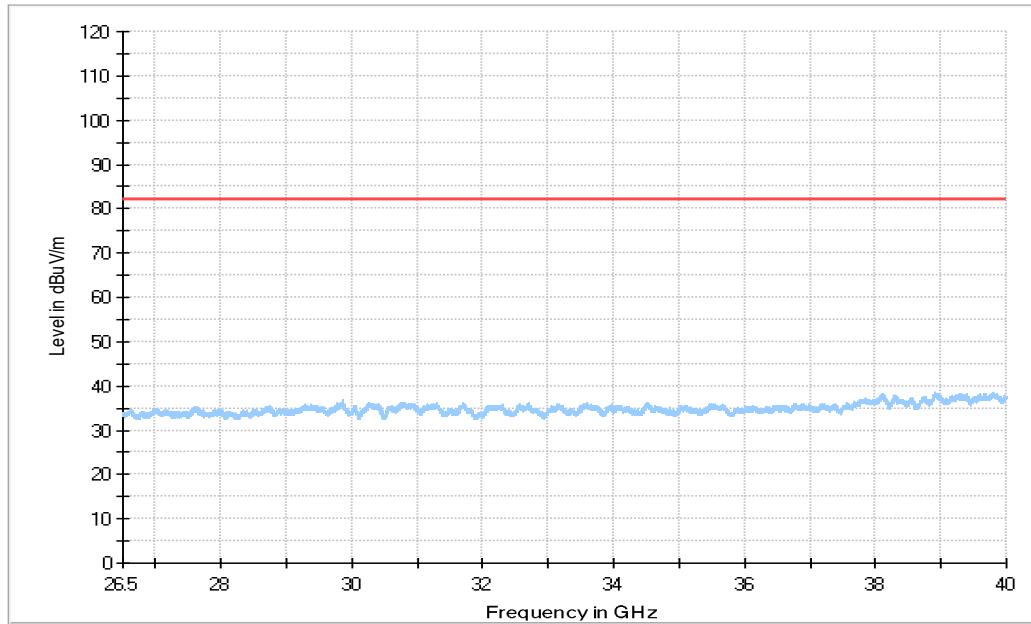
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Horizontal, 6GHz-18GHz



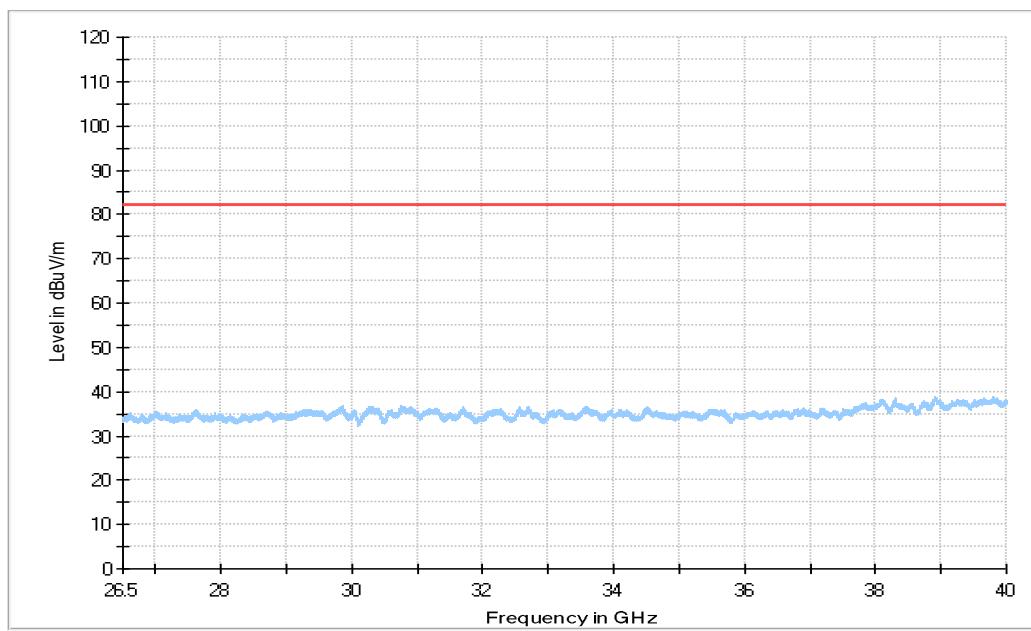
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Vertical, 18GHz-26.5GHz



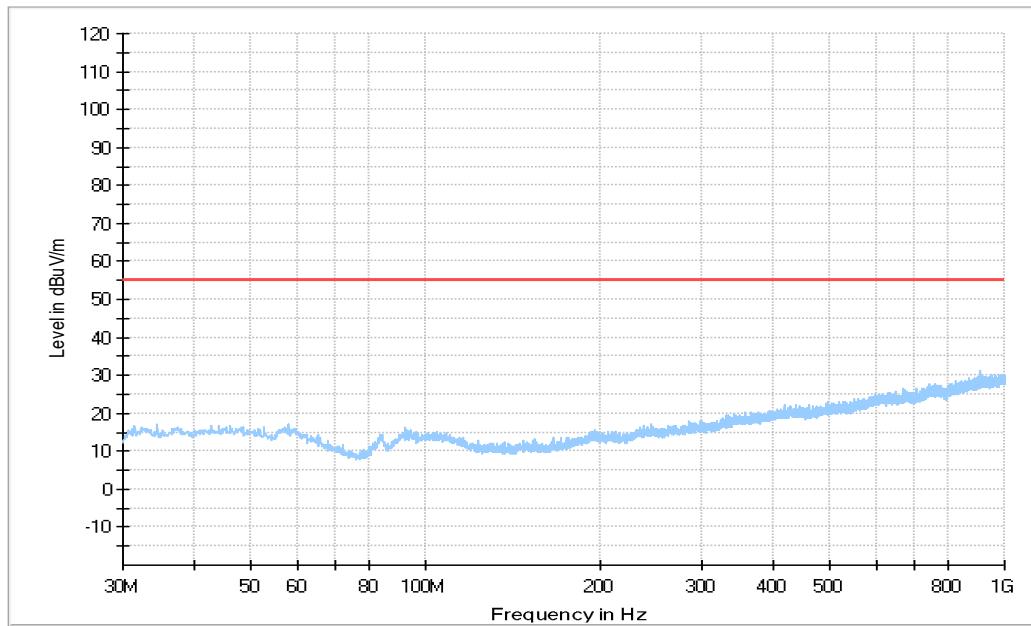
**Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel,
Horizontal, 18GHz-26.5GHz**



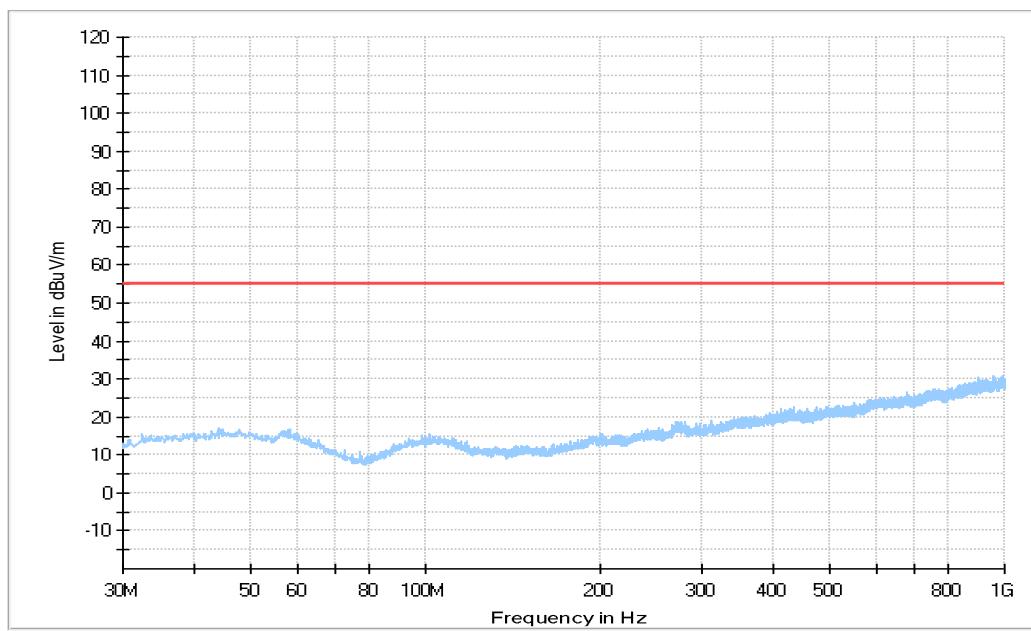
**Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Vertical,
26.5GHz-40GHz**



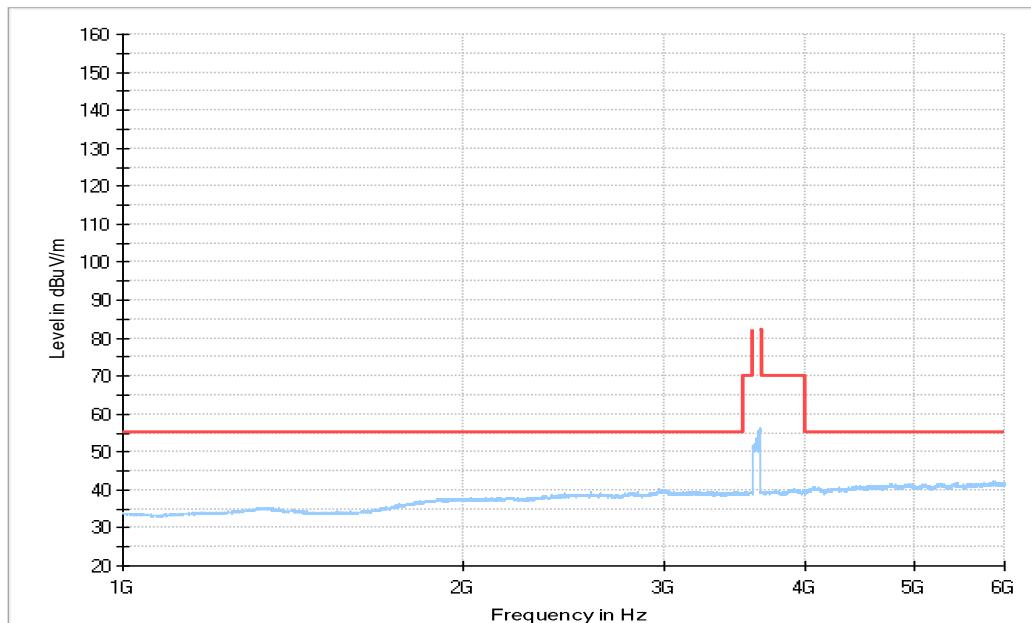
Configuration NR-MIMO-2C, QPSK, 100MHz+20MHz, 40W+40W, middle channel, Horizontal, 26.5GHz-40GHz



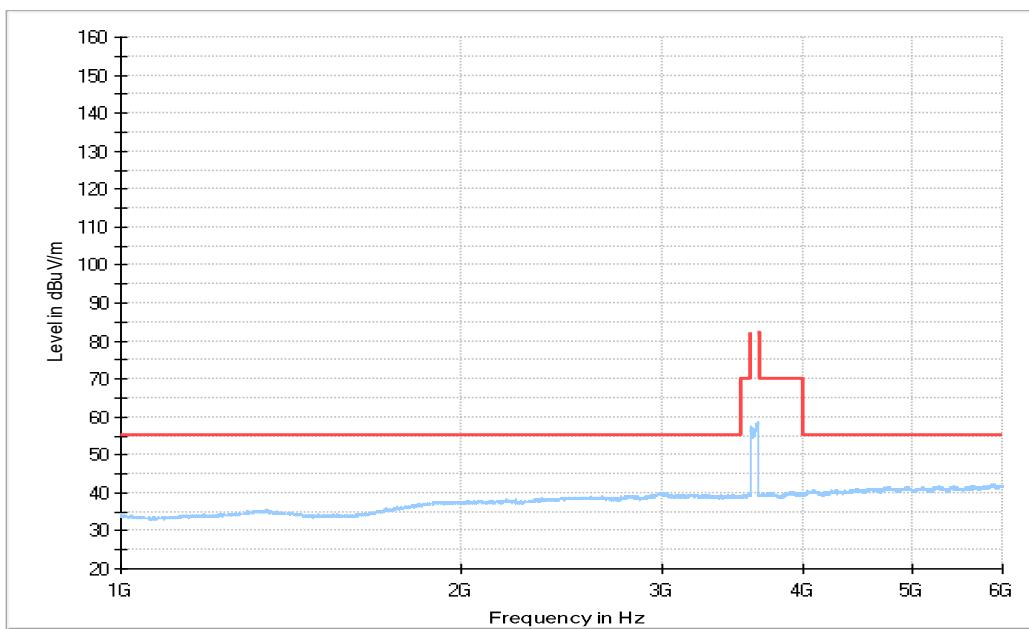
Configuration b48, QPSK, 50MHz, middle channel, Vertical, 30MHz-1GHz



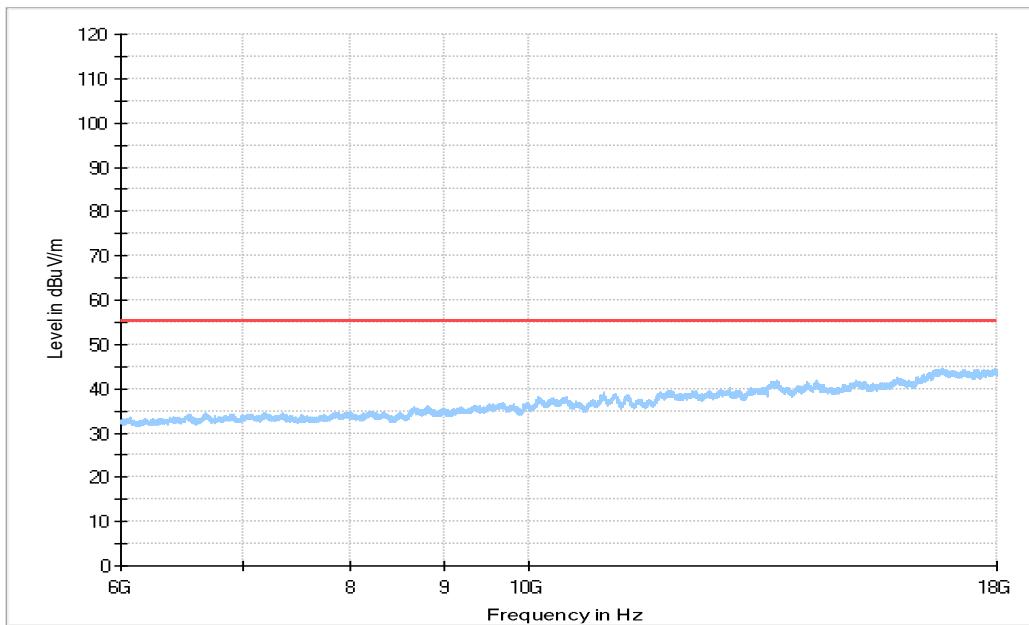
Configuration b48, QPSK, 50MHz, middle channel, Horizontal, 30MHz-1GHz



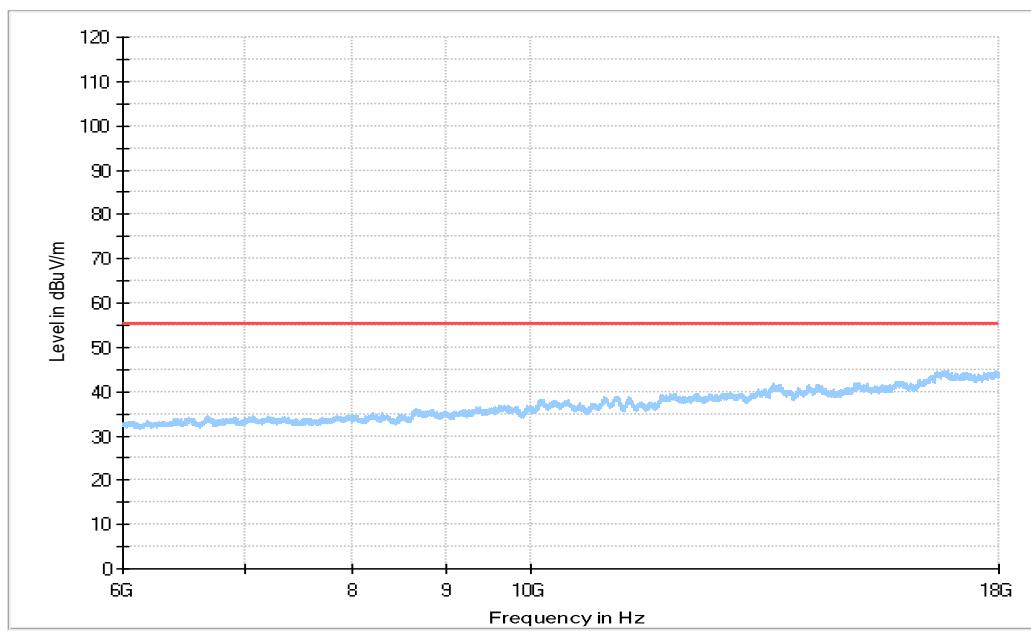
Configuration b48, QPSK, 50MHz, middle channel, Vertical, 1GHz-6GHz



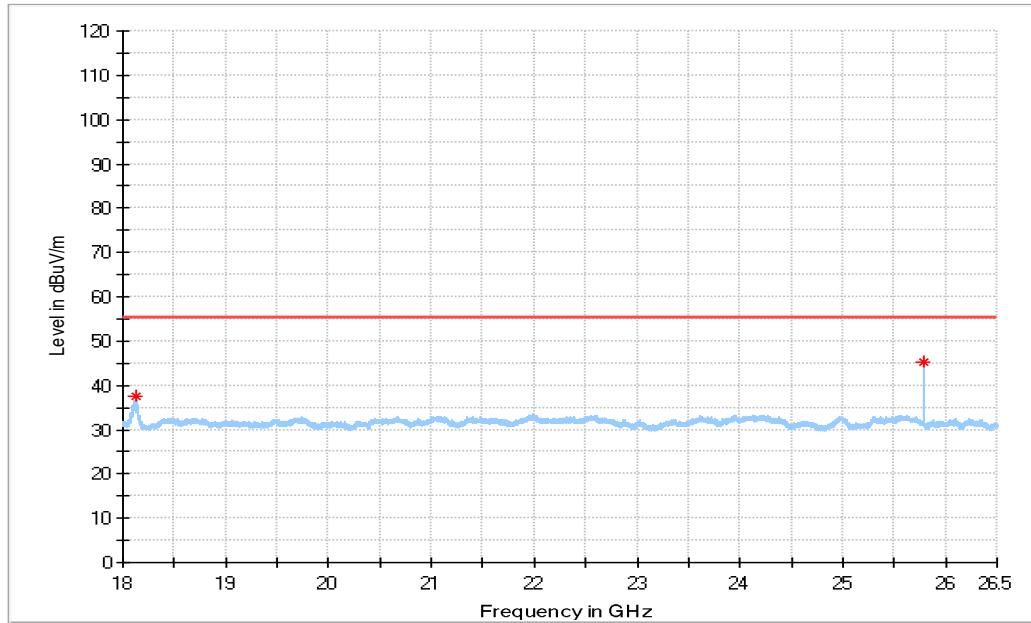
Configuration b48, QPSK, 50MHz, middle channel, Horizontal, 1GHz-6GHz



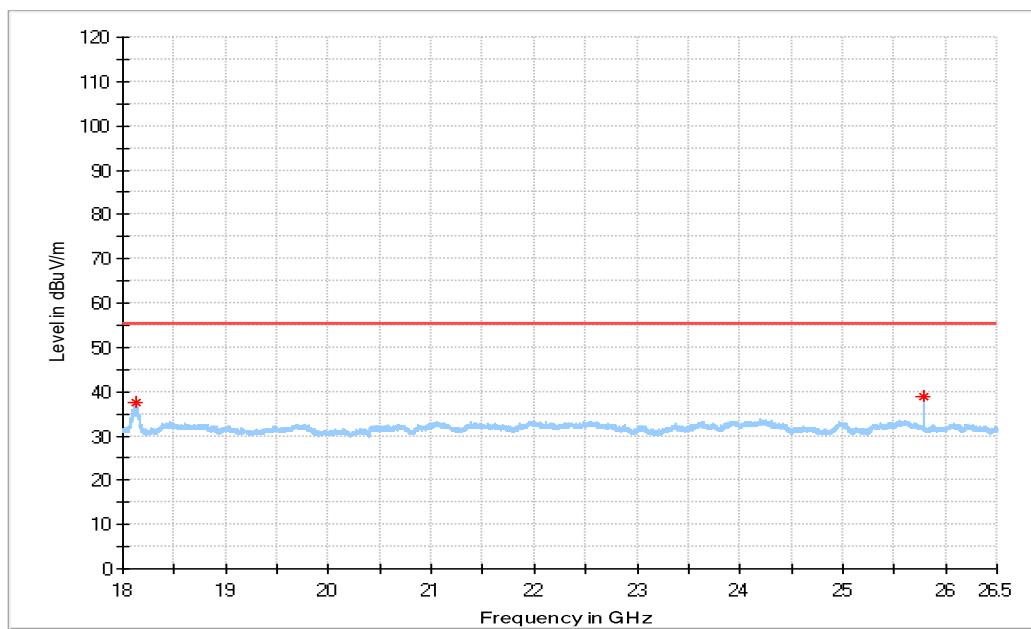
Configuration b48, QPSK, 50MHz, middle channel, Vertical, 6GHz-18GHz



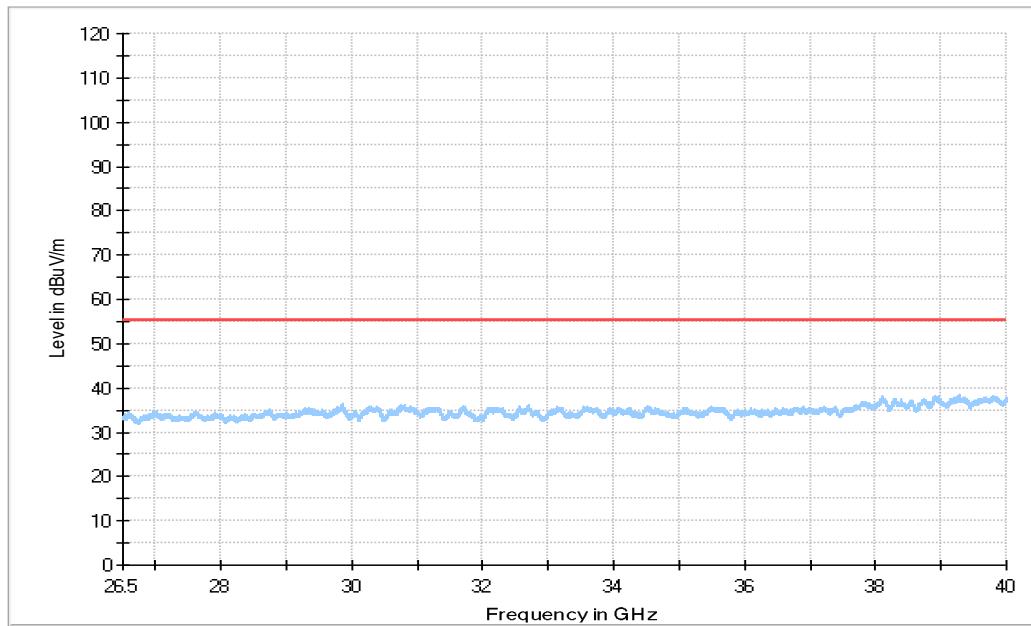
Configuration b48, QPSK, 50MHz, middle channel, Horizontal, 6GHz-18GHz



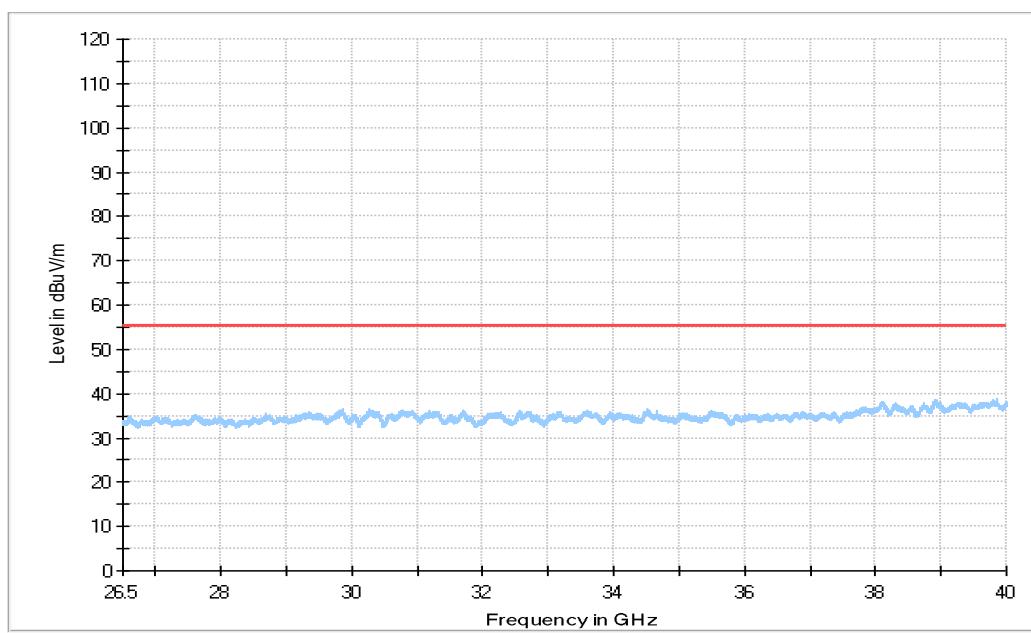
Configuration b48, QPSK, 50MHz, middle channel, Vertical, 18GHz-26.5GHz



Configuration b48, QPSK, 50MHz, middle channel, Horizontal, 18GHz-26.5GHz



Configuration b48, QPSK, 50MHz, middle channel, Vertical, 26.5GHz-40GHz



Configuration b48, QPSK, 50MHz, middle channel, Horizontal, 26.5GHz-40GHz

A.6 Frequency Stability

A.6.1 Reference

FCC Part 2, Clause 2.1055

FCC CFR 47 Part 27, Clause 27.54

A.6.2 Method of measurement

Temperature Variation

The EUT was tested over the temperature range -30°C to +55°C in 10°C steps with 120VAC Power Supply. At each temperature step, the Base Station was configured to transmit a [RAT]* at maximum power on the middle channel of the operating band. After achieving thermal balance, the averages of 200 transmission bursts were measured and the result recorded.

Voltage Variation

The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal value of 120VAC. At +20°C, the Base Station was configured to transmit a [RAT]* at maximum power on the middle channel of the operating band. The average of 200 transmission bursts was measured and the result recorded.

[RAT]*:

NR – QPSK modulation

A.6.3 Measurement results

Configuration NR-MIMO-2C, QPSK, 100MHz + 20MHz

Frequency Error vs Voltage

Port	Temperature	Supply Voltage AC(V)	Frequency Stability(Hz)	
			Channel position M	
			100MHz	20MHz
13	20°C	102	2.16	1.66
		138	1.71	1.95

Frequency Error vs Temperature

Supply Voltage AC(V)	Temperature	Frequency Stability (Hz) Channel position M	
		Bandwidth 100MHz	Bandwidth 20MHz
120	-30	1.01	1.55
	-20	1.37	2.11
	-10	1.51	2.16
	0	2.01	1.92
	10	2.26	1.65
	20	1.99	1.81
	30	1.75	2.01
	40	1.19	1.12
	50	1.22	1.92

ANNEX B: Accreditation Certificate



*****END OF REPORT*****