November 17, 2020

TUV SUD America Inc.
10 Centennial Drive
Peabody, MA 01960, USA

Attention: Director of Certification

RE: Analysis of RF Exposure for Mobile and Portable Device per KDB 447498 D01 General RF Exposure Guidance v06 and RSS-102 Issue 5 March 2015.

FCC ID: NU: YETQ34-2121466NU
CU: YETQ34-2121466CU

1. Limits

Limits for General Population/Uncontrolled Exposure (Title 47 Subpart J §2.1091 and KDB 447498 D01 referring to limits under §1.1310)

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Electric Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*($180/f^2$)	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f/1500	30
1500 - 100,000	-	-	1.0	30

f = frequency in MHz
**Plane-wave equivalent power density*

2. Internal Radio General Descriptions

2.1 NU LTE Band 2

Maximum Output RF Power	22 dBm
Production Tolerance	±2 dB
Maximum RF Power	24 dBm / 251.19mW
Frequency Range	1850 MHz to 1910 MHz
Power Density Limit	1.0 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. Gain	8.5 dBi / 7.079 (Numeric)

2.2 NU LTE Band 4

Output RF Power	22 dBm
Production Tolerance	±2 dB
Maximum RF Power	24 dBm / 251.19mW
Frequency Range	1710 MHz to 1755 MHz
Power Density Limit	1.0 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	8.5 dBi / 7.079 (Numeric)

2.3 NU LTE Band 12

Output RF Power	20 dBm
Production Tolerance	±2 dB
Maximum RF Power	20 dBm / 100.0 mW
Frequency Range	699 MHz to 716 MHz
Power Density Limit	0.466 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	6.5 dBi / 4.467 (Numeric)

2.4 NU LTE Band 14

Output RF Power	20 dBm
Production Tolerance	±2 dB
Maximum RF Power	20 dBm / 100.0 mW
Frequency Range	788 MHz to 798 MHz
Power Density Limit	0.525 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	6.5 dBi / 4.467 (Numeric)

2.5 CU LTE Band 2

Output RF Power	16 dBm
Production Tolerance	±2 dB
Maximum RF Power	18 dBm / 63.10 mW
Frequency Range	1930MHz to 1990 MHz
Power Density Limit	1.0 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	9.0 dBi / 7.943 (Numeric)

2.6 CU LTE Band 4

Maximum Output RF Power	16 dBm
Production Tolerance	±2 dB
Maximum RF Power	18 dBm / 63.10 mW
Frequency Range	2110 MHz to 2155 MHz
Power Density Limit	1.0 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	9.0 dBi / 7.943 (Numeric)

2.7 CU LTE Band 12

Output RF Power	13 dBm
Production Tolerance	±2 dB
Maximum RF Power	15 dBm / 31.62 mW
Frequency Range	729 MHz to 746 MHz
Power Density Limit	0.486 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	6.5 dBi / 4.467 (Numeric)

2.8 CU LTE Band 14

Output RF Power	13 dBm
Production Tolerance	±2 dB
Maximum RF Power	15 dBm / 31.62 mW
Frequency Range	758 MHz to 768 MHz
Power Density Limit	0.505 mW/cm^2
Antenna Type	External Wideband Directional Antenna
Antenna Model	A52-X12-100
Antenna Max. gain	6.5 dBi / 4.467 (Numeric)

3. Co-Located Transmitters transmission table:

Each CU are apart from each other at least 10 meters away. Worst case co-located transmission is 3 bands per NU or CU.

Transmitter type		Transmitter type that can transmit at the same time
NU	LTE B2	LTE B4 and B12, or LTE B4 and 14
	LTE B4	LTE B2 and B12, or LTE B2 and 14
	LTE B12	LTE B2 and B4
	LTE B14	LTE B2 and B4
	Note: worst case bands are LTE B2, B4 and B12	
CU	LTE B2	LTE B4 and B12, or LTE B4 and 14
	LTE B4	LTE B2 and B12, or LTE B2 and 14
	LTE B12	LTE B2 and B4
	LTE B14	LTE B2 and B4
	Note: worst case bands are LTE B2, B4 and B12	

4. Exposure from sources with multiple frequencies:

Calculation for the shortest distance with Multi-Bands Transmission (NU and CU with Patch antenna as the worst case configuration)

Antenna Type	Shortest Distance (cm)
NU with Antenna A52-X12-100	**18.955**
CU with Antenna A52-X12-100	**10.144**

The test results are based on the following calculation:

The distance between NU antenna and CU antenna is at least 1 meter. Therefore, the worst case bands that can transmit simutaneously are listed below:

Uplink (NU Antenna)				
Bands	**Power Density (mW/cm^2)**	**Evaluation Distance (cm)**	**Limit (mW/cm^2)**	**MPE ratio (MPE/Limit)**
LTE Band 2	$P_{N1}*G_{N1}/(4*PI*R^2)$	R	L_{N1} = 1.0	$Ratio_{N1}$
LTE Band 4	$P_{N2}*G_{N2}/(4*PI*R^2)$	R	L_{N2} = 1.0	$Ratio_{N2}$
LTE Band 12	$P_{N3}*G_{N3}/(4*PI*R^2)$	R	L_{N3} = 0.466	$Ratio_{N3}$
			Sum of the ratios (should be <1.0)	**1.0**

Downlink (CU Antenna)				
Bands	**Power Density (mW/cm^2)**	**Evaluation Distance (cm)**	**Limit (mW/cm^2)**	**MPE ratio (MPE/Limit)**
LTE Band 2	$P_{C1}*G_{C1}/(4*PI*R^2)$	R	L_{N1} = 1.0	$Ratio_{C1}$
LTE Band 4	$P_{C2}*G_{C2}/(4*PI*R^2)$	R	L_{N2} = 1.0	$Ratio_{C2}$
LTE Band 12	$P_{C3}*G_{C3}/(4*PI*R^2)$	R	L_{N3} = 0.486	$Ratio_{C3}$
			Sum of the ratios (should be <1.0)	**1.0**

To calculate the shortest distance between NU antenna and end user, use the following equation:

$Ratio_{N1} + Ratio_{N2} + Ratio_{N3} = 1$

Then,

$P_{N1}*G_{N1}/(4*PI*R^2)/L_{N1} + P_{N2}*G_{N2}/(4*PI*R^2)/L_{N2} + P_{N3}*G_{N3}/(4*PI*R^2)/L_{N3} = 1$

Therefore, the shortest distance,

$R = SQRT ((P_{N1}*G_{N1}/L_{N1} + P_{N2}*G_{N2}/L_{N2} + P_{N3}*G_{N3}/L_{N3})/(4*PI))$

= SQRT ((251.19*7.079/1 + 251.19*7.079/1 + 100*4.467/0.466)/(4*PI))

= SQRT (359.2869)

= **18.955 cm**

To calculate the shortest distance between CU antenna and end user, use the following equation:

$Ratio_{C1} + Ratio_{C2} + Ratio_{C3} = 1$

Then,

$P_{C1}*G_{C1}/(4*PI*R^2)/L_{C1} + P_{C2}*G_{C2}/(4*PI*R^2)/L_{C2} + P_{C3}*G_{C3}/(4*PI*R^2)/L_{C3} = 1$

Therefore, the shortest distance,

$R = SQRT ((P_{C1}*G_{C1}/L_{C1} + P_{C2}*G_{C2}/L_{C2} + P_{C3}*G_{C3}/L_{C3})/(4*PI))$

= SQRT ((63.1*7.943/1 + 63.1*7.943/1 + 31.62*4.467/0.486)/(4*PI))

= SQRT (102.8967)

= **10.144 cm**

Sincerely,

Xiaoying Zhang
Name
Authorized Signatory
Title: EMC/Wireless Test Engineer