



# FCC RF Exposure Test Report

Report No. : W7L-240430W002SA01

Applicant : CONTINENTAL AUTOMOTIVE SYSTEMS, INC.

Address : 21440 W LAKE COOK RD., DEER PARK, IL 60010, USA

Product : MODULE

Brand Name : CONTINENTAL

Model Name : FE5NAR110, FE5NAR111

FCC ID : LHJ-FE5NAR110

Standards : FCC Part 2 (Section 2.1091)  
KDB 447498 D01 General RF Exposure Guidance v06

Sample Received Date : May. 01, 2024

Date of Testing : May. 01, 2024 ~ Jun. 17, 2024

The FCC Site Registration No. : 525120

The Designation No. : CN1171

**CERTIFICATION:** The above equipment have been tested by **BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO., LTD.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by A2LA or any government agencies.

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## 1. Description of Equipment Under Test

<b>EUT Type</b>	Module
<b>Brand Name</b>	Continental
<b>Model Name</b>	FE5NAR110, FE5NAR111
<b>Tx Frequency Bands (Unit: MHz)</b>	WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band IV: 1712.4 ~ 1752.6 WCDMA Band V : 826.4 ~ 846.6 LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 14 : 790.5 MHz ~ 795.5 MHz LTE Band 66 : 1710.7 MHz ~ 1779.3 MHz LTE Band 71 : 665.5 MHz ~ 695.5 MHz LTE Band CA_5B: 825.6MHz ~ 847.4MHz LTE Band CA_7C: 2505.5MHz ~ 2564.7Hz LTE Band CA_66B: 1712.5MHz ~ 1777.5MHz LTE Band CA_66C: 1713.3MHz ~ 1776.7MHz NR Band n2:1852.5MHz ~ 1907.5MHz NR Band n5:826.5MHz ~ 846.5MHz NR Band n25:1852.5MHz ~1912.5MHz NR Band n41/n41 HPUE/n41 MIMO: 2506.02MHz ~ 2679.99MHz NR Band n66: 1712.5MHz ~ 1777.5MHz NR Band n71: 665.5MHz ~ 695.5MHz NR Band n77/n77C-HPUE/n77 MIMO: 3710.01MHz ~ 3969.99MHz
<b>Uplink Modulations</b>	WCDMA : BPSK/QPSK LTE : QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM( $\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM); CP-OFDM(QPSK, 16QAM, 64QAM, 256QAM);
<b>HW VERSION</b>	P2.0
<b>SW VERSION</b>	MODEM_GM_C3_3.0.2.24
<b>Antenna Type</b>	WWAN: Monopole Antenna
<b>EUT Stage</b>	Production Unit

**Note:**

- The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.
- Antenna gain and EUT conducted cable loss are provided by the customer, and the laboratory will record the results based on these items that involve these two parameters.
- According to the information provided by the manufacturer, The difference between FE5NAR110, FE5NAR111 is as follows:

Sample	HVIN/PMN	5G Bands NSA	5G Bands SA	SA UL MIMO	LTE Bands	UMTS	GNSS
1	FE5NAR110	n2, n5, n66, n77	n25, n41, n66, n71, n77	n41, n77, n78	2, 4, 5, 7, 12, 13, 14, 28A, 28B, 29Rx, 30Rx, 66, 71	2, 4, 5	L1, L5
2	FE5NAR111	n2, n5, n66, n77	n25, n41, n66, n71, n77	n41, n77, n78	2, 4, 5, 7, 12, 13, 14, 28A, 28B, 29Rx, 30Rx, 66, 71	2, 4, 5	L1

## 2. MPE(Maximum Permissible Exposure) Assessment

### 2.1 Introduction

According to 47 CFR §2.1091, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitting antenna and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 cm separation requirement. The limits to be used for MPE evaluation are specified in §1.1310. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population/uncontrolled exposure.

### 2.2 RF Radiation Exposure Limits

According to 47 CFR §1.1310, the criteria listed in below table shall be used to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093.

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (min)
(A) Limits for Occupational / Controlled Exposures				
0.3 – 3.0	614	1.63	100	6
3.0 – 30	1842/f	4.89/f	900/f <sup>2</sup>	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	-	-	f/300	6
1500 – 100000	-	-	5	6
(B) Limits for General Population / Uncontrolled Exposures				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/f	2.19/f	180/f <sup>2</sup>	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	-	-	f/1500	30
1500 – 100000	-	-	1.0	30

**Limits for maximum permissible exposure (MPE)**

**Notes:**

1. f = frequency in MHz
2. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided they are made aware of the potential for exposure.
3. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or

in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

### **2.3 MPE Assessment Method**

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$\text{Power Density (S)} = \frac{PG}{4\pi R^2} = \frac{\text{EIRP}}{4\pi R^2}$$

Where

S = Power Density, unit in mW/cm<sup>2</sup>

P = Power input to the antenna, unit in mW

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna, unit in cm

EIRP = Effective isotropically radiated power

### **2.4 MPE Calculation for Standalone Operations**

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least 20 cm away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.



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## RF Exposure Evaluation Results:

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Output Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (mW)	EIRP/ERP Limit (dBm)	Power Density at 20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Gain according to EIRP (dBi)	Gain according to PD (dBi)	Max Gain Allowed (dBi)	Conclusion
WCDMA Band II	1852.4	1.93	24.0	25.93	391.742	33.01	0.078	1.000	9.01	13.00	9.01	Pass
WCDMA Band IV	1712.4	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
WCDMA Band V	826.4	2.56	24.0	26.56	452.898	38.45	0.090	0.551	16.60	10.41	10.41	Pass
LTE Band 2	1850.7	1.93	24.0	25.93	391.742	33.01	0.078	1.000	9.01	13.00	9.01	Pass
LTE Band 4	1710.7	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
LTE Band 5	824.7	2.56	24.0	26.56	452.898	38.45	0.090	0.550	16.60	10.40	10.40	Pass
LTE Band 7	2502.5	1.24	24.0	25.24	334.195	33.01	0.067	1.000	9.01	13.00	9.01	Pass
LTE Band 12	699.7	-0.32	24.0	23.68	233.346	34.77	0.046	0.466	12.92	9.68	9.68	Pass
LTE Band 13	779.5	-0.32	24.0	23.68	233.346	34.77	0.046	0.520	12.92	10.15	10.15	Pass
LTE Band 14	790.5	-0.32	24.0	23.68	233.346	34.77	0.046	0.527	12.92	10.21	10.21	Pass
LTE Band 66	1710.7	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
LTE Band 71	665.5	0.94	24.0	24.94	311.889	34.77	0.062	0.444	12.92	9.46	9.46	Pass
LTE Band CA_5B	825.6	2.56	24.0	26.56	452.898	38.45	0.090	0.550	16.60	10.40	10.40	Pass
LTE Band CA_7C	2505.5	1.24	24.0	25.24	334.195	33.01	0.067	1.000	9.01	13.00	9.01	Pass
LTE Band CA_66B	1712.5	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
LTE Band CA_66C	1713.3	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
NR Band n2	1852.5	1.93	24.0	25.93	391.742	33.01	0.078	1.000	9.01	13.00	9.01	Pass
NR Band n5	826.5	2.56	24.0	26.56	452.898	38.45	0.090	0.551	16.60	10.41	10.41	Pass
NR Band n25	1852.5	2.56	24.0	26.56	452.898	33.01	0.090	1.000	9.01	13.00	9.01	Pass
NR Band n41	2506.02	1.24	24.0	25.24	334.195	33.01	0.067	1.000	9.01	13.00	9.01	Pass
NR Band n41 HPUE	2506.02	1.24	27.0	28.24	666.807	33.01	0.133	1.000	6.01	10.00	6.01	Pass
NR Band n41 MIMO	2506.02	4.25	24.0	28.25	668.344	33.01	0.133	1.000	9.01	13.00	9.01	Pass
NR Band n66	1712.5	1.93	24.0	25.93	391.742	30.00	0.078	1.000	6.00	13.00	6.00	Pass
NR Band n71	665.5	0.94	24.0	24.94	311.889	34.77	0.062	0.444	12.92	9.46	9.46	Pass
NR Band n77	3710.01	0.53	24.0	24.53	283.792	30.00	0.056	1.000	6.00	13.00	6.00	Pass
NR Band n77-HPUE	3710.01	0.53	27.0	27.53	566.239	30.00	0.113	1.000	3.00	10.00	3.00	Pass
NR Band n77 MIMO	3710.01	3.54	24.0	27.54	567.545	30.00	0.113	1.000	6.00	13.00	6.00	Pass



### **3. Information on the Testing Laboratories**

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO., LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The road map of all our labs can be found in our web site also.

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