

RF EXPOSURE EVALUATION REPORT

FCC ID : LHJ-FE5NAR110
Equipment : FE5NAR110, FE5NAR111
Brand Name : Continental
Model Name : FE5NAR110, FE5NAR111
Applicant : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Manufacturer : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1091 and it complies with applicable limit.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. RF EXPOSURE LIMIT INTRODUCTION	6
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	7
4.1. Standalone Power Density Calculation	7



History of this test report

Report No.	Version	Description	Issued Date
FA480602B	Rev. 01	Initial issue of report	Sep. 16, 2024



1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	FE5NAR110, FE5NAR111
Brand Name	Continental
Model Name	FE5NAR110, FE5NAR111
FCC ID	LHJ-FE5NAR110
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n25 : 1850 MHz ~ 1915 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz,
Mode	WCDMA: BPSK/QPSK LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
Host Information	
Equipment Name	G12N51RG1, G12N50RG1
Brand Name	Continental
Model Name	G12N51RG1, G12N50RG1
EUT Stage	Identical Prototype
External Antenna Information	
Amphenol L246 Embedded Glass Antenna	
Antenna Brand	Amphenol
Antenna Type	Glass antenna
Antenna PN	85038208, 85038209, 85038210, 85732934
Continental Y2XX Hidden Antennas	
Antenna Brand	Continental
Antenna Type	Front fender antenna
Antenna PN	Primary (Ant1): 86784729 Secondary (Ant2): 86784728
Continental Sharkfin Antenna	
Antenna Brand	Continental
Antenna Type	External Sharkfin Antenna + XM + Dual GNSS +5G
Antenna PN	86783279

Reviewed by: Jason Wang

Report Producer: Paula Chen

2. Maximum RF average output power among production units

Mode		Maximum Average power(dBm)
WCDMA	Band II	24
	Band IV	24
	Band V	24
LTE	Band 2	24
	Band 4	24
	Band 5	24
	Band 7	24
	Band 12	24
	Band 13	24
	Band 14	24
	Band 66	24
5G NR	Band 71	24
	n2	24
	n5	24
	n25	24
	n41	24
	n41_HPUE	27
	n41_MIMO	24
	n66	24
	n71	24
	n77	24
	n77_HPUE	27
	n77_MIMO	24

3. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(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 ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Amphenol L246 Embedded Glass Antenna

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum PG (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	4.34	24.00	682.34	0.136	1.000	0.136
WCDMA Band 4	5.07	24.00	807.24	0.161	1.000	0.161
WCDMA Band 5	2.72	24.00	469.89	0.094	0.536	0.174
LTE Band 2	4.34	24.00	682.34	0.136	1.000	0.136
LTE Band 4	5.07	24.00	807.24	0.161	1.000	0.161
LTE Band 5	2.72	24.00	469.89	0.094	0.549	0.170
LTE Band 7	4.03	24.00	635.33	0.126	1.000	0.126
LTE Band 12	0.59	24.00	287.74	0.057	0.466	0.123
LTE Band 13	3.25	24.00	530.88	0.106	0.518	0.204
LTE Band 14	3.25	24.00	530.88	0.106	0.525	0.201
LTE Band 66	5.07	24.00	807.24	0.161	1.000	0.161
LTE Band 71	2.31	24.00	427.56	0.085	0.442	0.193
5G NR n2	4.34	24.00	682.34	0.136	1.000	0.136
5G NR n5	2.72	24.00	469.89	0.094	0.549	0.170
5G NR n25	4.34	24.00	682.34	0.136	1.000	0.136
5G NR n41	4.03	24.00	635.33	0.126	1.000	0.126
5G NR n41_HPUE	4.03	27.00	1267.65	0.252	1.000	0.252
5G NR n41_MIMO	4.03	24.00	635.33	0.126	1.000	0.126
5G NR n66	5.07	24.00	807.24	0.161	1.000	0.161
5G NR n71	2.31	24.00	427.56	0.085	0.442	0.193
5G NR n77_	2.57	24.00	453.94	0.090	1.000	0.090
5G NR n77_HPUE	2.57	27.00	905.73	0.180	1.000	0.180
5G NR n77_MIMO	2.57	24.00	453.94	0.090	1.000	0.090

LTE Power Density / Limit	5G NR Power Density / Limit	Σ (Power Density / Limit) of LTE + 5G NR
0.204	0.252	0.456

Continental Y2XX Hidden Antenna

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum PG (mW)	Power Density at 27cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	4.89	24.00	774.46	0.085	1.000	0.085
WCDMA Band 4	4.55	24.00	716.14	0.078	1.000	0.078
WCDMA Band 5	4.81	24.00	760.33	0.083	0.536	0.155
LTE Band 2	4.89	24.00	774.46	0.085	1.000	0.085
LTE Band 4	4.55	24.00	716.14	0.078	1.000	0.078
LTE Band 5	4.81	24.00	760.33	0.083	0.549	0.151
LTE Band 7	6.73	24.00	1183.04	0.129	1.000	0.129
LTE Band 12	5.21	24.00	833.68	0.091	0.466	0.195
LTE Band 13	6.16	24.00	1037.53	0.113	0.518	0.219
LTE Band 14	6.67	24.00	1166.81	0.127	0.525	0.243
LTE Band 66	4.49	24.00	706.32	0.077	1.000	0.077
LTE Band 71	4.67	24.00	736.21	0.080	0.442	0.182
5G NR n2	4.89	24.00	774.46	0.085	1.000	0.085
5G NR n5	4.81	24.00	760.33	0.083	0.549	0.151
5G NR n25	4.89	24.00	774.46	0.085	1.000	0.085
5G NR n41	6.44	24.00	1106.62	0.121	1.000	0.121
5G NR n41_HPUE	6.44	27.00	2208.00	0.241	1.000	0.241
5G NR n41_MIMO	6.44	24.00	1106.62	0.121	1.000	0.121
5G NR n66	4.49	24.00	706.32	0.077	1.000	0.077
5G NR n71	4.67	24.00	736.21	0.080	0.442	0.182
5G NR n77	2.77	24.00	475.34	0.052	1.000	0.052
5G NR n77_HPUE	2.77	27.00	948.42	0.104	1.000	0.104
5G NR n77_MIMO	2.77	24.00	475.34	0.052	1.000	0.052

LTE Power Density / Limit	5G NR Power Density / Limit	Σ (Power Density / Limit) of LTE + 5G NR
0.243	0.241	0.484

**Continental Sharkfin Antenna**

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum PG (mW)	Power Density at 23cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	3.50	24.00	562.34	0.085	1.000	0.085
WCDMA Band 4	2.60	24.00	457.09	0.069	1.000	0.069
WCDMA Band 5	4.00	24.00	630.96	0.095	0.536	0.177
LTE Band 2	3.50	24.00	562.34	0.085	1.000	0.085
LTE Band 4	2.60	24.00	457.09	0.069	1.000	0.069
LTE Band 5	4.00	24.00	630.96	0.095	0.549	0.173
LTE Band 7	6.10	24.00	1023.29	0.154	1.000	0.154
LTE Band 12	1.30	24.00	338.84	0.051	0.466	0.109
LTE Band 13	3.50	24.00	562.34	0.085	0.518	0.163
LTE Band 14	3.50	24.00	562.34	0.085	0.525	0.161
LTE Band 66	2.60	24.00	457.09	0.069	1.000	0.069
LTE Band 71	1.70	24.00	371.54	0.056	0.442	0.127
5G NR n2	3.50	24.00	562.34	0.085	1.000	0.085
5G NR n5	4.00	24.00	630.96	0.095	0.549	0.173
5G NR n25	3.50	24.00	562.34	0.085	1.000	0.085
5G NR n41	6.10	24.00	1023.29	0.154	1.000	0.154
5G NR n41_HPUE	6.10	27.00	2041.74	0.307	1.000	0.307
5G NR n41_MIMO	6.10	24.00	1023.29	0.154	1.000	0.154
5G NR n66	2.60	24.00	457.09	0.069	1.000	0.069
5G NR n71	1.70	24.00	371.54	0.056	0.442	0.127
5G NR n77	6.20	24.00	1047.13	0.158	1.000	0.158
5G NR n77_HPUE	6.20	27.00	2089.30	0.314	1.000	0.314
5G NR n77_MIMO	6.20	24.00	1047.13	0.158	1.000	0.158

LTE Power Density / Limit	5G NR Power Density / Limit	Σ (Power Density / Limit) of LTE + 5G NR
0.173	0.314	0.487

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for LTE + 5G NR.
2. Considering the WWAN(LTE) module collocation with the WWAN(5G NR) transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.