RF EXPOSURE EVALUATION REPORT

FCC ID	:	LHJ-BL28NARD1
Equipment	:	BL28NA-RD1
Brand Name	:	Continental
Model Name	:	BL28NA-RD1
Applicant	:	Continental Automotive Systems, Inc. 21440 West Lake Cook Road, Deer Park, Illinois 60010, United States
Manufacturer	:	Continental Automotive Systems, Inc. 21440 West Lake Cook Road, Deer Park, Illinois 60010, United States
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.

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Cona Huang

Approved by: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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History of this test report

Report No.	Version	Description	Issued Date
FA120221-02	Rev. 01	Initial issue of report	Oct. 21, 2021
FA120221-02	Rev. 02	Update company address	Oct. 22, 2021

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	BL28NA-RD1
Brand Name	Continental
Model Name	BL28NA-RD1
FCC ID	LHJ-BL28NARD1
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 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
Mode	GPRS/EGPRS RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM
HW Version	P 4.0
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Paula Chen

2. Maximum RF average output power among production units

Mode	Burst average power(dBm)	
	GSM 850	GSM 1900
GPRS (GMSK, 1 Tx slot)	33.5	30.5
GPRS (GMSK, 2 Tx slots)	32.0	29.0
GPRS (GMSK, 3 Tx slots)	30.0	27.0
GPRS (GMSK, 4 Tx slots)	29.0	26.0
EDGE (8PSK, 1 Tx slot)	27.5	26.5
EDGE (8PSK, 2 Tx slots)	25.5	24.5
EDGE (8PSK, 3 Tx slots)	24.5	23.5
EDGE (8PSK, 4 Tx slots)	23.5	22.5

Mode		Maximum Average power(dBm)
WCDMA	Band II	24.5
	Band IV	24.5
	Band V	24.5
LTE	Band 2	24.0
	Band 4	24.0
	Band 5	24.0
	Band 7	24.0
	Band 12	24.0
	Band 13	24.0

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/f2)	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/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

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

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP (dBm)	Maximum ERP (W)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)
GPRS 850 (1 Tx slot)	4.50	33.50	35.850	3.846	38.000	6.310	7.000	794.328	0.158	0.549
GPRS 850 (2 Tx slots)	4.50	32.00	34.350	2.723	36.500	4.467	7.000	1116.709	0.222	0.549
GPRS 850 (3 Tx slots)	4.50	30.00	32.350	1.718	34.500	1.718	7.000	1056.818	0.210	0.549
GPRS 850 (4 Tx slots)	4.50	29.00	31.350	1.365	33.500	1.365	7.000	1122.018	0.223	0.549
EGPRS 850 (1 Tx slot)	4.50	27.50	29.850	0.966	32.000	0.968	7.000	199.526	0.040	0.549
EGPRS 850 (2 Tx slots)	4.50	25.50	27.850	0.610	30.000	1.000	7.000	250.000	0.050	0.549
EGPRS 850 (3 Tx slots)	4.50	24.50	26.850	0.484	29.000	0.794	7.000	297.873	0.059	0.549
EGPRS 850 (4 Tx slots)	4.50	23.50	25.850	0.385	28.000	0.631	7.000	315.479	0.063	0.549
GPRS 1900 (1 Tx slot)	2.50	30.50	30.850	1.216	33.000	1.995	2.000	251.189	0.050	1.000
GPRS 1900 (2 Tx slots)	2.50	29.00	29.350	0.861	31.500	1.413	2.000	353.134	0.070	1.000
GPRS 1900 (3 Tx slots)	2.50	27.00	27.350	0.543	29.500	0.891	2.000	334.195	0.067	1.000
GPRS 1900 (4 Tx slots)	2.50	26.00	26.350	0.432	28.500	0.708	2.000	354.813	0.071	1.000
EGPRS 1900 (1 Tx slot)	2.50	26.50	26.850	0.484	29.000	0.794	2.000	100.000	0.020	1.000
EGPRS 1900 (2 Tx slots)	2.50	24.50	24.850	0.305	27.000	0.501	2.000	125.297	0.025	1.000
EGPRS 1900 (3 Tx slots)	2.50	23.50	23.850	0.243	26.000	0.398	2.000	149.290	0.030	1.000
EGPRS 1900 (4 Tx slots)	2.50	22.50	22.850	0.193	25.000	0.316	2.000	158.114	0.031	1.000
WCDMA Band 2	2.50	24.50	24.850	0.305	27.000	0.501	2.000	501.187	0.100	1.000
WCDMA Band 4	5.50	24.50	27.850	0.610	30.000	1.000	1.000	1000.000	0.199	1.000
WCDMA Band 5	4.50	24.50	26.850	0.484	29.000	0.794	7.000	794.328	0.158	0.549
LTE Band 2	2.50	24.00	24.350	0.272	26.500	0.447	2.000	446.684	0.089	1.000
LTE Band 4	5.50	24.00	27.350	0.543	29.500	0.891	1.000	891.251	0.177	1.000
LTE Band 5	4.50	24.00	26.350	0.432	28.500	0.708	7.000	707.946	0.141	0.549
LTE Band 7	9.00	24.00	30.850	1.216	33.000	1.995	2.000	1995.262	0.397	1.000
LTE Band 12	6.50	24.00	28.350	0.684	30.500	1.122	3.000	1122.018	0.223	0.466
LTE Band 13	6.50	24.00	28.350	0.684	30.500	1.122	3.000	1122.018	0.223	0.518

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

4.2. Collocated Power Density Calculation

Note:

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 26dBm and for Bluetooth is less than or equal to 15dBm.
2. A maximum antenna gain of 5 dBi for WLAN/BT has been assumed for all collocated antennas.

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
GPRS 850 (1 Tx slot)	2.00	33.50	35.5	3.55	446.68	0.089	0.549	0.162
GPRS 850 (2 Tx slots)	2.00	32.00	34.0	2.51	627.97	0.125	0.549	0.228
GPRS 850 (3 Tx slots)	2.00	30.00	32.0	1.58	594.29	0.118	0.549	0.215
GPRS 850 (4 Tx slots)	2.00	29.00	31.0	1.26	630.96	0.126	0.549	0.229
EGPRS 850 (1 Tx slot)	2.00	27.50	29.5	0.89	112.20	0.022	0.549	0.041
EGPRS 850 (2 Tx slots)	2.00	25.50	27.5	0.56	140.59	0.028	0.549	0.051
EGPRS 850 (3 Tx slots)	2.00	24.50	26.5	0.45	167.51	0.033	0.549	0.061
EGPRS 850 (4 Tx slots)	2.00	23.50	25.5	0.35	177.41	0.035	0.549	0.064
GPRS 1900 (1 Tx slot)	2.50	30.50	33.0	2.00	251.19	0.050	1.000	0.050
GPRS 1900 (2 Tx slots)	2.50	29.00	31.5	1.41	353.13	0.070	1.000	0.070
GPRS 1900 (3 Tx slots)	2.50	27.00	29.5	0.89	334.20	0.067	1.000	0.067
GPRS 1900 (4 Tx slots)	2.50	26.00	28.5	0.71	354.81	0.071	1.000	0.071
EGPRS 1900 (1 Tx slot)	2.50	26.50	29.0	0.79	100.00	0.020	1.000	0.020
EGPRS 1900 (2 Tx slots)	2.50	24.50	27.0	0.50	125.30	0.025	1.000	0.025
EGPRS 1900 (3 Tx slots)	2.50	23.50	26.0	0.40	149.29	0.030	1.000	0.030
EGPRS 1900 (4 Tx slots)	2.50	22.50	25.0	0.32	158.11	0.031	1.000	0.031
WCDMA Band 2	2.50	24.50	27.0	0.50	501.19	0.100	1.000	0.100
WCDMA Band 4	5.50	24.50	30.0	1.00	1000.00	0.199	1.000	0.199
WCDMA Band 5	2.00	24.50	26.5	0.45	446.68	0.089	0.551	0.161
LTE Band 2	2.50	24.00	26.5	0.45	446.68	0.089	1.000	0.089
LTE Band 4	5.50	24.00	29.5	0.89	891.25	0.177	1.000	0.177
LTE Band 5	2.00	24.00	26.0	0.40	398.11	0.079	0.549	0.144
LTE Band 7	7.00	24.00	31.0	1.26	1258.93	0.251	1.000	0.251
LTE Band 12	3.50	24.00	27.5	0.56	562.34	0.112	0.466	0.240
LTE Band 13	3.50	24.00	27.5	0.56	562.34	0.112	0.518	0.216
WLAN2.4GHz Band	5.0	26.0	31.0	1.26	1258.93	0.251	1.000	0.251
WLAN5GHz Band	5.0	26.0	31.0	1.26	1258.93	0.251	1.000	0.251
Bluetooth	5.0	15.0	20.0	0.10	100.00	0.020	1.000	0.020

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit) of WWAN+WLAN+Bluetooth
0.251	0.251	0.020	0.522

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 WWAN + WLAN + Bluetooth.
2. Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

Conclusion:

Based on FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Technology	Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Stanalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
BL28NA-RD1	GSM	GSM 850	824.2 ~ 848.8	33.5	4.5	2.0
		GSM 1900	1850.2~ 1909.8	30.5	2.5	2.5
	WCDMA	Band II	1852.4~1907.6	24.5	2.5	2.5
		Band IV	1712.4~1752.6	24.5	5.5	5.5
		Band V	826.4~846.6	24.5	4.5	2.0
	LTE	Band 2	1850.7~1909.3	24.0	2.5	2.5
		Band 4	1710.7~1754.3	24.0	5.5	5.5
		Band 5	824.7~848.3	24.0	4.5	2.0
		Band 7	2502.5~2567.5	24.0	9.0	7.0
		Band 12	699.7~715.3	24.0	6.5	3.5
		Band 13	779.5~784.5	24.0	6.5	3.5