Wireless Device Over the Air RF Performance LTE Summary Report for PTCRB bands

REPORT NO.:	A220301W001OT01 R1
MODEL NO.:	D-215
PTCRB/CTIA REQUEST NO.:	107735
RECEIVED DATE:	2022.02.24
TESTED DATE:	2022.02.24 ~ 2022.04.06
ISSUED:	2022.05.17

MANUFACTURER:	Netradyne Inc.
ADDRESS :	9191,Towne Centre Drive, Suite 200, San Diego,CA 92122
ISSUED BY:	BV 7Layers Communications Technology (Shenzhen) Co., Ltd.
ADDRESS:	No. B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industry Park, Nanshan District, Shenzhen, Guangdong, China

This report should not be used by the client to claim product certification, approval, or endorsement by A2LA, CTIA or any government agencies.

A2LA ACCREDITED Certificate # 3939.01

CTIA Certification Authorized Test Lab Lab Code: 20150608- 00

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
A220301W001OT01	Original release	2022.05.13
A220301W001OT01 R1	Updated some information for DUT	2022.05.17

Table of Contents

GENERAL INFORMATION

APPLICANT:	Netradyne Inc.
MANUFACTURER:	Netradyne Inc.
MODEL NO.:	D-215
SERIES NUMBER/ESN/IMEI:	355882100145525
FCC ID NUMBER:	2AM8R-D215
HARDWARE VERSION:	Rev_A
SOFTWARE VERSION:	SWI9X07Y_02.35.02. 00
PRODUCT TYPE:	In-Vehicle IoT device
CELLULAR SYSTEM:	LTE
CELLULAR BAND:	LTE FDD: 2/4/12/66/71
POWER CLASS:	LTE: 3
ANTENNA TYPE:	Embedded
CONFIGURATION OF PRIMARY MECHANICAL MODE:	Monoblock
TEST PLAN VERSION:	CTIA Test Plan for Wireless Device Over the Air Performance Revision 3.9.4

The above equipment has been tested by **BV 7Layers Communications Technology (Shenzhen) Co., Ltd.**, and found compliance with the requirement of the above standards.

PREPARED BY : Li Bo **, DATE :** 2022.05.17

Bo Li / Engineer

APPROVED BY : Luke Lu **, DATE :** 2022.05.17

Luke Lu / Manager

1. Introduction

1.1. Test Methods

1.1.1. Total Radiated Power

The Total Radiated Power (TRP) test is using the conical circle cut test system. The call is established through the communication antenna and the EUT is positioned on center of turntable, for Free Space, Head and Hand Phantom, or Hand Phantom only. The call parameters are adjusted on the base station simulator to bring the EUT to the required traffic channel and output power level. The EUT is then stepped between 0 and 180 degrees along the theta axis in 15-degree increments. At each theta position, the phi axis is stepped from 0-360 degrees or from 360-0 degrees, alternating to minimize test time, in 15-degree increments. Data is recorded using the spectrum analyzer for both theta and phi polarizations at each position. Depending on the protocol, an appropriate filter is used in the EMQuest software to process the data per Appendix D of the Test Plan. Upon completion of the test, the net power (angular dependent EIRP) is calculated at each measurement point and the required values of TRP and Near Horizon Partial Radiated Power (NHPRP) are automatically calculated. This test procedure is repeated for each channel, band, and configuration as required.

1.1.2. Total Isotropic Sensitivity

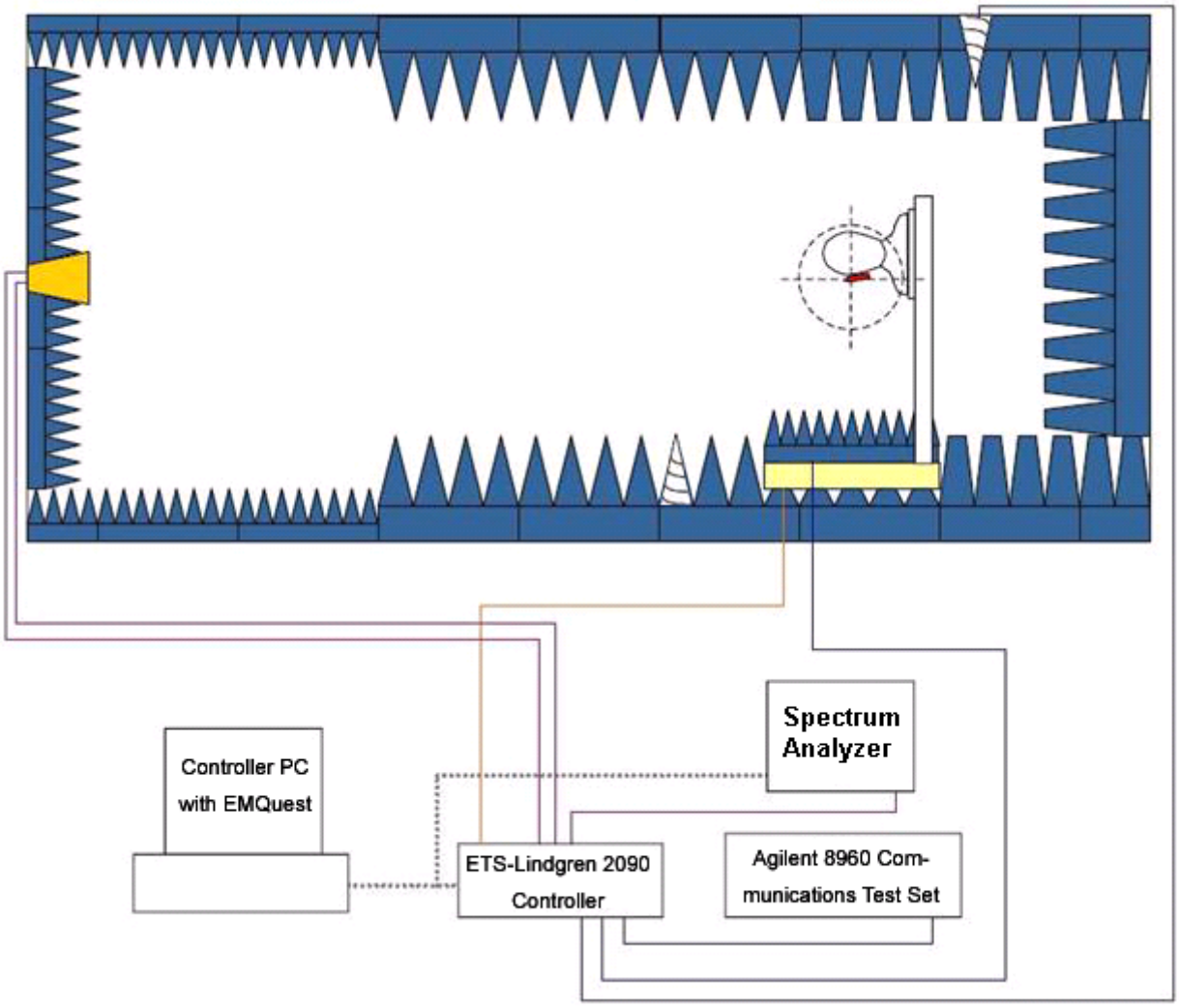
The Total Isotropic Sensitivity (TIS) test is using the conical circle cut test system. The call is established through the EMCO Model 3165-01 Dual-Polarized Dual-Vivaldi Antenna and the EUT is positioned center of turn table, for Free Space, Head and Hand Phantom, or Hand Phantom only . The call parameters are adjusted in the EMQuest software to bring the EUT to the required traffic channel and output power level. The EUT is then stepped between 0 and 180 degrees along the theta axis in 30-degree increments. At each theta position, the phi axis is stepped from 0-360 degrees or from 360-0 degrees, alternating to minimize test time, in 30-degree increments. Data is recorded using a Base Station Emulator for both theta and phi polarizations at each position. Depending on the protocol, an appropriate filter is used in the EMQuest software to process the data. Upon completion of the test, the net power (angular dependent EIS) is calculated at each measurement point and the required values of TIS and Near Horizon Partial Isotropic Sensitivity (NHPIS) are automatically calculated. This test procedure is repeated for each channel, band, and configuration as required.

1.1.3. Intermediate Channel Relative Sensitivity

The EUT and chamber positioner(s) are moved to the location and polarization resulting in the best-radiated sensitivity measured for the closest, in frequency, fully measured channel, now used as a Reference Channel. The RF signal of the Base Station Emulator is increased by [(M1 or M2) + 3 dB] over the signal used at the same spherical spatial location for the respective Reference Channel. M1 or M2 is the margin between the EUT's measured TIS and corresponding TIS limit. If the EUT doesn't meet the required TIS limit, then set M1 or M2 =0. Using the Base Station Emulator, the EMQuest software will measure the appropriate digital error rate for this test condition. The digital error rate shall not exceed the limit of each communication system and

will be notated in the Test Results section of this document as pass or fail. Until the TIS limits are added, EIS will be reported.

2. Test Configuration



3. Test Lab Environment Conditions

Temperature	20˚C to 30˚C
Humidity	30% to 70%

4. Test Equipment List

TYPE OF EQUIPMENT	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
Base Station	Anritsu MT8820c	6201381650	2023.02.14
Signal Analyzer	R&S FSV7	101561	2023.02.14
RF Switch	ETS EMCenter	160145	N/A
Axis Controller	ETS 2090-opt1	101738	N/A
Measurement Antenna	ETS 3164-06	158068	N/A

5. Device Configuration

5.1. EUTs Used For Each Test

Serial number/ ESN/IMEI	CATL/ Chamber used	RAT(s)	Band(s)	Test Type(s)	Test Condition(s)
355882100145525	OTA1-SZ	All	All	All	All

5.2. Bands and Protocols Supported by Each Antenna

Antenna Label	Bands and Protocols for Which the Antenna Is Connected to the Transmitter	Bands and Protocols for Which the Antenna Is Connected to any Receiver and Is Always Active	Bands and Protocols for Which the Antenna Is Connected to any Receiver and Is Dynamically Active	Protocol/Band Pairs Which Cannot Be Used for Single Point Offset Tests per (Section 5.13, Section 6.15, and Section 6.13.3.3) Because the Antenna Tuning Changes
A	LTE FDD: 2/4/12/66/71	LTE FDD: 2/4/12/66/71	-	-
B	-	-	-	-

6. Evaluation Summary

6.1. Total Radiated Power (TRP)

Band	Chan.	Freq. (MHz)	FS			
			Antenna Label(s)	TRP (dBm)	NHPRP±45 (dBm)	NHPRP±30 (dBm)
LTE FDD 2	18650	1851.58	A	19.4	18.3	16.6
	18900	1880	A	19.0	17.9	16.1
	19150	1908.42	A	18.9	17.8	16.0
LTE FDD 12	23035	699.97	A	21.1	20.3	19.1
	23095	707.41	A	21.1	20.2	19.0
	23155	715.03	A	21.1	20.1	18.9
LTE FDD 66	132022	1711.58	A	19.6	17.9	16.4
	132322	1745	A	19.2	18.0	16.6
	132622	1778.42	A	18.6	17.5	16.0
LTE FDD 71	133172	664.58	A	17.9	16.9	15.7
	133297	680.5	A	17.2	16.3	15.2
	133422	696.42	A	19.8	19.0	17.8

6.2. Total Isotropic Sensitivity (C-TIS)

Band	Chan.	Freq. (MHz)	FS			
			Antenna Label(s)	C-TIS (dBm)	NHPIS±45 (dBm)	NHPIS±30 (dBm)
LTE FDD 2	650	1935.0	-	-95.8	-94.5	-92.9
	900	1960.0	-	-96.0	-94.8	-93.2
	1150	1985.0	-	-95.2	-93.8	-92.2
LTE FDD 12	5035	731.5	-	-96.2	-95.3	-94.1
	5095	737.5	-	-96.2	-95.3	-94.1
	5155	743.5	-	-96.9	-96.0	-94.8
LTE FDD 66	66486	2115	-	-96.1	-94.4	-92.5
	66786	2145	-	-95.2	-93.4	-91.5
	67086	2175	-	-95.2	-93.9	-92.0
LTE FDD 71	68636	622	-	-92.6	-91.5	-90.2
	68761	634.5	-	-93.6	-92.6	-91.3
	68886	647	-	-93.0	-92.0	-90.7

7. Pass/Fail Criteria

7.1. Total Radiated Power (TRP) Results

Band	Use Cases Supported	Channel	UL RB Allocation	TX frequency (MHz) [center of UL RB allocation]	FS			HL			HR			BHHL			BHHR		
					Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info
LTE FDD 2	Other	18650	12 RB with RBstart=0	1851.58	TBD	19.4	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		18900	12 RB with RBstart=19	1880		19.0	Info		-	Info		-	Info		-	Info		-	Info
		19150	12 RB with RBstart=38	1908.42		18.9	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 12	Other	23035	8 RB with RBstart=0	699.97	TBD	21.1	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		23095	8 RB with RBstart=8	707.41		21.1	Info		-	Info		-	Info		-	Info		-	Info
		23155	8 RB with RBstart=17	715.03		21.1	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 66	Other	132022	12 RB with RBstart=0	1711.58	TBD	19.6	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		132322	12 RB with RBstart=19	1745		19.2	Info		-	Info		-	Info		-	Info		-	Info
		132622	12 RB with RBstart=38	1778.42		18.6	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 71	Other	133172	12 RB with RBstart=0	699.97	TBD	17.9	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		133297	12 RB with RBstart=19	707.41		17.2	Info		-	Info		-	Info		-	Info		-	Info
		133422	12 RB with RBstart=38	715.03		19.8	Info		-	Info		-	Info		-	Info		-	Info

Note 1: Primary Mechanical Mode refers to device configured in preferred mode per manufacturer instructions (typically means antenna extended, fold or portrait slide open, but depends on form factor).
Note 2: Report the single arm orientation (WL or WR) based on the expected worst-case orientation and based on input from target operators. Modify header to reflect the single arm orientation tested.
Note 3: The appropriate limits shall be populated in this column based on the device width.
Note 4: “Held to head for voice” applies if the device supports voice operation in the talking position against the head in any cellular radio mode.
Note 5: “Wrist worn” applies to devices that are worn on the wrist, e.g., smartwatches.
Note 6: “Other” applies to data-centric devices that are not held up against the head nor wrist worn, e.g., embedded laptop solutions.

7.2. Total Isotropic Sensitivity (C-TIS) Results

Band	Use Cases Supported	Channel	DL RB Allocation	RX frequency (MHz)	FS			HL			HR			BHHL			BHHR		
					Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info	Limit (dBm)	Test Results (dBm)	Pass / Fail / Info
LTE FDD 2	Other	650	50 RB with RBstart=0	1935	TBD	-95.8	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		900	50 RB with RBstart=0	1960		-96.0	Info		-	Info		-	Info		-	Info		-	Info
		1150	50 RB with RBstart=0	1985		-95.2	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 12	Other	5035	25 RB with RBstart=0	731.5	TBD	-96.2	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		5095	25 RB with RBstart=0	737.5		-96.2	Info		-	Info		-	Info		-	Info		-	Info
		5155	25 RB with RBstart=0	743.5		-96.9	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 66	Other	66486	50 RB with RBstart=0	2115	TBD	-96.1	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		66786	50 RB with RBstart=0	2145		-95.2	Info		-	Info		-	Info		-	Info		-	Info
		67086	50 RB with RBstart=0	2175		-95.2 C	Info		-	Info		-	Info		-	Info		-	Info
LTE FDD 71	Other	68636	50 RB with RBstart=0	622	TBD	-92.6	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info	TBD	-	Info
		68761	50 RB with RBstart=0	634.5		-93.6	Info		-	Info		-	Info		-	Info		-	Info
		68886	50 RB with RBstart=0	647		-93.0	Info		-	Info		-	Info		-	Info		-	Info

Note 1: Primary Mechanical Mode refers to device configured in preferred mode per manufacturer instructions (typically means antenna extended, fold or portrait slide open, but depends on form factor).
Note 2: Report the single arm orientation (WL or WR) based on the expected worst-case orientation and based on input from target operators. Modify header to reflect the single arm orientation tested.
Note 3: The appropriate limits shall be populated in this column based on the device width.
Note 4: “Held to head for voice” applies if the device supports voice operation in the talking position against the head in any cellular radio mode.
Note 5: “Wrist worn” applies to devices that are worn on the wrist, e.g., smartwatches.
Note 6: “Other” applies to data-centric devices that are not held up against the head nor wrist worn, e.g., embedded laptop solutions.

8. Measurement Uncertainty

The expanded measurement uncertainties are listed below. These uncertainties refer to a coverage factor of 2, corresponding to 95% confidence level.

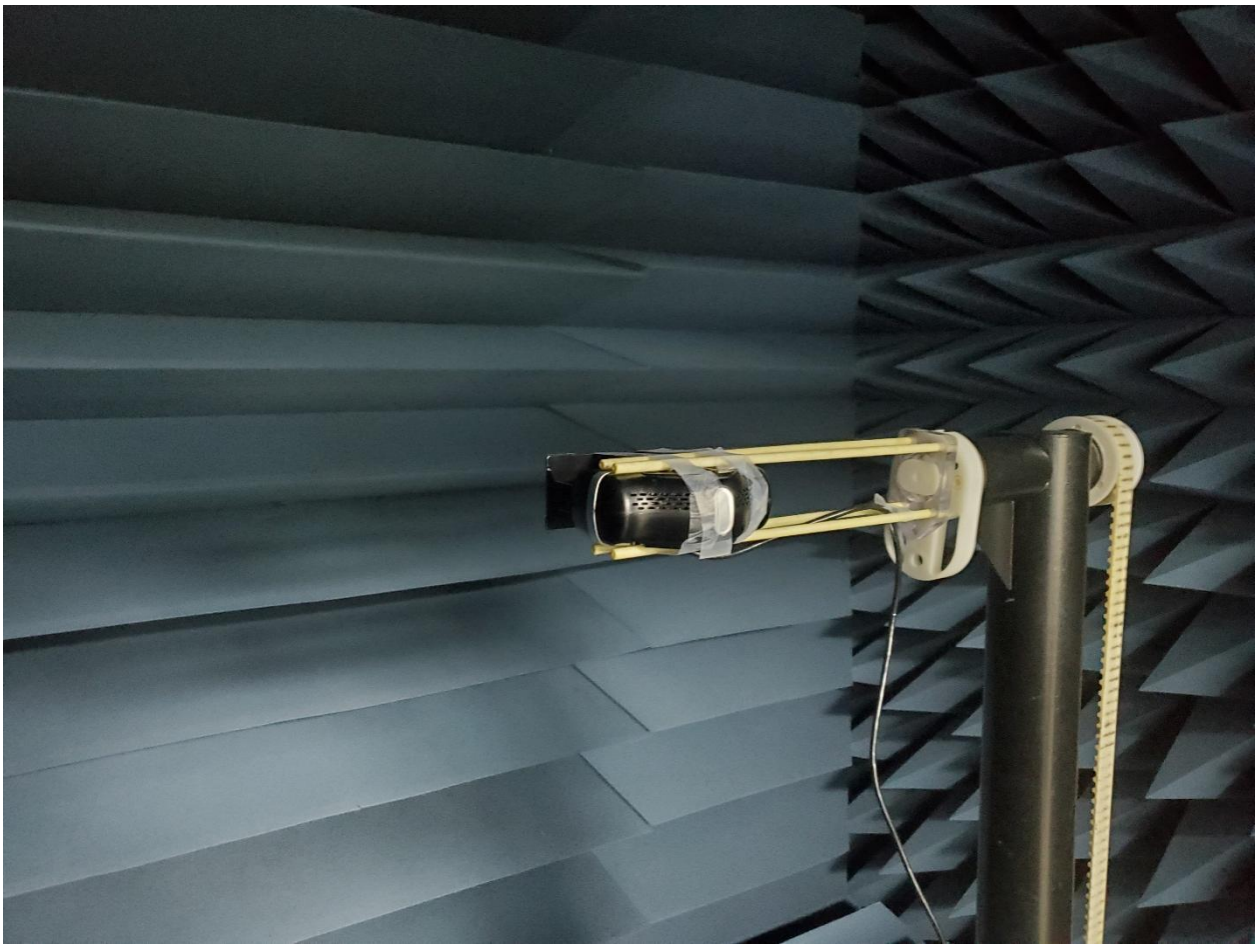
TRP Measurement (dB)							
Test Configuration	**LTE600**	**LTE700**	**Cellular**	**AWS-1 Tx**	**PCS**	**LTE41**	**LTE48**
Free Space	1.45	1.5	1.51	1.53	1.43	1.48	1.55
Phantom Head and Hand	2.03	2.07	2.12	2.09	2.06	2.06	2.1
Phantom Hand Only	1.68	1.73	1.73	1.76	1.67	1.71	1.77
Forearm Hand Only	1.66	1.71	1.71	1.74	1.64	1.69	1.75
Larger form over 30 cm	1.86	1.52	1.58	1.55	1.49	1.51	1.56
TIS Measurement (dB)							
Test Configuration	**LTE600**	**LTE700**	**Cellular**	**PCS**	**AWS-1 Rx**	**LTE41**	**LTE48**
Free Space	1.84	1.87	1.89	1.82	1.86	1.86	1.91
Phantom Head and Hand	2.33	2.36	2.41	2.35	2.35	2.35	2.39
Phantom Hand Only	2.03	2.06	2.08	2.01	2.04	2.05	2.09
Forearm Hand Only	2.01	2.04	2.06	1.99	2.03	2.03	2.08
Larger form over 30 cm	2.18	1.88	1.95	1.87	1.87	1.88	1.92

APPENDIX A. EUT Photographs

EUT Front Side

EUT Rear Side

APPENDIX B. EUT SETUP Photographs



Free Space