

FCC/IC Test Report

For: Lucid USA, Inc.

Host Model: P11-K2B100 Module Model: JODY-W354-00A

Product Description:

(Center Console Controller) CCCv2

FCC ID: 2AXZJ-K2B100 IC: 27970-K2B100

Applied Rules and Standards:

47 CFR Part 15.247 RSS-247 Issue 2 & RSS-Gen Issue 5

REPORT #: EMC_LUCID_011_21001_15_247_Rev1

DATE: 2023-06-02



A2LA Accredited

IC recognized # 3462B

CETECOM Inc.

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: +1 (408) 586 6200 • Fax: +1 (408) 586 6299 • E-mail: info@cetecom.com • http://www.cetecom.com CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Host Model #	Module Model #
Lucid USA, Inc.	(Center Console Controller) CCCv2	P11-K2B100	JODY-W354-00A

Responsible for Testing Laboratory:

Arndt Stoecker

2023-06-02	Compliance	(Director of Regulatory Services)	
Date	Section	Name	Signature

Responsible for the Report:

Art Thammanavarat

2023-06-02	Compliance	(Senior EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

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2 **Administrative Data**

Identification of the Testing Laboratory Issuing the EMC Test Report 2.1

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Arndt Stoecker
Responsible Project Leader:	Akanksha Baskaran

2.2 **Identification of the Client**

Client Firm/Name:	Lucid USA, Inc.
Street Address:	7373 Gateway Blvd
City/Zip Code	Newark, California, 94560
Country	USA

2.3 **Identification of the Manufacturer**

Manufacturer's Name:	
Manufacturers Address:	Same as Client
City/Zip Code	dante as offent
Country	

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3 Equipment Under Test (EUT)

3.1 EUT Specifications

Host Model No	P11-K2B100
HW Version	02
SW Version	23W4
Contains FCC ID :	2AXZJ-K2B100
Contains IC:	27970-K2B100
Product Description	(Center Console Controller) CCCv2
Radio Module	Wi-Fi & Bluetooth Modules Model Name: Ublox Model Number: JODY-W354-00A Wireless Technologies Wi-Fi 5GHz: 802.11a/ac Bluetooth: BDR/DER, BLE
Frequency Range, # of channels	Bluetooth Basic/EDR: Nominal band: 2400 MHz – 2483.5 MHz; 79 channels Bluetooth Low Energy: Nominal band: 2400 MHz – 2483.5 MHz; 40 channels
Modes of Operation	Bluetooth Basic/EDR: GFSK, π /4 DQPSK, 8DPSK Bluetooth Low Energy: GFSK
Antenna Gain as declared	2.8 dBi
Max. Peak Output Power	Bluetooth: +8.12dBm BLE: +6.68dBm
Rated Operating Voltage Range	9V to 16V DCs
Operating Temperature Range	-40 °C to 85 °C
Other Radios in the device	UNII-1 / UNII-3
Sample Revision	■Production Unit; □Pre-Production

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3.2 EUT Sample details

EUT#	Host Model #	HW Version	SW Version	Notes/Comments
1	P11-K2B100	02	23W4	N/A

3.3 Support Equipment (SE) details

SE#	Туре	Model	Manufacturer	Serial Number
1	Media Converter	100/1000Base-T1	Technica Engineering	1402240122420140
2	Center Console Monitor	P11-NAT6ST-01	LUCID	2213800007
3	Dash Monitor	P11-NASBST-07	LUCID	2218900006
4	USB Drive – 32GB	CRUZER 32 GB	San DISK	SDCZ36-032G
5	Video Camera	P11-G160WW-C	Continental	RVS231LD10-0001
6	Dual A2B Audio Generator	A2BFRTX2	Flexmedia XM	0090
7	Gigabit Ethernet Fiber Media Converter	ET91000SFP2	Startech.com	2821010161

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1+(SE#1+2+3+4+5+6+7)	Powered by 12 VDC Car battery

3.5 Mode of Operation details

Mode of Operation	Description
Bluetooth BR The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using contest software and scripts provided by the applicant.	
Bluetooth LE	The radio of the EUT was configured to a fixed channel transmission with highest possible duty cycle using confidential test software and scripts provided by the applicant.

3.6 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on mid channels, in BDR & BLE mode. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations.

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4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-247 Issue 2 of ISED Canada.

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This test report is to support a request for new equipment authorization under the FCC ID: 2AXZJ-K2B100

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	BDR/BLE				See Note 2
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	BDR/BLE				See Note 2
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	BDR/BLE	•			See Note 4
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	BDR/BLE			•	See Note 2
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	BDR/BLE			•	See Note 2
§15.247(d); §15.209 RSS-Gen 6.13	TX Spurious emissions- Radiated	Nominal	BDR/BLE				Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	BDR/BLE				See Note 3

Note 1: NA= Not Applicable

Note 2: The measurements from modular test report # MDE_UBLOX_2220_FCCa by 7layers GmbH will be leveraged

Note 3: This device does not connect to AC mains network

Note 4: Power verification testing was conducted only on middle channel.

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6 **Measurement Uncertainty**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=2.

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Radiated measurement

Measurement S	EMC 1	EMC 2	
Conducted emissions (mains por	t)	1.12 dB	0.46 dB
Radiated emissions	(< 30 MHz)	3.66 dB	3.88 dB
	(30 MHz - 1GHz)	3.17 dB	3.34 dB
	(1 GHz – 3 GHz)	5.01 dB	4.45 dB
	(>3 GHz)	4.0 dB	4.79 dB

RF conducted measurement

 $\pm 0.5 dB$

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3dB to the limit.

Environmental Conditions During Testing: 6.1

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

6.2 **Dates of Testing:**

<u>2023-03-10 – 2023-03-16</u>

6.3 **Decision Rule:**

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

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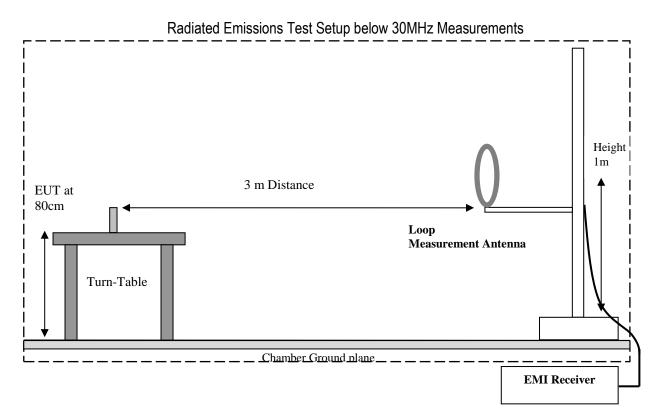


7 **Measurement Procedures**

7.1 Radiated Measurement

The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.



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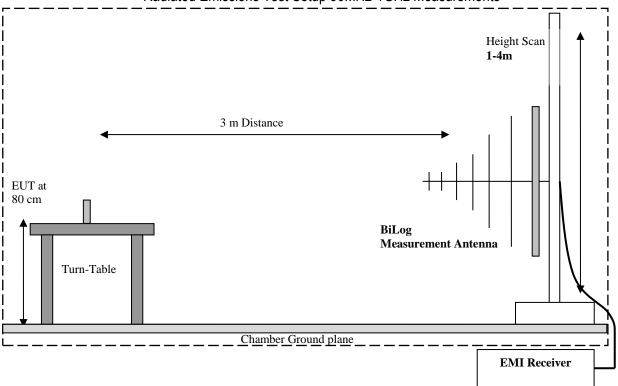
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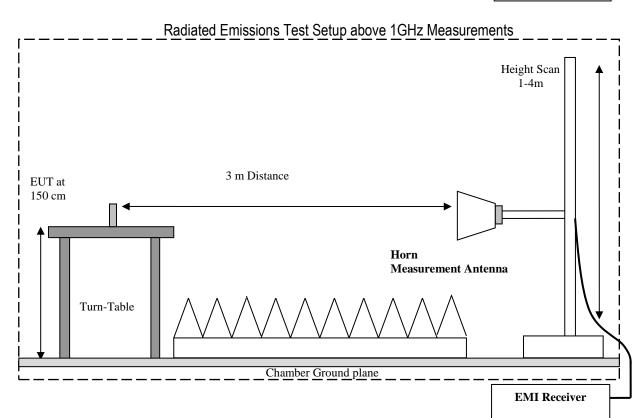
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Radiated Emissions Test Setup 30MHz-1GHz Measurements





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7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

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- 1. Measured reading in dBµV
- 2. Cable Loss between the receiving antenna and SA in dB and
- 3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS ($dB\mu V/m$) = Measured Value on SA ($dB\mu V$)+ Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

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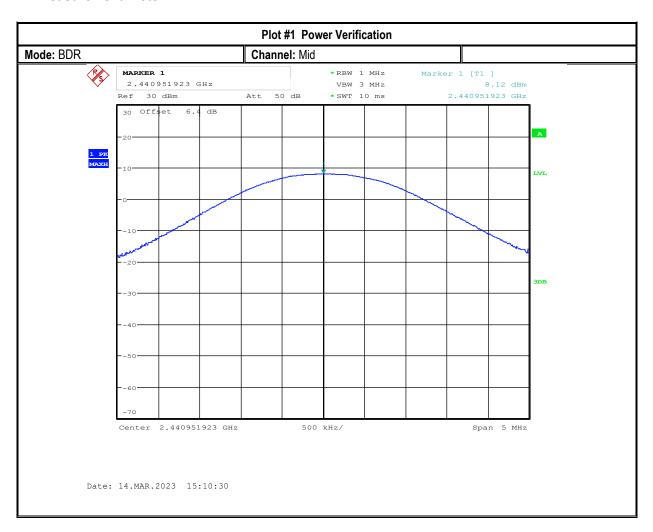


8 Test Result Data

8.1 Conducted Power Verification Results:

	EUT operating mode #1						
Plot #	Operating Mode	Channel #	Power Measurement (dBm)				
1	Bluetooth BR	Mid	8.12				
2	Bluetooth LE	Mid	6.68				

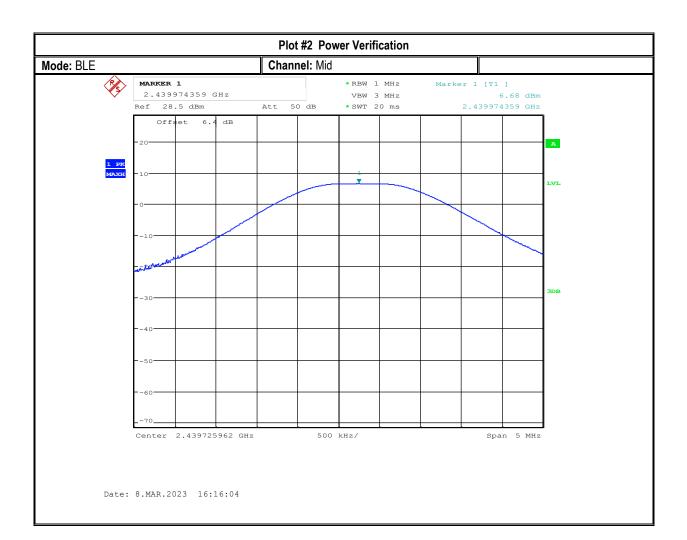
8.1.1 Measurement Plots:



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8.2 Radiated Transmitter Spurious Emissions and Restricted Bands

8.2.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz 30 MHz
- RBW = 9 KHz
- Detector: Peak
- Frequency = 30 MHz 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)
- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz
- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate
 for the lowest, middle and highest channel in each frequency band of operation and for the highest gain
 antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

8.2.2 Limits:

FCC §15.247

• In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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FCC §15.209

• Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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Frequency of emission (MHz)	Field strength (μV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009-0.490	2400/F(kHz) /	300	-
0.490-1.705	24000/F(kHz) /	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBμV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBμV/m
Above 960	500	3	54 dBµV/m

FCC §15.205

• Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

• Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

*PEAK LIMIT= 74 dBµV/m

*AVG. LIMIT= 54 dBµV/m

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8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
20.9° C	1	BDR/BLE	12 VDC

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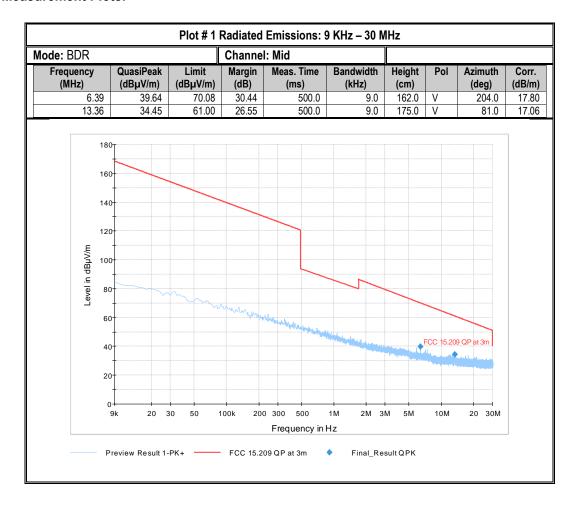
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8.2.4 Measurement result:

	EUT operating mode 1 (WAP)								
Plot#	Operating Mode	Scan Frequency	Limit	Result					
1-5	Bluetooth BR	Mid	9 kHz – 26 GHz	See section 8.1.2	Pass				
6-10	Bluetooth LE	Mid	9 kHz – 26 GHz	See section 8.1.2	Pass				

8.2.5 Measurement Plots:



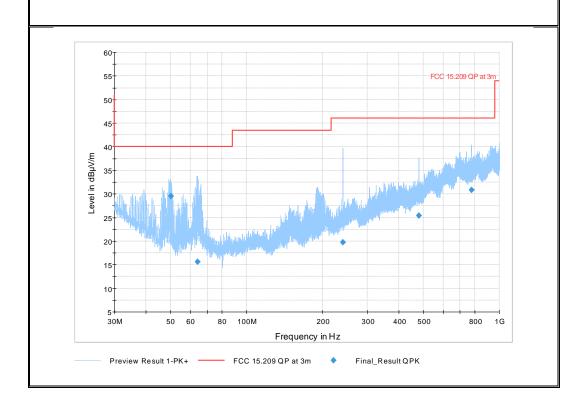
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	Plot #2 Radiated Emissions: 30 MHz – 1GHz									
Mode:	Mode: BDR Channel: Mid									
	quency MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
	50.11	29.60	40.00	10.40	500.0	120.0	150.0	V	315.0	13.54
	63.89	15.62	40.00	24.38	500.0	120.0	185.0	V	237.0	13.17
	240.07	19.81	46.02	26.21	500.0	120.0	173.0	Н	161.0	20.65
	480.02	25.45	46.02	20.57	500.0	120.0	164.0	Н	261.0	27.08
	778 65	30.89	46.02	15 13	500.0	120.0	207.0	Н	255.0	30.93

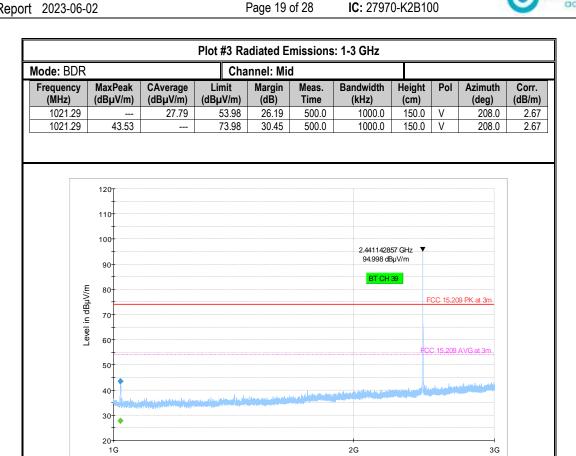


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Frequency in Hz

FCC 15.209 AVG at 3m

FCC 15.209 PK at 3m

 $Final_Result CAV$

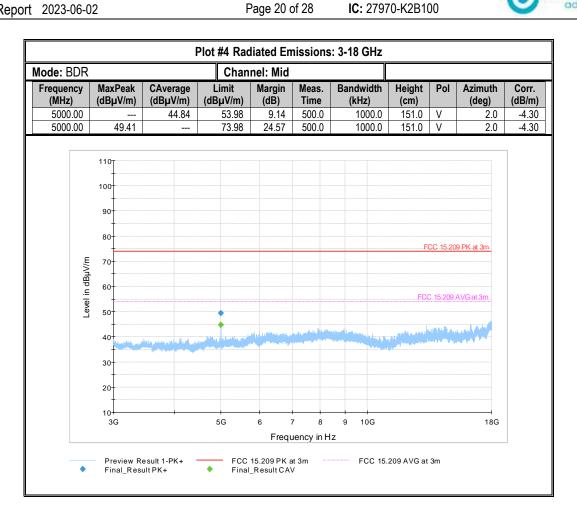
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Preview Result 1-PK+

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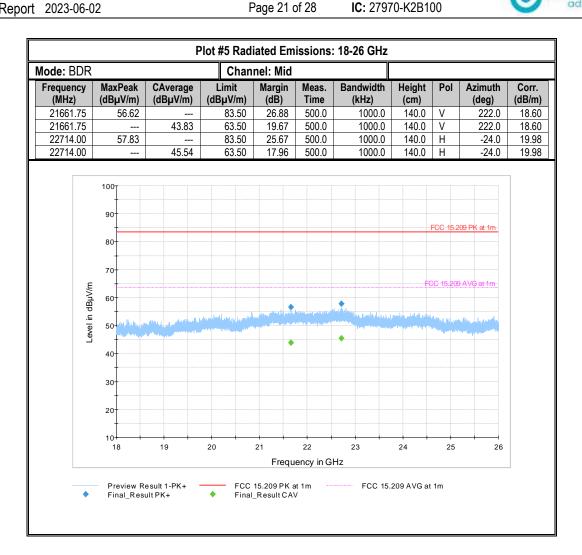




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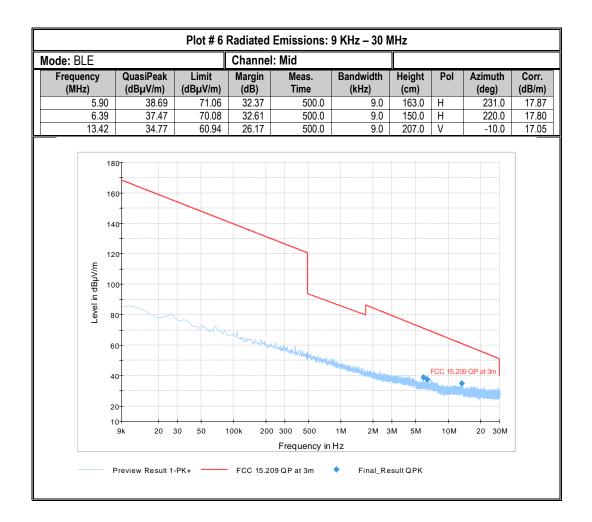


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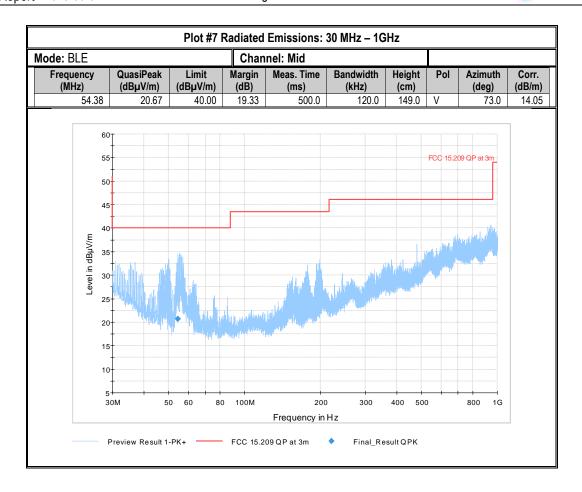




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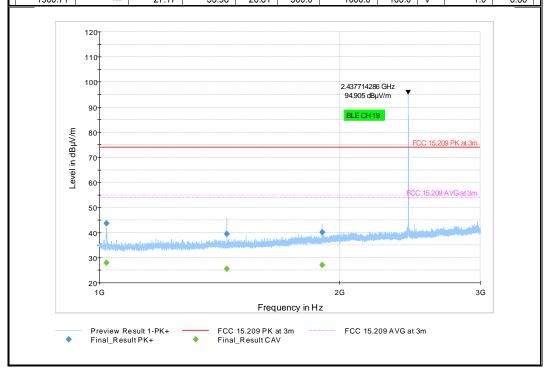


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	Plot #8 Radiated Emissions: 1-3 GHz									
Mode: BLE		Channel: Mid								
Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1021.14		27.92	53.98	26.06	500.0	1000.0	150.0	٧	208.0	2.67
1021.14	43.71		73.98	30.27	500.0	1000.0	150.0	٧	208.0	2.67
1443.86	39.49		73.98	34.49	500.0	1000.0	149.0	Н	51.0	5.24
1443.86		25.57	53.98	28.41	500.0	1000.0	149.0	Н	51.0	5.24
1900.71	40.17		73.98	33.81	500.0	1000.0	163.0	٧	1.0	6.86
1900 71		27 17	53 98	26.81	500.0	1000.0	163.0	V	1.0	6.86

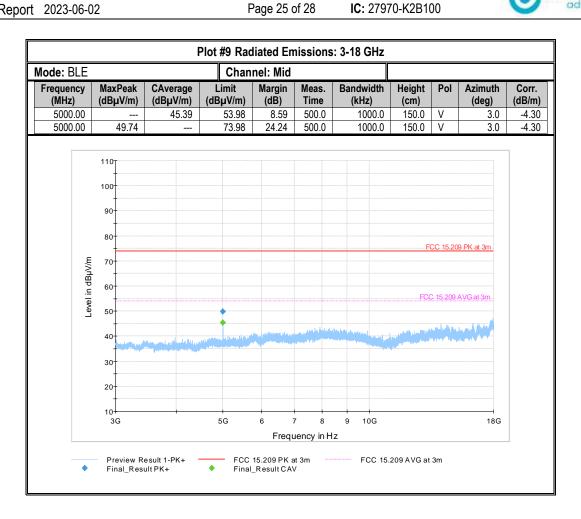


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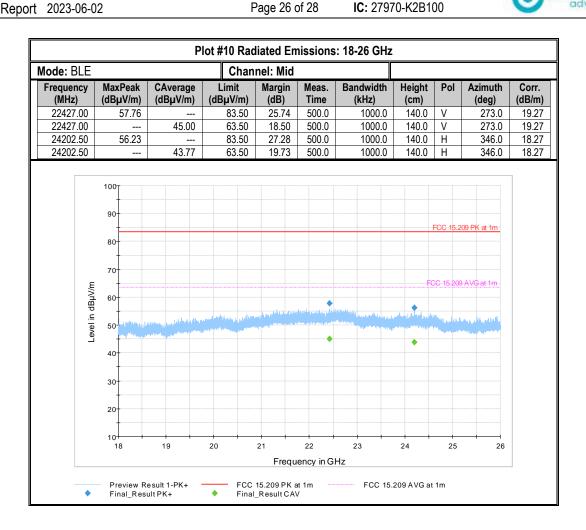




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9 Test setup photos

Setup photos are included in supporting file name: "EMC_LUCID_011_22001_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/30/2020
BILOG ANTENNA	ETS.LINDGREN	3142E	00166067	3 YEARS	10/21/2021
HORN ANTENNA	EMCO	3115	00035111	3 YEARS	09/30/2021
HORN ANTENNA	ETS.LINDGREN	3117	00215984	3 YEARS	01/31/2021
HORN ANTENNA	ETS.LINDGREN	3116	00070497	3 YEARS	11/23/2020
TEST RECEIVER	R&S	ESU40	100251	3 YEARS	09/13/2021
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	181230565	3 YEARS	10/20/2021

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

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11 History

Date	Report Name	Changes to report	Report prepared by
2023-04-19	EMC_LUCID_011_22001_15_247	Initial Version	Art Thammanavarat
2023-06-02	EMC_LUCID_011_22001_15_247_Rev1	Section 6: Updated Uncertainty statement and added Decision Rule. Section 3.1 Updated Typo in Max. Peak Output Power Section 8.1.4: Removed power level.	Art Thammanavarat

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