

Report No: CCISE190300102

# FCC REPORT

(Bluetooth)

Applicant: PCD, LLC

Address of Applicant: 1500 Tradeport Drive, Orlando, Florida, 32824. United States

**Equipment Under Test (EUT)** 

Product Name: Monkey II LTE

Model No.: PL504

Trade mark: PCD

FCC ID: 2ALJJPL504

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 01 Mar., 2019

**Date of Test:** 01 Mar., to 13 Mar., 2019

Date of report issued: 13 Mar., 2019

Test Result: PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

#### Authorized Signature:



Bruce Zhang Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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### 2 Version

Version No.	Date	Description
00	13 Mar., 2019	Original

Tested by: Mike OU Date: 13 Mar., 2019

Test Engineer

Reviewed by: Date: 13 Mar., 2019

**Project Engineer** 



### 3 Contents

		Page
1	1 COVER PAGE	1
2	2 VERSION	2
3		3
4	4 TEST SUMMARY	4
5	5 GENERAL INFORMATION	5
	5.1 CLIENT INFORMATION	5
	5.2 GENERAL DESCRIPTION OF E.U.T.	5
		6
	5.4 DESCRIPTION OF SUPPORT UNITS	6
		6
		6
		6
	5.8 TEST INSTRUMENTS LIST	7
6	6 TEST RESULTS AND MEASUREMENT DATA	8
	6.1 ANTENNA REQUIREMENT	8
		9
	6.3 CONDUCTED OUTPUT POWER	12
		15
		18
		22
		27
		32
		45
		45
		48
7	7 TEST SETUP PHOTO	53
R	8 FUT CONSTRUCTIONAL DETAILS	54



## 4 Test Summary

Test Items	Section in CFR 47	Result
Antenna Requirement	15.203 & 15.247 (b)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Spurious Emission	15.205 & 15.209	Pass
Band Edge	15.247(d)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not Applicable.





## 5 General Information

## **5.1 Client Information**

Applicant:	PCD, LLC
Address:	1500 Tradeport Drive, Orlando, Florida, 32824. United States
Manufacturer:	PCD, LLC
Address:	1500 Tradeport Drive, Orlando, Florida, 32824. United States

5.2 General Description of E.U.T.

of Contra Description of E.o. 1.				
Product Name:	Monkey II LTE			
Model No.:	PL504			
Operation Frequency:	2402MHz~2480MHz			
Transfer rate:	1/2/3 Mbits/s			
Number of channel:	79			
Modulation type:	GFSK, π/4-DQPSK, 8DPSK			
Modulation technology:	FHSS			
Antenna Type:	Internal Antenna			
Antenna gain:	-0.59 dBi			
Power supply:	Rechargeable Li-ion Battery DC3.8V-2000mAh			
AC adapter:	Model: PL504 Input: AC100-240V, 50/60Hz, 0.1A Output: DC 5.0V, 700mA			
Test Sample Condition:	The test samples were provided in good working order with no visible defects.			

Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
					•••		
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		
Remark: Cha	Remark: Channel 0, 39 &78 selected for GFSK, π/4-DQPSK and 8DPSK.						

Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366

Report No: CCISE190300102

#### 5.3 Test environment and test mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Modes:	
Non-hopping mode:	Keep the EUT in continuous transmitting mode with worst case data rate.
Hopping mode:	Keep the EUT in hopping mode.
Remark	GFSK (1 Mbps) is the worst case mode.

The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working with a fresh battery, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

### 5.4 Description of Support Units

The EUT has been tested as an independent unit.

### 5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 dB (k=2)

## 5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### FCC - Registration No.: 727551

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

#### IC - Registration No.: 10106A-1

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

#### • CNAS - Registration No.: CNAS L6048

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

#### A2LA - Registration No.: 4346.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <a href="https://portal.a2la.org/scopepdf/4346-01.pdf">https://portal.a2la.org/scopepdf/4346-01.pdf</a>

### 5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,

Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366





# 5.8 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	\	/ersion: 6.110919l	)
D	LID	0447D	0044400050	03-07-2018	03-06-2019
Pre-amplifier	HP	8447D	2944A09358	03-07-2019	03-06-2020
Dro omplifier	CD	DAD 4C40	11004	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G16	E3 Ve 3447D 2944A09358 - P-1G18 11804 - FSP30 101454 -	03-07-2019	03-06-2020
Spectrum analyzer	Rohde & Schwarz	FMZB1519B         00044         0           VULB9163         497         0           BBHA9120D         916         0           BBHA9120D         1805         0           BBHA 9170         BBHA9170582         1           E3         Versic         0           8447D         2944A09358         0           PAP-1G18         11804         0           FSP30         101454         0           FSP40         100363         1           ESRP7         101070         0           Z108-NJ-NJ-81         1608458         0           0         0         0	03-07-2018	03-06-2019	
Spectrum analyzer	Ronde & Schwarz		101454	03-07-2019	03-06-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Took Doopiyar	Rohde & Schwarz	ECDD7	404070	03-07-2018	03-06-2019
EMI Test Receiver	Ronde & Schwarz	ESRP1	00044 497 916 1805 BBHA9170582 V6 2944A09358 11804 101454 100363 101070 1608458 K10742-5	03-07-2019	03-06-2020
Cable	ZDECL	7400 NII NII 04	1600450	03-07-2018	03-06-2019
Cable	ZDECL	Z 100-INJ-INJ-01	1000430	03-07-2019	03-06-2020
Cabla	MICDO COAV	MEDCACOO	V40740 F	03-07-2018	03-06-2019
Cable	MICRO-COAX	IVIFK04039	K10/42-5	03-07-2019	03-06-2020
Cabla	CHLINED	CHCOELEV400	E0102/4DF	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2019	03-06-2020
RF Switch Unit	MWRFTEST	MW200	N/A	N/A	N/A
Test Software	MWRFTEST	MTS8200		Version: 2.0.0.0	

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESC!	101189	03-07-2018	03-06-2019
EIVII Test Receiver	Ronde & Schwarz	ESCI	101169	03-07-2019	03-06-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	0704	03-07-2018	03-06-2019
Puise Limitei	SCHWARZBECK	USKAW 2306	9731	03-07-2019	03-06-2020
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Coblo	UD	105024	105001		03-06-2019
Cable	HP	10503A	N/A	03-07-2019	03-06-2020
EMI Test Software	AUDIX	E3	\	/ersion: 6.110919l	0



### Test results and measurement data

### 6.1 Antenna Requirement

FCC Part 15 C Section 15.203 & 247(b) Standard requirement: 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. **E.U.T Antenna:** The Bluetooth antenna is an Internal antenna which permanently attached, and the best case gain of the antenna is -0.59 dBi.



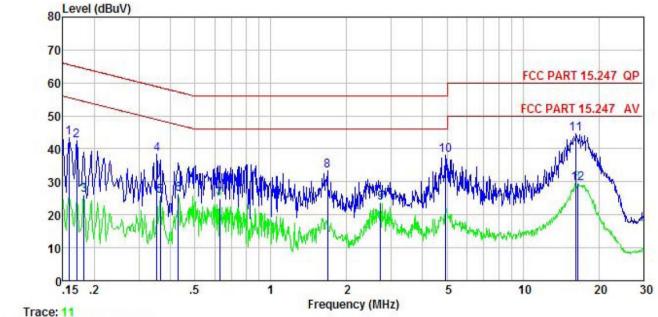
# **6.2 Conducted Emissions**

Test Method:  Test Frequency Range:  Class B  Receiver setup:  RBW=9 kHz, VBW=30 kHz, Sweep time=auto  Limit:  Frequency range (MHz) Quasi-peak Average 0.15-0.5 66 to 56* 56 to 46* 0.5-5 30 60 50 * Decreases with the logarithm of the frequency.  Test setup:  Reference Plane  LISN Limit Flitter  AC power  LISN Lish impedance Stabilization Network EUT Test table/insulation plane  Test procedure:  1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance of the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test mode:  Hopping mode  Test results: Pass	Test Requirement:	FCC Part 15 C Section 1	15.207		
Class / Severity:  Class B  Receiver setup:  RBW=9 kHz, VBW=30 kHz, Sweep time=auto  Limit:  Frequency range (MHz) Quasi-peak Average 0.15-0.5 66 to 56* 56 to 46* 0.5-5 56 46 5-30 60 50 * Decreases with the logarithm of the frequency.  Test setup:  Reference Plane  LISN Filter  Receiver  LISN Filter  Full Tempedance Stabilization Natwork Fest table Insulation plane  Fest table Insulation plane  Pennank EUT Test procedure:  1. The EU.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Refer to section 5.8 for details  Test mode:  Hopping mode	Test Method:	ANSI C63.10:2013			
Receiver setup:  RBW=9 kHz, VBW=30 kHz, Sweep time=auto  Limit:  Frequency range (MHz) Quasi-peak Average 0.15-0.5 66 to 56* 56 to 46* 0.5-5 5-30 60 50 * Decreases with the logarithm of the frequency.  Test setup:  Reference Plane  LISN AUX Equipment LUSN Aux Equipment Acc power  LUSN Acc power  Acc power  LUSN Acc power  LUSN Acc power  LUSN Acc power  LUSN Acc power	Test Frequency Range:	150 kHz to 30 MHz			
Limit:    Frequency range	Class / Severity:	Class B			
(MHz) Quasi-peak Average  0.15-0.5 66 to 56* 56 to 46*  0.5-5 56 46  5-30 60 50  * Decreases with the logarithm of the frequency.  Reference Plane  LISN 40cm 80cm Filter Ac power  EUT Equipment Under Test LISN Immedence Stabilization Network Test table height-0 immedence Stabilization network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments: Refer to section 5.8 for details  Test mode: Hopping mode	Receiver setup:	RBW=9 kHz, VBW=30 k	Hz, Sweep time=auto		
D.15-0.5 66 to 56* 56 to 46*  0.5-5 56 46  5-30 8 Decreases with the logarithm of the frequency.  Test setup:  Reference Plane  LISN 40cm 80cm   Filter AC power    Requipment Linder Test   List Linder Impedance Stabilization Network   List Linder Impedance Stabilization network (L.I.S.N.). This provides a 1 line impedance stabilization network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments: Refer to section 5.8 for details  Test mode: Hopping mode	Limit:	Frequency range	Limit (	dBuV)	
Test setup:    Reference Plane					
* Decreases with the logarithm of the frequency.  Test setup:  **Reference Plane  **LISN   AUX   Equipment   LiSN   Filter   AC power    **Equipment   LiSN   List   List					
* Decreases with the logarithm of the frequency.  Test setup:  Reference Plane  LISN  AUX Equipment  E.U.T  Test table/Insulation plane  Femark  E.U.T Equipment Under Test  LISN Link in pedence Stabilization Network  Test table height-0.5m  1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments:  Refer to section 5.8 for details  Hopping mode					
Test setup:  Reference Plane  LISN  AUX Equipment  E.U.T  Test table/Insulation plane  Receiver  Remark  E.U.T Equipment Under Test LISN Line Impedence Stabilization Network Test table height-0 8m  1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments:  Refer to section 5.8 for details  Test mode:  Hopping mode				50	
Test procedure:  1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments:  Refer to section 5.8 for details  Test mode:  Hopping mode		* Decreases with the log	arithm of the frequency.		
Test procedure:  1. The E.U.T and simulation network (L.I.S.N.). This provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 500hm/50uH coupling impedance with 500hm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments: Refer to section 5.8 for details  Test mode: Hopping mode	Test setup:	Reference	e Plane		
line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.  2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).  3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.  Test Instruments:  Refer to section 5.8 for details  Hopping mode		AUX Equipment  Test table/Insulation plane  Remark E.U.T. Equipment Under Test LISN: Line impedence Stabilization Network			
Test Instruments: Refer to section 5.8 for details  Test mode: Hopping mode	Test procedure:	<ol> <li>line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed</li> </ol>			
	Test Instruments:				
Test results: Pass	Test mode:	Hopping mode			
	Test results:	Pass			



#### **Measurement Data:**

Product name:	Monkey II LTE	Product model:	PL504
Test by:	Alex	Test mode:	BT Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%



ridee	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
2	MHz	dBu₹	dB		dBu₹	dBu∜	<u>dB</u>	
1	0.158	32.54	0.17	10.77	43.48	65.56	-22.08	QP
2	0.170	31.56	0.17	10.77	42.50	64.94	-22.44	QP
2	0.182	15.16	0.16	10.77	26.09	54.42	-28.33	Average
4 5 6	0.354	27.56	0.12	10.73	38.41	58.87	-20.46	QP
5	0.365	14.84	0.12	10.73	25.69	48.61	-22.92	Average
6	0.431	15.40	0.12	10.73	26.25	47.24	-20.99	Average
7	0.627	13.80	0.13	10.77	24.70	46.00	-21.30	Average
8	1.680	22.39	0.14	10.94	33.47	56.00	-22.53	QP
9	2.721	12.40	0.16	10.93	23.49	46.00	-22.51	Average
10	4.952	27.07	0.21	10.85	38.13	56.00	-17.87	QP
11	16.226	33.31	0.31	10.91	44.53	60.00	-15.47	QP
12	16.486	18.29	0.30	10.91	29.50	50.00	-20.50	Average

#### Notes

- 1. An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level =Receiver Read level + LISN Factor + Cable Loss.



Product name:	Monkey II LTE	Product model:	PL504	
Test by:	Alex	Test mode:	BT Tx mode	
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral	
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Huni: 55%	
80 Level (dBuV) 70 60 50 40 20 10	4 5 7 1/3 1/1/8 1/1/4/1/4/1/4/1/4/1/4/1/4/1/4/4/4/4/4/4		FCC PART 15.247 QP FCC PART 15.247 AV	
°.15 .2	.5 1	2 5 Frequency (MHz)	10 20 30	
Trace: 9 Free		Cable Limi Loss Level Lir dB dBuV dBu	ne Limit Remark	
1 0.178 2 0.178 3 0.358 4 0.368 5 0.488 6 0.488 7 0.830 8 0.830 9 4.926 10 4.978 11 16.750 12 17.018	3     19.76     0.95       3     18.03     0.97       1     29.39     0.97       1     29.18     0.97       1     18.70     0.97       0     29.21     0.97       0     16.00     0.97       3     29.49     1.01       3     14.16     1.01       0     36.79     0.82	10.77 31.48 54.5 10.73 29.73 48.7 10.73 41.09 58.6 10.75 40.90 56.3 10.75 30.42 46.3 10.82 41.00 56.0 10.82 27.79 46.0 10.85 41.35 56.0 10.85 26.02 46.0 10.91 48.52 60.0	59 -18.34 QP 59 -23.11 Average 78 -19.05 Average 59 -17.60 QP 52 -15.42 QP 52 -15.90 Average 50 -15.00 QP 50 -18.21 Average 50 -14.65 QP 50 -19.98 Average 50 -11.48 QP 50 -16.74 Average	

#### Notes:

- 1. An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- Final Level =Receiver Read level + LISN Factor + Cable Loss.



# **6.3 Conducted Output Power**

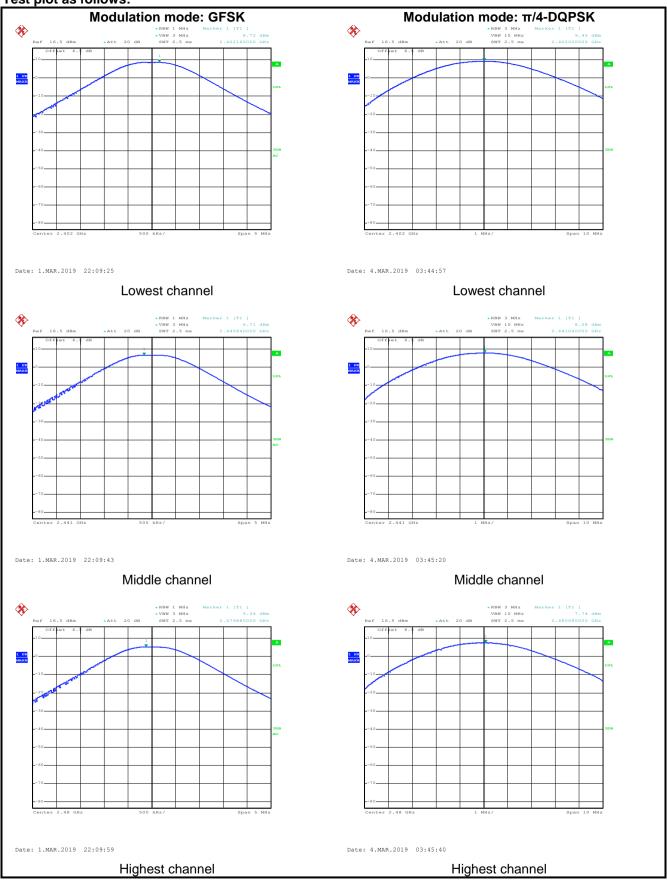
Test Requirement:	FCC Part 15 C Section 15.247 (b)(1)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤1 MHz) RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)	
Limit:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.	
Test setup:	1 1 9 1	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Non-hopping mode	
Test results:	Pass	

#### **Measurement Data:**

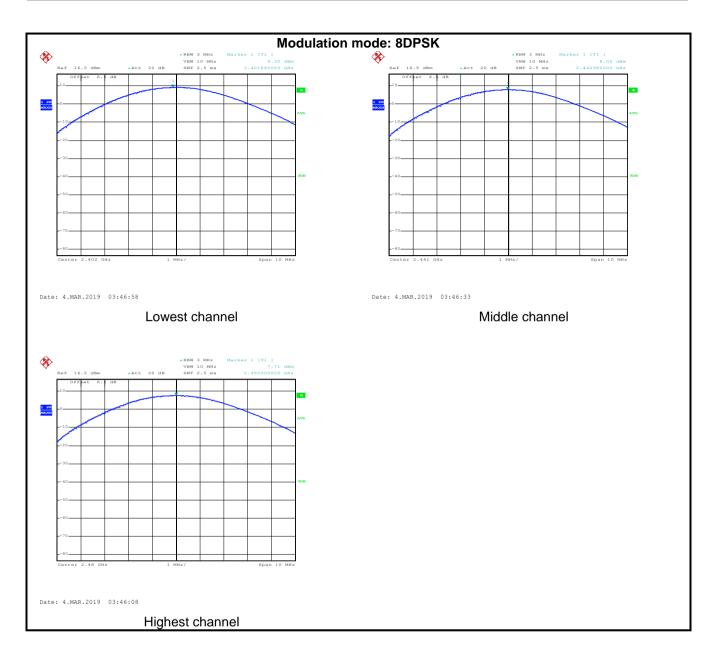
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
	GFSK mod	de			
Lowest channel	8.72	30.00	Pass		
Middle channel	6.71	30.00	Pass		
Highest channel	5.34	30.00	Pass		
	π/4-DQPSK mode				
Lowest channel	9.45	21.00	Pass		
Middle channel	8.08	21.00	Pass		
Highest channel	7.74	21.00	Pass		
	8DPSK mode				
Lowest channel	9.30	21.00	Pass		
Middle channel	8.05	21.00	Pass		
Highest channel	7.71	21.00	Pass		



#### Test plot as follows:









6.4 20dB Occupy Bandwidth

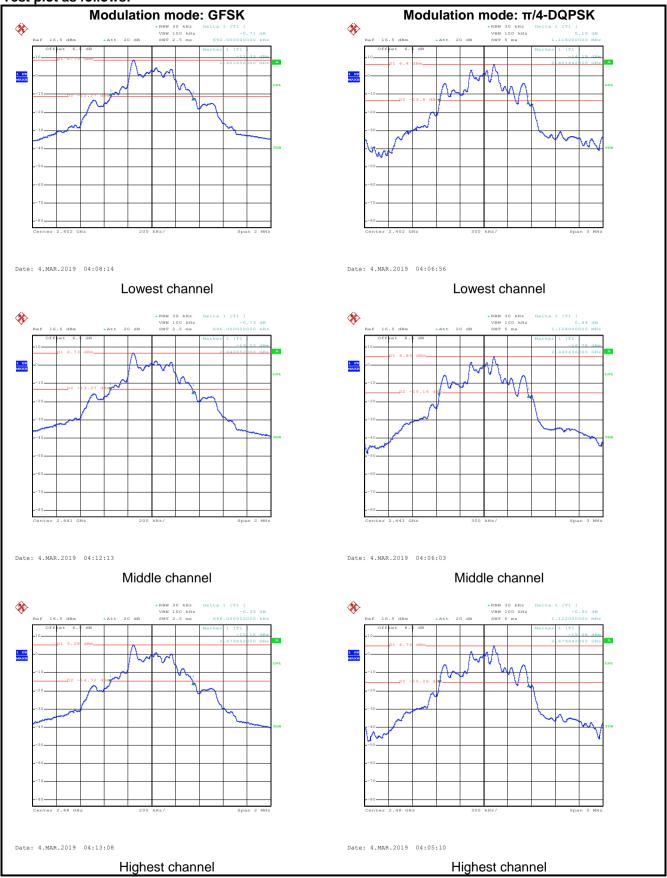
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)		
Test Method:	ANSI C63.10:2013 and KDB 558074		
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak		
Limit:	N/A		
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane		
Test Instruments:	t Instruments: Refer to section 5.8 for details		
Test mode:	Non-hopping mode		
Test results:	Pass		

#### **Measurement Data:**

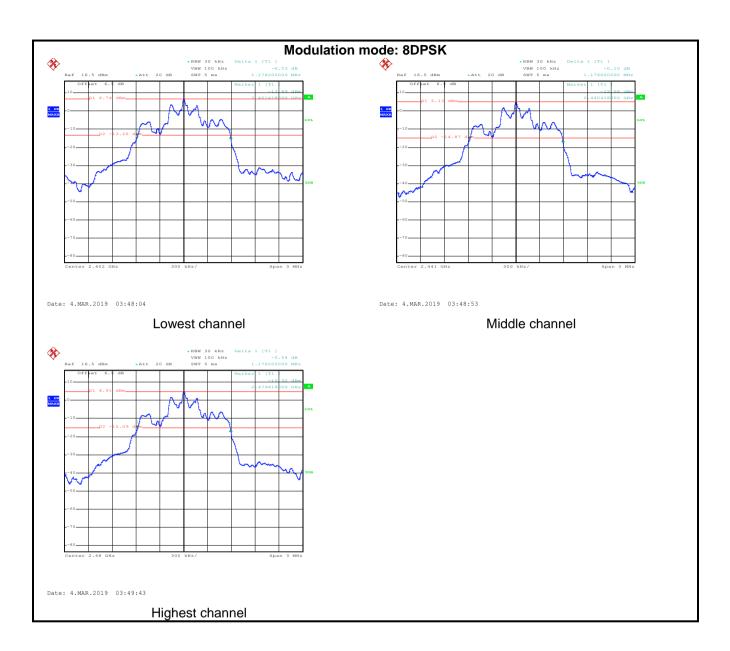
Toot channel	20dB Occupy Bandwidth (kHz)			
Test channel	GFSK	π/4-DQPSK	8DPSK	
Lowest	692	1116	1176	
Middle	696	1128	1176	
Highest	696	1122	1176	



#### Test plot as follows:









6.5 Carrier Frequencies Separation

io Carrior i requesticios esparation		
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Receiver setup:	RBW=100 kHz, VBW=300 kHz, detector=Peak	
Limit:	<ul><li>a) 0.025MHz or the 20dB bandwidth (whichever is greater)</li><li>b) 0.025MHz or two-thirds of the 20dB bandwidth (whichever is greater)</li></ul>	
Test setup:	Spectrum Analyzer  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Hopping mode	
Test results:	Pass	



#### **Measurement Data:**

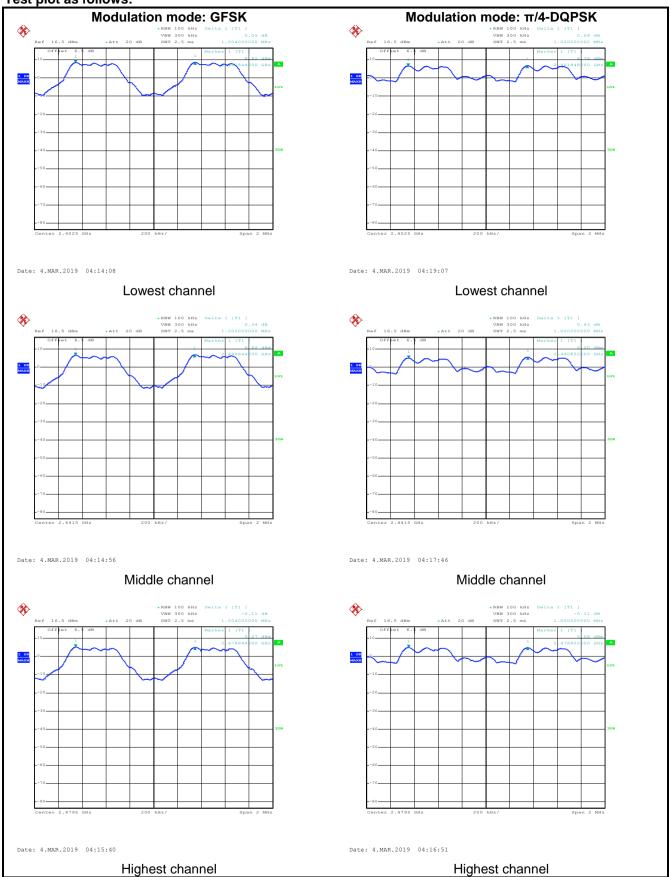
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result		
	GFSK				
Lowest	1004	696.00	Pass		
Middle	1000	696.00	Pass		
Highest	1004	696.00	Pass		
	π/4-DQPSK mode				
Lowest	1000	752.00	Pass		
Middle	1000	752.00	Pass		
Highest	1000	752.00	Pass		
8DPSK mode					
Lowest	1000	784.00	Pass		
Middle	1004	784.00	Pass		
Highest	1000	784.00	Pass		

Note: According to section 6.4

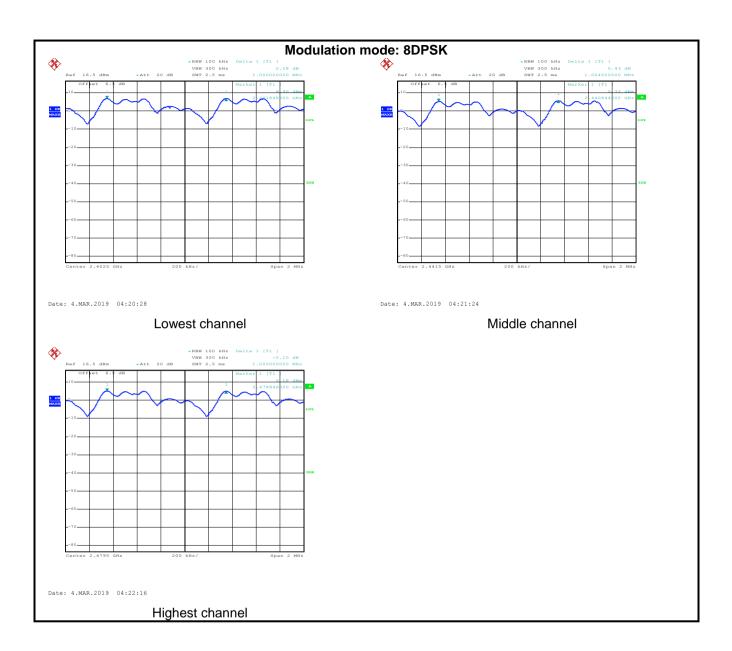
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	696	696.00
π/4-DQPSK	1128	752.00
8DPSK	1176	784.00



#### Test plot as follows:









6.6 Hopping Channel Number

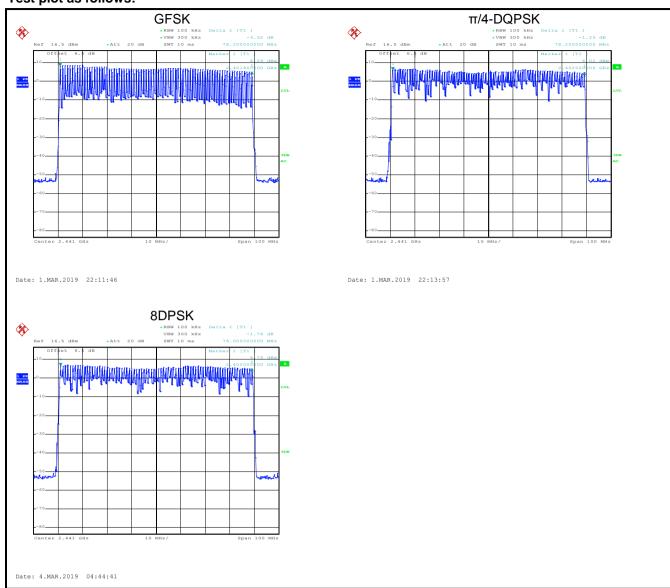
Toot Boquiroment:	ECC Part 45 C Caption 45 247 (a)/4)	
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz,	
	Detector=Peak	
Limit:	15 channels	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Hopping mode	
Test results:	Pass	

#### **Measurement Data:**

Mode	Hopping channel numbers	Limit	Result
GFSK, π/4-DQPSK, 8DPSK	79	15	Pass



### Test plot as follows:





## 6.7 Dwell Time

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2013 and KDB 558074	
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak	
Limit:	0.4 Second	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.8 for details	
Test mode:	Hopping mode	
Test results:	Pass	

### Measurement Data (Worse case):

Mode	Packet	Dwell time (second)	Limit (second)	Result
	DH1	0.13376		
GFSK	DH3	0.27168	0.4	Pass
	DH5	0.31488		
	2-DH1	0.13056		
π/4-DQPSK	2-DH3	0.26976	0.4	Pass
	2-DH5	0.31317		
	3-DH1	0.13056		
8DPSK	3-DH3	0.26784	0.4	Pass
	3-DH5	0.31488		

Note:

The test period = 0.4 Second/Channel x 79 Channel = 31.6 s

Calculation Formula: Dwell time = Ton time per hop \* Hopping numbers \* Period

For example:

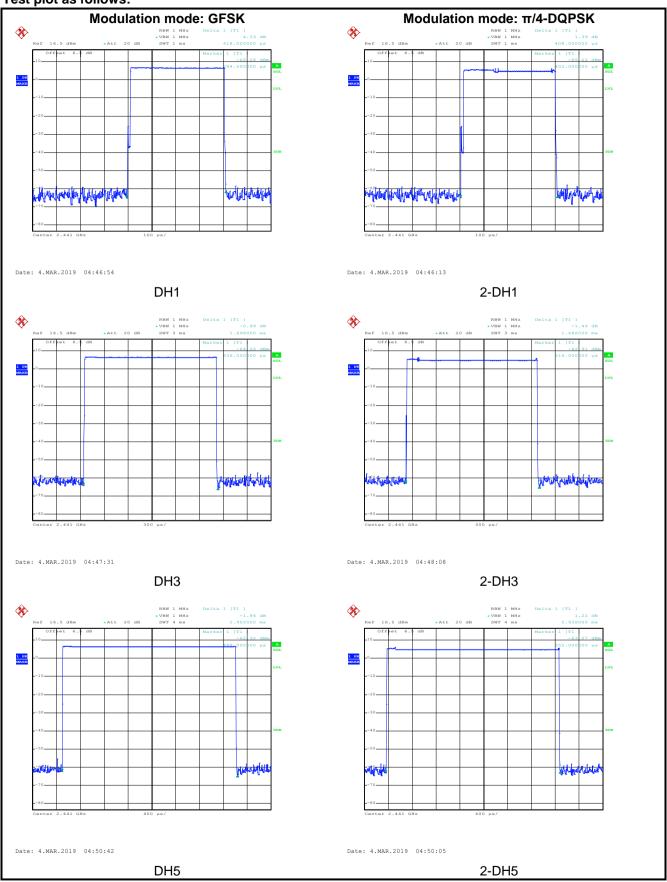
DH1 time slot=0.418\*(1600/ (2\*79)) \* 31.6=133.76ms

DH3 time slot=1.698\*(1600/ (4\*79)) \* 31.6=271.68ms

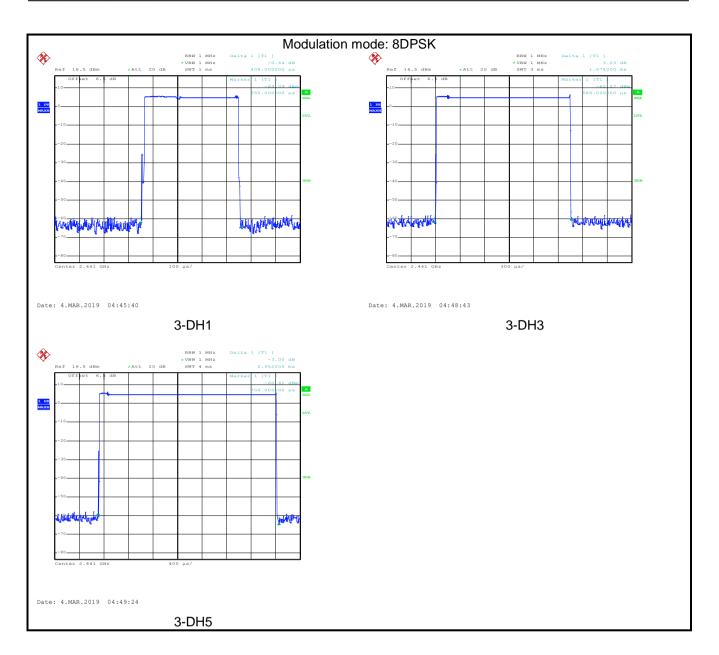
DH5 time slot=2.952\*(1600/ (6\*79)) \* 31.6=314.88ms



#### Test plot as follows:









6.8 Pseudorandom Frequency Hopping Sequence

### Test Requirement: FCC Part 15 C Section 15.247 (a)(1) requirement:

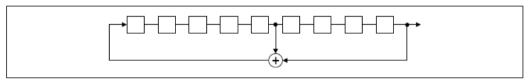
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **EUT Pseudorandom Frequency Hopping Sequence**

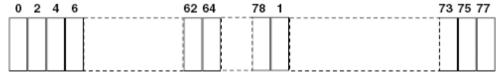
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 29-1 = 511 bits
- · Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



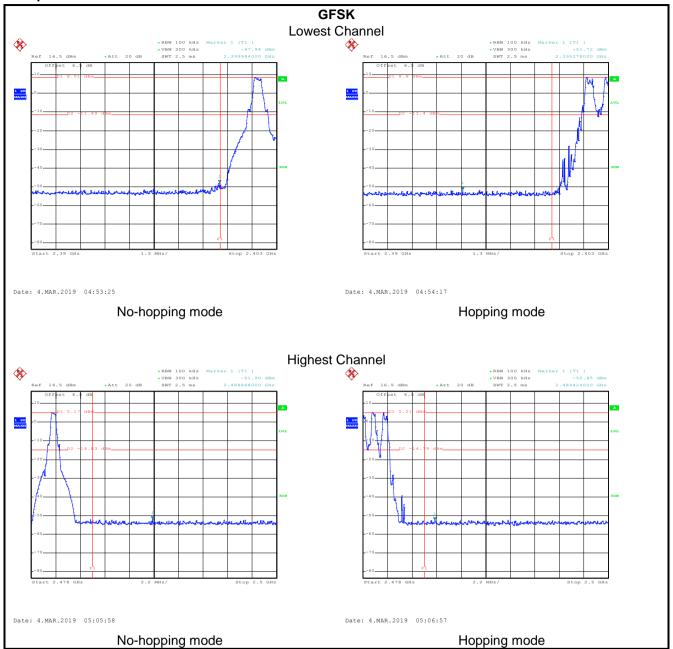
# 6.9 Band Edge

## 6.9.1 Conducted Emission Method

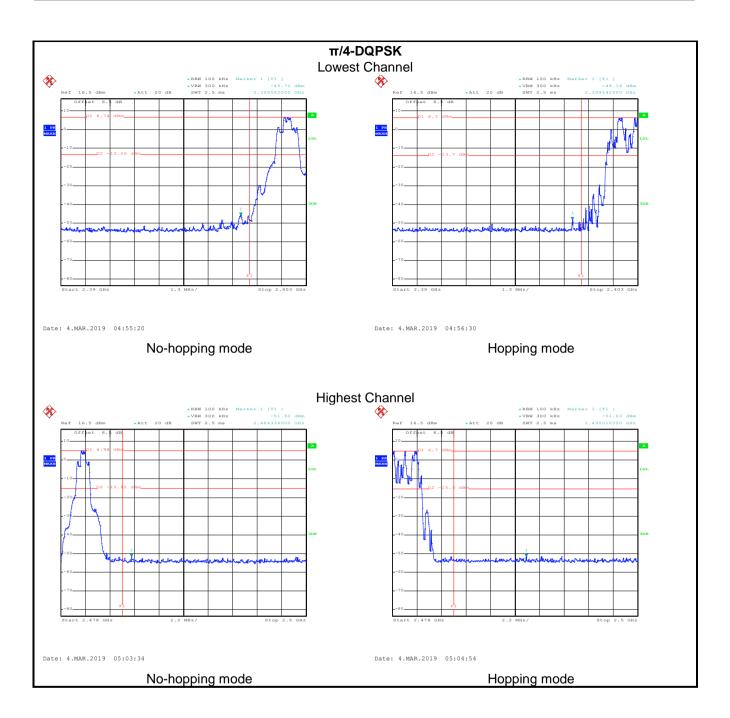
Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB 558074
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power 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.
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass



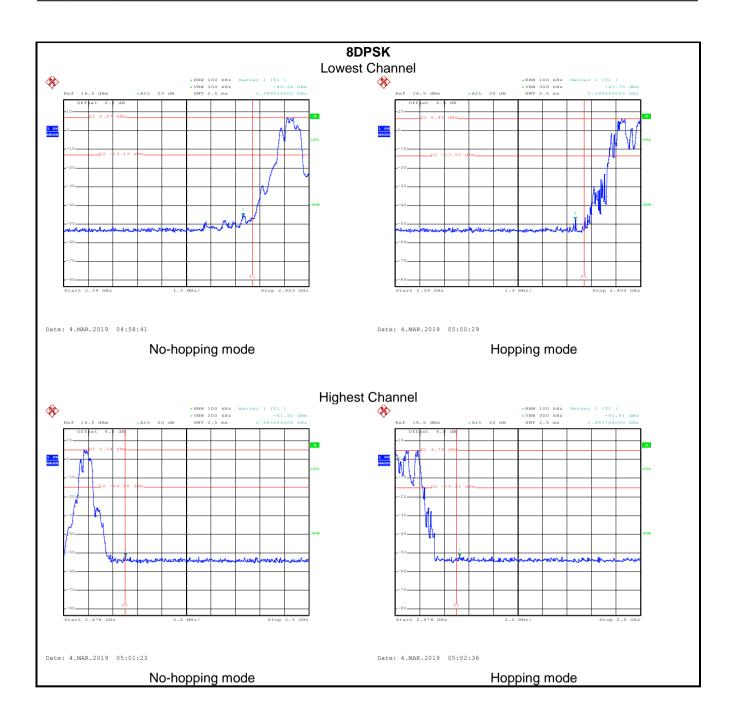
### Test plot as follows:













### 6.9.2 Radiated Emission Method

To at De autine as auti	E00 David 4E 0	0 4	F 000	)  4E 00E				
Test Requirement:	FCC Part 15 C Section 15.209 and 15.205  ANSI C63.10: 2013							
Test Method:								
Test Frequency Range:	2.3GHz to 2.50	3Hz						
Test Distance:	3m	Γ		T	<u> </u>		<u> </u>	
Receiver setup:	Frequency	Detect	or	RBW	V	BW	Remark	
	Above 1GHz	Peak Value						
	RMS 1MHz 3MHz Average Value							
Limit:	Frequen	су	Lim	nit (dBuV/m @3	3m)		Remark	
	Above 1GHz 54.00 Average Value							
	Above 1GHz 74.00 Peak Value							
Test setup:	AE (To	EUT		Ÿ.	Antenna Tov	wer		
Test Procedure:	ground at a determine the second second at a determine the second second and the second secon	3 meter come position as set 3 minich was minich was minich was minich wertical ent.  Is pected ele antenna in table was eading.  Seriver system and width with the period width with the period be reprinted to the period would be reprinted to the period would be reprinted to the position of the period would be reprinted to the period would be reprinted to the position of the period would be reprinted to the position of the posi	ambe of th eters nounte varie he ma polar missic was t s turne em w with M f the I sting orted e re-te	r. The table wat e highest radial away from the ed on the top of the ed on the top of the ed on the EUT was set to Peak laximum Hold EUT in peak mould be stopp. Otherwise the	as rota ation. interformation interformation favorable to of the fautences are as area s from ees to Detection Mode. ode we ed an e emis- ne usine usine	erence- riable-h four me field stre anged to a 1 mete 360 de et Functi vas 10dE d the pe sions th ng peak	receiving eight antenna sters above the ength. Both set to make the coits worst case or to 4 meters egrees to find the sion and solver than the eak values of that did not have as quasi-peak or	
Test Instruments:	Refer to sectio	-						
Test mode:	Non-hopping m	node						
Test results:	Passed							



#### **GFSK Mode:**

roduct	duct Name: Monkey II LTE					oduct Mod	el:	PL504		
est By:	:	Caffrey			Те	est mode:		DH1 Tx mode		
est Ch	annel:	Lowest channel			Po	olarization:		Vertical		
est Vo	Itage:	AC 120/60	AC 120/60Hz Environment:					Temp: 24℃ Huni: 57%		
Lo	wol /dPu\//m\									
110	vel (dBuV/m)				1					
100										
80								FCC	PART 15 (PK)	
									Λ	
60								FCC	PART 15 (AV)	
~	~~~~	mm	m	m	m	wh	mm	man	VVVV	
40						2747020		2		
20										
20										
023	10 2320		1	2350					24	
					quency (MH			120000		
	Frea	Keada Level	ntenna Factor		Preamp Factor	Level	Limit Line	Over Limit	Remark	
			5-19-56-01			ACE VALUE				
	MHz	dBu∜	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 2	2390.000		27.37	4.69	0.00			-23.57		
2	2390.000	7.00	27.37	4.69	0.00	40.74	54 00	-13 26	Average	

#### Remark:

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



oduc	t Name:	Monkey II LTE  Caffrey			Pr	oduct Mod	el:	PL504		
st By	y:				Те	Test mode: Polarization:		DH1 Tx mode  Horizontal		
st Ch	hannel:	Lowest ch	owest channel Polarization: Horizontal							
st Vo	oltage:	AC 120/6	0Hz		En	nvironment	:	Temp: 24℃ Huni: 57%		
- 1	ovol (dPu\l/m\	10					•			
110	Level (dBuV/m)									
100										
80								FCC	PART 15 (PK)	
									16	
60								FCC	PART 15 (AV)	
60		~~~	~~~	www		·	~~~	FCC	PART 15 (AV)	
60	h		ww.	m	~~~	www.	~~~	FCC 1	PART 15 (AV)	
J	h	~~~	www	~~~		· · · · · · · · · · · · · · · · · · ·	~~~	FCC 1	PART 15 (AV)	
J	h	~~~	~~~	~~~		~~~~·	~~~	FCC 1	PART 15 (AV)	
40		~~~	~~~	~~~		·	~~~	FCC	PART 15 (AV)	
40	2310 2320	~~~		2350 Freq	uency (MH	//////////////////////////////////////	~~~	FCC 2	PART 15 (AV)	
40	2310 2320		unt enna	Freq Cable	Preamp		Limit	Over	240	
40	2310 2320 Freq			Freq Cable	Preamp	250	Limit Line	Over	240	
40				Freq Cable	Preamp Factor		Line	Over Limit	240 Remark	
40	Freq	Level	Factor —dB/m	Freq Cable Loss dB	Preamp Factor dB	Level  dBuV/m  52.02	Line dBuV/m 74.00	Over Limit ———————————————————————————————————	240 Remark	

#### Remark:

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.

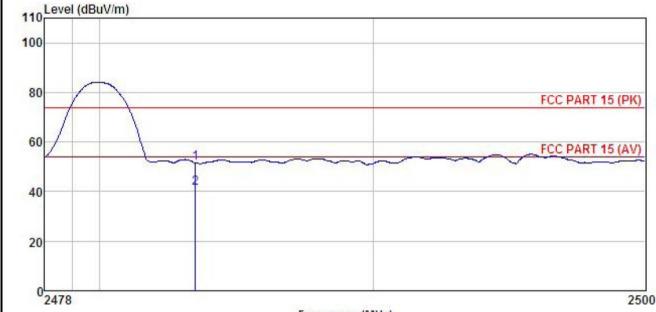


oduct Name:	Name: Monkey II LTE				oduct Mod	el: l	PL504		
est By:	Caffrey			Те	st mode:		DH1 Tx mode  Vertical		
est Channel:	Highest ch	nannel		Po	larization:	,			
est Voltage:	AC 120/60	)Hz		En	vironment	t: Temp: 24°C Huni: 5			
110 Level (dBuV/m) 100								PART 15 (PK)	
40	2	~~					FCCI	PART 15 (AV)	
20	2						FCC		
40	2			uency (MHz	100				
20	ReadA Level	ntenna Factor	Cable	Preamp	100	Limit Line	Over Limit	250	
20 2478			Cable	Preamp Factor		Line	Over Limit	250	

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Name:	Monkey II LTE	Product Model:	PL504
Test By:	Caffrey	Test mode:	DH1 Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%
110 Level (dBuV/m)			



				Free	quency (MF	łz)			
	Freq		Antenna Factor				Limit Line		Remark
-	MHz	dBu₹		dB	<u>dB</u>	$\overline{dBuV/m}$	dBu√/m	<u>d</u> B	
1 2		17.33 7.32				51.41 41.40			Peak Average

#### Remark:

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



## π/4-DQPSK mode

Product	uct Name: Monkey II LTE			LTE				Pro	duct Mod	del:	PL504			
est By:			Caffr	еу					Tes	st mode:		2DH1 Tx m	ode	
est Ch	annel:		Lowe	est cha	nnel				Pol	arization	:	Vertical		
est Vol	Itage:		AC 1	20/60H	Нz				Εn	/ironmen	t:	Temp: 24°C	Huni: 5	7%
Lo	avol /dDuV	Vena l	•					•						
110	evel (dBuV	nu)		1										
100														
80												FCC	PART 15 (	PK)
				Ī										1
60						V/20072			600			FC6	PART 15 (	AV
~		~~			V.		A.			Many	andre	- Andread		
40														-
20														
												2		
023	310 23	20				100	50 rea	uency (	MHZ	7)				240
					nt enna	Cab	le	Pream	np	.a 	Limit			
	F	req	Lev	el F	actor	Lo	SS	Facto	r	Level	Line	Limit	Remark	
		MHz	dE	āū⊽ -	dB/m		ΪĒ		ΪĒ	dBuV/m	dBuV/π	dB		
1	2390.				27.37	4.		0.0				-20.99		
2	2390.	000	-28.	74	27.37	4.	69	0.0	00	5.00	54.00	-49.00	Average	е

### Remark.

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



Name:	Monkey II	I LTE		Pr	oduct Mod	el:	PL504	
	Caffrey			Те	st mode:		2DH1 Tx m	ode
annel:	Lowest cha	annel		Po	olarization:		Horizontal	
tage:	AC 120/60	Hz		En	vironment	:	Temp: 24℃	Huni: 57%
vol (dRuV/m)								
ver (dbdv/iii)					1			
							FCC	PART 15 (PK)
					T			Λ
							FCC	PART 15 (AV)
many	<del>manadada</del>	-W	march	~~~~	America De	MANA MA	~~~~~~	<del></del>
							- 2	
10 2320				quency (MH	łz)			24
				A CONTRACTOR OF THE PARTY OF TH				
F65 154	D 14	dura month de la contraction					_	
Freq	ReadA Level	ntenna Factor	Cable Loss	Preamp Factor	Level	Limit Line		Remark
Freq	ReadA Level ——dBuV	ntenna Factor dB/m	Cable Loss dB	Factor	Level	Line	Limit	Remark
	annel:	Caffrey Lowest chatage: AC 120/60	Caffrey  Lowest channel  tage: AC 120/60Hz  vel (dBuV/m)	Caffrey  Lowest channel  tage: AC 120/60Hz  vel (dBuV/m)	Caffrey Teannel: Lowest channel Powel (dBuV/m)	Caffrey Test mode: Lowest channel Polarization: tage: AC 120/60Hz Environment:  vel (dBuV/m)	Caffrey Lowest channel Polarization: Environment:  Polarization:  Environment:	Caffrey Test mode: 2DH1 Tx m annel: Lowest channel Polarization: Horizontal tage: AC 120/60Hz  Environment: Temp: 24°C  vvel (dBuV/m)  FCC

<sup>1.</sup> Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.

<sup>2.</sup> The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Name:	Monkey	II LTE		Pr	roduct Mod	el:	PL504	
Test By:	Caffrey			Te	est mode:	2	2DH1 Tx mo	ode
Test Channel:	Highest c	hannel		Po	olarization:	,	Vertical	
Test Voltage:	AC 120/6	0Hz		Er	nvironment	-	Temp: <b>24</b> ℃	Huni: 57%
110 Level (dBuV/m) 100 80 60 40								PART 15 (PK) PART 15 (AV)
0 2478 Freq MHz	Level	untenna Factor ——dB/m	Cable	Factor	er S S Indi Sandt		Limit	2500 Remark
1 2483, 500 2 2483, 500		27.57 27.57	4.81 4.81	0.00 0.00	50.83 43.81	74.00 54.00	-23.17 -10.19	Peak Average

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.

54.00 -11.98 Average



Product Name:	Monkey II LTE		Pro	oduct Mode	el: F	PL504	
Гest By:	Caffrey		Tes	st mode:	2	2DH1 Tx mo	de
est Channel:	Highest channel		Ро	larization:	ŀ	Horizontal	
est Voltage:	AC 120/60Hz		En	vironment:	٦	Γemp: <b>24</b> ℃	Huni: 57%
Lovel (dDullim)							
110 Level (dBuV/m)							
100							
80						FCC	PART 15 (PK)
						100	TAKE TO UT
60	4					FCC	PART 15 (AV)
1	\		~			rcc	PART 15 (AV)
40	2						
20							
20							
2478			(8.01)				25
2410		Frocu	uency (MH)	Z)			
2410	2011-1200-0-0		-				
	ReadAntenna	Cable	Preamp		Limit		Remark
Freq	Level Factor	Cable Loss	Preamp Factor	Level	Line	Limit	Remark
	ReadAntenna Level Factor dBuV dB/m	Cable	Preamp Factor		Line	Limit	Remark

### Remark:

2483.500

7.94

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.

27.57

2. The emission levels of other frequencies are very lower than the limit and not show in test report.

4.81

0.00

42.02



## 8DPSK mode

roduct	Monkey II LTE	II LTE			Product Mo	del:	PL504			
est By	<b>/</b> :	Caffrey			٦	Test mode:		3DH1 Tx	mode	
est Ch	nannel:	Lowest c	owest channel Polarization: Vertical				Polarization:			
est Vo	oltage:	AC 120/6	0Hz		Environment:		nt:	Temp: 24°C Huni: 57		57%
110 Le	evel (dBuV/m)									
100										
80								FC	CC PART 15	PK)
co										1
								FC	CC PART 15	AV
60		A 10	No. 2	N1 ~00	MA A A	. ~~~	A- 000		- M. A	11
40	~~~~	~~~	m	~~~	····	~~~	~~~~		1	<i>T</i>
	~~~~	~~~		~~~	~~~		~~~\\\		2	<i>T</i> {
40	310 2320		~~	2350 Fre	O equency (M		~~~^~		2	240
40 20		ReadA Level	ntenna Factor	Fre Cable	equency (M Preamp	IHz)	Limit	~~~	Remark	240
40 20		ReadA Level	ntenna Factor	Fre Cable	equency (M Preamp Factor	IHz)	Limit Line	Over Limit	Remark	240

### Remark:

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.

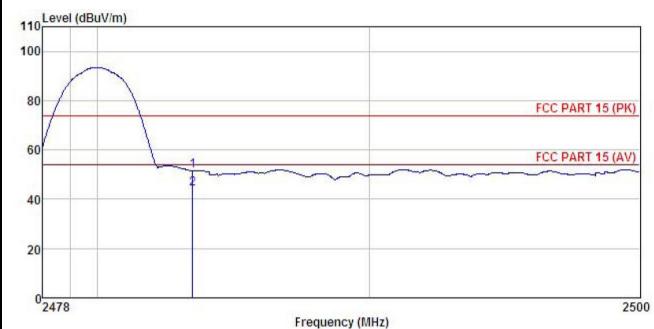


Product	Name:	Monkey I	LTE		Pi	roduct Mod	el:	PL504	
Test By:		Caffrey			Te	est mode:		3DH1 Tx mo	ode
Test Cha	annel:	Lowest cha	annel		P	olarization:		Horizontal	
Test Vol	tage:	AC 120/60	Hz		E	nvironment	:	Temp: 24℃	Huni: 57%
110 Le	evel (dBuV/m)								
100									
80								FCC	PART 15 (PK)
60		·	~~~	<del>~~~</del>		^~~~~	<b>~~~~</b>	FCC	PART 15 (AV)
40								2	
20									
0 23	310 2320			2350 Fred	juency (Mi	Hz)			2404
	Freq	ReadA Level	ntenna Factor		Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBu∜	dB/m	dB	₫B	dBuV/m	dBuV/m	dB	
1 2	2390.000 2390.000	20.68 7.89	27.37 27.37	4.69 4.69		54.42 41.63			Peak Average

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Name:	Monkey II LTE	Product Model:	PL504
Test By:	Caffrey	Test mode:	3DH1 Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Huni: 57%

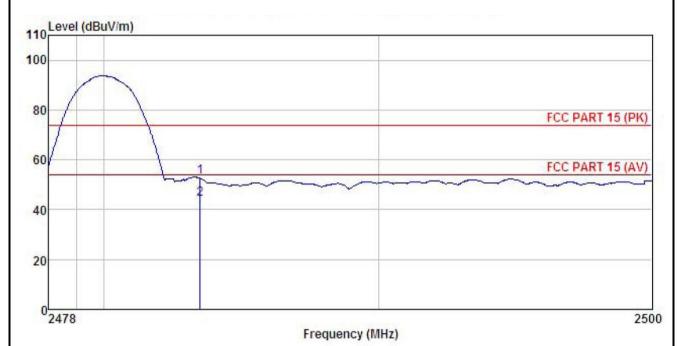


	Freq		Antenna Factor						
	MHz	dBu∜	dB/m	dB	dB	$\overline{dBuV/m}$	dBuV/m	<u>dB</u>	
1 2	2483,500 2483,500								

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Name:	Monkey II LTE	Product Model:	PL504
Test By:	Caffrey	Test mode:	3DH1 Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



	Freq		Antenna Factor						
	MHz	dBu₹	<u>dB</u> /m	<u>d</u> B	<u>dB</u>	dBuV/m	dBuV/m	<u>dB</u>	
1 2	2483.500 2483.500								

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor.
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.



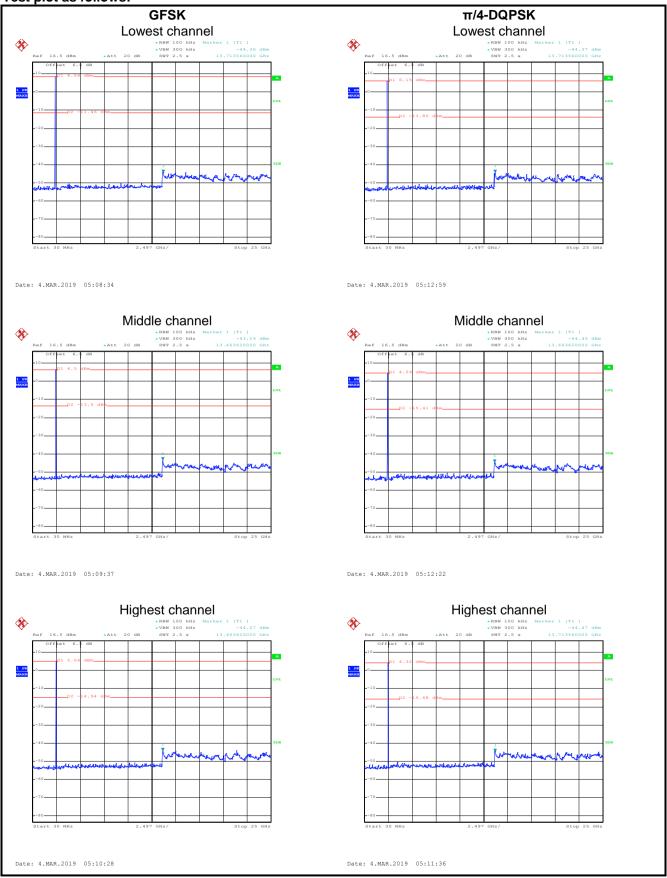
# 6.10 Spurious Emission

## 6.10.1 Conducted Emission Method

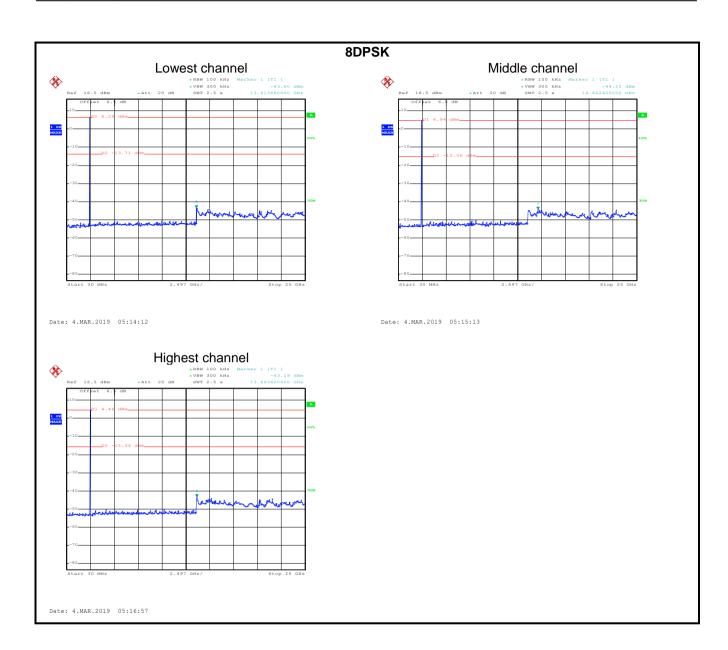
Test Requirement:	FCC Part 15 C Section 15.247 (d)						
Test Method:	ANSI C63.10:2013 and KDB 558074						
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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.						
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane						
Test Instruments:	Refer to section 5.8 for details						
Test mode:	Non-hopping mode						
Test results:	Pass						



## Test plot as follows:









## 6.10.2 Radiated Emission Method

6.10.2 Radiated Emission Mo									
Test Requirement:	FCC Part 15 C Section 15.209  ANSI C63.10: 2013								
Test Method:	ANSI C63.10: 2	013							
Test Frequency Range:	9 kHz to 25 GH:	Z							
Test Distance:	3m	T							
Receiver setup:	Frequency	Detect	or	RBW	VBV	V	Remark		
	30MHz-1GHz	Quasi-p	eak	120kHz	300kl	Hz	Quasi-peak Value		
	Above 1GHz	Peak		1MHz	3MH	lz	Peak Value		
	7.5575 7.57.12	RMS		1MHz	3MH	z	Average Value		
Limit:	Frequenc	•	Lim	it (dBuV/m @	93m)		Remark		
	30MHz-88N	ИHz		40.0		C	Quasi-peak Value		
	88MHz-216	MHz		43.5		C	Quasi-peak Value		
	216MHz-960	MHz		46.0			Quasi-peak Value		
	960MHz-10	SHz		54.0		C	Quasi-peak Value		
	Above 1GI	H <sub>7</sub> -		54.0			Average Value		
	Above 101	112		74.0			Peak Value		
	Ta	am 0.8m ble A	4m	n		RF T Rece			
Test Procedure:			Test R	Ground Reference Plane	iting tab		8m(below 1GHz)		
	was rotated 3 radiation.						chamber. The table f the highest		

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China
Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366





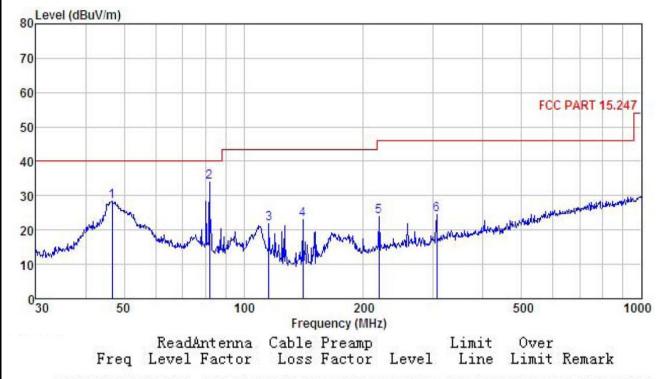
	<ol> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass
Remark:	<ol> <li>Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.</li> <li>9 kHz to 30 MHz is noise floor, so only shows the data of above 30MHz in this report.</li> </ol>



## Measurement Data (worst case):

### **Below 1GHz:**

Product Name:	Monkey II LTE	Product Model:	PL504
Test By:	Caffrey	Test mode:	BT Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Huni: 57%



	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBu₹	dB/m	<u>dB</u>	<u>ab</u>	dBu√/m	dBu√/m	<u>dB</u>	
1	46.666	43.05	13.84	1.28	29.85	28.32	40.00	-11.68	QP
2	82.071	53.35	8.51	1.72	29.62	33.96	40.00	-6.04	QP
3	115.726	38.01	11.08	2.12	29.42	21.79	43.50	-21.71	QP
4	140.835	41.77	8.14	2.41	29.27	23.05	43.50	-20.45	QP
5	219.075	37.61	12.23	2.85	28.71	23.98	46.00	-22.02	QP
6	305.680	36.24	13.72	2.96	28.46	24.46	46.00	-21.54	QP

### Remark:

<sup>1.</sup> Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.

<sup>2.</sup> The emission levels of other frequencies are very lower than the limit and not show in test report.



Toduci	oduct Name: Monkey II LTE				Pro	duct Mode	ıl:	PL504					
Гest By:	t By: Caffrey					st mode:		BT Tx mode					
Test Fre	quency:	30 MHz ~	1 GHz		Pol	arization:		Horizontal Temp: 24°C Huni: 57			Horizontal		
Test Vol	tage:	AC 120/60	)Hz		Env	/ironment:							
Lev	el (dBuV/m)						·						
80 200	er (dbdv/iii)												
70													
, ,													
60						-	-	FOO	PART 15.24	-			
								FCC	PART 15.24	Γ			
50					9								
40													
30					3	4		6	appropriate de proprie	Mary Mary			
					AL	7 5	5	The same	alvan.				
20	1		2		77	Jaka J	Land and the state of	MANAGER					
20	1 - Lander Mary	Maraja dila	2 /\/\/\/	Ynn /	- The	Salar	Later Appendix a popular	A graph de de partir de					
	phone was religious and the	renewalkan der der der	manuel Angel M	Marine	- The	Control Manager	to the companion is a series	Victorian					
10		remarkant for both	more March	Marine		and the second	bedar officially in soft	Newspaper					
	phosphate Albertan phosphate	remote man be bette	100	From	200		Leteral posterior de servicio	500	1	00			
10		Read		100	200 Jency (MHz	2)		500		00			
10			100 Antenna Factor	Cable	200	1)	Limit	500 Over		00			
10	50 Freq	Level	Antenna Factor	Cable Loss	200 Jency (MHz Preamp Factor	ı) Level	Limit Line	500 Over	Remark	000			
10	50 Freq MHz	Level ——dBuV	Antenna Factor ——dB/m	Cable Loss dB	200 Jency (MHz Preamp Factor dB	Level	Limit Line	500 Over Limit	Remark	00			
030	50 Freq MHz 51.481	Level 	Antenna Factor dB/m 13.83	Cable Loss dB	200 Jency (MHz Preamp Factor dB	Level  dBuV/m  18.64	Limit Line	500 Over Limit dB	Remark 	00			
030	50 Freq MHz 51.481 109.029	Level dBuV 33.35 33.99	Antenna Factor dB/m 13.83 12.24	Cable Loss dB 1.27 2.04	200 Jency (MHz Preamp Factor dB 29.81 29.46	Level  dBuV/m  18.64 18.81	Limit Line dBuV/m 40.00	500 Over Limit dB	Remark  QP QP	000			
10 030 1 2 3 4	50 Freq MHz 51.481	Level 	Antenna Factor dB/m 13.83	Cable Loss dB	200 Jency (MHz Preamp Factor dB	Level  dBuV/m  18.64	Limit Line dBuV/m 40.00 43.50 43.50	500 Over Limit dB	Remark  QP QP QP	000			
030	50 Freq MHz 51.481 109.029 180.017	Level dBuV 33.35 33.99 41.21	Antenna Factor dB/m 13.83 12.24 9.80	Cable Loss dB 1.27 2.04 2.73	200 Jency (MHz Preamp Factor dB 29.81 29.46 28.97	Level dBuV/m 18.64 18.81 24.77	Limit Line dBuV/m 40.00 43.50 46.00 46.00	500 Over Limit dB -21.36 -24.69	Remark QP QP QP QP QP QP QP	000			

<sup>1.</sup> Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.

<sup>2.</sup> The emission levels of other frequencies are very lower than the limit and not show in test report.





### **Above 1GHz:**

Test channel: Lowest channel										
Detector: Peak Value										
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4804	47.98	30.85	6.80	41.81	43.82	74.00	-30.18	Vertical		
4804	47.73	30.85	6.80	41.81	43.57	74.00	-30.43	Horizontal		
			Dete	ector: Avera	ge Value					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4804.00	37.46	30.85	6.80	41.81	33.30	54	-20.70	Vertical		
4804.00	37.49	30.85	6.80	41.81	33.33	54	-20.67	Horizontal		
				nannel: Midd						
		ı		tector: Peal	( Value					
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization		
4882.00	46.55	31.20	6.86	41.84	42.77	74.00	-31.23	Vertical		
,										
4882.00	46.78	31.20	6.86	41.84	43.00	74.00	-31.00	Horizontal		
4882.00	46.78	31.20		41.84 ector: Average		74.00	-31.00	Horizontal		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)				74.00 Limit Line (dBuV/m)	-31.00 Over Limit (dB)	Horizontal Polarization		
Frequency	Read Level	Antenna Factor	Dete Cable Loss	ector: Average Preamp Factor	ge Value Level	Limit Line	Over			

Test channel: Highest channel											
Detector: Peak Value											
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4960.00	47.91	31.63	6.91	41.87	44.58	74.00	-29.42	Vertical			
4960.00	46.48	31.63	6.91	41.87	43.15	74.00	-30.85	Horizontal			
			Dete	ector: Avera	ge Value						
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
4960.00	37.86	31.63	6.91	41.87	34.53	54.00	-19.47	Vertical			
4960.00	36.89	31.63	6.91	41.87	33.56	54.00	-20.44	Horizontal			

### Remark:

<sup>1.</sup> Final Level =Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.

<sup>2.</sup> The emission levels of other frequencies are very lower than the limit and not show in test report.