TEST REPORT

REPORT NUMBER: I22W00060-NB-IoT+Cat-M-RF-Rev4

ON

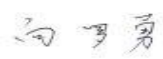
Type of Equipment:	tracker
Type of Designation:	AT-NG5
Brand Name：	PRIME
Manufacturer:	Micron Electronics LLC.
FCC ID:	ZKQ-P61G

ACCORDING TO

FCC CFR Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS，e-CFR
PART 22, PUBLIC MOBILE SERVICES，e-CFR
PART 24, PERSONAL COMMUNICATIONS SERVICES，e-CFR
PART 27,MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES，e-CFR
PART 90,PRIVATE LAND MOBILE RADIO SERVICES，e-CFR,
ANSI C63.26-2015 American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

Chongqing Academy of Information and Communications Technology

Month date, year
Feb, 01, 2023
Signature



Xiang Luoyong
Director

Note:
The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of Chongqing Academy of Information and Communications Technology.

Revision Version

Report Number	Revision	Date	Memo
I22W00060-WWAN RF	00	2022-09-13	Initial creation of test report
I22W00060-WWAN RF	01	2022-09-26	--
I22W00060-WWAN RF	02	2023-01-16	--
I22W00060-NB-IoT+Cat-M-RF	03	2023-01-31	--
I22W00060-NB-IoT+Cat-M-RF	04	2023-02-01	--

CONTENTS

1. Test Laboratory

1.1. Testing Location

Name:	Chongqing Academy of Information and Communications Technology
FCC Registration number:	CN1239
Address:	Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

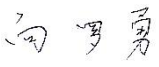
1.2. Testing Environment

Normal Temperature:	28.0-28.5℃
Relative Humidity:	48.0-51.0%

1.3. Project data

Testing Start Date:	2022-08-16
Testing End Date:	2023-01-31

1.4. Signature

	2023-02-01
Li Quan (Prepared this test report)	**Date**
	2023-02-01
Xiao Yu (Reviewed this test report)	**Date**
	2023-02-01
Xiang LuoyongDirector of the laboratory(Approved this test report)	**Date**

2. Client Information

2.1. Applicant Information

Company name:	Micron Electronics LLC.
Address /Post:	1001 Yamato Road, Suite 400, Boca Raton, FL 33431, USA
City:	Boca Raton
Country:	USA
Telephone:	18885383489
Fax:	--
Email:	pcheng@micron-electronics.com
Contact Person:	Ping Cheng

2.2. Manufacturer Information

Company name:	Micron Electronics LLC.
Address /Post:	1001 Yamato Road, Suite 400, Boca Raton, FL 33431, USA
City:	Boca Raton
Country:	USA
Telephone:	18885383489
Fax:	--
Email:	pcheng@micron-electronics.com
Contact Person:	Ping Cheng

3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	tracker
Model name	AT-NG5
Brand name	PRIME
GSM Frequency Band	850/1900
NB-IoT Frequency Band	2/4/5/12/13/26
CAT-M Frequency Band	2/4/5/12/13/26
Type of modulation	GMSK/8PSK/BPSK/QPSK/16QAM
Power supply	USB 5Vdc; Internal Battery power supply:3.7Vdc

Note: Photographs of EUT are shown in ANNEX A of this test report.
Note: High and low voltage values in extreme condition test are given by manufacturer.

3.2. Internal Identification of EUT used during the test

EUT ID	SN or IMEI	HW Version	SW Version	Date of receipt
S1	IMEI:355197370060068	A513_V1	P61V01.01B03.I01	2022-07-14

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Outline of Equipment under Test

Technology	Band	UL Freq.(MHz)	DL Freq.(MHz)	Note
GSM	GSM850	824 – 849	869 – 894	--
	PCS1900	1850 – 1910	1930 – 1990	--
NB-IoT	Band2	1850 – 1910	1930 – 1990	The uplink frequency range is 1850.2–1909.8MHz; Downlink frequency range: 1930.2 – 1989.8MHz
	Band4	1710-1755	2110-2155	The uplink frequency range is 1710.2–1754.8MHz; Downlink frequency range: 2110.2 – 2154.8MHz
	Band5	824 – 849	869 – 894	Covered by Band26 (Band5 is a subset of Band26. Both Bands share the same hardware and have the same radio performance. Separate measurement in Band5 is not required.)The uplink frequency range is 824.2–848.8MHz; Downlink frequency range: 869.2 – 893.8MHz
	Band12	699 – 716	729 – 746	The uplink frequency range is 699.2–715.8MHz; Downlink frequency range: 729.2 – 745.8MHz
	Band13	777 – 787	746 – 756	The uplink frequency range is 777.2–786.8MHz; Downlink frequency range: 746.2 – 755.8MHz
	Band26	814 – 849	859 – 894	The uplink frequency range is 814.2–848.8MHz; Downlink frequency range: 859.2 – 893.8MHz
	Band2	1850 – 1910	1930 – 1990	--
	Band4	1710 – 1755	2110 – 2155	--

CAT-M	Band5	824 – 849	869 – 894	Covered by Band26 (Band5 is a subset of Band26. Both Bands share the same hardware and have the same radio performance. Separate measurement in Band5 is not required.)
	Band12	698 – 716	728 – 746	--
	Band13	777 – 787	746 – 756	--
	Band26	814 –824 824-849	859 –869 869-894	--

3.4. Internal Identification of AE used during the test

AE ID*	Description	Information
AE1	Adapter	Model：CD112 Input：AC100-240V,50/60Hz，0.15Amax Output:DC5V,1Amax

Antenna Gain：

Frequency Band	AntennaGain (dBi)	AntennaGain (dBd)
GSM1900/NB-IoT Band2/CAT-M Band2	1.50	-0.65
NB-IoT Band4/CAT-M Band 4	1.40	-0.75
GSM850/NB-IoT Band5/CAT-M Band5	3.46	1.31
NB-IoT Band12/CAT-M Band12	2.36	0.21
NB-IoT Band13/CAT-M Band13	1.32	-0.83
NB-IoT Band26/CAT-M Band26 (814MHz-824MHz)	3.04	0.89
NB-IoT/CAT-M26 (824MHz-849MHz)	3.46	1.31

Antenna style: FPC antenna.

*AE ID: is used to identify the test sample in the lab internally.

dB*： is provided customer.

4. Reference Documents

4.1. Documents supplied by applicant

PICS/PIXIT, referring to Annex B for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC CFR Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS，e-CFR	--
PART 22	PUBLIC MOBILE SERVICES	--
PART 24	PERSONAL COMMUNICATIONS SERVICES,e-CFR,	--
PART 27	,MISCELLANEOUS WIRELESS OMMUNICATIONS SERVICES，e-CFR,	--
PART 90	PRIVATE LAND MOBILE RADIO SERVICES	--
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015

5. Test Equipments Utilized

5.1. RSE Test System

No.	Equipment	Model	SN	HW Version	SW Version	Manufacture	Cal.Due Date
1	Test Receiver	ESU26	100367	--	5.1-24-3	R&S	2023-06-29
2	Ultra-wideband Log Periodic Antenna	VULB 9163	01392	--	--	Schwarzbeck	2023-03-04
3	Double Ridged Guide Antenna	HF907	100357	--	--	R&S	2023-02-10
4	Universal Radio Communication Tester	CMW500	152395	--	--	R&S	2023-06-29
5	Generator	SMF100A	102222	--	--	R&S	2023-06-29
6	Ultra-wideband Log Periodic Antenna	VULB 9163	00995	--	--	R&S	2023-04-03
7	Double Ridged Guide Antenna	HF907	100356	--	--	R&S	2023-07-07

5.2. Climate Chamber

No.	Name	Type	SN	Manufacture	Cal.Due Date
2	Fully-Anechoic Chamber	FACT3-2	--	ETS	2025-04-29

5.3. Vibration table

No.	Name	Type	SN	Manufacture	Cal.Due Date
--	--	--	--	--	--

5.4. Test software

No.	Name	version	SN	Manufacture
1	EMC32	V 8.51.00	--	R&S

6. Test Results

6.1. Summary of Test Results

A brief summary of the tests carried out is shown as following.

FCC Rules	Name of Test	Result
2.1046,22.913(a),24.232(c),27.50,90.635(b)	ERP and EIRP	Pass
2.1051,24.238,2.1053,22.917, 27.53,90.691	Radiated Spurious Emission	Pass

6.2 ERP and EIRP

This is the test for the maximum radiated power from the EUT.

According to Part 22.913(a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to Part24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to Part 27.50(c), portable stations (hand-held devices) in the 600 MHz uplink Band and the 698-746 MHz Band, and fixed and mobile stations in the 600 MHz uplink Band are limited to 3 watts ERP.

According to Part 27.50(d), fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz Band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz Bands are limited to 1 watt EIRP.

According to 22.913(a), The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

According to Part 90.635(b), The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Conducted RF Power+Antenna Gain(dBi)=EIRP
Conducted RF Power+Antenna Gain(dBd)=ERP
Antenna Gain(dBd)= Antenna Gain(dBi)-2.15

Frequency Band	AntennaGain (dBi)	AntennaGain (dBd)
GSM1900/NB-IoT Band2/CAT-M Band2	1.50	-0.65
NB-IoT Band4/CAT-M Band 4	1.40	-0.75
GSM850/NB-IoT Band5/CAT-M Band5	3.46	1.31
NB-IoT Band12/CAT-M Band12	2.36	0.21
NB-IoT Band13/CAT-M Band13	1.32	-0.83
NB-IoT Band26/CAT-M Band26 (814MHz-824MHz)	3.04	0.89
NB-IoT/CAT-M26 (824MHz-849MHz)	3.46	1.31

NB-IoT Band 2

EIRP（dBm）EIRP Limit ： 33dBm Max EIRP=23.45dBm					
Sub-carrier Spacing [kHz]	Modulation	Ntones	Channel		
			Low18602	Mid18900	High19198
3.75	BPSK	1@0	23.31	22.71	23.01
		1@47	23.28	22.73	23.02
	QPSK	1@0	23.27	22.8	23.06
		1@47	23.24	22.74	22.99
15	BPSK	1@0	23.33	23.45	23.28
		1@11	23.33	23.45	23.24
	QPSK	1@0	23.34	22.65	23.35
		1@11	23.32	23.43	23.23
		12@0	21.72	21.82	22.42

NB-IoT Band 4

EIRP（dBm）Limit ： 30dBm Max EIRP=23.39dBm					
Sub-carrier Spacing [kHz]	Modulation	Ntones	Channel		
			Low19952	Mid20175	High20398
3.75	BPSK	1@0	23.37	22.71	22.56
		1@47	23.39	22.7	22.6
	QPSK	1@0	22.41	22.75	22.76
		1@47	23.32	22.7	22.61
15	BPSK	1@0	22.72	22.88	22.82
		1@11	22.68	22.8	22.8
	QPSK	1@0	22.74	22.99	22.86
		1@11	22.67	22.89	22.76
		12@0	22.08	22.27	22.16

NB-IoT B 12

ERP（Limits 34.8dBm ）max ERP =21.98dBm					
Sub-carrier Spacing [kHz]	Modulation	N_{tones}	Channel		
			Low23012	Mid23095	High23178
3.75	BPSK	1@0	21.70	21.62	21.98
		1@47	21.65	21.58	21.95
	QPSK	1@0	21.43	21.36	21.63
		1@47	21.47	21.33	21.6
15	BPSK	1@0	21.44	21.31	21.73
		1@11	21.42	21.37	21.56
	QPSK	1@0	21.63	21.61	21.89
		1@11	21.39	21.44	21.69
		12@0	20.57	20.69	21.01

NB-IoT B 13

ERP（Limits 34.8dBm ）max ERP =21.07dBm					
Sub-carrier Spacing [kHz]	Modulation	N_{tones}	Channel		
			Low23182	Mid23230	High23278
3.75	BPSK	1@0	20.93	20.63	20.68
		1@47	20.94	20.54	20.69
	QPSK	1@0	20.94	20.60	20.73
		1@47	20.91	20.51	20.66
15	BPSK	1@0	21.07	20.91	20.95
		1@11	21.01	20.75	20.91
	QPSK	1@0	21.06	20.99	21.02
		1@11	20.99	20.92	20.90
		12@0	19.32	19.42	20.09

NB-IoT B26
(824MHz-849MHz)

ERP（Limits 38.5dBm ）max ERP:23.29dBm					
Sub-carrier Spacing [kHz]	Modulation	N_{tones}	Channel		
			Low26792	Mid26915	High27038
3.75	BPSK	1@0	23.15	23.01	22.33
		1@47	23.29	22.99	23.27
	QPSK	1@0	23.13	23.10	23.24
		1@47	23.05	23.12	23.15
15	BPSK	1@0	22.79	23.24	22.59
		1@11	22.72	23.26	22.55
	QPSK	1@0	22.75	22.31	22.55
		1@11	22.68	22.45	22.48
		12@0	22.09	21.92	22.02

(814MHz-824MHz)

ERP（Limits 51.5 dBm ）max ERP:22.88dBm					
Sub-carrier Spacing [kHz]	Modulation	N_{tones}	Channel		
			Low26692	Mid26740	High26788
3.75	BPSK	1@0	22.69	22.67	22.50
		1@47	22.73	22.66	22.55
	QPSK	1@0	22.83	22.51	22.73
		1@47	22.76	22.56	22.60
15	BPSK	1@0	22.04	22.88	22.74
		1@11	22.14	22.86	22.71
	QPSK	1@0	21.99	21.94	22.83
		1@11	21.96	22.83	22.76
		12@0	21.86	21.87	21.88

CAT-M B2

Mode	Bandwidth	Channel	RB	Index	EIRP(Limits 33.0 dBm) Max EIRP:25.99	
					QPSK	16QAM
Band2	1.4MHz	18607	1#0	0	25.76	24.92
			6#0	0	23.52	23.65
		18900	1#0	0	25.29	24.48
			6#0	0	23.35	23.14
		19193	1#5	0	25.67	24.97
			6#0	0	23.38	23.86
	3MHz	18615	1#0	0	25.71	24.98
			6#0	0	23.57	23.61
		18900	1#0	0	25.41	24.69
			6#0	0	23.5	23.55
		19185	1#5	1	25.92	25.15
			6#0	1	25.15	23.73
	5MHz	18625	1#0	0	25.73	25.72
			6#0	0	24.49	24.84
		18900	1#0	0	25.36	25.89
			6#0	0	24.09	24.67
		19175	1#5	3	25.76	25.98

			6#0	3	24.5	24.95
	10MHz	18650	1#0	0	25.69	25.86
			4#0	0	25.51	25.62
		18900	1#0	0	25.47	24.85
			4#0	0	23.61	23.57
		19150	1#5	7	25.94	25.19
			4#2	7	24.93	23.68
	15MHz	18675	1#0	0	25.81	25.09
			6#0	0	23.97	24.04
		18900	1#0	0	25.06	24.99
			6#0	0	23.55	23.64
		19125	1#5	0	25.89	25.28
			6#0	0	25.29	23.78
	20MHz	18700	1#0	0	25.41	24.69
			6#0	0	23.5	23.55
		18900	1#0	0	25.99	25.17
			6#0	0	24.93	23.63
		19100	1#5	0	25.98	25.19
			6#0	0	25.25	24.13

CAT-M B4

Mode	Bandwidth	Channel	RB	Index	EIRP(Limits 30.0 dBm) Max EIRP:23.94dBm	
					QPSK	16QAM
Band4	1.4MHz	19957	1#0	0	23.69	22.84
			6#0	0	21.47	21.58
		20175	1#0	0	23.14	22.31
			6#0	0	21.28	21.03
		20393	1#5	0	23.52	22.88
			6#0	0	21.27	21.77
	3MHz	19965	1#0	0	23.81	22.78
			6#0	0	21.97	21.81
		20175	1#0	0	23.21	22.89
			6#0	0	21.8	22.15
		20385	1#5	1	23.52	22.65
			6#0	1	22.55	21.83
	5MHz	19975	1#0	0	23.64	23.61
			6#0	0	22.33	22.77
		20175	1#0	0	23.24	23.77
			6#0	0	21.98	22.53
		20375	1#5	3	23.64	23.82

			6#0	3	22.48	22.89
	10MHz	20000	1#0	0	23.71	23.86
			4#0	0	22.81	22.72
		20175	1#0	0	23.17	23.25
			4#0	0	22.31	21.57
		20350	1#5	7	23.94	22.89
			4#2	7	22.53	22.28
	15MHz	20025	1#0	0	23.79	22.93
			6#0	0	21.84	21.97
		20175	1#0	0	22.99	22.86
			6#0	0	21.44	21.55
		20325	1#5	0	23.78	23.19
			6#0	0	23.17	21.65
	20MHz	20050	1#0	0	22.71	23.09
			6#0	0	21.45	21.48
		20175	1#0	0	23.77	22.87
			6#0	0	22.63	21.57
		20300	1#5	0	23.74	23.39
			6#0	0	23.25	22.33

CAT-M B12

Mode	Bandwidth	Channel	RB	Index	ERP（Limits 34.8dBm ） Max ERP: 22.76dBm	
					QPSK	16QAM
Band12	1.4MHz	23017	1#0	0	22.48	21.70
			6#0	0	20.27	20.39
		23095	1#0	0	21.94	21.15
			6#0	0	20.10	19.83
		23173	1#5	0	21.90	20.62
			6#0	0	20.15	20.11
	3MHz	23025	1#0	0	22.52	21.69
			6#0	0	21.18	20.72
		23095	1#0	0	21.92	21.80
			6#0	0	20.64	20.46
		23165	1#5	1	22.10	20.85
			6#0	1	20.04	20.09
	5MHz	23035	1#0	0	22.47	22.45
			6#0	0	21.12	21.59
		23095	1#0	0	22.03	22.58
			6#0	0	20.78	21.32
		23155	1#5	3	21.91	21.80
			6#0	3	21.01	21.05
	10MHz	23060	1#0	0	22.70	22.76
			4#0	0	21.64	21.63
		23095	1#0	0	21.68	22.09
			4#0	0	21.13	20.35
		23130	1#5	7	22.11	22.02
			4#2	7	20.81	21.93

CAT-M B13

Mode	Bandwidth	Channel	RB	Index	ERP（Limits 34.8dBm ） Max ERP: 21.84dBm	
					QPSK	16QAM
Band13	5MHz	23205	1#0	0	21.63	21.81
			6#0	0	19.58	20.45
		23230	1#0	0	21.09	21.84
			6#0	3	19.34	20.91
		23255	1#5	3	21.55	21.42
			6#0	3	20.66	20.45
	10MHz	23230	1#0	0	21.58	21.52
			6#0	0	20.30	20.39
		23230	1#0	0	20.66	21.04
			6#0	0	19.49	19.61
		23230	1#5	7	21.55	21.13
			4#2	7	20.50	20.09

CAT-M B26
(824MHz-849MHz)

Mode	Bandwidth	Channel	RB	Index	ERP（Limits 38.5dBm ） Max ERP: 23.86dBm	
					QPSK	16QAM
Band26	1.4MHz	26797	1#0	0	23.58	22.80
			6#0	0	21.37	21.49
		26915	1#0	0	23.04	22.25
			6#0	0	21.20	20.93
		27033	1#5	0	23.42	22.74
			6#0	0	21.15	21.66
	3MHz	26805	1#0	0	23.62	22.79
			6#0	0	22.28	21.82
		26915	1#0	0	23.02	22.90
			6#0	0	21.74	21.56
		27025	1#5	1	23.83	22.66
			6#0	1	22.56	21.78
	5MHz	26815	1#0	0	23.57	23.55
			6#0	0	22.22	22.69
		26915	1#0	0	23.13	23.68
			6#0	0	21.88	22.42
		27015	1#5	3	23.59	23.76
			6#0	3	22.40	23.10
	10MHz	26840	1#0	0	23.80	23.86
			4#0	0	22.74	22.73
		26915	1#0	0	22.78	23.19
			4#0	0	22.23	21.45
		26990	1#5	7	23.65	22.77
			4#2	7	22.84	22.29

(814MHz-824MHz)

Mode	Bandwidth	Channel	RB	Index	ERP（Limits 51.5dBm ） Max ERP:23.40dBm	
					QPSK	16QAM
Band26	1.4MHz	26697	1#0	0	23.21	22.35
			6#0	0	21.34	21.52
		26740	1#0	0	22.01	21.34
			6#0	0	20.56	20.44
		26783	1#5	0	23.26	22.50
			6#0	0	20.65	21.74
	3MHz	26705	1#0	0	23.18	22.53
			6#0	0	21.26	21.13
		26740	1#0	0	22.57	22.32
			6#0	0	21.01	21.12
		26775	1#5	1	23.27	22.61
			6#0	1	22.50	21.70
	5MHz	26715	1#0	0	23.40	23.32
			6#0	0	21.77	22.81
		26740	1#0	0	22.64	23.15
			6#0	0	21.38	22.19
		26765	1#5	3	23.28	23.15
			6#0	3	22.28	22.52
	10MHz	26740	1#0	0	23.08	23.14
			4#0	0	22.24	22.11

6.2. Radiated Spurious Emission

Specifications:	FCC Part 2.1051, 2.1053, 22.917,90.691
DUT Serial Number:	866884046100616
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB, so the limit level is: P(dBm)– (43 + 10 log(P)) dB= -13dBm.

According to Part 27.53(c):

On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 Bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10(P) dB.

According to Part 27.53(g):

For operations in the 600 MHz Band and the 698-746 MHz Band, the power of any emission outside a licensee's frequency Band(s) of operation shall be attenuated below the transmitter power (P) within the licensed Band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116

Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Limits for Radiated spurious emissions(UE)	
Frequency range	**Limit Level /Resolution Bandwidth**
30 MHz to 20000 MHz	-13dBm/1MHz

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty（30MHz-150MHz）	5.15 dB (k=2)
Expanded Uncertainty（150MHz-1GHz）	4.09dB (k=2)
Expanded Uncertainty（1GHz-3GHz）	2.92dB (k=2)
Expanded Uncertainty（3GHz-6GHz）	2.93dB (k=2)
Expanded Uncertainty（3GHz-12.75GHz）	2.69dB (k=2)

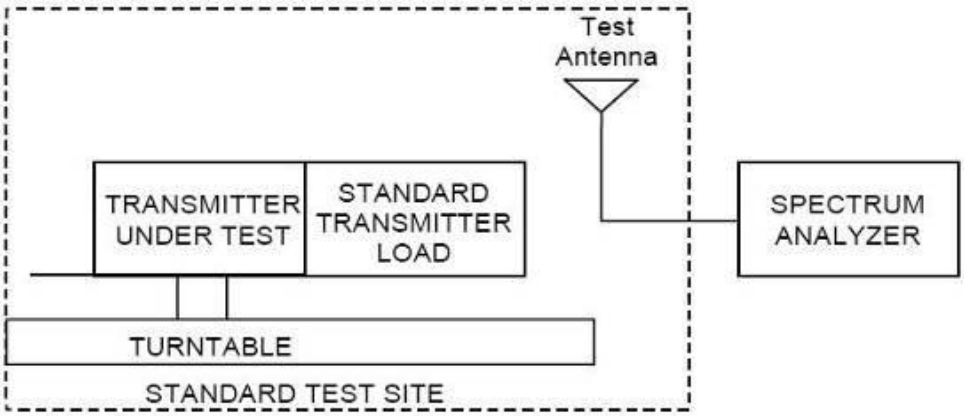
Test Setup:

The EUT was placed in an anechoic chamber. The Wireless Communications Test Set was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

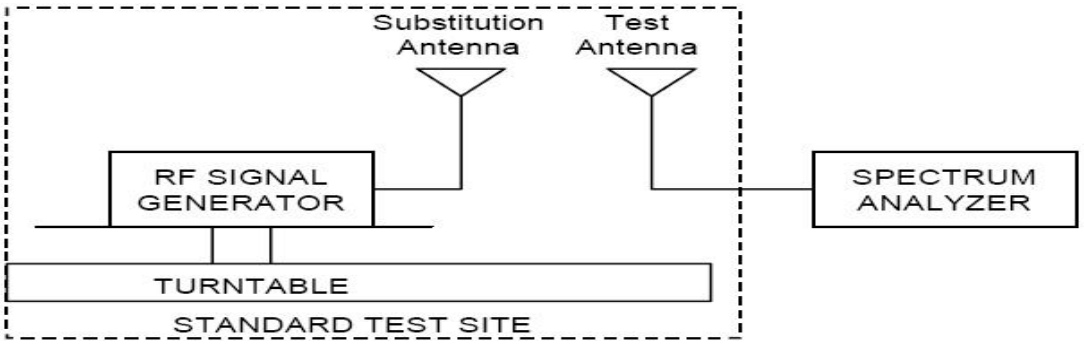
Test Method:

The measurement method is substitution method accordance with section 2.2.12 of ANSI/TIA-603-E: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

(a) Connect the equipment as illustrated and measure the spurious emissions as the method as above. The distance from the device to the antenna is 3 m .



(b) Reconnect the equipment as illustrated.



(c) Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter.

(d) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

(e) Repeat step d) with both antennas vertically polarized for each spurious frequency.

(f) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps d) and e) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

P_d(dBm) = P_g(dBm) – cable loss (dB) + antenna gain (dB)

where:

Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.

Test frequency：30MHz-20GHz

All modes were tested,only the worst case was reported.

NB-IoT B2 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH18900）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
460.8	-79.3	0.5	7.1	-72.7	V
1700.8	-55.6	1.0	7.6	-49.0	H
2059.0	-63.2	1.2	7.8	-56.6	V
3759.6	-50.0	1.6	9.0	-42.6	V
5640.0	-66.2	2.3	10.6	-57.9	V
11279.3	-65.1	3.4	13.8	-54.7	V

NB-IoT B4 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH19952）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
468.5	-78.9	0.5	7.1	-72.3	V
1106.0	-63.0	0.8	6.8	-57.0	H
1561.2	-62.2	1.0	6.3	-56.9	H
3420.0	-48.4	1.5	8.9	-41.0	V
5130.4	-69.3	2.0	10.2	-61.1	V
10260.8	-66.6	3.3	13.0	-56.9	V

NB-IoT B12 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH23178）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
91.2	-83.5	0.2	-0.6	-84.3	V
480.0	-87.2	0.5	7.1	-80.6	H
2209.8	-65.2	1.2	6.0	-60.4	V
3536.8	-68.0	1.6	9.0	-60.6	V
6490.4	-70.8	2.4	11.2	-62.0	V
10131.6	-67.8	3.5	12.9	-58.4	V

NB-IoT B13 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH23182）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
174.2	-80.5	0.3	5.9	-74.9	V
476.2	-81.9	0.5	7.1	-75.3	H
1554.4	-70.1	1.0	6.2	-64.9	H
2949.4	-60.8	1.5	5.9	-56.4	H
4928.0	-70.9	1.9	9.5	-63.3	V
10115.6	-68.9	3.3	13.0	-59.2	V

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1577.8	-73.6	1.0	6.3	-68.3	V

The max radiated power of 1559-1610 MHz is -73.6dBm＜-40dBm（-70dBW）.

There is no signal that bandwidth is less than 700 Hz bandwidth

NB-IoT B26 （814-824）Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH26740）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
460.8	-76.7	0.5	7.1	-70.1	V
1235.0	-74.2	0.9	7.6	-67.5	V
2322.4	-62.6	1.2	6.1	-57.7	H
4119.6	-69.7	1.8	9.3	-62.2	V
6493.6	-70.6	2.4	11.2	-61.8	V
10046.4	-68.7	3.2	13.0	-58.9	V

NB-IoT B26 Radiated Spurious Emission Results

Test Data 824-849 （3.75K bandwidth BPSK Mode CH26792）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
460.8	-76.1	0.5	7.1	-69.5	V
1016.0	-74.3	0.8	6.9	-68.2	H
2980.2	-60.2	1.5	5.3	-56.4	H
3476.0	-70.0	1.5	9.0	-62.5	V
6466.4	-70.4	2.4	11.2	-61.6	V
12029.0	-68.7	3.7	14.0	-58.4	V

CaT-M B2 Radiated Spurious Emission Results

Test Data （20M bandwidth QPSK Mode CH18900）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.5	-72.6	0.2	-0.6	-73.4	V
479.5	-68.0	0.5	7.1	-61.4	H
2678.6	-61.1	1.3	5.6	-56.8	V
3768.8	-65.7	1.6	9.0	-58.3	V
6514.8	-69.5	2.5	11.2	-60.8	V
11257.3	-66.8	3.2	13.7	-56.3	V

CaT-M B4 Radiated Spurious Emission Results

Test Data （10M bandwidth QPSK Mode CH20350）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.5	-71.6	0.2	-0.6	-72.4	V
480.0	-81.3	0.5	7.1	-74.7	H
760.4	-69.0	0.7	6.5	-63.2	H
4304.4	-68.7	1.8	9.3	-61.2	V
6538.4	-70.6	2.5	11.2	-61.9	V
10483.2	-69.2	3.5	13.2	-59.5	V

CaT-M B12 Radiated Spurious Emission Results

Test Data （10M bandwidth 16QAM Mode CH23060）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.2	-72.8	0.2	-0.6	-73.6	V
248.0	-88.5	0.4	5.5	-83.4	H
476.8	-84.1	0.5	7.1	-77.5	H
4938.4	-71.2	1.9	9.46	-63.6	V
6523.6	-70.5	2.5	11.2	-61.8	V
8186.4	-69.7	2.7	11.8	-60.6	V

CaT-M B13 Radiated Spurious Emission Results

Test Data （5M bandwidth 16QAM Mode CH23230）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1564.0	-71.90	1.0	6.2	-66.7	V
2346.0	-66.10	1.3	6.4	-61.0	H
3128.0	-74.38	1.5	8.28	-67.6	V
3910.0	-72.43	1.7	9.03	-65.1	V
4692.0	-72.90	1.9	9.9	-64.9	V
5474.0	-71.85	2.1	10.35	-63.6	V

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1583.6	-75.0	1.0	6.2	-69.8	V

The max radiated power of 1559-1610 MHz is -75.0 dBm＜-40dBm（-70dBW） .

There is no signal that bandwidth is less than 700 Hz bandwidth

CaT-M B26 Radiated Spurious Emission Results

Test Data 814-824MHz （5M bandwidth QPSK Mode CH26715）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.6	-83.6	0.2	-0.6	-84.4	V
248.0	-90.1	0.4	5.5	-85.0	H
460.8	-85.0	0.5	7.1	-78.4	H
3446.0	-68.3	1.5	8.9	-60.9	V
7472.4	-69.3	2.5	11.4	-60.4	V
11280.7	-69.1	3.4	13.8	-58.7	V

CaT-M B26 Radiated Spurious Emission Results

Test Data 824-849 MHz（10M bandwidth 16QAM Mode CH26840）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
90.6	-84.4	0.2	-0.6	-85.2	V
248.0	-89.3	0.4	5.5	-84.2	H
464.0	-83.3	0.5	7.1	-76.7	H
3504.8	-68.3	1.6	9.0	-60.9	V
6536.4	-70.4	2.5	11.2	-61.7	V
9417.6	-67.8	3.3	12.3	-58.8	V

Annex A EUT Photos

See the document" I22W00060-External Photos".
See the document" I22W00060-Internal Photos ".

ANNEX B Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*****END OF REPORT*****