RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISBLA-L29
Product	Smart Phone
Model	BLA-L29
Report No.	R1809H0120-R1
Issue Date	November 16, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2018)/ FCC CFR 47 Part 24E (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Jiangpeng Lan

Performed by: Jiangpeng Lan

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	24.232(c)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 /24.238(a)	PASS
5	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 24.235	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
8	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS
Date of Testing: September 18, 2018 ~ October 27, 2018			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

Note:

The device has two SIM card slot, and two 2G/3G/4G TX antennas (Main Antenna and Secondary Antenna). Main antenna (Ant1) and Secondary antenna (Ant 2) can't transmit simultaneously which will be chosen based on the RSSI. Only one antenna can be used for 2G/3G/4G transmission at a time.

For SIM card slot and TX antennas RF test, each one should be applied throughout the compliance test respectively, and however, only the worst case (SIM 1) and Main antenna (Ant1) will be recorded in this report.

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1. Test Laboratory

1.1. Notes of the test report

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1.2. Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

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1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
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2. General Description of Equipment under Test

Client Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.

General information

EUT Description			
Model	BLA-L29		
IMEI:	IMEI 1:866219030025331 IMEI 2:866219030029333		
Hardware Version	HL1BLAM		
Software Version	BLA-L29 8.0.0.69(C432)		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Test Mode(s)	LTE Band 2(CA_2C);		
Test Modulation	QPSK,16QAM, 64QAM		
LTE Category	Category 18		
Maximum E.I.R.P	LTE Band 2(CA_2C):	21.91dBm	
Rated Power Supply Voltage	3.82V		
Extreme Voltage	Minimum: 3.6V Maximum: 4.35V		
Extreme Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2(CA_2C)	1850 ~ 1910	1930 ~ 1990
EUT Accessory			
Battery 1	Manufacturer: SCUD (FUJIAN) Electronics Co., Ltd Model: HB436486ECW Power Rating: DC 3.82V, 3900mAh, Li-ion		
Battery 2	Manufacturer: Sunwoda Electronic Co., LTD Model: HB436486ECW Power Rating: DC 3.82V, 3900mAh, Li-ion		
Battery 3	Manufacturer: Desay Battery Co., Ltd. Model: HB436486ECW Power Rating: DC 3.82V, 3900mAh, Li-ion		
Earphone 1	Manufacturer: JIANGXI LIANCHUANG HONGSHENG ELECTRONIC CO., LTD Model: MEND1632B729000		

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Earphone 2	Manufacturer: BOLUO COUNTY QUANCHENG ELECTRONIC CO., LTD Model: 1311-3301-6001-TC-296
Earphone 3	Manufacturer: Goer Tek Inc Model: WINDY-C
Earphone 4	Manufacturer: MERRY ELECTRONICS (SHENZHEN) CO., LTD. Model: L99EP003-CS-H
Earphone 5	Manufacturer: JIANGXI LIANCHUANG HONGSHENG ELECTRONIC CO., LTD Model: MEND1632B729001
Earphone 6	Manufacturer: BOLUO COUNTY QUANCHENG ELECTRONIC CO., LTD Model: 1311-3301-6001-TC-305
Note: The information of the EUT is declared by the manufacturer. 2. There are more than one Battery and Earphone, each one should be applied throughout the compliance test respectively, and however, only the worst case (Battery 1 and Earphone 1) will be recorded in this report.	

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3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR47 Part 2 (2018)

FCC CFR 47 Part 24E (2018)

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v03r01

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4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.
Subsequently, only the worst case emissions are reported.
The following testing in LTE is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below for LTE Band 2(CA_2C):

Test items	Bandwidth (MHz) (PCC+SCC)						Modulation			RB#offset (PCC+SCC)			Test Channel		
	5 + 20	10 + 15	10 + 20	15 + 15	15 + 20	20 + 20	QPSK	16QAM	64QAM	1#max+1#0	1#0+1#max	100%+100%	L	M	H
RF power output	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Band Edge Compliance	O	-	-	-	-	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Frequency Stability	O	-	-	-	-	O	O	O	O	O	O	O	O	O	O
Conducted Spurious Emissions	O	-	-	-	-	O	O	-	-	O	-	-	O	O	O
Radiates Spurious Emission	O	-	O	-	-	O	O	-	-	O	-	-	-	O	-
Note	1. The mark “O” means that this configuration is chosen for testing. 2. The mark “-” means that this configuration is not testing.														

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5. Test Case Results

5.1. RF Power Output

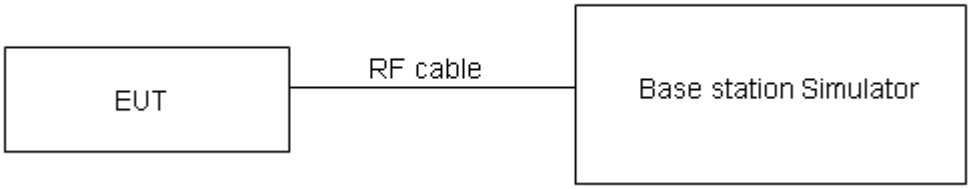
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB.

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Test Results

CA_2C	PCC		SCC1		PCC RB		SCC1 RB		Conducted Power (dBm)		
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Size	Offset	Size	Offset	QPSK	16QAM	64QAM
5MHz+20MHz	18633	1853.3	18750	1865	1	24	1	0	22.61	21.52	20.80
	18633	1853.3	18750	1865	1	0	1	99	13.02	12.45	11.26
	18633	1853.3	18750	1865	25	0	100	0	20.51	19.54	18.39
	18808	1870.8	18925	1882.5	1	24	1	0	22.41	21.72	20.55
	18808	1870.8	18925	1882.5	1	0	1	99	13.99	12.67	11.51
	18808	1870.8	18925	1882.5	25	0	100	0	20.34	18.98	18.32
	18983	1888.3	19100	1900	1	24	1	0	22.80	21.91	20.70
	18983	1888.3	19100	1900	1	0	1	99	13.39	12.66	12.01
	18983	1888.3	19100	1900	25	0	100	0	19.75	18.80	17.67
20MHz+5MHz	18700	1860	18817	1871.7	1	99	1	0	21.86	21.22	20.97
	18700	1860	18817	1871.7	1	0	1	24	13.99	13.02	12.62
	18700	1860	18817	1871.7	100	0	25	0	20.43	19.78	18.19
	18875	1877.5	18992	1889.2	1	99	1	0	22.00	21.07	20.64
	18875	1877.5	18992	1889.2	1	0	1	24	14.01	13.21	11.49
	18875	1877.5	18992	1889.2	100	0	25	0	19.20	18.11	17.91
	19050	1895	19167	1906.7	1	99	1	0	23.25	22.20	21.02
	19050	1895	19167	1906.7	1	0	1	24	13.64	12.96	11.77
	19050	1895	19167	1906.7	100	0	25	0	20.57	19.57	18.36
10MHz+15MHz	18653	1855.3	18773	1867.3	1	49	1	0	23.01	22.20	21.02
	18653	1855.3	18773	1867.3	1	0	1	74	13.44	12.62	11.45
	18653	1855.3	18773	1867.3	50	0	75	0	19.71	18.99	18.32
	18829	1872.9	18949	1884.9	1	49	1	0	22.84	21.88	21.03
	18829	1872.9	18949	1884.9	1	0	1	74	13.14	12.46	11.52
	18829	1872.9	18949	1884.9	50	0	75	0	19.62	18.66	17.50
	19005	1890.5	19125	1902.5	1	49	1	0	23.00	22.30	21.56
	19005	1890.5	19125	1902.5	1	0	1	74	13.35	12.68	11.58
	19005	1890.5	19125	1902.5	50	0	75	0	19.22	18.85	18.34
15MHz+10MHz	18675	1857.5	18795	1869.5	1	74	1	0	22.72	21.94	21.31
	18675	1857.5	18795	1869.5	1	0	1	49	13.42	13.07	12.39
	18675	1857.5	18795	1869.5	75	0	50	0	19.72	18.74	18.03
	18851	1875.1	18971	1887.1	1	74	1	0	22.82	22.05	21.49
	18851	1875.1	18971	1887.1	1	0	1	49	13.09	12.06	11.86
	18851	1875.1	18971	1887.1	75	0	50	0	20.15	19.02	18.74
	19027	1892.7	19147	1904.7	1	74	1	0	23.04	22.11	21.95
	19027	1892.7	19147	1904.7	1	0	1	49	13.37	12.95	12.06
	19027	1892.7	19147	1904.7	75	0	50	0	19.95	18.82	18.03
10MHz+20MHz	18655	1855.5	18799	1869.9	1	49	1	0	22.62	21.97	21.23
	18655	1855.5	18799	1869.9	1	0	1	99	13.21	12.44	12.23
	18655	1855.5	18799	1869.9	50	0	100	0	20.61	19.47	18.30

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	18806	1870.6	18950	1885	1	49	1	0	22.68	21.89	20.88
	18806	1870.6	18950	1885	1	0	1	99	13.56	12.97	12.19
	18806	1870.6	18950	1885	50	0	100	0	20.61	19.48	18.28
	18956	1885.6	19100	1900	1	49	1	0	22.87	21.97	20.96
	18956	1885.6	19100	1900	1	0	1	99	13.26	12.96	12.38
	18956	1885.6	19100	1900	50	0	100	0	20.83	19.77	18.62
20MHz+10MHz	18700	1860	18844	1874.4	1	99	1	0	22.92	21.99	21.12
	18700	1860	18844	1874.4	1	0	1	49	13.42	13.04	12.52
	18700	1860	18844	1874.4	100	0	50	0	20.69	19.70	18.50
	18851	1875.1	18995	1889.5	1	99	1	0	23.01	22.12	21.34
	18851	1875.1	18995	1889.5	1	0	1	49	13.01	12.93	12.09
	18851	1875.1	18995	1889.5	100	0	50	0	19.93	19.03	18.25
	19001	1890.1	19145	1904.5	1	99	1	0	23.20	22.35	21.75
	19001	1890.1	19145	1904.5	1	0	1	49	13.57	13.02	12.41
	19001	1890.1	19145	1904.5	100	0	50	0	21.19	19.03	18.80
15MHz+15MHz	18675	1857.5	18825	1872.5	1	74	1	0	22.38	21.58	20.85
	18675	1857.5	18825	1872.5	1	0	1	74	13.87	13.02	12.60
	18675	1857.5	18825	1872.5	75	0	75	0	20.41	19.38	18.20
	18825	1872.5	18975	1887.5	1	74	1	0	22.45	21.68	20.48
	18825	1872.5	18975	1887.5	1	0	1	74	13.39	12.57	11.98
	18825	1872.5	18975	1887.5	75	0	75	0	19.78	18.69	18.08
	18975	1887.5	19125	1902.5	1	74	1	0	22.68	22.01	20.77
	18975	1887.5	19125	1902.5	1	0	1	74	13.56	13.03	12.58
	18975	1887.5	19125	1902.5	75	0	75	0	19.90	18.78	18.62
15MHz+20MHz	18678	1857.8	18849	1874.9	1	74	1	0	22.49	21.78	20.95
	18678	1857.8	18849	1874.9	1	0	1	99	13.84	13.20	12.67
	18678	1857.8	18849	1874.9	75	0	100	0	20.20	19.19	17.98
	18803	1870.3	18974	1887.4	1	74	1	0	22.62	21.86	20.87
	18803	1870.3	18974	1887.4	1	0	1	99	13.95	13.02	12.57
	18803	1870.3	18974	1887.4	75	0	100	0	19.98	18.93	17.89
	18929	1882.9	19100	1900	1	74	1	0	22.66	21.72	20.91
	18929	1882.9	19100	1900	1	0	1	99	13.86	13.02	12.60
	18929	1882.9	19100	1900	75	0	100	0	19.74	18.72	18.02
20MHz+15MHz	18700	1860	18871	1877.1	1	99	1	0	22.91	22.08	21.09
	18700	1860	18871	1877.1	1	0	1	74	13.35	13.03	12.73
	18700	1860	18871	1877.1	100	0	75	0	19.82	18.98	18.05
	18826	1872.6	18997	1889.7	1	99	1	0	22.94	22.07	21.02
	18826	1872.6	18997	1889.7	1	0	1	74	13.81	13.15	12.61
	18826	1872.6	18997	1889.7	100	0	75	0	19.91	18.83	17.97
	18951	1885.1	19122	1902.2	1	99	1	0	23.14	22.19	21.76
	18951	1885.1	19122	1902.2	1	0	1	74	13.48	12.96	12.60
	18951	1885.1	19122	1902.2	100	0	75	0	20.06	19.00	18.89
20MHz+20MHz	18700	1860	18898	1879.8	1	99	1	0	22.70	21.96	21.43

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	18700	1860	18898	1879.8	1	0	1	99	13.68	13.12	12.94
	18700	1860	18898	1879.8	100	0	100	0	19.18	18.19	17.93
	18801	1870.1	18999	1889.9	1	99	1	0	22.83	21.99	21.55
	18801	1870.1	18999	1889.9	1	0	1	99	13.94	13.12	12.43
	18801	1870.1	18999	1889.9	100	0	100	0	19.76	18.94	17.96
	18902	1880.2	19100	1900	1	99	1	0	22.94	22.03	21.67
	18902	1880.2	19100	1900	1	0	1	99	13.75	13.28	12.43
	18902	1880.2	19100	1900	100	0	100	0	19.88	19.25	18.91

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5.2. Effective Isotropic Radiated Power

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.LOSS = Generator Output Power (dBm) – Analyzer reading (dBm)
e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:ERP (dBm) = LVL (dBm) + LOSS (dB)
f) The maximum ERP is the maximum value determined in the preceding step.
g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:
EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBd)
where:dBd refers to gain relative to an ideal dipole.
EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

The RB allocation refers to section 5.1, using the maximum output power configuration.

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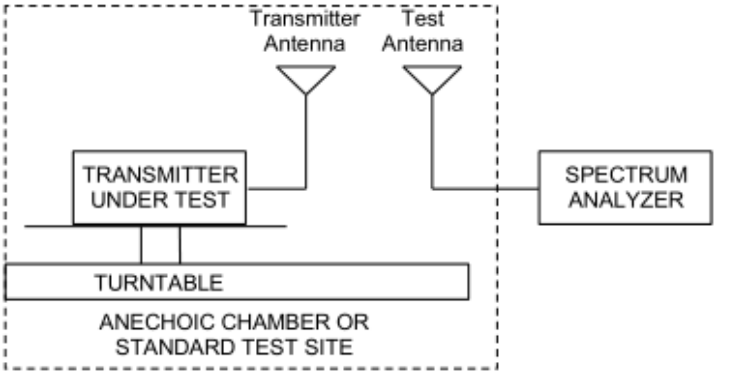
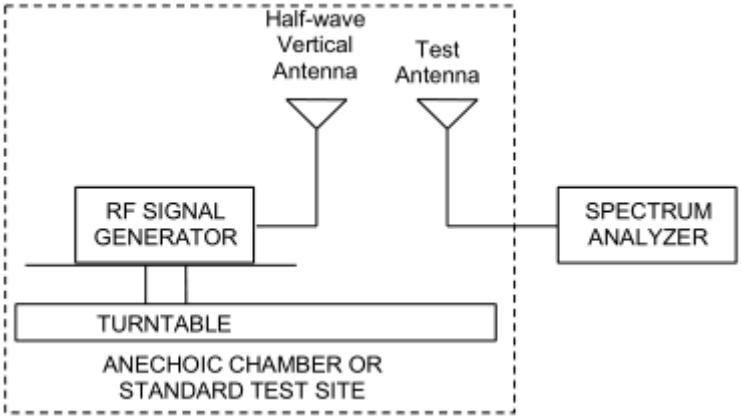
Test setup





Limits

Rule Part 24.232(c) Mobile and portable stations are limited to 2 watts EIRP.
Rule Part 24.232(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Limit	⩽ 2 W (33 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 1.19 dB

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Test Results:

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

CA_2C	PCC		SCC1		Polarization	EIRP (dBm)
	Channel	Frequency (MHz)	Channel	Frequency (MHz)		
5MHz+20MHz_QPSK	18633	1853.3	18750	1865	H	21.50
5MHz+20MHz_16QAM	18633	1853.3	18750	1865	H	21.01
5MHz+20MHz_64QAM	18633	1853.3	18750	1865	H	20.87
5MHz+20MHz_QPSK	18808	1870.8	18925	1882.5	H	21.19
5MHz+20MHz_16QAM	18808	1870.8	18925	1882.5	H	20.88
5MHz+20MHz_64QAM	18808	1870.8	18925	1882.5	H	20.65
5MHz+20MHz_QPSK	18983	1888.3	19100	1900	H	21.37
5MHz+20MHz_16QAM	18983	1888.3	19100	1900	H	20.99
5MHz+20MHz_64QAM	18983	1888.3	19100	1900	H	20.81
20MHz+5MHz_QPSK	18700	1860	18817	1871.7	H	21.28
20MHz+5MHz_16QAM	18700	1860	18817	1871.7	H	20.59
20MHz+5MHz_64QAM	18700	1860	18817	1871.7	H	20.34
20MHz+5MHz_QPSK	18875	1877.5	18992	1889.2	H	21.42
20MHz+5MHz_16QAM	18875	1877.5	18992	1889.2	H	20.97
20MHz+5MHz_64QAM	18875	1877.5	18992	1889.2	H	20.75
20MHz+5MHz_QPSK	19050	1895	19167	1906.7	H	19.84
20MHz+5MHz_16QAM	19050	1895	19167	1906.7	H	19.46
20MHz+5MHz_64QAM	19050	1895	19167	1906.7	H	19.21
10MHz+15MHz_QPSK	18653	1855.3	18773	1867.3	H	21.59
10MHz+15MHz_16QAM	18653	1855.3	18773	1867.3	H	20.93
10MHz+15MHz_64QAM	18653	1855.3	18773	1867.3	H	20.74
10MHz+15MHz_QPSK	18829	1872.9	18949	1884.9	H	21.16
10MHz+15MHz_16QAM	18829	1872.9	18949	1884.9	H	20.33
10MHz+15MHz_64QAM	18829	1872.9	18949	1884.9	H	20.13
10MHz+15MHz_QPSK	19005	1890.5	19125	1902.5	H	20.68
10MHz+15MHz_16QAM	19005	1890.5	19125	1902.5	H	20.41
10MHz+15MHz_64QAM	19005	1890.5	19125	1902.5	H	20.20
15MHz+10MHz_QPSK	18675	1857.5	18795	1869.5	H	21.28
15MHz+10MHz_16QAM	18675	1857.5	18795	1869.5	H	20.76
15MHz+10MHz_64QAM	18675	1857.5	18795	1869.5	H	20.54
15MHz+10MHz_QPSK	18851	1875.1	18971	1887.1	H	21.27
15MHz+10MHz_16QAM	18851	1875.1	18971	1887.1	H	20.83
15MHz+10MHz_64QAM	18851	1875.1	18971	1887.1	H	20.62
15MHz+10MHz_QPSK	19027	1892.7	19147	1904.7	H	20.34
15MHz+10MHz_16QAM	19027	1892.7	19147	1904.7	H	19.64
15MHz+10MHz_64QAM	19027	1892.7	19147	1904.7	H	19.43

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10MHz+20MHz_QPSK	18655	1855.5	18799	1869.9	H	21.91
10MHz+20MHz_16QAM	18655	1855.5	18799	1869.9	H	21.17
10MHz+20MHz_64QAM	18655	1855.5	18799	1869.9	H	21.02
10MHz+20MHz_QPSK	18806	1870.6	18950	1885	H	21.43
10MHz+20MHz_16QAM	18806	1870.6	18950	1885	H	20.82
10MHz+20MHz_64QAM	18806	1870.6	18950	1885	H	20.57
10MHz+20MHz_QPSK	18956	1885.6	19100	1900	H	21.21
10MHz+20MHz_16QAM	18956	1885.6	19100	1900	H	20.65
10MHz+20MHz_64QAM	18956	1885.6	19100	1900	H	20.43
20MHz+10MHz_QPSK	18700	1860	18844	1874.4	H	21.28
20MHz+10MHz_16QAM	18700	1860	18844	1874.4	H	20.62
20MHz+10MHz_64QAM	18700	1860	18844	1874.4	H	20.32
20MHz+10MHz_QPSK	18851	1875.1	18995	1889.5	H	21.59
20MHz+10MHz_16QAM	18851	1875.1	18995	1889.5	H	21.08
20MHz+10MHz_64QAM	18851	1875.1	18995	1889.5	H	20.85
20MHz+10MHz_QPSK	19001	1890.1	19145	1904.5	H	20.24
20MHz+10MHz_16QAM	19001	1890.1	19145	1904.5	H	19.83
20MHz+10MHz_64QAM	19001	1890.1	19145	1904.5	H	19.61
15MHz+15MHz_QPSK	18675	1857.5	18825	1872.5	H	20.88
15MHz+15MHz_16QAM	18675	1857.5	18825	1872.5	H	20.58
15MHz+15MHz_64QAM	18675	1857.5	18825	1872.5	H	20.32
15MHz+15MHz_QPSK	18825	1872.5	18975	1887.5	H	20.77
15MHz+15MHz_16QAM	18825	1872.5	18975	1887.5	H	20.33
15MHz+15MHz_64QAM	18825	1872.5	18975	1887.5	H	20.21
15MHz+15MHz_QPSK	18975	1887.5	19125	1902.5	H	20.32
15MHz+15MHz_16QAM	18975	1887.5	19125	1902.5	H	19.92
15MHz+15MHz_64QAM	18975	1887.5	19125	1902.5	H	19.76
15MHz+20MHz_QPSK	18678	1857.8	18849	1874.9	H	21.26
15MHz+20MHz_16QAM	18678	1857.8	18849	1874.9	H	20.73
15MHz+20MHz_64QAM	18678	1857.8	18849	1874.9	H	20.43
15MHz+20MHz_QPSK	18803	1870.3	18974	1887.4	H	20.71
15MHz+20MHz_16QAM	18803	1870.3	18974	1887.4	H	20.23
15MHz+20MHz_64QAM	18803	1870.3	18974	1887.4	H	20.06
15MHz+20MHz_QPSK	18929	1882.9	19100	1900	H	20.96
15MHz+20MHz_16QAM	18929	1882.9	19100	1900	H	20.39
15MHz+20MHz_64QAM	18929	1882.9	19100	1900	H	20.18
20MHz+15MHz_QPSK	18700	1860	18871	1877.1	H	20.71
20MHz+15MHz_16QAM	18700	1860	18871	1877.1	H	20.30
20MHz+15MHz_64QAM	18700	1860	18871	1877.1	H	20.13
20MHz+15MHz_QPSK	18826	1872.6	18997	1889.7	H	21.18
20MHz+15MHz_16QAM	18826	1872.6	18997	1889.7	H	20.72
20MHz+15MHz_64QAM	18826	1872.6	18997	1889.7	H	20.57
20MHz+15MHz_QPSK	18951	1885.1	19122	1902.2	H	20.62

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20MHz+15MHz_16QAM	18951	1885.1	19122	1902.2	H	20.15
20MHz+15MHz_64QAM	18951	1885.1	19122	1902.2	H	20.04
20MHz+20MHz_QPSK	18700	1860	18898	1879.8	H	20.74
20MHz+20MHz_16QAM	18700	1860	18898	1879.8	H	20.28
20MHz+20MHz_64QAM	18700	1860	18898	1879.8	H	20.08
20MHz+20MHz_QPSK	18801	1870.1	18999	1889.9	H	20.82
20MHz+20MHz_16QAM	18801	1870.1	18999	1889.9	H	20.31
20MHz+20MHz_64QAM	18801	1870.1	18999	1889.9	H	20.14
20MHz+20MHz_QPSK	18902	1880.2	19100	1900	H	21.43
20MHz+20MHz_16QAM	18902	1880.2	19100	1900	H	21.03
20MHz+20MHz_64QAM	18902	1880.2	19100	1900	H	20.88

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5.3. Occupied Bandwidth

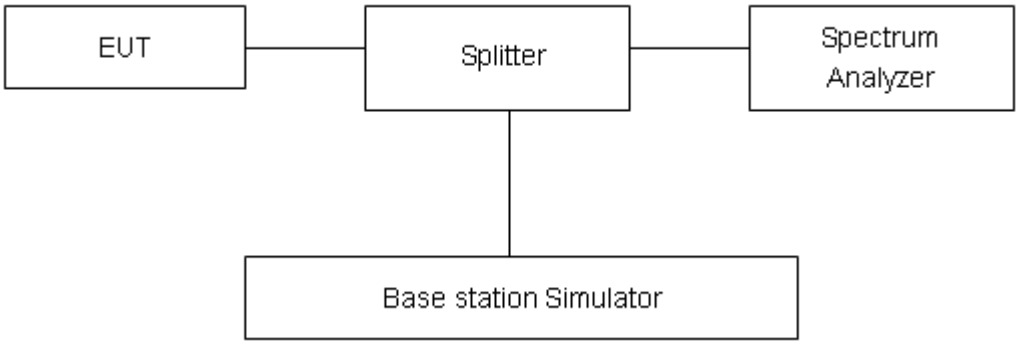
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 1MHz, VBW is set to 3MHz for CA_2C.
99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 2, *U*= 624Hz.

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Test Result

CA_2C	PCC		SCC1		PCC RB	SCC1 RB	Bandwidth(MHz)	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)			99% Power	-26dBc
5MHz+20MHz_QPSK	18808	1870.8	18925	1882.5	25#0	100#0	23.46	25.20
5MHz+20MHz_16QAM	18808	1870.8	18925	1882.5	25#0	100#0	23.49	25.11
5MHz+20MHz_64QAM	18808	1870.8	18925	1882.5	25#0	100#0	23.34	25.30
20MHz+5MHz_QPSK	18875	1877.5	18992	1889.2	100#0	25#0	23.29	25.39
20MHz+5MHz_16QAM	18875	1877.5	18992	1889.2	100#0	25#0	23.26	25.29
20MHz+5MHz_64QAM	18875	1877.5	18992	1889.2	100#0	25#0	23.28	25.53
10MHz+15MHz_QPSK	18829	1872.9	18949	1884.9	50#0	75#0	23.57	25.63
10MHz+15MHz_16QAM	18829	1872.9	18949	1884.9	50#0	75#0	23.51	25.62
10MHz+15MHz_64QAM	18829	1872.9	18949	1884.9	50#0	75#0	23.56	25.62
15MHz+10MHz_QPSK	18851	1875.1	18971	1887.1	75#0	50#0	23.51	25.74
15MHz+10MHz_16QAM	18851	1875.1	18971	1887.1	75#0	50#0	23.45	25.60
15MHz+10MHz_64QAM	18851	1875.1	18971	1887.1	75#0	50#0	23.51	25.66
10MHz+20MHz_QPSK	18806	1870.6	18950	1885	50#0	100#0	28.11	30.32
10MHz+20MHz_16QAM	18806	1870.6	18950	1885	50#0	100#0	28.01	30.28
10MHz+20MHz_64QAM	18806	1870.6	18950	1885	50#0	100#0	28.05	30.17
20MHz+10MHz_QPSK	18851	1875.1	18995	1889.5	100#0	50#0	28.05	30.25
20MHz+10MHz_16QAM	18851	1875.1	18995	1889.5	100#0	50#0	28.02	30.32
20MHz+10MHz_64QAM	18851	1875.1	18995	1889.5	100#0	50#0	28.03	30.44
15MHz+15MHz_QPSK	18825	1872.5	18975	1887.5	75#0	75#0	28.61	30.98
15MHz+15MHz_16QAM	18825	1872.5	18975	1887.5	75#0	75#0	28.56	30.96
15MHz+15MHz_64QAM	18825	1872.5	18975	1887.5	75#0	75#0	28.59	31.03
15MHz+20MHz_QPSK	18803	1870.3	18974	1887.4	75#0	100#0	32.84	35.31
15MHz+20MHz_16QAM	18803	1870.3	18974	1887.4	75#0	100#0	32.85	35.49
15MHz+20MHz_64QAM	18803	1870.3	18974	1887.4	75#0	100#0	32.85	35.40
20MHz+15MHz_QPSK	18826	1872.6	18997	1889.7	100#0	75#0	32.87	35.43
20MHz+15MHz_16QAM	18826	1872.6	18997	1889.7	100#0	75#0	32.79	35.31
20MHz+15MHz_64QAM	18826	1872.6	18997	1889.7	100#0	75#0	32.86	35.43
20MHz+20MHz_QPSK	18801	1870.1	18999	1889.9	100#0	100#0	37.64	40.41
20MHz+20MHz_16QAM	18801	1870.1	18999	1889.9	100#0	100#0	37.66	40.40
20MHz+20MHz_64QAM	18801	1870.1	18999	1889.9	100#0	100#0	37.74	40.34

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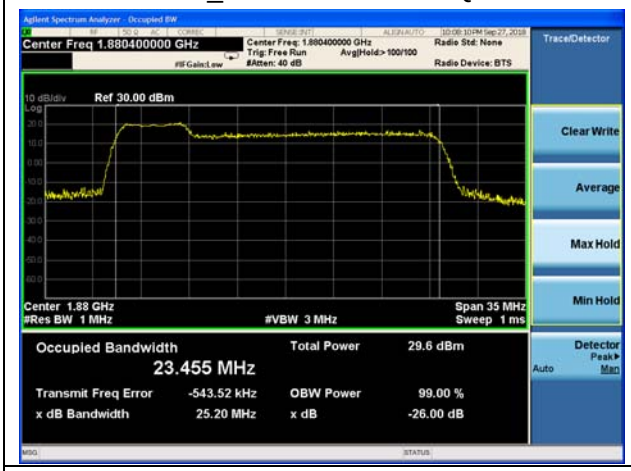
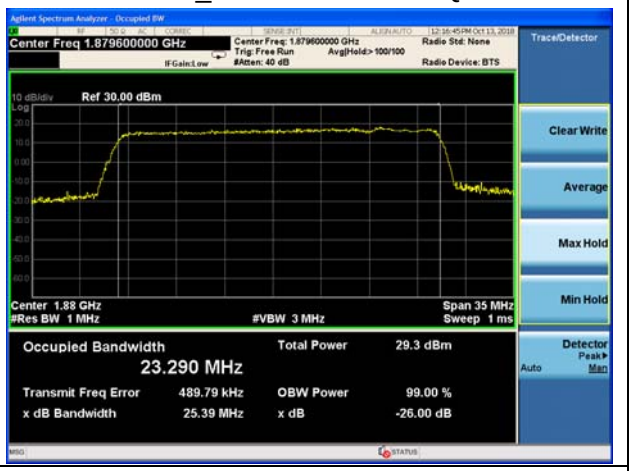
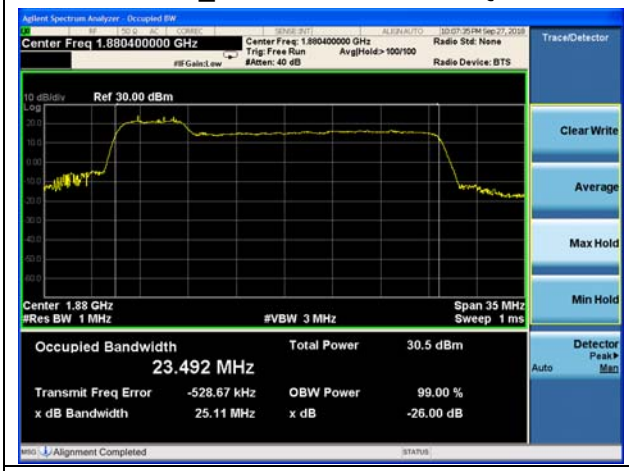
CA_2C 5MHz+20MHz QPSK



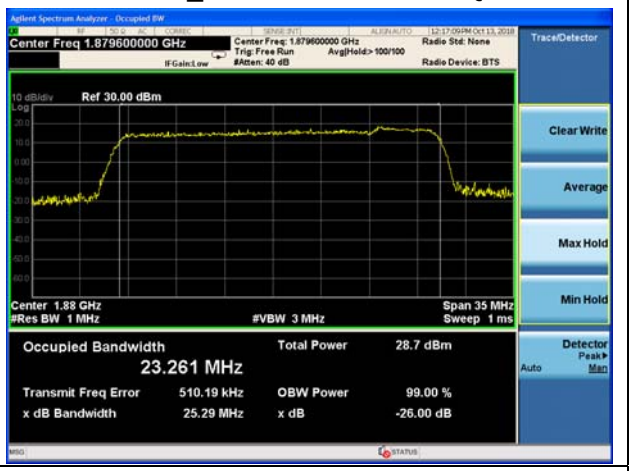
CA_2C 20MHz+5MHz QPSK



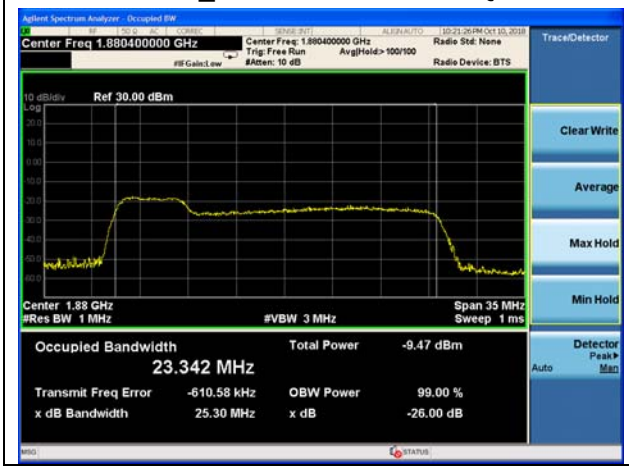
CA_2C 5MHz+20MHz 16QAM



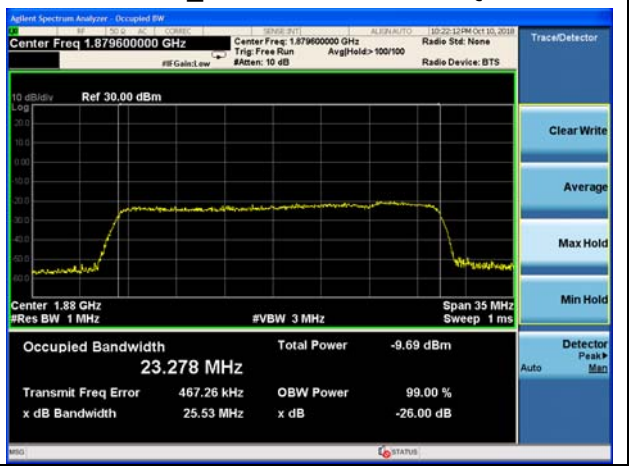
CA_2C 20MHz+5MHz 16QAM



CA_2C 5MHz+20MHz 64QAM



CA_2C 20MHz+5MHz 64QAM



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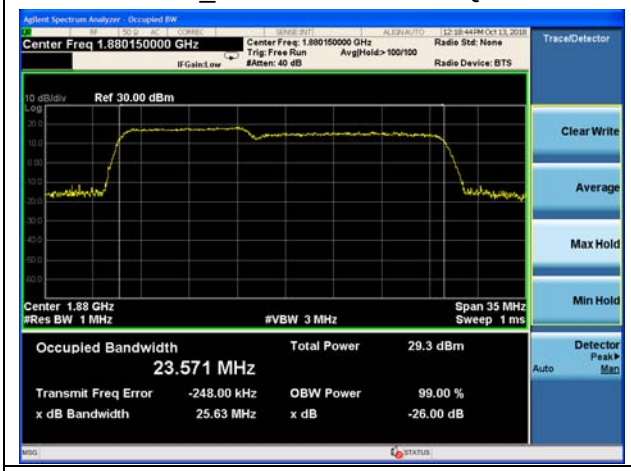
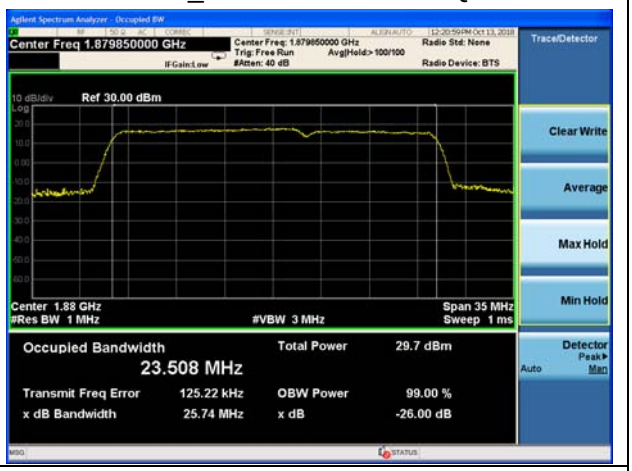
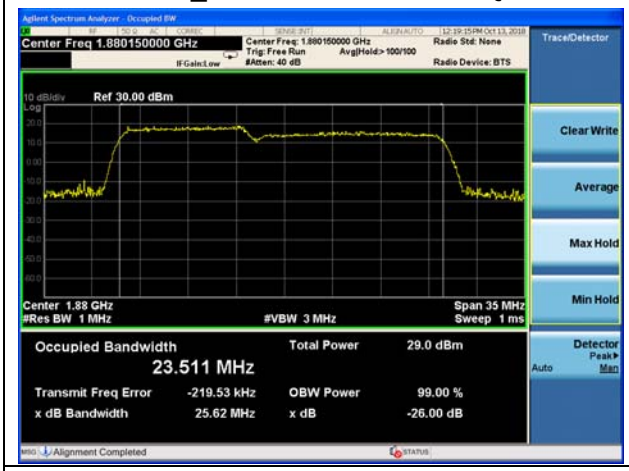
CA_2C 10MHz+15MHz QPSK



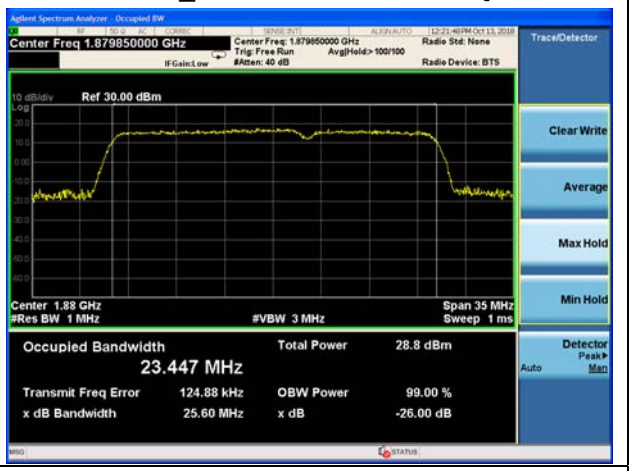
CA_2C 15MHz+10MHz QPSK



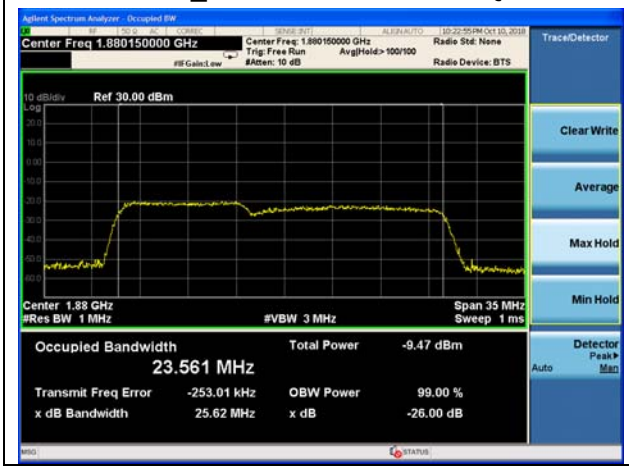
CA_2C 10MHz+15MHz 16QAM



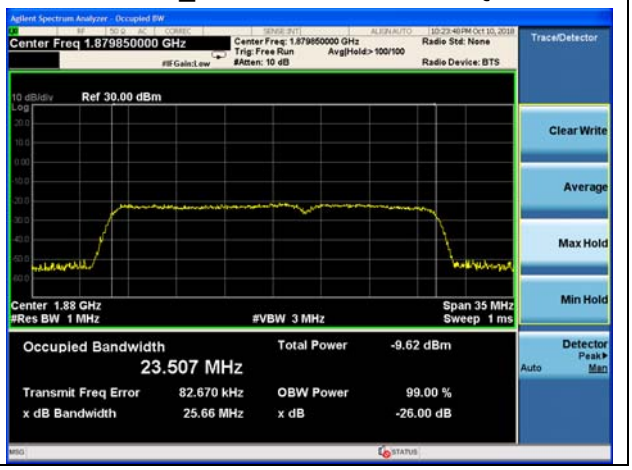
CA_2C 15MHz+10MHz 16QAM



CA_2C 10MHz+15MHz 64QAM



CA_2C 15MHz+10MHz 64QAM



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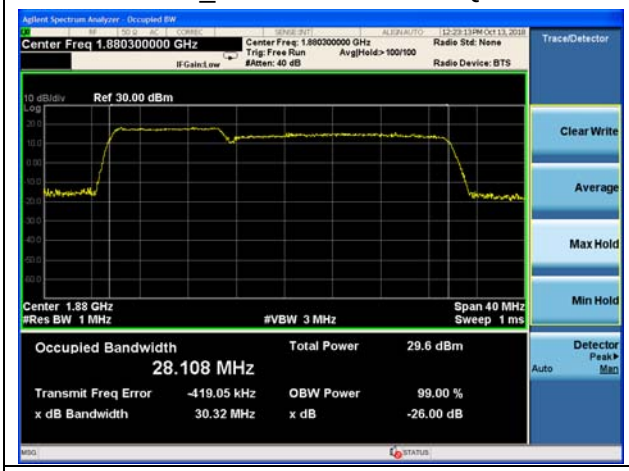
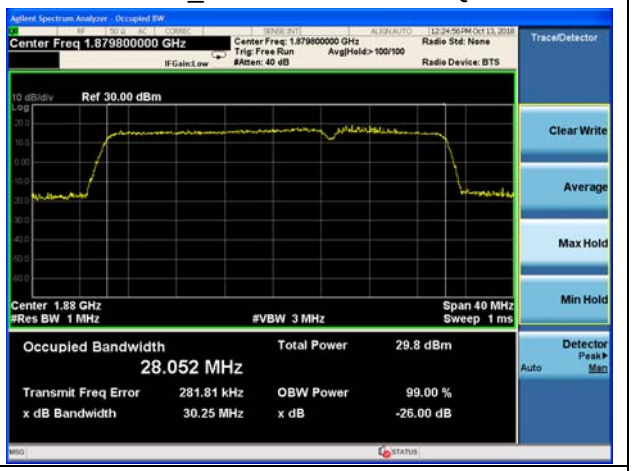
CA_2C 10MHz+20MHz QPSK

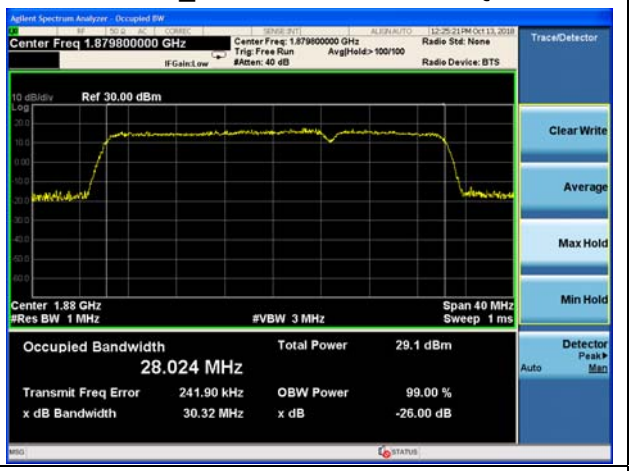


CA_2C 20MHz+10MHz QPSK

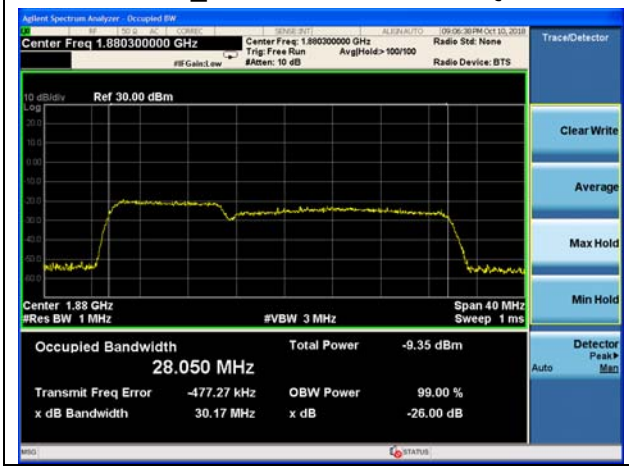


CA_2C 10MHz+20MHz 16QAM

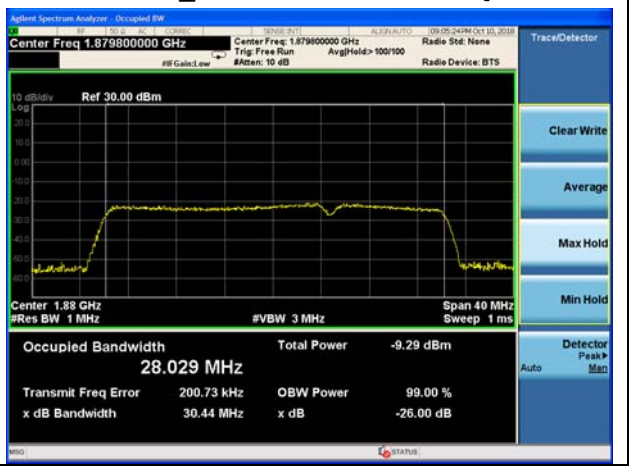
CA_2C 20MHz+10MHz 16QAM



CA_2C 10MHz+20MHz 64QAM



CA_2C 20MHz+10MHz 64QAM



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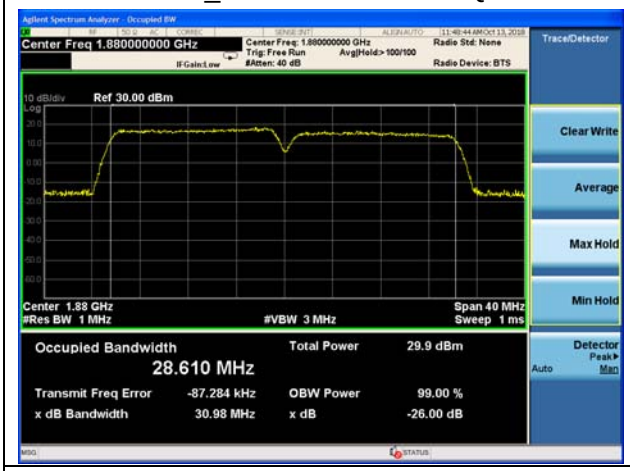
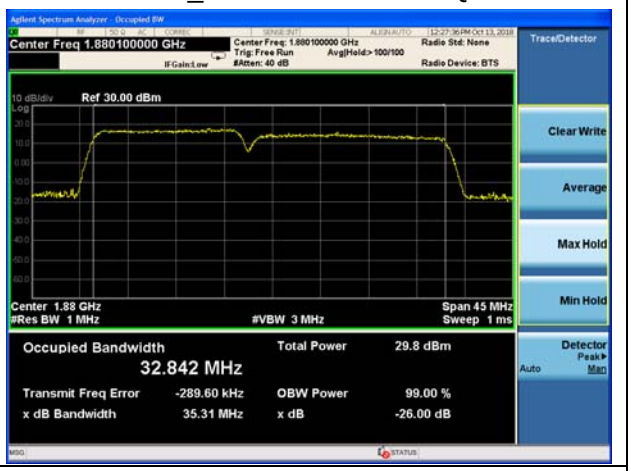
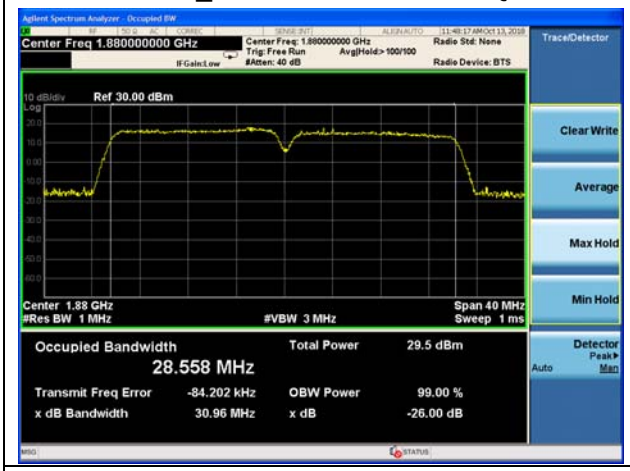
CA_2C 15MHz+15MHz QPSK



CA_2C 15MHz+20MHz QPSK

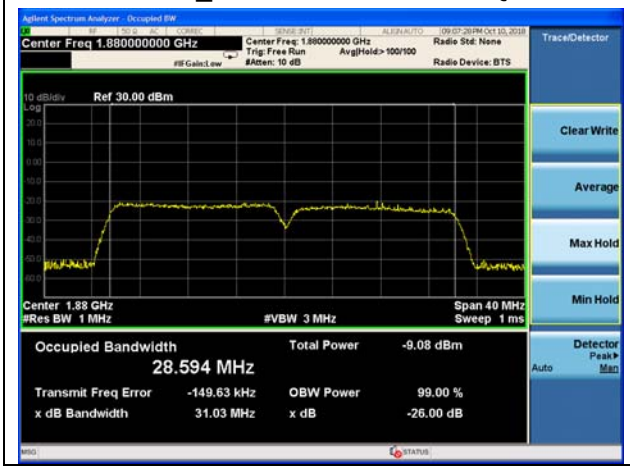


CA_2C 15MHz+15MHz 16QAM

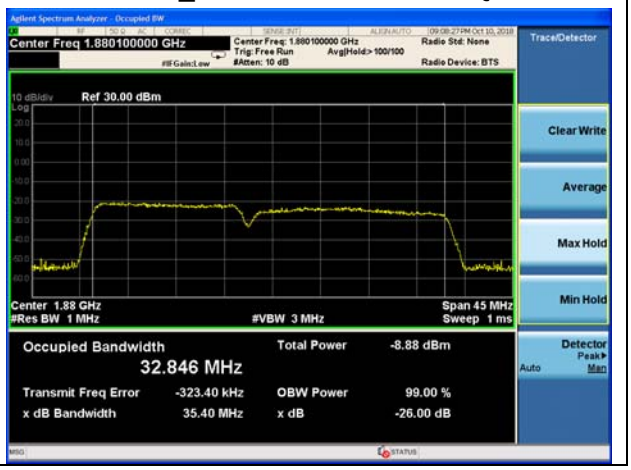


CA_2C 15MHz+20MHz 16QAM

CA_2C 15MHz+15MHz 64QAM



CA_2C 15MHz+20MHz 64QAM



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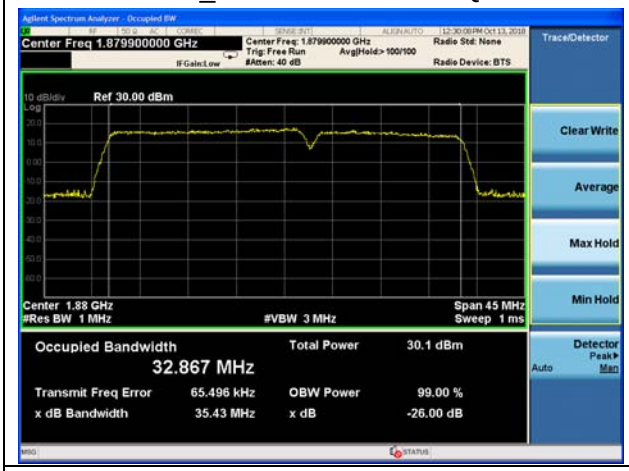
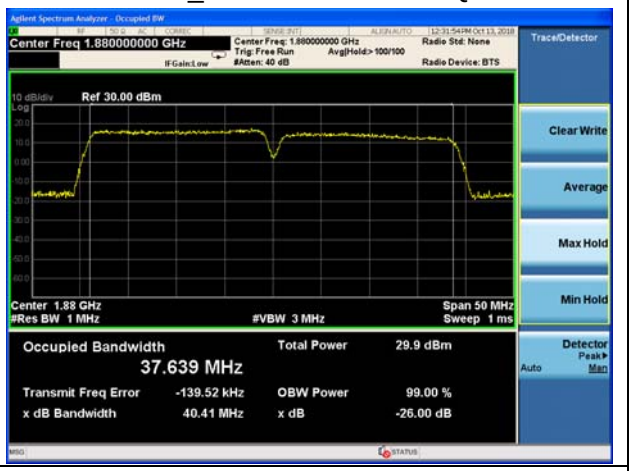
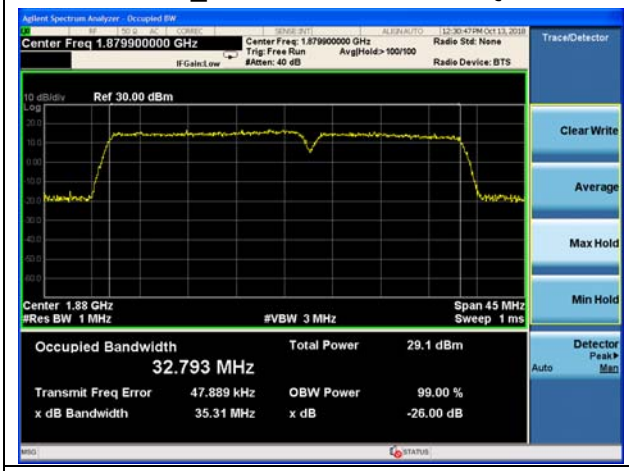
CA_2C 20MHz+15MHz QPSK



CA_2C 20MHz+20MHz QPSK

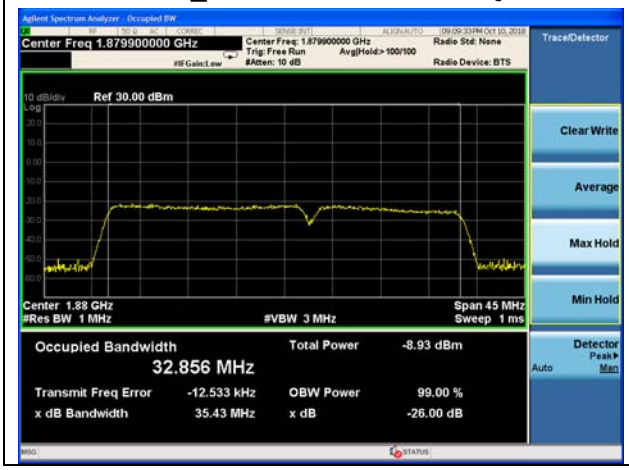


CA_2C 20MHz+15MHz 16QAM



CA_2C 20MHz+20MHz 16QAM

CA_2C 20MHz+15MHz 64QAM



CA_2C 20MHz+20MHz 64QAM

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5.4. Band Edge Compliance

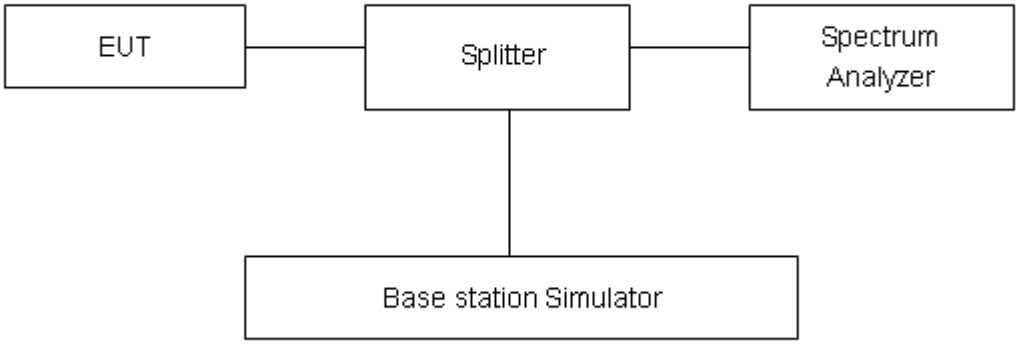
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and RBW is set to 300kHz, VBW is set to 1MHz for CA_2C.
Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96, *U*=0.684dB.

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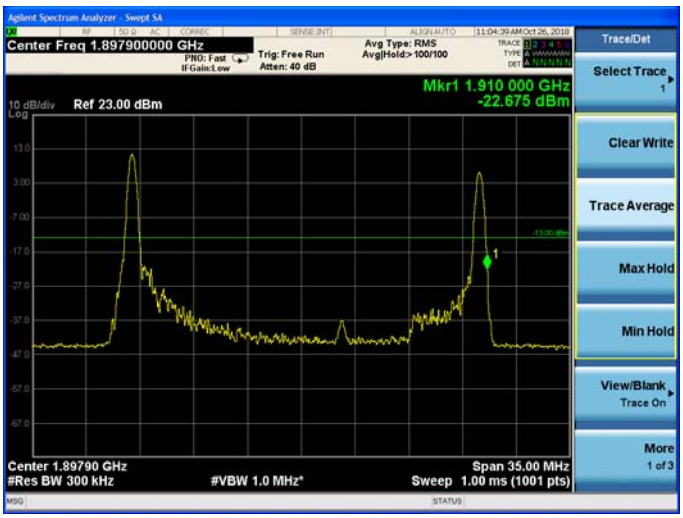
Test Result:

CA_2C 20MHz+5MHz QPSK RB=1#0+1#24 CH- Low

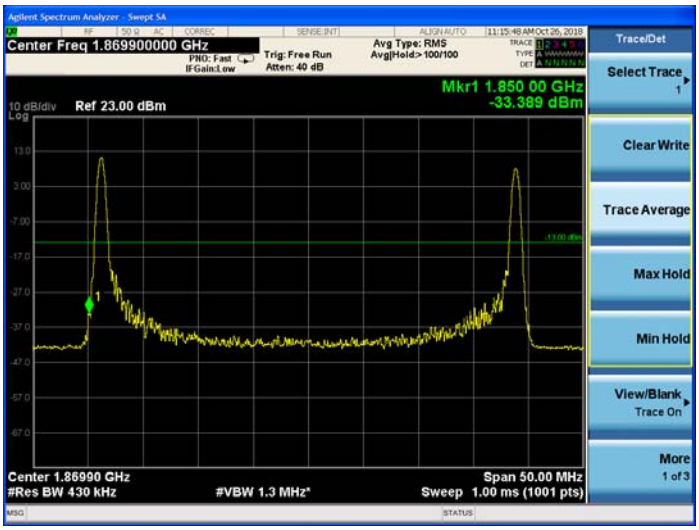
CA_2C 20MHz+5MHz QPSK RB=1#0+1#24 CH- High



CA_2C 20MHz+5MHz QPSK RB=100#0+25#0 CH-Low

CA_2C 20MHz+5MHz QPSK RB=100#0+25#0 CH-High

CA_2C 20MHz+20MHz QPSK RB=1#0+1#99 CH- Low



CA_2C 20MHz+20MHz QPSK RB=1#0+1#99 CH- High

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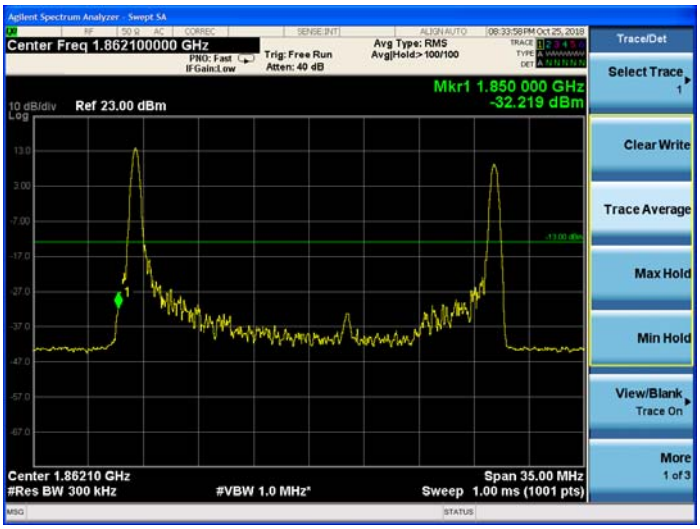
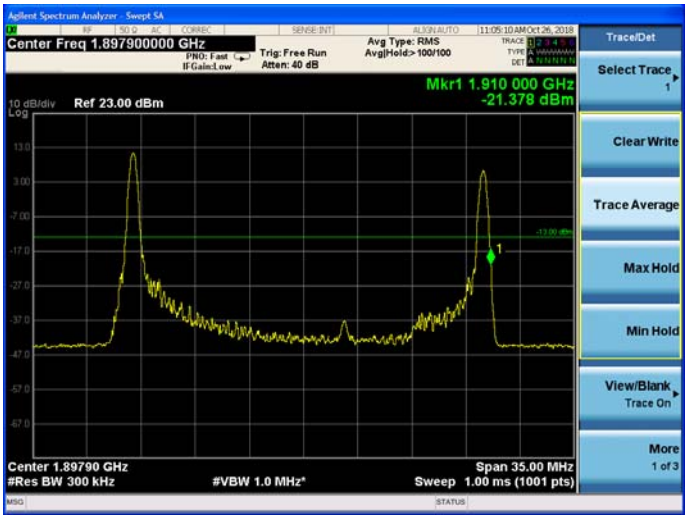
CA_2C 20MHz+20MHz QPSK RB=100#0+100#0 CH-Low

CA_2C 20MHz+20MHz QPSK RB=100#0+100#0 CH-High

CA_2C 20MHz+5MHz 16QAM RB=1#0+1#24 CH- Low

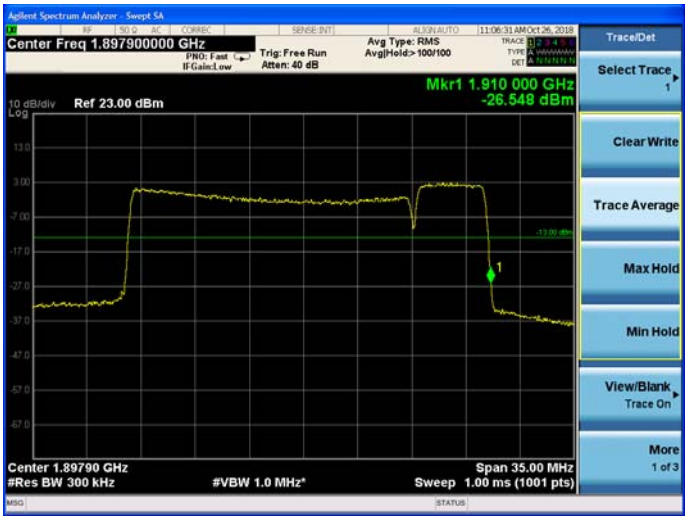


CA_2C 20MHz+5MHz 16QAM RB=1#0+1#24 CH- High



CA_2C 20MHz+5MHz 16QAM RB=100#0+25#0 CH-Low

CA_2C 20MHz+5MHz 16QAM RB=100#0+25#0 CH-High



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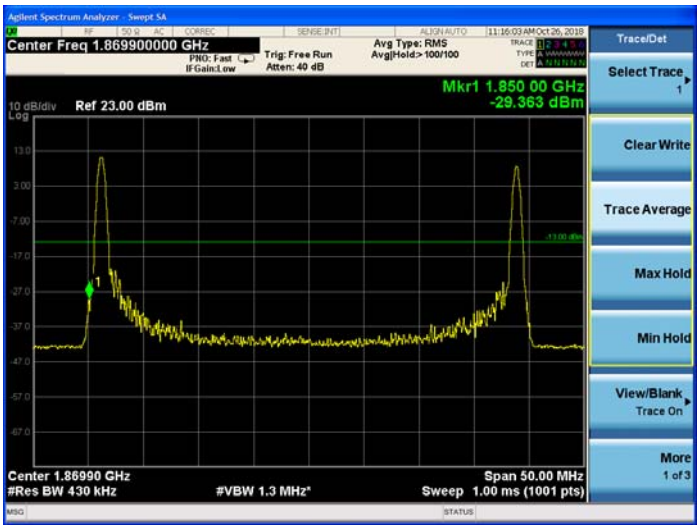
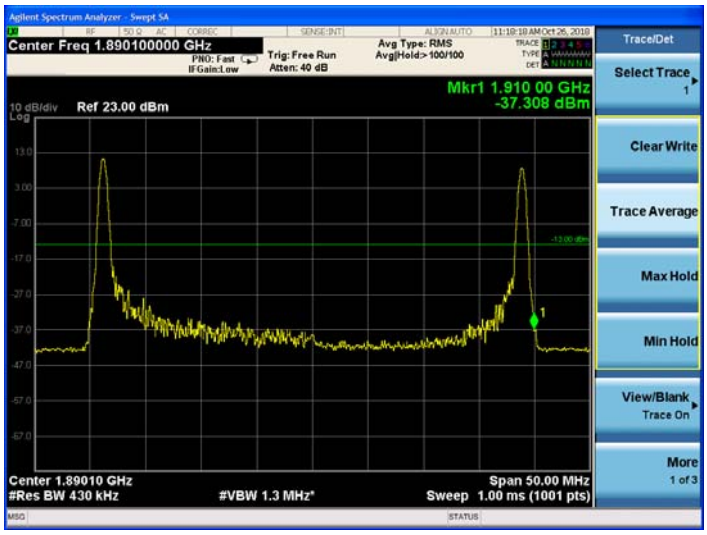
CA_2C 20MHz+20MHz 16QAM RB=1#0+1#99
CH-Low



CA_2C 20MHz+20MHz 16QAM RB=1#0+1#99
CH-High

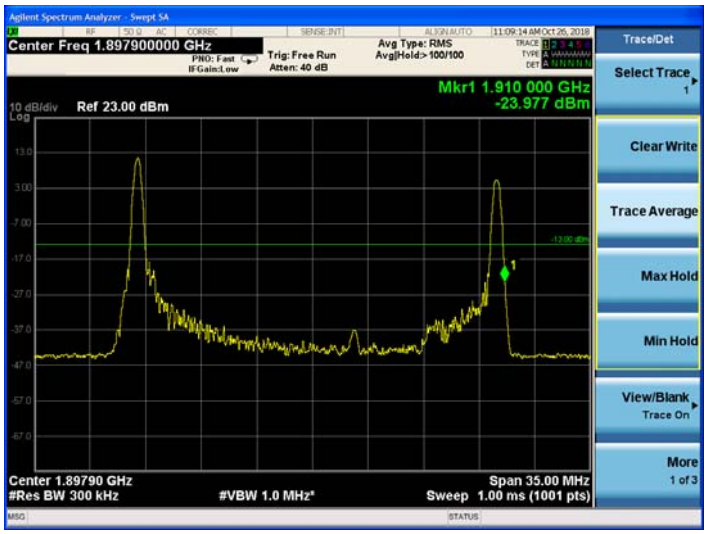


CA_2C 20MHz+20MHz 16QAM RB=100#0+100#0
CH-Low

CA_2C 20MHz+20MHz 16QAM RB=100#0+100#0
CH-High

CA_2C 20MHz+5MHz 64QAM RB=1#0+1#24
CH- Low

CA_2C 20MHz+5MHz 64QAM RB=1#0+1#24
CH- High



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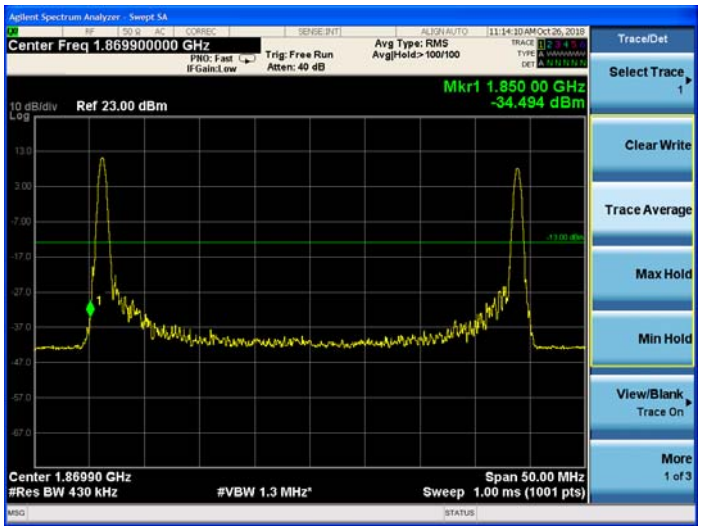
CA_2C 20MHz+5MHz 64QAM RB=100#0+25#0
CH- Low

CA_2C 20MHz+5MHz 64QAM RB=100#0+25#0
CH- High

CA_2C 20MHz+20MHz 64QAM RB=1#0+1#99
CH- Low



CA_2C 20MHz+20MHz 64QAM RB=1#0+1#99
CH- High

CA_2C 20MHz+20MHz 64QAM RB=100#0+100#0
CH- Low

CA_2C 20MHz+20MHz 64QAM RB=100#0+100#0
CH- High

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5.5. Peak-to-Average Power Ratio (PAPR)

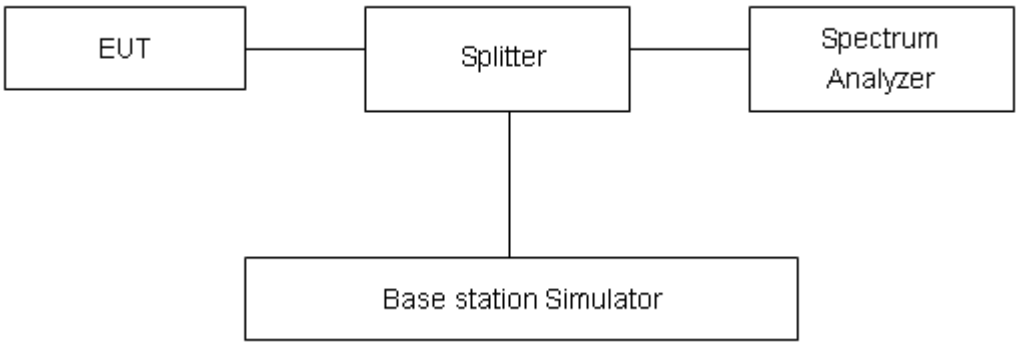
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peakto-average ratio (PAR) of the transmission may not exceed 13 dB in 24.232(d).

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the

normal distribution is with the coverage factor k = 2, U= 0.4 dB.

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Test Results

CA_2C Bandwidth	PCC		SCC1		Modulation	Peak-to-Average Power Ratio (PAPR)		
	Channel	Frequency (MHz)	Channel	Frequency (MHz)		Peak (dBm)	Avg (dBm)	PAPR (dB)
5MHz+20MHz	18808	1870.8	18925	1882.5	QPSK	26.65	20.34	6.31
5MHz+20MHz	18808	1870.8	18925	1882.5	16QAM	25.87	18.98	6.89
5MHz+20MHz	18808	1870.8	18925	1882.5	64QAM	25.16	18.32	6.84
20MHz+5MHz	18875	1877.5	18992	1889.2	QPSK	25.29	19.20	6.09
20MHz+5MHz	18875	1877.5	18992	1889.2	16QAM	24.82	18.11	6.71
20MHz+5MHz	18875	1877.5	18992	1889.2	64QAM	24.64	17.91	6.73
10MHz+15MHz	18829	1872.9	18949	1884.9	QPSK	25.65	19.62	6.03
10MHz+15MHz	18829	1872.9	18949	1884.9	16QAM	25.30	18.66	6.64
10MHz+15MHz	18829	1872.9	18949	1884.9	64QAM	24.14	17.50	6.64
15MHz+10MHz	18851	1875.1	18971	1887.1	QPSK	26.33	20.15	6.18
15MHz+10MHz	18851	1875.1	18971	1887.1	16QAM	25.76	19.02	6.74
15MHz+10MHz	18851	1875.1	18971	1887.1	64QAM	25.49	18.74	6.75
10MHz+20MHz	18806	1870.6	18950	1885	QPSK	27.05	20.61	6.44
10MHz+20MHz	18806	1870.6	18950	1885	16QAM	26.44	19.48	6.96
10MHz+20MHz	18806	1870.6	18950	1885	64QAM	25.19	18.28	6.91
20MHz+10MHz	18851	1875.1	18995	1889.5	QPSK	26.19	19.93	6.26
20MHz+10MHz	18851	1875.1	18995	1889.5	16QAM	25.86	19.03	6.83
20MHz+10MHz	18851	1875.1	18995	1889.5	64QAM	25.16	18.25	6.91
15MHz+15MHz	18825	1872.5	18975	1887.5	QPSK	26.16	19.78	6.38
15MHz+15MHz	18825	1872.5	18975	1887.5	16QAM	25.58	18.69	6.89
15MHz+15MHz	18825	1872.5	18975	1887.5	64QAM	24.97	18.08	6.89
15MHz+20MHz	18803	1870.3	18974	1887.4	QPSK	26.61	19.98	6.63
15MHz+20MHz	18803	1870.3	18974	1887.4	16QAM	26.03	18.93	7.10
15MHz+20MHz	18803	1870.3	18974	1887.4	64QAM	24.97	17.89	7.08
20MHz+15MHz	18826	1872.6	18997	1889.7	QPSK	26.57	19.91	6.66
20MHz+15MHz	18826	1872.6	18997	1889.7	16QAM	26.00	18.83	7.17
20MHz+15MHz	18826	1872.6	18997	1889.7	64QAM	25.18	17.97	7.21
20MHz+20MHz	18801	1870.1	18999	1889.9	QPSK	26.63	19.76	6.87
20MHz+20MHz	18801	1870.1	18999	1889.9	16QAM	26.25	18.94	7.31
20MHz+20MHz	18801	1870.1	18999	1889.9	64QAM	25.31	17.96	7.35

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5.6. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size,

(1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

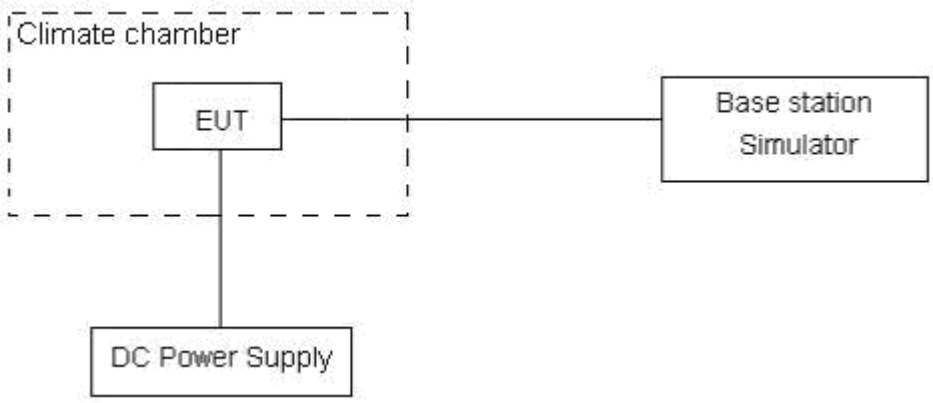
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.6 V and 4.35 V, with a nominal voltage of 3.82V.

Test setup



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Limits

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 3, U= 0.01ppm.

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Test Result

CA_2C_QPSK		20MHz+5MHz (Bandwidth)				20MHz+20MHz (Bandwidth)			
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)	1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@ -13dBm (MHz)	F high@ -13dBm (MHz)			F low@ -13dBm (MHz)	F high@ -13dBm (MHz)		
Normal(25°C)	Normal	1851.1788	1908.8258	-2.57	-0.00137	1851.1913	1908.8133	-3.75	-0.00199
Extreme(85°C)		1851.1791	1908.8255	-2.27	-0.00121	1851.1902	1908.8144	-2.64	-0.00140
Extreme(80°C)		1851.1794	1908.8252	-2.79	-0.00148	1851.2062	1908.7984	-1.26	-0.00067
Extreme(70°C)		1851.1789	1908.8257	-1.69	-0.00090	1851.2174	1908.7872	-3.59	-0.00191
Extreme(60°C)		1851.1783	1908.8253	2.64	0.00140	1851.2052	1908.7984	-2.75	-0.00146
Extreme(50°C)		1851.1868	1908.8338	1.00	0.00053	1851.1994	1908.8212	-1.64	-0.00087
Extreme(40°C)		1851.1822	1908.8292	-1.37	-0.00073	1851.2291	1908.7823	-1.82	-0.00097
Extreme(30°C)		1851.1829	1908.8299	-3.17	-0.00169	1851.1982	1908.8146	-1.88	-0.00100
Extreme(20°C)		1851.1832	1908.8302	-2.53	-0.00135	1851.2101	1908.8033	-2.67	-0.00142
Extreme(10°C)		1851.1797	1908.8267	-1.47	-0.00078	1851.2139	1908.7925	-1.34	-0.00071
Extreme(0°C)		1851.1856	1908.8326	-1.41	-0.00075	1851.222	1908.7962	-2.68	-0.00143
Extreme(-10°C)		1851.1793	1908.8263	-2.71	-0.00144	1851.2106	1908.795	-3.95	-0.00210
Extreme(-20°C)		1851.1834	1908.8304	-3.57	-0.00190	1851.1946	1908.8192	-0.46	-0.00024
Extreme(-30°C)		1851.1781	1908.8252	-1.27	-0.00068	1851.2004	1908.8029	-3.95	-0.00210
Extreme(-40°C)		1851.1788	1908.8258	-3.26	-0.00173	1851.2135	1908.7911	-4.69	-0.00249
25°C	LV	1851.1832	1908.8302	-2.22	-0.00118	1851.2126	1908.8008	-2.67	-0.00142
	HV	1851.1781	1908.8251	-3.87	-0.00206	1851.1949	1908.8083	-3.19	-0.00170

CA_2C_16QAM		20MHz+5MHz (Bandwidth)				20MHz+20MHz (Bandwidth)			
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)	1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@ -13dBm (MHz)	F high@ -13dBm (MHz)			F low@ -13dBm (MHz)	F high@ -13dBm (MHz)		
Normal(25°C)	Normal	1851.1814	1908.8232	-2.58	-0.00137	1851.2191	1908.7855	-2.94	-0.00156
Extreme(85°C)		1851.1859	1908.8187	-1.06	-0.00056	1851.2701	1908.7348	-2.64	-0.00140
Extreme(80°C)		1851.1841	1908.8205	0.71	0.00038	1851.2637	1908.7409	-3.16	-0.00168
Extreme(70°C)		1851.1874	1908.8172	-2.69	-0.00143	1851.2595	1908.7451	-2.06	-0.00110
Extreme(60°C)		1851.1847	1908.8189	-3.00	-0.00160	1851.244	1908.7603	1.29	0.00069
Extreme(50°C)		1851.1899	1908.8307	-0.15	-0.00008	1851.2285	1908.7921	0.68	0.00036
Extreme(40°C)		1851.1917	1908.8197	-0.97	-0.00052	1851.2697	1908.742	-1.69	-0.00090
Extreme(30°C)		1851.1875	1908.8253	-0.64	-0.00034	1851.249	1908.7672	-3.49	-0.00186
Extreme(20°C)		1851.1893	1908.8241	-1.28	-0.00068	1851.2474	1908.766	-2.85	-0.00152
Extreme(10°C)		1851.1834	1908.823	-2.67	-0.00142	1851.2709	1908.736	-1.67	-0.00089
Extreme(0°C)		1851.1924	1908.8258	-3.61	-0.00192	1851.3134	1908.7048	-1.61	-0.00086
Extreme(-10°C)		1851.1884	1908.8172	-2.48	-0.00132	1851.2702	1908.7354	-2.91	-0.00155
Extreme(-20°C)		1851.1903	1908.8235	-1.29	-0.00069	1851.2277	1908.7861	-3.77	-0.00201
Extreme(-30°C)		1851.1857	1908.8176	-2.19	-0.00116	1851.2393	1908.7645	-3.61	-0.00192

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Extreme(-40°C)		1851.1826	1908.822	-2.84	-0.00151	1851.2559	1908.7491	-3.65	-0.00194
25°C	LV	1851.19	1908.8234	-0.69	-0.00037	1851.2471	1908.7671	-2.61	-0.00139
	HV	1851.1848	1908.8184	-2.06	-0.00110	1851.271	1908.7322	-4.26	-0.00227
CA_2C_64QAM		20MHz+5MHz (Bandwidth)				20MHz+20MHz (Bandwidth)			
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)	1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@ -13dBm (MHz)	F high@ -13dBm (MHz)			F low@ -13dBm (MHz)	F high@ -13dBm (MHz)		
Normal(25°C)	Normal	1851.1839	1908.8207	-2.38	-0.00127	1851.2216	1908.783	-2.35	-0.00125
Extreme(85°C)		1851.1927	1908.8119	-2.64	-0.00140	1851.2516	1908.7533	-2.16	-0.00115
Extreme(80°C)		1851.1867	1908.8179	-1.06	-0.00056	1851.2688	1908.7358	-3.46	-0.00184
Extreme(70°C)		1851.1909	1908.8137	-3.07	-0.00163	1851.2897	1908.7149	-1.94	-0.00103
Extreme(60°C)		1851.1873	1908.8163	-1.61	-0.00086	1851.2611	1908.7432	-3.05	-0.00162
Extreme(50°C)		1851.1985	1908.8221	-1.28	-0.00068	1851.2312	1908.7894	-2.36	-0.00126
Extreme(40°C)		1851.1978	1908.8136	-0.75	-0.00040	1851.3104	1908.701	-2.83	-0.00151
Extreme(30°C)		1851.1939	1908.8189	-1.91	-0.00102	1851.2458	1908.7704	-2.61	-0.00139
Extreme(20°C)		1851.192	1908.8214	-0.64	-0.00034	1851.2648	1908.7486	-1.36	-0.00072
Extreme(10°C)		1851.1902	1908.8162	-1.77	-0.00094	1851.2819	1908.7245	-3.19	-0.00170
Extreme(0°C)		1851.1988	1908.8194	-2.69	-0.00143	1851.3143	1908.7039	-1.68	-0.00089
Extreme(-10°C)		1851.1948	1908.8108	-0.67	-0.00036	1851.2852	1908.7204	-2.66	-0.00141
Extreme(-20°C)		1851.1985	1908.8153	-2.64	-0.00140	1851.2327	1908.7811	-2.36	-0.00126
Extreme(-30°C)		1851.1918	1908.8115	-0.19	-0.00010	1851.2538	1908.75	-1.64	-0.00087
Extreme(-40°C)		1851.1882	1908.8164	-1.66	-0.00088	1851.2751	1908.7295	-2.39	-0.00127
25°C	LV	1851.1943	1908.8191	-2.87	-0.00153	1851.2692	1908.7445	-1.26	-0.00067
	HV	1851.1924	1908.8108	-1.94	-0.00103	1851.2598	1908.7434	-3.26	-0.00173

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5.7. Spurious Emissions at Antenna Terminals

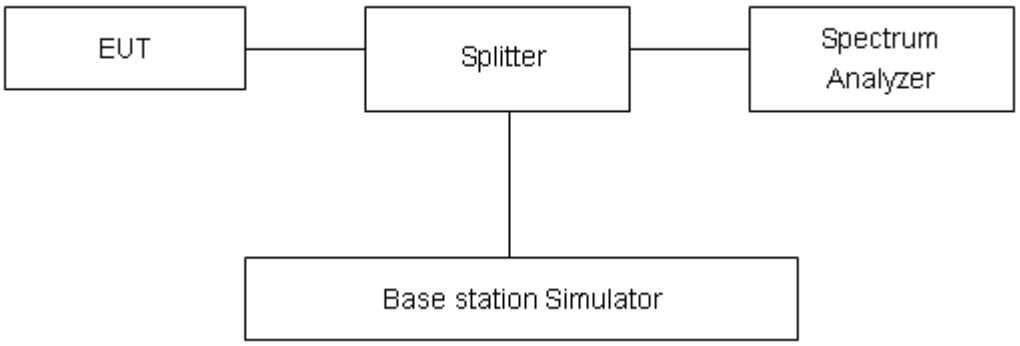
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz
RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

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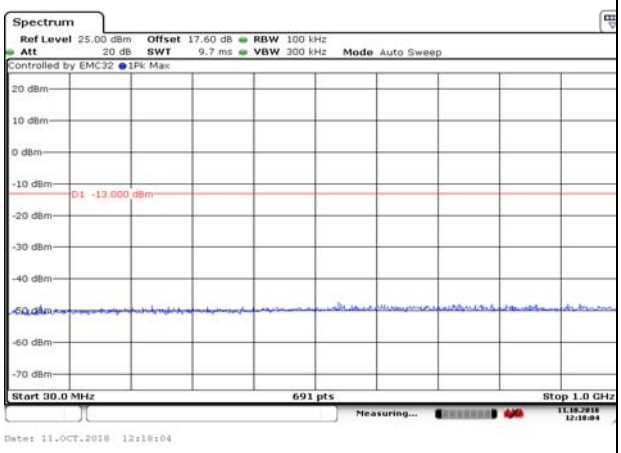
Test Result

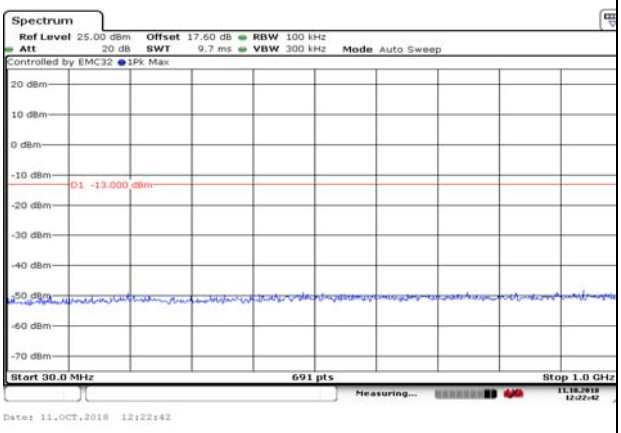
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

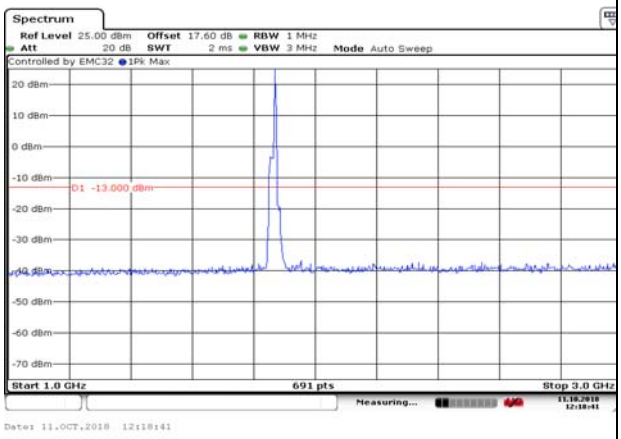
CA_2C 20MHz+5MHz CH-Low 30MHz~1GHz



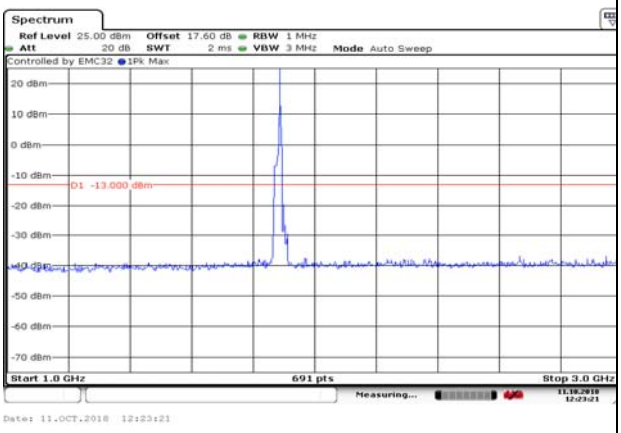
CA_2C 20MHz+5MHz CH-Middle 30MHz~1GHz



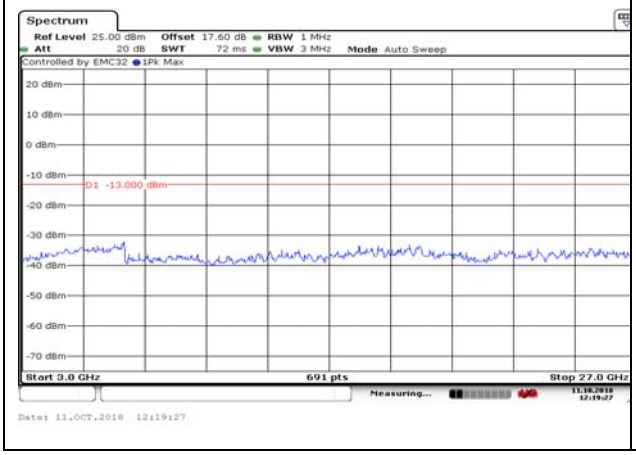
CA_2C 20MHz+5MHz CH-Low 1GHz~3GHz



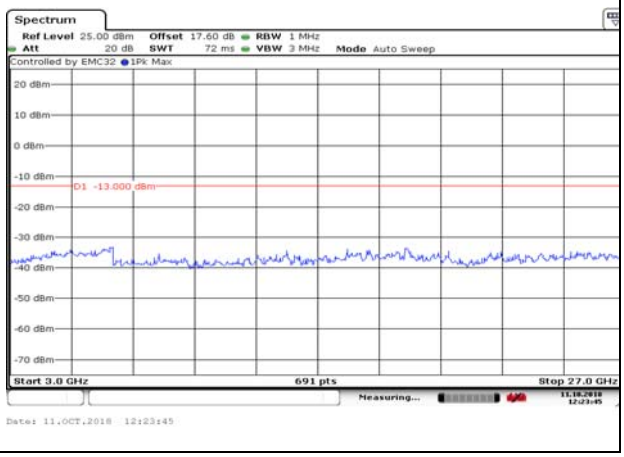
CA_2C 20MHz+5MHz CH-Middle 1GHz~3GHz



CA_2C 20MHz+5MHz CH-Low 3GHz~20GHz



CA_2C 20MHz+5MHz CH-Middle 3GHz~20GHz



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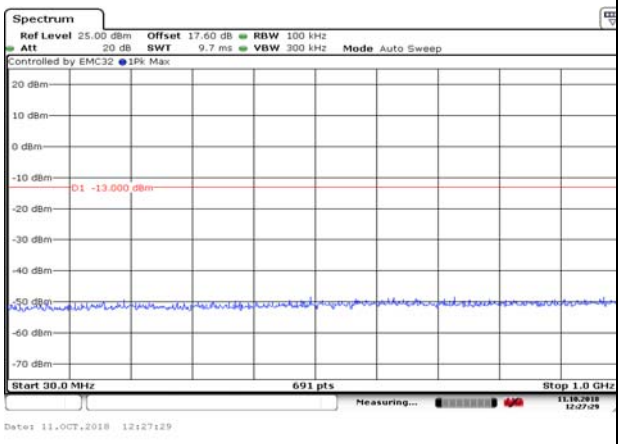
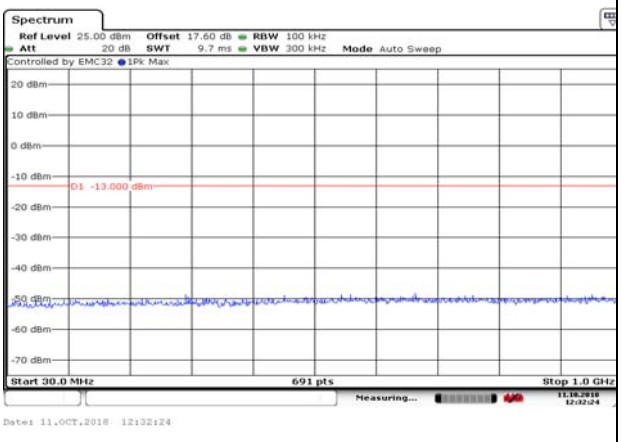
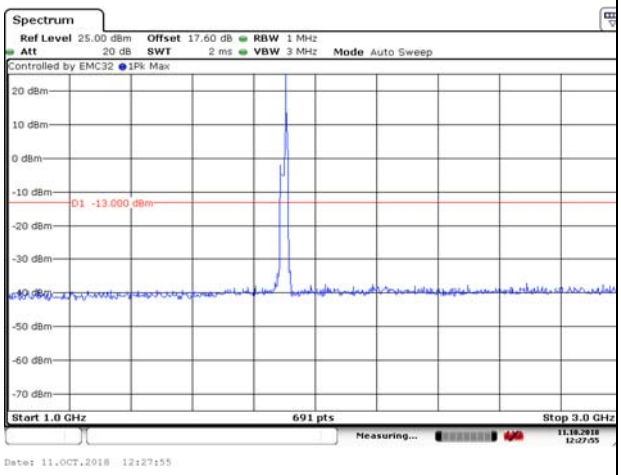
CA_2C 20MHz+5MHz CH- High 30MHz~1GHz



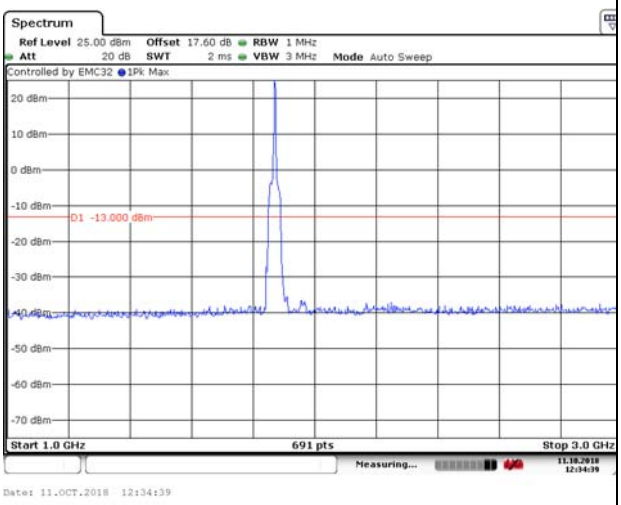
CA_2C 20MHz+20MHz CH-Low 30MHz~1GHz



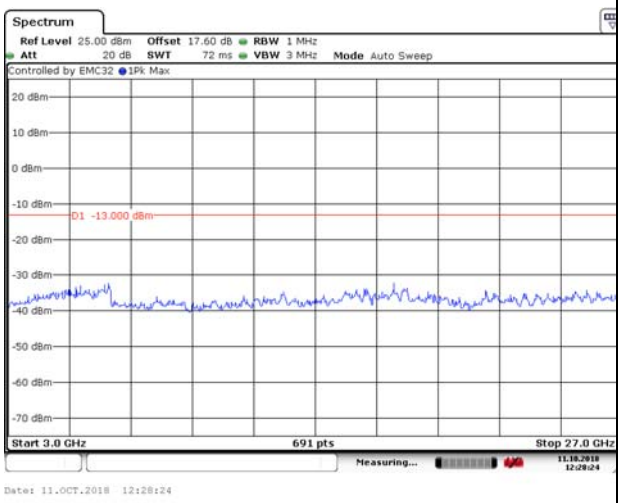
CA_2C 20MHz+5MHz CH- High 1GHz~3GHz



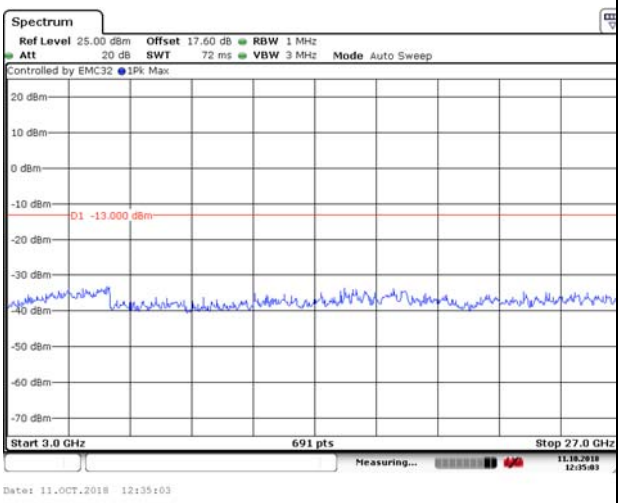
CA_2C 20MHz+20MHz CH-Low 1GHz~3GHz



CA_2C 20MHz+5MHz CH- High 3GHz~20GHz



CA_2C 20MHz+20MHz CH-Low 3GHz~20GHz



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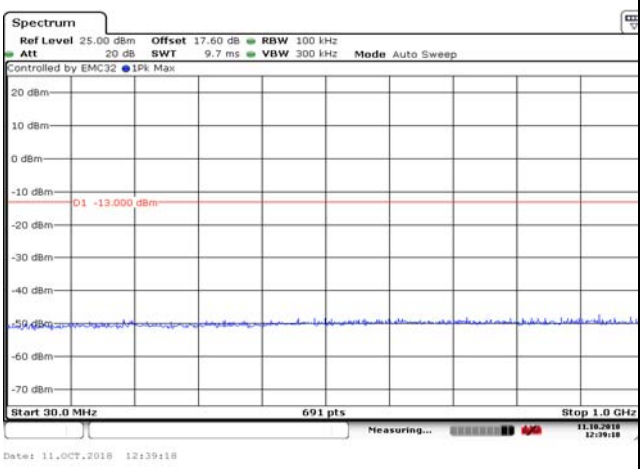
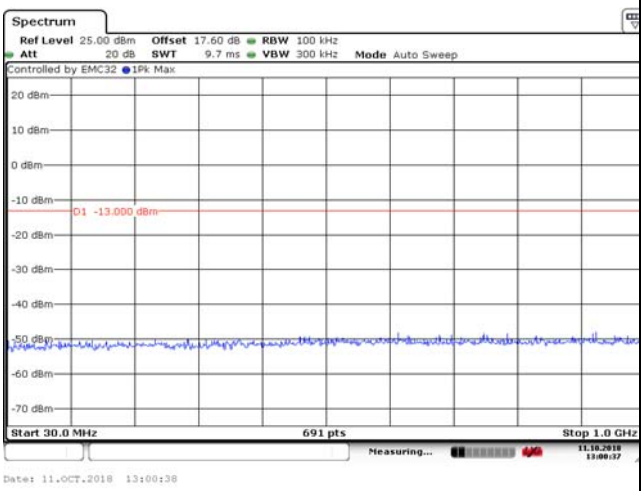
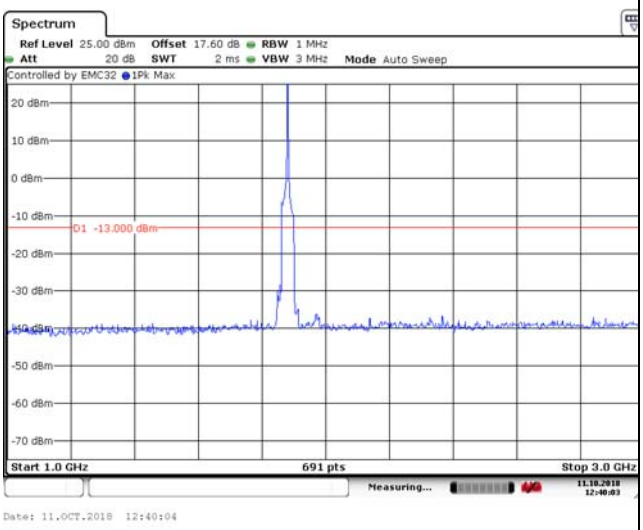
CA_2C 20MHz+20MHz CH-Middle 30MHz~1GHz



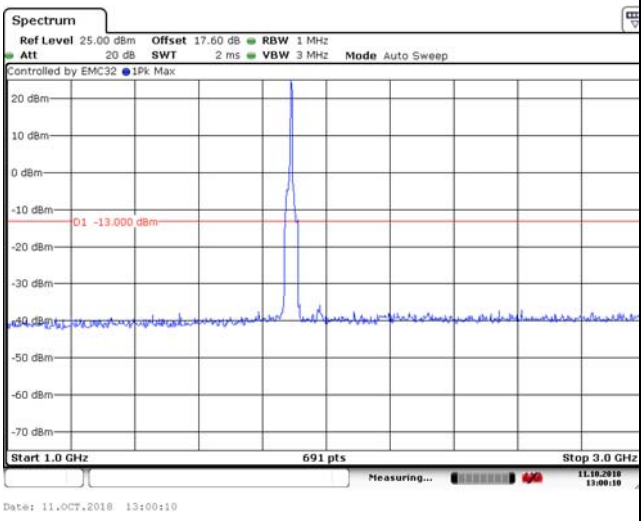
CA_2C 20MHz+20MHz CH- High 30MHz~1GHz



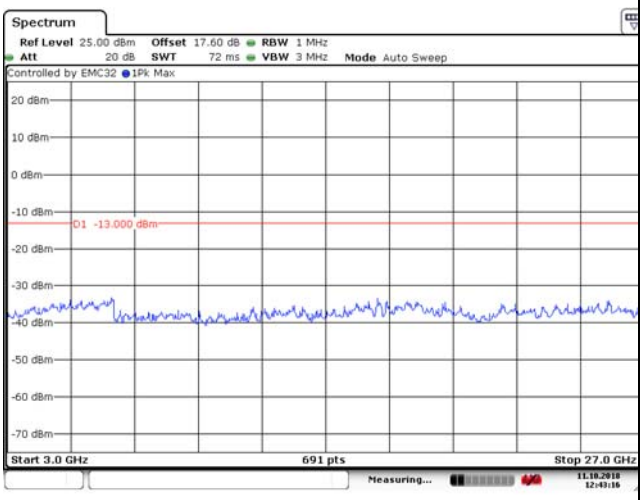
CA_2C 20MHz+20MHz CH- Middle 1GHz~3GHz



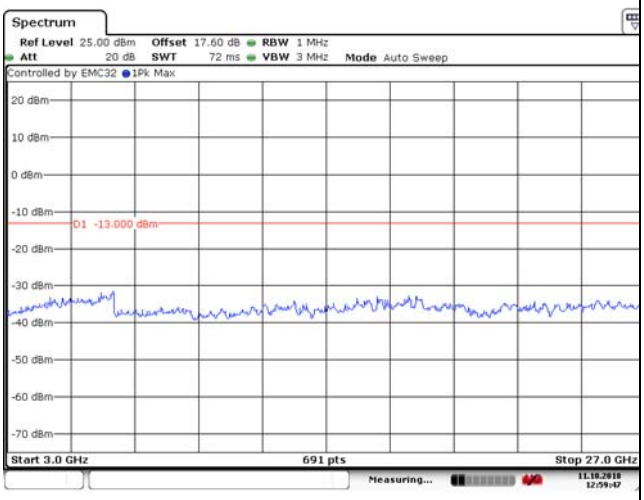
CA_2C 20MHz+20MHz CH- High 1GHz~3GHz



CA_2C 20MHz+20MHz CH- Middle 3GHz~20GHz



CA_2C 20MHz+20MHz CH- High 3GHz~20GHz



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5.8. Radiates Spurious Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Above 30MHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz,VBW=300kHz for 30MHz to 1GHz,, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

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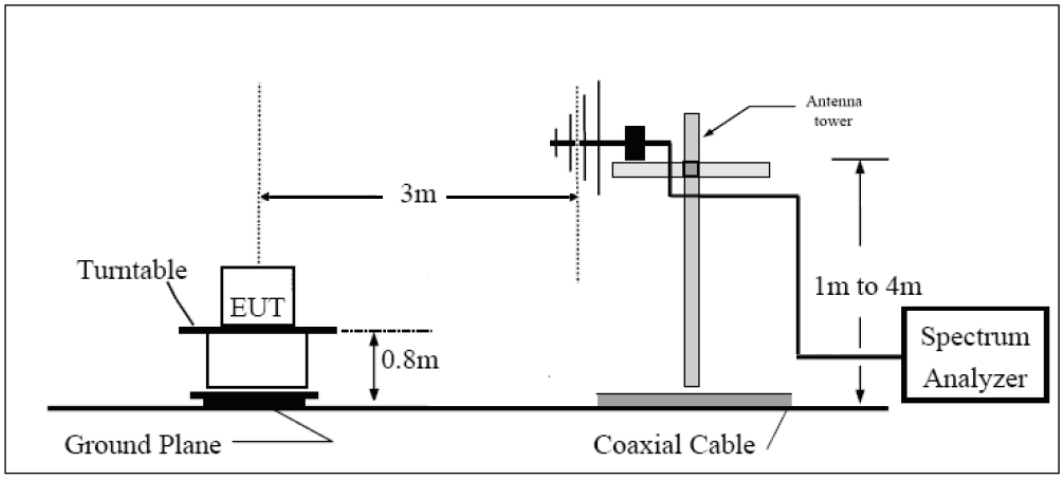
and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

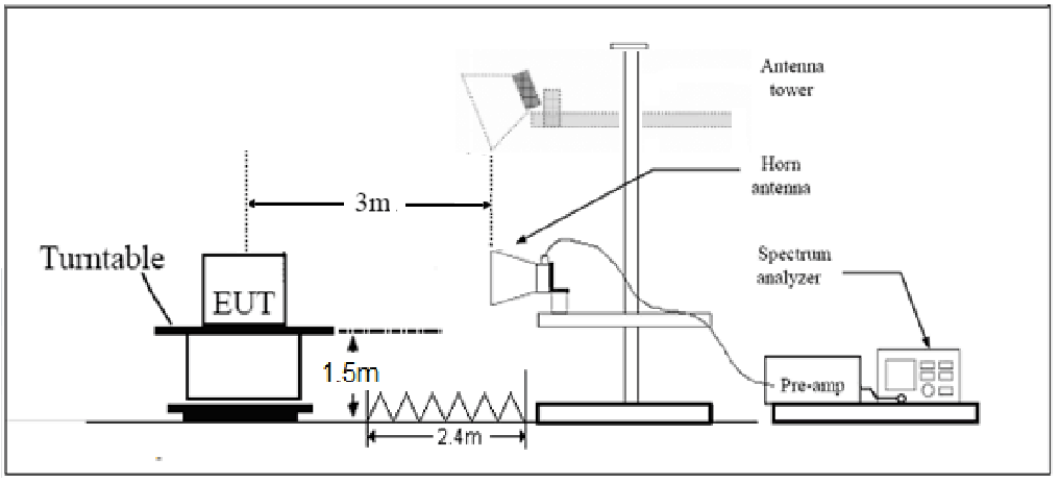
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

30MHz~~~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor *k* = 1.96, *U*= 3.55 dB.

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Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

Antenna 1

CA_2C 5MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3741.6	-63.20	5.10	11.05	Horizontal	-57.25	-13.00	44.25	45
3	5612.4	-59.97	5.42	12.65	Horizontal	-52.74	-13.00	39.74	225
4	7483.2	-56.59	6.70	13.85	Horizontal	-49.44	-13.00	36.44	315
5	9354.0	-55.87	7.01	14.75	Horizontal	-48.13	-13.00	35.13	270
6	11224.8	-54.82	7.48	15.95	Horizontal	-46.35	-13.00	33.35	45
7	13095.6	-54.64	7.51	16.55	Horizontal	-45.60	-13.00	32.60	315
8	14966.4	-52.70	8.24	15.35	Horizontal	-45.59	-13.00	32.59	0
9	16837.2	-50.07	8.41	14.95	Horizontal	-43.53	-13.00	30.53	0
10	18708.0	--	--	--	--	--	--	--	--
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

CA_2C 10MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3741.2	-63.11	5.10	11.05	Horizontal	-57.16	-13.00	44.16	315
3	5611.8	-61.71	5.42	12.65	Horizontal	-54.48	-13.00	41.48	45
4	7482.4	-56.36	6.70	13.85	Horizontal	-49.21	-13.00	36.21	180
5	9353.0	-55.49	7.01	14.75	Horizontal	-47.75	-13.00	34.75	225
6	11223.6	-53.79	7.48	15.95	Horizontal	-45.32	-13.00	32.32	0
7	13094.2	-53.64	7.51	16.55	Horizontal	-44.60	-13.00	31.60	180
8	14964.8	-52.48	8.24	15.35	Horizontal	-45.37	-13.00	32.37	135
9	16835.4	-49.92	8.41	14.95	Horizontal	-43.38	-13.00	30.38	45
10	18706.0	--	--	--	--	--	--	--	--
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Horizontal position.									

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CA_2C 20MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3740.2	-64.34	5.10	11.05	Horizontal	-58.39	-13.00	45.39	135
3	5610.3	-61.54	5.42	12.65	Horizontal	-54.31	-13.00	41.31	0
4	7480.4	-56.56	6.70	13.85	Horizontal	-49.41	-13.00	36.41	225
5	9350.5	-55.32	7.01	14.75	Horizontal	-47.58	-13.00	34.58	270
6	11220.6	-54.81	7.48	15.95	Horizontal	-46.34	-13.00	33.34	135
7	13090.7	-54.71	7.51	16.55	Horizontal	-45.67	-13.00	32.67	0
8	14960.8	-53.79	8.24	15.35	Horizontal	-46.68	-13.00	33.68	315
9	16830.9	-50.42	8.41	14.95	Horizontal	-43.88	-13.00	30.88	135
10	18701.0	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

Antenna 2

CA_2C 5MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3741.6	-63.36	5.10	11.05	Horizontal	-57.41	-13.00	44.41	225
3	5612.4	-62.08	5.42	12.65	Horizontal	-54.85	-13.00	41.85	180
4	7483.2	-56.20	6.70	13.85	Horizontal	-49.05	-13.00	36.05	0
5	9354.0	-55.20	7.01	14.75	Horizontal	-47.46	-13.00	34.46	135
6	11224.8	-53.19	7.48	15.95	Horizontal	-44.72	-13.00	31.72	45
7	13095.6	-54.37	7.51	16.55	Horizontal	-45.33	-13.00	32.33	0
8	14966.4	-52.04	8.24	15.35	Horizontal	-44.93	-13.00	31.93	180
9	16837.2	-50.64	8.41	14.95	Horizontal	-44.10	-13.00	31.10	315
10	18708.0	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

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CA_2C 10MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3741.2	-63.41	5.10	11.05	Horizontal	-57.46	-13.00	44.46	315
3	5611.8	-61.32	5.42	12.65	Horizontal	-54.09	-13.00	41.09	225
4	7482.4	-56.57	6.70	13.85	Horizontal	-49.42	-13.00	36.42	135
5	9353.0	-56.09	7.01	14.75	Horizontal	-48.35	-13.00	35.35	0
6	11223.6	-54.06	7.48	15.95	Horizontal	-45.59	-13.00	32.59	45
7	13094.2	-54.37	7.51	16.55	Horizontal	-45.33	-13.00	32.33	180
8	14964.8	-52.50	8.24	15.35	Horizontal	-45.39	-13.00	32.39	270
9	16835.4	-51.26	8.41	14.95	Horizontal	-44.72	-13.00	31.72	135
10	18706.0	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

CA_2C 20MHz+20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3740.2	-64.15	5.10	11.05	Horizontal	-58.20	-13.00	45.20	135
3	5610.3	-61.29	5.42	12.65	Horizontal	-54.06	-13.00	41.06	0
4	7480.4	-56.14	6.70	13.85	Horizontal	-48.99	-13.00	35.99	225
5	9350.5	-55.31	7.01	14.75	Horizontal	-47.57	-13.00	34.57	270
6	11220.6	-54.36	7.48	15.95	Horizontal	-45.89	-13.00	32.89	135
7	13090.7	-54.70	7.51	16.55	Horizontal	-45.66	-13.00	32.66	0
8	14960.8	-52.87	8.24	15.35	Horizontal	-45.76	-13.00	32.76	315
9	16830.9	-50.35	8.41	14.95	Horizontal	-43.81	-13.00	30.81	135
10	18701.0	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

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6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	150415	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Agilent	N9010A	MY50210259	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2018-05-20	2019-05-19
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2019-09-25
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2019-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Signal generator	R&S	SMB 100A	102594	2018-05-20	2019-05-19
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preampflier	R&S	SCU18	102327	2018-05-20	2019-05-19
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2018-05-07	2019-05-06
RF Cable	Agilent	SMA 15cm	0001	/	/
Software	R&S	EMC32	9.26.0	/	/

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