RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR201902M66
Product	GSM/GPRS Module
Brand	Quectel
Model	M66
Marketing	Quectel M66
Report No.	R1901A0009-R2
Issue Date	February 15, 2019

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.

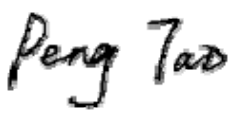

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TABLE OF CONTENT

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: January 9, 2019~ February 2, 2019			
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.			

1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

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.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
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2. General Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

General information

EUT Description			
Model	M66		
IMEI	867322039990304		
Hardware Version	R1.0		
Software Version	M66FAR01A12BT		
Power Supply	External Power Supply		
Antenna Type	External Antenna (The EUT don't have standard Antenna. The Antenna used for testing in this report is the after-market accessory.)		
Antenna Gain	2dBi		
Test Mode(s)	GSM1900		
Test Modulation	(GSM)GMSK		
GPRS Multislot Class	12		
Maximum E.I.R.P	GSM 1900:	31.38dBm	
Rated Power Supply Voltage	4.0V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.6V		
Extreme Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850 ~ 1910	1930 ~ 1990
Note: 1. The information of the EUT is declared by the manufacturer.			

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

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, vertical polarization) and the worst case was recorded.

The following testing in GSM is set based on the maximum RF Output Power.
Test modes are chosen to be reported as the worst case configuration below:

Test items	Modes/Modulation
	GSM 1900
RF power output	GSM GPRS
Effective Isotropic Radiated power	GSM GPRS(1Tx slot)
Occupied Bandwidth	GSM GPRS(1Tx slot)
Band Edge Compliance	GSM GPRS(1Tx slot)
Peak-to-Average Power Ratio	GSM GPRS(1Tx slot)
Frequency Stability	GSM GPRS(1Tx slot)
Spurious Emissions at Antenna Terminals	GSM
Radiates Spurious Emission	GSM

5. Test Case Results

5.1. RF Power Output

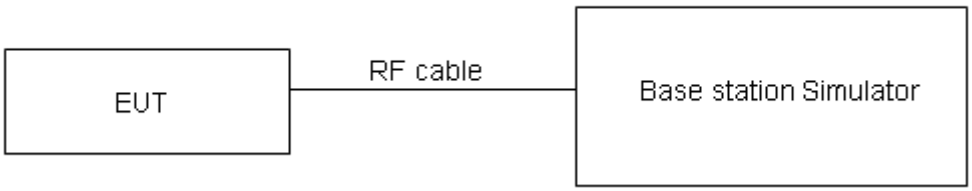
Ambient condition

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.

Test Results

GSM 1900			Conducted Power(dBm)		
Operation Mode		Power level	Channel 512	Channel 661	Channel 810
			1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	CS	0	29.22	29.07	29.02
GPRS (GMSK)	1TXslot	0	29.23	29.27	29.22
	2TXslots	0	29.14	29.16	29.18
	3TXslots	0	29.08	29.03	29.11
	4TXslots	0	29.08	29.01	28.99
	4TXslots	10	10.06	10.11	10.16
	4TXslots	15	-0.33	-0.35	-0.37

5.2. Effective Isotropic Radiated Power

Ambient condition

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

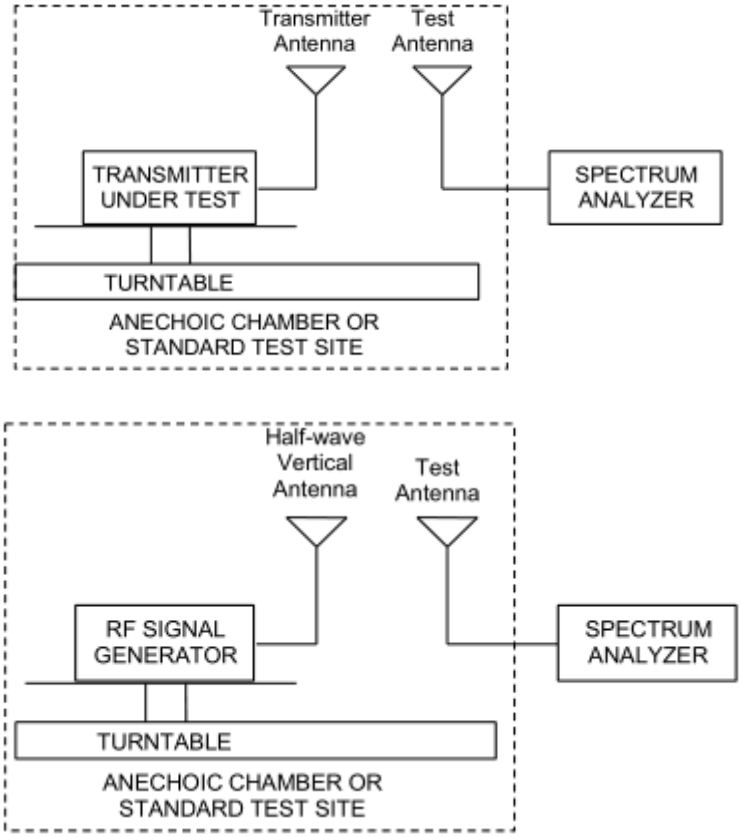
Methods of Measurement

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 (dBi)
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.

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

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.

Mode	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
GSM 1900	Low	1850.2	Horizontal	30.75	33	Pass
	Mid	1880	Horizontal	30.96	33	Pass
	High	1909.8	Horizontal	30.93	33	Pass
GPRS 1900	Low	1850.2	Horizontal	31.22	33	Pass
	Mid	1880	Horizontal	31.38	33	Pass
	High	1909.8	Horizontal	31.30	33	Pass

5.3. Occupied Bandwidth

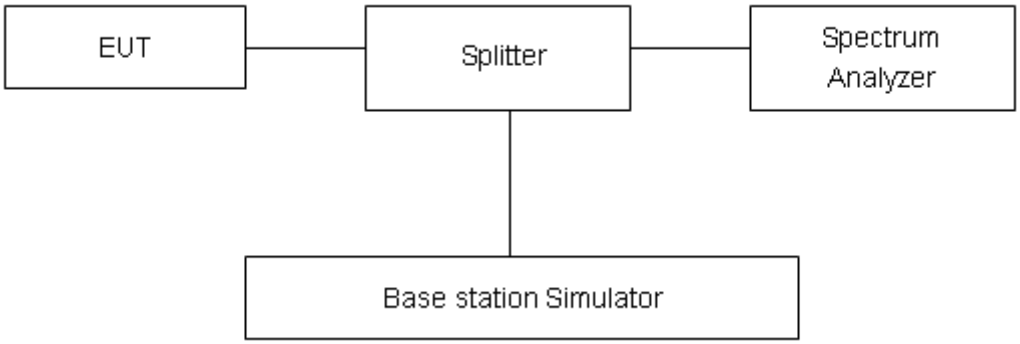
Ambient condition

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 3kHz, VBW is set to 10kHz for GSM 1900,
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.

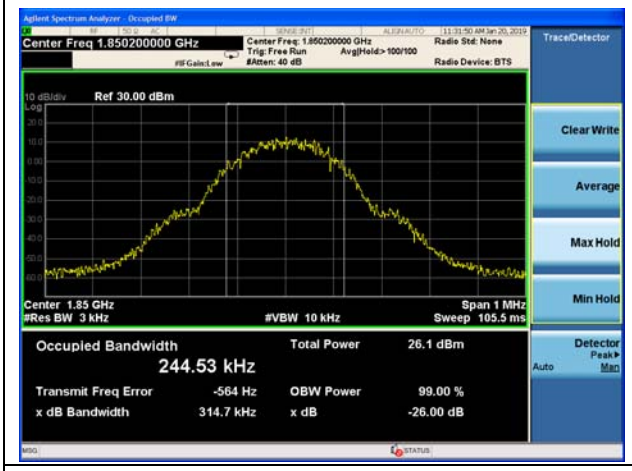
Measurement Uncertainty

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

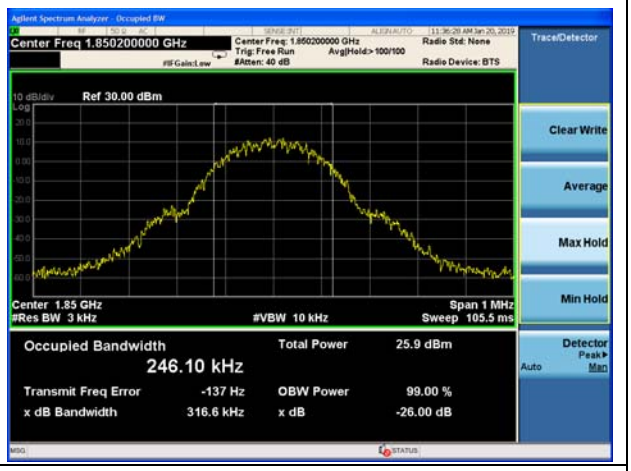
Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.245	0.315
	661	1880.0	0.247	0.313
	810	1909.8	0.248	0.316
GPRS 1900 (GMSK)	512	1850.2	0.246	0.317
	661	1880.0	0.242	0.309
	810	1909.8	0.245	0.308

GSM1900 GSM CH-Low



GSM1900 GPRS CH-Low

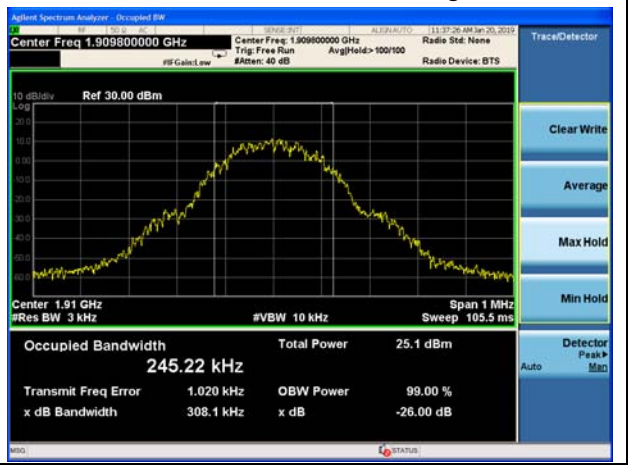


GSM 1900 GSM CH-Middle

GSM 1900 GPRS CH-Middle

GSM 1900 GSM CH-High

GSM 1900 GPRS CH-High



5.4. Band Edge Compliance

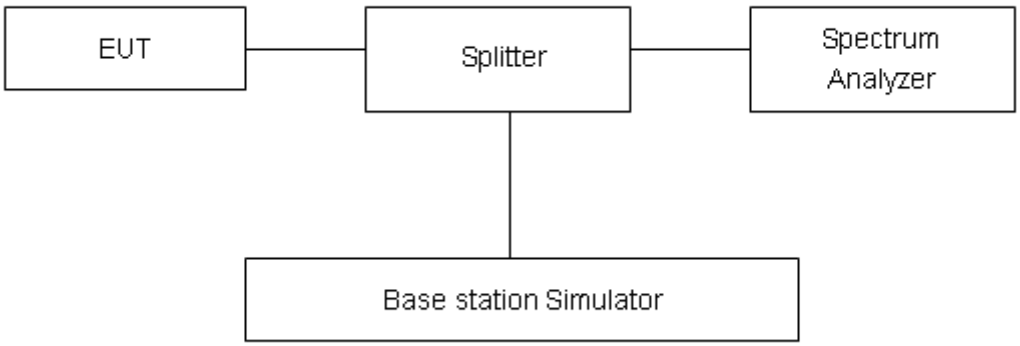
Ambient condition

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 3kHz, VBW is set to 10kHz for GSM 1900
Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

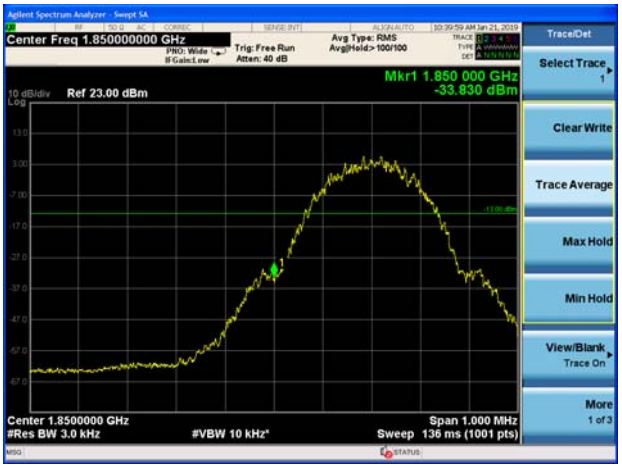
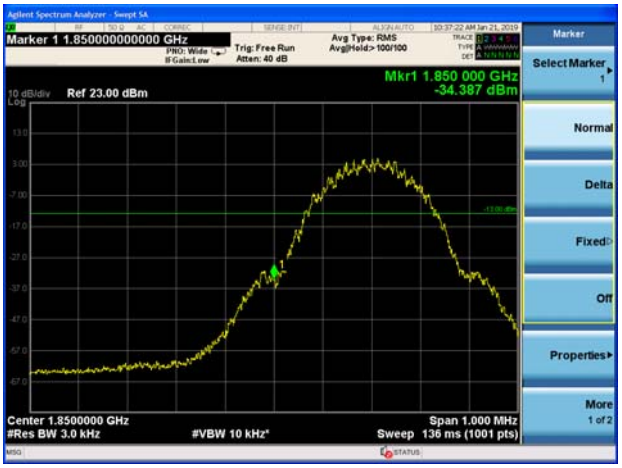
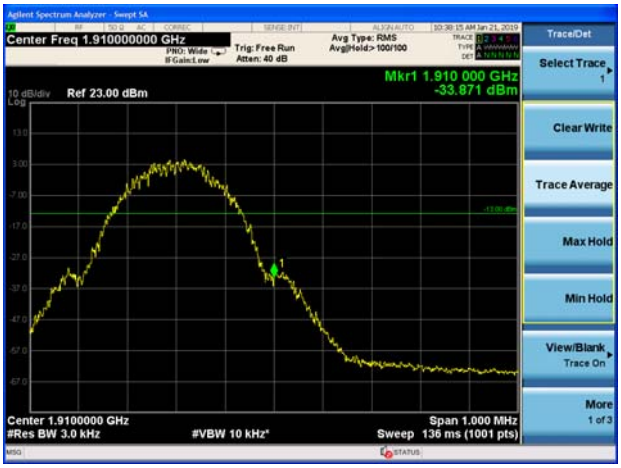
Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

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.

Test Result:

GSM1900 GSM CH-Low	GSM 1900 GSM CH-High
	
GSM1900 GPRS CH-Low	**GSM 1900 GPRS CH-High**
	

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

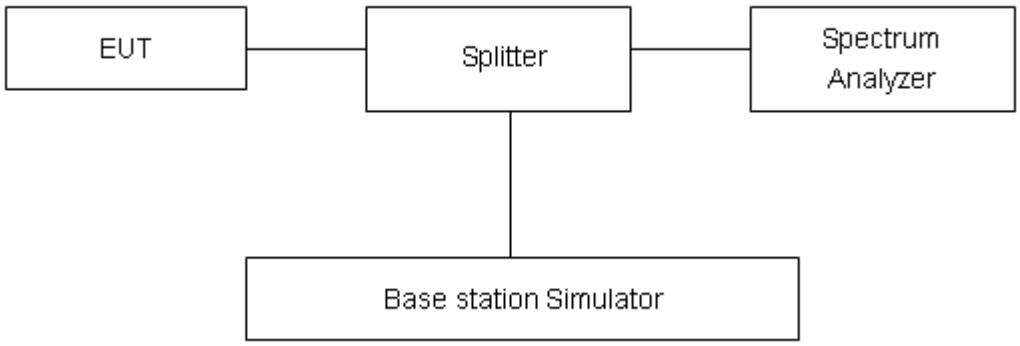
Ambient condition

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.

Test Results

Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
GSM 1900 (GSM)	512	1850.2	27.09	26.12	0.97	≤13	PASS
	661	1880	27.02	26.01	1.01	≤13	PASS
	810	1909.8	26.91	25.97	0.94	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	24.35	23.34	1.01	≤13	PASS
	661	1880	24.22	23.27	0.95	≤13	PASS
	810	1909.8	24.09	23.11	0.98	≤13	PASS

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)

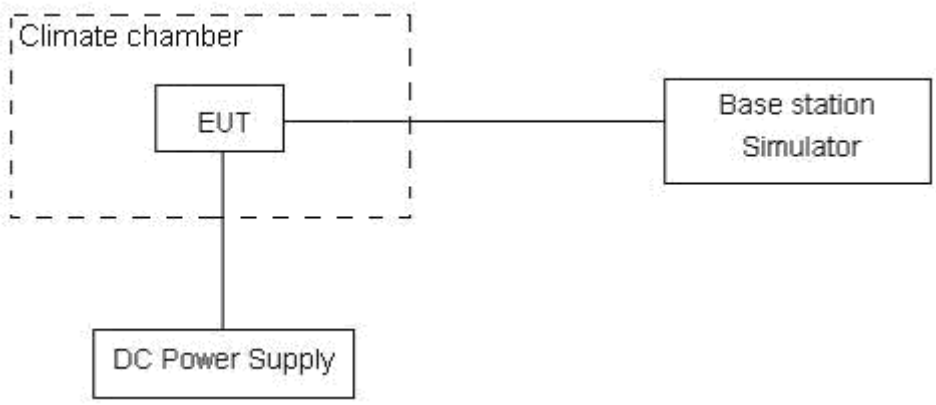
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 3.3 V and 4.6 V, with a nominal voltage of 4.0V.

Test setup



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.

Test Result

GSM 1900					
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	1850.0664	1909.9502	24.83	0.01321
Extreme（85°C）		1850.0662	1909.9500	23.47	0.01248
Extreme（80°C）		1850.0650	1909.9488	20.16	0.01072
Extreme（70°C）		1850.0663	1909.9501	19.26	0.01024
Extreme（60°C）		1850.0652	1909.9490	20.33	0.01081
Extreme（50°C）		1850.0651	1909.9489	21.64	0.01151
Extreme（40°C）		1850.0661	1909.9499	23.75	0.01263
Extreme（30°C）		1850.0652	1909.9490	17.94	0.00954
Extreme（20°C）		1850.0660	1909.9498	19.62	0.01044
Extreme（10C）		1850.0653	1909.9491	21.85	0.01162
Extreme（0°C）		1850.0659	1909.9497	18.31	0.00974
Extreme（-10°C）		1850.0654	1909.9492	19.58	0.01041
Extreme（-20°C）		1850.0658	1909.9496	20.67	0.01099
Extreme（-30°C）		1850.0655	1909.9493	15.34	0.00816
Extreme（-40°C）		1850.0657	1909.9495	17.62	0.00937
25°C	LV	1850.0656	1909.9494	13.52	0.00719
	HV	1850.0665	1909.9503	16.13	0.00858

GPRS 1900					
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	1850.0604	1909.9436	22.31	0.01187
Extreme（85°C）		1850.0602	1909.9434	23.74	0.01263
Extreme（80°C）		1850.0590	1909.9422	24.49	0.01303
Extreme（70°C）		1850.0603	1909.9435	20.16	0.01072
Extreme（60°C）		1850.0592	1909.9424	19.35	0.01029
Extreme（50°C）		1850.0591	1909.9423	17.56	0.00934
Extreme（40°C）		1850.0601	1909.9433	24.33	0.01294
Extreme（30°C）		1850.0592	1909.9424	21.90	0.01165
Extreme（20°C）		1850.0600	1909.9432	20.43	0.01087
Extreme（10C）		1850.0593	1909.9425	19.48	0.01036
Extreme（0°C）		1850.0599	1909.9431	23.21	0.01235
Extreme（-10°C）		1850.0594	1909.9426	18.97	0.01009
Extreme（-20°C）		1850.0598	1909.9430	20.86	0.01110

Extreme（-30°C）		1850.0595	1909.9427	21.55	0.01146
Extreme（-40°C）		1850.0597	1909.9429	18.34	0.00976
25°C	LV	1850.0596	1909.9428	20.01	0.01064
	HV	1850.0605	1909.9437	17.91	0.00953

5.7. Spurious Emissions at Antenna Terminals

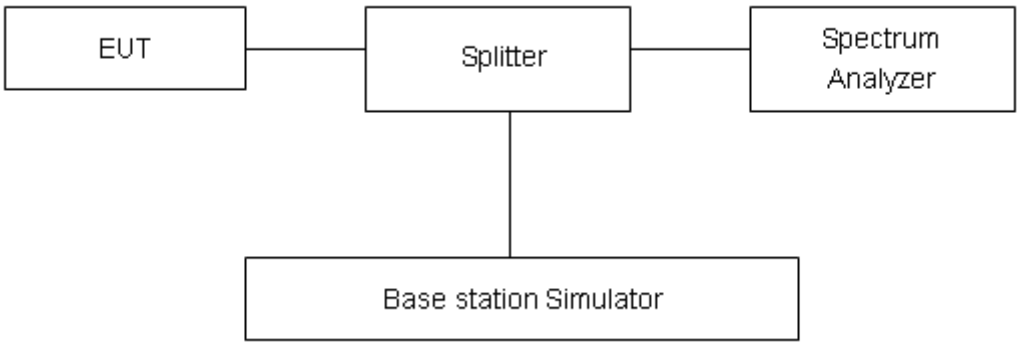
Ambient condition

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.

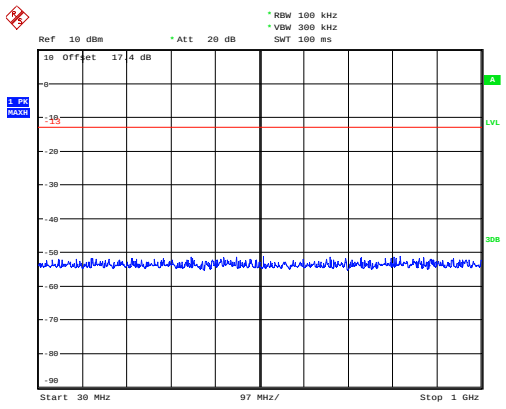
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

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.

GSM 1900 CH-Low 30MHz~1GHz



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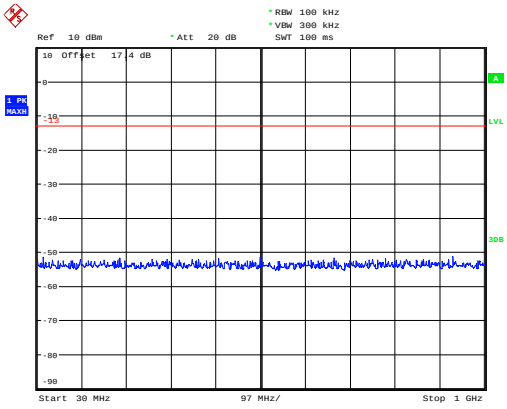
GSM 1900 CH-Middle 30MHz~1GHz



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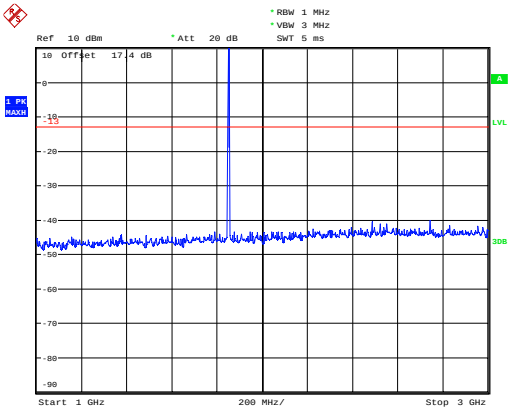
GSM 1900 CH-Low 1GHz~3GHz



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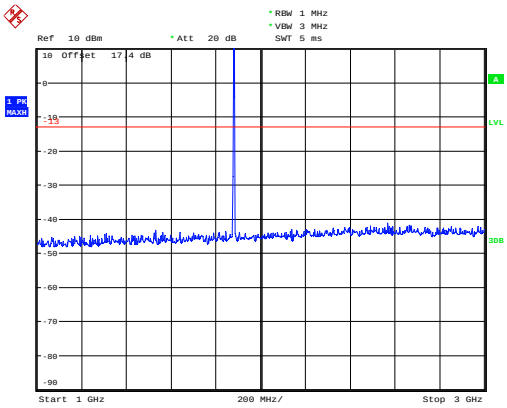
GSM 1900 CH-Middle 1GHz~3GHz



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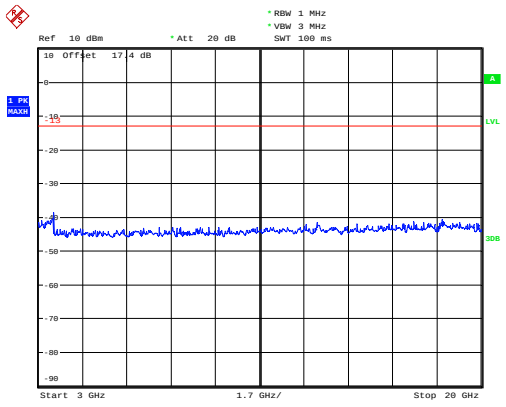
GSM 1900 CH-Low 3GHz~20GHz



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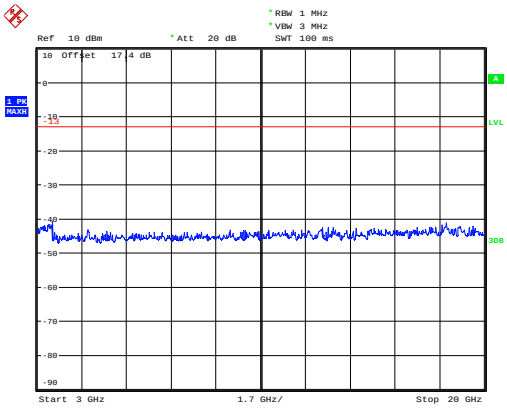
GSM 1900 CH-Middle 3GHz~20GHz



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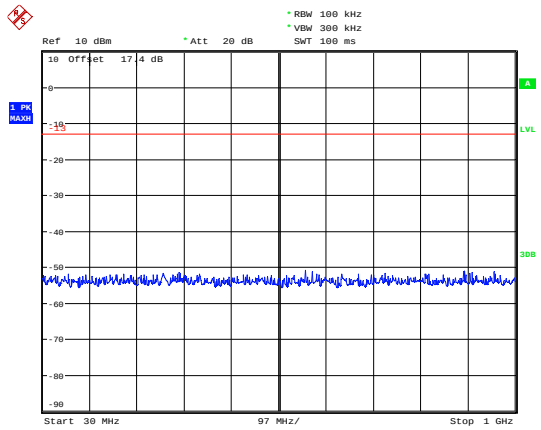
GSM 1900 CH-High 30MHz~1GHz



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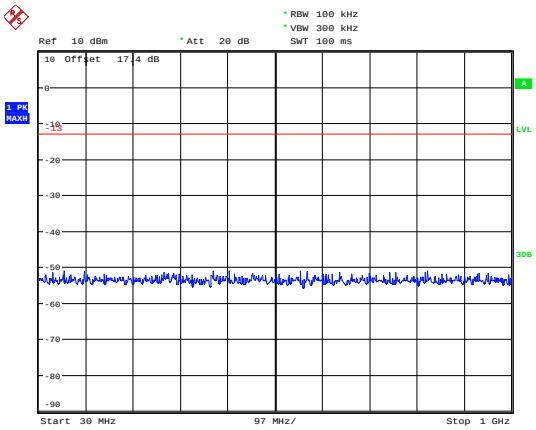
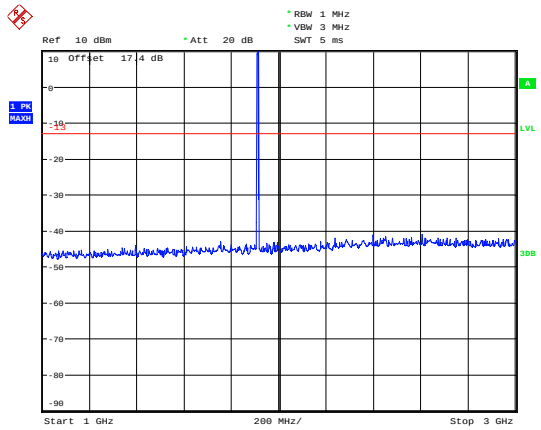
GPRS 1900 CH-Low 30MHz~1GHz



Date: 21.JAN.2019 09:52:01

GSM 1900 CH-High 1GHz~3GHz



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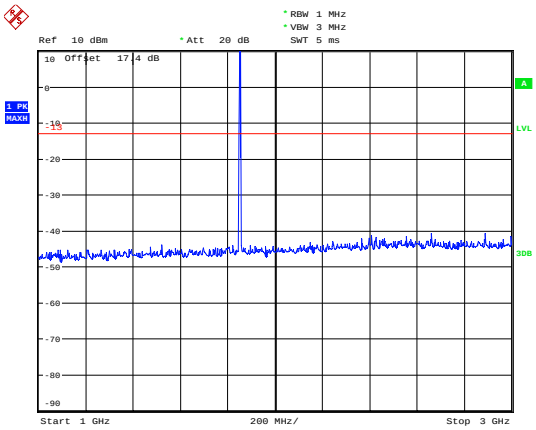
GPRS 1900 CH-Low 1GHz~3GHz



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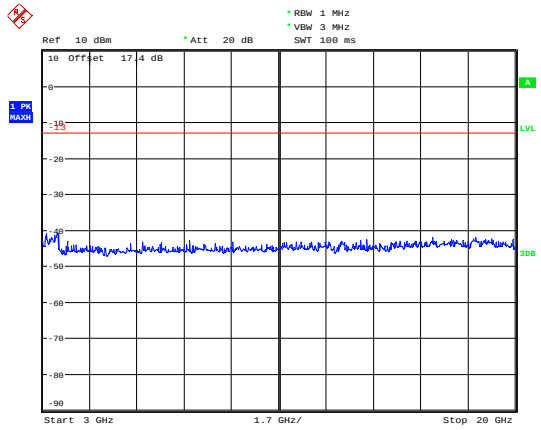
GSM 1900 CH-High 3GHz~20GHz



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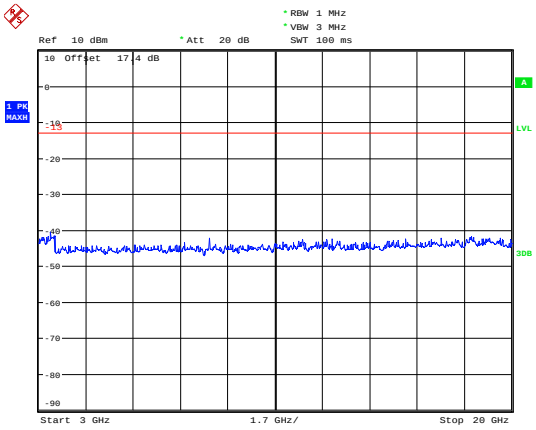
GPRS 1900 CH-Low 3GHz~20GHz



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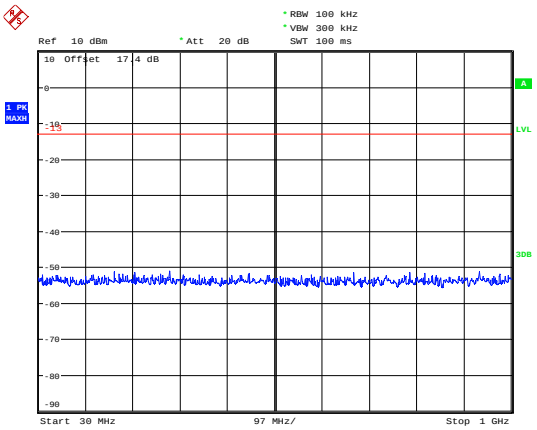
GPRS 1900 CH-Middle 30MHz~1GHz



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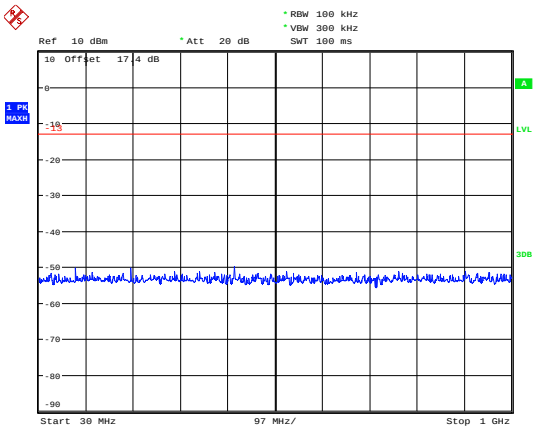
GPRS 1900 CH-High 30MHz~1GHz



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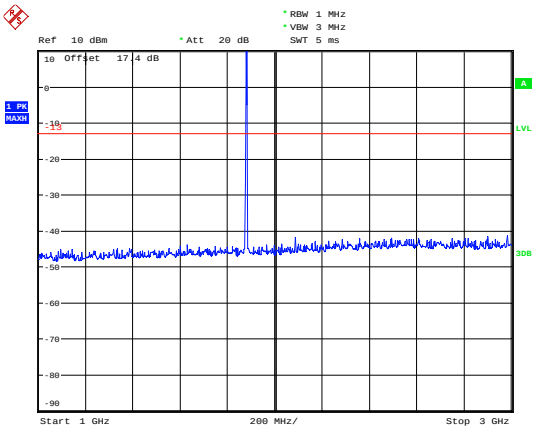
GPRS 1900 CH-Middle 1GHz~3GHz



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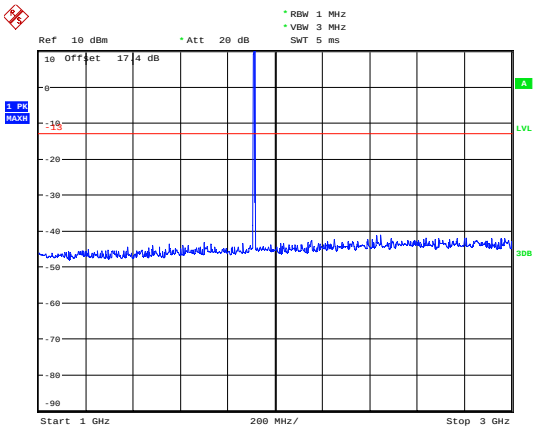
GPRS 1900 CH-High 1GHz~3GHz



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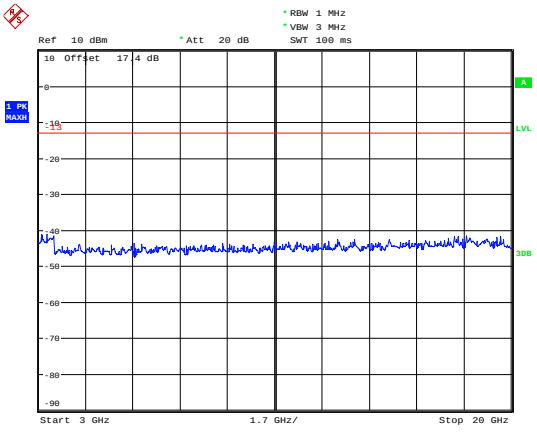
GPRS 1900 CH-Middle 3GHz~20GHz



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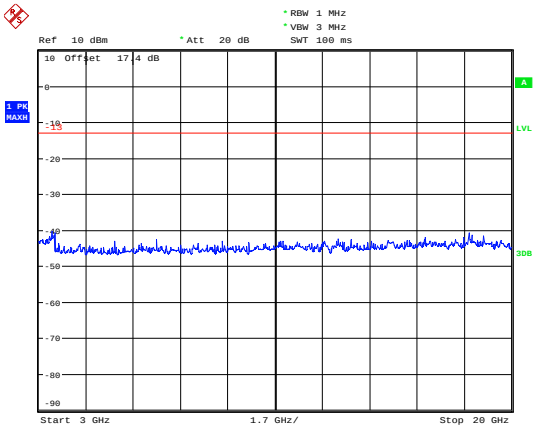
GPRS 1900 CH-High 3GHz~20GHz



Date: 21.JAN.2019 09:51:15

5.8. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

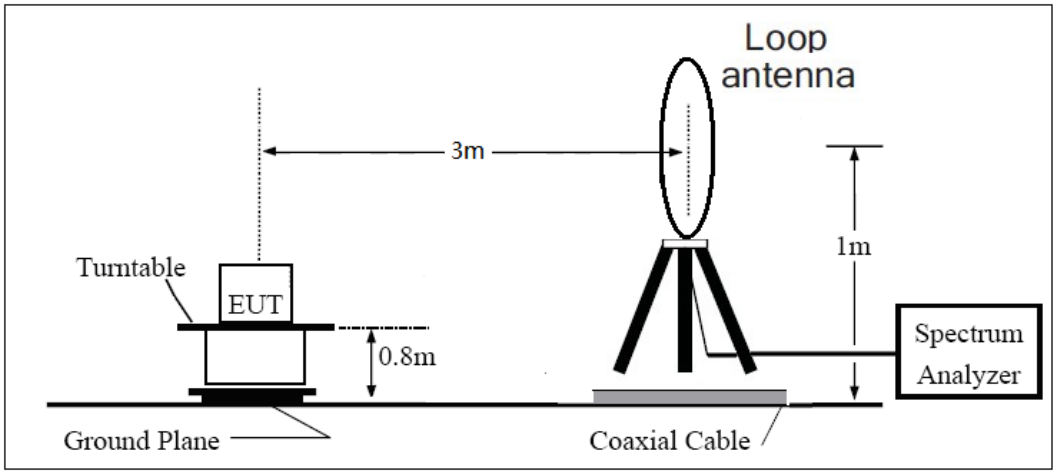
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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 loop antenna, 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=200Hz,VBW=600Hz for 9kHz150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz , RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 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)

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

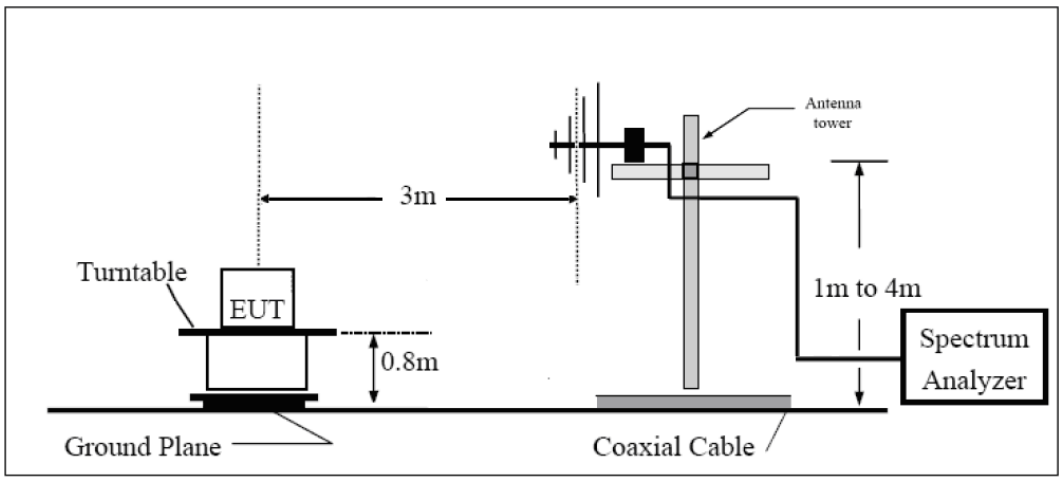
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

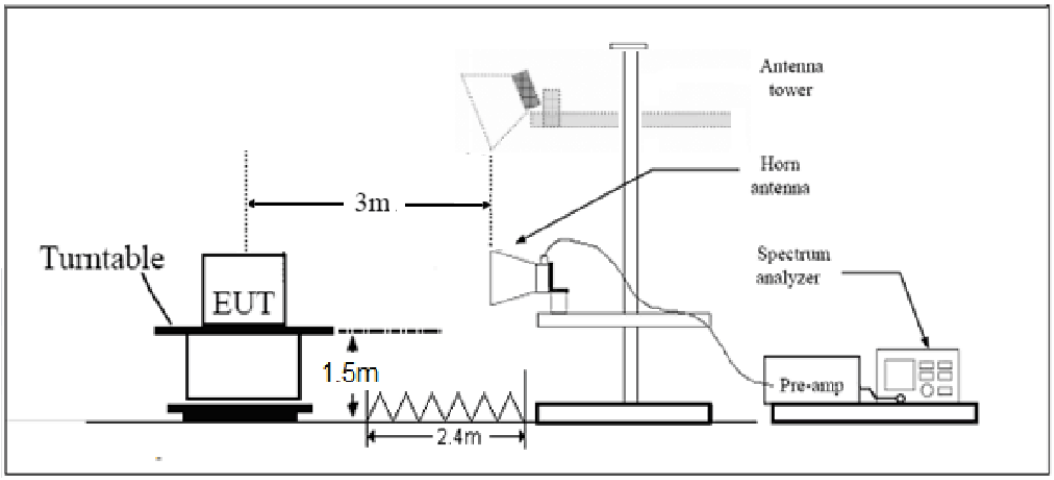
9KHz ~ 30MHz



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.

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.

GSM 1900 CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.4	-57.77	5.10	11.05	Horizontal	-51.82	-13.00	38.82	90
3	5550.6	-56.16	5.42	12.65	Horizontal	-48.93	-13.00	35.93	45
4	7400.8	-49.85	6.70	13.85	Horizontal	-42.70	-13.00	29.70	135
5	9251.0	-46.89	7.01	14.75	Horizontal	-39.15	-13.00	26.15	225
6	11101.2	-47.15	7.48	15.95	Horizontal	-38.68	-13.00	25.68	180
7	12951.4	-46.36	7.51	16.55	Horizontal	-37.32	-13.00	24.32	225
8	14801.6	-42.26	8.24	15.35	Horizontal	-35.15	-13.00	22.15	315
9	16651.8	-45.64	8.41	14.95	Horizontal	-39.10	-13.00	26.10	45
10	18502.0	-	-	-	-	-	-	-	-
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.									

GSM 1900 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-58.77	5.10	11.05	Horizontal	-52.82	-13.00	39.82	45
3	5640.0	-57.19	5.42	12.65	Horizontal	-49.96	-13.00	36.96	90
4	7520.0	-52.56	6.70	13.85	Horizontal	-45.41	-13.00	32.41	135
5	9400.0	-49.16	7.01	14.75	Horizontal	-41.42	-13.00	28.42	135
6	11280.0	-46.50	7.48	15.95	Horizontal	-38.03	-13.00	25.03	180
7	13160.0	-47.24	7.51	16.55	Horizontal	-38.20	-13.00	25.20	225
8	15040.0	-46.06	8.24	15.35	Horizontal	-38.95	-13.00	25.95	315
9	16920.0	-44.36	8.41	14.95	Horizontal	-37.82	-13.00	24.82	90
10	18800.0	-	-	-	-	-	-	-	-
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.									

GSM 1900 CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3819.6	-59.18	5.10	11.05	Horizontal	-53.23	-13.00	40.23	90
3	5729.4	-57.12	5.42	12.65	Horizontal	-49.89	-13.00	36.89	180
4	7639.2	-49.95	6.70	13.85	Horizontal	-42.80	-13.00	29.80	135
5	9549.0	-49.41	7.01	14.75	Horizontal	-41.67	-13.00	28.67	45
6	11458.8	-46.69	7.48	15.95	Horizontal	-38.22	-13.00	25.22	45
7	13368.6	-47.56	7.51	16.55	Horizontal	-38.52	-13.00	25.52	225
8	15278.4	-46.56	8.24	15.35	Horizontal	-39.45	-13.00	26.45	135
9	17188.2	-44.80	8.41	14.95	Horizontal	-38.26	-13.00	25.26	225
10	19098.0	-	-	-	-	-	-	-	-
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.									

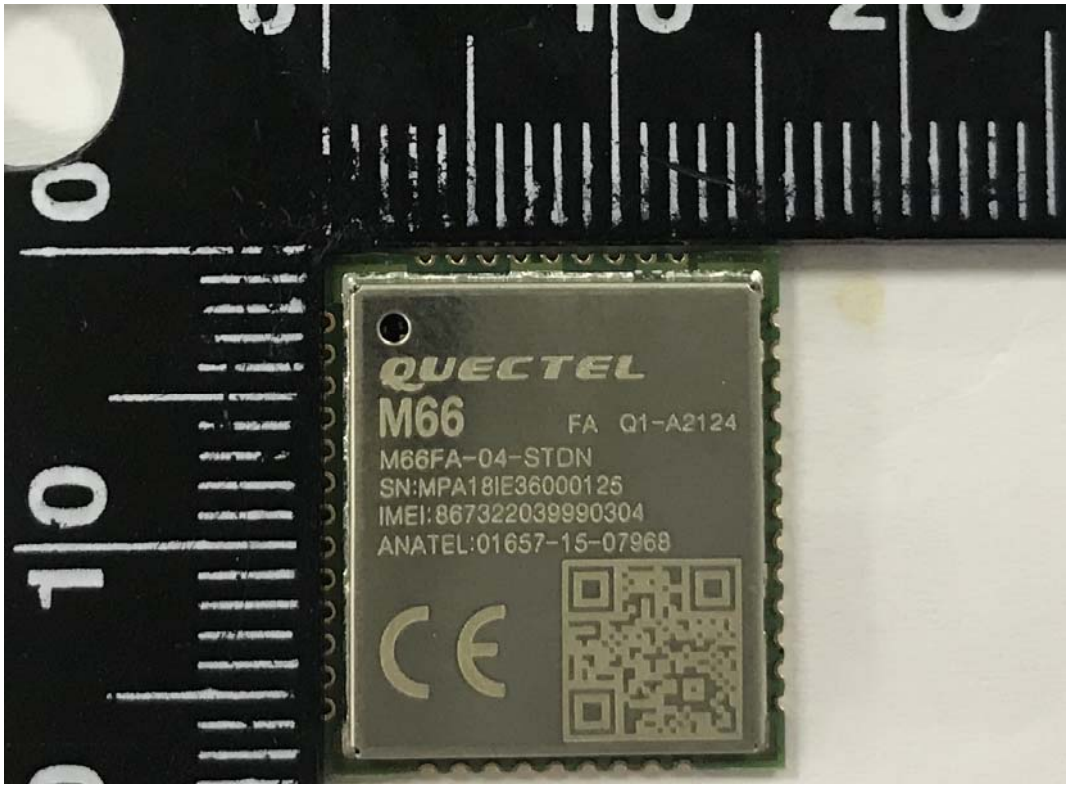
6. Main Test Instruments

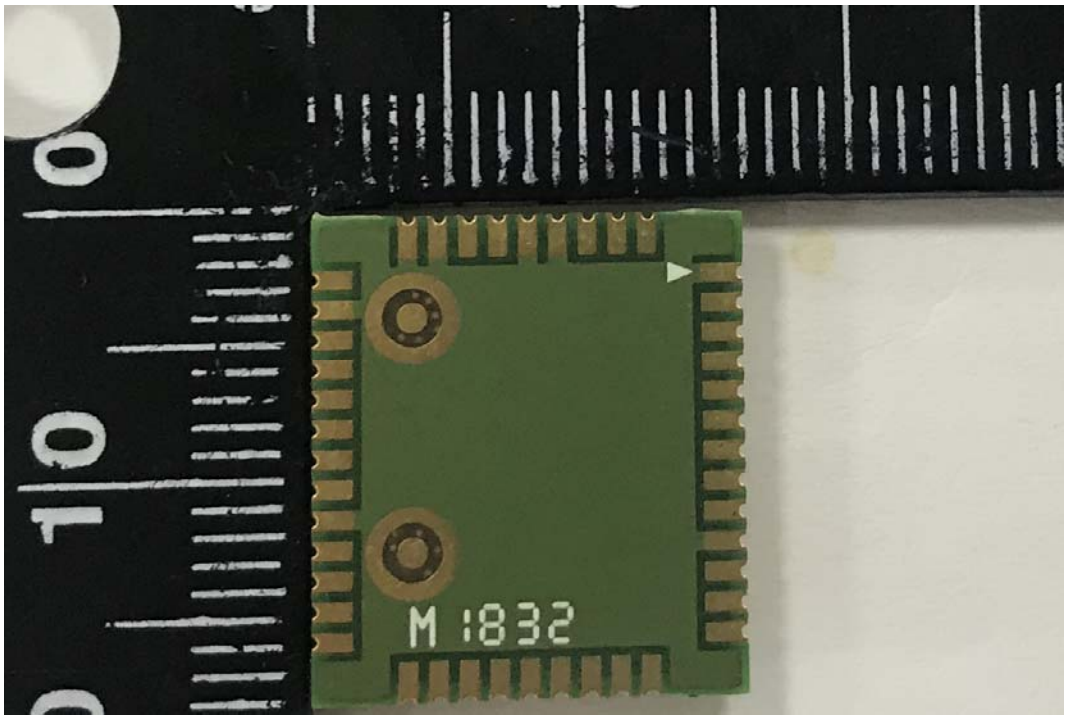
Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2018-05-13	2019-05-12
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2018-05-20	2019-05-19
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV30	100815	2018-12-16	2019-12-15
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	/	/

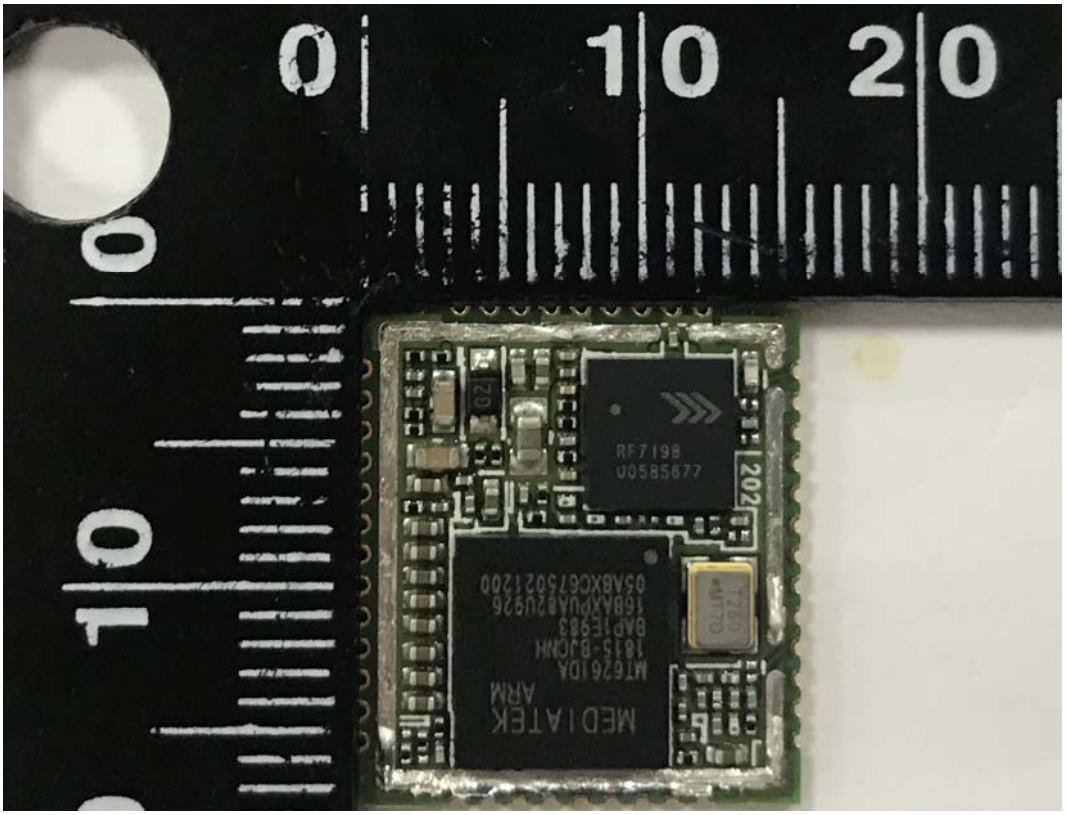
*******END OF REPORT *******

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



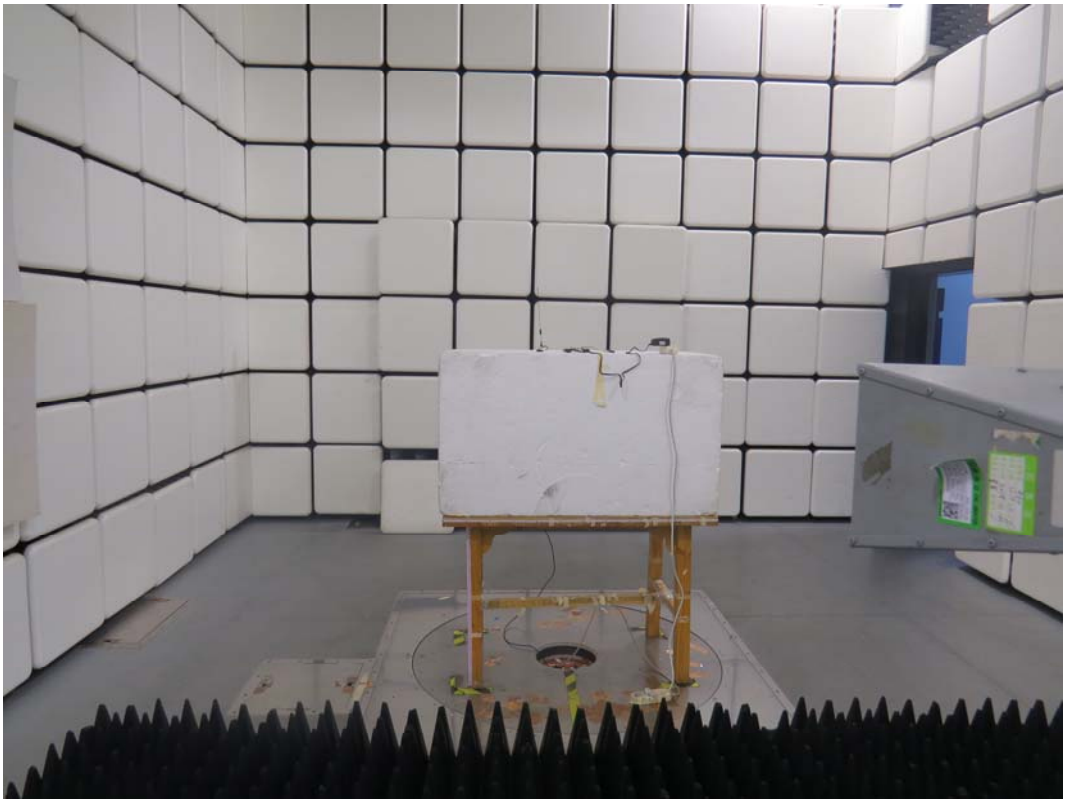




a: EUT

Picture 1 EUT

A.2 Test Setup



Picture 2 Radiated Spurious Emissions Test setup