



RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISJAT-LX3
Product	Smart Phone
Model	JAT-LX3
Report No.	R1811H0154-R2V1
Issue Date	December 18, 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.

Performed by: Jiangpeng Lan

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000



TABLE OF CONTENT

1. Test Laboratory	4
1.1. Notes of the test report.....	4
1.2. Test facility.....	4
1.3. Testing Location	5
2. General Description of Equipment under Test.....	6
3. Applied Standards.....	8
4. Test Configuration.....	9
5. Test Case Results.....	11
5.1. RF Power Output.....	11
5.2. Effective Isotropic Radiated Power	16
5.3. Occupied Bandwidth	20
5.4. Band Edge Compliance.....	26
5.5. Peak-to-Average Power Ratio (PAPR)	37
5.6. Frequency Stability	40
5.7. Spurious Emissions at Antenna Terminals	45
5.8. Radiates Spurious Emission	58
6. Main Test Instruments	63

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: November 11, 2018 ~ December 10, 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.			

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.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

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	JAT-LX3		
IMEI	IMEI 1:861844040014648 IMEI 2:861844040015942		
Hardware Version	HL1JATM		
Software Version	9.0.1.55(C900E61R1P4log)		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Antenna Gain	GSM 1900: 1.1dBi WCDMA Band II: 1.1dBi LTE Band 2: 1.1dBi		
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;		
Test Modulation	(GSM)GMSK,8PSK; (WCDMA)QPSK; (LTE)QPSK,16QAM		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	24		
HSUPA UE Category	6		
DC-HSDPA UE Category	24		
HSPA+ UE Category	7		
LTE Category	4		
Maximum E.I.R.P	GSM 1900:	31.63dBm	
	WCDMA Band II:	23.00dBm	
	LTE Band 2:	22.68dBm	
Rated Power Supply Voltage	3.82V		
Extreme Voltage	Minimum: 3.6V Maximum: 4.4V		
Extreme Temperature	Lowest: 0°C Highest: +35°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990



	LTE Band 2	1850 ~ 1910	1930 ~ 1990
EUT Accessory			
Adapter 1	Manufacturer: Huawei Technologies Co., Ltd. (SHENZHEN HUNTKEY ELECTRIC CO., LTD.) Model: HW-050100U01		
Adapter 2	Manufacturer: Huawei Technologies Co., Ltd. (HUIZHOU BYD ELECTRONIC CO., LTD.) Model: HW-050100U01		
Adapter 3	Manufacturer: Huawei Technologies Co., Ltd. (Dongguan Phitek Electronics Co., Ltd.) Model: HW-050100U01		
Battery 1	Manufacturer: Huawei Technologies Co., Ltd. (Sunwoda Electronic Co.,LTD) Model: HB405979ECW		
Battery 2	Manufacturer: Huawei Technologies Co., Ltd. (SCUD (Fujian) Electronics Co., LTD.) Model: HB405979ECW		
Battery 3	Manufacturer: Huawei Technologies Co., Ltd. (Desay Battery Electronic Co.,LTD) Model: HB405979ECW		
Earphone 1	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD. Model: MEND1532B528A02		
Earphone 2	Manufacturer: Boluo County Quancheng Electronic Co.,ltd. Model: 1293-3283-3.5MM-322		
USB Cable 1	Manufacturer: HONGLIN TECHNOLOGY CO.,LTD. Model: 130-26654		
USB Cable 2	Manufacturer: Dongguan Ming Ji Electronics Co.,Ltd. Model: 203-0786-0		
USB Cable 3	Manufacturer: Luxshare Precision industry Co., Ltd. Model: L99U2013-CS-H		
USB Cable 4	Manufacturer: NingBo Broad Telecommunication Co., Ltd. Model: WA0007		
Note: 1. The information of the EUT is declared by the manufacturer. 2. There are more than one Adapter, Battery, Earphone and USB Cable, each one should be applied throughout the compliance test respectively, however, only the worst case (Adapter 1, Battery 1, Earphone 2 and USB Cable 4) will be recorded in this report.			

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

There is more than one SIM card slot, each one should be applied throughout the compliance test respectively, and however, only the worst case (SIM 1) will be recorded in this report.

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 GSM/WCDMA/LTE 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	WCDMA Band II
RF power output	GSM GPRS EGPRS	RMC HSDPA/HSUPA DC-HSDPA/HSPA+
Effective Isotropic Radiated power	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Occupied Bandwidth	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Band Edge Compliance	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Peak-to-Average Power Ratio	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Frequency Stability	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Spurious Emissions at Antenna Terminals	GSM	RMC
Radiates Spurious Emission	GSM	RMC



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

Test items	Bandwidth (MHz)						Modulation		RB			Test Channel		
	1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	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
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Band Edge Compliance	O	O	O	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	O
Frequency Stability	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Conducted Spurious Emissions	O	O	O	O	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.													

5. Test Case Results

5.1. RF Power Output

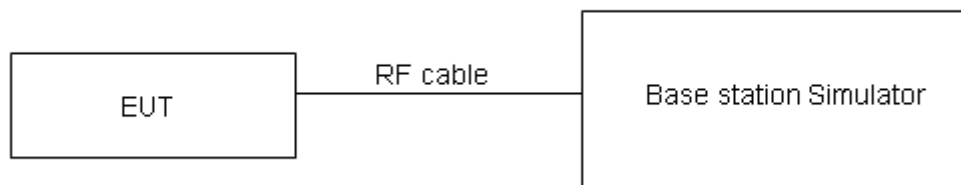
Ambient condition

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)		
		Channel 512	Channel 661	Channel 810
		1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	Results	30.41	30.57	30.68
GPRS/EGPRS (GMSK)	1TXslot	29.93	29.91	29.78
	2TXslots	27.00	27.16	27.17
	3TXslots	25.20	25.42	25.45
	4TXslots	23.92	24.13	24.19
EGPRS (8PSK)	1TXslot	26.07	26.76	26.72
	2TXslots	23.10	23.69	23.15
	3TXslots	21.59	21.76	21.71
	4TXslots	20.13	20.15	20.11

WCDMA Band II		Conducted Power(dBm)		
		Channel 9262	Channel 9400	Channel 9538
		1852.4(MHz)	1880(MHz)	1907.6(MHz)
RMC	12.2k	24.13	24.17	23.84
AMR	12.2k	24.29	24.29	23.76
HSDPA	Sub - Test 1	23.55	23.75	23.38
	Sub - Test 2	23.61	23.65	23.46
	Sub - Test 3	23.25	23.29	22.82
	Sub - Test 4	23.07	23.21	22.94
HSUPA	Sub - Test 1	21.67	21.71	21.46
	Sub - Test 2	21.57	21.65	21.30
	Sub - Test 3	22.57	22.73	22.40
	Sub - Test 4	21.09	21.31	20.90
	Sub - Test 5	22.53	22.63	22.38
DC-HSDPA	Sub - Test 1	23.53	23.75	23.46
	Sub - Test 2	23.61	23.69	23.48
	Sub - Test 3	23.19	23.33	22.94
	Sub - Test 4	23.13	23.15	22.74
HSPA+	16QAM	21.17	21.53	20.90

LTE Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18607/1850.7	18900/1880	19193/1909.3
1.4MHz	QPSK	1	0	22.53	23.17	23.04
		1	2	22.59	23.26	23.27
		1	5	22.68	23.21	23.07
		3	0	23.23	23.20	23.11
		3	2	23.15	23.24	23.05
		3	3	23.36	23.27	22.93
		6	0	22.45	22.17	21.60
	16QAM	1	0	22.29	22.41	22.24
		1	2	22.24	22.26	22.07
		1	5	22.48	22.18	22.20
		3	0	22.29	22.21	22.39
		3	2	22.04	22.24	21.90
		3	3	22.37	21.95	21.95
		6	0	20.98	21.20	21.19
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18615/1851.5	18900/1880	19185/1908.5
3MHz	QPSK	1	0	22.55	23.15	22.94
		1	7	22.51	23.52	23.43
		1	14	22.60	23.03	22.89
		8	0	22.37	22.00	22.23
		8	4	22.07	21.96	21.91
		8	7	21.96	22.03	21.75
		15	0	22.39	22.19	21.94
	16QAM	1	0	22.59	22.35	22.34
		1	7	22.24	22.30	22.11
		1	14	22.14	22.20	22.26
		8	0	21.25	21.19	21.31
		8	4	21.00	21.14	21.22
		8	7	21.19	21.27	20.95
		15	0	20.90	21.28	20.93
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	22.61	23.23	22.86
		1	13	22.51	23.42	23.49
		1	24	22.54	23.03	22.73
		12	0	22.27	22.12	22.13
		12	6	22.35	22.08	22.21
		12	13	22.04	22.29	21.87
		25	0	22.27	22.37	21.98



	16QAM	1	0	22.37	22.33	22.14
		1	13	22.36	22.08	22.03
		1	24	22.14	22.14	22.36
		12	0	21.29	21.33	21.13
		12	6	21.34	21.32	21.02
		12	13	20.73	21.05	20.93
		25	0	21.40	21.16	21.15
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	22.51	23.27	23.12
		1	25	22.63	23.72	23.47
		1	49	22.62	23.17	22.73
		25	0	22.29	22.20	22.09
		25	13	22.21	22.38	21.97
		25	25	22.06	22.11	21.97
		50	0	22.29	22.09	22.00
	16QAM	1	0	22.33	22.39	22.36
		1	25	22.06	22.16	21.89
		1	49	22.42	22.34	22.18
		25	0	21.53	21.19	21.17
		25	13	21.48	21.30	21.20
		25	25	21.11	21.17	21.09
		50	0	21.26	21.26	21.13
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	22.63	23.13	22.96
		1	38	22.53	23.56	23.41
		1	74	22.56	23.15	22.93
		36	0	22.35	22.32	22.15
		36	18	22.15	22.20	22.11
		36	39	22.26	22.19	21.81
		75	0	22.37	22.19	21.90
	16QAM	1	0	22.17	22.37	22.18
		1	38	22.14	22.14	22.17
		1	74	22.04	22.18	22.12
		36	0	21.07	21.19	21.31
		36	18	21.18	21.34	21.10
		36	39	20.97	21.05	20.97
		75	0	21.24	21.16	21.09
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18700/1860	18900/1880	19100/1900
20MHz	QPSK	1	0	22.53	23.23	23.00
		1	50	22.61	23.58	23.43



		1	99	22.54	23.05	22.89
		50	0	22.29	22.22	22.13
		50	25	22.25	22.24	22.03
		50	50	22.16	22.15	21.91
		100	0	22.27	22.19	21.92
	16QAM	1	0	22.37	22.29	22.18
		1	50	22.22	22.14	22.07
		1	99	22.24	22.24	22.16
		50	0	21.37	21.27	21.23
		50	25	21.30	21.26	21.16
		50	50	21.13	21.13	21.01
		100	0	21.14	21.16	21.03

5.2. Effective Isotropic Radiated Power

Ambient condition

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

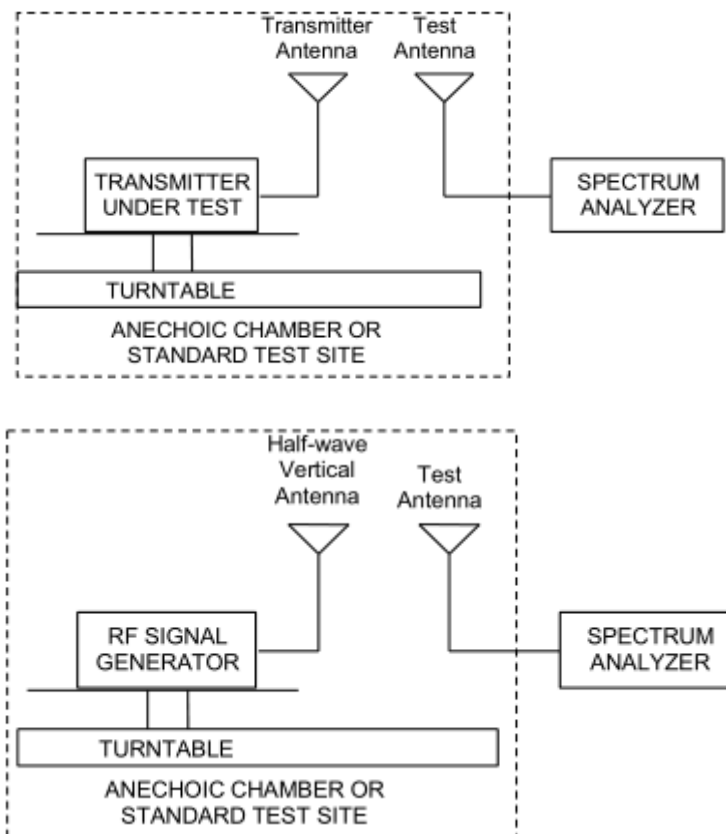
Methods of Measurement

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

- 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.
- 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).
- 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.
- 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. $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$
- Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation: $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$
- The maximum ERP is the maximum value determined in the preceding step.
- 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:
 $EIRP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$
where: dBd refers to gain relative to an ideal dipole.
 $EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$

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	$\leq 2 \text{ W}$ (33 dBm)
-------	-----------------------------

Measurement Uncertainty

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

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	29.23	33	Pass
	Mid	1880	Horizontal	30.79	33	Pass
	High	1909.8	Horizontal	31.63	33	Pass
GPRS 1900	Low	1850.2	Horizontal	28.02	33	Pass
	Mid	1880	Horizontal	29.51	33	Pass
	High	1909.8	Horizontal	30.30	33	Pass
EGPRS 1900	Low	1850.2	Horizontal	28.04	33	Pass
	Mid	1880	Horizontal	28.93	33	Pass
	High	1909.8	Horizontal	29.93	33	Pass
WCDMA Band II	Low	1852.4	Horizontal	20.09	33	Pass
	Mid	1880	Horizontal	21.95	33	Pass
	High	1907.6	Horizontal	23.00	33	Pass

LTE Band 2						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	1850.7	Horizontal	19.46	33	Pass
	Mid	1880	Horizontal	21.38	33	Pass
	High	1909.3	Horizontal	22.41	33	Pass
3 MHz (QPSK)	Low	1851.5	Horizontal	19.58	33	Pass
	Mid	1880	Horizontal	21.52	33	Pass
	High	1908.5	Horizontal	22.68	33	Pass
5 MHz (QPSK)	Low	1852.5	Horizontal	19.67	33	Pass
	Mid	1880	Horizontal	21.59	33	Pass
	High	1907.5	Horizontal	22.21	33	Pass
10 MHz (QPSK)	Low	1855	Horizontal	19.55	33	Pass
	Mid	1880	Horizontal	21.27	33	Pass
	High	1905	Horizontal	22.35	33	Pass
15 MHz (QPSK)	Low	1857.5	Horizontal	19.43	33	Pass
	Mid	1880	Horizontal	20.98	33	Pass
	High	1902.5	Horizontal	21.68	33	Pass
20 MHz (QPSK)	Low	1860	Horizontal	19.27	33	Pass
	Mid	1880	Horizontal	20.57	33	Pass
	High	1900	Horizontal	21.53	33	Pass
1.4 MHz (16QAM)	Low	1850.7	Horizontal	19.01	33	Pass
	Mid	1880	Horizontal	20.98	33	Pass
	High	1909.3	Horizontal	21.96	33	Pass
3 MHz (16QAM)	Low	1851.5	Horizontal	19.04	33	Pass
	Mid	1880	Horizontal	21.03	33	Pass
	High	1908.5	Horizontal	22.08	33	Pass
5 MHz (16QAM)	Low	1852.5	Horizontal	19.13	33	Pass
	Mid	1880	Horizontal	21.00	33	Pass
	High	1907.5	Horizontal	21.84	33	Pass
10 MHz (16QAM)	Low	1855	Horizontal	18.96	33	Pass
	Mid	1880	Horizontal	20.66	33	Pass
	High	1905	Horizontal	21.73	33	Pass
15 MHz (16QAM)	Low	1857.5	Horizontal	18.92	33	Pass
	Mid	1880	Horizontal	20.34	33	Pass
	High	1902.5	Horizontal	21.03	33	Pass
20 MHz (16QAM)	Low	1860	Horizontal	18.81	33	Pass
	Mid	1880	Horizontal	20.09	33	Pass
	High	1900	Horizontal	20.94	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,

RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II,

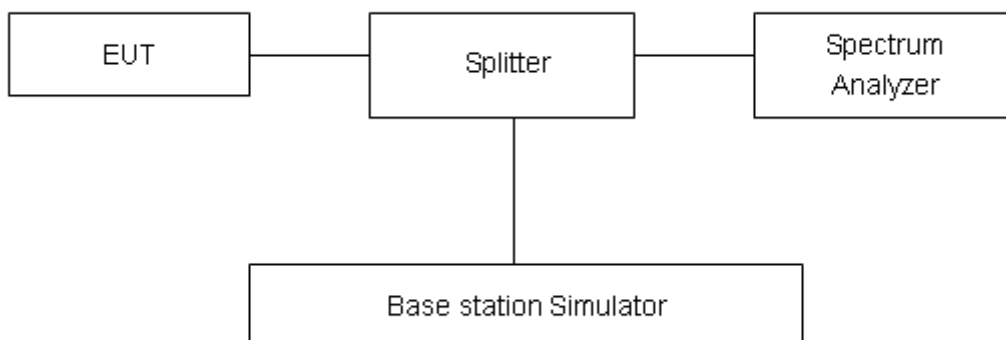
RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 2 (1.4MHz),

RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2 (3MHz/5MHz),

RBW is set to 300kHz,VBW is set to 1MHz for LTE Band 2(10MHz/15MHz/20MHz).

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 $k = 2$, $U = 624\text{Hz}$.

Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.245	0.311
	661	1880.0	0.245	0.304
	810	1909.8	0.244	0.308
GPRS 1900 (GMSK)	512	1850.2	0.246	0.317
	661	1880.0	0.244	0.308
	810	1909.8	0.247	0.311
EGPRS 1900 (8-PSK)	512	1850.2	0.250	0.319
	661	1880.0	0.250	0.316
	810	1909.8	0.247	0.308
WCDMA Band II (RMC)	9262	1852.4	4.167	4.672
	9400	1880	4.164	4.677
	9538	1907.6	4.172	4.683

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18900	1880.0	1.111	1.301
	3	18900	1880.0	2.731	2.953
	5	18900	1880.0	4.494	4.823
	10	18900	1880.0	9.049	9.734
	15	18900	1880.0	13.484	14.300
	20	18900	1880.0	17.922	18.750
16QAM	1.4	18900	1880.0	1.110	1.270
	3	18900	1880.0	2.723	2.944
	5	18900	1880.0	4.493	4.828
	10	18900	1880.0	9.059	9.717
	15	18900	1880.0	13.473	14.270
	20	18900	1880.0	17.918	18.770



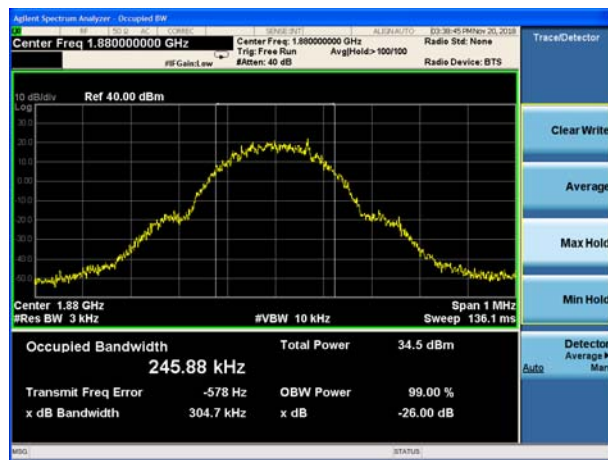
GSM1900 GSM CH-Low



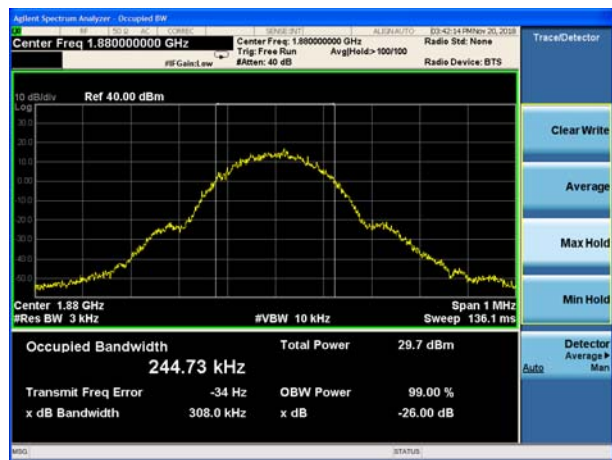
GSM1900 GPRS CH-Low



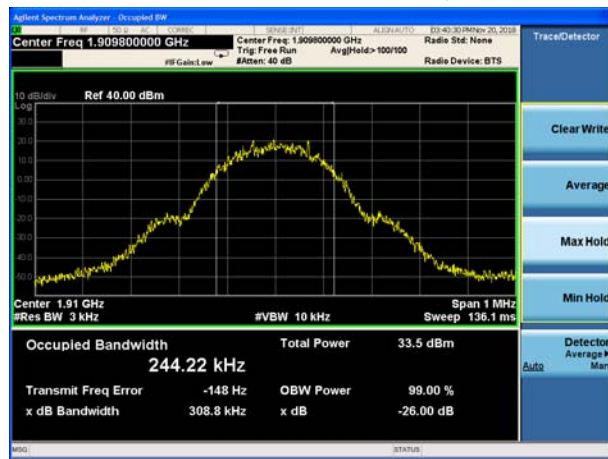
GSM 1900 GSM CH-Middle



GSM 1900 GPRS CH-Middle



GSM 1900 GSM CH-High

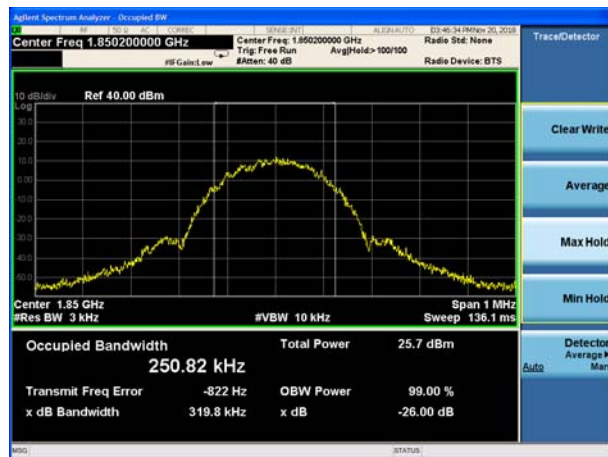


GSM 1900 GPRS CH-High

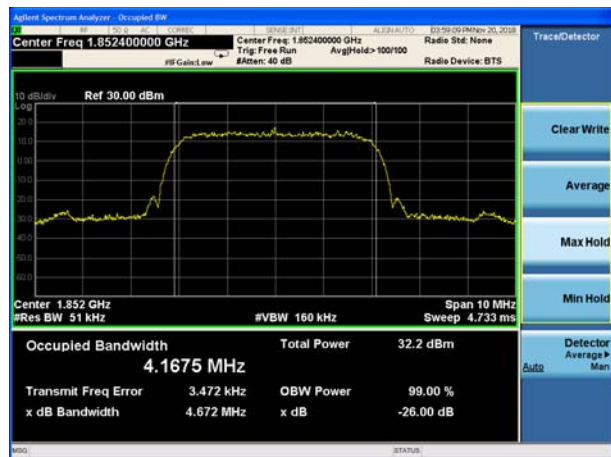




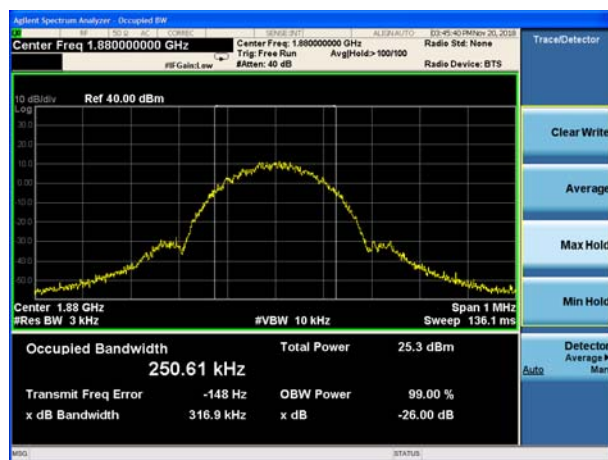
GSM1900 EGPRS CH-Low



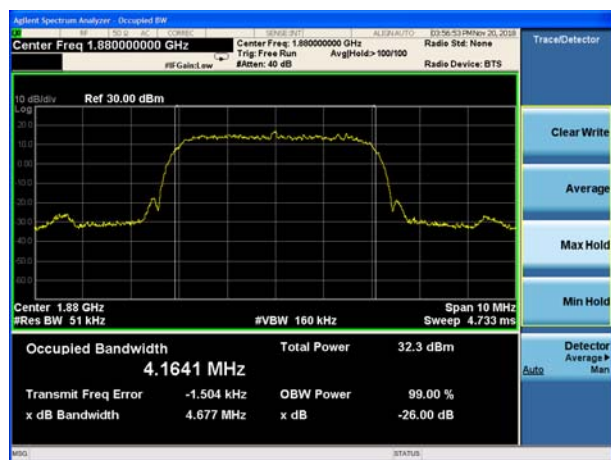
WCDMA Band II RMC CH-Low



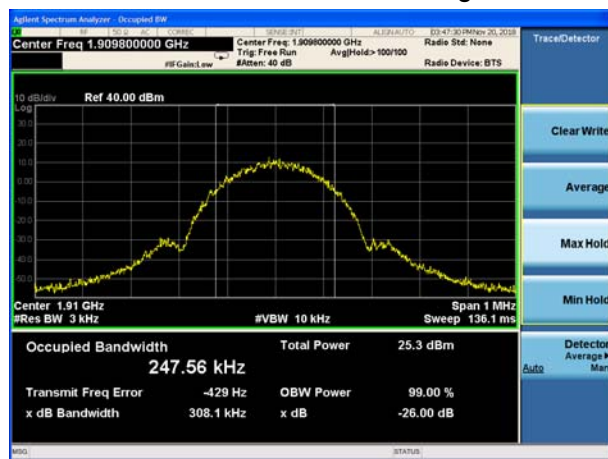
GSM 1900 EGPRS CH-Middle



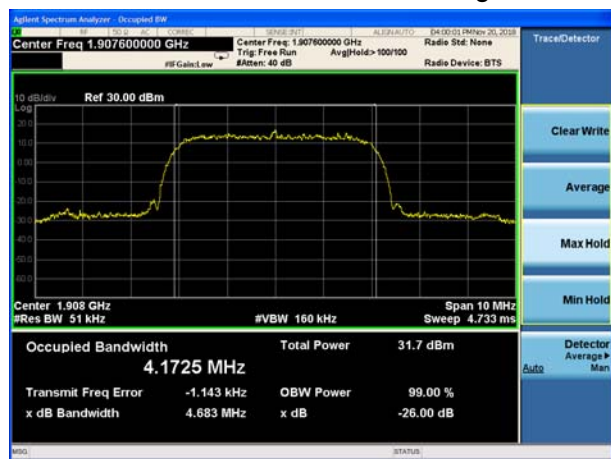
WCDMA Band II RMC CH-Middle



GSM 1900 EGPRS CH-High

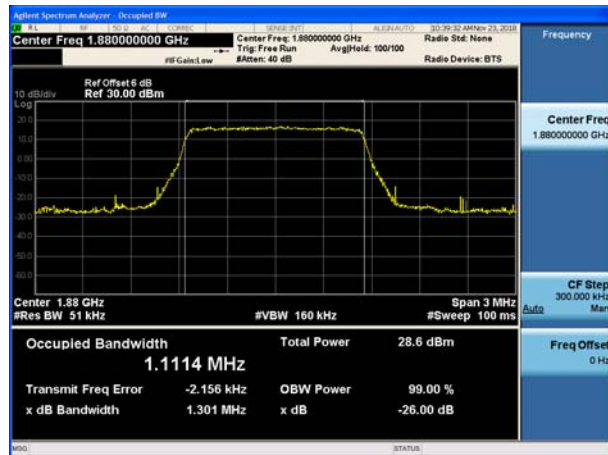


WCDMA Band II RMC CH-High

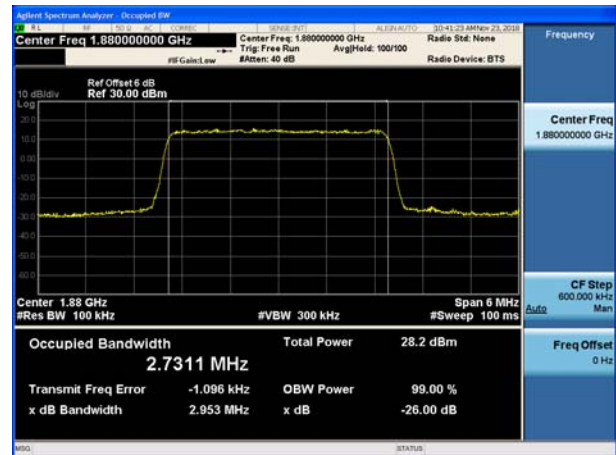




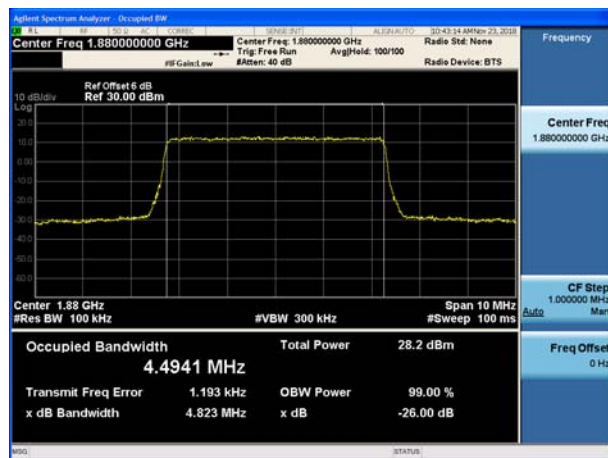
LTE Band 2 1.4MHz QPSK CH-Middle



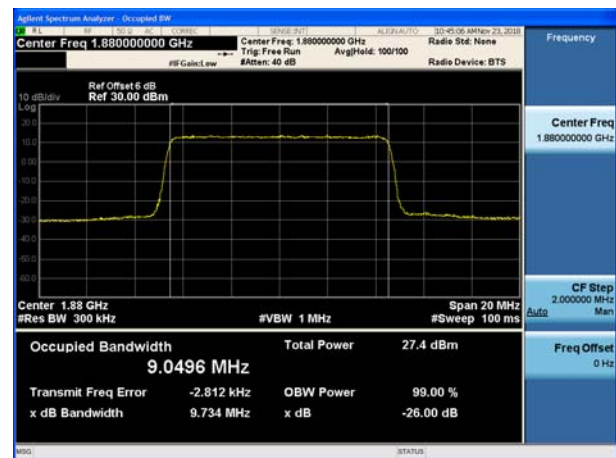
LTE Band 2 3MHz QPSK CH-Middle



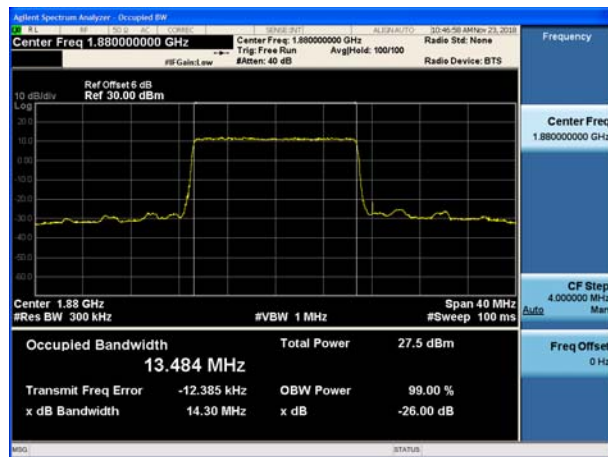
LTE Band 2 5MHz QPSK CH-Middle



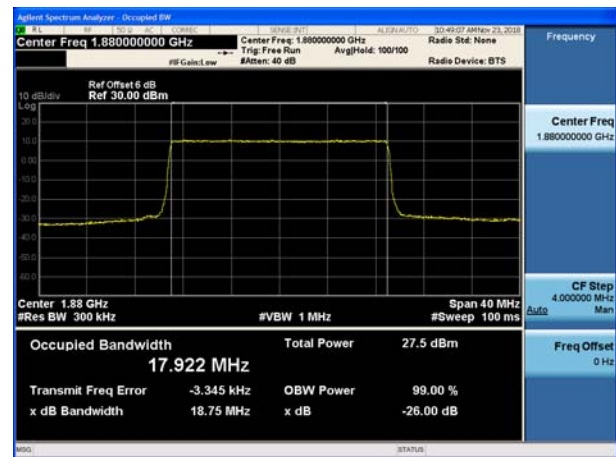
LTE Band 2 10MHz QPSK CH-Middle



LTE Band 2 15MHz QPSK CH-Middle

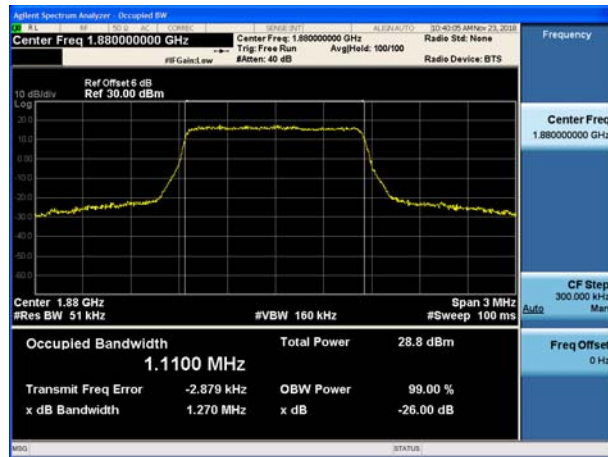


LTE Band 2 20MHz QPSK CH-Middle

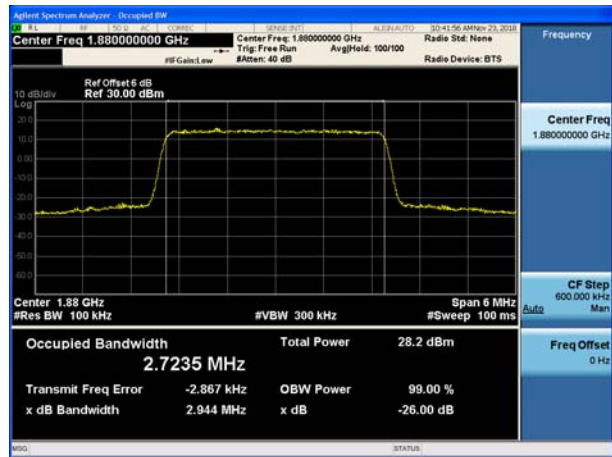




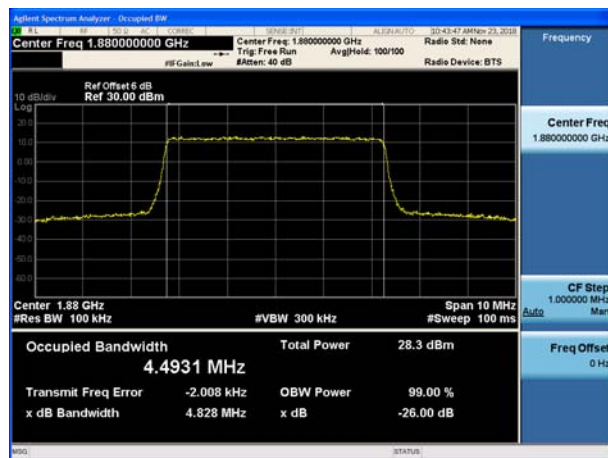
LTE Band 2 1.4MHz 16QAM CH-Middle



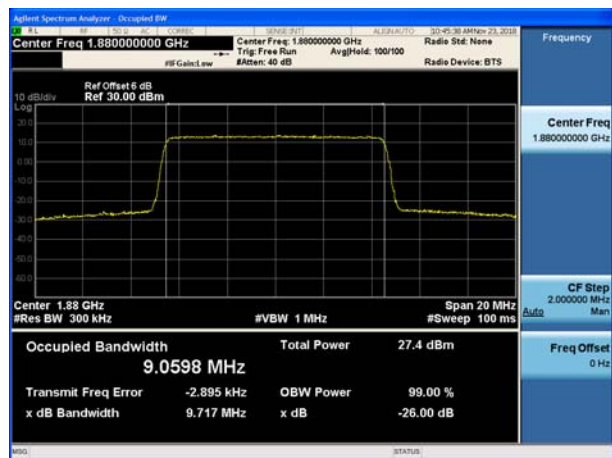
LTE Band 2 3MHz 16QAM CH-Middle



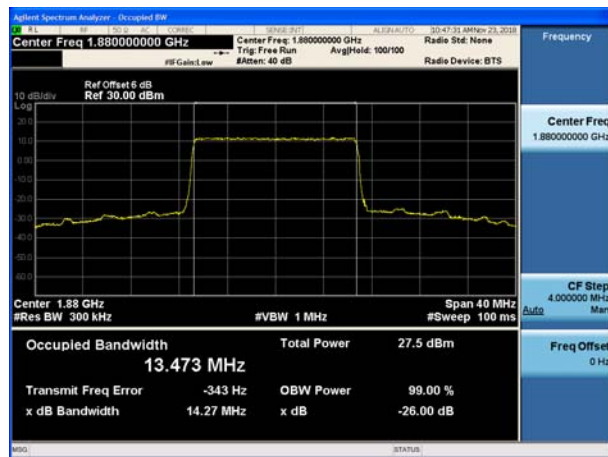
LTE Band 2 5MHz 16QAM CH-Middle



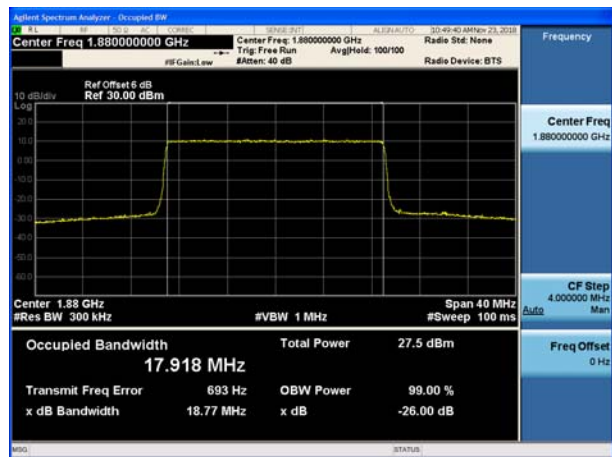
LTE Band 2 10MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-Middle



LTE Band 2 20MHz 16QAM CH-Middle



5.4. Band Edge Compliance

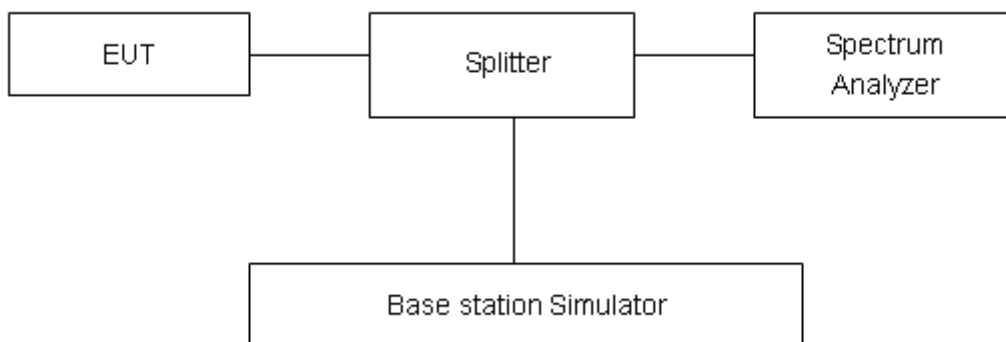
Ambient condition

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, RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II, RBW is set to 15kHz, VBW is set to 51kHz for LTE Band 2(1.4MHz), RBW is set to 30kHz, VBW is set to 100kHz for LTE Band 2 (3MHz), RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 2 (5MHz), RBW is set to 100kHz, VBW is set to 300kHz for LTE Band 2 (10MHz), RBW is set to 150kHz, VBW is set to 510kHz for LTE Band 2 (15MHz), RBW is set to 200kHz, VBW is set to 620kHz for LTE Band 2 (20MHz). 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 $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
-------	---------

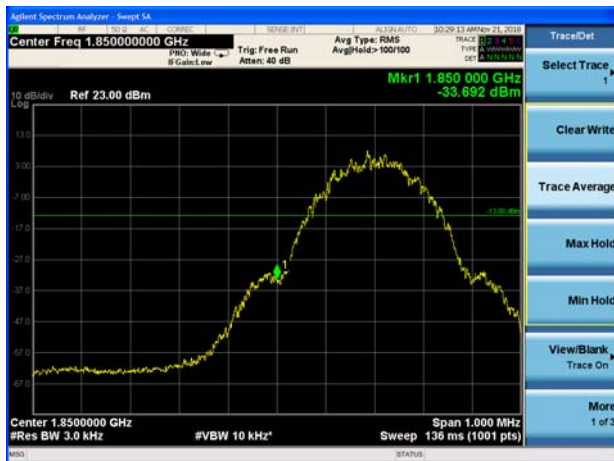
Measurement Uncertainty

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

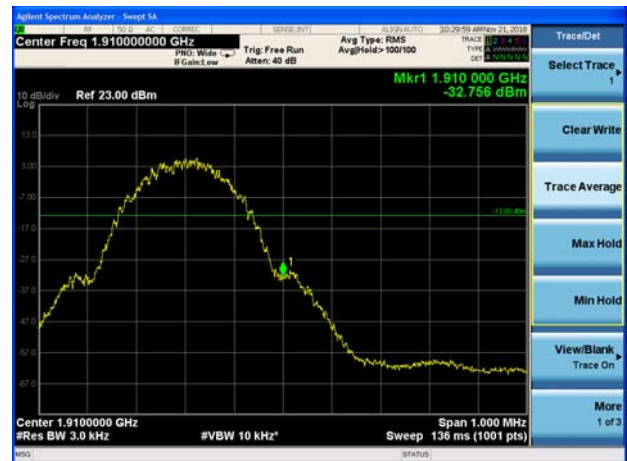


Test Result:

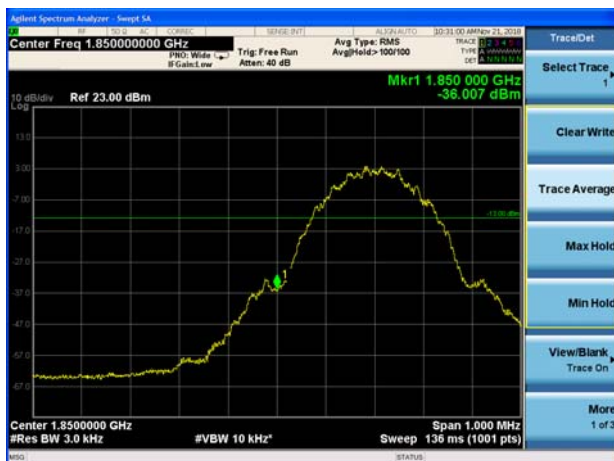
GSM1900 GSM CH-Low



GSM 1900 GSM CH-High



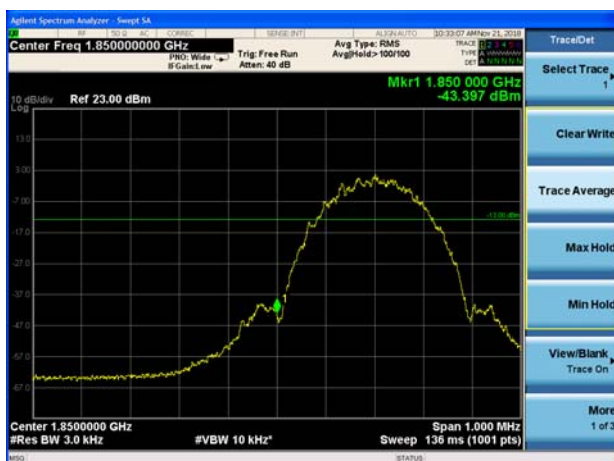
GSM1900 GPRS CH-Low



GSM 1900 GPRS CH-High



GSM1900 EGPRS CH-Low



GSM 1900 EGPRS CH-High





WCDMA Band II RMC CH-Low

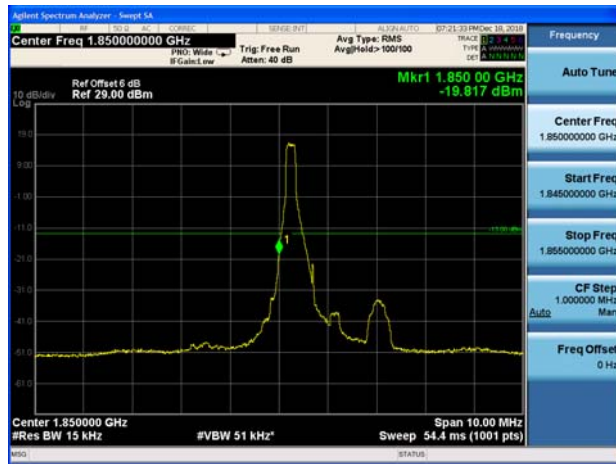


WCDMA Band II RMC CH-High

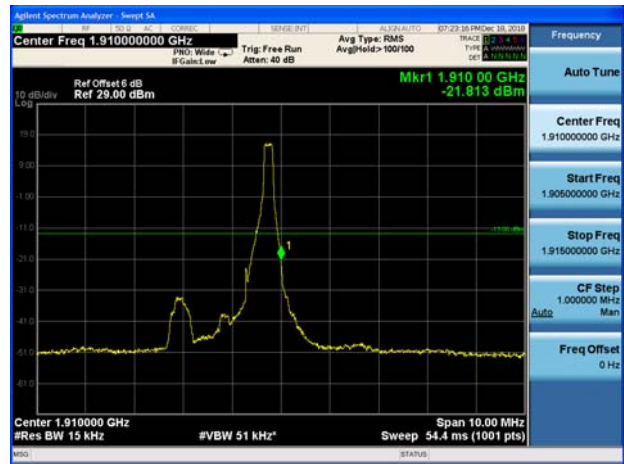




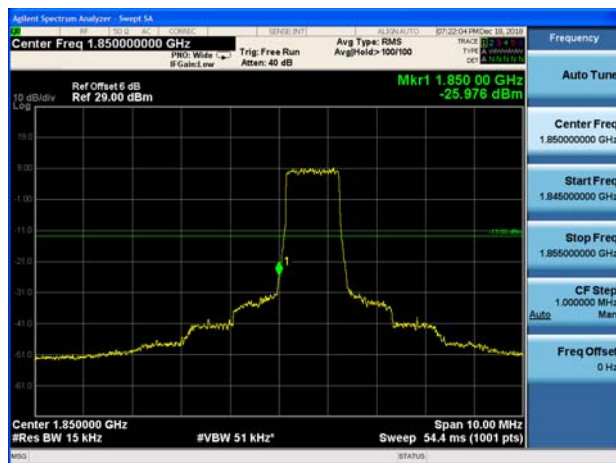
LTE Band 2 1.4MHz QPSK 1RB CH-Low



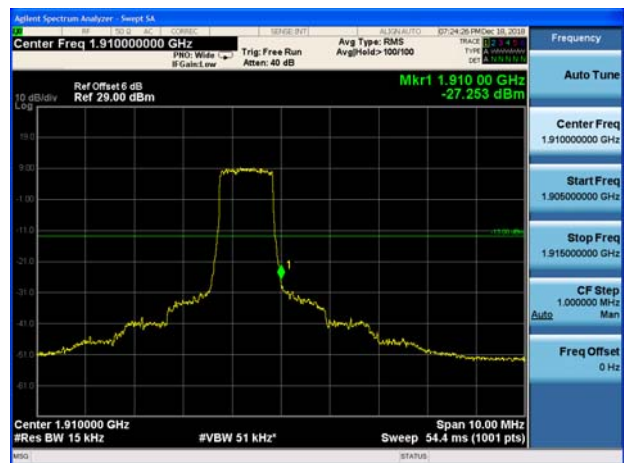
LTE Band 2 1.4MHz QPSK 1RB CH-High



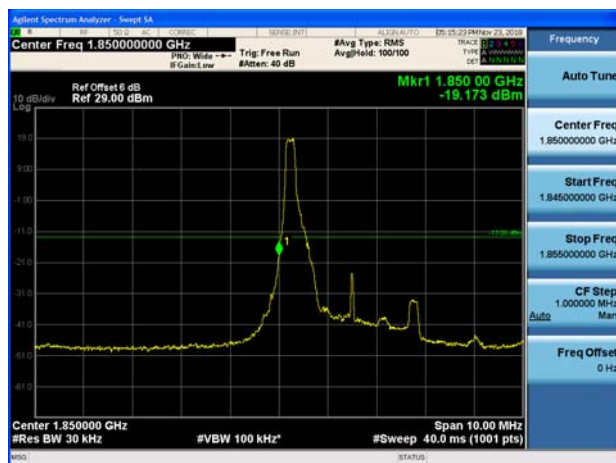
LTE Band 2 1.4MHz QPSK 100%RB CH-Low



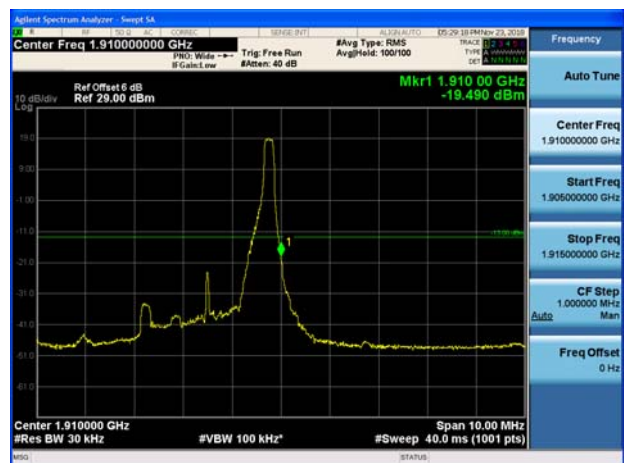
LTE Band 2 1.4MHz QPSK 100%RB CH-High



LTE Band 2 3MHz QPSK 1RB CH-Low

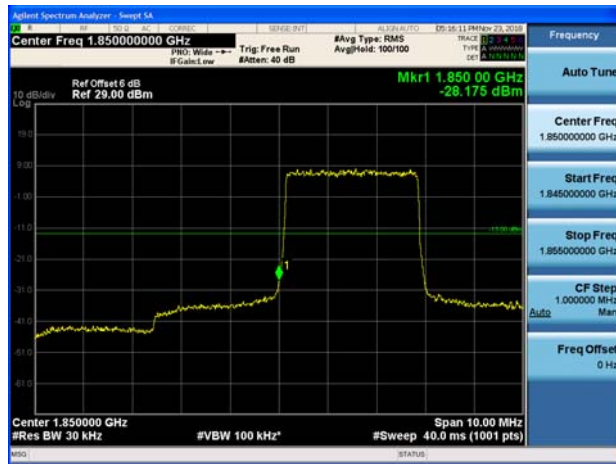


LTE Band 2 3MHz QPSK 1RB CH-High





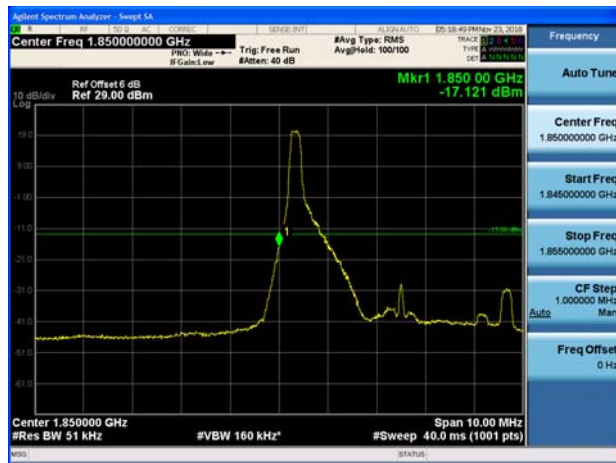
LTE Band 2 3MHz QPSK 100%RB CH-Low



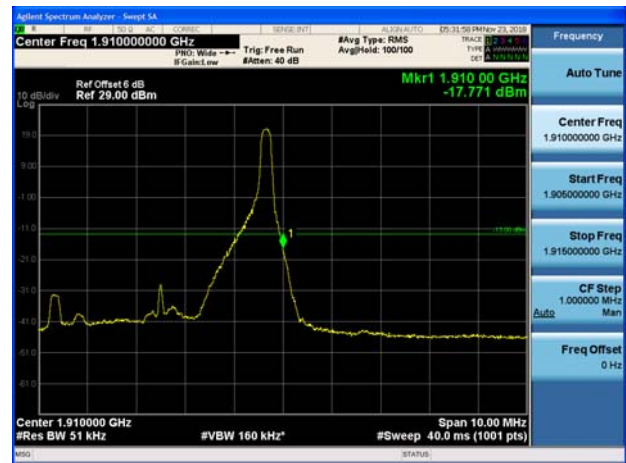
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High



LTE Band 2 5MHz QPSK 100%RB CH-Low

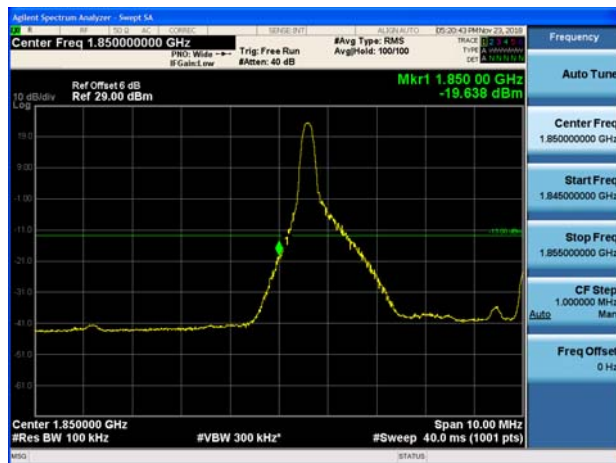


LTE Band 2 5MHz QPSK 100%RB CH-High

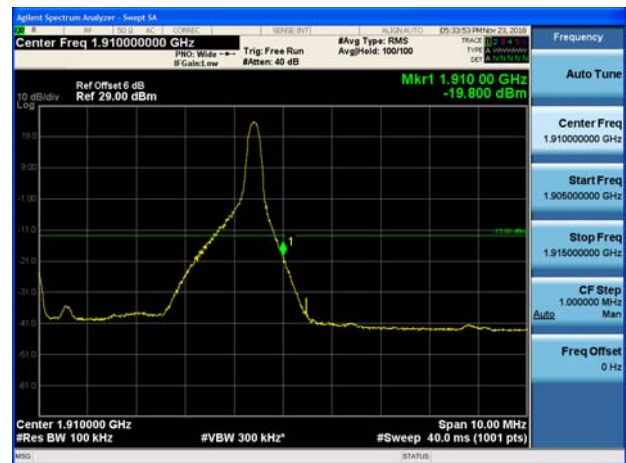




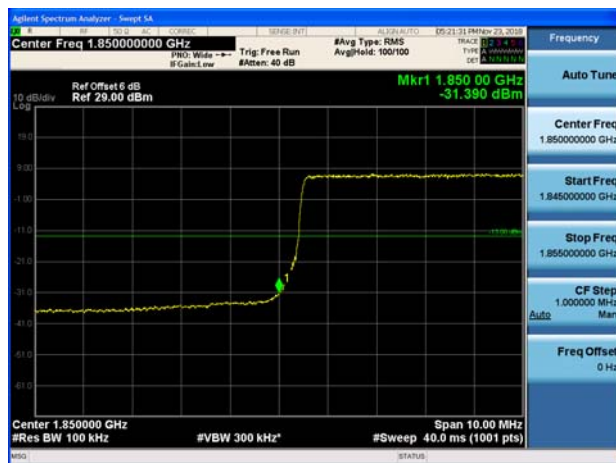
LTE Band 2 10MHz QPSK 1RB CH-Low



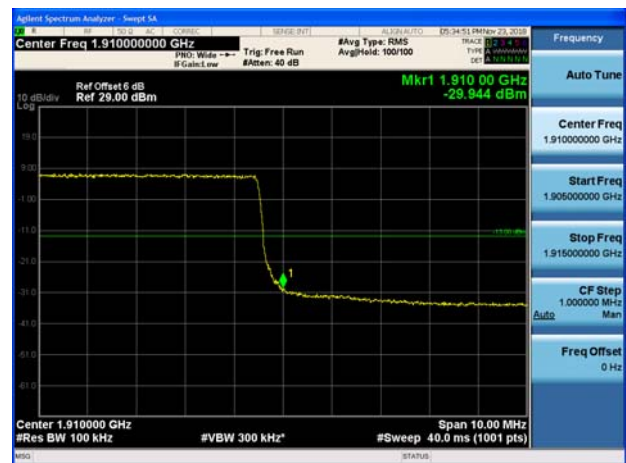
LTE Band 2 10MHz QPSK 1RB CH-High



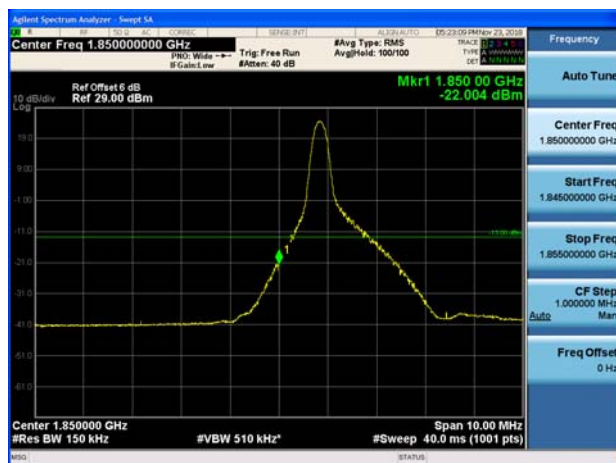
LTE Band 2 10MHz QPSK 100%RB CH-Low



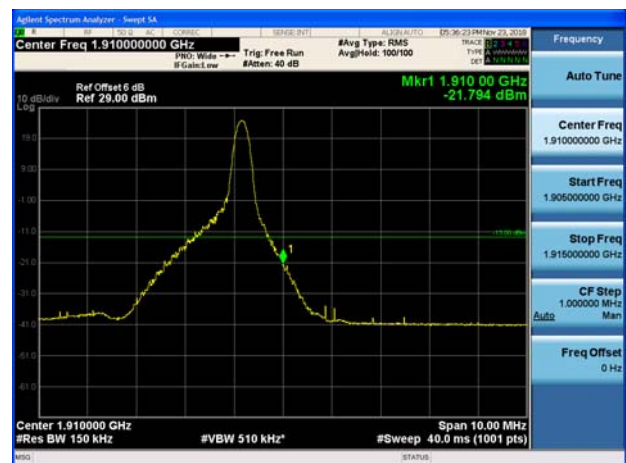
LTE Band 2 10MHz QPSK 100%RB CH-High



LTE Band 2 15MHz QPSK 1RB CH-Low

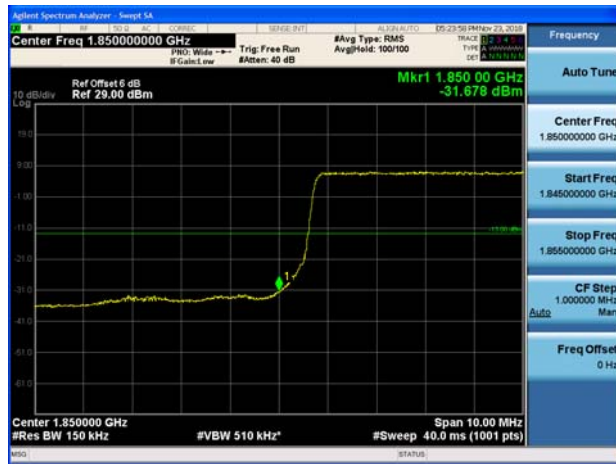


LTE Band 2 15MHz QPSK 1RB CH-High





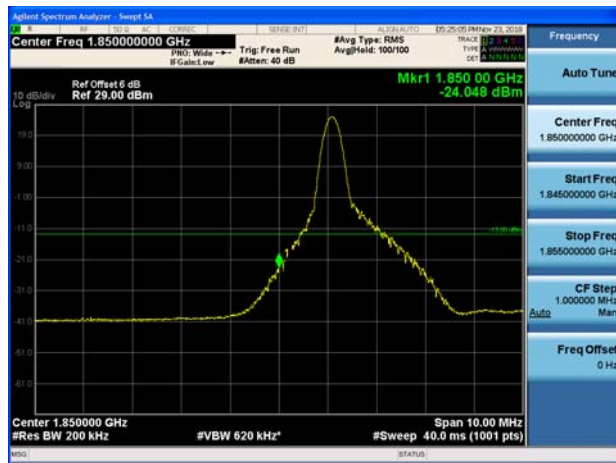
LTE Band 2 15MHz QPSK 100%RB CH-Low



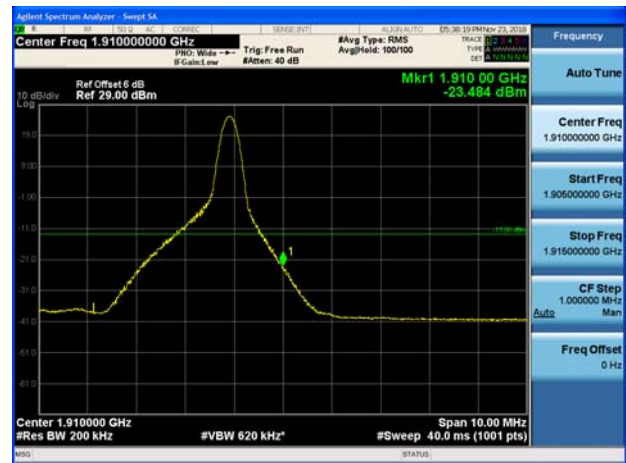
LTE Band 2 15MHz QPSK 100%RB CH-High



LTE Band 2 20MHz QPSK 1RB CH-Low



LTE Band 2 20MHz QPSK 1RB CH-High



LTE Band 2 20MHz QPSK 100%RB CH-Low

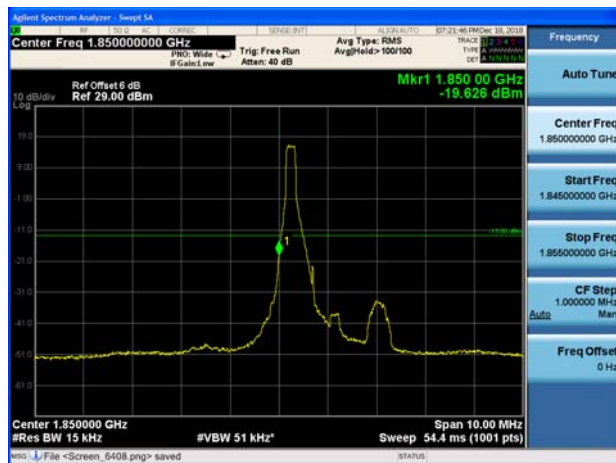


LTE Band 2 20MHz QPSK 100%RB CH-High

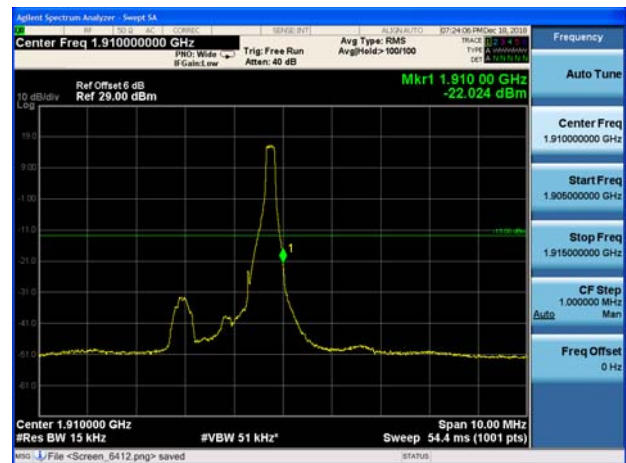




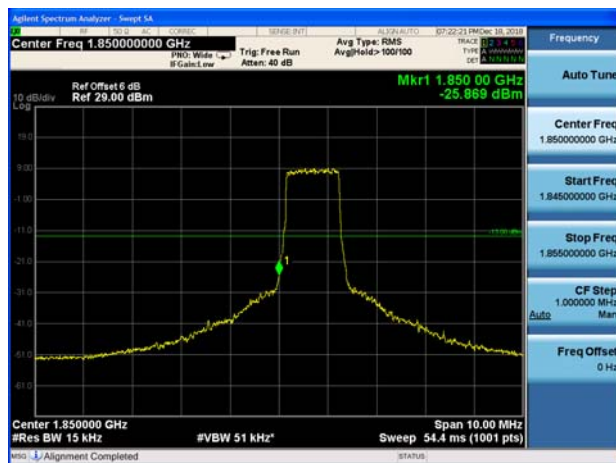
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



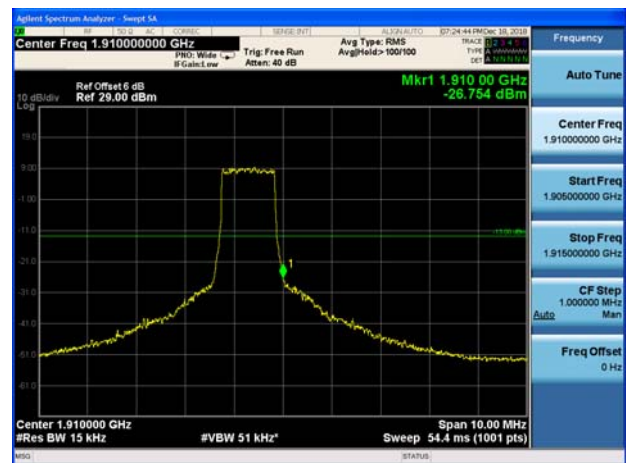
LTE Band 2 1.4MHz 16QAM 1RB CH-High



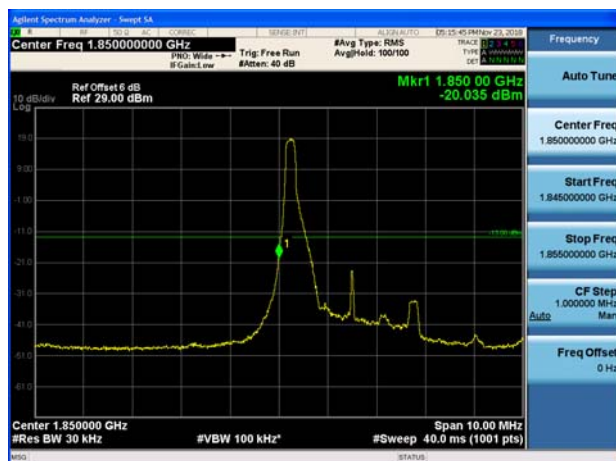
LTE Band 2 1.4MHz 16QAM 100%RB CH-Low



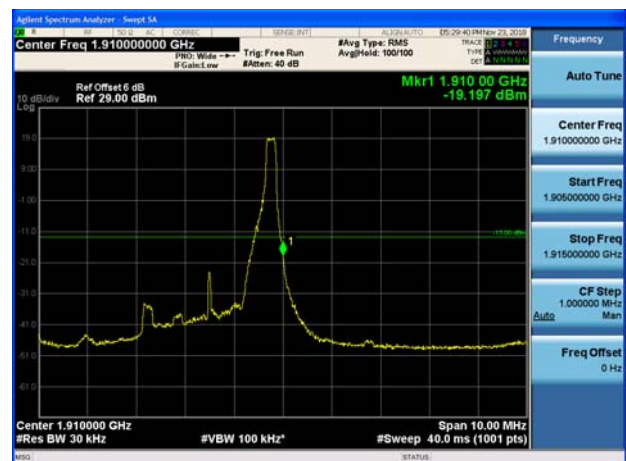
LTE Band 2 1.4MHz 16QAM 100%RB CH-High



LTE Band 2 3MHz 16QAM 1RB CH-Low

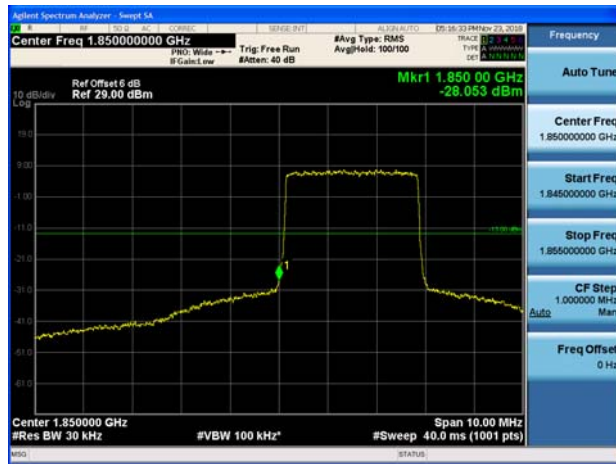


LTE Band 2 3MHz 16QAM 1RB CH-High





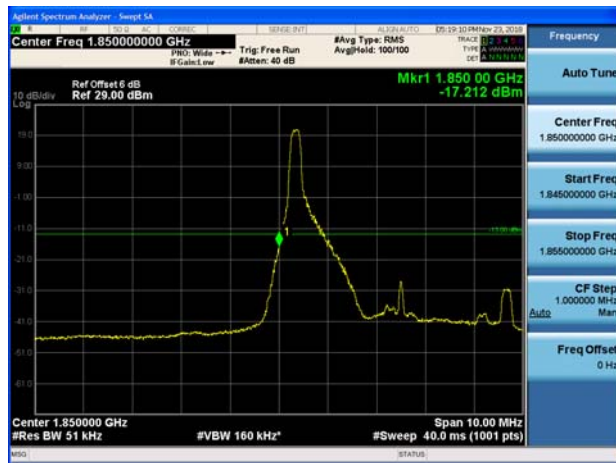
LTE Band 2 3MHz 16QAM 100%RB CH-Low



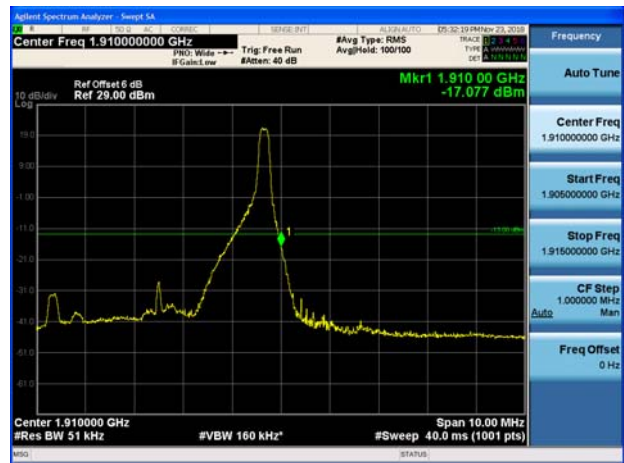
LTE Band 2 3MHz 16QAM 100%RB CH-High



LTE Band 2 5MHz 16QAM 1RB CH-Low



LTE Band 2 5MHz 16QAM 1RB CH-High



LTE Band 2 5MHz 16QAM 100%RB CH-Low

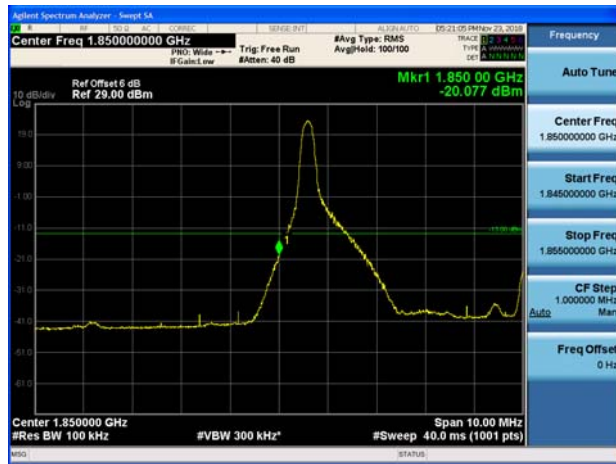


LTE Band 2 5MHz 16QAM 100%RB CH-High

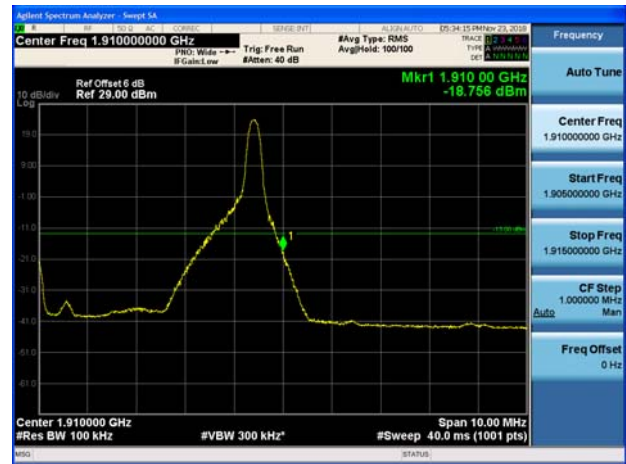




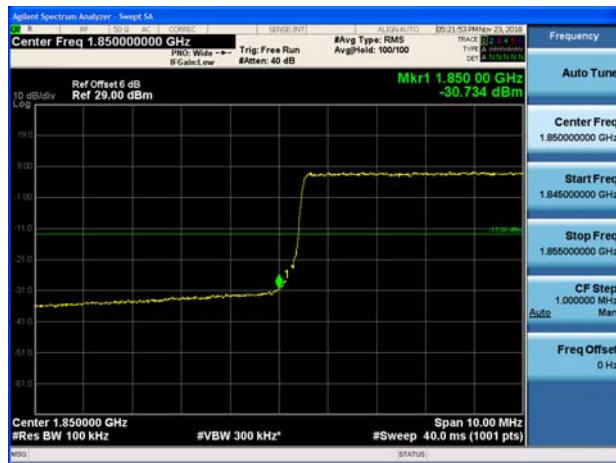
LTE Band 2 10MHz 16QAM 1RB CH-Low



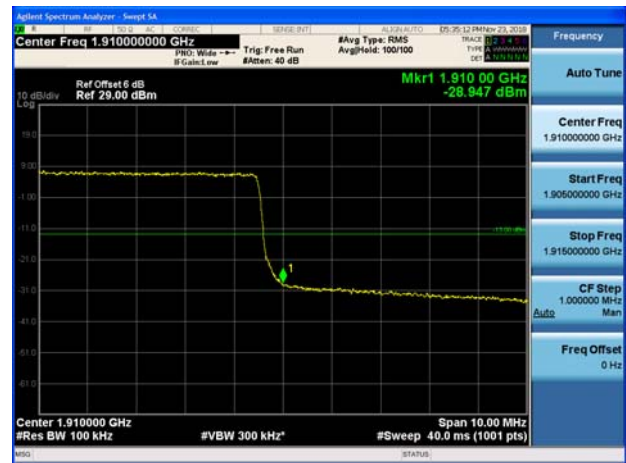
LTE Band 2 10MHz 16QAM 1RB CH-High



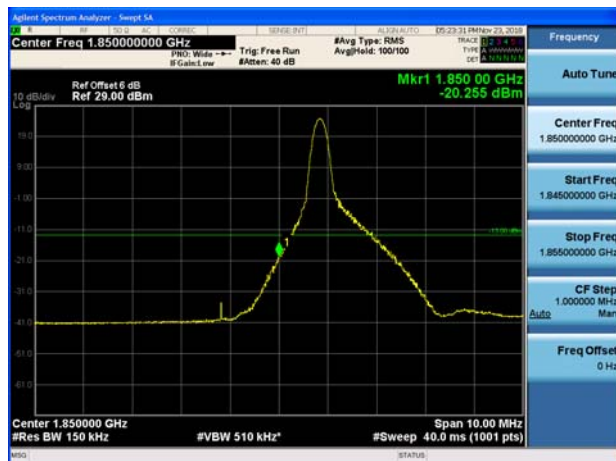
LTE Band 2 10MHz 16QAM 100%RB CH-Low



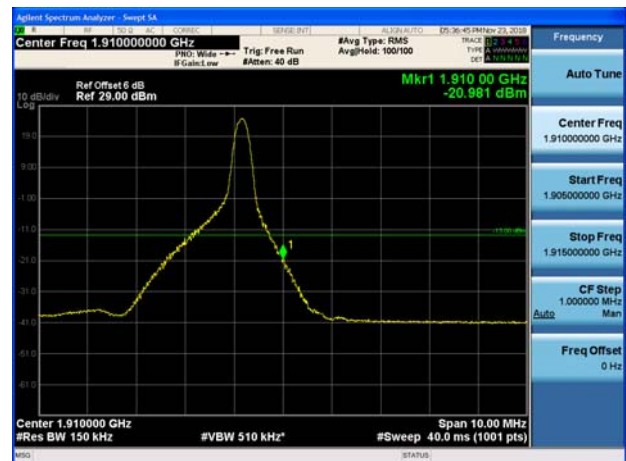
LTE Band 2 10MHz 16QAM 100%RB CH-High



LTE Band 2 15MHz 16QAM 1RB CH-Low



LTE Band 2 15MHz 16QAM 1RB CH-High





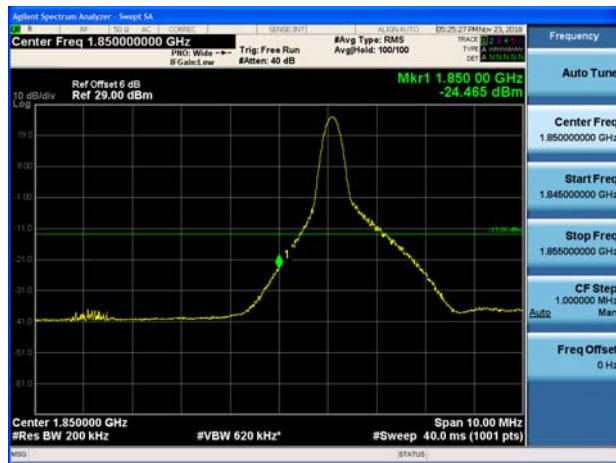
LTE Band 2 15MHz 16QAM 100%RB CH-Low



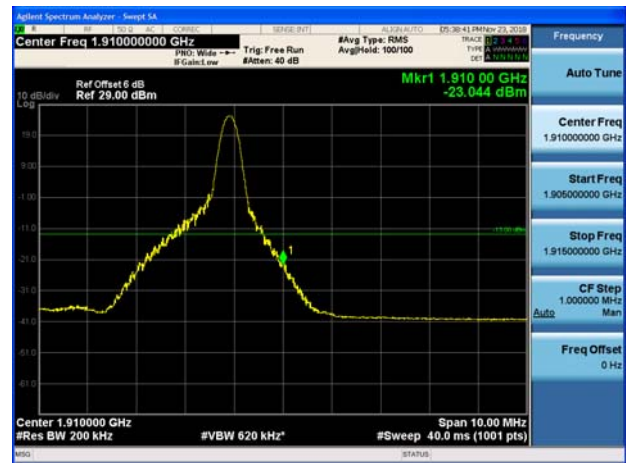
LTE Band 2 15MHz 16QAM 100%RB CH-High



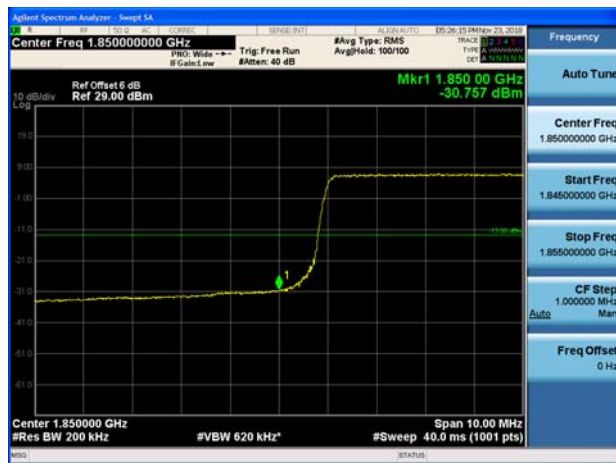
LTE Band 2 20MHz 16QAM 1RB CH-Low



LTE Band 2 20MHz 16QAM 1RB CH-High



LTE Band 2 20MHz 16QAM 100%RB CH-Low



LTE Band 2 20MHz 16QAM 100%RB CH-High



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

Ambient condition

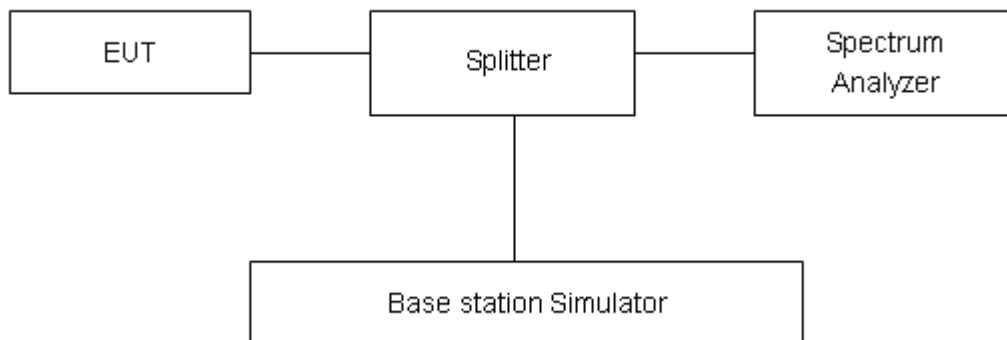
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peak-to-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	26.45	25.44	1.01	≤13	PASS
	661	1880	26.38	25.35	1.03	≤13	PASS
	810	1909.8	26.23	25.24	0.99	≤13	PASS
EGPRS 1900 (8-PSK)	512	1850.2	21.51	20.41	1.10	≤13	PASS
	661	1880	21.43	20.30	1.13	≤13	PASS
	810	1909.8	21.61	20.53	1.08	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	23.76	20.67	3.09	≤13	PASS
	9400	1880	23.91	20.76	3.15	≤13	PASS
	9538	1907.6	23.53	20.45	3.08	≤13	PASS

LTE Band 2								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	18607	1850.7	19.04	13.42	5.62	≤13	PASS
		18900	1880.0	21.62	16.35	5.27	≤13	PASS
		19193	1909.3	22.66	17.30	5.36	≤13	PASS
	3	18615	1851.5	19.22	13.59	5.63	≤13	PASS
		18900	1880	21.63	16.32	5.31	≤13	PASS
		19185	1908.5	22.61	17.22	5.39	≤13	PASS
	5	18625	1852.5	19.48	13.75	5.73	≤13	PASS
		18900	1880	21.76	16.37	5.39	≤13	PASS
		19175	1907.5	22.72	17.23	5.49	≤13	PASS
	10	18650	1855	19.79	14.10	5.69	≤13	PASS
		18900	1880	21.82	16.39	5.43	≤13	PASS
		19150	1905	22.59	17.25	5.34	≤13	PASS
	15	18675	1857.5	21.10	16.13	4.97	≤13	PASS
		18900	1880	21.83	16.56	5.27	≤13	PASS
		19125	1902.5	22.25	17.00	5.25	≤13	PASS
	20	18700	1860	20.49	14.77	5.72	≤13	PASS
		18900	1880	21.97	16.38	5.59	≤13	PASS
		19100	1900	22.48	17.14	5.34	≤13	PASS
16QAM	1.4	18607	1850.7	19.64	13.44	6.20	≤13	PASS
		18900	1880.0	22.28	16.32	5.96	≤13	PASS
		19193	1909.3	23.35	17.34	6.01	≤13	PASS
	3	18615	1851.5	19.95	13.65	6.30	≤13	PASS
		18900	1880	22.37	16.31	6.06	≤13	PASS
		19185	1908.5	23.34	17.26	6.08	≤13	PASS
	5	18625	1852.5	20.11	13.81	6.30	≤13	PASS
		18900	1880	22.37	16.32	6.05	≤13	PASS
		19175	1907.5	23.24	17.24	6.00	≤13	PASS
	10	18650	1855	20.43	14.12	6.31	≤13	PASS
		18900	1880	22.46	16.36	6.10	≤13	PASS
		19150	1905	23.23	17.20	6.03	≤13	PASS
	15	18675	1857.5	21.14	16.09	5.05	≤13	PASS
		18900	1880	22.15	16.59	5.56	≤13	PASS
		19125	1902.5	22.06	16.74	5.32	≤13	PASS
	20	18700	1860	21.06	14.77	6.29	≤13	PASS
		18900	1880	22.54	16.40	6.14	≤13	PASS
		19100	1900	23.24	17.13	6.11	≤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 -30°C to +55°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 -30°C to +55°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

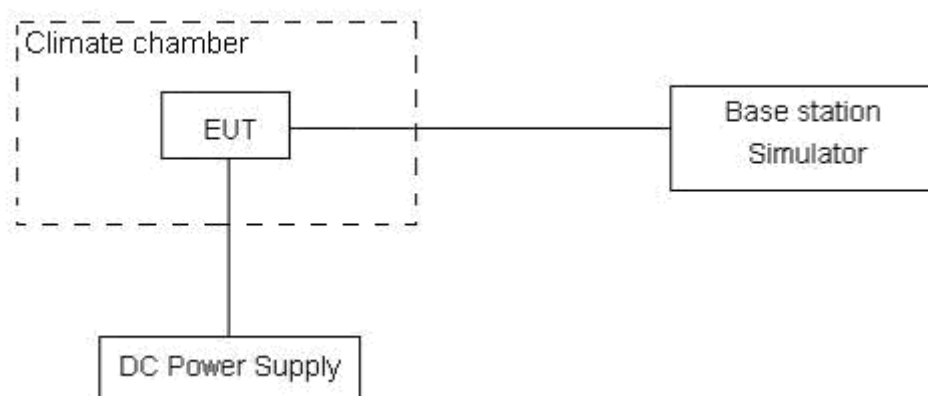
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 4.4V, with a nominal voltage of 3.82V.

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 $k = 3$, $U = 0.01\text{ppm}$.



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	0.59	0.00031
Extreme (55°C)		1850.0652	1909.9490	4.66	0.00248
Extreme (50°C)		1850.0651	1909.9489	5.46	0.00290
Extreme (40°C)		1850.0661	1909.9499	4.61	0.00245
Extreme (30°C)		1850.0652	1909.9490	4.46	0.00237
Extreme (20°C)		1850.0660	1909.9498	2.23	0.00119
Extreme (10C)		1850.0653	1909.9491	5.68	0.00302
Extreme (0°C)		1850.0659	1909.9497	2.76	0.00147
Extreme (-10°C)		1850.0654	1909.9492	7.64	0.00406
Extreme (-20°C)		1850.0658	1909.9496	2.42	0.00129
Extreme (-30°C)		1850.0655	1909.9493	3.62	0.00193
25°C	LV	1850.0656	1909.9494	2.76	0.00147
	HV	1850.0665	1909.9503	3.71	0.00197
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	-4.94	-0.00263
Extreme (55°C)		1850.0592	1909.9424	0.04	0.00002
Extreme (50°C)		1850.0591	1909.9423	4.31	0.00229
Extreme (40°C)		1850.0601	1909.9433	2.25	0.00120
Extreme (30°C)		1850.0592	1909.9424	4.82	0.00256
Extreme (20°C)		1850.0600	1909.9432	-0.47	-0.00025
Extreme (10C)		1850.0593	1909.9425	2.25	0.00120
Extreme (0°C)		1850.0599	1909.9431	4.82	0.00256
Extreme (-10°C)		1850.0594	1909.9426	-0.89	-0.00047
Extreme (-20°C)		1850.0598	1909.9430	5.34	0.00284
Extreme (-30°C)		1850.0595	1909.9427	3.62	0.00193
25°C	LV	1850.0596	1909.9428	5.67	0.00302
	HV	1850.0605	1909.9437	2.38	0.00127
EGPRS 1900					
Condition		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1850.0652	1909.9298	2.63	0.00140



Extreme (55°C)		1850.0640	1909.9286	3.18	0.00169
Extreme (50°C)		1850.0639	1909.9285	2.37	0.00126
Extreme (40°C)		1850.0649	1909.9295	7.15	0.00380
Extreme (30°C)		1850.0640	1909.9286	1.14	0.00061
Extreme (20°C)		1850.0648	1909.9294	3.91	0.00208
Extreme (10C)		1850.0641	1909.9287	9.38	0.00499
Extreme (0°C)		1850.0647	1909.9293	1.53	0.00081
Extreme (-10°C)		1850.0642	1909.9288	4.42	0.00235
Extreme (-20°C)		1850.0646	1909.9292	2.07	0.00110
Extreme (-30°C)		1850.0643	1909.9289	3.54	0.00188
25°C	LV	1850.0644	1909.9290	2.19	0.00116
	HV	1850.0653	1909.9299	3.72	0.00198

WCDMA Band II					
Condition		1850	1910	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1850.0291	1909.9496	0.06	0.00003
Extreme (55°C)		1850.0267	1909.9514	3.92	0.00209
Extreme (50°C)		1850.0273	1909.9508	-0.26	-0.00014
Extreme (40°C)		1850.0286	1909.9495	3.60	0.00191
Extreme (30°C)		1850.0293	1909.9488	2.76	0.00147
Extreme (20°C)		1850.0272	1909.9509	0.33	0.00018
Extreme (10C)		1850.0284	1909.9497	2.95	0.00157
Extreme (0°C)		1850.0271	1909.9514	1.97	0.00105
Extreme (-10°C)		1850.0266	1909.9515	1.82	0.00097
Extreme (-20°C)		1850.0277	1909.9504	2.89	0.00154
Extreme (-30°C)		1850.0312	1909.9471	0.14	0.00007
25°C	LV	1850.0274	1909.9507	3.85	0.00205
	HV	1850.0284	1909.9501	2.63	0.00140



LTE Band 2					
(QPSK, 20MHz BANDWIDTH)					
Condition		1850	1910	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1850.6462	1909.4831	6.32	0.00336
Extreme (55°C)		1850.6437	1909.4854	-10.21	-0.00543
Extreme (50°C)		1850.6443	1909.4848	-2.33	-0.00124
Extreme (40°C)		1850.6456	1909.4835	2.43	0.00129
Extreme (30°C)		1850.6463	1909.4828	-3.06	-0.00163
Extreme (20°C)		1850.6442	1909.4849	-3.75	-0.00199
Extreme (10°C)		1850.6454	1909.4837	-8.00	-0.00426
Extreme (0°C)		1850.6441	1909.4857	-3.73	-0.00198
Extreme (-10°C)		1850.6436	1909.4855	0.87	0.00046
Extreme (-20°C)		1850.6447	1909.4844	2.13	0.00113
Extreme (-30°C)		1850.6483	1909.4811	3.05	0.00162
25°C	LV	1850.6444	1909.4847	2.67	0.00142
	HV	1850.6455	1909.4841	5.88	0.00313
(16QAM, 20MHz BANDWIDTH)					
Condition		1850	1910	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1850.5825	1909.4472	4.31	0.00229
Extreme (55°C)		1850.5802	1909.4495	-1.73	-0.00092
Extreme (50°C)		1850.5808	1909.4489	1.97	0.00105
Extreme (40°C)		1850.5821	1909.4476	-6.78	-0.00361
Extreme (30°C)		1850.5828	1909.4469	-2.00	-0.00106
Extreme (20°C)		1850.5807	1909.4491	-5.85	-0.00311
Extreme (10°C)		1850.5819	1909.4478	0.84	0.00045
Extreme (0°C)		1850.5806	1909.4491	-1.00	-0.00053
Extreme (-10°C)		1850.5801	1909.4496	8.79	0.00468
Extreme (-20°C)		1850.5812	1909.4485	-7.18	-0.00382
Extreme (-30°C)		1850.5845	1909.4452	4.38	0.00233
25°C	LV	1850.5809	1909.4488	2.33	0.00124
	HV	1850.5815	1909.4482	1.84	0.00098

5.7. Spurious Emissions at Antenna Terminals

Ambient condition

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

Method of Measurement

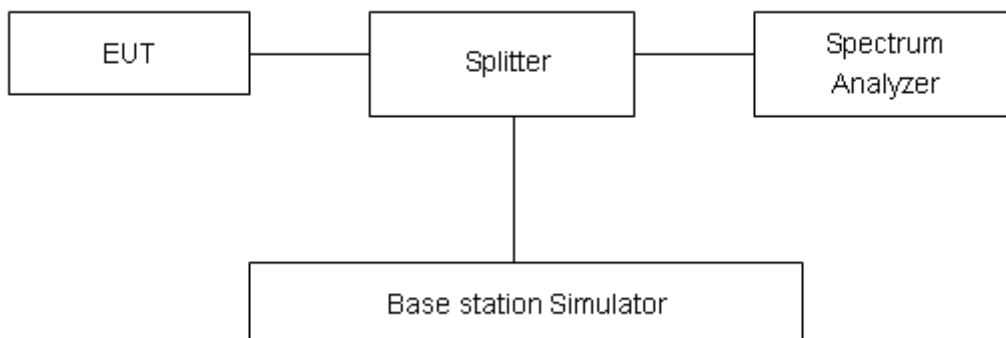
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

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 $43 + 10 \log_{10} (P)$ 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 $k = 1.96$.

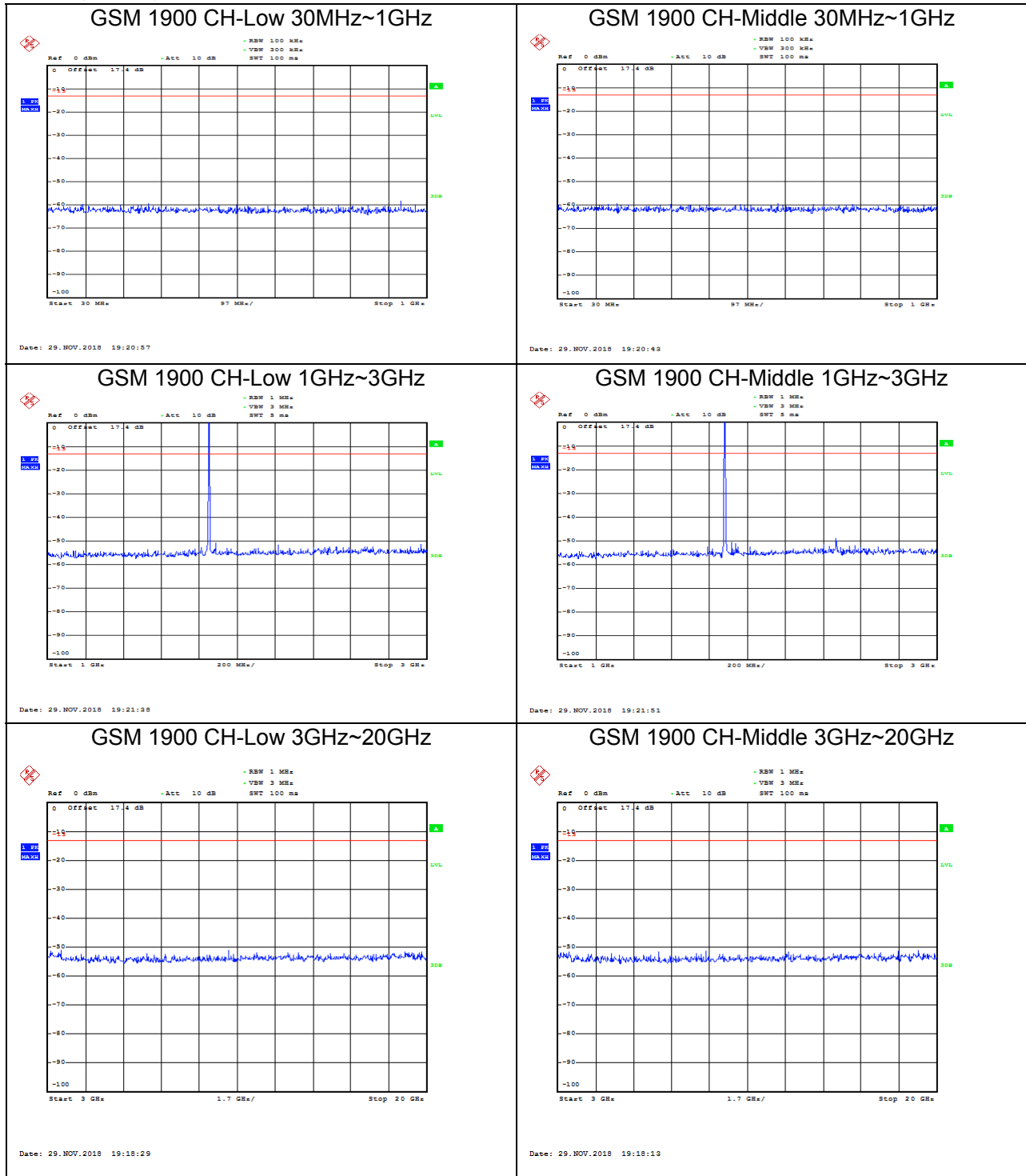
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB



Test Result

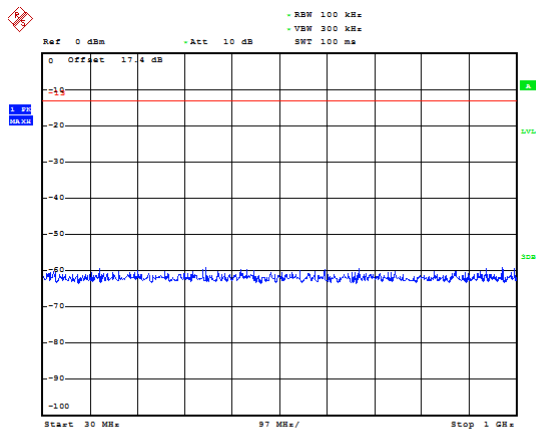
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.



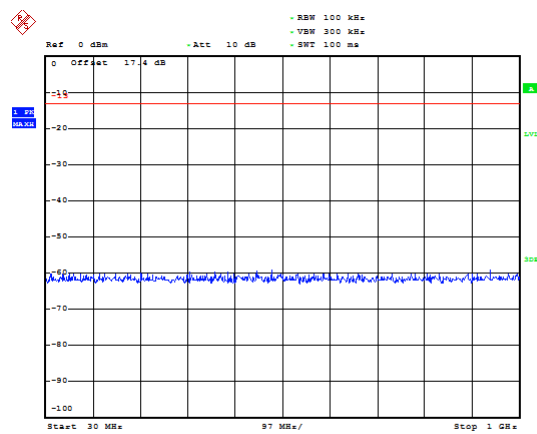


GSM 1900 CH-High 30MHz~1GHz



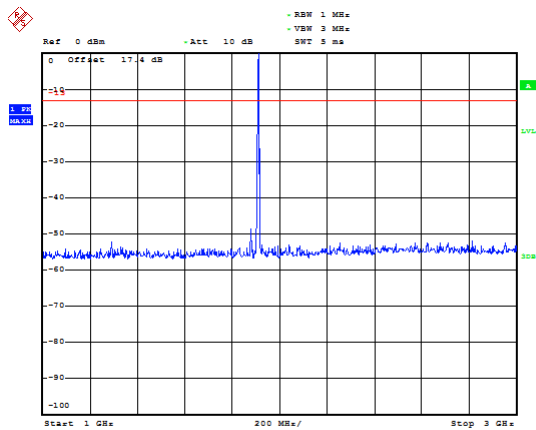
Date: 29.NOV.2018 19:20:29

WCDMA Band II CH-Low 30MHz~1GHz



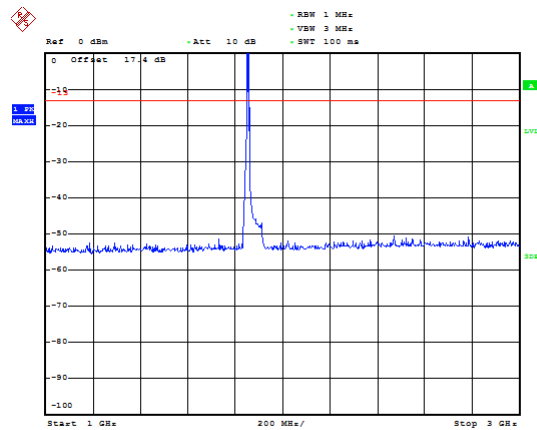
Date: 21.NOV.2018 14:40:02

GSM 1900 CH-High 1GHz~3GHz



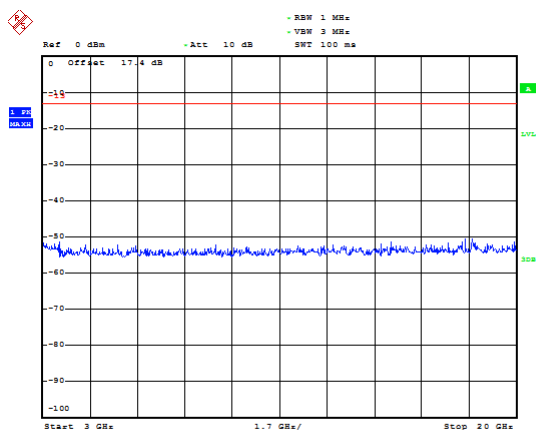
Date: 29.NOV.2018 19:22:09

WCDMA BAND II CH-Low 1GHz~3GHz



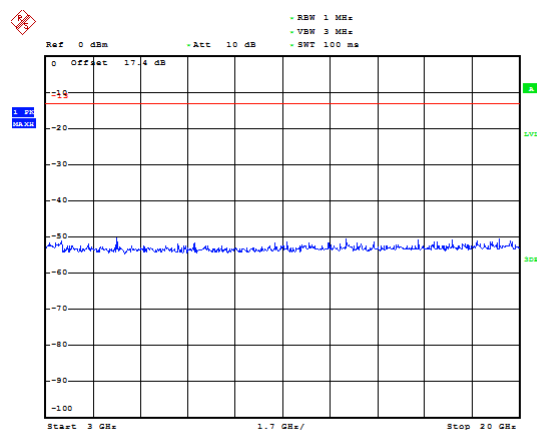
Date: 21.NOV.2018 14:47:31

GSM 1900 CH-High 3GHz~20GHz



Date: 29.NOV.2018 19:19:02

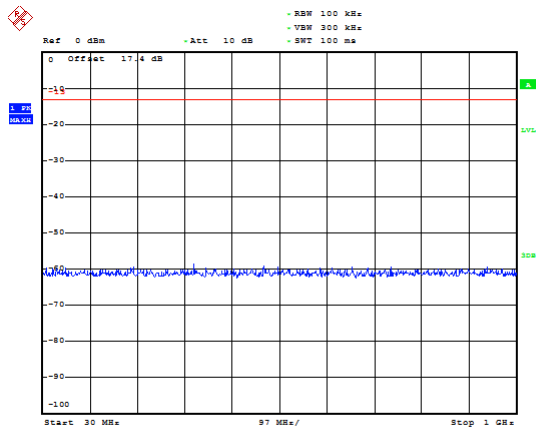
WCDMA BAND II CH-Low 3GHz~20GHz



Date: 21.NOV.2018 14:48:10

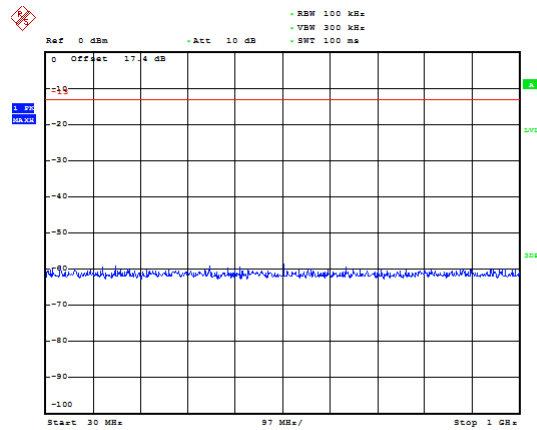


WCDMA Band II CH- Middle 30MHz~1GHz



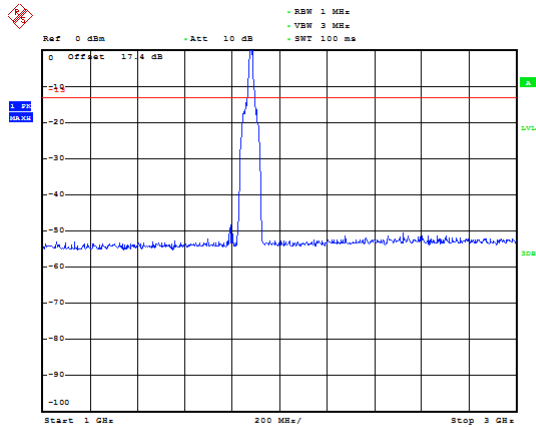
Date: 21.NOV.2018 14:39:14

WCDMA Band II CH- High 30MHz~1GHz



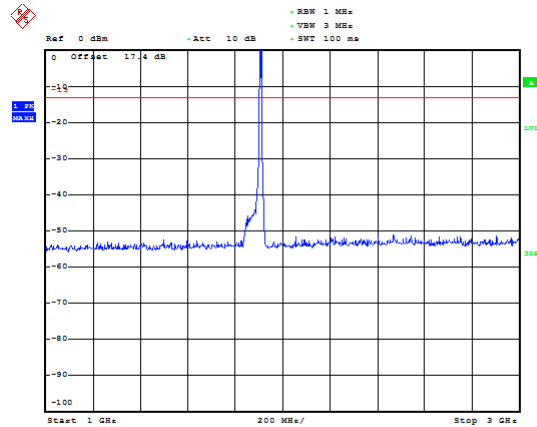
Date: 21.NOV.2018 14:40:31

WCDMA BAND II CH-Middle 1GHz~3GHz



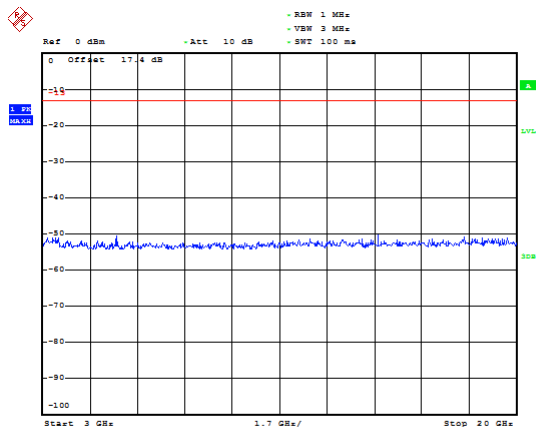
Date: 21.NOV.2018 14:45:55

WCDMA BAND II CH-High 1GHz~3GHz



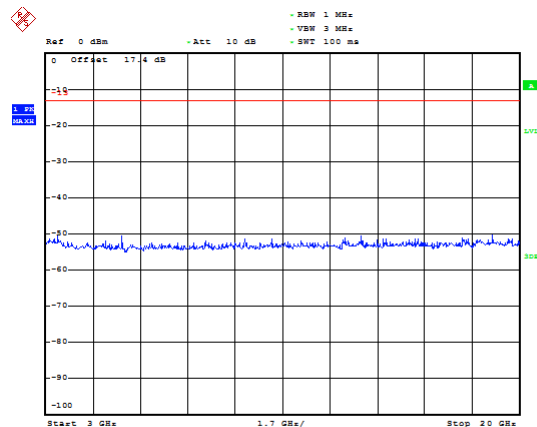
Date: 21.NOV.2018 14:41:40

WCDMA BAND II CH-Middle 3GHz~20GHz



Date: 21.NOV.2018 14:48:43

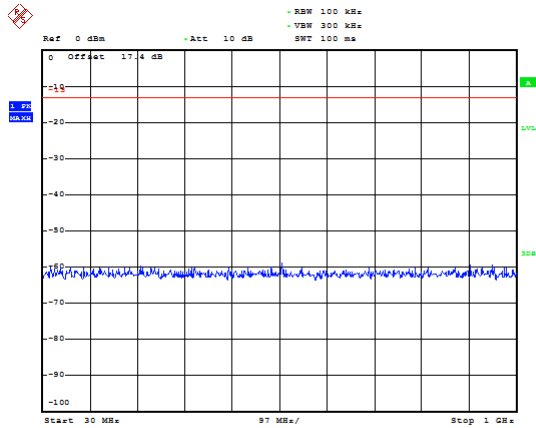
WCDMA BAND II CH-High 3GHz~20GHz



Date: 21.NOV.2018 14:49:09

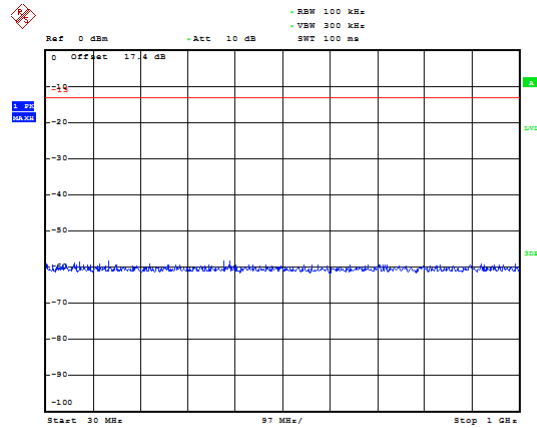


LTE Band 2 1.4MHz CH-Low 30MHz~1GHz



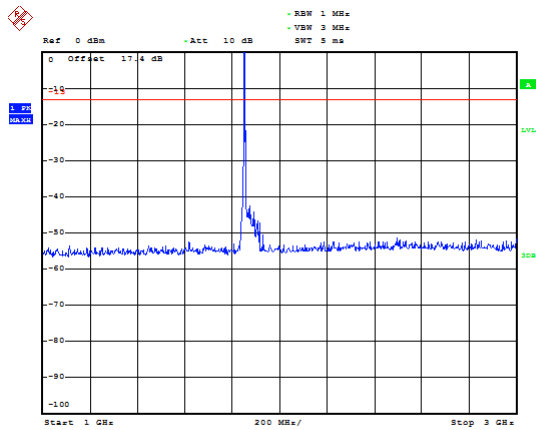
Date: 21.NOV.2018 18:12:53

LTE Band 2 1.4MHz CH-Middle 30MHz~1GHz



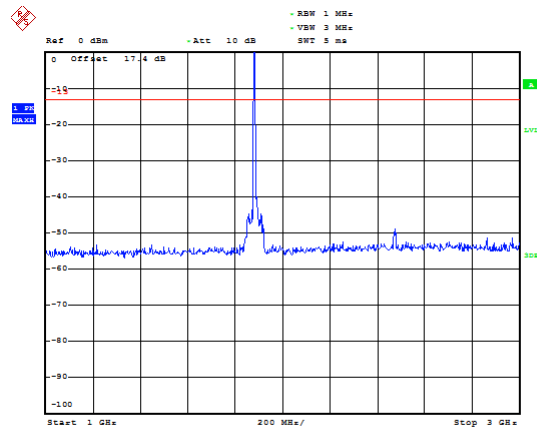
Date: 21.NOV.2018 17:17:55

LTE Band 2 1.4MHz CH-Low 1GHz~3GHz



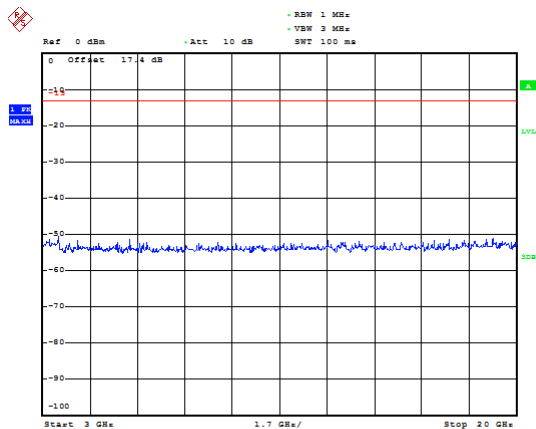
Date: 21.NOV.2018 18:12:32

LTE Band 2 1.4MHz CH-Middle 1GHz~3GHz



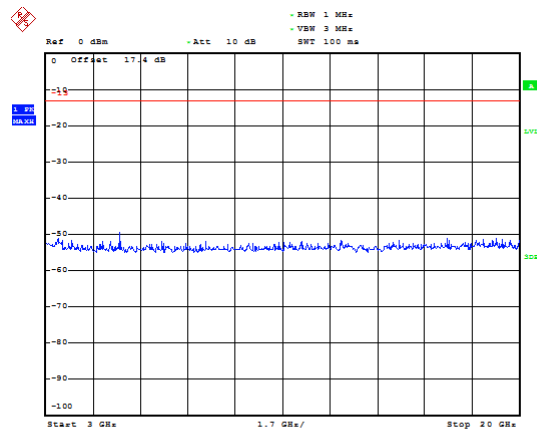
Date: 21.NOV.2018 18:07:50

LTE Band 2 1.4MHz CH-Low 3GHz~20GHz



Date: 21.NOV.2018 18:11:31

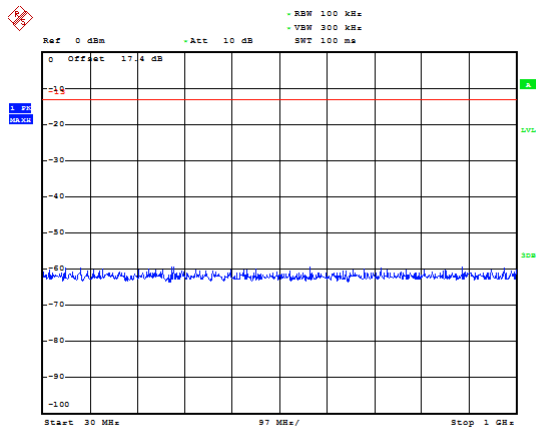
LTE Band 2 1.4MHz CH-Middle 3GHz~20GHz



Date: 21.NOV.2018 18:08:58

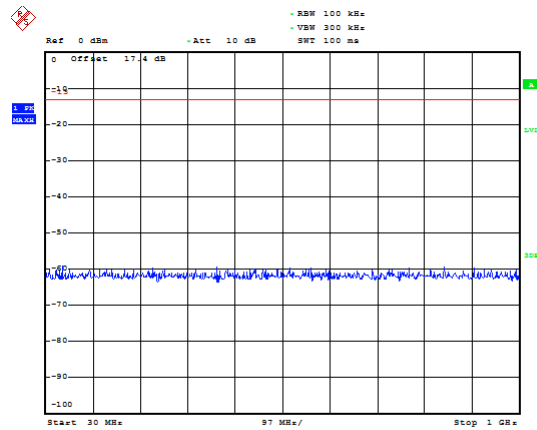


LTE Band 2 1.4MHz CH-High 30MHz~1GHz



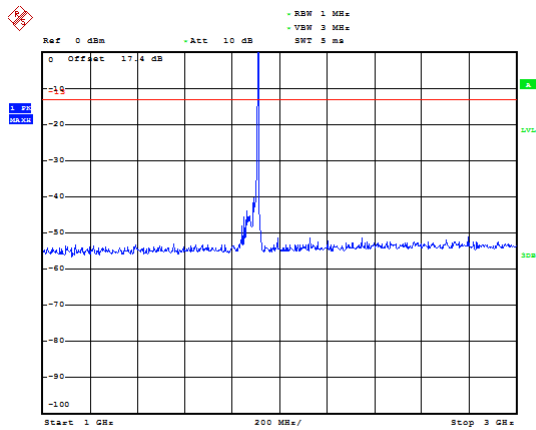
Date: 21.NOV.2018 18:14:18

LTE Band 2 3MHz CH-Low 30MHz~1GHz



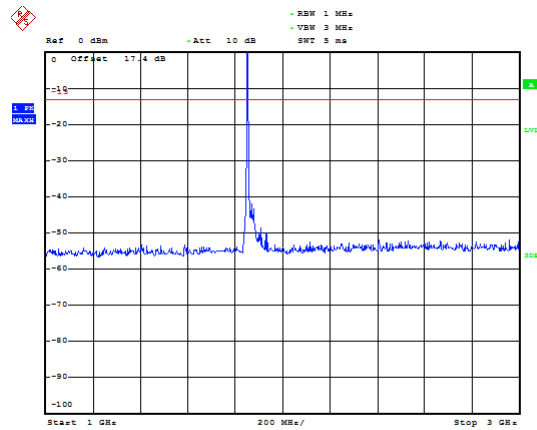
Date: 21.NOV.2018 19:57:29

LTE Band 2 1.4MHz CH-High 1GHz~3GHz



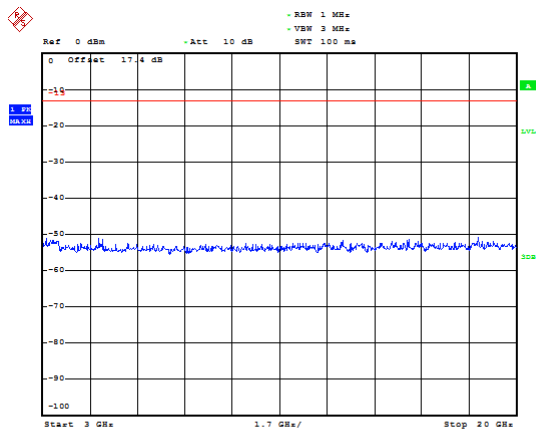
Date: 21.NOV.2018 18:14:59

LTE Band 2 3MHz CH-Low 1GHz~3GHz



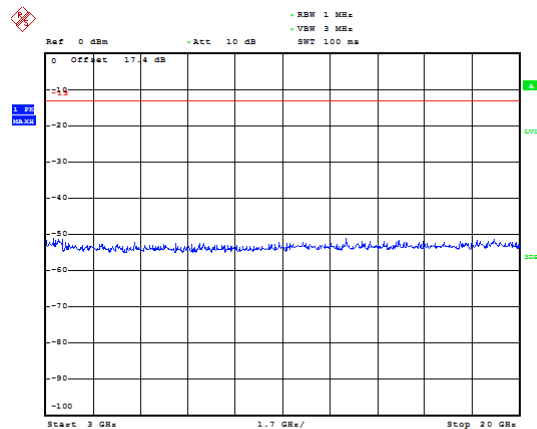
Date: 21.NOV.2018 19:57:06

LTE Band 2 1.4MHz CH-High 3GHz~20GHz



Date: 21.NOV.2018 18:15:48

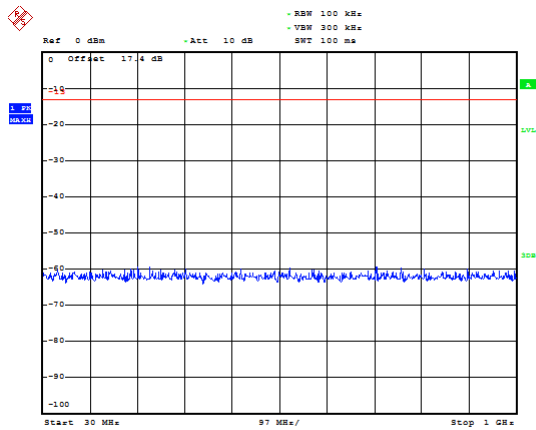
LTE Band 2 3MHz CH-Low 3GHz~20GHz



Date: 21.NOV.2018 19:56:28

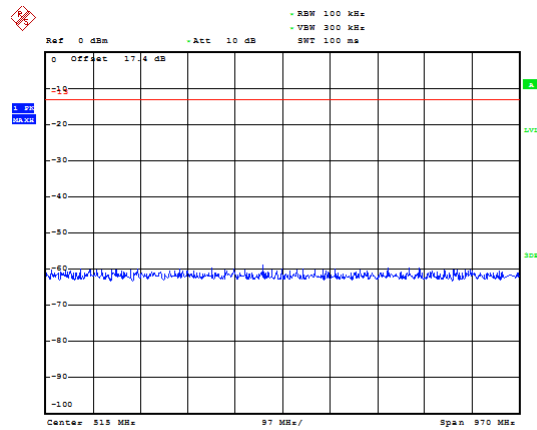


LTE Band 2 3MHz CH-Middle 30MHz~1GHz



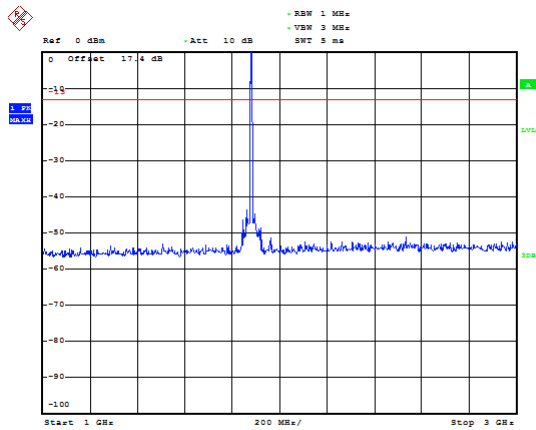
Date: 21.NOV.2018 20:00:40

LTE Band 2 3MHz CH-High 30MHz~1GHz



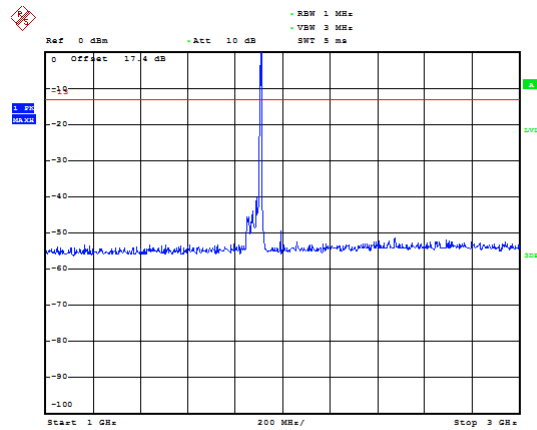
Date: 21.NOV.2018 20:03:15

LTE Band 2 3MHz CH-Middle 1GHz~3GHz



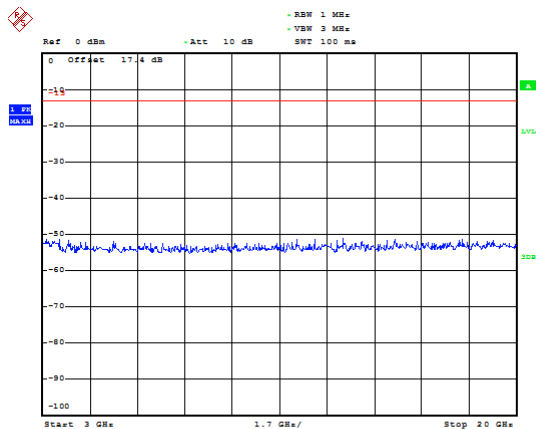
Date: 21.NOV.2018 20:00:57

LTE Band 2 3MHz CH-High 1GHz~3GHz



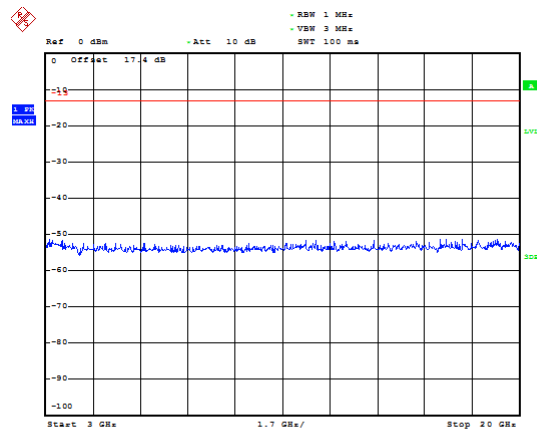
Date: 21.NOV.2018 20:02:57

LTE Band 2 3MHz CH-Middle 3GHz~20GHz



Date: 21.NOV.2018 20:01:46

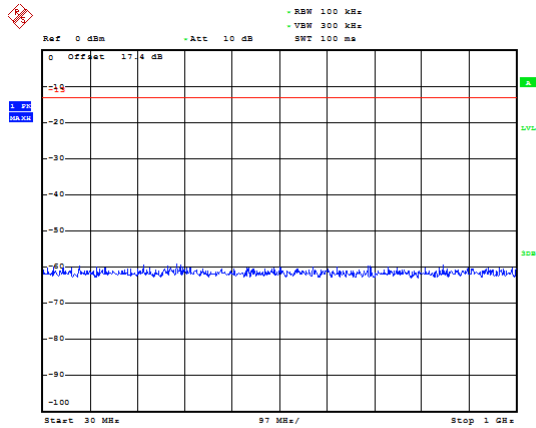
LTE Band 2 3MHz CH-High 3GHz~20GHz



Date: 21.NOV.2018 20:02:14

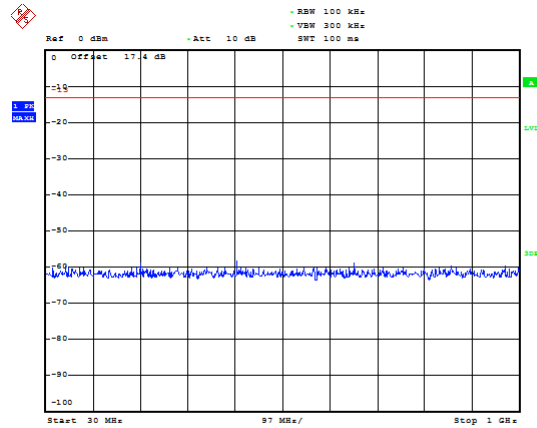


LTE Band 2 5MHz CH-Low 30MHz~1GHz



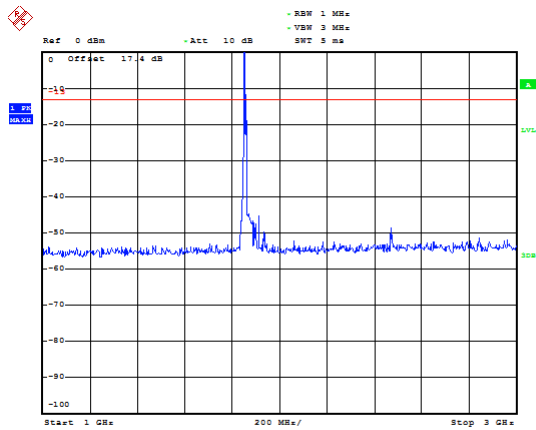
Date: 21.NOV.2018 21:00:09

LTE Band 2 5MHz CH-Middle 30MHz~1GHz



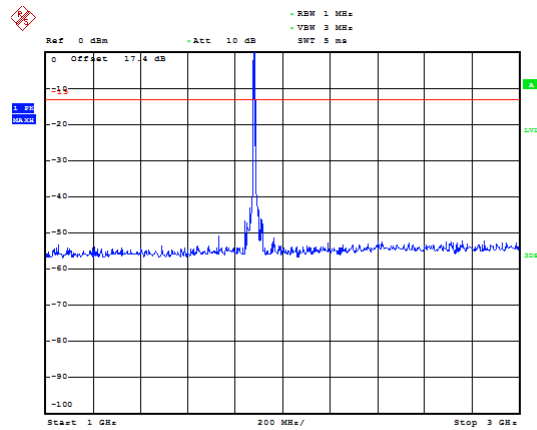
Date: 21.NOV.2018 21:04:22

LTE Band 2 5MHz CH-Low 1GHz~3GHz



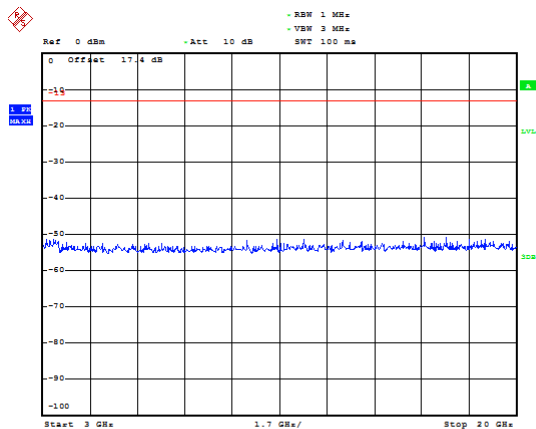
Date: 21.NOV.2018 21:00:44

LTE Band 2 5MHz CH-Middle 1GHz~3GHz



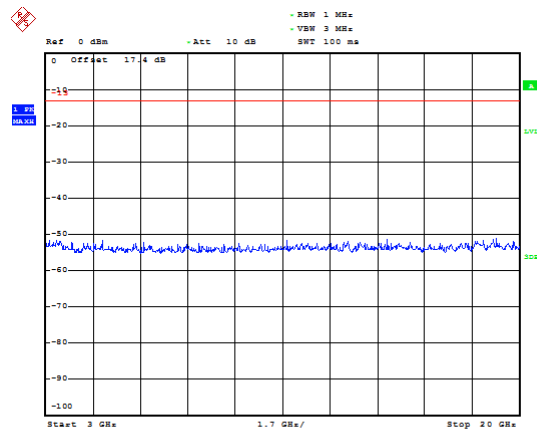
Date: 21.NOV.2018 21:04:04

LTE Band 2 5MHz CH-Low 3GHz~20GHz



Date: 21.NOV.2018 21:01:39

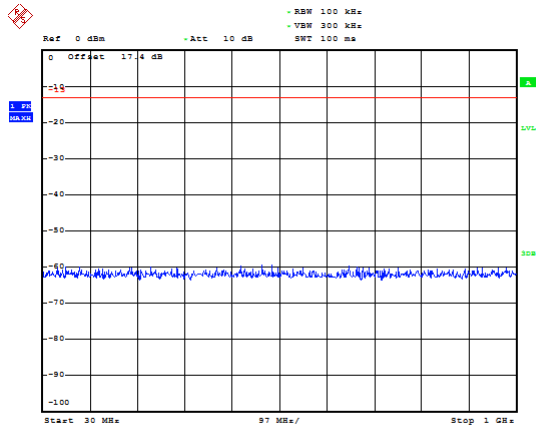
LTE Band 2 5MHz CH-Middle 3GHz~20GHz



Date: 21.NOV.2018 21:03:27

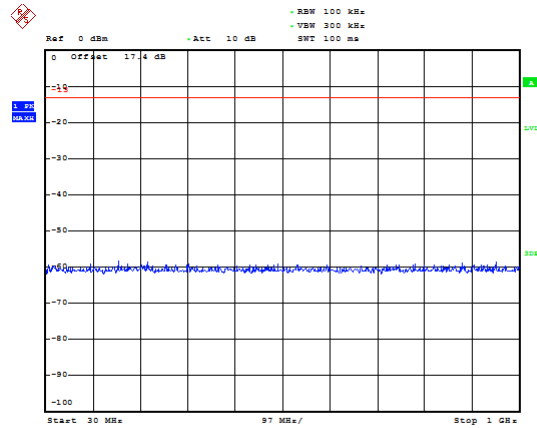


LTE Band 2 5MHz CH-High 30MHz~1GHz



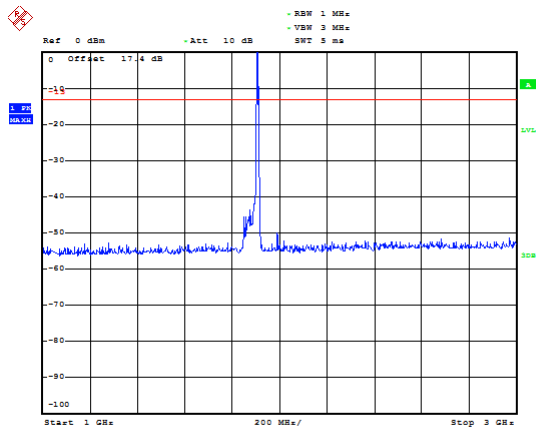
Date: 21.NOV.2018 21:04:49

LTE Band 2 10MHz CH-Low 30MHz~1GHz



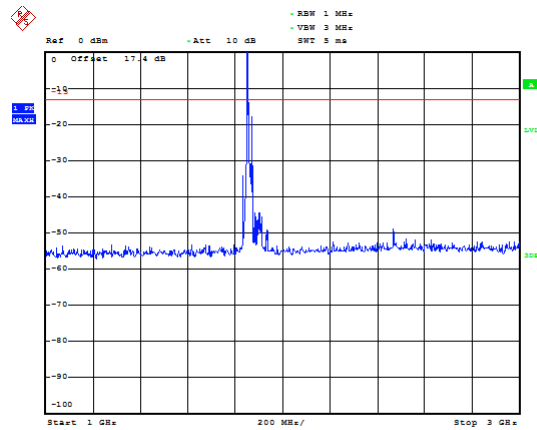
Date: 26.NOV.2018 13:26:51

LTE Band 2 5MHz CH-High 1GHz~3GHz



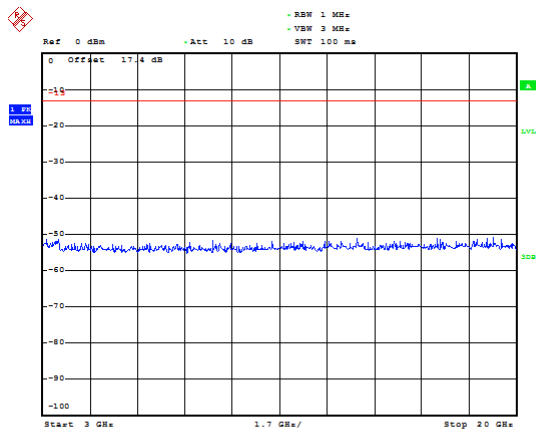
Date: 21.NOV.2018 21:05:14

LTE Band 2 10MHz CH-Low 1GHz~3GHz



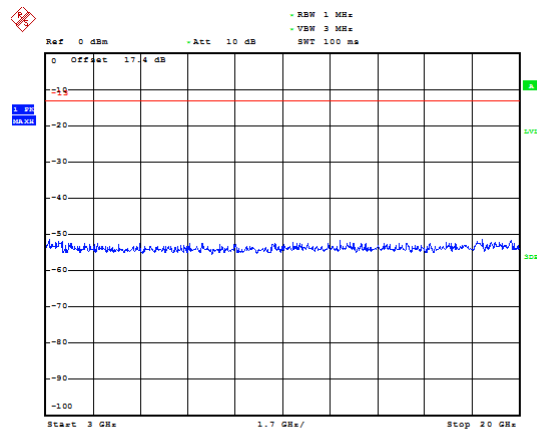
Date: 26.NOV.2018 13:27:32

LTE Band 2 5MHz CH-High 3GHz~20GHz



Date: 21.NOV.2018 21:08:09

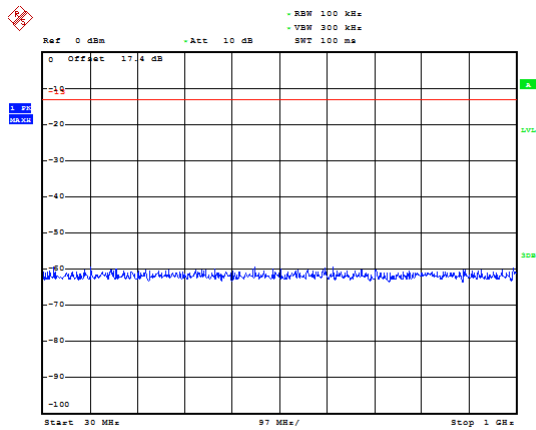
LTE Band 2 10MHz CH-Low 3GHz~20GHz



Date: 26.NOV.2018 13:28:16

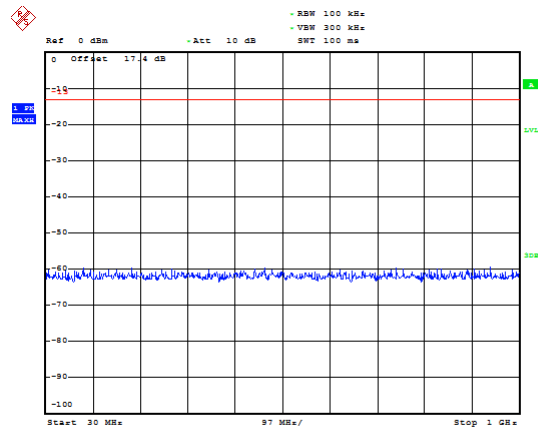


LTE Band 2 10MHz CH-Middle 30MHz~1GHz



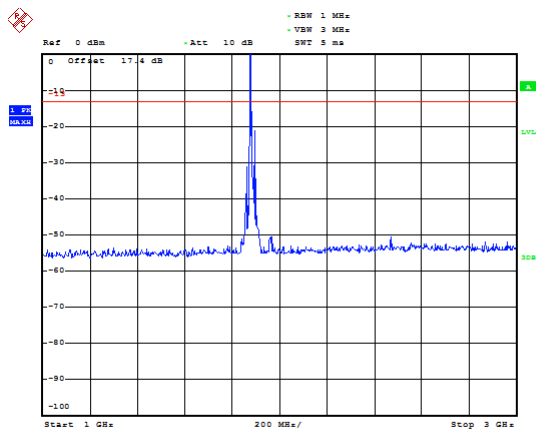
Date: 26.NOV.2018 13:30:03

LTE Band 2 10MHz CH-High 30MHz~1GHz



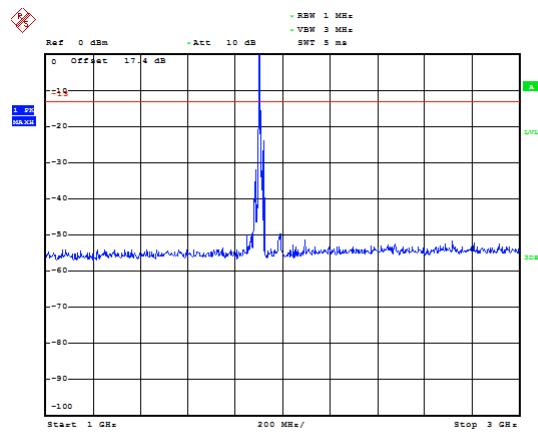
Date: 26.NOV.2018 13:30:36

LTE Band 2 10MHz CH-Middle 1GHz~3GHz



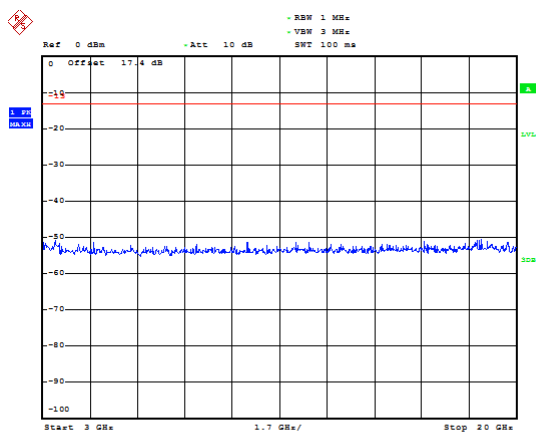
Date: 26.NOV.2018 13:29:45

LTE Band 2 10MHz CH-High 1GHz~3GHz



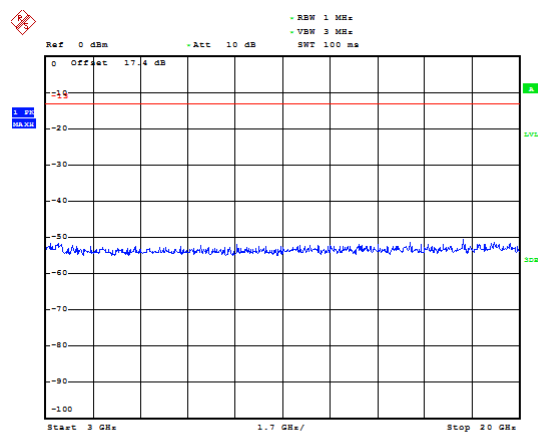
Date: 26.NOV.2018 13:30:58

LTE Band 2 10MHz CH-Middle 3GHz~20GHz



Date: 26.NOV.2018 13:28:50

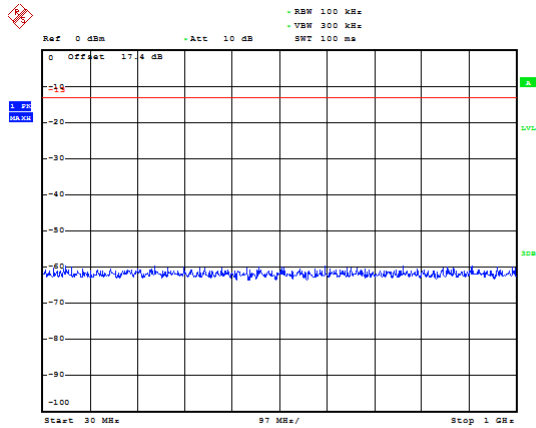
LTE Band 2 10MHz CH-High 3GHz~20GHz



Date: 26.NOV.2018 13:31:42

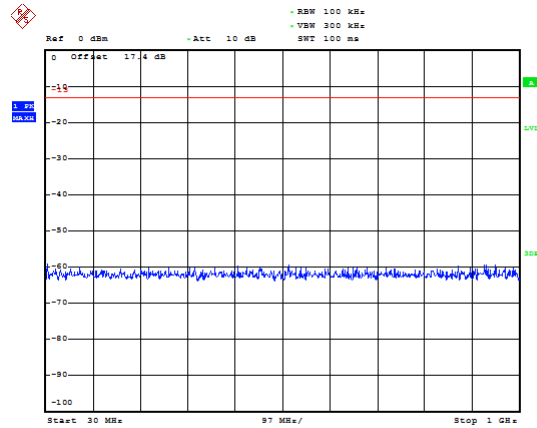


LTE Band 2 15MHz CH-Low 30MHz~1GHz



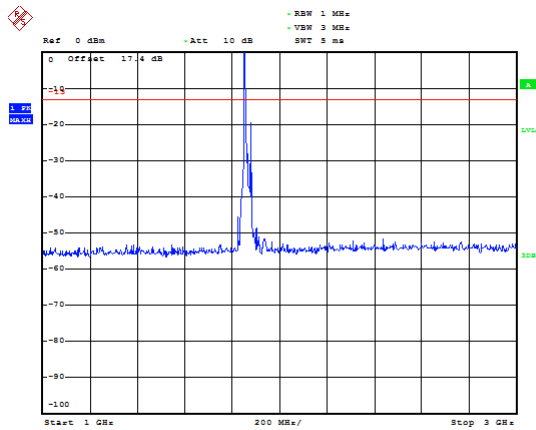
Date: 26.NOV.2018 13:34:06

LTE Band 2 15MHz CH-Middle 30MHz~1GHz



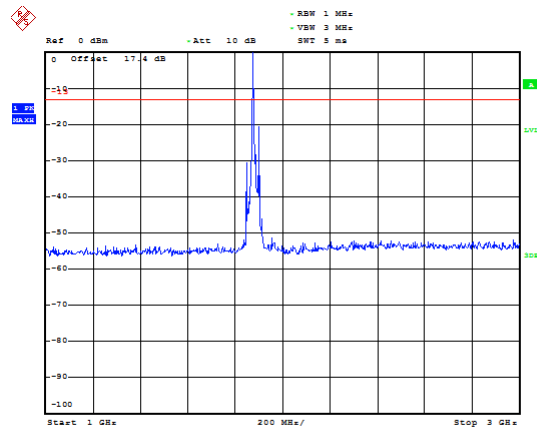
Date: 26.NOV.2018 13:34:35

LTE Band 2 15MHz CH-Low 1GHz~3GHz



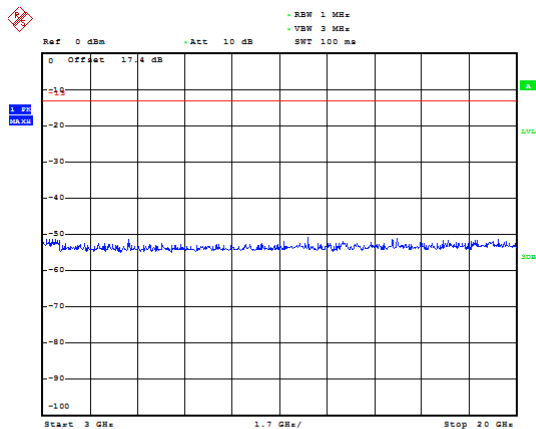
Date: 26.NOV.2018 13:33:46

LTE Band 2 15MHz CH-Middle 1GHz~3GHz



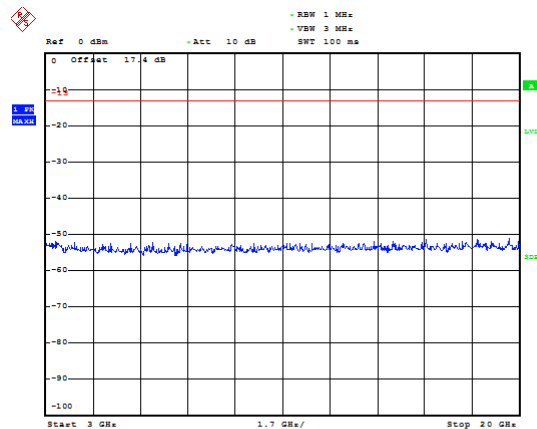
Date: 26.NOV.2018 13:35:00

LTE Band 2 15MHz CH-Low 3GHz~20GHz



Date: 26.NOV.2018 13:33:05

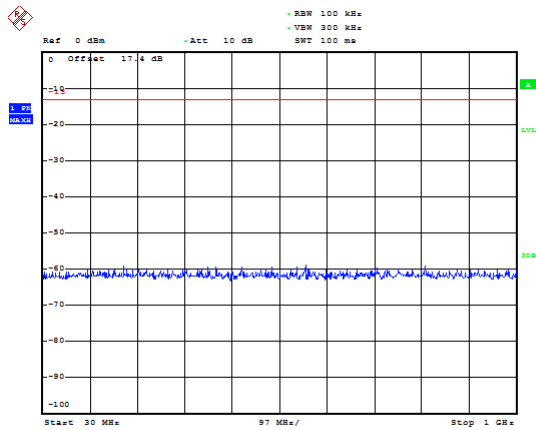
LTE Band 2 15MHz CH-Middle 3GHz~20GHz



Date: 26.NOV.2018 13:35:40

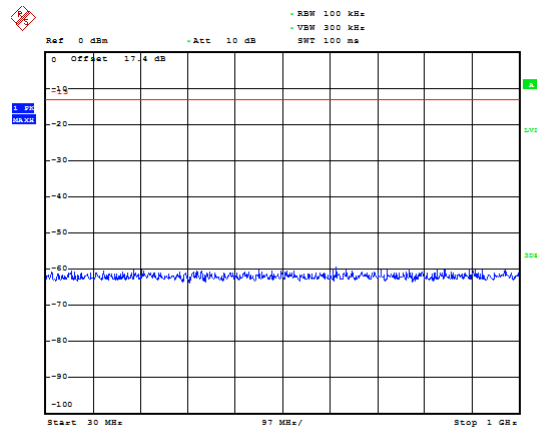


LTE Band 2 15MHz CH-High 30MHz~1GHz



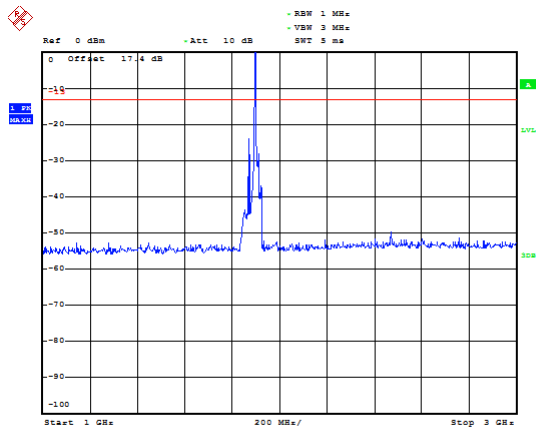
Date: 26.NOV.2018 13:37:14

LTE Band 2 20MHz CH-Low 30MHz~1GHz



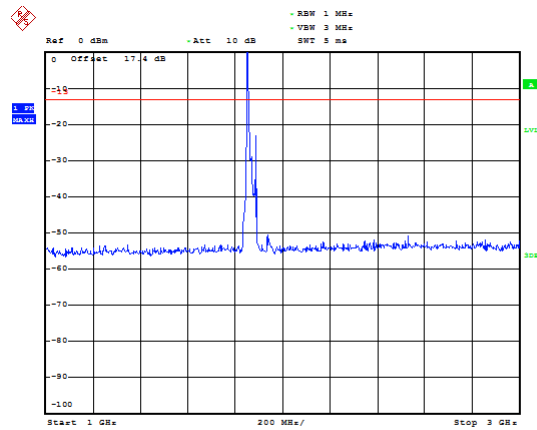
Date: 26.NOV.2018 13:38:44

LTE Band 2 15MHz CH-High 1GHz~3GHz



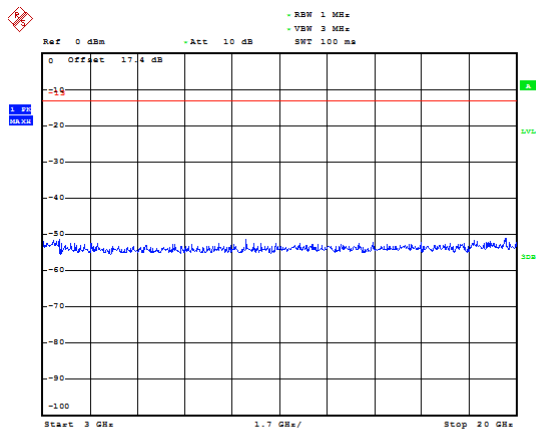
Date: 26.NOV.2018 13:36:55

LTE Band 2 20MHz CH-Low 1GHz~3GHz



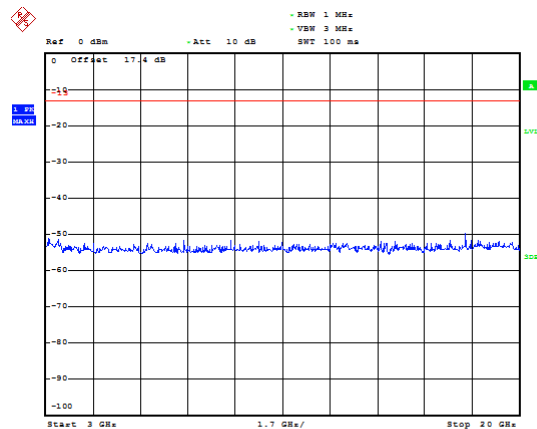
Date: 26.NOV.2018 13:39:02

LTE Band 2 15MHz CH-High 3GHz~20GHz



Date: 26.NOV.2018 13:36:02

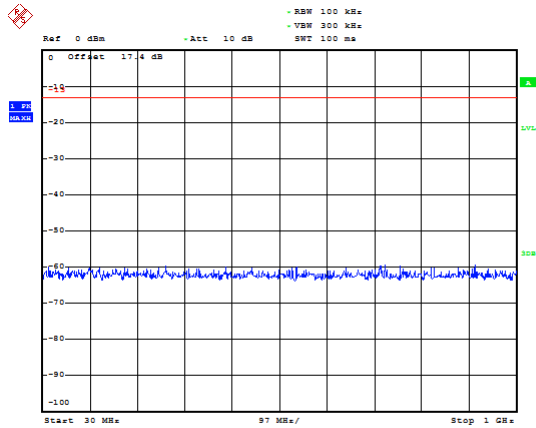
LTE Band 2 20MHz CH-Low 3GHz~20GHz



Date: 26.NOV.2018 13:39:49

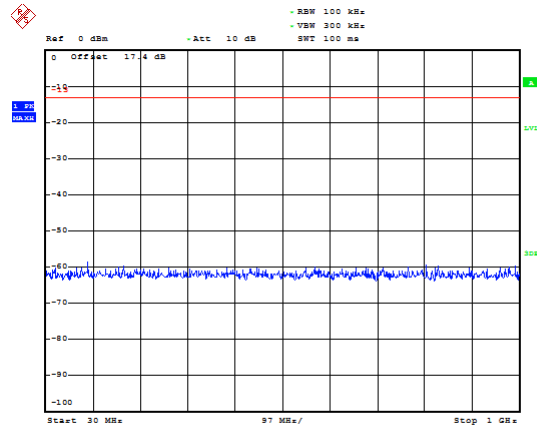


LTE Band 2 20MHz CH-Middle 30MHz~1GHz



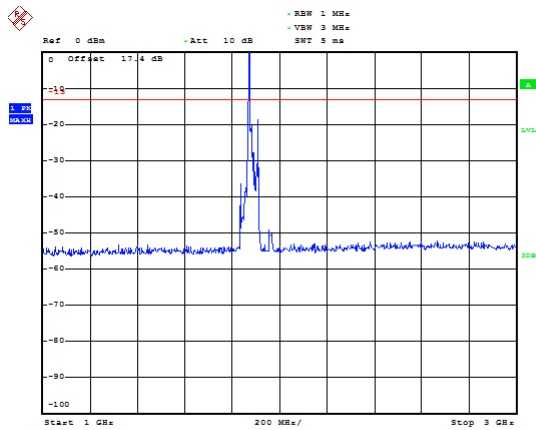
Date: 26.NOV.2018 13:41:23

LTE Band 2 20MHz CH-High 30MHz~1GHz



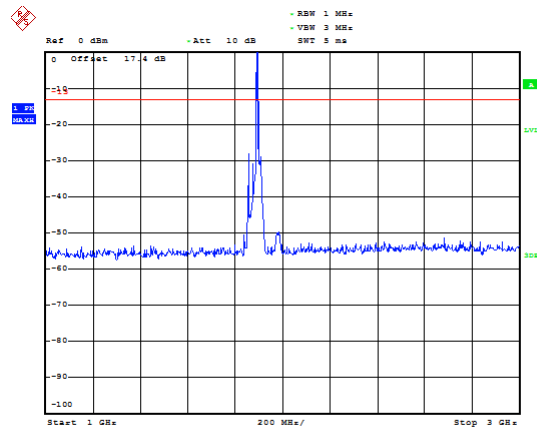
Date: 26.NOV.2018 13:41:41

LTE Band 2 20MHz CH-Middle 1GHz~3GHz



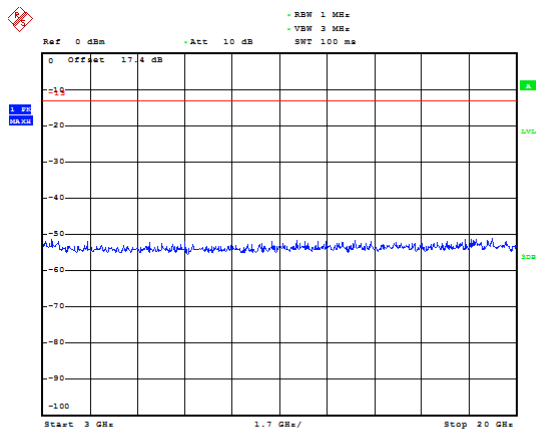
Date: 26.NOV.2018 13:40:52

LTE Band 2 20MHz CH-High 1GHz~3GHz



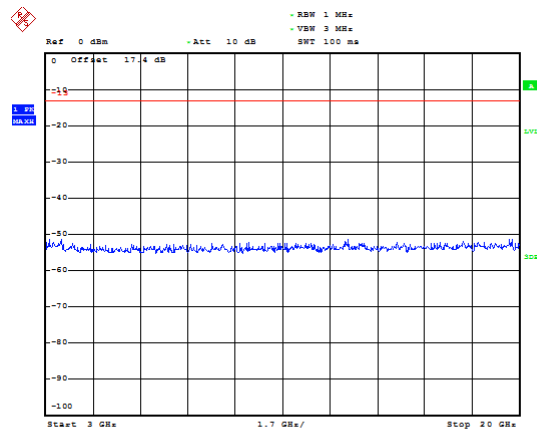
Date: 26.NOV.2018 13:41:58

LTE Band 2 20MHz CH-Middle 3GHz~20GHz



Date: 26.NOV.2018 13:40:10

LTE Band 2 20MHz CH-High 3GHz~20GHz



Date: 26.NOV.2018 13:42:49

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

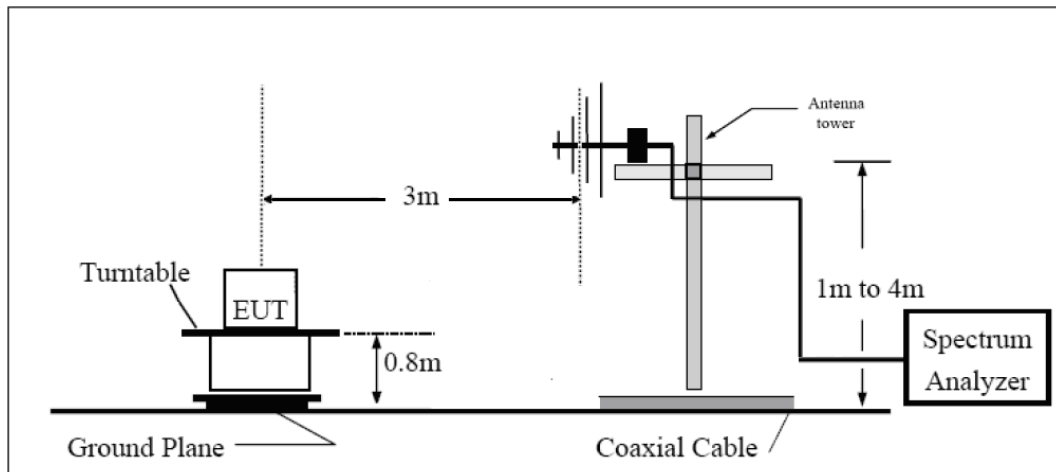
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dBi.

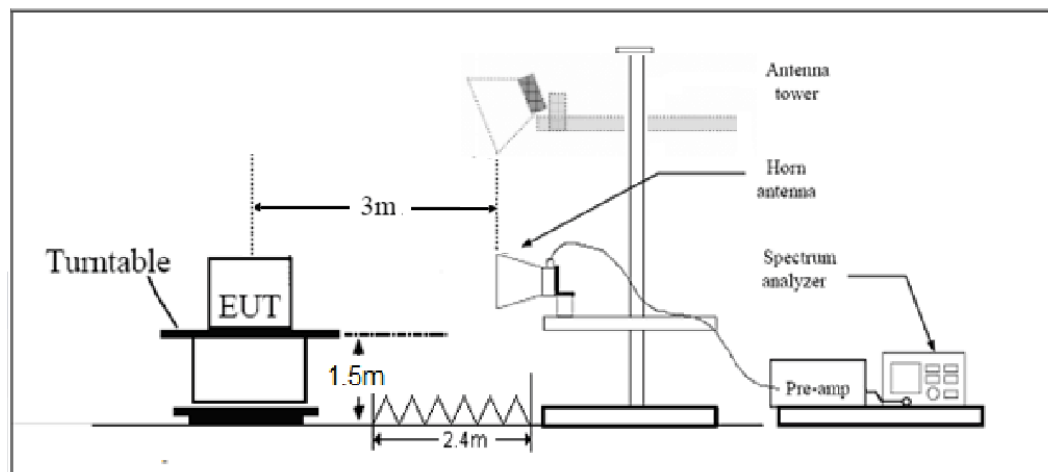
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

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 $43 + 10 \log_{10} (P)$ 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-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3759.9	-62.13	5.10	11.05	Horizontal	-56.18	-13.00	43.18	45
3	5640.2	-61.12	5.42	12.65	Horizontal	-53.89	-13.00	40.89	0
4	7519.5	-55.81	6.70	13.85	Horizontal	-48.66	-13.00	35.66	315
5	9402.8	-55.47	7.01	14.75	Horizontal	-47.73	-13.00	34.73	45
6	11279.3	-54.10	7.48	15.95	Horizontal	-45.63	-13.00	32.63	135
7	13159.1	-55.19	7.51	16.55	Horizontal	-46.15	-13.00	33.15	45
8	15041.3	-52.25	8.24	15.35	Horizontal	-45.14	-13.00	32.14	135
9	16922.3	-51.88	8.41	14.95	Horizontal	-45.34	-13.00	32.34	180
10	18800.0	-61.16	8.54	15.45	Horizontal	-54.25	-13.00	41.25	45

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.

WCDMA Band II 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	-63.17	5.10	11.05	Horizontal	-57.22	-13.00	44.22	45
3	5640.0	-60.17	5.42	12.65	Horizontal	-52.94	-13.00	39.94	135
4	7520.0	-57.09	6.70	13.85	Horizontal	-49.94	-13.00	36.94	225
5	9400.0	-55.53	7.01	14.75	Horizontal	-47.79	-13.00	34.79	315
6	11280.0	-54.34	7.48	15.95	Horizontal	-45.87	-13.00	32.87	0
7	13160.0	-54.54	7.51	16.55	Horizontal	-45.50	-13.00	32.50	90
8	15040.0	-52.69	8.24	15.35	Horizontal	-45.58	-13.00	32.58	315
9	16920.0	-51.44	8.41	14.95	Horizontal	-44.90	-13.00	31.90	45
10	18800.0	-60.22	8.54	15.45	Horizontal	-53.31	-13.00	40.31	180

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.

LTE Band 2 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3759.0	-62.26	5.10	11.05	Horizontal	-56.31	-13.00	43.31	180
3	5638.9	-62.45	5.42	12.65	Horizontal	-55.22	-13.00	42.22	270
4	7520.0	-57.09	6.70	13.85	Horizontal	-49.94	-13.00	36.94	225
5	9400.0	-55.31	7.01	14.75	Horizontal	-47.57	-13.00	34.57	45
6	11280.0	-53.21	7.48	15.95	Horizontal	-44.74	-13.00	31.74	0
7	13160.0	-53.46	7.51	16.55	Horizontal	-44.42	-13.00	31.42	135
8	15040.0	-52.37	8.24	15.35	Horizontal	-45.26	-13.00	32.26	315
9	16920.0	-50.48	8.41	14.95	Horizontal	-43.94	-13.00	30.94	0
10	18800.0	-60.81	8.54	15.45	Horizontal	-53.90	-13.00	40.90	135

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.

LTE Band 2 5MHz 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	-63.53	5.10	11.05	Horizontal	-57.58	-13.00	44.58	45
3	5640.0	-61.12	5.42	12.65	Horizontal	-53.89	-13.00	40.89	0
4	7520.0	-57.28	6.70	13.85	Horizontal	-50.13	-13.00	37.13	270
5	9400.0	-56.55	7.01	14.75	Horizontal	-48.81	-13.00	35.81	225
6	11280.0	-54.57	7.48	15.95	Horizontal	-46.10	-13.00	33.10	315
7	13160.0	-53.76	7.51	16.55	Horizontal	-44.72	-13.00	31.72	0
8	15040.0	-52.83	8.24	15.35	Horizontal	-45.72	-13.00	32.72	45
9	16920.0	-51.27	8.41	14.95	Horizontal	-44.73	-13.00	31.73	135
10	18800.0	-60.91	8.54	15.45	Horizontal	-54.00	-13.00	41.00	45

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.



LTE Band 2 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	3760.0	-63.36	5.10	11.05	Horizontal	-57.41	-13.00	44.41	270
3	5640.0	-60.92	5.42	12.65	Horizontal	-53.69	-13.00	40.69	225
4	7520.0	-56.60	6.70	13.85	Horizontal	-49.45	-13.00	36.45	315
5	9400.0	-55.67	7.01	14.75	Horizontal	-47.93	-13.00	34.93	0
6	11280.0	-53.38	7.48	15.95	Horizontal	-44.91	-13.00	31.91	90
7	13160.0	-53.48	7.51	16.55	Horizontal	-44.44	-13.00	31.44	180
8	15040.0	-52.80	8.24	15.35	Horizontal	-45.69	-13.00	32.69	0
9	16920.0	-50.50	8.41	14.95	Horizontal	-43.96	-13.00	30.96	135
10	18800.0	-62.36	8.54	15.45	Horizontal	-55.45	-13.00	42.45	45

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
Base Station Simulator	R&S	CMW500	113824	2018-05-20	2019-05-19
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	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
Preamplifier	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 *****