RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISLIO-LX9
Product	Smart Phone
Model	LIO-L29, LIO-L09
Report No.	R1907H0137-R2V1
Issue Date	January 20, 2020

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.

Peng Tao

Performed by: Peng Tao

Kai Xu

Approved by: Kai Xu

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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 17
5.3. Occupied Bandwidth 22
5.4. Band Edge Compliance 37
5.5. Peak-to-Average Power Ratio (PAPR) 52
5.6. Frequency Stability 56
5.7. Spurious Emissions at Antenna Terminals 62
5.8. Radiates Spurious Emission 75
6. Main Test Instruments 86

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	24.232(c)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 /24.238(a)	PASS
5	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 24.235	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
8	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS
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.			
Date of Testing: July 20, 2019~ August 11, 2019			

Note: This revised report (Report No.: R1907H0137-R2V1) supersedes and replaces the previously issued report (Report No.: R1907H0137-R2). Please discard or destroy the previously issued report and dispose of it accordingly.

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1. Test Laboratory

1.1. Notes of the test report

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1.2. Test facility

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

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

IC (recognition number is 8510A)

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

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

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

A2LA (Certificate Number: 3857.01)

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

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1.3. Testing Location

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

Client Information

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

General information

EUT Description			
Model	LIO-L29, LIO-L09		
SN:	YDM0119625000032		
Hardware Version	HL1LIONM		
Software Version	5.0.1.103M(C432E103R4P1)		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;		
Test Modulation	(GSM)GMSK,8PSK; (WCDMA) BPSK, QPSK,16QAM; (LTE)QPSK,16QAM,64QAM		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	14		
HSUPA UE Category	6		
LTE Category	19		
Maximum E.I.R.P	GSM 1900:	28.50dBm	
	WCDMA Band II:	22.13 dBm	
	LTE Band 2:	22.51dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.6V Maximum: 4.35V		
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			
Battery 1	Manufacturer: HUAWEI Technologies Co., Ltd. (Sunwoda, Murata) Model: HB555591EEW		

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Battery 2	Manufacturer: HUAWEI Technologies Co., Ltd. (Sunwoda, ATL) Model: HB555591EEW
Battery 3	Manufacturer: HUAWEI Technologies Co., Ltd. (SCUD) Model: HB555591EEW
Earphone 1	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD Model: MEND1632B729001
Earphone 2	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD Model: MEND1632B729000
Earphone 3	Manufacturer: GoerTek Inc Model: WINDY-C
Earphone 4	Manufacturer: Boluo County Quancheng Electronic Co.,ltd Model: 1331-3301-6001-TC-296
Earphone 5	Manufacturer: Foster Electric Co.,(GuangZhou)LTD.Sales Dep. Model: 618017
Note: 1. The information of the EUT is declared by the manufacturer.	

LIO-L29 is dual SIM smart phone. LIO-L09 is single SIM smart phone. The model LIO-L29 and LIO-L09 are identical except for LIO-L09 support single SIM card which deleted by software.

Band	Second-Antenna Gain	Main-antenna Gain	MAS- antenna Gain
PCS1900	-1.89	1.46	--
WCDMA B2	-1.76	1.49	--
LTE FDD Band2	-2.02	2.75	-5.25

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3. Applied Standards

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

FCC CFR47 Part 2 (2018)

FCC CFR 47 Part 24E (2018)

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v03r01

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4. Test Configuration

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 (Z 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

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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	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.													

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5. Test Case Results

5.1. RF Power Output

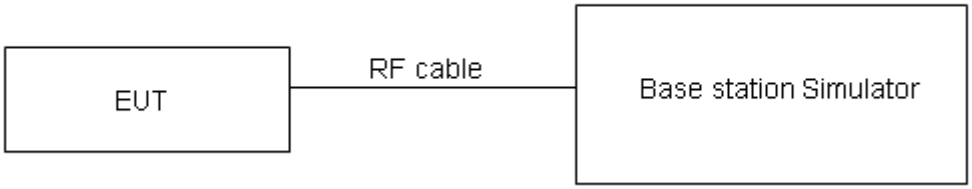
Ambient condition

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

Methods of Measurement

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

Test Setup



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

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

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

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Test Results

GSM 1900		Conducted Power(dBm)		
		Channel 512	Channel 661	Channel 810
		1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	Results	30.48	30.46	30.53
GPRS/EGPRS (GMSK)	1TXslot	30.49	30.48	30.46
	2TXslots	28.35	28.35	28.67
	3TXslots	26.29	26.23	26.58
	4TXslots	24.22	24.18	24.45
EGPRS (8PSK)	1TXslot	26.43	26.38	26.61
	2TXslots	23.85	23.75	24.15
	3TXslots	21.84	21.71	21.88
	4TXslots	19.99	19.68	19.97

WCDMA Band II		Conducted Power(dBm)		
		Channel 9262	Channel 9400	Channel 9538
		1852.4(MHz)	1880(MHz)	1907.6(MHz)
RMC	12.2k	23.74	23.61	23.72
HSDPA	Sub - Test 1	23.16	23.03	23.14
	Sub - Test 2	23.15	23.02	23.13
	Sub - Test 3	22.64	22.51	22.62
	Sub - Test 4	22.63	22.50	22.61
HSUPA	Sub - Test 1	23.12	22.99	23.10
	Sub - Test 2	22.91	22.78	22.89
	Sub - Test 3	23.39	23.27	23.38
	Sub - Test 4	22.88	22.76	22.87
	Sub - Test 5	23.07	22.95	23.06
DC-HSDPA	Sub - Test 1	22.88	22.77	22.86
	Sub - Test 2	22.87	22.76	22.85
	Sub - Test 3	22.03	21.83	21.94
	Sub - Test 4	22.02	21.82	21.93
HSPA+	16QAM	21.23	21.12	21.23

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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	23.00	23.12	22.69
		1	2	23.29	23.11	22.79
		1	5	23.21	22.94	22.78
		3	0	23.11	23.10	22.87
		3	2	23.06	23.09	22.93
		3	3	23.13	22.83	23.02
		6	0	22.16	21.95	22.00
	16QAM	1	0	22.26	22.16	21.86
		1	2	22.24	22.10	21.69
		1	5	22.28	22.09	21.67
		3	0	22.01	22.09	21.95
		3	2	21.94	22.07	22.02
		3	3	22.13	21.88	21.95
		6	0	21.10	20.99	21.04
	64QAM	1	0	21.26	21.36	21.40
		1	2	21.18	21.30	21.33
		1	5	21.20	21.34	21.30
		3	0	21.21	22.24	21.23
		3	2	21.38	22.21	21.29
		3	3	22.31	22.21	21.29
		6	0	20.32	20.34	20.33
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18615/1851.5	18900/1880	19185/1908.5
3MHz	QPSK	1	0	23.02	23.16	22.72
		1	7	23.27	23.14	22.83
		1	14	23.24	22.99	22.82
		8	0	22.21	22.22	22.00
		8	4	22.18	22.19	22.05
		8	7	22.23	21.94	22.12
		15	0	22.16	21.99	22.03
	16QAM	1	0	22.29	22.18	21.89
		1	7	22.27	22.10	21.73
		1	14	22.30	22.13	21.70
		8	0	21.12	21.22	21.07
		8	4	21.05	21.20	21.14
		8	7	21.23	21.00	21.08

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		15	0	21.13	21.03	21.07
	64QAM	1	0	21.29	21.38	21.43
		1	7	21.21	21.30	21.35
		1	14	21.22	21.33	21.33
		8	0	20.32	21.37	20.35
		8	4	20.49	21.34	20.41
		8	7	21.41	21.33	20.42
		15	0	20.35	20.38	20.36
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	22.99	23.14	22.68
		1	13	23.25	23.10	22.80
		1	24	23.21	22.94	22.78
		12	0	22.18	22.17	21.96
		12	6	22.16	22.15	22.00
		12	13	22.21	21.92	22.08
		25	0	22.16	21.98	22.01
	16QAM	1	0	22.26	22.14	21.86
		1	13	22.24	22.08	21.70
		1	24	22.27	22.11	21.66
		12	0	21.10	21.18	21.04
		12	6	21.02	21.15	21.10
		12	13	21.20	20.95	21.04
		25	0	21.11	20.99	21.02
	64QAM	1	0	21.26	21.38	21.40
		1	13	21.18	21.32	21.32
		1	24	21.23	21.31	21.29
		12	0	20.30	21.33	20.36
		12	6	20.46	21.29	20.37
		12	13	21.38	21.28	20.38
		25	0	20.33	20.34	20.31
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	23.01	23.15	22.71
		1	25	23.28	23.15	22.84
		1	49	23.23	22.98	22.81
		25	0	22.21	22.22	22.00
		25	13	22.19	22.20	22.04
		25	25	22.23	21.96	22.13
		50	0	22.20	22.00	22.05

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	16QAM	1	0	22.28	22.17	21.88
		1	25	22.27	22.12	21.73
		1	49	22.30	22.13	21.69
		25	0	21.13	21.23	21.08
		25	13	21.04	21.19	21.13
		25	25	21.23	21.00	21.08
		50	0	21.14	21.04	21.06
	64QAM	1	0	21.28	21.37	21.42
		1	25	21.21	21.32	21.35
		1	49	21.22	21.33	21.32
		25	0	20.33	21.38	20.36
		25	13	20.48	21.33	20.40
		25	25	21.41	21.33	20.42
		50	0	20.36	20.39	20.35
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	23.00	23.11	22.69
		1	38	23.26	23.14	22.81
		1	74	23.20	22.93	22.77
		36	0	22.19	22.18	21.97
		36	18	22.16	22.15	22.00
		36	39	22.20	21.93	22.09
		75	0	22.18	21.96	22.00
	16QAM	1	0	22.23	22.15	21.86
		1	38	22.25	22.09	21.71
		1	74	22.27	22.09	21.66
		36	0	21.10	21.21	21.05
		36	18	21.01	21.14	21.09
		36	39	21.21	20.96	21.05
		75	0	21.11	20.99	21.02
	64QAM	1	0	21.23	21.35	21.40
		1	38	21.19	21.29	21.33
		1	74	21.23	6.00	21.33
		36	0	20.32	21.40	20.37
		36	18	20.46	21.30	20.39
		36	39	21.39	21.29	20.39
		75	0	20.33	20.34	20.31
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18700/1860	18900/1880	19100/1900
20MHz	QPSK	1	0	22.97	23.07	22.66

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		1	50	23.25	23.10	22.79
		1	99	23.18	22.92	22.74
		50	0	22.16	22.13	21.93
		50	25	22.14	22.11	21.97
		50	50	22.17	21.88	22.05
		100	0	22.15	21.91	21.96
	16QAM	1	0	21.99	22.11	21.81
		1	50	22.21	22.07	21.67
		1	99	22.25	22.06	21.64
		50	0	21.07	21.17	21.02
		50	25	20.98	21.12	21.06
		50	50	21.18	20.91	21.01
		100	0	21.09	20.95	20.99
	64QAM	1	0	21.21	21.31	21.35
		1	50	21.15	21.27	21.29
		1	99	21.17	21.26	21.27
		50	0	20.27	21.32	20.30
		50	25	20.42	21.26	20.33
		50	50	21.36	21.24	20.35
		100	0	20.31	20.30	20.28

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5.2. Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

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

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

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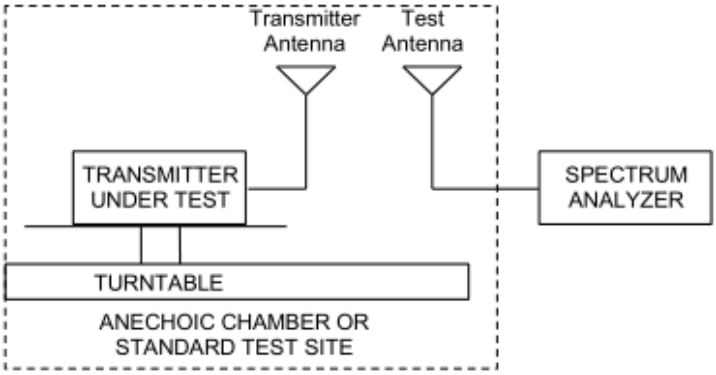
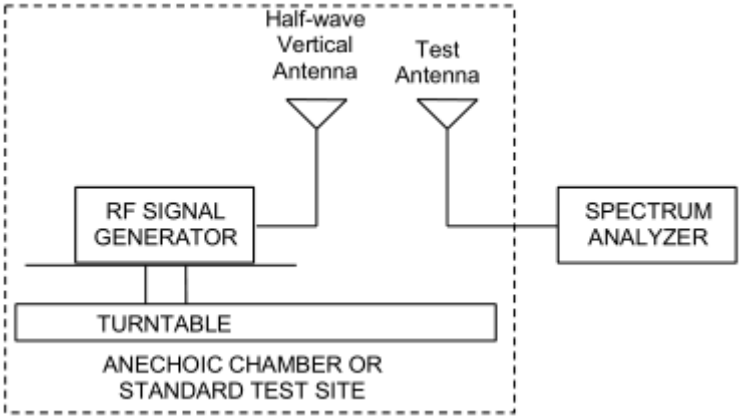
Test setup





Limits

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

Limit	⩽ 2 W (33 dBm)

Measurement Uncertainty

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

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Test Results:

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

Mode	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
GSM 1900	Low	1850.2	Horizontal	27.48	33	Pass
	Mid	1880	Horizontal	28.46	33	Pass
	High	1909.8	Horizontal	28.50	33	Pass
GPRS 1900	Low	1850.2	Horizontal	27.01	33	Pass
	Mid	1880	Horizontal	27.98	33	Pass
	High	1909.8	Horizontal	28.05	33	Pass
EGPRS 1900	Low	1850.2	Horizontal	24.31	33	Pass
	Mid	1880	Horizontal	25.12	33	Pass
	High	1909.8	Horizontal	25.34	33	Pass
WCDMA Band II	Low	1852.4	Horizontal	21.74	33	Pass
	Mid	1880	Horizontal	22.13	33	Pass
	High	1907.6	Horizontal	21.87	33	Pass

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LTE Band 2						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	1850.7	Horizontal	22.08	33	Pass
	Mid	1880	Horizontal	22.51	33	Pass
	High	1909.3	Horizontal	21.96	33	Pass
3 MHz (QPSK)	Low	1851.5	Horizontal	20.41	33	Pass
	Mid	1880	Horizontal	20.81	33	Pass
	High	1908.5	Horizontal	21.79	33	Pass
5 MHz (QPSK)	Low	1852.5	Horizontal	21.44	33	Pass
	Mid	1880	Horizontal	22.27	33	Pass
	High	1907.5	Horizontal	21.73	33	Pass
10 MHz (QPSK)	Low	1855	Horizontal	21.56	33	Pass
	Mid	1880	Horizontal	22.41	33	Pass
	High	1905	Horizontal	21.87	33	Pass
15 MHz (QPSK)	Low	1857.5	Horizontal	21.86	33	Pass
	Mid	1880	Horizontal	22.43	33	Pass
	High	1902.5	Horizontal	21.74	33	Pass
20 MHz (QPSK)	Low	1860	Horizontal	21.75	33	Pass
	Mid	1880	Horizontal	22.38	33	Pass
	High	1900	Horizontal	21.39	33	Pass
1.4 MHz (16QAM)	Low	1850.7	Horizontal	21.56	33	Pass
	Mid	1880	Horizontal	21.97	33	Pass
	High	1909.3	Horizontal	21.41	33	Pass
3 MHz (16QAM)	Low	1851.5	Horizontal	19.83	33	Pass
	Mid	1880	Horizontal	20.21	33	Pass
	High	1908.5	Horizontal	21.25	33	Pass
5 MHz (16QAM)	Low	1852.5	Horizontal	20.87	33	Pass
	Mid	1880	Horizontal	21.75	33	Pass
	High	1907.5	Horizontal	21.19	33	Pass
10 MHz (16QAM)	Low	1855	Horizontal	21.01	33	Pass
	Mid	1880	Horizontal	21.83	33	Pass
	High	1905	Horizontal	21.30	33	Pass
15 MHz (16QAM)	Low	1857.5	Horizontal	21.35	33	Pass
	Mid	1880	Horizontal	21.91	33	Pass
	High	1902.5	Horizontal	21.20	33	Pass
20 MHz (16QAM)	Low	1860	Horizontal	21.17	33	Pass
	Mid	1880	Horizontal	21.78	33	Pass
	High	1900	Horizontal	20.85	33	Pass
1.4 MHz (64QAM)	Low	1850.7	Horizontal	21.03	33	Pass
	Mid	1880	Horizontal	21.45	33	Pass
	High	1909.3	Horizontal	20.84	33	Pass

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LTE Band 2						
bandwidth	**Channel**	**Frequency (MHz)**	**Polarization**	**EIRP (dBm)**	**Limit (dBm)**	**Conclusion**
3 MHz (64QAM)	Low	1851.5	Horizontal	19.32	33	Pass
	Mid	1880	Horizontal	19.69	33	Pass
	High	1908.5	Horizontal	20.71	33	Pass
5 MHz (64QAM)	Low	1852.5	Horizontal	20.32	33	Pass
	Mid	1880	Horizontal	21.17	33	Pass
	High	1907.5	Horizontal	20.59	33	Pass
10 MHz (64QAM)	Low	1855	Horizontal	20.47	33	Pass
	Mid	1880	Horizontal	21.26	33	Pass
	High	1905	Horizontal	20.78	33	Pass
15 MHz (64QAM)	Low	1857.5	Horizontal	20.81	33	Pass
	Mid	1880	Horizontal	21.36	33	Pass
	High	1902.5	Horizontal	20.62	33	Pass
20 MHz (64QAM)	Low	1860	Horizontal	20.60	33	Pass
	Mid	1880	Horizontal	21.27	33	Pass
	High	1900	Horizontal	20.33	33	Pass

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5.3. Occupied Bandwidth

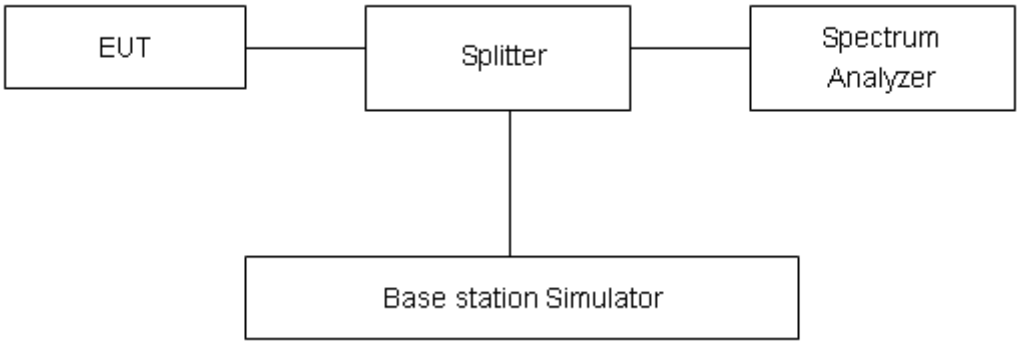
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 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= 624Hz.

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Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.2441	0.309
	661	1880.0	0.2425	0.3077
	810	1909.8	0.2416	0.3081
GPRS 1900 (GMSK)	512	1850.2	0.247	0.3143
	661	1880.0	0.244	0.3082
	810	1909.8	0.2428	0.3084
EGPRS 1900 (8-PSK)	512	1850.2	0.2501	0.3255
	661	1880.0	0.2487	0.3098
	810	1909.8	0.2474	0.3008
WCDMA Band II (RMC)	9262	1852.4	4.1583	4.678
	9400	1880	4.1503	4.665
	9538	1907.6	4.1529	4.663

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1106	1.252
		18900	1880.0	1.1122	1.256
		19193	1909.3	1.1105	1.251
	3	18615	1851.5	2.7295	2.978
		18900	1880	2.7350	2.973
		19185	1908.5	2.7337	2.979
	5	18625	1852.5	4.5024	4.859
		18900	1880	4.5000	4.860
		19175	1907.5	4.4974	4.877
	10	18650	1855	9.0473	9.763
		18900	1880	9.0558	9.786
		19150	1905	9.0458	9.742
	15	18675	1857.5	13.4740	14.310

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		18900	1880	13.4870	14.390
		19125	1902.5	13.4870	14.340
	20	18700	1860	17.9120	18.940
		18900	1880	17.9430	19.000
		19100	1900	17.9030	18.870
16QAM	1.4	18607	1850.7	1.1138	1.256
		18900	1880.0	1.1129	1.253
		19193	1909.3	1.1094	1.250
	3	18615	1851.5	2.7408	2.980
		18900	1880	2.7306	2.973
		19185	1908.5	2.7334	2.979
	5	18625	1852.5	3.3997	4.857
		18900	1880	4.5035	4.877
		19175	1907.5	4.4985	4.867
	10	18650	1855	9.0575	9.770
		18900	1880	9.0543	9.751
		19150	1905	9.0504	9.741
	15	18675	1857.5	13.4670	14.380
		18900	1880	13.4920	14.310
		19125	1902.5	13.4760	14.280
	20	18700	1860	17.9120	18.930
		18900	1880	17.9430	18.980
		19100	1900	17.9180	18.910
64QAM	1.4	18607	1850.7	1.1133	1.257
		18900	1880.0	1.1145	1.251
		19193	1909.3	1.1099	1.255
	3	18615	1851.5	2.7304	2.982
		18900	1880	2.7367	2.991
		19185	1908.5	2.7319	2.989
	5	18625	1852.5	4.5021	4.873
		18900	1880	4.5023	4.857
		19175	1907.5	4.5030	4.850
	10	18650	1855	9.0497	9.743
		18900	1880	9.0591	9.790

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		19150	1905	9.0550	9.752
	15	18675	1857.5	13.4810	14.330
		18900	1880	13.4940	14.400
		19125	1902.5	13.4770	14.360
	20	18700	1860	17.9120	18.990
		18900	1880	17.9450	19.040
		19100	1900	17.9000	18.860

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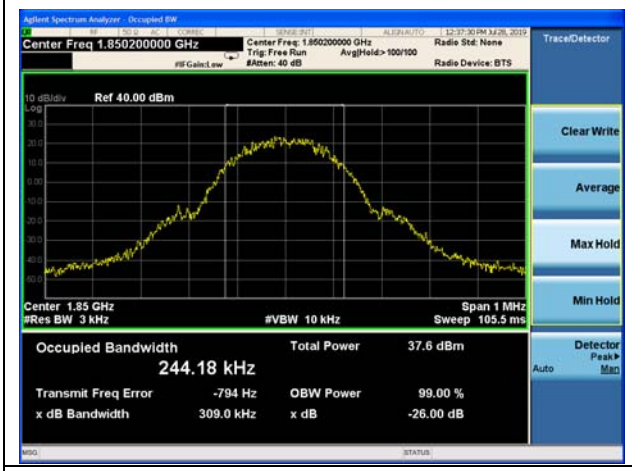
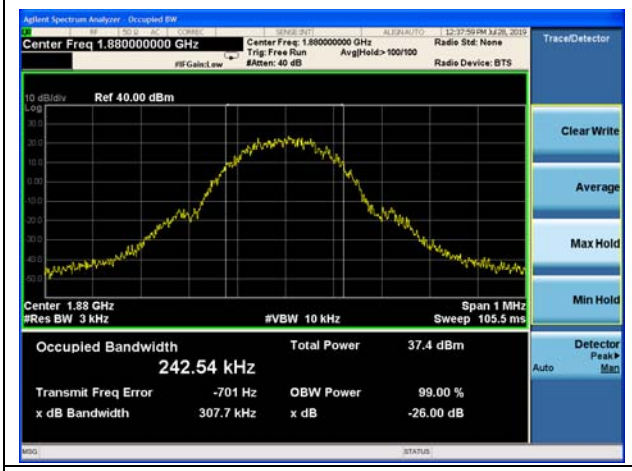
GSM1900 GSM CH-Low

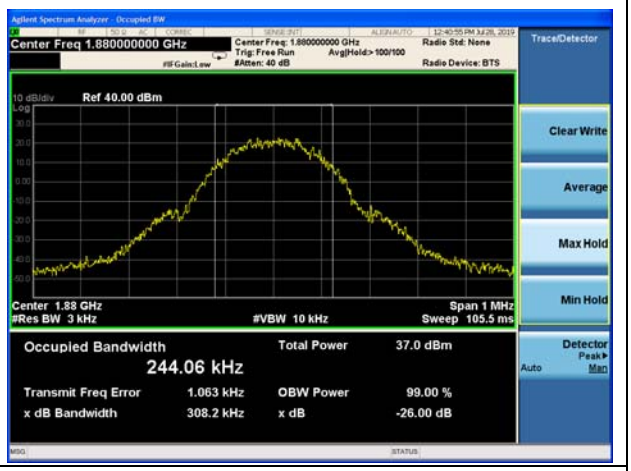


GSM1900 GPRS CH-Low

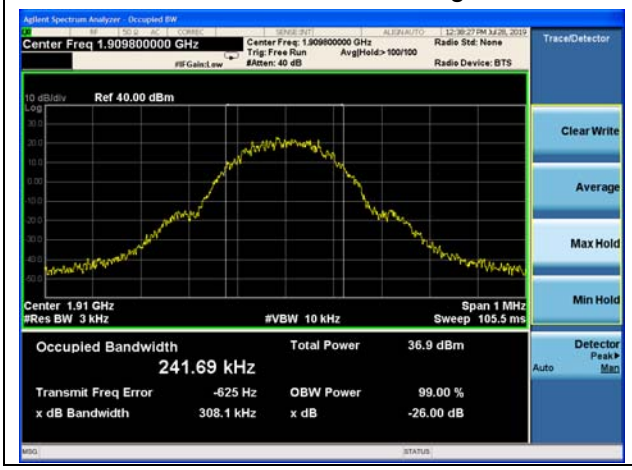
GSM 1900 GSM CH-Middle



GSM 1900 GPRS CH-Middle



GSM 1900 GSM CH-High



GSM 1900 GPRS CH-High

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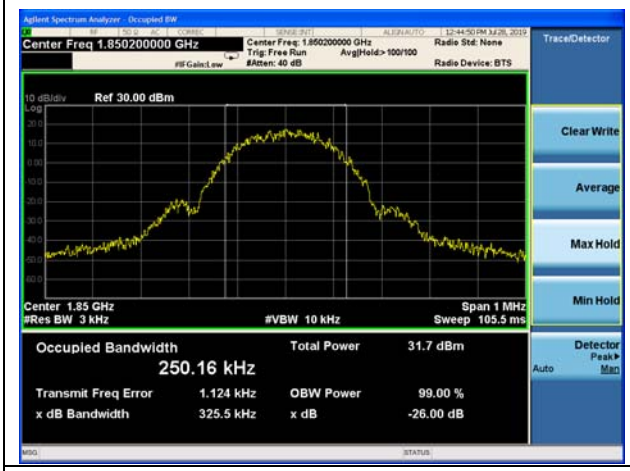
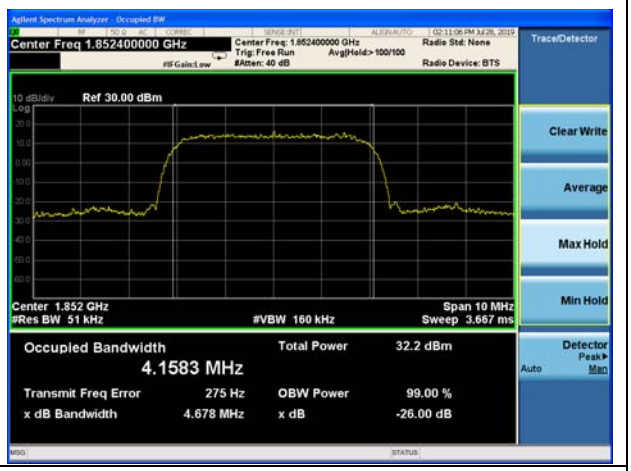
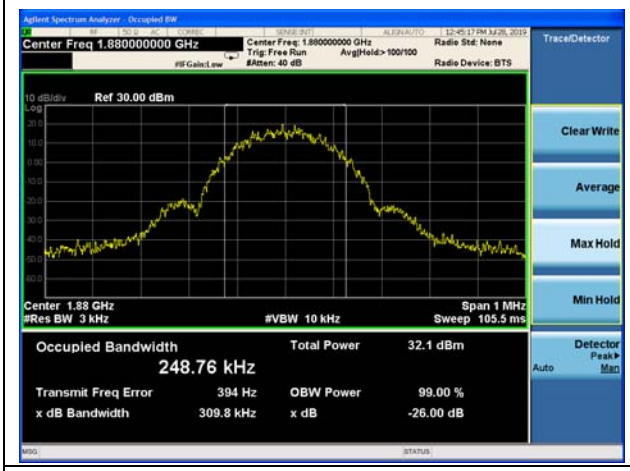
GSM1900 EGPRS CH-Low



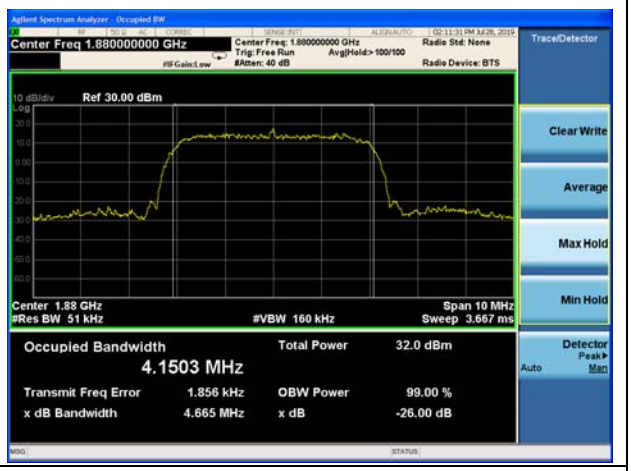
WCDMA Band II RMC CH-LOW



GSM 1900 EGPRS CH-Middle

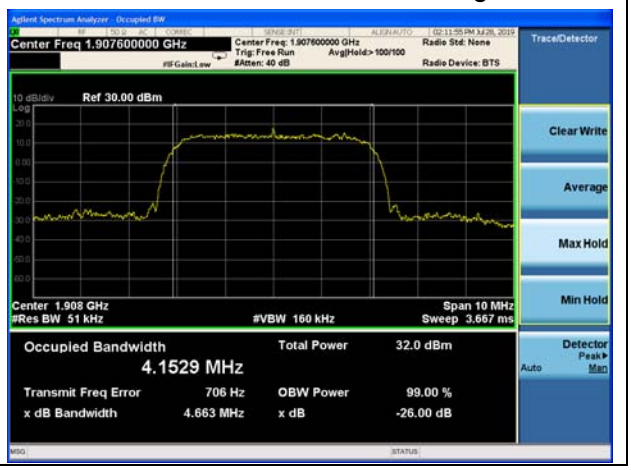


WCDMA Band II RMC CH-Middle



GSM 1900 EGPRS CH-High

WCDMA Band II RMC CH-High



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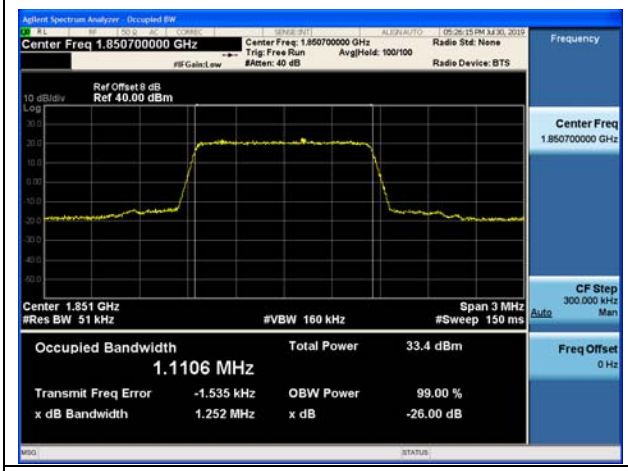
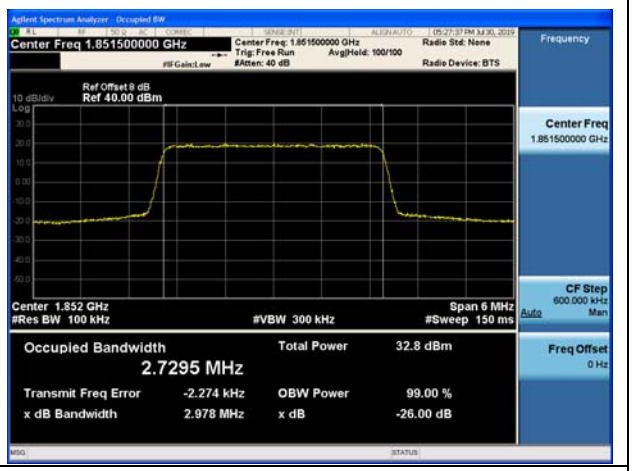
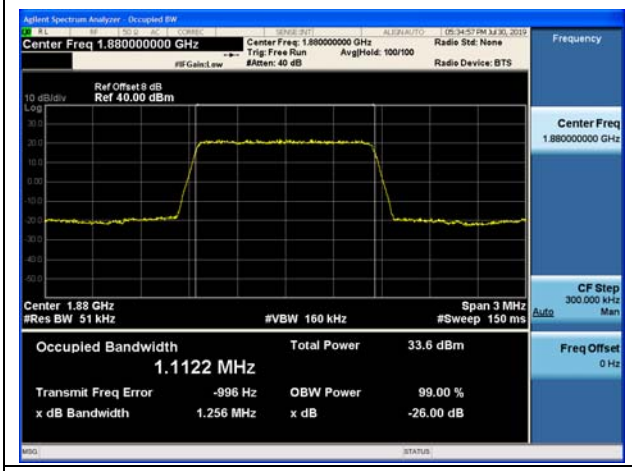
LTE Band 2 1.4MHz QPSK CH-Low



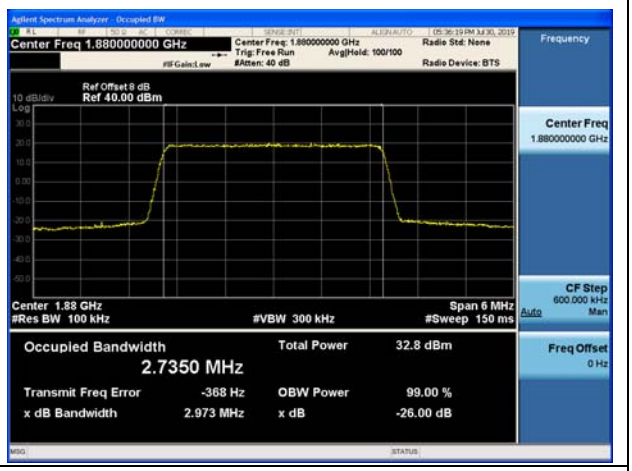
LTE Band 2 3MHz QPSK CH-Low



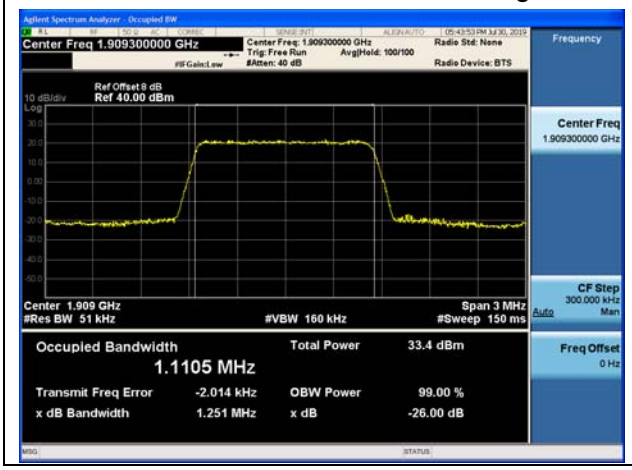
LTE Band 2 1.4MHz QPSK CH-Middle



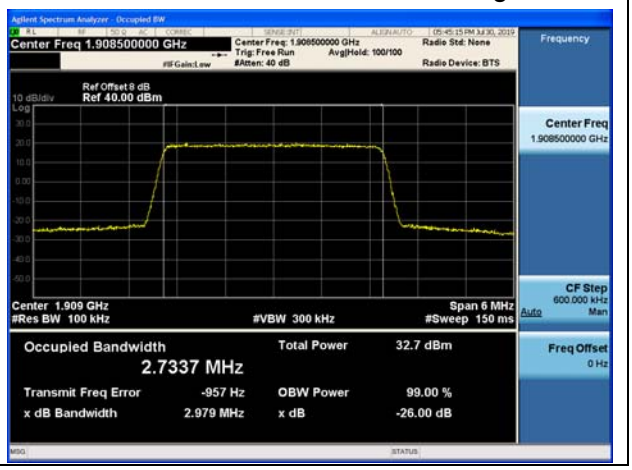
LTE Band 2 3MHz QPSK CH-Middle



LTE Band 2 1.4MHz QPSK CH-High



LTE Band 2 3MHz QPSK CH-High



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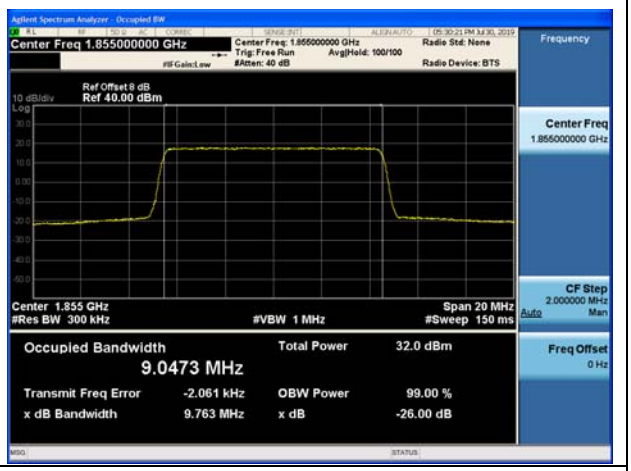
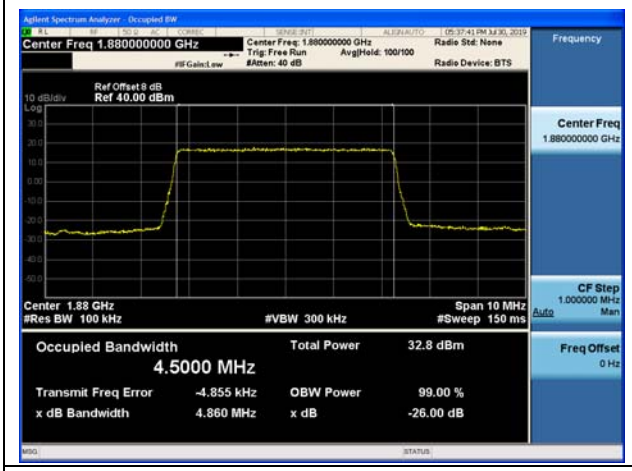
LTE Band 2 5MHz QPSK CH-Low

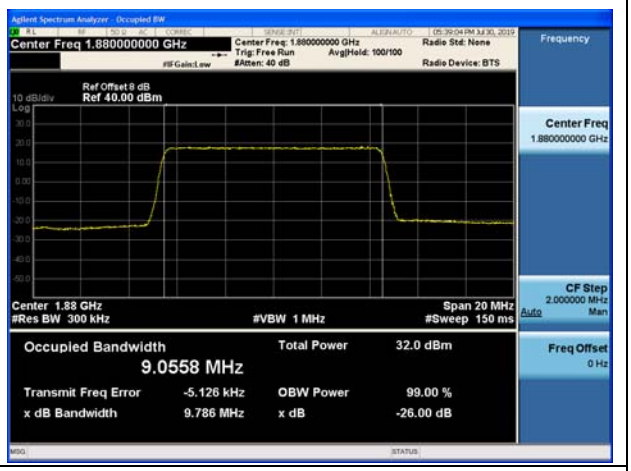
LTE Band 2 10MHz QPSK CH-Low



LTE Band 2 5MHz QPSK CH-Middle

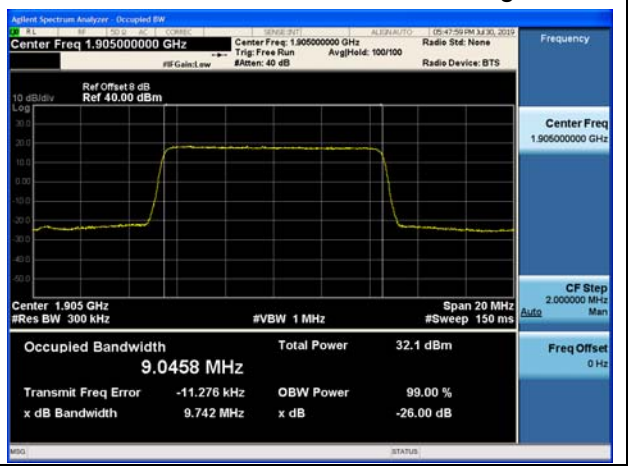


LTE Band 2 10MHz QPSK CH-Middle



LTE Band 2 5MHz QPSK CH-High

LTE Band 2 10MHz QPSK CH-High



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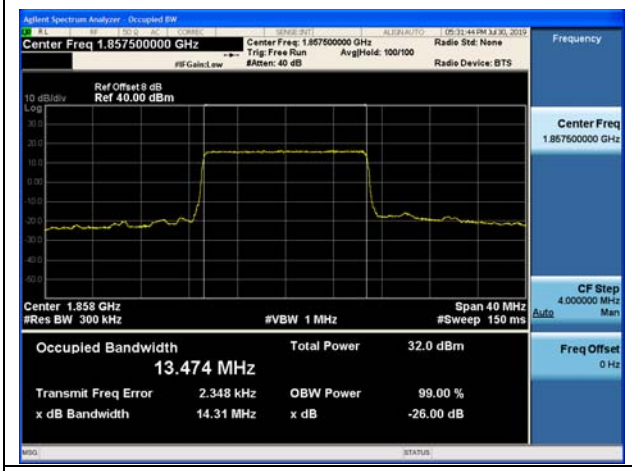
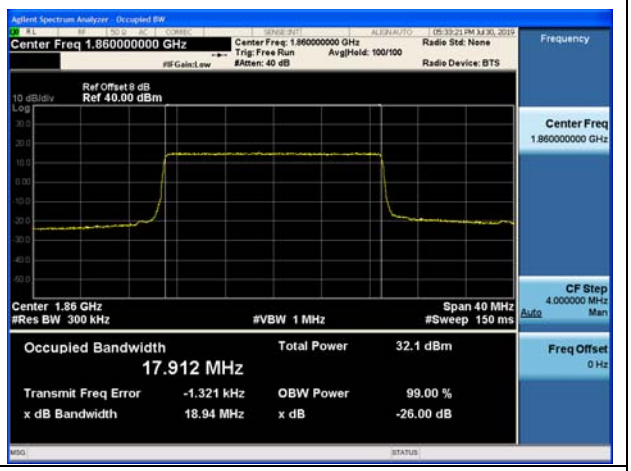
LTE Band 2 15MHz QPSK CH-Low

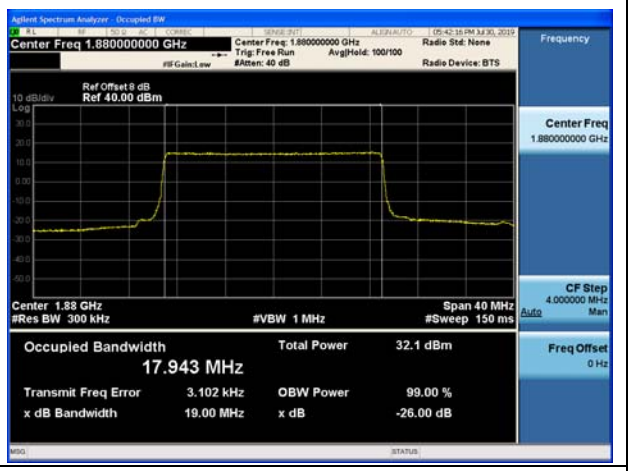


LTE Band 2 20MHz QPSK CH-Low

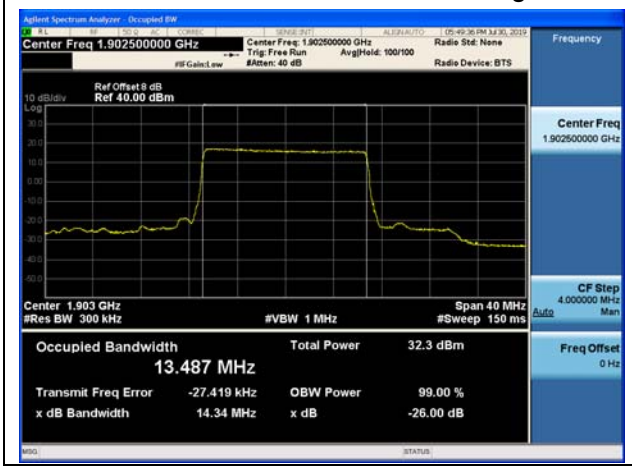


LTE Band 2 15MHz QPSK CH-Middle

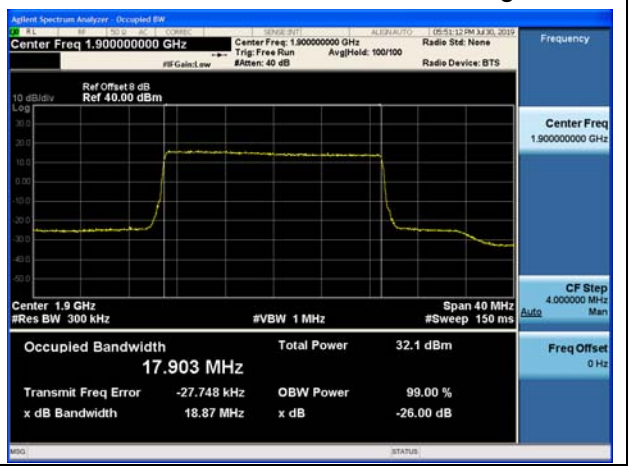
LTE Band 2 20MHz QPSK CH-Middle



LTE Band 2 15MHz QPSK CH-High



LTE Band 2 20MHz QPSK CH-High



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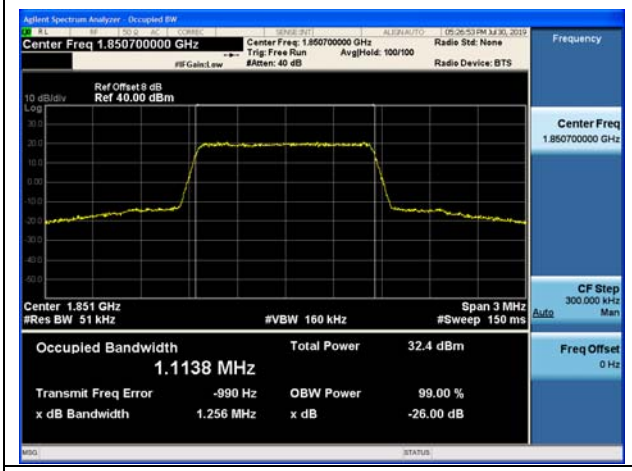
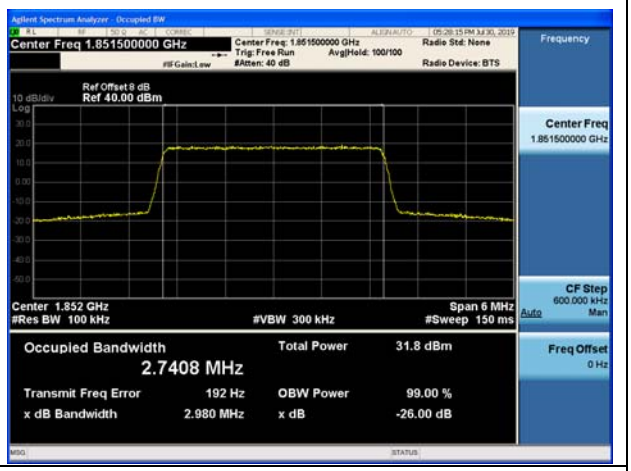
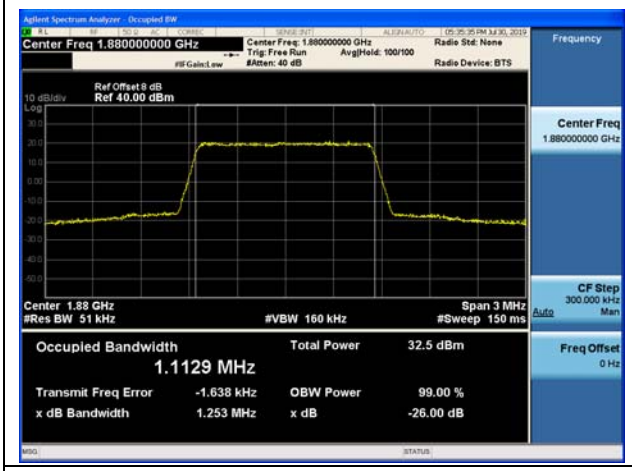
LTE Band 2 1.4MHz 16QAM CH-Low



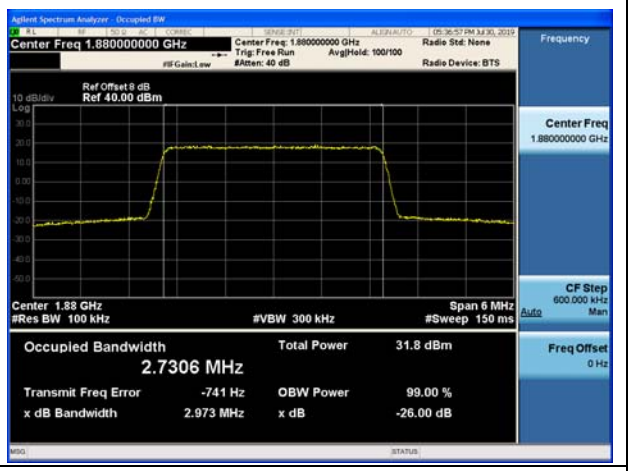
LTE Band 2 3MHz 16QAM CH-Low



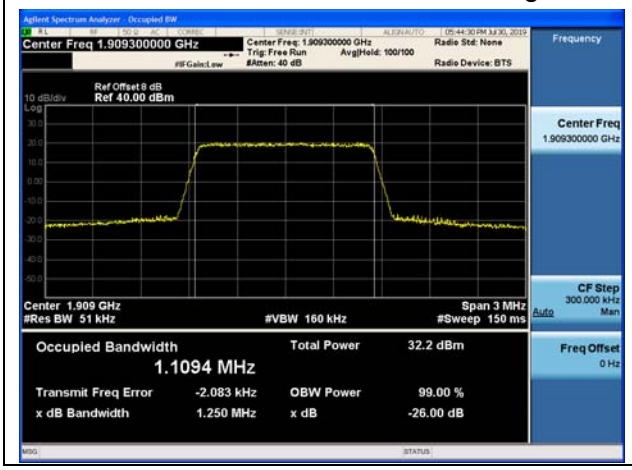
LTE Band 2 1.4MHz 16QAM CH-Middle



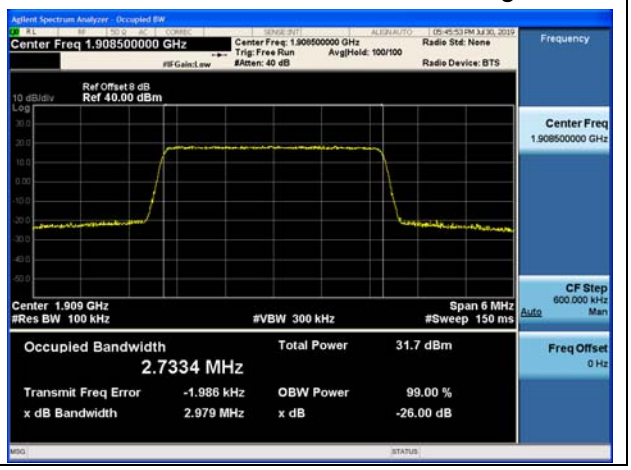
LTE Band 2 3MHz 16QAM CH-Middle



LTE Band 2 1.4MHz 16QAM CH-High



LTE Band 2 3MHz 16QAM CH-High



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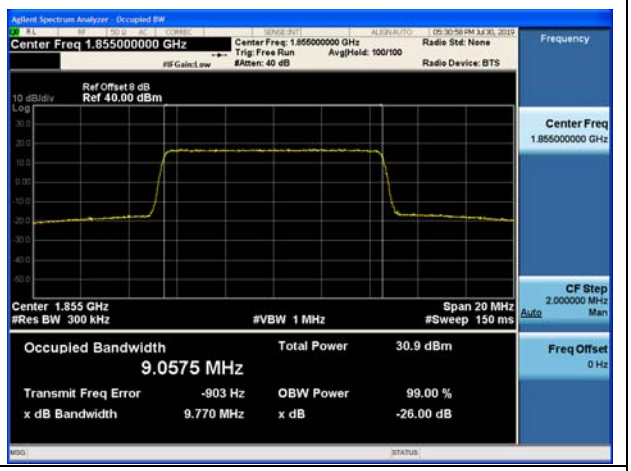
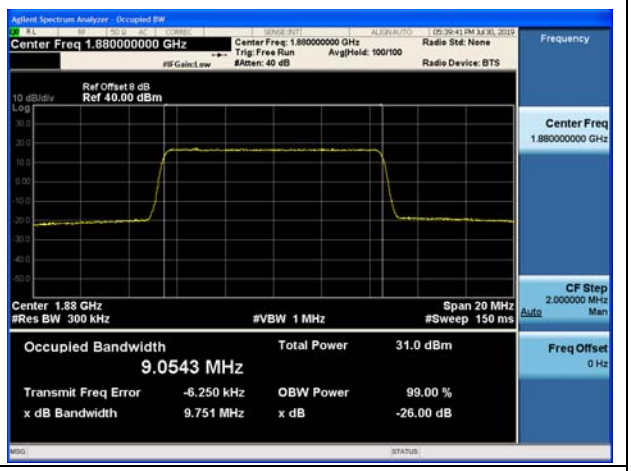
LTE Band 2 5MHz 16QAM CH-Low

LTE Band 2 10MHz 16QAM CH-Low



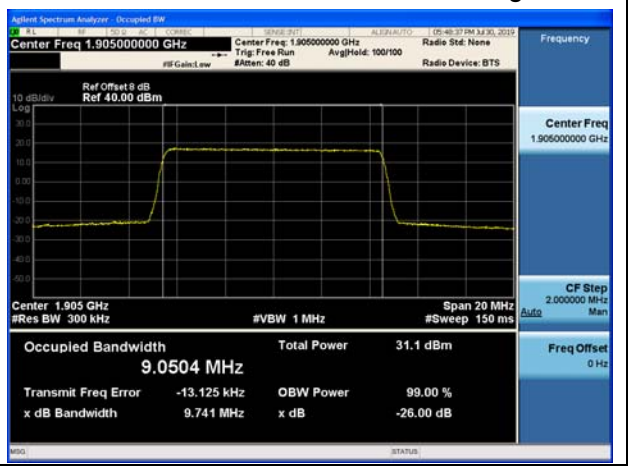
LTE Band 2 5MHz 16QAM CH-Middle

LTE Band 2 10MHz 16QAM CH-Middle



LTE Band 2 5MHz 16QAM CH-High

LTE Band 2 10MHz 16QAM CH-High



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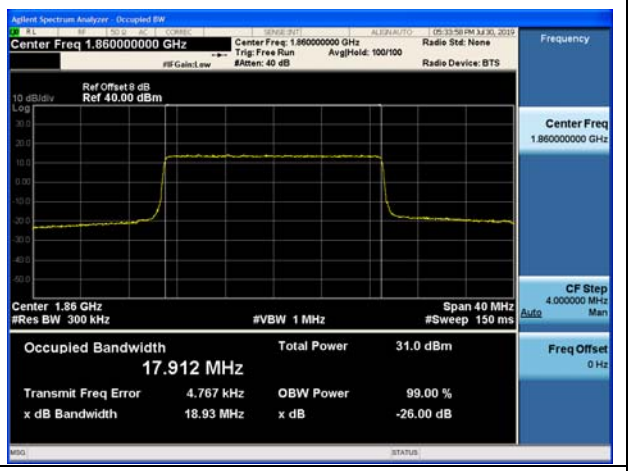
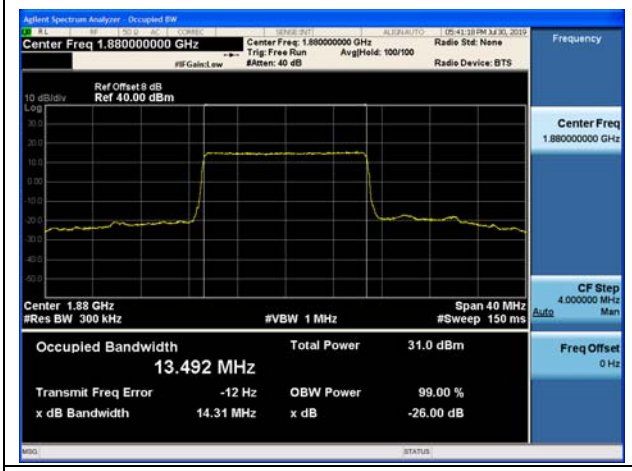
LTE Band 2 15MHz 16QAM CH-Low

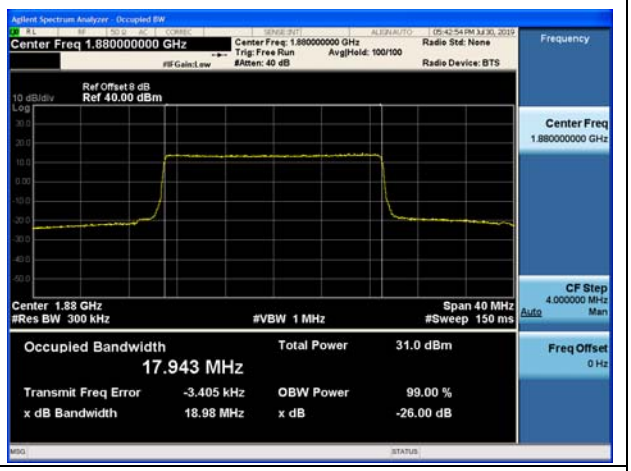
LTE Band 2 20MHz 16QAM CH-Low



LTE Band 2 15MHz 16QAM CH-Middle



LTE Band 2 20MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-High

LTE Band 2 20MHz 16QAM CH-High

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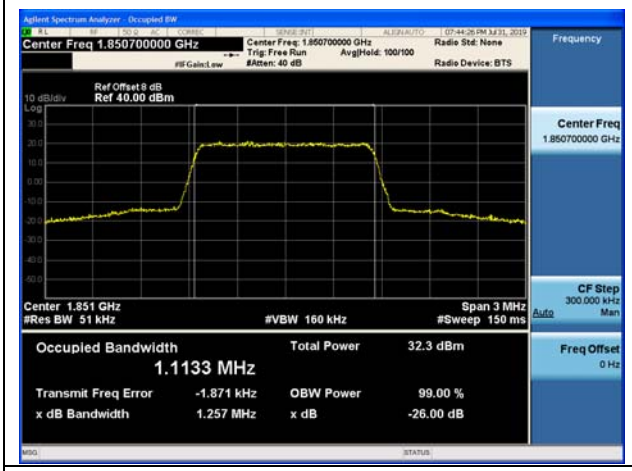
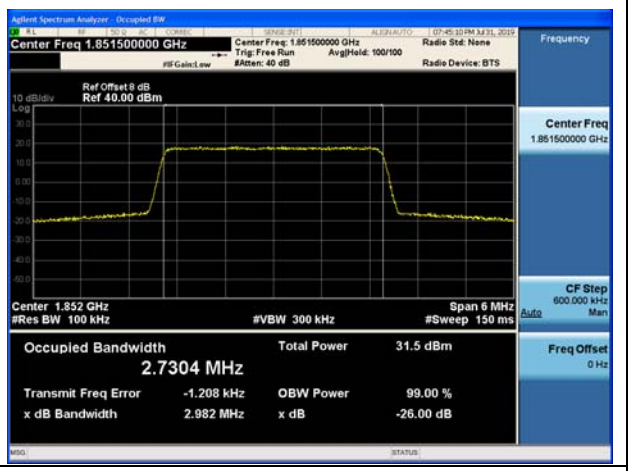
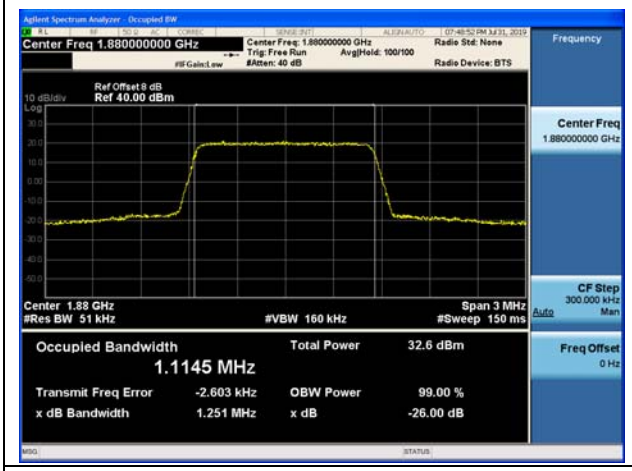
LTE Band 2 1.4MHz 64QAM CH-Low



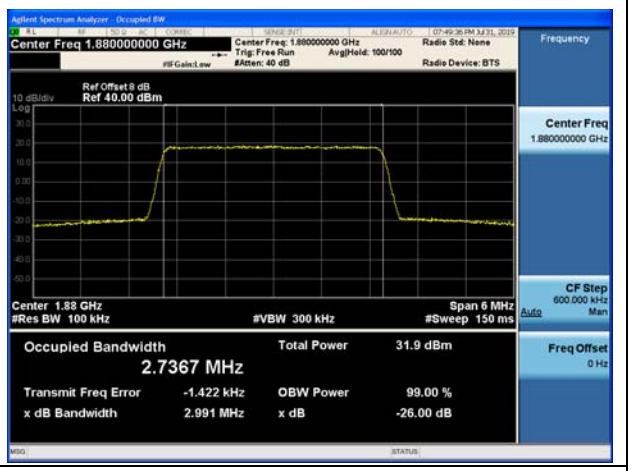
LTE Band 2 3MHz 64QAM CH-Low



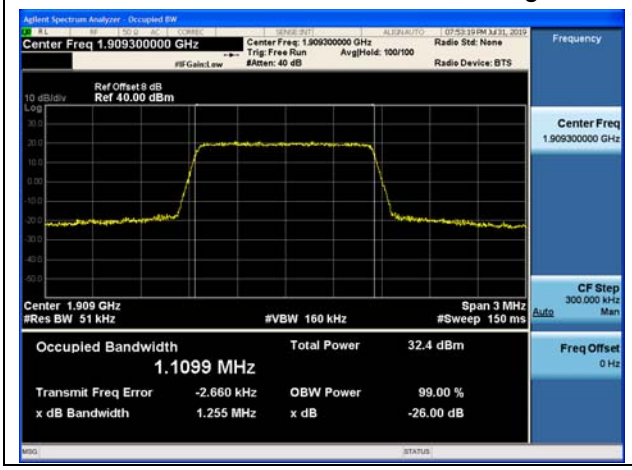
LTE Band 2 1.4MHz 64QAM CH-Middle



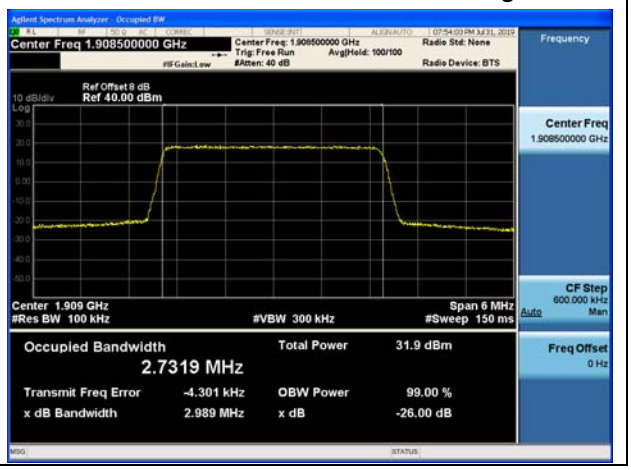
LTE Band 2 3MHz 64QAM CH-Middle



LTE Band 2 1.4MHz 64QAM CH-High



LTE Band 2 3MHz 64QAM CH-High



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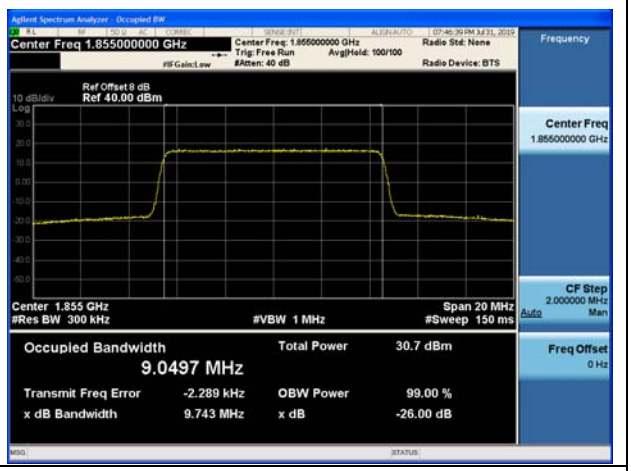
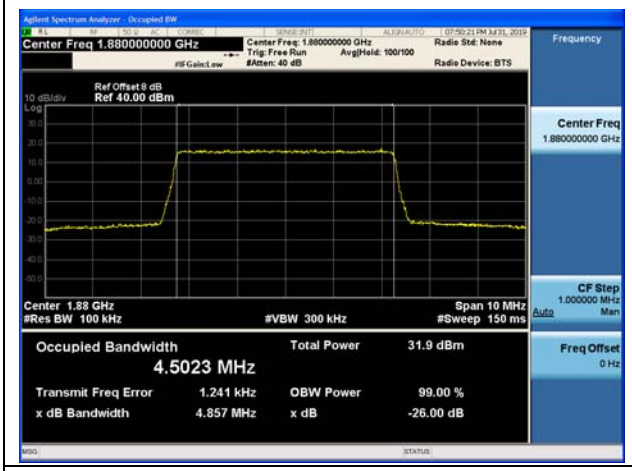
LTE Band 2 5MHz 64QAM CH-Low

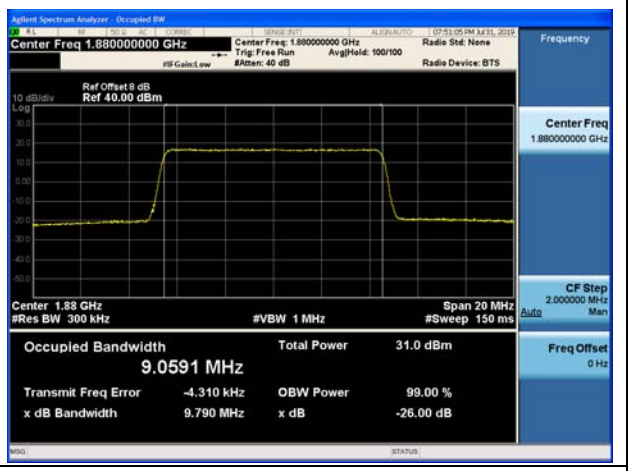
LTE Band 2 10MHz 64QAM CH-Low



LTE Band 2 5MHz 64QAM CH-Middle

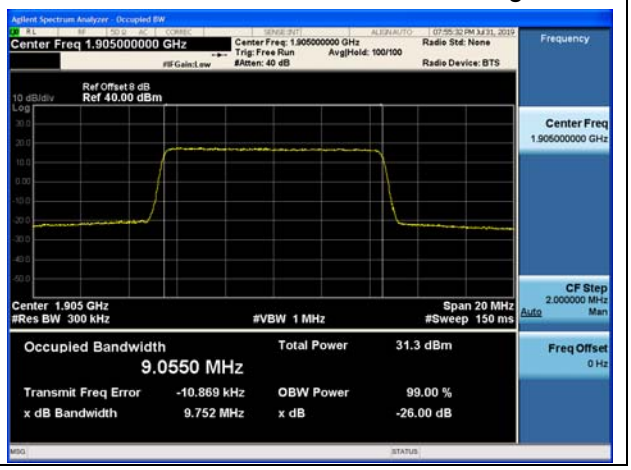


LTE Band 2 10MHz 64QAM CH-Middle



LTE Band 2 5MHz 64QAM CH-High

LTE Band 2 10MHz 64QAM CH-High



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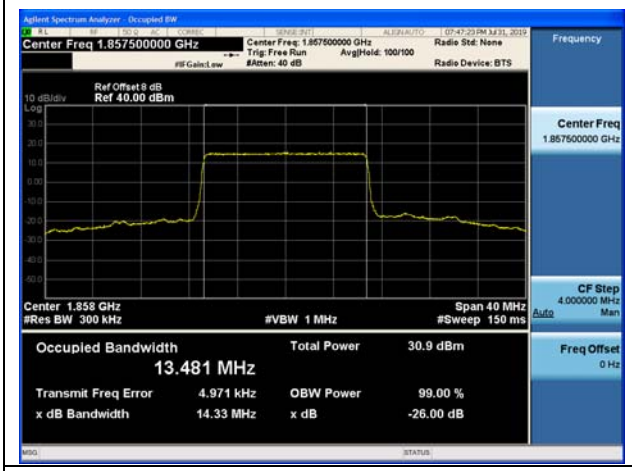
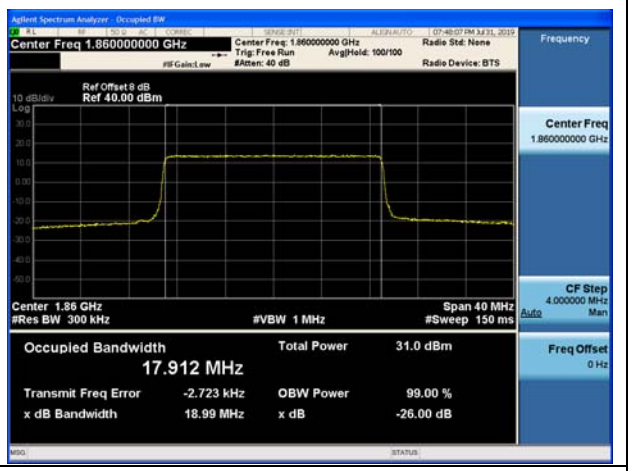
LTE Band 2 15MHz 64QAM CH-Low

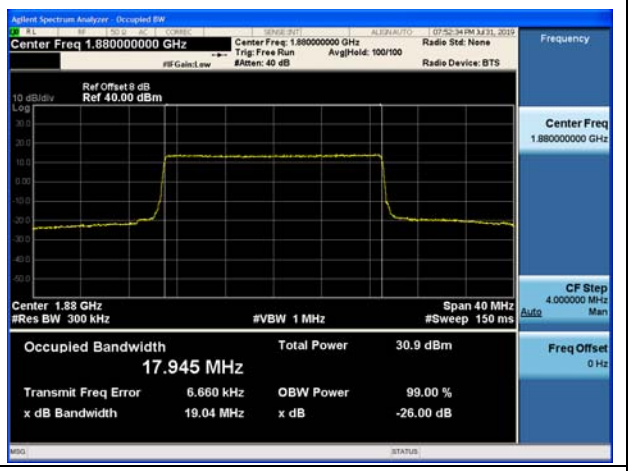


LTE Band 2 20MHz 64QAM CH-Low



LTE Band 2 15MHz 64QAM CH-Middle

LTE Band 2 20MHz 64QAM CH-Middle



LTE Band 2 15MHz 64QAM CH-High

LTE Band 2 20MHz 64QAM CH-High

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5.4. Band Edge Compliance

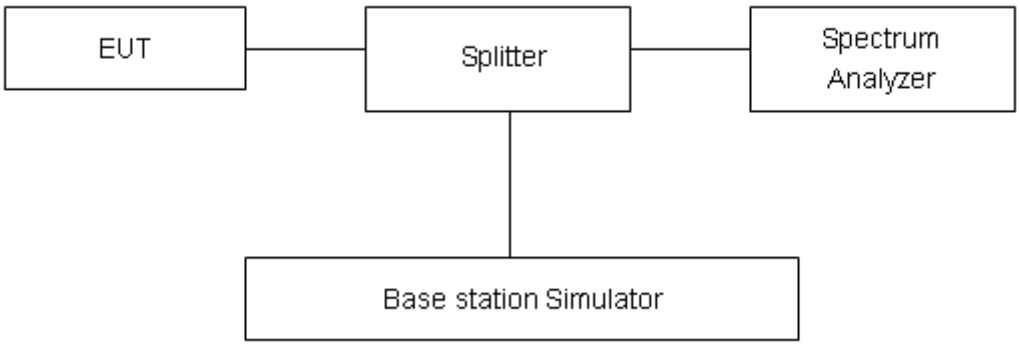
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and
RBW is set to 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 fo 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 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

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

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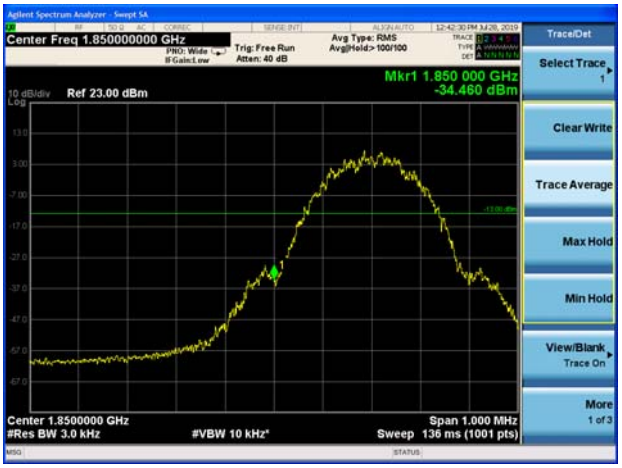
Test Result:

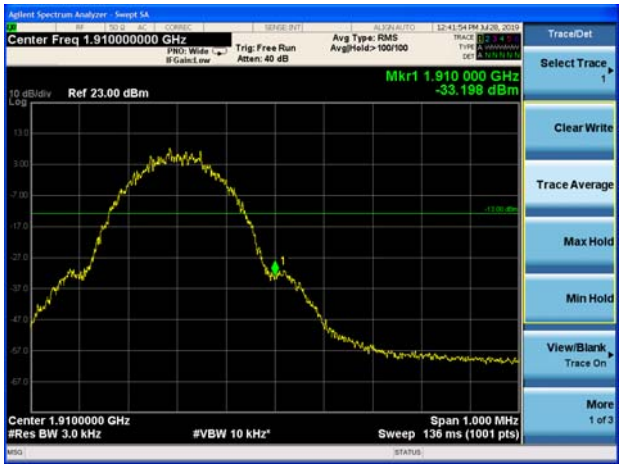
GSM1900 GSM CH-Low

GSM 1900 GSM CH-High

GSM1900 GPRS CH-Low

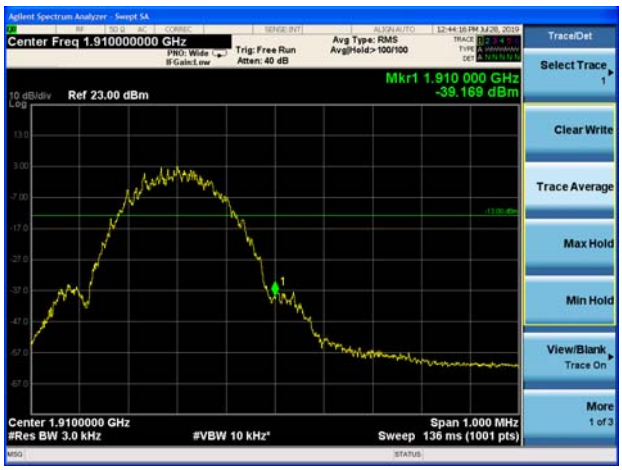


GSM 1900 GPRS CH-High



GSM1900 EGPRS CH-Low

GSM 1900 EGPRS CH-High



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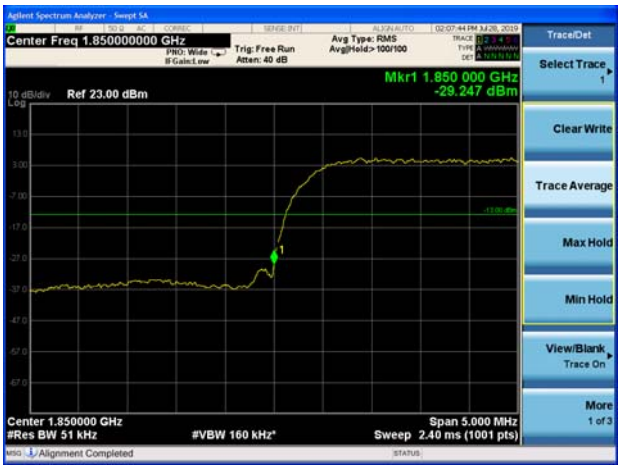
WCDMA Band II RMC CH-Low	WCDMA Band II RMC CH-High
	

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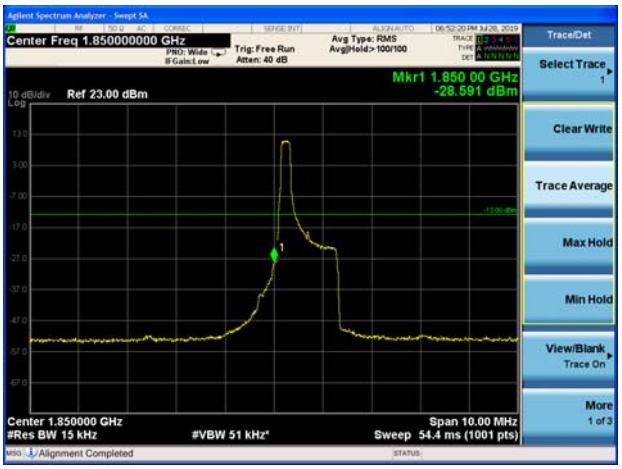
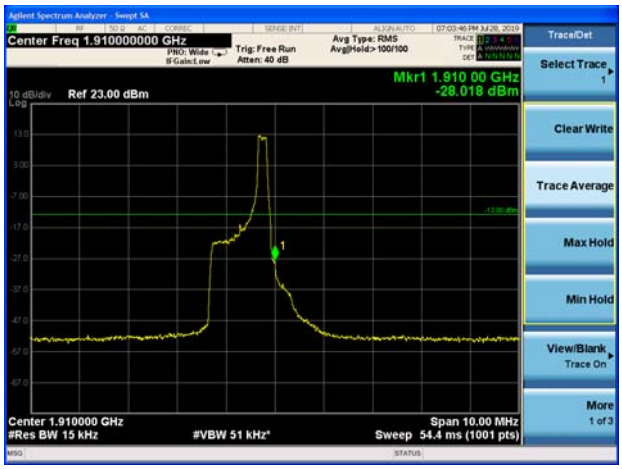
LTE Band 2 1.4MHz QPSK 1RB CH-Low



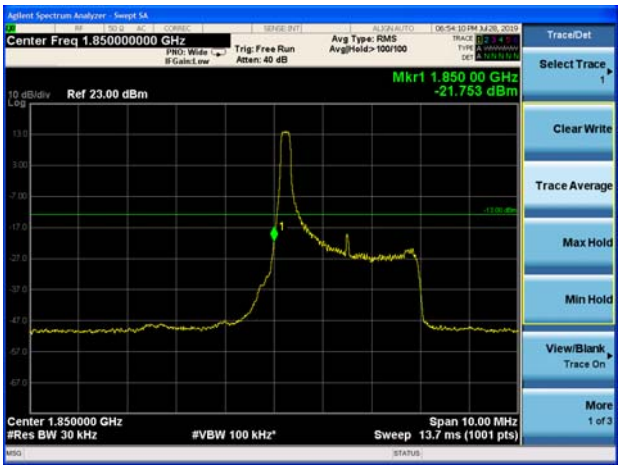
LTE Band 2 1.4MHz QPSK 1RB CH-High



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

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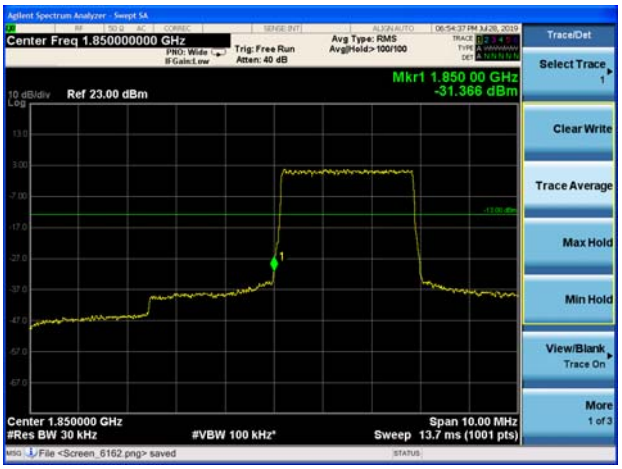
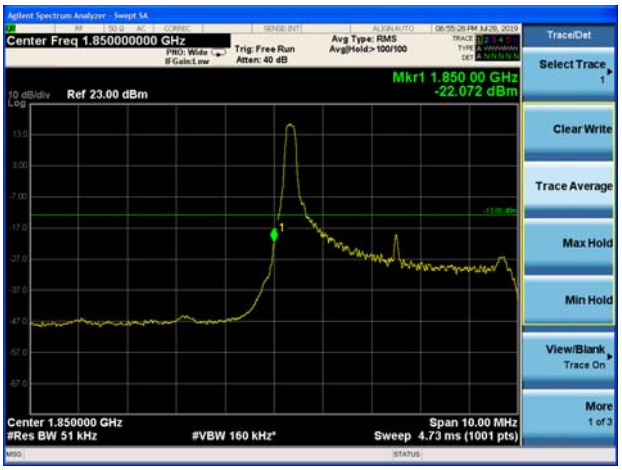
LTE Band 2 3MHz QPSK 100%RB CH-Low

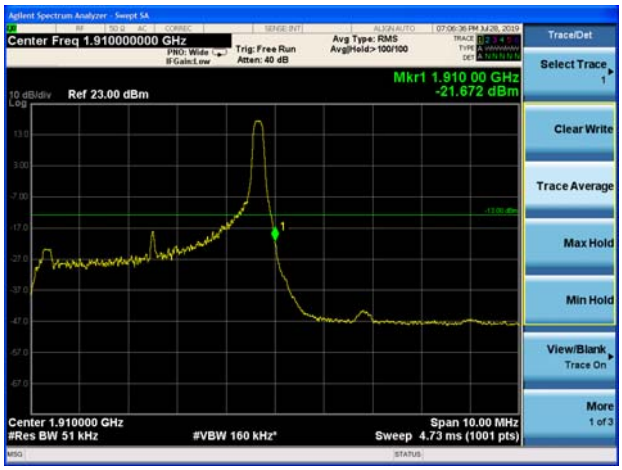


LTE Band 2 3MHz QPSK 100%RB CH-High

LTE Band 2 5MHz QPSK 1RB CH-Low

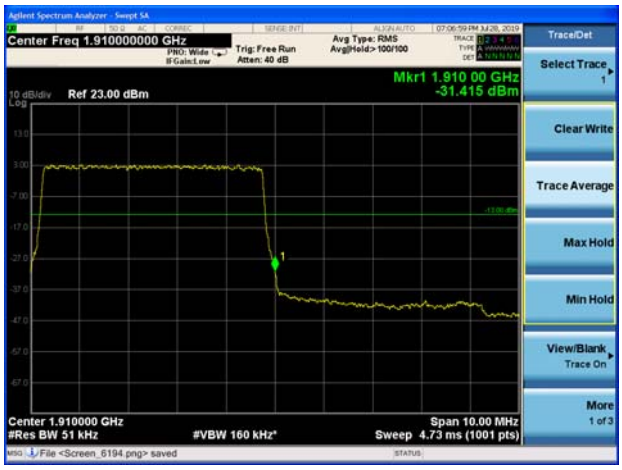


LTE Band 2 5MHz QPSK 1RB CH-High



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

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



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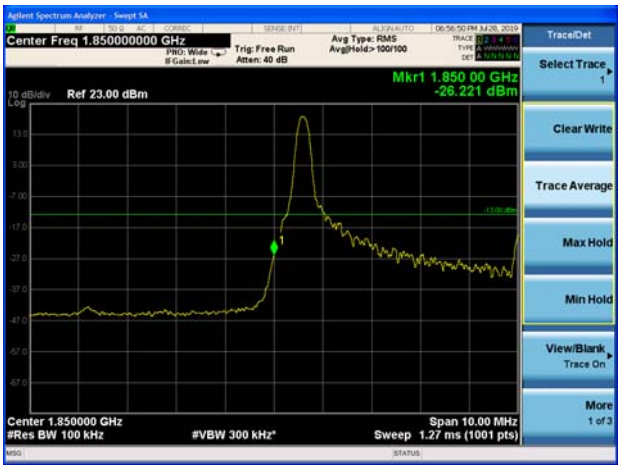
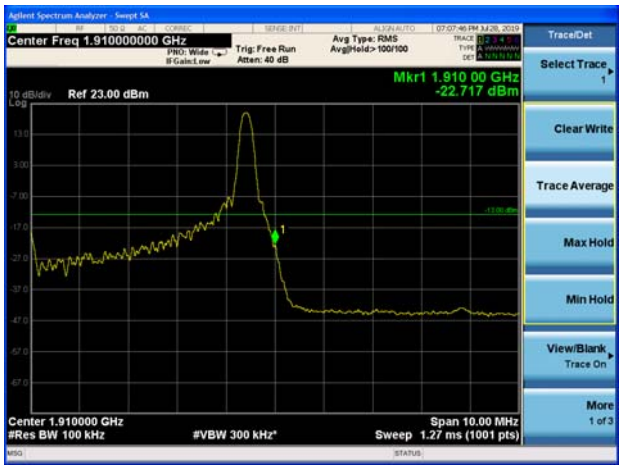
LTE Band 2 10MHz QPSK 1RB CH-Low



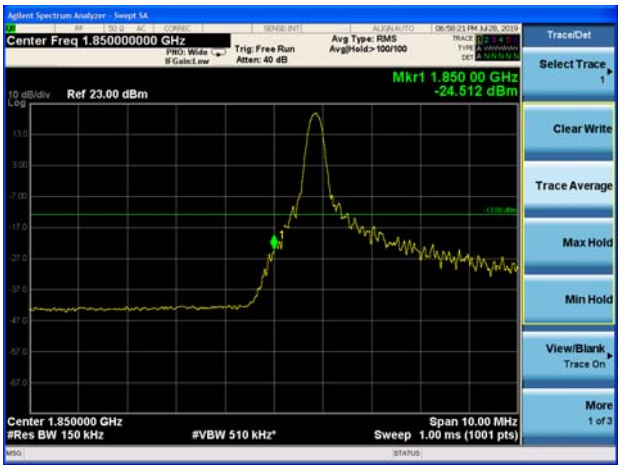
LTE Band 2 10MHz QPSK 1RB CH-High



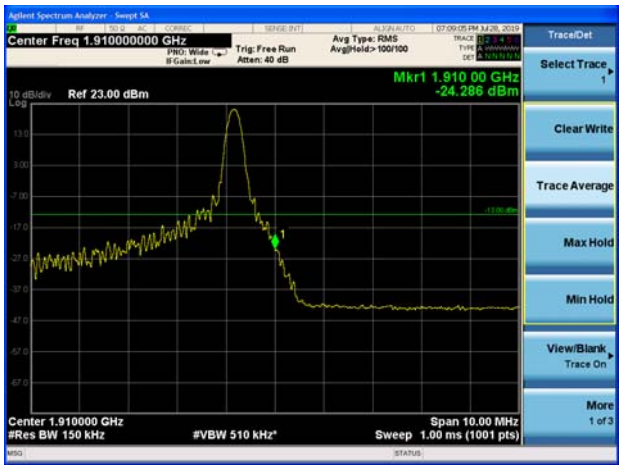
LTE Band 2 10MHz QPSK 100%RB CH-Low

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



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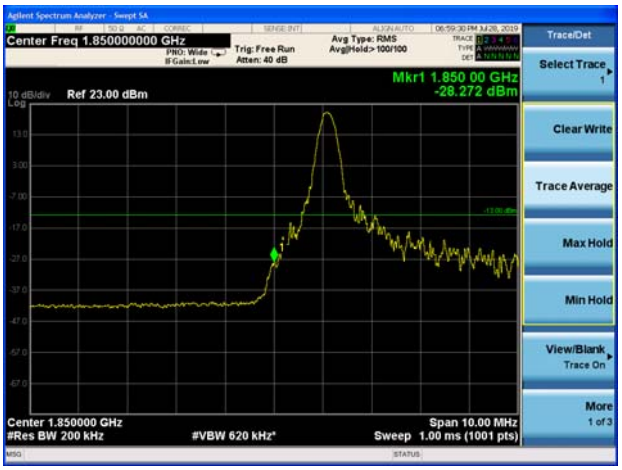
LTE Band 2 15MHz QPSK 100%RB CH-Low

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

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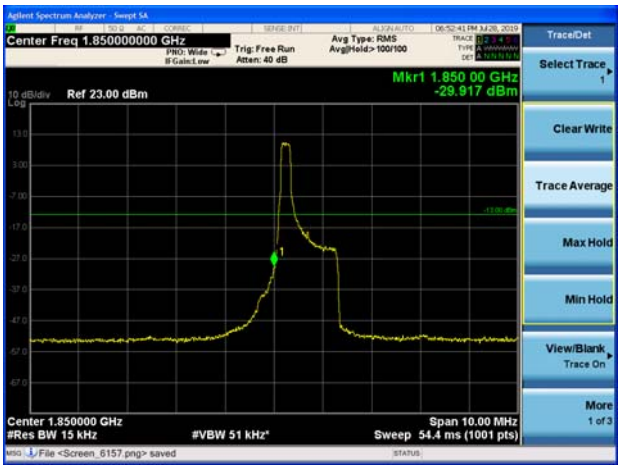
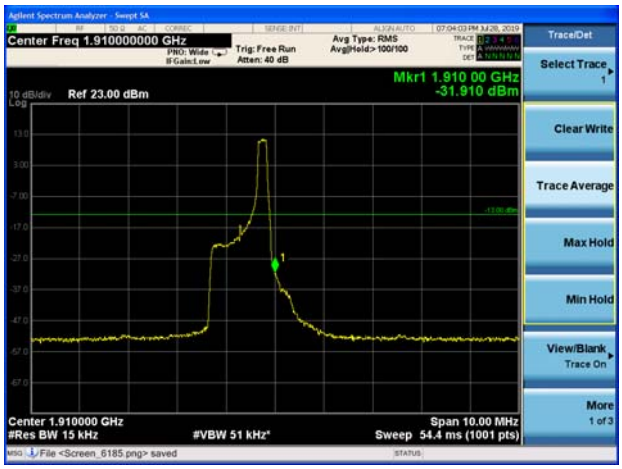
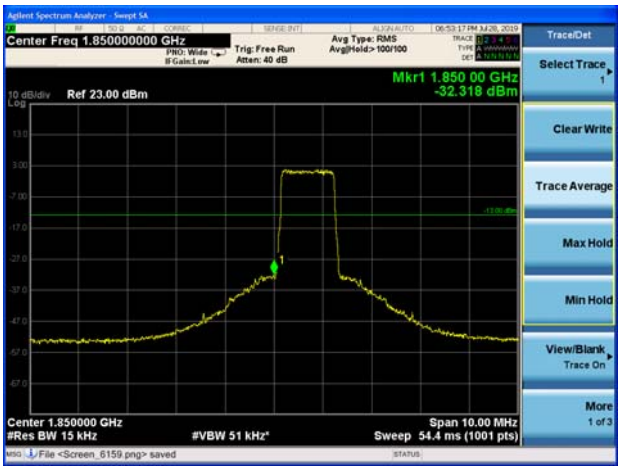
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



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

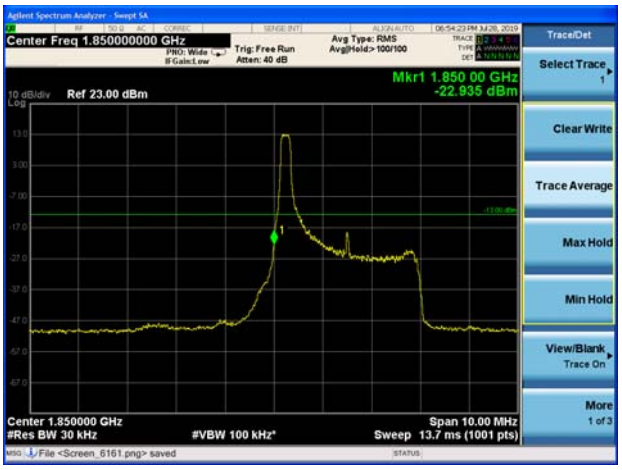


LTE Band 2 1.4MHz 16QAM 100%RB CH-Low

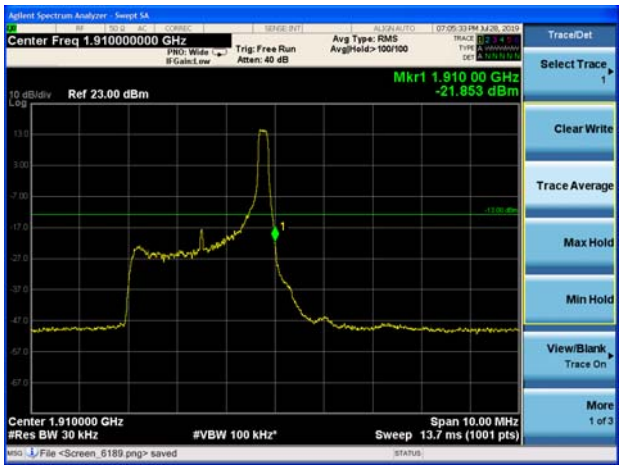


LTE Band 2 1.4MHz 16QAM 100%RB CH-High

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



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



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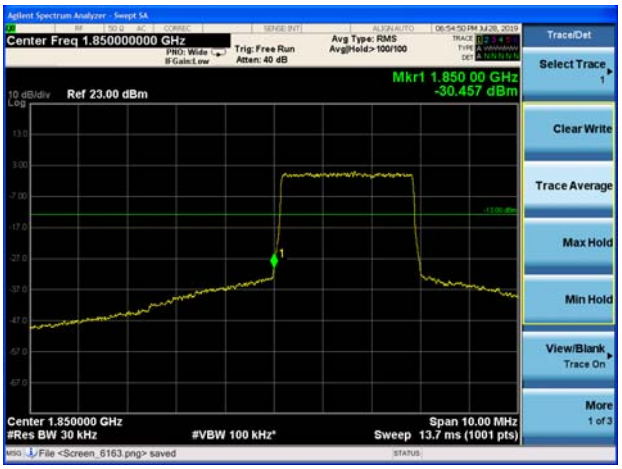
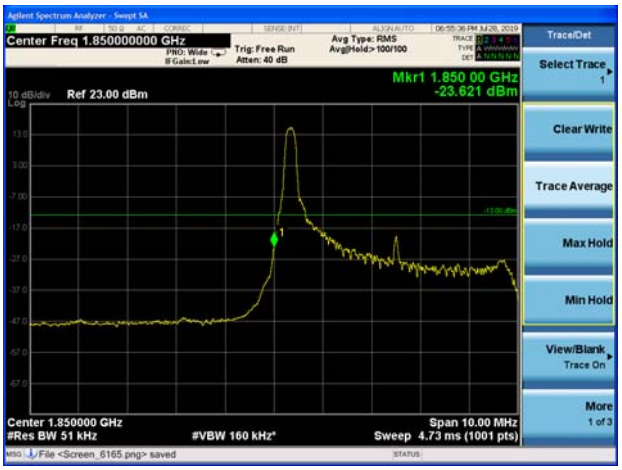
LTE Band 2 3MHz 16QAM 100%RB CH-Low

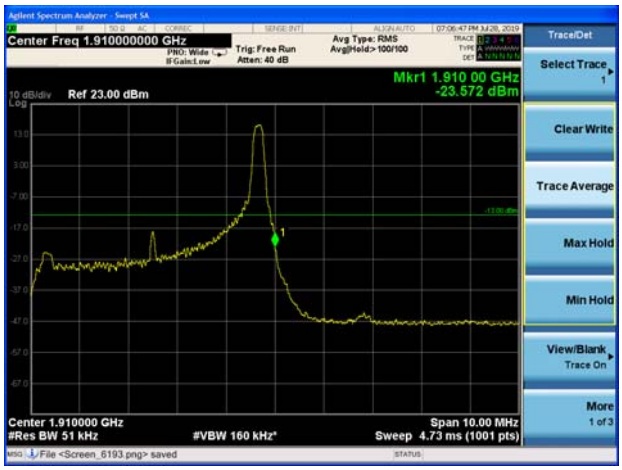


LTE Band 2 3MHz 16QAM 100%RB CH-High

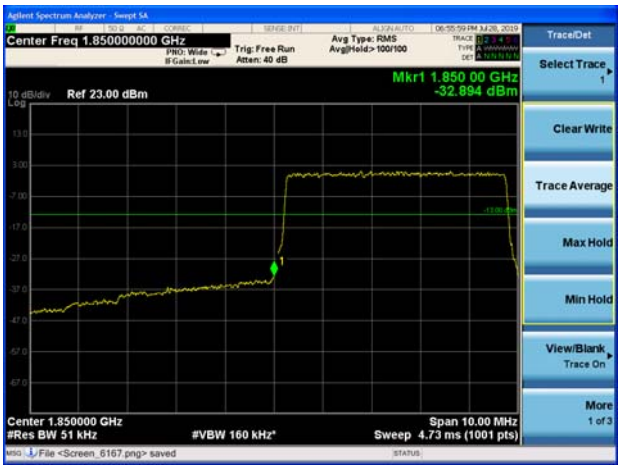
LTE Band 2 5MHz 16QAM 1RB CH-Low



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

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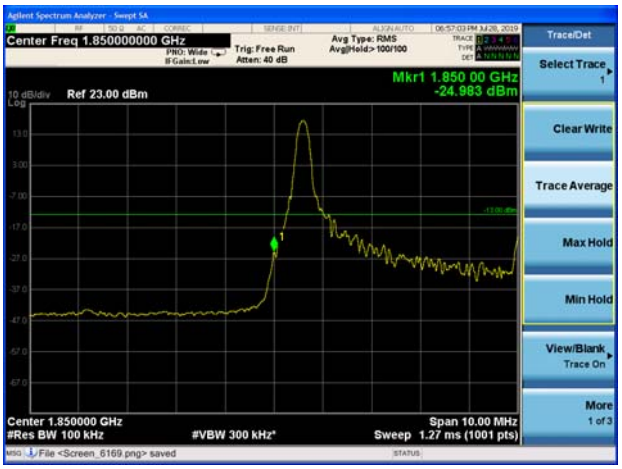
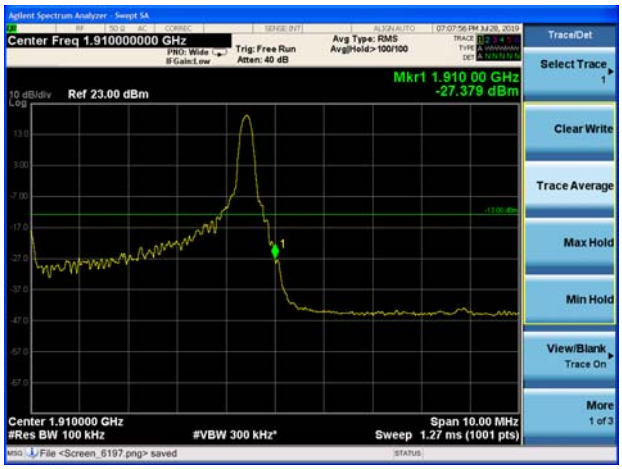
LTE Band 2 10MHz 16QAM 1RB CH-Low

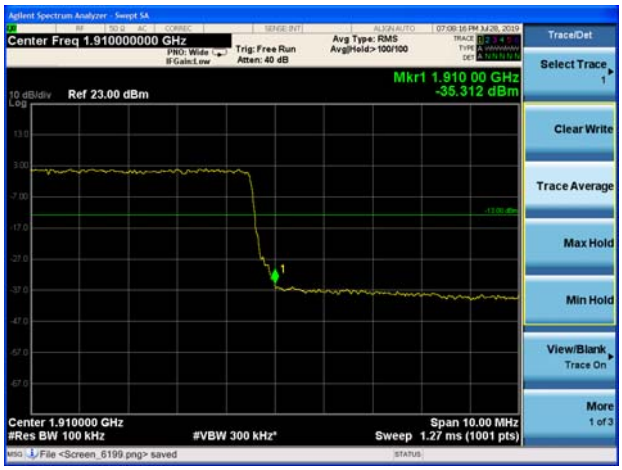


LTE Band 2 10MHz 16QAM 1RB CH-High



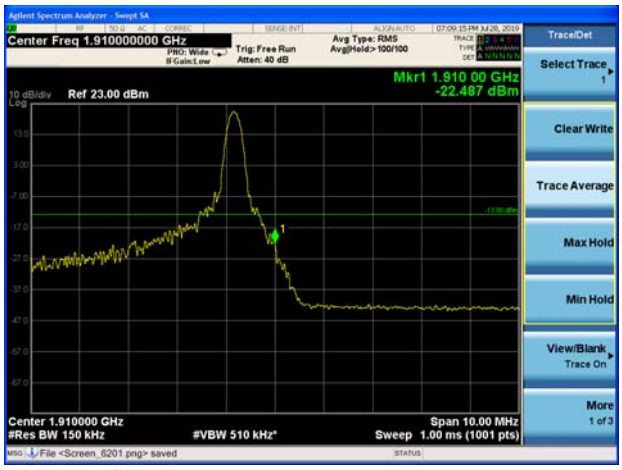
LTE Band 2 10MHz 16QAM 100%RB CH-Low

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



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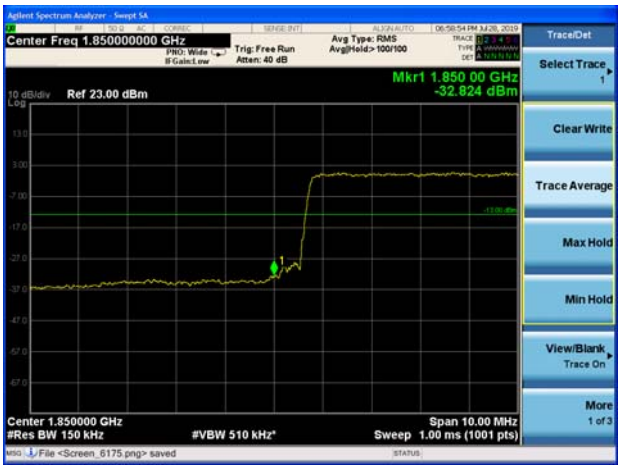
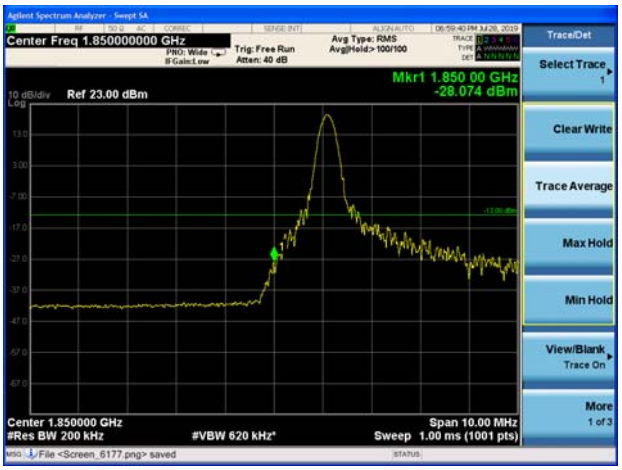
LTE Band 2 15MHz 16QAM 100%RB CH-Low



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

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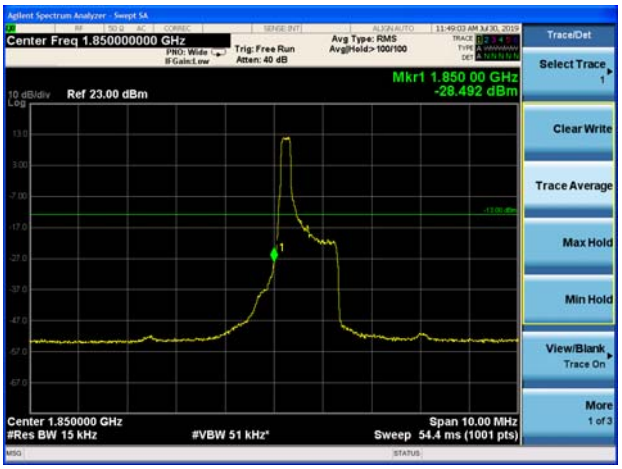
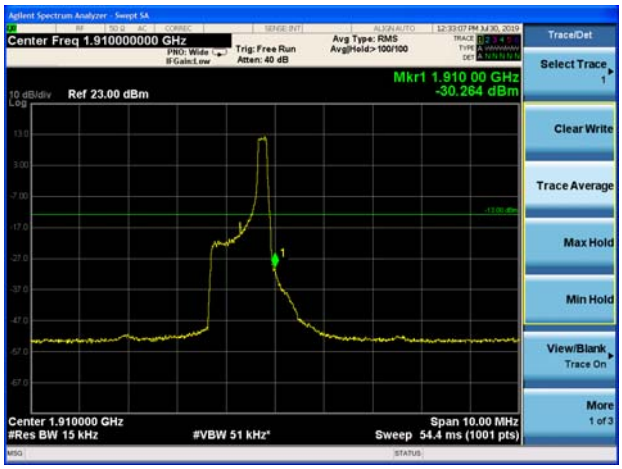
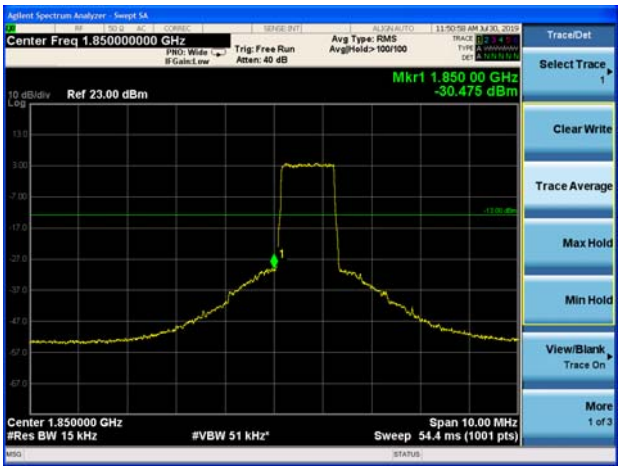
LTE Band 2 1.4MHz 64QAM 1RB CH-Low



LTE Band 2 1.4MHz 64QAM 1RB CH-High

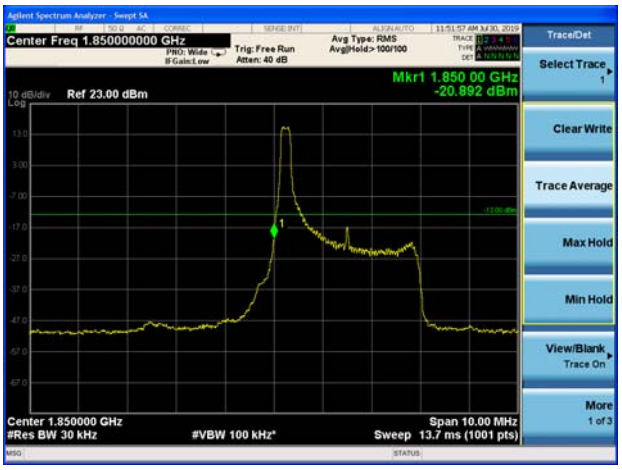


LTE Band 2 1.4MHz 64QAM 100%RB CH-Low

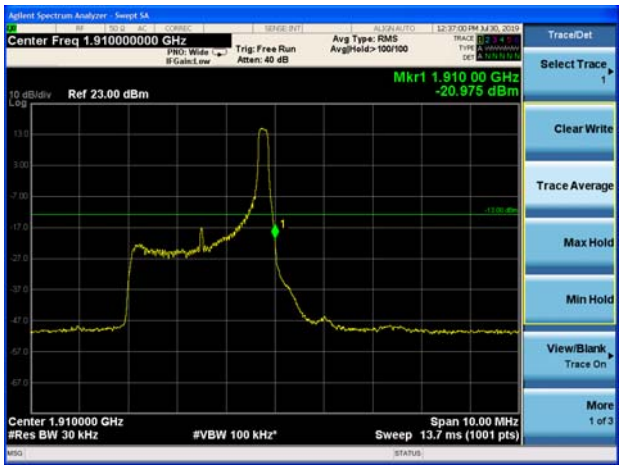


LTE Band 2 1.4MHz 64QAM 100%RB CH-High

LTE Band 2 3MHz 64QAM 1RB CH-Low



LTE Band 2 3MHz 64QAM 1RB CH-High



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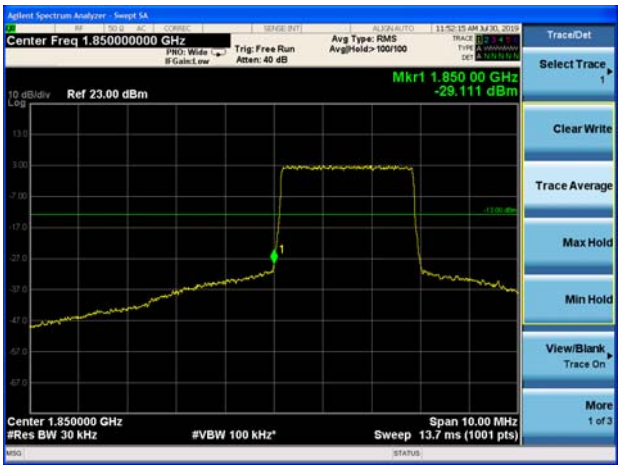
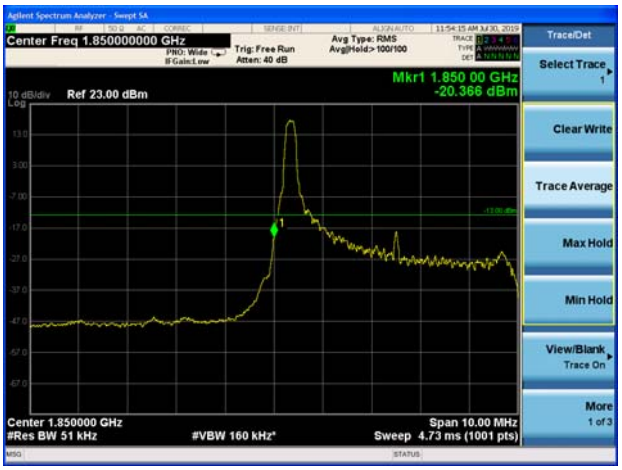
LTE Band 2 3MHz 64QAM 100%RB CH-Low

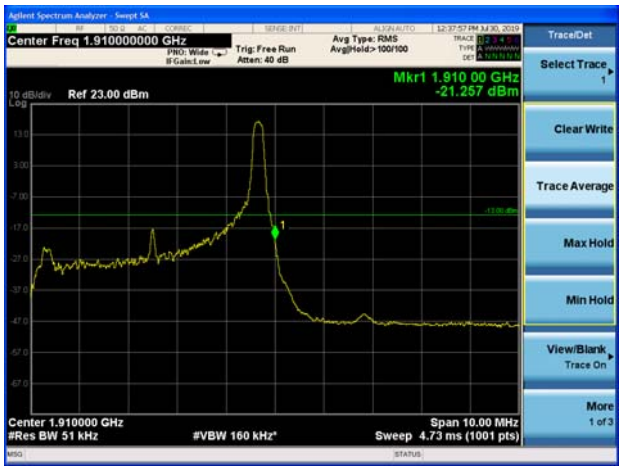


LTE Band 2 3MHz 64QAM 100%RB CH-High

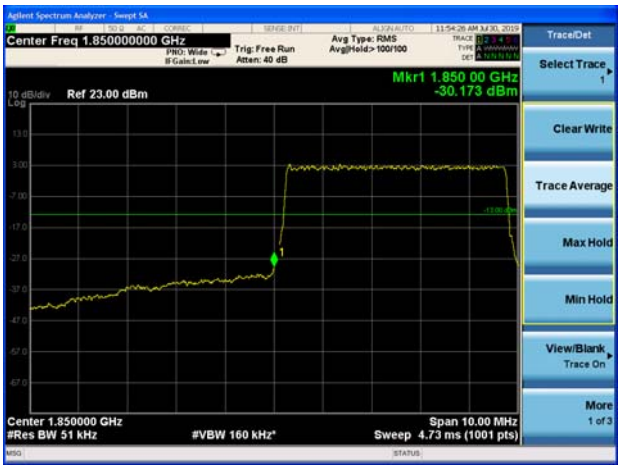
LTE Band 2 5MHz 64QAM 1RB CH-Low



LTE Band 2 5MHz 64QAM 1RB CH-High



LTE Band 2 5MHz 64QAM 100%RB CH-Low



LTE Band 2 5MHz 64QAM 100%RB CH-High

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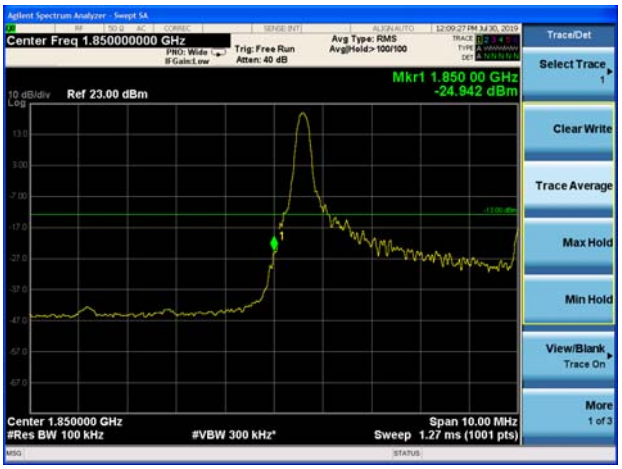
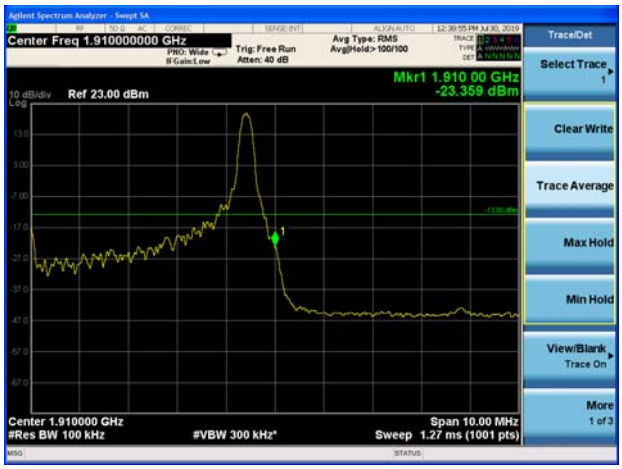
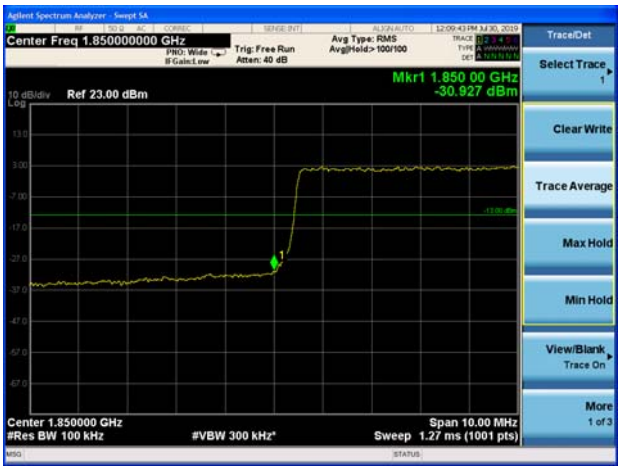
LTE Band 2 10MHz 64QAM 1RB CH-Low



LTE Band 2 10MHz 64QAM 1RB CH-High

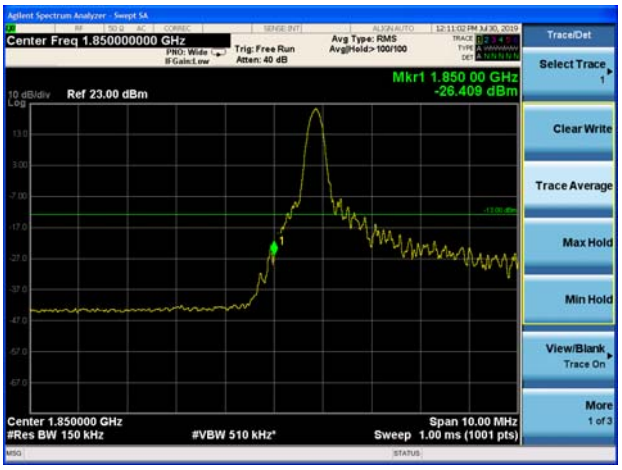


LTE Band 2 10MHz 64QAM 100%RB CH-Low

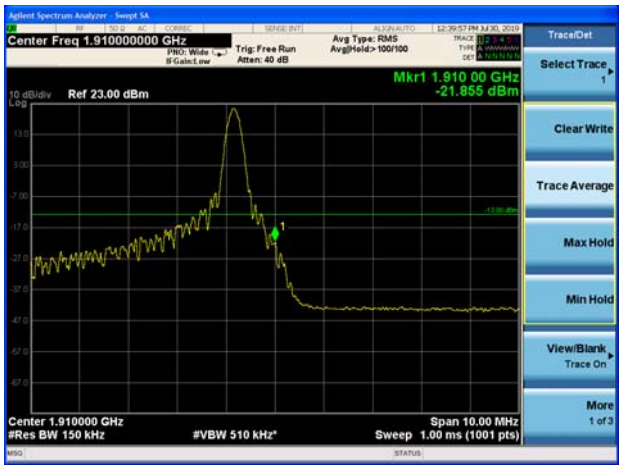


LTE Band 2 10MHz 64QAM 100%RB CH-High

LTE Band 2 15MHz 64QAM 1RB CH-Low



LTE Band 2 15MHz 64QAM 1RB CH-High



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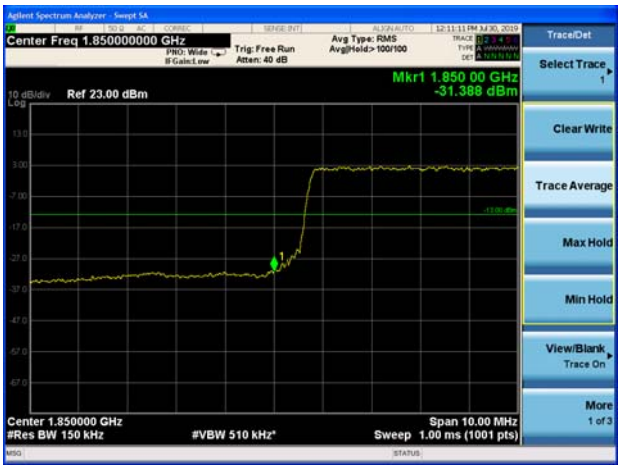
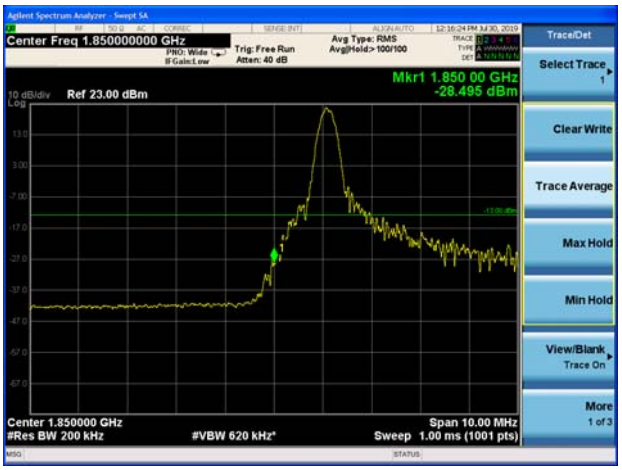
LTE Band 2 15MHz 64QAM 100%RB CH-Low



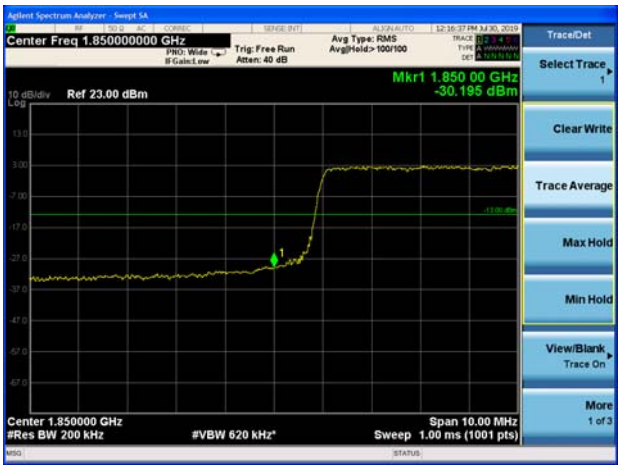
LTE Band 2 15MHz 64QAM 100%RB CH-High

LTE Band 2 20MHz 64QAM 1RB CH-Low



LTE Band 2 20MHz 64QAM 1RB CH-High

LTE Band 2 20MHz 64QAM 100%RB CH-Low



LTE Band 2 20MHz 64QAM 100%RB CH-High

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

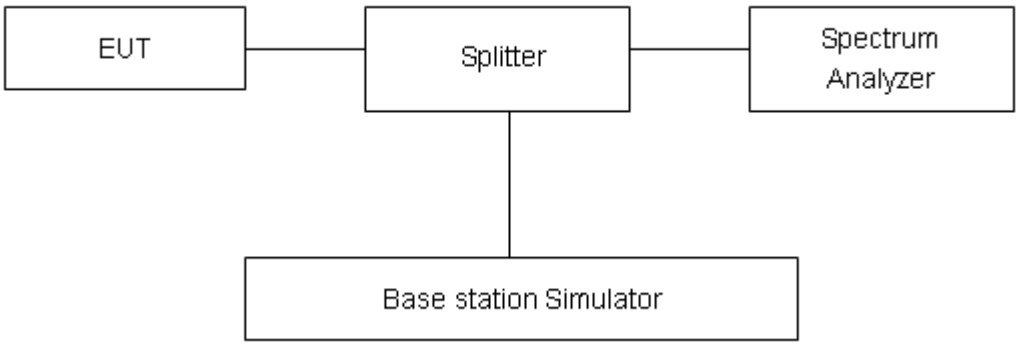
Ambient condition

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

Methods of Measurement

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

Test Setup



Limits

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

Measurement Uncertainty

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

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

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Test Results

Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
GSM 1900 (GSM)	512	1850.2	32.52	30.48	2.04	≤13	PASS
	661	1880	32.57	30.46	2.11	≤13	PASS
	810	1909.8	32.62	30.53	2.09	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	32.54	30.49	2.05	≤13	PASS
	661	1880	32.54	30.48	2.06	≤13	PASS
	810	1909.8	32.53	30.46	2.07	≤13	PASS
EGPRS 1900 (8-PSK)	512	1850.2	29.89	26.43	3.46	≤13	PASS
	661	1880	29.75	26.38	3.37	≤13	PASS
	810	1909.8	30.05	26.61	3.44	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	26.09	23.03	3.06	≤13	PASS
	9400	1880	26.25	23.02	3.23	≤13	PASS
	9538	1907.6	26.04	22.91	3.13	≤13	PASS

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LTE Band 2								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	18607	1850.7	29.44	23.63	5.81	≤13	PASS
		18900	1880.0	29.83	24.16	5.67	≤13	PASS
		19193	1909.3	30.08	24.71	5.37	≤13	PASS
	3	18615	1851.5	29.30	23.54	5.76	≤13	PASS
		18900	1880	29.84	24.22	5.62	≤13	PASS
		19185	1908.5	30.18	24.78	5.40	≤13	PASS
	5	18625	1852.5	29.29	23.53	5.76	≤13	PASS
		18900	1880	26.88	24.23	2.65	≤13	PASS
		19175	1907.5	30.27	24.86	5.41	≤13	PASS
	10	18650	1855	29.31	23.64	5.67	≤13	PASS
		18900	1880	29.84	24.20	5.64	≤13	PASS
		19150	1905	30.39	24.96	5.43	≤13	PASS
	15	18675	1857.5	28.81	23.34	5.47	≤13	PASS
		18900	1880	29.47	24.01	5.46	≤13	PASS
		19125	1902.5	29.89	24.51	5.38	≤13	PASS
	20	18700	1860	29.54	23.86	5.68	≤13	PASS
		18900	1880	30.00	24.28	5.72	≤13	PASS
		19100	1900	30.34	24.84	5.50	≤13	PASS
16QAM	1.4	18607	1850.7	29.04	22.42	6.62	≤13	PASS
		18900	1880.0	29.58	23.16	6.42	≤13	PASS
		19193	1909.3	29.77	23.63	6.14	≤13	PASS
	3	18615	1851.5	28.98	22.41	6.57	≤13	PASS
		18900	1880	29.45	23.09	6.36	≤13	PASS
		19185	1908.5	29.83	23.66	6.17	≤13	PASS
	5	18625	1852.5	28.98	22.39	6.59	≤13	PASS
		18900	1880	29.59	23.15	6.44	≤13	PASS
		19175	1907.5	29.92	23.74	6.18	≤13	PASS
	10	18650	1855	29.01	22.51	6.50	≤13	PASS
		18900	1880	29.56	23.16	6.40	≤13	PASS
		19150	1905	30.10	23.89	6.21	≤13	PASS
	15	18675	1857.5	28.49	22.16	6.33	≤13	PASS
		18900	1880	29.04	22.76	6.28	≤13	PASS
		19125	1902.5	29.67	23.47	6.20	≤13	PASS
	20	18700	1860	29.25	22.76	6.49	≤13	PASS
		18900	1880	29.66	23.17	6.49	≤13	PASS
		19100	1900	29.98	23.70	6.28	≤13	PASS
64QAM	1.4	18607	1850.7	29.61	23.06	6.55	≤13	PASS
		18900	1880.0	29.63	23.39	6.24	≤13	PASS
		19193	1909.3	29.41	23.27	6.14	≤13	PASS

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	3	18615	1851.5	29.64	23.11	6.53	≤13	PASS
		18900	1880	29.68	23.37	6.31	≤13	PASS
		19185	1908.5	29.35	23.25	6.10	≤13	PASS
	5	18625	1852.5	29.59	23.05	6.54	≤13	PASS
		18900	1880	29.68	23.30	6.38	≤13	PASS
		19175	1907.5	29.53	23.37	6.16	≤13	PASS
	10	18650	1855	29.55	23.09	6.46	≤13	PASS
		18900	1880	29.67	23.30	6.37	≤13	PASS
		19150	1905	29.71	23.54	6.17	≤13	PASS
	15	18675	1857.5	29.11	22.81	6.30	≤13	PASS
		18900	1880	29.09	22.86	6.23	≤13	PASS
		19125	1902.5	30.33	23.16	7.17	≤13	PASS
	20	18700	1860	29.72	23.26	6.46	≤13	PASS
		18900	1880	29.73	23.29	6.44	≤13	PASS
		19100	1900	29.77	23.54	6.23	≤13	PASS

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5.6. Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -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)

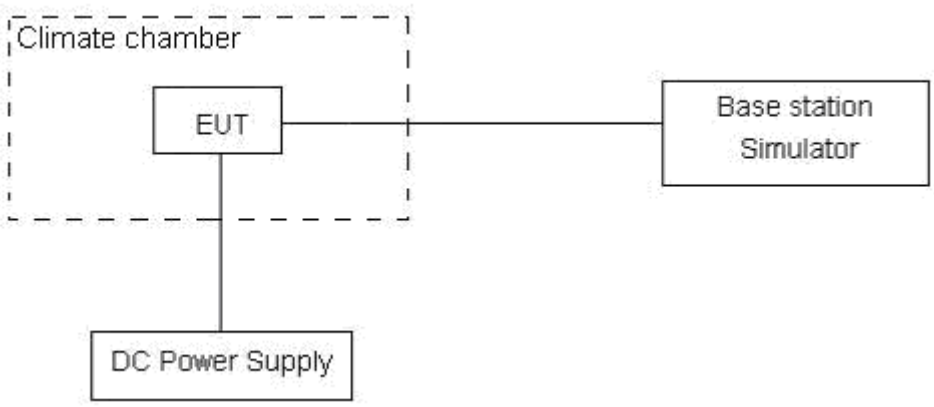
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 4.35 V, with a nominal voltage of 3.8V.

Test setup



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Limits

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

Measurement Uncertainty

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

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Test Result

GSM1900						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability（ppm）	Frequency Stability（ppm）	Verdict
Temperature	Voltage	GMSK	8PSK	GMSK	8PSK	
Normal（25℃）	Normal	3.33	5.55	0.00177	0.00295	PASS
Extreme（55℃）		9.54	9.30	0.00508	0.00495	PASS
Extreme（50℃）		5.24	8.26	0.00279	0.00440	PASS
Extreme（40℃）		16.34	14.30	0.00869	0.00761	PASS
Extreme（30℃）		10.35	17.82	0.00550	0.00948	PASS
Extreme（20℃）		13.74	17.02	0.00731	0.00905	PASS
Extreme（10℃）		2.70	15.21	0.00143	0.00809	PASS
Extreme（0℃）		7.58	2.00	0.00403	0.00106	PASS
Extreme（-10℃）		14.41	3.67	0.00767	0.00195	PASS
Extreme（-20℃）		15.32	16.69	0.00815	0.00888	PASS
Extreme（-30℃）		3.55	13.86	0.00189	0.00737	PASS
25℃	LV	3.98	15.43	0.00212	0.00821	PASS
	HV	14.39	9.73	0.00765	0.00517	PASS

WCDMA Band II						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability（ppm）	Frequency Stability（ppm）	Verdict
Temperature	Voltage	QPSK	BPSK	QPSK	BPSK	
Normal（25℃）	Normal	12.60	10.27	0.00670	0.00546	PASS
Extreme（55℃）		15.06	17.66	0.00801	0.00940	PASS
Extreme（50℃）		13.13	2.48	0.00698	0.00132	PASS
Extreme（40℃）		14.05	12.80	0.00747	0.00681	PASS
Extreme（30℃）		16.36	14.91	0.00870	0.00793	PASS
Extreme（20℃）		17.76	12.46	0.00944	0.00663	PASS
Extreme（10℃）		12.25	10.82	0.00651	0.00576	PASS
Extreme（0℃）		16.25	12.77	0.00864	0.00679	PASS
Extreme（-10℃）		6.81	14.77	0.00362	0.00785	PASS
Extreme（-20℃）		1.15	17.85	0.00061	0.00950	PASS
Extreme（-30℃）		13.04	14.66	0.00694	0.00780	PASS
25℃	LV	8.92	17.28	0.00475	0.00919	PASS
	HV	5.45	14.30	0.00290	0.00760	PASS

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LTE Band 2(BANDWIDTH, 1.4MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	2.49	12.51	8.35	0.00133	0.00665	0.00444	PASS
Extreme（55℃）		14.30	7.09	13.42	0.00760	0.00377	0.00714	PASS
Extreme（50℃）		9.01	6.72	3.46	0.00479	0.00358	0.00184	PASS
Extreme（40℃）		10.67	7.42	14.24	0.00567	0.00395	0.00757	PASS
Extreme（30℃）		17.42	2.34	16.26	0.00927	0.00125	0.00865	PASS
Extreme（20℃）		11.58	7.69	5.62	0.00616	0.00409	0.00299	PASS
Extreme（10℃）		1.58	13.69	17.96	0.00084	0.00728	0.00956	PASS
Extreme（0℃）		6.69	9.14	14.73	0.00356	0.00486	0.00784	PASS
Extreme（-10℃）		10.49	13.22	12.53	0.00558	0.00703	0.00667	PASS
Extreme（-20℃）		13.01	17.98	13.00	0.00692	0.00956	0.00691	PASS
Extreme（-30℃）		7.90	1.68	14.98	0.00420	0.00089	0.00797	PASS
25℃	LV	2.24	3.79	9.82	0.00119	0.00202	0.00522	PASS
	HV	9.61	10.90	6.36	0.00511	0.00580	0.00338	PASS

LTE Band 2(BANDWIDTH, 3MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	4.88	12.72	3.09	0.00259	0.00677	0.00165	PASS
Extreme（55℃）		3.09	14.44	1.50	0.00164	0.00768	0.00080	PASS
Extreme（50℃）		1.29	7.87	11.48	0.00068	0.00418	0.00611	PASS
Extreme（40℃）		8.81	13.08	3.16	0.00469	0.00696	0.00168	PASS
Extreme（30℃）		10.64	14.74	8.98	0.00566	0.00784	0.00478	PASS
Extreme（20℃）		14.75	12.63	17.53	0.00784	0.00672	0.00932	PASS
Extreme（10℃）		15.86	15.96	1.63	0.00844	0.00849	0.00086	PASS
Extreme（0℃）		12.75	15.50	7.65	0.00678	0.00824	0.00407	PASS
Extreme（-10℃）		13.10	12.64	17.00	0.00697	0.00672	0.00904	PASS
Extreme（-20℃）		5.58	10.45	1.08	0.00297	0.00556	0.00057	PASS
Extreme（-30℃）		9.72	7.45	10.95	0.00517	0.00396	0.00583	PASS
25℃	LV	11.19	6.10	11.67	0.00595	0.00324	0.00621	PASS
	HV	17.61	9.92	1.24	0.00937	0.00528	0.00066	PASS

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LTE Band 2(BANDWIDTH, 5MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability（ppm）	Frequency Stability（ppm）	Frequency Stability（ppm）	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	17.21	9.57	8.77	0.00916	0.00509	0.00467	PASS
Extreme（55℃）		5.43	5.78	4.34	0.00289	0.00308	0.00231	PASS
Extreme（50℃）		3.62	2.02	3.95	0.00192	0.00108	0.00210	PASS
Extreme（40℃）		4.85	8.34	13.20	0.00258	0.00444	0.00702	PASS
Extreme（30℃）		1.11	7.05	9.97	0.00059	0.00375	0.00530	PASS
Extreme（20℃）		3.82	8.05	10.01	0.00203	0.00428	0.00532	PASS
Extreme（10℃）		3.04	12.18	2.64	0.00162	0.00648	0.00141	PASS
Extreme（0℃）		1.65	9.50	2.22	0.00088	0.00505	0.00118	PASS
Extreme（-10℃）		8.64	7.37	12.44	0.00460	0.00392	0.00661	PASS
Extreme（-20℃）		14.22	5.43	1.71	0.00756	0.00289	0.00091	PASS
Extreme（-30℃）		12.85	3.36	10.74	0.00684	0.00179	0.00571	PASS
25℃	LV	9.75	9.88	3.35	0.00519	0.00525	0.00178	PASS
	HV	13.16	13.54	2.73	0.00700	0.00720	0.00145	PASS

LTE Band 2(BANDWIDTH, 10MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability（ppm）	Frequency Stability（ppm）	Frequency Stability（ppm）	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	2.21	9.64	9.01	0.00117	0.00513	0.00479	PASS
Extreme（55℃）		17.53	12.91	3.14	0.00932	0.00687	0.00167	PASS
Extreme（50℃）		4.86	5.96	11.28	0.00259	0.00317	0.00600	PASS
Extreme（40℃）		6.69	10.51	2.98	0.00356	0.00559	0.00159	PASS
Extreme（30℃）		4.82	10.87	11.87	0.00256	0.00578	0.00631	PASS
Extreme（20℃）		6.23	13.83	5.10	0.00332	0.00736	0.00271	PASS
Extreme（10℃）		15.87	13.65	8.74	0.00844	0.00726	0.00465	PASS
Extreme（0℃）		13.17	14.46	10.31	0.00701	0.00769	0.00548	PASS
Extreme（-10℃）		4.73	8.58	17.39	0.00252	0.00456	0.00925	PASS
Extreme（-20℃）		5.94	2.45	4.17	0.00316	0.00130	0.00222	PASS
Extreme（-30℃）		16.74	13.01	17.52	0.00890	0.00692	0.00932	PASS
25℃	LV	13.99	9.57	11.52	0.00744	0.00509	0.00613	PASS
	HV	10.86	5.87	1.33	0.00578	0.00312	0.00071	PASS

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LTE Band 2(BANDWIDTH, 15MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	14.58	16.15	3.77	0.00775	0.00859	0.00200	PASS
Extreme（55℃）		10.99	13.79	16.75	0.00584	0.00734	0.00891	PASS
Extreme（50℃）		5.36	2.81	6.22	0.00285	0.00150	0.00331	PASS
Extreme（40℃）		3.79	8.09	1.06	0.00201	0.00430	0.00057	PASS
Extreme（30℃）		6.20	9.87	12.02	0.00330	0.00525	0.00639	PASS
Extreme（20℃）		10.44	1.52	7.44	0.00555	0.00081	0.00396	PASS
Extreme（10℃）		8.68	7.31	8.06	0.00462	0.00389	0.00428	PASS
Extreme（0℃）		11.05	13.61	14.64	0.00588	0.00724	0.00779	PASS
Extreme（-10℃）		13.29	5.34	15.46	0.00707	0.00284	0.00822	PASS
Extreme（-20℃）		17.24	2.25	14.00	0.00917	0.00120	0.00744	PASS
Extreme（-30℃）		5.94	7.30	13.27	0.00316	0.00388	0.00706	PASS
25℃	LV	7.51	13.21	6.63	0.00400	0.00703	0.00353	PASS
	HV	15.06	7.28	8.86	0.00801	0.00387	0.00471	PASS

LTE Band 2(BANDWIDTH, 20MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	15.55	16.31	14.42	0.00827	0.00868	0.00767	PASS
Extreme（55℃）		12.27	3.97	4.18	0.00653	0.00211	0.00223	PASS
Extreme（50℃）		2.62	12.36	17.19	0.00139	0.00657	0.00915	PASS
Extreme（40℃）		4.55	16.27	3.45	0.00242	0.00865	0.00183	PASS
Extreme（30℃）		5.12	10.22	14.83	0.00272	0.00543	0.00789	PASS
Extreme（20℃）		6.51	17.96	12.90	0.00346	0.00955	0.00686	PASS
Extreme（10℃）		9.39	10.68	12.83	0.00500	0.00568	0.00682	PASS
Extreme（0℃）		11.54	14.26	14.10	0.00614	0.00758	0.00750	PASS
Extreme（-10℃）		2.16	2.14	1.01	0.00115	0.00114	0.00054	PASS
Extreme（-20℃）		11.78	7.55	5.03	0.00627	0.00401	0.00268	PASS
Extreme（-30℃）		2.12	3.24	17.38	0.00113	0.00173	0.00925	PASS
25℃	LV	3.52	5.19	2.35	0.00187	0.00276	0.00125	PASS
	HV	15.72	8.86	7.61	0.00836	0.00471	0.00405	PASS

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5.7. Spurious Emissions at Antenna Terminals

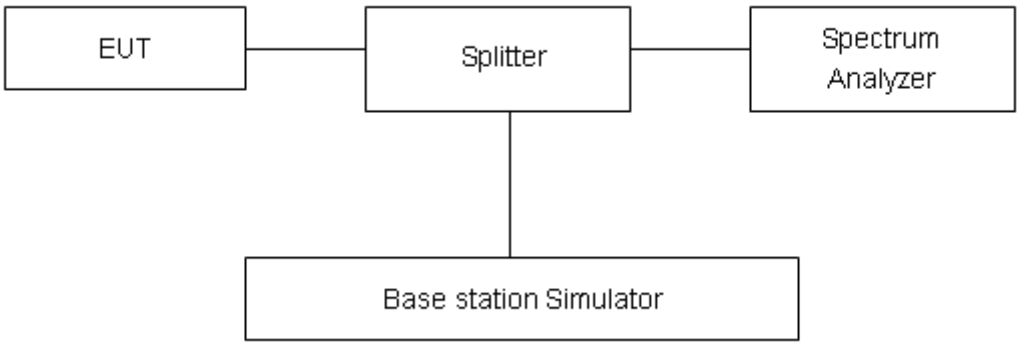
Ambient condition

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

Method of Measurement

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

Test setup



Limits

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

Limit	-13 dBm

Measurement Uncertainty

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

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

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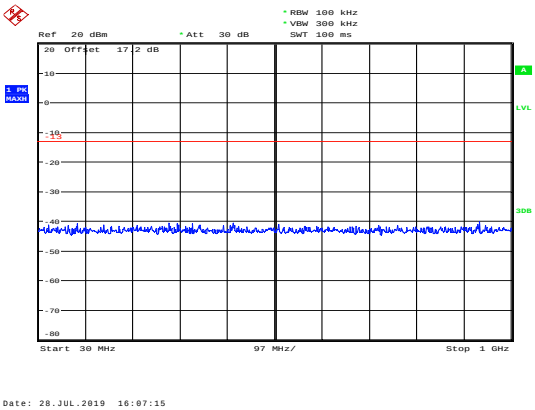
Test Result

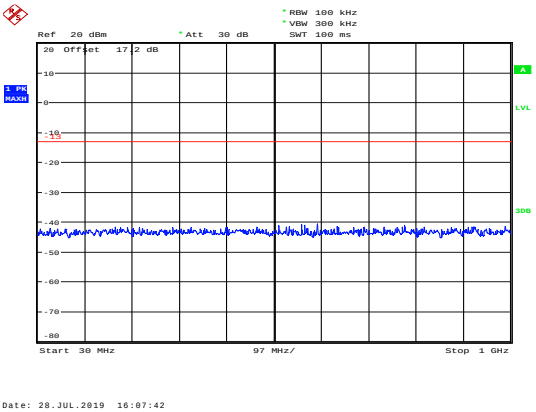
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

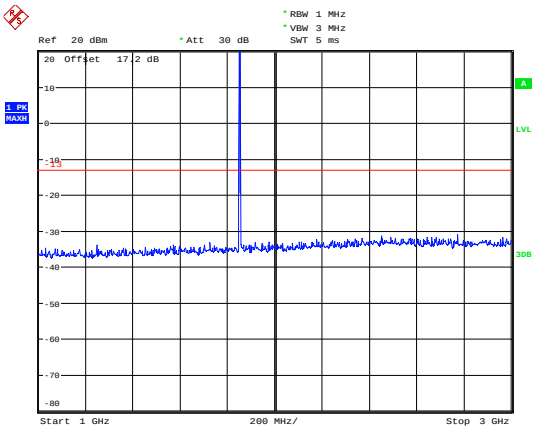
GSM 1900 CH-Low 30MHz~1GHz



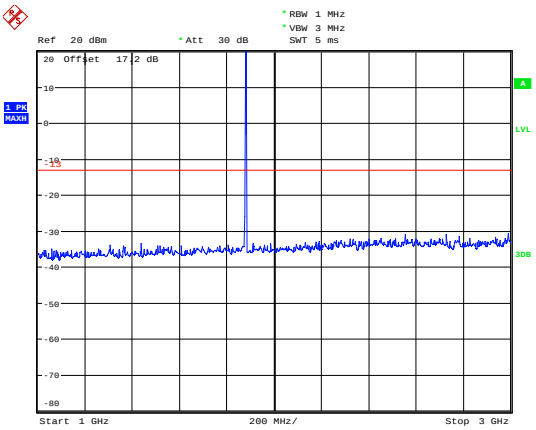
GSM 1900 CH-Middle 30MHz~1GHz



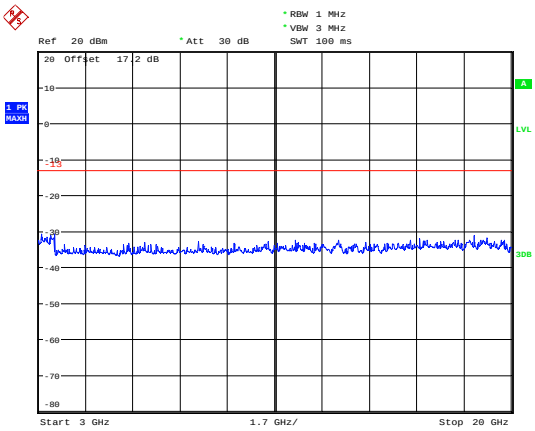
GSM 1900 CH-Low 1GHz~3GHz



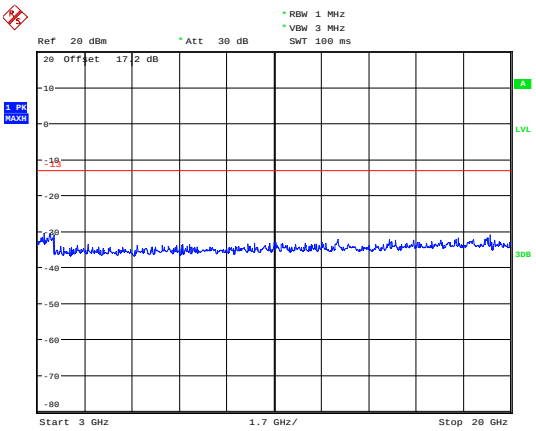
GSM 1900 CH-Middle 1GHz~3GHz



GSM 1900 CH-Low 3GHz~20GHz



GSM 1900 CH-Middle 3GHz~20GHz



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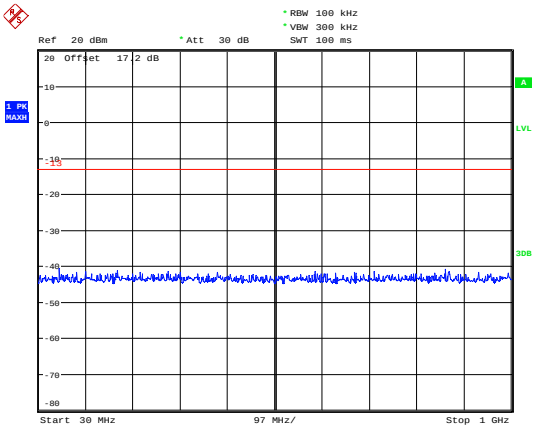
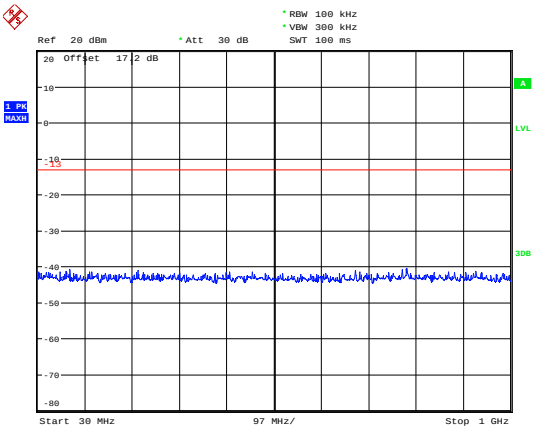
GSM 1900 CH-High 30MHz~1GHz



Date: 28.JUL.2019 16:07:54

WCDMA Band II CH-Low 30MHz~1GHz



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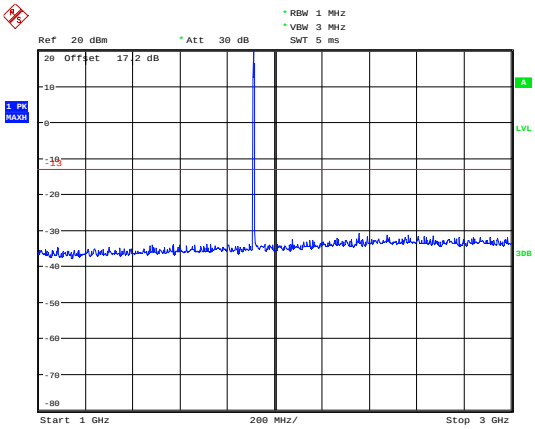
GSM 1900 CH-High 1GHz~3GHz



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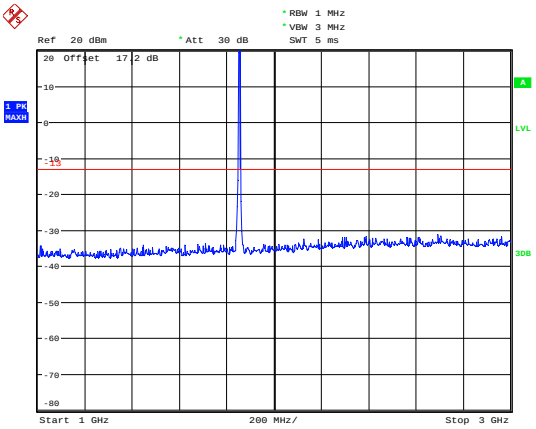
WCDMA BAND II CH-Low 1GHz~3GHz



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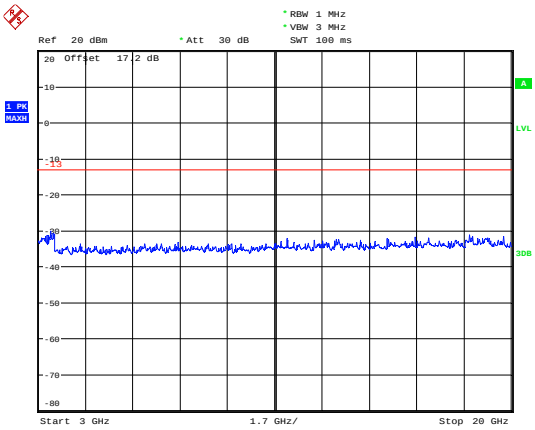
GSM 1900 CH-High 3GHz~20GHz



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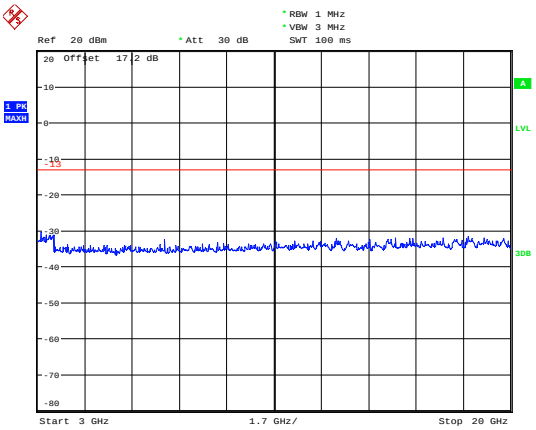
WCDMA BAND II CH-Low 3GHz~20GHz



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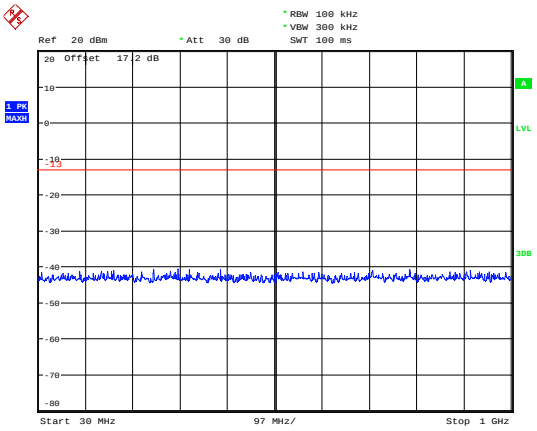
WCDMA Band II CH- Middle 30MHz~1GHz



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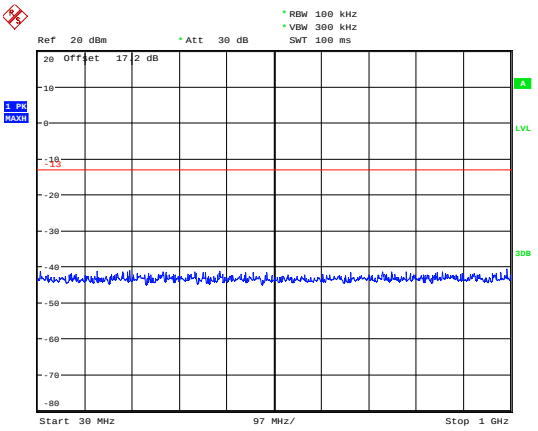
WCDMA Band II CH- High 30MHz~1GHz



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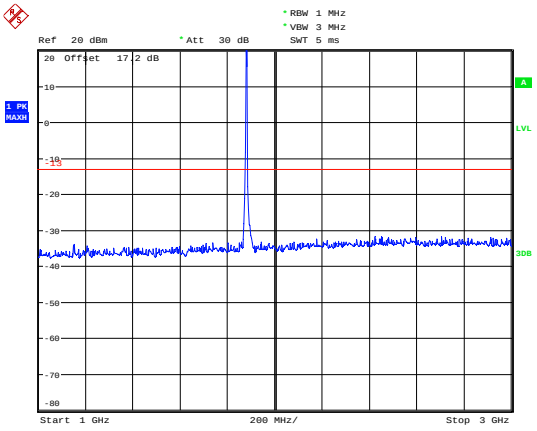
WCDMA BAND II CH-Middle 1GHz~3GHz



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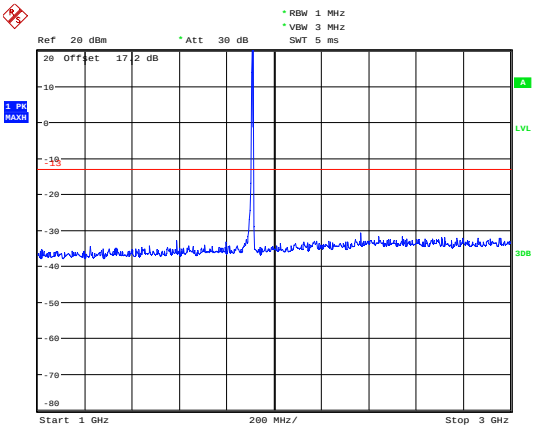
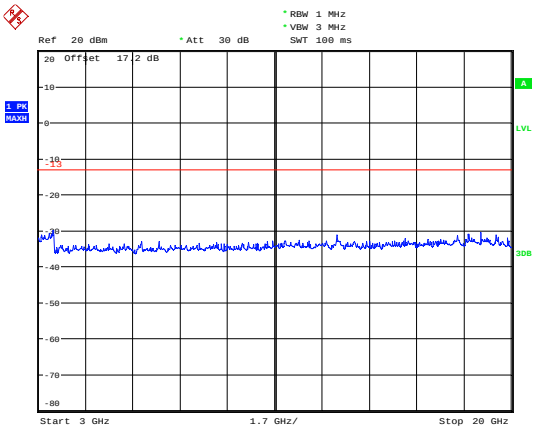
WCDMA BAND II CH-High 1GHz~3GHz



Date: 28.JUL.2019 15:37:37

WCDMA BAND II CH-Middle 3GHz~20GHz



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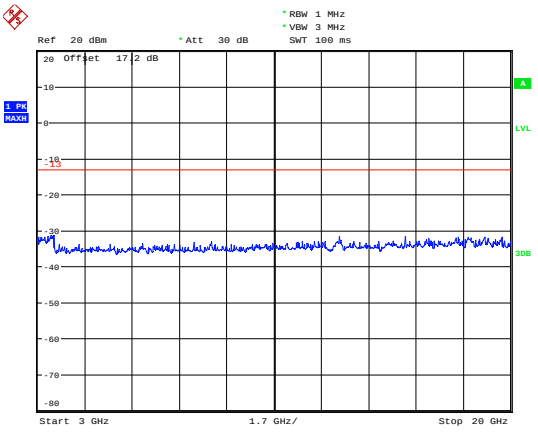
WCDMA BAND II CH-High 3GHz~20GHz



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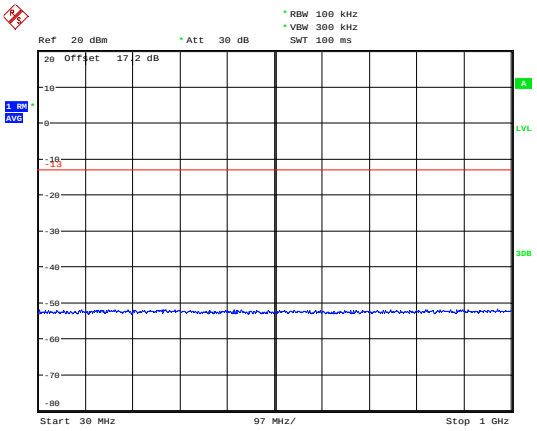
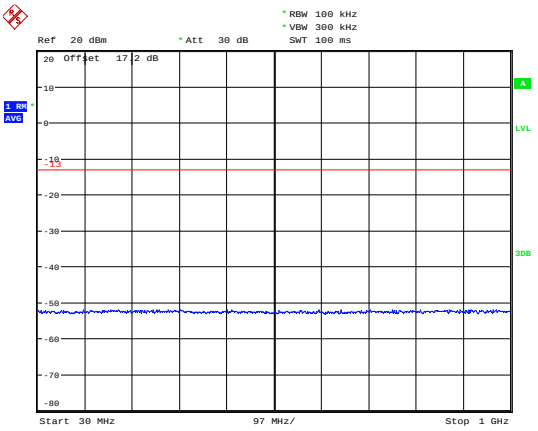
LTE Band 2 1.4MHz CH-Low 30MHz~1GHz



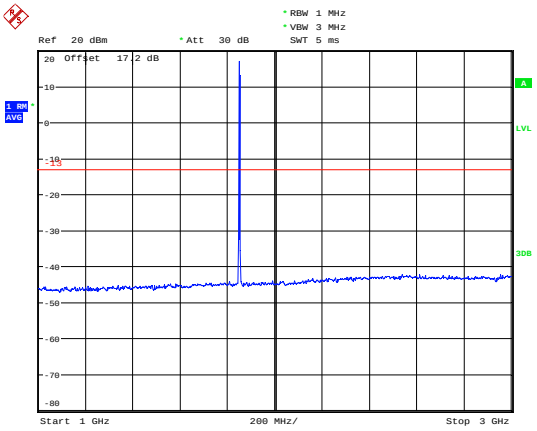
Date: 2.AUG.2019 11:19:56

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



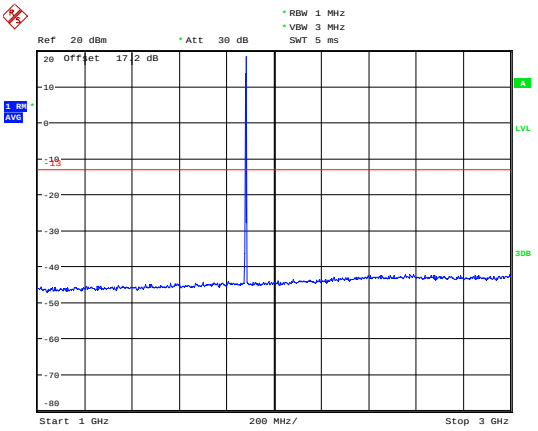
Date: 2.AUG.2019 11:20:25

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



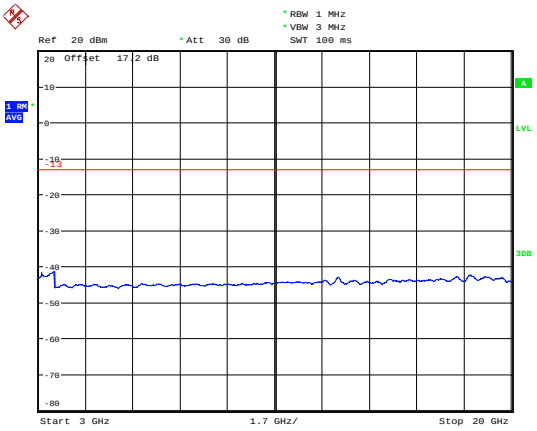
Date: 2.AUG.2019 11:28:21

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



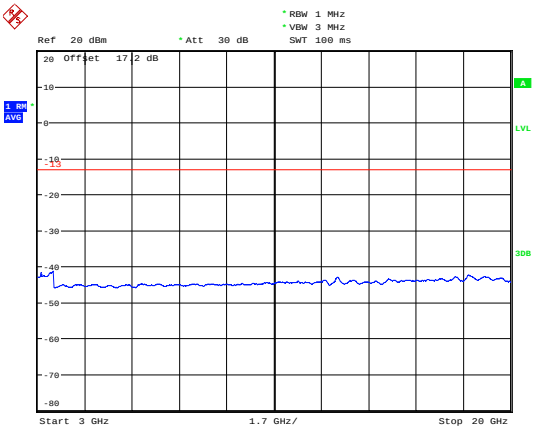
Date: 2.AUG.2019 11:28:36

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



Date: 2.AUG.2019 11:46:33

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



Date: 2.AUG.2019 11:46:47

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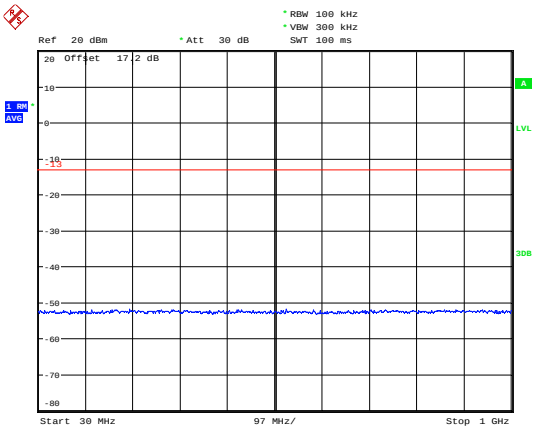
LTE Band 2 1.4MHz CH-High 30MHz~1GHz



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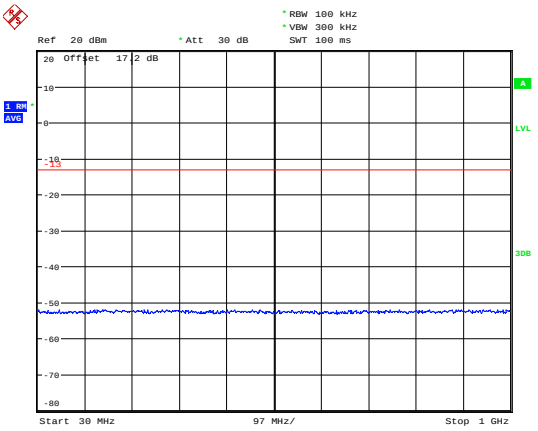
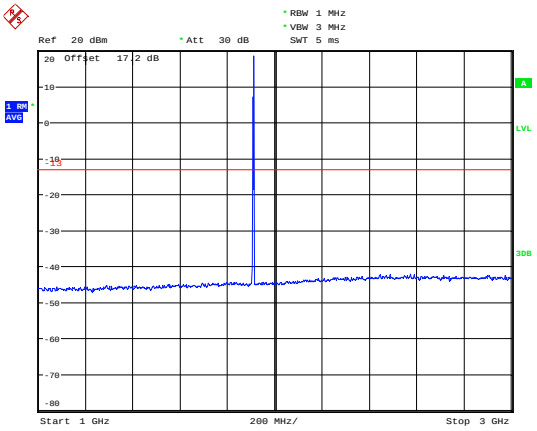
LTE Band 2 3MHz CH-Low 30MHz~1GHz



Date: 2.AUG.2019 11:21:30

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



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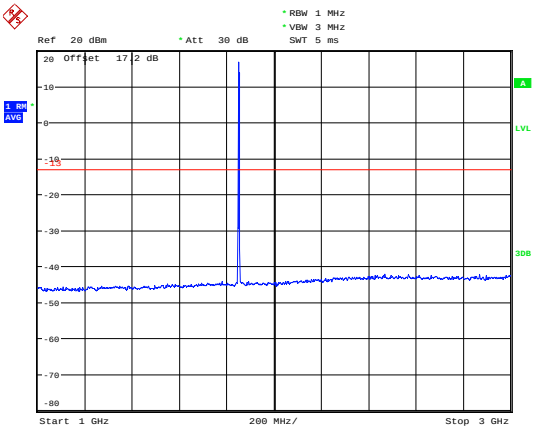
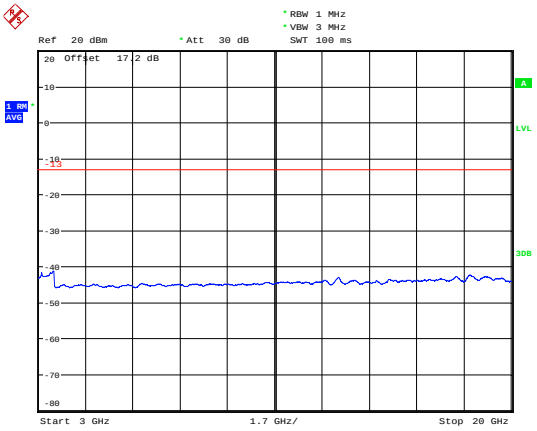
LTE Band 2 3MHz CH-Low 1GHz~3GHz



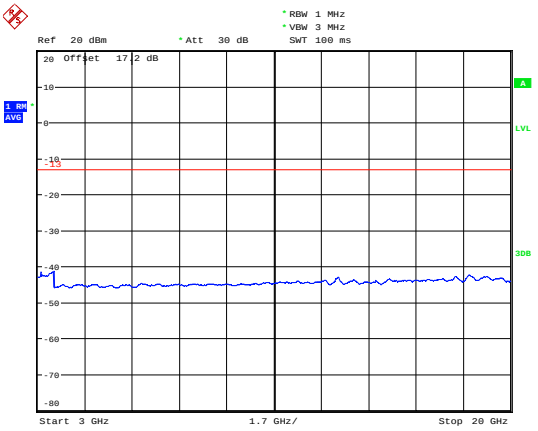
Date: 2.AUG.2019 11:34:07

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



Date: 2.AUG.2019 11:47:03

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



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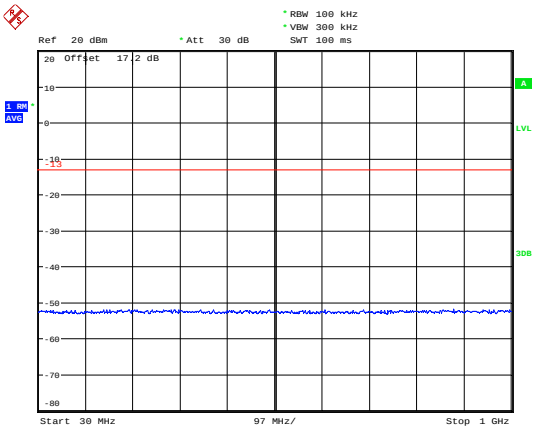
LTE Band 2 3MHz CH-Middle 30MHz~1GHz



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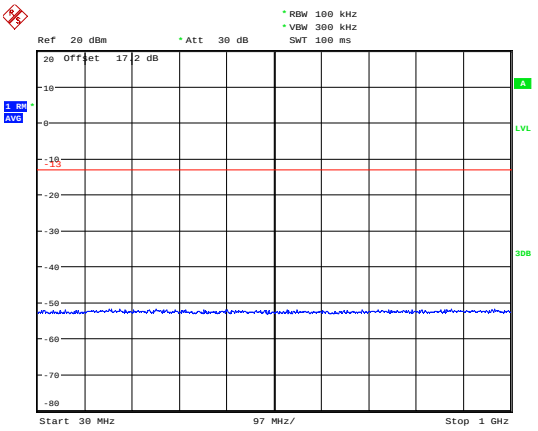
LTE Band 2 3MHz CH-High 30MHz~1GHz



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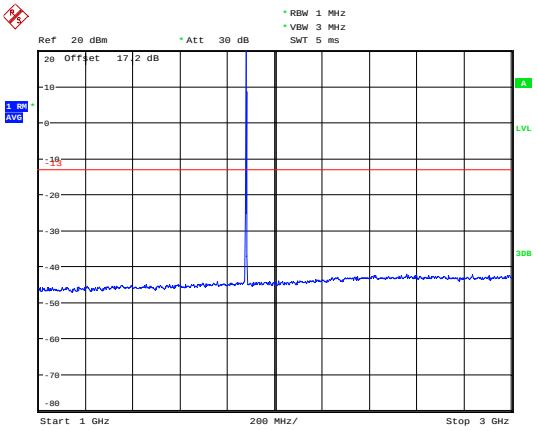
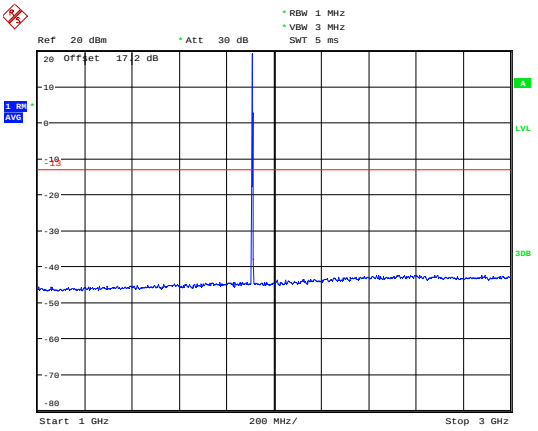
LTE Band 2 3MHz CH-Middle 1GHz~3GHz



Date: 2.AUG.2019 11:34:18

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



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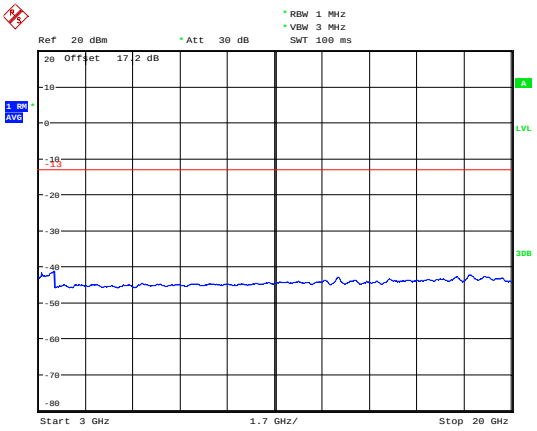
LTE Band 2 3MHz CH-Middle 3GHz~20GHz



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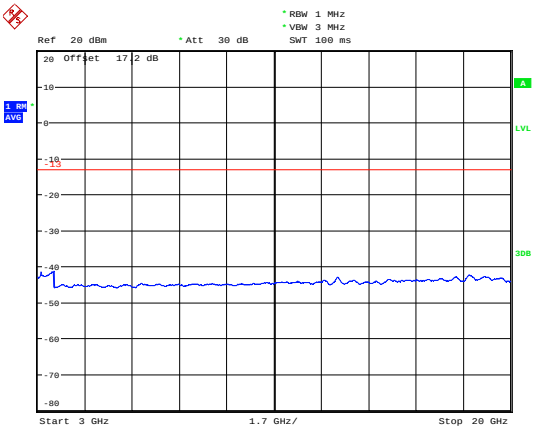
LTE Band 2 3MHz CH-High 3GHz~20GHz



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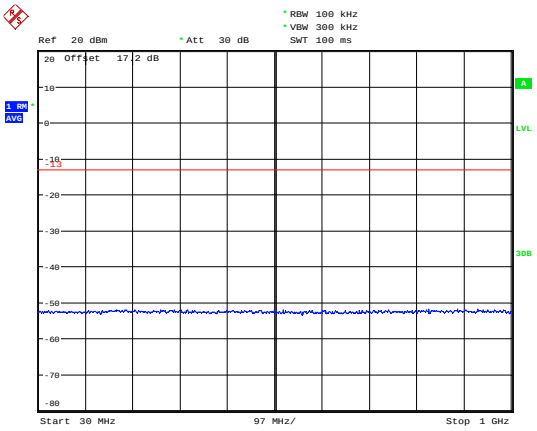
LTE Band 2 5MHz CH-Low 30MHz~1GHz



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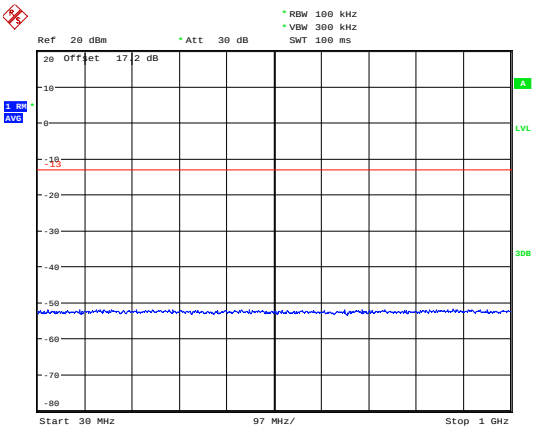
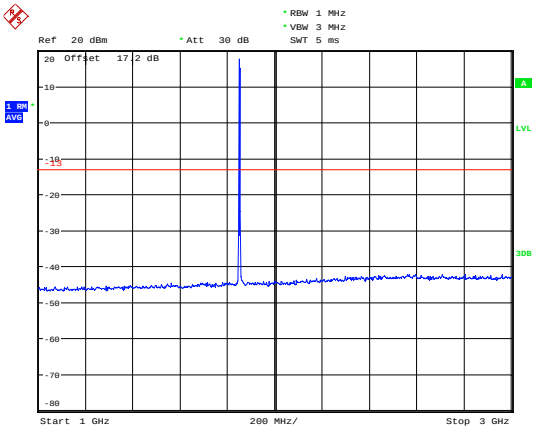
LTE Band 2 5MHz CH-Middle 30MHz~1GHz



Date: 2.AUG.2019 11:23:03

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



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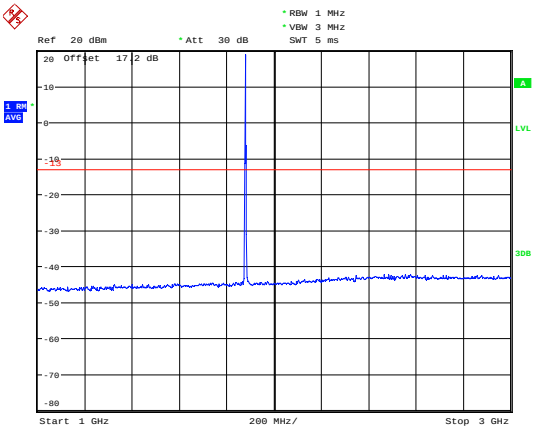
LTE Band 2 5MHz CH-Middle 1GHz~3GHz



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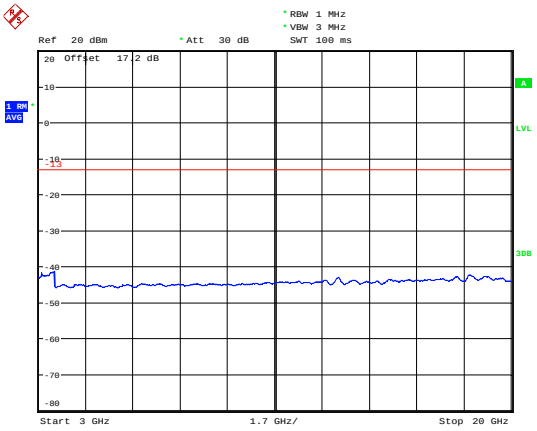
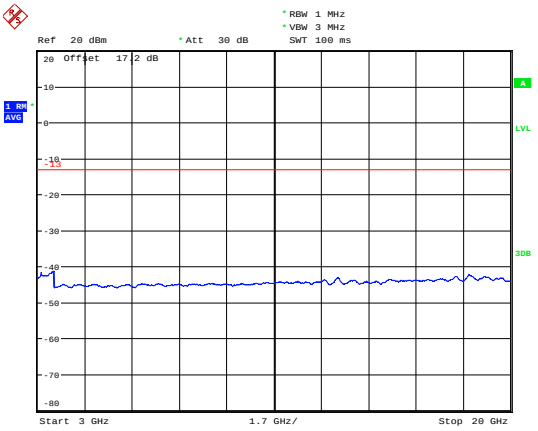
LTE Band 2 5MHz CH-Low 3GHz~20GHz



Date: 2.AUG.2019 12:29:50

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



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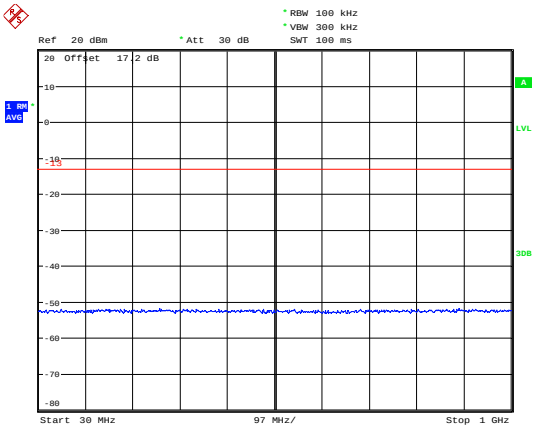
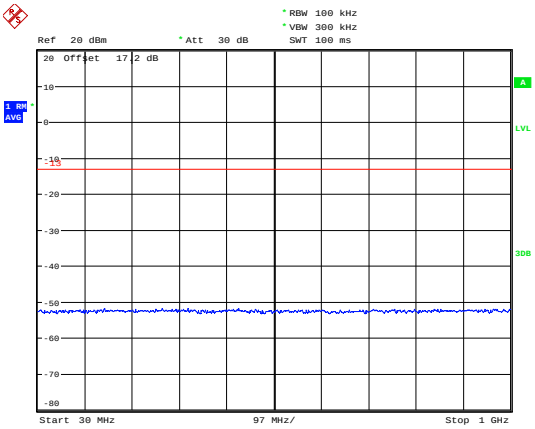
LTE Band 2 5MHz CH-High 30MHz~1GHz



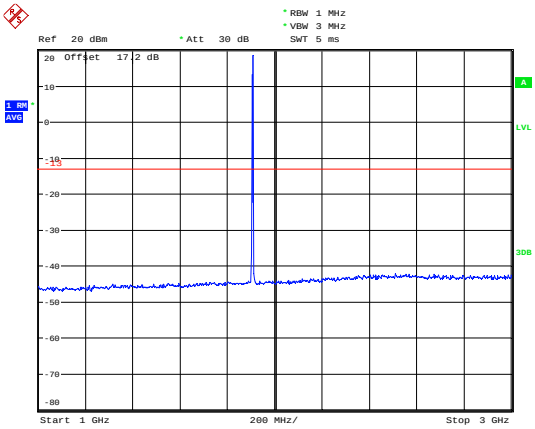
Date: 2.AUG.2019 11:23:19

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



Date: 2.AUG.2019 11:23:46

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



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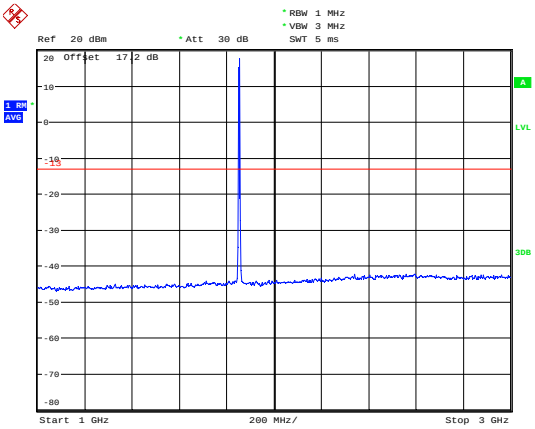
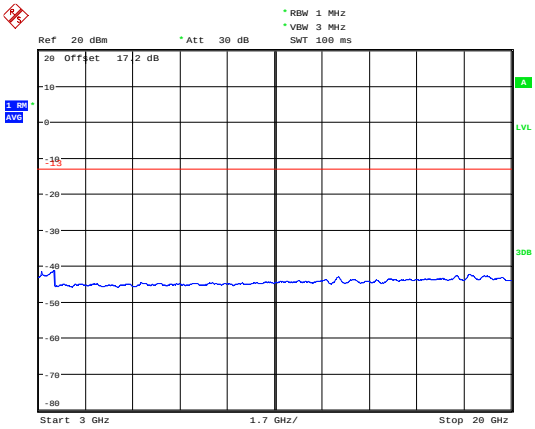
LTE Band 2 10MHz CH-Low 1GHz~3GHz



Date: 2.AUG.2019 11:35:35

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



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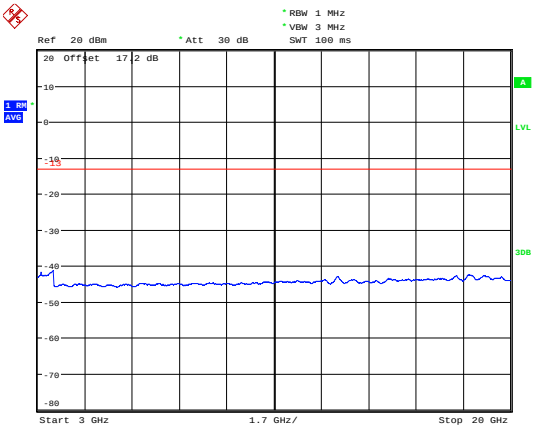
LTE Band 2 10MHz CH-Low 3GHz~20GHz



Date: 2.AUG.2019 12:32:19

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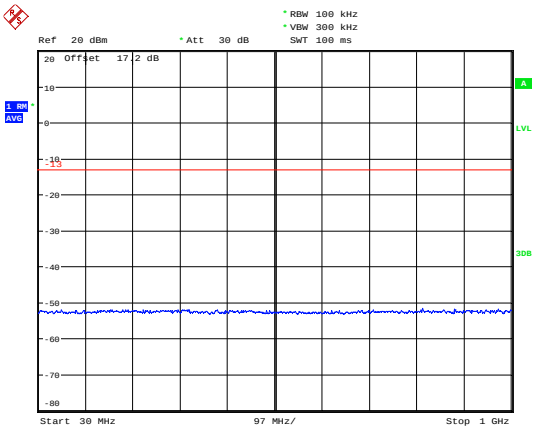
LTE Band 2 10MHz CH-Middle 30MHz~1GHz



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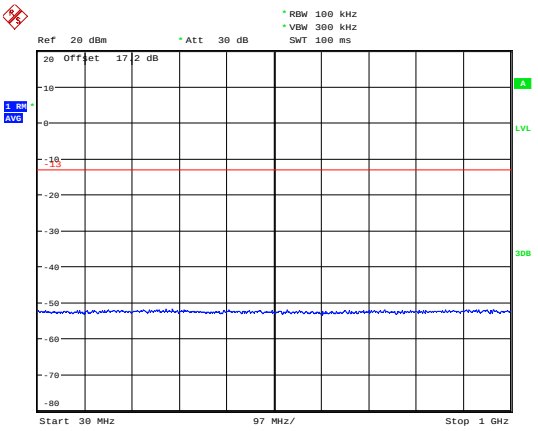
LTE Band 2 10MHz CH-High 30MHz~1GHz



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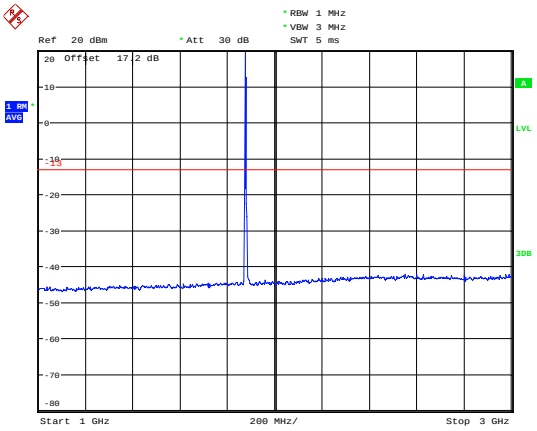
LTE Band 2 10MHz CH-Middle 1GHz~3GHz



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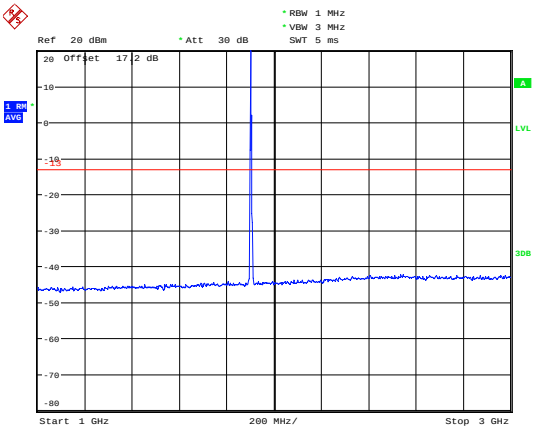
LTE Band 2 10MHz CH-High 1GHz~3GHz



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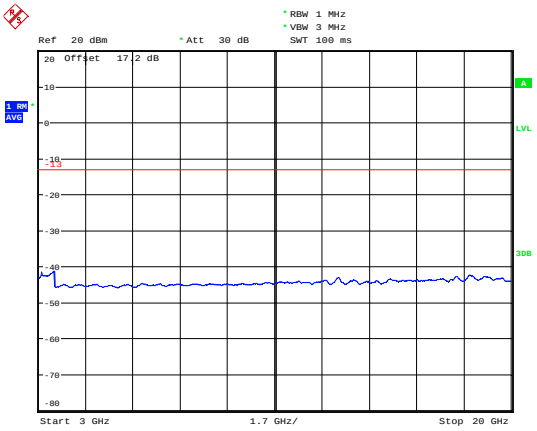
LTE Band 2 10MHz CH-Middle 3GHz~20GHz



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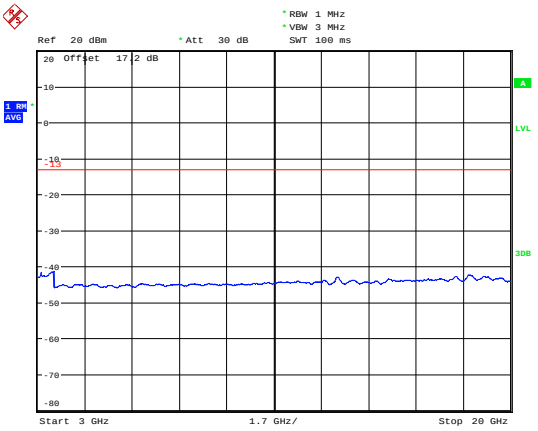
LTE Band 2 10MHz CH-High 3GHz~20GHz



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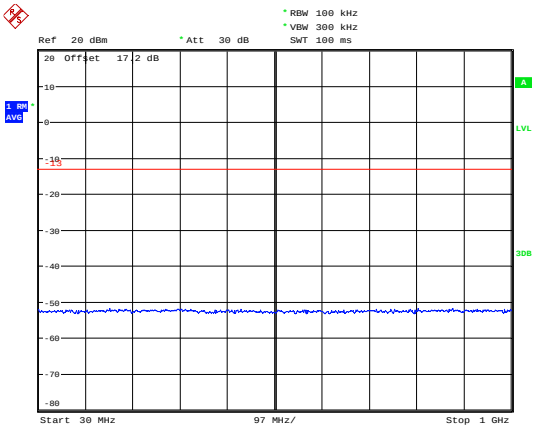
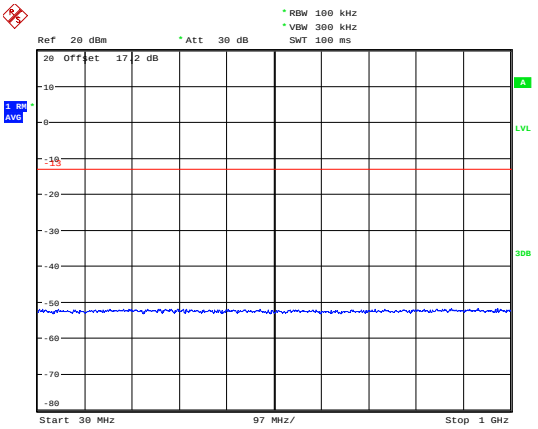
LTE Band 2 15MHz CH-Low 30MHz~1GHz



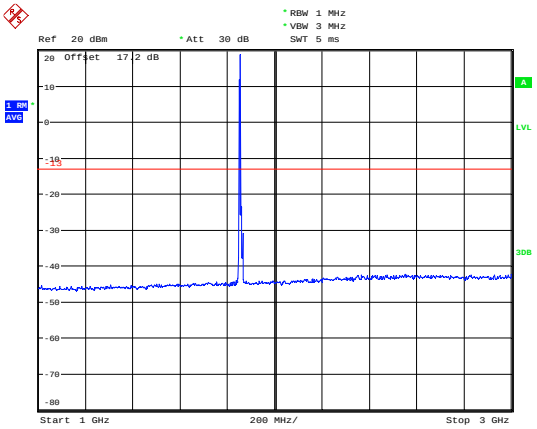
Date: 2.AUG.2019 11:26:18

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



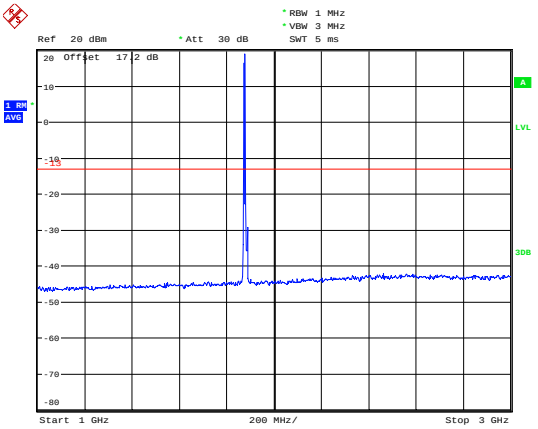
Date: 2.AUG.2019 11:26:25

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



Date: 2.AUG.2019 11:37:07

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



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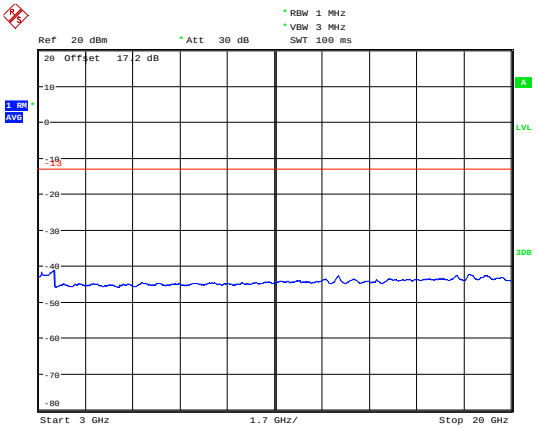
LTE Band 2 15MHz CH-Low 3GHz~20GHz



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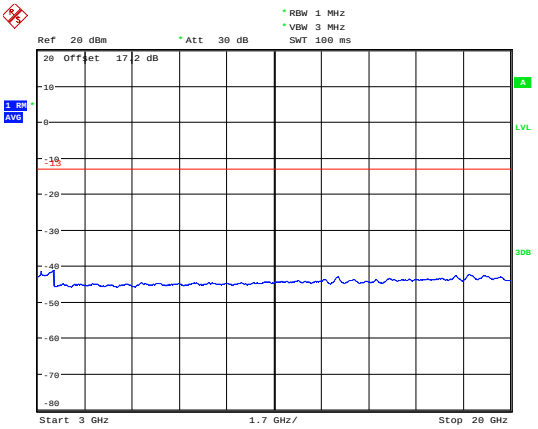
LTE Band 2 15MHz CH-Middle 3GHz~20GHz



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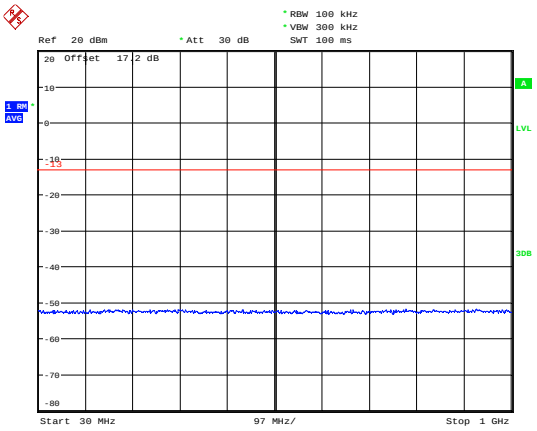
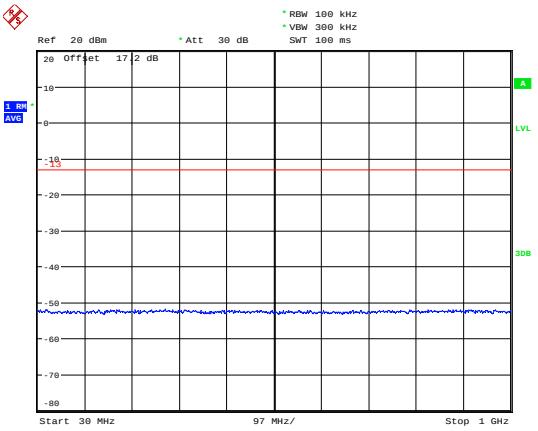
LTE Band 2 15MHz CH-High 30MHz~1GHz



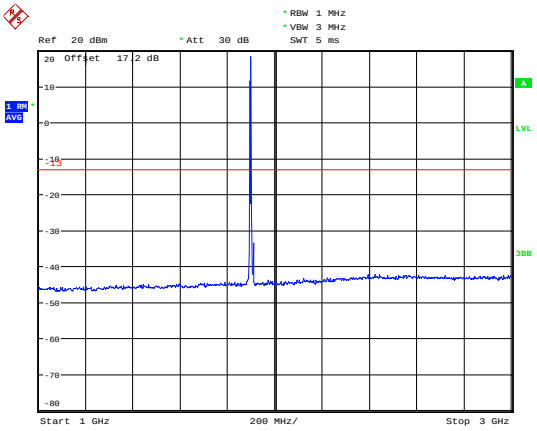
Date: 2.AUG.2019 11:26:32

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



Date: 2.AUG.2019 11:26:50

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



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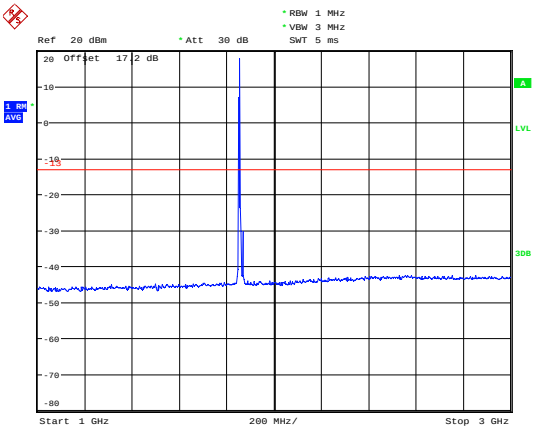
LTE Band 2 20MHz CH-Low 1GHz~3GHz



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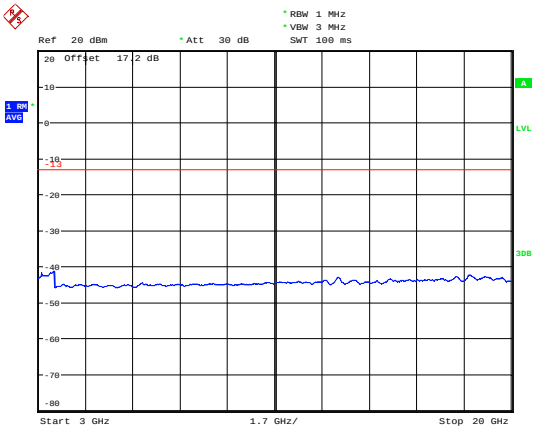
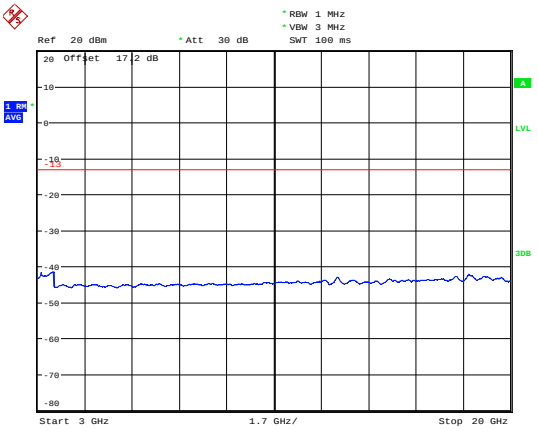
LTE Band 2 15MHz CH-High 3GHz~20GHz



Date: 2.AUG.2019 12:36:07

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



Date: 2.AUG.2019 12:36:31

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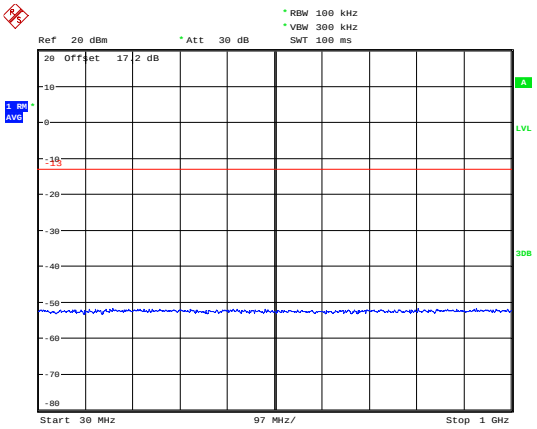
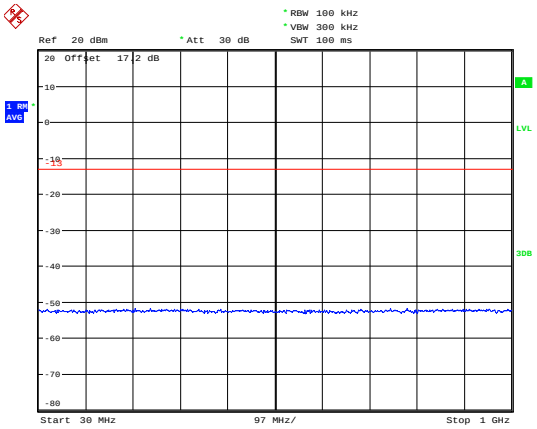
LTE Band 2 20MHz CH-Middle 30MHz~1GHz



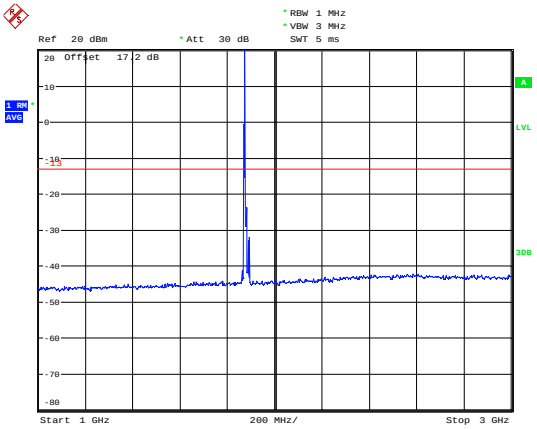
Date: 2.AUG.2019 11:27:00

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



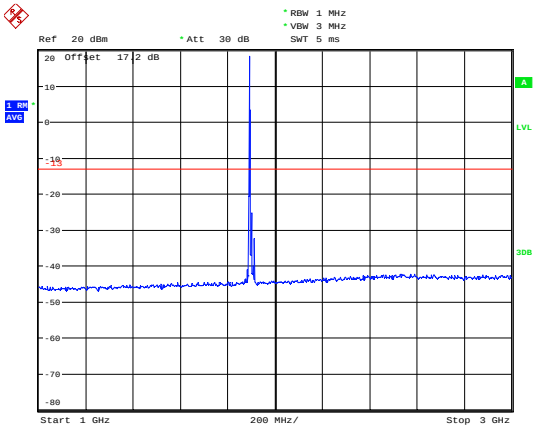
Date: 2.AUG.2019 11:27:11

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



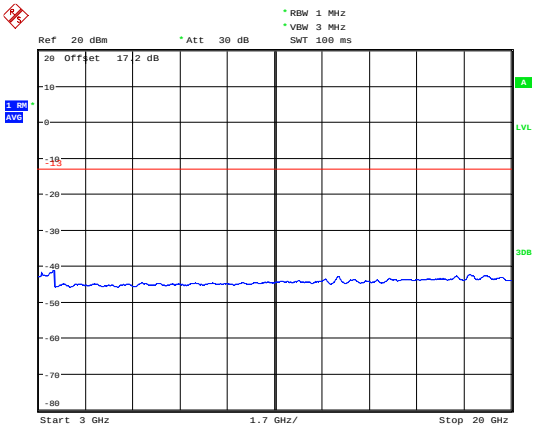
Date: 2.AUG.2019 11:45:52

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



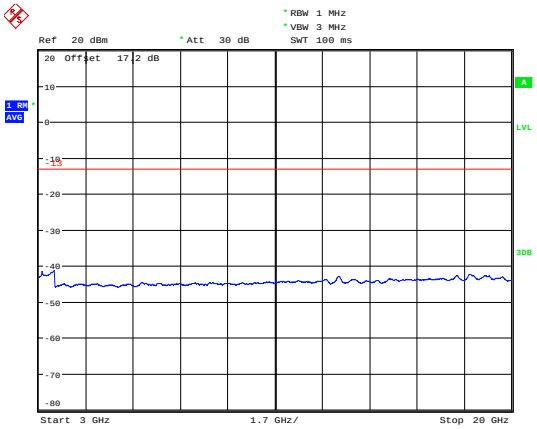
Date: 2.AUG.2019 11:46:02

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



Date: 2.AUG.2019 12:37:36

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



Date: 2.AUG.2019 12:40:56

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5.8. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. 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)

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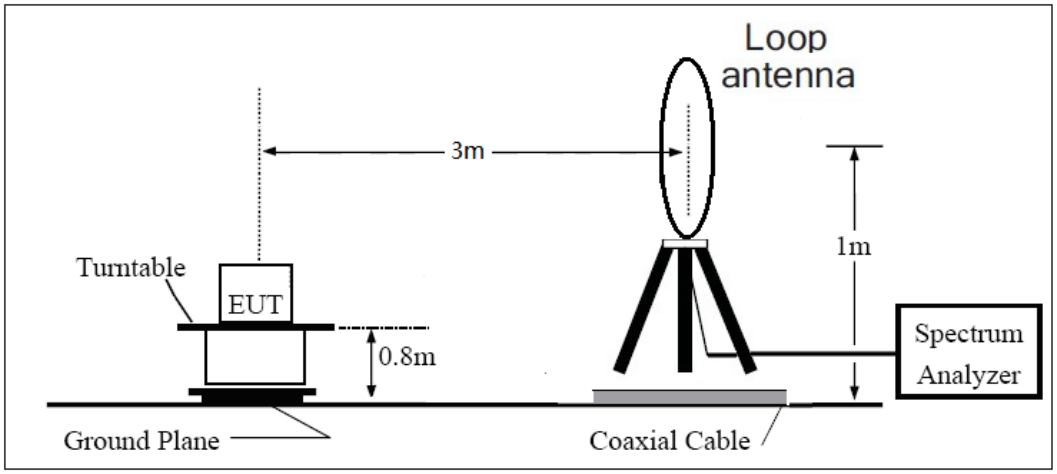
and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

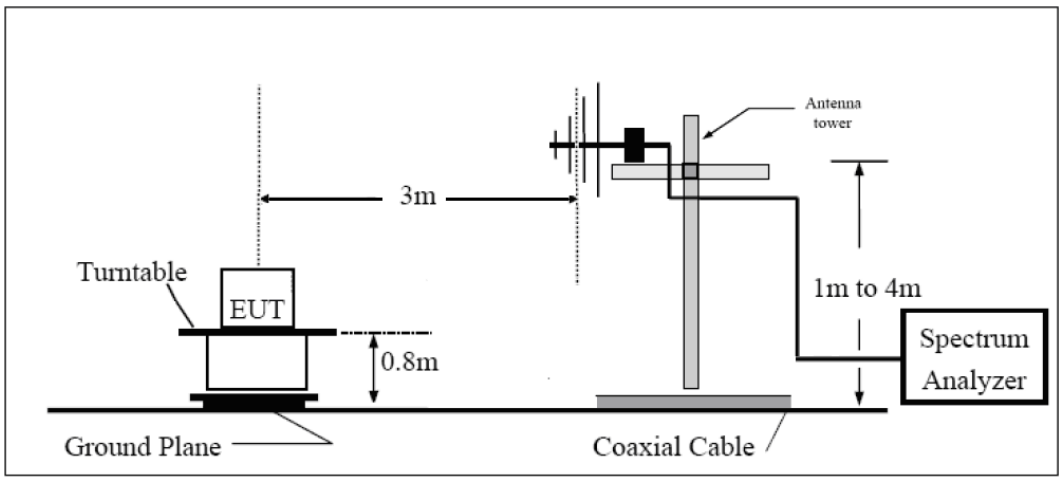
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

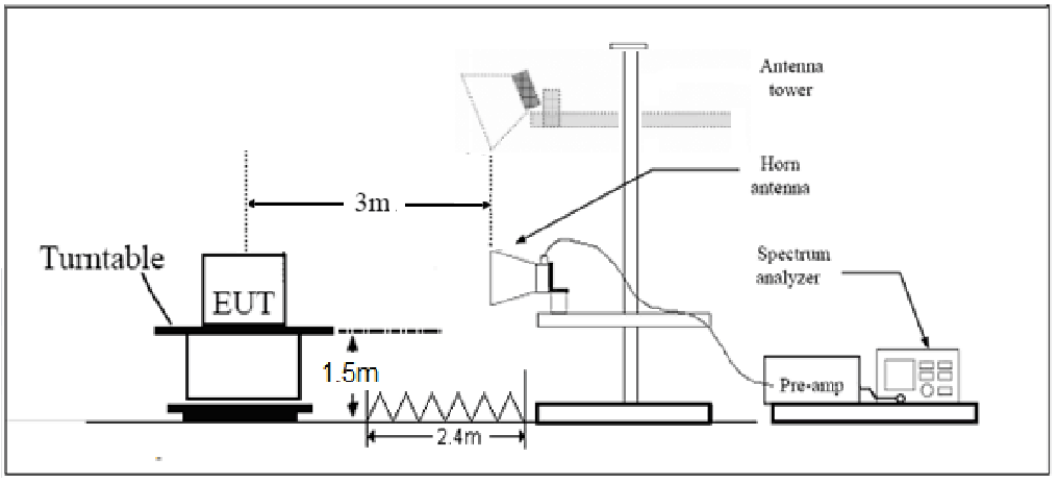
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



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Note: Area side: 2.4mX3.6m

Limits

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

Limit	-13 dBm

Measurement Uncertainty

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

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Test Result

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

Main-antenna

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	-63.02	5.10	11.05	Horizontal	-57.07	-13.00	44.07	135
3	5640.2	-56.48	5.42	12.65	Horizontal	-49.25	-13.00	36.25	270
4	7519.5	-60.03	6.70	13.85	Horizontal	-52.88	-13.00	39.88	45
5	9402.8	-57.06	7.01	14.75	Horizontal	-49.32	-13.00	36.32	90
6	11279.3	-54.99	7.48	15.95	Horizontal	-46.52	-13.00	33.52	180
7	13159.1	-56.85	7.51	16.55	Horizontal	-47.81	-13.00	34.81	45
8	15041.3	-53.93	8.24	15.35	Horizontal	-46.82	-13.00	33.82	315
9	16922.3	-50.47	8.41	14.95	Horizontal	-43.93	-13.00	30.93	225
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.									

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	-63.66	5.10	11.05	Horizontal	-57.71	-13.00	44.71	45
3	5640.0	-62.45	5.42	12.65	Horizontal	-55.22	-13.00	42.22	225
4	7520.0	-57.98	6.70	13.85	Horizontal	-50.83	-13.00	37.83	315
5	9400.0	-54.65	7.01	14.75	Horizontal	-46.91	-13.00	33.91	180
6	11280.0	-56.55	7.48	15.95	Horizontal	-48.08	-13.00	35.08	90
7	13160.0	-54.72	7.51	16.55	Horizontal	-45.68	-13.00	32.68	135
8	15040.0	-53.28	8.24	15.35	Horizontal	-46.17	-13.00	33.17	45
9	16920.0	-51.87	8.41	14.95	Horizontal	-45.33	-13.00	32.33	270
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.									

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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	-56.68	5.10	11.05	Horizontal	-50.73	-13.00	37.73	135
3	5638.9	-62.73	5.42	12.65	Horizontal	-55.50	-13.00	42.50	45
4	7520.0	-57.73	6.70	13.85	Horizontal	-50.58	-13.00	37.58	270
5	9400.0	-55.66	7.01	14.75	Horizontal	-47.92	-13.00	34.92	0
6	11280.0	-55.94	7.48	15.95	Horizontal	-47.47	-13.00	34.47	45
7	13160.0	-55.94	7.51	16.55	Horizontal	-46.90	-13.00	33.90	270
8	15040.0	-53.42	8.24	15.35	Horizontal	-46.31	-13.00	33.31	315
9	16920.0	-51.38	8.41	14.95	Horizontal	-44.84	-13.00	31.84	45
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.									

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	-56.01	5.10	11.05	Horizontal	-50.06	-13.00	37.06	225
3	5640.0	-63.73	5.42	12.65	Horizontal	-56.50	-13.00	43.50	45
4	7520.0	-58.90	6.70	13.85	Horizontal	-51.75	-13.00	38.75	0
5	9400.0	-56.14	7.01	14.75	Horizontal	-48.40	-13.00	35.40	135
6	11280.0	-55.45	7.48	15.95	Horizontal	-46.98	-13.00	33.98	270
7	13160.0	-55.99	7.51	16.55	Horizontal	-46.95	-13.00	33.95	315
8	15040.0	-51.62	8.24	15.35	Horizontal	-44.51	-13.00	31.51	45
9	16920.0	-51.17	8.41	14.95	Horizontal	-44.63	-13.00	31.63	180
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.									

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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	-59.32	5.10	11.05	Horizontal	-53.37	-13.00	40.37	45
3	5640.0	-63.35	5.42	12.65	Horizontal	-56.12	-13.00	43.12	0
4	7520.0	-58.42	6.70	13.85	Horizontal	-51.27	-13.00	38.27	225
5	9400.0	-56.97	7.01	14.75	Horizontal	-49.23	-13.00	36.23	315
6	11280.0	-54.68	7.48	15.95	Horizontal	-46.21	-13.00	33.21	180
7	13160.0	-55.52	7.51	16.55	Horizontal	-46.48	-13.00	33.48	45
8	15040.0	-52.83	8.24	15.35	Horizontal	-45.72	-13.00	32.72	315
9	16920.0	-51.39	8.41	14.95	Horizontal	-44.85	-13.00	31.85	45
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.

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Second-Antenna

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	-63.81	5.10	11.05	Horizontal	-57.86	-13.00	44.86	135
3	5640.2	-63.60	5.42	12.65	Horizontal	-56.37	-13.00	43.37	225
4	7519.5	-59.77	6.70	13.85	Horizontal	-52.62	-13.00	39.62	45
5	9402.8	-57.86	7.01	14.75	Horizontal	-50.12	-13.00	37.12	90
6	11279.3	-56.46	7.48	15.95	Horizontal	-47.99	-13.00	34.99	45
7	13159.1	-55.37	7.51	16.55	Horizontal	-46.33	-13.00	33.33	45
8	15041.3	-53.40	8.24	15.35	Horizontal	-46.29	-13.00	33.29	180
9	16922.3	-51.12	8.41	14.95	Horizontal	-44.58	-13.00	31.58	225
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.

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	-63.69	5.10	11.05	Horizontal	-57.74	-13.00	44.74	45
3	5640.0	-60.97	5.42	12.65	Horizontal	-53.74	-13.00	40.74	270
4	7520.0	-58.81	6.70	13.85	Horizontal	-51.66	-13.00	38.66	315
5	9400.0	-57.85	7.01	14.75	Horizontal	-50.11	-13.00	37.11	225
6	11280.0	-56.36	7.48	15.95	Horizontal	-47.89	-13.00	34.89	90
7	13160.0	-55.77	7.51	16.55	Horizontal	-46.73	-13.00	33.73	135
8	15040.0	-54.40	8.24	15.35	Horizontal	-47.29	-13.00	34.29	45
9	16920.0	-51.50	8.41	14.95	Horizontal	-44.96	-13.00	31.96	315
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.

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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	-56.36	5.10	11.05	Horizontal	-50.41	-13.00	37.41	315
3	5638.9	-63.23	5.42	12.65	Horizontal	-56.00	-13.00	43.00	45
4	7520.0	-57.44	6.70	13.85	Horizontal	-50.29	-13.00	37.29	270
5	9400.0	-57.63	7.01	14.75	Horizontal	-49.89	-13.00	36.89	225
6	11280.0	-56.58	7.48	15.95	Horizontal	-48.11	-13.00	35.11	0
7	13160.0	-55.22	7.51	16.55	Horizontal	-46.18	-13.00	33.18	45
8	15040.0	-53.59	8.24	15.35	Horizontal	-46.48	-13.00	33.48	90
9	16920.0	-50.23	8.41	14.95	Horizontal	-43.69	-13.00	30.69	45
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.

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	-60.05	5.10	11.05	Horizontal	-54.10	-13.00	41.10	135
3	5640.0	-61.23	5.42	12.65	Horizontal	-54.00	-13.00	41.00	45
4	7520.0	-59.45	6.70	13.85	Horizontal	-52.30	-13.00	39.30	0
5	9400.0	-56.07	7.01	14.75	Horizontal	-48.33	-13.00	35.33	90
6	11280.0	-56.56	7.48	15.95	Horizontal	-48.09	-13.00	35.09	270
7	13160.0	-54.75	7.51	16.55	Horizontal	-45.71	-13.00	32.71	45
8	15040.0	-53.24	8.24	15.35	Horizontal	-46.13	-13.00	33.13	135
9	16920.0	-51.49	8.41	14.95	Horizontal	-44.95	-13.00	31.95	180
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.

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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	-60.67	5.10	11.05	Horizontal	-54.72	-13.00	41.72	225
3	5640.0	-63.91	5.42	12.65	Horizontal	-56.68	-13.00	43.68	0
4	7520.0	-58.89	6.70	13.85	Horizontal	-51.74	-13.00	38.74	180
5	9400.0	-57.17	7.01	14.75	Horizontal	-49.43	-13.00	36.43	315
6	11280.0	-55.32	7.48	15.95	Horizontal	-46.85	-13.00	33.85	135
7	13160.0	-55.99	7.51	16.55	Horizontal	-46.95	-13.00	33.95	45
8	15040.0	-53.38	8.24	15.35	Horizontal	-46.27	-13.00	33.27	315
9	16920.0	-51.23	8.41	14.95	Horizontal	-44.69	-13.00	31.69	270
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.

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MAS-antenna

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	-57.52	5.10	11.05	Horizontal	-51.57	-13.00	38.57	135
3	5638.9	-62.54	5.42	12.65	Horizontal	-55.31	-13.00	42.31	225
4	7520.0	-58.23	6.70	13.85	Horizontal	-51.08	-13.00	38.08	0
5	9400.0	-56.36	7.01	14.75	Horizontal	-48.62	-13.00	35.62	45
6	11280.0	-54.65	7.48	15.95	Horizontal	-46.18	-13.00	33.18	180
7	13160.0	-53.18	7.51	16.55	Horizontal	-44.14	-13.00	31.14	45
8	15040.0	-52.22	8.24	15.35	Horizontal	-45.11	-13.00	32.11	135
9	16920.0	-49.66	8.41	14.95	Horizontal	-43.12	-13.00	30.12	315
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.

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	3755.6	-58.63	5.10	11.05	Horizontal	-52.68	-13.00	39.68	0
3	5633.6	-62.12	5.42	12.65	Horizontal	-54.89	-13.00	41.89	45
4	7520.0	-58.32	6.70	13.85	Horizontal	-51.17	-13.00	38.17	135
5	9400.0	-55.99	7.01	14.75	Horizontal	-48.25	-13.00	35.25	225
6	11280.0	-54.45	7.48	15.95	Horizontal	-45.98	-13.00	32.98	270
7	13160.0	-54.56	7.51	16.55	Horizontal	-45.52	-13.00	32.52	135
8	15040.0	-52.20	8.24	15.35	Horizontal	-45.09	-13.00	32.09	45
9	16920.0	-49.49	8.41	14.95	Horizontal	-42.95	-13.00	29.95	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.

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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	3742.1	-61.05	5.10	11.05	Horizontal	-55.10	-13.00	42.10	135
3	5613.4	-61.52	5.42	12.65	Horizontal	-54.29	-13.00	41.29	90
4	7484.6	-57.84	6.70	13.85	Horizontal	-50.69	-13.00	37.69	180
5	9400.0	-55.54	7.01	14.75	Horizontal	-47.80	-13.00	34.80	315
6	11280.0	-54.99	7.48	15.95	Horizontal	-46.52	-13.00	33.52	225
7	13160.0	-54.75	7.51	16.55	Horizontal	-45.71	-13.00	32.71	180
8	15040.0	-51.97	8.24	15.35	Horizontal	-44.86	-13.00	31.86	45
9	16920.0	-48.86	8.41	14.95	Horizontal	-42.32	-13.00	29.32	0
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.

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6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2019-05-19	2020-05-18
Base Station Simulator	R&S	CMW500	113824	2019-05-19	2020-05-18
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2019-05-19	2020-05-18
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2019-05-19	2020-05-18
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	2019-05-19	2020-05-18
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preampflier	R&S	SCU18	102327	2019-05-19	2020-05-18
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2019-05-19	2020-05-18
RF Cable	Agilent	SMA 15cm	0001	2019-06-14	2019-09-13
Software	R&S	EMC32	9.26.0	/	/

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