

# TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H,  
 Part 24 Subpart E, Part 27 Subpart C and Part 90 Subpart I/S

FCC ID: BEJIGCJ2PHE

Equipment Under Test : Car AVN  
 Model Name : IGCJ1PHE  
 Variant Model Name : IGCJ2PHE  
 Applicant : LG Electronics USA  
 Manufacturer : LG Electronics Inc.  
 Date of Receipt : 2022.12.07  
 Date of Test(s) : 2022.12.23 ~ 2023.02.16  
 Date of Issue : 2023.02.23

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
- 3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
- 4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.  
 We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by:



Teo Kim

Technical  
 Manager:



Jinhyoung Cho

**SGS Korea Co., Ltd. Gunpo Laboratory**



# INDEX

<u>Table of Contents</u>	Page
1. General Information -----	3
2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions -----	11
3. Conducted Output Power -----	23
4. Occupied Bandwidth -----	30
5. Peak-Average Ratio -----	39
6. Spurious Emissions at Antenna Terminal -----	51
7. Band Edge -----	59
8. Frequency Stability -----	92

## 1. General Information

### 1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

### 1.2. Details of Applicant

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States, 07632

Contact Person : Cho, Hee-jae

Phone No. : +1 201 470 2696

### 1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

### 1.4. Description of EUT

<b>Kind of Product</b>	Car AVN
<b>Brand Name</b>	JAGUAR LAND ROVER
<b>Model Name</b>	IGCJ1PHE
<b>Variant Model Name</b>	IGCJ2PHE
<b>Serial Number</b>	211VIYKC97034
<b>Power Supply</b>	DC 12 V
<b>Rated Power</b>	GSM850: 33 dB m GSM1 900: 30 dB m WCDMA V: 23 dB m LTE Band 5, 7, 26: 23 dB m
<b>Frequency Range</b>	GSM 850: 824 MHz ~ 849 MHz GSM 1 900: 1 850 MHz ~ 1 910 MHz WCDMA V: 824 MHz ~ 849 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2 500 MHz ~ 2 570 MHz LTE Band 26(Part 90): 814 MHz ~ 824 MHz LTE Band 26(Part 22): 824 MHz ~ 849 MHz
<b>Modulation Technique</b>	QPSK, 16QAM, GMSK, 8PSK
<b>Antenna Type</b>	External Antenna
<b>Antenna Gain*</b>	814 MHz ~ 824 MHz: -1.79 dB i 824 MHz ~ 849 MHz: -0.69 dB i 1 850 MHz ~ 1 910 MHz: 0.85 dB i 2 500 MHz ~ 2 570 MHz: 0.99 dB i
<b>H/W Version</b>	V9.0
<b>S/W Version</b>	IP36

### 1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMA100B	106887	Oct. 13, 2022	Annual	Oct. 13, 2023
Signal Generator	R&S	SMBV100A	255834	May 25, 2022	Annual	May 25, 2023
Spectrum Analyzer	R&S	FSV30	103210	Dec. 07, 2022	Annual	Dec. 07, 2023
Spectrum Analyzer	Agilent	N9020A	MY53421758	Aug. 26, 2022	Annual	Aug. 26, 2023
Mobile Test Unit	R&S	CMW 500	144035	Feb. 10, 2023	Annual	Feb. 10, 2024
Communication Analyzer	Anritsu	MT8821C	6262192291	Oct. 11, 2022	Annual	Oct. 11, 2023
Power Meter	Anritsu	ML2495A	1223004	Nov. 29, 2022	Annual	Nov. 29, 2023
Power Sensor	Anritsu	MA2411B	1207272	May 27, 2022	Annual	May 27, 2023
Temperature Chamber	ESPEC CORP.	SH-662	93000533	Jun. 02, 2022	Annual	Jun. 02, 2023
BRIDGE COUPLER	MARKI MICROWAVE INC	CBR16-0012	1542	May 06, 2022	Annual	May 06, 2023
Directional Coupler	KRYTAR	152613	122660	Jul. 06, 2022	Annual	Jul. 06, 2023
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-2	Feb. 09, 2023	Annual	Feb. 09, 2024
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-40SS	7	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX2.2/12.75G-10SS	8	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-6SS	21	Jun. 09, 2022	Annual	Jun. 09, 2023
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	Oct. 24, 2022	Annual	Oct. 24, 2023
DC Power Supply	Agilent	U8002A	MY49030063	Jan. 20, 2023	Annual	Jan. 20, 2024
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2022	Annual	Aug. 04, 2023
Preamplifier	R&S	SCU 18	10117	Jun. 13, 2022	Annual	Jun. 13, 2023
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 11, 2023	Annual	Jan. 11, 2024
Test Receiver	R&S	ESU26	100109	Jan. 18, 2023	Annual	Jan. 18, 2024
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2021	Biennial	Aug. 23, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	390	Feb. 21, 2022	Annual	Feb. 21, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Feb. 09, 2023	Annual	Feb. 09, 2024
Horn Antenna	R&S	HF906	100326	Feb. 18, 2022	Annual	Feb. 18, 2023
Horn Antenna	R&S	HF907	102270	Mar. 03, 2022	Annual	Mar. 03, 2023
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 30, 2022	Annual	Nov. 30, 2023
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	N.C.R.	N/A	N.C.R.
Turn Table	Innco systems GmbH	DS 1200S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/383 30516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182287	Feb. 18, 2023	Semi-Annual	Aug. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182288	Feb. 18, 2023	Semi-Annual	Aug. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182291	Feb. 18, 2023	Semi-Annual	Aug. 18, 2023

**Note;**

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

## 1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2, 22, 24, 27 and 90		
Section(s)	Test Item	Result
§2.1046 §22.913(a)(5) §24.232(c) §27.50(h)(2) §90.635(b)	E.R.P. / E.I.R.P.	Complied
§22.917(a) §24.238(a) §27.53(m)(4) §90.691(a)	Radiated Spurious Emissions	Complied
§2.1046	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§22.913(d) §24.232(d) §27.50(d)(5)	Peak-Average Ratio	Complied
§22.917(a) §24.238(a) §27.53(m)(4) §90.691(a)	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a) §27.53(m)(4) §90.691(a)	Band Edge and Emission Mask	Complied
§2.1055 §22.355 §24.235 §27.54 §90.213(a)	Frequency Stability	Complied

## 1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

### 1.7.1. Conducted Test

Offset value (dB) = Directional coupler (dB) + Cable loss (dB)

### 1.7.2. Radiated test

- E.I.R.P. (dB m) = Measured level (dB $\mu$ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.8;  
 where D is the measurement distance in meters.
- E.R.P (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

### 1.8. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty	
RF Output Power	0.32 dB	
Occupied Bandwidth	3.90 kHz	
Conducted Spurious Emissions	0.61 dB	
Peak to Average Ratio	0.60 dB	
Frequency Stability	5.97 kHz	
Radiated Emission, 9 kHz to 30 MHz	H	3.40 dB
	V	3.40 dB
Radiated Emission, below 1 GHz	H	4.50 dB
	V	5.10 dB
Radiated Emission, above 1 GHz	H	3.70 dB
	V	3.90 dB

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicate a 95 % level of confidence.

### 1.9. Information of Variant Model

Model Names	Description
IGCJ1PHE	- Basic Model
IGCJ2PHE	- Same as basic model, - The only difference is the model name for Costa Rica, Thailand

### 1.10. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL003848	2023.02.23	Initial

### 1.11. Manufacturer Declaration

The EUT not supported voice mode on GSM.

### 1.12. Worst Case Configuration and Mode

#### GSM

The worst-case is based on the average conducted output power measurement investigation results. Output power measurements were measured on GPRS, EDGE Mode. All testing was performed using GPRS and EDGE mode, except frequency stability, spurious radiated emission spurious and emission at antenna terminal were tested only GPRS mode as worst case.

The peak to average ratio were tested only EGPRS modulation as worst case.

The radiated test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

#### WCDMA

WCDMA mode, Output power measurements were measured on RMC, HSDPA, HSUPA and HSPA+ Modulation. All testing was performed using RMC and HSDPA modulations, except spurious radiated emission spurious and emission at antenna terminal were tested only RMC modulation as worst case. The worst-case is based on the average conducted output power measurement investigation results.

The peak to average ratio were tested only HSDPA modulation as worst case.

The radiated test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

#### LTE

The worst-case is based on the conducted output power measurement investigation results. All testing was performed using QPSK and 16QAM modulations. However, the spurious radiated emission and spurious at antenna terminal were only performed on bandwidth and RB offset (with RB size 1) with the highest conducted power in QPSK.

The peak to average ratio were tested only 16QAM modulation as worst case.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

### 1.13. Device Capabilities

This device contains the following capabilities;

LTE Band 5 (824 MHz ~ 849 MHz) is covered by LTE Band 26 (824 MHz ~ 849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth. Therefore test data provided in this report covers LTE Band 5 as well as Band 26.

### 1.14. Measurement Configuration

#### GSM

Test Items	Band	Test Channel			Modulation	
		Low	Mid	High	GPRS	EGPRS
Conducted Output Power	GSM 850	V	V	V	V	V
	GSM 1 900	V	V	V	V	V
Frequency Stability	GSM 850	-	V	-	V	-
	GSM 1 900	-	V	-	V	-
Occupied Bandwidth	GSM 850	-	V	-	-	V
	GSM 1 900	-	V	-	-	V
Peak to Average Ratio	GSM 850	V	V	V	-	V
	GSM 1 900	V	V	V	-	V
Band Edge	GSM 850	V	-	V	-	V
	GSM 1 900	V	-	V	-	V
Spurious Emission at Antenna Terminal &	GSM 850	Worst case				
	GSM 1 900	Worst case				
Radiated Spurious Emissions	GSM 850	Worst case				
	GSM 1 900	Worst case				

#### WCDMA

Test Items	Band	Test Channel			Modulation		
		Low	Mid	High	RMC	HSUPA	HSDPA
Conducted Output Power	Band V	V	V	V	V	V	V
Frequency Stability	Band V	-	V	-	V	-	-
Occupied Bandwidth	Band V	-	V	-	V	-	V
Peak to Average Ratio	Band V	V	V	V	V	-	V
Band Edge	Band V	V	-	V	V	-	V
Spurious Emission at Antenna Terminal &	Band V	Worst case					
Radiated Spurious Emissions	Band V	Worst case					



**LTE**

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation		RB #		
		Low	Mid	High	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full
Conducted Output Power	7	V	V	V			V	V	V	V	V	V	V	V	V
	26 Part 90	V	V	V	V	V	V	V	V		V	V	V	V	V
	*26/5 Part 22	V	V	V	V	V	V	V	V		V	V	V	V	V
Frequency Stability	7	-	V	-			V	-	-	-	V	-	-	-	V
	26 Part 90	-	V	-	-	-	V	-			V	-	-	-	V
	*26/5 Part 22	-	V	-	-	-	V	-	-		V	-	-	-	V
Occupied Bandwidth	7	-	V	-			V	V	V	V	V	V	-	-	V
	26 Part 90	-	V	-	V	V	V	V	V		V	V	-	-	V
	*26/5 Part 22	-	V	-	V	V	V	V	V		V	V	-	-	V
Peak-to-Average Ratio	7	V	V	V			V	V	V	V	-	V	-	-	V
	26 Part 90	V	V	V	V	V	V	V	V		-	V	-	-	V
	*26/5 Part 22	V	V	V	V	V	V	V	V		-	V	-	-	V
Band edge	7	V	V	V			V	V	V	V	V	V	V	-	V
	26 Part 90	V	V	V	V	V	V	V	V		V	V	V	-	V
	*26/5 Part 22	V	V	V	V	V	V	V	V		V	V	V	-	V
Spurious at antenna terminal & Radiated Spurious Emissions	7	V	V	V	Worst case										
	26 Part 90	V	V	V	Worst case										
	*26/5 Part 22	V	V	V	Worst case										

\*B5 is not supported 15M bandwidth.

**1.15. Test information of Cable Loss and Antenna Gain**

Test Item	Frequency Range (MHz)	Cable Loss (dB)	Antenna Gain of EUT (dB i)	Final Antenna Gain (dB i)
GSM 850	824 ~ 849	1.12	-0.69	-1.81
GSM 1 900	1 850 ~ 1 910	1.12	0.85	-0.27
WCDMA V	824 ~ 849	1.12	-0.69	-1.81
LTE 7	2 500 ~ 2 570	1.94	0.99	-0.95
LTE 26 part 90	814 ~ 824	1.12	-1.79	-2.91
LTE 26/5 part 22	824 ~ 849	1.12	-0.69	-1.81

### 1.16. Emission Designator and Max Power

#### GSM

Band	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Average (dB m)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator
850	GPRS	824	849	32.19	-1.81	28.23	0.665	239KGXW
	EGPRS			26.25		22.29	0.169	245KG7W
1 900	GPRS	1 850	1 910	28.46	-0.27	28.19	0.659	242KGXW
	EGPRS			24.55		24.28	0.268	242KG7W

#### WCDMA

Band	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Average (dB m)	Ant. Gain (dB i)	E.R.P. Average (dB m)	E.R.P. Average (W)	Emission Designator
V	RMC	824	849	23.11	-1.81	19.15	0.082	4M17F9W
	HSDPA			21.94		17.98	0.063	4M14F9W

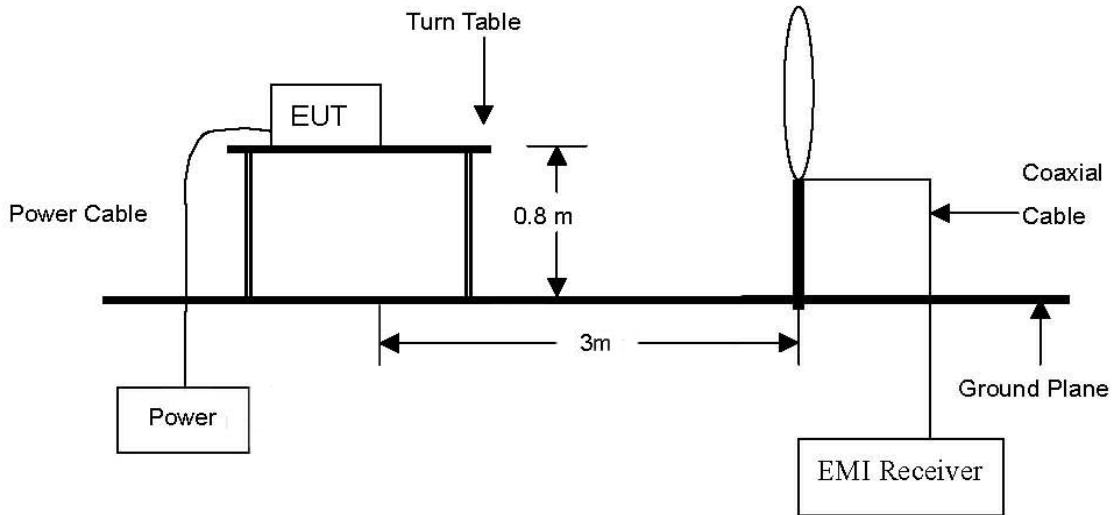
#### LTE

Band	Band width (MHz)	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Average (dB m)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator		
7	5	QPSK	2 502.5	2 567.5	24.36	-0.95	23.41	0.219	4M49G7D		
		16QAM			22.99		22.04	0.160	4M48D7D		
	10	QPSK	2 505	2 565	24.00		23.05	0.202	8M92G7D		
		16QAM			23.04		22.09	0.162	8M95D7D		
	15	QPSK	2 507.5	2 562.5	24.34		23.39	0.218	13M5G7D		
		16QAM			23.79		22.84	0.192	13M5D7D		
	20	QPSK	2 510	2 560	24.33		23.38	0.218	17M9G7D		
		16QAM			23.74		22.79	0.190	17M9D7D		
26 Part 90	1.4	QPSK	814.7	823.3	23.47	-2.91	18.41	0.069	1M10G7D		
		16QAM			22.66		17.60	0.058	1M08D7D		
	3	QPSK	815.5	822.5	23.66		18.60	0.072	2M68G7D		
		16QAM			22.85		17.79	0.060	2M69D7D		
	5	QPSK	816.5	821.5	23.61		18.55	0.072	4M49G7D		
		16QAM			22.79		17.73	0.059	4M51D7D		
	10	QPSK	819	819	23.77		18.71	0.074	8M94G7D		
		16QAM			22.69		17.63	0.058	8M95D7D		
	15	QPSK	821.5	821.5	23.73		18.67	0.074	13M5G7D		
		16QAM			23.11		18.05	0.064	13M5D7D		
	26/5 Part 22	1.4	QPSK	824.7	848.3		23.56	-1.81	19.60	0.091	1M10G7D
			16QAM				22.64		18.68	0.074	1M10D7D
3		QPSK	825.5	847.5	23.71	19.75	0.094		2M70G7D		
		16QAM			22.87	18.91	0.078		2M69D7D		
5		QPSK	826.5	846.5	23.96	20.00	0.100		4M49G7D		
		16QAM			22.92	18.96	0.079		4M51D7D		
10		QPSK	829	844	24.14	20.18	0.104		8M95G7D		
		16QAM			22.74	18.78	0.076		8M95D7D		
15		QPSK	831.5	841.5	24.04	20.08	0.102		13M5G7D		
		16QAM			23.33	19.37	0.086		13M5D7D		

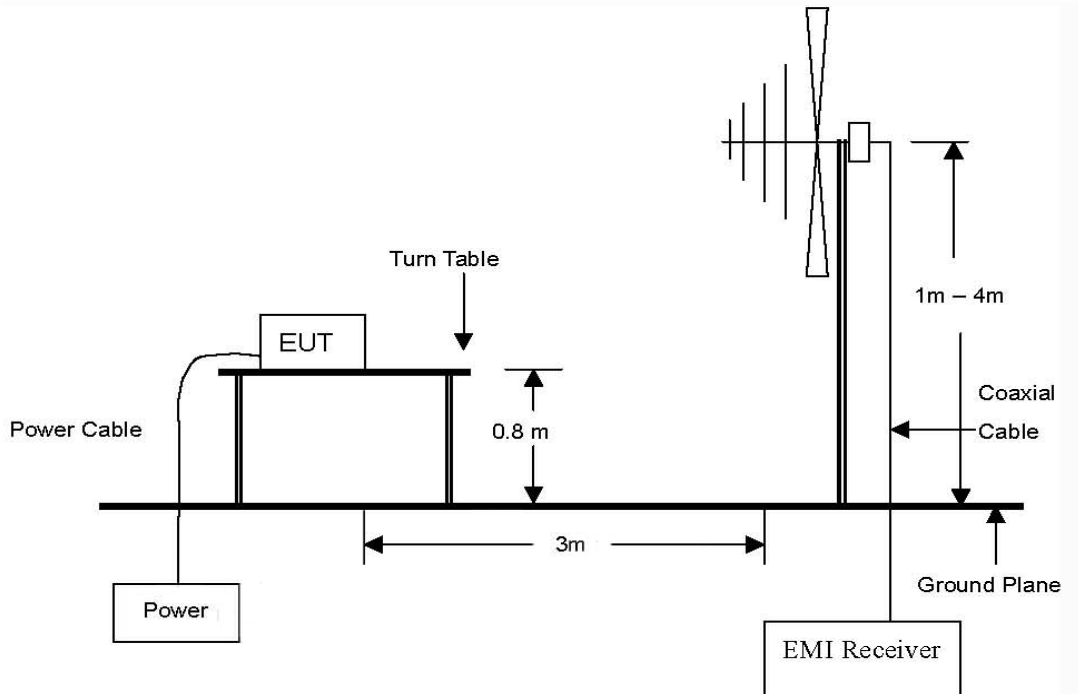
## 2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions

### 2.1. Test setup

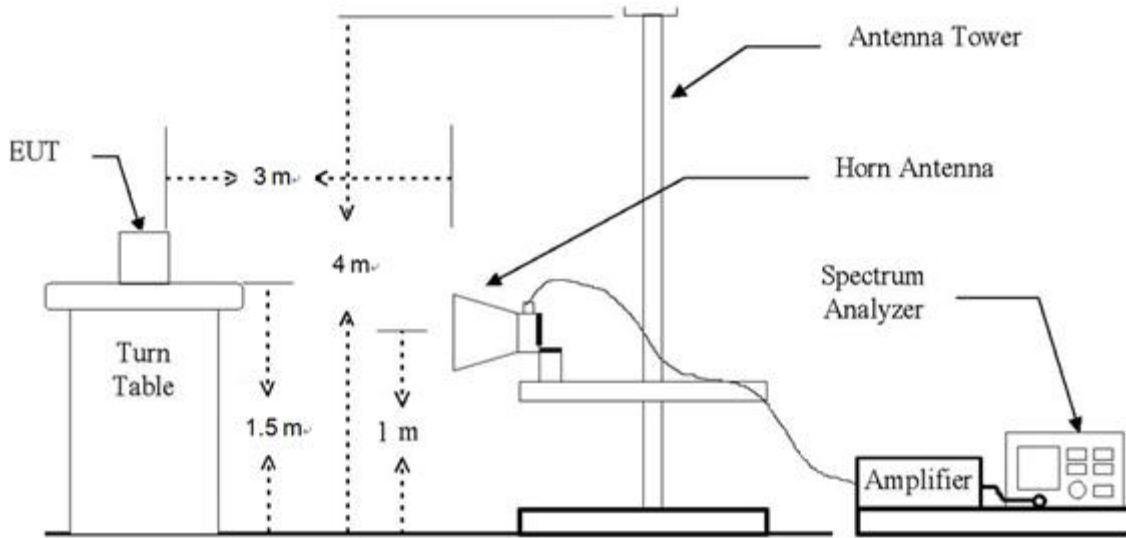
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 26 GHz Emissions.



## 2.2. Limit

### 2.2.1. Limit of E.R.P. / E.I.R.P.

- §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
- §24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
- §27.50(h)(2), mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
- §90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

### 2.2.2. Limit of Radiated Spurious Emissions

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10\log(P)$  dB.
- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.
- §27.53(m)(4), for mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
- §90.691(a), Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
  - (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{ Log}^{10}(f/6.1)$  decibels or  $50 + 10 \text{ Log}^{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
  - (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10\text{Log}^{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

**2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015, KDB 971168 D01 Power Meas License Digital Systems v03r01.**

1. On a test site, the EUT shall be placed at 0.8 m or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. Radiated spurious emissions measurement method was set as follows:  
RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz, VBW  $\geq 3 \times$  RBW,  
Detector = RMS, trace mode = max hold, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
11. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
12. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

## 2.4. Test results

Ambient temperature : (23 ± 1) °C  
 Relative humidity : 47 % R.H.

### 2.4.1. E.R.P. / E.I.R.P.

#### GSM

Band	Frequency (MHz)	Maximum Output Power (dB m)	Maximum Output Power (W)	Final Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
850	824 ~ 849	35	3.162	-1.81	33.19	2.084	31.04	1.271	7 W E.R.P.
1 900	1 850 ~ 1 910	32	1.585	-0.27	31.73	1.489			2 W E.I.R.P.

#### WCDMA

Band	Frequency (MHz)	Maximum Output Power (dB m)	Maximum Output Power (W)	Final Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
V	824 ~ 849	25	0.316	-1.81	23.19	0.208	21.04	0.127	7 W E.R.P.

#### LTE

Band	Frequency (MHz)	Maximum Output Power (dB m)	Maximum Output Power (W)	Final Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
7	2 500 ~ 2 570	25	0.316	-0.95	24.05	0.254			2 W E.I.R.P.
26 Part 90	814 ~ 824	25	0.316	-2.91	22.09	0.162	19.94	0.099	100 W E.R.P.
26/5 Part 22	824 ~ 849	25	0.316	-1.81	23.19	0.208	21.04	0.127	7 W E.R.P.

#### Remark;

1. E.I.R.P. (dB m) = Maximum Conducted Power (dB m) + Antenna Gain (dB i)
2. E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.

### 2.4.2. Radiated Spurious Emissions

#### GSM 850\_GPRS

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (824.2 MHz)									
1 399.50	55.22	H	25.10	-39.15	41.17	-97.41	-56.24	-13	43.24
1 500.50	56.29	V	25.00	-38.90	42.39	-97.41	-55.02	-13	42.02
1 499.75	55.09	H	25.00	-38.90	41.19	-97.41	-56.22	-13	43.22
1 648.50	59.42	V	25.60	-38.67	46.35	-97.41	-51.06	-13	38.06
1 648.75	54.31	H	25.60	-38.68	41.23	-97.41	-56.18	-13	43.18
3 000.25	53.21	V	29.70	-36.88	46.03	-97.41	-51.38	-13	38.38
3 000.25	52.15	H	29.70	-36.88	44.97	-97.41	-52.44	-13	39.44
5 837.00	44.99	V	34.17	-33.68	45.48	-97.41	-51.93	-13	38.93
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (836.6 MHz)									
1 451.50	57.31	V	25.00	-39.10	43.21	-97.41	-54.20	-13	41.20
1 500.50	55.86	H	25.00	-38.90	41.96	-97.41	-55.45	-13	42.45
1 500.50	55.91	V	25.00	-38.90	42.01	-97.41	-55.40	-13	42.40
1 673.50	51.16	V	25.88	-38.66	38.38	-97.41	-59.03	-13	46.03
3 000.25	52.43	H	29.70	-36.88	45.25	-97.41	-52.16	-13	39.16
3 000.25	53.00	V	29.70	-36.88	45.82	-97.41	-51.59	-13	38.59
Above 3 100.00	Not detected	-	-	-	-	-	-	-	-
High Channel (848.8 MHz)									
1 500.00	54.89	H	25.00	-38.90	40.99	-97.41	-56.42	-13	43.42
1 500.25	55.31	V	25.00	-38.90	41.41	-97.41	-56.00	-13	43.00
1 697.75	57.65	H	26.17	-38.77	45.05	-97.41	-52.36	-13	39.36
1 698.00	59.21	V	26.18	-38.77	46.62	-97.41	<b>-50.79</b>	-13	37.79
2 546.25	48.13	H	28.38	-36.57	39.94	-97.41	-57.47	-13	44.47
2 546.50	46.79	V	28.38	-36.57	38.60	-97.41	-58.81	-13	45.81
3 000.25	52.79	H	29.70	-36.88	45.61	-97.41	-51.80	-13	38.80
3 000.25	51.91	V	29.70	-36.88	44.73	-97.41	-52.68	-13	39.68
5 836.75	45.12	V	34.17	-33.68	45.61	-97.41	-51.80	-13	38.80
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-



**GSM 1 900\_GPRS**

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 850.2 MHz)									
3 000.00	50.36	H	29.70	-36.88	43.18	-95.26	-52.08	-13	39.08
3 000.00	50.25	V	29.70	-36.88	43.07	-95.26	-52.19	-13	39.19
5 836.40	40.63	H	34.17	-33.69	41.11	-95.26	-54.15	-13	41.15
5 836.40	43.14	V	34.17	-33.69	43.62	-95.26	-51.64	-13	38.64
5 999.50	42.12	H	34.60	-33.03	43.69	-95.26	-51.57	-13	38.57
5 999.50	42.11	V	34.60	-33.03	43.68	-95.26	-51.58	-13	38.58
7 400.60	40.46	V	36.00	-32.16	44.30	-95.26	-50.96	-13	37.96
9 000.00	42.02	V	37.00	-33.83	45.19	-95.26	-50.07	-13	37.07
9 000.00	42.69	H	37.00	-33.83	45.86	-95.26	-49.40	-13	36.40
Above 9 100.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 880.0 MHz)									
3 000.00	50.62	H	29.70	-36.88	43.44	-95.26	-51.82	-13	38.82
3 000.00	49.77	V	29.70	-36.88	42.59	-95.26	-52.67	-13	39.67
4 825.30	42.68	V	32.70	-35.60	39.78	-95.26	-55.48	-13	42.48
5 836.40	41.39	H	34.17	-33.69	41.87	-95.26	-53.39	-13	40.39
5 836.40	43.02	V	34.17	-33.69	43.50	-95.26	-51.76	-13	38.76
5 999.50	40.61	H	34.60	-33.03	42.18	-95.26	-53.08	-13	40.08
6 000.00	41.29	V	34.60	-33.03	42.86	-95.26	-52.40	-13	39.40
8 999.50	43.35	H	37.00	-33.82	46.53	-95.26	-48.73	-13	35.73
9 000.00	42.43	V	37.00	-33.83	45.60	-95.26	-49.66	-13	36.66
15 039.40	36.33	H	40.62	-26.19	50.76	-95.26	<b>-44.50</b>	-13	31.50
Above 15 100.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (1 909.8 MHz)									
3 000.00	50.72	H	29.70	-36.88	43.54	-95.26	-51.72	-13	38.72
3 000.00	50.61	V	29.70	-36.88	43.43	-95.26	-51.83	-13	38.83
5 836.40	43.67	V	34.17	-33.69	44.15	-95.26	-51.11	-13	38.11
6 000.00	41.50	V	34.60	-33.03	43.07	-95.26	-52.19	-13	39.19
7 639.20	40.53	V	35.90	-32.50	43.93	-95.26	-51.33	-13	38.33
9 000.00	43.42	H	37.00	-33.83	46.59	-95.26	-48.67	-13	35.67
9 000.00	41.66	V	37.00	-33.83	44.83	-95.26	-50.43	-13	37.43
9 548.40	39.98	V	37.70	-32.24	45.44	-95.26	-49.82	-13	36.82
Above 9 600.00	Not detected	-	-	-	-	-	-	-	-

**WCDMA V**

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (826.4 MHz)									
1 500.25	54.90	H	25.00	-38.90	41.00	-97.41	-56.41	-13	43.41
1 500.25	54.50	V	25.00	-38.90	40.60	-97.41	-56.81	-13	43.81
2 512.75	63.97	V	28.18	-37.02	55.13	-97.41	-42.28	-13	29.28
3 000.00	52.71	H	29.70	-36.88	45.53	-97.41	-51.88	-13	38.88
3 000.25	52.02	V	29.70	-36.88	44.84	-97.41	-52.57	-13	39.57
5 837.00	43.39	H	34.17	-33.68	43.88	-97.41	-53.53	-13	40.53
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (836.6 MHz)									
1 500.25	53.59	H	25.00	-38.90	39.69	-97.41	-57.72	-13	44.72
1 500.25	56.65	V	25.00	-38.90	42.75	-97.41	-54.66	-13	41.66
2 123.00	53.58	H	27.55	-37.05	44.08	-97.41	-53.33	-13	40.33
2 513.50	64.38	V	28.18	-37.01	55.55	-97.41	-41.86	-13	28.86
2 513.75	59.83	H	28.18	-37.01	51.00	-97.41	-46.41	-13	33.41
3 000.25	52.44	V	29.70	-36.88	45.26	-97.41	-52.15	-13	39.15
3 000.25	51.25	H	29.70	-36.88	44.07	-97.41	-53.34	-13	40.34
5 837.25	45.13	V	34.17	-33.68	45.62	-97.41	-51.79	-13	38.79
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (846.6 MHz)									
1 500.50	55.64	H	25.00	-38.90	41.74	-97.41	-55.67	-13	42.67
1 500.50	55.82	V	25.00	-38.90	41.92	-97.41	-55.49	-13	42.49
2 543.00	58.28	H	28.36	-36.61	50.03	-97.41	-47.38	-13	34.38
2 542.50	66.30	V	28.36	-36.62	58.04	-97.41	<b>-39.37</b>	-13	26.37
3 000.25	51.84	H	29.70	-36.88	44.66	-97.41	-52.75	-13	39.75
3 000.25	51.41	V	29.70	-36.88	44.23	-97.41	-53.18	-13	40.18
5 837.00	45.39	V	34.17	-33.68	45.88	-97.41	-51.53	-13	38.53
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-

**LTE band 7 (5 MHz - QPSK)**

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 502.5 MHz)									
3 000.00	51.41	H	29.70	-36.88	44.23	-95.26	-51.03	-25	26.03
3 000.00	50.48	V	29.70	-36.88	43.30	-95.26	-51.96	-25	26.96
5 836.40	42.89	H	34.17	-33.69	43.37	-95.26	-51.89	-25	26.89
5 836.40	43.47	V	34.17	-33.69	43.95	-95.26	-51.31	-25	26.31
5 999.50	40.47	H	34.60	-33.03	42.04	-95.26	-53.22	-25	28.22
6 000.00	41.75	V	34.60	-33.03	43.32	-95.26	-51.94	-25	26.94
9 000.00	43.01	H	37.00	-33.83	46.18	-95.26	-49.08	-25	24.08
9 000.00	41.61	V	37.00	-33.83	44.78	-95.26	-50.48	-25	25.48
Above 9 100.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (2 535.0 MHz)									
3 000.00	52.43	H	29.70	-36.88	45.25	-95.26	-50.01	-25	25.01
3 000.00	49.63	V	29.70	-36.88	42.45	-95.26	-52.81	-25	27.81
5 836.40	43.16	H	34.17	-33.69	43.64	-95.26	-51.62	-25	26.62
5 836.40	43.14	V	34.17	-33.69	43.62	-95.26	-51.64	-25	26.64
5 999.50	42.22	V	34.60	-33.03	43.79	-95.26	-51.47	-25	26.47
9 000.00	43.31	H	37.00	-33.83	46.48	-95.26	<b>-48.78</b>	-25	23.78
9 000.00	41.03	V	37.00	-33.83	44.20	-95.26	-51.06	-25	26.06
Above 9 100.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (2 567.5 MHz)									
3 000.00	51.72	H	29.70	-36.88	44.54	-95.26	-50.72	-25	25.72
3 000.00	49.41	V	29.70	-36.88	42.23	-95.26	-53.03	-25	28.03
5 130.00	45.61	H	33.26	-35.45	43.42	-95.26	-51.84	-25	26.84
5 130.50	44.14	V	33.26	-35.45	41.95	-95.26	-53.31	-25	28.31
5 836.40	42.06	H	34.17	-33.69	42.54	-95.26	-52.72	-25	27.72
5 836.40	42.48	V	34.17	-33.69	42.96	-95.26	-52.30	-25	27.30
6 000.00	40.89	H	34.60	-33.03	42.46	-95.26	-52.80	-25	27.80
6 000.00	42.19	V	34.60	-33.03	43.76	-95.26	-51.50	-25	26.50
9 000.00	42.64	H	37.00	-33.83	45.81	-95.26	-49.45	-25	24.45
9 000.00	42.27	V	37.00	-33.83	45.44	-95.26	-49.82	-25	24.82
Above 9 100.00	Not detected	-	-	-	-	-	-	-	-

\*1 RB Size

**LTE band 26\_Part 90 (10 MHz - QPSK)**

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (819.0 MHz)									
1 500.25	55.19	H	25.00	-38.90	41.29	-97.41	-56.12	-13	43.12
1 500.50	55.27	V	25.00	-38.90	41.37	-97.41	-56.04	-13	43.04
3 000.25	52.99	H	29.70	-36.88	45.81	-97.41	<b>-51.60</b>	-13	38.60
3 000.25	52.23	V	29.70	-36.88	45.05	-97.41	-52.36	-13	39.36
5 837.25	43.80	H	34.17	-33.68	44.29	-97.41	-53.12	-13	40.12
5 836.50	45.28	V	34.17	-33.69	45.76	-97.41	-51.65	-13	38.65
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-

\*1 RB Size

**LTE band 26/5\_Part 22 (10 MHz - QPSK)**

Frequency (MHz)	Measured Level (dB $\mu$ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB $\mu$ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (829.0 MHz)									
1 500.25	55.13	H	25.00	-38.90	41.23	-97.41	-56.18	-13	43.18
1 500.50	55.79	V	25.00	-38.90	41.89	-97.41	-55.52	-13	42.52
3 000.00	52.99	H	29.70	-36.88	45.81	-97.41	-51.60	-13	38.60
3 000.25	51.14	V	29.70	-36.88	43.96	-97.41	-53.45	-13	40.45
5 837.25	44.47	V	34.17	-33.68	44.96	-97.41	-52.45	-13	39.45
Above 5 900.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (836.5 MHz)									
1 500.25	53.29	H	25.00	-38.90	39.39	-97.41	-58.02	-13	45.02
1 500.50	54.41	V	25.00	-38.90	40.51	-97.41	-56.90	-13	43.90
2 496.25	61.34	H	28.11	-37.16	52.29	-97.41	-45.12	-13	32.12
2 496.50	63.31	V	28.11	-37.16	54.26	-97.41	-43.15	-13	30.15
2 521.75	64.27	H	28.23	-36.89	55.61	-97.41	-41.80	-13	28.80
2 522.00	70.79	V	28.23	-36.89	62.13	-97.41	<b>-35.28</b>	-13	22.28
3 000.25	53.22	H	29.70	-36.88	46.04	-97.41	-51.37	-13	38.37
3 000.25	52.08	V	29.70	-36.88	44.90	-97.41	-52.51	-13	39.51
5 386.75	43.79	H	33.90	-34.62	43.07	-97.41	-54.34	-13	41.34
Above 5 400.00	Not detected	-	-	-	-	-	-	-	-
High Channel (844.0 MHz)									
1 500.25	54.86	H	25.00	-38.90	40.96	-97.41	-56.45	-13	43.45
1 500.00	56.48	V	25.00	-38.90	42.58	-97.41	-54.83	-13	41.83
2 519.00	61.20	H	28.21	-36.93	52.48	-97.41	-44.93	-13	31.93
2 519.00	68.36	V	28.21	-36.93	59.64	-97.41	-37.77	-13	24.77
3 000.25	51.14	H	29.70	-36.88	43.96	-97.41	-53.45	-13	40.45
3 000.25	51.98	V	29.70	-36.88	44.80	-97.41	-52.61	-13	39.61
5 386.75	43.07	H	33.90	-34.62	42.35	-97.41	-55.06	-13	42.06
Above 5 400.00	Not detected	-	-	-	-	-	-	-	-

\*1 RB Size

**Remark;**

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2.  $E \text{ (dB}\mu\text{V/m)} = \text{Measured Level (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + \text{AMP (dB)}$ .
3.  $\text{E.I.R.P. (dB m)} = E \text{ (dB}\mu\text{V/m)} + \text{CF (dB)}$ .
4.  $\text{E.R.P. (dB m)} = E \text{ (dB}\mu\text{V/m)} + \text{CF (dB)} - 2.15 \text{ (dB)}$ ; where E.R.P. and E.I.R.P. are expressed in consistent units.
5.  $\text{CF (dB)} = 20 \log D - 104.8$ ; where D is the measurement distance in meters, According to ANSI C63.26-2015 5.2.7 and KDB 971168 D01 v03r01 5.8.4
6. The frequency spectrum is examined from 9 kHz to the 10<sup>th</sup> harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

### 3. Conducted Output Power

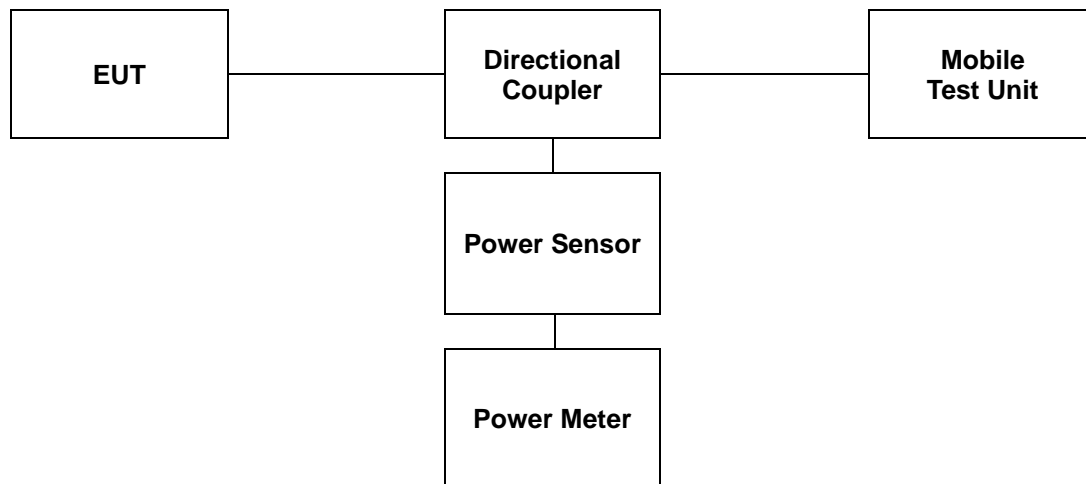
#### 3.1. Limit

CFR 47, Section FCC §2.1046.

#### 3.2. Test Procedure

Output power shall be measured at the RF output terminals for all configurations.

1. The RF output of the transmitter was connected to the input of the mobile test unit in order to establish communication with the EUT.
2. The EUT was set up for the max. output power with pseudo random data modulation by using mobile test unit parameters.
3. The measurement performed using a wideband RF power meter.
4. This EUT was tested under all configurations and the highest power was investigated and reported.



### 3.3. Test Result

Ambient temperature : (23 ± 1) °C  
 Relative humidity : 47 % R.H.

GSM 850							
Mode		Conducted Output Power					
		128 (824.2 MHz)		190 (836.6 MHz)		251 (848.8 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
GPRS	1 Tx slot	<u>32.19</u>	<u>1.656</u>	31.97	1.574	31.82	1.521
	2 Tx slot	31.37	1.371	31.79	1.510	31.41	1.384
EGPRS	1 Tx slot	<u>26.25</u>	<u>0.422</u>	26.02	0.400	26.21	0.418
	2 Tx slot	26.20	0.417	26.15	0.412	26.13	0.410

GSM 1 900							
Mode		Conducted Output Power					
		512 (1 850.2 MHz)		661 (1 880.0 MHz)		810 (1 909.8 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
GPRS	1 Tx slot	<u>28.46</u>	<u>0.701</u>	28.16	0.655	28.33	0.681
	2 Tx slot	28.13	0.650	28.23	0.665	28.39	0.690
EGPRS	1 Tx slot	24.13	0.259	<u>24.55</u>	<u>0.285</u>	24.22	0.264
	2 Tx slot	24.23	0.265	24.33	0.271	24.19	0.262

WCDMA V							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		4132 (826.4 MHz)		4183 (836.6 MHz)		4233 (846.6 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	22.92	0.196	<u>23.11</u>	<u>0.205</u>	23.06	0.202
HSDPA	Subtest 1	21.84	0.153	21.89	0.155	<u>21.94</u>	<u>0.156</u>
	Subtest 2	21.83	0.152	21.79	0.151	21.88	0.154
	Subtest 3	21.43	0.139	21.45	0.140	21.49	0.141
	Subtest 4	21.40	0.138	21.41	0.138	21.39	0.138
HSUPA	Subtest 1	21.43	0.139	21.39	0.138	21.31	0.135
	Subtest 2	21.38	0.137	21.40	0.138	21.49	0.141
	Subtest 3	21.33	0.136	21.39	0.138	21.42	0.139
	Subtest 4	21.36	0.137	21.41	0.138	21.49	0.141
	Subtest 5	21.39	0.138	21.42	0.139	21.55	0.143
HSPA+		21.91	0.155	22.05	0.160	22.11	0.163



LTE Band 7									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20775 (2 502.5 MHz)		21100 (2 535.0 MHz)		21425 (2 567.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	23.68	0.233	24.19	0.262	<b>24.36</b>	<b>0.273</b>
		1	12	23.14	0.206	23.82	0.241	23.44	0.221
		1	24	23.15	0.207	23.86	0.243	23.49	0.223
		12	0	22.41	0.174	22.66	0.185	23.52	0.225
		12	6	22.38	0.173	22.67	0.185	23.39	0.218
		12	13	22.34	0.171	22.67	0.185	23.45	0.221
		25	0	22.37	0.173	22.66	0.185	23.52	0.225
	16QAM	1	0	22.54	0.179	<b>22.99</b>	<b>0.199</b>	22.58	0.181
		1	12	22.40	0.174	22.94	0.197	22.60	0.182
		1	24	22.40	0.174	22.99	0.199	22.66	0.185
		12	0	21.47	0.140	21.69	0.148	22.79	0.190
		12	6	21.39	0.138	21.65	0.146	22.65	0.184
		12	13	21.33	0.136	21.66	0.147	22.60	0.182
		25	0	21.46	0.140	21.70	0.148	22.64	0.184

LTE Band 7									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20800 (2 505.0 MHz)		21100 (2 535.0 MHz)		21400 (2 565.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
10	QPSK	1	0	23.65	0.232	<b>24.00</b>	<b>0.251</b>	23.56	0.227
		1	25	23.51	0.224	23.72	0.236	23.33	0.215
		1	49	23.44	0.221	23.58	0.228	23.36	0.217
		25	0	23.56	0.227	22.81	0.191	22.45	0.176
		25	12	23.48	0.223	22.71	0.187	22.43	0.175
		25	25	23.54	0.226	22.80	0.191	22.45	0.176
		50	0	22.56	0.180	22.78	0.190	22.43	0.175
	16QAM	1	0	22.55	0.180	<b>23.04</b>	<b>0.201</b>	22.74	0.188
		1	25	22.77	0.189	22.99	0.199	22.33	0.171
		1	49	22.50	0.178	22.81	0.191	22.55	0.180
		25	0	22.54	0.179	21.76	0.150	21.38	0.137
		25	12	22.42	0.175	21.74	0.149	21.38	0.137
		25	25	22.50	0.178	21.77	0.150	21.38	0.137
		50	0	21.51	0.142	21.82	0.152	21.37	0.137

LTE Band 7									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20825 (2 507.5 MHz)		21100 (2 535.0 MHz)		21375 (2 562.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
15	QPSK	1	0	24.34	0.272	<b>24.34</b>	<b>0.272</b>	24.16	0.261
		1	36	23.83	0.242	23.95	0.248	23.38	0.218
		1	74	23.67	0.233	23.92	0.247	23.96	0.249
		36	0	24.15	0.260	23.15	0.207	22.88	0.194
		36	18	23.89	0.245	23.07	0.203	22.63	0.183
		36	37	23.84	0.242	22.82	0.191	22.60	0.182
		75	0	22.83	0.192	23.00	0.200	22.73	0.187
	16QAM	1	0	23.43	0.220	<b>23.79</b>	<b>0.239</b>	23.40	0.219
		1	36	22.98	0.199	23.14	0.206	22.62	0.183
		1	74	23.00	0.200	23.12	0.205	23.21	0.209
		36	0	22.90	0.195	22.18	0.165	21.93	0.156
		36	18	22.98	0.199	22.03	0.160	21.51	0.142
		36	37	22.80	0.191	21.83	0.152	21.55	0.143
		75	0	21.89	0.155	22.06	0.161	21.64	0.146

LTE Band 7									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20850 (2 510.0 MHz)		21100 (2 535.0 MHz)		21350 (2 560.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
20	QPSK	1	0	<b>24.33</b>	<b>0.271</b>	24.28	0.268	24.12	0.258
		1	50	24.06	0.255	24.28	0.268	23.55	0.226
		1	99	24.04	0.254	23.76	0.238	23.69	0.234
		50	0	24.31	0.270	23.67	0.233	23.22	0.210
		50	25	24.27	0.267	23.19	0.208	22.86	0.193
		50	50	24.09	0.256	23.05	0.202	22.47	0.177
		100	0	23.26	0.212	23.26	0.212	23.00	0.200
	16QAM	1	0	<b>23.74</b>	<b>0.237</b>	23.32	0.215	23.56	0.227
		1	50	23.01	0.200	23.39	0.218	22.92	0.196
		1	99	23.24	0.211	23.01	0.200	23.07	0.203
		50	0	23.52	0.225	22.61	0.182	22.19	0.166
		50	25	23.33	0.215	22.25	0.168	21.93	0.156
		50	50	23.11	0.205	22.04	0.160	21.44	0.139
		100	0	22.28	0.169	22.27	0.169	21.92	0.156

LTE Band 26_part 90									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26697 (814.7 MHz)		26740 (819.0 MHz)		26783 (823.3 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
1.4	QPSK	1	0	<b>23.47</b>	<b>0.222</b>	23.46	0.222	23.32	0.215
		1	2	23.43	0.220	23.14	0.206	23.35	0.216
		1	5	23.21	0.209	23.15	0.207	23.36	0.217
		3	0	23.42	0.220	23.27	0.212	23.40	0.219
		3	2	23.30	0.214	23.19	0.208	23.38	0.218
		3	3	23.36	0.217	23.44	0.221	23.34	0.216
		6	0	22.51	0.178	23.28	0.213	23.38	0.218
	16QAM	1	0	22.64	0.184	22.50	0.178	22.61	0.182
		1	2	22.61	0.182	22.36	0.172	<b>22.66</b>	<b>0.185</b>
		1	5	22.49	0.177	22.40	0.174	22.63	0.183
		3	0	22.42	0.175	22.39	0.173	22.54	0.179
		3	2	22.46	0.176	22.54	0.179	22.49	0.177
		3	3	22.42	0.175	22.51	0.178	22.16	0.164
		6	0	21.52	0.142	22.45	0.176	22.52	0.179

LTE Band 26_part 90									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26705 (815.5 MHz)		26740 (819.0 MHz)		26775 (822.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
3	QPSK	1	0	23.43	0.220	23.47	0.222	23.46	0.222
		1	7	23.62	0.230	23.43	0.220	<b>23.66</b>	<b>0.232</b>
		1	14	23.54	0.226	23.34	0.216	23.60	0.229
		8	0	23.44	0.221	22.46	0.176	22.47	0.177
		8	4	23.43	0.220	22.38	0.173	22.49	0.177
		8	7	23.48	0.223	22.48	0.177	22.55	0.180
		15	0	22.55	0.180	22.43	0.175	22.52	0.179
	16QAM	1	0	22.62	0.183	22.50	0.178	22.67	0.185
		1	7	22.69	0.186	22.53	0.179	<b>22.85</b>	<b>0.193</b>
		1	14	22.68	0.185	22.45	0.176	22.67	0.185
		8	0	22.53	0.179	21.61	0.145	21.53	0.142
		8	4	22.49	0.177	21.47	0.140	21.51	0.142
		8	7	22.55	0.180	21.57	0.144	21.56	0.143
		15	0	21.64	0.146	21.47	0.140	21.55	0.143

LTE Band 26_part 90									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26715 (816.5 MHz)		26740 (819.0 MHz)		26765 (821.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	23.58	0.228	23.44	0.221	23.48	0.223
		1	12	<b>23.61</b>	<b>0.230</b>	23.60	0.229	23.28	0.213
		1	24	23.57	0.228	23.61	0.230	23.39	0.218
		12	0	23.37	0.217	23.40	0.219	22.43	0.175
		12	6	23.37	0.217	23.51	0.224	22.42	0.175
		12	13	23.34	0.216	23.41	0.219	22.47	0.177
		25	0	23.39	0.218	22.47	0.177	22.40	0.174
	16QAM	1	0	22.58	0.181	22.65	0.184	<b>22.79</b>	<b>0.190</b>
		1	12	22.73	0.187	22.69	0.186	22.55	0.180
		1	24	22.66	0.185	22.59	0.182	22.50	0.178
		12	0	22.49	0.177	22.58	0.181	21.46	0.140
		12	6	22.47	0.177	22.53	0.179	21.44	0.139
		12	13	22.43	0.175	22.58	0.181	21.50	0.141
		25	0	22.54	0.179	21.42	0.139	21.49	0.141

LTE Band 26_part 90									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				-		26740 (819.0 MHz)		-	
				-	-	-	-	-	-
10	QPSK	1	0	-	-	23.42	0.220	-	-
		1	25	-	-	<b>23.77</b>	<b>0.238</b>	-	-
		1	49	-	-	23.44	0.221	-	-
		25	0	-	-	23.36	0.217	-	-
		25	12	-	-	23.49	0.223	-	-
		25	25	-	-	23.37	0.217	-	-
		50	0	-	-	22.51	0.178	-	-
	16QAM	1	0	-	-	<b>22.69</b>	<b>0.186</b>	-	-
		1	25	-	-	22.58	0.181	-	-
		1	49	-	-	22.63	0.183	-	-
		25	0	-	-	22.56	0.180	-	-
		25	12	-	-	22.60	0.182	-	-
		25	25	-	-	22.44	0.175	-	-
		50	0	-	-	21.49	0.141	-	-

LTE Band 26_part 90									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				-		26765 (821.5 MHz)		-	
				-	-	-	-	-	-
15	QPSK	1	0	-	-	<b>23.73</b>	<b>0.236</b>	-	-
		1	36	-	-	23.68	0.233	-	-
		1	74	-	-	23.28	0.213	-	-
		36	0	-	-	23.67	0.233	-	-
		36	18	-	-	23.55	0.226	-	-
		36	37	-	-	23.69	0.234	-	-
		75	0	-	-	23.34	0.216	-	-
	16QAM	1	0	-	-	22.94	0.197	-	-
		1	36	-	-	22.83	0.192	-	-
		1	74	-	-	<b>23.11</b>	<b>0.205</b>	-	-
		36	0	-	-	22.97	0.198	-	-
		36	18	-	-	22.65	0.184	-	-
		36	37	-	-	22.42	0.175	-	-
		75	0	-	-	22.92	0.196	-	-

LTE Band 26/5_part 22									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26797 (824.7 MHz)		26915 (836.5 MHz)		27033 (848.3 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
1.4	QPSK	1	0	23.28	0.213	23.06	0.202	<b>23.56</b>	<b>0.227</b>
		1	2	23.32	0.215	23.07	0.203	23.19	0.208
		1	5	23.31	0.214	23.03	0.201	23.28	0.213
		3	0	23.36	0.217	23.17	0.207	23.54	0.226
		3	2	23.41	0.219	23.44	0.221	23.28	0.213
		3	3	23.29	0.213	23.29	0.213	23.20	0.209
	16QAM	6	0	22.48	0.177	23.21	0.209	23.21	0.209
		1	0	22.60	0.182	22.42	0.175	22.45	0.176
		1	3	<b>22.64</b>	<b>0.184</b>	22.34	0.171	22.63	0.183
		1	5	22.57	0.181	22.47	0.177	22.44	0.175
		3	0	22.37	0.173	22.40	0.174	22.44	0.175
		3	2	22.48	0.177	22.44	0.175	22.45	0.176
		3	3	22.29	0.169	22.57	0.181	22.49	0.177
		6	0	21.55	0.143	22.41	0.174	22.42	0.175

LTE Band 26/5_part 22									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26805 (825.5 MHz)		26915 (836.5 MHz)		27025 (847.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
3	QPSK	1	0	23.48	0.223	23.41	0.219	23.48	0.223
		1	7	23.57	0.228	23.37	0.217	23.62	0.230
		1	14	23.56	0.227	23.35	0.216	<b>23.71</b>	<b>0.235</b>
		8	0	23.34	0.216	22.52	0.179	22.50	0.178
		8	4	23.45	0.221	22.54	0.179	22.53	0.179
		8	7	23.43	0.220	22.46	0.176	22.52	0.179
		15	0	22.56	0.180	22.55	0.180	22.51	0.178
	16QAM	1	0	22.63	0.183	22.44	0.175	22.60	0.182
		1	7	22.76	0.189	22.42	0.175	<b>22.87</b>	<b>0.194</b>
		1	14	22.67	0.185	22.43	0.175	22.73	0.187
		8	0	22.39	0.173	21.65	0.146	21.47	0.140
		8	4	22.53	0.179	21.66	0.147	21.47	0.140
		8	7	22.48	0.177	21.52	0.142	21.47	0.140
		15	0	21.67	0.147	21.48	0.141	21.46	0.140

LTE Band 26/5_part 22									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26815 (826.5 MHz)		26915 (836.5 MHz)		27015 (846.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	23.51	0.224	23.51	0.224	23.52	0.225
		1	12	23.56	0.227	<b>23.96</b>	<b>0.249</b>	23.46	0.222
		1	24	23.50	0.224	23.63	0.231	23.55	0.226
		12	0	23.40	0.219	23.42	0.220	22.53	0.179
		12	6	23.35	0.216	23.40	0.219	22.54	0.179
		12	13	23.32	0.215	23.41	0.219	22.49	0.177
		25	0	23.48	0.223	22.46	0.176	22.56	0.180
	16QAM	1	0	22.58	0.181	22.76	0.189	22.72	0.187
		1	12	22.52	0.179	<b>22.92</b>	<b>0.196</b>	22.62	0.183
		1	24	22.64	0.184	22.43	0.175	22.67	0.185
		12	0	22.39	0.173	22.55	0.180	21.54	0.143
		12	6	22.37	0.173	22.59	0.182	21.53	0.142
		12	13	22.40	0.174	22.63	0.183	21.44	0.139
		25	0	22.58	0.181	21.33	0.136	21.55	0.143

LTE Band 26/5_part 22									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26840 (829.0 MHz)		26915 (836.5 MHz)		26990 (844.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
10	QPSK	1	0	23.48	0.223	23.61	0.230	<b>24.14</b>	<b>0.259</b>
		1	25	23.44	0.221	23.57	0.228	23.55	0.226
		1	49	23.53	0.225	23.63	0.231	23.60	0.229
		25	0	23.50	0.224	23.51	0.224	23.46	0.222
		25	12	23.36	0.217	23.47	0.222	23.59	0.229
		25	25	23.44	0.221	23.42	0.220	23.52	0.225
		50	0	23.38	0.218	22.60	0.182	22.62	0.183
	16QAM	1	0	22.61	0.182	<b>22.74</b>	<b>0.188</b>	22.73	0.187
		1	25	22.63	0.183	22.45	0.176	22.65	0.184
		1	49	22.60	0.182	22.35	0.172	22.70	0.186
		25	0	22.56	0.180	22.70	0.186	22.47	0.177
		25	12	22.41	0.174	22.66	0.185	22.61	0.182
		25	25	22.53	0.179	22.53	0.179	22.51	0.178
		50	0	22.44	0.175	21.51	0.142	21.58	0.144

LTE Band 26_part 22									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				26865 (831.5 MHz)		-		26965 (841.5 MHz)	
				(dB m)	(W)	-	-	(dB m)	(W)
15	QPSK	1	0	23.63	0.231	-	-	<b>24.04</b>	<b>0.254</b>
		1	36	23.58	0.228	-	-	23.82	0.241
		1	74	23.71	0.235	-	-	23.54	0.226
		36	0	23.93	0.247	-	-	23.76	0.238
		36	18	23.77	0.238	-	-	23.59	0.229
		36	37	23.76	0.238	-	-	23.61	0.230
		75	0	23.77	0.238	-	-	22.84	0.192
	16QAM	1	0	22.98	0.199	-	-	<b>23.33</b>	<b>0.215</b>
		1	36	23.04	0.201	-	-	23.16	0.207
		1	74	22.93	0.196	-	-	22.64	0.184
		36	0	22.97	0.198	-	-	22.96	0.198
		36	18	22.63	0.183	-	-	22.80	0.191
		36	37	22.85	0.193	-	-	22.72	0.187
		75	0	22.93	0.196	-	-	21.86	0.153

## 4. Occupied Bandwidth

### 4.1. Limit

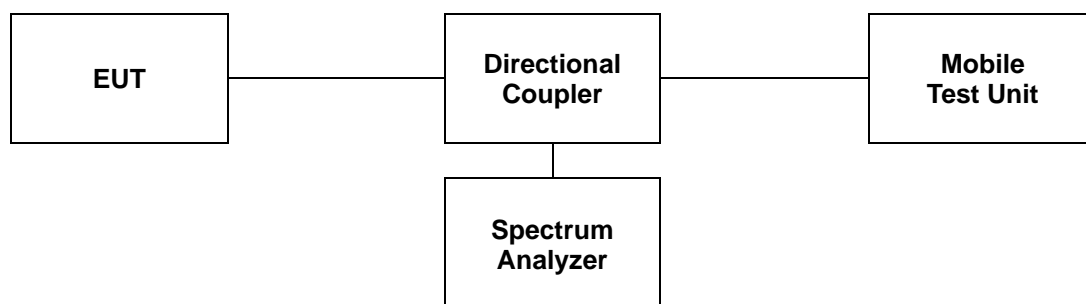
CFR 47, Section FCC §2.1049.

### 4.2. Test Procedure

The test follows section 5.4.4 of ANSI C63.26-2015.

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of  $1.5 \times \text{OBW}$  is sufficient).
- b. The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. Set the detection mode to peak, and the trace mode to max-hold.
- e. If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference between these two frequencies.
- f. The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).



### 4.3 Test Results

Ambient temperature : (23 ± 1) °C  
 Relative humidity : 47 % R.H.

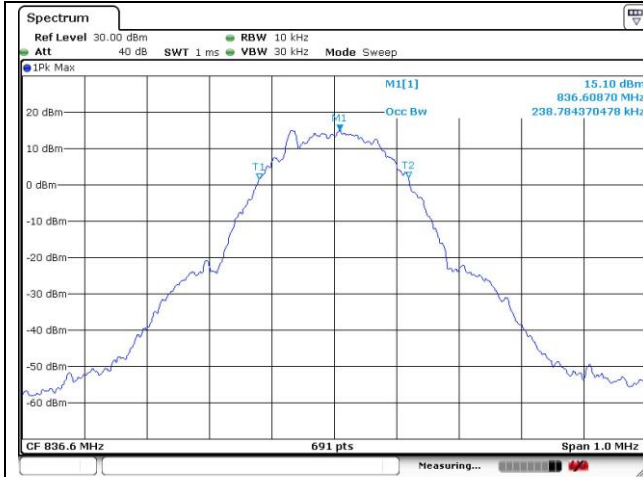
Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
GSM 850	GPRS	836.6	0.239
	EDGE		0.245
GSM 1 900	GPRS	1 880.0	0.242
	EDGE		0.242

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
WCDMA V	RMC	836.6	4.168
	HSDPA		4.139

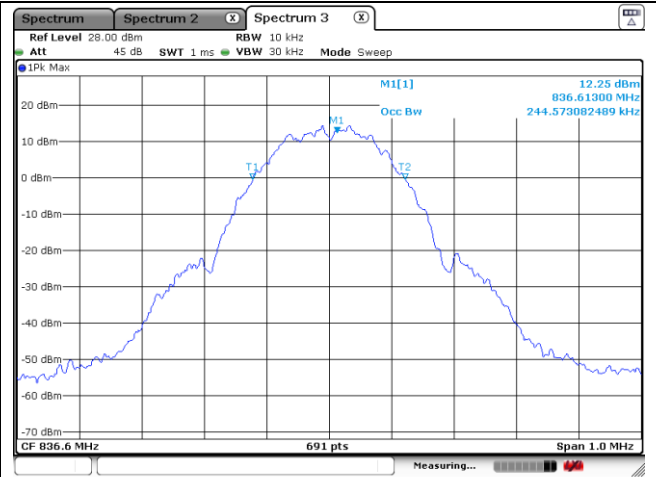
Band	Bandwidth (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)	
			QPSK	16QAM
LTE Band 7	5	2 535	4.493	4.476
	10		8.918	8.952
	15		13.478	13.478
	20		17.903	17.903
LTE Band 26 Part 90	1.4	819	1.103	1.083
	3		2.676	2.686
	5		4.493	4.509
	10		8.944	8.952
	15	821.5	13.527	13.478
LTE Band 26/5 Part 22	1.4	836.5	1.098	1.098
	3		2.696	2.686
	5		4.493	4.509
	10		8.952	8.952
LTE Band 26 Part 22	15	831.5	13.527	13.478

**- Test plots**

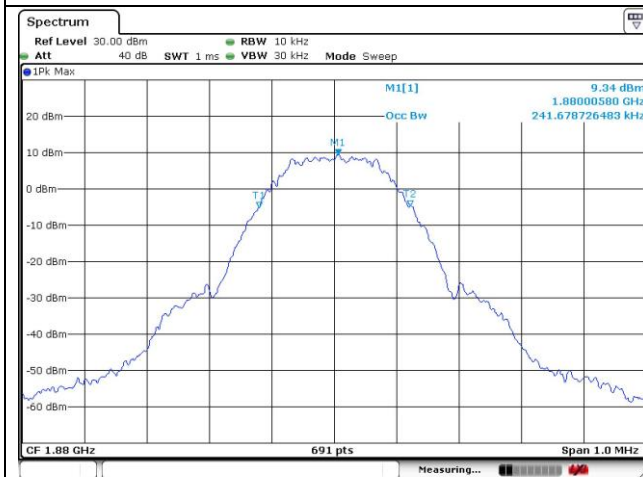
**GSM**



GSM 850 GPRS Middle Channel



GSM 850 EDGE Middle Channel

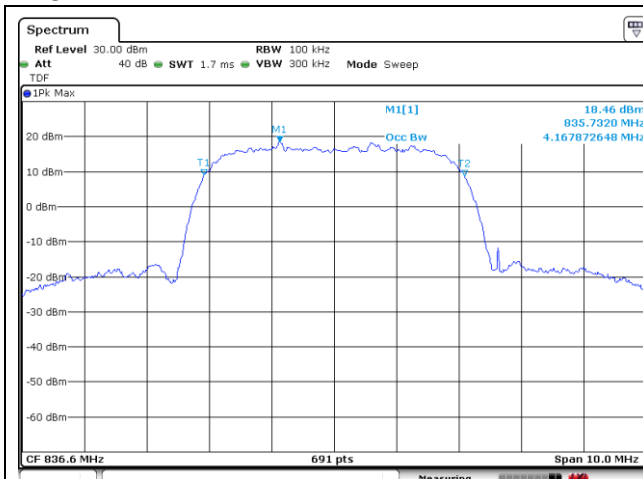


GSM 1 900 GPRS Middle Channel

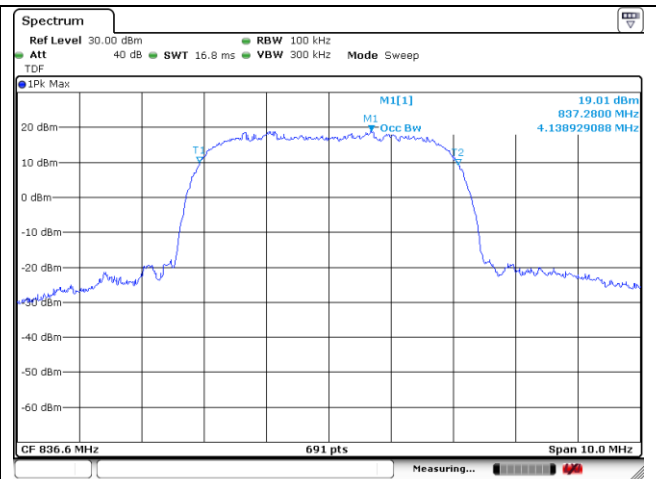


GSM 1 900 EDGE Middle Channel

**WCDMA**



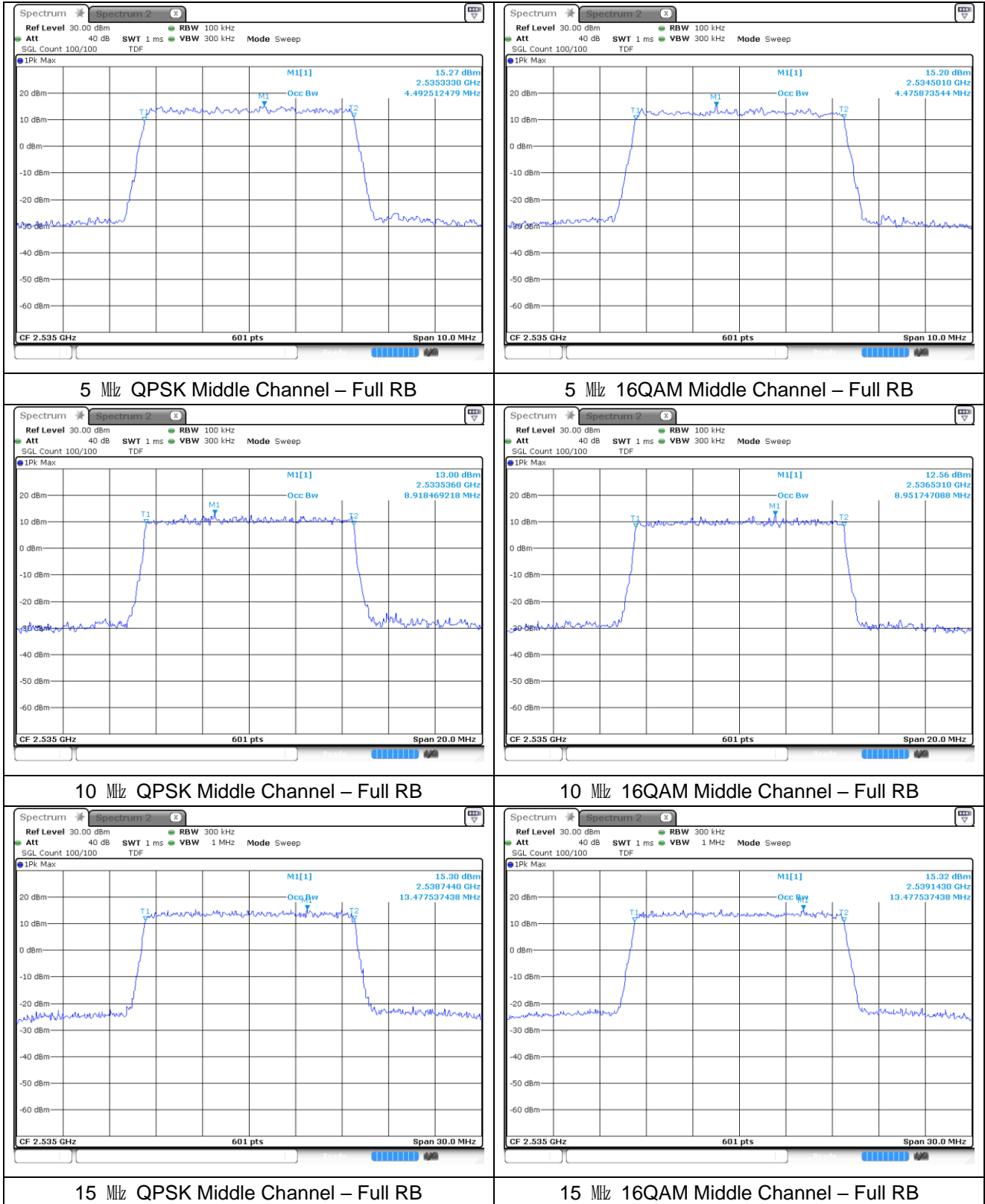
WCDMA RMC Middle Channel

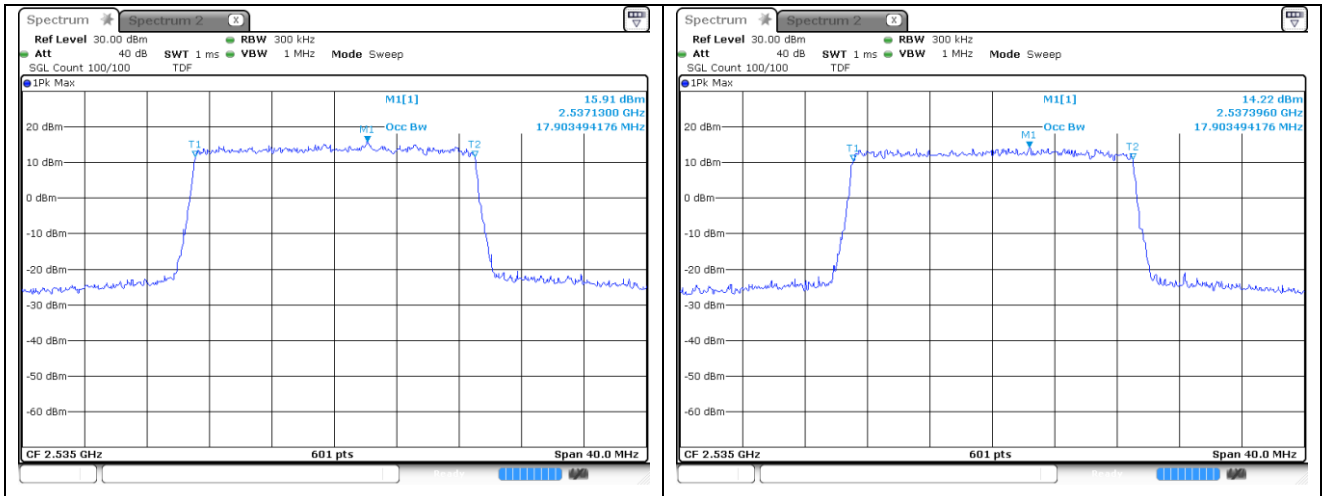


WCDMA HSDPA Middle Channel



**LTE band 7**

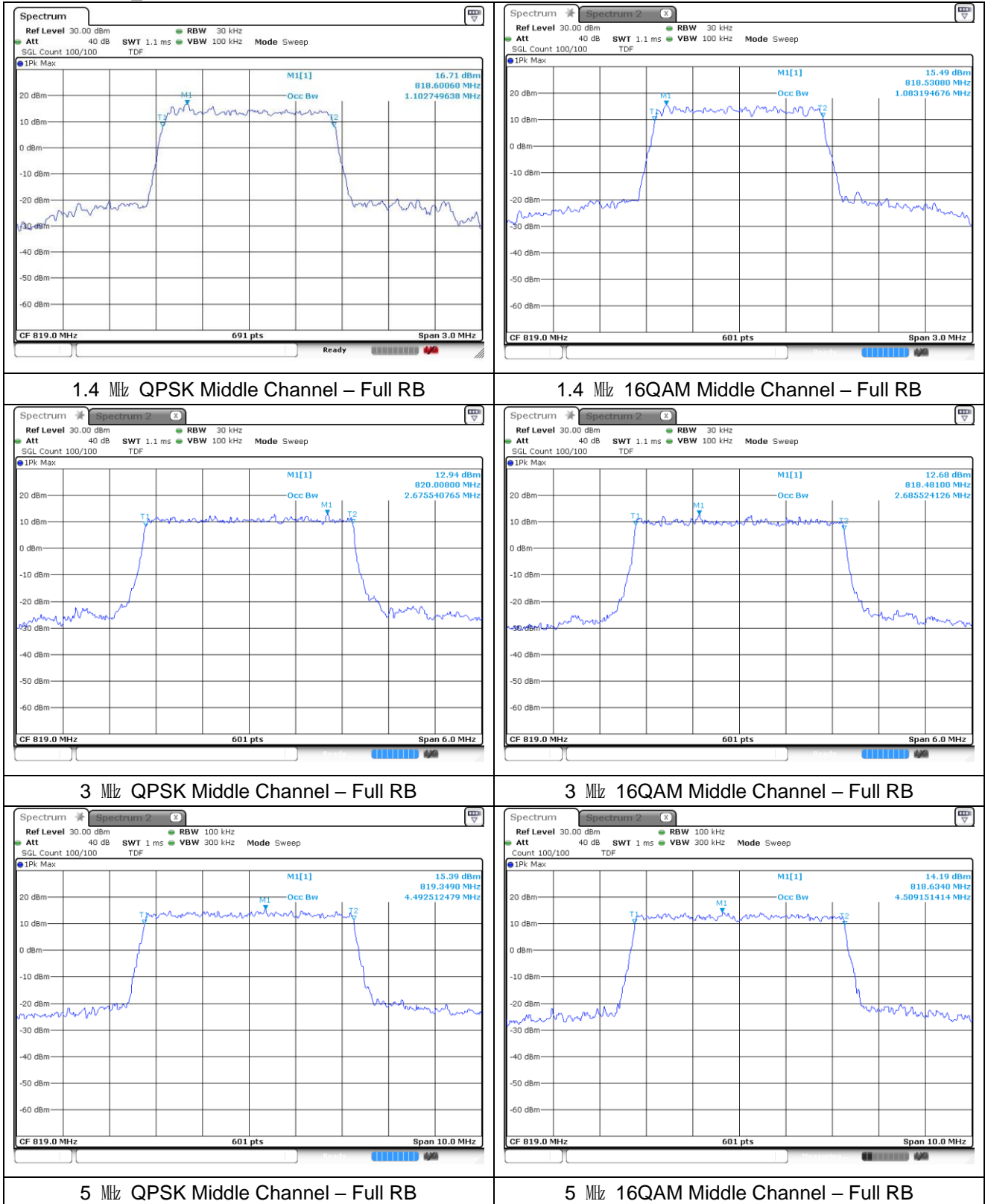


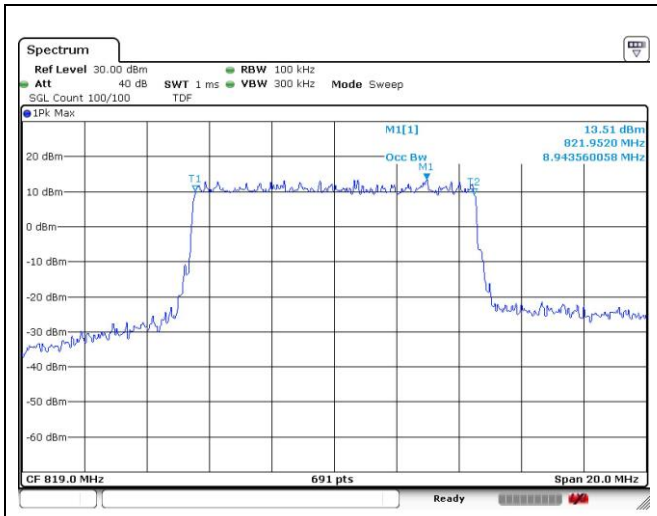


20 MHz QPSK Middle Channel – Full RB

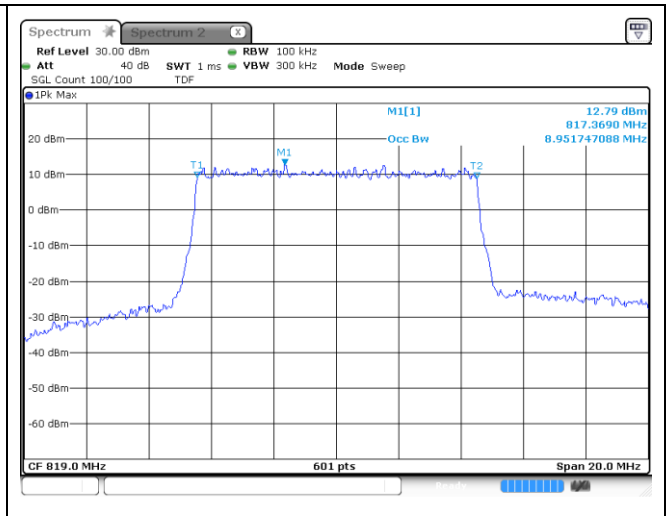
20 MHz 16QAM Middle Channel – Full RB

**LTE band 26 Part 90**

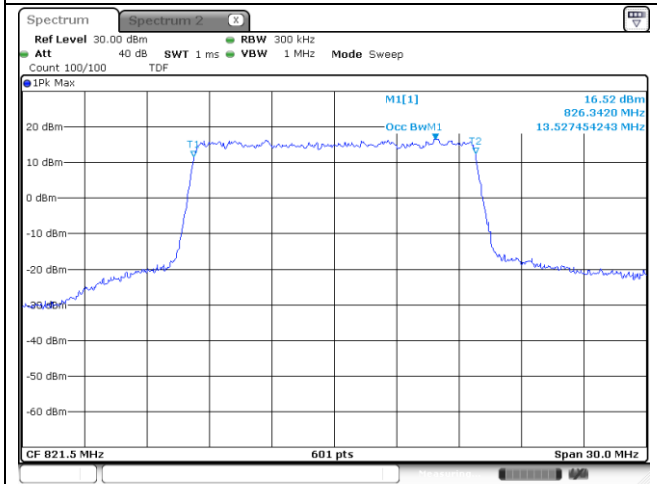




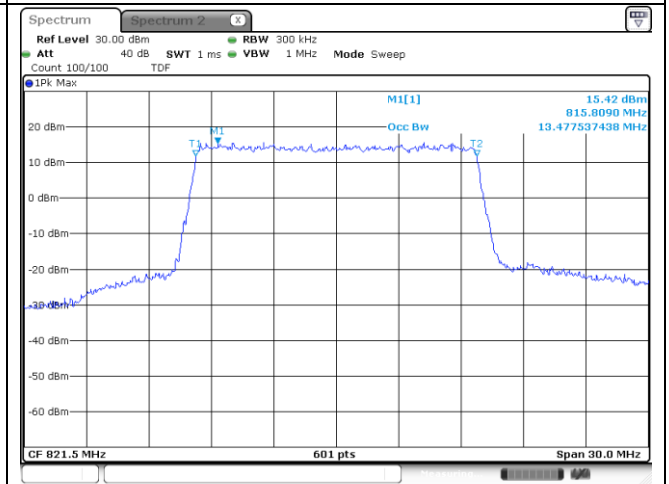
10 MHz QPSK Middle Channel – Full RB



10 MHz 16QAM Middle Channel – Full RB



15 MHz QPSK Low Channel – Full RB



15 MHz 16QAM Low Channel – Full RB

**LTE band 26/5 Part 22**

