

TEST REPORT

of

FCC Part 22 Subpart H, Part 24 Subpart E and Part 27 Subpart C
FCC ID: TQ8-ATC40D3AN

Equipment Under Test : DIGITAL CAR AVN SYSTEM
Model Name : ATC40D3AN
Applicant : Hyundai MOBIS Co., Ltd.
Manufacturer : Hyundai MOBIS Co., Ltd.
Date of Test(s) : 2014.11.13 ~ 2014.12.02
Date of Issue : 2014.12.05

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Wonjun Sim

Date:

2014.12.05

Approved By:



Hyunchae You

Date:

2014.12.05

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1. General information

1.1. Testing laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-837

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Telephone : + 82 31 688 0901

FAX : + 82 31 688 0921

1.2. Details of applicant

Applicant : Hyundai MOBIS Co., Ltd.

Address : 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, Korea

Contact Person : Choi, Seung-Hoon

Phone No. : + 82 31 260 0098

1.3. Description of EUT

Kind of Product	DIGITAL CAR AVN SYSTEM
Model Name	ATC40D3AN
Power Supply	DC 14.4 V (Vehicle Battery)
Rated Power	CDMA 850: 24 dBm CDMA 1 900: 24 dBm LTE Band 4 (5 MHz): 23 dBm LTE Band 4 (10 MHz): 23 dBm LTE Band 4 (15 MHz): 23 dBm LTE Band 4 (20 MHz): 23 dBm LTE Band 13 (5 MHz): 23 dBm LTE Band 13 (10 MHz): 23 dBm
Frequency Range	CDMA 850: 824.70 MHz ~ 848.31 MHz CDMA 1 900: 1 851.25 MHz ~ 1 908.75 MHz LTE Band 4 (5 MHz): 1 712.5 MHz ~ 1 752.5 MHz LTE Band 4 (10 MHz): 1 715.0 MHz ~ 1 750.0 MHz LTE Band 4 (15 MHz): 1 717.5 MHz ~ 1 747.5 MHz LTE Band 4 (20 MHz): 1 720.0 MHz ~ 1 745.0 MHz LTE Band 13 (5 MHz): 779.5 MHz ~ 784.5 MHz LTE Band 13 (10 MHz): 782 MHz
Emission Designator	CDMA 850: 1M27F9D (1xRTT) / 1M28F9D (1xEV-DO) CDMA 1 900: 1M27F9D (1xRTT) / 1M27F9D (1xEV-DO) LTE Band 4 (5 MHz): 4M51G7D (QPSK) / 4M51W7D (16QAM) LTE Band 4 (10 MHz): 8M95G7D (QPSK) / 8M95W7D (16QAM) LTE Band 4 (15 MHz): 13M5G7D (QPSK) / 13M5W7D (16QAM) LTE Band 4 (20 MHz): 17M9G7D (QPSK) / 17M9W7D (16QAM) LTE Band 13 (5 MHz): 4M51G7D (QPSK) / 4M52W7D (16QAM) LTE Band 13 (10 MHz): 8M95G7D (QPSK) / 8M95W7D (16QAM)

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1.4. Test equipment list

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due.
Signal Generator	R&S	SMBV100A	255834	Jun. 25, 2014	Annual	Jun. 25, 2015
Signal Generator	R&S	SMR40	100272	Jul. 18, 2014	Annual	Jul. 18, 2015
Spectrum Analyzer	Agilent	N9030A	US51350132	Sep. 24, 2014	Annual	Sep. 24, 2015
Spectrum Analyzer	R&S	FSV30	100768	Mar. 27, 2014	Annual	Mar. 27, 2015
Mobile Test Unit	Agilent	E5515C	GB43345198	Mar. 28, 2014	Annual	Mar. 28, 2015
Mobile Test Unit	R&S	CMW500	144035	Mar. 03, 2014	Annual	Mar. 03, 2015
Power Meter	Anritsu	ML2495A	1223004	Jun. 10, 2014	Annual	Jun. 10, 2015
Power Sensor	Anritsu	MA2411B	1207272	Jun. 10, 2014	Annual	Jun. 10, 2015
Directional Coupler	KRYTAR	152613	140972	Jun. 10, 2014	Annual	Jun. 10, 2015
Attenuator	MCLI	FAS-12-10	1	Jun. 20, 2014	Annual	Jun. 20, 2015
Temperature Chamber	Hangil Tech.	HGT-410P	HGT-410p-04-01	Feb. 12, 2014	Annual	Feb. 12, 2015
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jun. 10, 2014	Annual	Jun. 10, 2015
High Pass Filter	Wainwright	WHKX2.2/12.75G-10SS	8	Apr. 15, 2014	Annual	Apr. 15, 2015
High Pass Filter	Wainwright	WHKX1.5/15G-6SS	4	Mar. 18, 2014	Annual	Mar. 18, 2015
DC Power Supply	Agilent	U8002A	MY50060028	Mar. 27, 2014	Annual	Mar. 27, 2015
Preamplifier	H.P.	8447F	2944A03909	Aug. 27, 2014	Annual	Aug. 27, 2015
Preamplifier	R&S	SCU 18	10117	Jan. 14, 2014	Annual	Jan. 14, 2015
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	Apr. 28, 2014	Annual	Apr. 28, 2015
Test Receiver	R&S	ESU26	100109	Mar. 04, 2014	Annual	Mar. 04, 2015
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	396	Jun. 07, 2013	Biennial	Jun. 07, 2015
Horn Antenna	R&S	HF906	100326	Dec. 10, 2013	Biennial	Dec. 10, 2015
Horn Antenna	SCHWARZBECK MESSELEKTRONIK	BBHA9170	BBHA9170223	Sep. 01, 2014	Biennial	Sep. 01, 2016
Dipole Antenna	SCHWARZBECK MESSELEKTRONIK	VHA 9103	9103-2817	May 09, 2013	Biennial	May 09, 2015
Dipole Antenna	SCHWARZBECK MESSELEKTRONIK	UHA 9105	9105-2514	May 09, 2013	Biennial	May 09, 2015
Antenna Master	INNCO	MM4000	N/A	N.C.R.	N/A	N.C.R.
Turn Table	INNCO	DS 1200S	N/A	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.4 m)	N/A	N.C.R.	N/A	N.C.R.

► Support equipment

Description	Manufacturer	Model	Serial Number
N/A	-	-	-

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1.5. Summary of test results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22, 24 and 27		
Section in FCC part	Test Item	Result
§2.1046 §22.913(a)(2) §24.232(c) §27.50(b)(10) §27.50(d)(4)	RF Radiated Output Power	Complied
§2.1053 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(h)(1)	Spurious Radiated Emission	Complied
§2.1046	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§24.232(d)	Peak-Average Ratio	Complied
§2.1051 §22.917(a) §24.238(a) §27.53(c)(2) §27.53(g)(1)	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a) §27.53(c)(2)(4) §27.53(h)(1)	Band Edge	Complied
§2.1055 §22.355 §24.235 §27.54	Frequency Stability	Complied

1.6. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL008228	2014.12.05	Initial

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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. Radiation test

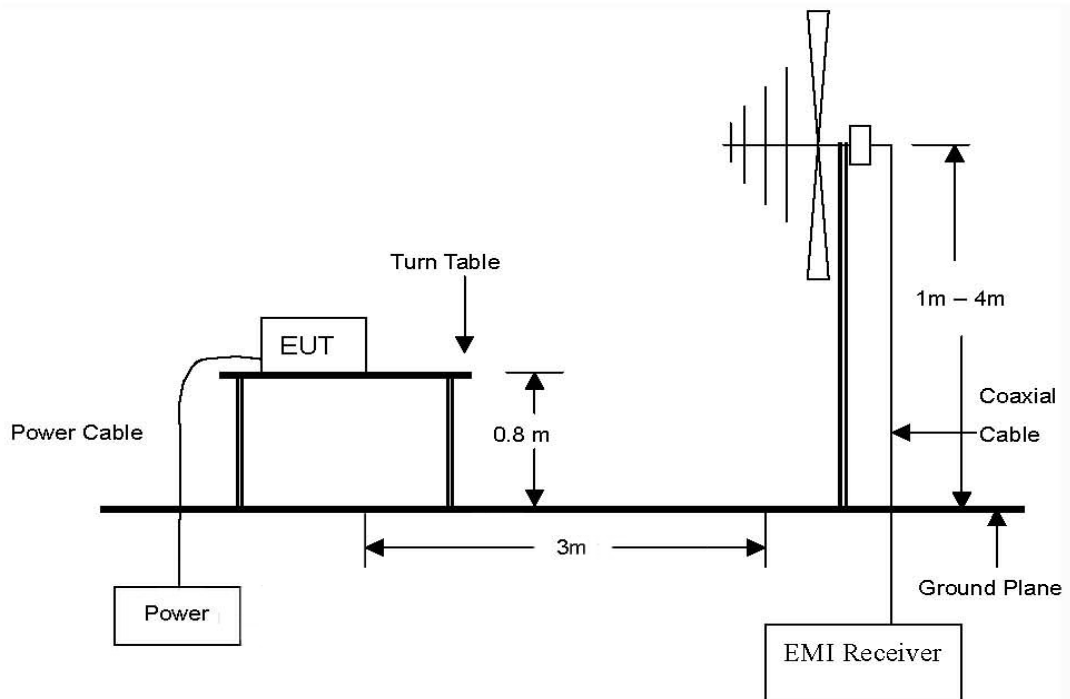
E.R.P. & E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d/dB i)

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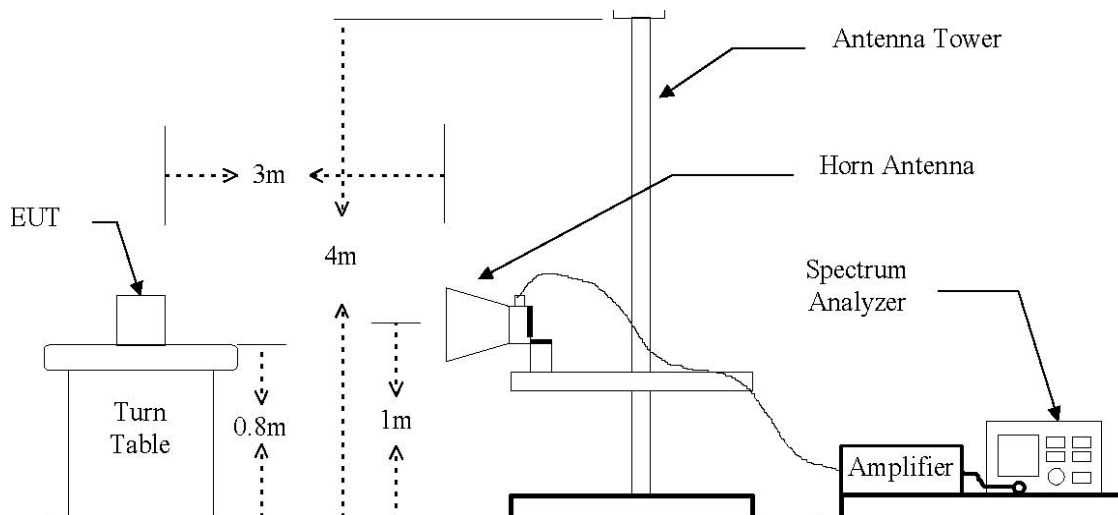
2. RF radiated output power & spurious radiated emission

2.1. Test setup

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

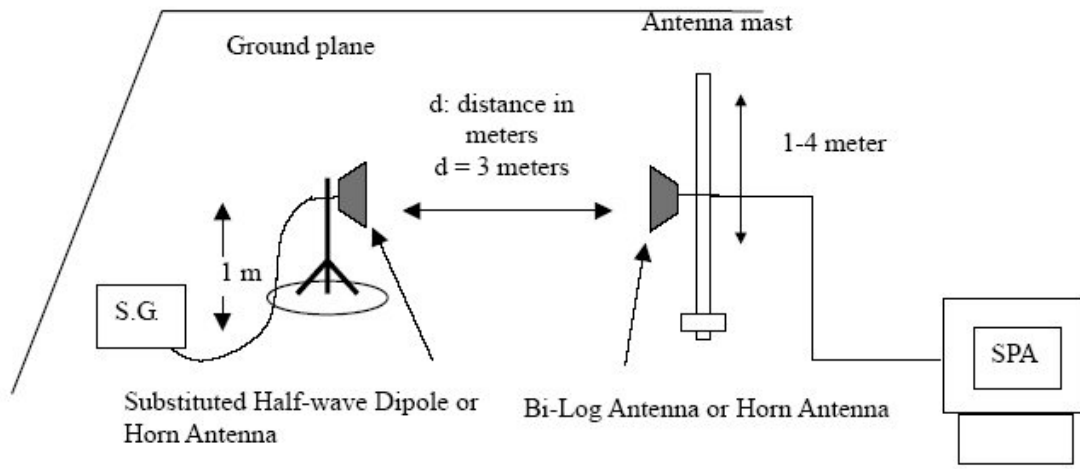


The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 20 GHz Emissions.



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The diagram below shows the test setup for substituted method.



2.2. Limit

2.2.1. Limit of radiated output power

FCC §22.913(a)(2), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

FCC §24.232(c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means to limiting power to the minimum necessary for successful communications.

FCC §27.50(b)(10), Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

FCC §27.50(d), the following power and antenna height requirements apply to stations transmitting in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz and 2 180-2 200 MHz bands:

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 MHz band and mobile and portable stations operating in the 1 695-1 710 MHz and 1 755-1 780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1 710-1 755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

2.2.2. Limit of spurious radiated emission

FCC §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.

FCC §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.

FCC §27.53(c), for operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10\log_{10}(P)$ dB.

FCC §27.53(h), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log_{10}(P)$ dB.

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2.3. Test procedure: Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm 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. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions occupied bandwidth, RBW = 1-5 % of the OBW (not to exceed 1 MHz), VBW $\geq 3 \times$ RBW, Detector = RMS, sweep time = auto, trace average at least 100 traces in power averaging(i.e., RMS) mode, per the guidelines of KDB 971168 v02r02.
5. 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 = Peak, trace mode = max hold, per the guidelines of KDB 971168 v02r02.
6. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
7. 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.
8. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
9. 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.
10. The maximum signal level detected by the measuring receiver shall be noted.
11. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
12. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

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2.4. Test result for RF radiated output power

Ambient temperature : (24 ± 1) °C
Relative humidity : 47 % R.H.

CDMA850 1xRTT mode

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
824.70	H	30.55	3.28	-0.95	26.32	428.55
824.70	V	26.95	3.28	-0.95	22.72	187.07
836.52	H	30.11	3.31	-0.95	25.85	384.59
836.52	V	26.29	3.31	-0.95	22.03	159.59
848.31	H	33.87	3.35	-0.94	29.58	907.82
848.31	V	27.11	3.35	-0.94	22.82	191.43

CDMA1 900 1xRTT mode

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 851.25	H	21.67	5.90	7.87	23.64	231.21
1 851.25	V	22.78	5.90	7.87	24.75	298.54
1 880.00	H	22.10	5.83	7.86	24.13	258.82
1 880.00	V	22.62	5.83	7.86	24.65	291.74
1 908.75	H	23.56	5.77	7.84	25.63	365.59
1 908.75	V	23.06	5.77	7.84	25.13	325.84

Remark:

1. E.R.P. & E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d/dB i)

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SGS Korea Co., Ltd. (Gunpo Laboratory)

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

CDMA850 1xEV-DO mode

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
824.70	H	29.20	3.28	-0.95	24.97	314.05
824.70	V	23.64	3.28	-0.95	19.41	87.30
836.52	H	29.77	3.31	-0.95	25.51	355.63
836.52	V	24.00	3.31	-0.95	19.74	94.19
848.31	H	33.76	3.35	-0.94	29.47	885.12
848.31	V	25.90	3.35	-0.94	21.61	144.88

CDMA1 900 1xEV-DO mode

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 851.25	H	21.82	5.90	7.87	23.79	239.33
1 851.25	V	22.59	5.90	7.87	24.56	285.76
1 880.00	H	21.91	5.83	7.86	23.94	247.74
1 880.00	V	22.56	5.83	7.86	24.59	287.74
1 908.75	H	23.57	5.77	7.84	25.64	366.44
1 908.75	V	22.84	5.77	7.84	24.91	309.74

Remark:

1. E.R.P. & E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d/dB i)

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<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 4 (5 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 712.5	V	22.66	6.09	7.93	24.50	281.84
1 712.5	H	18.84	6.09	7.93	20.68	116.95
1 732.5	V	24.14	6.08	7.92	25.98	396.28
1 732.5	H	19.77	6.08	7.92	21.61	144.88
1 752.5	V	23.63	6.06	7.92	25.49	354.00
1 752.5	H	21.77	6.06	7.92	23.63	230.67

* 5 BW 1RB size / 0 Offset for B4

LTE band 4 (5 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 712.5	V	22.90	6.09	7.93	24.74	297.85
1 712.5	H	19.50	6.09	7.93	21.34	136.14
1 732.5	V	24.82	6.08	7.92	26.66	463.45
1 732.5	H	20.63	6.08	7.92	22.47	176.60
1 752.5	V	24.51	6.06	7.92	26.37	433.51
1 752.5	H	22.72	6.06	7.92	24.58	287.08

* 5 BW 1RB size / 0 Offset for B4

LTE band 4 (10 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 715.0	V	21.98	6.09	7.93	23.82	240.99
1 715.0	H	18.16	6.09	7.93	20.00	100.00
1 732.5	V	22.81	6.08	7.92	24.65	291.74
1 732.5	H	19.22	6.08	7.92	21.06	127.64
1 750.0	V	25.04	6.06	7.92	26.90	489.78
1 750.0	H	23.67	6.06	7.92	25.53	357.27

* 10 BW 1RB size / 0 Offset for B4

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<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 4 (10 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 715.0	V	21.79	6.09	7.93	23.63	230.67
1 715.0	H	17.99	6.09	7.93	19.83	96.16
1 732.5	V	22.98	6.08	7.92	24.82	303.39
1 732.5	H	18.71	6.08	7.92	20.55	113.50
1 750.0	V	25.34	6.06	7.92	27.20	524.81
1 750.0	H	23.32	6.06	7.92	25.18	329.61

* 10 BW 1RB size / 0 Offset for B4

LTE band 4 (15 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 717.5	V	21.38	6.09	7.92	23.21	209.41
1 717.5	H	17.91	6.09	7.92	19.74	94.19
1 732.5	V	22.68	6.08	7.92	24.52	283.14
1 732.5	H	18.44	6.08	7.92	20.28	106.66
1 747.5	V	22.20	6.07	7.92	24.05	254.10
1 747.5	H	19.61	6.07	7.92	21.46	139.96

* 15 BW 1RB size / 0 Offset for B4

LTE band 4 (15 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 717.5	V	21.07	6.09	7.92	22.90	194.98
1 717.5	H	17.25	6.09	7.92	19.08	80.91
1 732.5	V	21.32	6.08	7.92	23.16	207.01
1 732.5	H	17.43	6.08	7.92	19.27	84.53
1 747.5	V	21.43	6.07	7.92	23.28	212.81
1 747.5	H	19.40	6.07	7.92	21.25	133.35

* 15 BW 1RB size / 0 Offset for B4

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 4 (20 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 720.0	V	21.17	6.09	7.92	23.00	199.53
1 720.0	H	16.72	6.09	7.92	18.55	71.61
1 732.5	V	20.90	6.08	7.92	22.74	187.93
1 732.5	H	17.40	6.08	7.92	19.24	83.95
1 745.0	V	21.84	6.07	7.92	23.69	233.88
1 745.0	H	19.09	6.07	7.92	20.94	124.17

* 20 BW 1RB size / 0 Offset for B4

LTE band 4 (20 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 720.0	V	20.66	6.09	7.92	22.49	177.42
1 720.0	H	16.50	6.09	7.92	18.33	68.08
1 732.5	V	19.99	6.08	7.92	21.83	152.41
1 732.5	H	16.85	6.08	7.92	18.69	73.96
1 745.0	V	20.63	6.07	7.92	22.48	177.01
1 745.0	H	17.91	6.07	7.92	19.76	94.62

* 20 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB i)

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4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

<http://www.sgsgroup.kr>

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A4(210 mm x 297 mm)

LTE band 13 (5 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
779.5	V	24.02	3.19	-0.93	19.90	97.72
779.5	H	27.18	3.19	-0.93	23.06	202.30
784.5	V	23.95	3.21	-0.93	19.81	95.72
784.5	H	27.78	3.21	-0.93	23.64	231.21

* 5 BW 1RB size / 0 Offset for B13

LTE band 13 (5 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
779.5	V	24.55	3.19	-0.93	20.43	110.41
779.5	H	27.70	3.19	-0.93	23.58	228.03
784.5	V	24.40	3.21	-0.93	20.26	106.17
784.5	H	28.69	3.21	-0.93	24.55	285.10

* 5 BW 1RB size / 0 Offset for B13

LTE band 13 (10 MHz – QPSK)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
782.0	V	23.16	3.20	-0.93	19.03	79.98
782.0	H	26.38	3.20	-0.93	22.25	167.88

* 10 BW 1RB size / 0 Offset for B13

LTE band 13 (10 MHz – 16QAM)

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
782.0	V	22.15	3.20	-0.93	18.02	63.39
782.0	H	26.05	3.20	-0.93	21.92	155.60

* 10 BW 1RB size / 0 Offset for B13

Remark:

1. E.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d)
2. This device was tested under all bandwidths, and RB configurations, and modulations.
3. The data reported in the table above was measured in worst case.

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4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

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A4(210 mm x 297 mm)

2.5. Spurious radiated emission

- Measured output Power : 29.58 dB m = 0.908 W
- Modulation Signal : CDMA850 1xRTT
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 42.58$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (824.70 MHz)							
1 648.58	V	-33.71	5.92	5.78	-33.85	63.43	20.85
1 650.48	H	-46.70	5.93	5.78	-46.85	76.43	33.85
2 473.15	V	-31.43	5.80	6.76	-30.47	60.05	17.47
2 473.68	H	-37.24	5.80	6.76	-36.28	65.86	23.28
Middle Channel (836.52 MHz)							
1 673.59	V	-39.92	6.01	5.78	-40.15	69.73	27.15
1 673.62	H	-53.64	6.01	5.78	-53.87	83.45	40.87
2 510.86	V	-36.47	5.86	6.83	-35.50	65.08	22.50
2 510.79	H	-45.95	5.86	6.83	-44.98	74.56	31.98
High Channel (848.31 MHz)							
1 697.43	V	-36.21	6.09	5.78	-36.52	66.10	23.52
1 695.92	H	-46.85	6.09	5.78	-47.16	76.74	34.16
2 544.26	V	-29.12	5.92	6.85	-28.19	57.77	15.19
2 545.06	H	-36.05	5.92	6.85	-35.12	64.70	22.12

Remark:

1. E.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)

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A4(210 mm x 297 mm)

- Measured output Power : 25.63 dB m = 0.366 W
- Modulation Signal : CDMA1 900 1xRTT
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 38.63$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (1 851.25 MHz)							
3 702.84	V	-34.88	8.05	9.08	-33.85	59.48	20.85
3 702.49	H	-37.21	8.05	9.08	-36.18	61.81	23.18
5 553.96	V	-39.18	9.11	10.45	-37.84	63.47	24.84
5 553.68	H	-47.54	9.11	10.45	-46.20	71.83	33.20
Middle Channel (1 880.00 MHz)							
3 759.18	V	-41.56	8.32	9.10	-40.78	66.41	27.78
3 760.61	H	-40.09	8.32	9.10	-39.31	64.94	26.31
5 639.84	V	-48.96	9.15	10.55	-47.56	73.19	34.56
5 639.78	H	-50.15	9.15	10.55	-48.75	74.38	35.75
High Channel (1 908.75 MHz)							
3 817.69	V	-43.40	8.49	9.12	-42.77	68.40	29.77
3 817.99	H	-37.47	8.49	9.12	-36.84	62.47	23.84
5 727.34	V	-39.01	9.22	10.64	-37.59	63.22	24.59
5 727.38	H	-43.32	9.22	10.64	-41.90	67.53	28.90

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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- Measured output Power : 29.47 dB m = 0.885 W
- Modulation Signal : CDMA850 1xEV-DO
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 42.47$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (824.70 MHz)							
1 650.15	V	-33.76	5.93	5.78	-33.91	63.38	20.91
1 650.11	H	-46.84	5.93	5.78	-46.99	76.46	33.99
2 473.19	V	-31.55	5.80	6.76	-30.59	60.06	17.59
2 473.37	H	-37.34	5.80	6.76	-36.38	65.85	23.38
Middle Channel (836.52 MHz)							
1 672.56	V	-40.11	6.00	5.78	-40.33	69.80	27.33
1 673.82	H	-53.71	6.01	5.78	-53.94	83.41	40.94
2 510.54	V	-36.56	5.86	6.83	-35.59	65.06	22.59
2 510.26	H	-45.98	5.86	6.83	-45.01	74.48	32.01
High Channel (848.31 MHz)							
1 696.24	V	-36.61	6.09	5.78	-36.92	66.39	23.92
1 695.82	H	-47.01	6.08	5.78	-47.31	76.78	34.31
2 543.95	V	-28.44	5.92	6.85	-27.51	56.98	14.51
2 544.82	H	-35.90	5.92	6.85	-34.97	64.44	21.97

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

- Measured output Power : 25.64 dB m = 0.366 W
- Modulation Signal : CDMA1 900 1xEV-DO
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 38.64$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (1 851.25 MHz)							
3 703.45	V	-35.39	8.06	9.08	-34.37	60.01	21.37
3 701.84	H	-36.54	8.05	9.07	-35.52	61.16	22.52
5 554.15	V	-40.30	9.11	10.45	-38.96	64.60	25.96
5 554.85	H	-47.57	9.11	10.46	-46.22	71.86	33.22
Middle Channel (1 880.00 MHz)							
3 760.69	V	-41.83	8.33	9.10	-41.06	66.70	28.06
3 760.94	H	-40.35	8.33	9.10	-39.58	65.22	26.58
5 641.19	V	-49.12	9.15	10.55	-47.72	73.36	34.72
5 640.92	H	-50.31	9.15	10.55	-48.91	74.55	35.91
High Channel (1 908.75 MHz)							
3 816.87	V	-42.69	8.49	9.12	-42.06	67.70	29.06
3 818.65	H	-36.40	8.49	9.12	-35.77	61.41	22.77
5 727.33	V	-40.11	9.22	10.64	-38.69	64.33	25.69
5 727.37	H	-44.39	9.22	10.64	-42.97	68.61	29.97

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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- Measured output Power : 25.98 dB m = 0.396 W
- Modulation Signal : LTE band 4 (5 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 38.98$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 712.5 MHz)							
3 425.07	V	-39.91	7.62	9.01	-38.52	64.50	25.52
3 420.97	H	-36.79	7.62	9.02	-35.39	61.37	22.39
Middle Channel(1 732.5 MHz)							
3 460.60	V	-40.16	7.63	8.99	-38.80	64.78	25.80
3 460.67	H	-38.98	7.63	8.99	-37.62	63.60	24.62
High Channel(1 752.5 MHz)							
3 500.80	V	-40.53	7.64	8.96	-39.21	67.85	28.87
3 500.66	H	-40.70	7.64	8.96	-39.38	65.36	26.38

* 5 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

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A4(210 mm x 297 mm)

- Measured output Power : 26.90 dB m = 0.490 W
- Modulation Signal : LTE band 4 (10 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 39.90$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 715.0 MHz)							
3 421.24	V	-42.62	7.62	9.02	-41.22	68.12	28.22
3 421.01	H	-39.13	7.62	9.02	-37.73	64.80	24.90
Middle Channel(1 732.5 MHz)							
3 456.51	V	-41.03	7.63	8.99	-39.67	66.57	26.67
3 456.40	H	-40.44	7.63	8.99	-39.08	65.98	26.08
High Channel(1 750.0 MHz)							
3 491.10	V	-42.67	7.64	8.97	-41.34	68.24	28.34
3 491.07	H	-42.31	7.64	8.97	-40.98	67.88	27.98

* 10 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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A4(210 mm x 297 mm)

- Measured output Power : 24.52 dB m = 0.283 W
- Modulation Signal : LTE band 4 (15 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 37.52$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 717.5 MHz)							
3 421.55	V	-43.30	7.62	9.01	-41.91	66.43	28.91
3 421.87	H	-40.42	7.62	9.01	-39.03	63.89	26.37
Middle Channel(1 732.5 MHz)							
3 451.76	V	-42.93	7.63	8.99	-41.57	66.09	28.57
3 451.61	H	-40.26	7.63	8.99	-38.90	65.07	27.55
High Channel(1 747.5 MHz)							
3 481.87	V	-44.52	7.64	8.97	-43.19	67.71	30.19
3 482.02	H	-43.17	7.64	8.97	-41.84	64.79	27.27

* 15 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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A4(210 mm x 297 mm)

- Measured output Power : 23.69 dB m = 0.234 W
- Modulation Signal : LTE band 4 (20 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 36.69$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 720.0 MHz)							
3 422.37	V	-46.76	7.62	9.01	-45.37	69.06	32.37
3 422.15	H	-41.05	7.62	9.01	-39.66	63.60	26.91
Middle Channel(1 732.5 MHz)							
3 447.33	V	-45.85	7.63	9.00	-44.48	68.17	31.48
3 446.96	H	-40.68	7.63	9.00	-39.31	63.00	26.31
High Channel(1 745.0 MHz)							
3 472.10	V	-45.04	7.63	8.98	-43.69	68.04	31.35
3 472.37	H	-43.12	7.63	8.98	-41.77	65.46	28.77

* 20 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB i)

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A4(210 mm x 297 mm)

- Measured output Power : 26.66 dB m = 0.463 W
- Modulation Signal : LTE band 4 (5 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 39.66$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 712.5 MHz)							
3 420.57	V	-41.42	7.62	9.02	-40.02	66.68	27.02
3 420.98	H	-37.90	7.62	9.02	-36.50	63.16	23.50
Middle Channel(1 732.5 MHz)							
3 460.93	V	-40.15	7.63	8.99	-38.79	65.45	25.79
3 460.78	H	-39.81	7.63	8.99	-38.45	65.11	25.45
High Channel(1 752.5 MHz)							
3 500.41	V	-41.25	7.64	8.96	-39.93	66.59	26.93
3 500.66	H	-41.50	7.64	8.96	-40.18	66.84	27.18

* 5 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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A4(210 mm x 297 mm)

- Measured output Power : 27.20 dB m = 0.525 W
- Modulation Signal : LTE band 4 (10 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 40.20$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 715.0 MHz)							
3 426.53	V	-43.84	7.62	9.01	-42.45	69.65	29.45
3 421.71	H	-40.31	7.62	9.01	-38.92	66.12	25.92
Middle Channel(1 732.5 MHz)							
3 456.64	V	-42.53	7.63	8.99	-41.17	68.37	28.17
3 456.13	H	-41.65	7.63	8.99	-40.29	67.49	27.29
High Channel(1 750.0 MHz)							
3 491.28	V	-43.83	7.64	8.97	-42.50	69.70	29.50
3 491.30	H	-43.09	7.64	8.97	-41.76	68.96	28.76

* 10 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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A4(210 mm x 297 mm)

- Measured output Power : 23.28 dB m = 0.213 W
- Modulation Signal : LTE band 4 (15 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 36.28$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 717.5 MHz)							
3 422.00	V	-45.54	7.62	9.01	-44.15	71.22	34.94
3 421.58	H	-41.59	7.62	9.01	-40.20	63.00	26.72
Middle Channel(1 732.5 MHz)							
3 451.60	V	-44.73	7.63	8.99	-43.37	66.65	30.37
3 451.85	H	-42.84	7.63	8.99	-41.48	64.76	28.48
High Channel(1 747.5 MHz)							
3 481.50	V	-45.15	7.64	8.97	-43.82	67.10	30.82
3 481.91	H	-44.34	7.64	8.97	-43.01	66.29	30.01

* 15 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB i)

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SGS Korea Co., Ltd. (Gunpo Laboratory)

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- Measured output Power : 22.49 dB m = 0.177 W
- Modulation Signal : LTE band 4 (20 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 35.48$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 720.0 MHz)							
3 422.39	V	-46.08	7.62	9.01	-44.69	72.13	36.65
3 422.22	H	-41.86	7.62	9.01	-40.47	63.17	27.69
Middle Channel(1 732.5 MHz)							
3 447.40	V	-46.01	7.63	9.00	-44.64	68.94	33.46
3 447.25	H	-43.07	7.63	9.00	-41.70	64.19	28.71
High Channel(1 745.0 MHz)							
3 472.39	V	-46.15	7.63	8.98	-44.80	69.10	33.62
3 471.95	H	-44.63	7.63	8.98	-43.28	65.77	30.29

* 20 BW 1RB size / 0 Offset for B4

Remark:

1. E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB i)

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- Measured output Power : 23.64 dB m = 0.231 W
- Modulation Signal : LTE band 13 (5 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 36.64$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel(779.5 MHz)							
1 559.31	V	-48.66	5.47	5.77	-48.36	72.00	35.36
1 554.58	H	-51.73	5.44	5.76	-51.41	75.05	38.41
2 332.53	V	-58.78	5.66	6.47	-57.97	81.61	44.97
2 332.30	H	-54.61	5.66	6.47	-53.80	77.44	40.80
3 117.75	V	-46.43	6.84	7.01	-46.26	69.90	33.26
3 118.17	H	-54.38	6.84	7.01	-54.21	77.85	41.21
High Channel(784.5 MHz)							
1 566.08	V	-48.99	5.52	5.77	-48.74	72.38	35.74
1 564.66	H	-51.54	5.51	5.77	-51.28	74.92	38.28
2 347.19	V	-58.45	5.67	6.50	-57.62	71.47	34.83
2 346.88	H	-57.53	5.67	6.50	-56.70	80.34	43.70
3 129.60	V	-49.92	6.89	7.01	-49.80	73.44	36.80
3 129.45	H	-55.31	6.89	7.01	-55.19	78.83	42.19

* 5 BW 1RB size / 0 Offset for B13

Remark:

1. E.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- Measured output Power : 22.25 dB m = 0.168 W
- Modulation Signal : LTE band 13 (10 MHz - QPSK)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 35.25$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Middle Channel(782.0 MHz)							
1 563.82	V	-51.07	5.50	5.77	-50.80	73.05	37.80
1 554.75	H	-53.91	5.44	5.76	-53.59	75.84	40.59
2 332.80	V	-50.04	5.66	6.47	-49.23	71.48	36.23
2 332.82	H	-50.17	5.66	6.47	-49.36	71.61	36.36
3 127.97	V	-50.87	6.89	7.01	-50.75	73.00	37.75
3 887.63	H	-46.13	8.43	7.01	-47.55	69.80	34.55

* 10 BW 1RB size / 0 Offset for B13

Remark:

1. E.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- Measured output Power : 24.55 dB m = 0.285 W
- Modulation Signal : LTE band 13 (5 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 37.55$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel(779.5 MHz)							
1 555.08	V	-49.29	5.44	5.76	-48.97	73.52	35.97
1 554.45	H	-52.78	5.44	5.76	-52.46	77.01	39.46
2 331.73	V	-57.96	5.66	6.46	-57.16	81.71	44.16
2 331.76	H	-55.42	5.66	6.46	-54.62	79.17	41.62
3 118.11	V	-46.72	6.84	7.01	-46.55	71.10	33.55
3 118.15	H	-54.77	6.84	7.01	-54.60	79.15	41.60
High Channel(784.5 MHz)							
1 564.72	V	-48.84	5.51	5.77	-48.58	73.13	35.58
1 564.68	H	-51.97	5.51	5.77	-51.71	76.26	38.71
2 347.08	V	-57.74	5.67	6.50	-56.91	81.46	43.91
2 346.98	H	-53.88	5.67	6.50	-53.05	77.60	40.05
3 129.18	V	-50.47	6.89	7.01	-50.35	74.90	37.35
3 129.60	H	-55.05	6.89	7.01	-54.93	79.48	41.93

* 5 BW 1RB size / 0 Offset for B13

Remark:

1. E.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- Measured output Power : 21.92 dB m = 0.156 W
- Modulation Signal : LTE band 13 (10 MHz - 16QAM)
- Distance : 3 meters
- Limit : $43 + 10\log_{10}(W) = 34.93$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Middle Channel(782.0 MHz)							
1555.24	V	-51.34	5.44	5.76	-51.02	72.94	38.01
1555.12	H	-54.65	5.44	5.76	-54.33	76.25	41.32
2332.74	V	-50.40	5.66	6.47	-49.59	71.51	36.58
2332.63	H	-50.59	5.66	6.47	-49.78	71.70	36.77
3887.70	V	-51.34	8.43	7.01	-52.76	74.68	39.75
3887.75	H	-46.57	8.43	7.01	-47.99	69.91	34.98

* 10 BW 1RB size / 0 Offset for B13

Remark:

1. E.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d)
2. This device was tested under all bandwidths, and RB configurations, and modulations.
3. The data reported in the table above was measured in worst case.

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A4(210 mm x 297 mm)

3. Conducted Output Power

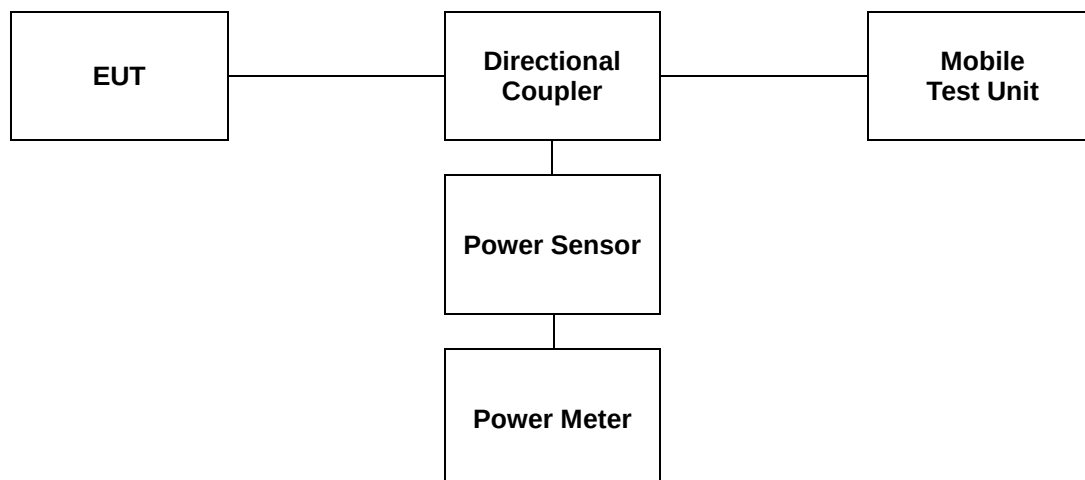
3.1. Limit

Requirements: CFR 47, Section §2.1046

3.2. Test Procedure

In compliance with §2.1046, power output 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.



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3.3. Test Result

Ambient temperature : (24 ± 1) °C
Relative humidity : 47 % R.H.

CDMA 1xRTT

- Cellular band

Radio Configuration (RC)	Service Option (SO)	Average Output Power (dB m)		
		Ch. 1 013 / 824.70 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
RC1 (Fwd1, Rvs1)	1 (Voice)	-	-	-
	2 (Loopback)	23.39	23.45	23.27
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	23.26	23.42	23.25
	68 (Voice)	-	-	-
RC2 (Fwd2, Rvs2)	70 (Voice)	-	-	-
	9 (Loopback)	23.30	23.44	23.29
	14 (SMS)	-	-	-
	17 (Voice)	-	-	-
	55 (Loopback)	23.28	23.44	23.29
RC3 (Fwd3, Rvs3)	32768 (Voice)	-	-	-
	1 (Voice)	-	-	-
	2 (Loopback)	23.41	23.52	23.35
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	23.41	23.54	23.36
	32 (+F-SCH)	23.31	23.45	23.35
	32 (+SCH)	23.35	23.41	23.41
RC4 (Fwd4, Rvs3)	68 (Voice)	-	-	-
	70 (Voice)	-	-	-
	1 (Voice)	-	-	-
	2 (Loopback)	23.41	23.42	23.28
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	23.31	23.45	23.25
	32 (+F-SCH)	23.32	23.38	23.34
RC5 (Fwd5, Rvs4)	32 (+SCH)	23.36	23.42	23.38
	68 (Voice)	-	-	-
	70 (Voice)	-	-	-
	9 (Loopback)	23.36	23.56	23.36
	14 (SMS)	-	-	-
RC5 (Fwd5, Rvs4)	17 (Voice)	-	-	-
	55 (Loopback)	23.38	23.53	23.35
	32768 (Voice)	-	-	-

- The service option 9 of RC5 of worst case is bigger than other power compared with each service option.

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- PCS band

Radio Configuration (RC)	Service Option (SO)	Average Output Power (dB m)		
		Ch. 25 / 1 851.25 MHz	Ch. 600 / 1 880.00 MHz	Ch. 1 175 / 1 908.75 MHz
RC1 (Fwd1, Rvs1)	1 (Voice)	-	-	-
	2 (Loopback)	22.44	22.57	22.58
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	22.44	22.53	22.50
	68 (Voice)	-	-	-
	70 (Voice)	-	-	-
RC2 (Fwd2, Rvs2)	9 (Loopback)	22.46	22.53	22.51
	14 (SMS)	-	-	-
	17 (Voice)	-	-	-
	55 (Loopback)	22.45	22.51	22.54
	32768 (Voice)	-	-	-
RC3 (Fwd3, Rvs3)	1 (Voice)	-	-	-
	2 (Loopback)	22.54	22.59	22.51
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	22.53	22.58	22.52
	32 (+F-SCH)	22.42	22.57	22.60
	32 (+SCH)	22.53	22.49	22.55
	68 (Voice)	-	-	-
	70 (Voice)	-	-	-
RC4 (Fwd4, Rvs3)	1 (Voice)	-	-	-
	2 (Loopback)	22.45	22.60	22.61
	3 (Voice)	-	-	-
	6 (SMS)	-	-	-
	55 (Loopback)	22.57	22.59	22.51
	32 (+F-SCH)	22.45	22.44	22.47
	32 (+SCH)	22.46	22.52	22.32
	68 (Voice)	-	-	-
	70 (Voice)	-	-	-
RC5 (Fwd5, Rvs4)	9 (Loopback)	22.57	22.71	22.60
	14 (SMS)	-	-	-
	17 (Voice)	-	-	-
	55 (Loopback)	22.59	22.62	22.68
	32768 (Voice)	-	-	-

- The service option 9 of RC5 of worst case is bigger than other power compared with each service option.

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CDMA 1xEV-DO Release 0 (Rel 0)

- Cellular band

Application Protocol	Rate	Average Output Power (dB m)		
		Ch. 1 013 / 824.70 MHz	Ch. 384 / 836.52 MHz	Ch. 777 / 848.31 MHz
RTAP	9.6	22.63	22.74	22.86
	19.2	22.65	22.89	22.81
	38.4	22.68	22.77	22.79
	76.8	22.60	22.76	22.72
	153.6	22.69	22.81	22.75
FTAP	307.2 kbps (2 slot, QPSK)	21.38	21.69	21.47

- The rate 19.2 of RTAP of worst case is bigger than other power compared with each rate.

- PCS band

Application Protocol	Rate	Average Output Power (dB m)		
		Ch. 25 / 1 851.25 MHz	Ch. 600 / 1 880.00 MHz	Ch. 1 175 / 1 908.75 MHz
RTAP	9.6	22.85	23.07	23.01
	19.2	22.88	22.90	23.05
	38.4	22.92	22.90	22.86
	76.8	22.88	22.94	23.03
	153.6	22.85	22.82	22.96
FTAP	307.2 kbps (2 slot, QPSK)	21.39	21.44	21.28

- The rate 19.2 of RTAP of worst case is bigger than other power compared with each rate.

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

- LTE band

Band	Bandwidth (MHz)	RB Size	RB Offset	QPSK			16QAM		
				1 712.5	1 732.5	1 752.5	1 712.5	1 732.5	1 752.5
				19975	20175	20375	19975	20175	20375
LTE 4	5	1	0	22.64	22.62	22.51	22.72	22.89	22.24
	5	1	12	22.73	22.60	22.38	22.66	22.90	22.33
	5	1	24	22.76	22.50	22.40	22.64	22.92	22.43
	5	12	0	22.74	22.43	22.46	22.68	22.84	21.89
	5	12	6	22.75	22.47	22.44	22.57	22.86	21.87
	5	12	13	22.67	22.44	22.45	22.50	22.86	21.89
	5	25	0	22.56	22.34	22.51	22.54	22.84	21.76
	Bandwidth (MHz)	RB Size	RB Offset	1 715.0	1 732.5	1 750.0	1 715.0	1 732.5	1 750.0
				20000	20175	20350	20000	20175	20350
	10	1	0	22.55	22.51	22.46	22.71	22.85	22.28
	10	1	25	22.48	22.43	22.51	22.72	22.71	22.17
	10	1	49	22.37	22.31	22.37	22.75	22.60	22.14
	10	25	0	22.32	22.28	22.29	22.73	22.67	22.19
	10	25	12	22.18	22.17	22.34	22.63	22.54	22.24
	10	25	25	22.06	22.12	22.39	22.68	22.60	22.19
	10	50	0	21.93	22.01	22.39	22.55	22.50	22.16
	Bandwidth (MHz)	RB Size	RB Offset	1 717.5	1 732.5	1 747.5	1 717.5	1 732.5	1 747.5
				20025	20175	20325	20025	20175	20325
	15	1	0	22.40	22.58	22.44	22.78	22.83	22.26
	15	1	36	22.42	22.47	22.40	22.85	22.91	22.26
	15	1	74	22.40	22.47	22.31	22.74	22.90	22.27
	15	36	0	22.30	22.48	22.23	22.79	22.89	22.35
	15	36	18	22.28	22.40	22.24	22.76	22.74	22.41
	15	36	37	22.19	22.43	22.15	22.76	22.74	22.42
	15	75	0	22.14	22.33	22.18	22.84	22.83	22.33
	Bandwidth (MHz)	RB Size	RB Offset	1 720.0	1 732.5	1 745.0	1 720.0	1 732.5	1 745.0
				20050	20175	20300	20050	20175	20300
	20	1	0	22.37	22.62	22.44	22.75	22.89	22.27
	20	1	50	22.43	22.63	22.32	22.83	22.75	22.28
	20	1	99	22.28	22.69	22.36	22.73	22.69	22.37
	20	50	0	22.35	22.58	22.45	22.58	22.65	22.39
	20	50	25	22.22	22.63	22.48	22.57	22.54	22.34
	20	50	50	22.20	22.62	22.51	22.47	22.40	22.31
	20	100	0	22.05	22.49	22.58	22.39	22.40	22.36

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Band	Bandwidth (MHz)	RB Size	RB Offset	QPSK			16QAM		
				779.5	-	784.5	779.5	-	784.5
				23205	-	23255	23205	-	23255
LTE 13	5	1	0	24.03	-	24.13	23.01	-	23.19
	5	1	12	23.99	-	24.20	22.89	-	23.10
	5	1	24	24.06	-	24.11	22.88	-	23.19
	5	12	0	24.01	-	24.08	22.84	-	23.20
	5	12	6	24.04	-	23.99	22.81	-	23.26
	5	12	13	23.89	-	23.95	22.89	-	23.34
	5	25	0	23.80	-	23.94	22.83	-	23.43
	Bandwidth (MHz)	RB Size	RB Offset	-	782.0	-	-	782.0	-
				-	23230	-	-	23230	-
	10	1	0	-	24.23	-	-	23.38	-
	10	1	25	-	24.27	-	-	23.37	-
	10	1	49	-	24.19	-	-	23.46	-
	10	25	0	-	24.11	-	-	23.51	-
	10	25	12	-	23.98	-	-	23.58	-
	10	25	25	-	23.90	-	-	23.46	-
	10	50	0	-	23.76	-	-	23.52	-

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4. Occupied Bandwidth 99 %

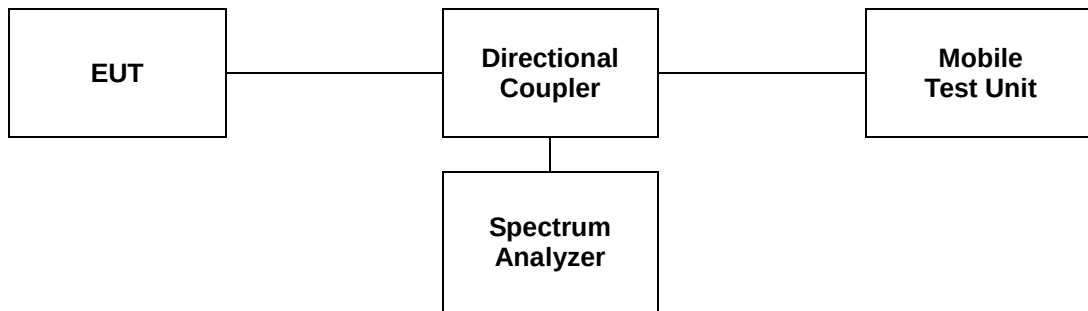
4.1. Limit

Requirements: CFR 47, Section §2.1049.

4.2. Test Procedure

The test follows section 4.1 of FCC KDB Publication 971168 v02r02.

1. Set span = 2 – 5 x OBW.
2. Set resolution bandwidth (RBW) = 1 – 5 % of OBW.
3. Set video bandwidth (VBW) $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.



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4.3 Test Results

Ambient temperature : (24 ± 1) °C
Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
CDMA850	1xRTT RC5 9 (Loopback)	824.70	1.27
		836.52	1.27
		848.31	1.27
CDMA1 900	1xRTT RC5 9 (Loopback)	1 851.25	1.27
		1 880.00	1.27
		1 908.75	1.27

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
CDMA850	1xEV-DO(Rel0) RTAP 19.2	824.70	1.28
		836.52	1.27
		848.31	1.27
CDMA1 900	1xEV-DO(Rel0) RTAP 19.2	1 851.25	1.27
		1 880.00	1.27
		1 908.75	1.27

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Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
LTE 4 (5 MHz)	QPSK	1 712.5	4.50
		1 732.5	4.50
		1 752.5	4.51
LTE 4 (10 MHz)	QPSK	1 715.0	8.94
		1 732.5	8.94
		1 750.0	8.95
LTE 4 (15 MHz)	QPSK	1 717.5	13.44
		1 732.5	13.48
		1 747.5	13.46
LTE 4 (20 MHz)	QPSK	1 720.0	17.86
		1 732.5	17.90
		1 745.0	17.90
LTE 4 (5 MHz)	16QAM	1 712.5	4.51
		1 732.5	4.51
		1 752.5	4.51
LTE 4 (10 MHz)	16QAM	1 715.0	8.94
		1 732.5	8.95
		1 750.0	8.95
LTE 4 (15 MHz)	16QAM	1 717.5	13.46
		1 732.5	13.52
		1 747.5	13.44
LTE 4 (20 MHz)	16QAM	1 720.0	17.88
		1 732.5	17.93
		1 745.0	17.89
LTE 13 (5 MHz)	QPSK	779.5	4.51
		784.5	4.51
LTE 13 (10 MHz)	QPSK	782.0	8.95
LTE 13 (5 MHz)	16QAM	779.5	4.52
		784.5	4.51
LTE 13 (10 MHz)	16QAM	782.0	8.95

Please refer to the following plots.

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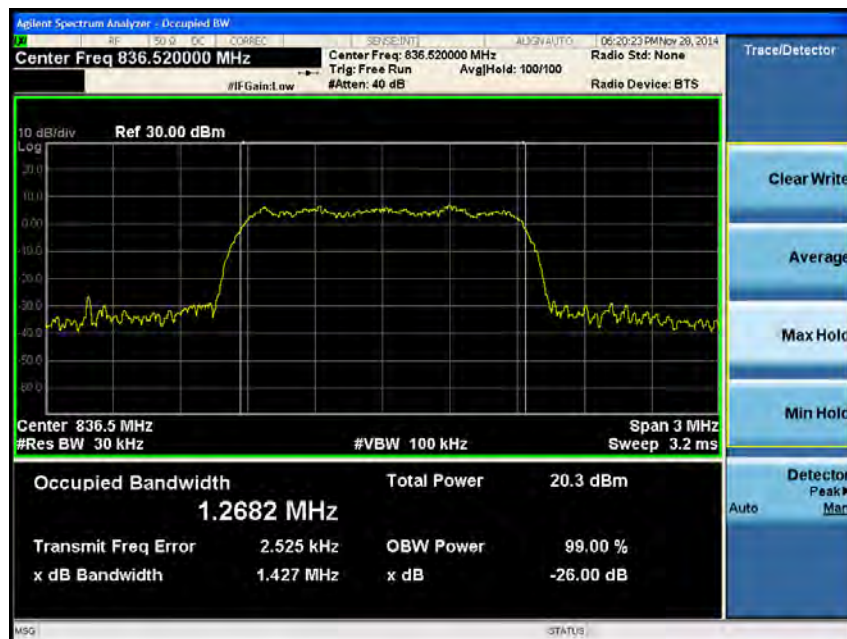
CDMA850 1xRTT

99%

Low Channel



Middle Channel



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<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

High Channel



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CDMA1 900 1xRTT

99%

Low Channel



Middle Channel



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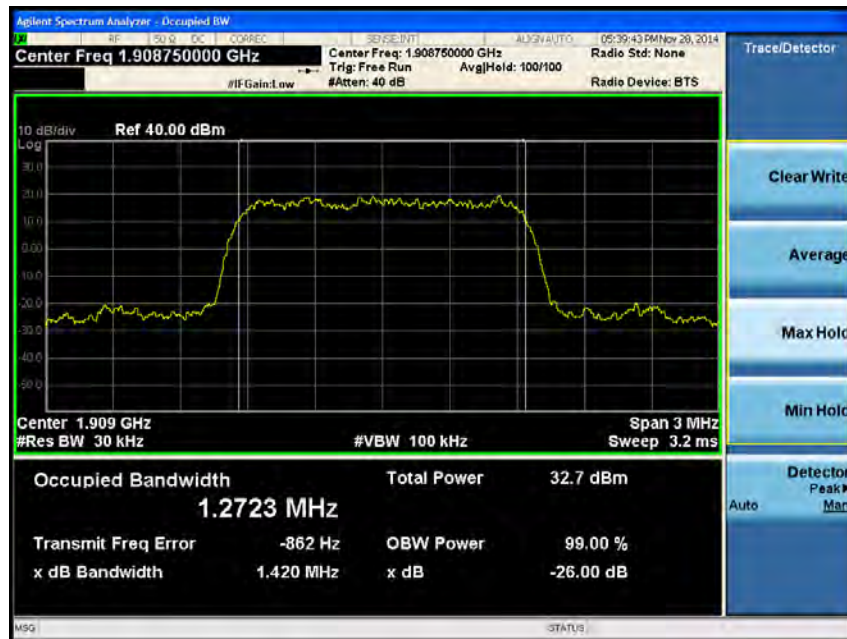
<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

High Channel

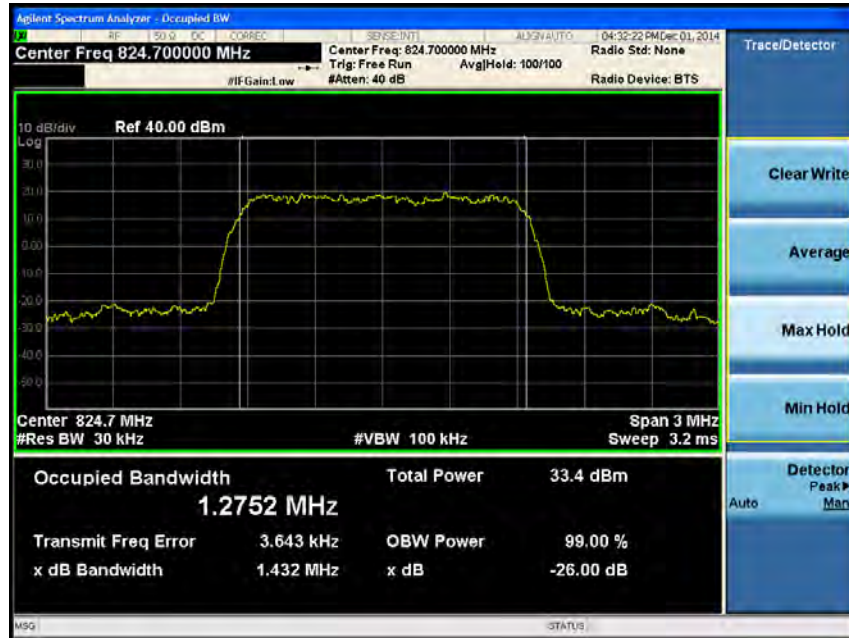


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

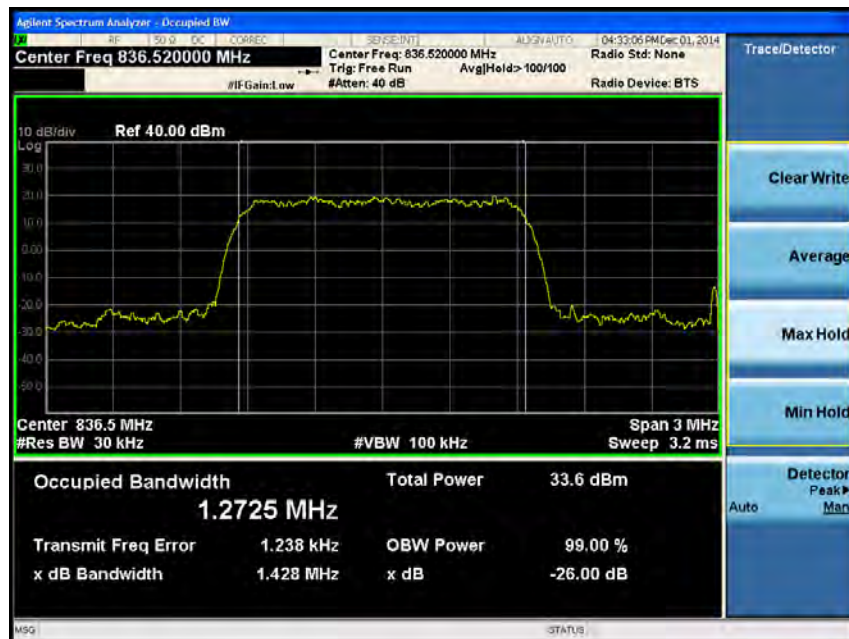
CDMA850 1xEV-DO

99%

Low Channel



Middle Channel



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High Channel

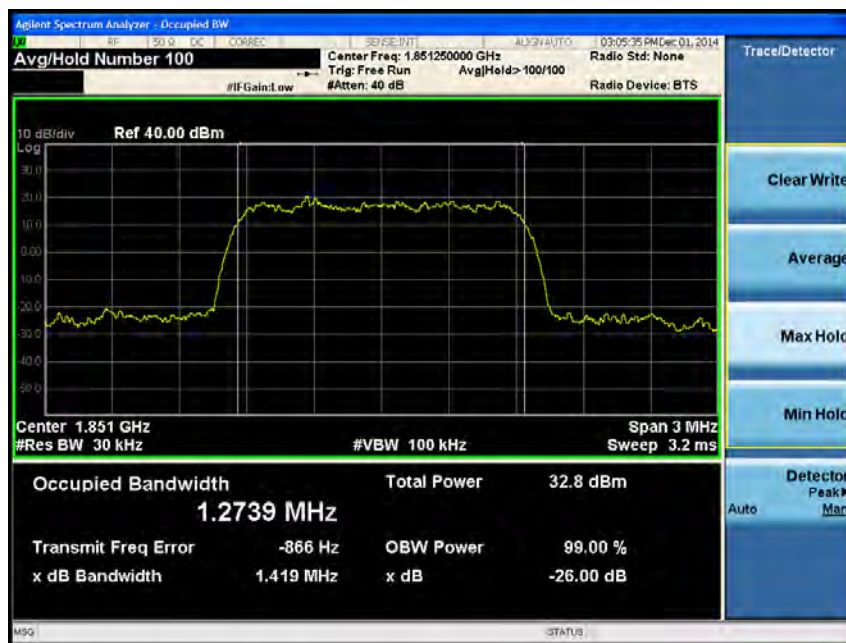


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

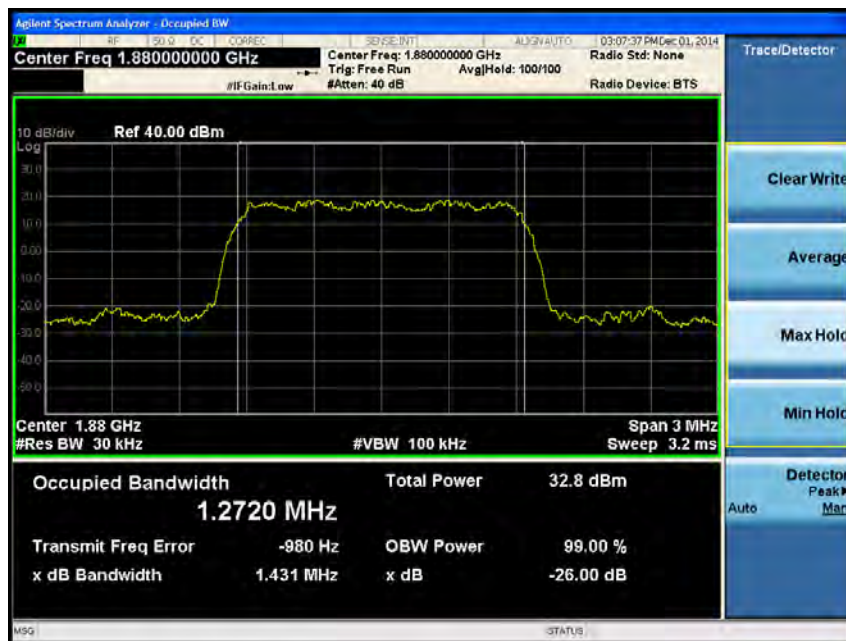
CDMA1 900 1xEV-DO

99%

Low Channel

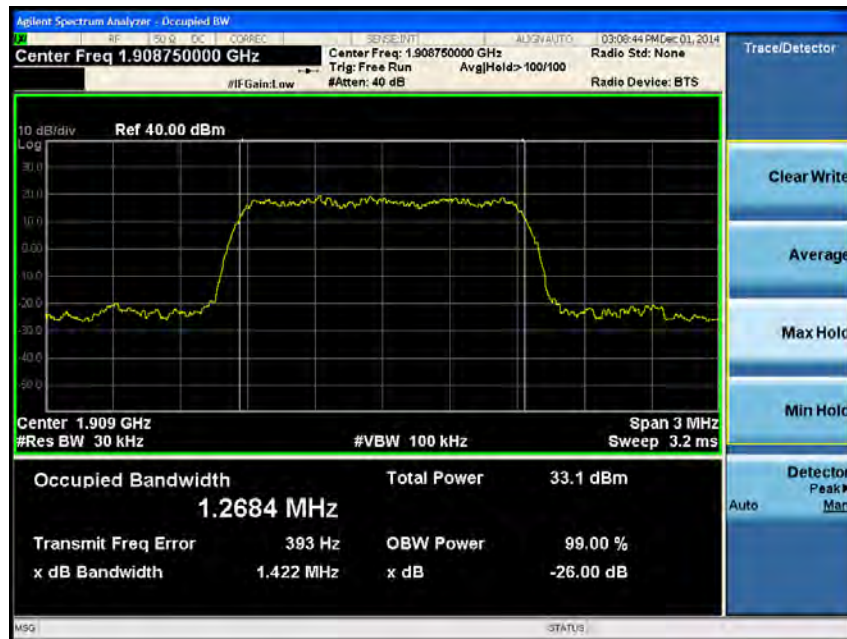


Middle Channel



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High Channel



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LTE band 4 (5 MHz – QPSK_RB 25)

99 %

Low Channel



Middle Channel



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A4(210 mm x 297 mm)

High Channel

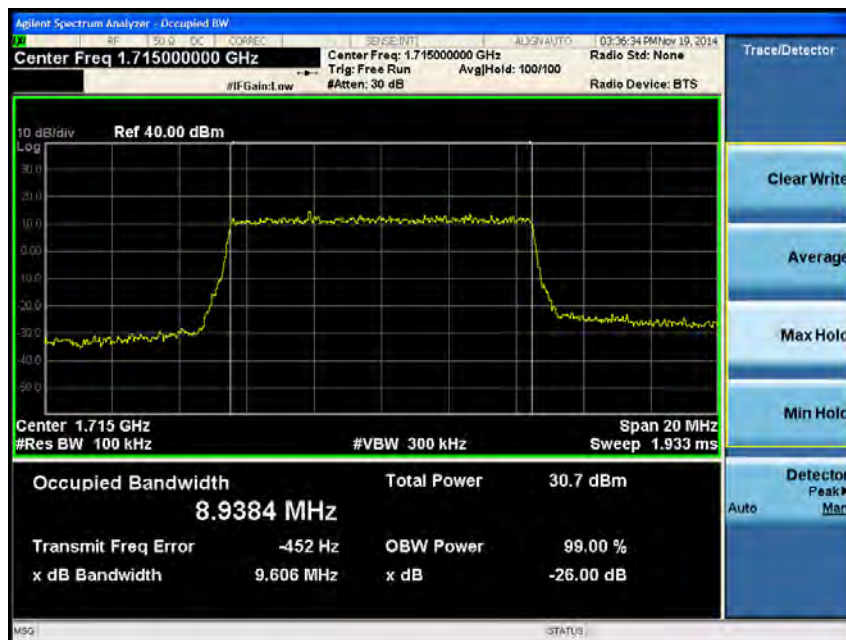


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

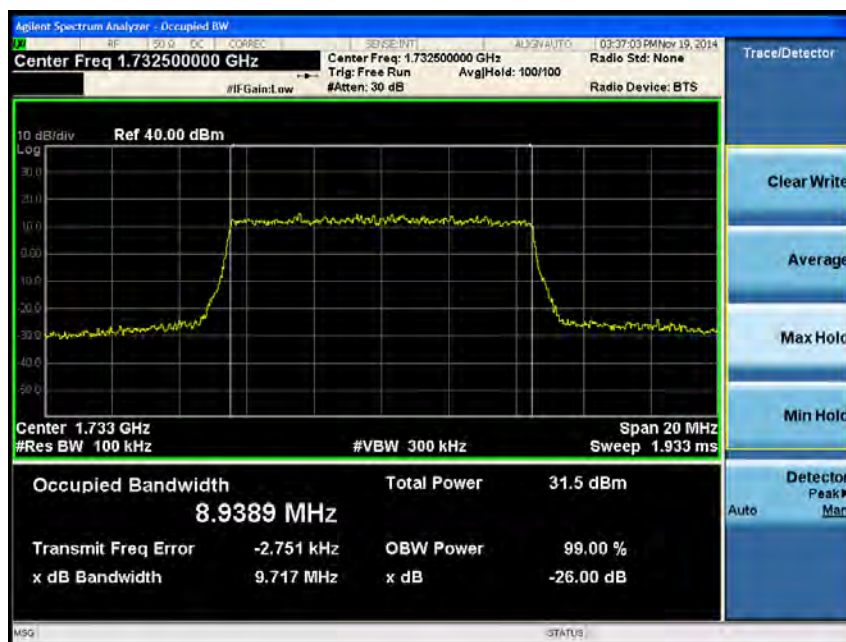
LTE band 4 (10 MHz – QPSK_RB 50)

99 %

Low Channel



Middle Channel



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High Channel



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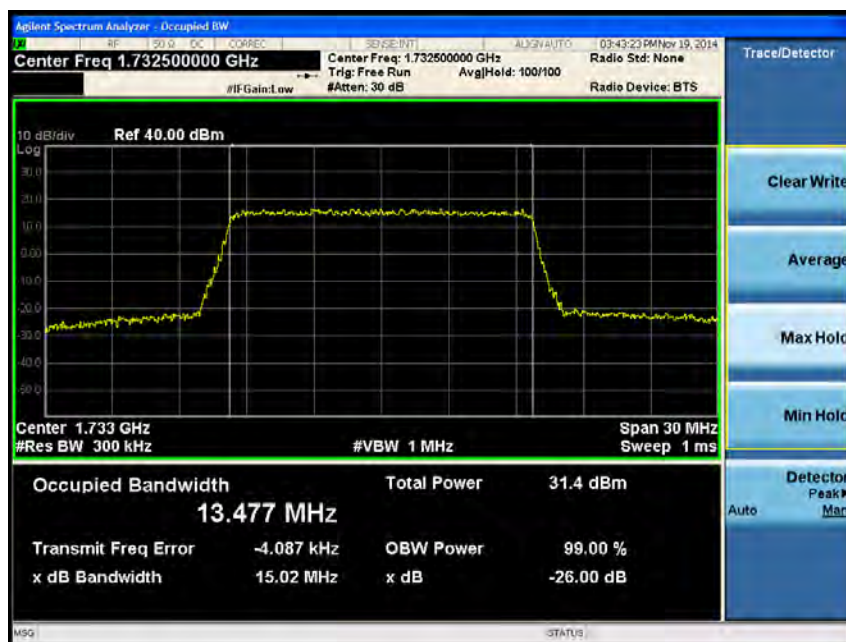
LTE band 4 (15 MHz – QPSK_RB 75)

99 %

Low Channel



Middle Channel



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High Channel



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A4(210 mm x 297 mm)

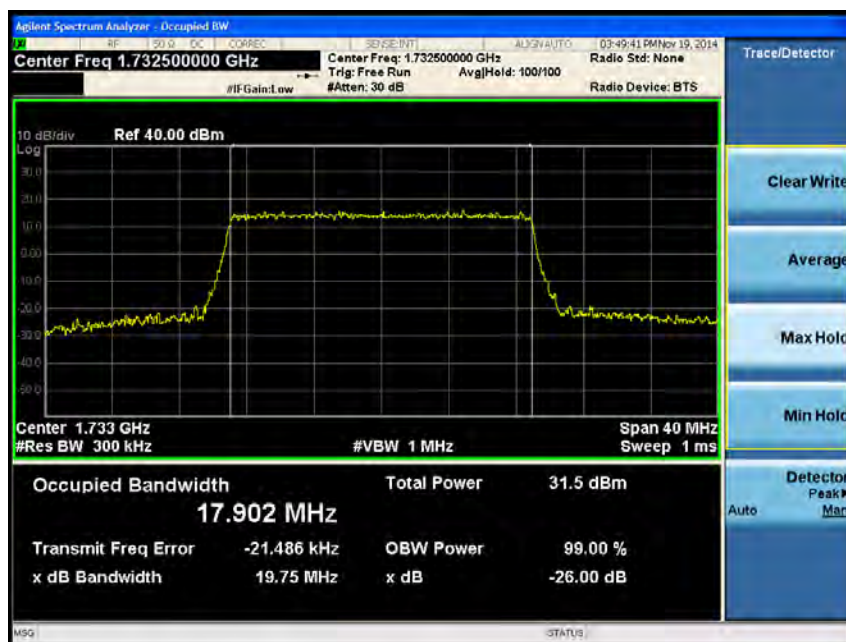
LTE band 4 (20 MHz – QPSK_RB 100)

99 %

Low Channel



Middle Channel



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A4(210 mm x 297 mm)

High Channel



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A4(210 mm x 297 mm)

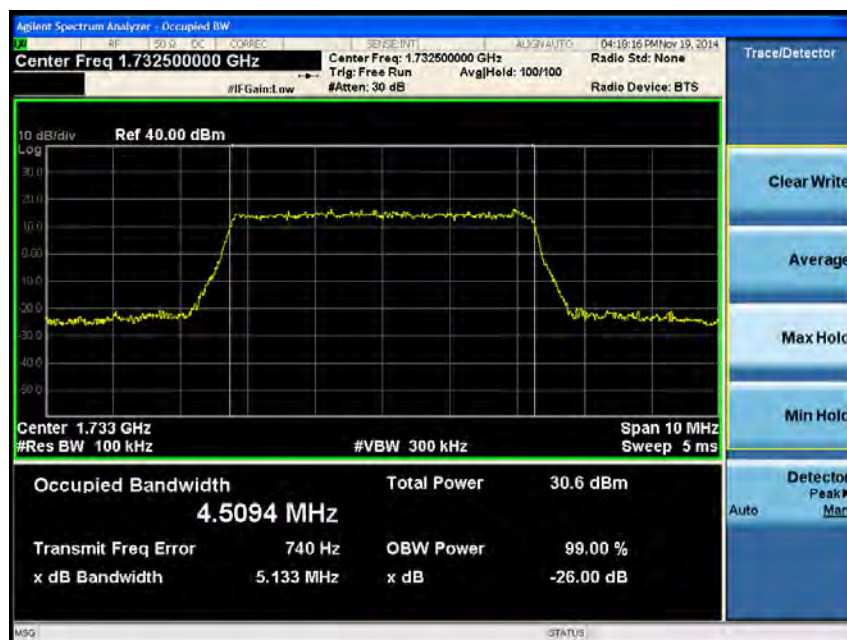
LTE band 4 (5 MHz – 16QAM_RB 25)

99 %

Low Channel



Middle Channel



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High Channel



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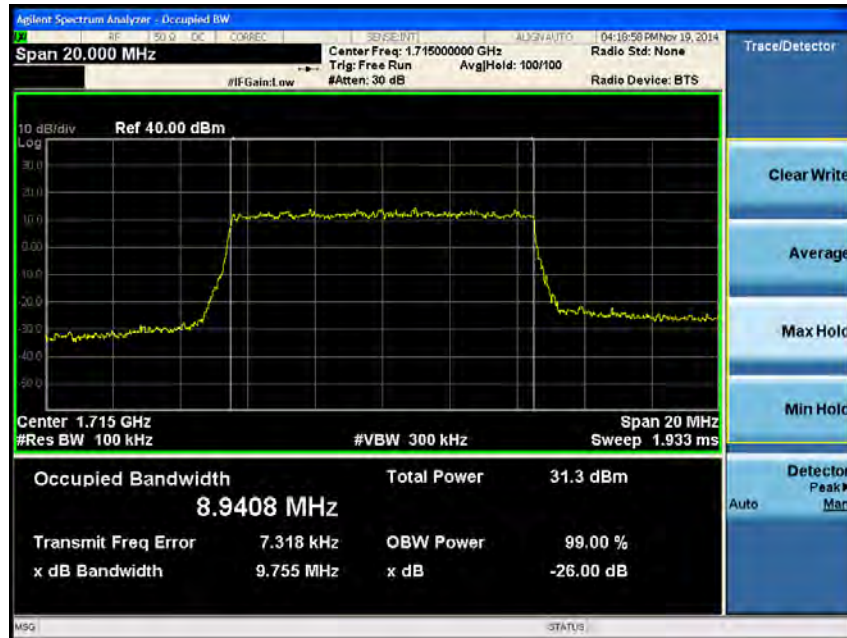
Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 4 (10 MHz – 16QAM_RB 50)

99 %

Low Channel

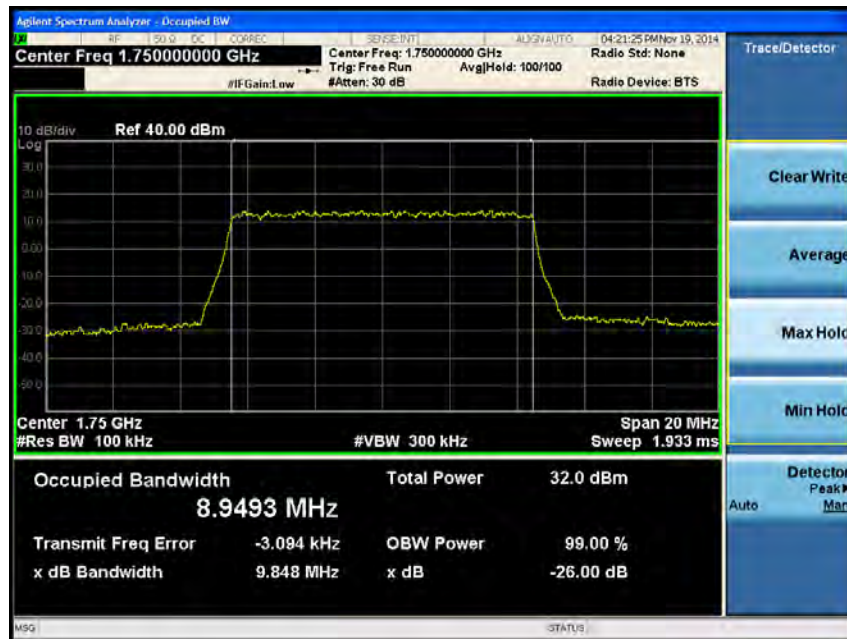


Middle Channel



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High Channel



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LTE band 4 (15 MHz – 16QAM_RB 75)

99 %

Low Channel

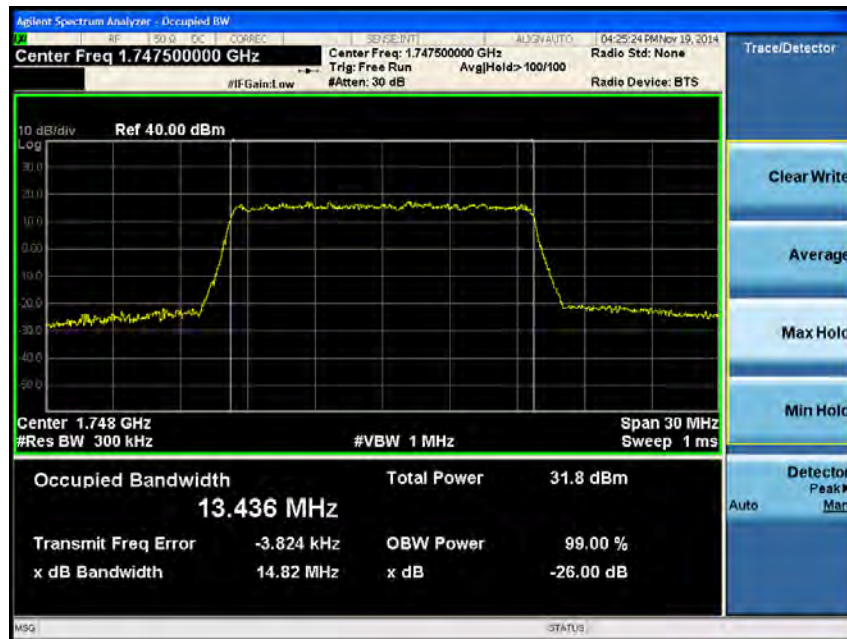


Middle Channel



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High Channel

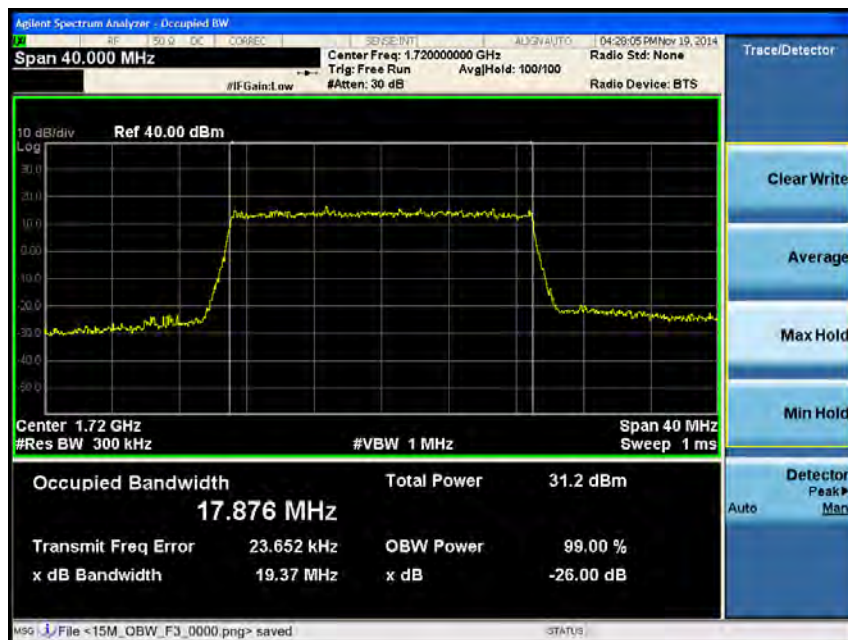


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LTE band 4 (20 MHz – 16QAM_RB 100)

99 %

Low Channel

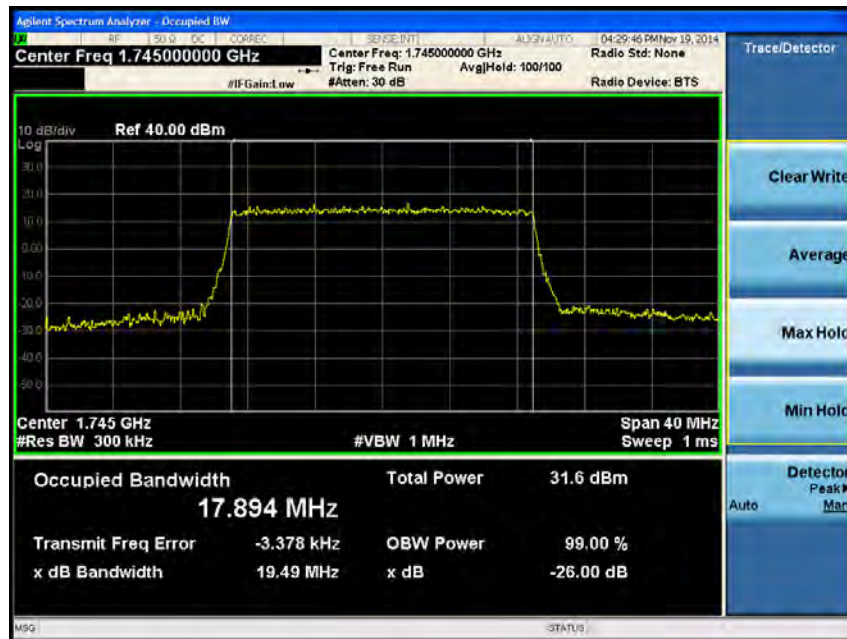


Middle Channel



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High Channel



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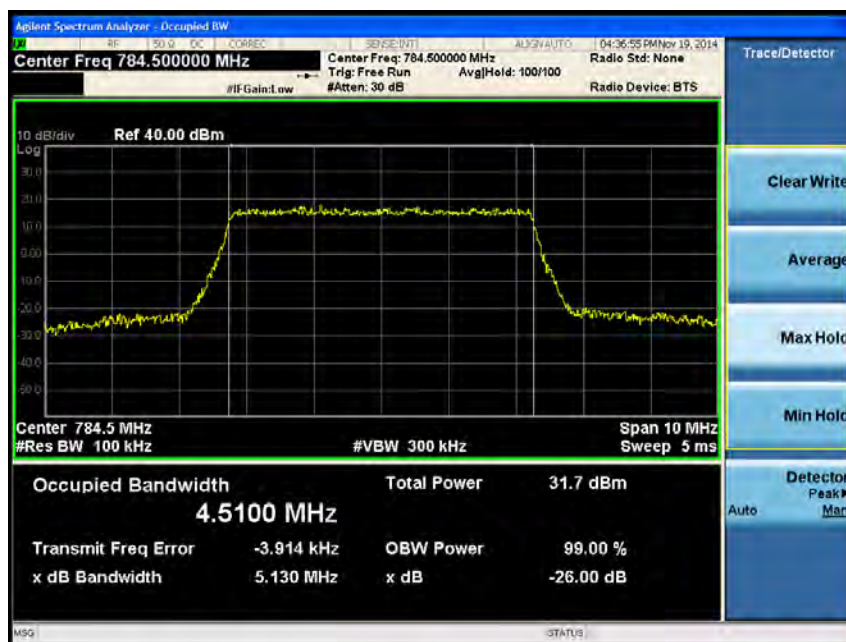
LTE band 13 (5 MHz – QPSK_RB 25)

99 %

Low Channel



High Channel



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LTE band 13 (10 MHz – QPSK_RB 50)

99 %

Middle Channel



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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 13 (5 MHz – 16QAM_RB 25)

99 %

Low Channel



High Channel



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LTE band 13 (10 MHz – 16QAM_RB 50)

99 %

Middle Channel



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A4(210 mm x 297 mm)

5. Peak-Average Ratio

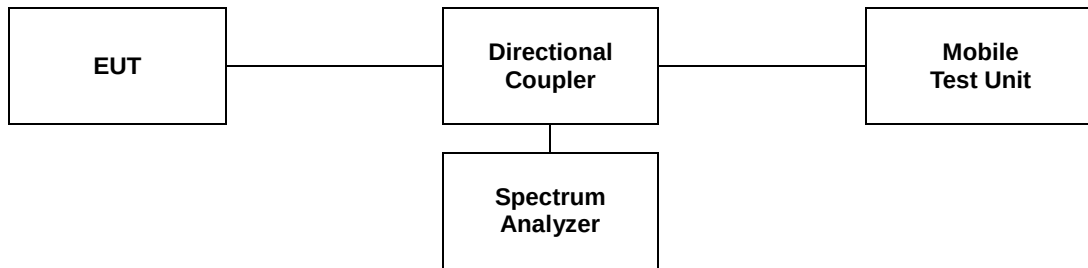
5.1. Limit

§24.232(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2. Test Procedure

The test follows section 5.7.1 of FCC KDB publication 971168 v02r02.

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The CCDF function of the spectrum analyzer was set.
3. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth.
4. PAR was measured with spectrum analyzer for each channel.



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5.3 Test Results

Ambient temperature : (24 ± 1) °C
Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	PAR (dB)
CDMA1 900	1xRTT RC5 9 (Loopback)	1 851.25	3.77
		1 880.00	3.76
		1 908.75	3.80
CDMA1 900	1xEV-DO(Rel0) RTAP 19.2	1 851.25	3.61
		1 880.00	3.75
		1 908.75	3.79
LTE 4 (5 MHz)	QPSK	1 712.5	5.33
		1 732.5	5.42
		1 752.5	5.45
LTE 4 (10 MHz)	QPSK	1 715.0	5.36
		1 732.5	5.36
		1 750.0	5.39
LTE 4 (15 MHz)	QPSK	1 717.5	5.80
		1 732.5	5.91
		1 747.5	5.77
LTE 4 (20 MHz)	QPSK	1 720.0	5.30
		1 732.5	5.42
		1 745.0	5.42
LTE 4 (5 MHz)	16QAM	1 712.5	5.94
		1 732.5	6.17
		1 752.5	6.20
LTE 4 (10 MHz)	16QAM	1 715.0	5.33
		1 732.5	5.30
		1 750.0	6.23
LTE 4 (15 MHz)	16QAM	1 717.5	6.32
		1 732.5	6.43
		1 747.5	6.32
LTE 4 (20 MHz)	16QAM	1 720.0	6.23
		1 732.5	6.32
		1 745.0	6.17
LTE 13 (5 MHz)	QPSK	779.5	5.30
		784.5	5.42
LTE 13 (10 MHz)	QPSK	782.0	5.51
LTE 13 (5 MHz)	16QAM	779.5	6.43
		784.5	6.35
LTE 13 (10 MHz)	16QAM	782.0	6.17

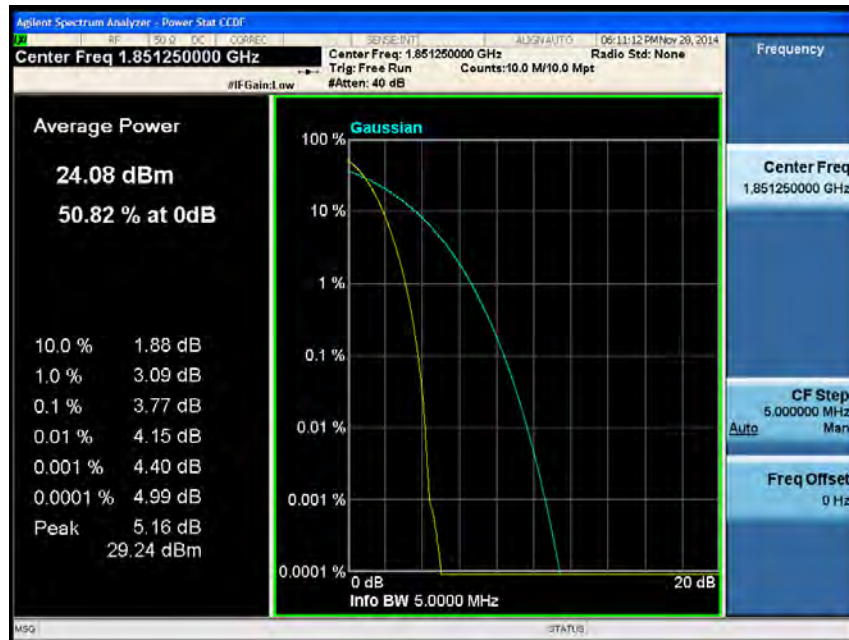
Please refer to the following plots.

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Peak-Average Ratio

CDMA1 900 1xRTT

Low Channel

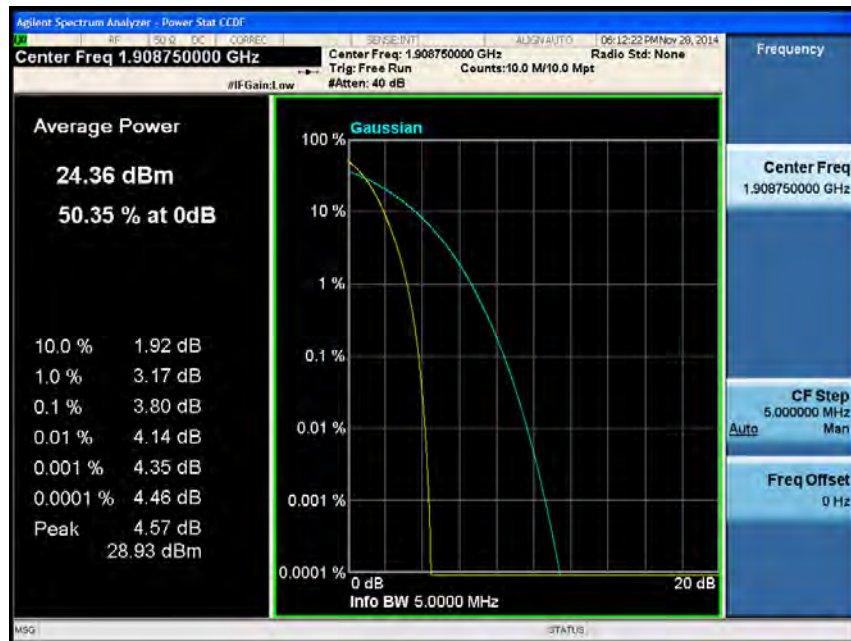


Middle Channel



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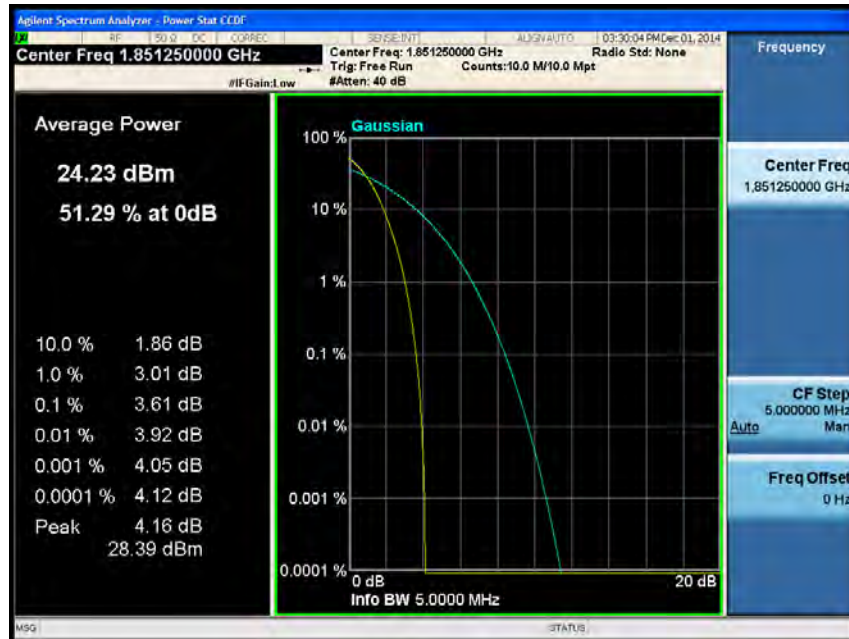
High Channel



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CDMA1 900 1xEV-DO

Low Channel

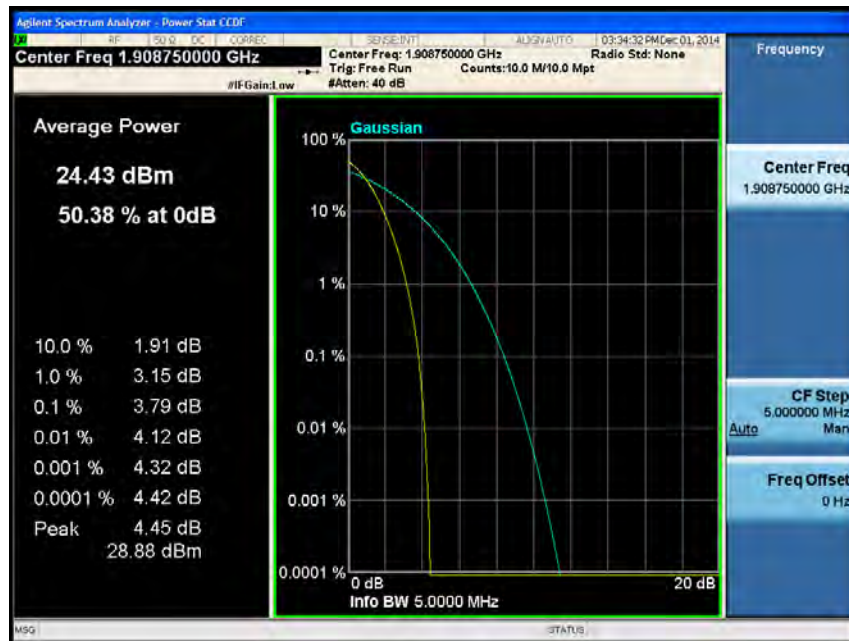


Middle Channel



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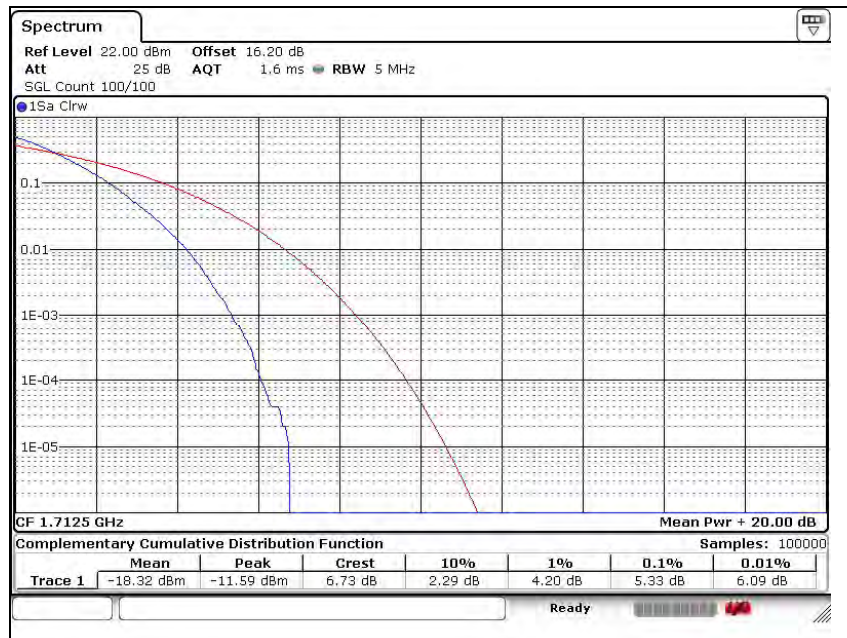
High Channel



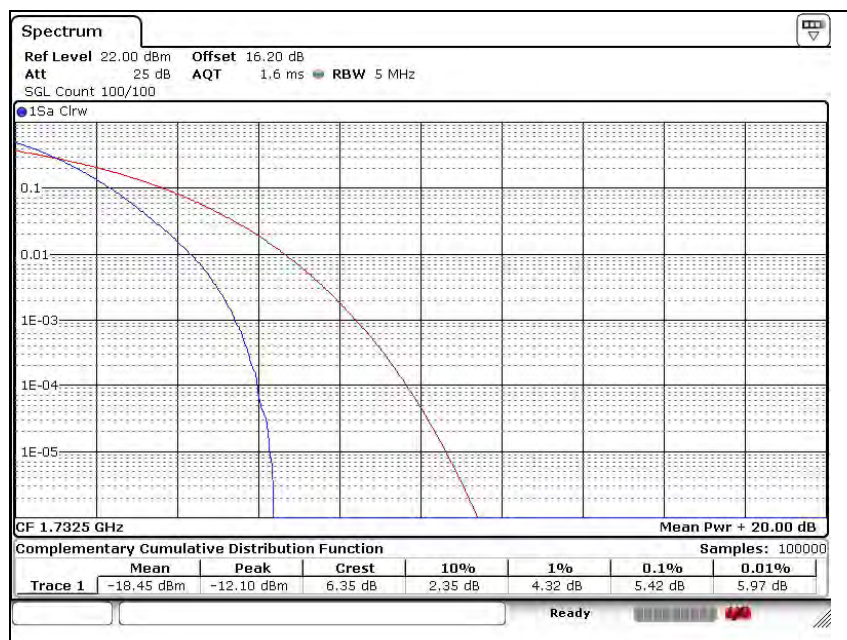
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (5 MHz – QPSK_RB 25)

Low Channel

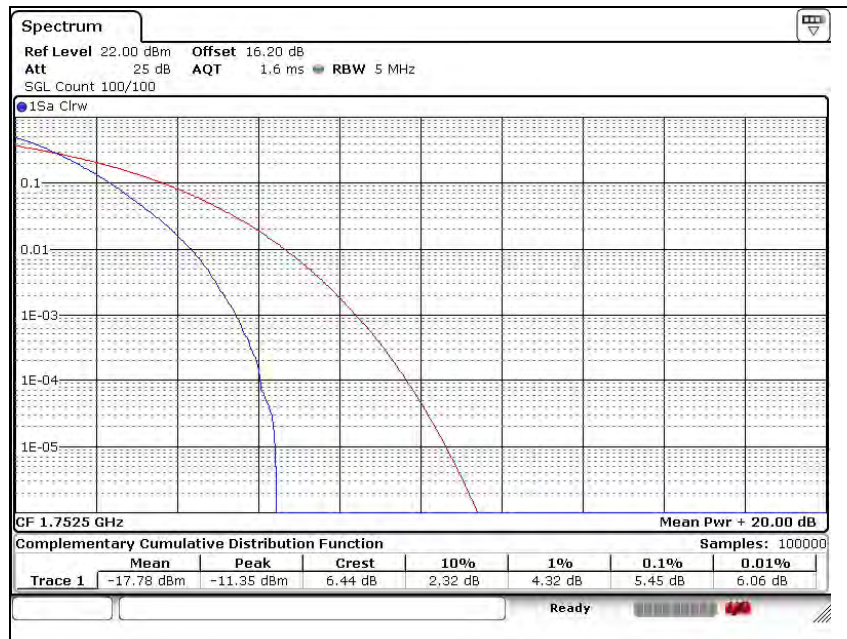


Middle Channel



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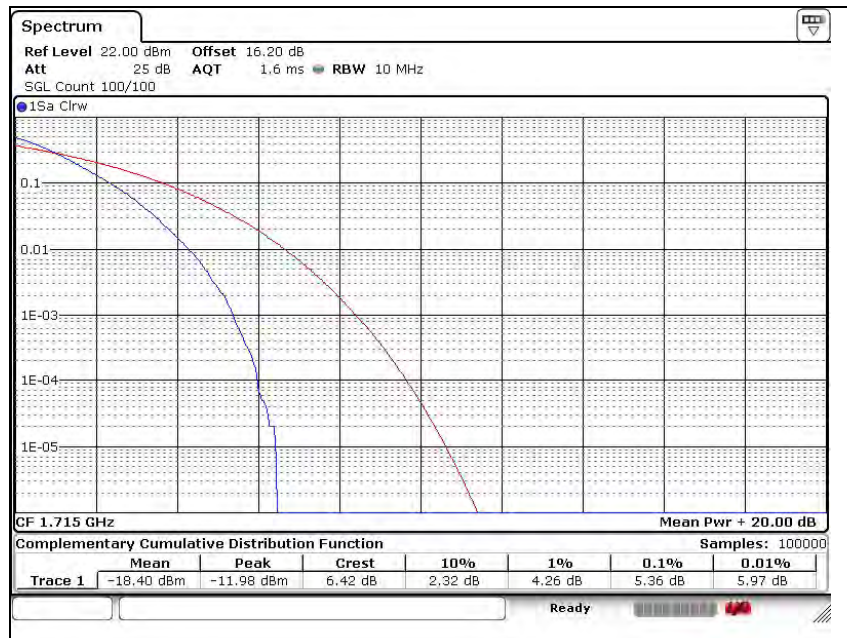
High Channel



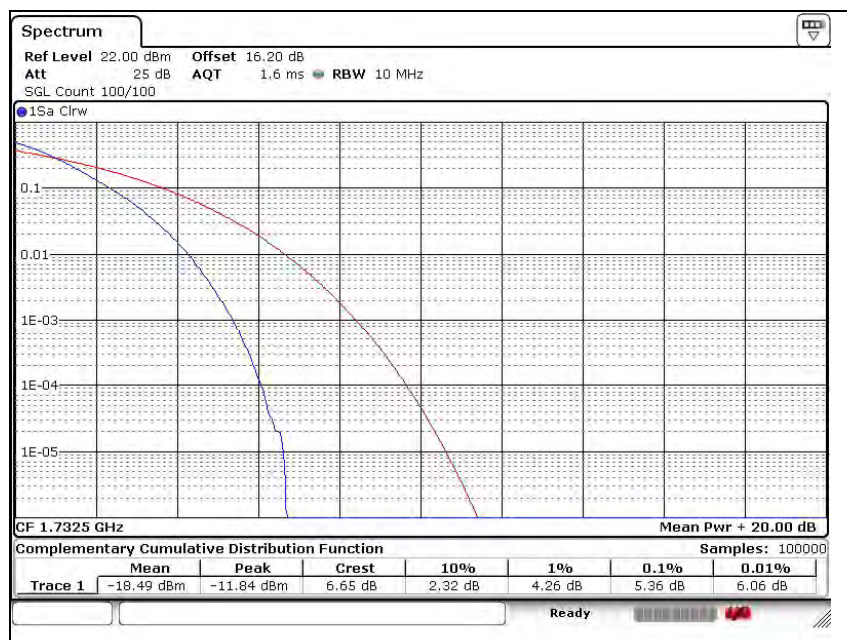
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (10 MHz – QPSK_RB 50)

Low Channel

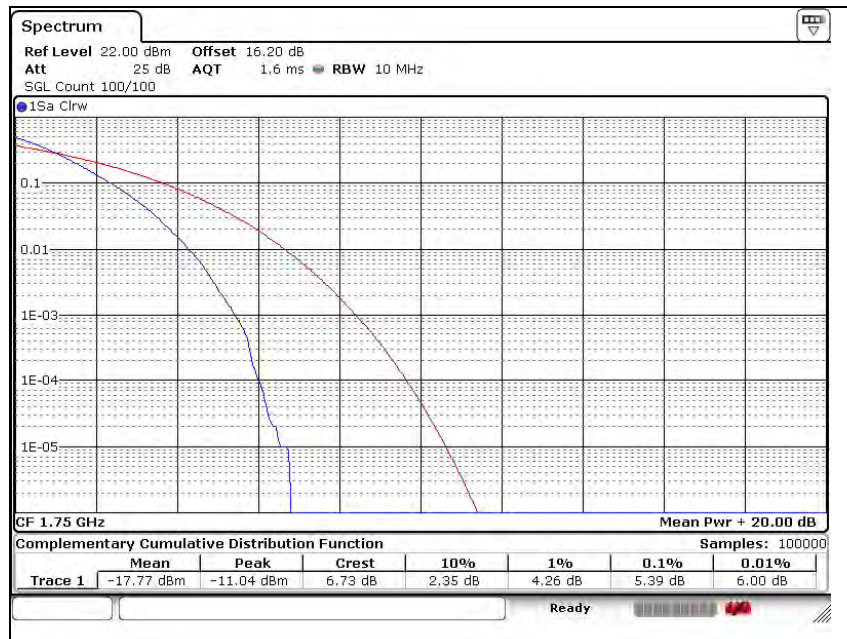


Middle Channel



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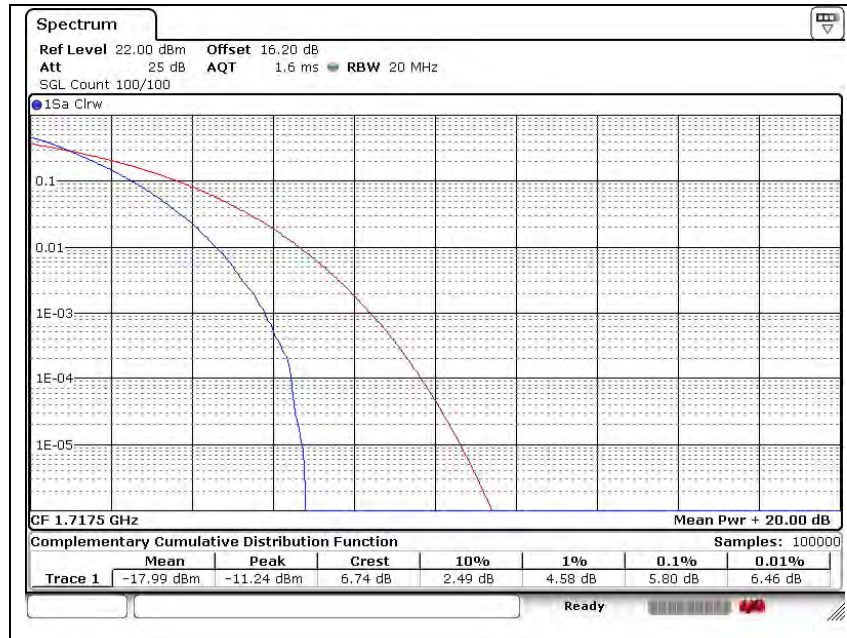
High Channel



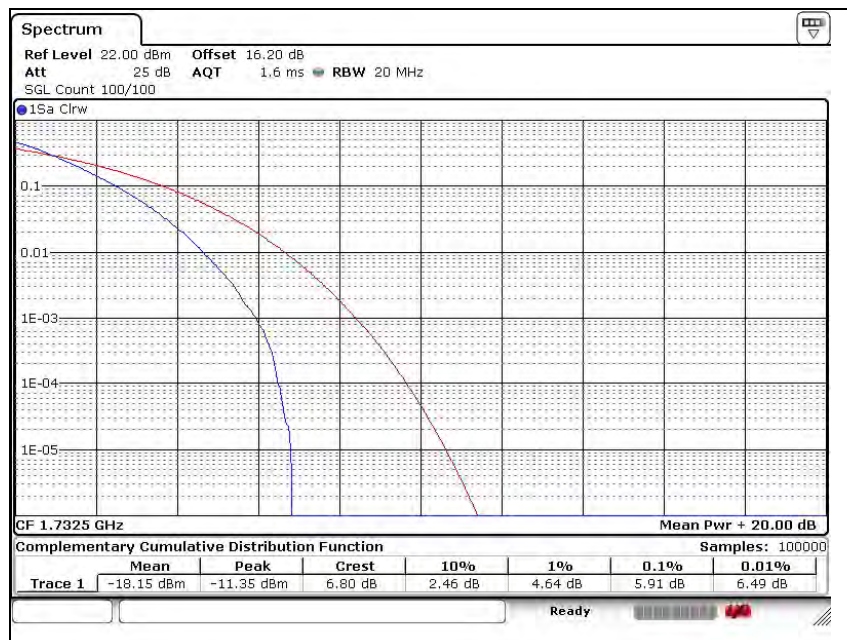
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (15 MHz – QPSK_RB 75)

Low Channel

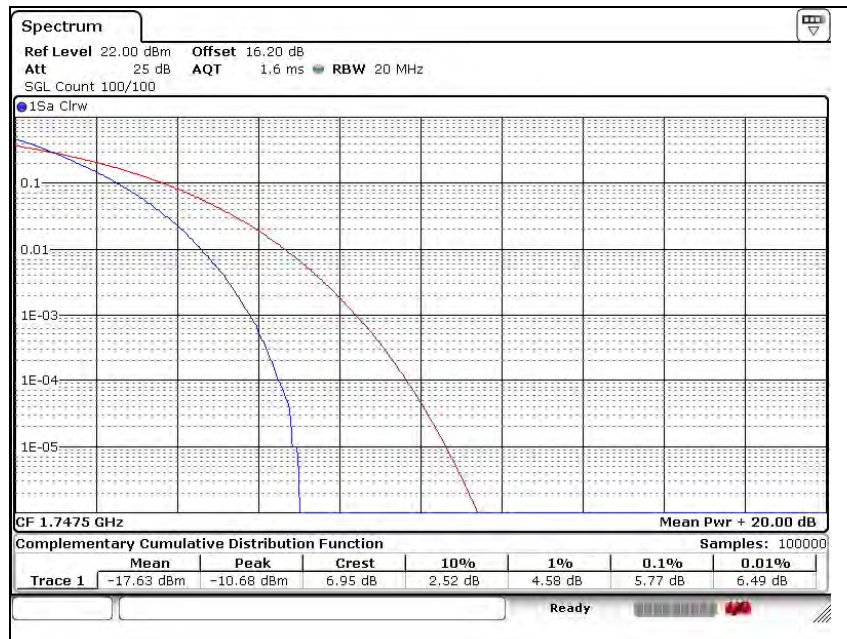


Middle Channel



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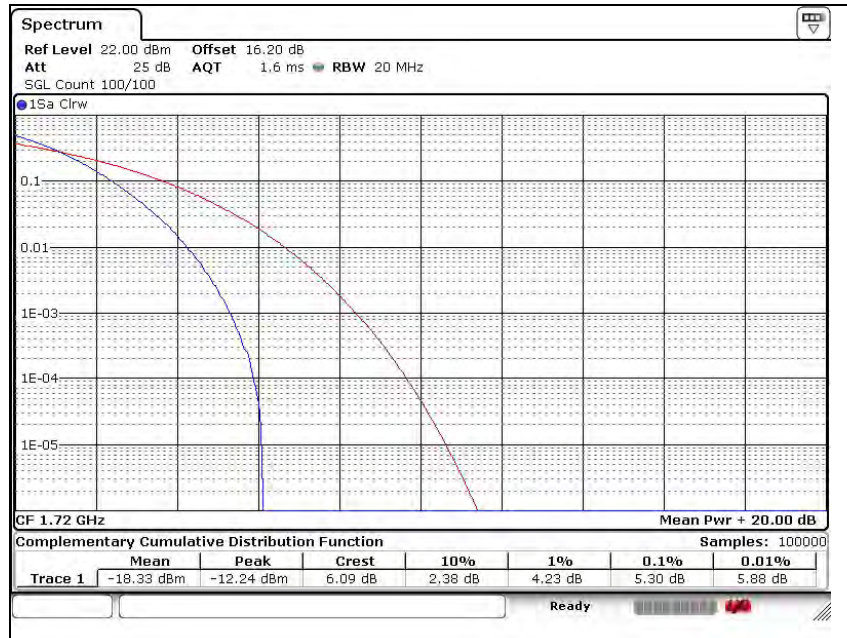
High Channel



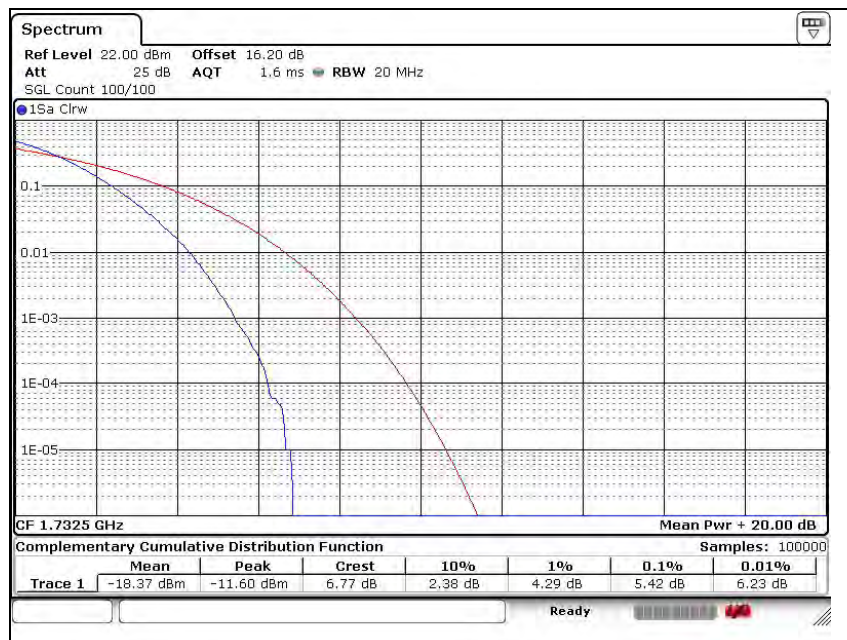
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (20 MHz – QPSK_RB 100)

Low Channel

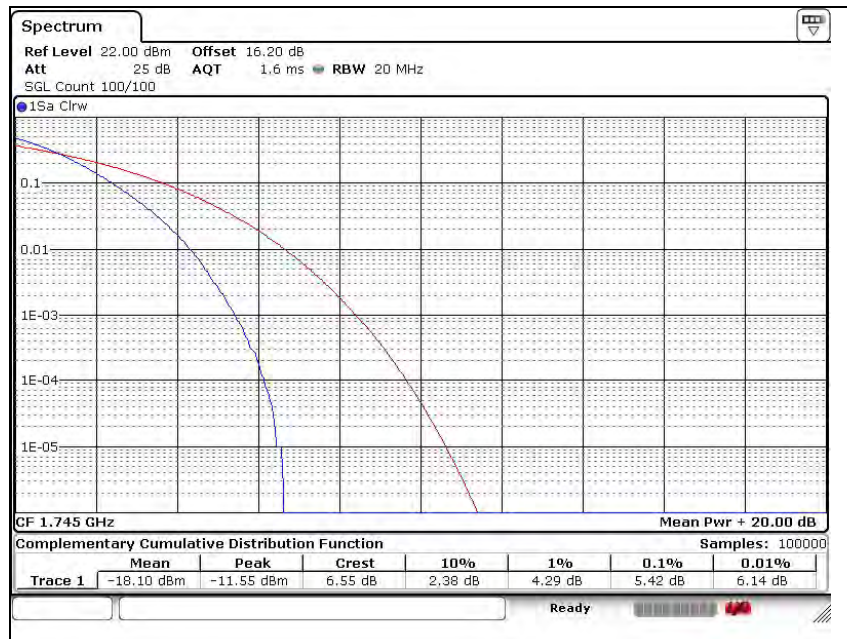


Middle Channel



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High Channel



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