

FCC Part 22H&24E Test Report

Product Name : Module
Trade Name : 
Model No. : LE910C1-LA
FCC ID : RI7LE910C1LA

Applicant : TELIT WIRELESS SOLUTIONS CO., LTD
Address : 12TH FL., SHINYOUNG SECURITIES BLD.SEOUL.REPUBLIC
OF KOREA

Date of Receipt : Mar. 21, 2019
Issued Date : May 29, 2019
Report No. : 1930357R-HPUSP17V00
Report Version : V1.0



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Test Report Certification

Issued Date : May 29, 2019

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Product Name : Module
Applicant : TELIT WIRELESS SOLUTIONS CO., LTD
Address : 12TH FL., SHINYOUNG SECURITIES
BLD.SEOUL.REPUBLIC OF KOREA
Manufacturer : TELIT WIRELESS SOLUTIONS CO., LTD
Model No. : LE910C1-LA
FCC ID : RI7LE910C1LA
EUT Voltage : DC 3.8V
Testing Voltage : DC 3.8V
Trade name : 
Applicable Standard : FCC CFR Title 47 Part 2, ANSI/TIA-603-D
FCC Part 22 Subpart H, FCC Part 24 Subpart E
Test Lab : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By :



(Fonbo Fang / Engineering Adm. Specialist)

Tested By :



(Clemens Fang / Senior Engineer)

Approved By :



(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
1930357R-HPUSP17V00	V1.0	Initial issue of report	May 29, 2019

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1. General Information

1.1. EUT Description

Product Name	Module
Trade Name	
Model No.	LE910C1-LA
Tx Frequency Range/ Channel number	GSM 850: 824.2-848.8 MHz PCS 1900: 1850.2-1909.8 MHz
Rx Frequency Range/ Channel number	GSM 850: 869.2-893.8 MHz PCS 1900: 1930.2-1989.8 MHz
Type of Modulation	GPRS: GMSK; EGPRS: GMSK / 8PSK
HW Version	1.0
Firmware Version	25.20.272-B024

Accessories Information	
Antenna	1 pcs

Antenna Information	
MFR. / Model	Hankook / WE14-LF-07
Antenna Type	Dipole Antenna
Antenna Gain	GSM 850: 1.5dBi PCS 1900: 3.5dBi

Note:

1. This LE910C1-LA support GSM 850, PCS 1900, WCDMA Band 2/4/5 and LTE Band 2/4/5/7.
2. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

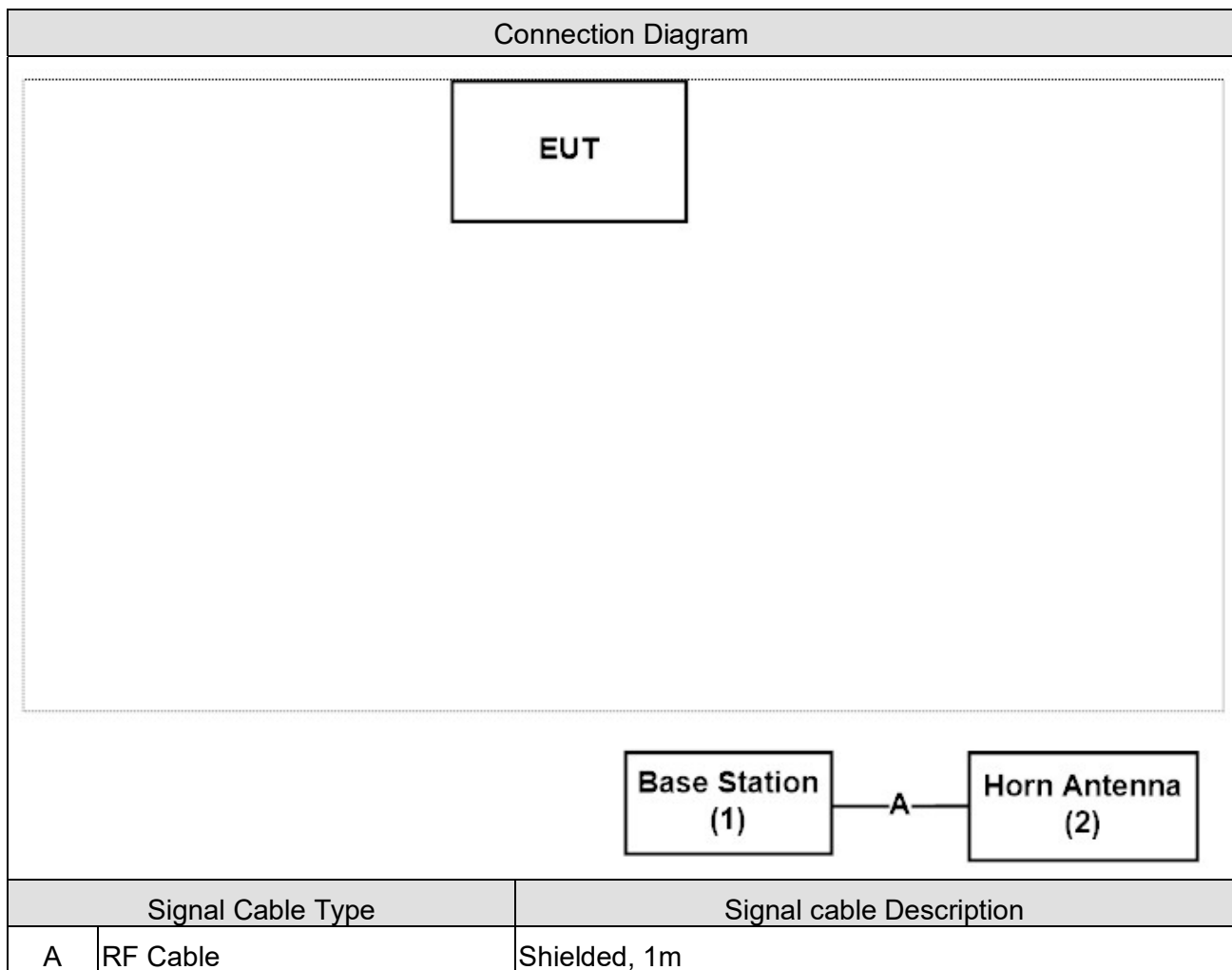
Test Mode
Mode 1: GSM 850 Mode
Mode 2: PCS1900 mode

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Base Station	R&S	CMW500	106071	Non-Shielded, 2m.
2 Horn Antenna	schwahnbeck	BBHA9120B	639	--

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of all equipment. Horn link with base station.
3	The EUT link with base station and it will continue receive the signal.
4	Repeat the above procedure.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
☐ Deviations from the test standards as below description:

For GSM 850 (FCC Part 22 Subpart H)

Performed Item	FCC Rule	Limit	Result
Maximum Output Power	§2.1033 §2.1046 §22.913	< 7 Watts	Pass
Modulation characteristic	§2.1047	N/A	Pass
Occupied Bandwidth	§2.1049	N/A	Pass
Peak To Average Ratio	§22.913(d)	$\leq$ 13dB	Pass
Conducted Band Edge	§22.917	< -13dBm	Pass
Spurious Emission	§2.1053 §22.917	< -13dBm	Pass
Frequency Stability	§2.1055 §22.335	< $\pm$ 2.5 ppm	Pass

For PCS 1900 (FCC Part 24 Subpart E)

Performed Item	FCC Rule	Limit	Result
Maximum Output Power	§2.1033 §2.1046 §24.232	< 2 Watts	Pass
Modulation characteristic	§2.1047	N/A	Pass
Occupied Bandwidth	§2.1049	N/A	Pass
Peak To Average Ratio	§24.232(d)	$\leq$ 13dB	Pass
Conducted Band Edge	§24.238	< -13dBm	Pass
Spurious Emission	§2.1053 §24.238	< -13dBm	Pass
Frequency Stability	§2.1055 §24.235	< $\pm$ 2.5 ppm	Pass

2.2. Test Environment

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	RF Output Power	15-35	23	3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	
Temperature (°C)	Occupied Bandwidth	15-35	23	3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	
Temperature (°C)	Peak To Average Ratio	15-35	23	3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	
Temperature (°C)	Conducted Band Edge	15-35	23	3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	
Temperature (°C)	Spurious Emission	15-35	23	2/3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	
Temperature (°C)	Frequency Stability	15-35	23	3
Humidity (%RH)		25-75	52	
Barometric pressure (mbar)		860-1060	950-1000	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : FCC Registration Number: TW3024

Canada : IC Registration Number: 22397-1 / 22397-2 / 22397-3

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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- 2 No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com
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2.3. List of Test Equipment

RF Output Power / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Peak To Average Ratio / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Conducted Band Edge / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Conducted Spurious Emissions / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Radiated Spurious Emissions / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2018/06/01	2019/05/31
Bilog Antenna	Teseq	CBL6112D	23191	2018/06/26	2019/06/25
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Signal Analyzer	R&S	FSVA40	101455	2018/11/05	2019/11/04
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/01/16	2020/01/15
Pre-Amplifier	Dekra	AP-400C	201801231	2018/12/05	2019/12/04
Pre-Amplifier	EMCI	EMC11830I	980366	2018/12/21	2019/12/20
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2018/10/17	2019/10/16
Pre-Amplifier	Dekra	AP-025C	201801236	2019/02/18	2020/02/17
Signal Analyzer	R&S	FSV40	101435	2018/07/19	2019/07/18
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Coaxial Cable	Huber+Suhner	SF104_SF104_SF104_SF104(16.0m)	CB2-H	2018/08/21	2019/08/20

Frequency Stability / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Wireless Conn. Tseter	R&S	CMW500	157118	2018/08/16	2019/08/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

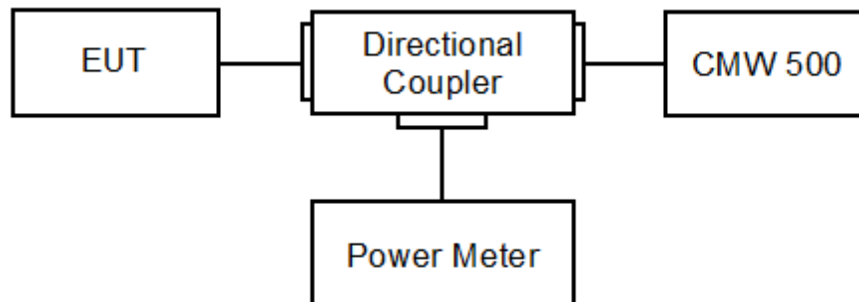
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.4. Uncertainty

Test Item	Uncertainty
RF Output Power	± 1.27 dB
Occupied Bandwidth	± 10 Hz
Peak To Average Ratio	In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13dB.
Conducted Band Edge	± 1.2 dB
Spurious Emissions	The measurement uncertainty is defined as ± 1.27 dB for Conducted Measurement. The measurement uncertainty is defined as ± 3.2 dB for Radiated Measurement.
Frequency Stability	± 10 Hz

3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

- The RF output of the transmitter was connected to base station simulator.
- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- Set EUT at maximum average power by base station simulator.
- Measure lowest, middle, and highest channels for each bandwidth and different modulation.

Effective Isotropic Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi)

Effective Radiated Power = Conducted Power(dBm) + Antenna Gain(dBi) - 2.15dB

3.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.2.4

ANSI C63.26-2015 Sub-clause 5.2.4.2

3.4. Test Result

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/14~2019/04/30	Test Site	SR10-H

GSM 850_GPRS

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
824.2	32.81	32.16	38.45
836.6	32.53	31.88	38.45
848.8	32.57	31.92	38.45

GSM 850_EGPRS (GMSK)

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
824.2	32.77	32.12	38.45
836.6	32.51	31.86	38.45
848.8	32.58	31.93	38.45

GSM 850_Voice

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
824.2	32.47	31.82	38.45
836.6	32.35	31.70	38.45
848.8	32.25	31.60	38.45

Note: Measure Level (ERP) = Reading Level + Antenna Gain - 2.15dB

Product	Module		
Test Item	RF Output Power		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/14~2019/04/30	Test Site	SR10-H

PCS 1900_GPRS

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
1850.2	29.79	33.29	38.45
1880	29.68	33.18	38.45
1909.8	29.46	32.96	38.45

PCS 1900_EGPRS (GMSK)

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
1850.2	29.75	33.25	38.45
1880	29.62	33.12	38.45
1909.8	29.48	32.98	38.45

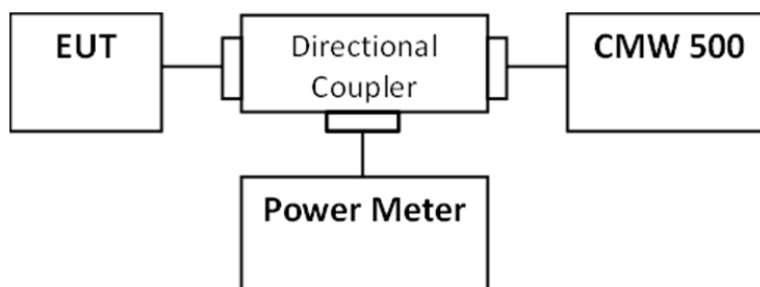
PCS 1900_Voice

Frequency (MHz)	Average Power		Limit (dBm)
	Reading Level (dBm)	Measure Level (dBm)	
1850.2	29.68	33.18	38.45
1880	29.47	32.97	38.45
1909.8	29.41	32.91	38.45

Note: Measure Level (EIRP) = Reading Level + Antenna Gain

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 26 dB bandwidth and 99% occupied bandwidth of the low & middle & high channel for the highest RF powers were measured.

4.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 4.2 & 4.3
ANSI C63.26-2015 Sub-clause 5.4.3 & 5.4.4

4.4. Test Result

Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/14	Test Site	SR10-H

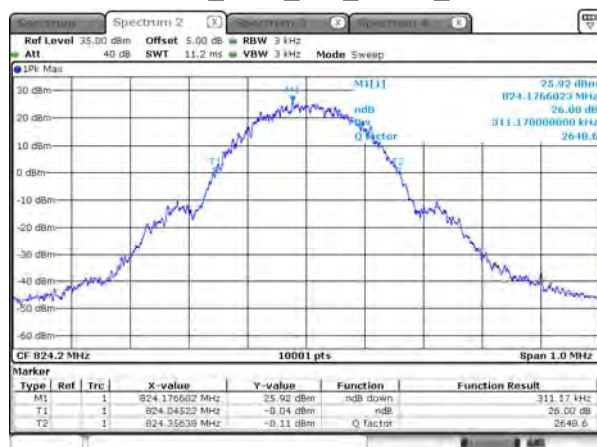
GSM 850_GPRS

Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Limit (MHz)
128	824.20	311.17	243.07	NA
190	836.60	317.27	243.17	NA
251	848.80	312.57	243.17	NA

GSM 850_EGPRS

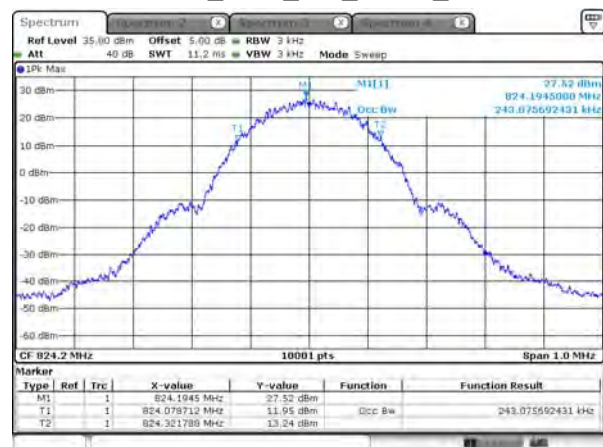
Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Limit (MHz)
128	824.20	314.47	242.67	NA
190	836.60	312.97	244.57	NA
251	848.80	316.97	242.87	NA

26dB BW_GSM_850_GPRS_824.2



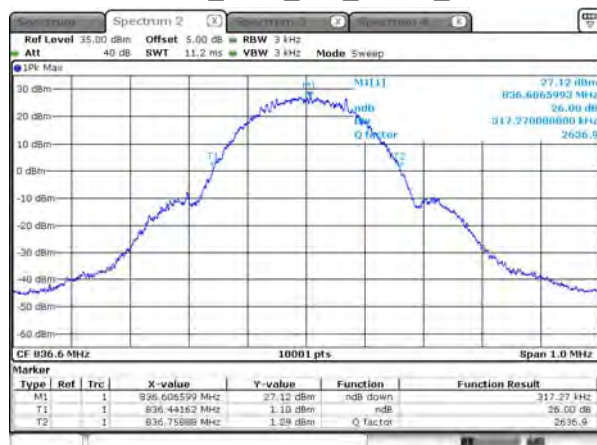
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99% BW_GSM_850_GPRS_824.2



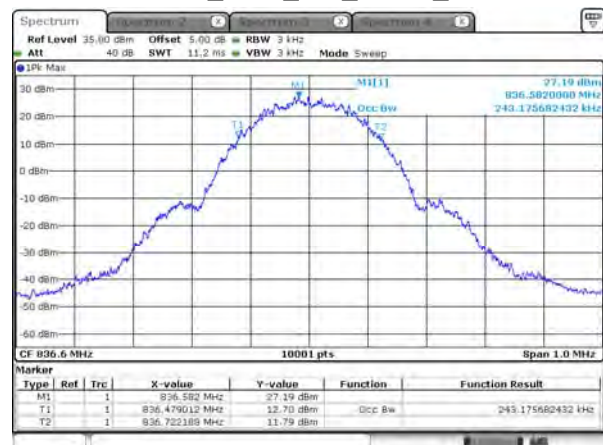
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26dB BW_GSM_850_GPRS_836.6



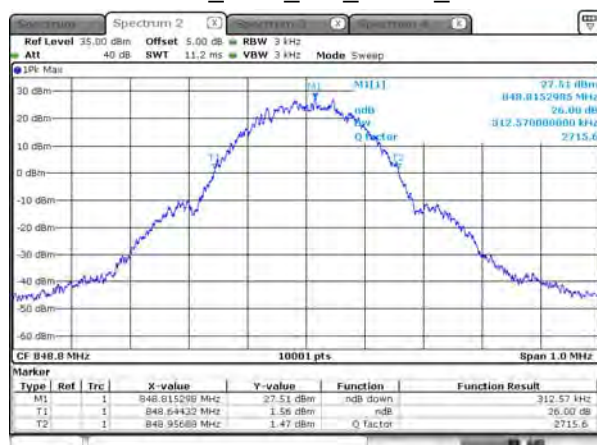
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99% BW_GSM_850_GPRS_836.6



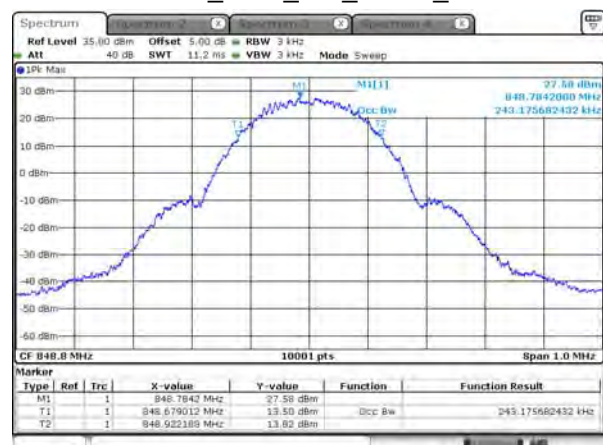
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26dB BW_GSM_850_GPRS_848.8



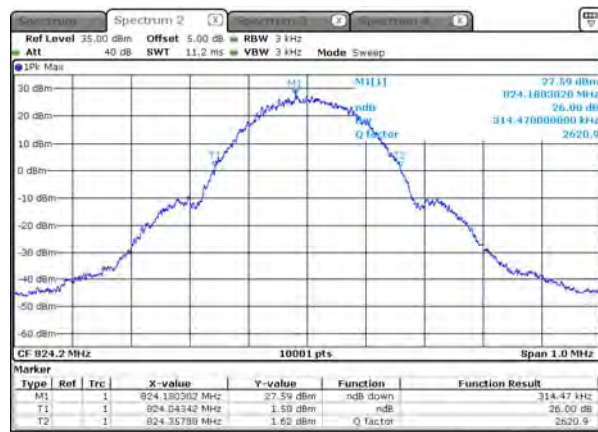
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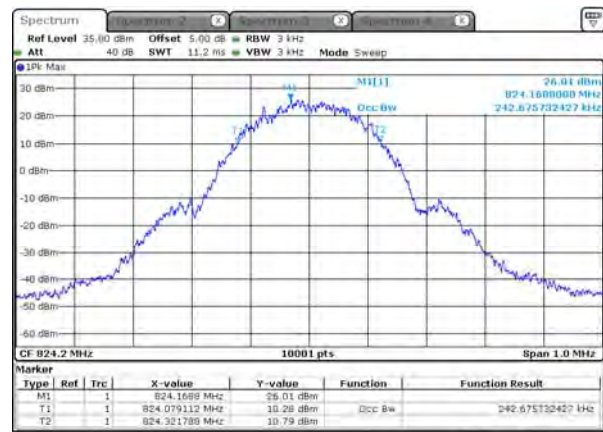
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26dB BW_GSM_850_EGPRS_824.2



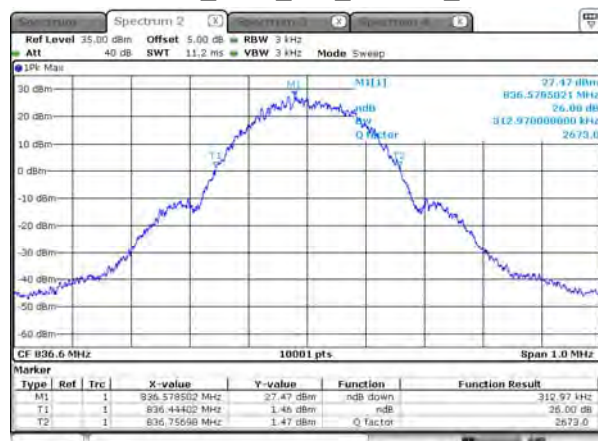
Date 2 APR 2019 14:31:55

99% BW_GSM_850_EGPRS_824.2



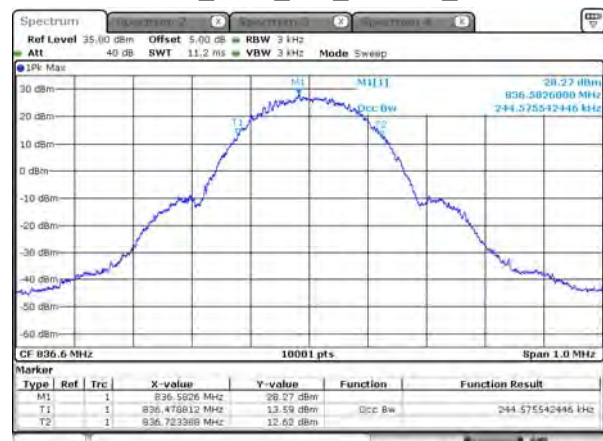
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26dB BW_GSM_850_EGPRS_836.6



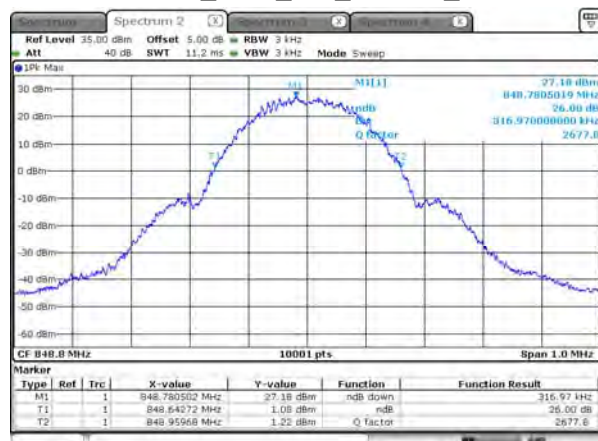
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99% BW_GSM_850_EGPRS_836.6



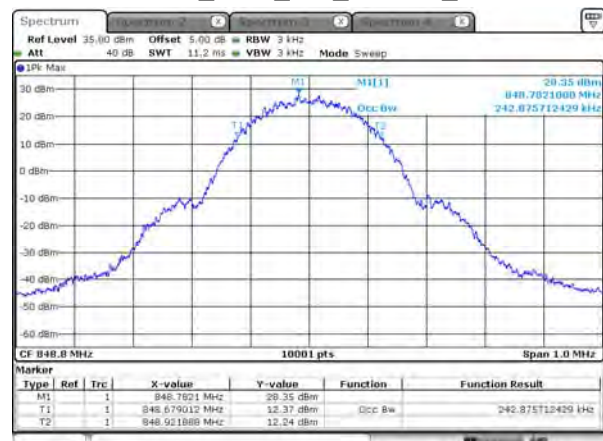
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26dB BW_GSM_850_EGPRS_848.8



Date 2 APR 2019 12:43:29

99% BW_GSM_850_EGPRS_848.8



Date 2 APR 2019 12:46:07

Product	Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/14	Test Site	SR10-H

PCS 1900_GPRS

Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Limit (MHz)
512	1850.2	314.47	243.27	NA
661	1880	311.67	243.07	NA
810	1909.8	291.67	245.07	NA

PCS 1900_EGPRS

Channel No.	Frequency (MHz)	26dB Occupied Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Limit (MHz)
512	1850.2	312.87	241.77	NA
661	1880	312.97	244.17	NA
810	1909.8	311.77	242.27	NA

26dB BW_PCS_1900_GPRS_1850.2



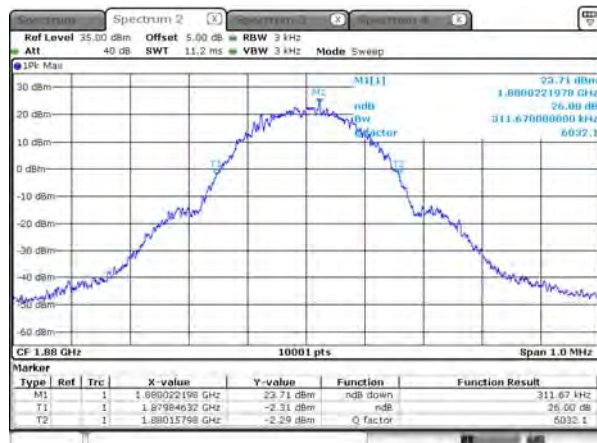
Date: 1 APR 2019 18:30:50

99% BW_PCS_1900_GPRS_1850.2



Date: 1 APR 2019 18:31:52

26dB BW_PCS_1900_GPRS_1880



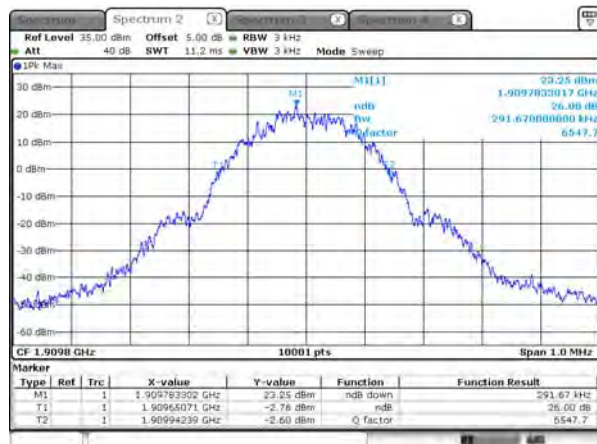
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99% BW_PCS_1900_GPRS_1880



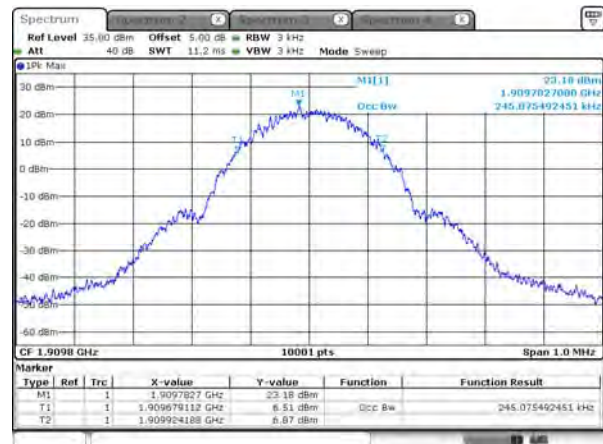
Date: 1 APR 2019 18:34:05

26dB BW_PCS_1900_GPRS_1909.8

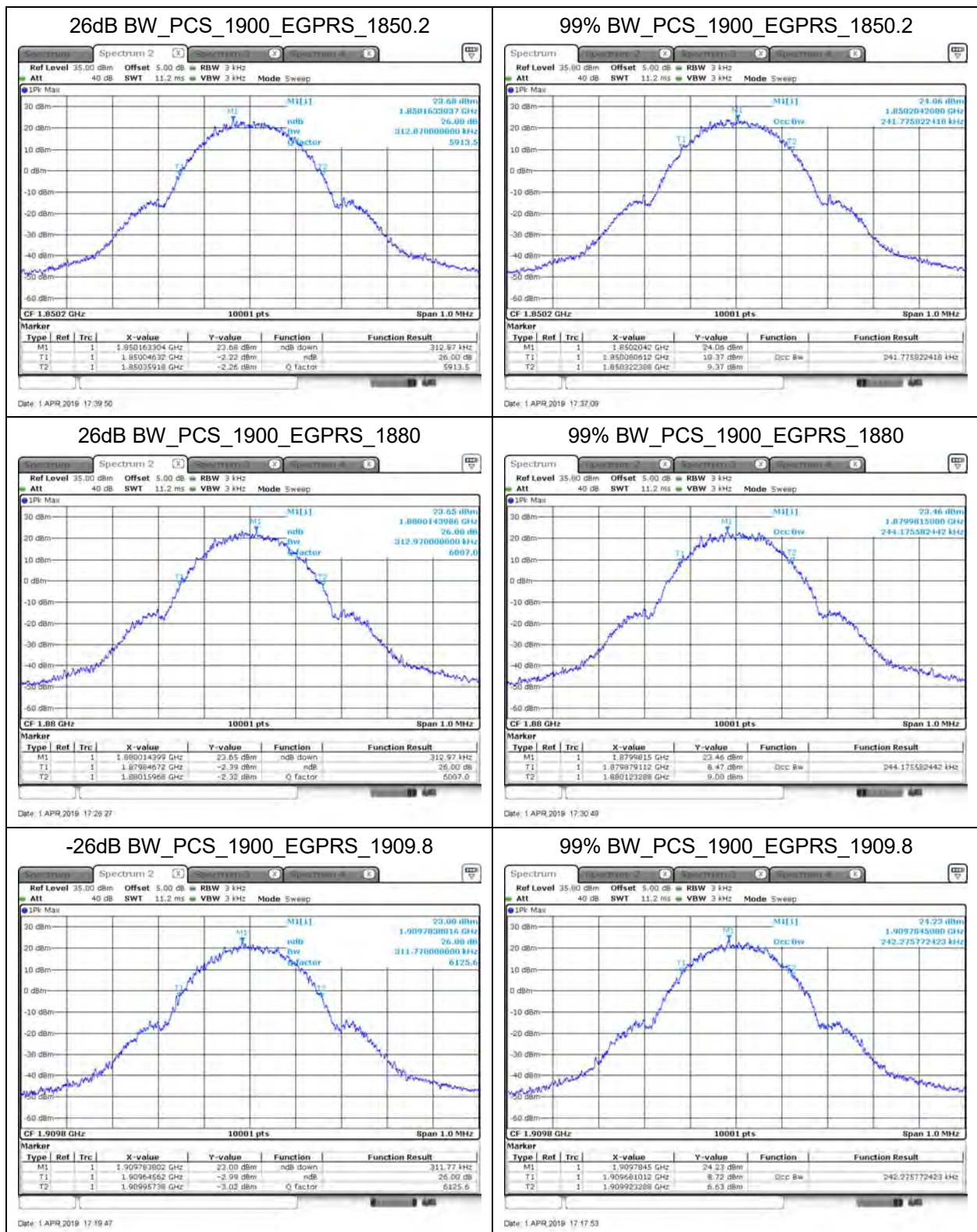


Date: 1 APR 2019 18:39:29

99% BW_PCS_1900_GPRS_1909.8

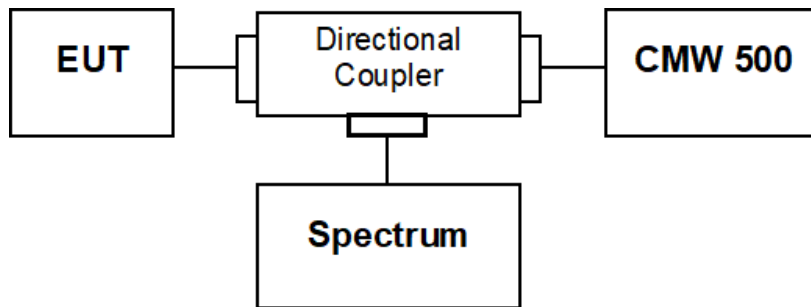


Date: 1 APR 2019 18:40:05



5. Peak To Average Ratio

5.1. Test Setup



5.2. Test Procedure

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1 %.

5.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.7.2

ANSI C63.26-2015 Sub-clause 5.2.3.4

5.4. Test Result

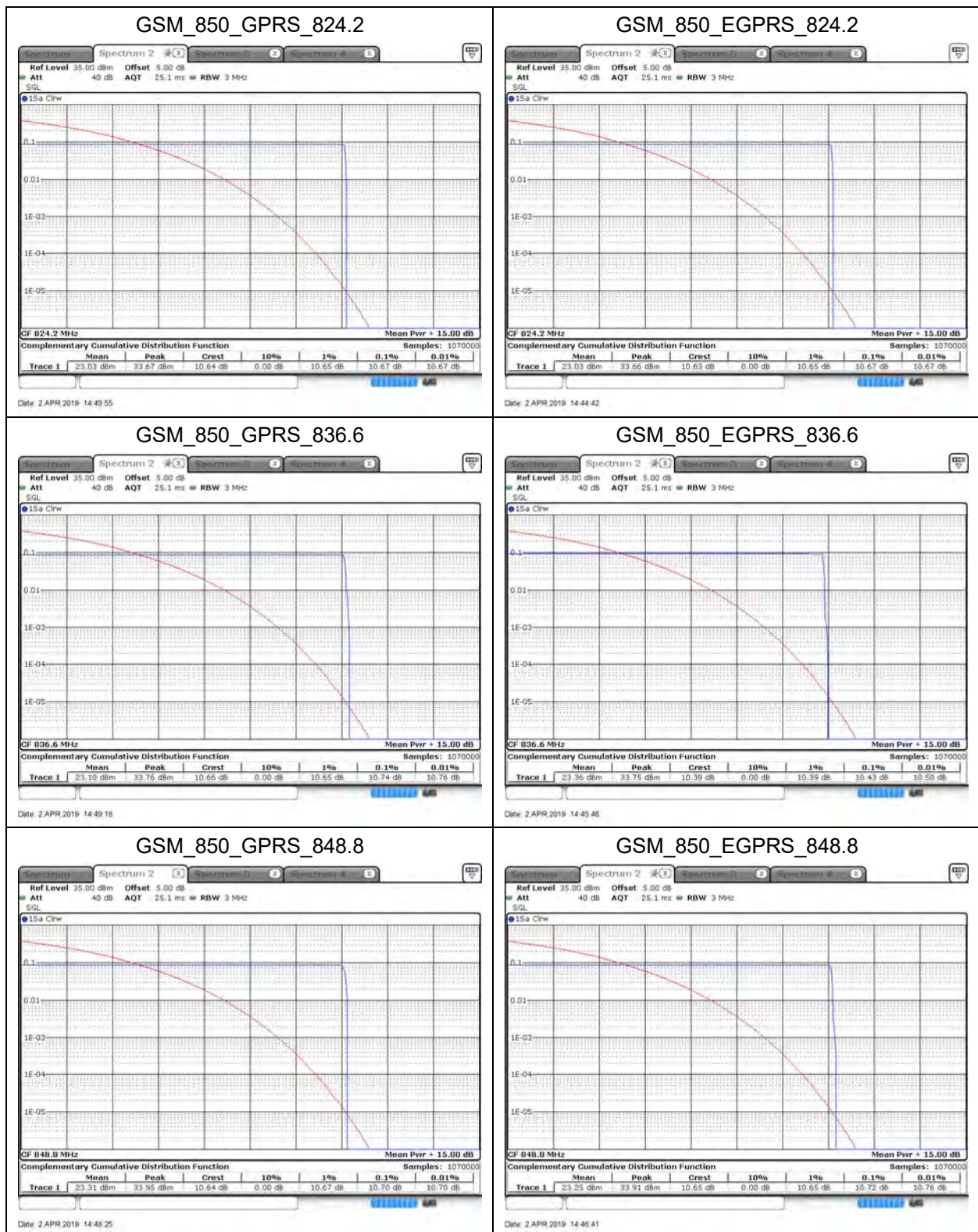
Product	Module		
Test Item	Peak To Average Ratio		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/21	Test Site	SR10-H

GSM 850_GPRS

Channel No.	Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
128	824.20	33.67	23.03	10.64
190	836.60	33.76	23.10	10.66
251	848.80	33.95	23.31	10.64

GSM 850_EGPRS

Channel No.	Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
128	824.20	33.66	23.03	10.63
190	836.60	33.75	23.36	10.39
251	848.80	33.91	23.25	10.66



Product	Module		
Test Item	Peak To Average Ratio		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/21	Test Site	SR10-H

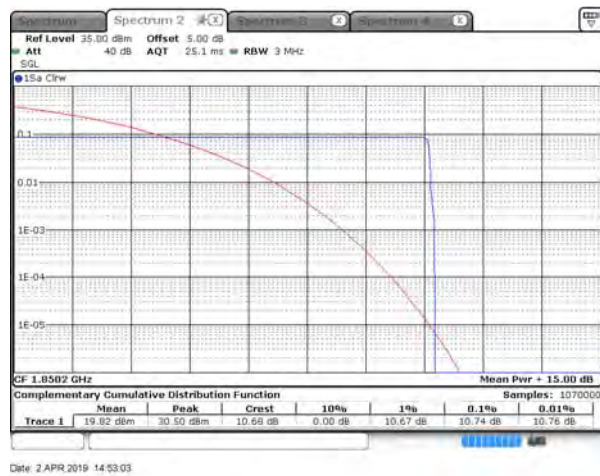
PCS 1900_GPRS

Channel No.	Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
512	1850.2	30.50	19.82	10.68
661	1880	30.69	19.99	10.70
810	1909.8	30.69	20.01	10.68

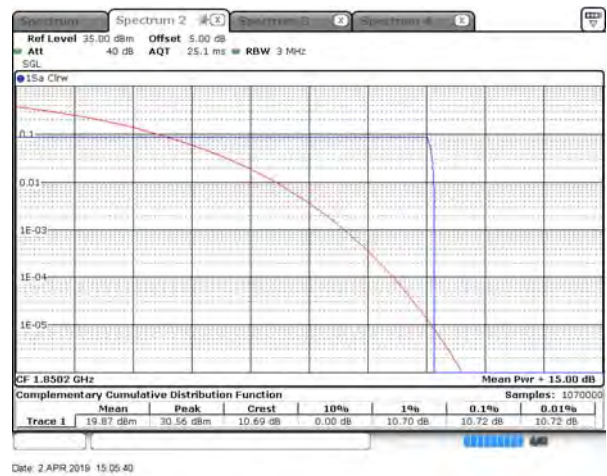
PCS 1900_EGPRS

Channel No.	Frequency (MHz)	Peak (dBm)	Average (dBm)	PAPR (dB)
512	1850.2	30.56	19.87	10.69
661	1880	30.72	20.04	10.68
810	1909.8	30.73	20.06	10.67

PCS_1900_GPRS_1850.2



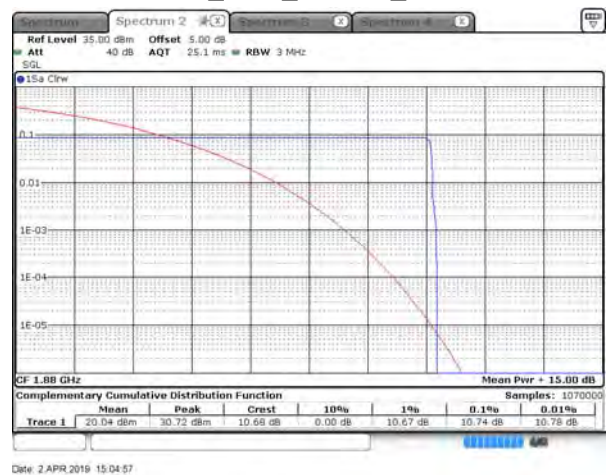
PCS_1900_EGPRS_1850.2



PCS_1900_GPRS_1880



PCS_1900_EGPRS_1880



PCS_1900_GPRS_1909.8

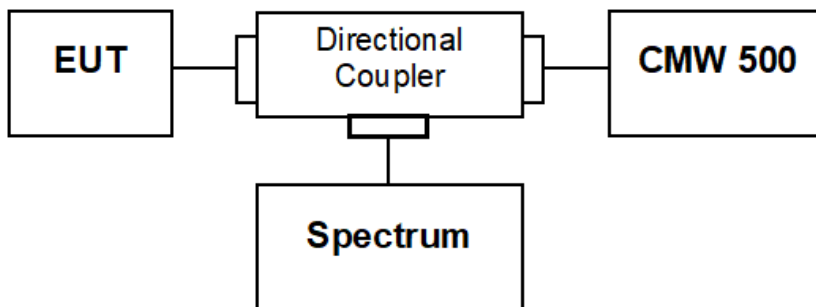


PCS_1900_EGPRS_1909.8



6. Conducted Band Edge

6.1. Test Setup



6.2. Test Procedure

1. The EUT was connected to spectrum analyzer and System Simulator via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The conducted spurious emission for the whole frequency range was taken.
4. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

6.3. Test Method

Conducted Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1

ANSI C63.26: 2015 Sub-clause 5.7

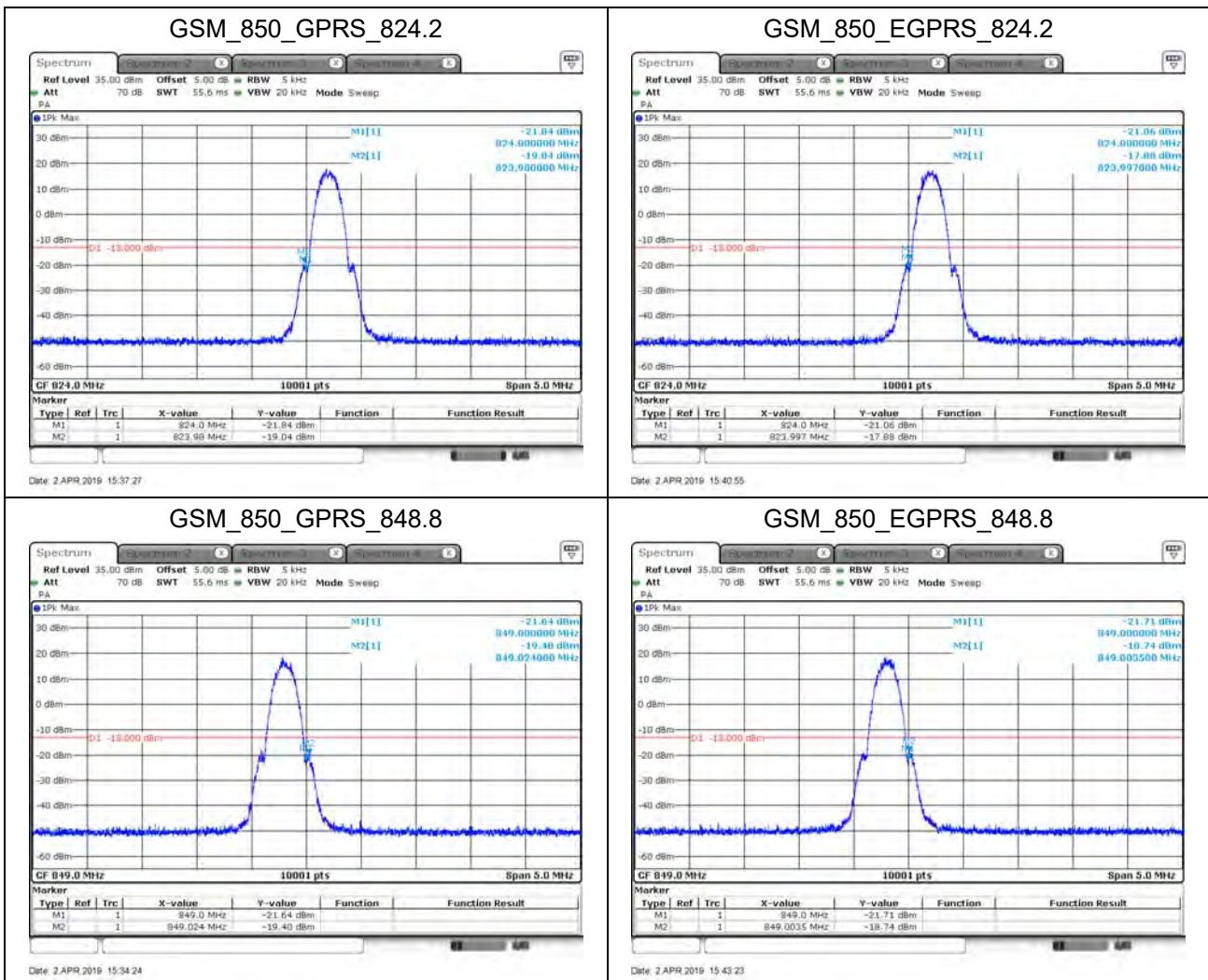
Radiated Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.8

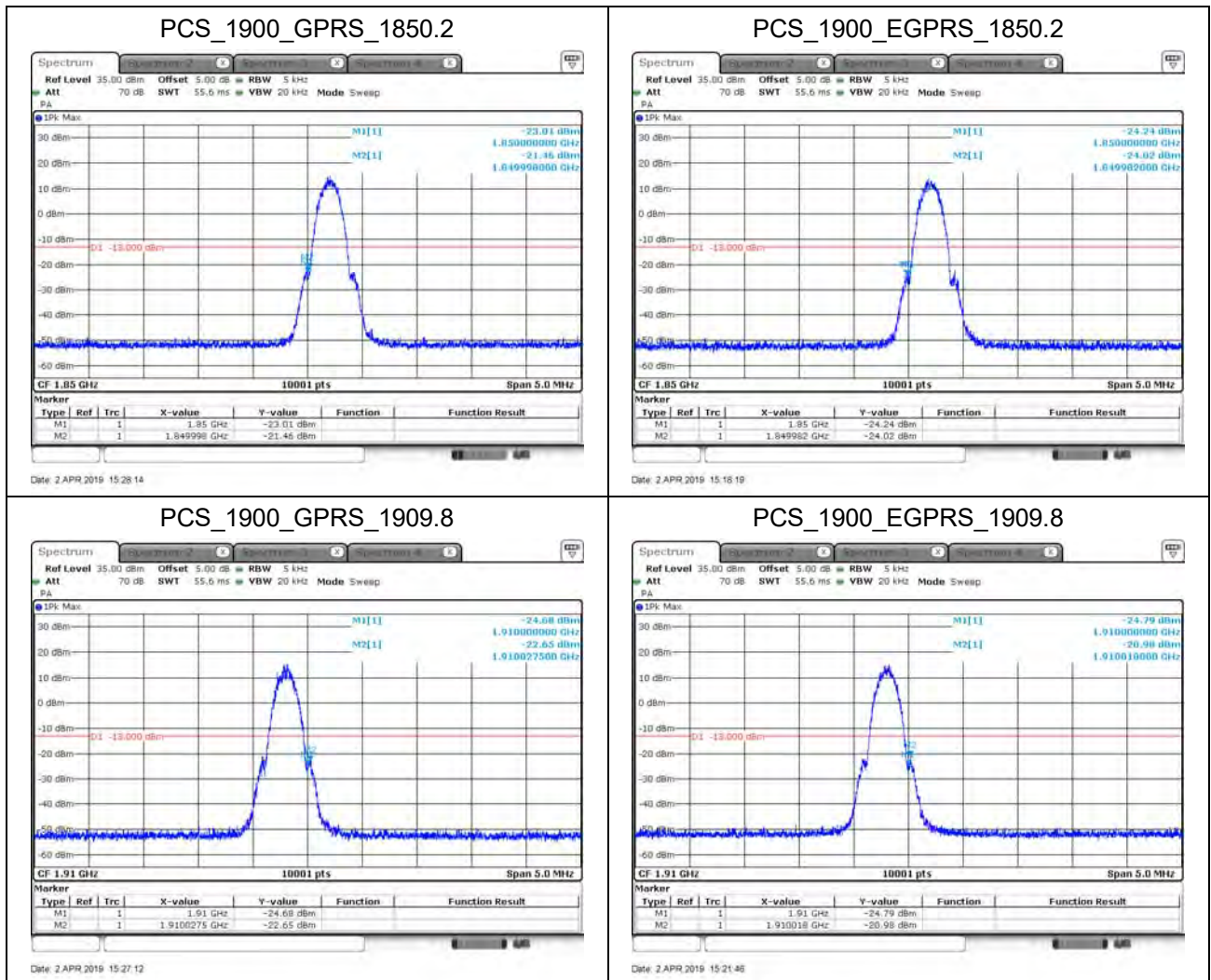
ANSI C63.26: 2015 Sub-clause 5.5.3.2

6.4. Test Result

Product	Module		
Test Item	Conducted Band Edge		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/18	Test Site	SR10-H



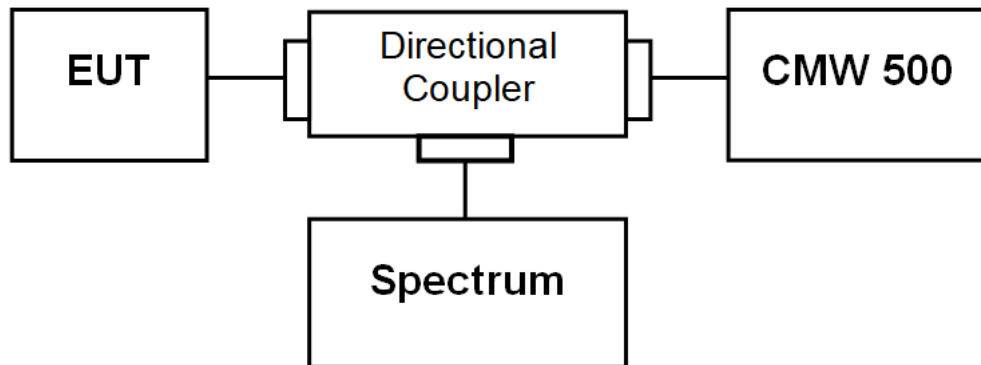
Product	Module		
Test Item	Conducted Band Edge		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/18	Test Site	SR10-H



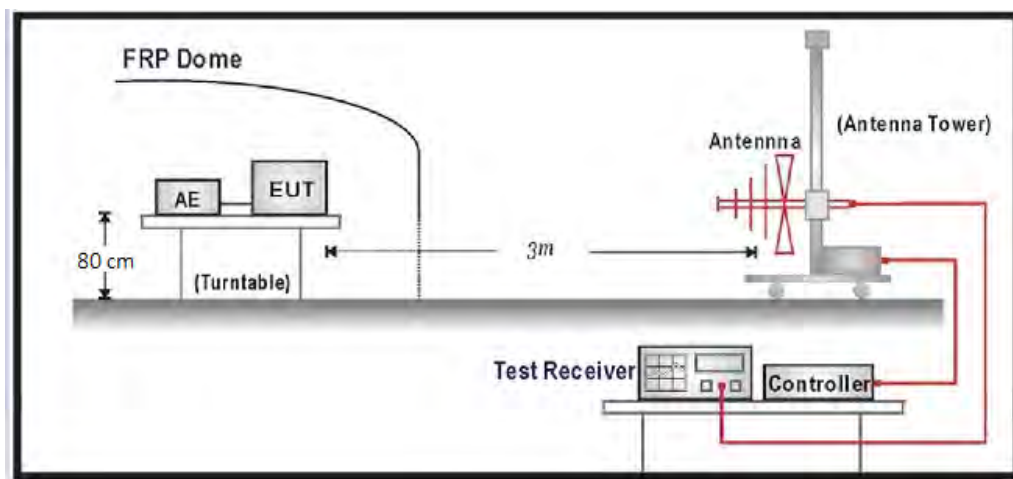
7. Spurious Emission

7.1. Test Setup

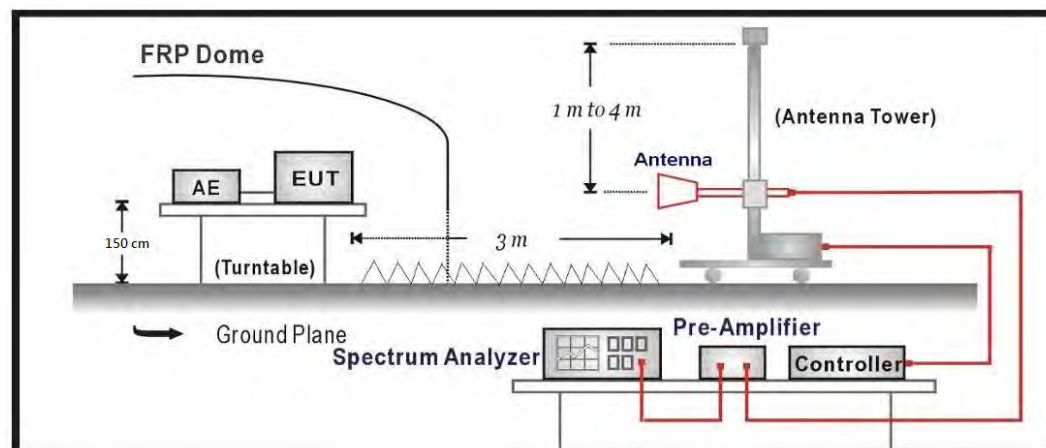
Conducted Spurious Measurement (below 1GHz)



Radiated Spurious Measurement (below 1GHz)



Radiated Spurious Measurement (above 1GHz)



7.2. Test Procedure

Conducted Spurious Measurement:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and Base station by a Directional Couple.
- c) EUT Communicate with Base station, then select a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.
- e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

Radiated Spurious Measurement:

- a) The EUT was placed on a rotatable wooden table with 1.5 meter above ground.
- b) The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- c) The table was rotated 360 degrees to determine the position of the highest spurious emission.
- d) The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
- e) Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 1MHz, Sweep 500ms, Taking the record of maximum spurious emission.
- f) A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- g) Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- h) Taking the record of output power at antenna port
- i) Repeat step 7 to step 8 for another polarization.
- j) $EIRP = SG - \text{Cable loss} + \text{Antenna Gain}$

7.3. Test Method

Conducted Spurious Measurement:

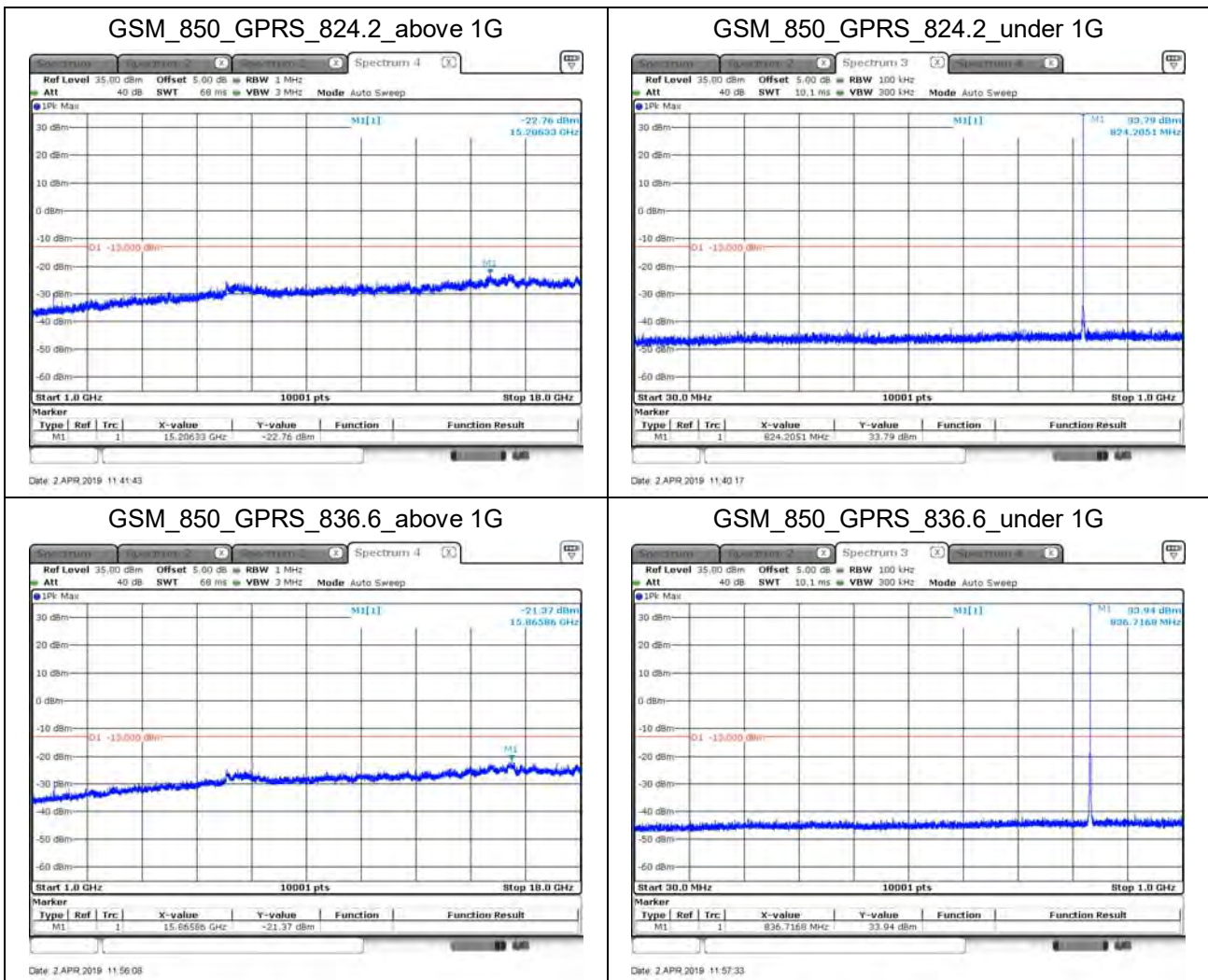
KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 6.1
ANSI C63.26-2015 Sub-clause 5.7

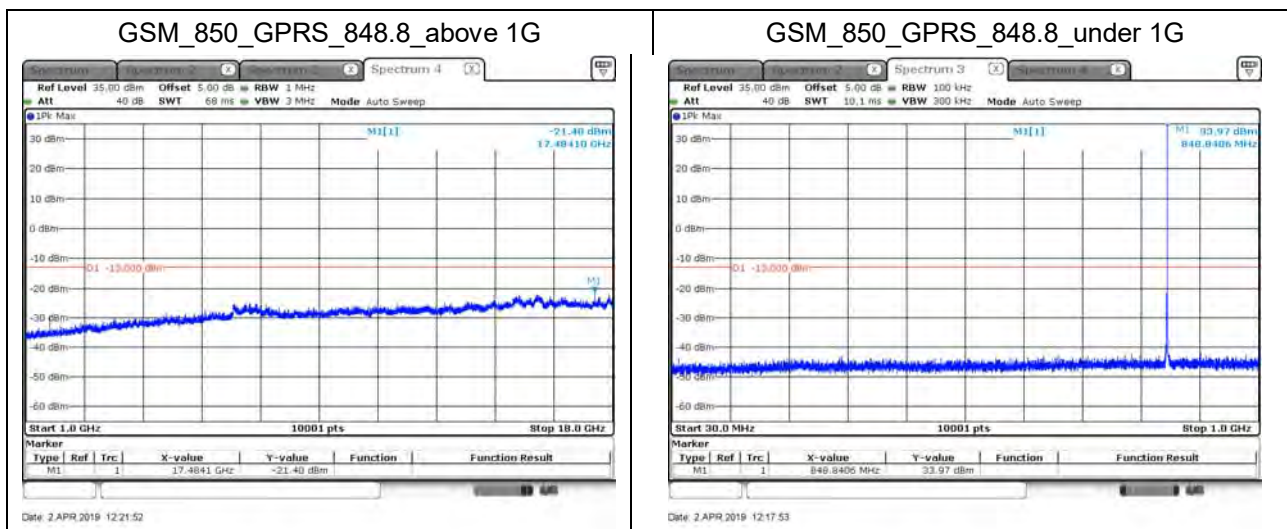
Radiated Spurious Measurement:

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.8
ANSI C63.26-2015 Sub-clause 5.5.3.2

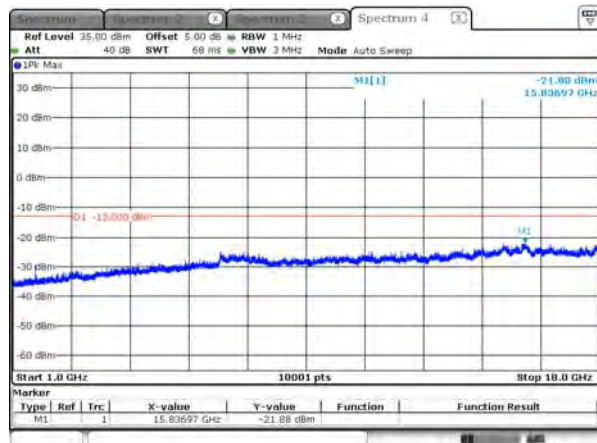
7.4. Test Result

Product	Module		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/02	Test Site	SR10-H



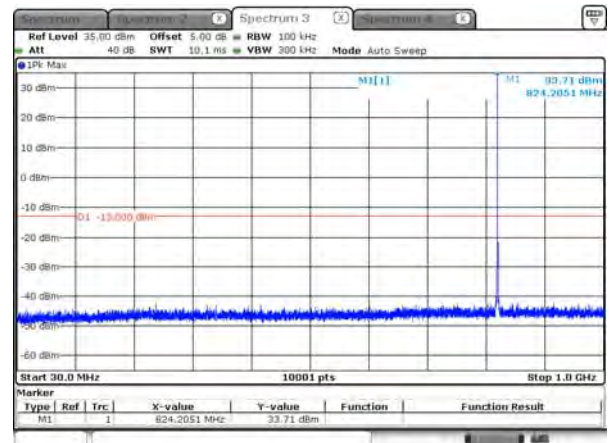


GSM_850_EGPRS_824.2_above 1G



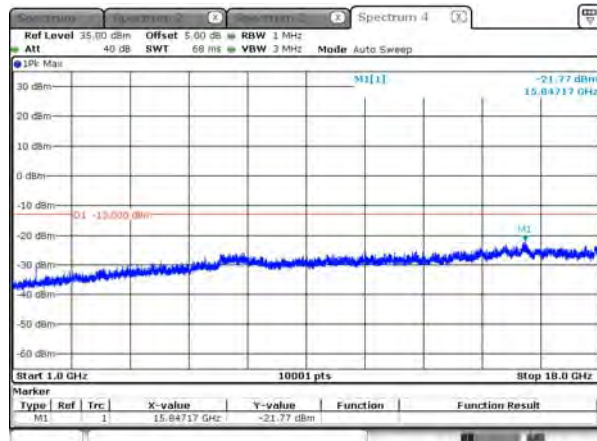
Date: 2 APR 2019 14:18:52

GSM_850_EGPRS_824.2_under 1G



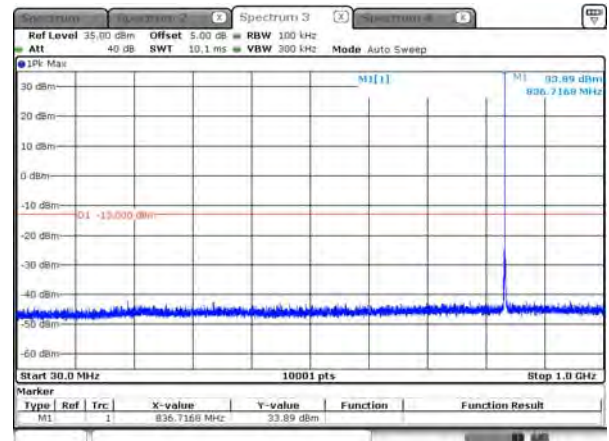
Date: 2 APR 2019 14:28:34

GSM_850_EGPRS_836.6_above 1G



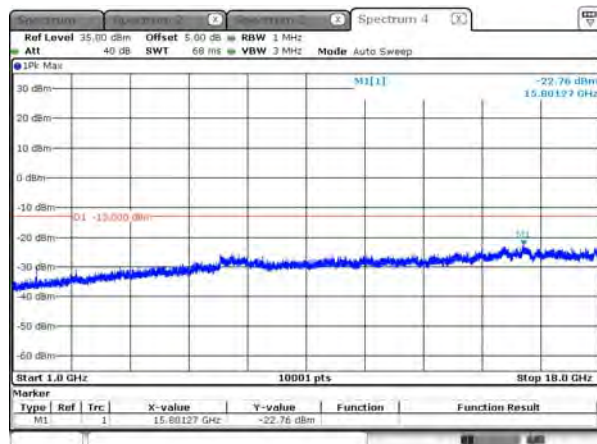
Date: 2 APR 2019 13:07:58

GSM_850_EGPRS_836.6_under 1G



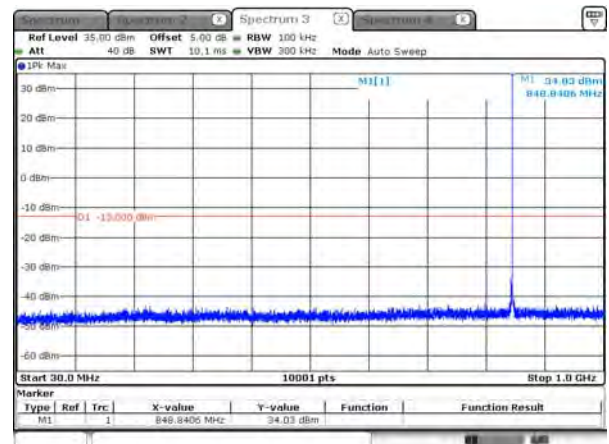
Date: 2 APR 2019 13:07:25

GSM_850_EGPRS_848.8_above 1G



Date: 2 APR 2019 12:33:04

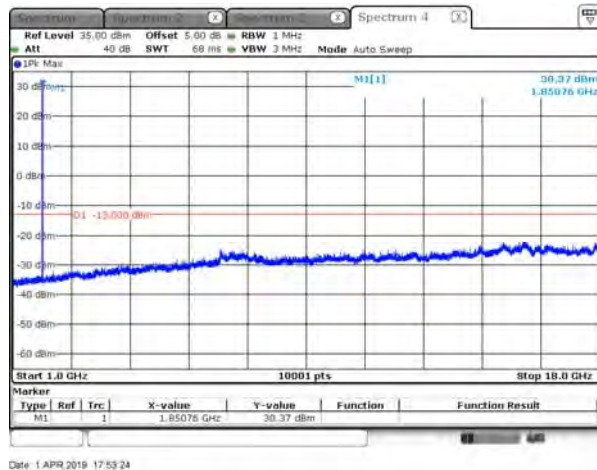
GSM_850_EGPRS_848.8_under 1G



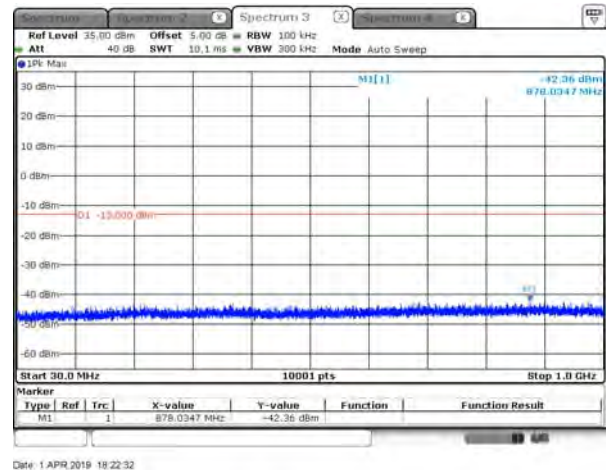
Date: 2 APR 2019 12:35:57

Product	Module		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/01	Test Site	SR10-H

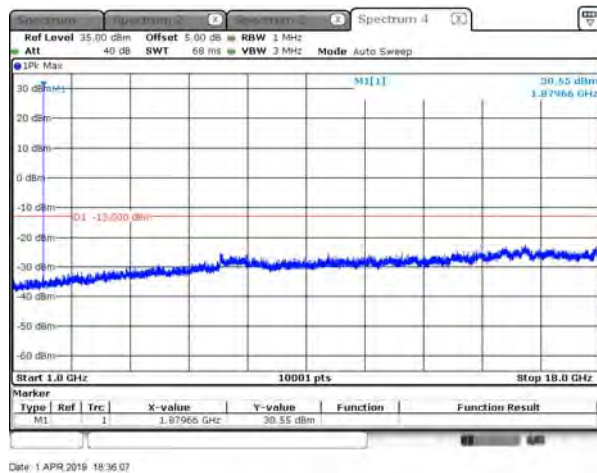
PCS_1900_GPRS_1850.2_above 1G



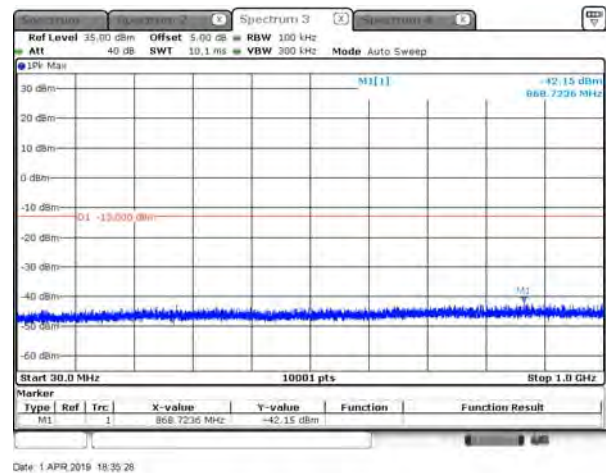
PCS_1900_GPRS_1850.2_under 1G

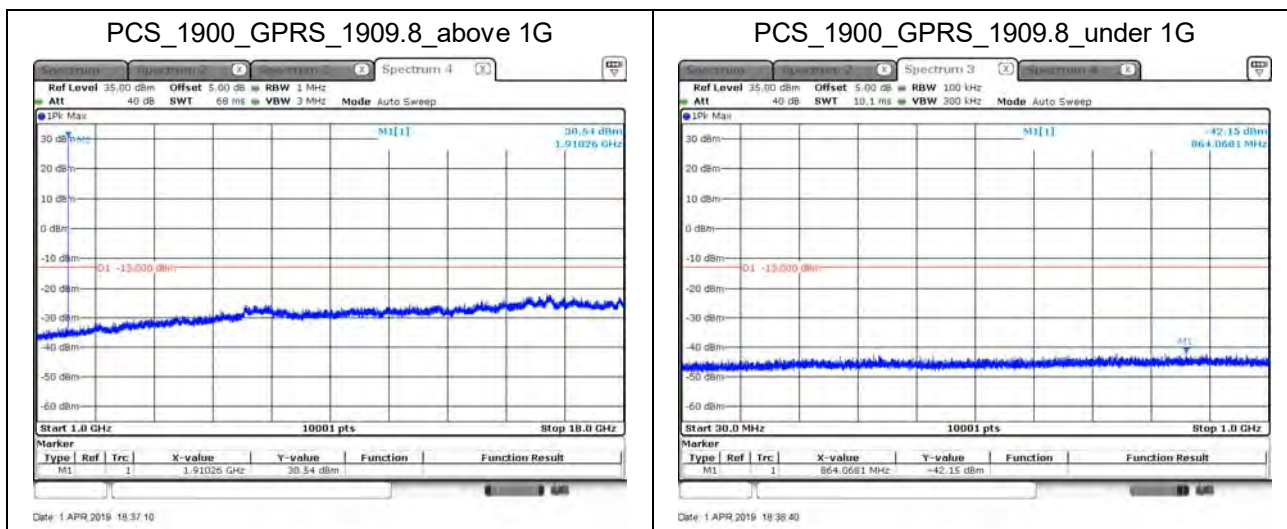


PCS_1900_GPRS_1880_above 1G

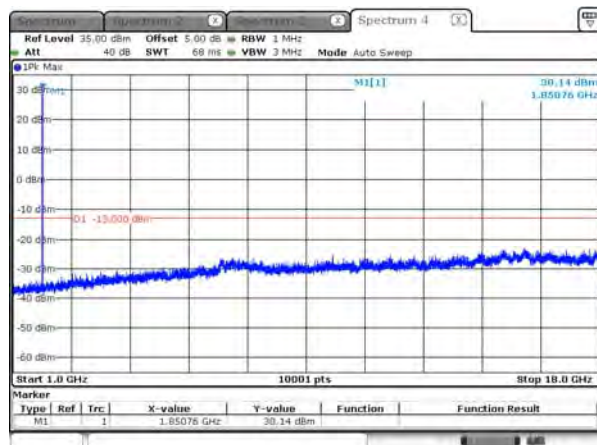


PCS_1900_GPRS_1880_under 1G



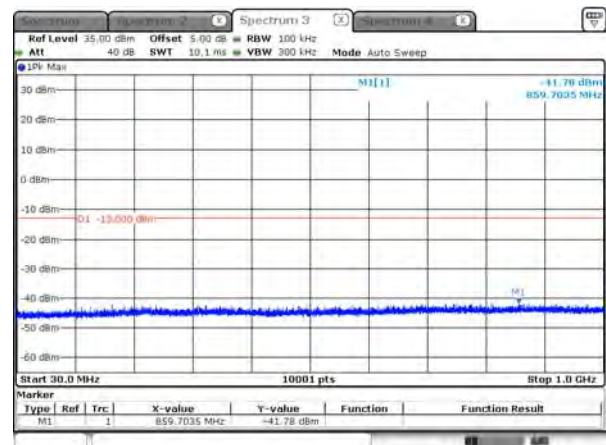


PCS_1900_EGPRS_1850.2_above 1G



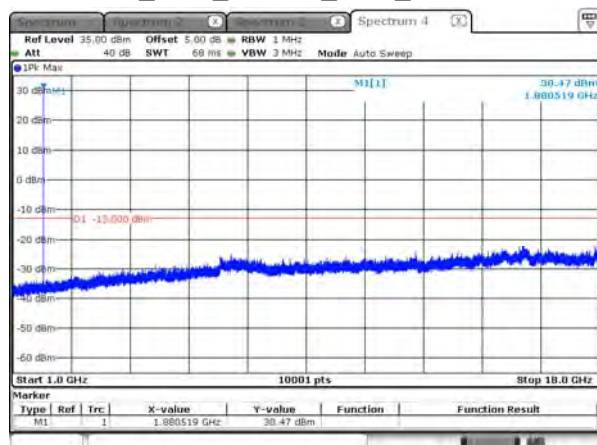
Date: 1 APR 2019 17:44:01

PCS_1900_EGPRS_1850.2_under 1G



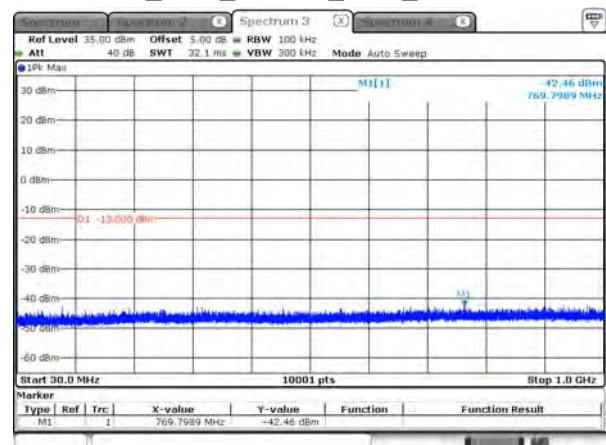
Date: 1 APR 2019 17:42:51

PCS_1900_EGPRS_1880_above 1G



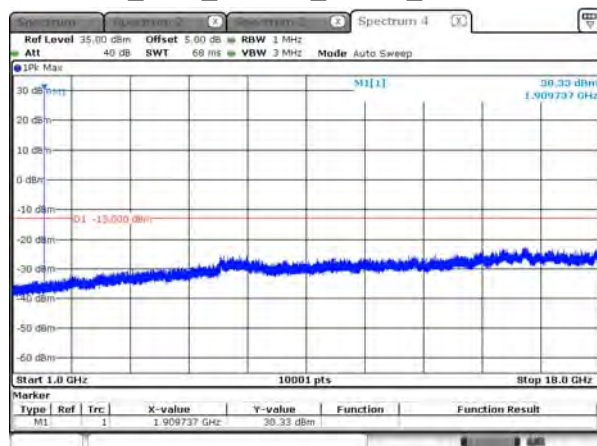
Date: 1 APR 2019 17:25:07

PCS_1900_EGPRS_1880_under 1G



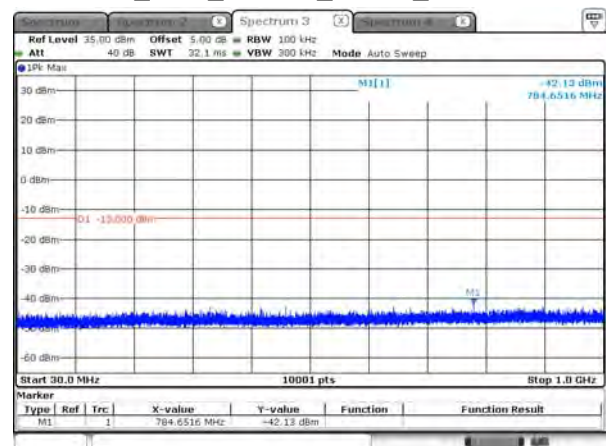
Date: 1 APR 2019 17:25:50

PCS_1900_EGPRS_1909.8_above 1G



Date: 1 APR 2019 17:23:43

PCS_1900_EGPRS_1909.8_under 1G



Date: 1 APR 2019 17:26:33

Product	Module		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/15	Test Site	CB2-H

GSM 850_GPRS_Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.2MHz)								
1648.40	-44.920	H	-58.505	2.790	8.745	-52.550	-13	-39.550
2472.60	-63.060	H	-74.489	3.437	10.556	-67.370	-13	-54.370
1648.40	-44.910	V	-57.915	2.790	8.745	-51.960	-13	-38.960
2472.60	-65.160	V	-74.609	3.437	10.556	-67.490	-13	-54.490
Middle Channel 190 (836.6MHz)								
1673.20	-32.420	H	-46.047	2.813	8.820	-40.040	-13	-27.040
2509.80	-65.670	H	-76.855	3.463	10.608	-69.710	-13	-56.710
1673.20	-31.050	V	-44.157	2.813	8.820	-38.150	-13	-25.150
2509.80	-65.260	V	-74.275	3.463	10.608	-67.130	-13	-54.130
High Channel 251 (848.8MHz)								
1697.60	-31.740	H	-45.418	2.835	8.893	-39.360	-13	-26.360
2546.40	-64.690	H	-75.488	3.489	10.637	-68.340	-13	-55.340
1697.60	-32.950	V	-46.168	2.835	8.893	-40.110	-13	-27.110
2546.40	-66.650	V	-75.198	3.489	10.637	-68.050	-13	-55.050

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

GSM 850_EGPRS_Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.2MHz)								
1648.40	-34.500	H	-48.085	2.790	8.745	-42.130	-13	-29.130
2472.60	-64.910	H	-76.339	3.437	10.556	-69.220	-13	-56.220
1648.40	-33.530	V	-46.535	2.790	8.745	-40.580	-13	-27.580
2472.60	-65.820	V	-75.269	3.437	10.556	-68.150	-13	-55.150
Middle Channel 190 (836.6MHz)								
1673.20	-32.360	H	-45.987	2.813	8.820	-39.980	-13	-26.980
2509.80	-64.720	H	-75.905	3.463	10.608	-68.760	-13	-55.760
1673.20	-32.010	V	-45.117	2.813	8.820	-39.110	-13	-26.110
2509.80	-66.290	V	-75.305	3.463	10.608	-68.160	-13	-55.160
High Channel 251 (848.8MHz)								
1697.60	-32.720	H	-46.398	2.835	8.893	-40.340	-13	-27.340
2546.40	-65.720	H	-76.518	3.489	10.637	-69.370	-13	-56.370
1697.60	-34.160	V	-47.378	2.835	8.893	-41.320	-13	-28.320
2546.40	-66.430	V	-74.978	3.489	10.637	-67.830	-13	-54.830

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

Product	Module		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/15	Test Site	CB2-H

PCS 1900_GPRS_Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.2MHz)								
3700.40	-60.340	H	-61.746	4.283	11.939	-54.090	-13	-41.090
5550.60	-53.730	H	-48.329	5.201	12.900	-40.630	-13	-27.630
3700.40	-53.960	V	-53.426	4.283	11.939	-45.770	-13	-32.770
5550.60	-46.530	V	-41.219	5.201	12.900	-33.520	-13	-20.520
Middle Channel 661 (1880MHz)								
3760.00	-52.860	H	-54.337	4.335	11.832	-46.840	-13	-33.840
5640.00	-55.070	H	-49.925	5.235	12.900	-42.260	-13	-29.260
3760.00	-49.060	V	-48.427	4.335	11.832	-40.930	-13	-27.930
5640.00	-48.890	V	-44.015	5.235	12.900	-36.350	-13	-23.350
High Channel 810 (1909.8MHz)								
3819.60	-54.350	H	-55.909	4.386	11.725	-48.570	-13	-35.570
5729.40	-55.700	H	-50.820	5.270	12.900	-43.190	-13	-30.190
3819.60	-49.720	V	-48.999	4.386	11.725	-41.660	-13	-28.660
5729.40	-51.010	V	-46.570	5.270	12.900	-38.940	-13	-25.940

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

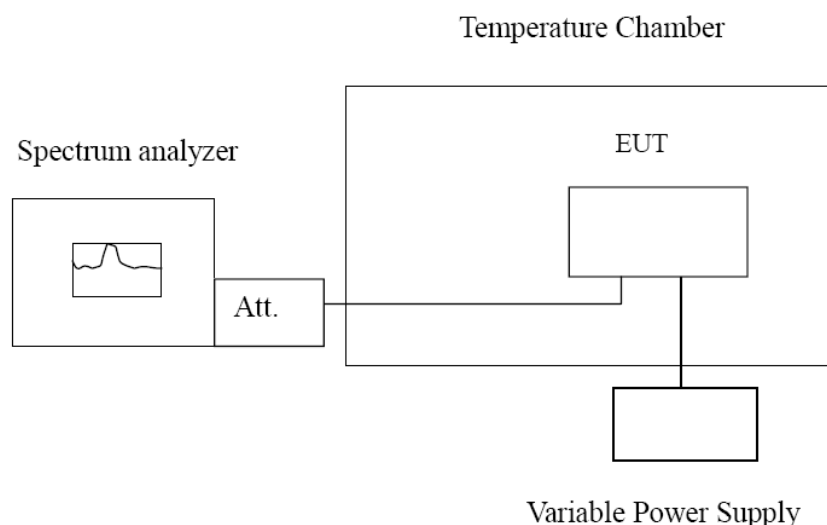
PCS 1900_EGPRS_Link

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.2MHz)								
3700.40	-60.150	H	-61.556	4.283	11.939	-53.900	-13	-40.900
5550.60	-52.760	H	-47.359	5.201	12.900	-39.660	-13	-26.660
3700.40	-53.870	V	-53.336	4.283	11.939	-45.680	-13	-32.680
5550.60	-46.840	V	-41.529	5.201	12.900	-33.830	-13	-20.830
Middle Channel 661 (1880MHz)								
3760.00	-52.870	H	-54.347	4.335	11.832	-46.850	-13	-33.850
5640.00	-54.680	H	-49.535	5.235	12.900	-41.870	-13	-28.870
3760.00	-47.870	V	-47.237	4.335	11.832	-39.740	-13	-26.740
5640.00	-49.120	V	-44.245	5.235	12.900	-36.580	-13	-23.580
High Channel 810 (1909.8MHz)								
3819.60	-54.060	H	-55.619	4.386	11.725	-48.280	-13	-35.280
5729.40	-56.050	H	-51.170	5.270	12.900	-43.540	-13	-30.540
3819.60	-48.710	V	-47.989	4.386	11.725	-40.650	-13	-27.650
5729.40	-51.150	V	-46.710	5.270	12.900	-39.080	-13	-26.080

Test Result (EIRP) = SG Level - Cable Loss + Antenna Gain.

8. Frequency Stability

8.1. Test Setup



8.2. Test Procedure

Frequency Stability under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

8.3. Test Method

KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 9

ANSI C63.26-2015 Sub-clause 5.6

8.4. Test Result

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/14	Test Site	SR10-H

GSM 850_824.2MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	5	-0.0072
3.8	-1	0.0014
3.4	-3	0.0043

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	-24	0.0345
-20	14	-0.0201
-10	-21	0.0302
0	-25	0.0359
10	-25	0.0359
20	3	-0.0043
30	4	-0.0058
40	-7	0.0101
50	17	-0.0244

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/14	Test Site	SR10-H

GSM 850_836.6MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	13	-0.0193
3.8	-4	0.0059
3.4	4	-0.0059

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	2	-0.0030
-20	-2	0.0030
-10	-26	0.0386
0	23	-0.0342
10	-18	0.0267
20	-7	0.0104
30	-38	0.0565
40	9	-0.0134
50	7	-0.0104

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 1: GSM 850 Mode		
Date of Test	2019/04/14	Test Site	SR10-H

GSM 850_848.8MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	-3	0.0045
3.8	18	-0.0267
3.4	-11	0.0163

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	19	-0.0282
-20	-29	0.0431
-10	6	-0.0089
0	-30	0.0446
10	-5	0.0074
20	-38	0.0565
30	10	-0.0149
40	18	-0.0267
50	20	-0.0297

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/14	Test Site	SR10-H

PCS 1900_1850.2MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	24	-0.0353
3.8	-36	0.0529
3.4	12	-0.0176

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	-23	0.0338
-20	-7	0.0103
-10	5	-0.0073
0	-23	0.0338
10	-20	0.0294
20	10	-0.0147
30	-3	0.0044
40	2	-0.0029
50	2	-0.0029

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/14	Test Site	SR10-H

PCS 1900_1880MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	-30	0.0431
3.8	23	-0.0331
3.4	-22	0.0316

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	11	-0.0158
-20	23	-0.0331
-10	-10	0.0144
0	-32	0.0460
10	8	-0.0115
20	-22	0.0316
30	-42	0.0604
40	2	-0.0029
50	-22	0.0316

Product	Module		
Test Item	Frequency Stability		
Test Mode	Mode 2: PCS1900 mode		
Date of Test	2019/04/14	Test Site	SR10-H

PCS 1900_1909.8MHz

Voltage

DC Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
4.2	-25	0.0367
3.8	-26	0.0382
3.4	-24	0.0353

Temperature

Temperature	Frequency Error (Hz)	Frequency Error (ppm)
-30	-18	0.0265
-20	-11	0.0162
-10	-20	0.0294
0	-3	0.0044
10	-4	0.0059
20	3	-0.0044
30	-22	0.0323
40	22	-0.0323
50	14	-0.0206