



Test Report No:
2360394R-RFUSV22S-A

TEST REPORT

FCC Rules&Regulations

Product Name	TracKing V5
Brand Name	Thermo King
Model No.	TKV5LA
FCC ID	Q37TKV5LA
Applicant's Name / Address	Thermo King Corporation 314 West 90th Street, Minneapolis, MN USA 55420
Manufacturer's Name / Address	Thermo King Corporation 314 West 90th Street, Minneapolis, MN USA 55420
Test Method Requested, Standard	FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E ANSI/TIA-603-E-2016 ANSI C63.26-2015
Verdict Summary	IN COMPLIANCE
Documented By	<i>Amelia Wu</i> Amelia Wu
Approved By	<i>Rueyuan Lin</i> Rueyuan Lin
Date of Receipt	Jun. 12, 2023
Date of Issue	Sep. 25, 2023
Report Version	V1.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

General Conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Sep. 25, 2023

Summary of Test Result.

Report Clause	Test Items	Description	Ref Std. Clause	Limit	Result (PASS/FAIL)	Remark
3	RF Output Power	GSM 850	§2.1033 §2.1046 §22.913	< 7 Watts ERP	PASS	-
		PCS 1900	§2.1033 §2.1046 §24.232	< 2 Watts EIRP	PASS	-
4	Occupied Bandwidth	GSM 850, PCS 1900	§2.1049	N/A	PASS	-
5	Peak to Average Power Ratio	GSM 850	§22.913	≤ 13 dB	PASS	-
		PCS 1900	§24.232	≤ 13 dB	PASS	-
6	Spurious Emission	GSM 850	§2.1053 §22.917	< -13 dBm	PASS	-
		PCS 1900	§2.1053 §24.238	< -13 dBm	PASS	-
7	Conducted Band Edge	GSM 850	§22.917	< -13 dBm	PASS	-
		PCS 1900	§24.238	< -13 dBm	PASS	-
8	Frequency Stability	GSM 850	§2.1055 §22.335	± 2.5 ppm	PASS	-
		PCS 1900	§2.1055 §24.235	± 2.5 ppm	PASS	-

Comments and Explanations

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1. General Information

1.1. EUT Description

Tx Frequency Range (MHz)	GSM 850: 824.2 ~ 848.8 PCS 1900: 1850.2 ~ 1909.8
Rx Frequency Range (MHz)	GSM 850: 869.2 ~ 893.8 PCS 1900: 1930.2 ~ 1989.8
Function	GSM / GPRS / EGPRS
Type of Modulation	GMSK / 8PSK
Hardware Version	3.0
Software Version	1.00014
IMEI No.	8627540511

Antenna Information					
Ant.	Brand Name	Model No.	Type	Gain (dBi)	
				GSM 850	PCS 1900
0	N/A	N/A	PCB	-0.35	2.33

1.2. EUT Information

EUT Power Type	From DC power supply
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1.3. Testing Applied Standards

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

- FCC CFR Title 47 Part 22 Subpart H
- FCC CFR Title 47 Part 24 Subpart E
- FCC CFR Title 47 Part 2
- ANSI/TIA-603-E (2016)
- ANSI C63.26-2015
- FCC KDB 971168 D01 v03r01

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

1.4. Testing Location Information

Testing Location Information	
Test Laboratory : DEKRA Testing and Certification Co., Ltd.	
1 (TAF: 3024)	ADD: No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. TEL: +886-3-582-8001 FAX: +886-3-582-8958
2 (TAF: 3024)	ADD: 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
Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted Emission	HC-SR12	Getaz Yang	25 / 65	2023/06/19
Radiated Emission	HC-CB04	Cyril Chen	23 / 61	2023/06/26

1.5. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Test Item	Uncertainty
RF Output Power	± 1.16 dB
Occupied Bandwidth	± 217.9 Hz
Peak to Average Power Ratio	± 2.47 dB
Conducted Band Edge	± 2.47 dB
Spurious Emissions	± 3.52 dB below 1 GHz ± 3.56 dB above 1 GHz
Frequency Stability	± 217.9 Hz

1.6. List of Test Equipment

HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	0.3-40 GHz	2022/11/02	2023/11/01
Pulse Power Sensor	Anritsu	MA2411B	1531043	0.3-40 GHz	2022/11/02	2023/11/01
EXA Signal Analyzer	Keysight	N9010A	MY51440132	10 Hz-44 GHz	2022/12/13	2023/12/12
Pulse Power Sensor	Anritsu	MA2411B	1531044	0.3-40 GHz	2022/11/02	2023/11/01
Spectrum Analyzer	Keysight	N9010B	MY57110159	10 Hz-7 GHz	2023/03/03	2024/03/02
Spectrum Analyzer	Agilent	N9010A	US47140172	9 kHz-26.5 GHz	2023/05/09	2024/05/08
Signal & Spectrum Analyzer	R&S	FSV40	101869	10Hz-40GHz	2022/07/13	2023/07/12
Wireless Conn. Tester	R&S	CMW500	157118	Simulator	2022/07/11	2023/07/10

HC-CB04

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	10 Hz-40 GHz	2022/09/29	2023/09/28
EXA Signal Analyzer	Keysight	N9010A	MY51440132	10 Hz-44 GHz	2022/12/13	2023/12/12
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1209	30 MHz-2 GHz	2023/06/13	2024/06/12
Horn Antenna	Schwarzbeck	BBHA 9170	203	18G-40GHz	2023/02/13	2024/02/12
Pre-Amplifier	EMCI	EMC01820I	980364	30M-8 GHz,20 dB	2023/06/06	2024/06/05
Pre-Amplifier	EMEC	EM01G18GA	060835	1-18 GHz,50 dB	2022/07/04	2023/07/03
Pre-Amplifier	DEKRA	AP-400C	201801231	18G-40 GHz,48 dB	2022/09/27	2023/09/26
Wireless Conn. Tester	R&S	CMW500	157118	Simulator	2022/07/11	2023/07/10
Coaxial Cable(10m)	Suhner	SF102_SF104	HC-CB04	30M-18 GHz	2022/08/08	2023/08/07
Coaxial Cable(3m)	Suhner,Rosnol	SF102_UP0264	HC-CB04_1	18G-40 GHz	2022/08/14	2023/08/13
Radiated Software	AUDIX	e3 V9	HC-CB04_1	N/A	N/A	N/A

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

2. Test Configuration of EUT

2.1. Test Condition

EUT Operational Condition	
Testing Voltage	DC 14.2V

2.2. The Worst Case Measurement Configuration

Test Mode	Mode 1: GSM 850 Mode 2: PCS 1900
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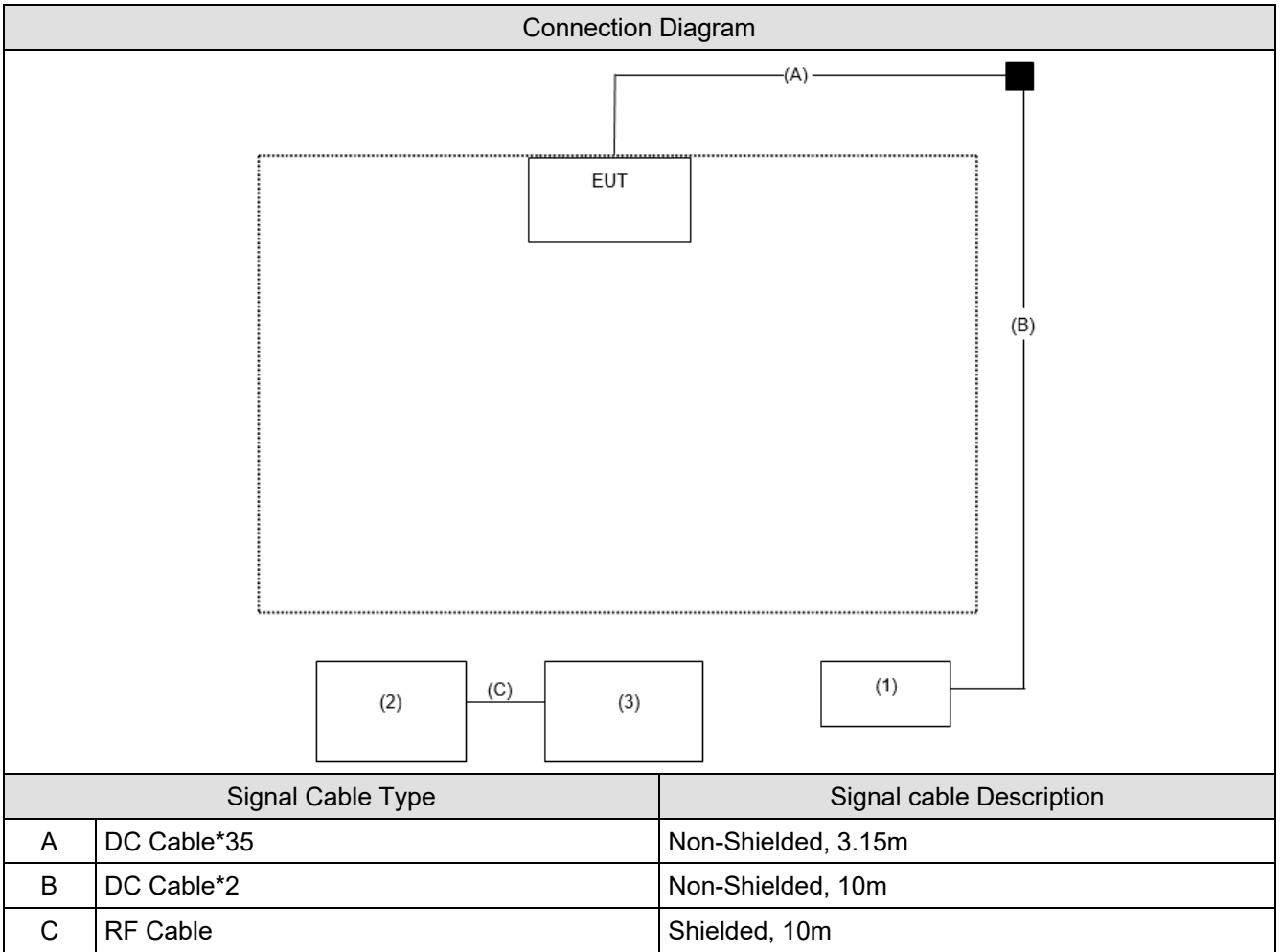
Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. This device was tested under all bandwidths, RB configurations and modulations.
The worst case was found in RMC mode and show the worst case in the test report.
3. The EUT was performed at X axis, Y axis and Z axis position for radiated spurious emission test.
The worst case was found at X axis, so the measurement will follow this same test configuration.

2.3. Tested System Details

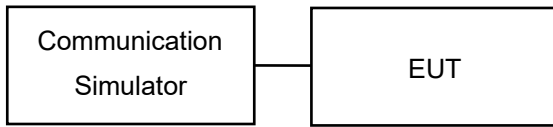
No.	Equipment	Brand Name	Model No.	Serial No.
1	Power Supply	Topward	6303D	8095908
2	Base Station	R&S	CMW500	157118
3	Horn Antenna	Schwarzbeck	BBHA 9120D	1640

2.4. Configuration of Tested System



3. RF Output Power

3.1. Test Setup



3.2. Test Procedure

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum conducted RF output power under transmission mode and specific channel frequency. The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{C}}$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_{T} = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

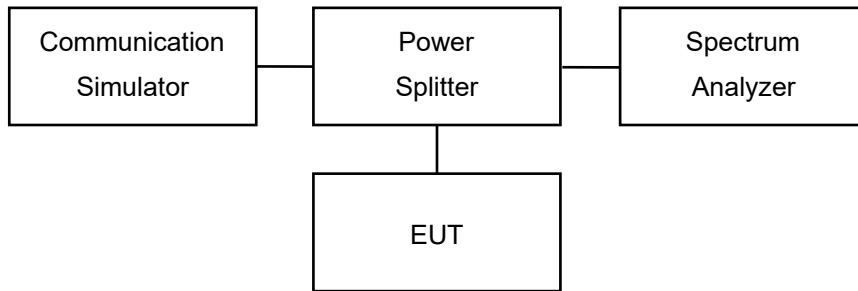
L_{C} = signal attenuation in the connecting cable between the transmitter and antenna, in dB

3.3. Test Result of RF Output Power

Refer as Appendix A

4. Occupied Bandwidth

4.1. Test Setup



4.2. Test Procedures

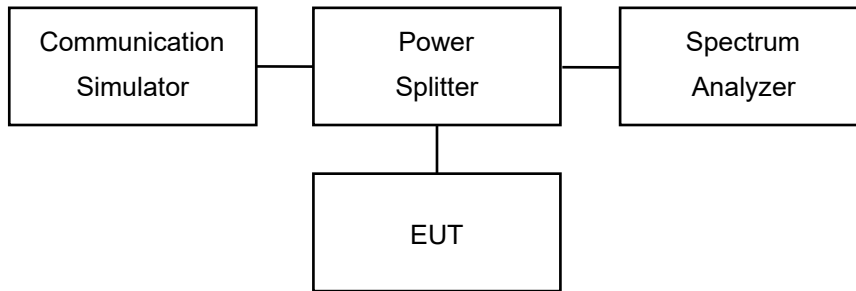
The EUT makes a call to the communication simulator. The 26dB bandwidth and 99% occupied bandwidth measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.

4.3. Test Result of Occupied Bandwidth

Refer as Appendix B

5. Peak to Average Power Ratio

5.1. Test Setup



5.2. Test Procedure

1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. Set resolution/measurement bandwidth \geq signal's occupied bandwidth.
3. Set the number of counts to a value that stabilizes the measured CCDF curve.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

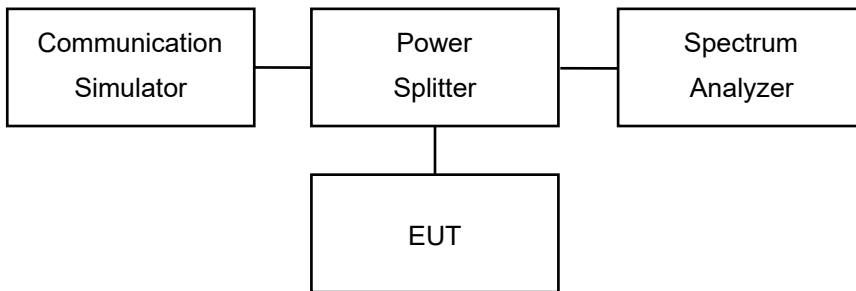
5.3. Test Result of Peak to Average Power Ratio

Refer as Appendix C

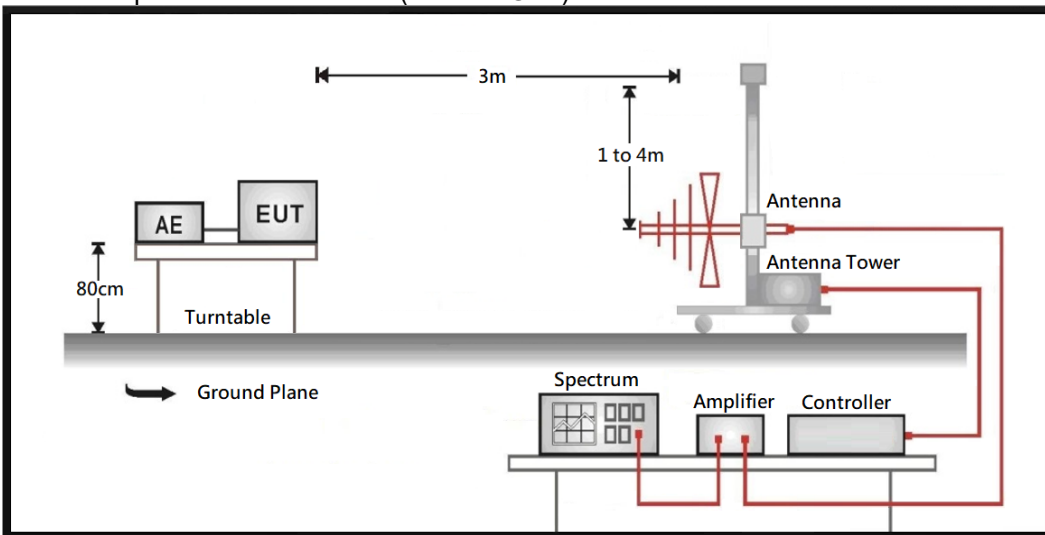
6. Spurious Emission

6.1. Test Setup

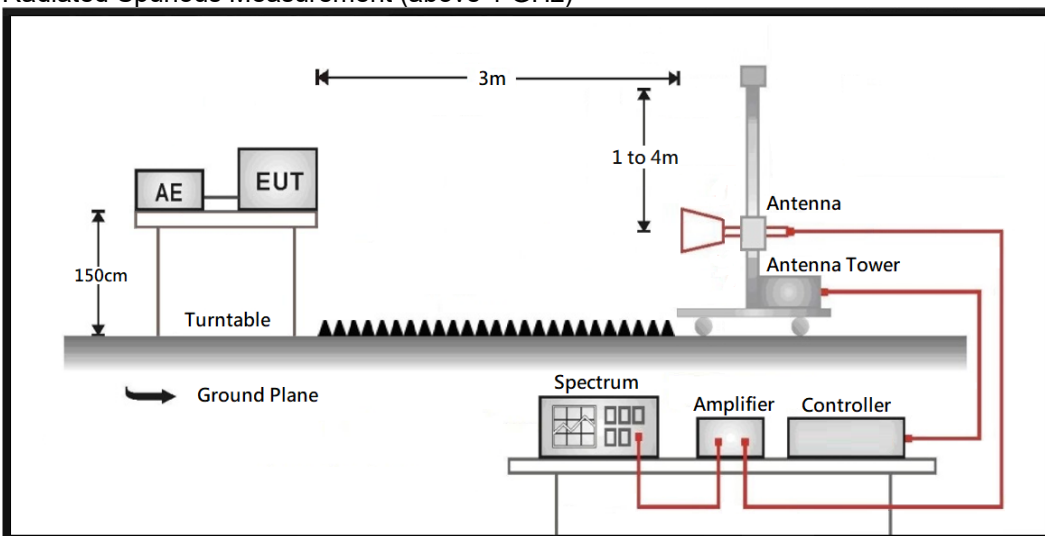
Conducted Spurious Measurement



Radiated Spurious Measurement (below 1 GHz)



Radiated Spurious Measurement (above 1 GHz)



6.2. Test Procedure

Conducted Spurious Measurement:

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement. 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:

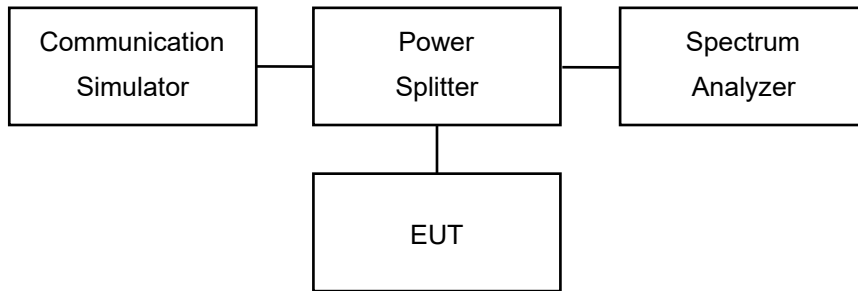
The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations. 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. Taking the record of maximum spurious emission.

6.3. Test Result of Spurious Emission

Refer as Appendix D

7. Conducted Band Edge

7.1. Test Setup



7.2. Test Procedure

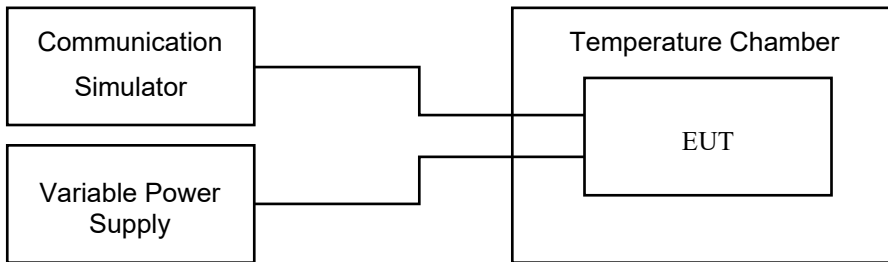
1. The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. The path loss was compensated to the results for each measurement.
2. In the 1MHz bands immediately 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.

7.3. Test Result of Conducted Band Edge

Refer as Appendix E

8. Frequency Stability

8.1. Test Setup



8.2. Test Procedures

Frequency Stability under Temperature Variations:

The EUT under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a communication simulator. The EUT was placed inside the temperature chamber. Set the 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 or DC power supply to power the EUT and set the voltage to rated voltage. Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

8.3. Test Result of Frequency Stability

Refer as Appendix F

Appendix A. Test Result of RF Output Power

GSM 850						
Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (W)	ERP Limit (W)
GSM/GPRS	824.2	33.22	-0.35	30.720	1.180	7
	836.6	33.58	-0.35	31.080	1.282	7
	848.8	33.32	-0.35	30.820	1.208	7
EGPRS	824.2	30.05	-0.35	27.550	0.569	7
	836.6	30.19	-0.35	27.690	0.587	7
	848.8	30.11	-0.35	27.610	0.577	7

Note:

1. ERP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15 dB
2. ERP (W) = $(10^{(\text{Power(dBm)}/10)}) * 10^{-3}$

PCS 1900						
Test Mode	Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	EIRP Limit (W)
GSM/GPRS	1850.2	29.96	2.33	32.290	1.694	2
	1880.0	29.34	2.33	31.670	1.469	2
	1909.8	29.34	2.33	31.670	1.469	2
EGPRS	1850.2	25.36	2.33	27.690	0.587	2
	1880.0	25.31	2.33	27.640	0.581	2
	1909.8	25.32	2.33	27.650	0.582	2

Note:

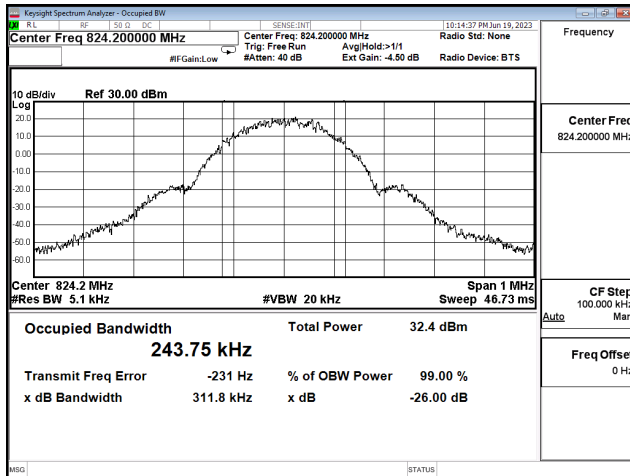
1. EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)
2. EIRP (W) = $(10^{(\text{Power(dBm)}/10)}) * 10^{-3}$

Appendix B. Test Result of Occupied Bandwidth

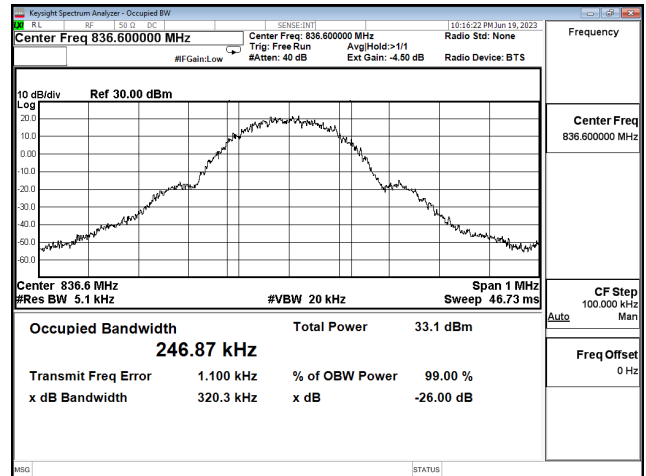
GSM 850					
Test Mode	Channel	Frequency (MHz)	Measure Level (kHz)		Limit (MHz)
			26dB BW	99% OBW	
GSM/GPRS	128	824.2	311.80	243.75	N/A
	190	836.6	310.50	245.25	N/A
	251	848.8	320.30	246.87	N/A
EGPRS	128	824.2	319.10	234.17	N/A
	190	836.6	315.60	246.11	N/A
	251	848.8	318.10	245.57	N/A

PCS 1900					
Test Mode	Channel	Frequency (MHz)	Measure Level (kHz)		Limit (MHz)
			26dB BW	99% OBW	
GSM/GPRS	512	1850.2	310.00	244.43	N/A
	661	1880.0	312.20	244.87	N/A
	810	1909.8	318.50	242.70	N/A
EGPRS	512	1850.2	304.10	246.33	N/A
	661	1880.0	311.30	245.95	N/A
	810	1909.8	309.20	243.71	N/A

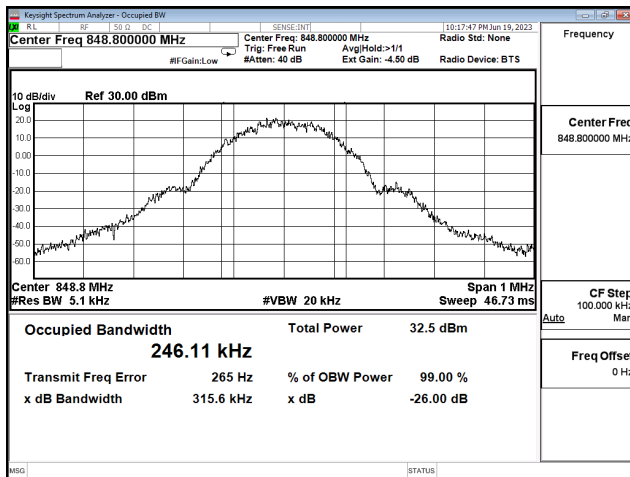
GSM 850 / GPRS / 824.2 MHz



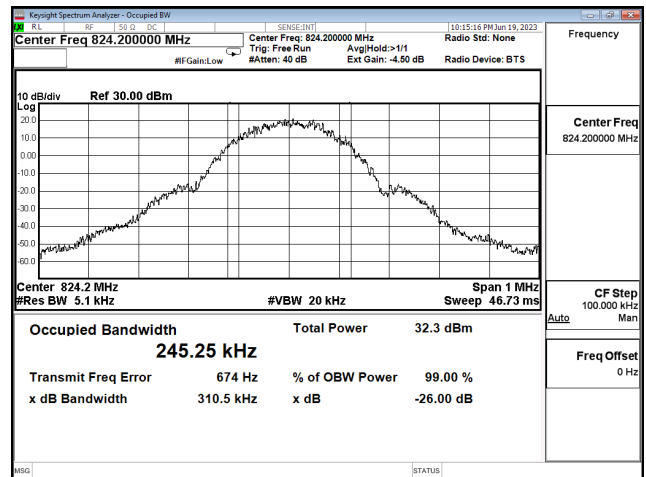
GSM 850 / GPRS / 836.6 MHz



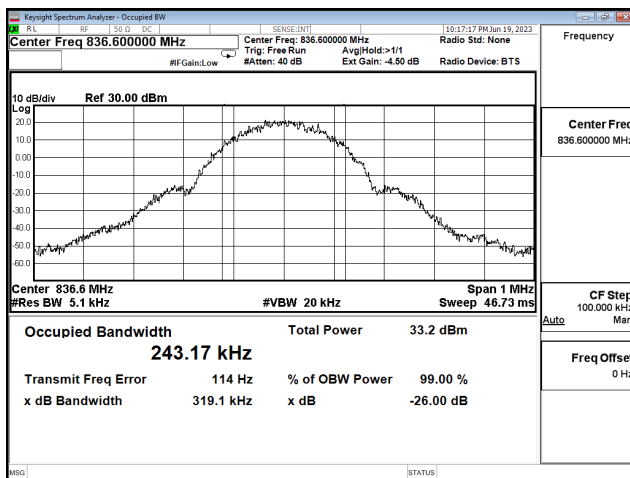
GSM 850 / GPRS / 848.8 MHz



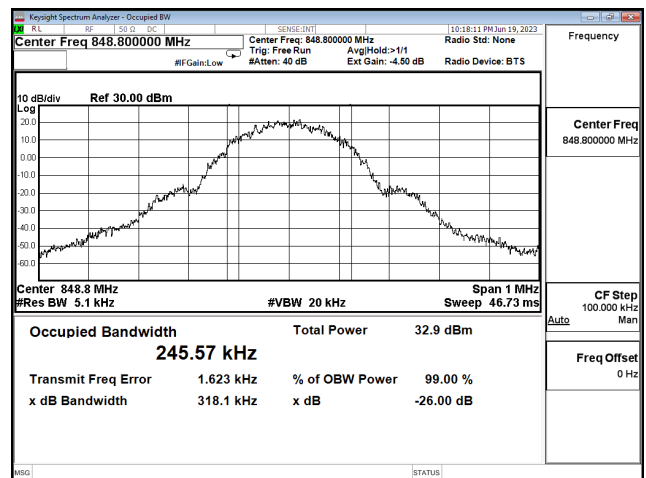
GSM 850 / EGPRS / 824.2 MHz



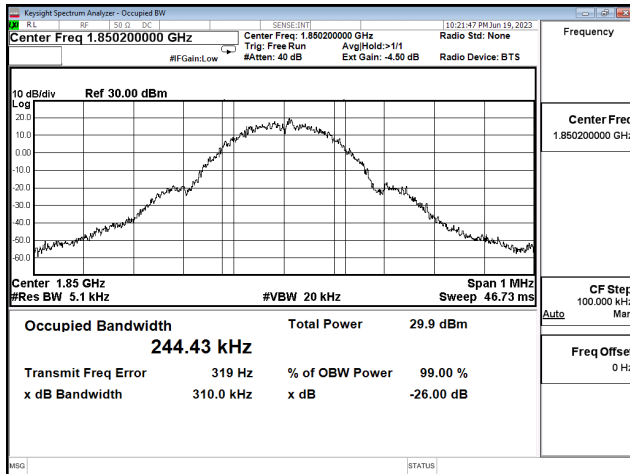
GSM 850 / EGPRS / 836.6 MHz



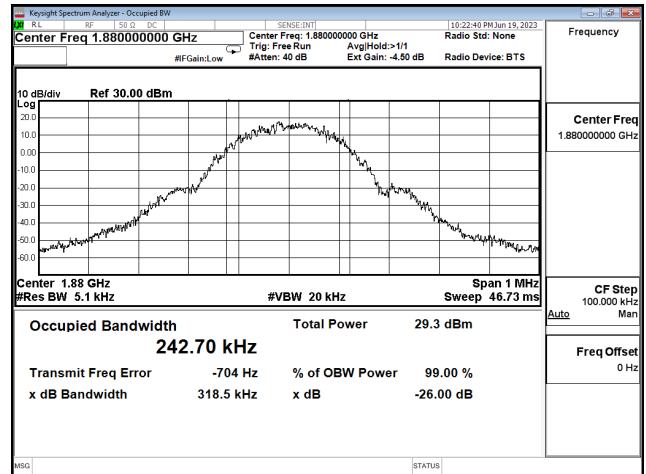
GSM 850 / EGPRS / 848.8 MHz



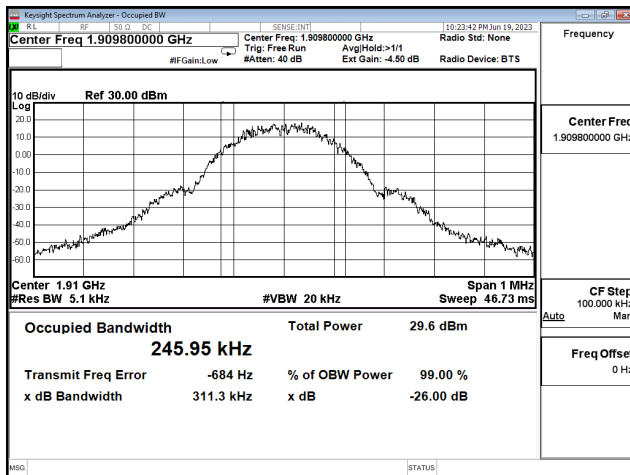
PCS 1900 / GPRS / 1850.2 MHz



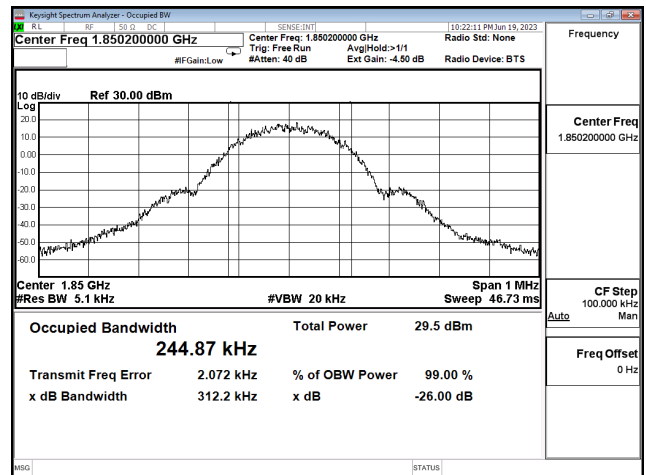
PCS 1900 / GPRS / 1880 MHz



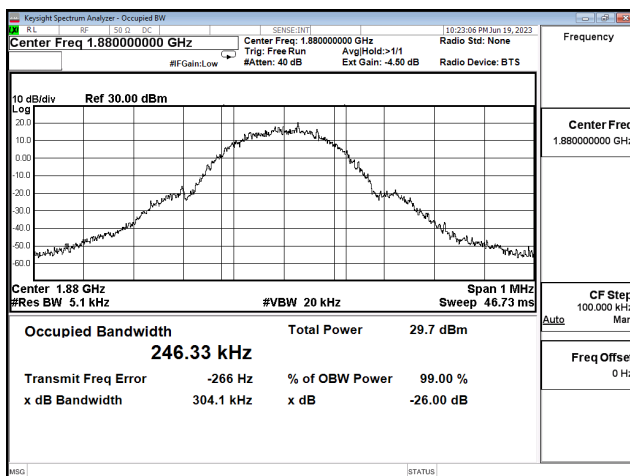
PCS 1900 / GPRS / 1909.8 MHz



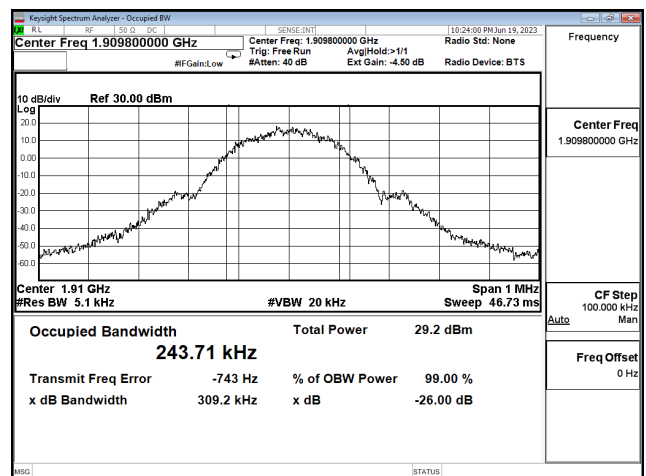
PCS 1900 / EGPRS / 1850.2 MHz



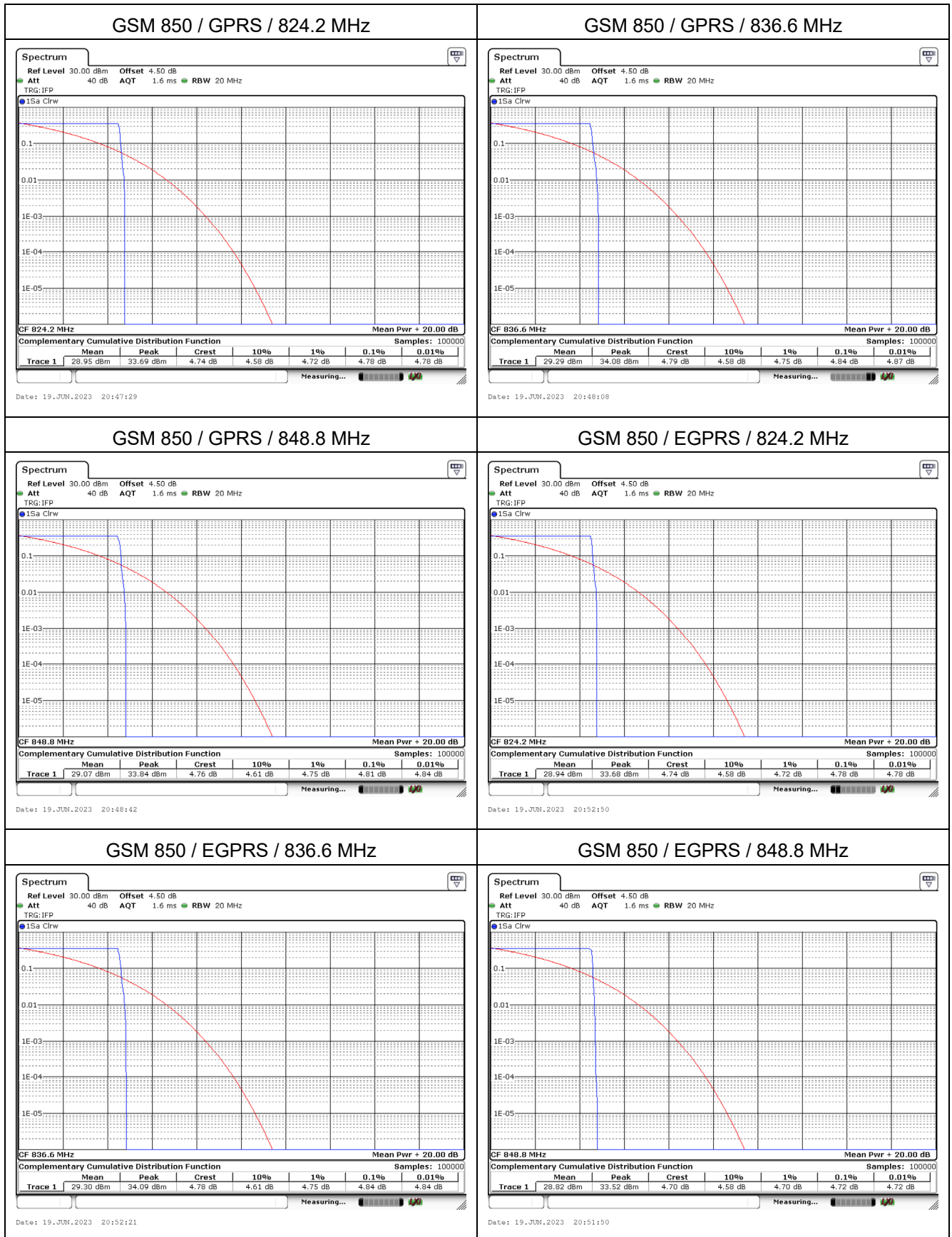
PCS 1900 / EGPRS / 1880 MHz



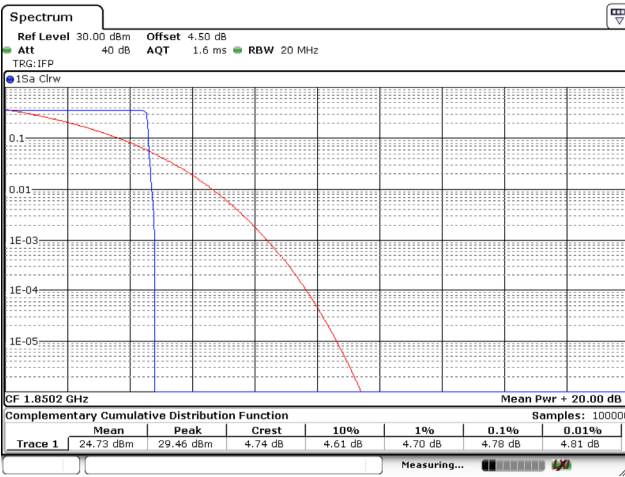
PCS 1900 / EGPRS / 1909.8 MHz



Appendix C. Test Result of Peak to Average Power Ratio

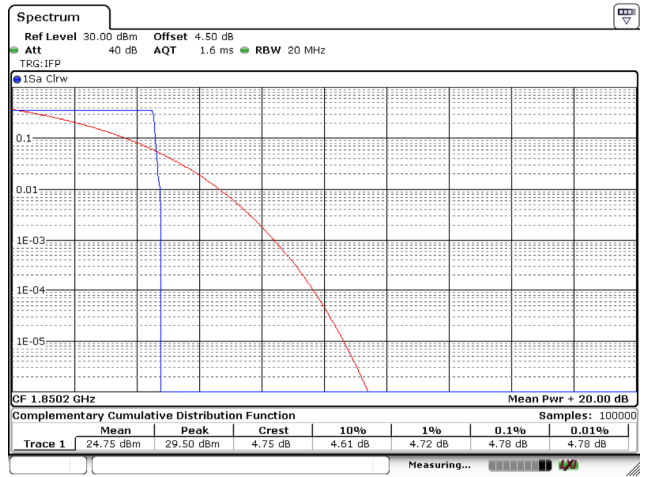


PCS 1900 / GPRS / 1850.2 MHz



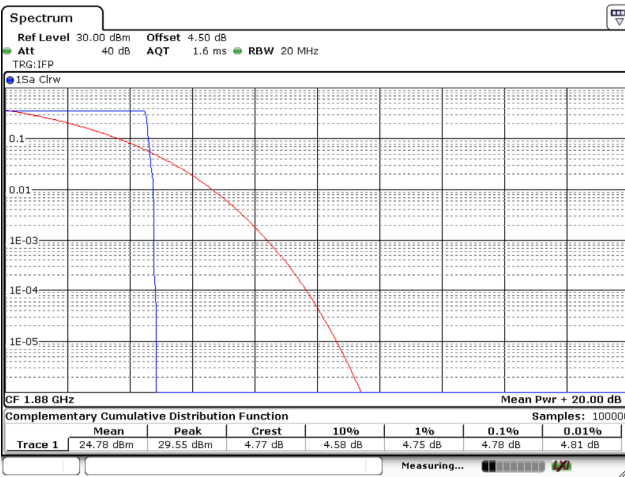
Date: 19. JUN. 2023 20:40:42

PCS 1900 / GPRS / 1880 MHz



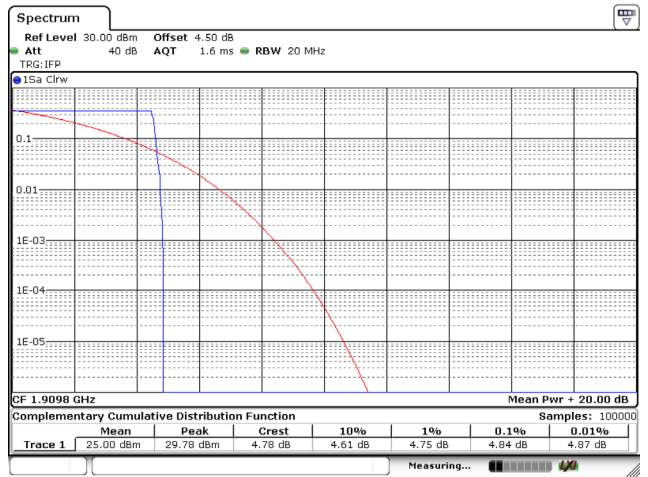
Date: 19. JUN. 2023 20:46:02

PCS 1900 / GPRS / 1909.8 MHz



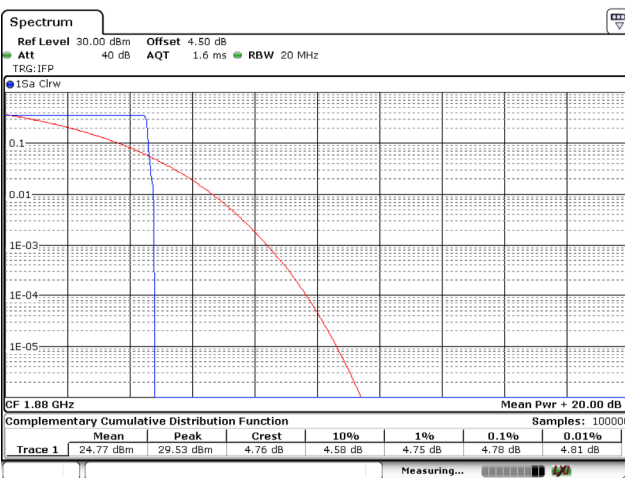
Date: 19. JUN. 2023 20:45:30

PCS 1900 / EGPRS / 1850.2 MHz



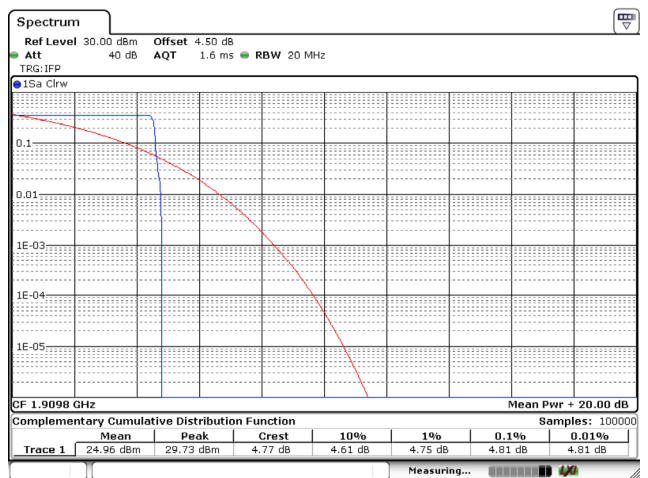
Date: 19. JUN. 2023 20:44:54

PCS 1900 / EGPRS / 1880 MHz



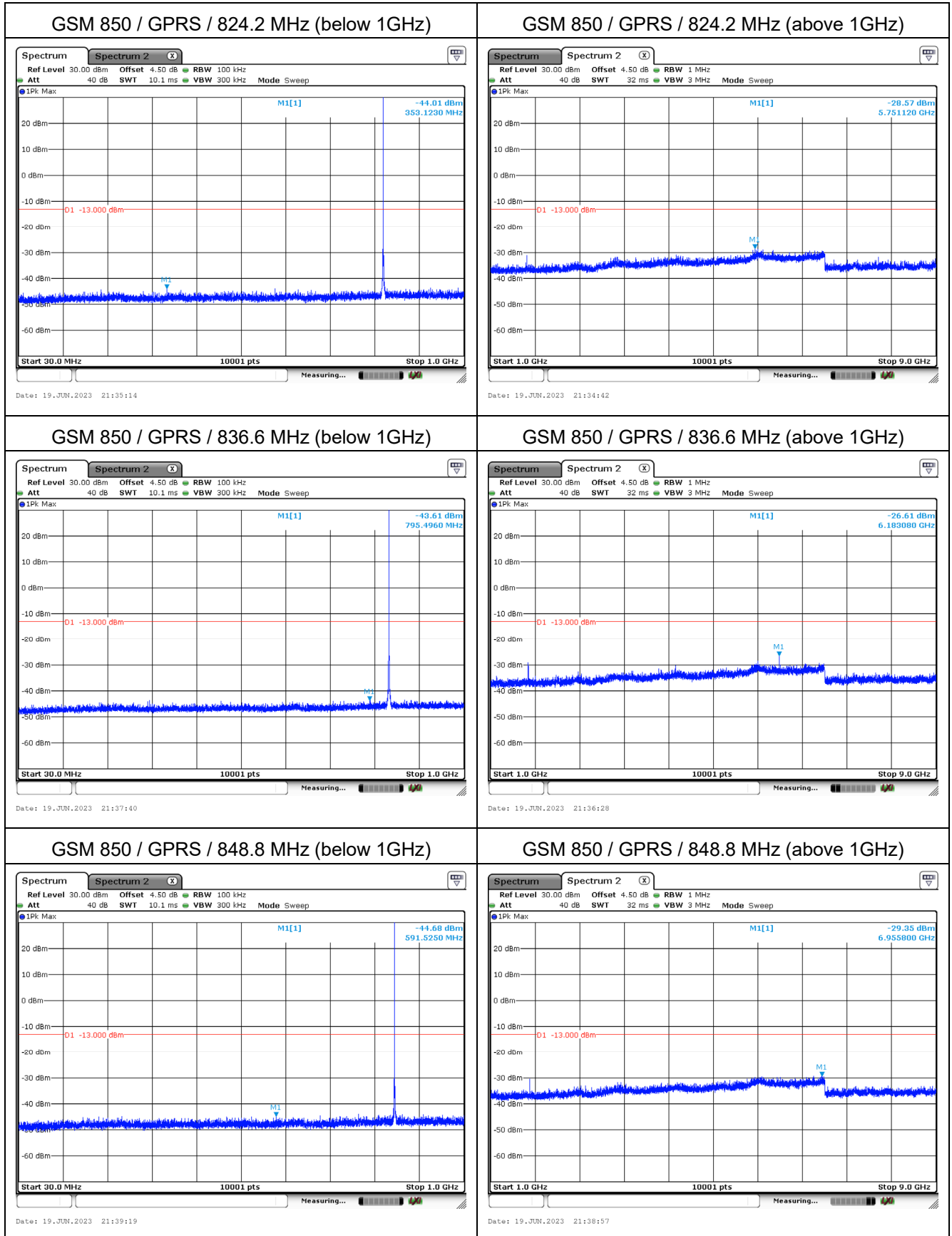
Date: 19. JUN. 2023 20:42:08

PCS 1900 / EGPRS / 1909.8 MHz

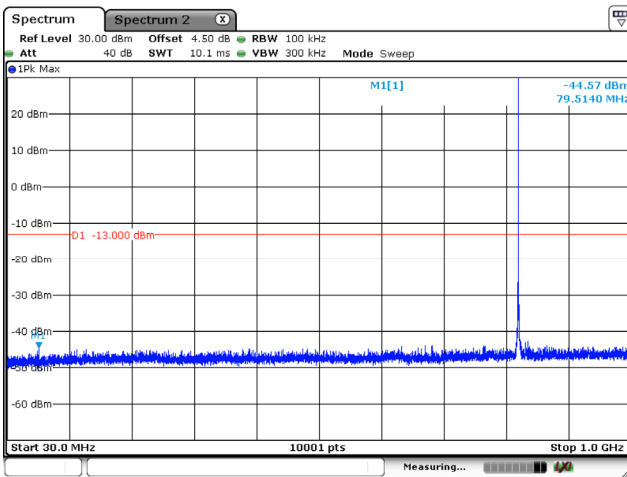


Date: 19. JUN. 2023 20:42:42

Appendix D.1 Test Result of Conducted Spurious Emission

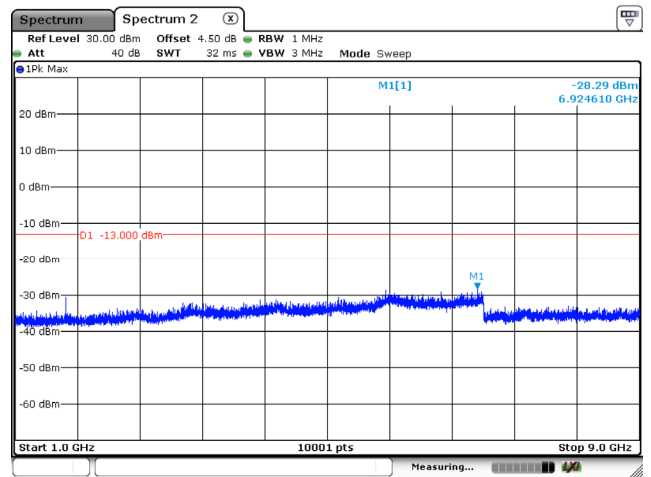


GSM 850 / EGPRS / 824.2 MHz (below 1GHz)



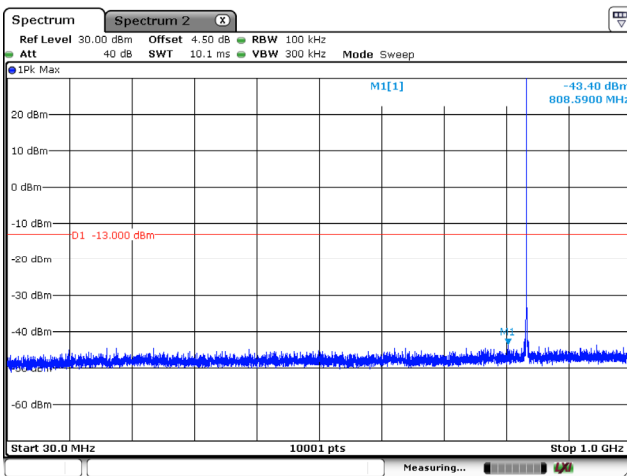
Date: 19.JUN.2023 21:35:59

GSM 850 / EGPRS / 824.2 MHz (above 1GHz)



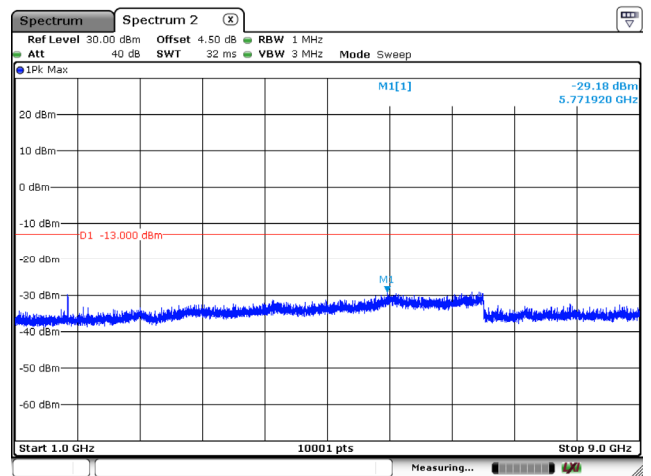
Date: 19.JUN.2023 21:35:35

GSM 850 / EGPRS / 836.6 MHz (below 1GHz)



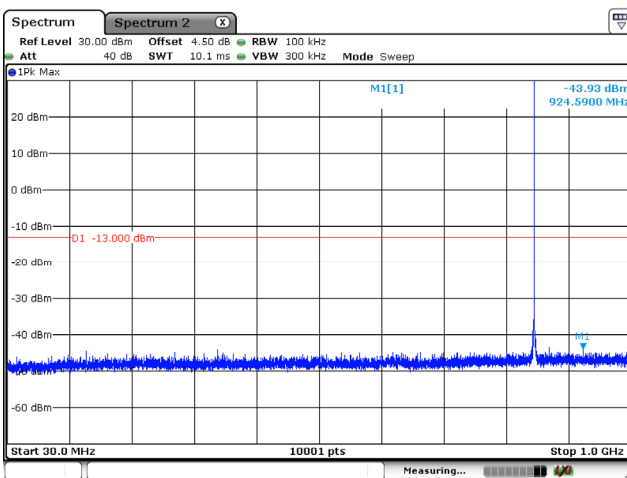
Date: 19.JUN.2023 21:38:24

GSM 850 / EGPRS / 836.6 MHz (above 1GHz)



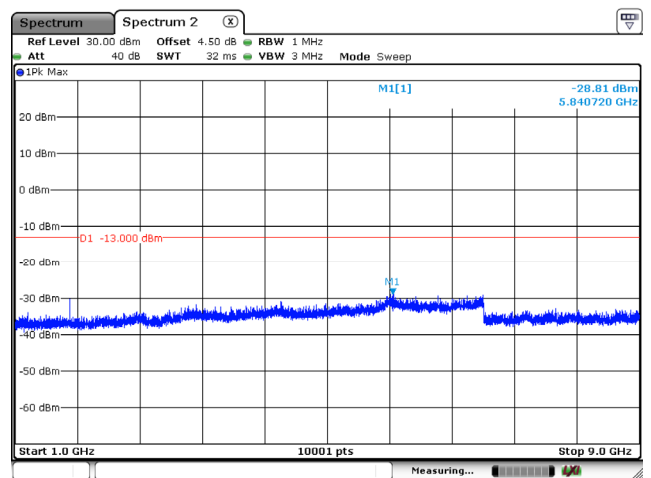
Date: 19.JUN.2023 21:38:05

GSM 850 / EGPRS / 848.8 MHz (below 1GHz)



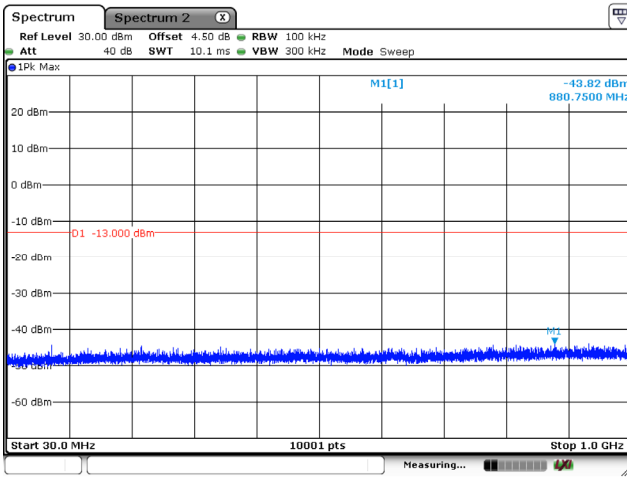
Date: 19.JUN.2023 21:40:04

GSM 850 / EGPRS / 848.8 MHz (above 1GHz)



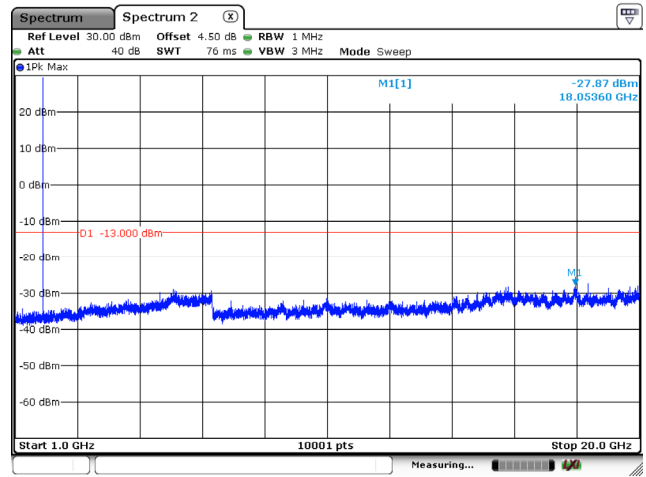
Date: 19.JUN.2023 21:39:42

PCS 1900 / GPRS / 1850.2 MHz (below 1GHz)



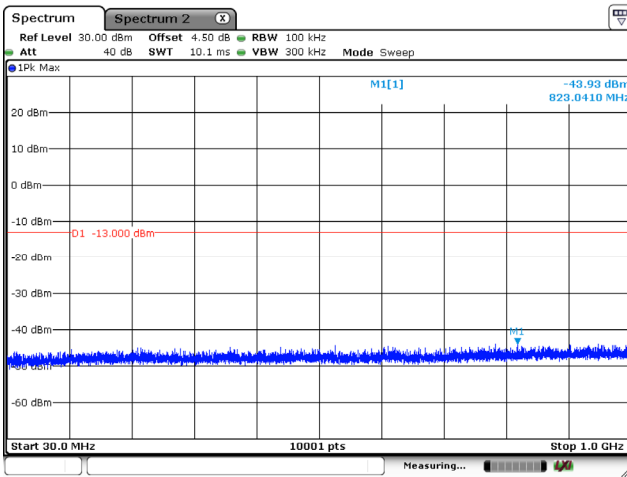
Date: 19 JUN 2023 21:13:20

PCS 1900 / GPRS / 1850.2 MHz (above 1GHz)



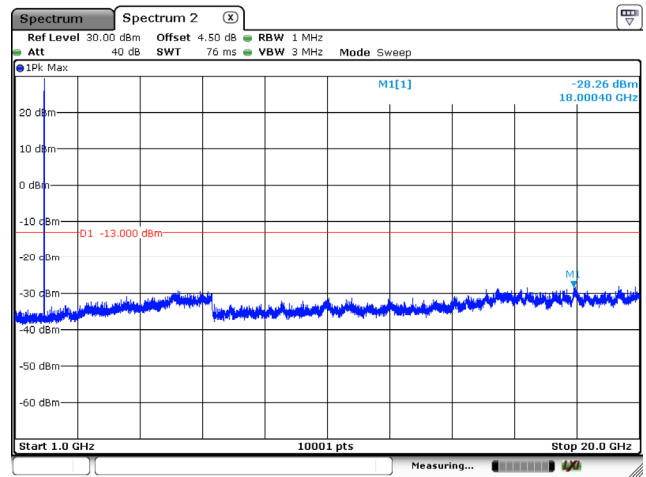
Date: 19 JUN 2023 21:13:04

PCS 1900 / GPRS / 1880 MHz (below 1GHz)



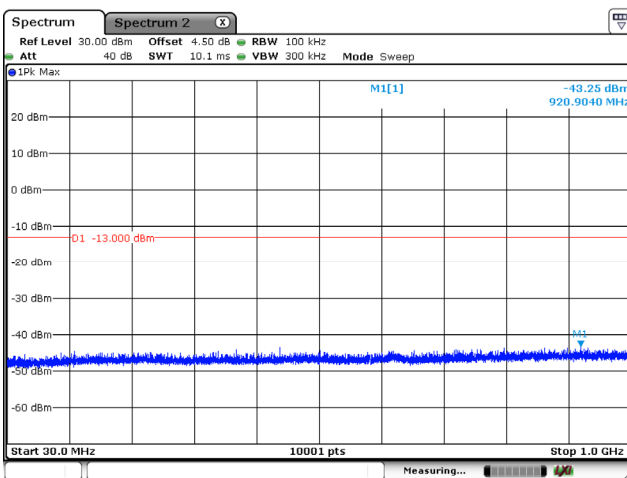
Date: 19 JUN 2023 21:13:39

PCS 1900 / GPRS / 1880 MHz (above 1GHz)



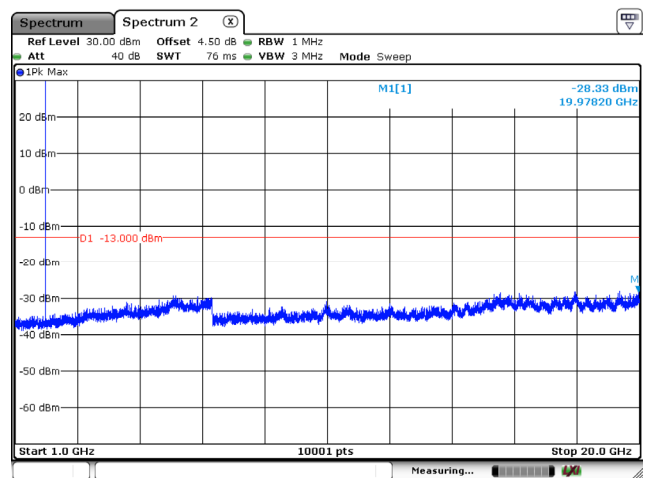
Date: 19 JUN 2023 21:13:06

PCS 1900 / GPRS / 1909.8 MHz (below 1GHz)



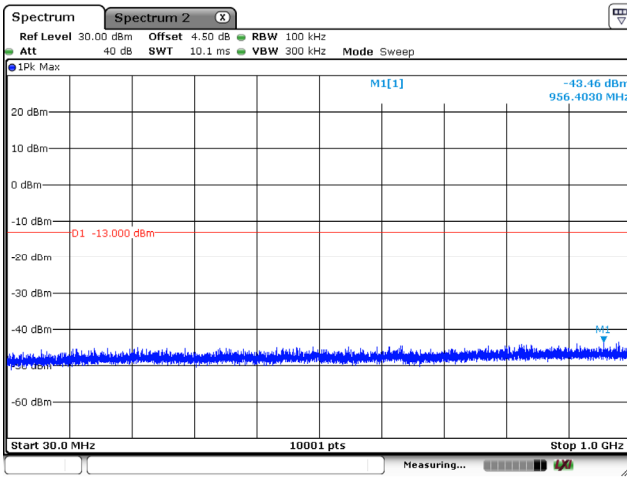
Date: 19 JUN 2023 21:12:17

PCS 1900 / GPRS / 1909.8 MHz (above 1GHz)



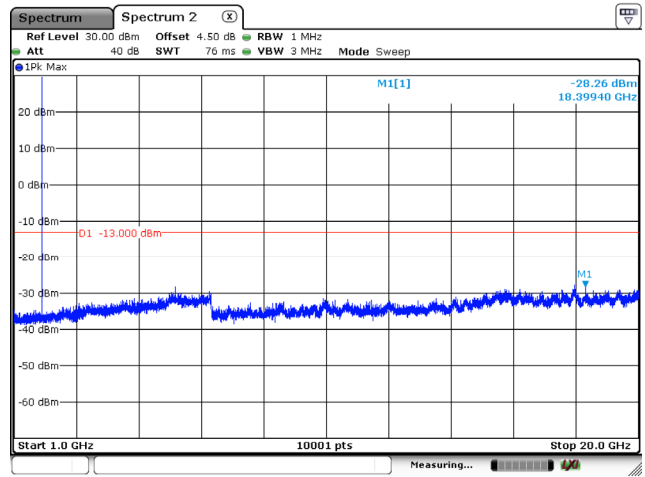
Date: 19 JUN 2023 21:12:43

PCS 1900 / EGPRS / 1850.2 MHz (below 1GHz)



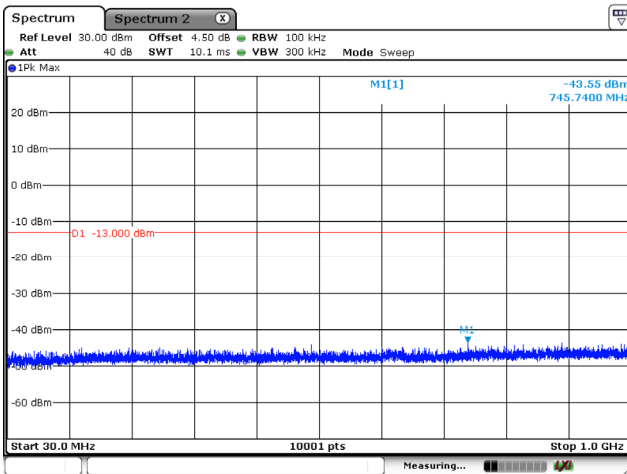
Date: 19 JUN 2023 21:13:20

PCS 1900 / EGPRS / 1850.2 MHz (above 1GHz)



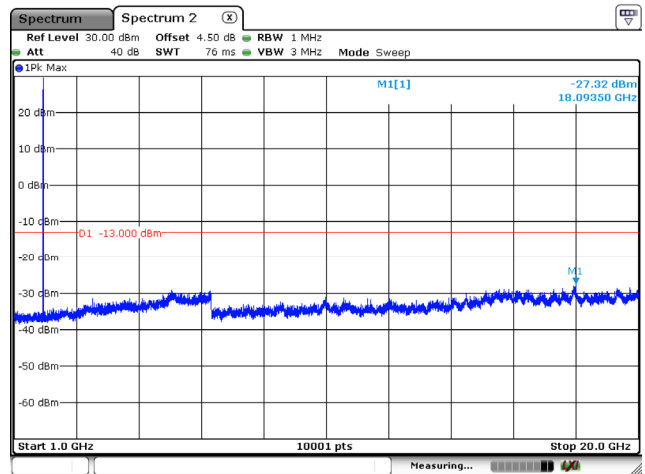
Date: 19 JUN 2023 21:32:56

PCS 1900 / EGPRS / 1880 MHz (below 1GHz)



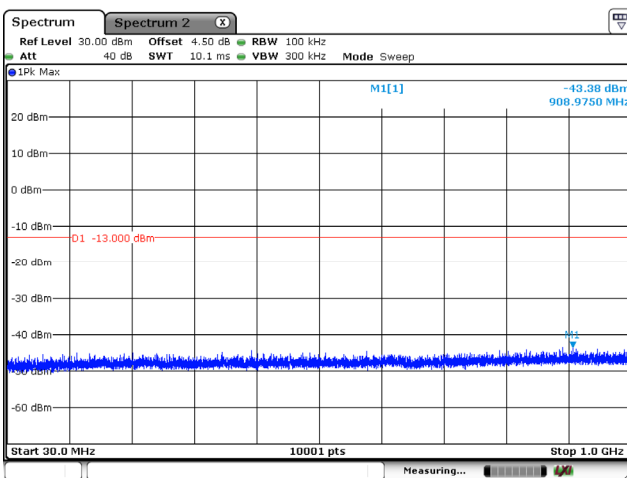
Date: 19 JUN 2023 21:31:32

PCS 1900 / EGPRS / 1880 MHz (above 1GHz)



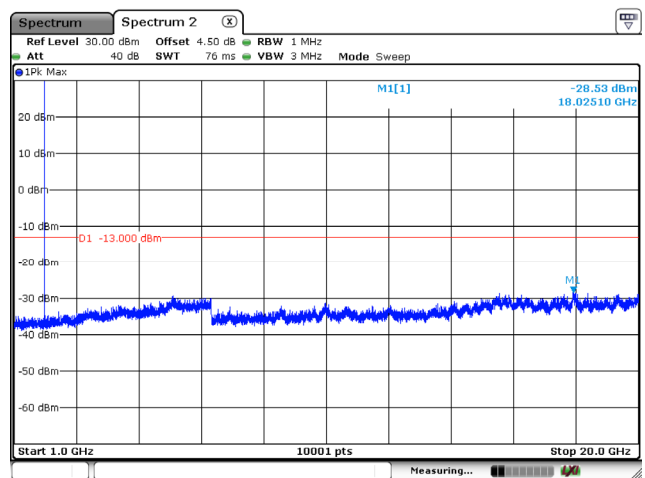
Date: 19 JUN 2023 21:31:13

PCS 1900 / EGPRS / 1909.8 MHz (below 1GHz)



Date: 19 JUN 2023 21:29:09

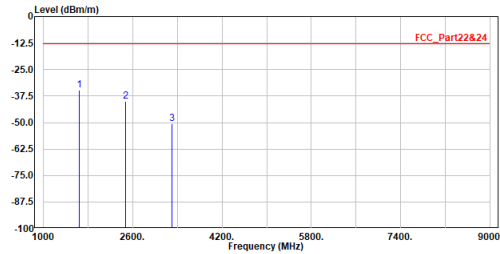
PCS 1900 / EGPRS / 1909.8 MHz (above 1GHz)



Date: 19 JUN 2023 21:29:29

Appendix D.2 Test Result of Radiated Spurious Emission

Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_850_CH128_GPRS
 Test By :Cyril

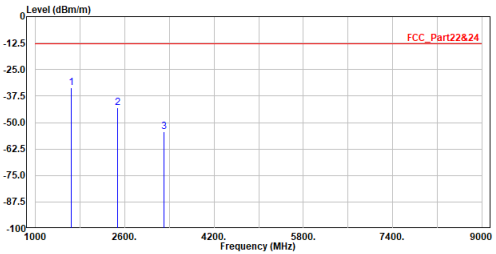


No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	1648.400	-34.59	-13.00	-21.59	-20.17	-14.42	Peak
2	2472.600	-40.18	-13.00	-27.18	-28.13	-12.05	Peak
3	3296.800	-50.42	-13.00	-37.42	-40.29	-10.13	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_850_CH128_GPRS
 Test By :Cyril

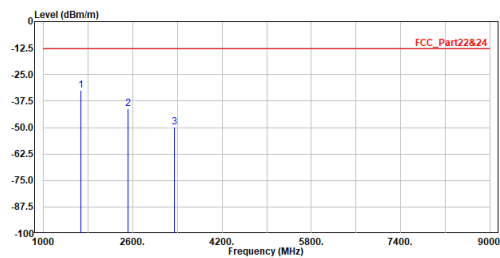


No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	1648.400	-33.55	-13.00	-20.55	-19.13	-14.42	Peak
2	2472.600	-43.13	-13.00	-30.13	-31.08	-12.05	Peak
3	3296.800	-54.45	-13.00	-41.45	-44.32	-10.13	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBa)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_850_CH190_GPRS
 Test By :Cyril

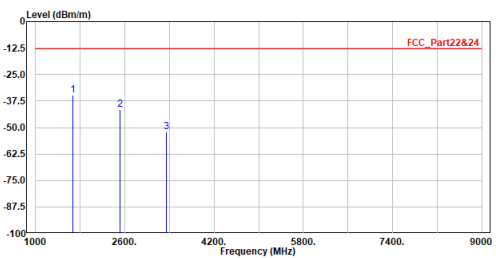


No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	1673.200	-32.44	-13.00	-19.44	-18.10	-14.34	Peak
2	2509.800	-41.06	-13.00	-28.06	-29.11	-11.95	Peak
3	3346.400	-49.83	-13.00	-36.83	-39.76	-10.07	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_850_CH190_GPRS
 Test By :Cyril

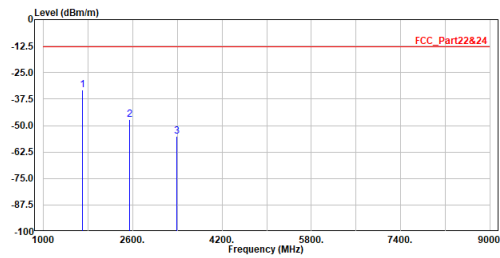


No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	1673.200	-34.83	-13.00	-21.83	-20.49	-14.34	Peak
2	2509.800	-41.56	-13.00	-28.56	-29.61	-11.95	Peak
3	3346.400	-52.10	-13.00	-39.10	-42.03	-10.07	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_850_CH251_GPRS
 Test By :Cyril

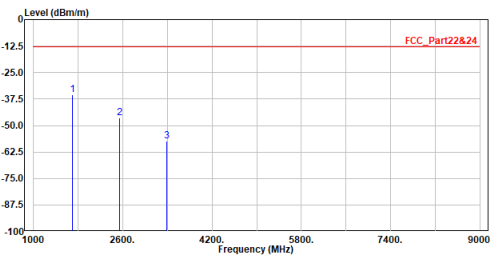


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1697.600	-33.36	-13.00	-20.36	-19.11	-14.25	Peak
2	2546.400	-47.12	-13.00	-34.12	-35.28	-11.84	Peak
3	3395.200	-55.04	-13.00	-42.04	-45.02	-10.02	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_850_CH251_GPRS
 Test By :Cyril

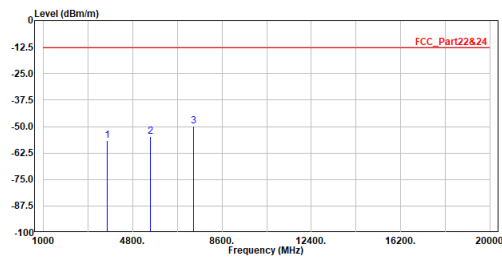


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	1697.600	-35.63	-13.00	-22.63	-21.38	-14.25	Peak
2	2546.400	-46.52	-13.00	-33.52	-34.68	-11.84	Peak
3	3395.200	-57.22	-13.00	-44.22	-47.20	-10.02	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_1900_CH512_GPRS
 Test By :Cyril

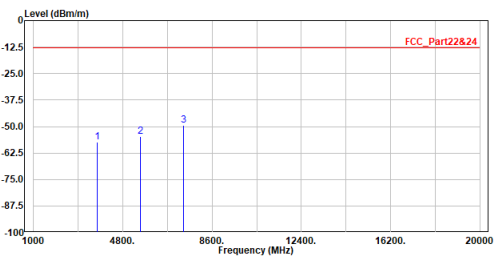


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3700.400	-56.48	-13.00	-43.48	-47.49	-8.99	Peak
2	5550.600	-54.72	-13.00	-41.72	-49.29	-5.43	Peak
3	7400.800	-49.82	-13.00	-36.82	-49.08	-0.74	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_1900_CH512_GPRS
 Test By :Cyril

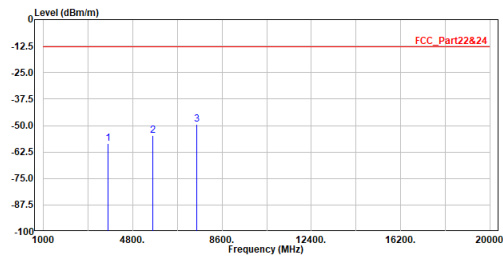


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBm	dBm	dB	dBm	dB	
1	3700.400	-57.40	-13.00	-44.40	-48.41	-8.99	Peak
2	5550.600	-54.69	-13.00	-41.69	-49.26	-5.43	Peak
3	7400.800	-49.40	-13.00	-36.40	-48.66	-0.74	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
3. Over Limit = Level - Limit Line
4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 $= 107 + 20\log(3) - 104.8 = 11.8$ dB
5. The other emission levels were very low against the limit.
6. The emission under 1GHz was not included since the emission levels are very low against the limit.

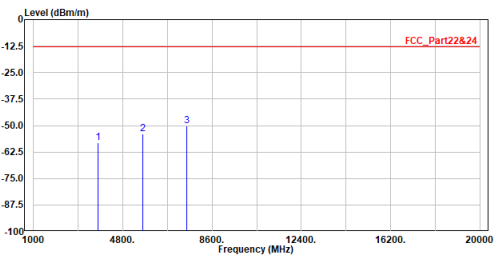
Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_1900_CH611_GPRS
 Test By :Cyril



No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	3760.000	-58.55	-13.00	-45.55	-49.83	-8.72	Peak
2	5640.000	-54.69	-13.00	-41.69	-49.49	-5.20	Peak
3	7520.000	-49.34	-13.00	-36.34	-48.77	-0.57	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
 3. Over Limit = Level - Limit Line
 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 = 107 + 20log(3) - 104.8 = 11.8 dB
 5. The other emission levels were very low against the limit.
 6. The emission under 1GHz was not included since the emission levels are very low against the limit.

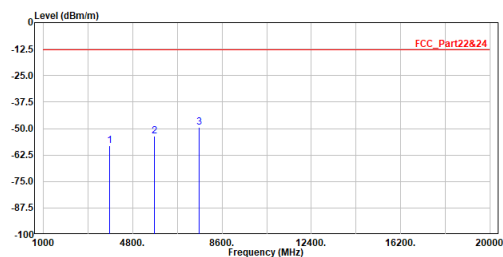
Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_1900_CH611_GPRS
 Test By :Cyril



No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	3760.000	-58.15	-13.00	-45.15	-49.43	-8.72	Peak
2	5640.000	-54.02	-13.00	-41.02	-48.82	-5.20	Peak
3	7520.000	-50.08	-13.00	-37.08	-49.51	-0.57	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
 3. Over Limit = Level - Limit Line
 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 = 107 + 20log(3) - 104.8 = 11.8 dB
 5. The other emission levels were very low against the limit.
 6. The emission under 1GHz was not included since the emission levels are very low against the limit.

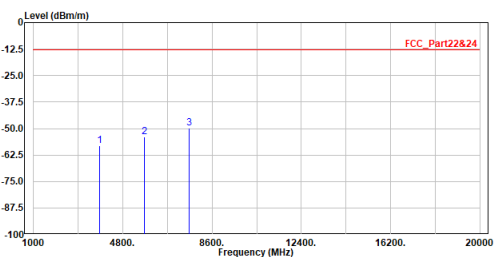
Site :HC-CB04
 Condition :3m Horizontal
 Mode :GSM_1900_CH810_GPRS
 Test By :Cyril



No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	3819.600	-58.19	-13.00	-45.19	-49.73	-8.46	Peak
2	5729.400	-53.45	-13.00	-40.45	-48.47	-4.98	Peak
3	7639.200	-49.44	-13.00	-36.44	-48.91	-0.53	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
 3. Over Limit = Level - Limit Line
 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 = 107 + 20log(3) - 104.8 = 11.8 dB
 5. The other emission levels were very low against the limit.
 6. The emission under 1GHz was not included since the emission levels are very low against the limit.

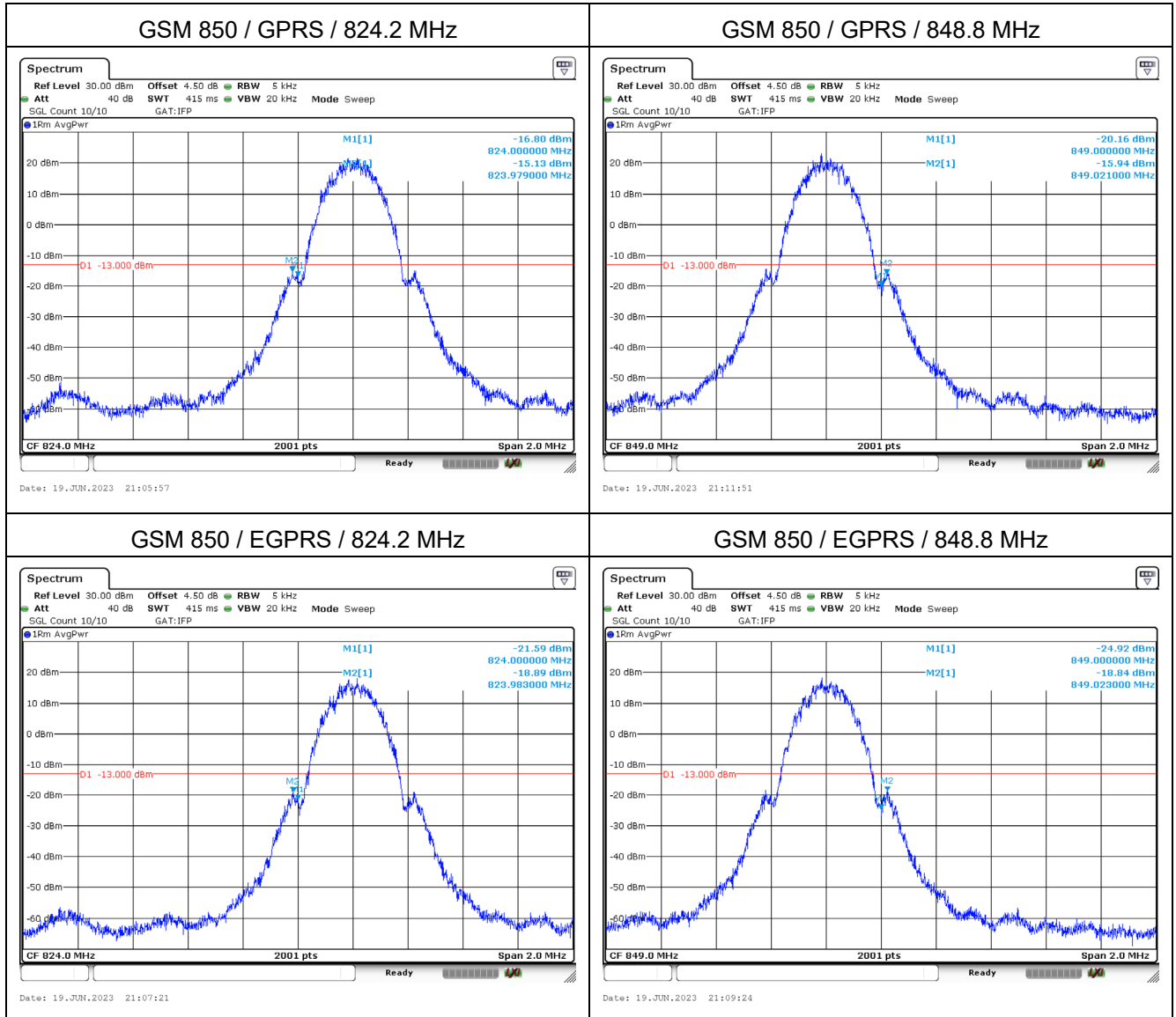
Site :HC-CB04
 Condition :3m Vertical
 Mode :GSM_1900_CH810_GPRS
 Test By :Cyril



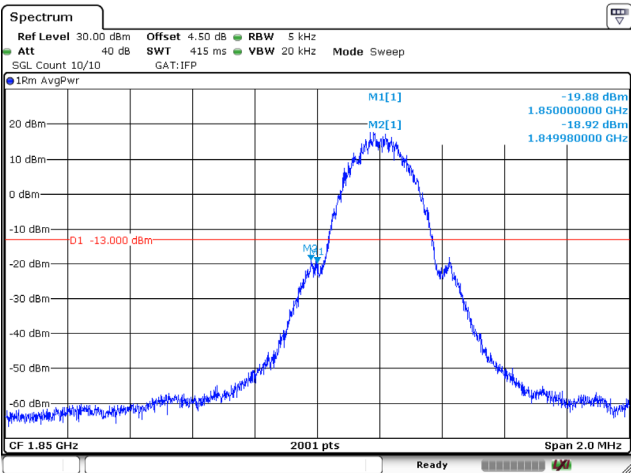
No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark
1	3819.600	-58.20	-13.00	-45.20	-49.74	-8.46	Peak
2	5729.400	-53.99	-13.00	-40.99	-49.01	-4.98	Peak
3	7639.200	-49.99	-13.00	-36.99	-49.46	-0.53	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor
 3. Over Limit = Level - Limit Line
 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm)
 = 107 + 20log(3) - 104.8 = 11.8 dB
 5. The other emission levels were very low against the limit.
 6. The emission under 1GHz was not included since the emission levels are very low against the limit.

Appendix E. Test Result of Conducted Band Edge

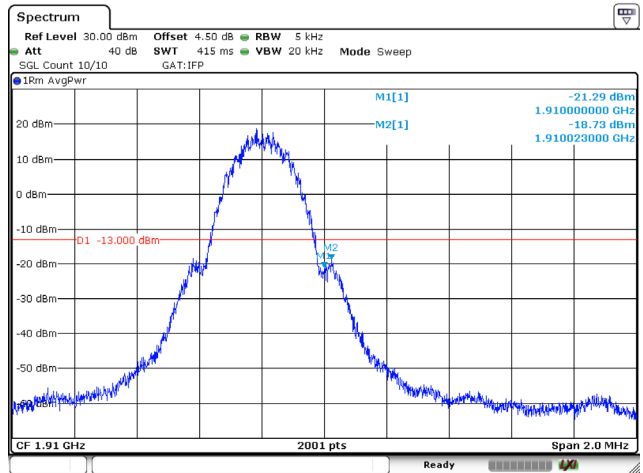


PCS 1900 / GPRS / 1850.2 MHz



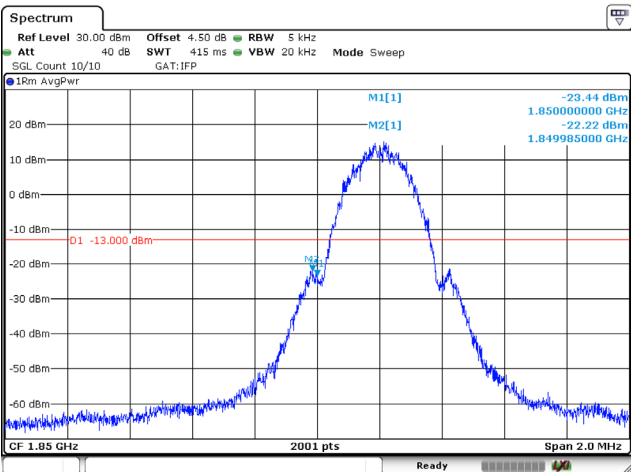
Date: 19.JUN.2023 21:14:24

PCS 1900 / GPRS / 1909.8 MHz



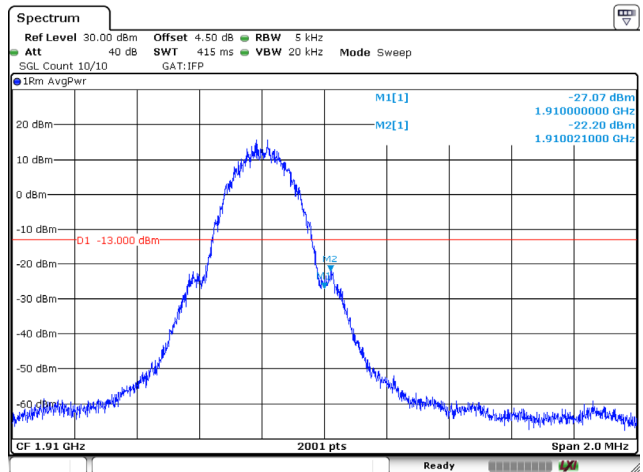
Date: 19.JUN.2023 21:21:11

PCS 1900 / EGPRS / 1850.2 MHz



Date: 19.JUN.2023 21:17:17

PCS 1900 / EGPRS / 1909.8 MHz



Date: 19.JUN.2023 21:19:12

Appendix F. Test Result of Frequency Stability

GSM/GPRS 850 / 824.2 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	1.94	0.0024
14.20	2.41	0.0029
10.20	2.67	0.0032

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	1.66	0.0020
-30	1.59	0.0019
-20	2.00	0.0024
-10	2.89	0.0035
0	2.56	0.0031
10	2.39	0.0029
20	2.14	0.0026
30	2.92	0.0035
40	1.66	0.0020
50	2.01	0.0024
60	1.13	0.0014
70	1.75	0.0021
85	2.45	0.0030

GSM/GPRS 850/ 836.6 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	1.87	0.0022
14.20	2.22	0.0027
10.20	0.90	0.0011

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	1.81	0.0022
-30	1.40	0.0017
-20	1.90	0.0023
-10	0.99	0.0012
0	2.24	0.0027
10	2.75	0.0033
20	1.85	0.0022
30	2.74	0.0033
40	1.87	0.0022
50	1.46	0.0017
60	1.68	0.0020
70	1.75	0.0021
85	2.18	0.0012

GSM/GPRS 850/ 848.8 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	1.46	0.0017
14.20	1.69	0.0020
10.20	1.09	0.0013

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	0.46	0.0005
-30	0.70	0.0008
-20	0.88	0.0010
-10	0.74	0.0009
0	0.93	0.0011
10	1.11	0.0013
20	0.96	0.0011
30	1.18	0.0014
40	1.45	0.0017
50	0.78	0.0009
60	1.16	0.0014
70	0.61	0.0007
85	1.11	0.0013

GSM/GPRS 1900 / 1850.2 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	3.38	0.00183
14.20	3.04	0.00164
10.20	2.64	0.00143

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	2.59	0.0014
-30	2.85	0.0015
-20	2.26	0.0012
-10	3.01	0.0016
0	2.63	0.0014
10	3.07	0.0017
20	2.15	0.0012
30	2.05	0.0011
40	3.53	0.0019
50	1.52	0.0008
60	1.83	0.0010
70	2.30	0.0012
85	1.96	0.0011

GSM/GPRS 1900 / 1880 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	2.44	0.0013
14.20	2.78	0.0015
10.20	2.70	0.0014

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	2.09	0.0011
-30	2.03	0.0011
-20	2.39	0.0013
-10	1.64	0.0009
0	2.98	0.0016
10	1.40	0.0007
20	2.82	0.0015
30	2.32	0.0012
40	1.19	0.0006
50	3.71	0.0020
60	2.72	0.0014
70	2.06	0.0011
85	2.68	0.0014

GSM/GPRS 1900 / 1909.8 MHz

Voltage (VDC)	Frequency Stability (Hz)	Frequency Stability (ppm)
27.60	3.77	0.0020
14.20	3.24	0.0017
10.20	2.79	0.0015

Temperature (°C)	Frequency Stability (Hz)	Frequency Stability (ppm)
-40	3.13	0.0016
-30	2.48	0.0013
-20	2.98	0.0016
-10	2.88	0.0015
0	2.37	0.0012
10	2.37	0.0012
20	2.72	0.0014
30	3.46	0.0018
40	2.24	0.0012
50	3.58	0.0019
60	2.30	0.0012
70	3.40	0.0018
85	3.37	0.0018