

FCC Test Report

Product Name : Connectivity Module
Trade Name : Husqvarna
Model No. : HCM500
FCC ID : ZASHCM500

Applicant : HUSQVARNA AB
Address : 561 82 HUSKVARNA Sweden

Date of Receipt : Dec. 22, 2020
Issued Date : Jun. 29, 2021
Report No. : 20C0830R-E3042110001
Report Version : V1.0



The test results relate only to the samples tested.

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Test Report Certification

Issued Date : Jun. 29, 2021

Report No. : 20C0830R-E3042110001



Product Name : Connectivity Module
Applicant : HUSQVARNA AB
Address : 561 82 HUSKVARNA Sweden
Manufacturer : HUSQVARNA AB
Address : 561 82 HUSKVARNA Sweden
Model No. : HCM500
Trade name : Husqvarna
FCC ID : ZASHCM500
EUT Voltage : DC 6-58V
Testing Voltage : DC 48V
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 :



(Demi Chang / Senior Engineering Adm. Specialist)

Tested By :



(Lion Wang / Senior Engineer)

Approved By :



(Louis Hsu / Deputy Manager)

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jun. 29, 2021

TABLE OF CONTENTS

Description	Page
1. General Information	6
1.1. EUT Description	6
1.2. Mode of Operation	7
1.3. Tested System Details.....	8
1.4. Configuration of Tested System	9
1.5. EUT Exercise Software	9
1.6. Comments and Remarks	10
2. Technical Test	11
2.1. Summary of Test Result	11
2.2. Test Environment	12
2.3. List of Test Equipment.....	13
2.4. Uncertainty	16
3. RF Output Power	17
3.1. Test Setup	17
3.2. Test Procedure	17
3.3. Test Method.....	17
3.4. Test Result	18
4. Occupied Bandwidth.....	19
4.1. Test Setup	19
4.2. Test Procedure	19
4.3. Test Method.....	19
4.4. Test Result	20
5. Peak To Average Ratio	30
5.1. Test Setup	30
5.2. Test Procedure	30
5.3. Test Method.....	30
5.4. Test Result	31
6. Conducted Band Edge.....	41
6.1. Test Setup	41
6.2. Test Procedure	41
6.3. Test Method.....	41
6.4. Test Result	42
7. Spurious Emission	54
7.1. Test Setup	54
7.2. Test Procedure	55

7.3.	Test Method.....	55
7.4.	Test Result	56
8.	Frequency Stability	62
8.1.	Test Setup	62
8.2.	Test Procedure	62
8.3.	Test Method.....	62
8.4.	Test Result	63
Attachment 1.....		67
	Test Setup Photograph.....	67

1. General Information

1.1. EUT Description

Product Name	Connectivity Module
Trade Name	Husqvarna
Model No.	HCM500
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

Accessories Information	
Power Line (M5 - 5 pin)	Non-Shielded, 3.0m
Signal Cable (M8 - 8 pin)	Non-Shielded, 3.0m

Antenna Information	
Trade Name	TE
Model Name	2363696-5
Antenna Type	Dipole
Antenna Gain	0dBi (GSM850) 2dBi (PCS1900)

Note:

1. This Connectivity Module support BT5.0, LTE Cat-M1 Band 2/4/5/12/13/26 & GSM functions.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.
3. The EUT description is from the customer declaration.

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:

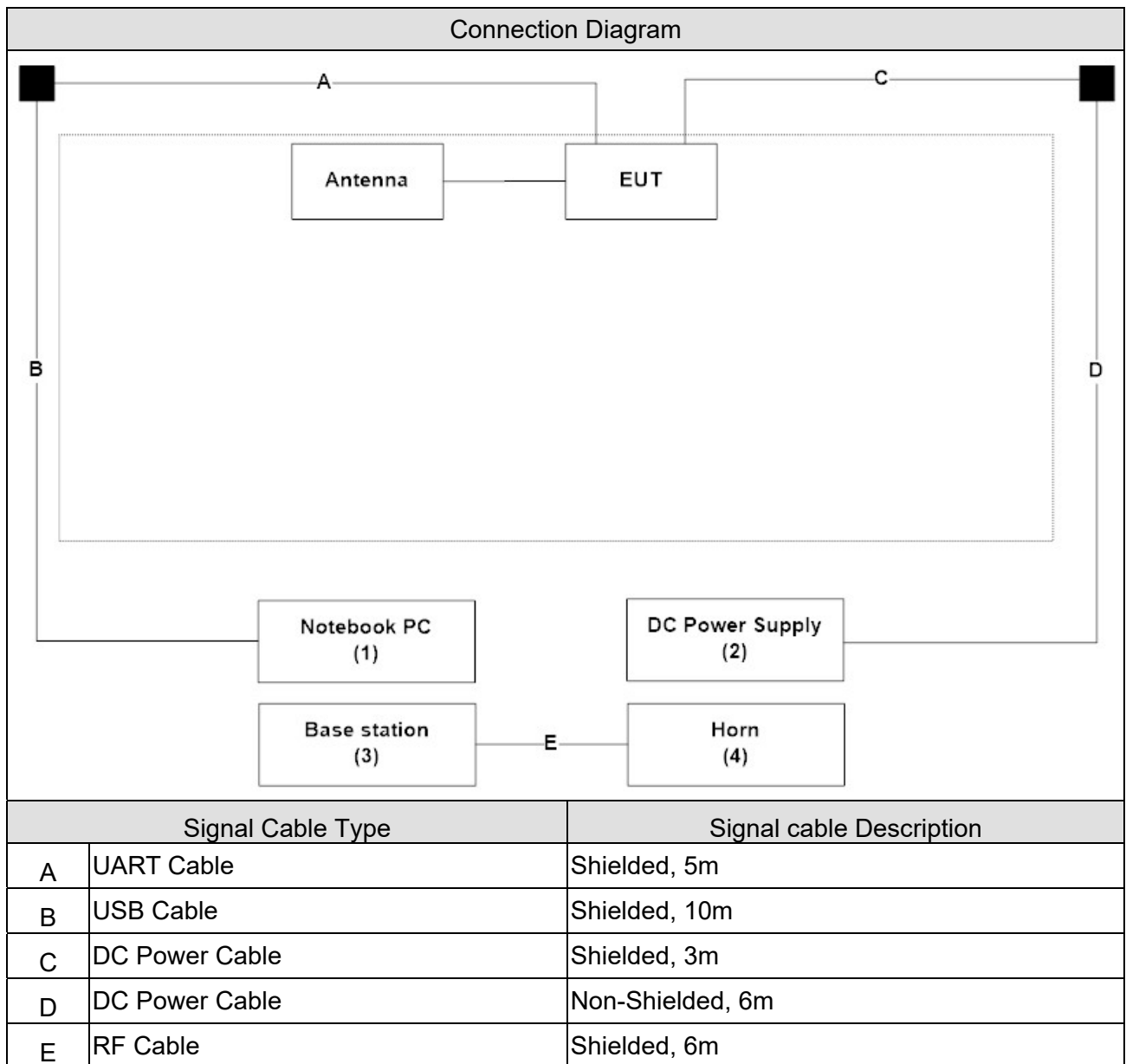
Test Mode
Mode 1: GSM 850 Link
Mode 2: PCS 1900 Link

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.	FCC ID	Power Cord
1	Notebook PC	ASUS	E402S	GBN0CV14 W050478	DoC	Shielded, 2m
2	DC Power Supply	Topward	6030D	809508	DoC	Non-Shielded, 1.8m
3	Base Station	R&S	CMW500	157118	DoC	Non-Shielded, 1.8m
4	Horn Antenna	Schwarzbeck	BBHA 9120D	1640	DoC	--

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	EUT is connected through the base station.
3	Configure test mode, test channel and data rate.
4	Let the EUT start trasmitting signal continuously.
5	Verify that the device is working properly.

1.6. 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.

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

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.2. Test Environment

Items	Test Item	Required	Test Site
Temperature (°C)	RF Output Power	15-35	1
Humidity (%RH)		25-75	
Temperature (°C)	Occupied Bandwidth	15-35	1
Humidity (%RH)		25-75	
Temperature (°C)	Peak To Average Ratio	15-35	1
Humidity (%RH)		25-75	
Temperature (°C)	Conducted Band Edge	15-35	1
Humidity (%RH)		25-75	
Temperature (°C)	Spurious Emission	15-35	1
Humidity (%RH)		25-75	
Temperature (°C)	Frequency Stability	15-35	1
Humidity (%RH)		25-75	

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

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

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
Email address	info.tw@dekra.com
Website	http://www.dekra.com.tw

2.3. List of Test Equipment

RF Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2021/01/25	2022/01/24
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Occupied Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/03/30	2021/03/29
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Peak To Average Ratio / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/03/30	2021/03/29
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Conducted Band Edge / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/03/30	2021/03/29
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Conducted Spurious Emissions / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/03/30	2021/03/29
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

Radiated Spurious Emissions / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2020/10/12	2021/10/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30 2021/03/31	2021/03/29 2022/03/30
Signal Analyzer	R&S	FSVA40	101435	2020/06/24	2021/06/23
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21 2021/01/25	2021/02/20 2022/01/24
Bilog Antenna	Teseq	CBL6112D	23191	2021/02/26	2022/02/25
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2020/06/04	2021/06/03
Horn Antenna	Schwarzbeck	BBHA 9170	202	2020/12/16	2021/12/15
Pre-Amplifier	EMCI	EMC01820I	980365	2020/06/19	2021/06/18
Pre-Amplifier	EMEC	EM01G18GA	060741	2020/07/24	2021/07/23
Pre-Amplifier	DEKRA	AP-400C	201801231	2020/11/16	2021/11/15
Wideband Radio Communication Tester	R&S	CMW500	106071	2021/01/27	2022/01/26
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Coaxial Cable(13m)	Huber+Suhner	SF104	CB2-H	2020/07/25	2021/07/24
DEKRA Testing System	DEKRA	Version 2.0	CB2-H	NA	NA

Frequency Stability / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/03/30 2021/03/31	2021/03/29 2022/03/30
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30 2021/03/31	2021/03/29 2022/03/30
Wireless Conn. Tseter	R&S	CMW500	157118	2020/07/23	2021/07/22
Wideband Radio Communication Tester	R&S	CMW500	106071	2020/02/03	2021/02/02

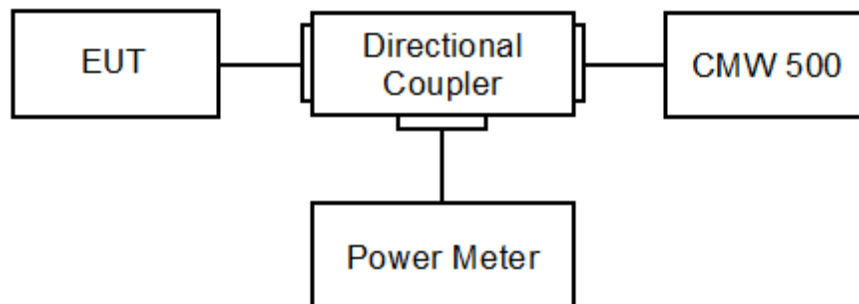
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

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	Connectivity Module		
Test Item	RF Output Power		
Test Mode	Mode 1: GSM 850 Link Mode 2: PCS1900 Link		
Date of Test	2021/04/13	Test Site	SR12-H
Temperature (°C)	24	Humidity (%RH)	60

GSM 850

Test Mode	Data Rate	Frequency (MHz)	Reading Level (dBm)	Antenna Gain (dBi)	ERP Measure Level (dBm)	Measure Level (W)	Limit (W) ERP
GPRS	CS1	824.2	32.92	0	30.770	1.194	7
		836.6	33.22	0	31.070	1.279	7
		848.8	33.10	0	30.950	1.245	7
EGPRS	MCS9	824.2	26.46	0	24.310	0.270	7
		836.6	26.51	0	24.360	0.273	7
		848.8	26.48	0	24.330	0.271	7

Note: Measure Level (ERP) = Reading Level (Conducted Output Power) + Antenna Gain - 2.15

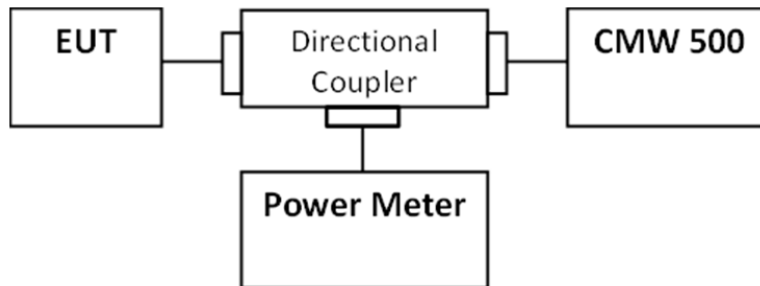
PCS 1900

Test Mode	Data Rate	Frequency (MHz)	Reading Level (dBm)	Antenna Gain (dBi)	EIRP Measure Level (dBm)	Measure Level (W)	Limit (W) EIRP
GPRS	CS1	1850.2	28.70	2	30.700	1.175	2
		1880.0	28.71	2	30.710	1.178	2
		1909.8	28.47	2	30.470	1.114	2
EGPRS	MCS9	1850.2	25.01	2	27.010	0.502	2
		1880.0	25.03	2	27.030	0.505	2
		1909.8	25.02	2	27.020	0.504	2

Note: Measure Level (EIRP) = Reading Level (Conducted Output Power) + 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

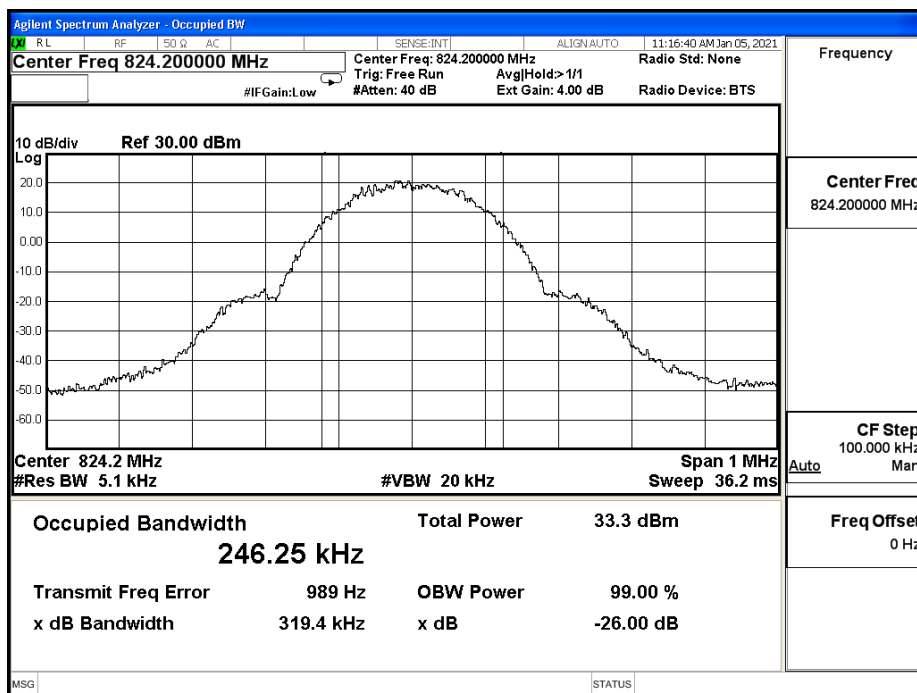
4.4. Test Result

Product	Connectivity Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/01/05	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

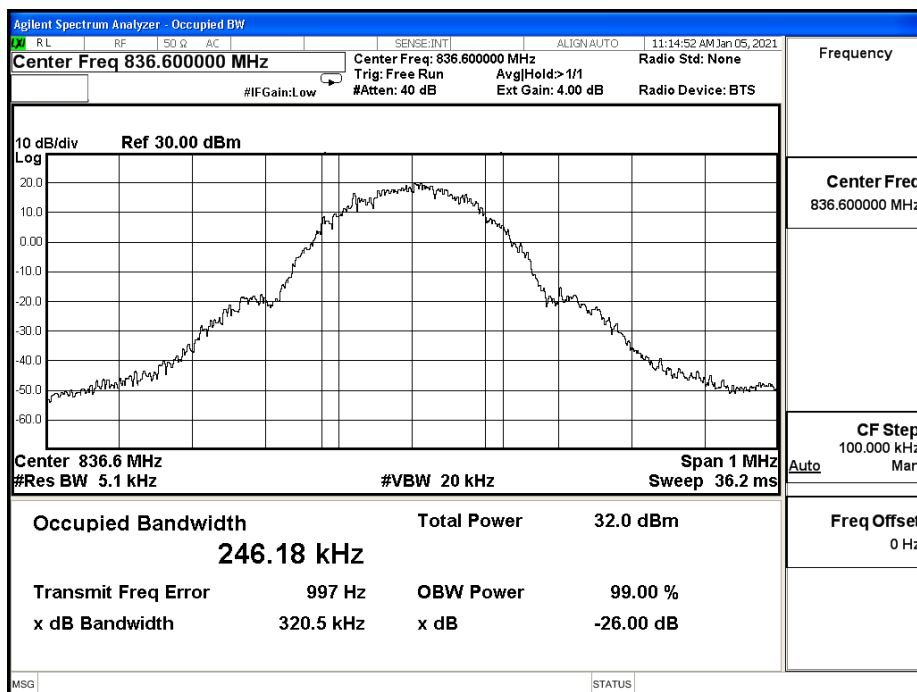
GSM 850

Band	Channel	MHz	Mode	Measure Level (kHz)		Limit (MHz)
				99% BW	26dB BW	
850	128	824.2	GPRS	246.25	319.40	NA
			EGPRS	241.27	314.40	NA
	190	836.6	GPRS	246.18	320.50	NA
			EGPRS	245.43	317.50	NA
	251	848.8	GPRS	242.79	319.00	NA
			EGPRS	243.03	310.30	NA

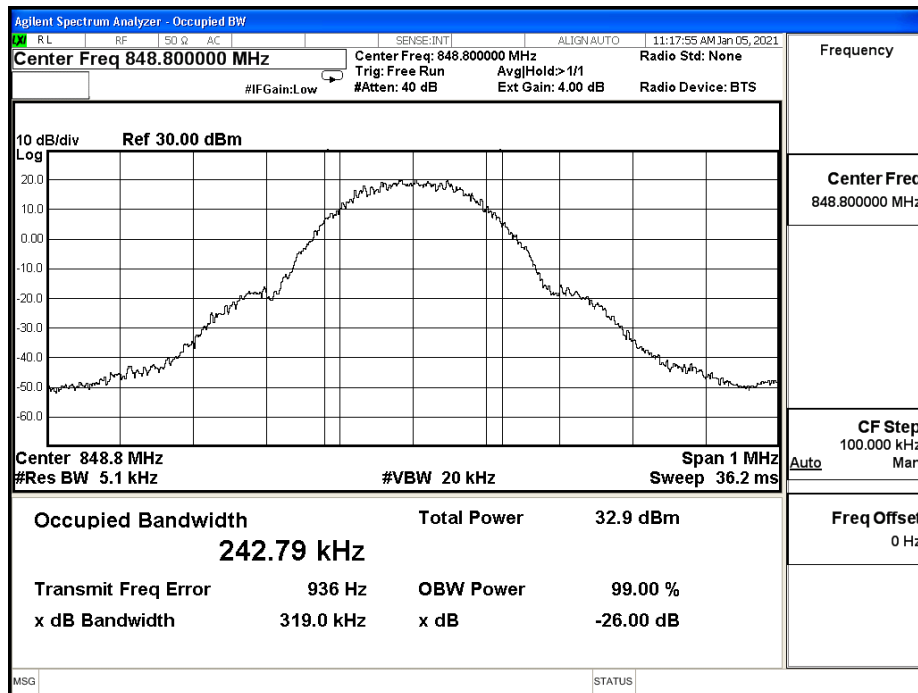
GSM_850_CH128_GPRS



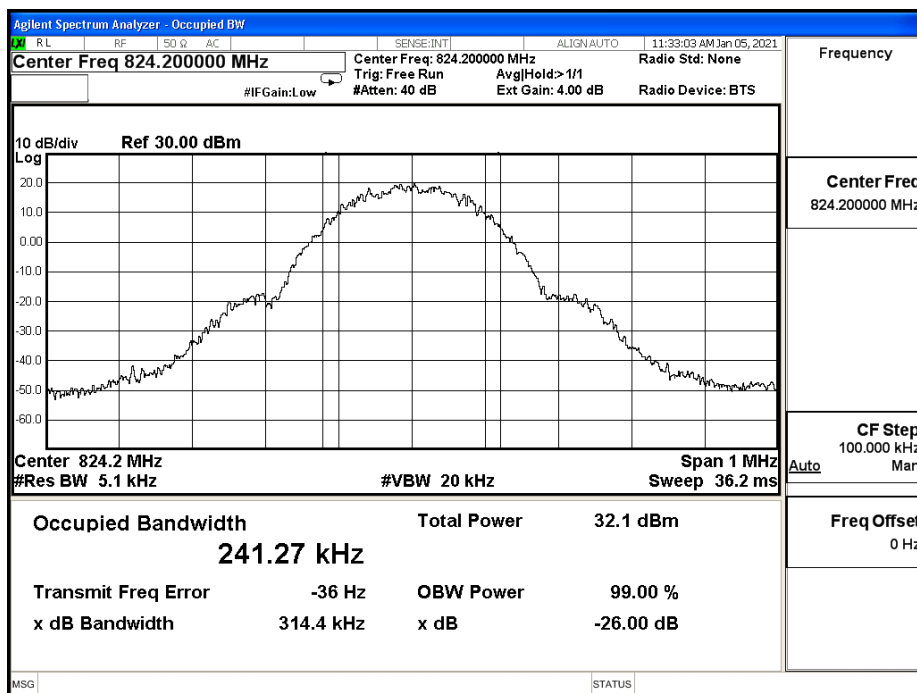
GSM_850_CH190_GPRS



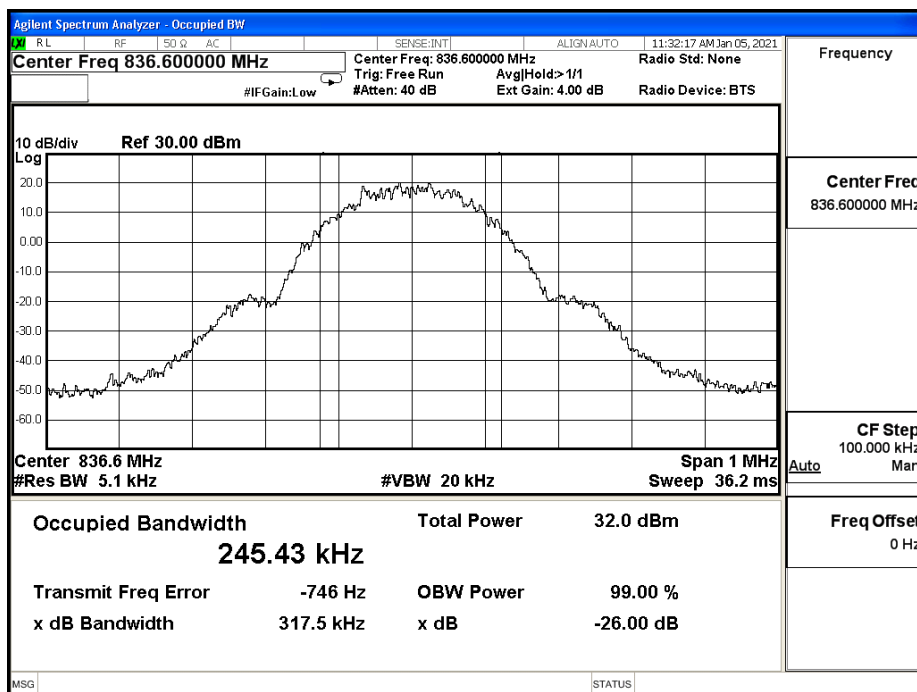
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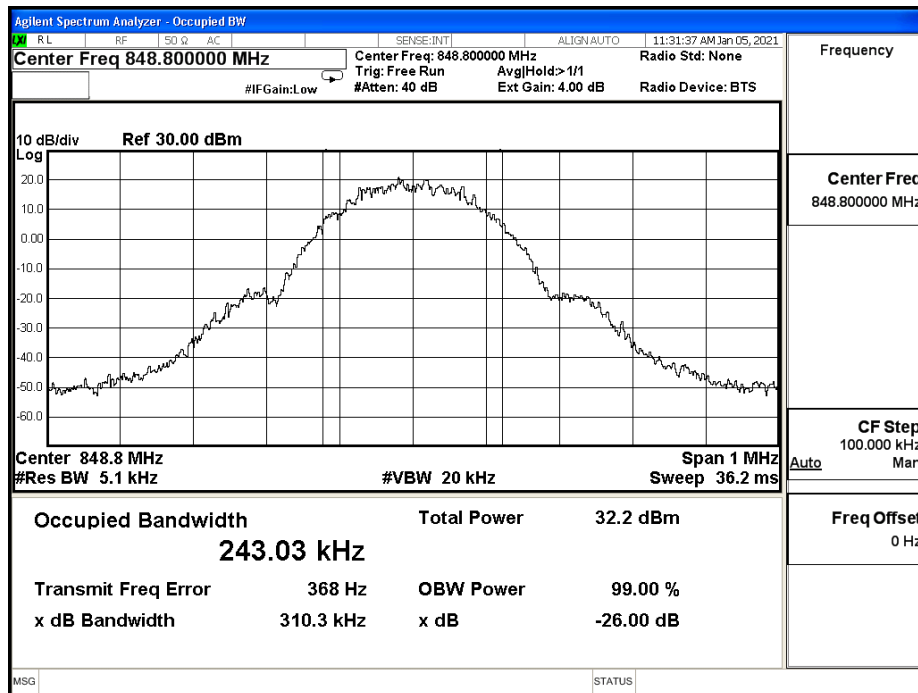
GSM_850_CH128_EGPRS



GSM_850_CH190_EGPRS



GSM_850_CH251_EGPRS

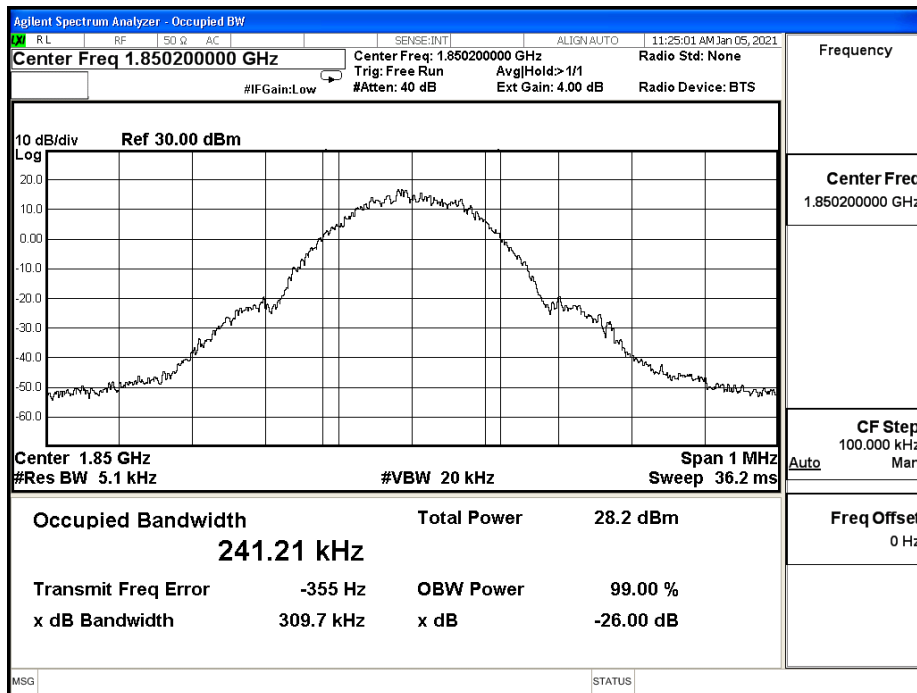


Product	Connectivity Module		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/01/05	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

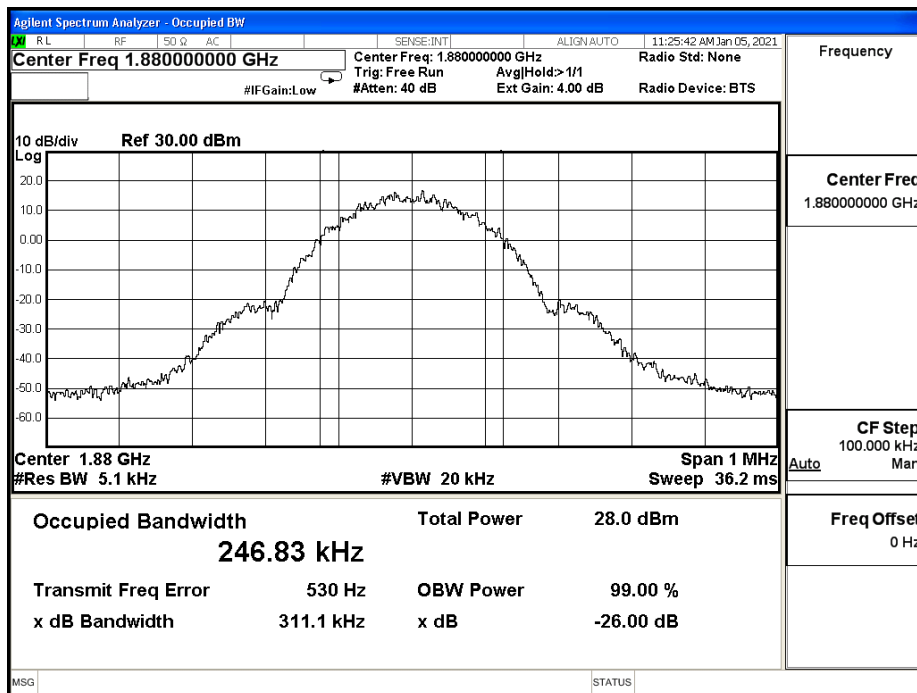
PCS 1900

Band	Channel	MHz	Mode	Measure Level (kHz)		Limit (MHz)
				99% BW	26dB BW	
1900	512	1850.2	GPRS	241.21	309.70	NA
			EGPRS	244.25	314.90	NA
	661	1880	GPRS	246.83	311.10	NA
			EGPRS	243.11	311.80	NA
	810	1909.8	GPRS	244.80	316.00	NA
			EGPRS	241.50	306.10	NA

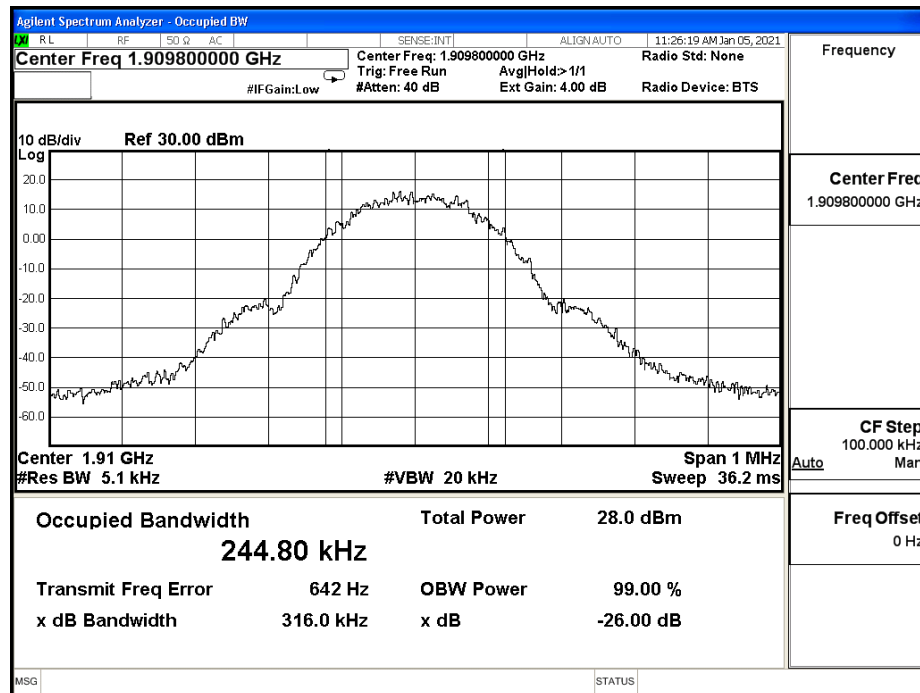
PCS_1900_CH512_GPRS



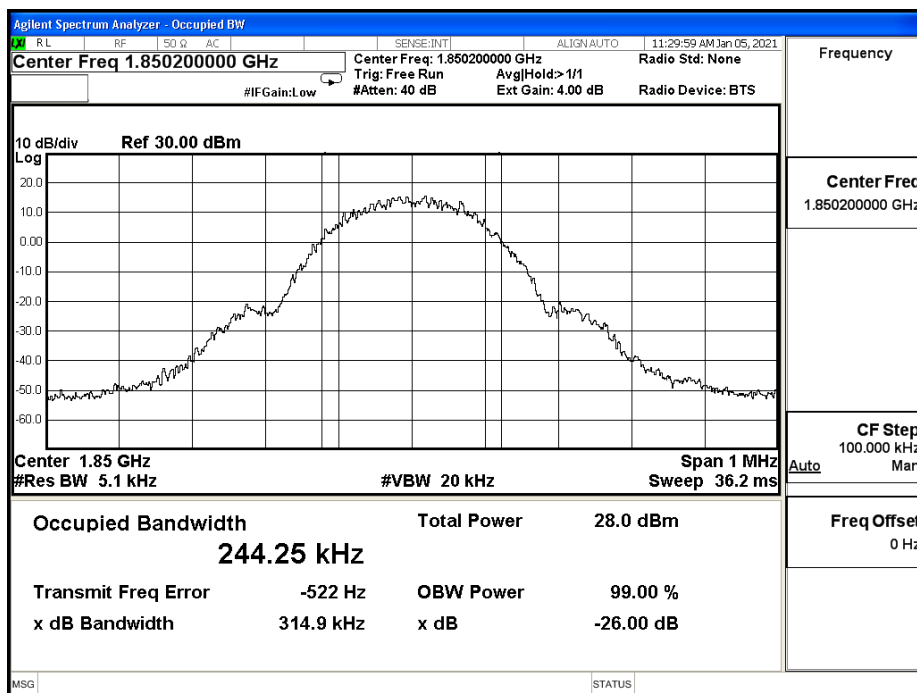
PCS_1900_CH661_GPRS



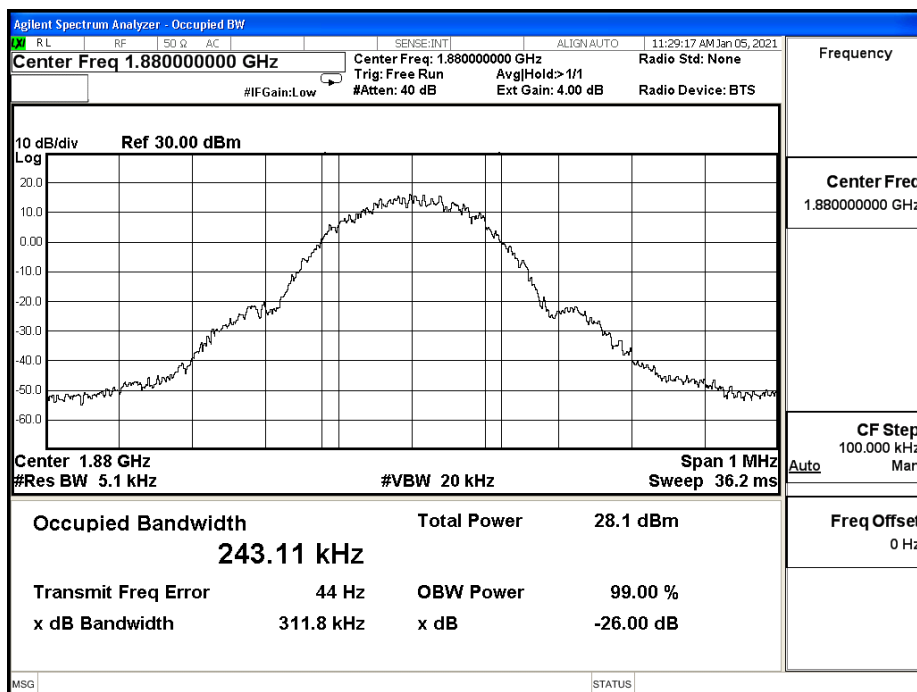
PCS_1900_CH810_GPRS



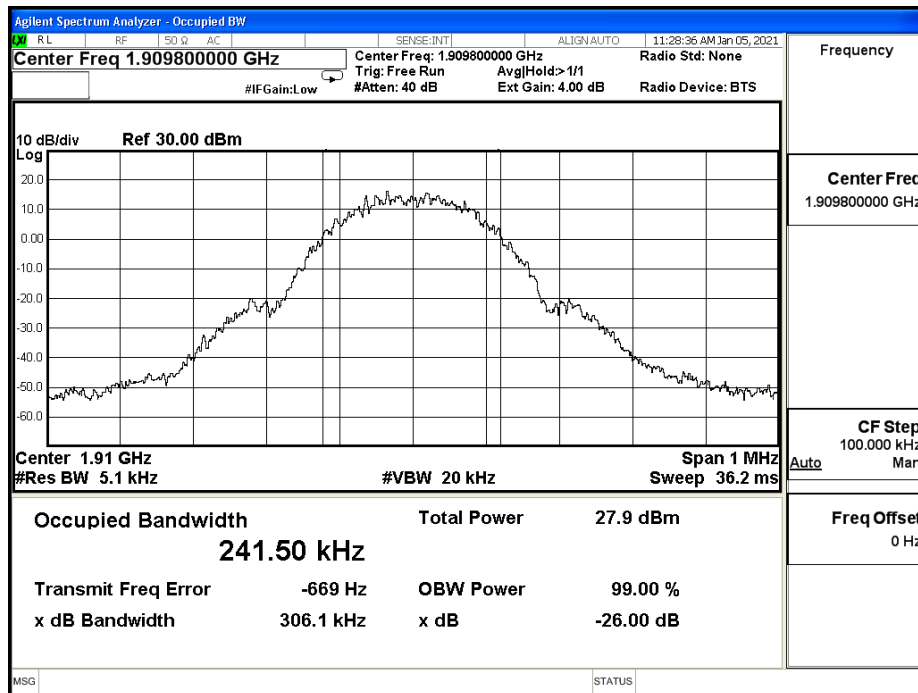
PCS_1900_CH512_EGPRS



PCS_1900_CH661_EGPRS

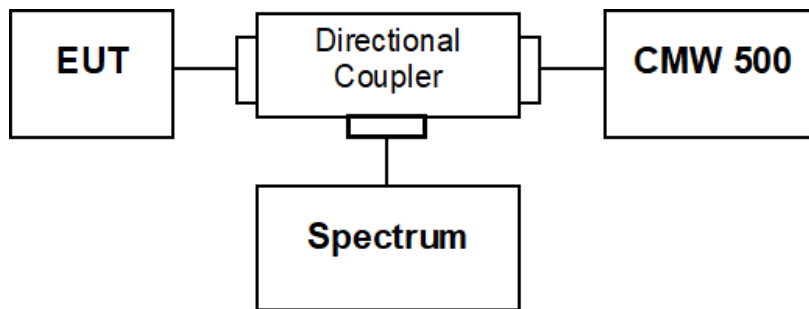


PCS_1900_CH810_EGPRS



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

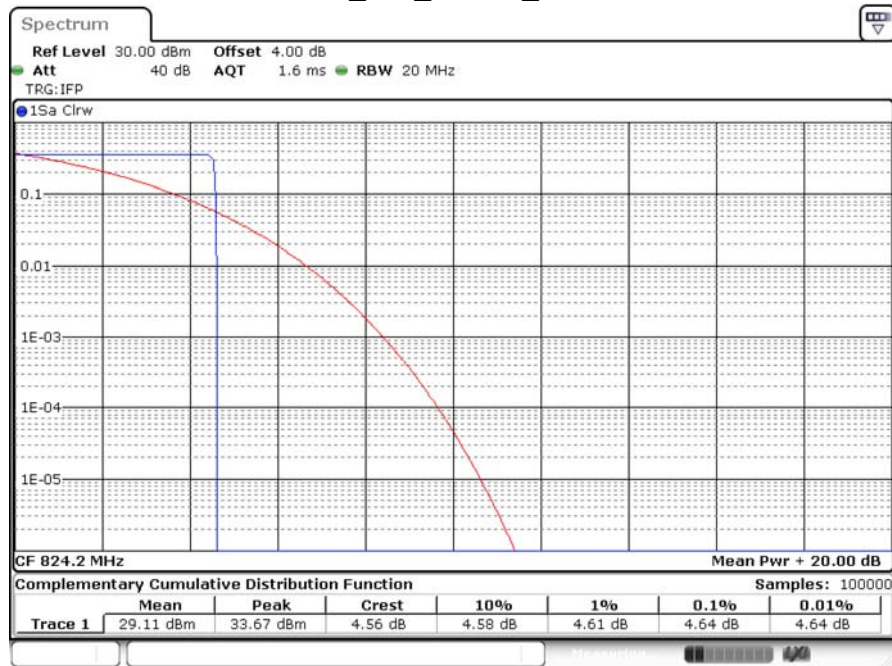
5.4. Test Result

Product	Connectivity Module		
Test Item	Peak To Average Ratio		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/01/06	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

GSM 850

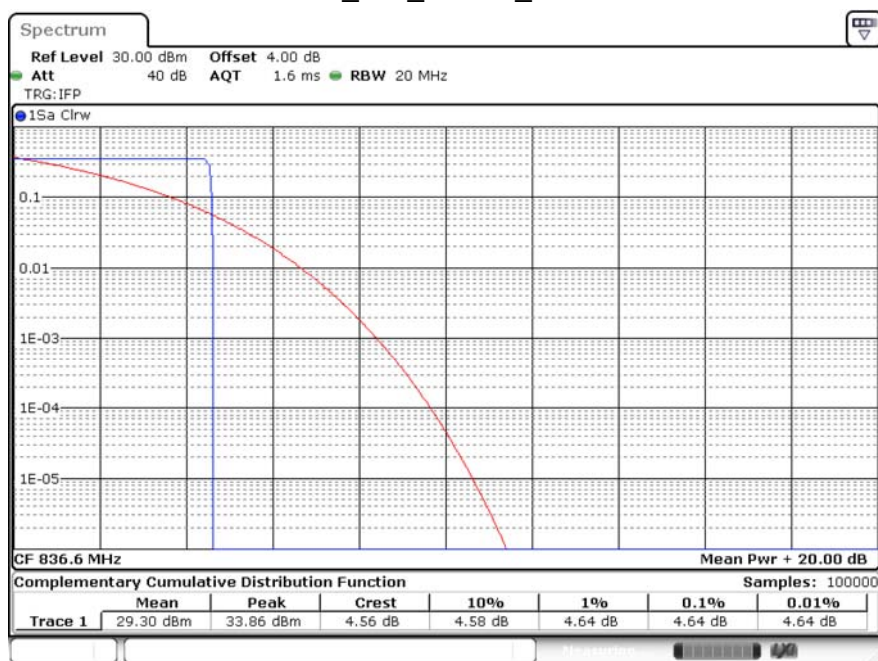
Channel No.	Frequency (MHz)	Modulation	Peak (dBm)	Average (dBm)	PAPR (dB)
128	824.2	GPRS	33.67	29.11	4.64
		EGPRS	33.68	29.12	4.61
190	836.6	GPRS	33.86	29.30	4.64
		EGPRS	33.85	29.28	4.64
251	848.8	GPRS	34.03	29.45	4.67
		EGPRS	34.01	29.42	4.61

GSM_850_CH128_GPRS



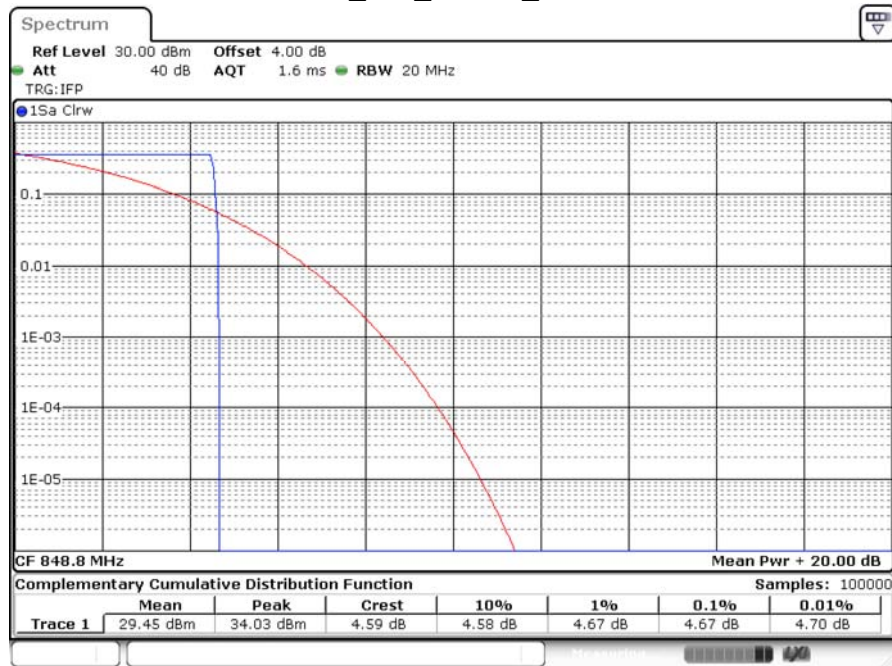
Date: 6 JAN 2021 14:53:46

GSM_850_CH190_GPRS



Date: 6 JAN 2021 14:53:31

GSM_850_CH251_GPRS



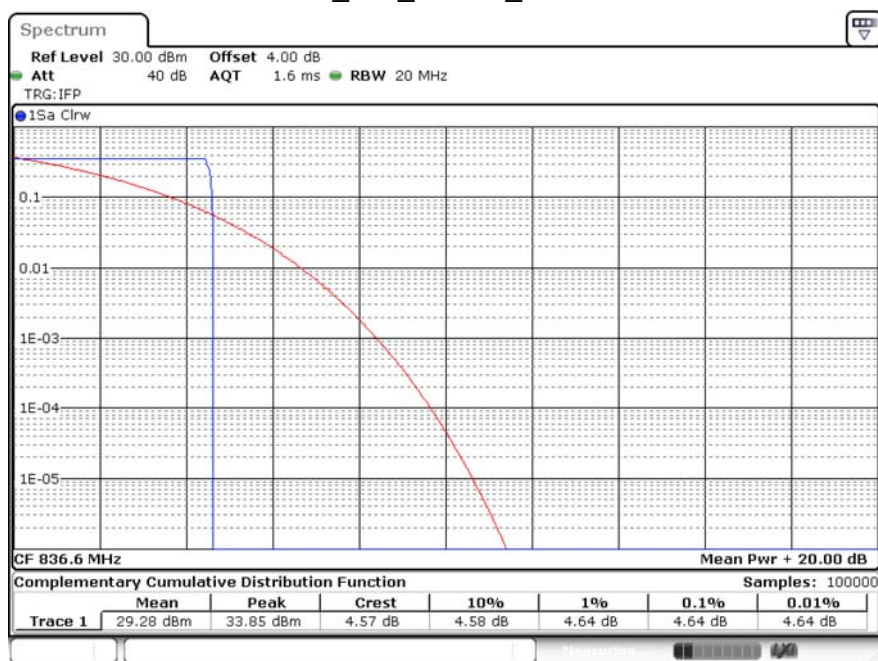
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GSM_850_CH128_EGPRS



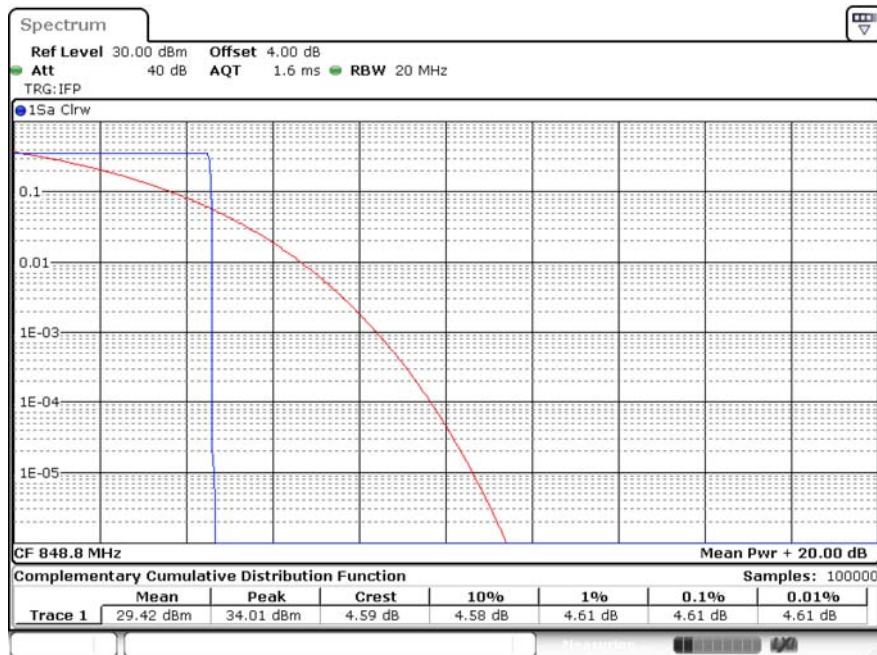
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GSM_850_CH190_EGPRS



Date: 6 JAN 2021 14:51:37

GSM_850_CH251_EGPRS



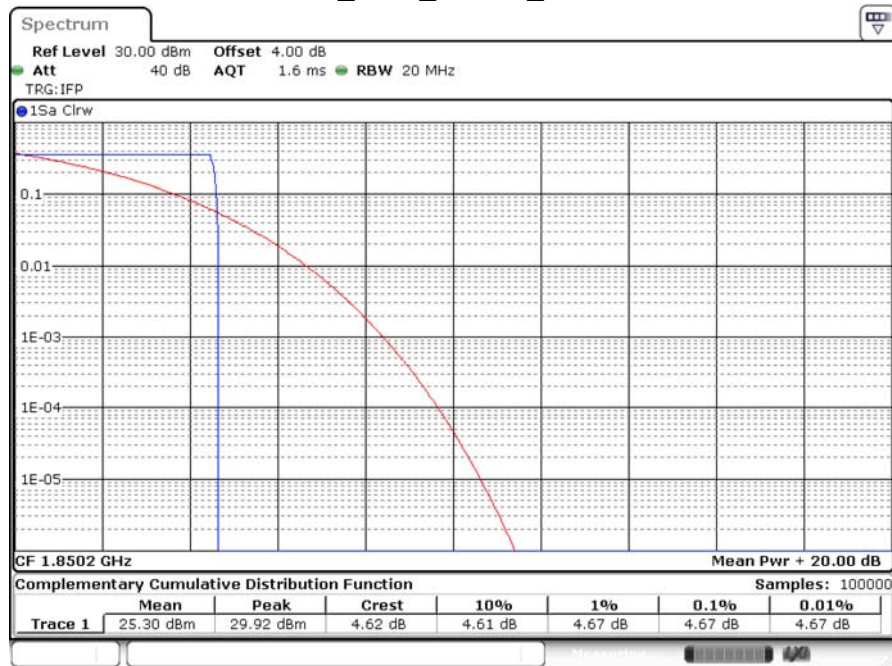
Date: 6 JAN 2021 14:51:55

Product	Connectivity Module		
Test Item	Peak To Average Ratio		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/01/06	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

PCS 1900

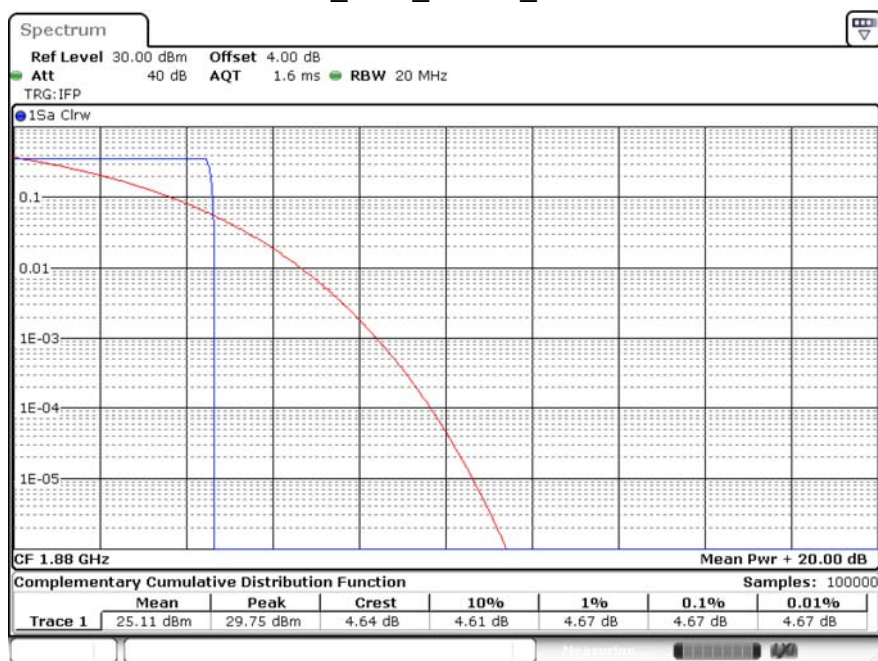
Channel No.	Frequency (MHz)	Modulation	Peak (dBm)	Average (dBm)	PAPR (dB)
512	1850.2	GPRS	29.92	25.30	4.67
		EGPRS	29.68	25.04	4.67
661	1880	GPRS	29.75	25.11	4.67
		EGPRS	29.77	25.12	4.72
810	1909.8	GPRS	29.75	25.10	4.70
		EGPRS	29.79	25.14	4.72

PCS_1900_CH512_GPRS



Date: 6 JAN 2021 14:45:37

PCS_1900_CH661_GPRS



Date: 6 JAN 2021 14:46:02

PCS_1900_CH810_GPRS



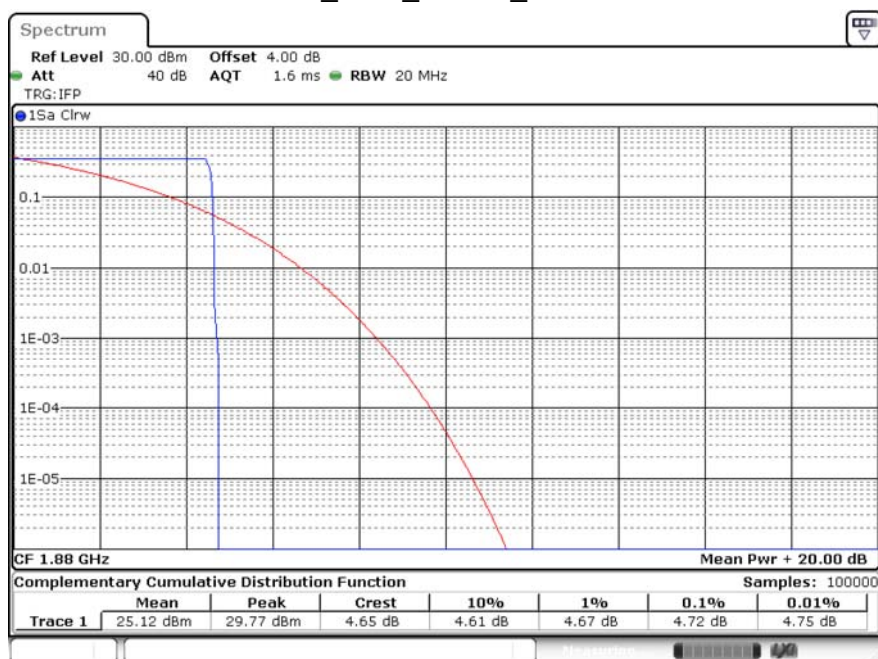
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PCS_1900_CH512_EGPRS



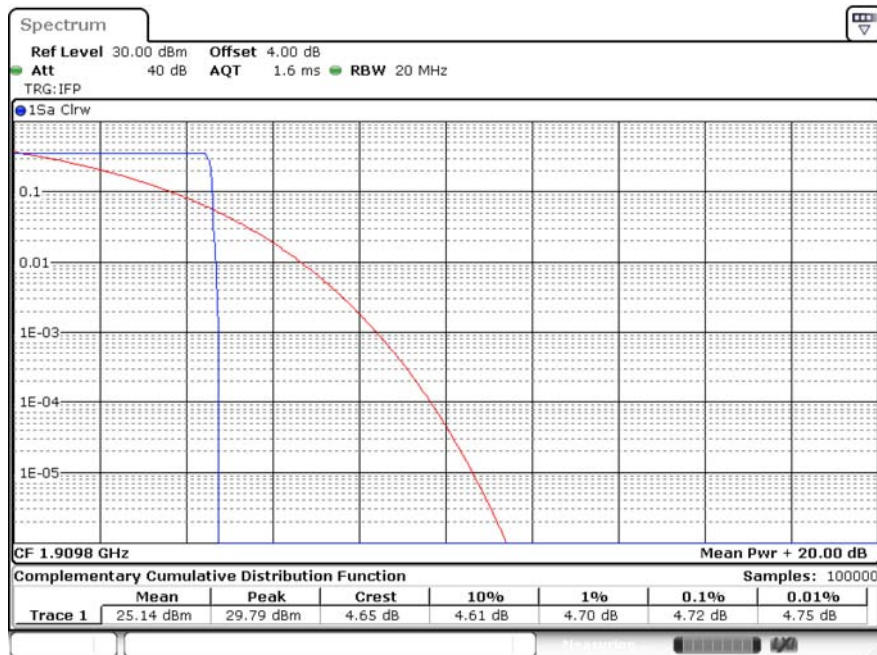
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PCS_1900_CH661_EGPRS



Date: 6 JAN 2021 14:49:25

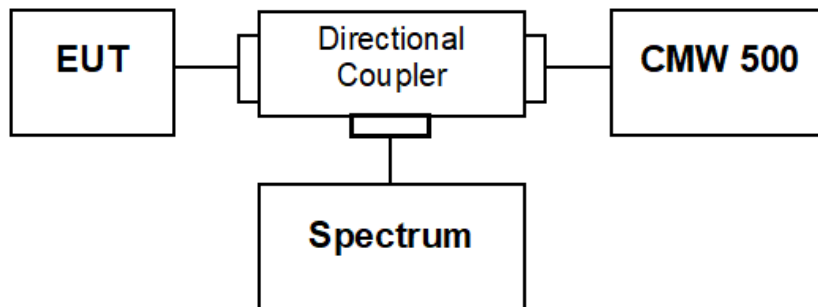
PCS_1900_CH810_EGPRS



Date: 6 JAN 2021 14:49:08

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:

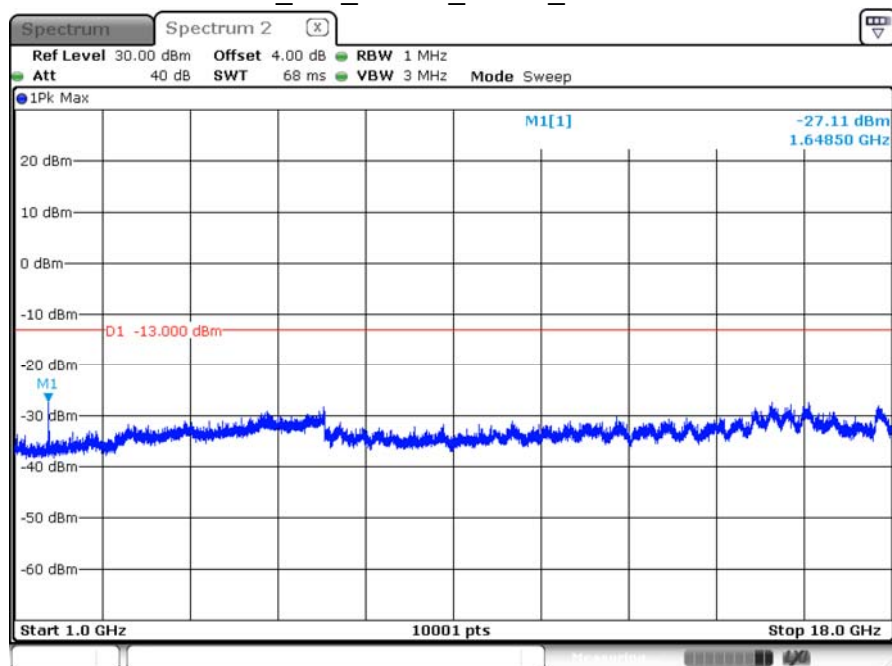
KDB 971168 D01 Power Meas License Digital Systems v03 sub-clause 5.8

ANSI C63.26: 2015 Sub-clause 5.5.3.2

6.4. Test Result

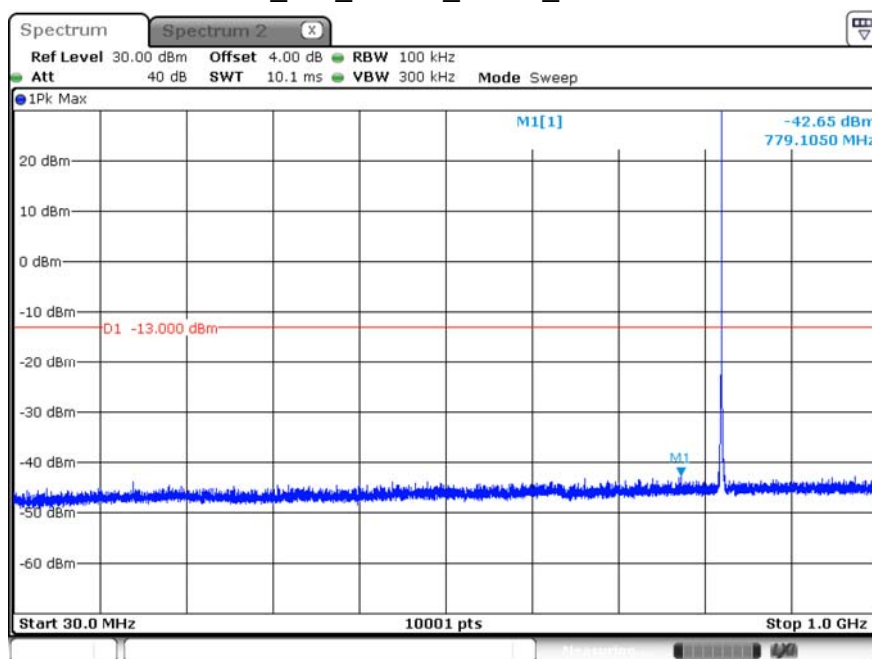
Product	Connectivity Module		
Test Item	Conducted Band Edge		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/01/07	Test Site	SR12-H
Temperature (°C)	16	Humidity (%RH)	58

GSM_850_CH128_GPRS_Above 1G



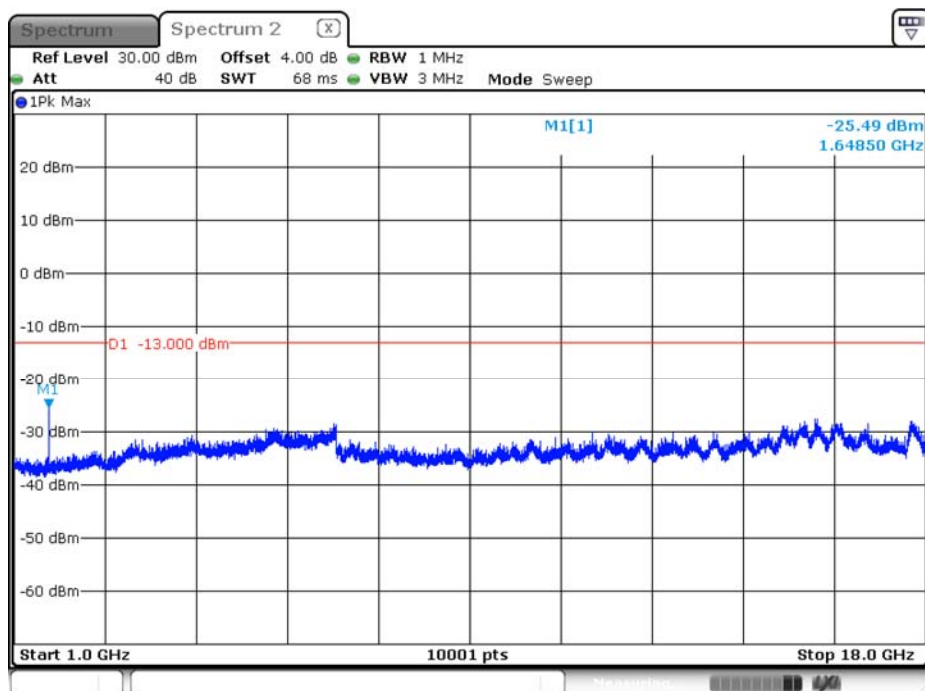
Date: 7.JAN.2021 09:45:15

GSM_850_CH128_GPRS_Below 1G



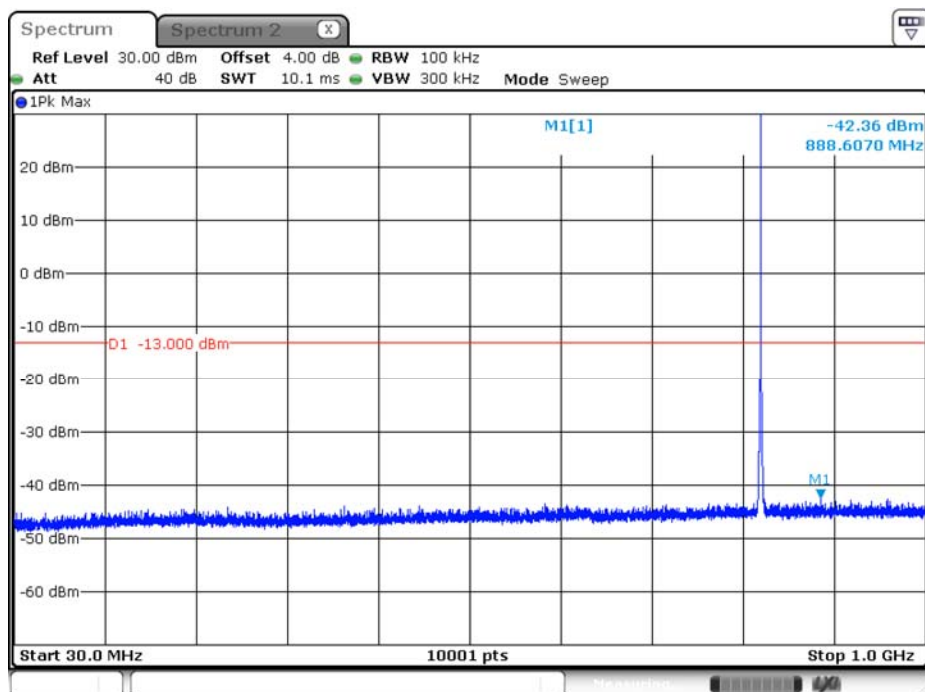
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GSM_850_CH128_EGPRS_Above 1G



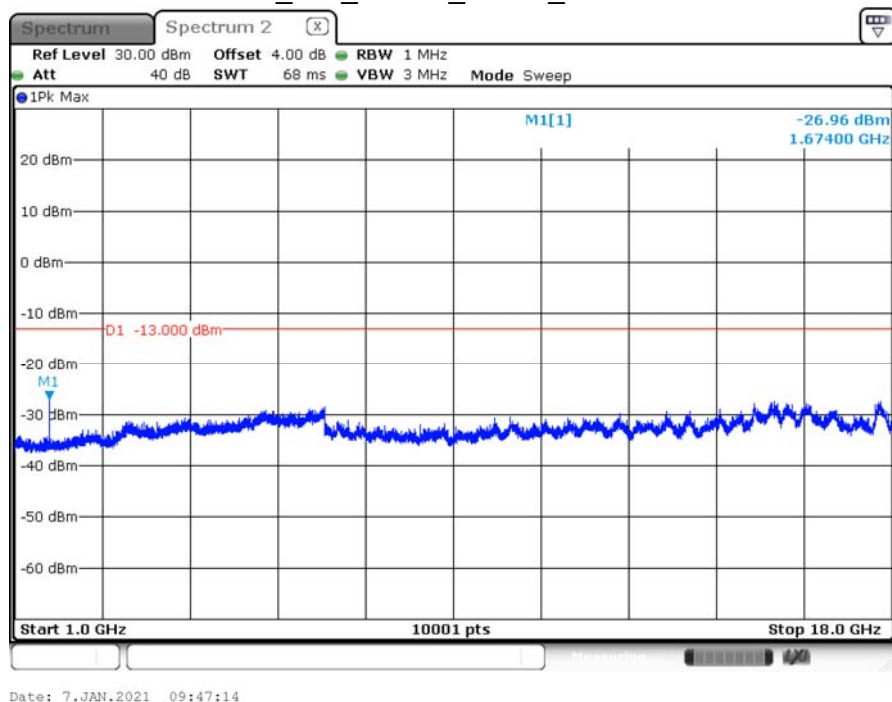
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GSM_850_CH128_EGPRS_Below 1G

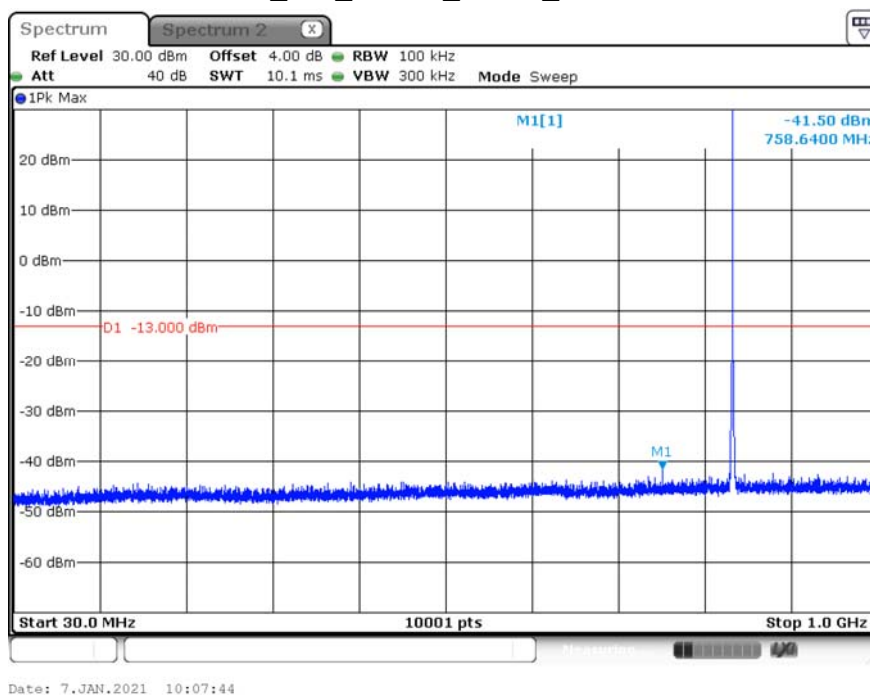


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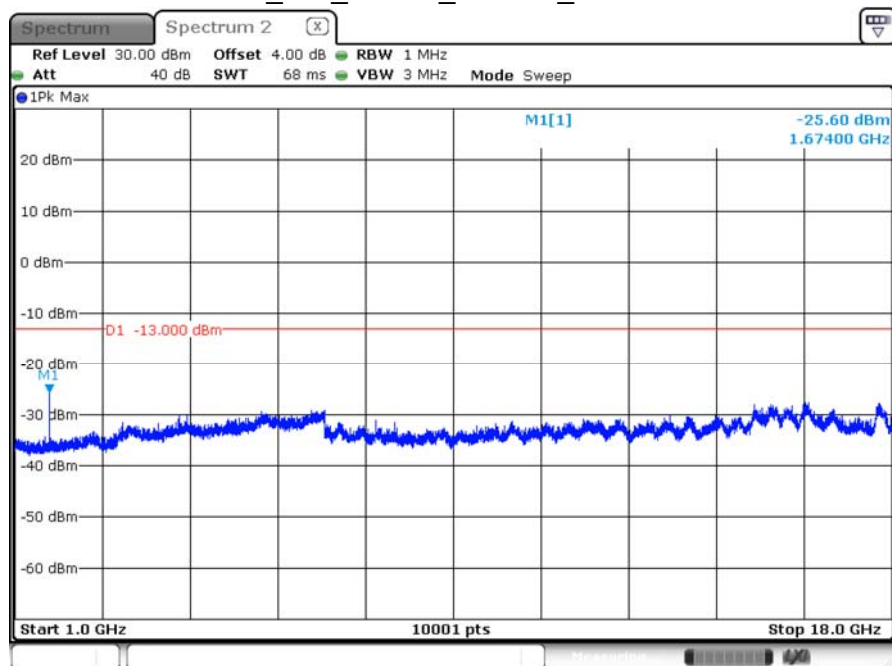
GSM_850_CH190_GPRS_Above 1G



GSM_850_CH190_GPRS_Below 1G

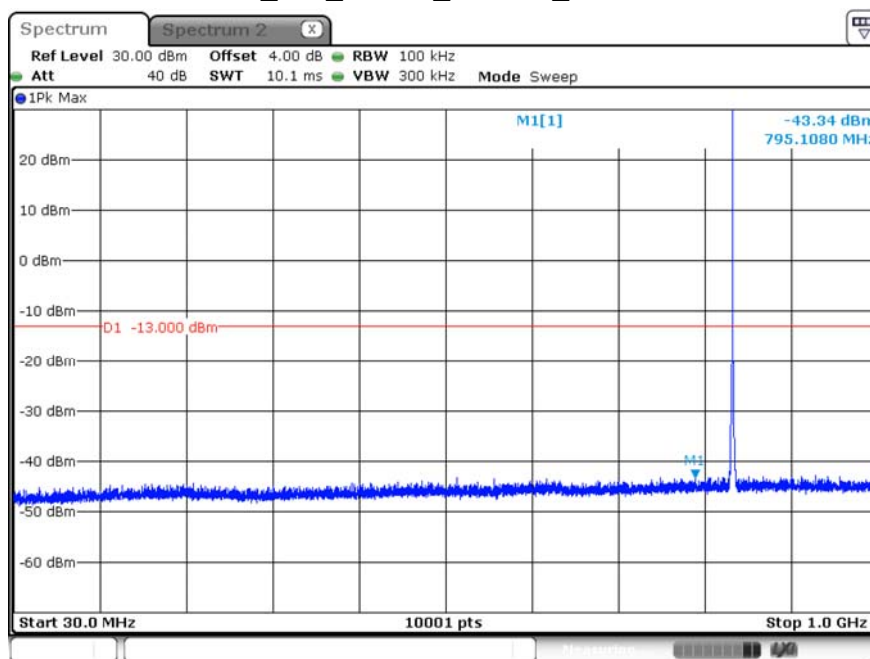


GSM_850_CH190_EGPRS_Above 1G



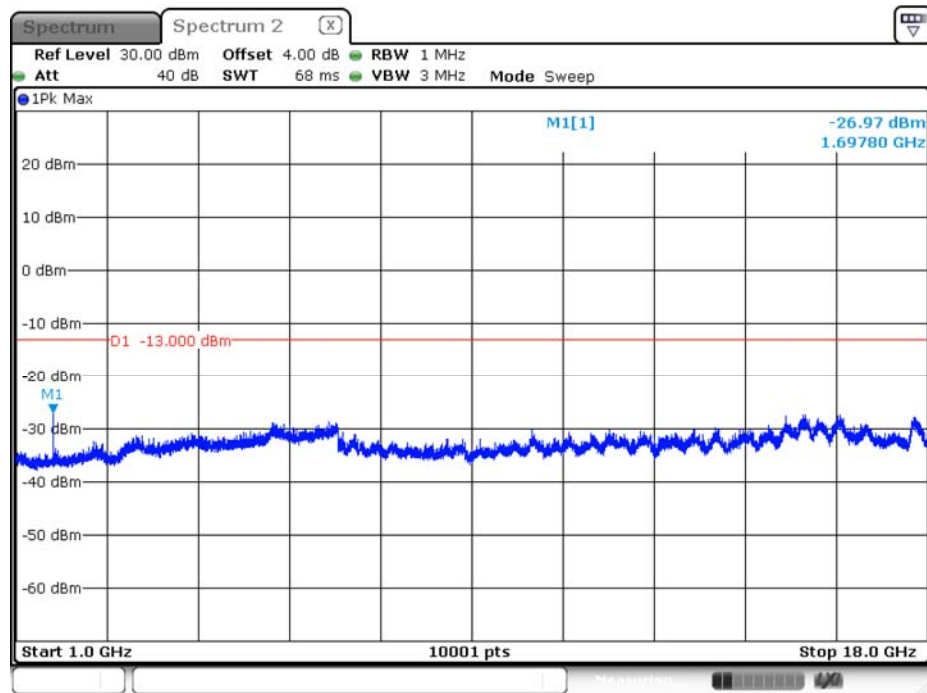
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GSM_850_CH190_EGPRS_Below 1G



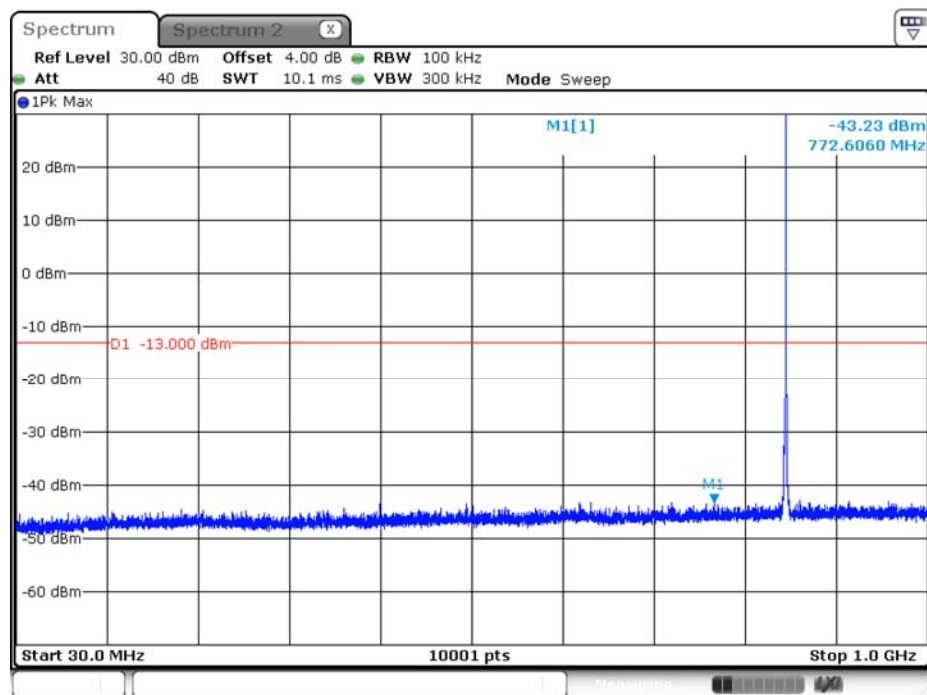
Date: 7.JAN.2021 10:11:53

GSM_850_CH251_GPRS_Above 1G



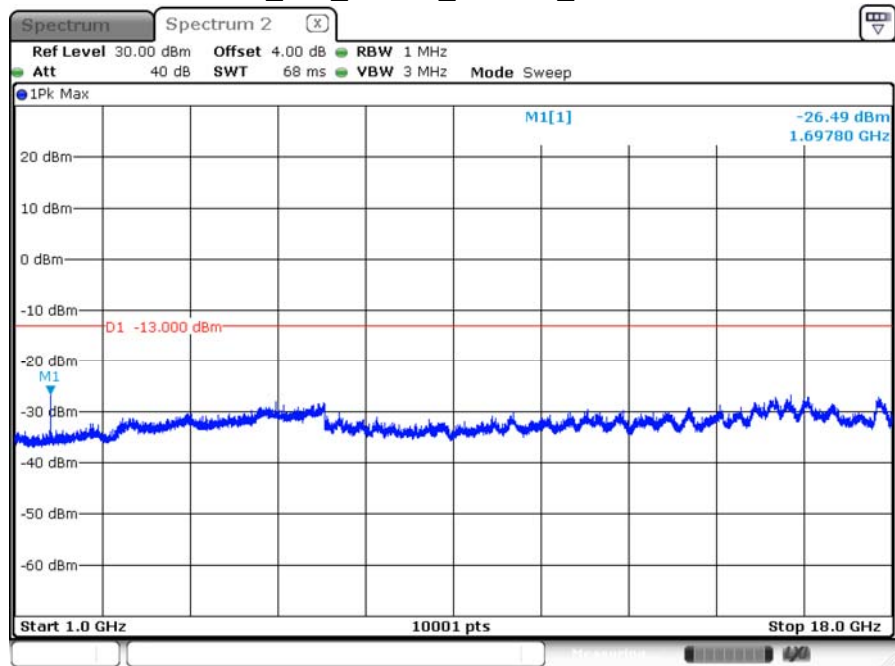
Date: 7.JAN.2021 09:51:19

GSM_850_CH251_GPRS_Below 1G



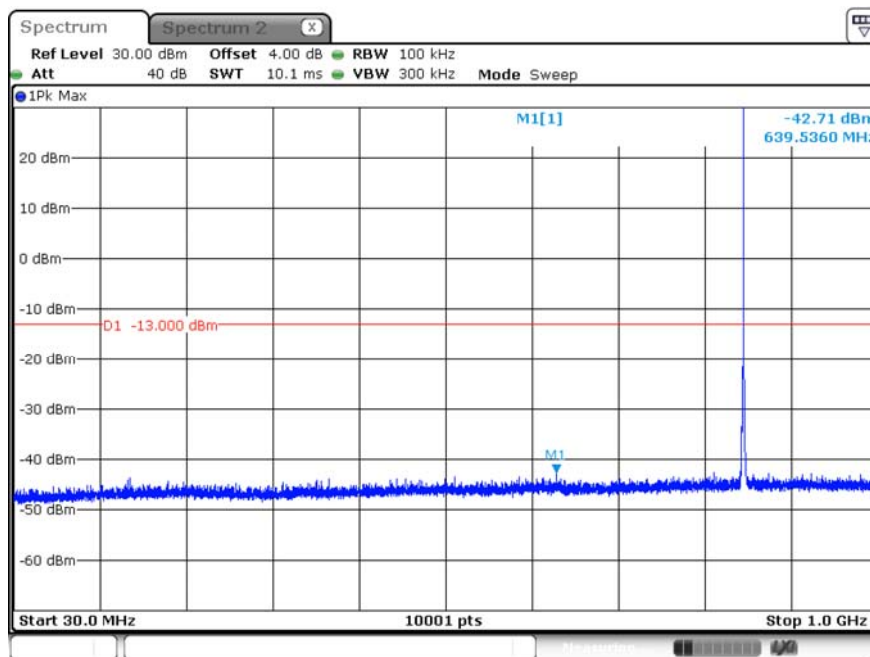
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GSM_850_CH251_EGPRS_Above 1G



Date: 7.JAN.2021 10:02:22

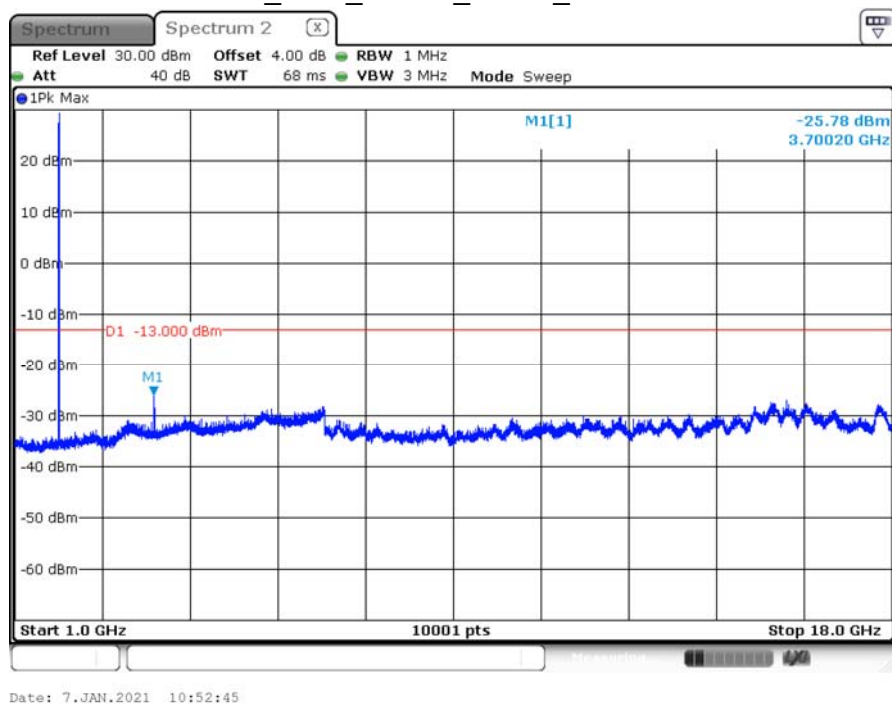
GSM_850_CH251_EGPRS_Below 1G



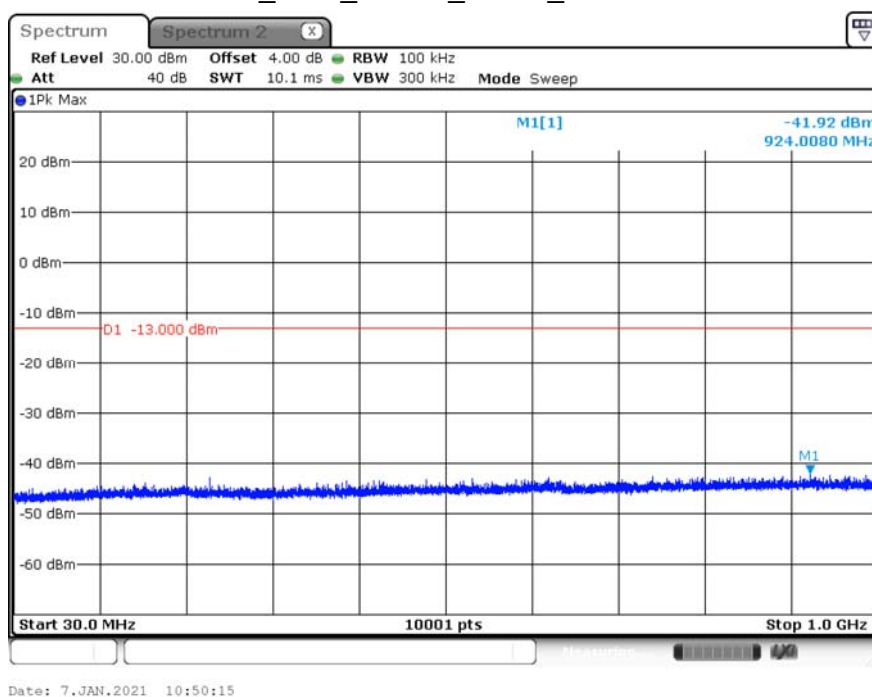
Date: 7.JAN.2021 10:05:14

Product	Connectivity Module		
Test Item	Conducted Band Edge		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/01/07	Test Site	SR12-H
Temperature (°C)	16	Humidity (%RH)	58

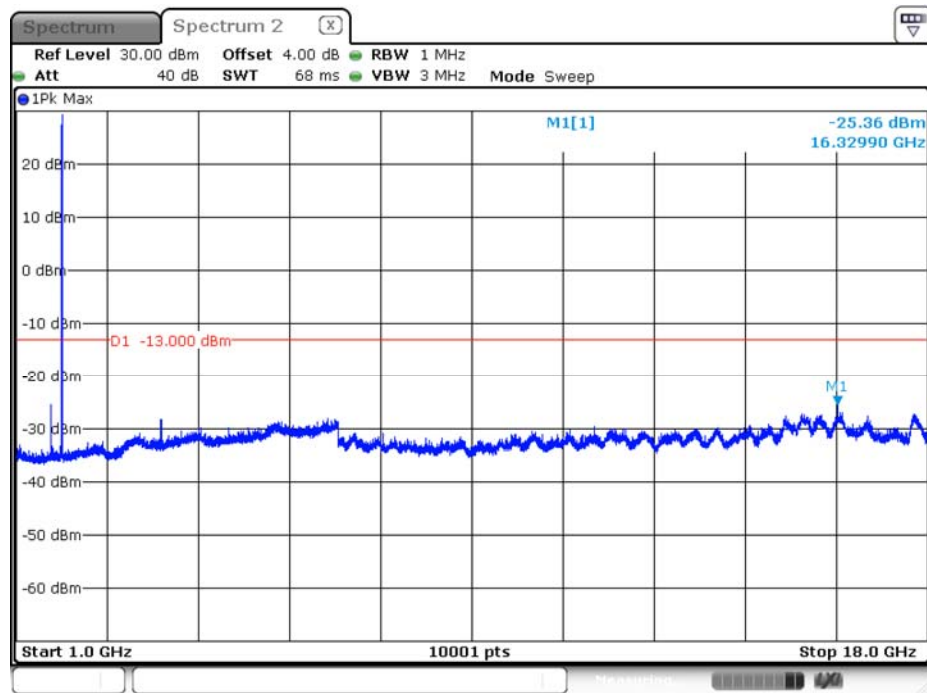
PCS_1900_CH512_GPRS_Above 1G



PCS_1900_CH512_GPRS_Below 1G

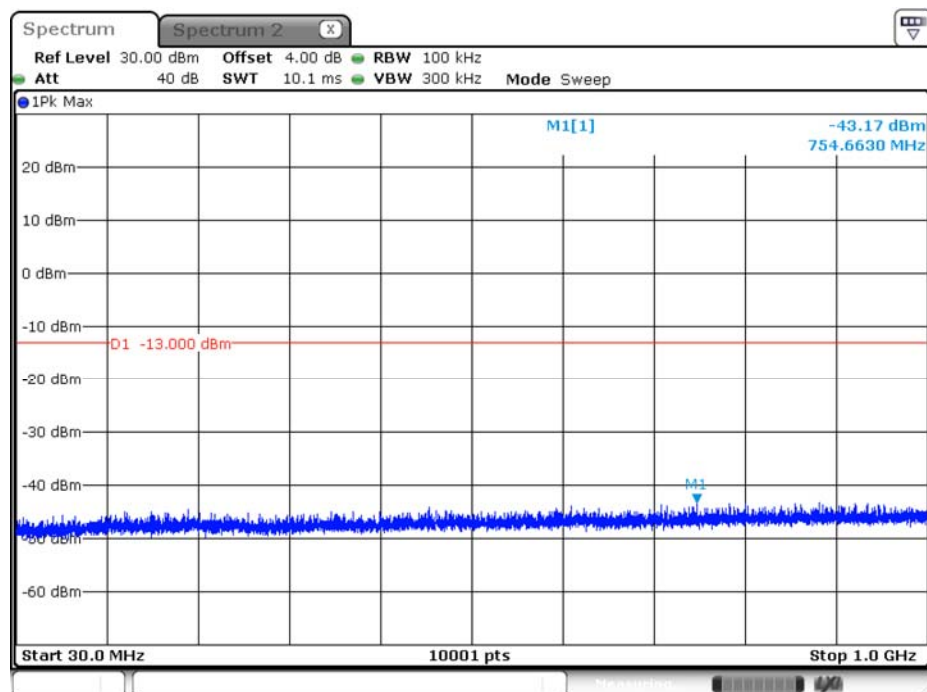


PCS_1900_CH512_EGPRS_Above 1G



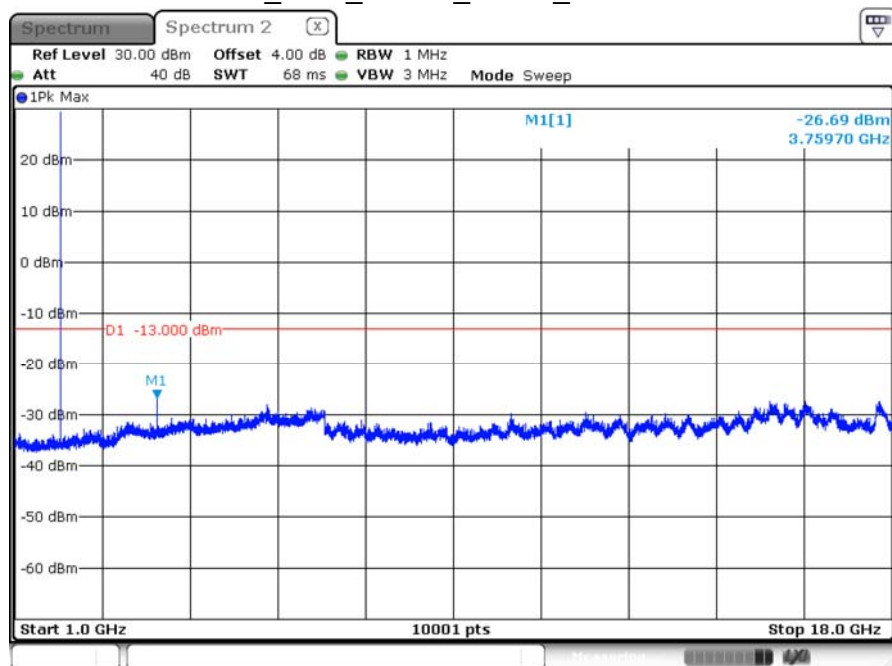
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PCS_1900_CH512_EGPRS_Below 1G



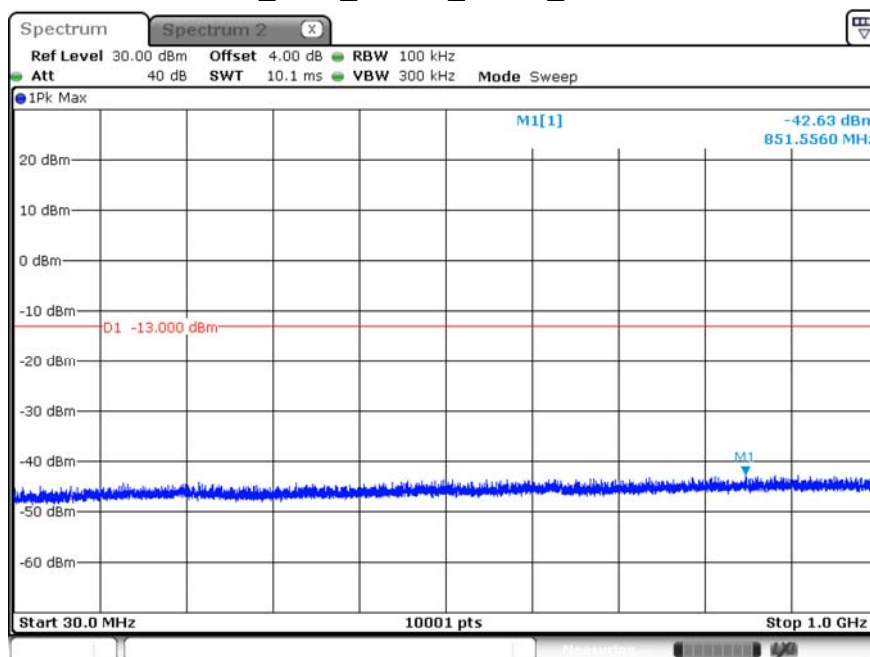
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PCS_1900_CH661_GPRS_Above 1G



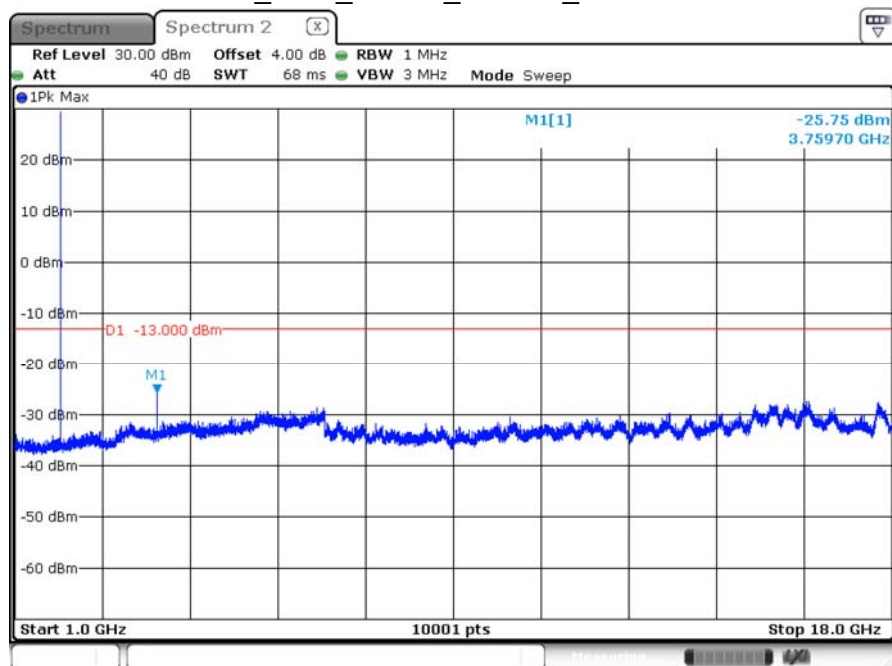
Date: 7.JAN.2021 10:32:37

PCS_1900_CH661_GPRS_Below 1G



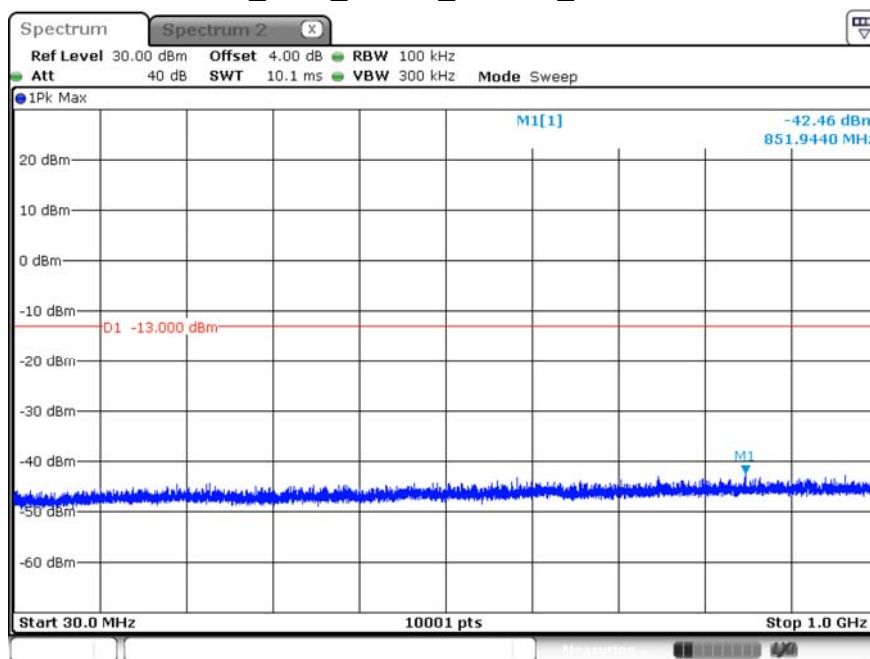
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PCS_1900_CH661_EGPRS_Above 1G



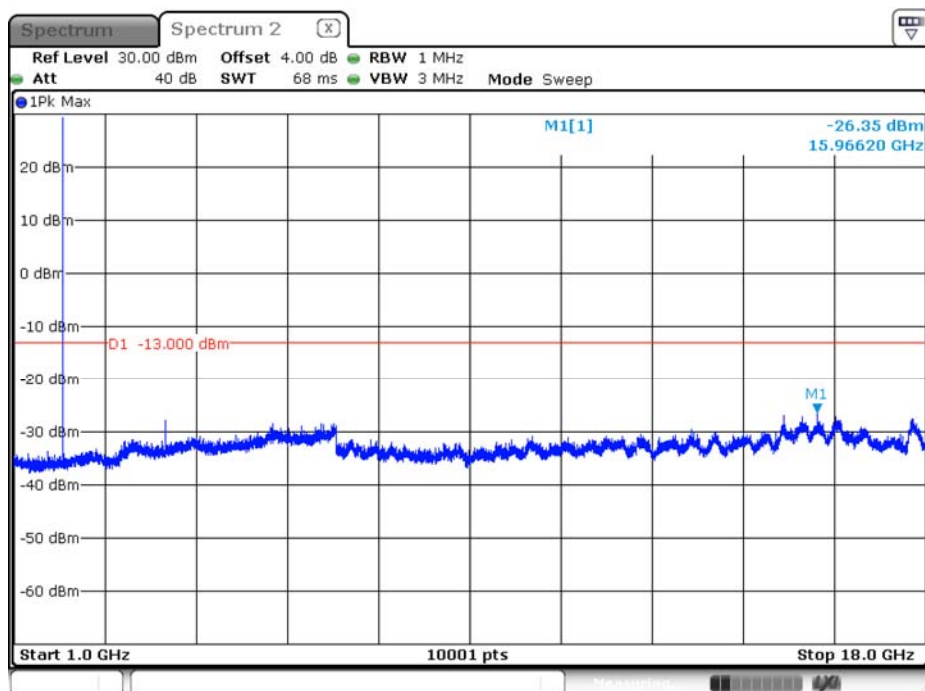
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PCS_1900_CH661_EGPRS_Below 1G



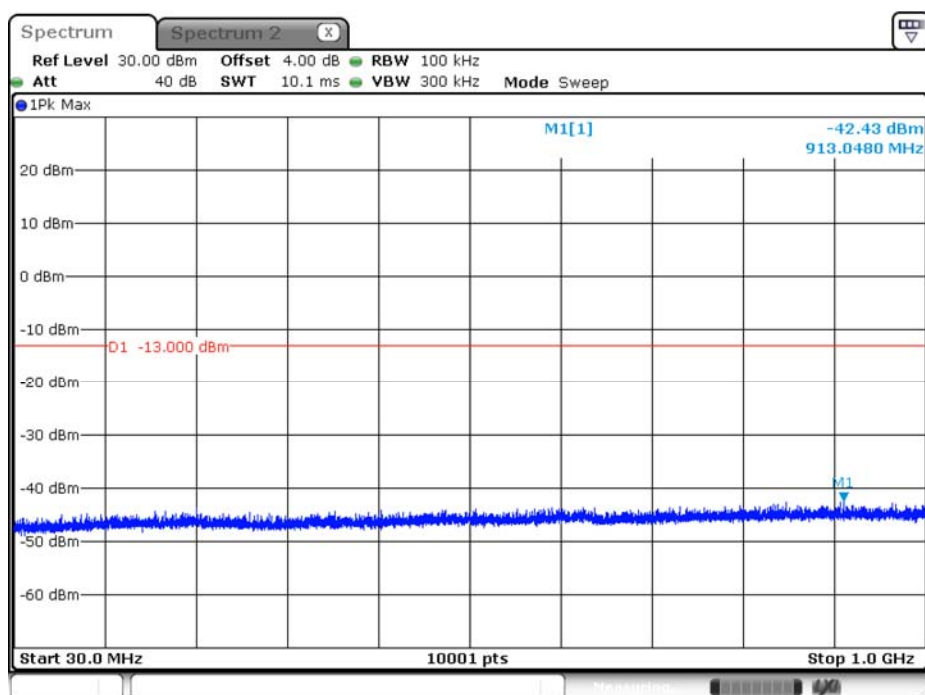
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PCS_1900_CH810_GPRS_Above 1G



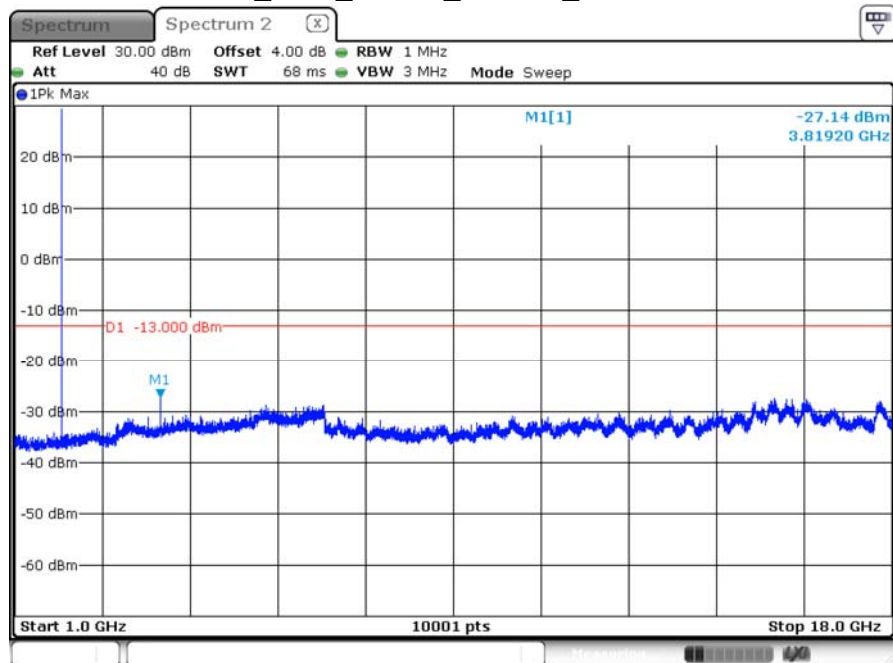
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PCS_1900_CH810_GPRS_Below 1G

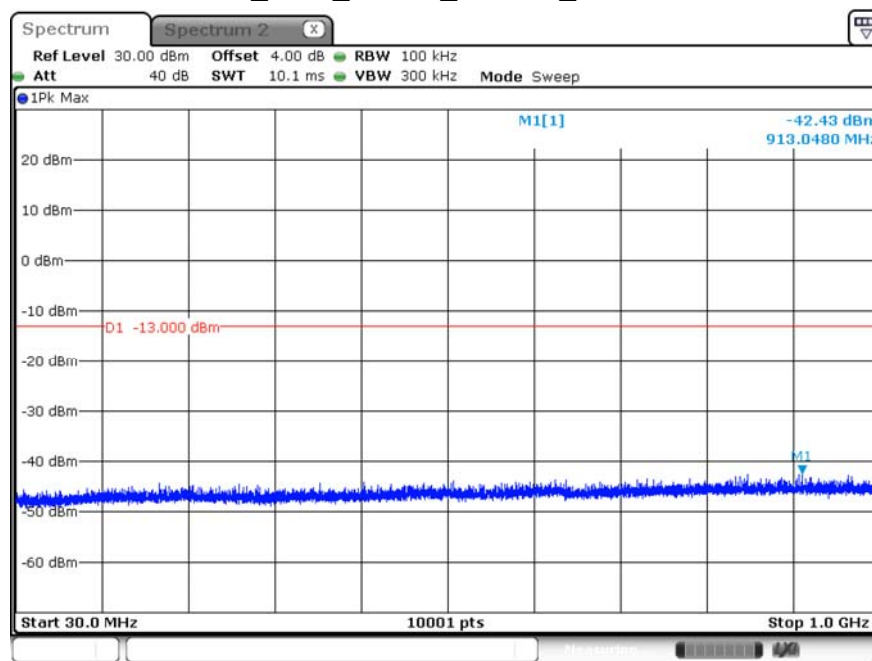


Date: 7.JAN.2021 10:29:07

PCS_1900_CH810_EGPRS_Above 1G



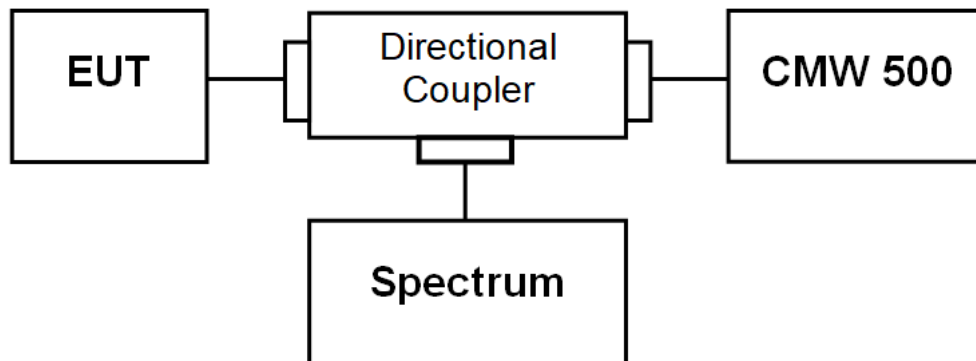
PCS_1900_CH810_EGPRS_Below 1G



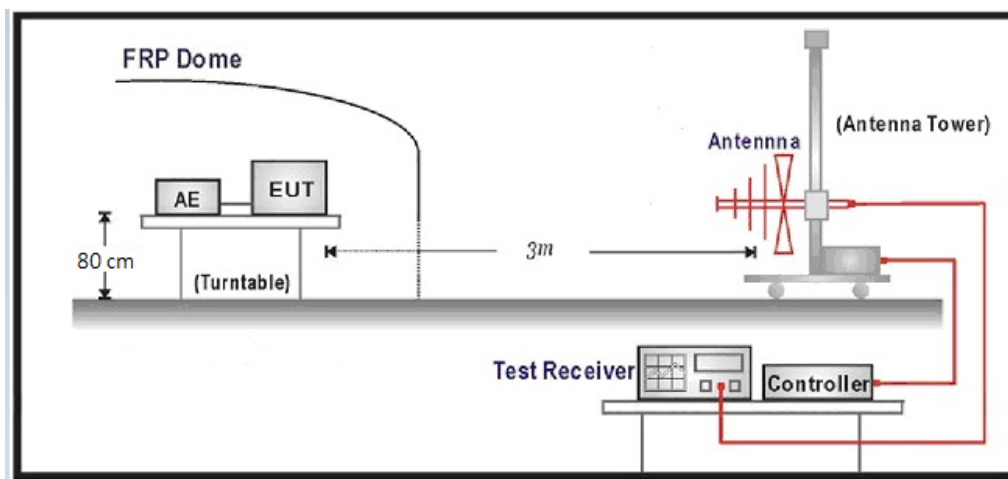
7. Spurious Emission

7.1. Test Setup

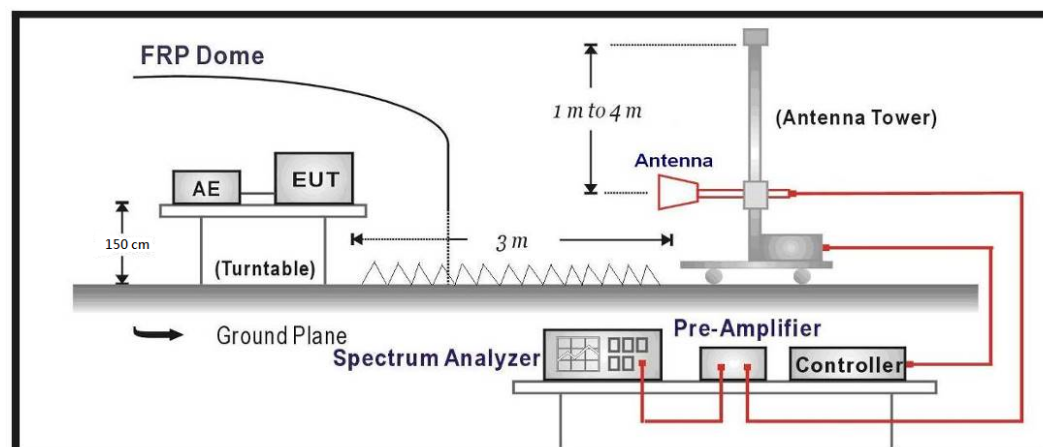
Conducted Spurious Measurement (below 1GHz)



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

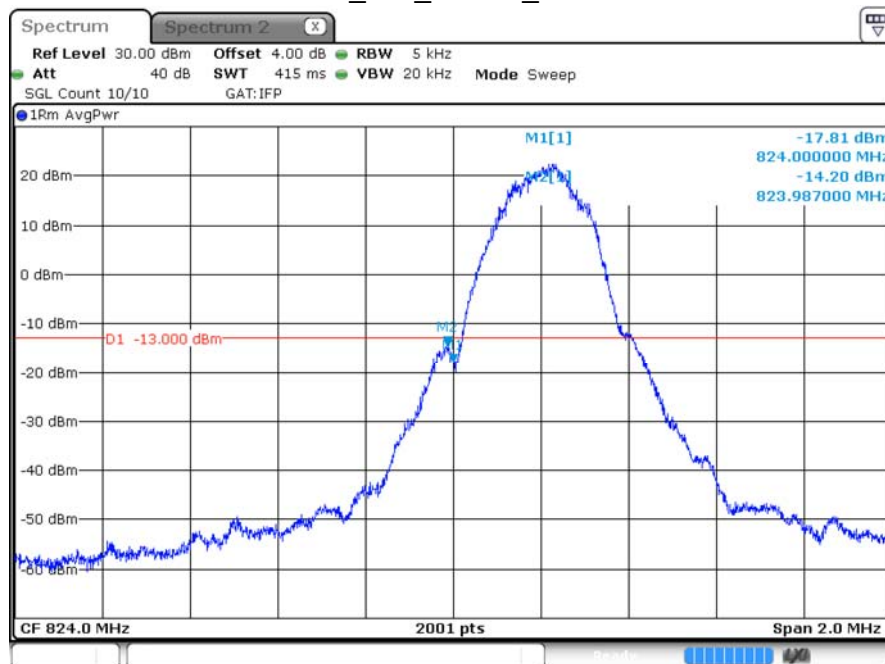
Radiated Spurious Measurement:

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

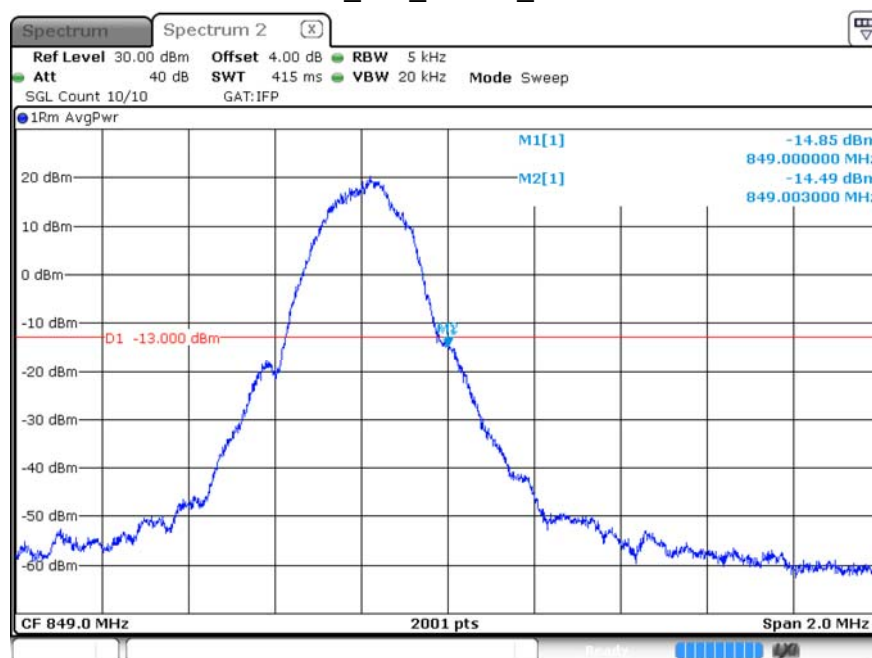
Product	Connectivity Module		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/01/06	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

GSM_850_CH128_GPRS



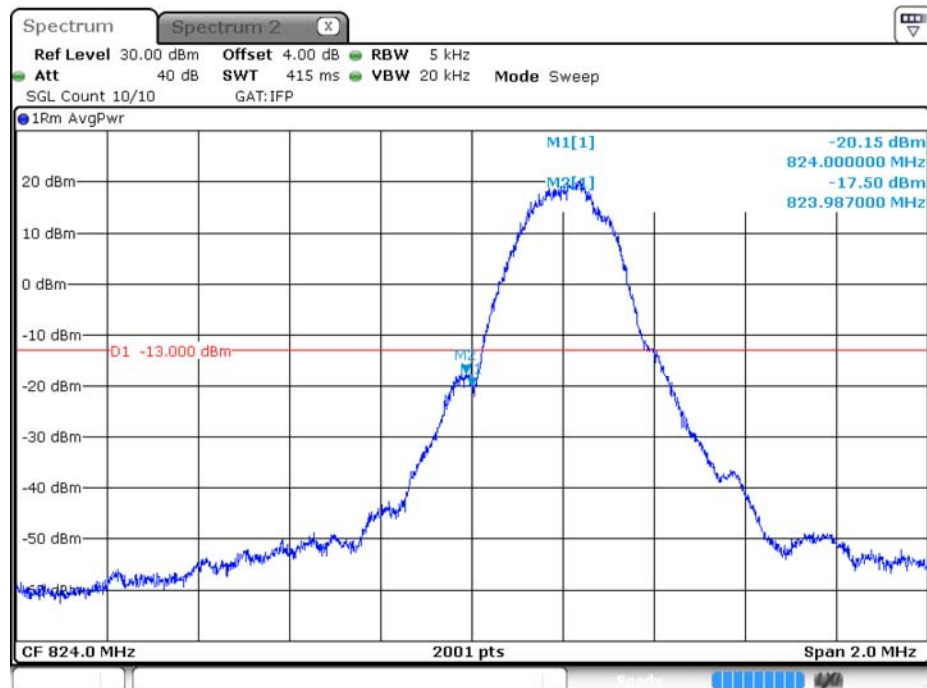
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GSM_850_CH251_GPRS



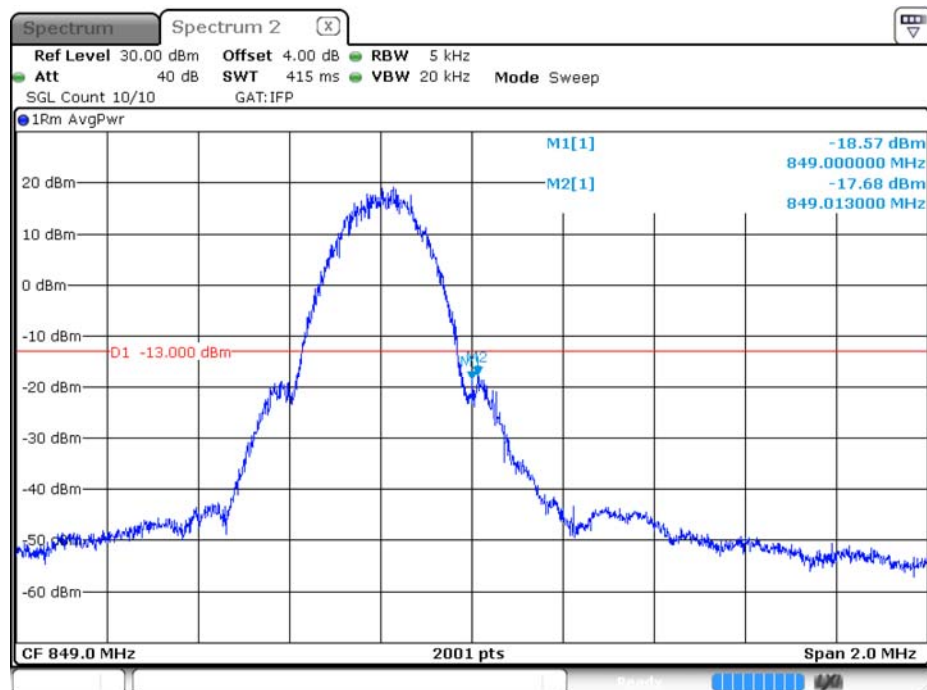
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GSM_850_CH128_EGPRS



Date: 6.JAN.2021 11:36:38

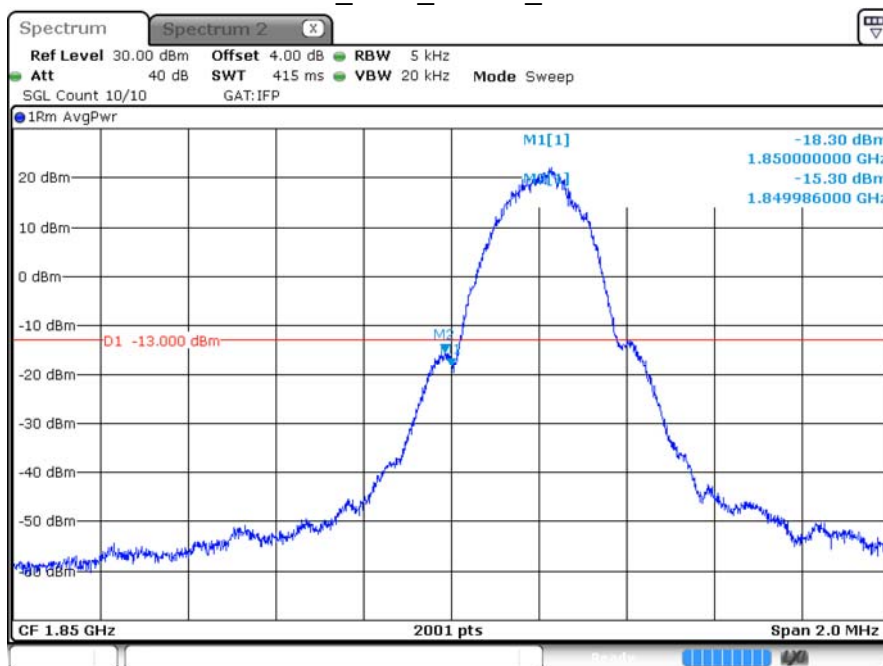
GSM_850_CH251_EGPRS



Date: 6.JAN.2021 11:24:44

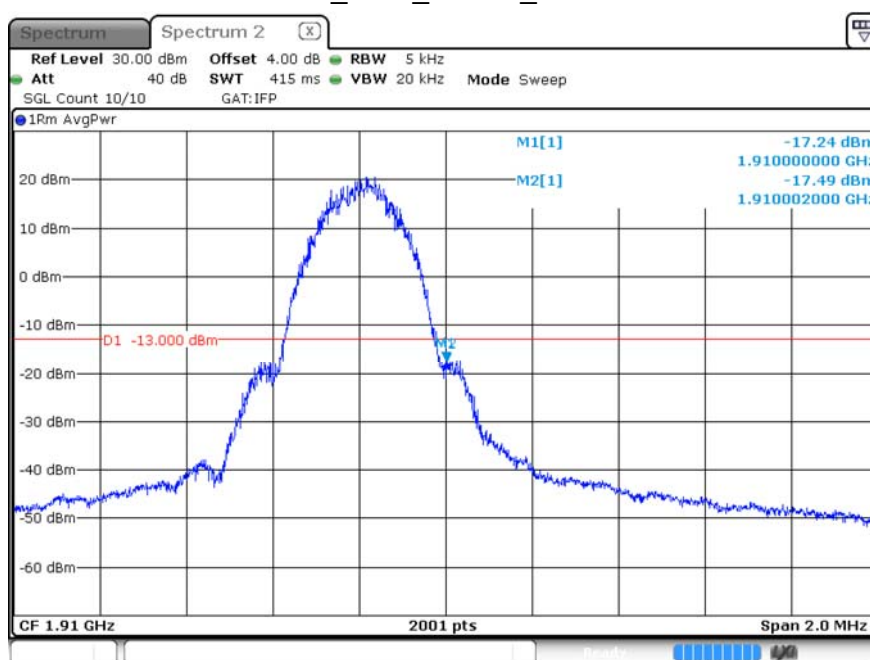
Product	Connectivity Module		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/01/06	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

PCS_1900_CH512_GPRS

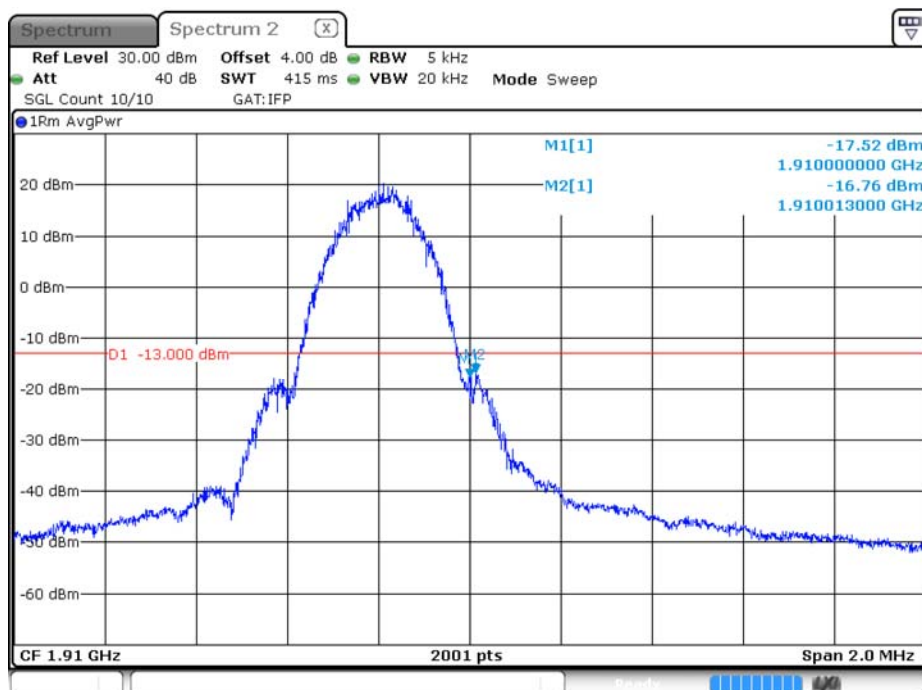
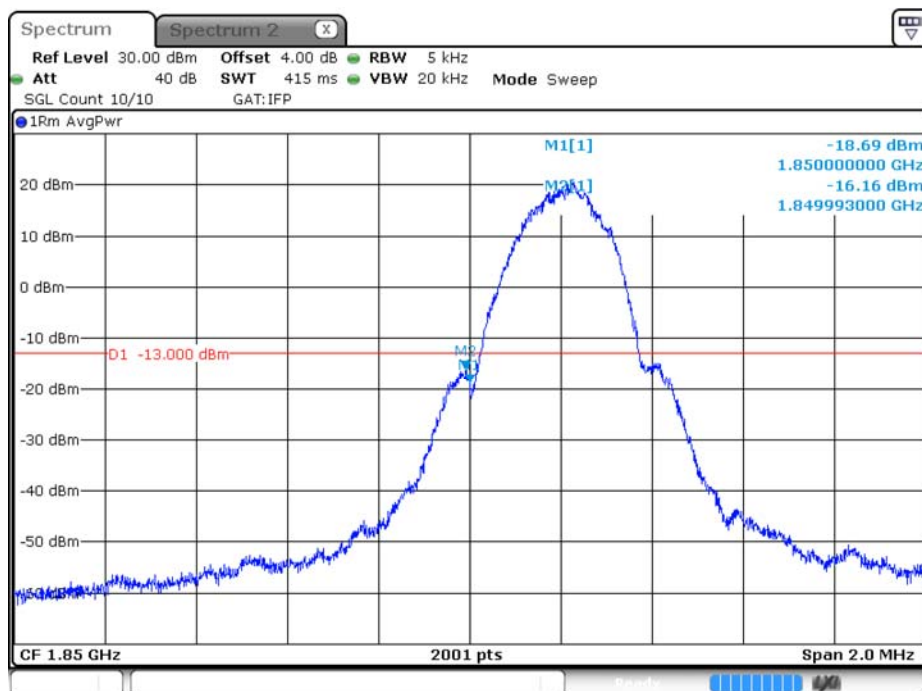


Date: 6 JAN 2021 14:37:13

PCS_1900_CH810_GPRS



Date: 6 JAN 2021 14:23:46



Product	Connectivity Module		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/05/03	Test Site	CB2-H
Temperature (°C)	20.6	Humidity (%RH)	52.3

GSM850_GPRS_Ch 128

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1648.400	-23.32	-13	-10.32	-29.62	9.29	2.99
V	1648.400	-35.30	-13	-22.30	-41.60	9.29	2.99

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

GSM850_GPRS_Ch 190

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1673.200	-28.63	-13	-15.63	-34.98	9.36	3.01
V	1673.200	-35.13	-13	-22.13	-41.48	9.36	3.01

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

GSM850_GPRS_Ch 251

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	1697.600	-30.19	-13	-17.19	-36.59	9.44	3.03
V	1697.600	-39.16	-13	-26.16	-45.56	9.44	3.03

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

Product	Connectivity Module		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/05/04	Test Site	CB2-H
Temperature (°C)	20.6	Humidity (%RH)	52.3

GPRS1900_ CH512_ GPRS_2G

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	3700.400	-31.76	-13	-18.76	-39.86	12.61	4.51
V	3700.400	-41.20	-13	-28.20	-49.30	12.61	4.51

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

GPRS1900_ CH661_ GPRS_2G

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	3760.000	-35.45	-13	-22.45	-43.52	12.60	4.54
V	3760.000	-41.62	-13	-28.62	-49.69	12.60	4.54

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

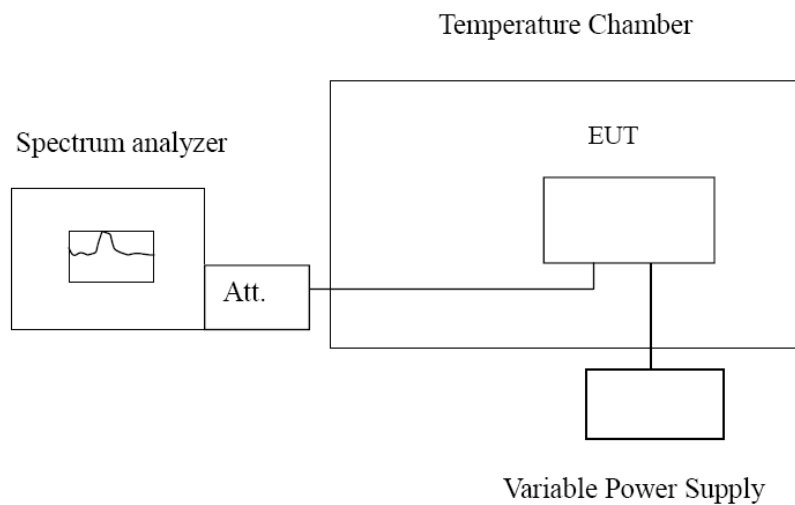
GPRS1900_ CH810_ GPRS_2G

Antenna Polarity	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)
H	3819.600	-33.70	-13	-20.70	-41.74	12.60	4.57
V	3819.600	-37.82	-13	-24.82	-45.86	12.60	4.57

Emission Level=SG(Signal Generator) Level+Antenna Gain-Cable Loss.

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	Connectivity Module		
Test Item	Frequency Stability		
Test Mode	Mode 1: GSM 850 Link		
Date of Test	2021/01/07	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

GSM 850_824.2 MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
52.8	3.34	0.0041
48.0	3.00	0.0036
43.2	2.17	0.0026

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-20	2.83	0.0034
-10	1.65	0.0020
0	2.83	0.0034
10	1.88	0.0023
20	2.35	0.0029
30	2.54	0.0031
40	2.71	0.0033
50	2.26	0.0027
60	2.93	0.0036

GSM 850 848.8 MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
52.8	3.12	0.0037
48.0	3.14	0.0037
43.2	2.62	0.0031

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-20	3.35	0.0039
-10	3.08	0.0036
0	2.81	0.0033
10	3.50	0.0041
20	1.77	0.0021
30	2.66	0.0031
40	2.48	0.0029
50	3.18	0.0037
60	3.14	0.0037

Product	Connectivity Module		
Test Item	Frequency Stability		
Test Mode	Mode 2: PCS1900 Link		
Date of Test	2021/01/07	Test Site	SR12-H
Temperature (°C)	25	Humidity (%RH)	64

PCS 1900_1850.2 MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
52.8	3.03	0.0016
48.0	3.45	0.0019
43.2	3.04	0.0016

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-20	3.35	0.0018
-10	3.43	0.0019
0	2.26	0.0012
10	3.29	0.0018
20	2.73	0.0015
30	2.59	0.0014
40	2.83	0.0015
50	3.70	0.0020
60	2.92	0.0016

PCS 1900_1909.8 MHz

Voltage

Voltage (VAC)	Frequency Error(Hz)	Frequency Error(ppm)
52.8	4.68	0.0025
48.0	4.12	0.0022
43.2	3.79	0.0020

Temperature

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-20	3.68	0.0019
-10	3.81	0.0020
0	3.69	0.0019
10	3.38	0.0018
20	4.03	0.0021
30	2.60	0.0014
40	2.72	0.0014
50	3.56	0.0019
60	4.00	0.0021