

# TEST REPORT

Reference No..... : WTX21X03015086W-1  
FCC ID ..... : 2AMLF-WETRACK2  
Applicant ..... : Shenzhen Jimi IOT Co., Ltd  
Address..... : 4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road, No.67 Xin'an Street, Bao'an District, Shenzhen, China  
Product Name ..... : Vehicle GPS Tracker  
Test Model. .... : Wetrack2  
Standards ..... : FCC Part 22H, FCC Part 24E  
Date of Receipt sample .... : Mar.03, 2021  
Date of Test..... : Mar.03, 2021 to Mar.11, 2021  
Date of Issue ..... : Mar.11, 2021  
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

**Waltek Testing Group (Shenzhen) Co., Ltd.**

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,  
Block 70 Bao'an District, Shenzhen, Guangdong, China

Tel.: +86-755-33663308

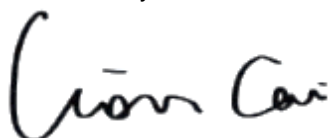
Fax.: +86-755-33663309

Tested by:



Jason Su / Project Engineer

Reviewed By:



Lion Cai / RF Manager

Approved & Authorized By:



Silin Chen / Manager

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**Report version**

Version No.	Date of issue	Description
Rev.00	Mar.11, 2021	Original
/	/	/

## 1. GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Shenzhen Jimi IOT Co., Ltd  
Address of applicant: 4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road,  
No.67 Xin'an Street, Bao'an District, Shenzhen, China

Manufacturer: Shenzhen Jimi IOT Co., Ltd  
Address of manufacturer: 4/F, Building C, Gaoxinqi Industrial Park, Liuxian 1st Road,  
No.67 Xin'an Street, Bao'an District, Shenzhen, China

General Description of EUT:	
Product Name:	Vehicle GPS Tracker
Trade Name:	JIMI
Model No.:	Wetrack2
Adding Model(s):	/
Rated Voltage:	DC3.7V
Battery Capacity	270mAh
Adapter Model:	/
Software Version:	/
Hardware Version:	/
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

<b>Technical Characteristics of EUT:</b>	
<b>2G</b>	
Support Networks:	GSM, GPRS
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS 850: 869~894MHz GSM/GPRS 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.43dBm, GSM1900: 29.21dBm
Type of Emission:	GSM850: 258KGXW, GSM1900: 257KGXW
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -3.0dBi; GSM1900: -1.8dBi
GPRS/EDGE Class:	Class 12

## 1.2 Test Standards

The tests were performed according to following standards:

**FCC Rules Part 2:** FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS.

**FCC Rules Part 22:** PRIVATE LAND MOBILE RADIO SERVICES.

**FCC Rules Part 24:** PUBLIC MOBILE SERVICES.

**TIA/EIA 603 E March 2016:** Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

**ANSI C63.26-2015:** American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

**KDB 971168 D01 Power Meas License Digital Systems v03r01:** MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with TIA/EIA 603 E/ KDB 971168/ ANSI C63.26. The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.4 Test Facility

### Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

### FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

### Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

## 1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GSM 850	Low, Middle, High Channels
TM2	GPRS 850	Low, Middle, High Channels
TM3	GSM 1900	Low, Middle, High Channels
TM4	GPRS 1900	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency(MHz)	Channel Number
GSM 850	GSM/GPRS	824.2	128
		836.6	190
		848.8	251
PCS 1900	GSM/GPRS	1850.2	512
		1880.0	661
		1909.8	810

Note: the transmitter has been tested on the communications mode of GSM, GPRS compliance test and record the worst case.

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.8	Unshielded	Without Core

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Battery	JIAD E	DC12X2	/

## 1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Conducted	$\pm 0.42\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$



**1.7 Test Equipment List and Details**

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2020-04-28	2021-04-27
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2020-04-28	2021-04-27
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2020-04-28	2021-04-27
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2020-04-28	2021-04-27
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2020-04-28	2021-04-27
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2020-04-28	2021-04-27
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2020-04-28	2021-04-27
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2020-04-28	2021-04-27
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2020-04-28	2021-04-27
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2020-04-28	2021-04-27
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2020-04-28	2021-04-27
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2020-04-28	2021-04-27
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2020-04-28	2021-04-27
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2020-04-28	2021-04-27
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2020-04-28	2021-04-27
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2020-04-28	2021-04-27
SEMT-1055	RF Limiter	ATTEN	AT-BSF-0820~0920	/	2020-04-28	2021-04-27
SEMT-1056	RF Limiter	ATTEN	AT-BSF-1710~1910	/	2020-04-28	2021-04-27
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2020-04-28	2021-04-27
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2020-03-17	2021-03-16
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2020-03-17	2021-03-16

SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2020-03-17	2021-03-16
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2020-03-17	2021-03-16
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16

<b>Software List</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Version</b>
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1

\*Remark: indicates software version used in the compliance certification testing

## 2. SUMMARY OF TEST RESULTS

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<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§22.913(a), §24.232(c)	RF Output Power	Compliant
§24.51	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§22.917(b), §24.238(b)	Emission Bandwidth	Compliant
§22.917(a), §24.238(a)	Spurious Emissions at Antenna Terminal	Compliant
§22.917(a), §24.238(a)	Spurious Radiation Emissions	Compliant
§22.917(a), §24.238(a)	Out of Band Emissions	Compliant
§22.355, §24.235	Frequency Stability	Compliant
§2.1047	Modulation characteristics	Compliant

### 3. RF Output Power

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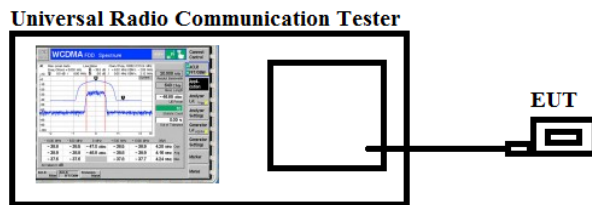
#### 3.1 Standard Applicable

According to §22.913(a)(2), the ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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

#### 3.2 Test Procedure

- Conducted output power test method:



- Radiated power test method:

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

#### 3.3 Summary of Test Results/Plots

➤ **Max. Radiated Power**

Mode	Channel	Antenna Polar	ERP (dBm)	Limit (dBm)	Result
GSM850	128	V	29.02	<38.45	Pass
		H	24.13		
	190	V	29.54		
		H	25.11		
	251	V	28.46		
		H	23.81		
GPRS850	128	V	28.46	<38.45	Pass
		H	23.24		
	190	V	28.95		
		H	23.21		
	251	V	28.74		
		H	23.69		

Mode	Channel	Antenna Polar	EIRP (dBm)	Limit (dBm)	Result
PCS1900	512	V	26.87	<33.00	Pass
		H	21.45		
	661	V	26.32		
		H	22.02		
	810	V	26.74		
		H	21.31		
GPRS1900	512	V	26.53	<33.00	Pass
		H	21.52		
	661	V	26.39		
		H	21.41		
	810	V	26.46		
		H	21.03		

➤ **Max. Conducted Power (Average power)**

Please refer to Appendix A

## 4. Peak-to-average Ratio (PAR) of Transmitter

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### 4.1 Standard Applicable

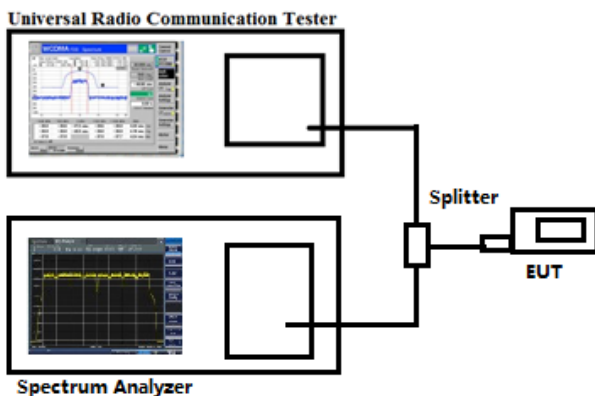
According to §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in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

### 4.2 Test Procedure

According with KDB 971168

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Configuration for the emission bandwidth testing:



### 4.3 Summary of Test Results

Please refer to Appendix B.

## 5. Emission Bandwidth

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### 5.1 Standard Applicable

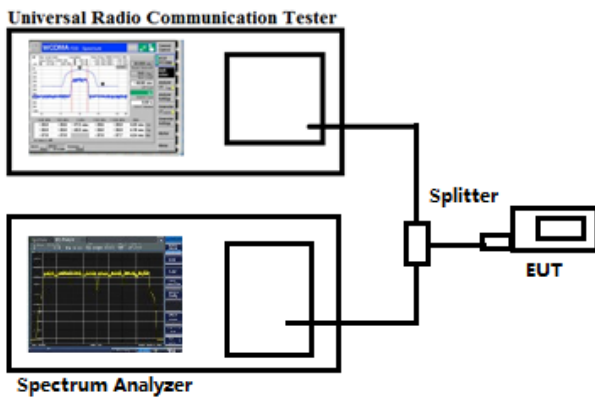
According to §22.917(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 5.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



### 5.3 Summary of Test Results/Plots

Please refer to Appendix C

## 6. Out of Band Emissions at Antenna Terminal

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### 6.1 Standard Applicable

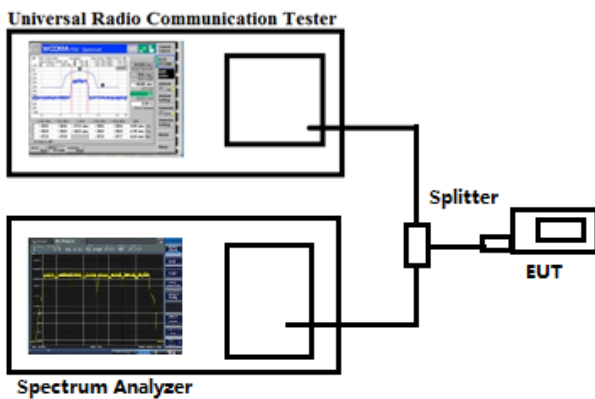
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### 6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to  $10^{\text{th}}$  harmonic.

Test Configuration for the out of band emissions testing:



### 6.3 Summary of Test Results/Plots

Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

Please refer to Appendix D



## 7. Spurious Radiated Emissions

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### 7.1 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

### 7.2 Test Procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

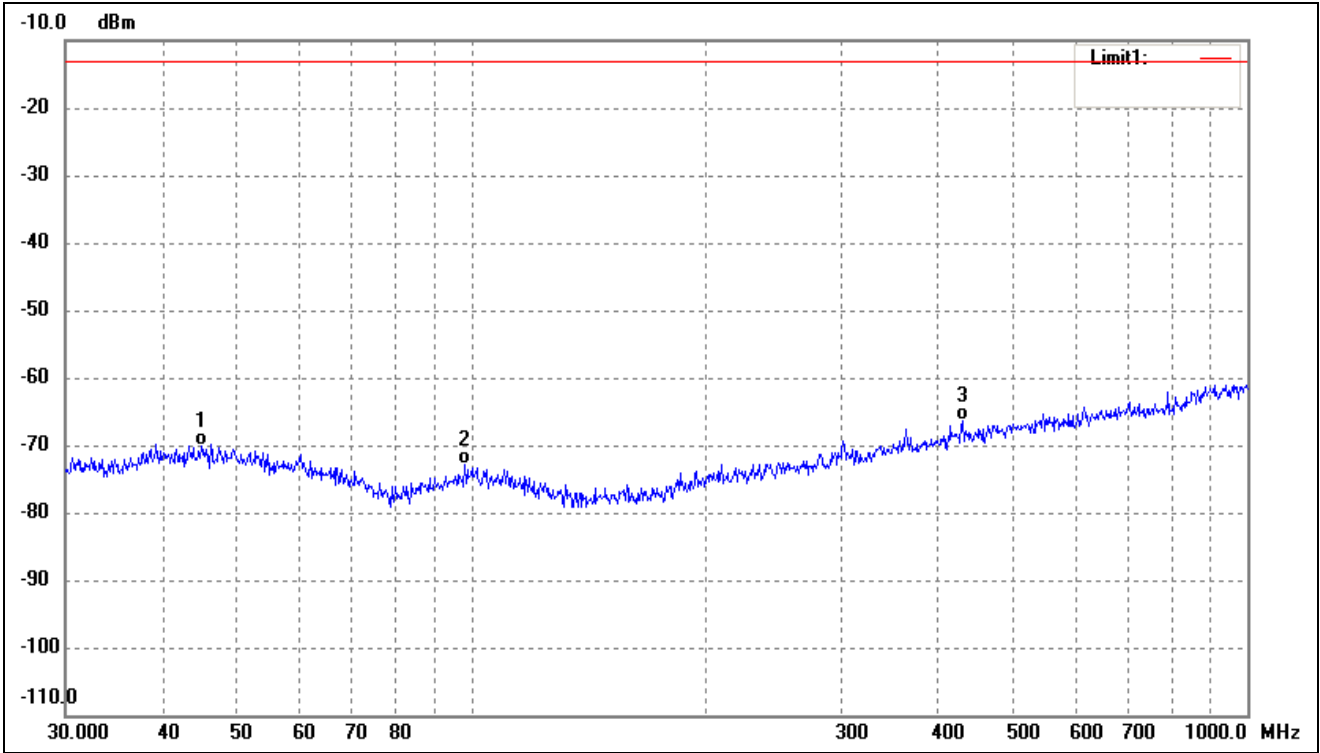
Spurious attenuation limit in dB =  $43 + 10 \log_{10}$  (power out in Watts)

### 7.3 Summary of Test Results/Plots

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

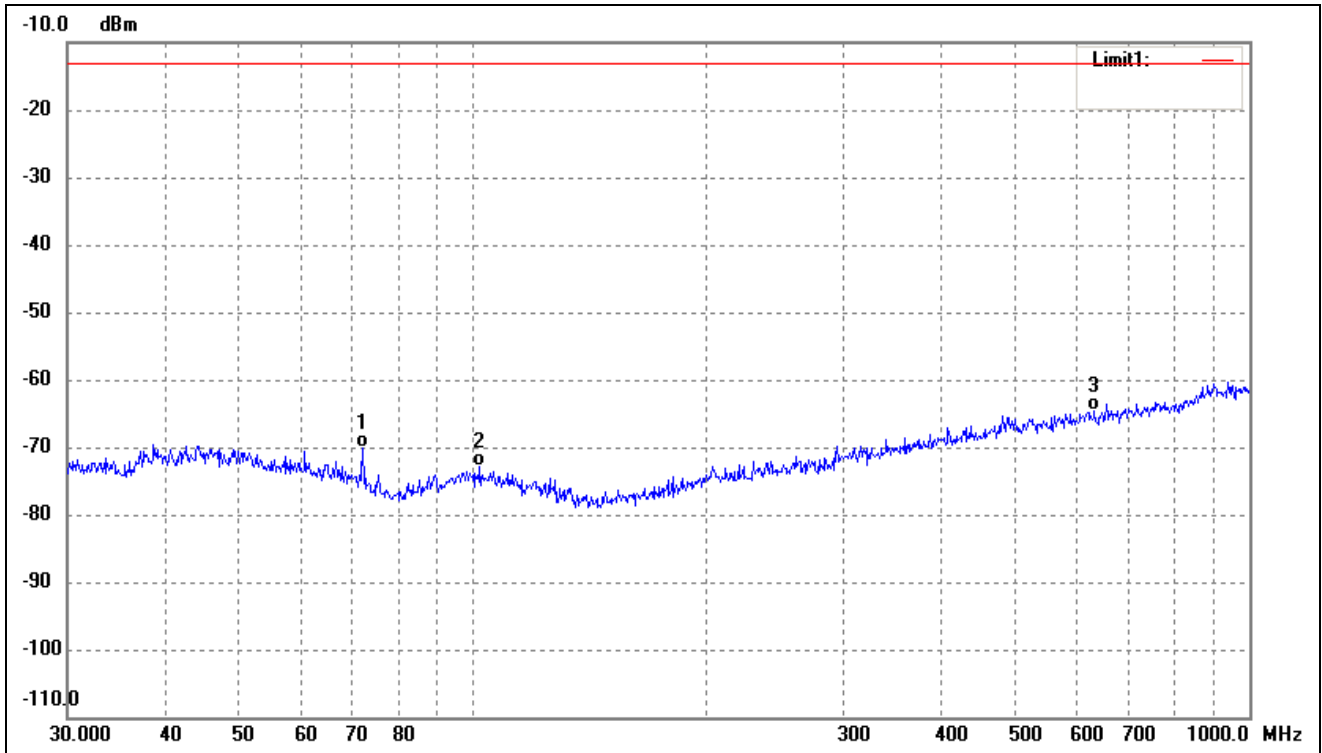
➤ Spurious Emissions Below 1GHz

For Cellular Band			
Test Channel	GSM850	Polarity:	Horizontal



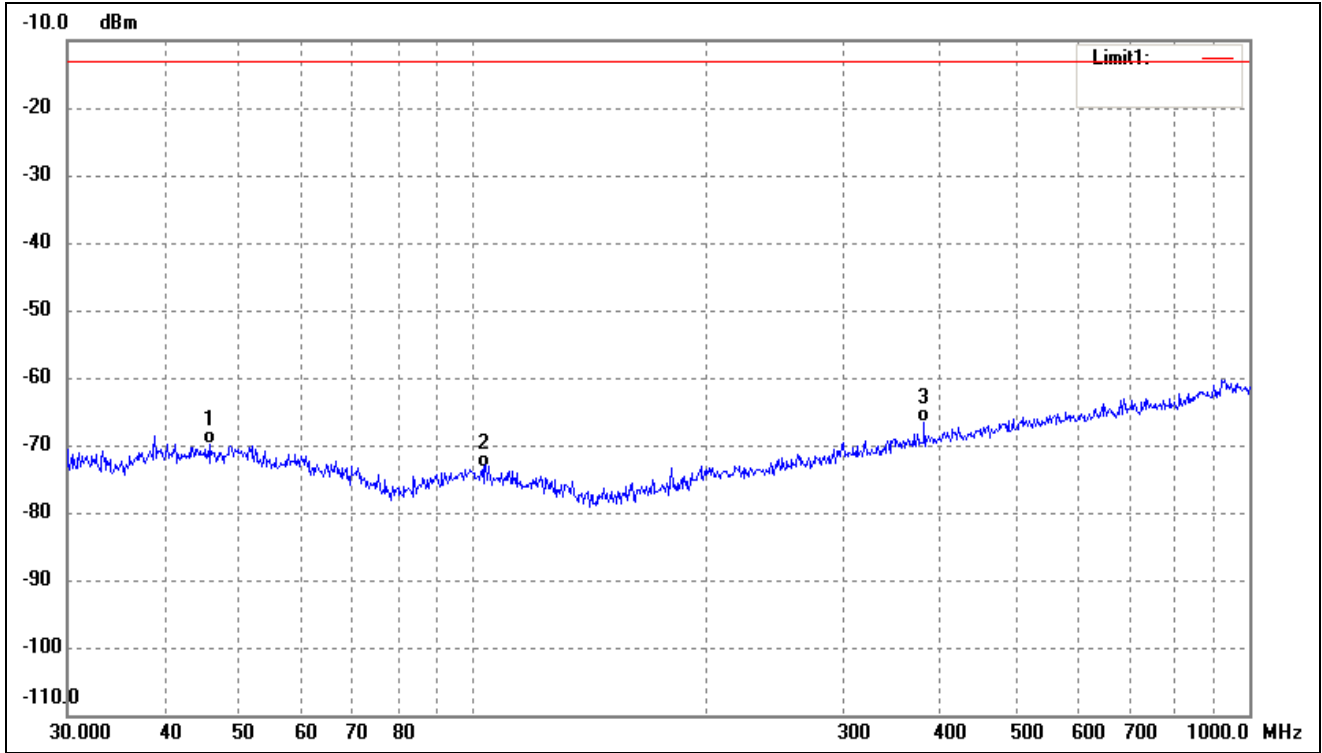
No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	44.9006	-70.08	0.00	-70.08	-13.00	-57.08	-	-	QP
2	98.1419	-70.95	-1.82	-72.77	-13.00	-59.77	-	-	QP
3	429.5228	-72.33	5.97	-66.36	-13.00	-53.36	-	-	QP

For Cellular Band			
Test Channel	GSM850	Polarity:	Vertical



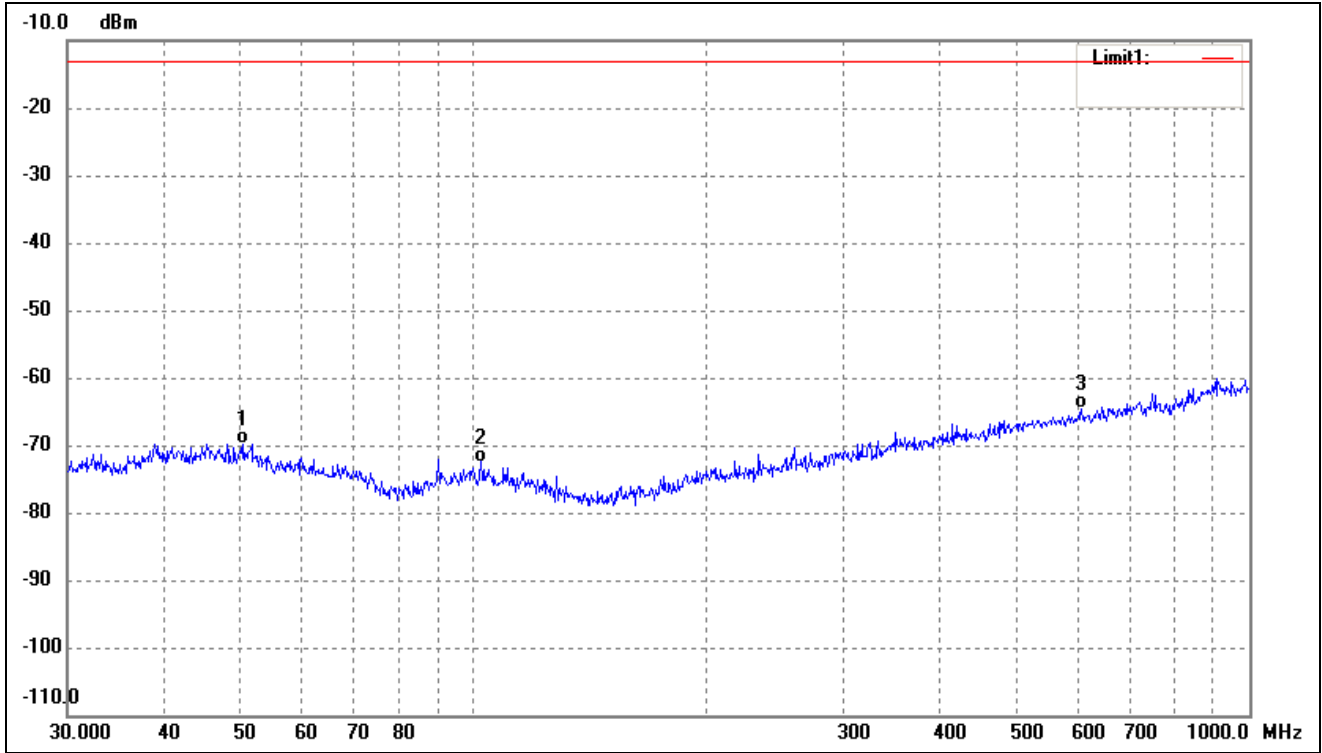
No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	72.0843	-66.75	-3.42	-70.17	-13.00	-57.17	-	-	QP
2	102.0014	-71.43	-1.52	-72.95	-13.00	-59.95	-	-	QP
3	631.6884	-74.20	9.59	-64.61	-13.00	-51.61	-	-	QP

For Cellular Band			
Test Channel	GSM1900	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	45.8553	-69.90	0.05	-69.85	-13.00	-56.85	-	-	QP
2	103.4421	-71.79	-1.51	-73.30	-13.00	-60.30	-	-	QP
3	381.2487	-71.32	4.79	-66.53	-13.00	-53.53	-	-	QP

For Cellular Band			
Test Channel	GSM1900	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.5860	-69.88	0.11	-69.77	-13.00	-56.77	-	-	QP
2	102.3597	-70.99	-1.51	-72.50	-13.00	-59.50	-	-	QP
3	607.7867	-74.53	9.80	-64.73	-13.00	-51.73	-	-	QP

Note:  $Margin = (Reading + Correct) - Limit$

Remark: '-' Means the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

- Spurious Emissions Above 1GHz
- For Cellular Band\_GSM850 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (824.2MHz)						
1648.4	-35.24	4.94	-30.3	-13	-17.30	H
2472.6	-41.28	8.46	-32.82	-13	-19.82	H
1648.4	-36.75	4.94	-31.81	-13	-18.81	V
2472.6	-42.89	8.46	-34.43	-13	-21.43	V
Middle Channel (836.6MHz)						
1673.2	-37.07	5.11	-31.96	-13	-18.96	H
2509.8	-41.06	8.54	-32.52	-13	-19.52	H
1673.2	-36.72	5.11	-31.61	-13	-18.61	V
2509.8	-42.5	8.54	-33.96	-13	-20.96	V
High Channel (848.8MHz)						
1697.6	-35.91	5.25	-30.66	-13	-17.66	H
2546.4	-43.17	8.57	-34.6	-13	-21.60	H
1697.6	-37.64	5.25	-32.39	-13	-19.39	V
2546.4	-42.88	8.57	-34.31	-13	-21.31	V

- For PCS Band\_GSM1900 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1850.2MHz)						
3700.4	-42.1	10.54	-31.56	-13	-18.56	H
5550.6	-47.89	13.37	-34.52	-13	-21.52	H
3700.4	-41.45	10.54	-30.91	-13	-17.91	V
5550.6	-46.43	13.37	-33.06	-13	-20.06	V
Middle Channel (1880MHz)						
3760.0	-40.74	10.64	-30.1	-13	-17.1	H
5640.0	-47.29	13.54	-33.75	-13	-20.75	H
3760.0	-40.12	10.64	-29.48	-13	-16.48	V
5640.0	-48.62	13.54	-35.08	-13	-22.08	V
High Channel (1909.8MHz)						
3819.6	-42.18	10.74	-31.44	-13	-18.44	H
5729.4	-46.22	13.71	-32.51	-13	-19.51	H
3819.6	-39.27	10.74	-28.53	-13	-15.53	V
5729.4	-49.3	13.71	-35.59	-13	-22.59	V

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## **8. Frequency Stability**

---

### **8.1 Standard Applicable**

According to §22.355, §24.235 the limit is 2.5ppm.

### **8.2 Test Procedure**

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

### **8.3 Summary of Test Results/Plots**

**Please refer to Appendix E**

## 9. Modulation characteristics

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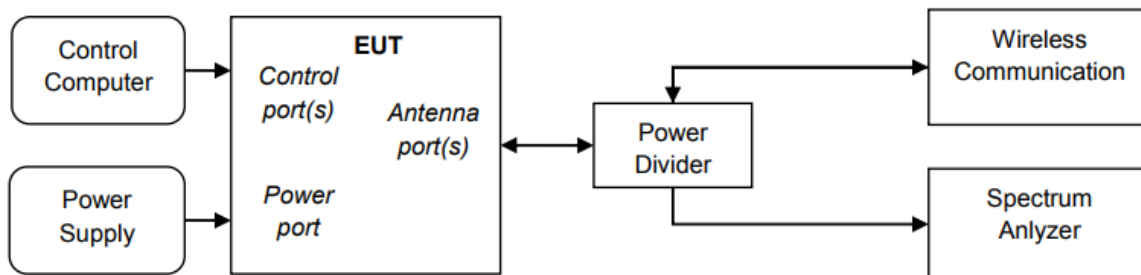
### 9.1 Standard Applicable

According to §2.1047, measurements required: Modulation characteristics is given below:

- (a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
- (b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
- (c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
- (d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

### 9.2 Test Procedure

According to ANSI C63.26-2015 section 5.3.2, the following test setup was performed.



### 9.3 Summary of Test Results/Plots

Only the worst case was selected to record

**Please refer to Appendix F**



**APPENDIX SUMMARY**

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Project No.	WTX21X03015086W	Test Engineer	Moon
Start date	2021/03/04	Finish date	2021/03/04
Temperature	23.5°C	Humidity	53%
RF specifications	GSM		

<b>APPENDIX</b>	<b>Description of Test Item</b>	<b>Result</b>
A	RF Output Power	Compliant
B	Peak-to-average Ratio (PAR) of Transmitter	Compliant
C	Emission Bandwidth	Compliant
D	Out of Band Emissions at Antenna Terminal	Compliant
E	Frequency Stability	Compliant
F	Modulation characteristics	Compliant

## APPENDIX A

---

### Conducted Average power

Conducted Average power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency(MHz)	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM	32.43	32.36	32.26	29.21	29.15	29.06
GPRS(1Slot)	32.28	32.22	32.14	29.21	29.19	29.09

## APPENDIX B

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### Peak-to-average Ratio (PAR) of Transmitter

PCS1900				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	661	1850.2	4.98	13
GPRS(1 Slot)	661	1850.2	5.02	13
EDGE(1 Slot)	661	1850.2	4.27	13

Note: Only the worst case was selected to record.

**APPENDIX C**

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GSM 850 (GMSK)	128	824.20	248.4120	311.820
	190	836.60	240.1638	313.726
	251	848.80	243.8770	310.077
GPRS850 (GMSK,1Slot)	128	824.20	241.1911	314.089
	190	836.60	253.0033	312.178
	251	848.80	258.1237	314.781
PCS1900 (GMSK)	512	1850.20	244.7276	313.890
	661	1880.00	257.4964	320.864
	810	1909.80	257.1018	317.423
GPRS1900 (GMSK,1Slot)	512	1850.20	241.1693	298.104
	661	1880.00	250.3442	323.897
	810	1909.80	250.8699	312.003

<p>GSM 850 (GMSK)-Low</p>	<p>Agilent R T</p> <p>Ch Freq 824.2 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>6.5</p> <p>dB</p> <p>Center 824.2 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 248.4120 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -2.353 kHz x dB Bandwidth 311.820 kHz</p> <p>Freq/Channel</p> <p>Center Freq 824.200000 MHz</p> <p>Start Freq 823.700000 MHz</p> <p>Stop Freq 824.700000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GSM 850 (GMSK)-Middle</p>	<p>Agilent R T</p> <p>Ch Freq 836.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>6.5</p> <p>dB</p> <p>Center 836.6 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 240.1638 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -1.086 kHz x dB Bandwidth 313.726 kHz</p> <p>Freq/Channel</p> <p>Center Freq 836.600000 MHz</p> <p>Start Freq 836.100000 MHz</p> <p>Stop Freq 837.100000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GSM 850 (GMSK)-High</p>	<p>Agilent R T</p> <p>Ch Freq 848.8 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>6.5</p> <p>dB</p> <p>Center 848.8 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 243.8770 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 1.705 kHz x dB Bandwidth 310.077 kHz</p> <p>Freq/Channel</p> <p>Center Freq 848.800000 MHz</p> <p>Start Freq 848.300000 MHz</p> <p>Stop Freq 849.300000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

<p>GPRS850 (GMSK,1Slot)-Low</p>	<p>Agilent R T</p> <p>Ch Freq 824.2 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 824.2 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 %</p> <p><b>241.1911 kHz</b> x dB -26.00 dB</p> <p>Transmit Freq Error -1.481 kHz</p> <p>x dB Bandwidth 314.089 kHz</p> <p>Freq/Channel</p> <p>Center Freq 824.200000 MHz</p> <p>Start Freq 823.700000 MHz</p> <p>Stop Freq 824.700000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GPRS850 (GMSK,1Slot)-Middle</p>	<p>Agilent R T</p> <p>Ch Freq 836.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 836.6 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 %</p> <p><b>253.0033 kHz</b> x dB -26.00 dB</p> <p>Transmit Freq Error 1.117 kHz</p> <p>x dB Bandwidth 312.178 kHz</p> <p>Freq/Channel</p> <p>Center Freq 836.600000 MHz</p> <p>Start Freq 836.100000 MHz</p> <p>Stop Freq 837.100000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GPRS850 (GMSK,1Slot)-High</p>	<p>Agilent R T</p> <p>Ch Freq 848.8 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 848.8 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 %</p> <p><b>258.1237 kHz</b> x dB -26.00 dB</p> <p>Transmit Freq Error 324.420 Hz</p> <p>x dB Bandwidth 314.781 kHz</p> <p>Freq/Channel</p> <p>Center Freq 848.800000 MHz</p> <p>Start Freq 848.300000 MHz</p> <p>Stop Freq 849.300000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.0000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

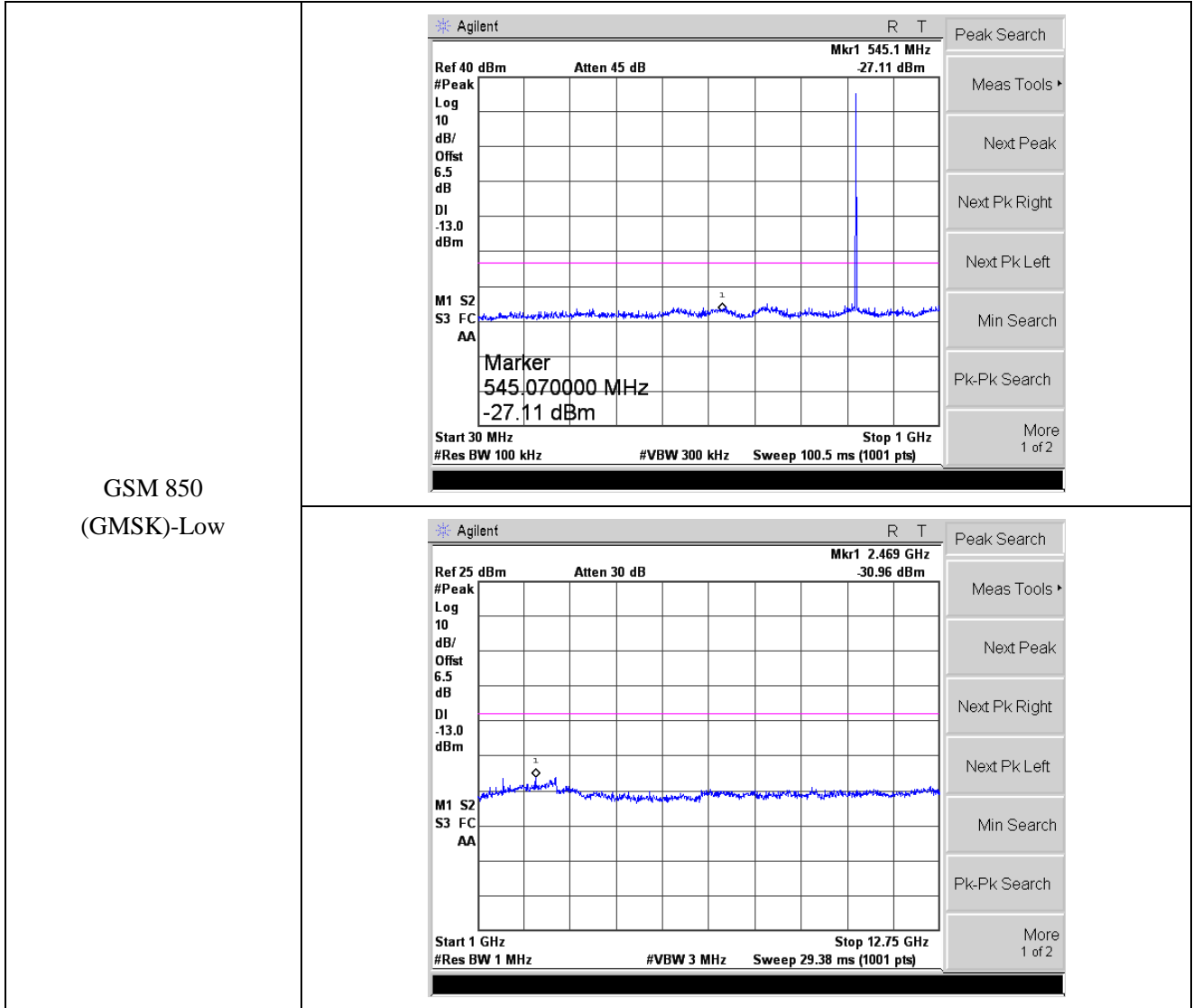
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<p>PCS1900 (GMSK)-High</p>	

<p>GPRS1900 (GMSK,1Slot)-Low</p>	
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<p>GPRS1900 (GMSK,1Slot)-High</p>	

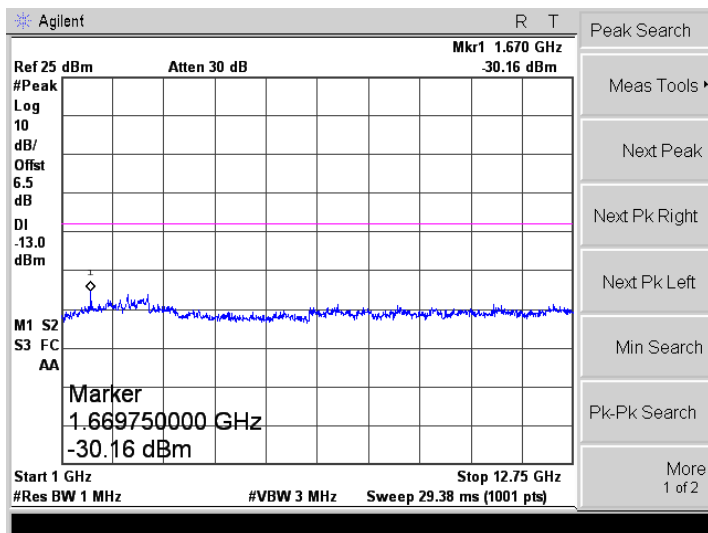
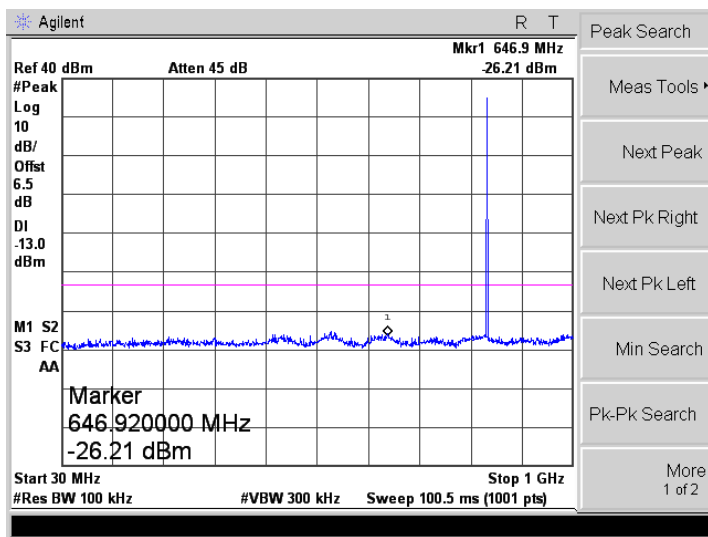


## APPENDIX D

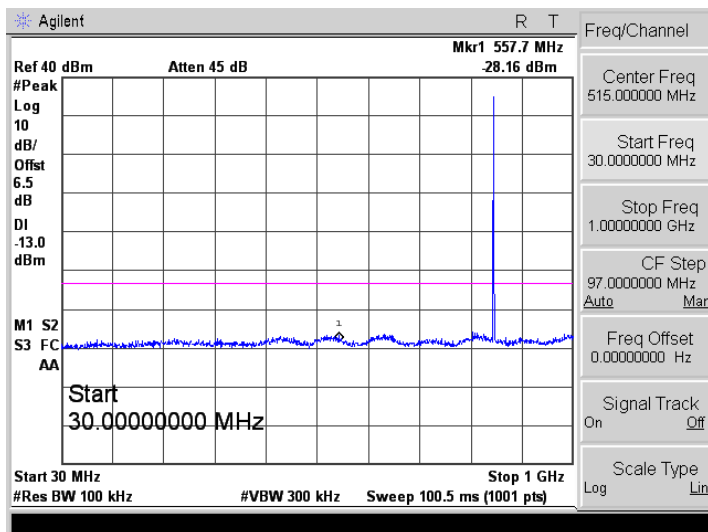
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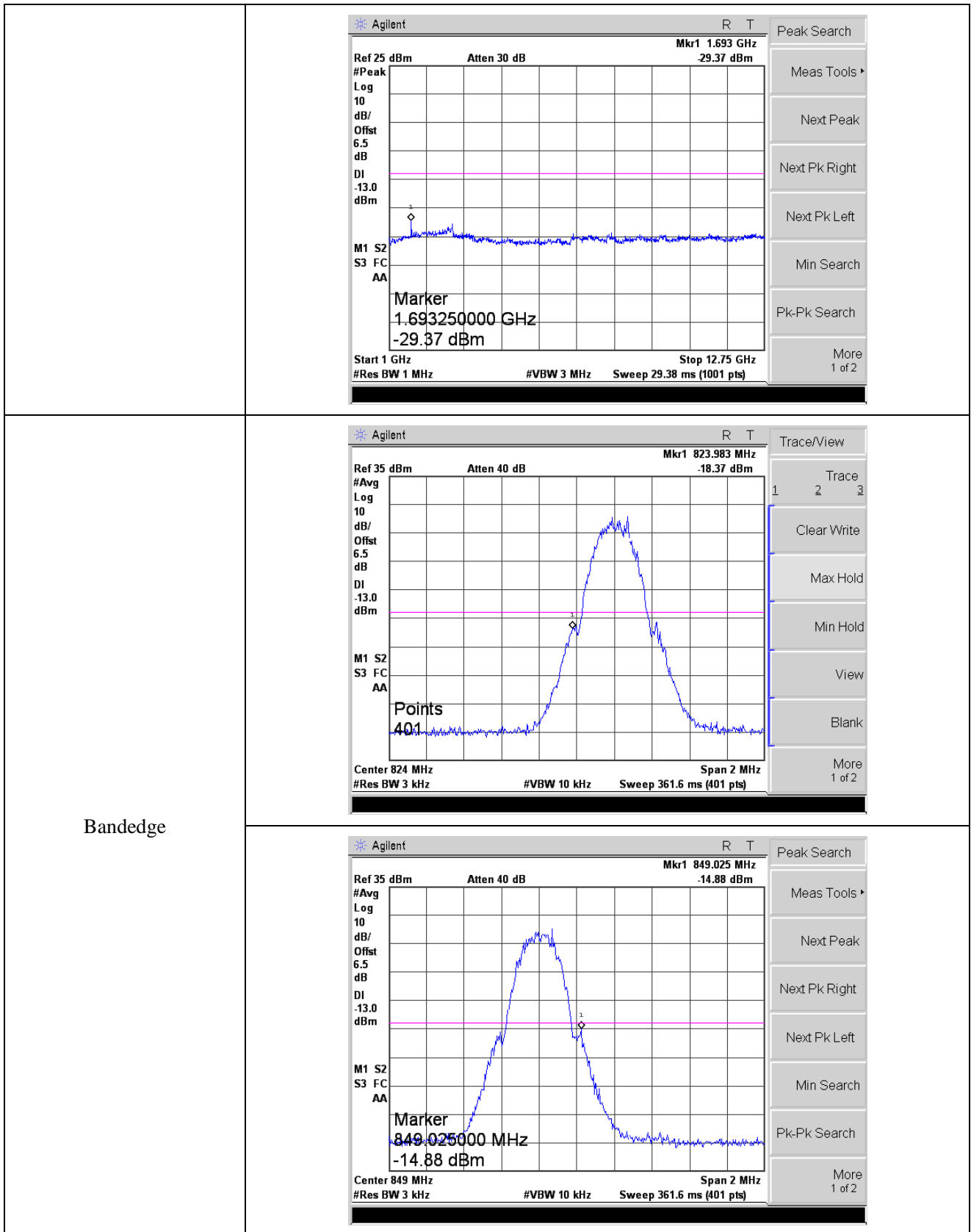


GSM 850  
(GMSK)-Middle

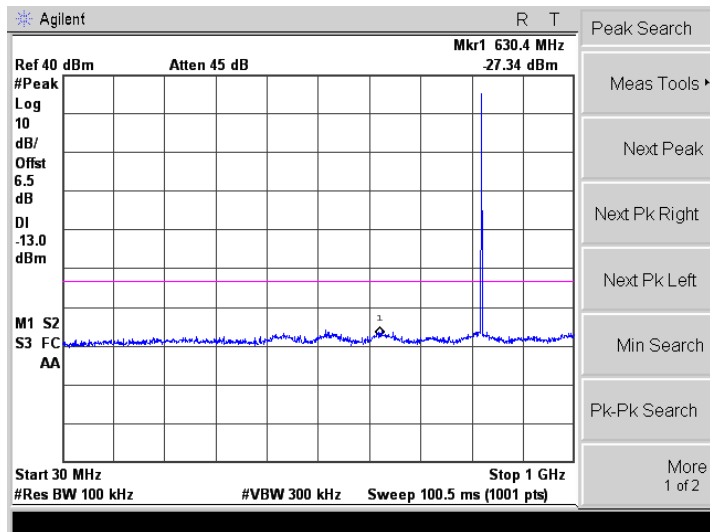


GSM 850  
(GMSK)-High



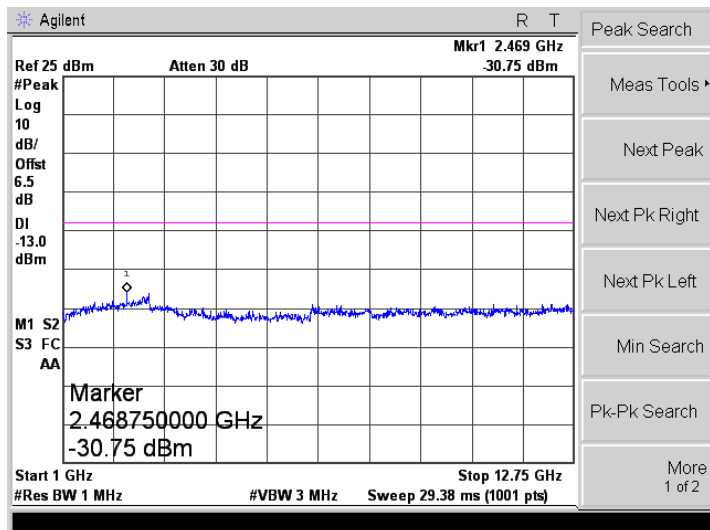


GPRS850  
(GMSK,1Slot)-Low

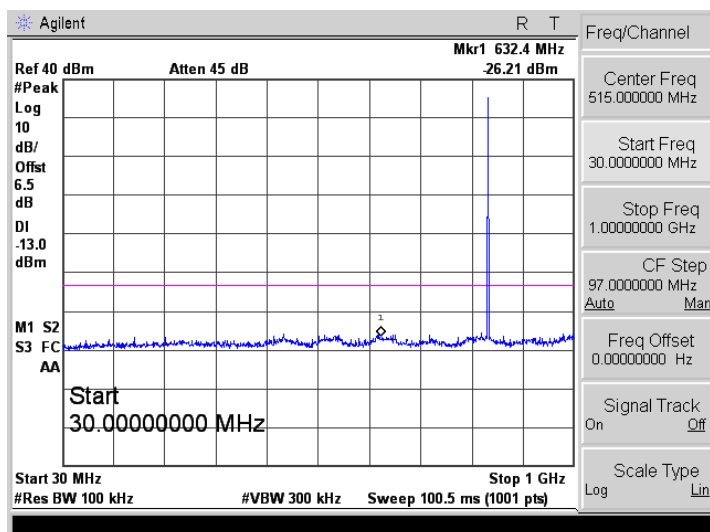


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- Meas Tools ▶
- Next Peak
- Next Pk Right
- Next Pk Left
- Min Search
- Pk-Pk Search
- More 1 of 2

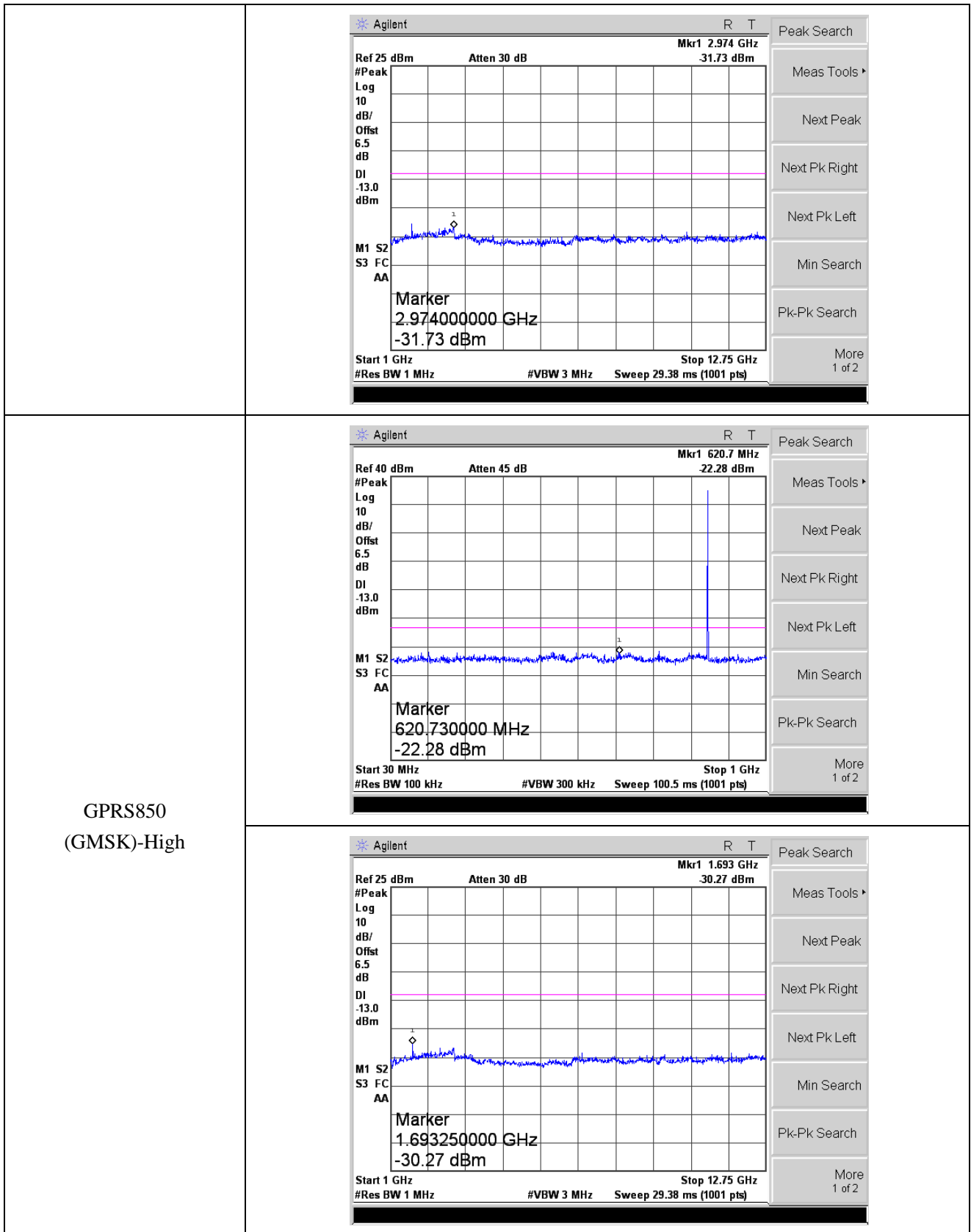
GPRS850  
(GMSK,1Slot)-Middle



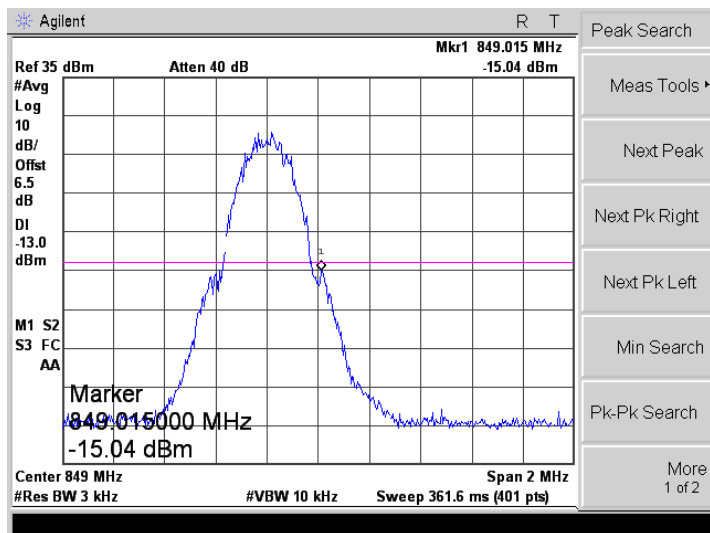
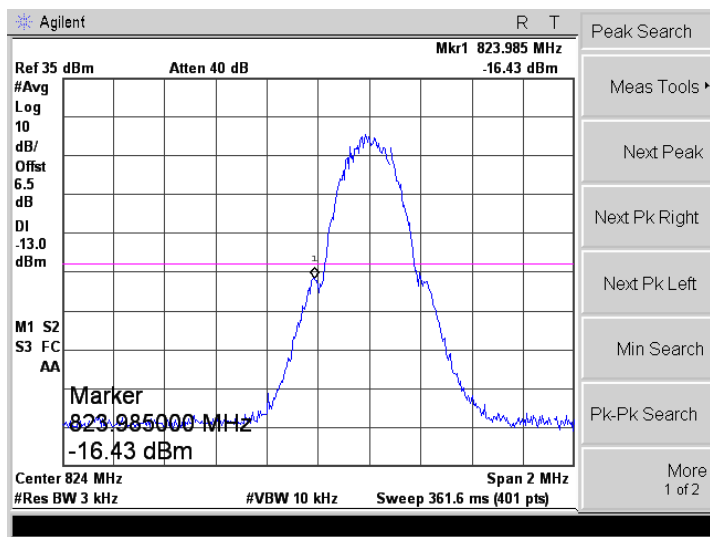
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- More 1 of 2



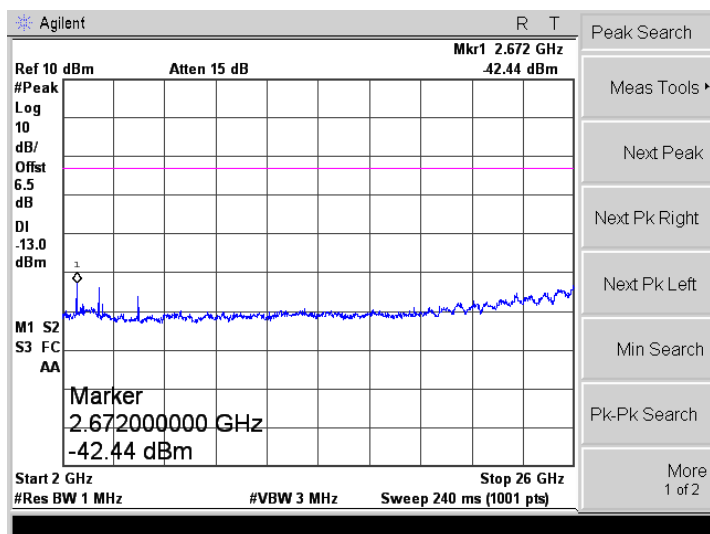
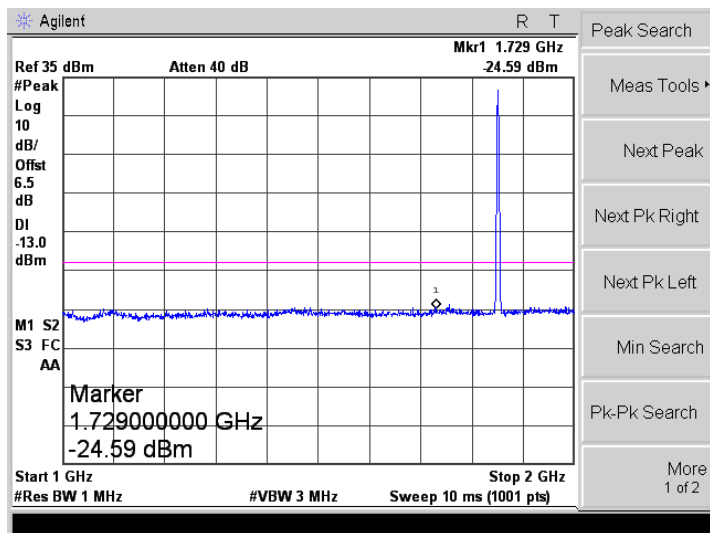
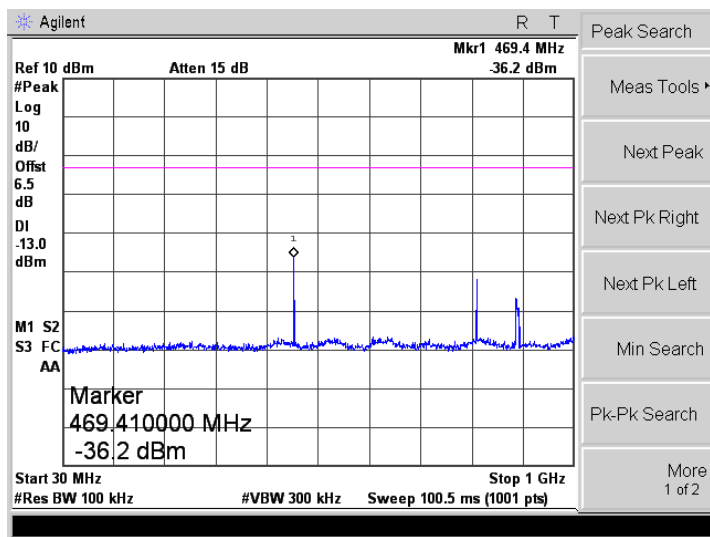
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- Start Freq 30.000000 MHz
- Stop Freq 1.000000 GHz
- CF Step 97.000000 MHz  
Auto Man
- Freq Offset 0.000000 Hz
- Signal Track On Off
- Scale Type Log Lin



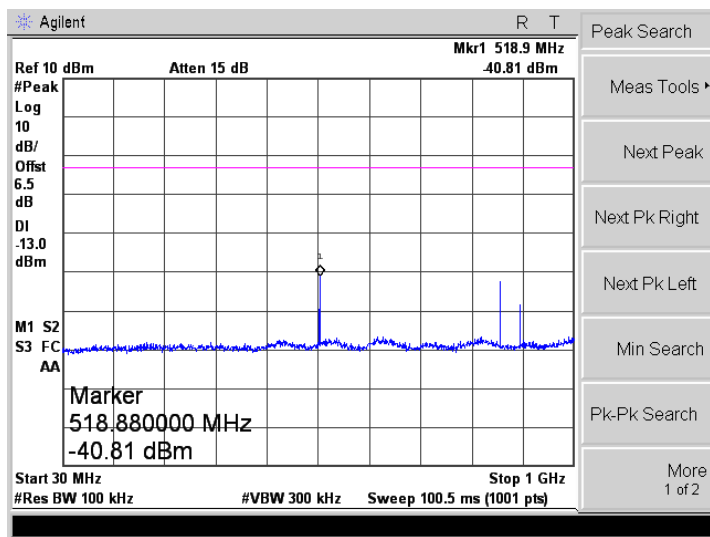
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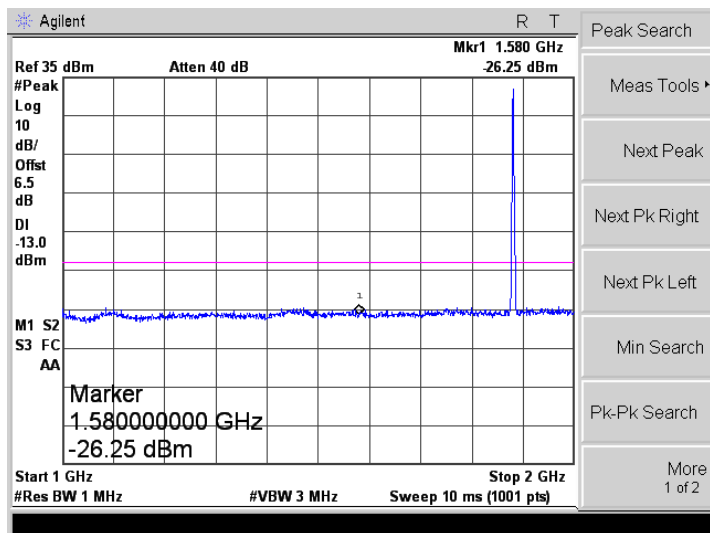
PCS1900  
(GMSK)-Low



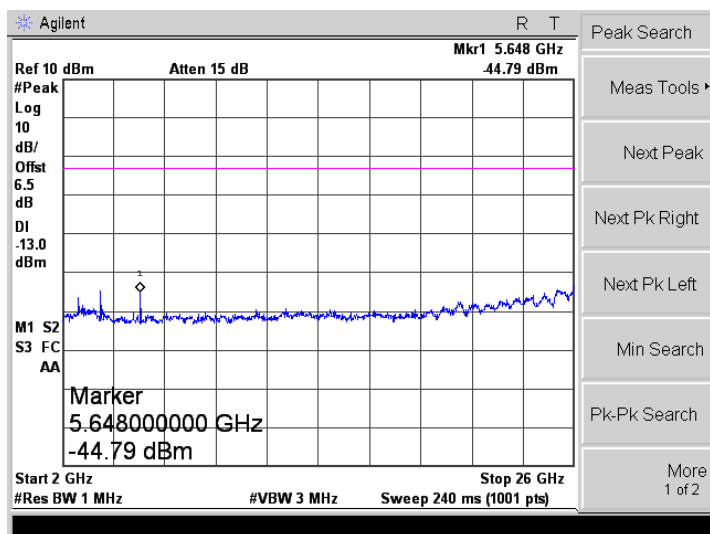
PCS1900  
(GMSK)-Middle



- Peak Search
- Meas Tools ▶
- Next Peak
- Next Pk Right
- Next Pk Left
- Min Search
- Pk-Pk Search
- More 1 of 2



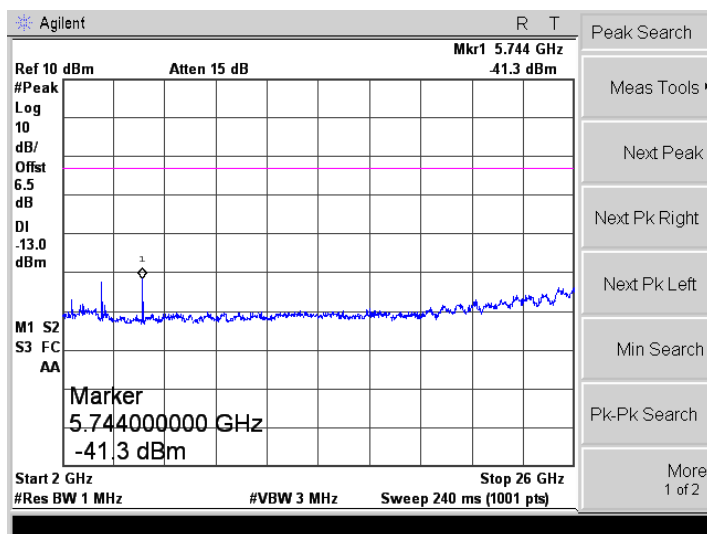
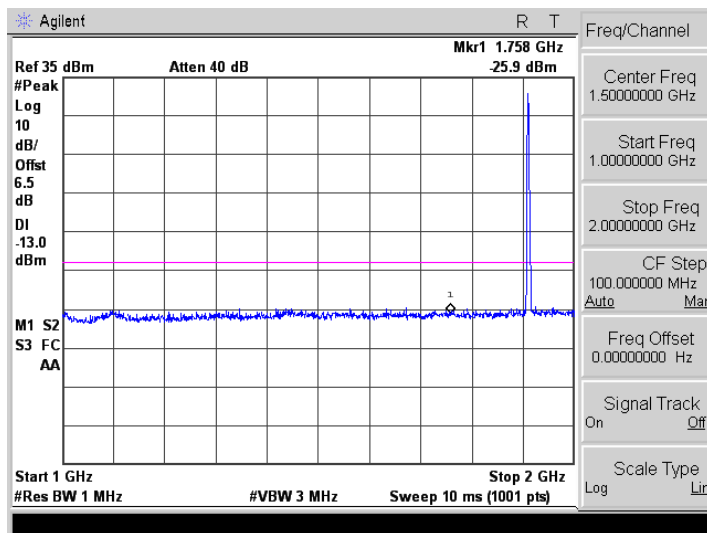
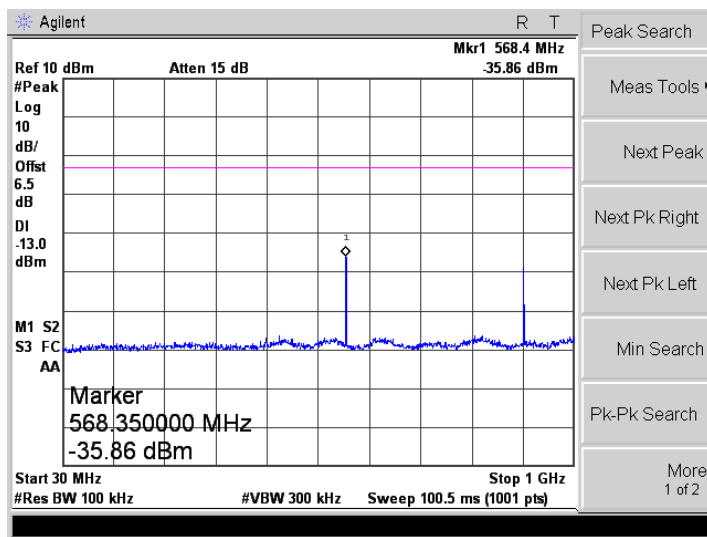
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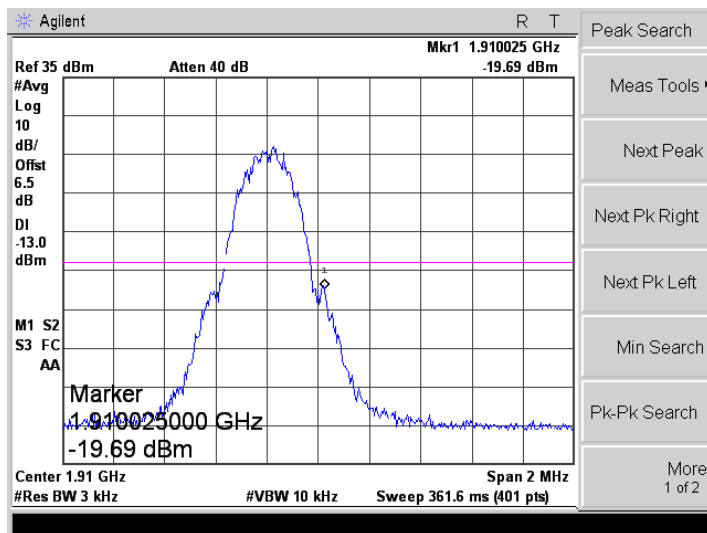
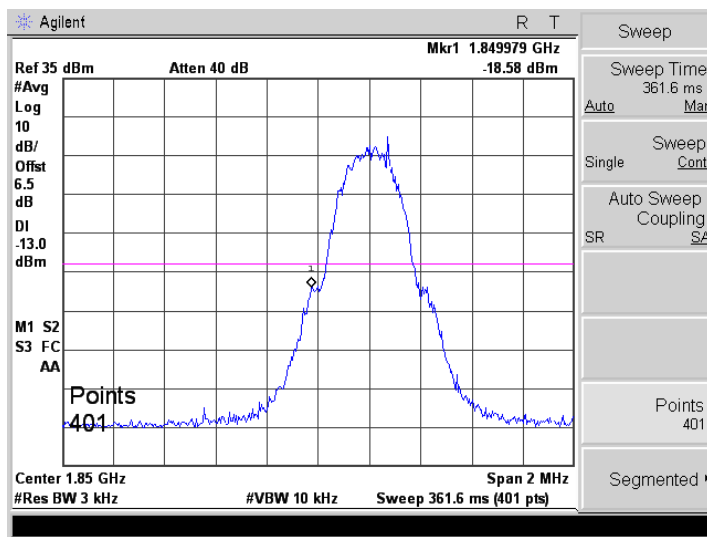
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- More 1 of 2



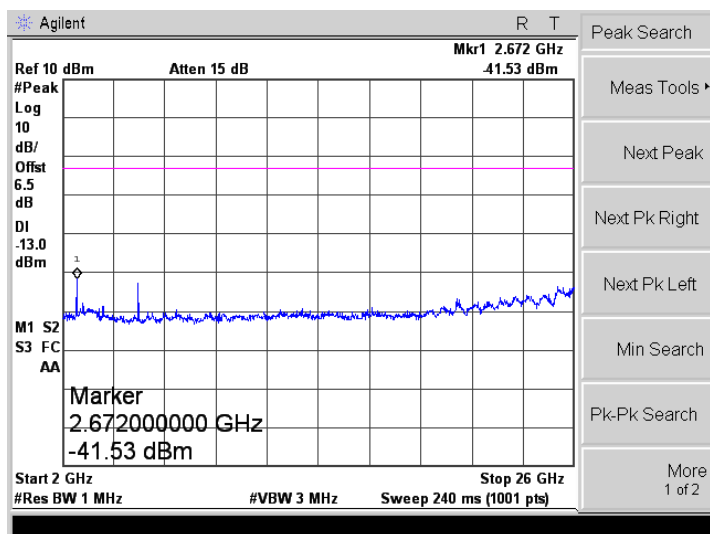
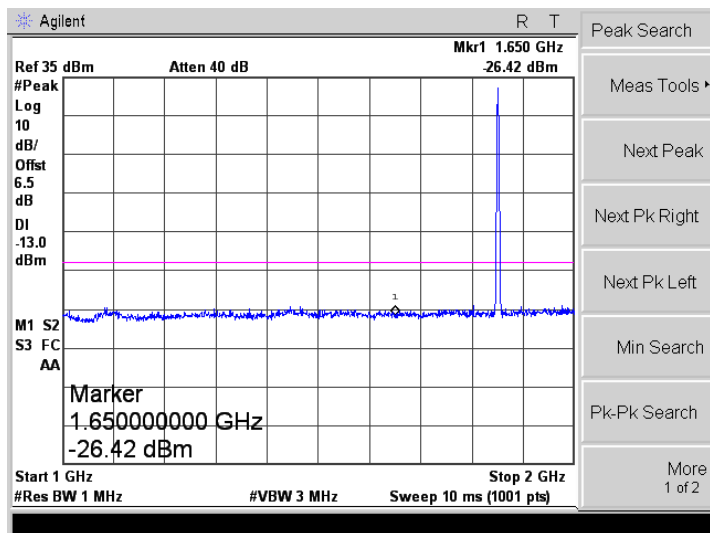
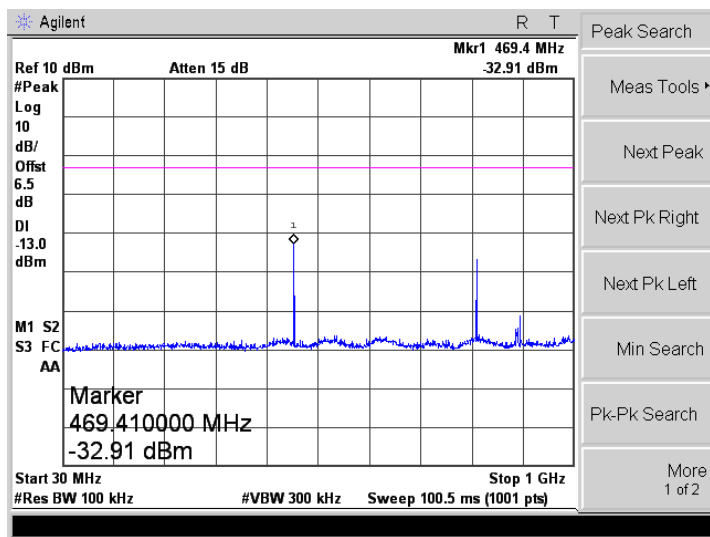
PCS1900  
(GMSK)-High



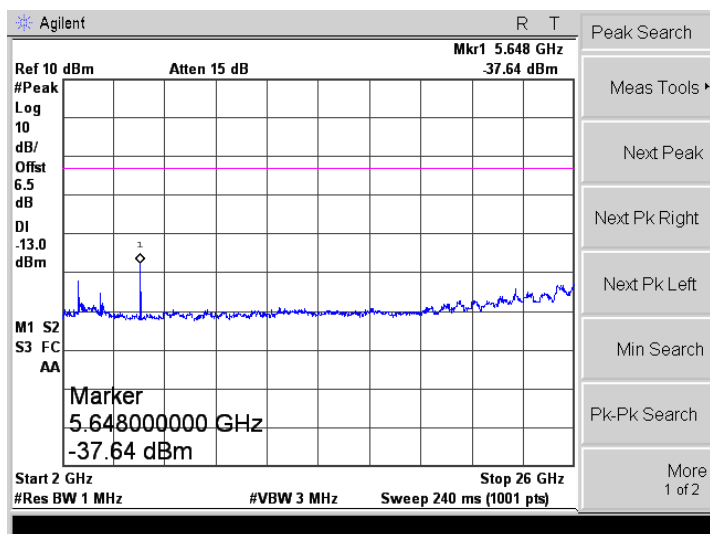
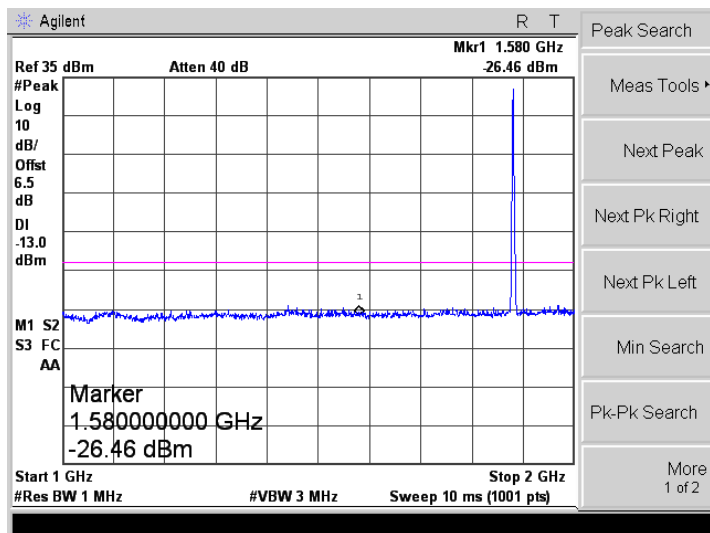
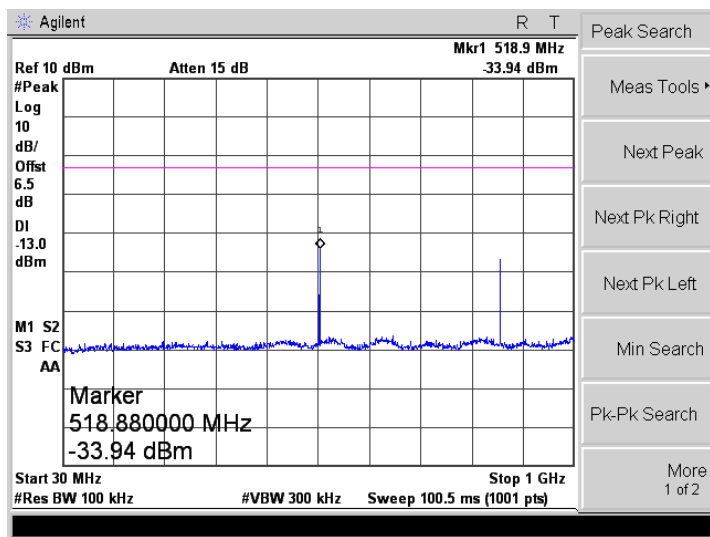
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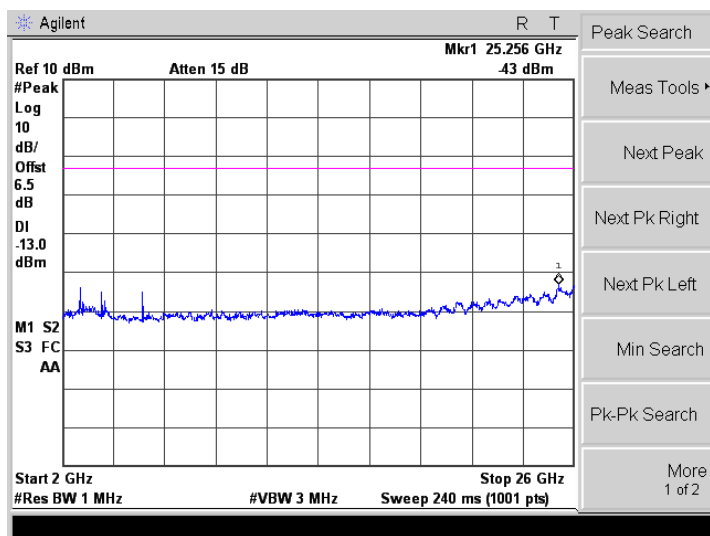
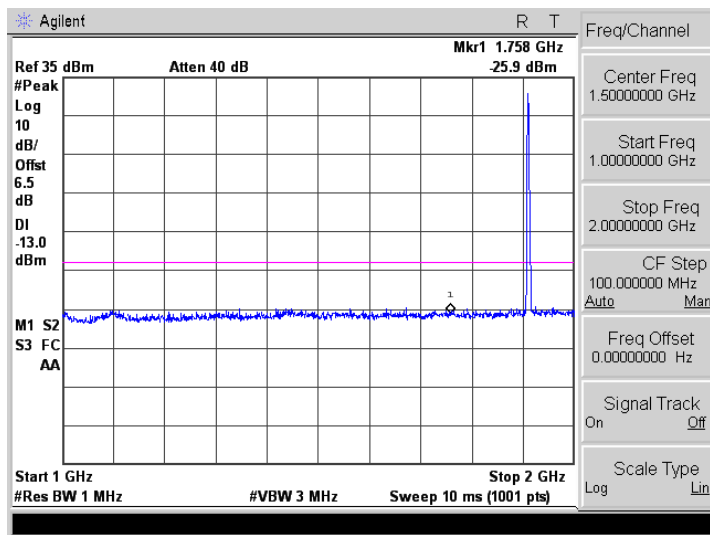
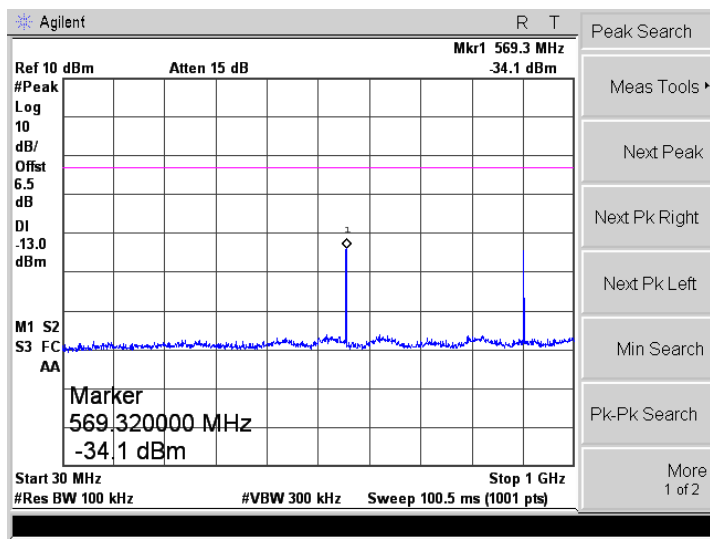
GPRS1900  
(GMSK,1Slot)-Low



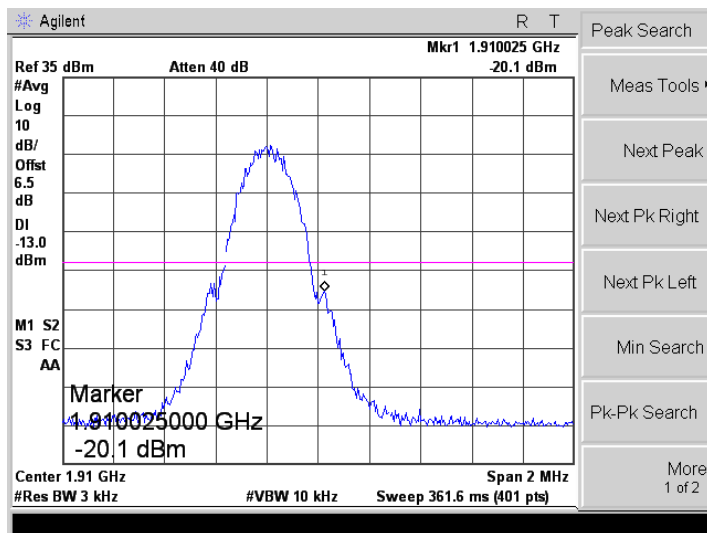
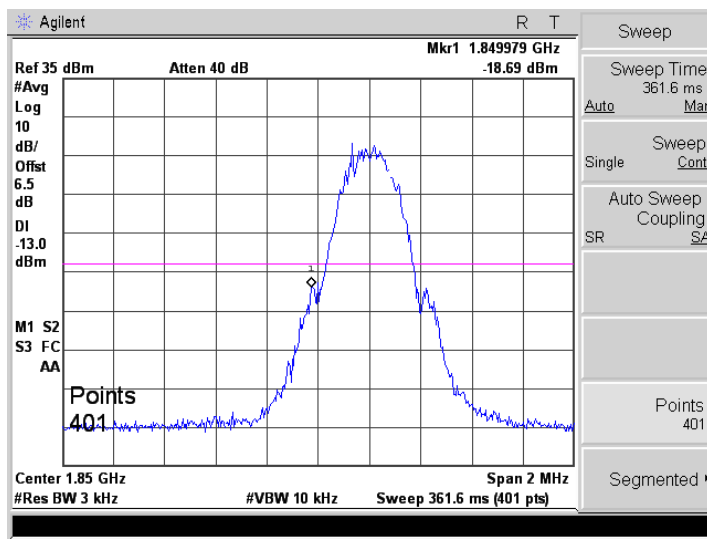
GPRS1900  
(GMSK,1Slot)-Middle



GPRS1900  
(GMSK, 1Slot)-High



Bandedge



## APPENDIX E

### Frequency Stability

Note: 1. Worst case at GSM850/PCS1900 middle channel

2. Normal Voltage NV=DC3.7V; Low Voltage LV=DC3.5V; High Voltage HV=DC4.2V

➤ Frequency stability V.S. Temperature measurement

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	49	0.0588	2.50	Pass
	-20	42	0.0497		
	-10	34	0.0405		
	0	30	0.0359		
	10	25	0.0303		
	20	20	0.0239		
	30	28	0.0331		
	40	35	0.0414		
	50	38	0.0460		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	64	0.0340	2.50	Pass
	-20	50	0.0266		
	-10	39	0.0209		
	0	35	0.0184		
	10	30	0.0160		
	20	25	0.0131		
	30	32	0.0172		
	40	39	0.0209		
	50	43	0.0229		

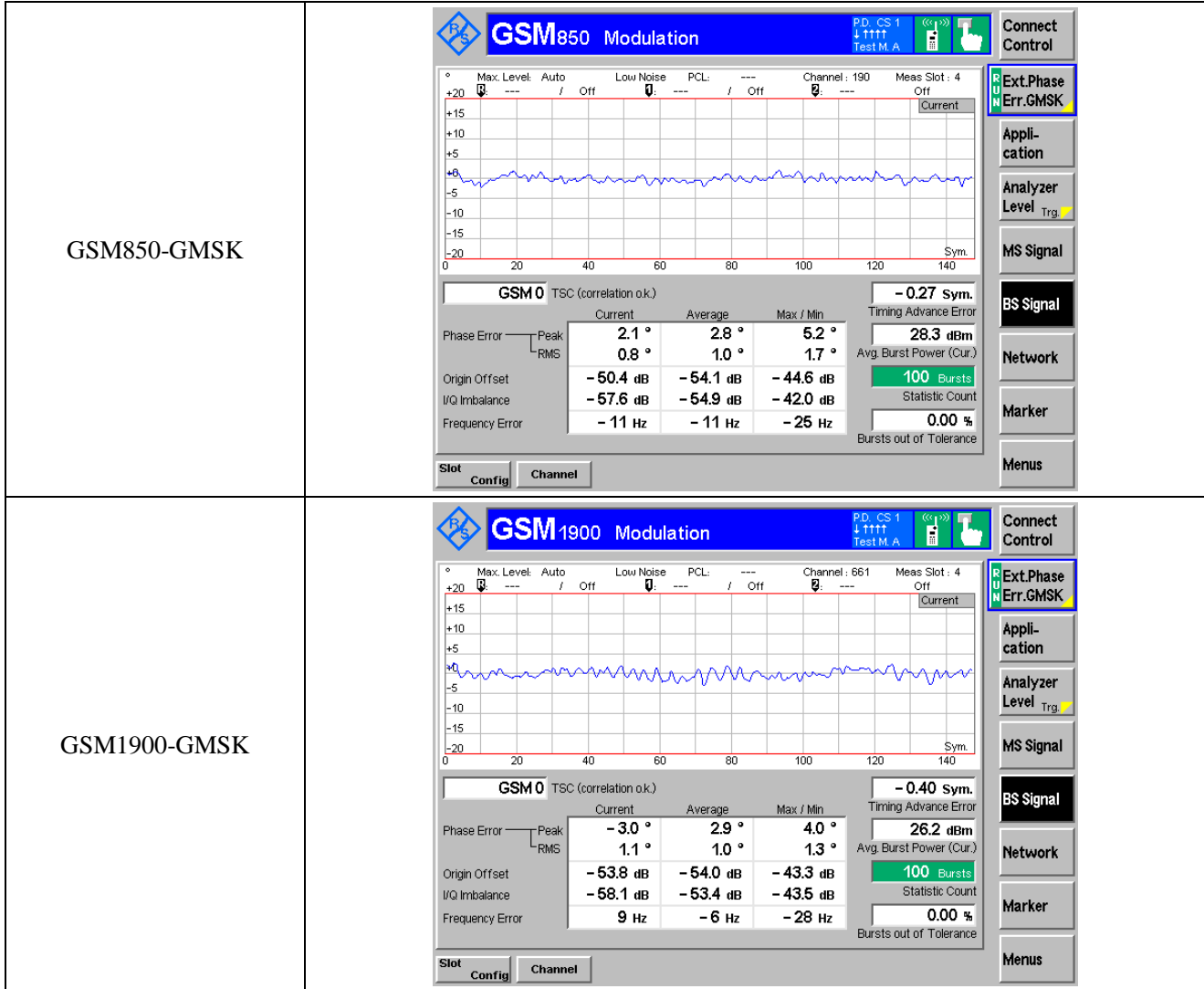
## ➤ Frequency stability V.S. Voltage measurement

Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	39	0.0469	2.50	Pass
	NV	35	0.0423		
	LV	29	0.0349		
Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	48	0.0258	2.50	Pass
	NV	45	0.0237		
	LV	40	0.0213		



# APPENDIX F

## Modulation characteristics



## **APPENDIX PHOTOGRAPHS**

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**Please refer to “ANNEX”**

**\*\*\*\*\* END OF REPORT \*\*\*\*\***