Report On

FCC Testing of the Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS in accordance with FCC 47 CFR Part 22 and FCC 47 CFR Part 2 (GSM 850)

COMMERCIAL-IN-CONFIDENCE

FCC ID: APYHRO00243

Document 75935599 Report 14 Issue 1 **September 2016**

Product Service

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REPORT ON

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Document 75935599 Report 14 Issue 1

September 2016

PREPARED FOR

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DATED

22 September 2016

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 22 and FCC 47 CFR Part 2. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

D Ralley M Russell G Lawler

UKAS TESTING 0141

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Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 22 and FCC 47 CFR Part 2 (GSM 850)

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS to the requirements of FCC 47 CFR Part 22 and FCC 47 CFR Part 2.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Sharp Corporation
Serial Number(s)	IMEI 004401115905156 IMEI 004401115905347
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 22 (2015) FCC 47 CFR Part 2 (2015)
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10879 18 July 2016
Start of Test	10 August 2016
Finish of Test	7 September 2016
Name of Engineer(s)	D Ralley M Russell G Lawler
Related Document(s)	ANSI C63.4 (2014) ANSI TIA-603-C (2004)

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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 22 and FCC 47 CFR Part 2 is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 22	Part 2			
GSM 850					
2.1	22.355	2.1055	Frequency Tolerance	Pass	
2.2	22.905 and 22.917	2.1051	Spurious Emissions at Band Edge	Pass	
2.3	22.913 (a)(2)	2.1046	Maximum Conducted Output Power	Pass	
2.4	22.917	-	Emission Limitations for Cellular Equipment	Pass	
2.5	22.917 (a)	2.1051	Spurious Emissions at Antenna Terminals	Pass	
2.6	22.917 (b)	2.1049 (h)	26 dB Bandwidth	Pass	
2.7	-	2.1047 (d)	Modulation Characteristics	-	Customer Declaration

Product Service

1.3 PRODUCT TECHNICAL DESCRIPTION

Refer to Model Description APYHRO00243 Rev 4.0 document.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 4.0 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Sharp Quad-band LTE (B1/ B3/ B17/ B26), Dual-band WCDMA (FDD I / V) , Quad-band GSM (850/900/1800/1900) & WiMAX2+ (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD(NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 22 and FCC 47 CFR Part 2 (GSM 850)

Product Service

2.1 FREQUENCY TOLERANCE

2.1.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.355
FCC 47 CFR Part 2, Clause 2.1055

2.1.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905156 - Modification State 0

2.1.3 Date of Test

26 August 2016

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

This test was performed in accordance with FCC 47 CFR Part 2, clause 2.1055.

Remarks

A radio communications test set frequency measurement function was used to measure the frequency error. The radio communications test set was configured for an uplink frequency of 836.4 MHz and the frequency reference was set to an external 10MHz rubidium frequency standard.

2.1.6 Environmental Conditions

Ambient Temperature	23.7°C
Relative Humidity	45.9%

Product Service

2.1.7 Test Results

4.0 V DC Supply

GSM 850, 836.40 MHz, Circuit-Switched, GMSK, Frequency Tolerance Under Temperature Variations Results

Temperature	Fundamental Frequency Deviation (ppm)
-30 ºC	-0.02272
-20 ºC	-0.02272
-10 ºC	-0.02391
0 ºC	-0.01913
+10 ºC	-0.01913
+20 ºC	-0.02272
+30 ºC	0.02272
+40 ºC	0.01435
+50 ºC	0.01674

FCC 47 CFR Part 22, Limit Clause 22.355

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5.0	-	-
929 to 960	1.5	-	-
2110 to 2220	10	-	-

2.2 SPURIOUS EMISSIONS AT BAND EDGE

2.2.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.905 and 22.917
FCC 47 CFR Part 2, Clause 2.1051

2.2.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905156 - Modification State 0

2.2.3 Date of Test

7 September 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, Clause 6.

Remarks

The EUT was controlled using a Rohde and Schwarz CMU 200. Measurements of the EUT were performed using a spectrum analyser.

An external trigger was derived from the CMU 200.

An RMS detector was used in conjunction with a gated external trigger to ensure measurements were made during a transmission burst with an RBW which was at least 1% of the measured 26dB Bandwidth.

Sweep time was calculated such that, the minimum dwell time per measurement point was greater than 1 ms.

2.2.6 Environmental Conditions

Ambient Temperature	23.4°C
Relative Humidity	56.3%

Product Service

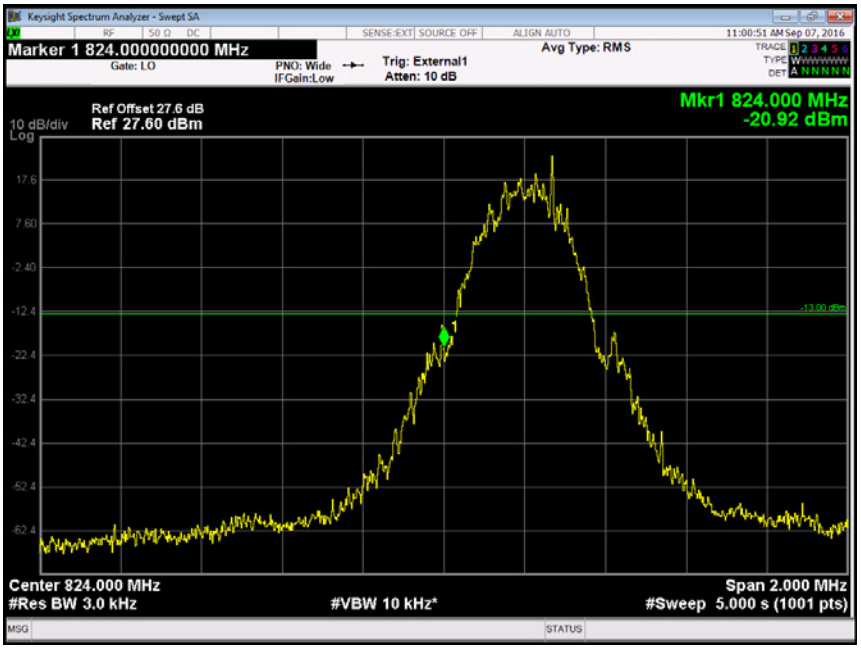
2.2.7 Test Results

4.0 V DC Supply

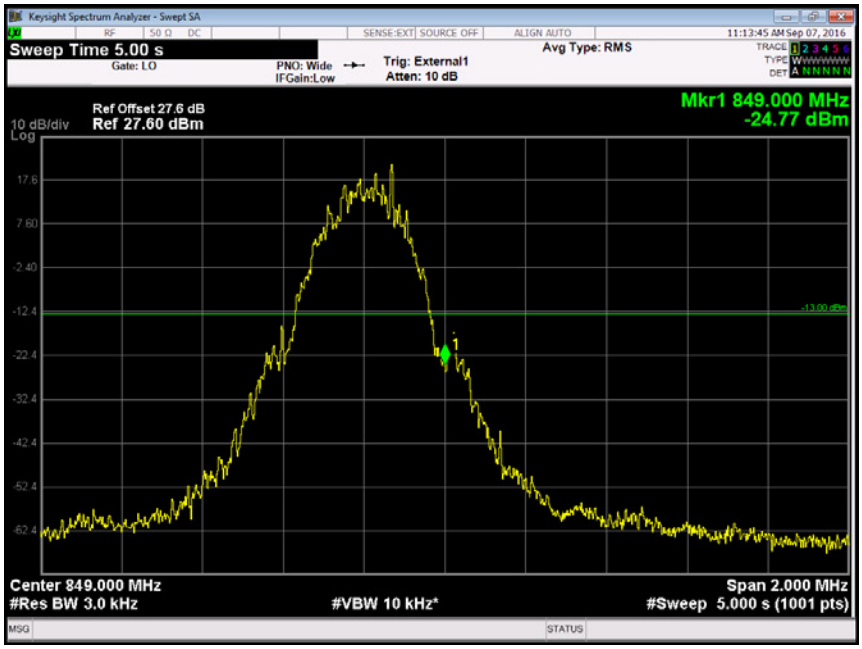
GSM 850, Circuit-Switched, GMSK, Spurious Emissions at Band Edge Results

Block Edge	Frequency Block (MHz)	
	A :824.0 MHz – 835.0 MHz	B :846.5 MHz – 849.0 MHz
Lower	Channel: 128 824.2 MHz	-
Upper	-	Channel: 251 848.8 MHz

GSM 850, Circuit-Switched, GMSK, Frequency Block A, Spurious Emissions at Band Edge Plot



GSM 850, Circuit-Switched, GMSK, Frequency Block B, Spurious Emissions at Band Edge Plot



FCC 47 CFR Part 22, Limit Clause 22.905 and 22.917

-13 dBm at block edge.

2.3 MAXIMUM CONDUCTED OUTPUT POWER

2.3.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.913 (a)(2)
FCC 47 CFR Part 2, Clause 2.1046

2.3.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905156 - Modification State 0

2.3.3 Date of Test

10 August 2016

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, clause 5.1.2.

Remarks

The antenna gain was declared by the manufacturer as 2.0 dBi. The ERP result was calculated using the formula below:

ERP (dBm) = Pout (dBm) + Antenna Gain (dBi) - 2.15 dB

2.3.6 Environmental Conditions

Ambient Temperature	22.3°C
Relative Humidity	61.7%

Product Service

2.3.7 Test Results

4.0 V DC Supply

GSM 850, Circuit-Switched, Maximum Conducted Output Power Results

Frequency	Conducted Power (dBm)	Antenna Gain	ERP (dBm)	ERP (W)
824.20 MHz	32.28	2.0 dBi	32.13	1.63
836.40 MHz	32.46	2.0 dBi	32.31	1.70
848.80 MHz	32.41	2.0 dBi	32.26	1.68

FCC 47 CFR Part 22, Limit Clause 22.913 (a)(2)

Mobile Transmitters: 7 W or 38.45 dBm

2.4 EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT

2.4.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.917

2.4.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905347 - Modification State 0

2.4.3 Date of Test

29 August 2016

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with ANSI C63.26, clause 5.5.

2.4.6 Environmental Conditions

Ambient Temperature	21.5°C
Relative Humidity	61.0%

Product Service

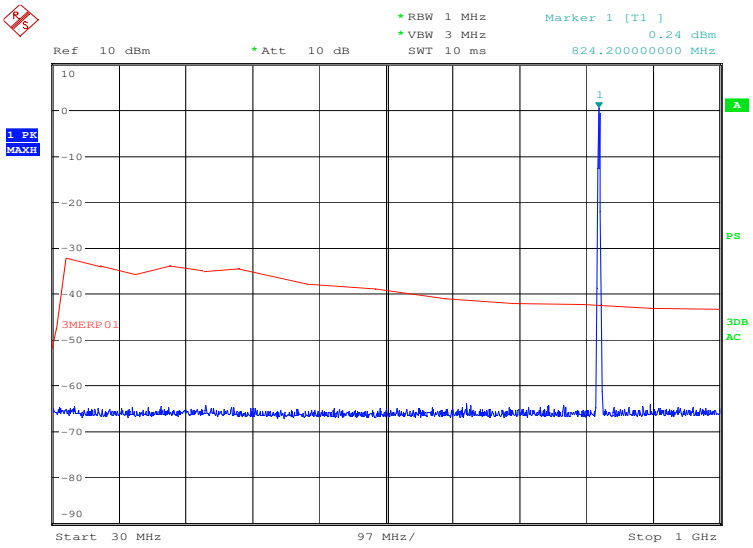
2.4.7 Test Results

GSM 850, 824.20 MHz, Emission Limitations for Cellular Equipment Results

Frequency (MHz)	Emission Results (dBm)
*	

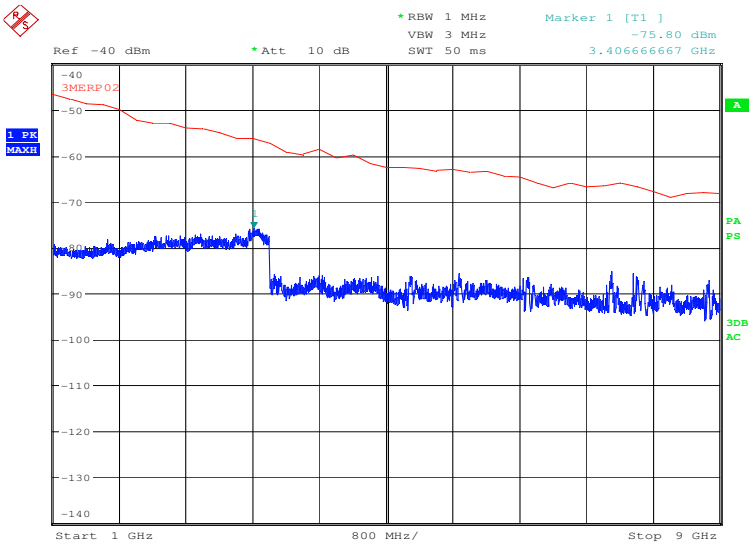
*No emissions were detected within 10 dB of the limit.

GSM 850, 824.20 MHz, 30 MHz to 1 GHz, Emission Limitations for Celluar Equipment Plot



Product Service

GSM 850, 824.20 MHz, 1 GHz to 9 GHz, Emission Limitations for Celluar Equipment Plot



Date: 29.AUG.2016 08:38:24

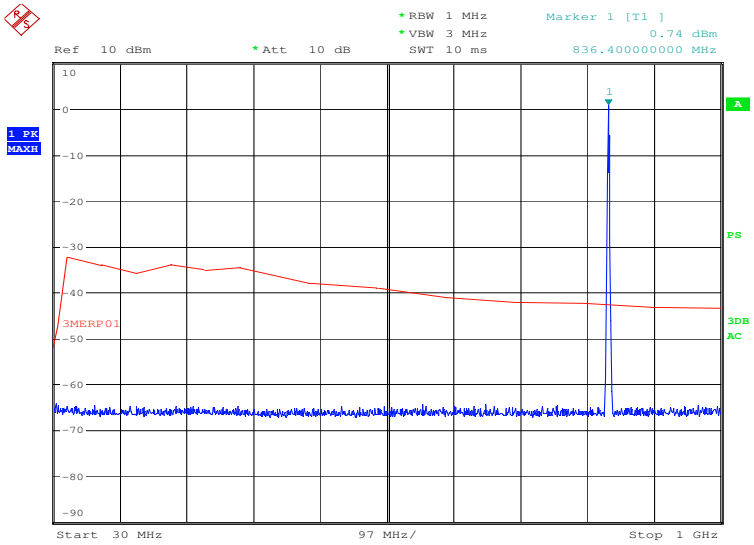
Product Service

GSM 850, 836.40 MHz, Emission Limitations for Cellular Equipment Results

Frequency (MHz)	Emission Results (dBm)
*	

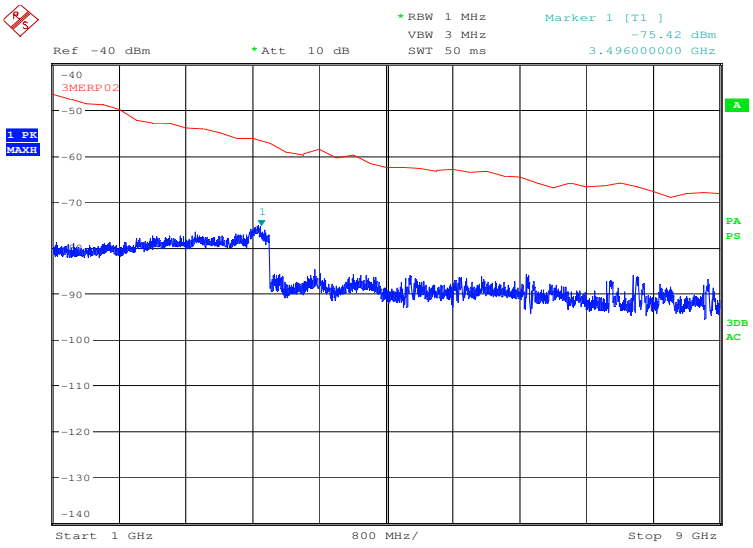
*No emissions were detected within 10 dB of the limit.

GSM 850, 836.40 MHz, 30 MHz to 1 GHz, Emission Limitations for Celluar Equipment Plot



Product Service

GSM 850, 836.40 MHz, 1 GHz to 9 GHz, Emission Limitations for Celluar Equipment Plot



Date: 29.AUG.2016 08:30:00

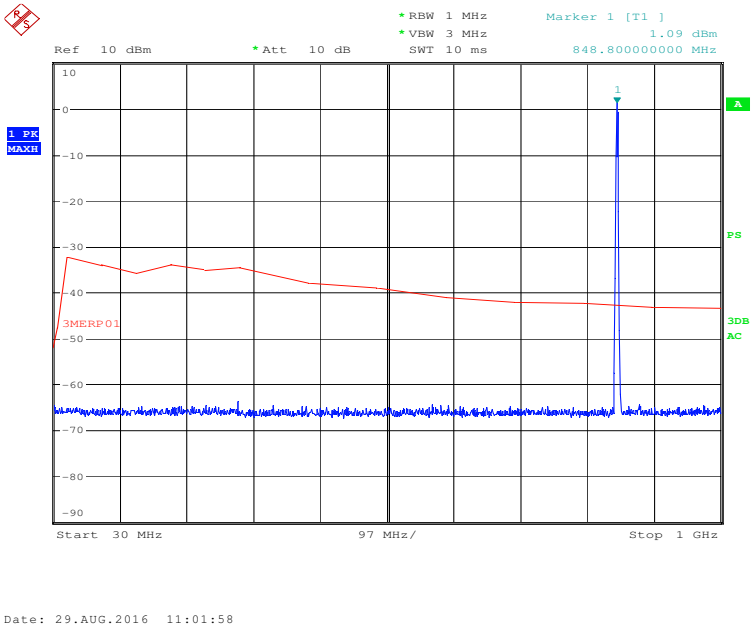
Product Service

GSM 850, 848.80 MHz, Emission Limitations for Cellular Equipment Results

Frequency (MHz)	Emission Results (dBm)
*	

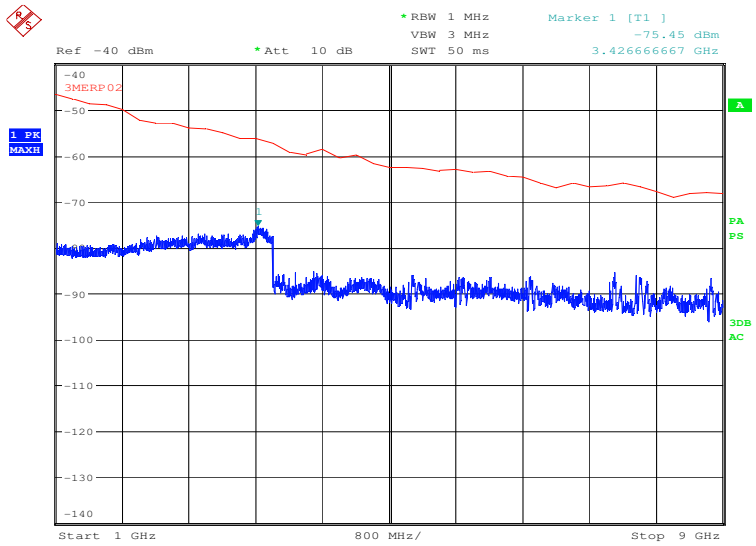
*No emissions were detected within 10 dB of the limit.

GSM 850, 848.80 MHz, 30 MHz to 1 GHz, Emission Limitations for Celluar Equipment Plot



Product Service

GSM 850, 848.80 MHz, 1 GHz to 9 GHz, Emission Limitations for Celluar Equipment Plot



Date: 29.AUG.2016 08:45:51

FCC 47 CFR Part 22, Limit Clause 22.917 (a)

43+10log(P) or -13 dBm

Product Service

2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

2.5.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.917 (a)
FCC 47 CFR Part 2, Clause 2.1051

2.5.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905156 - Modification State 0

2.5.3 Date of Test

7 September 2016

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, Clause 6.

Remarks

The EUT was connected using a Rohde and Schwarz CMU 200. Measurements of the EUT were performed using a spectrum analyser.

Testing was carried out with an RBW of 100 kHz as defined in 22.917(b). Measurements were made with a Peak detector and the trace set to Max Hold.

2.5.6 Environmental Conditions

Ambient Temperature	24.0°C
Relative Humidity	68.4%

Product Service

2.5.7 Test Results

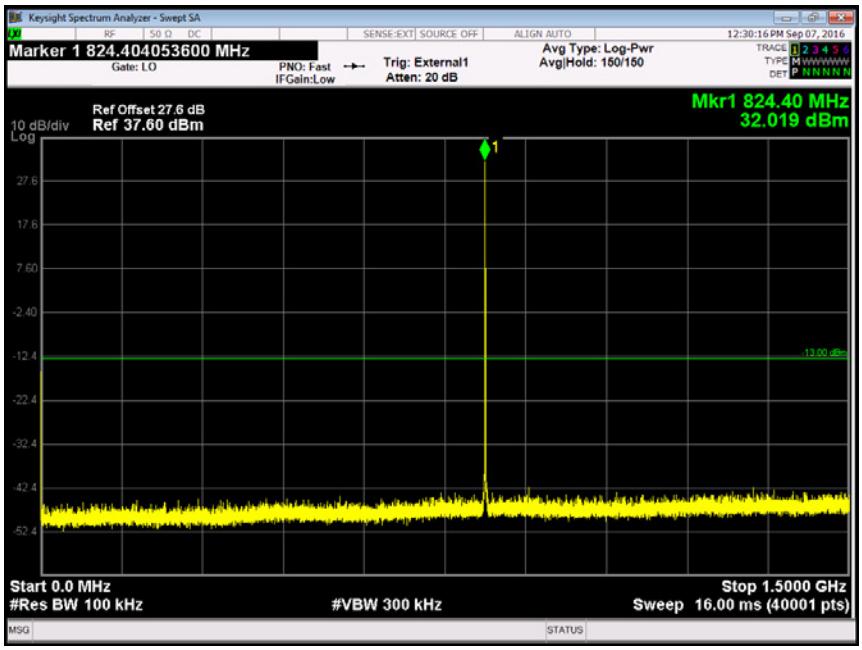
4.0 V DC Supply

GSM 850, 824.20 MHz, Spurious Emissions at Antenna Terminals Results

Frequency (MHz)	Emission Results (dBm)
*	

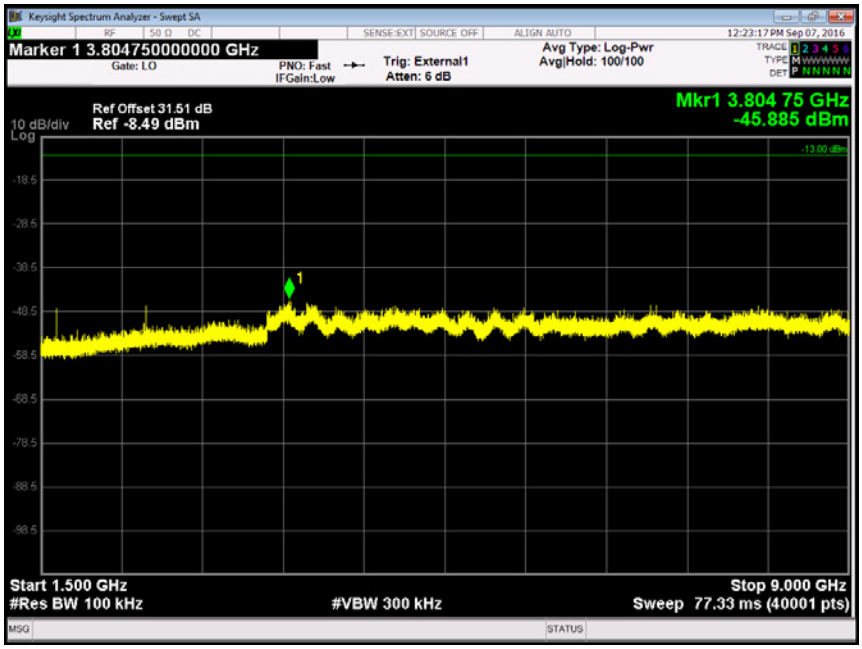
*No emissions were detected within 20 dB of the limit.

GSM 850, 824.20 MHz, 9 kHz to 1.5 GHz, Spurious Emissions at Antenna Terminals Plot



Product Service

GSM 850, 824.20 MHz, 1.5 GHz to 9 GHz, Spurious Emissions at Antenna Terminals Plot

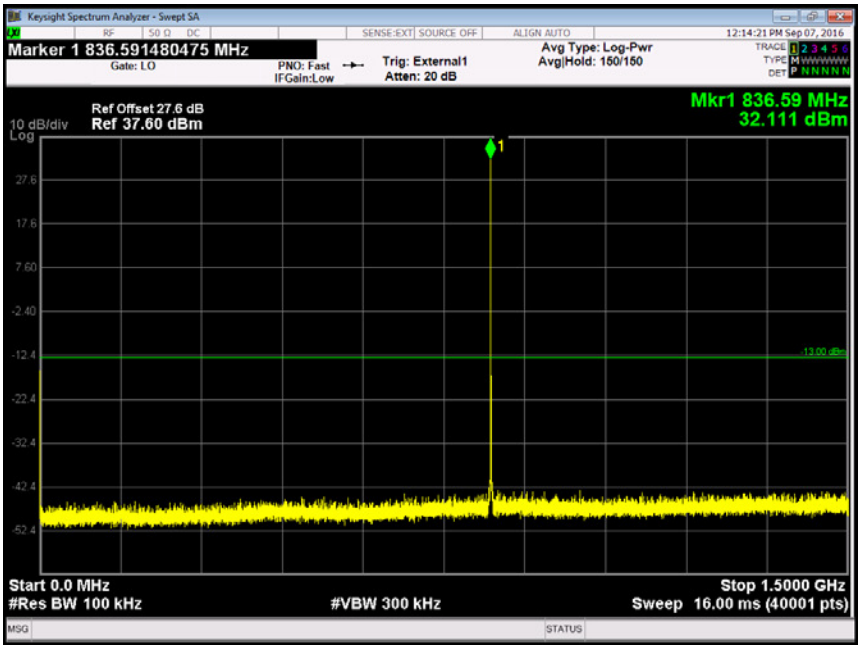


GSM 850, 836.40 MHz, Spurious Emissions at Antenna Terminals Results

Frequency (MHz)	Emission Results (dBm)
*	

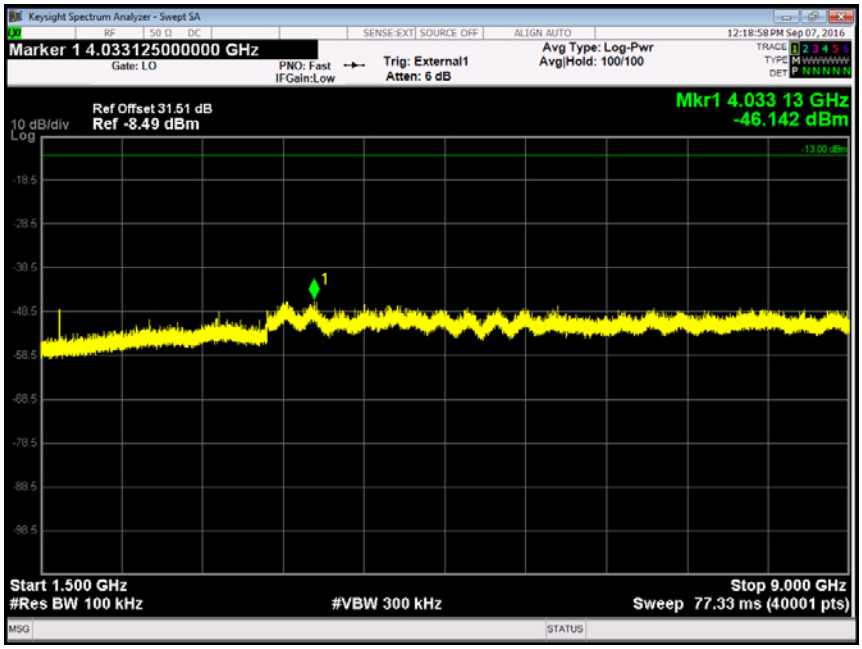
*No emissions were detected within 20 dB of the limit.

GSM 850, 836.40 MHz, 9 kHz to 1.5 GHz, Spurious Emissions at Antenna Terminals Plot



Product Service

GSM 850, 836.40 MHz, 1.5 GHz to 9 GHz, Spurious Emissions at Antenna Terminals Plot



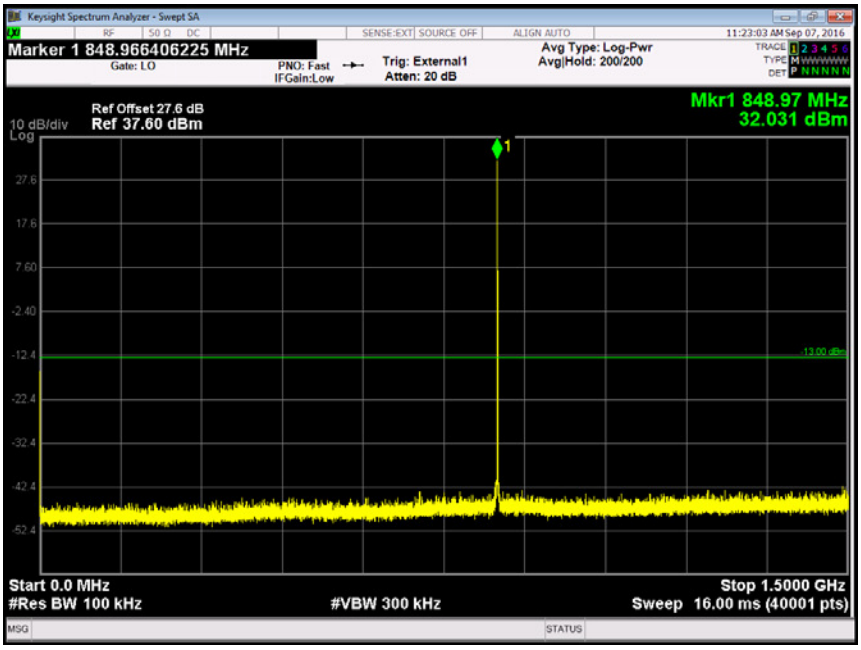
Product Service

GSM 850, 848.80 MHz, Spurious Emissions at Antenna Terminals Results

Frequency (MHz)	Emission Results (dBm)
*	

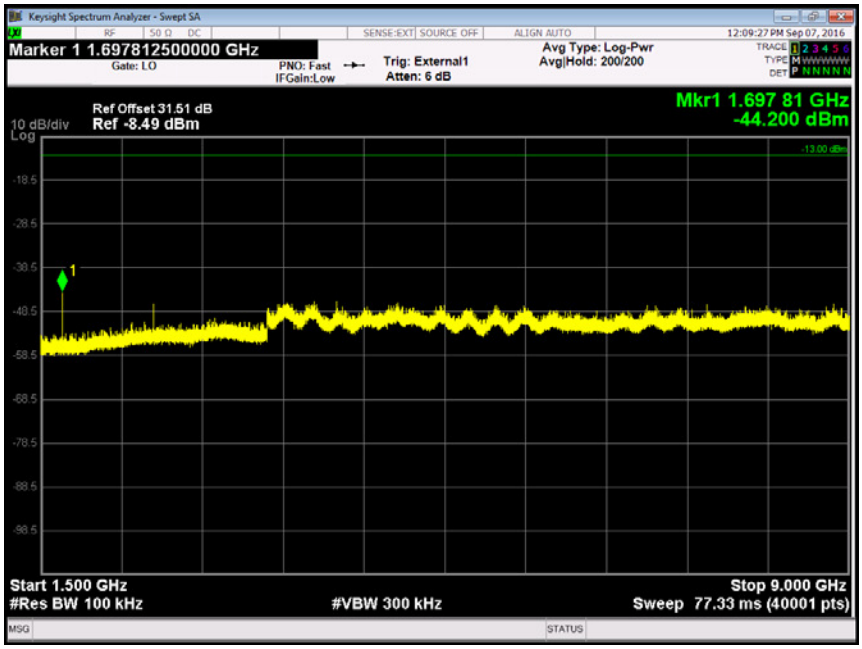
*No emissions were detected within 20 dB of the limit.

GSM 850, 848.80 MHz, 9 kHz to 1.5 GHz, Spurious Emissions at Antenna Terminals Plot



Product Service

GSM 850, 848.80 MHz, 1.5 GHz to 9 GHz, Spurious Emissions at Antenna Terminals Plot



FCC 47 CFR Part 22, Limit Clause 22.917 (a)

43+10log(P) or -13 dBm

Product Service

2.6 26 dB BANDWIDTH

2.6.1 Specification Reference

FCC 47 CFR Part 22, Clause 22.917 (b)
FCC 47 CFR Part 2, Clause 2.1049 (h)

2.6.2 Equipment Under Test and Modification State

S/N: IMEI 004401115905156 - Modification State 0

2.6.3 Date of Test

26 August 2016

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, Clause 4.1.

2.6.6 Environmental Conditions

Ambient Temperature	21.4 - 23.6°C
Relative Humidity	48.5 - 48.8%

Product Service

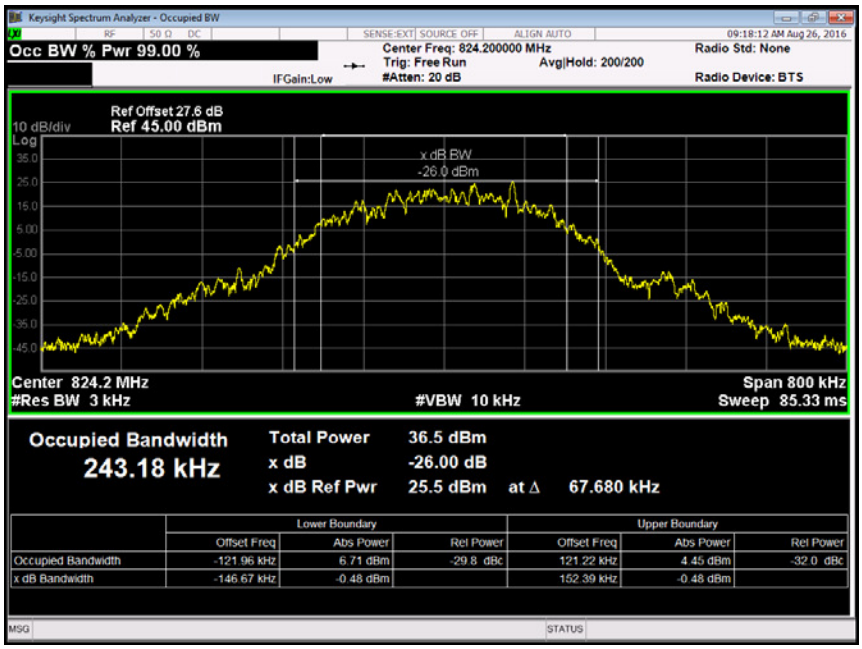
2.6.7 Test Results

4.0 V DC Supply

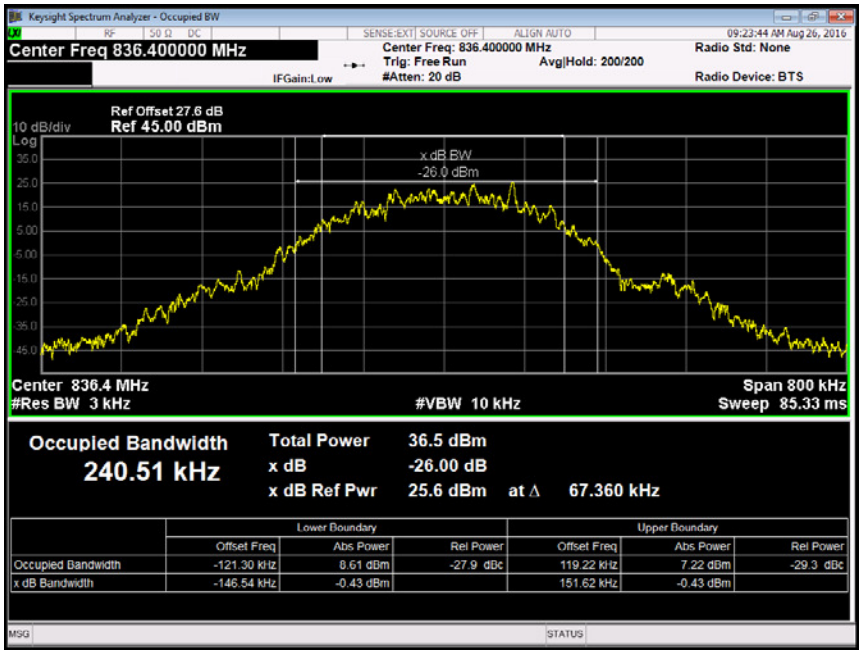
GSM 850, GMSK, 26 dB Bandwidth Results

824.20 MHz	836.40 MHz	848.80 MHz
kHz	kHz	kHz
299.06	298.16	299.32

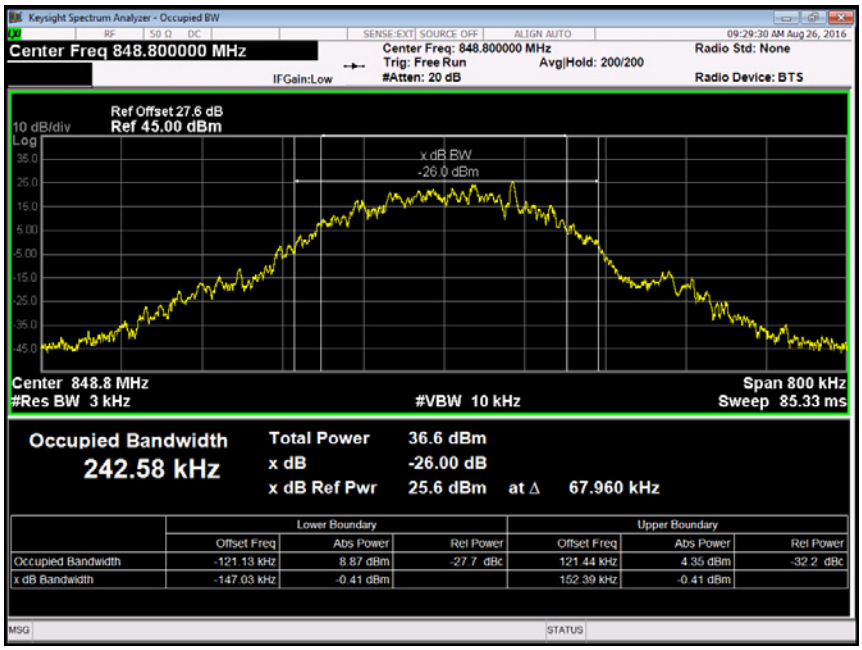
GSM 850, 824.20 MHz, GMSK, 26 dB Bandwidth Plot



GSM 850, 836.40 MHz,GMSK, 26 dB Bandwidth Plot



GSM 850, 848.80 MHz, GMSK, 26 dB Bandwidth Plot



FCC 47 CFR Part 22, Limit Clause

None specified.

Product Service

2.7 MODULATION CHARACTERISTICS

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

2.7.2 Test Results

GSM 850, Modulation Characteristics, Customer Description

The modulation scheme used in GSM is called Gaussian Minimum Shift Keying (GMSK). GMSK facilitates the use of narrow bandwidth and allows for both coherent and non coherent detection capabilities. It is a scheme in which the transitions from One to Zero or Zero to One do not occur quickly, but over a period of time. If pulses are transmitted quickly harmonics are transmitted. The power spectrum for a square wave is rich in harmonics, and the power within the side lobes is wasted, and can be a cause of potential interference.

A method to reduce the harmonics is to round off the edges of the pulses thus lowering the spectral components of the signal. In GSM this is done by using a Gaussian pre-filter which typically has a bandwidth of 81.25kHz. The output from the Gaussian filter then phase modulates the carrier. As there are no dramatic phase transitions of the carrier this gives a constant envelope and low spectral component output from the transmitter.

The spectral efficiency is calculated by

bit rate / Channel bandwidth = 270.83333 kbit/s / 200 kHz = 1.354 bit/s/Hz.

The bandwidth product BT = Bandwidth x bit duration = 81.25 kHz x 3.6923 micros = 0.3

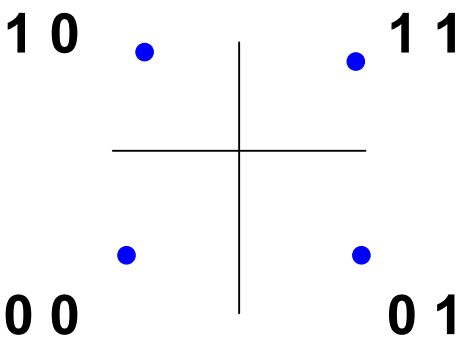
GMSK OVERVIEW

The modulation scheme used for the EUT is GMSK.

A brief overview of how GMSK works is shown below.

GMSK (Gaussian Minimum Shift Keying)

The fundamental principal behind GMSK is Phase shift keying. This splits a data stream into a series of 2-digit phase shifts, using the following phase shifts to represent data pairs.



Therefore for the BIT sequence 0 0 1 1 1 0 0 1 The corresponding phase shift will be used

BIT SEQUENCE	0 0	1 1	1 0	01
PHASE	225º	45º	135º	315º

This is called QPSK (Quadratic Phase Shift Keying)

However

There is a problem with QPSK: transition from e.g. 00 to 11 gives phase shift of 180° (π radians). This has the effect of inverting the carrier waveform and this can lead to detection errors at the receiver.

Solution: restrict phase changes to ± 90°

1. Split bitstream into 2 streams e.g.

	0 0		1 1		0 1		1 0	
I Stream	0		1		0		1	
Q stream		0		1		1		0

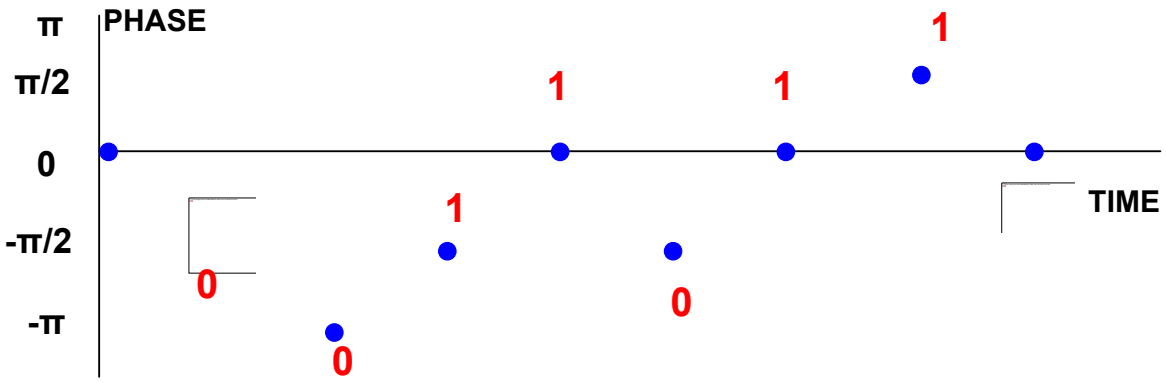
2. Modulate each stream with PSK (1 = 90° or π/2, 0 = -90° or - π/2 phase shift)

I Stream	0		1		0		1	
	-π/2		-π/2		-π/2		π/2	
Q stream		0		1		1		0
		-π/2		π/2		π/2		-π/2

3. Combine (add) the two PSK signals:

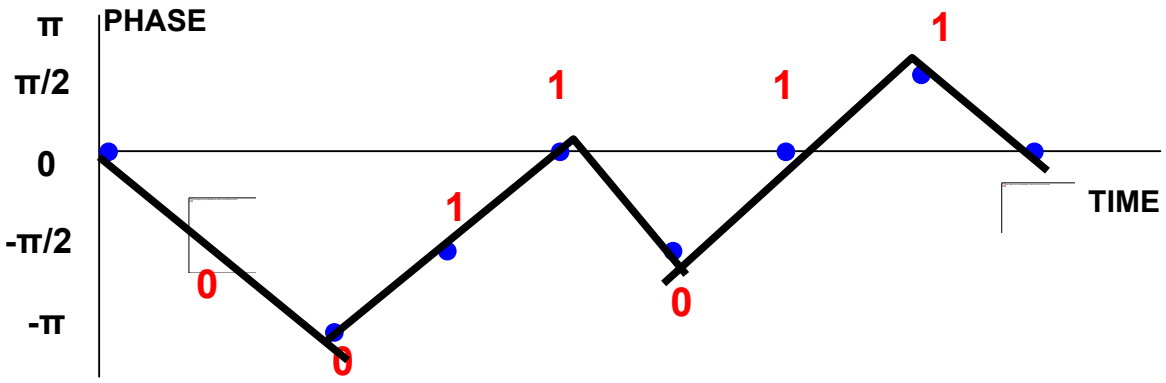
Combined Phase	-π/2	-π	-π/2	0	-π/2	0	π/2	0

Result: offset - QPSK, phase change is restricted to ± π/2 radians:



It would be preferable to have "gradual" changes in place between each pair of bits (Continuous-phase modulation). Replacing each “rectangular” shaped pulse (for 1 or 0) with a sinusoidal pulse can do this:

Result: Minimum Shift Keying (MSK):



Gaussian Minimum Shift Keying

MSK has high sidebands relative to the main lobes in the frequency domain - this can lead to interference with adjacent signals.

If the rectangular pulses corresponding to the bitstream are filtering using a Gaussian-shaped impulse response filter, we get Gaussian MSK (GMSK) - this has low sidelobes compared to MSK.

FCC 47 CFR Part 2, Limit Clause 2.1047 (d)

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.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Frequency Tolerance					
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	5-Mar-2017
Radio Communications Test Set	Rohde & Schwarz	CMU 200	2809	12	19-Jul-2017
Climatic Chamber	TAS	Micro 225	2892	-	O/P Mon
Thermocouple Thermometer	Fluke	51	3174	12	9-Dec-2016
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Power Divider	Weinschel	1506A	3345	12	7-Jun-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	5-Mar-2017
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4518	12	16-Feb-2017
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4-KMS	4519	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU
Section 2.2 - Spurious Emissions at Band Edge					
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	5-Mar-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Power Divider	Weinschel	1506A	3345	12	7-Jun-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	7-Jun-2017
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	5-Mar-2017
Digital Multi-meter	Iso-tech	IDM93N	4435	12	25-Aug-2017
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4518	12	16-Feb-2017
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4-KMS	4519	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.3 - Maximum Conducted Output Power					
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	7-Jun-2017
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	25-Sep-2016
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3982	12	25-Sep-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU
Section 2.4 - Emission Limitations for Cellular Equipment					
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Digital thermo Hygrometer	Radio Spares	1260	4300	12	23-Aug-2017
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.5 - Spurious Emissions at Antenna Terminals					
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	5-Mar-2017
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	5-Feb-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Power Divider	Weinschel	1506A	3345	12	7-Jun-2017
High Pass Filter (3GHz)	RLC Electronics	F-100-3000-5-R	3349	12	1-Jun-2017
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	26-Feb-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	7-Jun-2017
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	5-Mar-2017
Digital Multi-meter	Iso-tech	IDM93N	4435	12	25-Aug-2017
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4518	12	16-Feb-2017
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4-KMS	4519	12	16-Feb-2017
Wideband Radio Test Set	Rohde & Schwarz	CMW500	4546	12	3-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.6 - 26 dB Bandwidth					
Multimeter	Fluke	75 Mk3	455	12	10-Sep-2016
20dB/2W Attenuator	Narda	4772-20	462	-	TU
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	2809	12	19-Jul-2017
Climatic Chamber	TAS	Micro 225	2892	-	O/P Mon
Thermocouple Thermometer	Fluke	51	3174	12	9-Dec-2016
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Power Divider	Weinschel	1506A	3345	12	7-Jun-2017
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Sep-2016
Combiner/Splitter	Weinschel	1506A	3878	12	7-Jun-2017
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	7-Sep-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	27-Apr-2017
2 metre SMA Cable	Florida Labs	SMS-235SP-78.8-SMS	4518	12	16-Feb-2017
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4-KMS	4519	12	16-Feb-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	8-Oct-2016
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU

TU – Traceability Unscheduled
O/P MON – Output Monitored with Calibrated Equipment

Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Frequency Tolerance	± 46.70 Hz
Modulation Characteristics	-
Maximum Conducted Output Power	± 0.70 dB
Spurious Emissions at Antenna Terminals	± 3.454 dB
Emission Limitations for Cellular Equipment	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
26 dB Bandwidth	± 16.74 kHz
Spurious Emissions at Band Edge	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

UKAS TESTING 0141

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).