Product Service

Choose certainty.
Add value.

Report On

FCC Testing of the Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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: APYHRO00236

Document 75933584 Report 15 Issue 2 May 2016

Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

REPORT ON

FCC Testing of the Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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)

Document 75933584 Report 15 Issue 2

May 2016

PREPARED FOR

Sharp Telecommunications of Europe Ltd
Inspired
Easthampstead Road
Bracknell
Berkshire
RG12 1NS

PREPARED BY

Natalie Bennett
Senior Administrator, Project Support

APPROVED BY

Ryan Henley
Authorised Signatory

DATED 19 May 2016

This report has been up-issued to Issue 2 to correct a typographical error.

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);

M Russell S Bennett T Guy

UKAS TESTING 0141

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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)

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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 004401115792588 IMEI 004401115794253
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	10753 17 February 2016
Start of Test	19 April 2016
Finish of Test	28 April 2016
Name of Engineer(s)	M Russell S Bennett T Guy
Related Document(s)	ANSI C63.4 (2014) ANSI TIA-603-C (2004)

Product Service

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	2.1051	Spurious Emissions at Band Edge	Pass	
2.3	22.913 (a)	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 APYHRO00236 Rev 1.0 document.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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 Dual-band LTE (B1 / B26), Dual-band WCDMA (FDD I / V) &,Quad-band GSM (850/900/1800/1900) multi mode Cellular 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)

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 004401115792588 - Modification State 0

2.1.3 Date of Test

27 April 2016 & 28 April 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

The test was performed in accordance with KDB 971168 D01 v02r02, Clause 9.

Remarks

Using a communication test set, frequency error measurements were made over the temperature range -30°C to +50°C in 10° steps. At 20°C, the voltage was varied in accordance with 2.1055 (d).

The communication test set was connected to an external frequency standard to improve measurement accuracy.

2.1.6 Environmental Conditions

Ambient Temperature	21.8°C
Relative Humidity	31.8%

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	0.022
-20 ºC	0.018
-10 ºC	0.022
0 ºC	0.019
+10 ºC	0.025
+20 ºC	0.024
+30 ºC	0.023
+40 ºC	0.023
+50 ºC	0.031

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

Voltage	Fundamental Frequency Deviation (ppm)
4.0 V DC	0.024
3.7 V DC	0.026

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
FCC 47 CFR Part 2, Clause 2.1051

2.2.2 Equipment Under Test and Modification State

S/N: IMEI 004401115792588 - Modification State 0

2.2.3 Date of Test

25 April 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

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 26 dB Bandwidth.

2.2.6 Environmental Conditions

Ambient Temperature	21.3°C
Relative Humidity	34.5%

Product Service

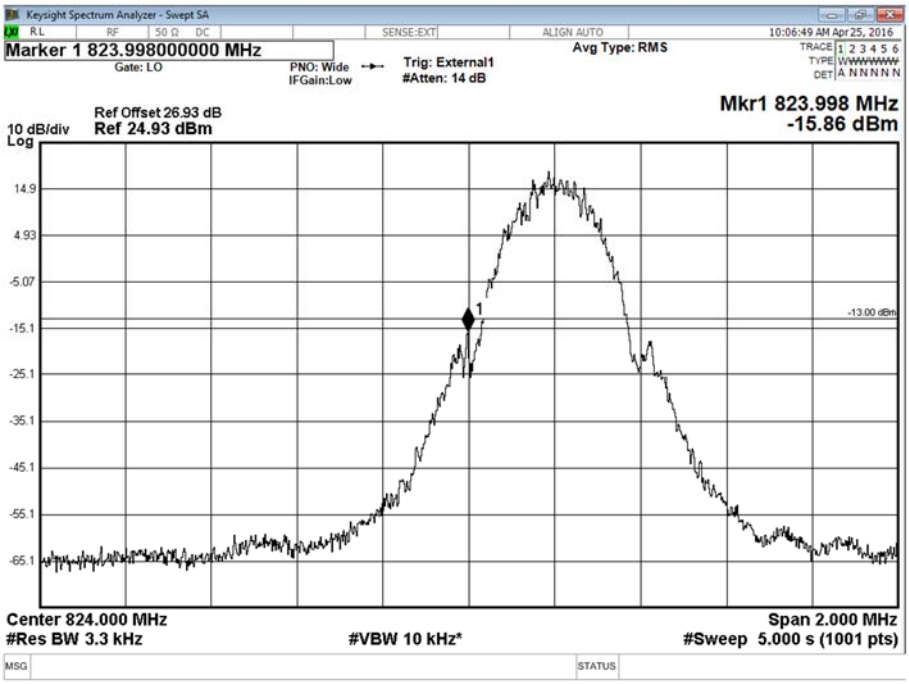
2.2.7 Test Results

4.0 V DC Supply

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

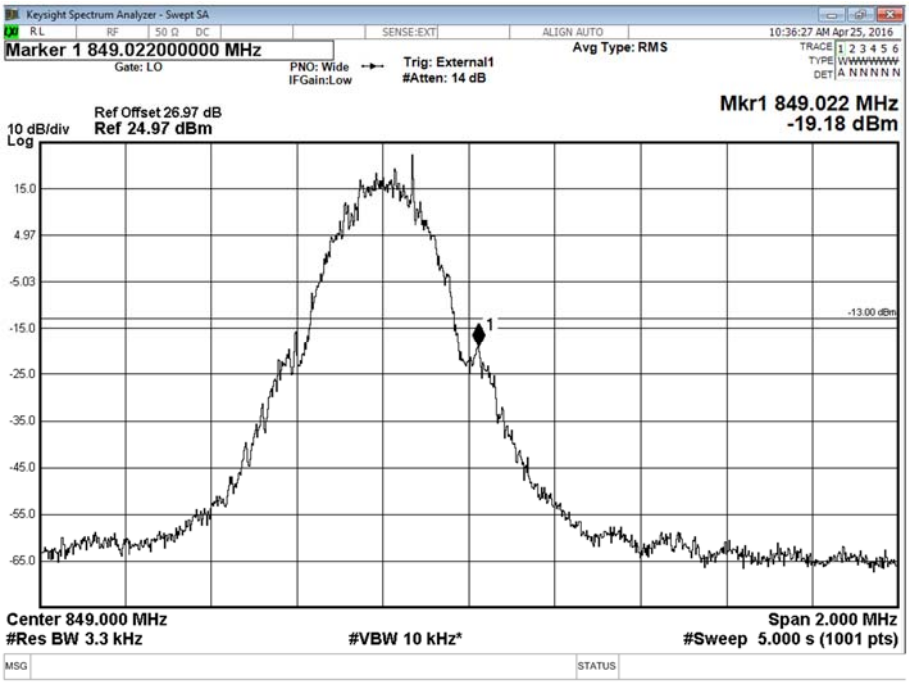
Block Edge	Frequency Block (MHz)	
	A :824.0 MHz – 835.0 MHz	B :846.5 MHz – 849.0 MHz
Lower	Channel: 128 824.2 MHz	-
Upper	-	Channel: 251 848.8 MHz

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



Product Service

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.

Product Service

2.3 MAXIMUM CONDUCTED OUTPUT POWER

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test and Modification State

S/N: IMEI 004401115792588 - Modification State 0

2.3.3 Date of Test

19 April 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. As per KDB 412172 D01 v01r01 results are recorded in ERP therefore reported results are calculated as per the following calculation:

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

2.3.6 Environmental Conditions

Ambient Temperature	23.4°C
Relative Humidity	27.7%

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)	EIRP (W)
824.20 MHz	32.32	2.0 dBi	32.17	1.65
836.40 MHz	32.17	2.0 dBi	32.02	1.59
848.80 MHz	32.10	2.0 dBi	31.95	1.57

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

Mobile Transmitters: 7 W or 38.45 dBm

Product Service

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 004401115794253 - Modification State 0

2.4.3 Date of Test

21 April 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 KDB 971168 D01 v02r02, Clause 5.8 and 7 and ANSI TIA-603-C, Clause 2.2.12. The EUT was configured as defined in ANSI C63.26.

2.4.6 Environmental Conditions

Ambient Temperature	20.7 - 21.7°C
Relative Humidity	34.8 - 35.4%

Product Service

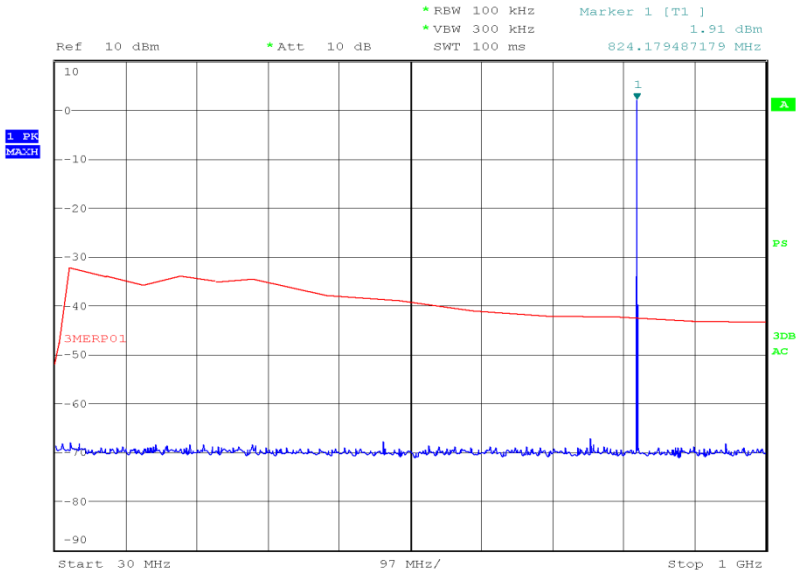
2.4.7 Test Results

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

Frequency (MHz)	Emission Results (dBm)
*	

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

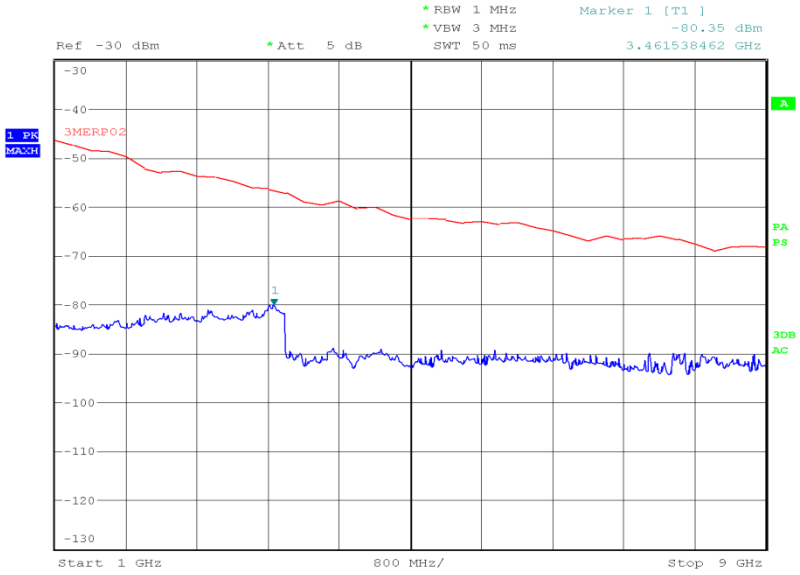
GSM 850, 824.20 MHz, 30 MHz to 1 GHz, Emission Limitations for Celluar Equipment Plot



Date: 21.APR.2016 21:17:48

Product Service

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



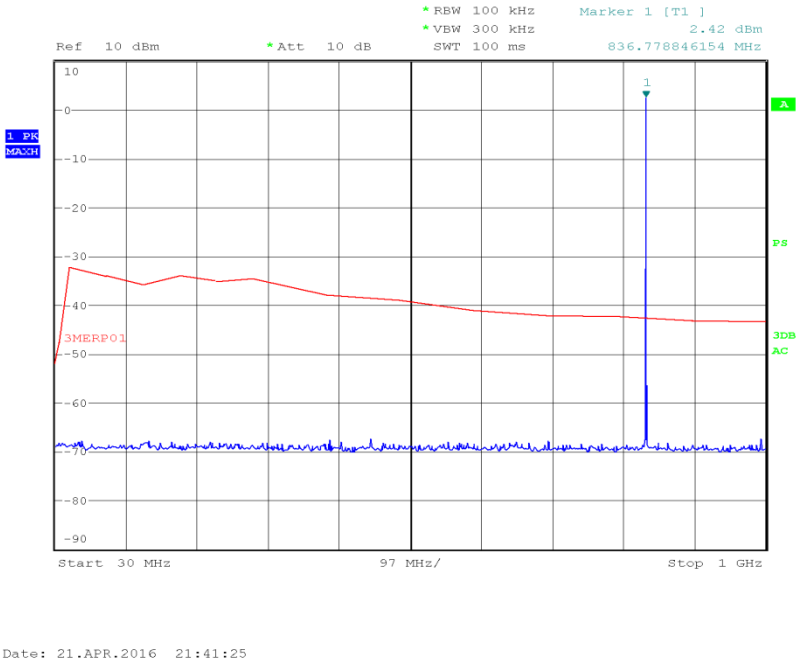
Date: 21.APR.2016 03:42:22

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

Frequency (MHz)	Emission Results (dBm)
*	

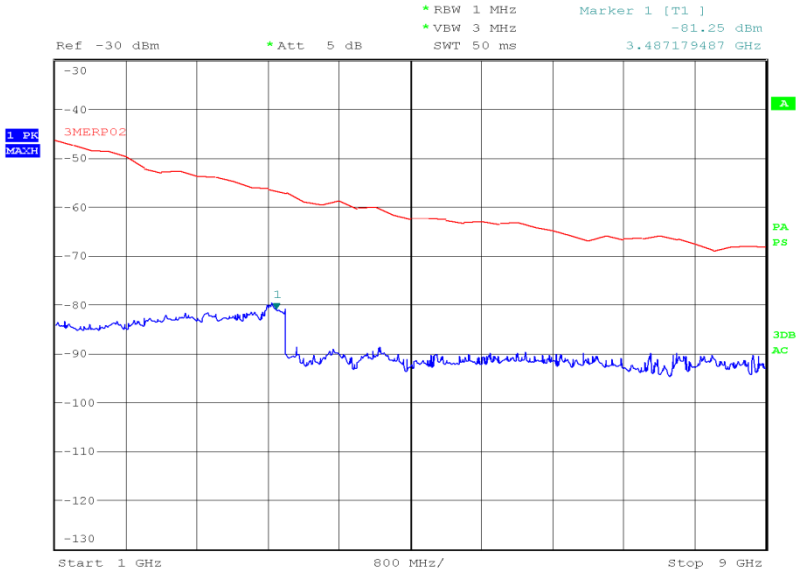
*No emissions were detected within 20 dB of the limit.

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



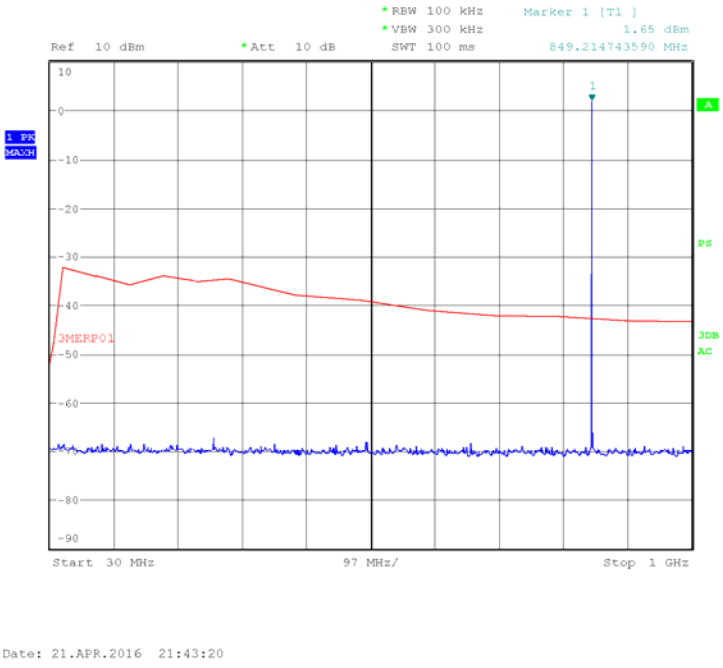
Product Service

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

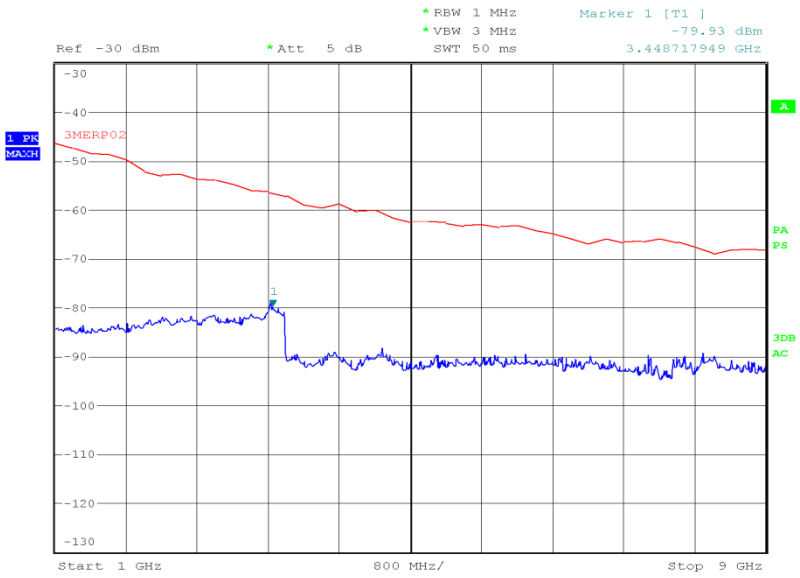
Frequency (MHz)	Emission Results (dBm)
*	

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

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



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



Date: 21.APR.2016 03:38:28

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

43+10log(P) or -13 dBm

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 004401115792588 - Modification State 0

2.5.3 Date of Test

25 April 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

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	21.3°C
Relative Humidity	34.5%

Product Service

2.5.7 Test Results

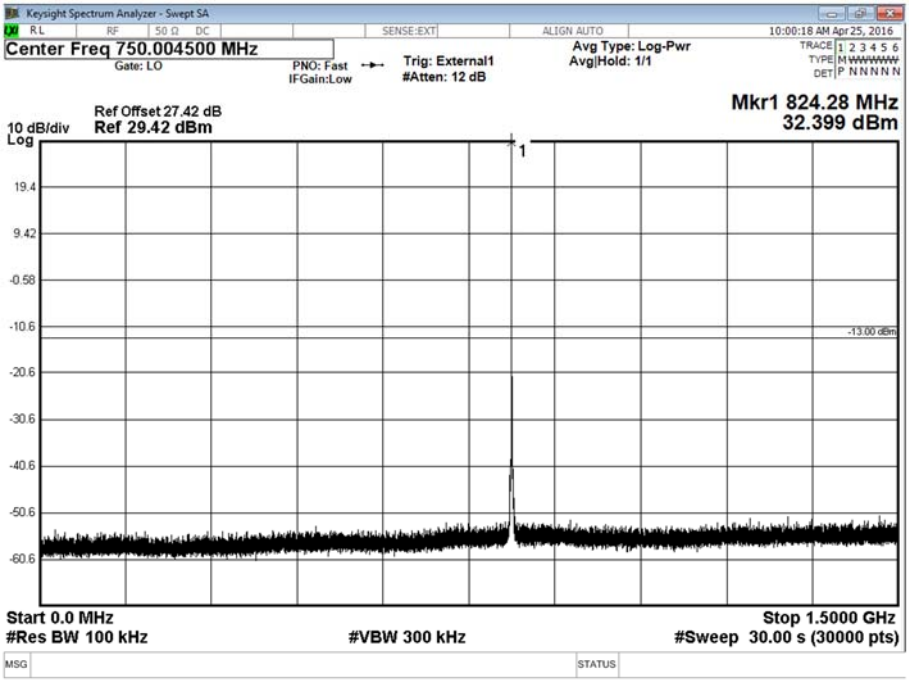
4.0 V DC Supply

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

Frequency (MHz)	Emission Results (dBm)
*	

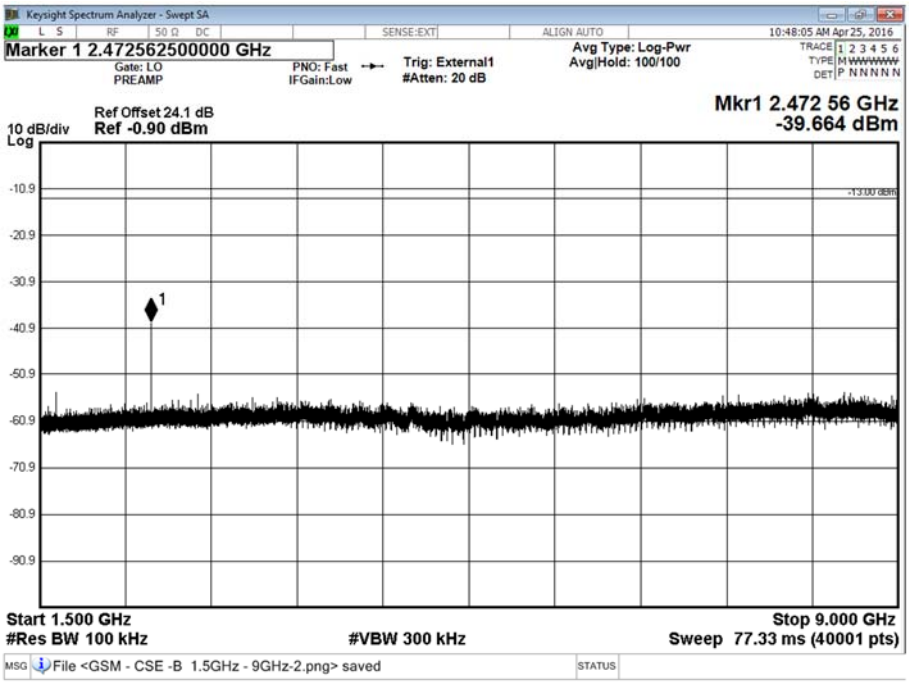
*No emissions were detected within 20 dB of the limit.

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

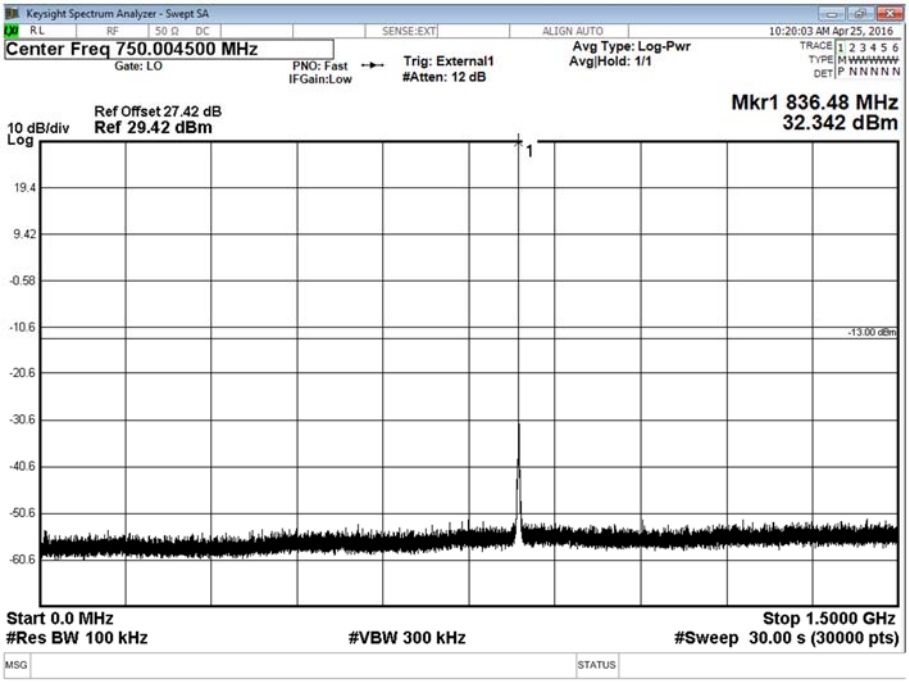


GSM 850, 836.40 MHz, Spurious Emissions at Antenna Terminals Results

Frequency (MHz)	Emission Results (dBm)
*	

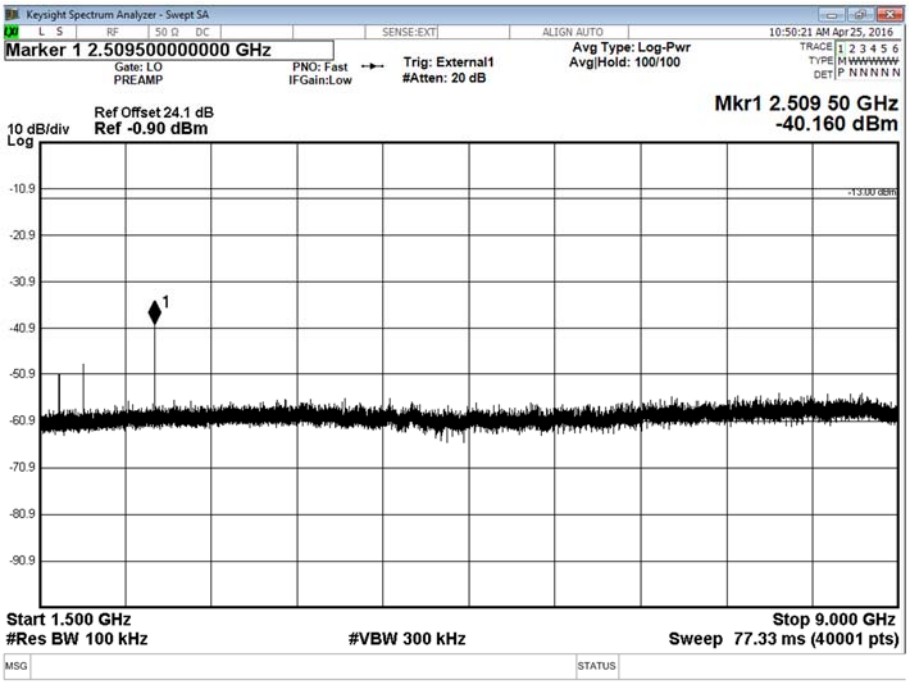
*No emissions were detected within 20 dB of the limit.

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



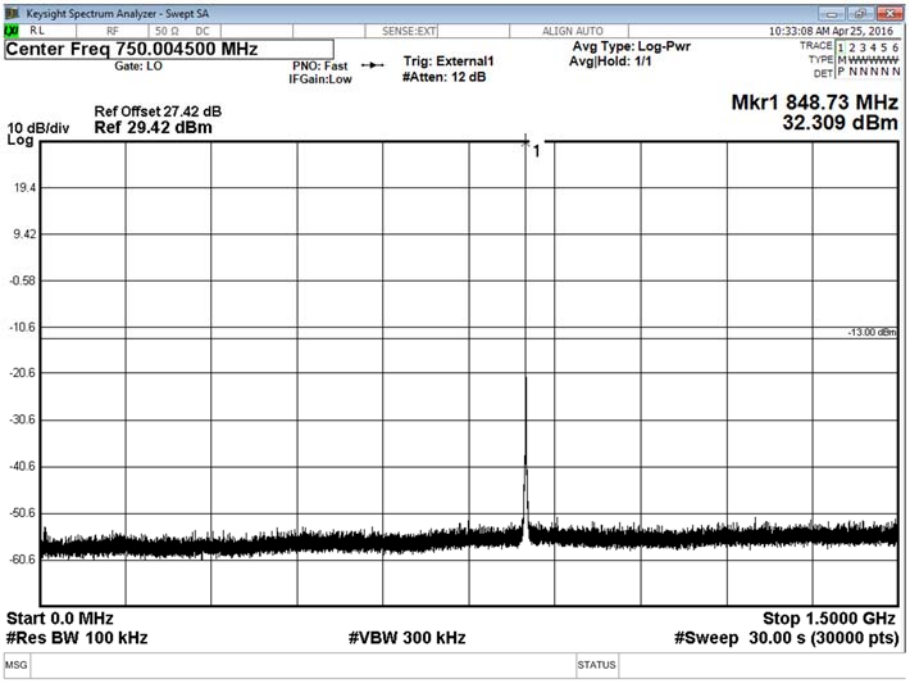
Product Service

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

Frequency (MHz)	Emission Results (dBm)
*	

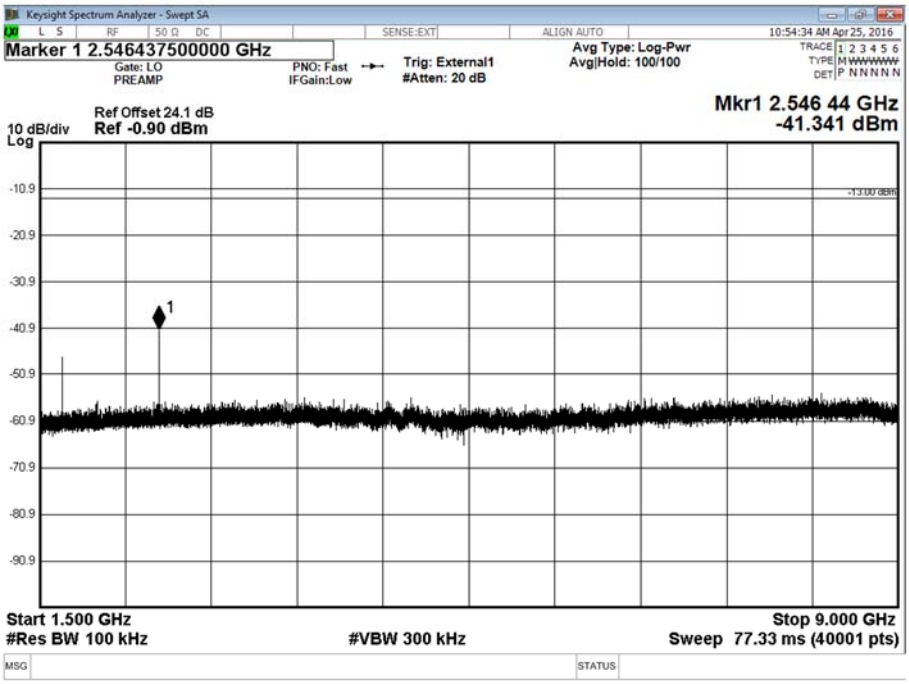
*No emissions were detected within 20 dB of the limit.

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 004401115792588 - Modification State 0

2.6.3 Date of Test

25 April 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	21.3°C
Relative Humidity	34.5%

Product Service

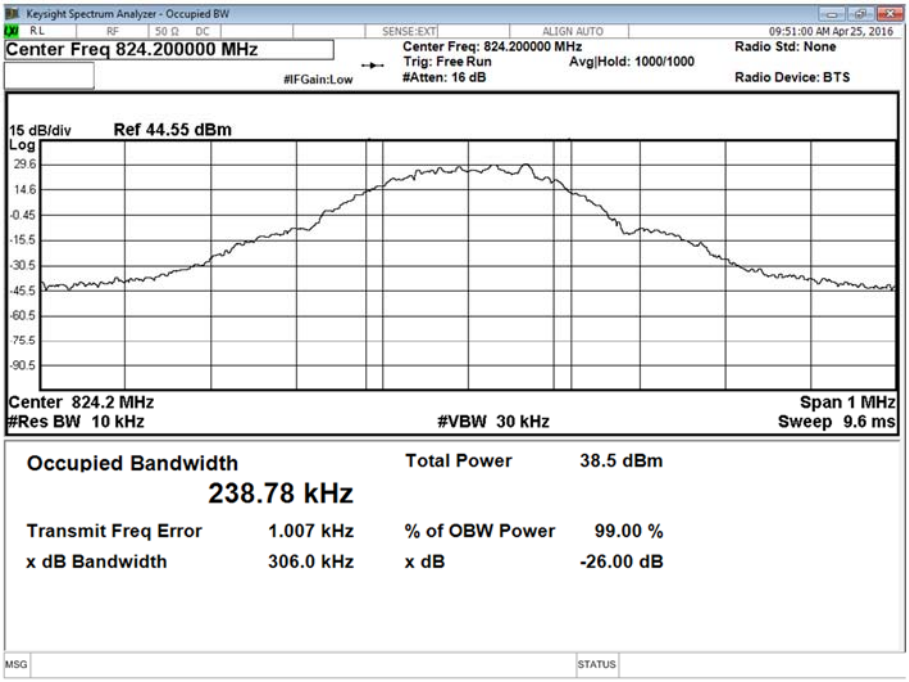
2.6.7 Test Results

4.0 V DC Supply

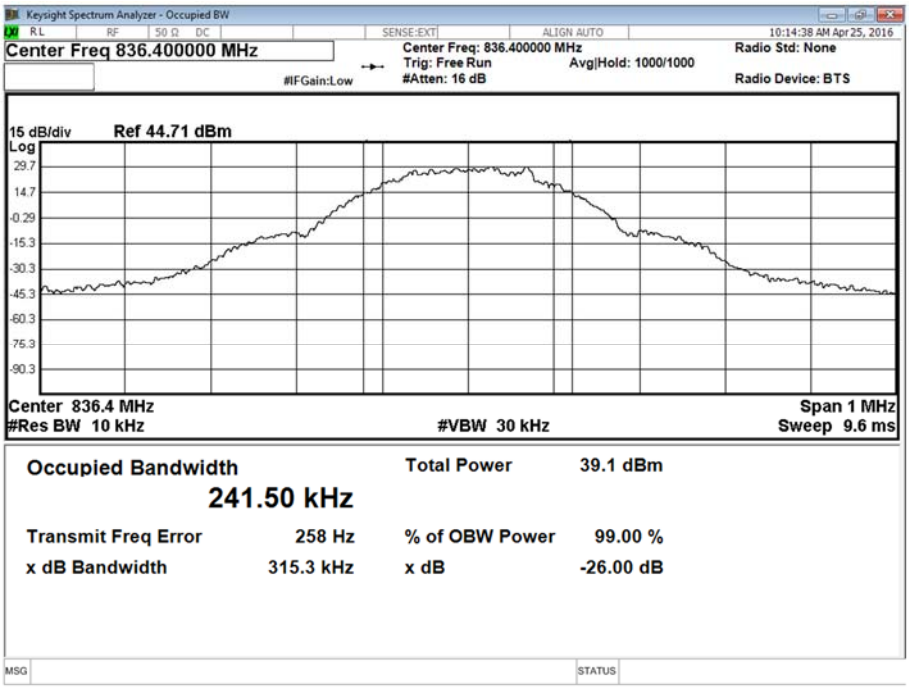
GSM 850, GMSK, 26 dB Bandwidth Results

824.20 MHz	836.40 MHz	848.80 MHz
kHz	kHz	kHz
306.0	315.3	308.3

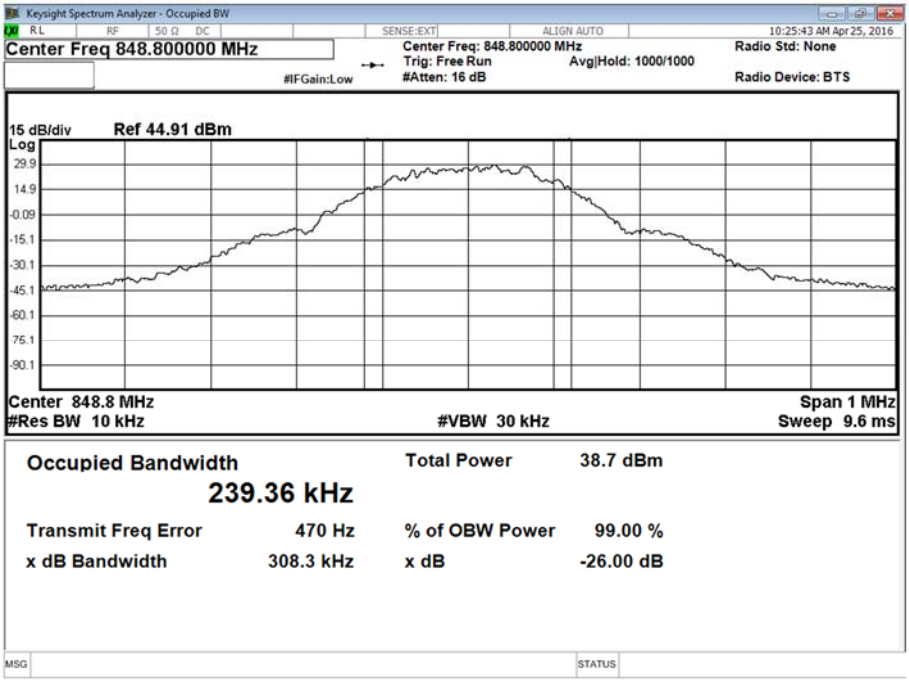
GSM 850, 824.20 MHz, GMSK, 26 dB Bandwidth Plot



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.

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

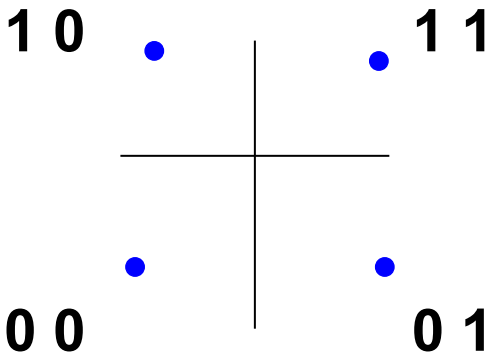
GMSK OVERVIEW

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)

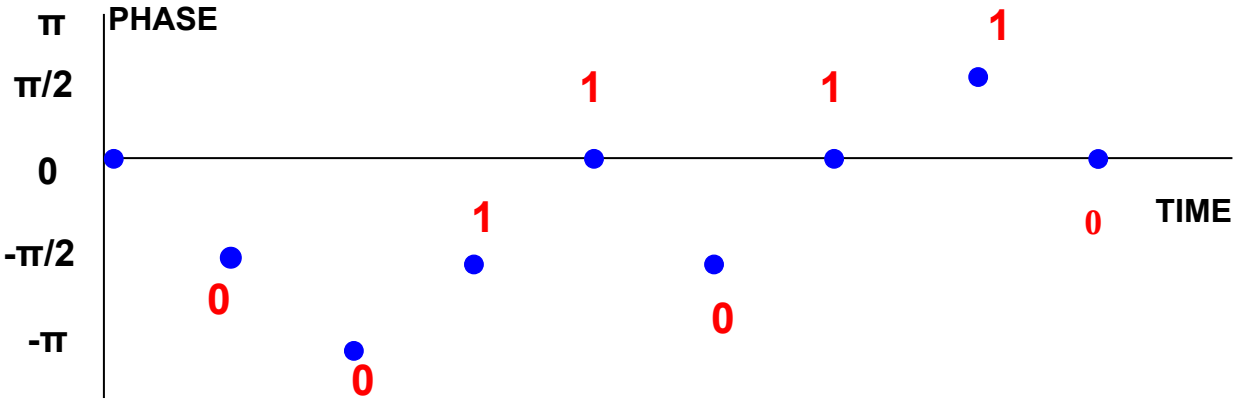
I Stream	0		1		0		1	
	-π/2		-π/2		-π/2		π/2	
Q stream		0		1		1		0
		-π/2		π/2		π/2		-π/2

Product Service

3. Combine (add) the two PSK signals:

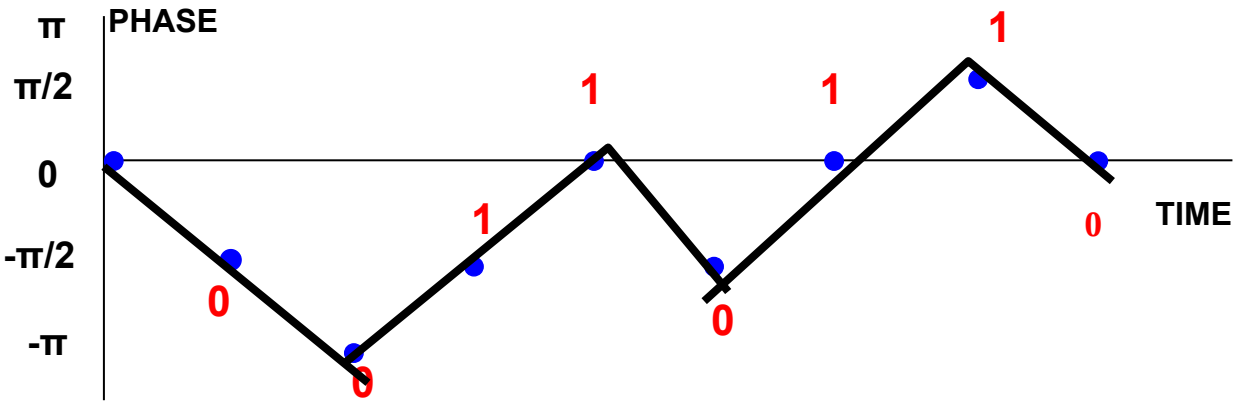
Combined Phase	-π/2	-π	-π/2	0	-π/2	0	π/2	0

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					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Digital Temperature Indicator + T/C	Fluke	51	412	12	2-Mar-2017
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	16-Nov-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	3-Sep-2016
Section 2.2- Spurious Emissions at Band Edge					
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-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
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Section 2.3 - Maximum Conducted Output Power					
Multimeter	White Gold	WG022	190	12	24-Nov-2016
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Attenuator (20dB/ 2W)	Pasternack	PE7004-20	489	12	30-Oct-2016
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
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	2-Jun-2016
P-Series Power Meter	Agilent Technologies	N1911A	3981	12	25-Sep-2016
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3983	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
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017

Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Emission Limitations for Cellular Equipment					
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	16-Nov-2016
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	28-Sep-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
Section 2.5 - Spurious Emissions at Antenna Terminals					
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
High Pass Filter (7GHz)	Lorch	9HP7-7000-SR	2246	0	Class 1 (Int)
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	5-Feb-2017
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-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
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	23-Mar-2017
Section 2.6 - 26 dB Bandwidth					
Attenuator 10dB/25W	Weinschel	46-10-43	400	12	18-Jun-2016
Amplifier	Miteq Corp	AM-4A-0510-1103	422	-	TU
Radio Communications Test Set	Rohde & Schwarz	CMU 200	442	12	18-Jan-2017
Power Splitter	Weinschel	1506A	607	12	31-Mar-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	3-Sep-2016
Power Supply	Hewlett Packard	6104A	1948	-	TU
Multimeter	Iso-tech	IDM101	2424	12	29-Sep-2016
Programmable Power Supply	Iso-tech	IPS 2010	2436	-	O/P Mon
Attenuator (20dB, 2W)	Pasternack	PE7004-20	2943	12	4-Apr-2017
Hygrometer	Rotronic	I-1000	3220	12	19-Aug-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-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
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	8-Mar-2017

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	± 10.14 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

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).