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Report On

FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 24 and FCC 47 CFR Part 2 (PCS 1900)

COMMERCIAL-IN-CONFIDENCE
FCC ID: APYHRO00218

Document 75929719 Report 19 Issue 4 June 2015

Product Service

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REPORT ON

FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 24 and FCC 47 CFR Part 2 (PCS 1900)

Document 75929719 Report 19 Issue 4

May 2015

PREPARED FOR

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Authorised Signatory

DATED 25 June 2015

This report has been up-issued to Issue 4 to amend the antenna gain.

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 24 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 T Guy

UKAS TESTING 0141

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V),
Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with
Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 24 and FCC 47 CFR Part 2 (PCS 1900)

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS to the requirements of FCC 47 CFR Part 24 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
Model Number(s)	SHV32
Serial Number(s)	IMEI 004401115406452 IMEI 004401115406759
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 24 (2014) FCC 47 CFR Part 2 (2014)
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	10477 02 March 2015
Start of Test	17 April 2015
Finish of Test	01 May 2015
Name of Engineer(s)	M Russell T Guy
Related Document(s)	ANSI C63.4 (2003) 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 24 and FCC 47 CFR Part 2 is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 24	Part 2			
PCS 1900					
2.1	24.229 and 24.238	2.1051	Spurious Emissions at Band Edge	Pass	
2.2	24.232 (d)	-	Peak to Average Ratio	Pass	
2.3	24.232	2.1046	Maximum Conducted Output Power	Pass	
2.4	24.235	2.1055	Frequency Stability	Pass	
2.5	24.238	2.1053	Emission Limitations for Broadband PCS Equipment	Pass	
2.6	24.238	2.1049 (h)	26 dB Bandwidth	Pass	
2.7	-	2.1047 (d)	Modulation Characteristics	-	Customer Declaration

1.3 PRODUCT TECHNICAL DESCRIPTION

Please refer to the SHV32 Model Description Form.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Sharp SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (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 SHV32 Hex-band LTE (B1 / B3 / B5 / B17 / B26 / B28), Dual-band WCDMA (FDD I / V), Quad-band GSM (850/900/1800/1900) & AXGP (TDD41) multi mode Smart phone with Bluetooth, WLAN, SRD (NFC,FeliCa) and GPS
In accordance with FCC 47 CFR Part 24 and FCC 47 CFR Part 2 (PCS 1900)

2.1 SPURIOUS EMISSIONS AT BAND EDGE

2.1.1 Specification Reference

FCC 47 CFR Part 24, Clause 24.229, 24.238
FCC 47 CFR Part 2, Clause 2.1051

2.1.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406452 - Modification State 0

2.1.3 Date of Test

01 May 2015

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 KDB 971168 D01 v02r02, clause 6.

Remarks

The EUT was configured using a communications test set with the EUT configured to maximum output power using circuit switched voice call.

2.1.6 Environmental Conditions

Ambient Temperature	24.8°C
Relative Humidity	29.6%

Product Service

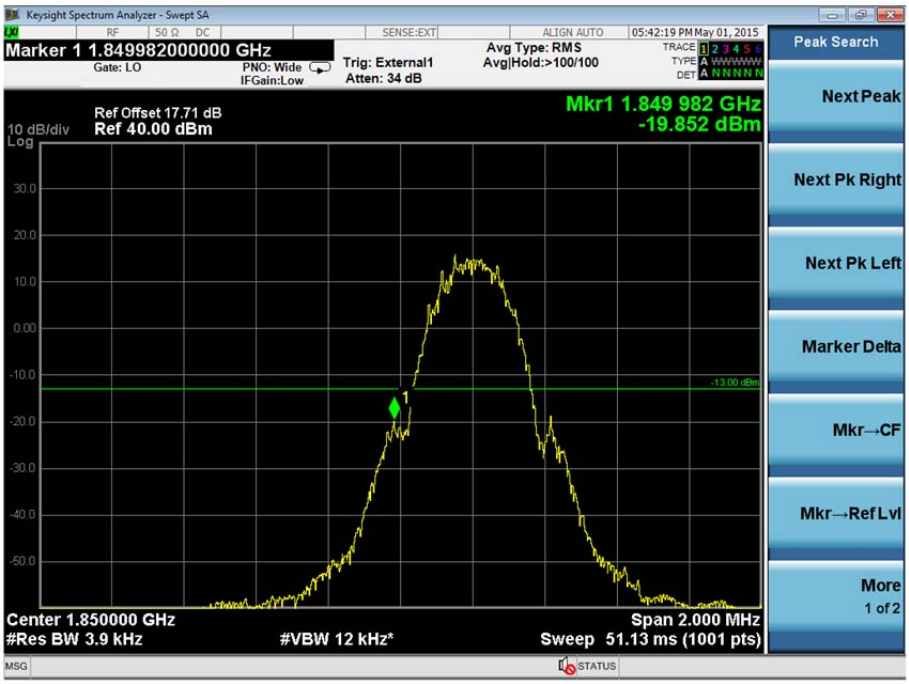
2.1.7 Test Results

4.0 V DC Supply

PCS 1900, Circuit-Switched, GMSK, Spurious Emissions at Band Edge Results

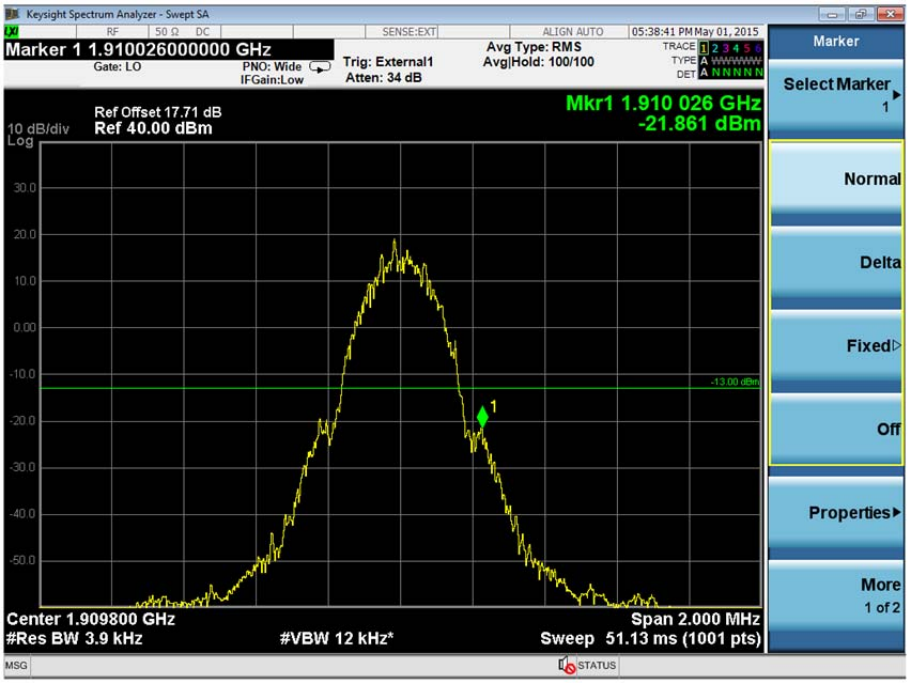
Block Edge	Frequency Block (MHz)	
	A :1850 MHz – 1865 MHz	C :1895 MHz – 1910 MHz
Lower	Channel: 512 1850.2 MHz	-
Upper	-	Channel: 810 1909.8 MHz

PCS 1900, Circuit-Switched, GMSK, Frequency Block A, Spurious Emissions at Band Edge Plot



Product Service

PCS 1900, Circuit-Switched, GMSK, Frequency Block C, Spurious Emissions at Band Edge Plot



FCC 47 CFR Part 24, Limit Clause 24.229 (a)

Mobile Transmitters:

Block A: 1850 to 1865 MHz paired with 1930 to 1945 MHz
Block B: 1870 to 1885 MHz paired with 1950 to 1965 MHz

FCC 47 CFR Part 24, Limit Clause 24.238 (a)

43 + 10 log (P) dB or -13 dBm.

2.2 PEAK TO AVERAGE RATIO

2.2.1 Specification Reference

FCC 47 CFR Part 24, Clause 24.232 (d)

2.2.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406452 - Modification State 0

2.2.3 Date of Test

17 April 2015

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 5.7.2. Clause 5.1.2 was used for peak power measurements and clause 5.2.3 for average measurements.

2.2.6 Environmental Conditions

Ambient Temperature	24.9°C
Relative Humidity	28.3%

2.2.7 Test Results

PCS 1900, Peak to Average Ratio Results

1850.2 MHz	1880.0 MHz	1909.8 MHz
dB	dB	dB
0.33	0.35	0.37

FCC 47 CFR Part 24, Limit Clause 24.232 (d)

< 13 dB

2.3 MAXIMUM CONDUCTED OUTPUT POWER

2.3.1 Specification Reference

FCC 47 CFR Part 24, Clause 24.232
FCC 47 CFR Part 2, Clause 2.1046

2.3.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406452 - Modification State 0

2.3.3 Date of Test

17 April 2015

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

This test was performed in accordance with KDB 971168 D01 v02r02, clause 5.2.3.

Remarks

The EUT was configured by using a communications test to set the EUT at maximum output power using a circuit switched voice call.

2.3.6 Environmental Conditions

Ambient Temperature	24.9°C
Relative Humidity	28.3%

2.3.7 Test Results

4.0 V DC Supply

PCS 1900, GMSK, Maximum Average Conducted Output Power Results

Frequency	Conducted Power (dBm)	Antenna Gain)	EIRP (dBm)	EIRP (W)
1850.2 MHz	28.81	2.0 dBi	30.81	1.205
1880.0 MHz	29.64	2.0 dBi	31.64	1.459
1909.8 MHz	29.63	2.0 dBi	31.63	1.455

FCC 47 CFR Part 24, Limit Clause 24.232 (c)

Mobile and portable stations: 2 Watts.

2.4 FREQUENCY STABILITY

2.4.1 Specification Reference

FCC 47 CFR Part 24, Clause 24.235
FCC 47 CFR Part 2, Clause 2.1055

2.4.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406452 - Modification State 0

2.4.3 Date of Test

24 April 2015 & 27 April 2015

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

Measurements were performed in accordance with FCC 47 CFR Part 2, clause 2.1055.

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.

2.4.6 Environmental Conditions

Ambient Temperature	22.2 - 22.3°C
Relative Humidity	34.6 - 38.6%

Product Service

2.4.7 Test Results

PCS 1900, 1880.0 MHz, Circuit-Switched, GMSK, Frequency Stability Under Temperature Variations Results

Temperature	Fundamental Measured Frequency (MHz)
-30 ºC	1880.000046
-20 ºC	1880.000026
-10 ºC	1880.000035
0 ºC	1800.000027
+10 ºC	1880.000013
+20 ºC	1880.000035
+30 ºC	1880.000035
+40 ºC	1880.000030
+50 ºC	18880.000025

PCS 1900, 1880.0 MHz, Circuit-Switched, GMSK, Frequency Stability Under Voltage Variations Results

Voltage	Fundamental Measured Frequency (MHz)
4.0 V DC	1880.000035
3.7 V DC	1880.000038

Remark

The measured frequency error over temperature and voltage extremes does not cause the fundamental emission to go outside the authorised frequency block.

FCC 47 CFR Part 24, Limit Clause 24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorised frequency block.

Product Service

2.5 EMISSION LIMITATIONS FOR BROADBAND PCS EQUIPMENT

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 24, Clause 24.238

2.5.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406759 - Modification State 0

2.5.3 Date of Test

22 April 2015 & 26 April 2015

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 5.8 and 7 and ANSI TIA-603-C, Clause 2.2.12. The EUT was configured as defined in ANSI C63.4.

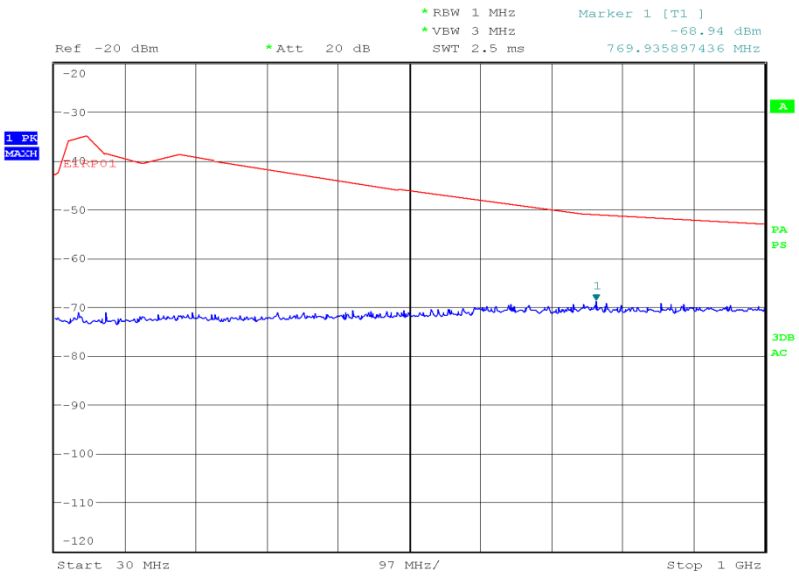
2.5.6 Environmental Conditions

Ambient Temperature	19.9 - 20.1°C
Relative Humidity	27.0 - 33.0%

Product Service

2.5.7 Test Results

PCS 1900, 1850.2 MHz, 30 MHz to 1 GHz, Emission Limitations for Broadband PCS Equipment Results



Date: 22.APR.2015 10:40:20

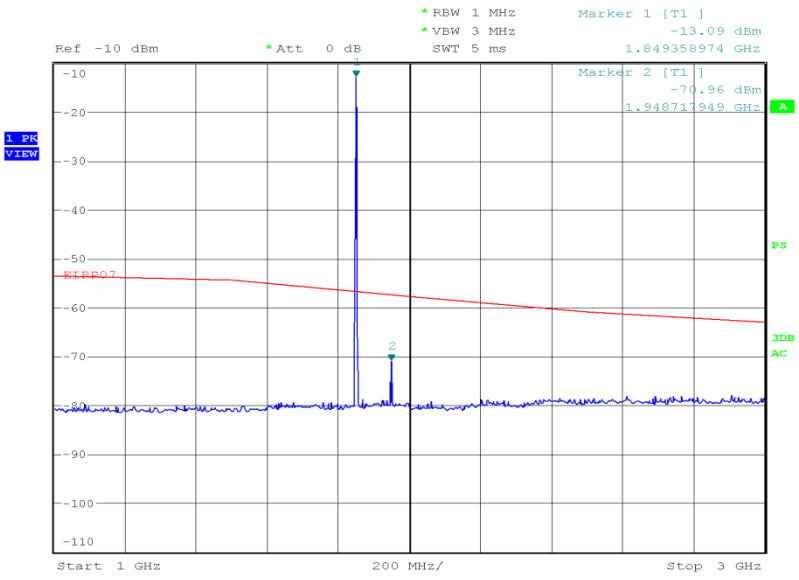
Product Service

PCS 1900, 1850.2 MHz, 1 GHz to 20 GHz, Emission Limitations for Broadband PCS Equipment Results

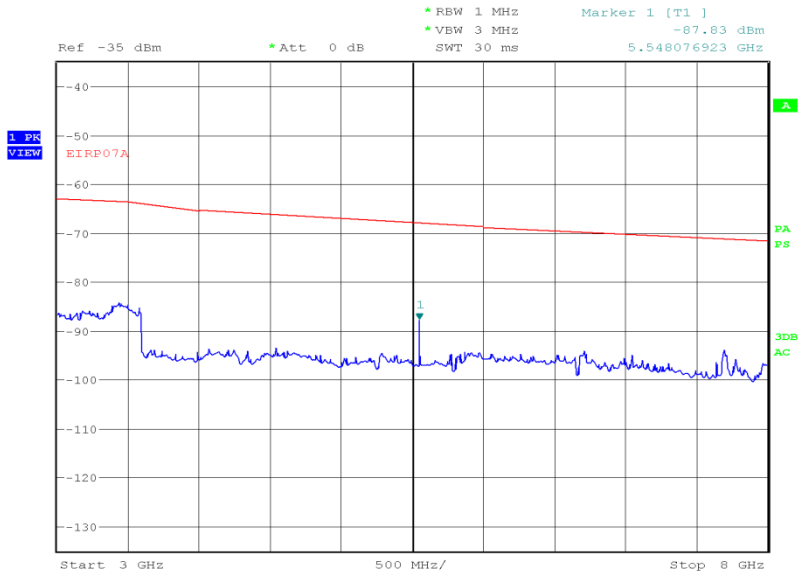
Frequency (MHz)	Emission Results (dBm)
*	

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

PCS 1900, 1850.2 MHz, 1 GHz to 3 GHz, Emission Limitations for Broadband PCS Equipment Plot



PCS 1900, 1850.2 MHz, 3 GHz to 8 GHz, Emission Limitations for Broadband PCS Equipment Plot



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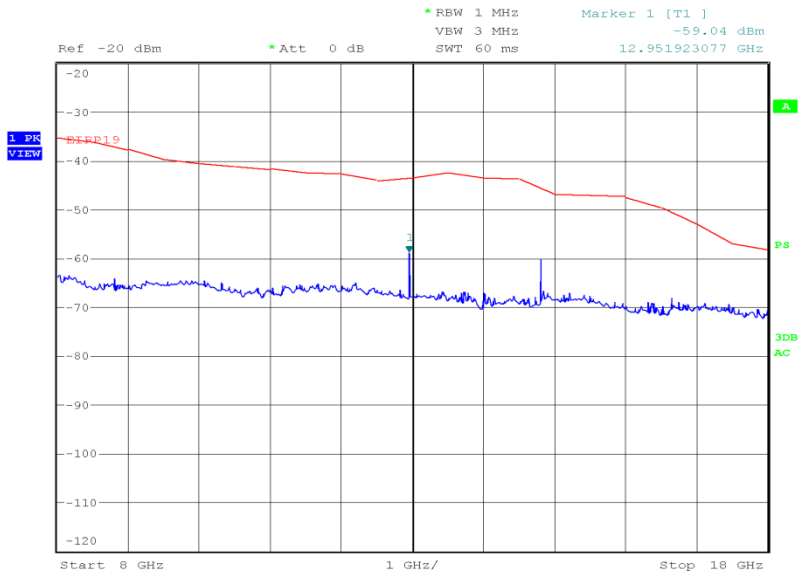
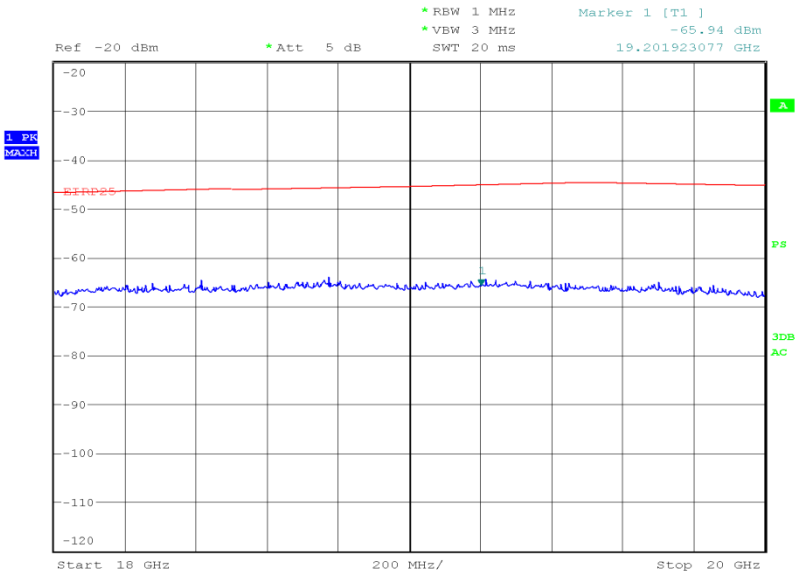
PCS 1900, 1850.2 MHz, 8 GHz to 18 GHz, Emission Limitations for Broadband PCS Equipment Plot



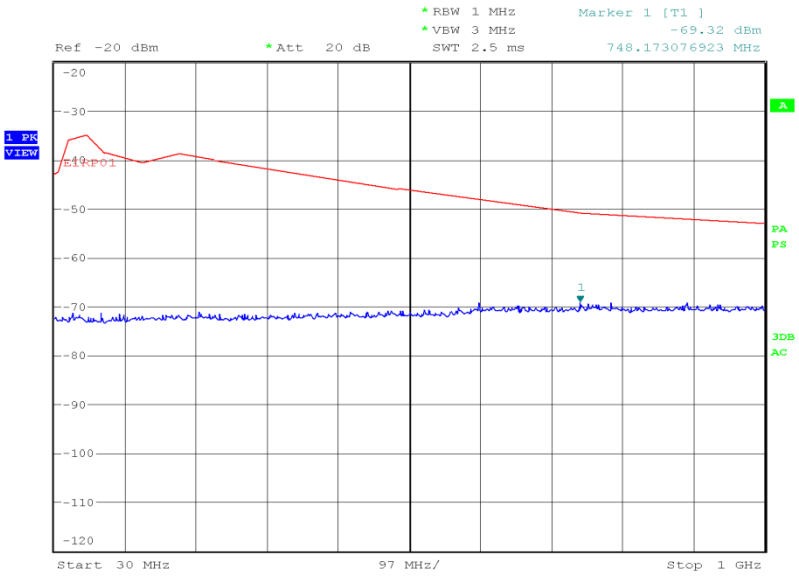
Date: 21.APR.2015 14:04:30

PCS 1900, 1850.2 MHz, 18 GHz to 20 GHz, Emission Limitations for Broadband PCS Equipment Plot



Date: 26.APR.2015 03:06:42

PCS 1900, 1880.0 MHz, 30 MHz to 1 GHz, Emission Limitations for Broadband PCS Equipment Results



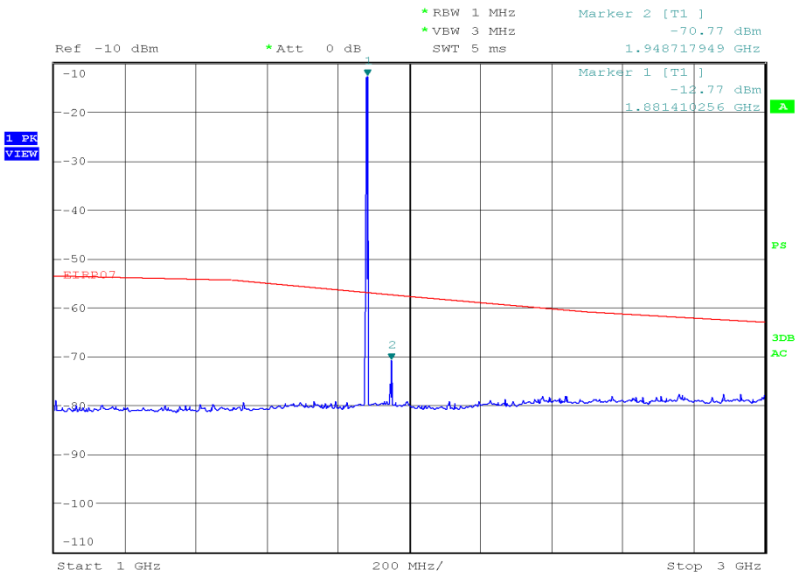
Date: 22.APR.2015 10:35:27

PCS 1900, 1880.0 MHz, 1 GHz to 20 GHz Emission Limitations for Broadband PCS Equipment Results

Frequency (MHz)	Emission Results (dBm)
13160	-32.94

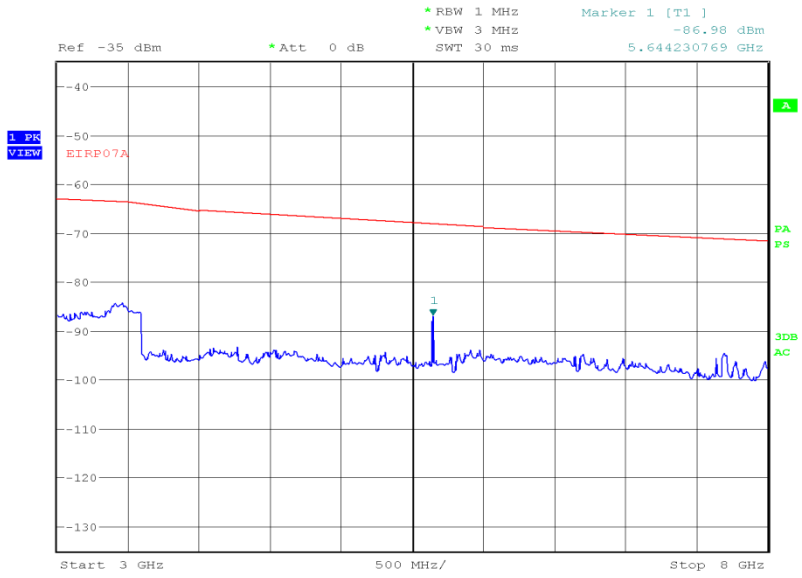
No other emissions were detected within 20 dB of the limit.

PCS 1900, 1880.0 MHz, 1 GHz to 3 GHz, Emission Limitations for Broadband PCS Equipment Plot



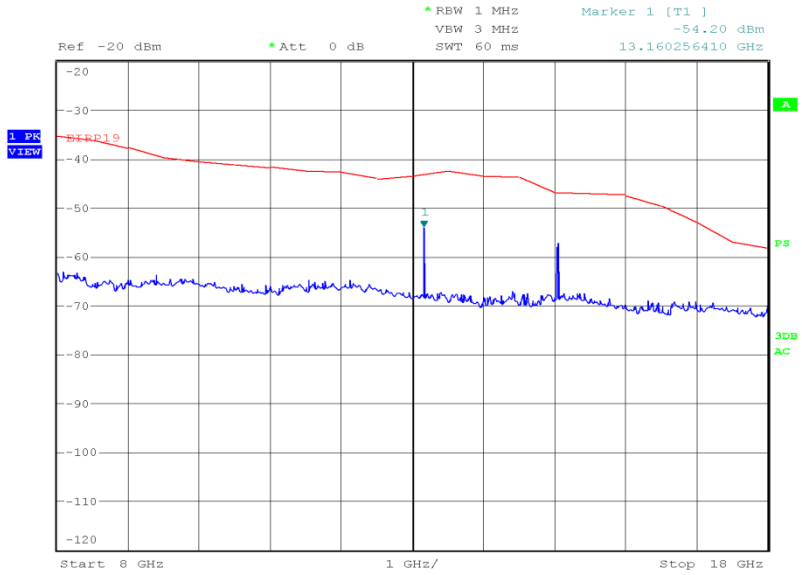
Product Service

PCS 1900, 1880.0 MHz, 3 GHz to 8 GHz, Emission Limitations for Broadband PCS Equipment Plot



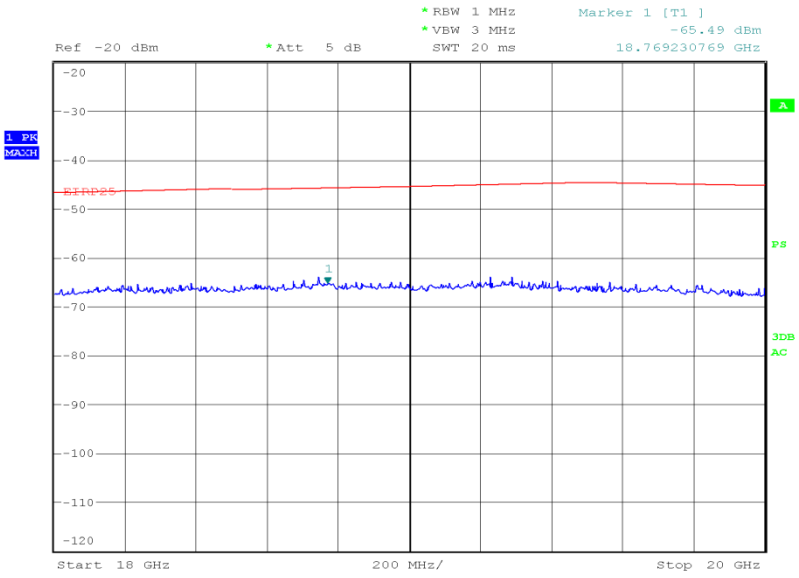
Date: 21.APR.2015 11:53:42

PCS 1900, 1880.0 MHz, 8 GHz to 18 GHz, Emission Limitations for Broadband PCS Equipment Plot



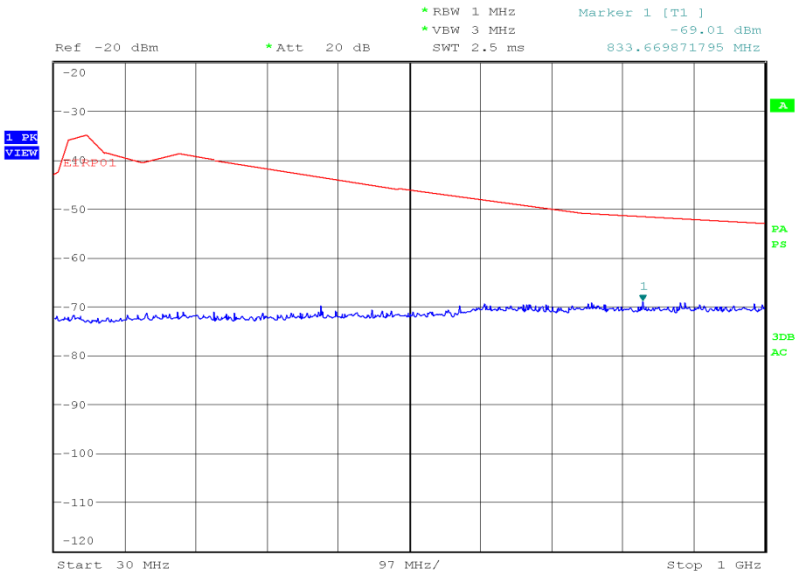
Date: 21.APR.2015 14:22:02

PCS 1900, 1880.0 MHz, 18 GHz to 20 GHz, Emission Limitations for Broadband PCS Equipment Plot



Date: 26.APR.2015 03:10:08

PCS 1900, 1909.8 MHz, 30 MHz to 1 GHz, Emission Limitations for Broadband PCS Equipment Results



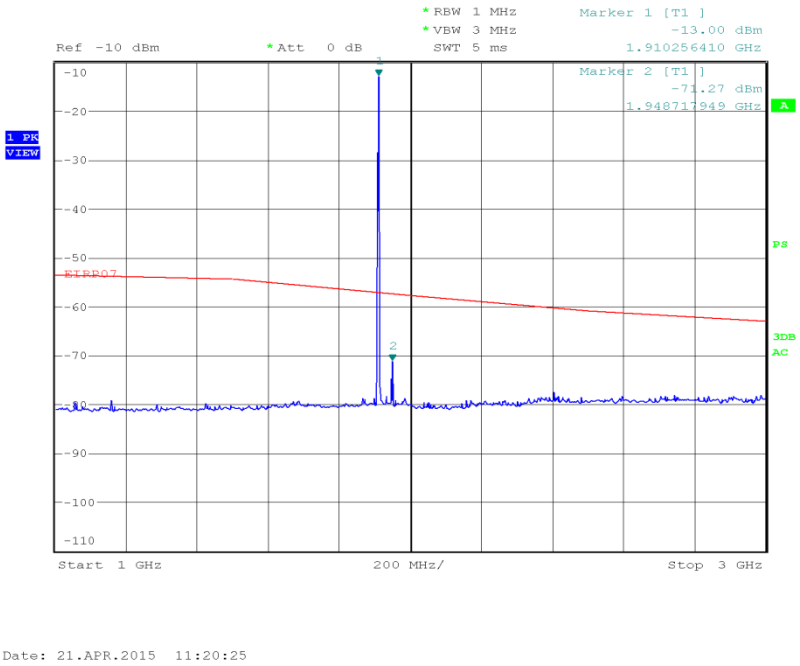
Date: 22.APR.2015 10:47:28

PCS 1900, 1909.8 MHz, 1 GHz to 20 GHz, Emission Limitations for Broadband PCS Equipment Results

Frequency (MHz)	Emission Results (dBm)
*	

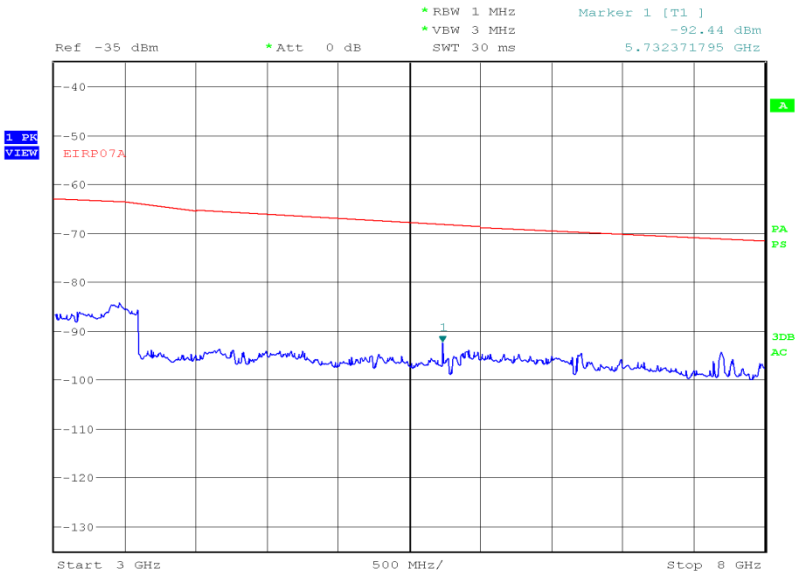
*No emissions were detected within 20 dB of the limit.

PCS 1900, 1909.8 MHz, 1 GHz to 3 GHz, Emission Limitations for Broadband PCS Equipment Plot



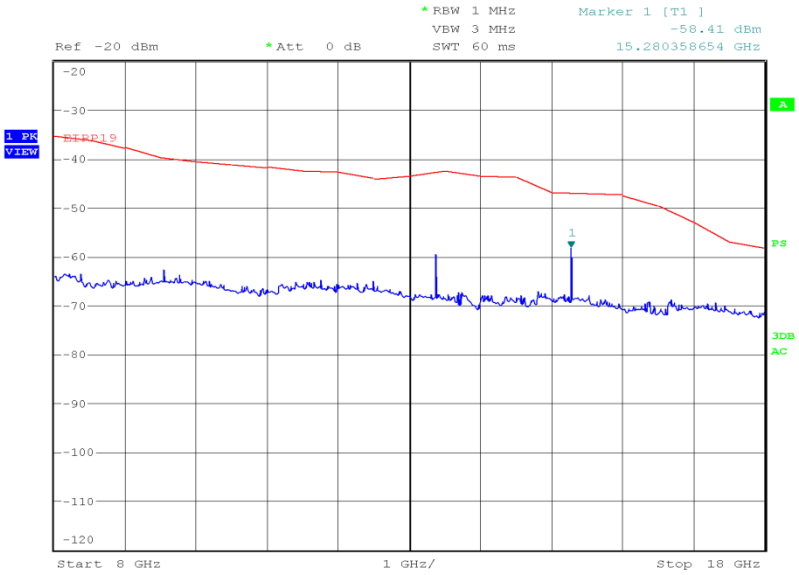
Product Service

PCS 1900, 1909.8 MHz, 3 GHz to 8 GHz, Emission Limitations for Broadband PCS Equipment Plot



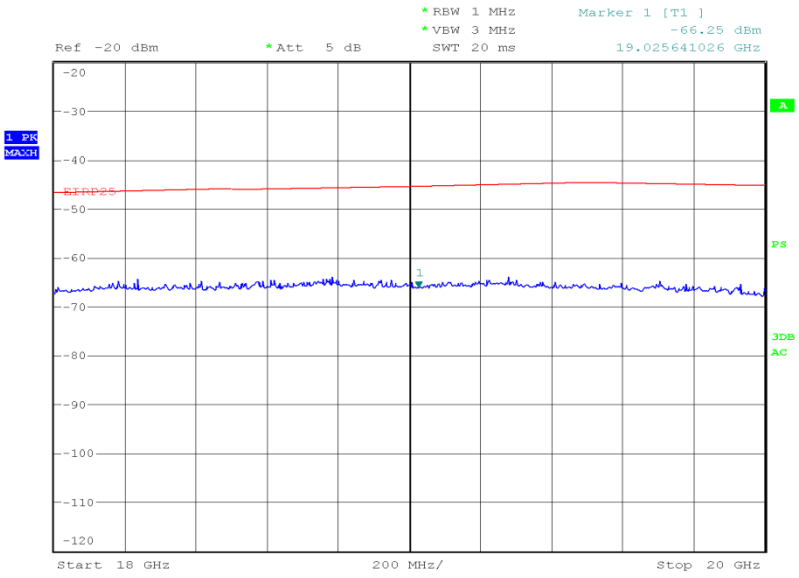
Date: 21.APR.2015 12:17:42

PCS 1900, 1909.8 MHz, 8 GHz to 18 GHz, Emission Limitations for Broadband PCS Equipment Plot



Date: 21.APR.2015 15:13:35

PCS 1900, 1909.8 MHz, 18 GHz to 20 GHz, Emission Limitations for Broadband PCS Equipment Plot



Date: 26.APR.2015 03:26:07

FCC 47 CFR Part 24, Limit Clause 24.238 (a)

43 + 10 log (P) dB or -13 dBm.

2.6 26 dB BANDWIDTH

2.6.1 Specification Reference

FCC 47 CFR Part 24, Clause 24.238
FCC 47 CFR Part 2, Clause 2.1049 (h)

2.6.2 Equipment Under Test and Modification State

SHV32 S/N: IMEI 004401115406452 - Modification State 0

2.6.3 Date of Test

01 May 2015

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

This test was performed in accordance with KDB 971168 D01 v02r02, clause 4.1.

Remarks

The EUT was configured with using a communications test set at maximum output power using 12.2kbps RMC data connection.

2.6.6 Environmental Conditions

Ambient Temperature	24.8°C
Relative Humidity	29.6%

Product Service

2.6.7 Test Results

4.0 V DC Supply

PCS 1900, GMSK, 26 dB Bandwidth Results

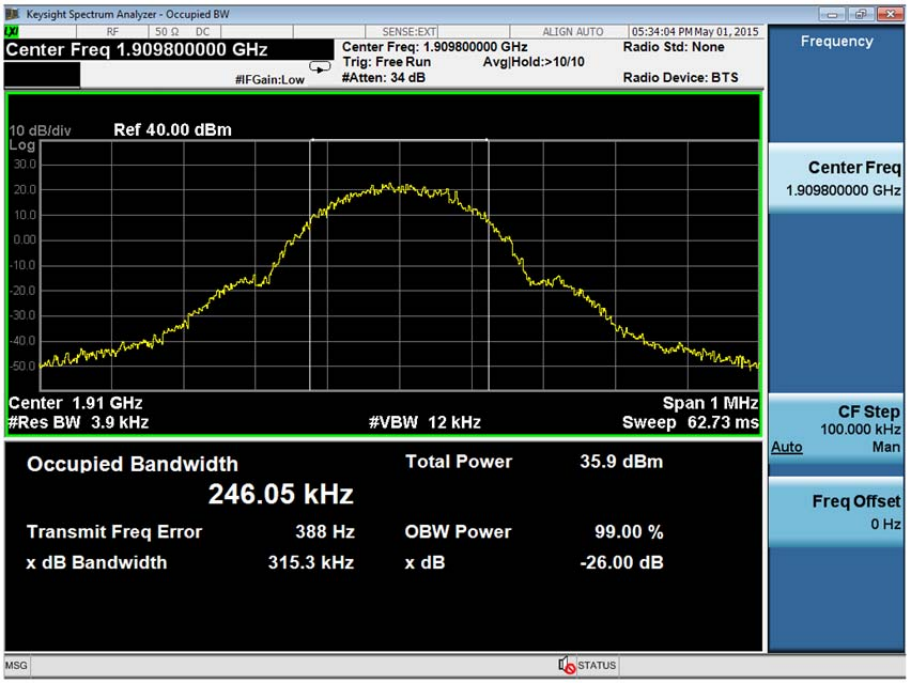
1850.2 MHz	1880.0 MHz	1909.8 MHz
kHz	kHz	kHz
313.7	308.8	315.3

PCS 1900, 1850.2 MHz, GMSK, 26 dB Bandwidth Plot

Product Service

PCS 1900, 1880.0 MHz, GMSK, 26 dB Bandwidth Plot

PCS 1900, 1909.8 MHz, GMSK, 26 dB Bandwidth Plot



FCC 47 CFR Part 24, Limit Clause 24.238

The emission bandwidth is defined as the width of the signal between two points, one below the carrier centre frequency and one above the carrier centre frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

2.7 MODULATION CHARACTERISTICS

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

2.7.2 Equipment Under Test

SHV32

2.7.3 Test Results

PCS 1900, Modulation Characteristics, Customer Description

Description of Modulation Technique

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

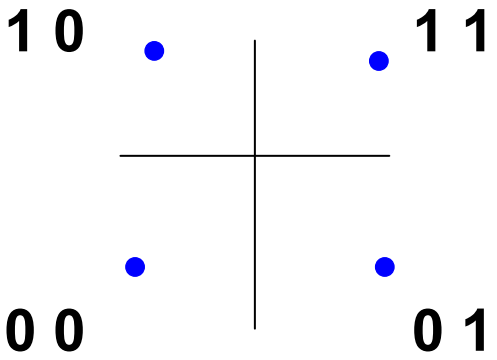
GMSK OVERVIEW

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

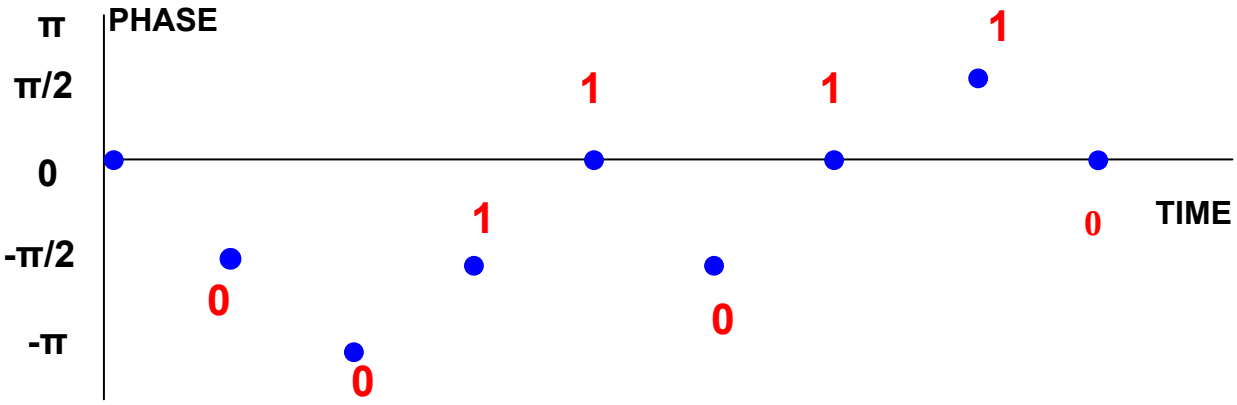
2. Modulate each stream with PSK (1 = 90° or π/2, 0 = -90° or – π/2 phase shift)

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:

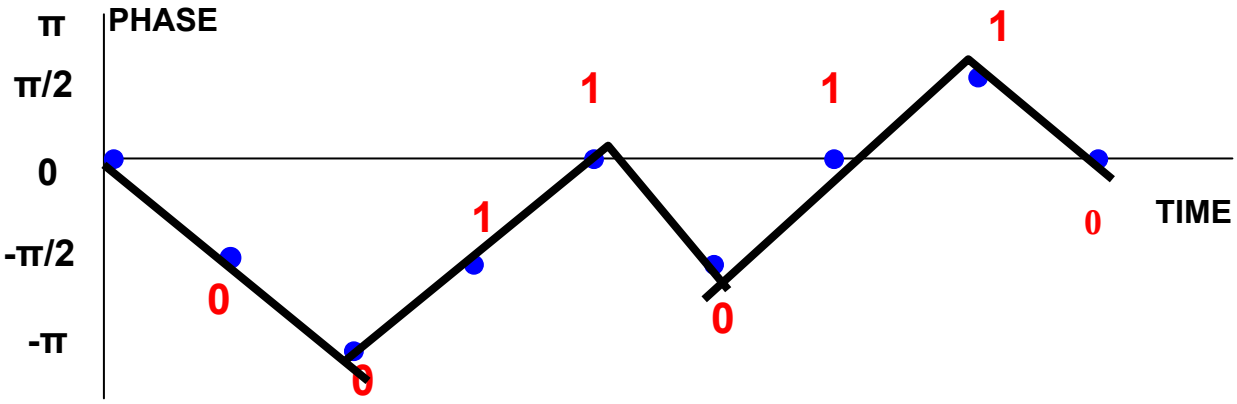
Combined Phase	-π/2	-π	-π/2	0	-π/2	0	π/2	0

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 - Spurious Emissions at Band Edge					
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB)	Weinschel	47-10-34	481	12	1-Apr-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Nov-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	12-Dec-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
Combiner/Splitter	Weinschel	1506A	3877	12	24-Mar-2016
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	22-Oct-2015
True RMS Multimeter	Fluke	179	4007	12	31-Jul-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
			4409		
Section 2.2- Peak to Average Ratio					
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB)	Weinschel	47-10-34	481	12	1-Apr-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Nov-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
Combiner/Splitter	Weinschel	1506A	3877	12	24-Mar-2016
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	22-Sep-2015
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3982	12	22-Sep-2015
True RMS Multimeter	Fluke	179	4007	12	31-Jul-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
2 metre N-Type Cable	Florida Labs	NMS-235SP-78.8-NMS	4508	12	26-Feb-2016
Section 2.3 – Maximum Conducted Output Power					
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Radio Communications Test Set	Rohde & Schwarz	CMU 200	3035	12	6-Nov-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	12-Dec-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
Combiner/Splitter	Weinschel	1506A	3877	12	24-Mar-2016
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	22-Oct-2015
P-Series Power Meter	Agilent Technologies	N1911A	3980	12	22-Sep-2015
50 MHz-18 GHz Wideband Power Sensor	Agilent Technologies	N1921A	3982	12	22-Sep-2015
True RMS Multimeter	Fluke	179	4007	12	31-Jul-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4504	12	26-Feb-2016
1 metre SMA Cable	IW Microwave	3PS-1806LC-394-3PS	4522	12	29-Jan-2016

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.4 - Frequency Stability					
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
GSM Test Set	Rohde & Schwarz	CMU 200	2809	12	30-Jun-2015
Digital Thermometer	Digitron	T208	2831	12	31-Jul-2015
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	30-Jun-2015
Type T PFA Insulated Thermocouple	TC Limited	Type T	4229	12	28-Jan-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
1 metre N-Type Cable	IW Microwave	NPS-1806LC-394-NPS	4505	12	26-Feb-2016
Section 2.5 - Emission Limitations for Broadband PCS Equipment					
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	24	26-Nov-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	2-May-2015
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	22	28-Nov-2015
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Filter (High Pass)	Lorch	SHP7-7000-SR	566	12	24-Feb-2016
Pre-Amplifier	Phase One	PSO4-0087	1534	12	23-Dec-2015
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Sweep Generator	Hewlett Packard	8350B	1904	-	TU
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	29-Aug-2015
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	24-Mar-2016
Section 2.6 - 26 dB Bandwidth					
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB)	Weinschel	47-10-34	481	12	1-Apr-2016
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	20-Jan-2016
GSM Test Set	Rohde & Schwarz	CMU 200	2809	12	30-Jun-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	12-Dec-2015
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
Combiner/Splitter	Weinschel	1506A	3877	12	24-Mar-2016
True RMS Multimeter	Fluke	179	4007	12	31-Jul-2015
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016

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

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	MU
Modulation Characteristics	-
26 dB Bandwidth	± 9.04 kHz
Maximum Conducted Output Power	± 0.70 dB
Spurious Emissions at Band Edge	± 0.70 dB ± 17.62 kHz
Emission Limitations for Broadband PCS Equipment	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Frequency Stability	± 99.54 Hz
Peak to Average Ratio	± 0.70 dB

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).