FCC RADIO TEST REPORT

FCC ID	**:**	**B32C6803GBTWN**
Equipment	**:**	**Point of Sales Terminal**
Brand Name	**:**	**Verifone**
Model Name	**:**	**C680 3G-BT-WiFi**
Applicant	**:**	**Verifone, Inc.** **1400 West Stanford Ranch Road, Suite 200, Rocklin CA 95765 USA**
Manufacturer	**:**	**Verifone, Inc.**
Standard	**:**	**FCC 47 CFR Part 2, 22(H), 24(E)**

The product was received on Jan. 20, 2020 and testing was started from Aug. 14, 2020 and completed on Aug. 27, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FG692114-08	01	Initial issue of report	Aug. 27, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Pass	-
	§22.913 (a)(2)	Effective Radiated Power (GSM850) (WCDMA Band V)		
	§24.232 (c)	Equivalent Isotropic Radiated Power (GSM1900) (WCDMA Band II)		
-	§24.232 (d)	Peak-to-Average Ratio	Not Required	
-	§2.1049 §22.917 (b) §24.238 (b)	Occupied Bandwidth (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II)	Not Required	-
-	§2.1051 §22.917 (a) §24.238 (a)	Band Edge Measurement (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II)	Not Required	-
-	§2.1051 §22.917 (a) §24.238 (a)	Conducted Emission (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II)	Not Required	-
-	§2.1055 §22.355 §24.235	Frequency Stability Temperature & Voltage	Not Required	-
4.4	§2.1053 §22.917 (a) §24.238 (a)	Field Strength of Spurious Radiation (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II)	Pass	Under limit 14.82 dB at 2544.000 MHz

Remark:

1. Not required means after assessing, test items are not necessary to carry out.

2. This is a variant report by revising WLAN Antenna and source. All the test cases were performed on original report which can be referred to Sporton Report Number FG692114-05 as appendix D. Based on the original report, the test cases were verified.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Celery Wei

1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n, and RFID.

Product Specification subjective to this standard	
Antenna Type	WWAN: PCB Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna RFID: Bobbin Antenna

Specification of Accessory		
AC Adapter	**Brand Name**	Verifone, Inc.
	Manufacturer	PHIHONG
	Model Name	AM11A-050A
	Power Rating	Input : 100-240 V AC 50/60Hz, 0.5A Output: 5.0V DC 2.2A
	Power Cord	1.8 meter, non-shielded cable, without ferrite core
Battery	**Brand Name**	Verifone, Inc.
	Model Name	BPK260-001

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH03-HY	03CH07-HY
Test Engineer	Louis Chung	Ken Wu
Temperature	21 ~ 24 ℃	23 ~ 25 ℃
Relative Humidity	51 ~ 55 %	53 ~ 56 %

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26-2015
- ANSI / TIA-603-E
- FCC 47 CFR Part 2, 22(H), 24(E)
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane for Cellular Band; Z plane for PCS Band) were recorded in this report.

Radiated emissions were investigated as following frequency range:

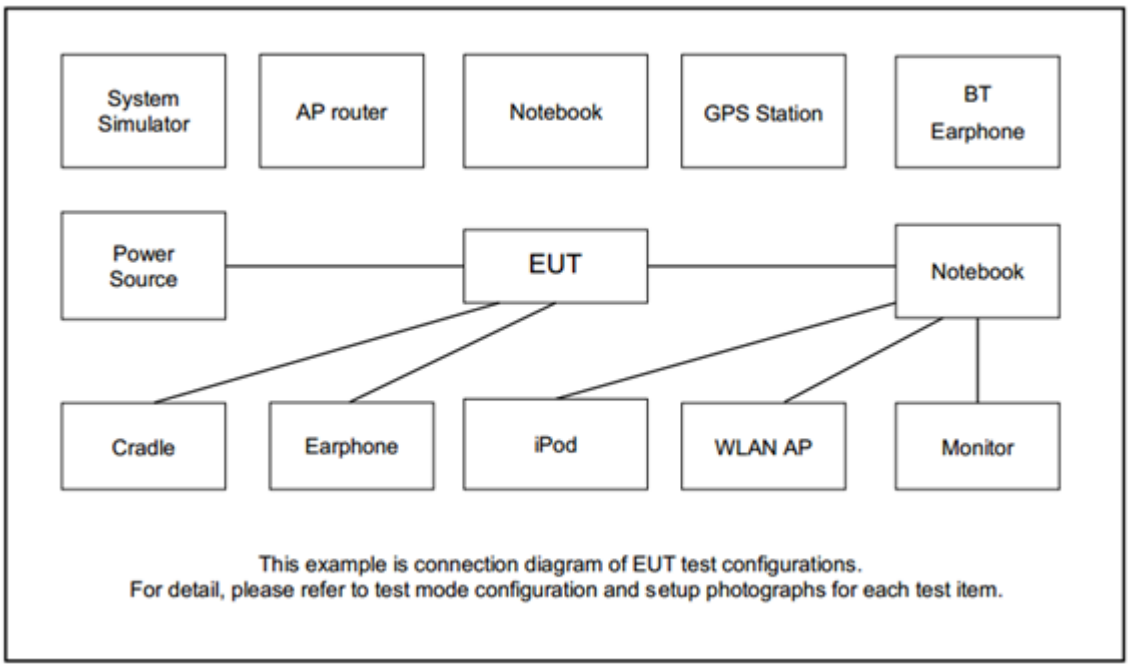
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V
2. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM850	■ GPRS Class 8 Link ■ EDGE Class 8 Link	■ GPRS Class 8 Link ■ EDGE Class 8 Link
GSM1900	■ GPRS Class 8 Link ■ EDGE Class 8 Link	■ GPRS Class 8 Link ■ EDGE Class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

Frequency List				
Band	Channel/Frequency(MHz)	Lowest	Middle	Highest
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
GSM1900	Channel	512	661	810
	Frequency	1850.2	1880.0	1909.8
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6

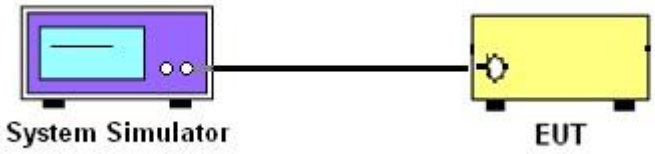
3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power and ERP/EIRP

3.2.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for GSM850 and WCDMA Band V

The EIRP of mobile transmitters must not exceed 2 Watts for GSM1900 and WCDMA Band II

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

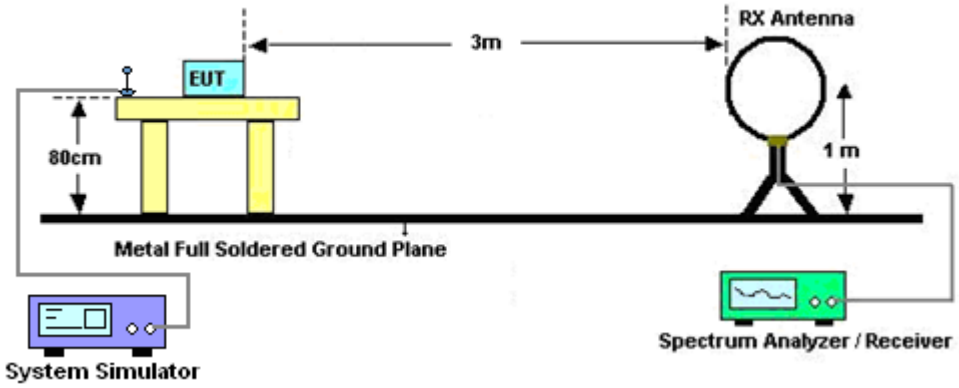
4 Radiated Test Items

4.1 Measuring Instruments

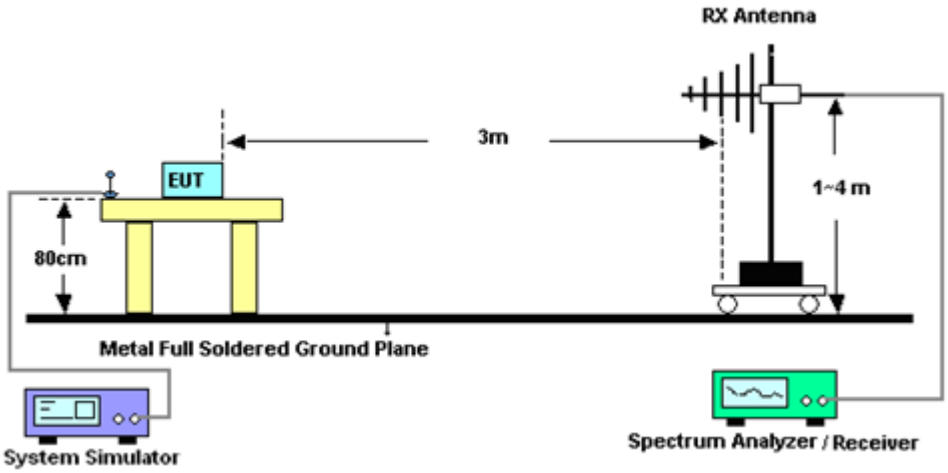
See list of measuring instruments of this test report.

4.2 Test Setup

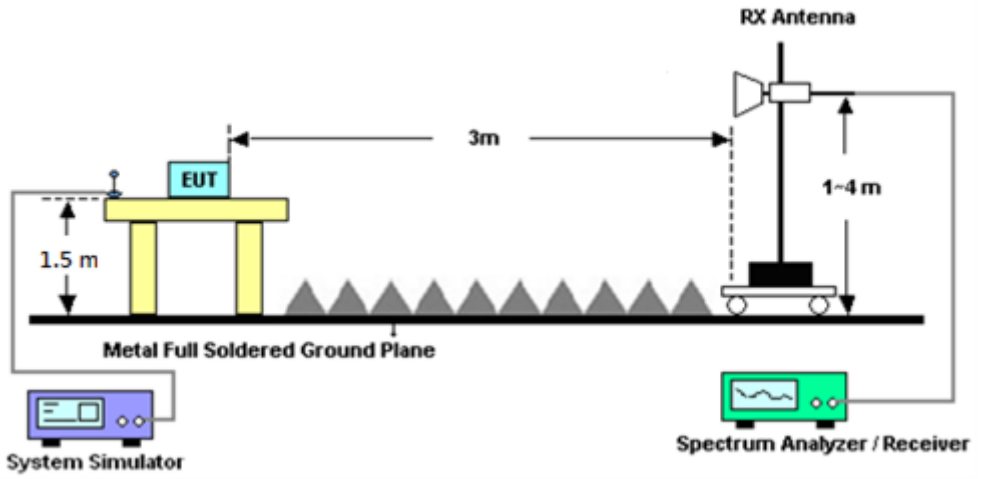
For radiated emissions below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	35419 & 03	30MHz~1GHz	Apr. 29, 2020	Aug. 14, 2020	Apr. 28, 2021	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 06, 2019	Aug. 14, 2020	Dec. 05, 2020	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz~26.5GHz	May 21, 2020	Aug. 14, 2020	May 20, 2021	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Jun. 09, 2020	Aug. 14, 2020	Jun. 08, 2021	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 19, 2020	Aug. 14, 2020	May 18, 2021	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Nov. 01, 2019	Aug. 14, 2020	Oct. 31, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2,80 1606/2	18GHz~40GHz	Feb. 25, 2020	Aug. 14, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 25, 2020	Aug. 14, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	1GHz~18GHz	Feb. 25, 2020	Aug. 14, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF78020836 8	Control Ant Mast	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB2495	N/A	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Feb. 10, 2020	Aug. 14, 2020	Feb. 09, 2021	Radiation (03CH07-HY)
Horn Antenna	EMCO	3117	00143261	1GHz~18GHz	Jan. 10, 2020	Aug. 14, 2020	Jan. 09, 2021	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA917025 1	18GHz~40GHz	Nov. 26, 2019	Aug. 14, 2020	Nov. 25, 2020	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 13, 2019	Aug. 14, 2020	Dec. 12, 2020	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	N/A	N/A	N/A	Aug. 14, 2020	N/A	Radiation (03CH07-HY)
Signal Generator	Anritsu	MG3710A	6261943042	2G / 3G / LTE / 5G FR1	May 10, 2020	Aug. 14, 2020	May 09, 2021	Radiation (03CH07-HY)
Base Station	Anritsu	MT8821C	6201341950	GSM / GPRS / WCDMA / LTE	Oct. 31, 2019	Aug. 27, 2020	Oct. 30, 2020	Conducted (TH03-HY)

6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.35**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.81**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.85**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880	1909.8
GPRS class 8	32.18	**32.26**	32.20	28.99	**29.01**	28.88
GPRS class 10	29.38	29.45	29.38	26.14	26.17	26.02
GPRS class 11	27.60	27.67	27.61	24.37	24.38	24.24
GPRS class 12	26.44	26.52	26.45	23.17	23.18	23.04
EGPRS class 8	26.35	**26.42**	26.35	**24.89**	**24.89**	24.75
EGPRS class 10	23.49	23.55	23.50	22.05	22.06	21.92
EGPRS class 11	21.66	21.74	21.68	20.20	20.22	20.09
EGPRS class 12	20.47	20.52	20.46	19.04	19.05	18.93

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	**23.40**	23.18	23.00	22.77	**23.18**	22.52
HSDPA Subtest-1	22.00	21.95	22.01	22.49	22.19	22.08
HSDPA Subtest-2	21.88	22.02	21.76	22.46	22.30	22.05
HSDPA Subtest-3	22.11	21.83	22.01	22.10	22.08	22.04
HSDPA Subtest-4	22.23	22.06	22.12	22.35	22.28	21.98
HSUPA Subtest-1	21.76	21.51	21.75	22.16	22.09	21.79
HSUPA Subtest-2	20.37	20.51	20.26	20.78	20.88	20.53
HSUPA Subtest-3	21.52	21.22	21.25	21.93	21.69	21.40
HSUPA Subtest-4	20.74	20.71	20.72	20.94	20.80	20.86
HSUPA Subtest-5	22.63	22.62	22.49	22.69	22.53	22.12

Appendix B. Test Results of ERP/EIRP and Radiated Test

ERP/EIRP

Channel	Mode	Conducted		ERP	
		Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	GSM850	32.18	1.6520	32.22	1.6672
Middle	GPRS class 8	32.26	1.6827	32.30	1.6982
Highest	(GT - LC = 2.19 dB)	32.20	1.6596	32.24	1.6749
Lowest	GSM850	26.35	0.4315	26.39	0.4355
Middle	EDGE class 8	26.42	0.4385	26.46	0.4426
Highest	(GT - LC = 2.19 dB)	26.35	0.4315	26.39	0.4355
Lowest	WCDMA Band V	23.40	0.2188	23.44	0.2208
Middle	RMC 12.2Kbps	23.18	0.2080	23.22	0.2099
Highest	(GT - LC = 2.19 dB)	23.00	0.1995	23.04	0.2014
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900	28.99	0.7925	31.04	1.2706
Middle	GPRS class 8	29.01	0.7962	31.06	1.2764
Highest	(GT - LC = 2.05 dB)	28.88	0.7727	30.93	1.2388
Lowest	GSM1900	24.89	0.3083	26.94	0.4943
Middle	EDGE class 8	24.89	0.3083	26.94	0.4943
Highest	(GT - LC = 2.05 dB)	24.75	0.2985	26.80	0.4786
Lowest	WCDMA Band II	22.77	0.1892	24.82	0.3034
Middle	RMC 12.2Kbps	23.18	0.2080	25.23	0.3334
Highest	(GT - LC = 2.05 dB)	22.52	0.1786	24.57	0.2864
Limit	EIRP < 2W	Result		PASS	

Radiated Spurious Emission

GPRS850

GPRS 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	1696	-52.90	-13	-39.90	-65.5	-54.5	1.00	4.75	H
	2544	-30.02	-13	-17.02	-47.37	-32	1.30	5.44	H
	4248	-53.80	-13	-40.80	-74.62	-58.4	1.90	8.65	H
	5096	-52.44	-13	-39.44	-76.04	-57.6	2.39	9.70	H
	5944	-49.25	-13	-36.25	-74.65	-54.1	2.88	9.88	H
									H
									H
	1696	-55.80	-13	-42.80	-68.8	-57.4	1.00	4.75	V
	2544	-27.82	-13	-14.82	-45.37	-29.8	1.30	5.44	V
	4248	-53.70	-13	-40.70	-74.28	-58.3	1.90	8.65	V
	5096	-51.64	-13	-38.64	-74.76	-56.8	2.39	9.70	V
	5944	-49.85	-13	-36.85	-75.51	-54.7	2.88	9.88	V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA 850

WCDMA 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	1696	-54.00	-13	-41.00	-66.14	-55.6	1.00	4.75	H
	2536	-38.02	-13	-25.02	-55.3	-40	1.30	5.43	H
	3386	-57.72	-13	-44.72	-77.28	-61.5	1.57	7.50	H
									H
									H
									H
									H
	1696	-49.50	-13	-36.50	-62.13	-51.1	1.00	4.75	V
	2536	-32.82	-13	-19.82	-50.46	-34.8	1.30	5.43	V
	3386	-57.82	-13	-44.82	-77.46	-61.6	1.57	7.50	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

GPRS 1900

GPRS 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
	3702	-55.93	-13	-42.93	-76.51	-62.5	1.67	8.24	H
	5550	-35.03	-13	-22.03	-59.8	-42.1	2.65	9.72	H
	7404	-52.95	-13	-39.95	-80.21	-62.1	2.46	11.61	H
	9252	-45.04	-13	-32.04	-75.56	-55.1	2.54	12.60	H
									H
									H
									H
Lowest	3702	-55.53	-13	-42.53	-76.18	-62.1	1.67	8.24	V
	5550	-39.13	-13	-26.13	-63.87	-46.2	2.65	9.72	V
	7404	-52.75	-13	-39.75	-80.29	-61.9	2.46	11.61	V
	9252	-48.04	-13	-35.04	-78.81	-58.1	2.54	12.60	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA 1900

WCDMA 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	3816	-35.62	-13	-22.62	-55.94	-42.3	1.70	8.38	H
	5724	-54.46	-13	-41.46	-79.82	-61.5	2.75	9.79	H
	7631	-53.01	-13	-40.01	-80.93	-62.5	2.39	11.88	H
									H
									H
									H
									H
	3816	-44.32	-13	-31.32	-64.55	-51	1.70	8.38	V
	5724	-54.56	-13	-41.56	-79.67	-61.6	2.75	9.79	V
	7631	-53.11	-13	-40.11	-81	-62.6	2.39	11.88	V
									V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Appendix D. Original Report

Please refer to Sporton report number FG692114-05 as below.