FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 27 SUBPART L
INDUSTRY CANADA RSS-132 ISSUE 3
INDUSTRY CANADA RSS-133 ISSUE 6
INDUSTRY CANADA RSS-139 ISSUE 3

CERTIFICATION TEST REPORT
GSM/WCDMA & ANT+

MODEL NUMBER: QOLLECTOR2

FCC ID: C9O-QOLL2
IC ID: 10161A-QOLL2

REPORT NUMBER: 15U21180-E2V3

ISSUE DATE: NOVEMBER 03, 2015

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/20/15	Initial Issue (This report contain spot check test data of Qollector2)	C.OOI
V2	10/22/15	Add full radiated testing result to test report.	C.OOI
V3	11/03/15	Revised Page 7	C.OOI

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SRAM LLC
EUT DESCRIPTION:	GERAN/UMTS/2.4 GHz
MODEL:	QOLLECTOR2
SERIAL NUMBER:	LX-00052510
DATE TESTED:	OCTOBER 22, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E, 27L	PASS

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Verification Services Inc. By:

CHOON OOI
CONSUMER TECHNOLOGY DIVISION
PROJECT LEAD
UL VERIFICATION SERVICES INC

Tested By:

Angel Escamilla

ANGEL ESCAMILLA
CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
UL VERIFICATION SERVICES INC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24 and FCC CFR 47 Part 27.

Qollector2 device contain FCC: R17HE910 full modular approved module the system. This report only contains fundamental ERP/EIRP and harmonic spurious radiated test data. For antenna port conducted test data, please refer to FCC: R17HE910 radio module report.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1GHz to 40GHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA and ANT+ device.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24/27				
Band	Frequency Range(MHz)	Modulation	Radiated	
			AVG(dBm)	AVG(mW)
GSM850	824~849	GPRS	34.67	2930.89
	824~849	EGPRS	28.31	677.64
GSM1900	1850~1910	GPRS	30.34	1081.43
	1850~1910	EGPRS	25.78	378.44
Band 5	824~849	REL99	22.82	191.43
Band 4	1710~1755	REL99	21.18	131.22
Band 2	1850~1910	REL99	22.53	179.06

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
GSM850, 824~849MHz	1.49
GSM1900, 1850~1910MHz	2.3
Band 5, 824~849MHz	1.49
Band 4, 1710~1755MHz	2.53
Band 2, 1850~1910MHz	2.3

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

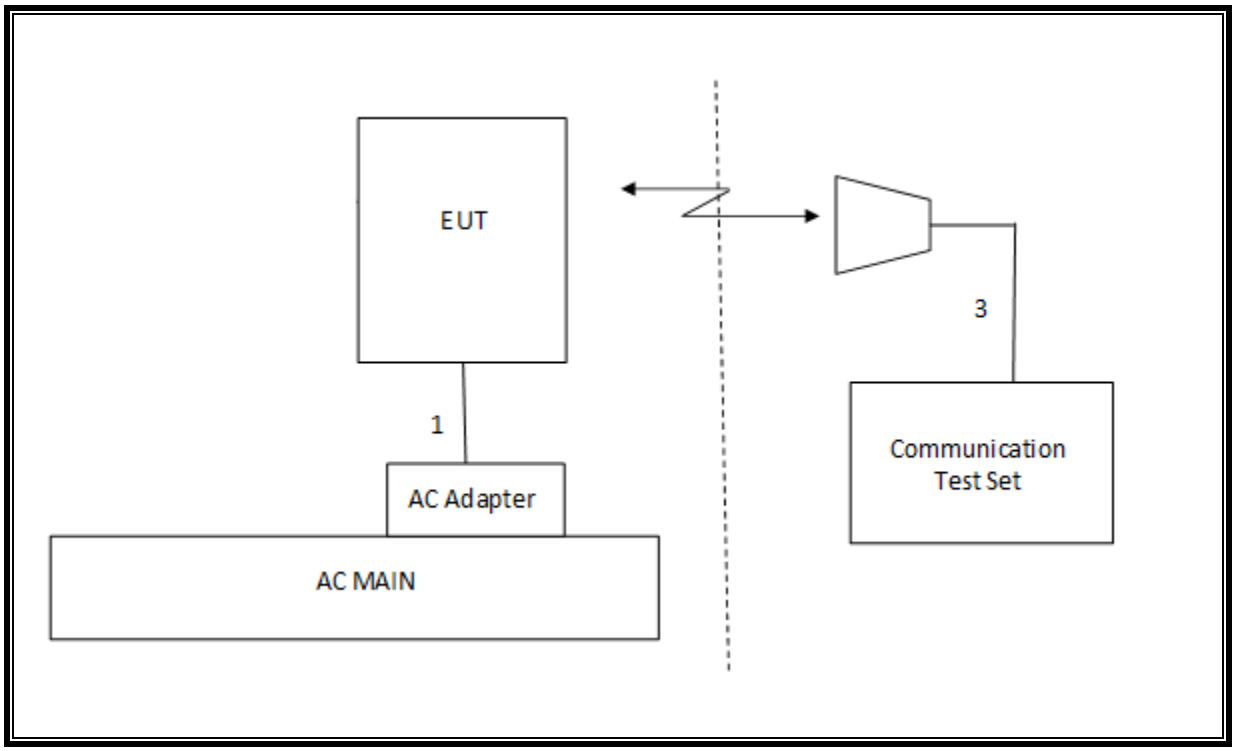
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length m	Remarks
1	USB	1	USB	Shielded	1	AC Adapter

TEST SETUP

The EUT is continuously communicated to the call box during the tests.

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	123	10/28/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	T243	12/08/15
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/15
Antenna, Horn, 18 GHz	EMCO	3115	C00784	10/25/15
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	T80	11/01/15
Communications Test Set	R&S	CMW500	T232	01/14/16
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	T201	06/16/16
Antenna, Tuned Dipole 400~1000	ETS	6502	158071	10/14/15
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/15

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Version 9.5, 07/22/14
Conducted Software	UL	UL EMC	Version 9.5, 05/17/14
CLT Software	UL	UL RF	Version 1.0, 02/02/15
Antenna Port Software	UL	UL RF	Version 2.1.1.1, 1/20/15

7. RADIATED TEST RESULTS

7.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27 and § 90.635.

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 4)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17; PSA setting reference to 971168 D01 v02r02

For peak power measurement with a PSA:

a) Set the RBW ≥ OBW; b) Set VBW ≥ 3 × RBW; c) Set span ≥ 2 x RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points ≥ span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

MODES TESTED

GSM, WCDMA, and LTE

TEST RESULTS

GSM

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	29.44	879.02
		661	1880	29.64	920.45
		810	1909.8	30.34	1081.43
	EGPRS	512	1850.2	24.84	304.79
		661	1880	25.03	318.42
		810	1909.8	25.78	378.44

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM850	GPRS	128	824.2	34.67	2930.89
		190	836.6	34.21	2636.33
		251	848.8	33.18	2079.70
	EGPRS	128	824.2	28.31	677.64
		190	836.6	27.58	572.80
		251	848.8	26.44	440.55

WCDMA

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	21.13	129.72
		9400	1880	21.80	151.36
		9538	1907.6	22.53	179.06

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 4	REL99	1312	1712.4	21.18	131.22
		1413	1732.6	20.42	110.15
		1513	1752.6	21.16	130.62

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	22.82	191.43
		4183	836.6	21.97	157.40
		4233	846.6	20.62	115.35

7.1.1. ERP/EIRP Results

GSM

Band

GSM 1900

GPRS

High Frequency Substitution Measurement
UL Verification Services, Inc.

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT Only, Z-Position
Location:	Chamber A
Mode:	GPRS 1900 MHz Fundamentals

Test Equpment:
Receiving: Horn T136, and Chamber A SMA Cables
Substitution: Horn T60, Xft SMA Cable (SN # 506392) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	22.45	V	0.9	7.9	29.44	33.0	-3.6	
1850.20	8.72	H	0.9	7.9	15.71	33.0	-17.3	
Mid Ch								
1880.00	22.67	V	0.9	7.9	29.64	33.0	-3.4	
1880.00	9.83	H	0.9	7.9	16.80	33.0	-16.2	
High Ch								
1909.80	23.36	V	0.9	7.9	30.34	33.0	-2.7	
1909.80	11.08	H	0.9	7.9	18.07	33.0	-14.9	

Band

GSM 1900

EGPRS

High Frequency Substitution Measurement
UL Verification Services, Inc.

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT Only, Z-Position
Location:	Chamber A
Mode:	EGPRS 1900 MHz Fundamentals

Test Equpment:
Receiving: Horn T136, and Chamber A SMA Cables
Substitution: Horn T60, Xft SMA Cable (SN # 506392) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1850.20	17.85	V	0.9	7.9	24.84	33.0	-8.2	
1850.20	4.74	H	0.9	7.9	11.73	33.0	-21.3	
Mid Ch								
1880.00	18.06	V	0.9	7.9	25.03	33.0	-8.0	
1880.00	5.81	H	0.9	7.9	12.78	33.0	-20.2	
High Ch								
1909.80	18.79	V	0.9	7.9	25.78	33.0	-7.2	
1909.80	7.26	H	0.9	7.9	14.24	33.0	-18.8	

Band

GSM 850

GPRS

High Frequency Substitution Measurement
UL Verification Services, Inc.

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT Only, Z-Position
Location:	Chamber A
Mode:	GPRS 850 MHz Fundamentals

Test Equpment:
Receiving: Hybrid T477, and Chamber A SMA Cables
Substitution: Dipole T273, Xft SMA Cable (SN # 506392) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.20	35.57	V	0.9	0.0	34.67	38.5	-3.8	
824.20	12.45	H	0.9	0.0	11.55	38.5	-27.0	
Mid Ch								
836.60	35.11	V	0.9	0.0	34.21	38.5	-4.3	
836.60	11.92	H	0.9	0.0	11.02	38.5	-27.5	
High Ch								
848.80	34.08	V	0.9	0.0	33.18	38.5	-5.3	
848.80	12.20	H	0.9	0.0	11.30	38.5	-27.2	

Band

GSM 850

EGPRS

High Frequency Substitution Measurement
UL Verification Services, Inc.

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT Only, Z-Position
Location:	Chamber A
Mode:	EGPRS 850 MHz Fundamentals

Test Equipment:
Receiving: Hybrid T477, and Chamber A SMA Cables
Substitution: Dipole T273, Xft SMA Cable (SN # 506392) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
824.20	29.21	V	0.9	0.0	28.31	38.5	-10.2	
824.20	7.35	H	0.9	0.0	6.45	38.5	-32.1	
Mid Ch								
836.60	28.48	V	0.9	0.0	27.58	38.5	-10.9	
836.60	7.23	H	0.9	0.0	6.33	38.5	-32.2	
High Ch								
848.80	27.34	V	0.9	0.0	26.44	38.5	-12.1	
848.80	6.99	H	0.9	0.0	6.09	38.5	-32.4	

WCDMA

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT Only, Z-Position
Location: Chamber A
Mode: Rel99 Band 2 Fundamentals

Test Equpment:
Receiving: Horn T136, and Chamber A SMA Cables
Substitution: Horn T60, Xft SMA Cable (SN # 506392) Warehouse

Band

Band 2

REL99

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1852.40	14.14	V	0.9	7.9	21.13	33.0	-11.9	
1852.40	1.29	H	0.9	7.9	8.28	33.0	-24.7	
Mid Ch								
1880.00	14.84	V	0.9	7.9	21.80	33.0	-11.2	
1880.00	4.70	H	0.9	7.9	11.67	33.0	-21.3	
High Ch								
1907.60	15.55	V	0.9	7.9	22.53	33.0	-10.5	
1907.60	4.07	H	0.9	7.9	11.04	33.0	-22.0	

Band

Band 4

REL99

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT Only, Z-Position
Location: Chamber A
Mode: Rel99 Band 4 Fundamentals

Test Equpment:
Receiving: Horn T136, and Chamber A SMA Cables
Substitution: Horn T59, Xft SMA Cable (SN # SERIALNUMBER) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	13.84	V	0.9	8.2	21.18	30.0	-8.8	
1712.40	5.72	H	0.9	8.2	13.06	30.0	-16.9	
Mid Ch								
1732.60	13.15	V	0.9	8.2	20.42	30.0	-9.6	
1732.60	5.17	H	0.9	8.2	12.44	30.0	-17.6	
High Ch								
1752.60	13.96	V	0.9	8.1	21.16	30.0	-8.8	
1752.60	4.90	H	0.9	8.1	12.10	30.0	-17.9	

Band

Band 5

REL99

High Frequency Substitution Measurement
UL Verification Services, Inc.

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT Only, Z-Position
Location: Chamber A
Mode: Rel99 Band 5 Fundamentals

Test Equpment:
Receiving: Hybrid T477, and Chamber A SMA Cables
Substitution: Dipole T273, Xft SMA Cable (SN # 506392) Warehouse

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	23.72	V	0.9	0.0	22.82	38.5	-15.7	
826.40	3.62	H	0.9	0.0	2.72	38.5	-35.8	
Mid Ch								
836.60	22.87	V	0.9	0.0	21.97	38.5	-16.5	
836.60	4.22	H	0.9	0.0	3.32	38.5	-35.2	
High Ch								
846.60	21.52	V	0.9	0.0	20.62	38.5	-17.9	
846.60	3.53	H	0.9	0.0	2.63	38.5	-35.9	

7.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53 and §90.691

LIMIT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

Part 27: (m)(4) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

GSM, WCDMA, and LTE

RESULTS

7.2.1. SPURIOUS RADIATION PLOTS

GSM

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT + AC Charger
Location: Chamber A
Mode: GPRS 1900 MHz Harmonics

Band	f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
GSM 1900 GPRS	Low Ch, 1850.2									
	3700.40	-14.3	V	3.0	35.9	1.0	-49.2	-13.0	-36.2	
	5550.60	-13.7	V	3.0	35.5	1.0	-48.1	-13.0	-35.1	
	7400.80	-12.4	V	3.0	35.7	1.0	-47.1	-13.0	-34.1	
	3700.40	-17.7	H	3.0	35.9	1.0	-52.6	-13.0	-39.6	
	5550.60	-14.6	H	3.0	35.5	1.0	-49.1	-13.0	-36.1	
	7400.80	-12.9	H	3.0	35.7	1.0	-47.6	-13.0	-34.6	
	Mid Ch, 1880									
	3760.00	-15.8	V	3.0	35.8	1.0	-50.6	-13.0	-37.6	
	5640.00	-13.2	V	3.0	35.5	1.0	-47.7	-13.0	-34.7	
	7520.00	-11.8	V	3.0	35.7	1.0	-46.5	-13.0	-33.5	
	3760.00	-18.1	H	3.0	35.8	1.0	-52.9	-13.0	-39.9	
	5640.00	-14.6	H	3.0	35.5	1.0	-49.1	-13.0	-36.1	
	7520.00	-11.9	H	3.0	35.7	1.0	-46.6	-13.0	-33.6	
	High Ch, 1909.8									
	3819.60	-13.8	V	3.0	35.8	1.0	-48.6	-13.0	-35.6	
	5729.40	-12.7	V	3.0	35.5	1.0	-47.2	-13.0	-34.2	
	7639.20	-11.8	V	3.0	35.8	1.0	-46.6	-13.0	-33.6	
	3819.60	-17.1	H	3.0	35.8	1.0	-51.9	-13.0	-38.9	
	5729.40	-14.6	H	3.0	35.5	1.0	-49.1	-13.0	-36.1	
	7639.20	-12.5	H	3.0	35.8	1.0	-47.3	-13.0	-34.3	

Band

GSM 1900

EGPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT + AC Charger
Location: Chamber A
Mode: EGPRS 1900 MHz Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2									
3700.40	-15.7	V	3.0	35.9	1.0	-50.6	-13.0	-37.6	
5550.60	-14.7	V	3.0	35.5	1.0	-49.1	-13.0	-36.1	
7400.80	-12.9	V	3.0	35.7	1.0	-47.6	-13.0	-34.6	
3700.40	-16.8	H	3.0	35.9	1.0	-51.7	-13.0	-38.7	
5550.60	-12.5	H	3.0	35.5	1.0	-47.0	-13.0	-34.0	
7400.80	-11.9	H	3.0	35.7	1.0	-46.7	-13.0	-33.7	
Mid Ch, 1880									
3760.00	-15.9	V	3.0	35.8	1.0	-50.7	-13.0	-37.7	
5640.00	-14.4	V	3.0	35.5	1.0	-48.9	-13.0	-35.9	
7520.00	-13.0	V	3.0	35.7	1.0	-47.7	-13.0	-34.7	
3760.00	-17.6	H	3.0	35.8	1.0	-52.4	-13.0	-39.4	
5640.00	-13.9	H	3.0	35.5	1.0	-48.4	-13.0	-35.4	
7520.00	-11.6	H	3.0	35.7	1.0	-46.4	-13.0	-33.4	
High Ch, 1909.8									
3819.60	-17.5	V	3.0	35.8	1.0	-52.3	-13.0	-39.3	
5729.40	-13.6	V	3.0	35.5	1.0	-48.1	-13.0	-35.1	
7639.20	-12.7	V	3.0	35.8	1.0	-47.5	-13.0	-34.5	
3819.60	-17.1	H	3.0	35.8	1.0	-51.9	-13.0	-38.9	
5729.40	-13.6	H	3.0	35.5	1.0	-48.1	-13.0	-35.1	
7639.20	-11.2	H	3.0	35.8	1.0	-46.0	-13.0	-33.0	

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT + AC Charger
Location:	Chamber A
Mode:	GPRS 850 MHz Harmonics

Band

GSM 850

GPRS

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2									
1648.40	-19.2	V	3.0	37.0	1.0	-55.2	-13.0	-42.2	
2472.60	-19.1	V	3.0	36.4	1.0	-54.5	-13.0	-41.5	
3296.80	-19.6	V	3.0	36.2	1.0	-54.8	-13.0	-41.8	
1648.40	-24.2	H	3.0	37.0	1.0	-60.2	-13.0	-47.2	
2472.60	-20.7	H	3.0	36.4	1.0	-56.1	-13.0	-43.1	
3296.80	-20.1	H	3.0	36.2	1.0	-55.2	-13.0	-42.2	
Mid Ch, 836.6									
1673.20	-18.7	V	3.0	37.0	1.0	-54.7	-13.0	-41.7	
2509.80	-19.1	V	3.0	36.4	1.0	-54.5	-13.0	-41.5	
3346.40	-19.5	V	3.0	36.1	1.0	-54.7	-13.0	-41.7	
1673.20	-22.6	H	3.0	37.0	1.0	-58.6	-13.0	-45.6	
2509.80	-23.1	H	3.0	36.4	1.0	-58.5	-13.0	-45.5	
3346.40	-20.2	H	3.0	36.1	1.0	-55.3	-13.0	-42.3	
High Ch, 848.8									
1697.60	-17.7	V	3.0	37.0	1.0	-53.7	-13.0	-40.7	
2546.40	-17.9	V	3.0	36.4	1.0	-53.3	-13.0	-40.3	
3395.20	-18.9	V	3.0	36.1	1.0	-54.0	-13.0	-41.0	
1697.60	-23.1	H	3.0	37.0	1.0	-59.1	-13.0	-46.1	
2546.40	-23.5	H	3.0	36.4	1.0	-58.9	-13.0	-45.9	
3395.20	-20.4	H	3.0	36.1	1.0	-55.5	-13.0	-42.5	

Band

GSM 850

EGPRS

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT + AC Charger
Location:	Chamber A
Mode:	EGPRS 850 MHz Hamonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 824.2									
1648.40	-20.8	V	3.0	37.0	1.0	-56.9	-13.0	-43.9	
2472.60	-19.9	V	3.0	36.4	1.0	-55.3	-13.0	-42.3	
3296.80	-19.9	V	3.0	36.2	1.0	-55.1	-13.0	-42.1	
1648.40	-25.9	H	3.0	37.0	1.0	-61.9	-13.0	-48.9	
2472.60	-23.8	H	3.0	36.4	1.0	-59.2	-13.0	-46.2	
3296.80	-21.1	H	3.0	36.2	1.0	-56.2	-13.0	-43.2	
Mid Ch, 836.6									
1673.20	-20.8	V	3.0	37.0	1.0	-56.8	-13.0	-43.8	
2509.80	-20.8	V	3.0	36.4	1.0	-56.2	-13.0	-43.2	
3346.40	-20.4	V	3.0	36.1	1.0	-55.5	-13.0	-42.5	
1673.20	-23.9	H	3.0	37.0	1.0	-59.9	-13.0	-46.9	
2509.80	-23.8	H	3.0	36.4	1.0	-59.2	-13.0	-46.2	
3346.40	-21.1	H	3.0	36.1	1.0	-56.2	-13.0	-43.2	
High Ch, 848.8									
1697.60	-20.6	V	3.0	37.0	1.0	-56.6	-13.0	-43.6	
2546.40	-20.3	V	3.0	36.4	1.0	-55.7	-13.0	-42.7	
3395.20	-20.6	V	3.0	36.1	1.0	-55.7	-13.0	-42.7	
1697.60	-25.2	H	3.0	37.0	1.0	-61.1	-13.0	-48.1	
2546.40	-23.6	H	3.0	36.4	1.0	-59.0	-13.0	-46.0	
3395.20	-20.8	H	3.0	36.1	1.0	-55.8	-13.0	-42.8	

WCDMA

Band

Band 2

REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT + AC Charger
Location: Chamber A
Mode: Rel99 Band 2 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4									
3704.80	-14.4	V	3.0	35.9	1.0	-49.3	-13.0	-36.3	
5557.20	-12.4	V	3.0	35.5	1.0	-46.9	-13.0	-33.9	
7409.60	-12.1	V	3.0	35.7	1.0	-46.8	-13.0	-33.8	
3704.80	-17.3	H	3.0	35.9	1.0	-52.1	-13.0	-39.1	
5557.20	-13.8	H	3.0	35.5	1.0	-48.3	-13.0	-35.3	
7409.60	-11.6	H	3.0	35.7	1.0	-46.3	-13.0	-33.3	
Mid Ch, 1880									
3760.00	-15.8	V	3.0	35.8	1.0	-50.6	-13.0	-37.6	
5640.00	-13.2	V	3.0	35.5	1.0	-47.7	-13.0	-34.7	
7520.00	-12.3	V	3.0	35.7	1.0	-47.0	-13.0	-34.0	
3760.00	-17.3	H	3.0	35.8	1.0	-52.1	-13.0	-39.1	
5640.00	-13.7	H	3.0	35.5	1.0	-48.2	-13.0	-35.2	
7520.00	-11.0	H	3.0	35.7	1.0	-45.7	-13.0	-32.7	
High Ch, 1907.6									
3815.20	-13.9	V	3.0	35.8	1.0	-48.6	-13.0	-35.6	
5722.80	-13.2	V	3.0	35.5	1.0	-47.7	-13.0	-34.7	
7630.40	-12.7	V	3.0	35.8	1.0	-47.4	-13.0	-34.4	
3815.20	-16.1	H	3.0	35.8	1.0	-50.8	-13.0	-37.8	
5722.80	-12.9	H	3.0	35.5	1.0	-47.4	-13.0	-34.4	
7630.40	-11.3	H	3.0	35.8	1.0	-46.1	-13.0	-33.1	

Band

Band 4

REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: SRAM
Project #: 15U21180
Date: 10/21/2015
Test Engineer: A. Escamilla
Configuration: EUT + AC Charger
Location: Chamber A
Mode: Rel99 Band 4 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4									
3424.80	-14.3	V	3.0	36.1	1.0	-49.4	-13.0	-36.4	
5137.20	-14.2	V	3.0	35.4	1.0	-48.7	-13.0	-35.7	
6849.60	-13.1	V	3.0	35.7	1.0	-47.8	-13.0	-34.8	
3424.80	-18.3	H	3.0	36.1	1.0	-53.4	-13.0	-40.4	
5137.20	-15.2	H	3.0	35.4	1.0	-49.6	-13.0	-36.6	
6849.60	-12.1	H	3.0	35.7	1.0	-46.8	-13.0	-33.8	
Mid Ch, 1732.6									
3465.20	-15.0	V	3.0	36.0	1.0	-50.0	-13.0	-37.0	
5197.80	-14.7	V	3.0	35.4	1.0	-49.2	-13.0	-36.2	
6930.40	-13.3	V	3.0	35.7	1.0	-48.0	-13.0	-35.0	
3465.20	-17.6	H	3.0	36.0	1.0	-52.7	-13.0	-39.7	
5197.80	-14.5	H	3.0	35.4	1.0	-48.9	-13.0	-35.9	
6930.40	-12.9	H	3.0	35.7	1.0	-47.6	-13.0	-34.6	
High Ch, 1752.6									
3505.20	-14.0	V	3.0	36.0	1.0	-49.0	-13.0	-36.0	
5257.80	-13.4	V	3.0	35.4	1.0	-47.8	-13.0	-34.8	
7010.40	-13.6	V	3.0	35.7	1.0	-48.3	-13.0	-35.3	
3505.20	-18.0	H	3.0	36.0	1.0	-53.0	-13.0	-40.0	
5257.80	-14.8	H	3.0	35.4	1.0	-49.2	-13.0	-36.2	
7010.40	-12.9	H	3.0	35.7	1.0	-47.6	-13.0	-34.6	

Band

Band 5

REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company:	SRAM
Project #:	15U21180
Date:	10/21/2015
Test Engineer:	A. Escamilla
Configuration:	EUT + AC Charger
Location:	Chamber A
Mode:	Rel99 Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4									
1652.80	-24.6	V	3.0	37.0	1.0	-60.6	-13.0	-47.6	
2479.20	-21.7	V	3.0	36.4	1.0	-57.2	-13.0	-44.2	
3305.60	-20.8	V	3.0	36.1	1.0	-56.0	-13.0	-43.0	
1652.80	-24.9	H	3.0	37.0	1.0	-61.0	-13.0	-48.0	
2479.20	-23.5	H	3.0	36.4	1.0	-59.0	-13.0	-46.0	
3305.60	-20.7	H	3.0	36.1	1.0	-55.9	-13.0	-42.9	
Mid Ch, 836.6									
1673.20	-25.5	V	3.0	37.0	1.0	-61.4	-13.0	-48.4	
2509.80	-19.9	V	3.0	36.4	1.0	-55.3	-13.0	-42.3	
3346.40	-19.5	V	3.0	36.1	1.0	-54.6	-13.0	-41.6	
1673.20	-24.6	H	3.0	37.0	1.0	-60.6	-13.0	-47.6	
2509.80	-23.0	H	3.0	36.4	1.0	-58.4	-13.0	-45.4	
3346.40	-20.5	H	3.0	36.1	1.0	-55.6	-13.0	-42.6	
High Ch, 846.6									
1693.20	-24.3	V	3.0	37.0	1.0	-60.3	-13.0	-47.3	
2539.80	-21.8	V	3.0	36.4	1.0	-57.2	-13.0	-44.2	
3386.40	-20.8	V	3.0	36.1	1.0	-55.9	-13.0	-42.9	
1693.20	-25.3	H	3.0	37.0	1.0	-61.2	-13.0	-48.2	
2539.80	-23.4	H	3.0	36.4	1.0	-58.8	-13.0	-45.8	
3386.40	-20.3	H	3.0	36.1	1.0	-55.4	-13.0	-42.4	