PARTIAL FCC TEST REPORT

(PART 22)

REPORT NO.:	RF150327C04
MODEL NO.:	U1 Lite+ / U-ECO
FCC ID:	RLS-STAVL1515
RECEIVED:	Mar. 27, 2015
TESTED:	Apr. 17, 2015
ISSUED:	Apr. 24, 2015

APPLICANT:	SYSTEMS & TECHNOLOGY CORP.
ADDRESS:	18F-5, No.79, Hsin Tai Wu Road, Sec. 1, Hsichih, New Taipei City, Taiwan, R.O.C.

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150327C04	Original release	Apr. 24, 2015

1 CERTIFICATION

PRODUCT:	GPS Vehicle Tracking Device
MODEL:	U1 Lite+ / U-ECO
BRAND:	CAREU
APPLICANT:	SYSTEMS & TECHNOLOGY CORP.
TESTED:	Apr. 17, 2015
TEST SAMPLE:	Identical Prototype
STANDARDS:	**FCC PART 22, Subpart H**

The above equipment (model: U1 Lite+ / U-ECO) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Evonne Liu , **DATE :** Apr. 24, 2015

Evonne Liu / Specialist

APPROVED BY : Sam chen , **DATE :** Apr. 24, 2015

Sam Chen / Senior Project Engineer

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
2.1046 22.913 (a)	Effective Radiated Power	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	N/A	Refer to Note as below.
2.1049	Occupied Bandwidth	N/A	Refer to Note as below.
22.917	Band Edge Measurements	N/A	Refer to Note as below.
2.1051 22.917	Conducted Spurious Emissions	N/A	Refer to Note as below.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -12.48dB at 2509.20MHz.

Note:

Test items for Effective Radiated Power and Radiated Spurious Emissions were performed for this report. Other testing data please refer to module (Type / Model: SARA-U260, FCC ID: XPYSARAU260) Report No.: MDE_UBLOX_1404_FCCa

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Feb. 03, 2015	Feb. 02, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Aug. 27, 2014	Aug. 26, 2015
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 25, 2014	Dec. 24, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF signal cable Worken	RG-213	NA	Nov. 07, 2014	Nov. 06, 2015
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Power Splitter Woken	2-18GHz 2Way SMA Fwd.:30W/Rev.:2W Isolated Power	COM412W5E3	Apr. 17, 2014	Apr. 16, 2016
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Communications Tester-Wireless	E5515C	MY52102544	Sep. 11, 2014	Sep. 10, 2016

NOTE: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC 7450F-10.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	GPS Vehicle Tracking Device	
MODEL NO.	U1 Lite+ / U-ECO	
POWER SUPPLY	DC12V (power supply) 3.7Vdc (battery)	
MODULATION TYPE	**GSM/GPRS**	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	BPSK
FREQUENCY RANGE	**GSM/GPRS/EDGE**	824.2MHz ~ 848.8MHz
	WCDMA	826.4MHz ~ 846.6MHz
MAX. ERP POWER	**GSM**	1377.21mW
	WCDMA	126.77mW
ANTENNA TYPE	Fixed Internal Antenna	
I/O PORTS	Refer to users' manual	
DATA CABLE	Refer to NOTE as below	
ACCESSORY DEVICES	Refer to NOTE as below	

NOTE:

1. All models are listed as below.

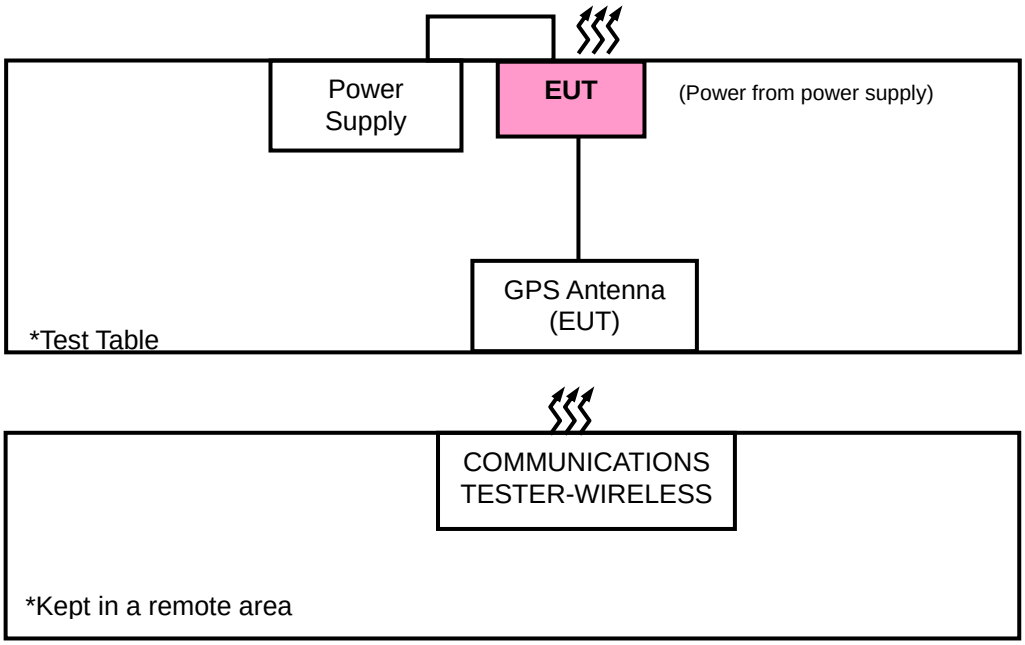
Product Name	Brand	Model	Difference
GPS Vehicle Tracking Device	CAREU	U1 Lite+	Marketing differentiation
		U-ECO	

2. The EUT contains following accessory devices.

ITEM	BRAND	MODEL	SPECIFICATION
Battery 1	Top-Power Technology Corp.	422025	3.7Vdc, 160mAh
Battery 2	POWERTRONICS CO., LTD.	533450P	3.7Vdc, 950mAh
MIC & SPK Cable	ACEMUX	88-8193-01G	0.2m cable
Serial Cable	ACEMUX	88-8194-01G	1.2m cable
Power I/O Cable	ACEMUX	88-8192-01G	1.2m cable
GPS Antenna	ALLIS	X830B	--
GPS Antenna (2nd)	ALLIS	M820D	--
GPS Antenna (3rd)	ALLIS	M820L	--

3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 CONFIGURATION OF SYSTEM UNDER TEST



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC POWER SUPPLY	N/A	33010D	807748	N/A
2	COMMUNICATIONS TESTER-WIRELESS	Agilent	8960 Series 10	MY53201073	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 acted as a communication partner to transfer data.

3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

GSM MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	ERP	128 to 251	-	GPRS
-	RADIATED EMISSION	128 to 251	189	GPRS

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	ERP	4132 to 4233	-	WCDMA
-	RADIATED EMISSION	4132 to 4233	4182	WCDMA

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	26deg. C, 58%RH	120Vac, 60Hz	Karl Lee
RADIATED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Karl Lee

3.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 22
ANSI/TIA/EIA-603-C 2004

NOTE: All test items have been performed and recorded as per the above standards.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

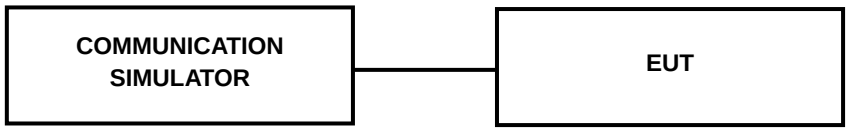
4.1.2 TEST PROCEDURES

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA & CDMA & LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 TEST SETUP

CONDUCTED POWER MEASUREMENT:



4.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM (1 Uplink)	**32.54**	32.11	32.22
GPRS 8 (GMSK, 1 slot)	32.43	31.98	32.08
GPRS 10 (GMSK, 2 slot)	32.41	31.96	32.06
GPRS 11 (GMSK, 3 slot)	31.52	31.07	31.17
GPRS 12 (GMSK, 4 slot)	30.33	29.88	29.98
EDGE 8 (GMSK, 1 Uplink)	31.54	31.97	32.08
EDGE 10 (GMSK, 2 Uplink)	31.52	31.95	32.06
EDGE 11 (GMSK, 3 Uplink)	30.62	31.05	31.16
EDGE 12 (GMSK, 4 Uplink)	29.42	29.85	29.96

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	**22.18**	22.14	22.11

4.2 RADIATED POWER EIRP / ERP CALCULATION

Pursuant to FCC KDB 412172 D01 Determining ERP and EIRP v01, the ERP and EIRP can be determined from the results of the power measurement of the module, which is integrated into the host.

Based on the maximum conducted power measurement results and the antenna gain in the host, ERP / EIRP are determined as below.

Mode	MAX Output Power (dBm)	Ant Gain (dBi)	Ant Gain (dBd)	ERP (dBm)	ERP (W)	ERP (mW)	Part 22.913 Requirement	Result
GSM 850	32.54	1	-2.15	31.39	1.377	1377.21	ERP<7W	Pass
WCDMA V	22.18	1	-2.15	21.03	0.12	126.77		Pass

4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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. The emission limit is equal to -13dBm.

4.3.2 TEST PROCEDURES

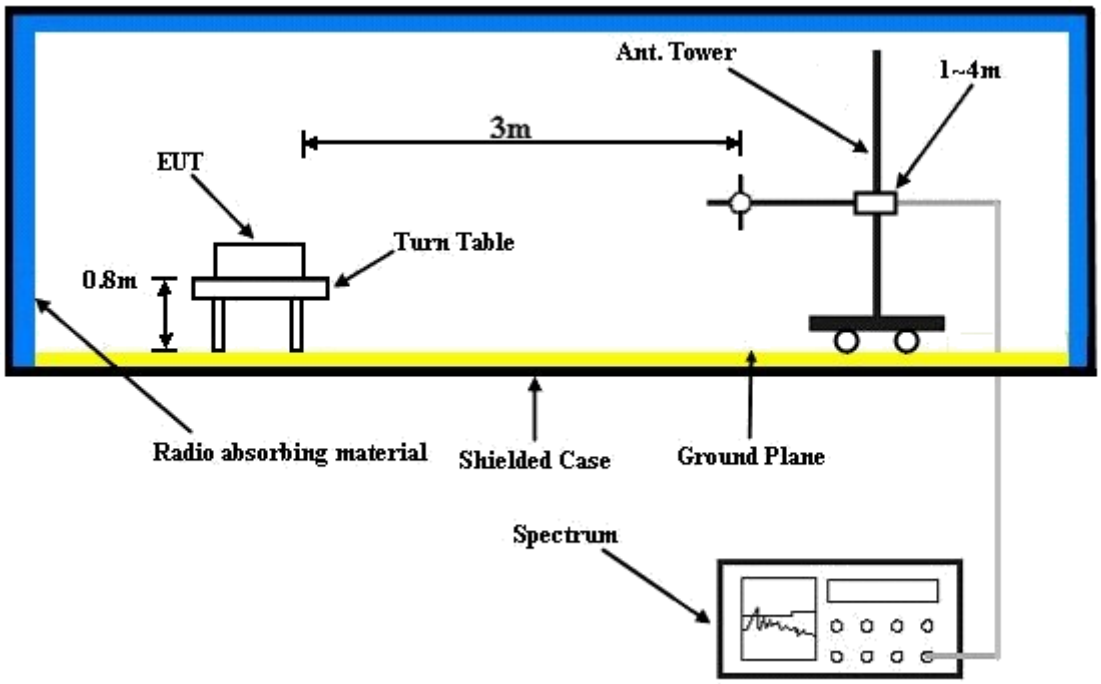
a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.3.3 DEVIATION FROM TEST STANDARD

No deviation

4.3.4 TEST SETUP

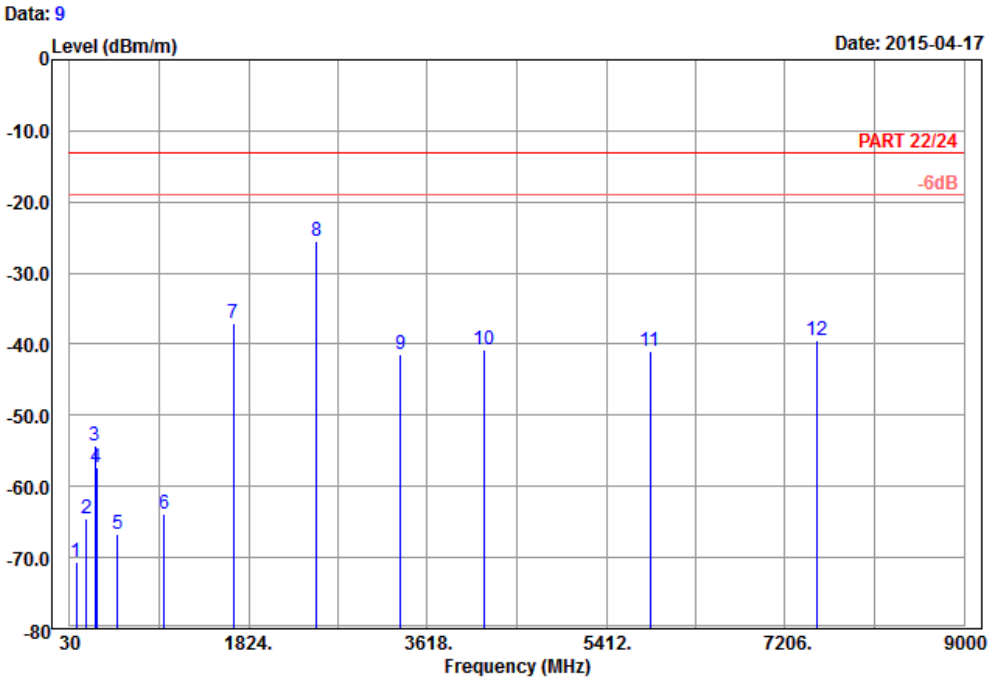


For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.3.5 TEST RESULTS

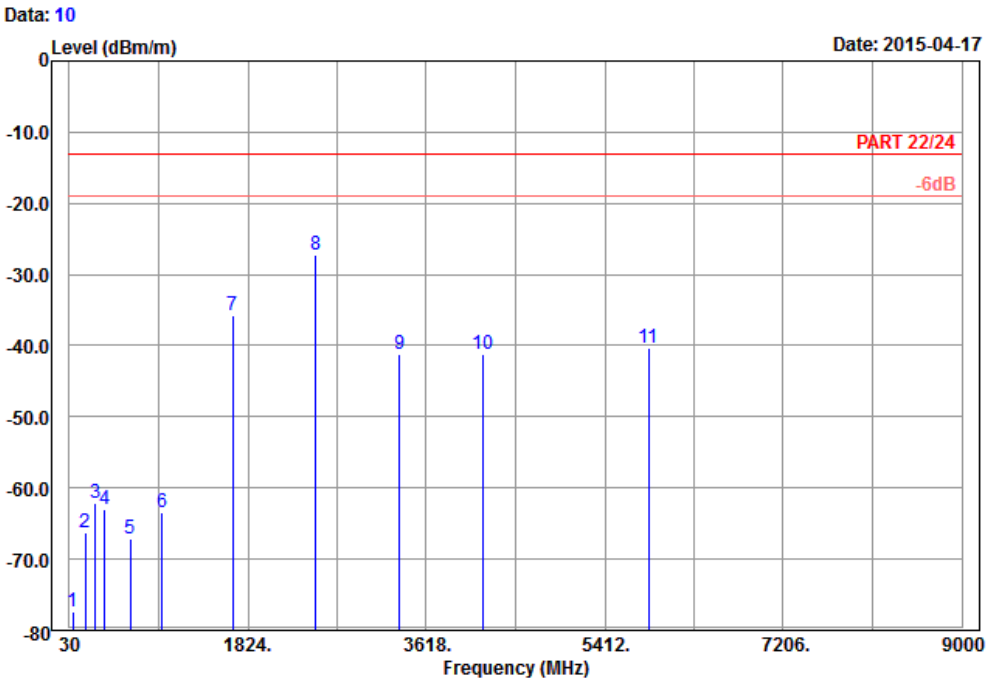
GSM:

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 3m Horizontal
Remark : GPRS 850_Link_CH189
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	99.39	-70.63	-60.51	-13.00	-57.63	-10.12	Peak
2	194.97	-64.57	-58.61	-13.00	-51.57	-5.96	Peak
3	284.88	-54.28	-48.45	-13.00	-41.28	-5.83	Peak
4	301.40	-57.26	-51.32	-13.00	-44.26	-5.94	Peak
5	512.10	-66.61	-62.18	-13.00	-53.61	-4.43	Peak
6	976.20	-63.91	-69.10	-13.00	-50.91	5.19	Peak
7	1672.80	-36.95	-44.86	-13.00	-23.95	7.91	Peak
8 pp	2509.20	-25.48	-36.76	-13.00	-12.48	11.28	Peak
9	3345.60	-41.35	-55.80	-13.00	-28.35	14.45	Peak
10	4182.00	-40.83	-57.96	-13.00	-27.83	17.13	Peak
11	5854.80	-40.90	-61.68	-13.00	-27.90	20.78	Peak
12	7527.60	-39.36	-62.21	-13.00	-26.36	22.85	Peak



Site : 966 chamber 1
Condition: PART 22/24 3m Vertical
Remark : GPRS 850_Link_CH189
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	68.34	-77.40	-64.58	-13.00	-64.40	-12.82	Peak
2	187.14	-66.22	-60.53	-13.00	-53.22	-5.69	Peak
3	291.09	-62.03	-56.15	-13.00	-49.03	-5.88	Peak
4	384.70	-63.00	-59.48	-13.00	-50.00	-3.52	Peak
5	643.70	-67.14	-67.07	-13.00	-54.14	-0.07	Peak
6	964.30	-63.52	-68.67	-13.00	-50.52	5.15	Peak
7	1672.80	-35.79	-43.70	-13.00	-22.79	7.91	Peak
8 pp	2509.20	-27.17	-38.45	-13.00	-14.17	11.28	Peak
9	3345.60	-41.09	-55.54	-13.00	-28.09	14.45	Peak
10	4182.00	-41.30	-58.43	-13.00	-28.30	17.13	Peak
11	5854.80	-40.24	-61.02	-13.00	-27.24	20.78	Peak

EDGE:

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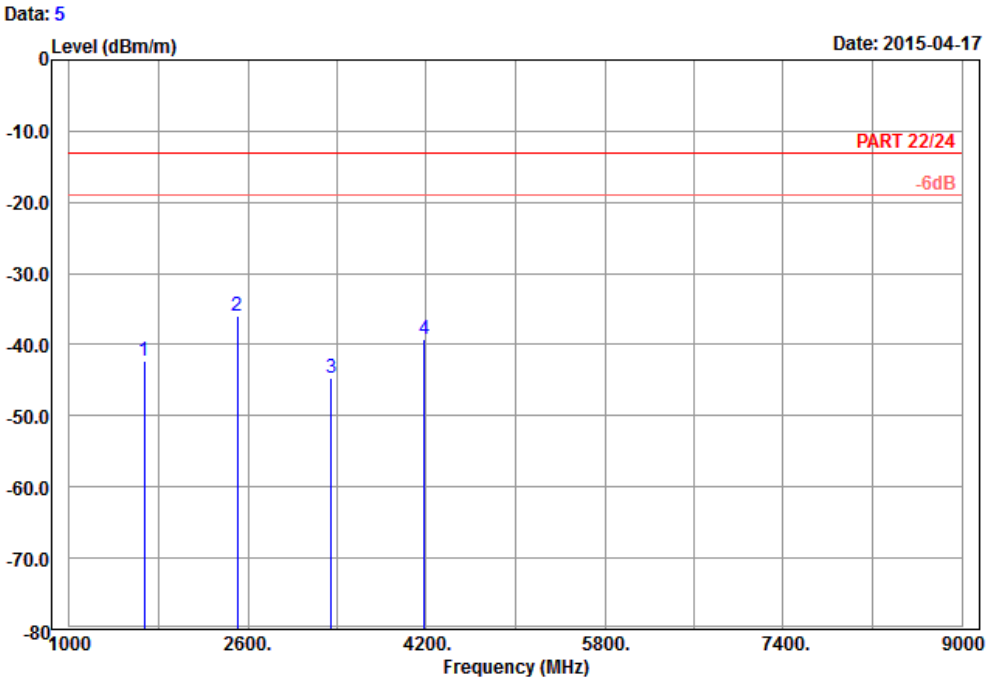
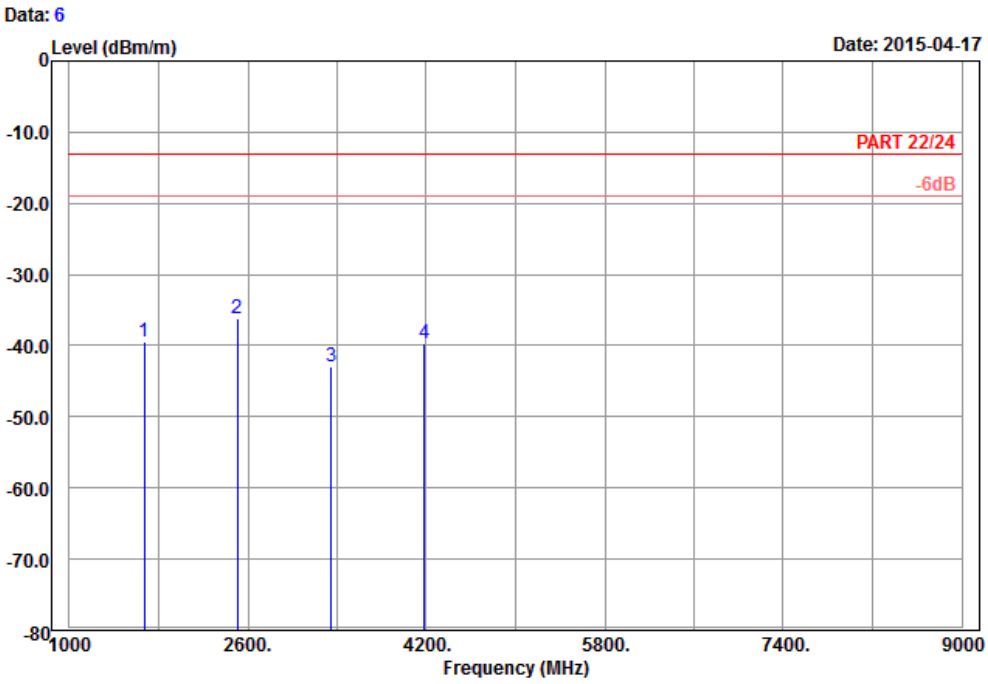


Site : 966 chamber 1
Condition: PART 22/24 3m Horizontal
Remark : EDGE 850_Link_CH189
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	1672.80	-42.24	-50.15	-13.00	-29.24	7.91	Peak
2 pp	2509.20	-35.96	-47.24	-13.00	-22.96	11.28	Peak
3	3345.60	-44.75	-59.20	-13.00	-31.75	14.45	Peak
4	4182.00	-39.19	-56.32	-13.00	-26.19	17.13	Peak



Site : 966 chamber 1
Condition: PART 22/24 3m Vertical
Remark : EDGE 850_Link_CH189
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	1672.80	-39.56	-47.47	-13.00	-26.56	7.91	Peak
2 pp	2509.20	-36.29	-47.57	-13.00	-23.29	11.28	Peak
3	3345.60	-43.00	-57.45	-13.00	-30.00	14.45	Peak
4	4182.00	-39.59	-56.72	-13.00	-26.59	17.13	Peak

WCDMA:

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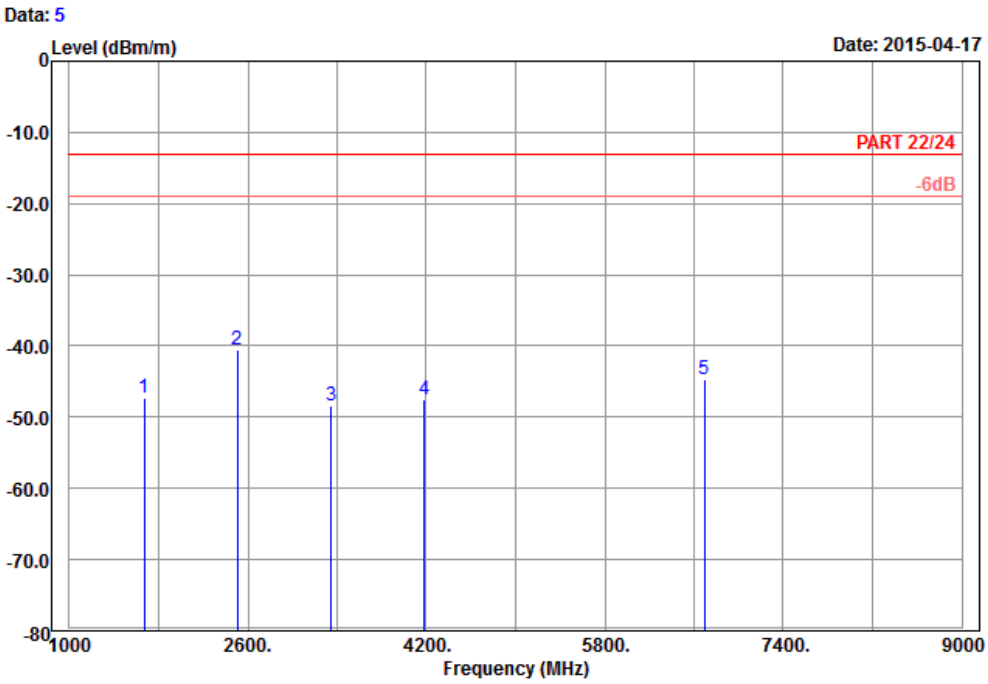
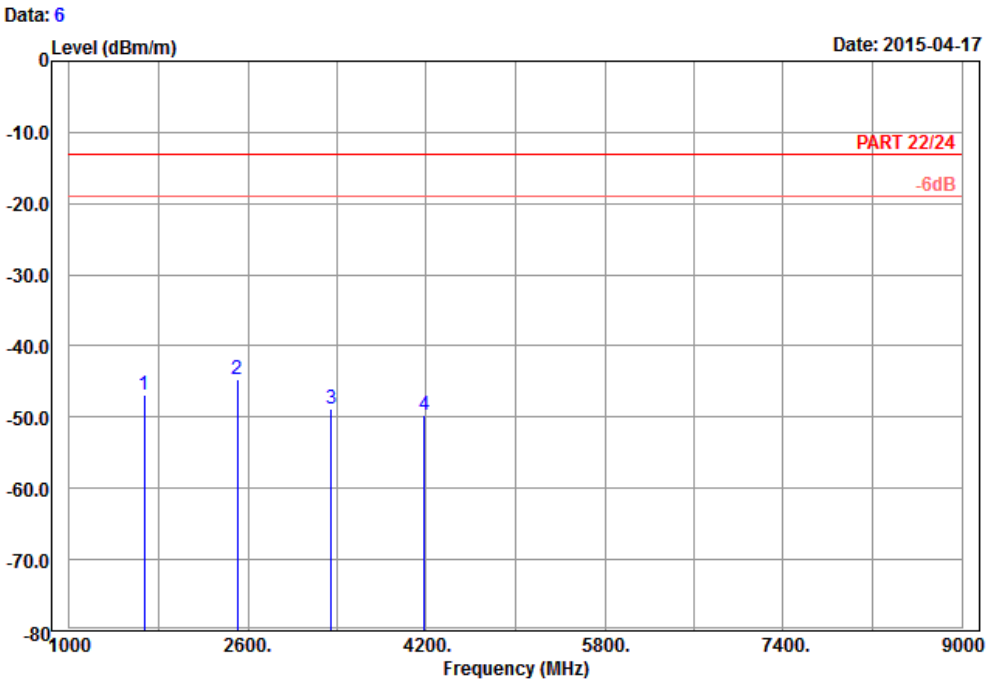


Site : 966 chamber 1
Condition: PART 22/24 3m Horizontal
Remark : Band V_Link_CH4182
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	1672.80	-47.25	-55.16	-13.00	-34.25	7.91	Peak
2 pp	2509.20	-40.54	-51.82	-13.00	-27.54	11.28	Peak
3	3345.60	-48.35	-62.80	-13.00	-35.35	14.45	Peak
4	4182.00	-47.44	-64.57	-13.00	-34.44	17.13	Peak
5	6691.20	-44.71	-67.11	-13.00	-31.71	22.40	Peak



Site : 966 chamber 1
Condition: PART 22/24 3m Vertical
Remark : Band V_Link_CH4182
Tested by: Karl Lee
Plane : Z

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	1672.80	-46.87	-54.78	-13.00	-33.87	7.91	Peak
2 pp	2509.20	-44.58	-55.86	-13.00	-31.58	11.28	Peak
3	3345.60	-48.80	-63.25	-13.00	-35.80	14.45	Peak
4	4182.00	-49.73	-66.86	-13.00	-36.73	17.13	Peak

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---