

FCC Test Report

(PART 24)

Report No.: RF170623C05-1

FCC ID: RLS-STAVL1629

Test Model: UW1

Received Date: Jun. 23, 2017

Test Date: Jul. 08, 2017 ~ Jul. 13, 2017

Issued Date: Oct. 31, 2017

Applicant: SYSTEMS & TECHNOLOGY CORP.

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Release Control Record

Issue No.	Description	Date Issued
RF170623C05-1	Original Release	Oct. 31, 2017

1 Certificate of Conformity

Product: GPS Vehicle Tracking Device

Brand: CAREU

Test Model: UW1

Sample Status: Production Unit

Applicant: SYSTEMS & TECHNOLOGY CORP.

Test Date: Jul. 08, 2017 ~ Jul. 13, 2017

Standards: FCC Part 24, Subpart E

The above equipment 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 : Gina Liu , **Date:** Oct. 31, 2017
Gina Liu / Specialist

Approved by : Dylan Chiou , **Date:** Oct. 31, 2017
Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -6.70 dB at 3819.60 MHz.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site And Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 16, 2016	Dec. 15, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 26, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2016	Dec. 13, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Dec. 26, 2016	Dec. 27, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 12, 2016	Dec. 13, 2017
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 184045	980116	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 330H	980112	Oct. 21, 2016	Oct. 20, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 21, 2016	Oct. 20, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 21, 2016	Oct. 20, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 21, 2016	Oct. 20, 2017
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
Radio Communication Analyzer	MT8820C	6201300640	Aug. 10, 2015	Aug. 09, 2017
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 02, 2016	Sep. 01, 2017
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 30, 2017	Jun. 29, 2018

- 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 preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
 4. The FCC Site Registration No. is 690701.
 5. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	GPS Vehicle Tracking Device	
Brand	CAREU	
Test Model	UW1	
Status of EUT	Production Unit	
Power Supply Rating	12 Vdc (car battery)	
Modulation Type	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
Frequency Range	GSM/GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
Max. EIRP Power	GSM/GPRS	822.62 mW
	EDGE	306.48 mW
	WCDMA	140.09 mW
Emission Designator	GSM/GPRS	244KGXW
	EDGE	252KG7W
	WCDMA	4M07F9W
Antenna Type	Fixed External Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

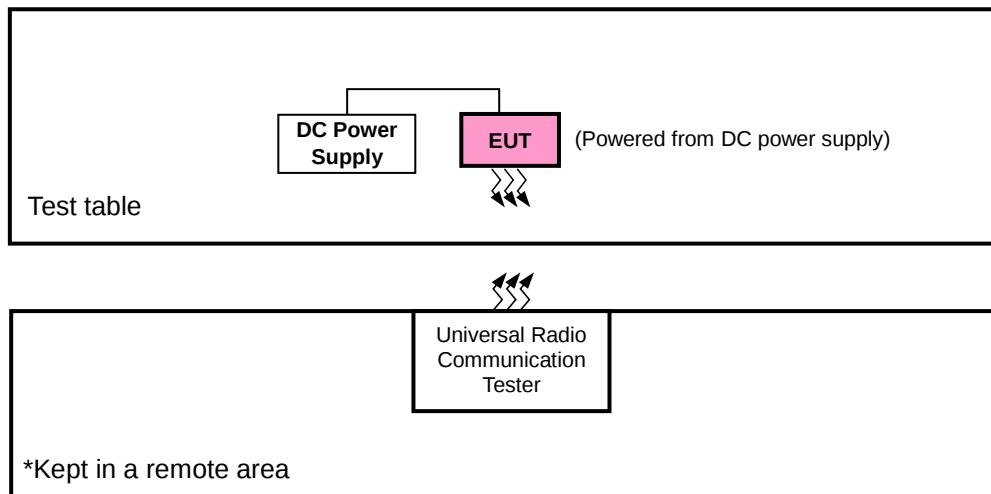
Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery	EVERPOWER TECHNOLOGY	603048-R02	3.7 Vdc, 900 mAh
WWAN Module	u-blox	SARA-U201	--

2. The above EUT information is 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



3.2.1 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.	Universal Radio Communication Tester	R&S	CMU200	123295	N/A
2.	DC Power Supply	Topward	33010D	807748	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A
2.	N/A

Note:

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

3.3 Test Mode Applicability and Tested Channel Detail

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 as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
GSM	Y-plane	Y-axis
EDGE	Y-plane	Y-axis
WCDMA	Y-plane	Y-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	512 to 810	512, 661, 810	GSM, EDGE
-	Frequency Stability	512 to 810	512, 810	GSM, EDGE
-	Occupied Bandwidth	512 to 810	512, 661, 810	GSM, EDGE
-	Band Edge	512 to 810	512, 810	GSM, EDGE
-	Peak to Average Ratio	512 to 810	512, 661, 810	GSM, EDGE
-	Conducuted Emission	512 to 810	512, 661, 810	GSM, EDGE
-	Radiated Emission	512 to 810	512, 661, 810	GSM, EDGE

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Frequency Stability	9262 to 9538	9262, 9538	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
-	Band Edge	9262 to 9538	9262, 9538	WCDMA
-	Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
-	Conducuted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	12 Vdc	Gavin Wu
Frequency Stability	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Occupied Bandwidth	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Band Edge	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Peak to Average Ratio	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Conducuted Emission	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu

3.4 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

3.5 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 24

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-E 2016

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 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

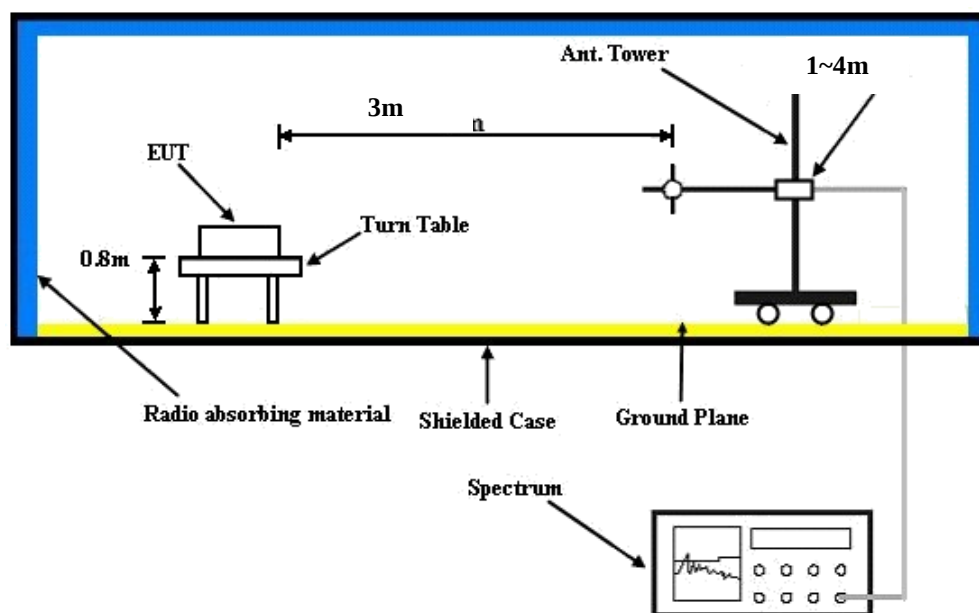
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of 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.
- c. 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 b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated from E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}$.

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and 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.

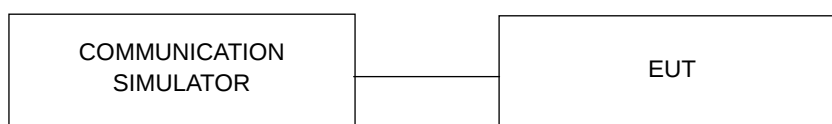
4.1.3 Test Setup

EIRP / ERP Measurement:



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

Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GPRS (GMSK, 1Tx-slot)	29.92	29.95	29.85
GPRS (GMSK, 2Tx-slot)	29.89	29.82	29.83
GPRS (GMSK, 3Tx-slot)	29.16	29.19	29.09
GPRS (GMSK, 4Tx-slot)	27.94	27.97	27.87
EDGE (8PSK, 1Tx-slot)	26.15	26.21	26.07
EDGE (8PSK, 2Tx-slot)	26.11	26.17	26.03
EDGE (8PSK, 3Tx-slot)	25.48	25.54	25.40
EDGE (8PSK, 4Tx-slot)	24.34	24.40	24.26

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	23.79	23.72	23.71

EIRP Power (dBm)

GSM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	512	1850.2	-8.35	36.57	28.22	664.05	H
	661	1880.0	-8.72	37.22	28.50	708.60	
	810	1909.8	-8.03	37.18	29.15	822.62	
	512	1850.2	-14.85	37.65	22.80	190.59	V
	661	1880.0	-14.49	37.58	23.09	203.84	
	810	1909.8	-14.65	37.48	22.83	191.87	

EDGE							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	512	1850.2	-12.46	36.57	24.11	257.75	H
	661	1880.0	-12.36	37.22	24.86	306.48	
	810	1909.8	-12.56	37.18	24.62	289.87	
	512	1850.2	-19.03	37.65	18.62	72.79	V
	661	1880.0	-18.58	37.58	19.00	79.49	
	810	1909.8	-18.65	37.48	18.83	76.38	

WCDMA							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	9262	1852.4	-15.55	36.57	21.02	126.53	H
	9400	1880.0	-15.76	37.22	21.46	140.09	
	9538	1907.6	-15.84	37.18	21.34	136.21	
	9262	1852.4	-21.68	37.65	15.97	39.55	V
	9400	1880.0	-21.36	37.58	16.22	41.91	
	9538	1907.6	-21.47	37.48	16.01	39.90	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

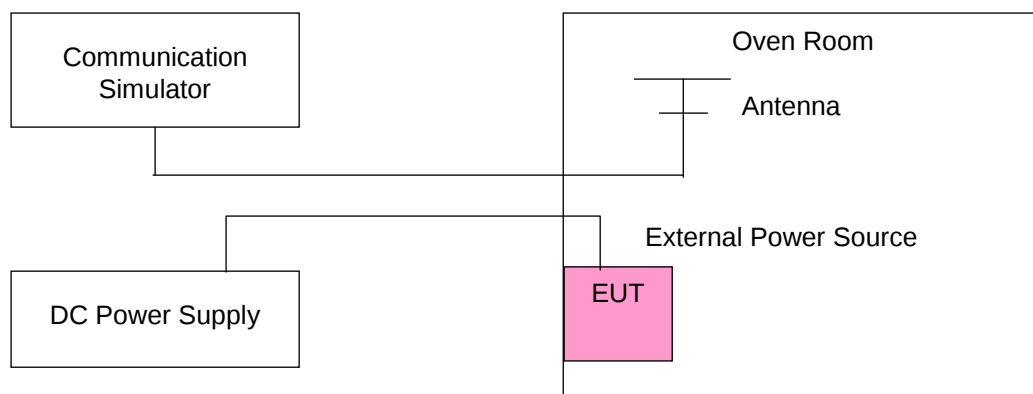
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
12.0	1850.200002	0.001	1909.800002	0.001	2.5
10.2	1850.200002	0.001	1909.800002	0.001	2.5
13.8	1850.200002	0.001	1909.800001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-40	1850.200001	0.001	1909.800004	0.002	2.5
-30	1850.200002	0.001	1909.800003	0.001	2.5
-20	1850.200002	0.001	1909.800003	0.002	2.5
-10	1850.200003	0.002	1909.800002	0.001	2.5
0	1850.200001	0.001	1909.800001	0.001	2.5
10	1850.199996	-0.002	1909.799997	-0.002	2.5
20	1850.199998	-0.001	1909.799996	-0.002	2.5
30	1850.199996	-0.002	1909.799998	-0.001	2.5
40	1850.199999	-0.001	1909.799996	-0.002	2.5
50	1850.199997	-0.001	1909.799998	-0.001	2.5
60	1850.199997	-0.001	1909.799997	-0.002	2.5
70	1850.199999	-0.001	1909.799999	-0.001	2.5
80	1850.199999	-0.001	1909.799999	-0.001	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -20°C to 60°C.
2. The EUT would shut down automatically as below -20°C.

Frequency Error vs. Voltage

Voltage (Volts)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
12.0	1850.200004	0.002	1909.800003	0.001	2.5
10.2	1850.200001	0.001	1909.800002	0.001	2.5
13.8	1850.200002	0.001	1909.800003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-40	1850.200002	0.001	1909.800003	0.002	2.5
-30	1850.200003	0.001	1909.800003	0.001	2.5
-20	1850.200001	0.001	1909.800003	0.002	2.5
-10	1850.200003	0.002	1909.800003	0.002	2.5
0	1850.200002	0.001	1909.800003	0.001	2.5
10	1850.199998	-0.001	1909.799998	-0.001	2.5
20	1850.199997	-0.001	1909.799998	-0.001	2.5
30	1850.199999	-0.001	1909.799998	-0.001	2.5
40	1850.199997	-0.002	1909.799996	-0.002	2.5
50	1850.199997	-0.001	1909.799999	-0.001	2.5
60	1850.199998	-0.001	1909.799997	-0.001	2.5
70	1850.199999	-0.001	1909.799997	-0.001	2.5
80	1850.199997	-0.002	1909.799998	-0.001	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -40°C to 80°C.
2. The EUT would shut down automatically as below -20°C.

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
12.0	1852.400003	0.002	1907.600001	0.001	2.5
10.2	1852.400002	0.001	1907.600003	0.001	2.5
13.8	1852.400002	0.001	1907.600003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-40	1852.400002	0.001	1907.600004	0.002	2.5
-30	1852.400001	0.001	1907.600002	0.001	2.5
-20	1852.400003	0.002	1907.600004	0.002	2.5
-10	1852.400004	0.002	1907.600004	0.002	2.5
0	1852.400003	0.002	1907.600004	0.002	2.5
10	1852.399997	-0.002	1907.599998	-0.001	2.5
20	1852.399997	-0.002	1907.599997	-0.002	2.5
30	1852.399998	-0.001	1907.599999	-0.001	2.5
40	1852.399996	-0.002	1907.599998	-0.001	2.5
50	1852.399999	-0.001	1907.599996	-0.002	2.5
60	1852.399996	-0.002	1907.599998	-0.001	2.5
70	1852.399999	-0.001	1907.599998	-0.001	2.5
80	1852.399998	-0.001	1907.599999	-0.001	2.5

Note:

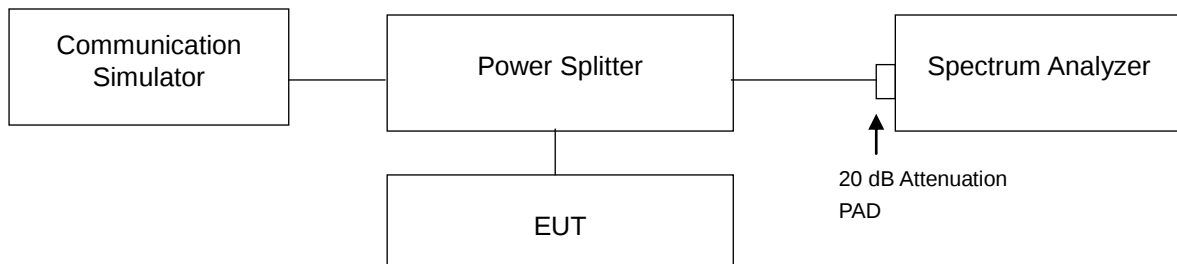
1. The applicant declared that the normal operating temperature of the EUT is from -40°C to 80°C.
2. The EUT would shut down automatically as below -20°C.

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

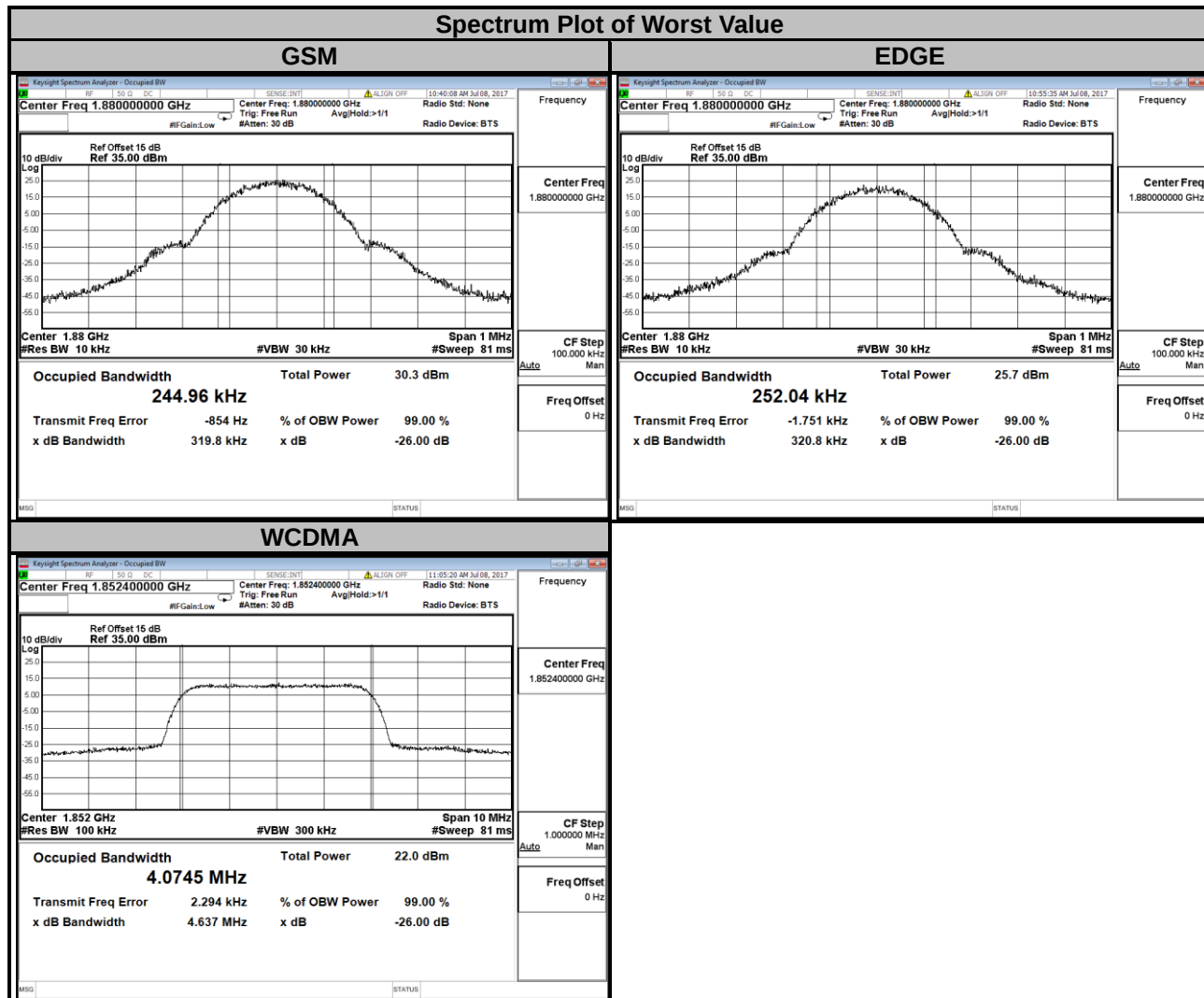
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup



4.3.3 Test Result

Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		GSM	EDGE			
512	1850.2	243.22	251.98	9262	1852.4	4.07
661	1880.0	244.96	252.04	9400	1880.0	4.07
810	1909.8	244.55	249.19	9538	1907.6	4.07

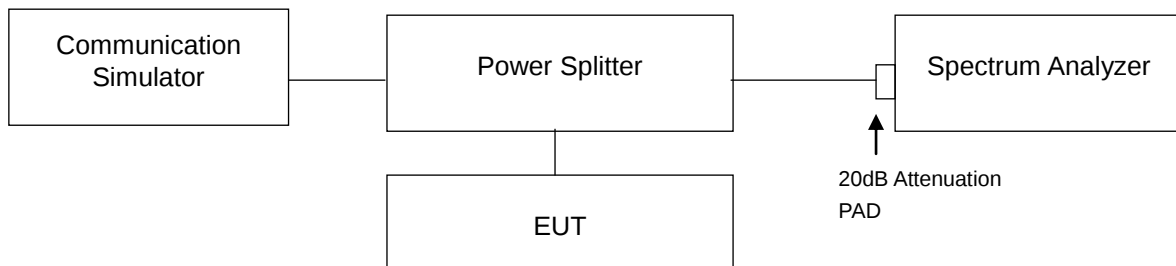


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

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. 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.

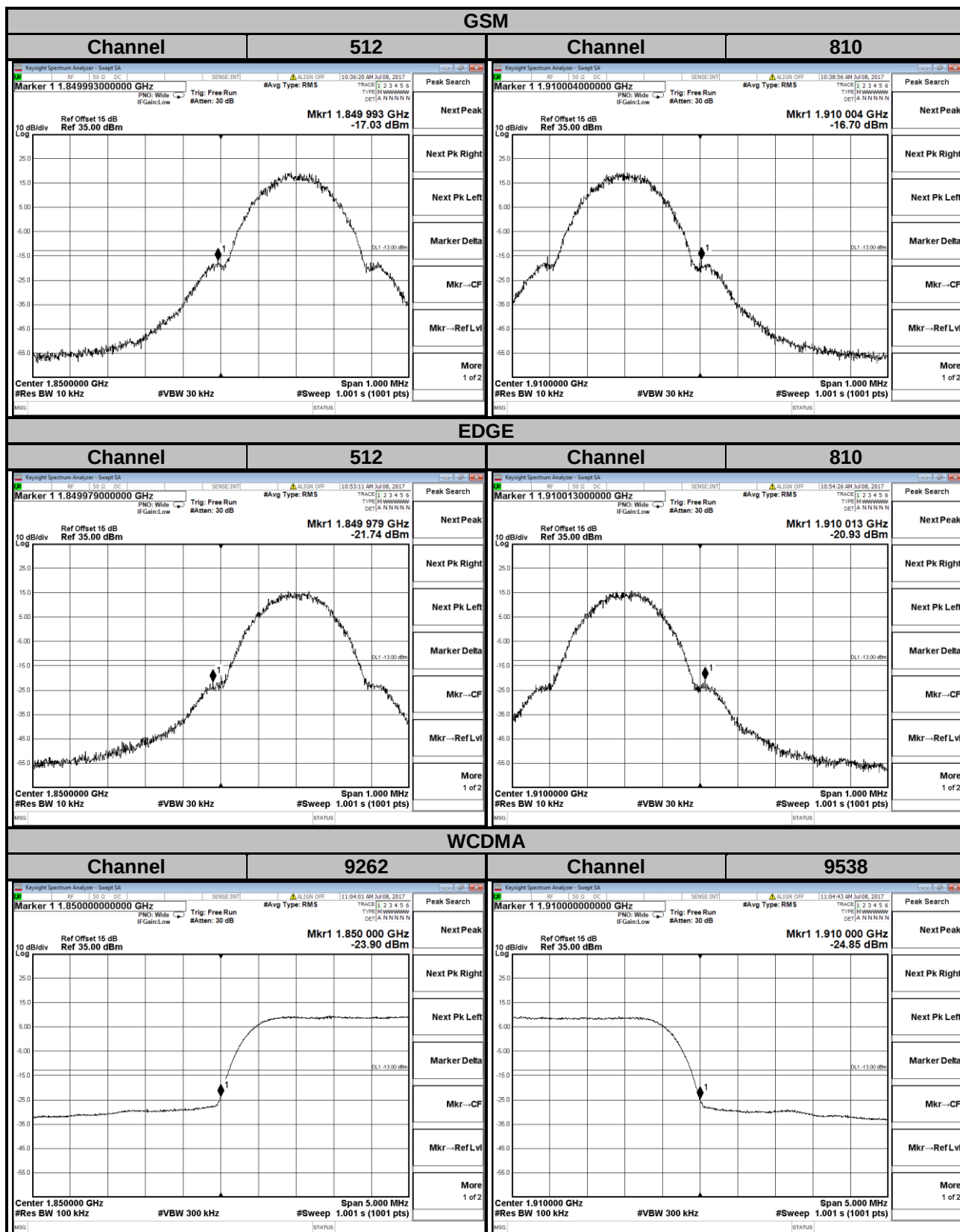
4.4.2 Test Setup



4.4.3 Test Procedures

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 10 kHz and VB of the spectrum is 30 kHz (GSM/GPRS/EDGE).
- The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
- Record the max trace plot into the test report.

4.4.4 Test Results

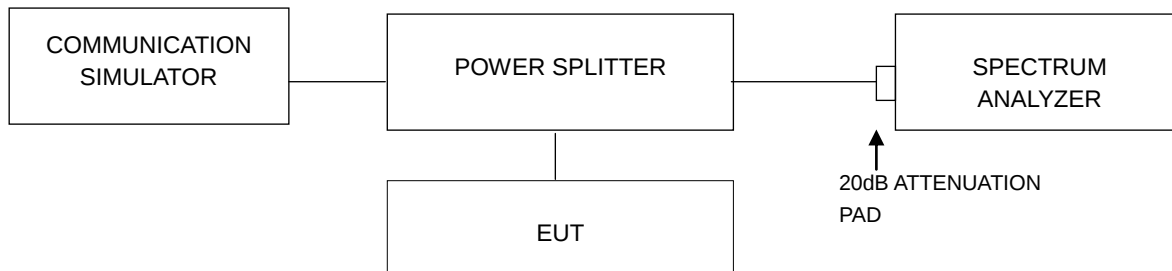


4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.5.2 Test Setup

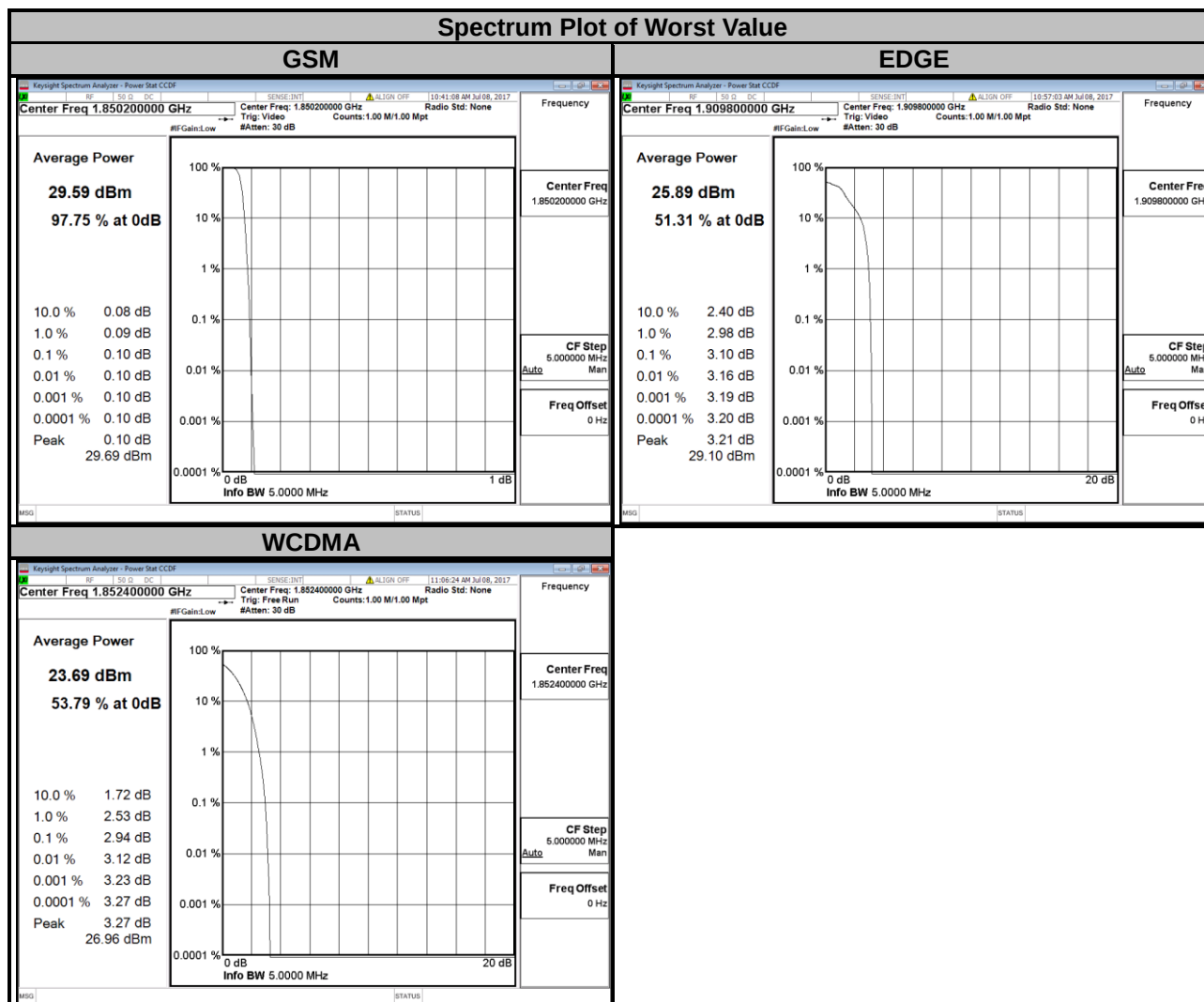


4.5.3 Test Procedures

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.5.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		GSM	EDGE			WCDMA
512	1850.2	0.10	3.07	9262	1852.4	2.94
661	1880.0	0.09	3.09	9400	1880.0	2.93
810	1909.8	0.09	3.10	9538	1907.6	2.93

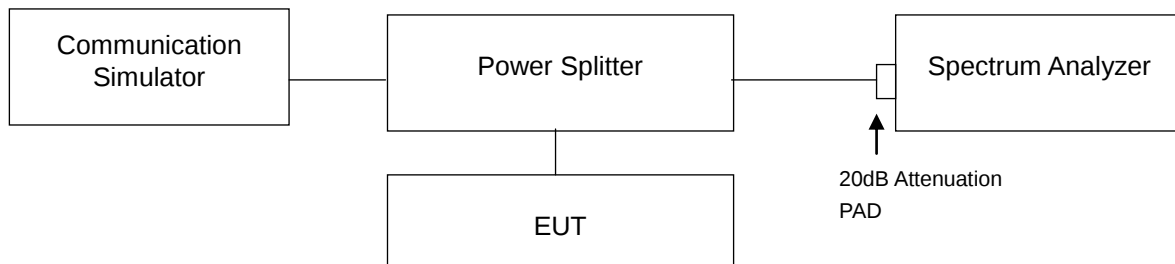


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions 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 equal to -13 dBm.

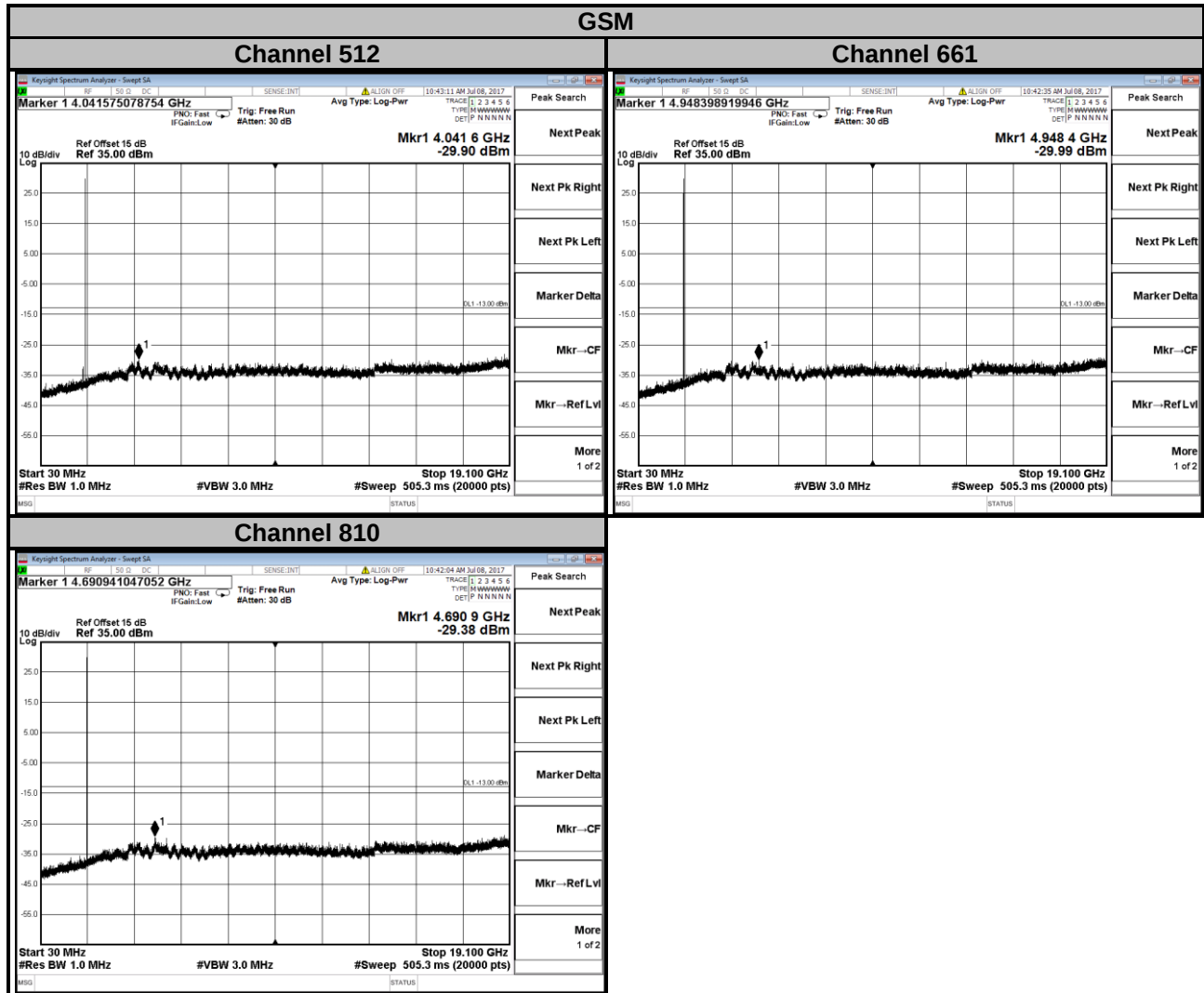
4.6.2 Test Setup



4.6.3 Test Procedure

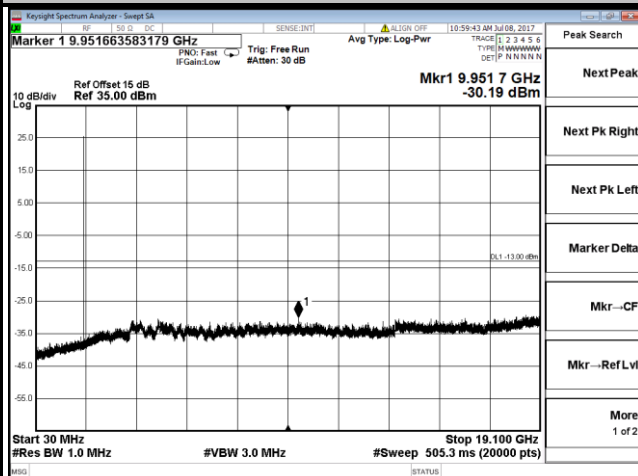
- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 9 GHz. 20 dB attenuation pad is connected with spectrum. RBW=1 MHz and VBW=3 MHz is used for conducted emission measurement.

4.6.4 Test Results

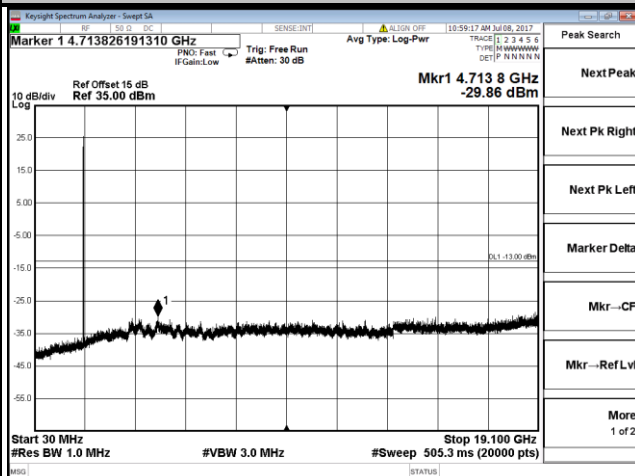


EDGE

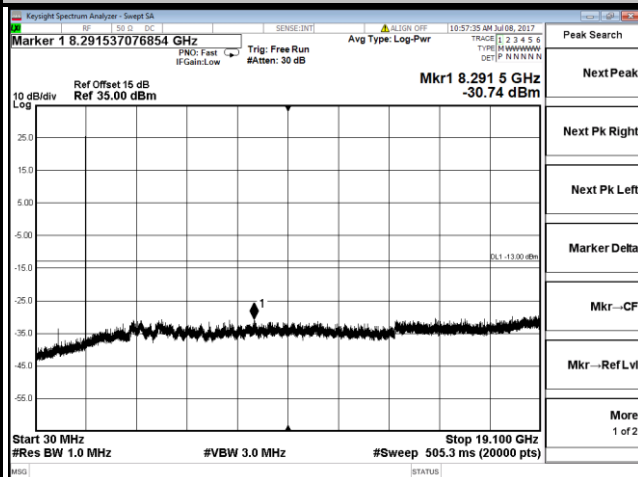
Channel 512



Channel 661

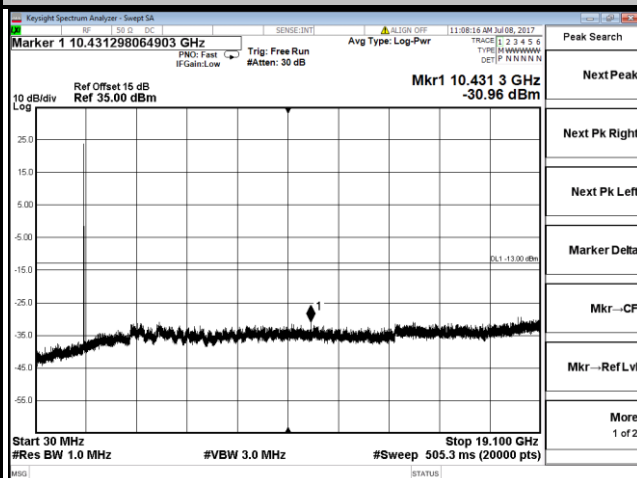


Channel 810

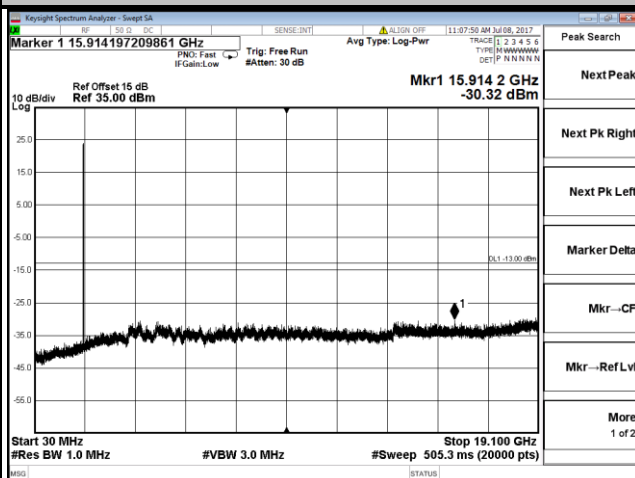


WCDMA

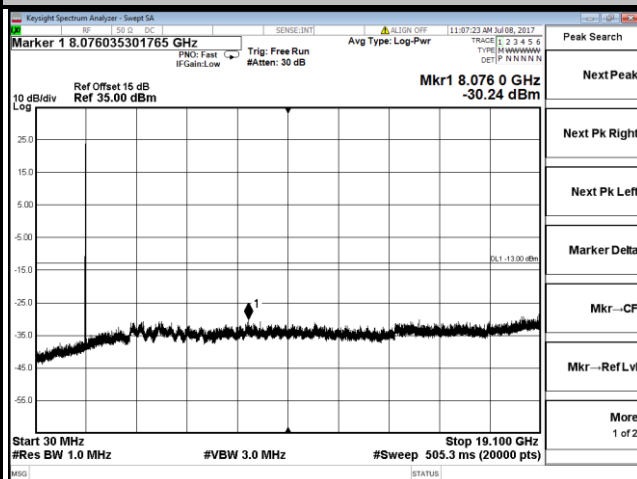
Channel 9262



Channel 9400



Channel 9538



4.7 Radiated Emission Measurement

4.7.1 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 -13 dBm.

4.7.2 Test Procedure

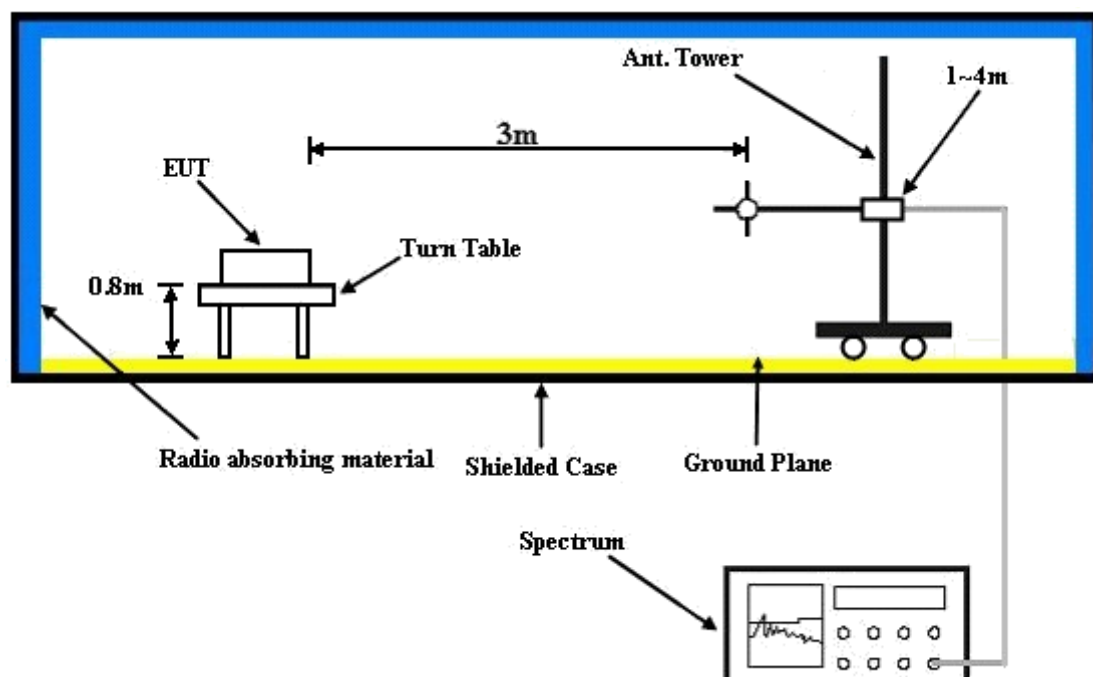
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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.
- EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
- 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.P.R power - 2.15 dBi.

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

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup



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

4.7.5 Test Results

GSM:

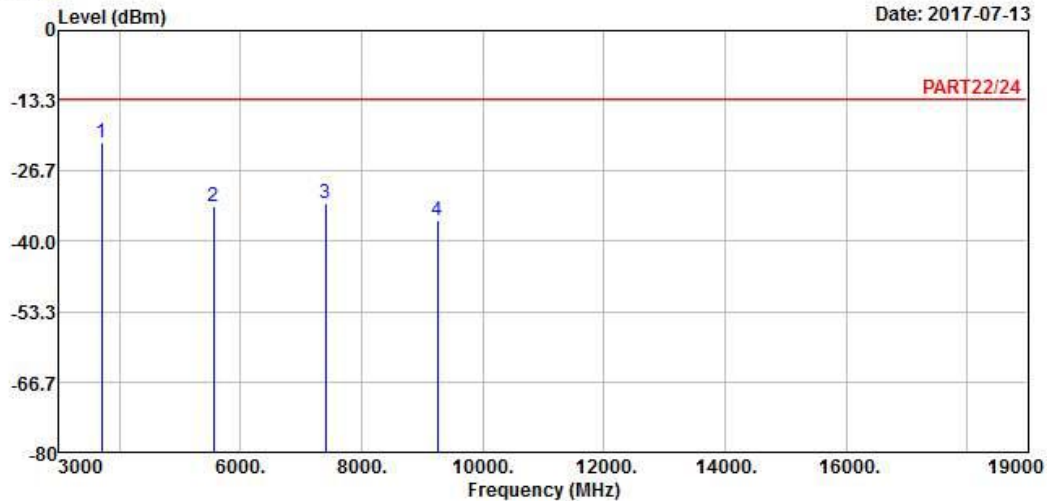
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : GPRS 1900_L-CH Link

Tested by: Gavin Wu

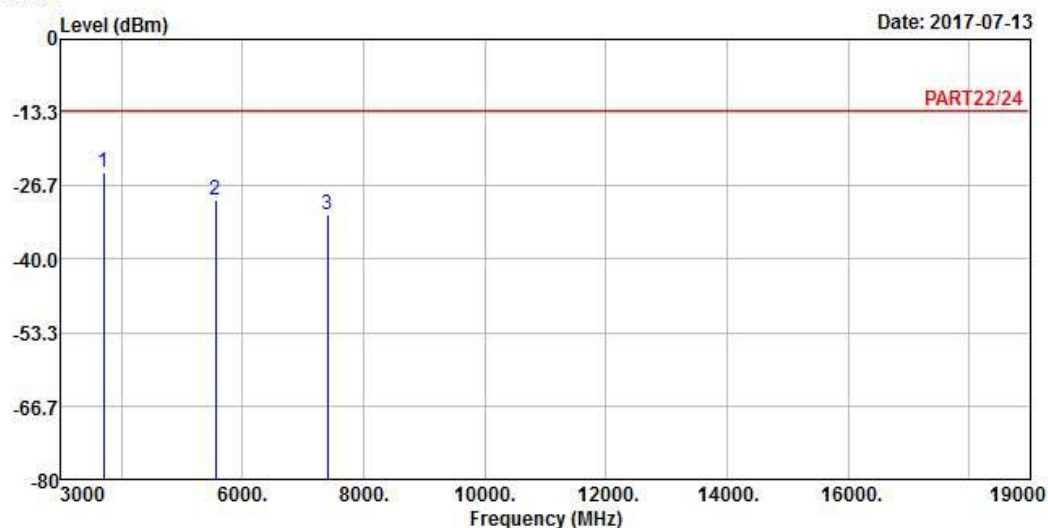
	Freq	Level	Read	Limit	Over		
	MHz	dBm	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-21.16	-12.99	-13.00	-8.16	-8.17	Peak
2	5550.60	-33.27	-31.82	-13.00	-20.27	-1.45	Peak
3	7400.80	-32.72	-38.22	-13.00	-19.72	5.50	Peak
4	9251.00	-36.03	-43.69	-13.00	-23.03	7.66	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 4



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : GPRS 1900_L-CH Link
Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-24.25	-16.08	-13.00	-11.25	-8.17	Peak
2	5550.60	-29.24	-27.79	-13.00	-16.24	-1.45	Peak
3	7400.80	-31.88	-37.38	-13.00	-18.88	5.50	Peak

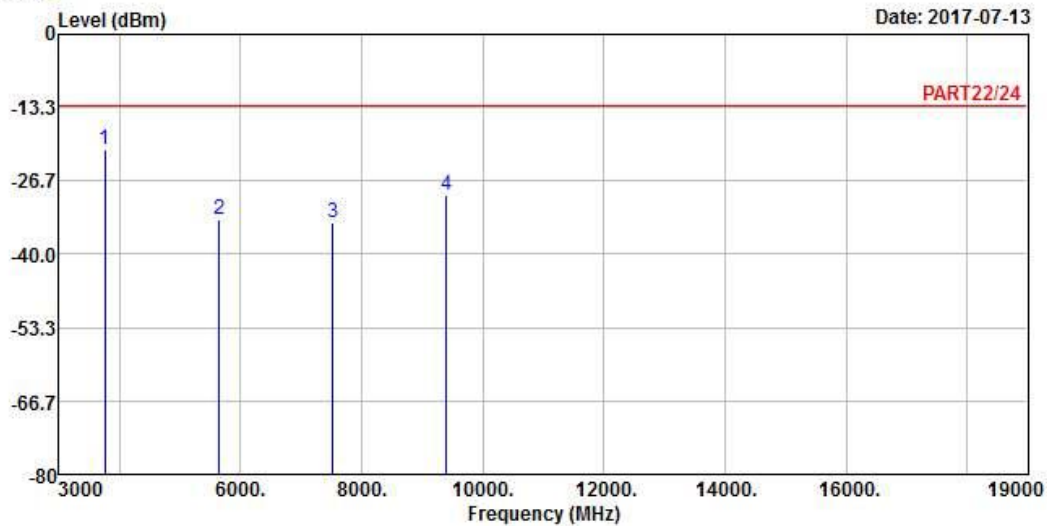
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : GPRS 1900_M-CH Link

Tested by: Gavin Wu

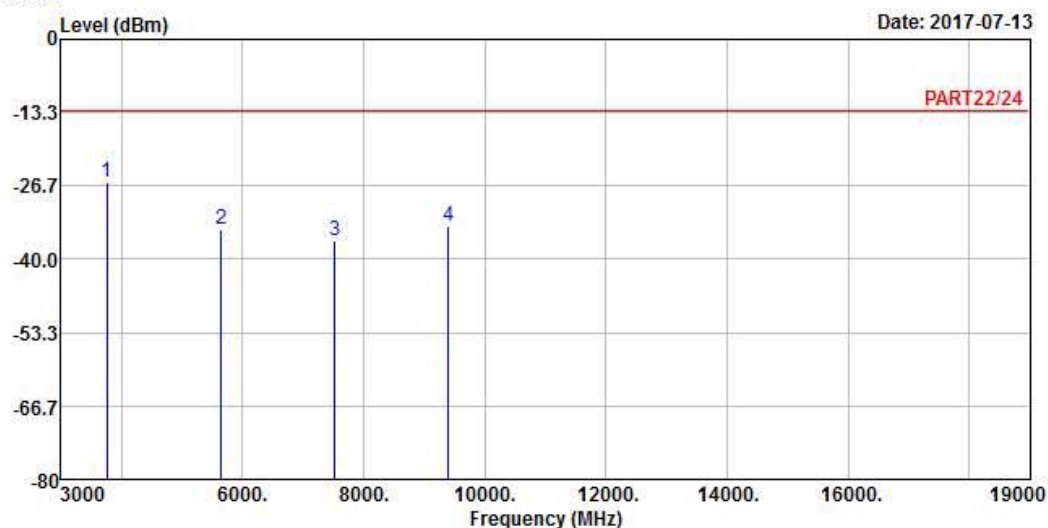
	Freq	Level	Read	Limit	Over		
	MHz	dBm	Level	Line	Limit	Factor	Remark
			dBm	dBm	dB	dB	
1 pp	3760.00	-20.91	-12.85	-13.00	-7.91	-8.06	Peak
2	5640.00	-33.74	-31.80	-13.00	-20.74	-1.94	Peak
3	7520.00	-34.36	-39.95	-13.00	-21.36	5.59	Peak
4	9400.00	-29.20	-37.25	-13.00	-16.20	8.05	Peak



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Data: 4



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : GPRS 1900_M-CH Link

Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-26.02	-17.96	-13.00	-13.02	-8.06	Peak
2	5640.00	-34.39	-32.45	-13.00	-21.39	-1.94	Peak
3	7520.00	-36.57	-42.16	-13.00	-23.57	5.59	Peak
4	9400.00	-33.99	-42.04	-13.00	-20.99	8.05	Peak

High Channel

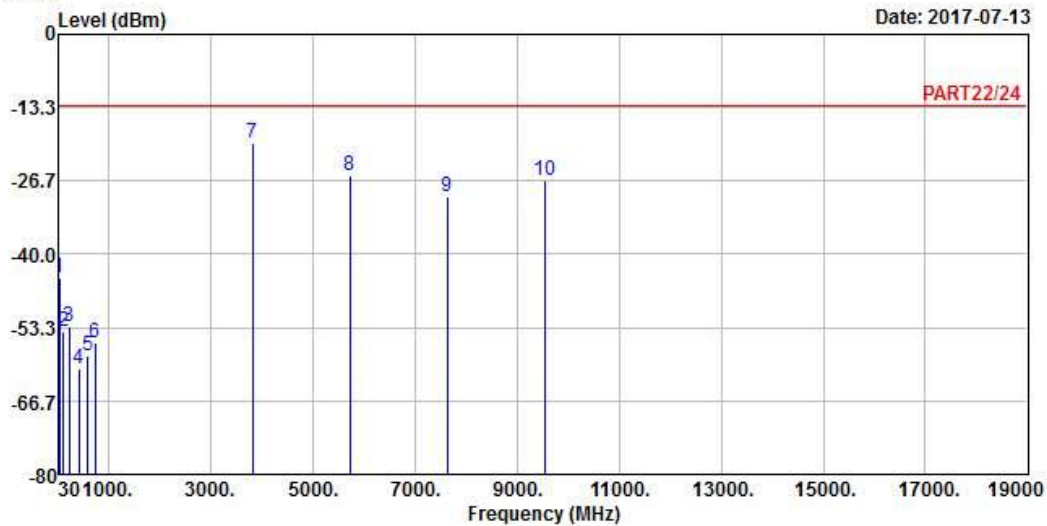


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Data: 9

Date: 2017-07-13



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : GPRS 1900_H-CH Link

Tested by: Gavin Wu

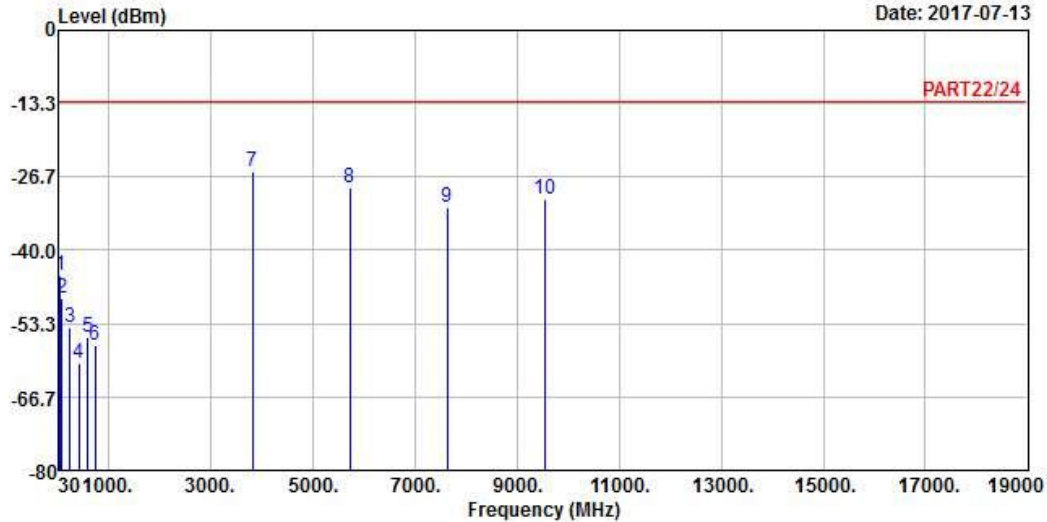
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	42.15	-44.22	-43.28	-13.00	-31.22	-0.94	Peak
2	119.91	-54.04	-44.19	-13.00	-41.04	-9.85	Peak
3	227.64	-53.15	-46.26	-13.00	-40.15	-6.89	Peak
4	409.20	-60.84	-54.97	-13.00	-47.84	-5.87	Peak
5	598.90	-58.30	-57.47	-13.00	-45.30	-0.83	Peak
6	729.80	-56.02	-56.50	-13.00	-43.02	0.48	Peak
7 pp	3819.60	-19.70	-12.02	-13.00	-6.70	-7.68	Peak
8	5729.40	-25.82	-24.24	-13.00	-12.82	-1.58	Peak
9	7639.20	-29.47	-34.53	-13.00	-16.47	5.06	Peak
10	9549.00	-26.43	-34.48	-13.00	-13.43	8.05	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 10



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : GPRS 1900_H-CH Link
Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.50	-44.54	-43.07	-13.00	-31.54	-1.47	Peak
2	75.09	-48.58	-39.05	-13.00	-35.58	-9.53	Peak
3	236.55	-54.09	-47.55	-13.00	-41.09	-6.54	Peak
4	409.20	-60.49	-54.62	-13.00	-47.49	-5.87	Peak
5	588.40	-55.92	-54.68	-13.00	-42.92	-1.24	Peak
6	729.10	-57.13	-57.61	-13.00	-44.13	0.48	Peak
7 pp	3819.60	-25.54	-17.86	-13.00	-12.54	-7.68	Peak
8	5729.40	-28.65	-27.07	-13.00	-15.65	-1.58	Peak
9	7639.20	-32.21	-37.27	-13.00	-19.21	5.06	Peak
10	9549.00	-30.63	-38.68	-13.00	-17.63	8.05	Peak

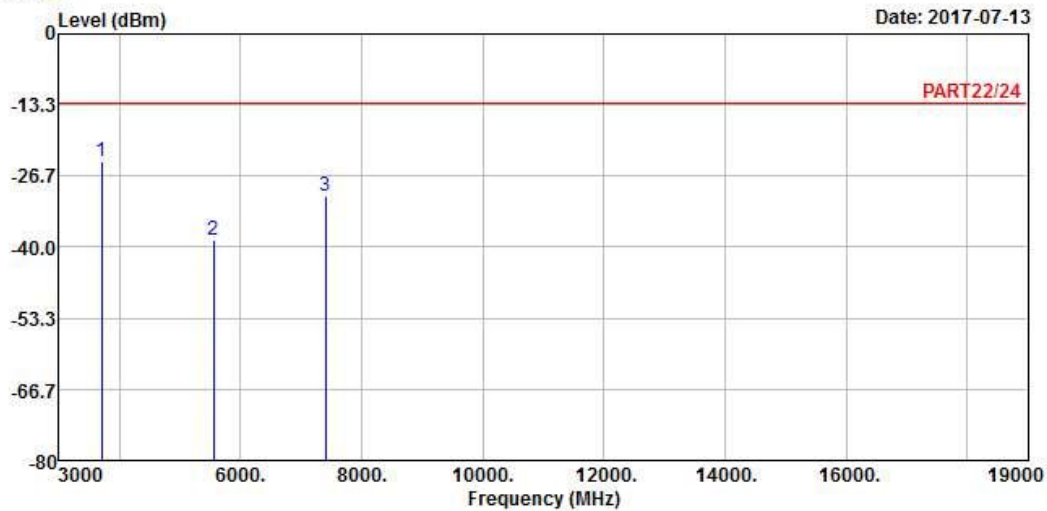
EDGE:
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : EDGE 1900_L-CH Link
Tested by: Gavin Wu

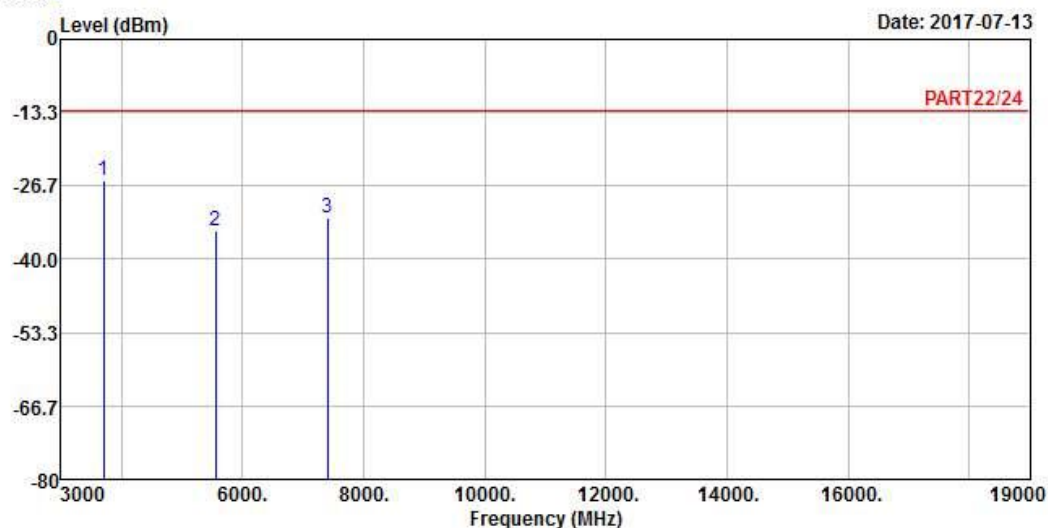
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-23.93	-15.76	-13.00	-10.93	-8.17	Peak
2	5550.60	-38.58	-37.13	-13.00	-25.58	-1.45	Peak
3	7400.80	-30.38	-35.88	-13.00	-17.38	5.50	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : EDGE 1900_L-CH Link

Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-25.80	-17.63	-13.00	-12.80	-8.17	Peak
2	5550.60	-34.79	-33.34	-13.00	-21.79	-1.45	Peak
3	7400.80	-32.33	-37.83	-13.00	-19.33	5.50	Peak

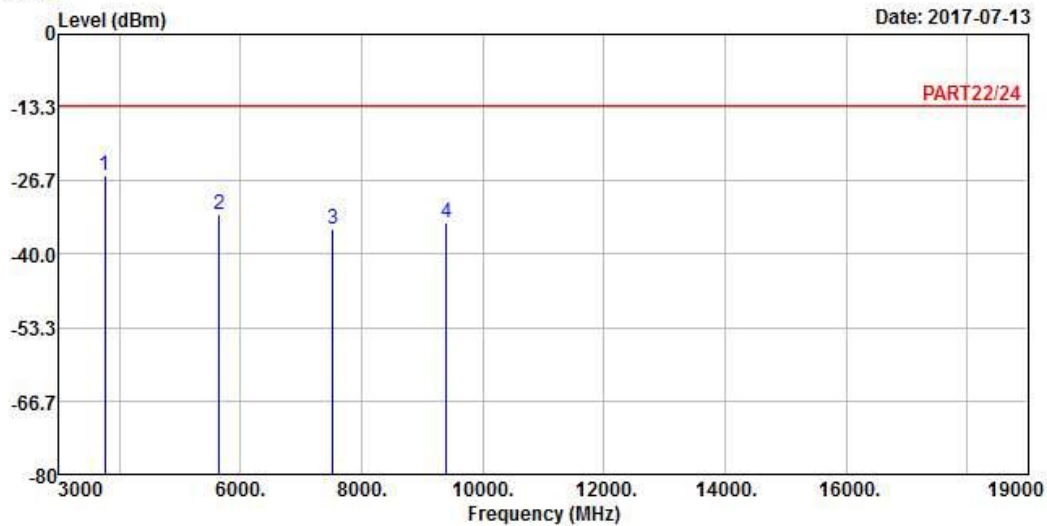
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : EDGE 1900_M-CH Link

Tested by: Gavin Wu

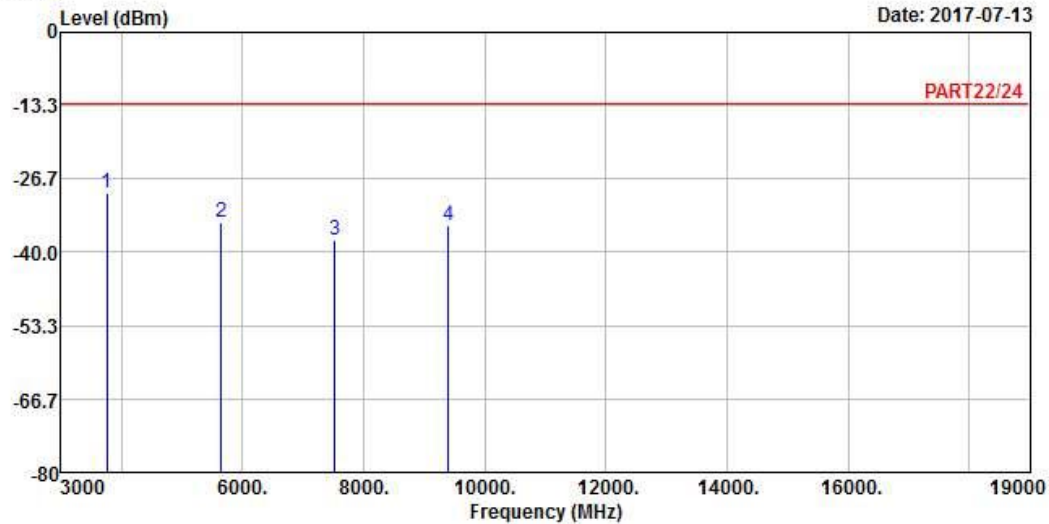
	Freq	Level	Read	Limit	Over		
	MHz	dBm	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-25.67	-17.61	-13.00	-12.67	-8.06	Peak
2	5640.00	-32.89	-30.95	-13.00	-19.89	-1.94	Peak
3	7520.00	-35.33	-40.92	-13.00	-22.33	5.59	Peak
4	9400.00	-34.11	-42.16	-13.00	-21.11	8.05	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : EDGE 1900_M-CH Link

Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-29.12	-21.06	-13.00	-16.12	-8.06	Peak
2	5640.00	-34.43	-32.49	-13.00	-21.43	-1.94	Peak
3	7520.00	-37.72	-43.31	-13.00	-24.72	5.59	Peak
4	9400.00	-34.99	-43.04	-13.00	-21.99	8.05	Peak

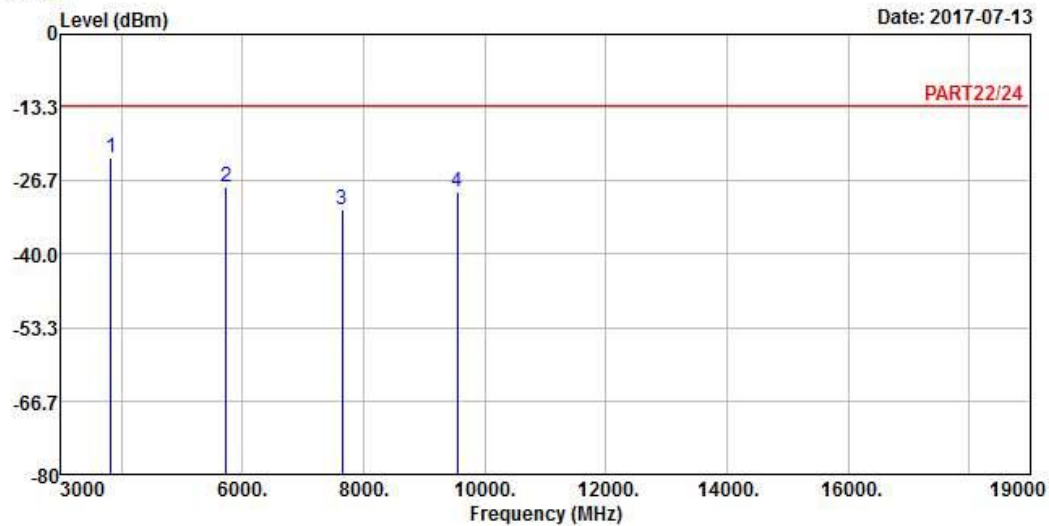
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : EDGE 1900_H-CH Link

Tested by: Gavin Wu

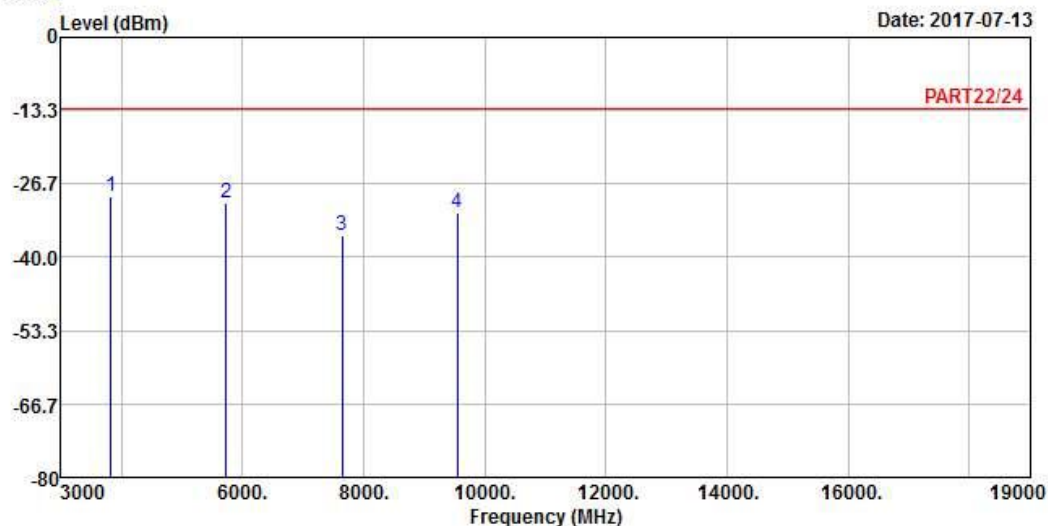
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3819.60	-22.58	-14.90	-13.00	-9.58	-7.68	Peak
2	5729.40	-27.90	-26.32	-13.00	-14.90	-1.58	Peak
3	7639.20	-31.93	-36.99	-13.00	-18.93	5.06	Peak
4	9549.00	-28.78	-36.83	-13.00	-15.78	8.05	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : EDGE 1900_H-CH Link

Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3819.60	-28.81	-21.13	-13.00	-15.81	-7.68	Peak
2	5729.40	-30.02	-28.44	-13.00	-17.02	-1.58	Peak
3	7639.20	-36.11	-41.17	-13.00	-23.11	5.06	Peak
4	9549.00	-31.78	-39.83	-13.00	-18.78	8.05	Peak

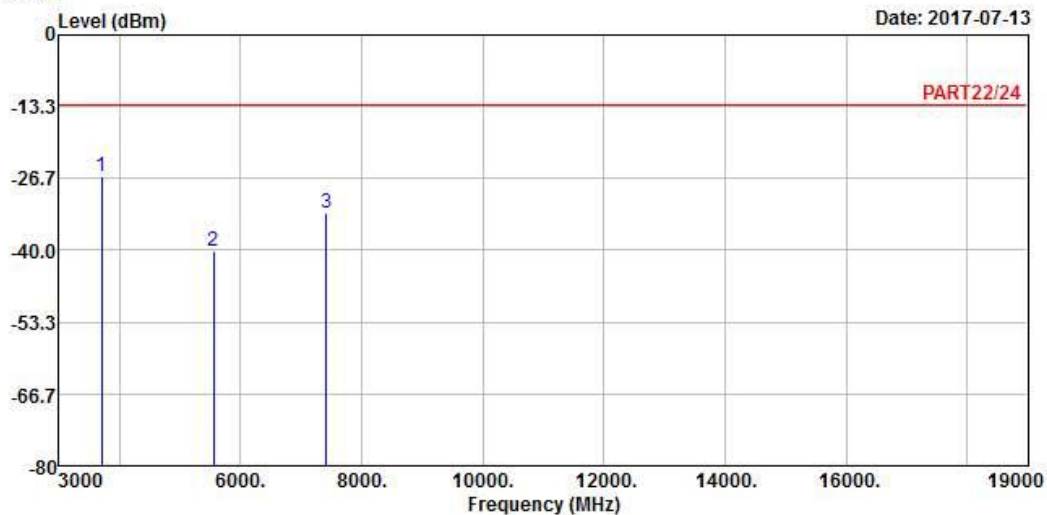
WCDMA:
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : WCDMA Band II_L-CH Link
 Tested by: Gavin Wu

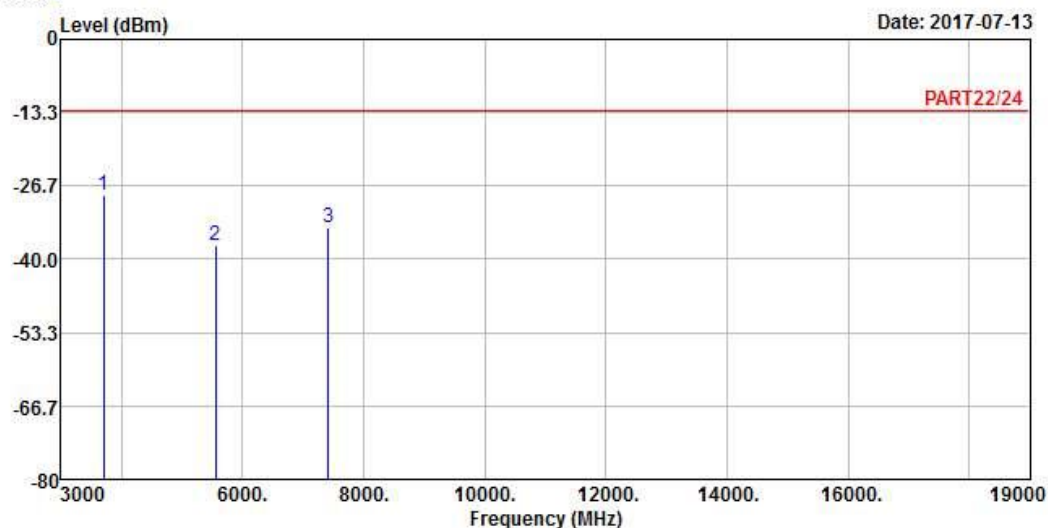
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-26.37	-18.20	-13.00	-13.37	-8.17	Peak
2	5557.20	-40.21	-38.76	-13.00	-27.21	-1.45	Peak
3	7409.60	-33.03	-38.53	-13.00	-20.03	5.50	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : WCDMA Band II_L-CH Link
Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-28.40	-20.23	-13.00	-15.40	-8.17	Peak
2	5557.20	-37.41	-35.96	-13.00	-24.41	-1.45	Peak
3	7409.60	-34.36	-39.86	-13.00	-21.36	5.50	Peak

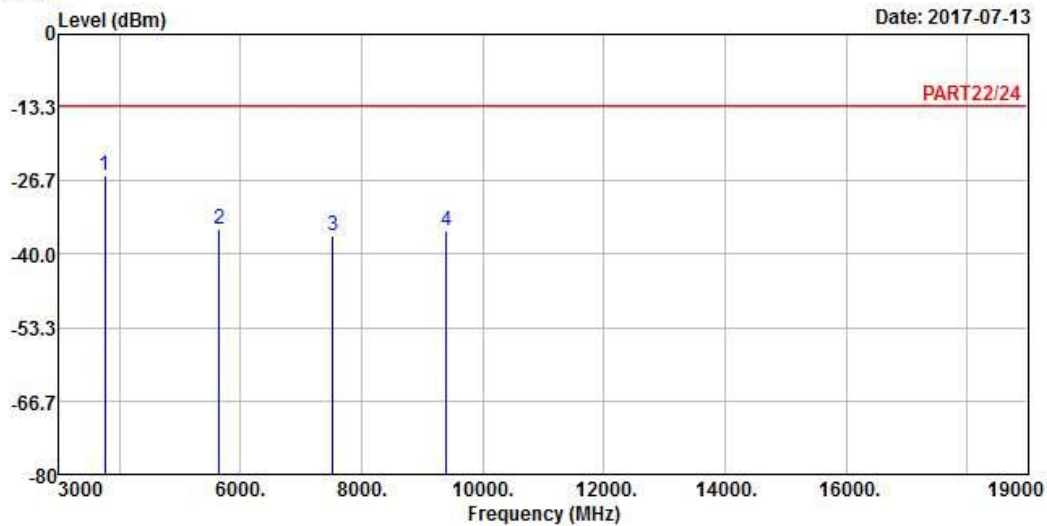
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : WCDMA Band II_M-CH Link

Tested by: Gavin Wu

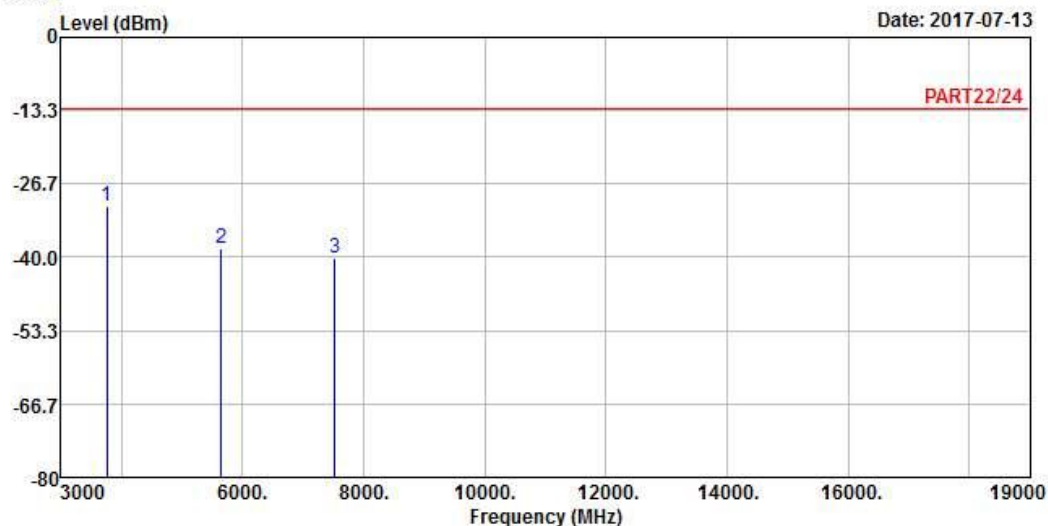
	Freq	Level	Read	Limit	Over		
	MHz	dBm	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-25.78	-17.72	-13.00	-12.78	-8.06	Peak
2	5640.00	-35.39	-33.45	-13.00	-22.39	-1.94	Peak
3	7520.00	-36.69	-42.28	-13.00	-23.69	5.59	Peak
4	9400.00	-35.70	-43.75	-13.00	-22.70	8.05	Peak



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A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : WCDMA Band II_M-CH Link
 Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-30.68	-22.62	-13.00	-17.68	-8.06	Peak
2	5640.00	-38.44	-36.50	-13.00	-25.44	-1.94	Peak
3	7520.00	-40.21	-45.80	-13.00	-27.21	5.59	Peak

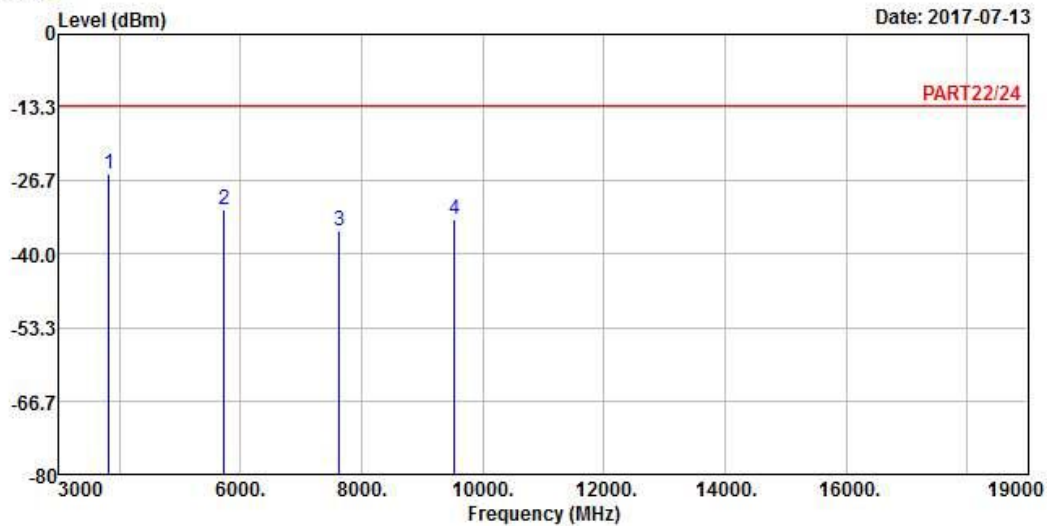
High Channel



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A D T

Data: 3



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : WCDMA Band II_H-CH Link
Tested by: Gavin Wu

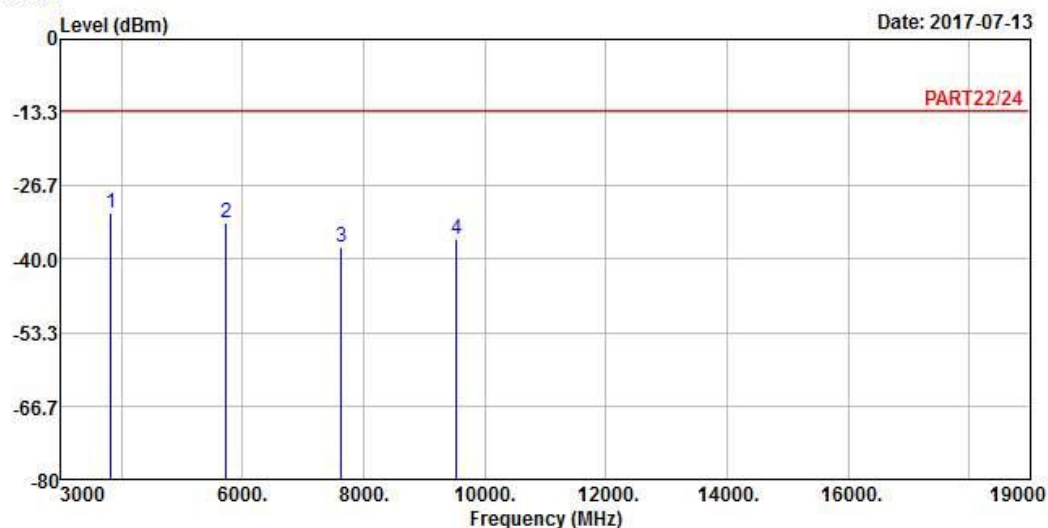
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.20	-25.53	-17.75	-13.00	-12.53	-7.78	Peak
2	5722.80	-31.96	-30.20	-13.00	-18.96	-1.76	Peak
3	7630.40	-35.61	-40.66	-13.00	-22.61	5.05	Peak
4	9538.00	-33.79	-41.81	-13.00	-20.79	8.02	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : WCDMA Band II_H-CH Link
Tested by: Gavin Wu

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.20	-31.59	-23.81	-13.00	-18.59	-7.78	Peak
2	5722.80	-33.43	-31.67	-13.00	-20.43	-1.76	Peak
3	7630.40	-37.76	-42.81	-13.00	-24.76	5.05	Peak
4	9538.00	-36.37	-44.39	-13.00	-23.37	8.02	Peak

5 Pictures of Test Arrangements

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

Appendix – 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:

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Web Site: www.bureauveritas-adt.com

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

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