Partial FCC Test Report

(PART 24)

Report No.:	RF180802C04-1
FCC ID:	WIYT910
Test Model:	LE910-NA1
Received Date:	Aug. 02, 2018
Test Date:	Aug. 20, 2018 ~ Aug. 21, 2018
Issued Date:	Sep. 14, 2018
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Address:	6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT, NEW TAIPEI CITY 23143, 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 (1):	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
Test Location (2):	No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C
FCC Registration / Designation Number:	427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RF180802C04-1	Original Release	Sep. 14, 2018

1 Certificate of Conformity

Product:	LTE module
Brand:	Telit
Test Model:	LE910-NA1
Sample Status:	Identical Prototype
Applicant:	CASTLES TECHNOLOGY CO., LTD.
Test Date:	Aug. 20, 2018 ~ Aug. 21, 2018
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 RF characteristics under the conditions specified in this report.

Prepared by : Gina Liu , **Date:** Sep. 14, 2018

Gina Liu / Specialist

Approved by : , **Date:** Sep. 14, 2018

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.
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1046 24.232(d)	Peak to Average Ratio	N/A	Refer to Note
2.1055 24.235	Frequency Stability	N/A	Refer to Note
2.1049 24.238(b)	Occupied Bandwidth	N/A	Refer to Note
24.238(b)	Band Edge Measurements	N/A	Refer to Note
2.1051 24.238	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -18.30 dB at 13300.00 MHz.

Note:

This report is a partial report. Therefore, only test item of Effective Isotropic Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to ATL report no.: 1506FR22-01 and 1506FR21-01 for module (Brand: Telit, Model: LE910-NA V2)

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) (±)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
MXG Vector signal generator	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2019
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

Product	LTE module	
Brand	Telit	
Test Model	LE910-NA1	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 Vdc (adapter or host equipment) 3.7 Vdc (battery)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	WCDMA	244.34 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	254.68 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	256.45 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	258.23 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	260.02 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	262.42 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	264.24 mW
Antenna Type	Dipole Antenna with 1.19 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

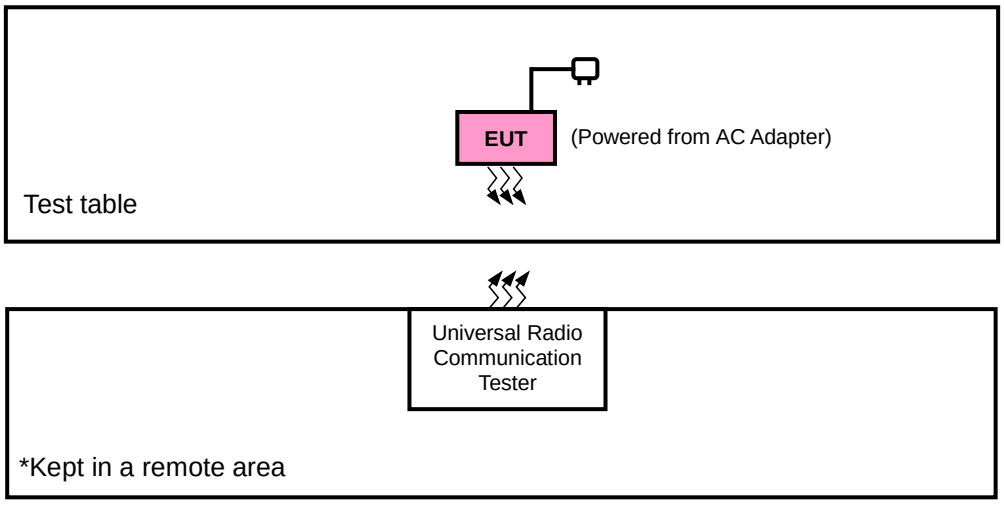
1. The EUT was installed in POS Terminal (Brand: CASTLES TECHNOLOGY, Model: VEGA3000).
2. The EUT contains following accessory devices.

Product	Brand	Model	Description
USB Cable	CHANG YANG ELECTRON CO., LTD.	CY-AS-HK0059	1 m

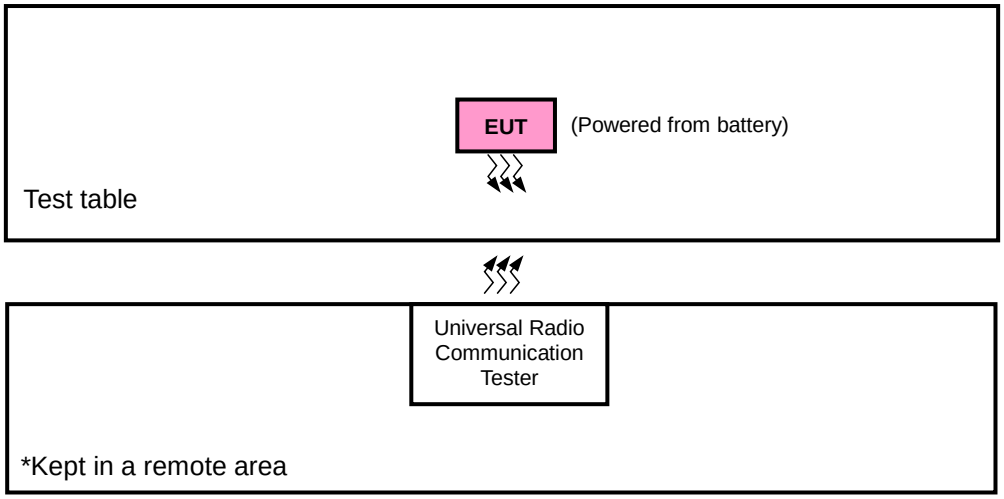
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. 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.	Adapter	LUCENT	1A52-UB52A	N/A	N/A

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

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 was provided by client.

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
WCDMA	X-plane	Z-axis
LTE Band 2	Z-plane	Z-axis

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission below 1GHz	9262 to 9538	9538	WCDMA
-	Radiated Emission above 1GHz	9262 to 9538	9262, 9400, 9538	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Radiated Emission below 1GHz	18700 to 19100	19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission above 1GHz	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	3.7 Vdc	Harry Hsueh, Karl Lee
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Harry Hsueh, Karl Lee

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 v03r01
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

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:

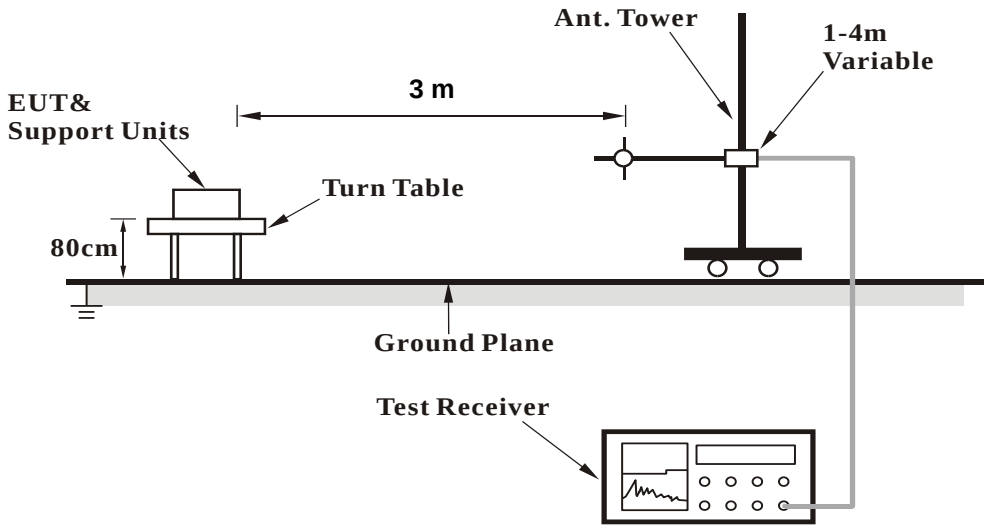
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) 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.
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 = 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.R.P power - 2.15 dB.

Conducted Power Measurement:

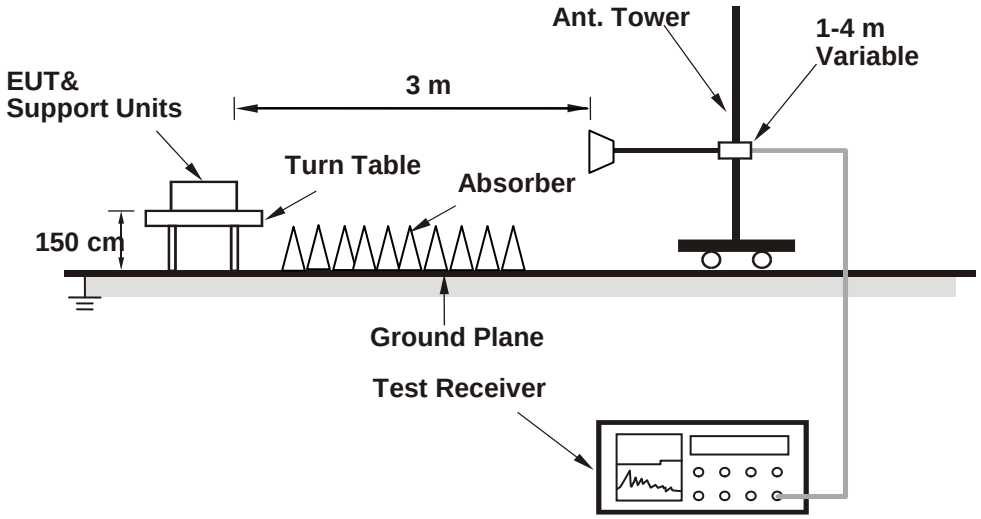
The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.57	22.68	22.66
HSDPA Subtest-1	22.56	22.67	22.65
HSDPA Subtest-2	22.13	22.24	22.22
HSDPA Subtest-3	21.64	21.75	21.73
HSDPA Subtest-4	21.32	21.43	21.41
DC-HSDPA Subtest-1	22.52	22.63	22.61
DC-HSDPA Subtest-2	22.09	22.20	22.18
DC-HSDPA Subtest-3	21.60	21.71	21.69
DC-HSDPA Subtest-4	21.28	21.39	21.37
HSUPA Subtest-1	22.43	22.54	22.52
HSUPA Subtest-2	20.23	20.34	20.32
HSUPA Subtest-3	21.21	21.32	21.30
HSUPA Subtest-4	20.36	20.47	20.45
HSUPA Subtest-5	22.53	22.64	22.62

LTE Band 2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		18700	18900	19100				Channel		18675	18900	19125	
		Frequency (MHz)		1860.0	1880.0	1900.0				Frequency (MHz)		1857.5	1880.0	1902.5	
20M	QPSK	1	0	22.80	22.89	22.88	0	15M	QPSK	1	0	22.80	22.89	22.88	0
		1	50	22.52	22.61	22.60	0			1	37	22.52	22.61	22.60	0
		1	99	22.30	22.39	22.38	0			1	74	22.30	22.39	22.38	0
		50	0	21.91	22.00	21.99	1			36	0	21.91	22.00	21.99	1
		50	25	21.62	21.71	21.70	1			36	19	21.62	21.71	21.70	1
		50	50	21.53	21.62	21.61	1			36	39	21.53	21.62	21.61	1
		100	0	21.41	21.50	21.49	1			75	0	21.41	21.50	21.49	1
	16QAM	1	0	22.07	22.16	22.15	1		16QAM	1	0	22.07	22.16	22.15	1
		1	50	21.87	21.96	21.95	1			1	37	21.87	21.96	21.95	1
		1	99	21.51	21.60	21.59	1			1	74	21.51	21.60	21.59	1
		50	0	20.91	21.00	20.99	2			36	0	20.91	21.00	20.99	2
		50	25	20.62	20.71	20.70	2			36	19	20.62	20.71	20.70	2
		50	50	20.52	20.61	20.60	2			36	39	20.52	20.61	20.60	2
		100	0	20.71	20.80	20.79	2			75	0	20.71	20.80	20.79	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		18650	18900	19150				Channel		18625	18900	19175	
		Frequency (MHz)		1855.0	1880.0	1905.0				Frequency (MHz)		1852.5	1880.0	1907.5	
10M	QPSK	1	0	22.75	22.84	22.83	0	5M	QPSK	1	0	22.72	22.81	22.80	0
		1	24	22.47	22.56	22.55	0			1	12	22.44	22.53	22.52	0
		1	49	22.25	22.34	22.33	0			1	24	22.22	22.31	22.30	0
		25	0	21.86	21.95	21.94	1			12	0	21.83	21.92	21.91	1
		25	12	21.57	21.66	21.65	1			12	6	21.54	21.63	21.62	1
		25	25	21.48	21.57	21.56	1			12	13	21.45	21.54	21.53	1
		50	0	21.36	21.45	21.44	1			25	0	21.33	21.42	21.41	1
	16QAM	1	0	22.02	22.11	22.10	1		16QAM	1	0	21.99	22.08	22.07	1
		1	24	21.82	21.91	21.90	1			1	12	21.79	21.88	21.87	1
		1	49	21.46	21.55	21.54	1			1	24	21.43	21.52	21.51	1
		25	0	20.86	20.95	20.94	2			12	0	20.83	20.92	20.91	2
		25	12	20.57	20.66	20.65	2			12	6	20.54	20.63	20.62	2
		25	25	20.47	20.56	20.55	2			12	13	20.44	20.53	20.52	2
		50	0	20.66	20.75	20.74	2			25	0	20.63	20.72	20.71	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		18615	18900	19185				Channel		18607	18900	19193	
		Frequency (MHz)		1851.5	1880.0	1908.5				Frequency (MHz)		1850.7	1880.0	1909.3	
3M	QPSK	1	0	22.68	22.77	22.76	0	1.4M	QPSK	1	0	22.66	22.75	22.74	0
		1	7	22.40	22.49	22.48	0			1	2	22.38	22.47	22.46	0
		1	14	22.18	22.27	22.26	0			1	5	22.16	22.25	22.24	0
		8	0	21.79	21.88	21.87	1			3	0	22.57	22.71	22.69	0
		8	3	21.50	21.59	21.58	1			3	1	22.52	22.61	22.60	0
		8	7	21.41	21.50	21.49	1			3	3	22.43	22.52	22.51	0
		15	0	21.29	21.38	21.37	1			6	0	22.30	22.39	22.38	1
	16QAM	1	0	21.95	22.04	22.03	1		16QAM	1	0	21.91	22.00	21.99	1
		1	7	21.75	21.84	21.83	1			1	2	21.71	21.80	21.79	1
		1	14	21.39	21.48	21.47	1			1	5	21.35	21.44	21.43	1
		8	0	20.79	20.88	20.87	2			3	0	21.83	21.92	21.91	1
		8	3	20.50	20.59	20.58	2			3	1	21.54	21.63	21.62	1
		8	7	20.40	20.49	20.48	2			3	3	21.44	21.53	21.52	1
		15	0	20.59	20.68	20.67	2			6	0	20.41	20.36	20.40	2

EIRP Power (dBm)

WCDMA							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
X	9262	1852.4	-14.38	38.19	23.81	240.44	H
	9400	1880.0	-14.82	38.70	23.88	244.34	
	9538	1907.6	-15.50	39.35	23.85	242.66	
	9262	1852.4	-18.66	38.48	19.82	95.94	V
	9400	1880.0	-18.69	38.59	19.90	97.72	
	9538	1907.6	-18.99	38.87	19.88	97.27	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	18607	1850.7	-20.73	44.70	23.97	249.46	H
	18900	1880.0	-20.64	44.70	24.06	254.68	
	19193	1909.3	-20.53	44.57	24.04	253.69	
	18607	1850.7	-24.31	44.27	19.96	99.08	V
	18900	1880.0	-24.78	44.87	20.09	102.09	
	19193	1909.3	-24.54	44.61	20.07	101.70	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	18607	1850.7	-21.74	44.70	22.96	197.70	H
	18900	1880.0	-21.64	44.70	23.06	202.30	
	19193	1909.3	-21.54	44.57	23.03	201.05	
	18607	1850.7	-25.32	44.27	18.95	78.52	V
	18900	1880.0	-25.79	44.87	19.08	80.91	
	19193	1909.3	-25.55	44.61	19.06	80.59	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18615	1851.5	-20.70	44.70	24.00	251.19	H
	18900	1880.0	-20.61	44.70	24.09	256.45	
	19185	1908.5	-20.49	44.57	24.08	256.04	
	18615	1851.5	-24.28	44.27	19.99	99.77	V
	18900	1880.0	-24.75	44.87	20.12	102.80	
	19185	1908.5	-24.51	44.61	20.10	102.40	
Channel Bandwidth: 3 MHz / 16QAM							
Z	18615	1851.5	-21.71	44.70	22.99	199.07	H
	18900	1880.0	-21.62	44.70	23.08	203.24	
	19185	1908.5	-21.50	44.57	23.07	202.91	
	18615	1851.5	-25.29	44.27	18.98	79.07	V
	18900	1880.0	-25.75	44.87	19.12	81.66	
	19185	1908.5	-25.52	44.61	19.09	81.15	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18625	1852.5	-20.67	44.70	24.03	252.93	H
	18900	1880.0	-20.58	44.70	24.12	258.23	
	19175	1907.5	-20.46	44.57	24.11	257.81	
	18625	1852.5	-24.24	44.27	20.03	100.69	V
	18900	1880.0	-24.71	44.87	20.16	103.75	
	19175	1907.5	-24.48	44.61	20.13	103.11	
Channel Bandwidth: 5 MHz / 16QAM							
Z	18625	1852.5	-21.69	44.70	23.01	199.99	H
	18900	1880.0	-21.59	44.70	23.11	204.64	
	19175	1907.5	-21.47	44.57	23.10	204.31	
	18625	1852.5	-25.25	44.27	19.02	79.80	V
	18900	1880.0	-25.72	44.87	19.15	82.22	
	19175	1907.5	-25.49	44.61	19.12	81.71	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18650	1855.0	-20.64	44.70	24.06	254.68	H
	18900	1880.0	-20.55	44.70	24.15	260.02	
	19150	1905.0	-20.43	44.57	24.14	259.60	
	18650	1855.0	-24.21	44.27	20.06	101.39	V
	18900	1880.0	-24.67	44.87	20.20	104.71	
	19150	1905.0	-24.45	44.61	20.16	103.82	
Channel Bandwidth: 10 MHz / 16QAM							
Z	18650	1855.0	-21.66	44.70	23.04	201.37	H
	18900	1880.0	-21.56	44.70	23.14	206.06	
	19150	1905.0	-21.45	44.57	23.12	205.26	
	18650	1855.0	-25.23	44.27	19.04	80.17	V
	18900	1880.0	-25.68	44.87	19.19	82.99	
	19150	1905.0	-25.45	44.61	19.16	82.47	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18675	1857.5	-20.61	44.70	24.09	256.45	H
	18900	1880.0	-20.51	44.70	24.19	262.42	
	19125	1902.5	-20.40	44.57	24.17	261.40	
	18675	1857.5	-24.17	44.27	20.10	102.33	V
	18900	1880.0	-24.64	44.87	20.23	105.44	
	19125	1902.5	-24.42	44.61	20.19	104.54	
Channel Bandwidth: 15 MHz / 16QAM							
Z	18675	1857.5	-21.62	44.70	23.08	203.24	H
	18900	1880.0	-21.52	44.70	23.18	207.97	
	19125	1902.5	-21.42	44.57	23.15	206.68	
	18675	1857.5	-25.18	44.27	19.09	81.10	V
	18900	1880.0	-25.64	44.87	19.23	83.75	
	19125	1902.5	-25.42	44.61	19.19	83.04	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	18700	1860.0	-20.57	44.70	24.13	258.82	H
	18900	1880.0	-20.48	44.70	24.22	264.24	
	19100	1900.0	-20.36	44.57	24.21	263.82	
	18700	1860.0	-24.13	44.27	20.14	103.28	V
	18900	1880.0	-24.61	44.87	20.26	106.17	
	19100	1900.0	-24.38	44.61	20.23	105.51	
Channel Bandwidth: 20 MHz / 16QAM							
Z	18700	1860.0	-21.58	44.70	23.12	205.12	H
	18900	1880.0	-21.49	44.70	23.21	209.41	
	19100	1900.0	-21.37	44.57	23.20	209.07	
	18700	1860.0	-25.13	44.27	19.14	82.04	V
	18900	1880.0	-25.62	44.87	19.25	84.14	
	19100	1900.0	-25.39	44.61	19.22	83.62	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

4.2 Radiated Emission Measurement

4.2.1 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.

4.2.2 Test Procedure

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) 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.
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 - 2.15 dB.

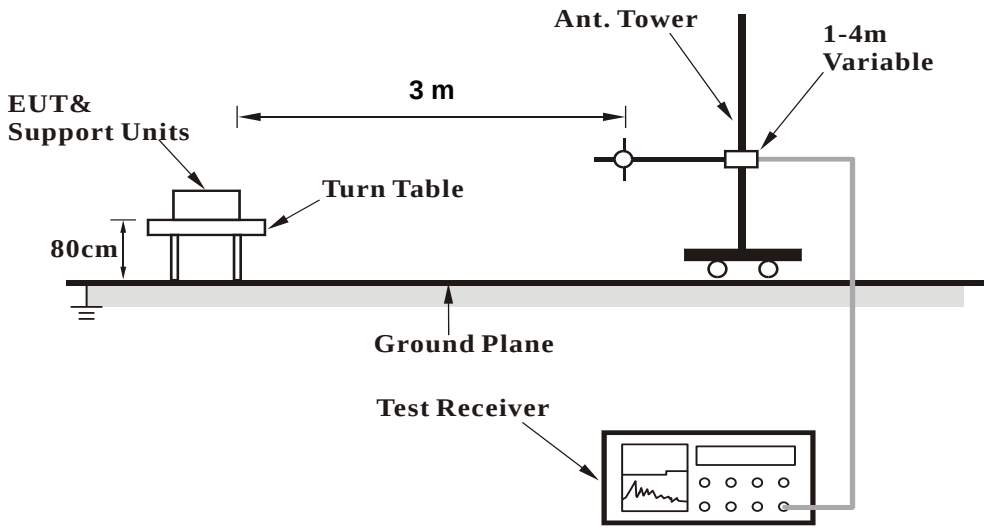
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.2.3 Deviation from Test Standard

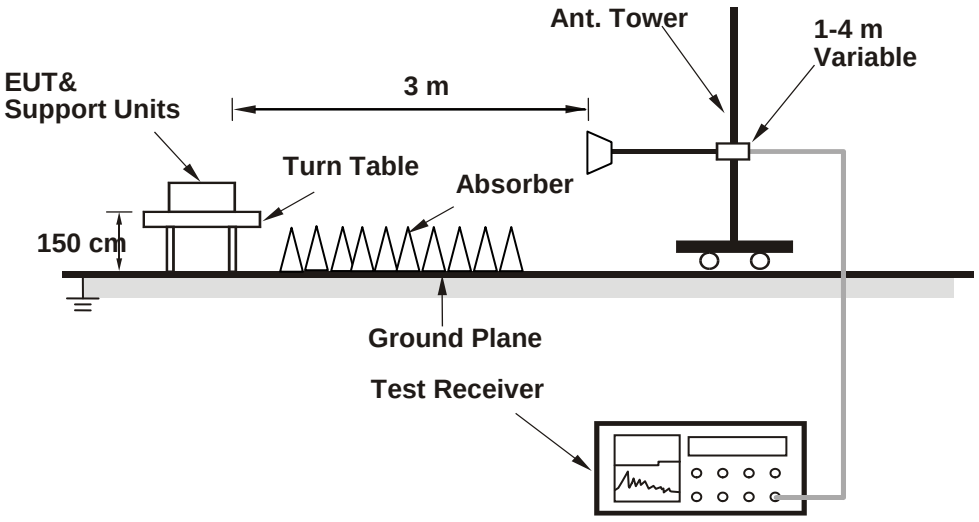
No deviation.

4.2.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

4.2.5 Test Results

WCDMA:

Low Channel

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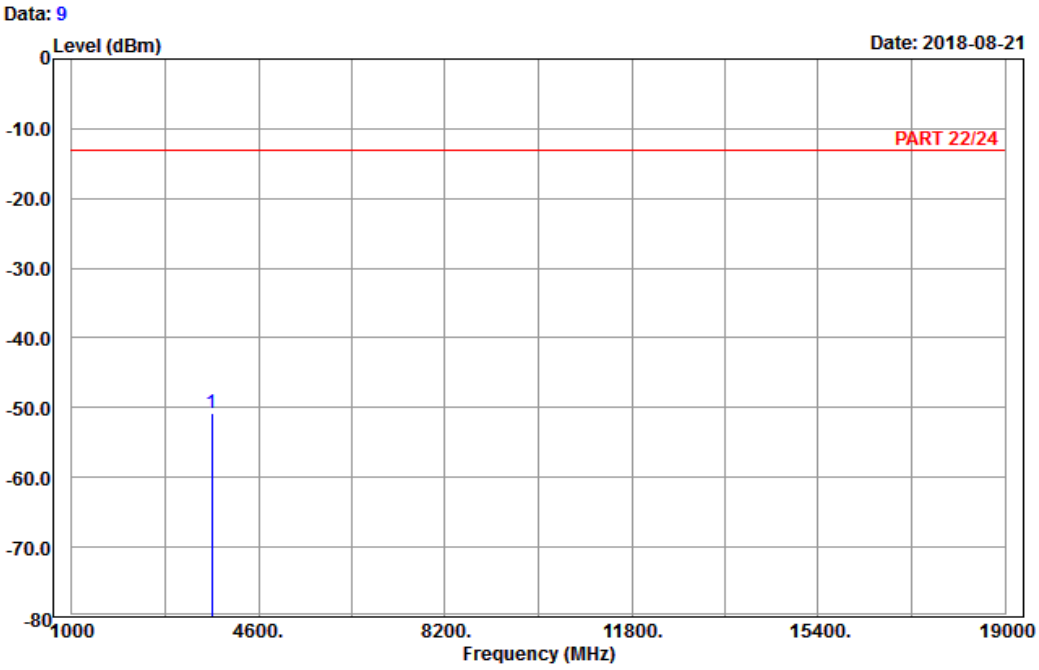
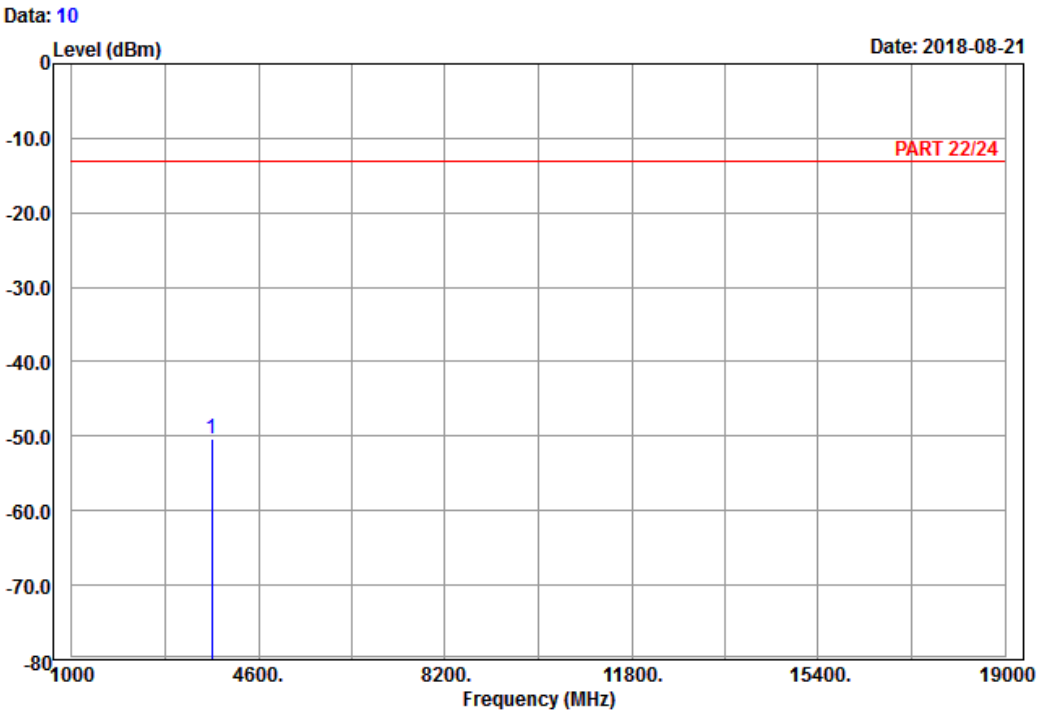



```
Site      : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark    : Band II_Link_CH9262
Tested by: Karl Lee
                          Read  Limit   Over
           Freq  Level  Level   Line  Limit Factor Remark
          ______ _____ _______ _____ _____ ______ ________
             MHz   dBm    dBm   dBm    dB     dB

  1 pp  3704.80 -50.88 -66.76 -13.00 -37.88  15.88 Peak
```



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9262
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-50.28	-66.16	-13.00	-37.28	15.88	Peak

Middle Channel

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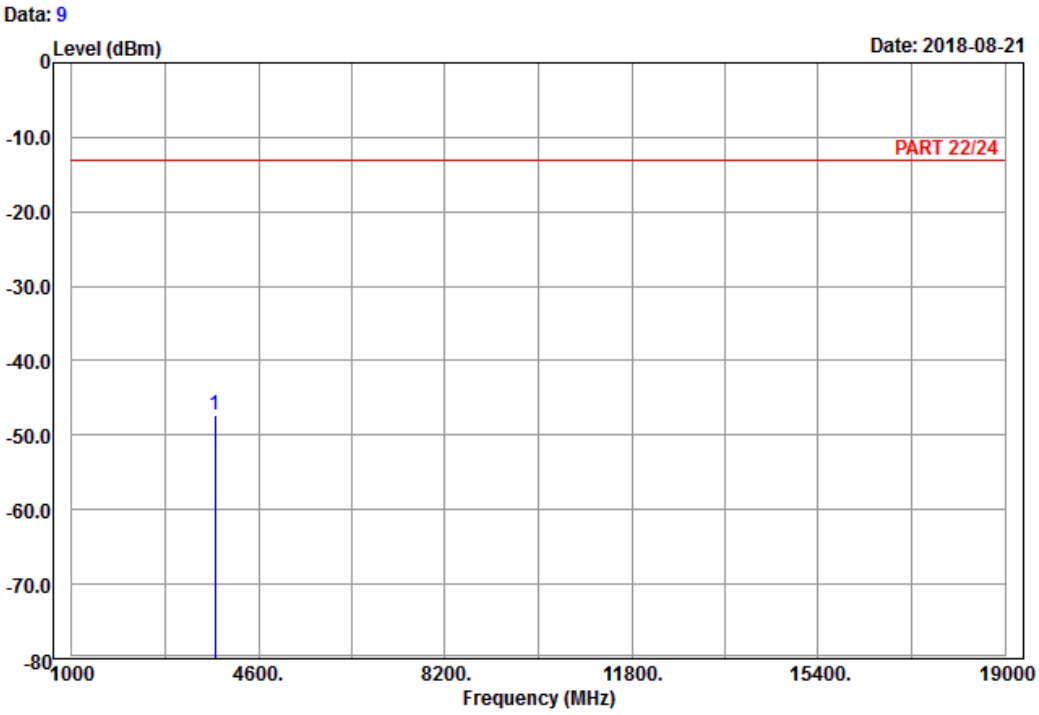
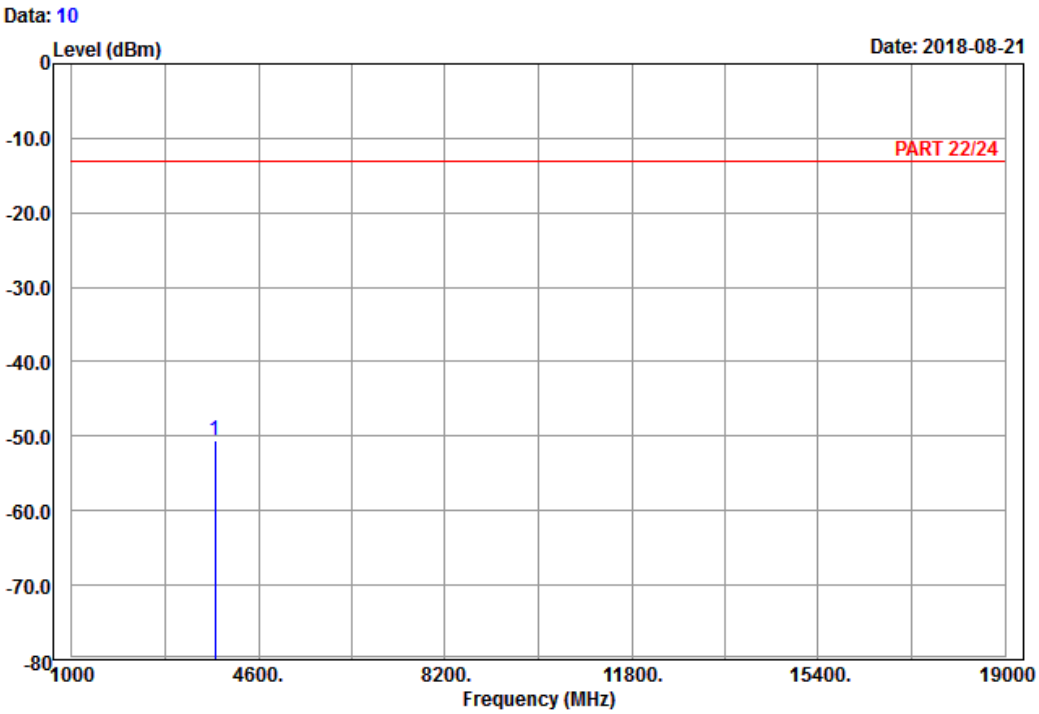


Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : Band II_Link_CH9400
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-47.41	-63.55	-13.00	-34.41	16.14	Peak

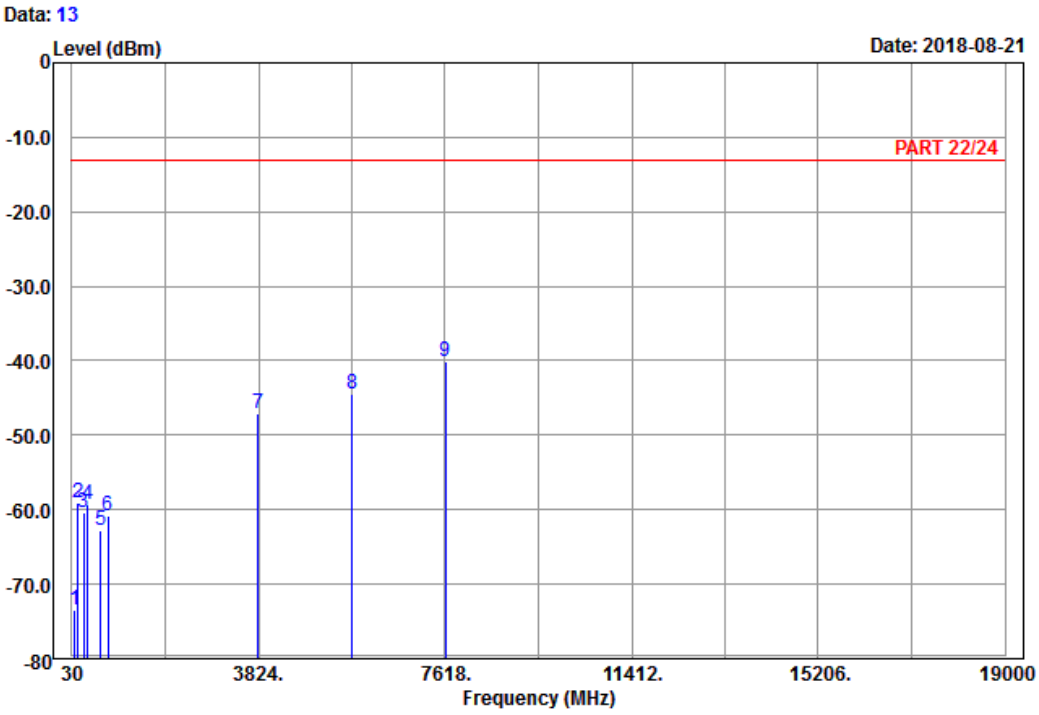


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9400
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-50.47	-66.61	-13.00	-37.47	16.14	Peak

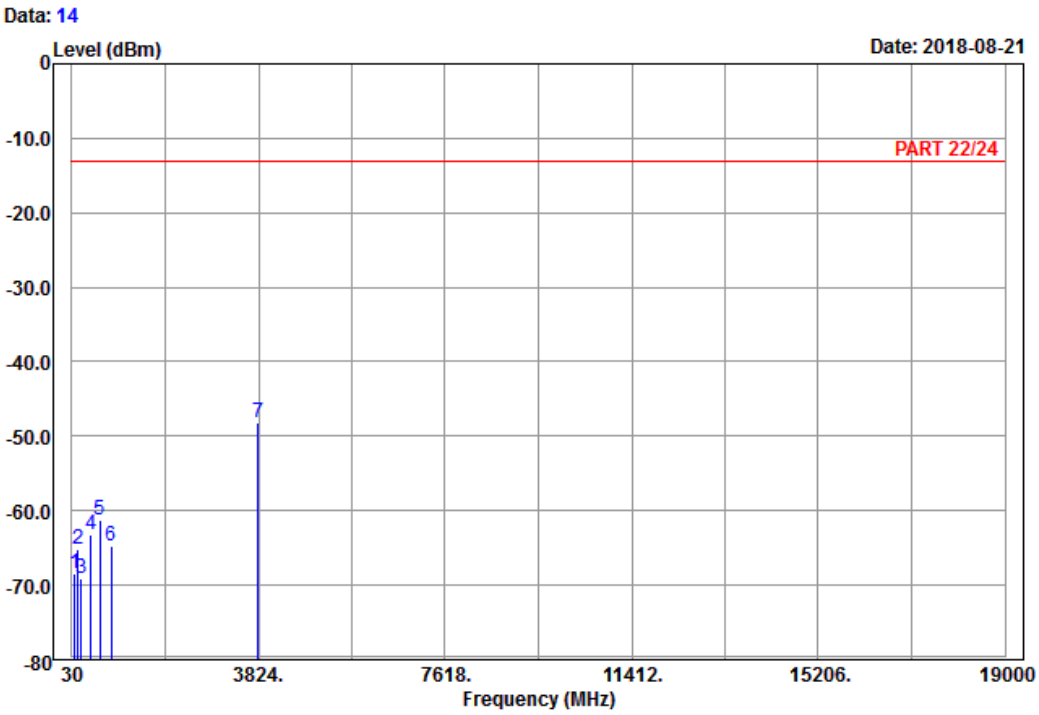
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : Band II_Link_CH9538
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	90.48	-73.42	-62.75	-13.00	-60.42	-10.67	Peak
2	160.14	-59.14	-51.47	-13.00	-46.14	-7.67	Peak
3	261.66	-60.32	-54.71	-13.00	-47.32	-5.61	Peak
4	351.10	-59.31	-53.98	-13.00	-46.31	-5.33	Peak
5	608.00	-62.74	-63.08	-13.00	-49.74	0.34	Peak
6	761.30	-60.90	-60.36	-13.00	-47.90	-0.54	Peak
7	3815.20	-47.04	-63.45	-13.00	-34.04	16.41	Peak
8	5722.80	-44.55	-64.82	-13.00	-31.55	20.27	Peak
9 pp	7630.40	-40.04	-63.06	-13.00	-27.04	23.02	Peak



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : Band II_Link_CH9538
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	84.81	-68.49	-57.27	-13.00	-55.49	-11.22	Peak
2	153.39	-65.23	-57.37	-13.00	-52.23	-7.86	Peak
3	226.02	-69.05	-63.22	-13.00	-56.05	-5.83	Peak
4	425.30	-63.23	-59.92	-13.00	-50.23	-3.31	Peak
5	601.70	-61.22	-61.64	-13.00	-48.22	0.42	Peak
6	828.50	-64.84	-66.53	-13.00	-51.84	1.69	Peak
7 pp	3815.20	-48.13	-64.54	-13.00	-35.13	16.41	Peak

LTE Band 2
Channel Bandwidth: 1.4 MHz / QPSK
Low Channel

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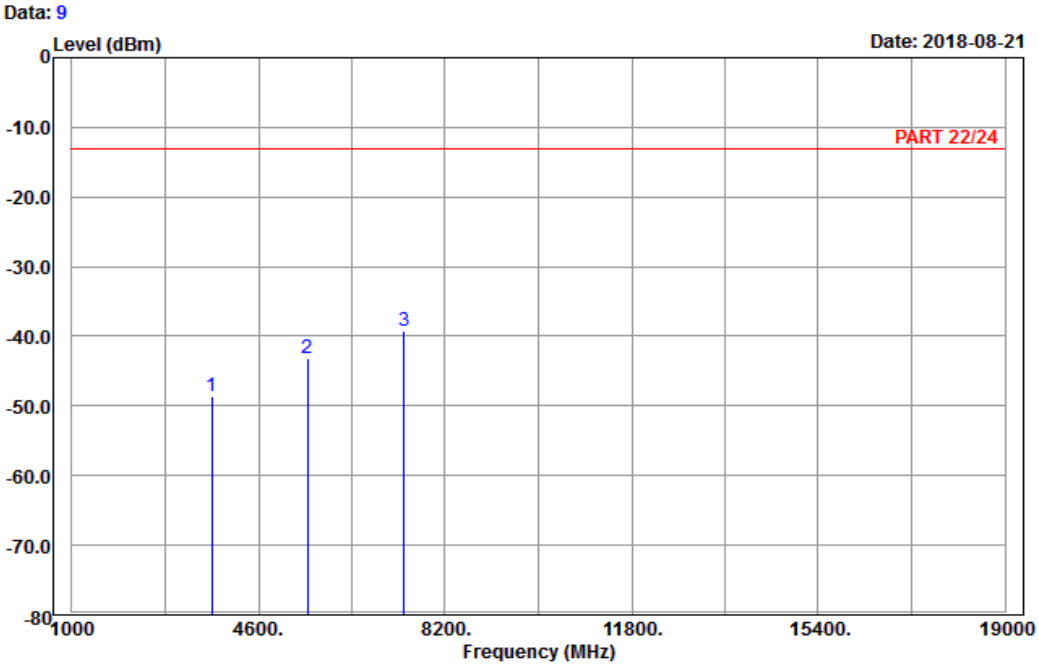
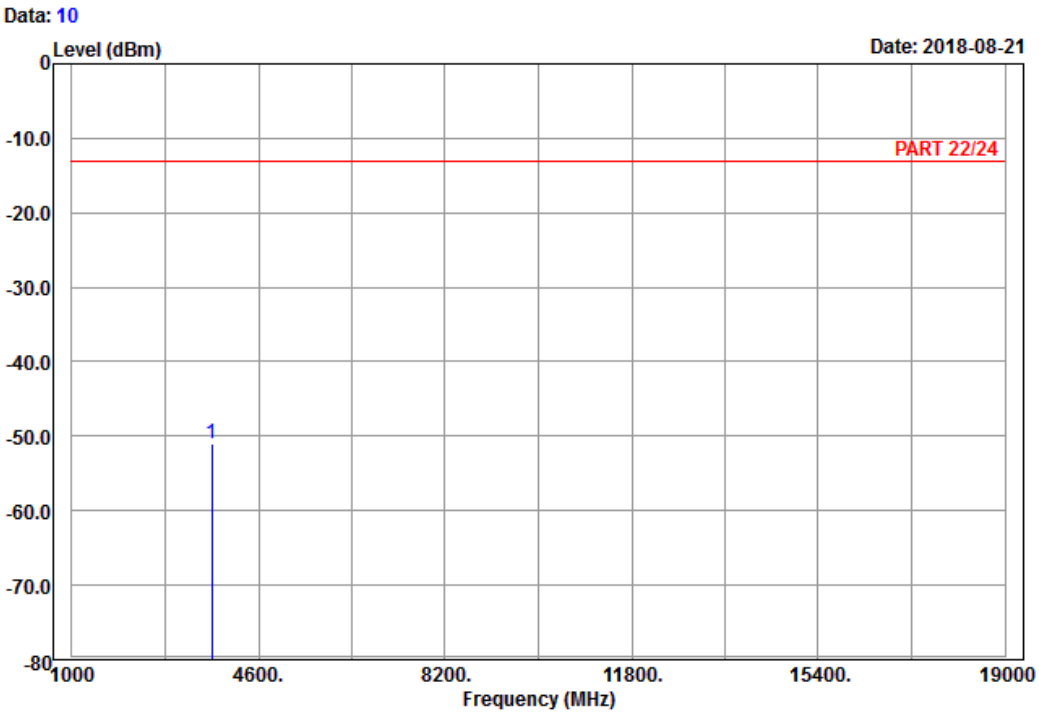


Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18607
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3701.40	-48.63	-64.51	-13.00	-35.63	15.88	Peak
2	5552.10	-43.19	-63.53	-13.00	-30.19	20.34	Peak
3 pp	7402.80	-39.33	-61.61	-13.00	-26.33	22.28	Peak

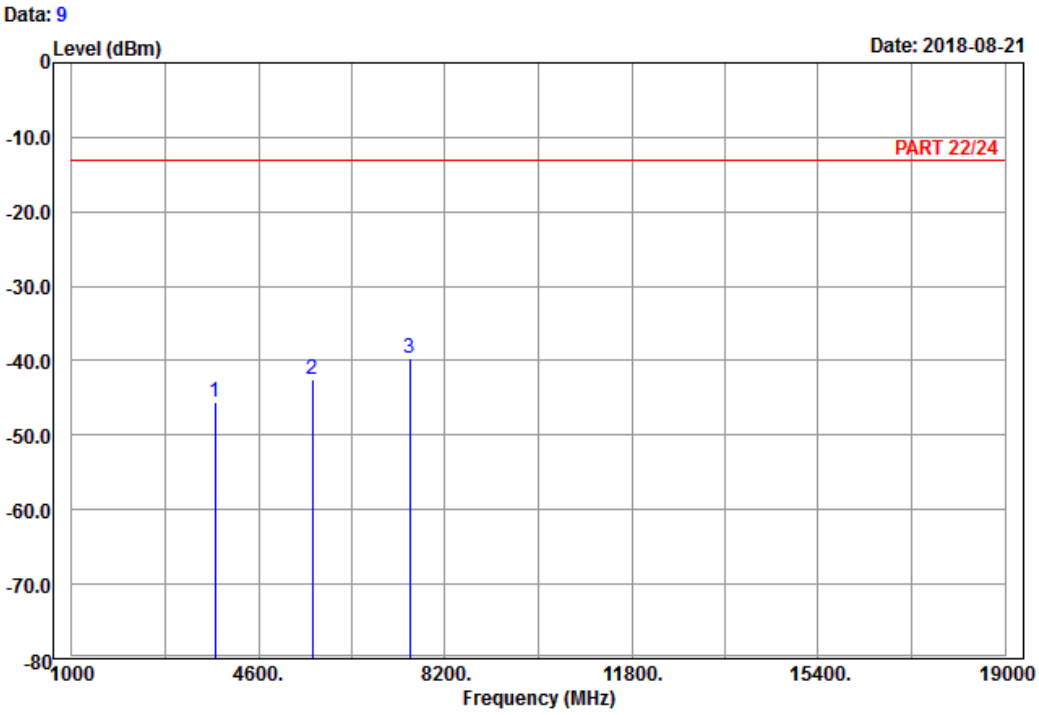


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18607
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3701.40	-50.90	-66.78	-13.00	-37.90	15.88	Peak

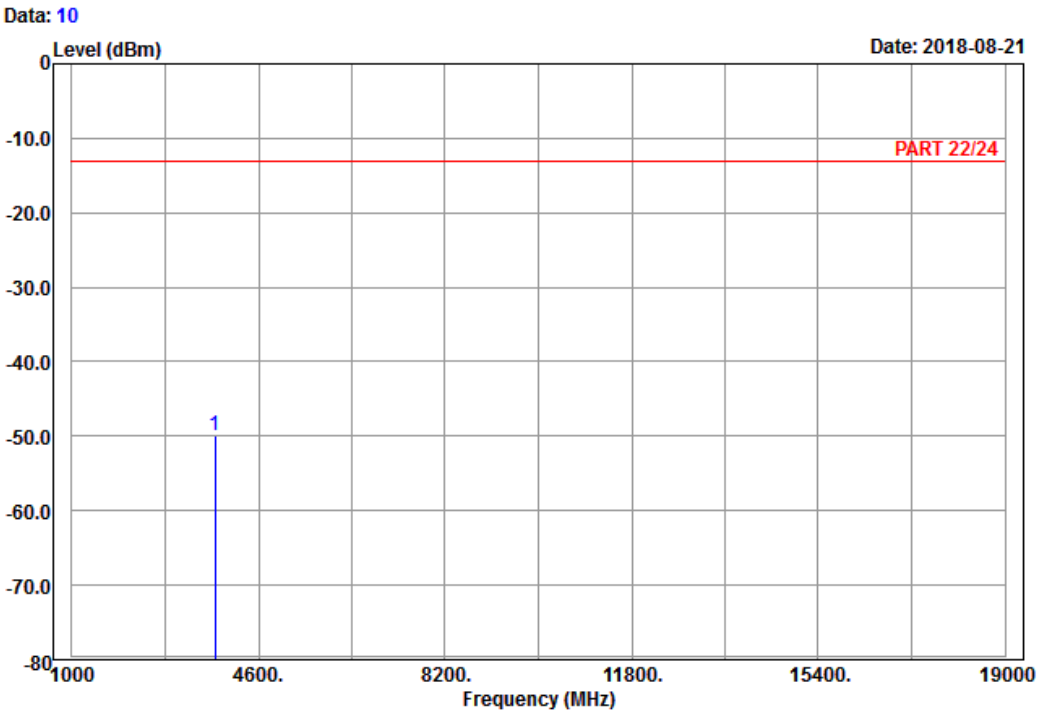
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-45.51	-61.65	-13.00	-32.51	16.14	Peak
2	5640.00	-42.52	-62.99	-13.00	-29.52	20.47	Peak
3 pp	7520.00	-39.78	-62.46	-13.00	-26.78	22.68	Peak

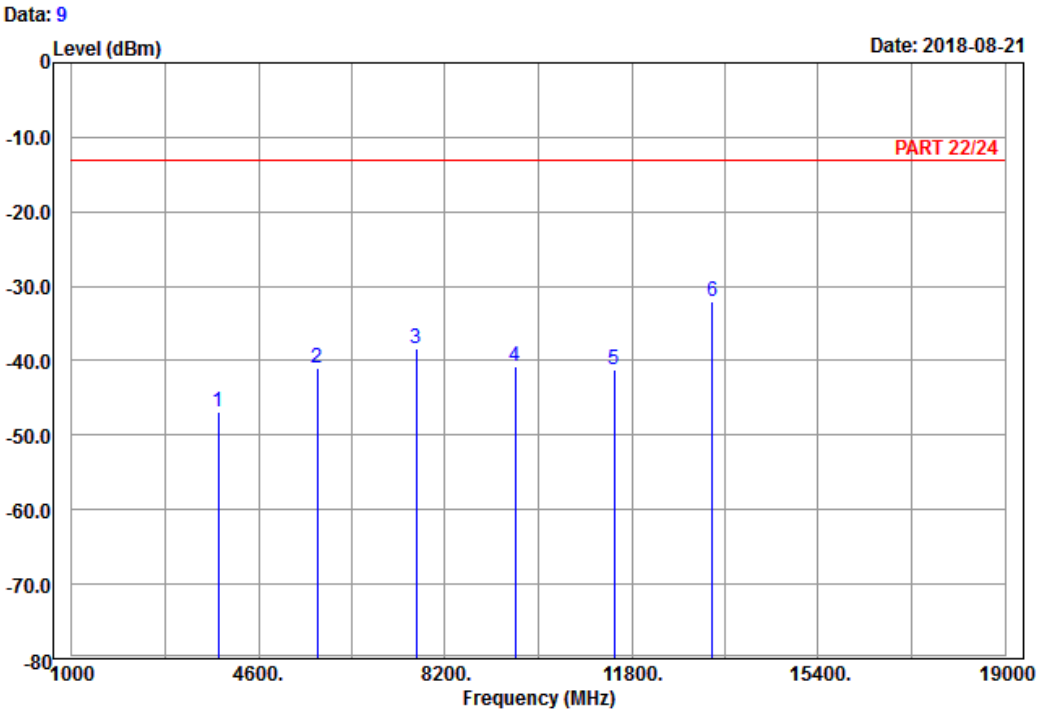


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-49.88	-66.02	-13.00	-36.88	16.14	Peak

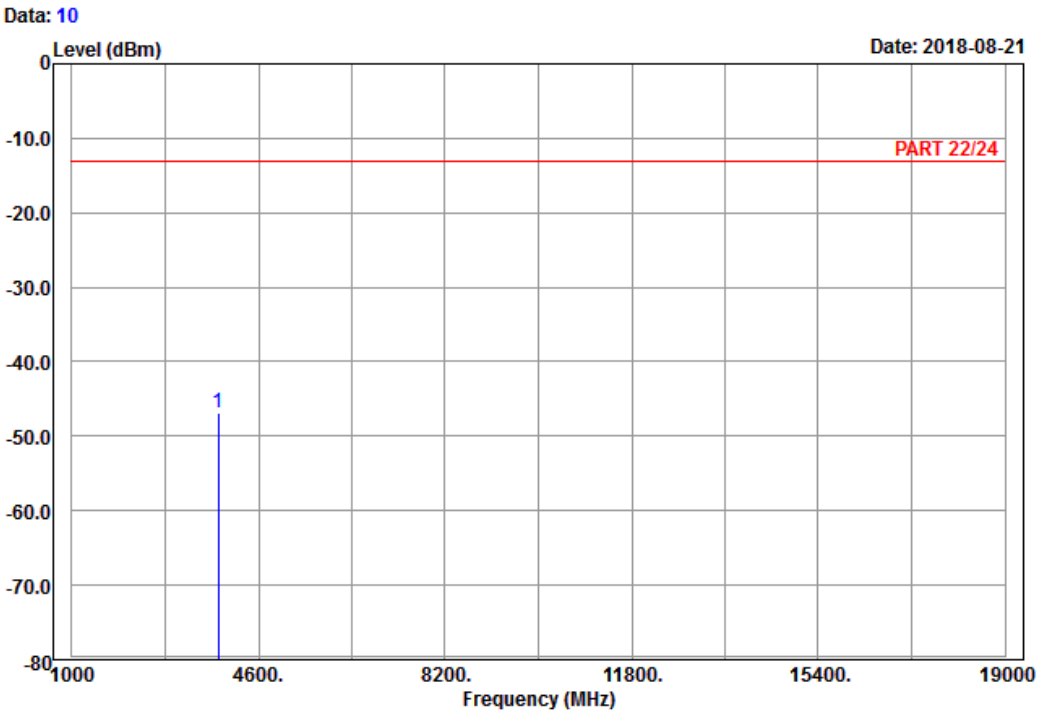
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH19193
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3818.60	-46.86	-63.36	-13.00	-33.86	16.50	Peak
2	5727.90	-40.95	-61.29	-13.00	-27.95	20.34	Peak
3	7637.20	-38.39	-61.45	-13.00	-25.39	23.06	Peak
4	9546.50	-40.87	-66.91	-13.00	-27.87	26.04	Peak
5	11455.80	-41.24	-69.06	-13.00	-28.24	27.82	Peak
6 pp	13365.10	-32.03	-63.31	-13.00	-19.03	31.28	Peak

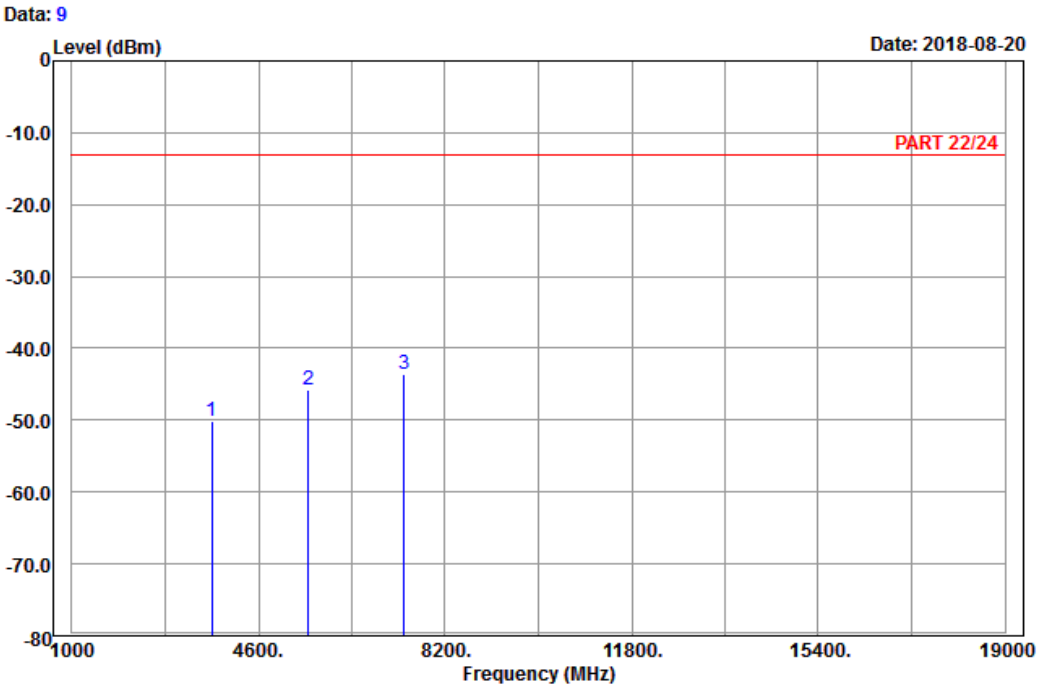


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19193
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3818.60	-46.94	-63.44	-13.00	-33.94	16.50	Peak

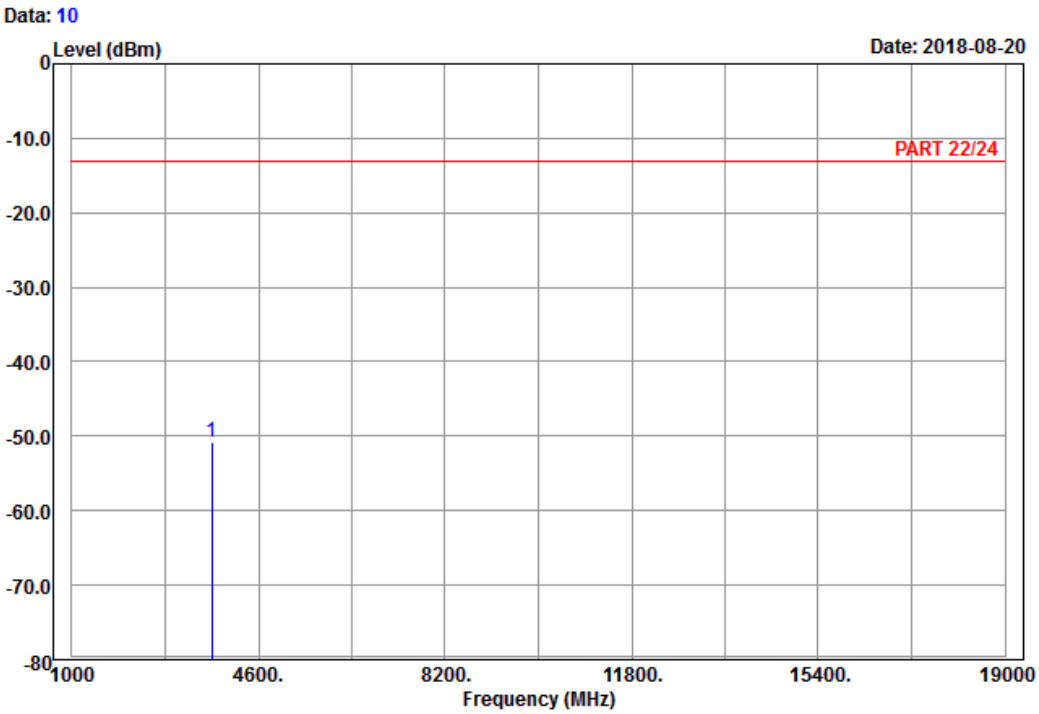
Channel Bandwidth: 5 MHz / QPSK
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18625
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3705.00	-50.10	-65.98	-13.00	-37.10	15.88	Peak
2	5557.50	-45.76	-66.10	-13.00	-32.76	20.34	Peak
3 pp	7410.00	-43.66	-65.94	-13.00	-30.66	22.28	Peak

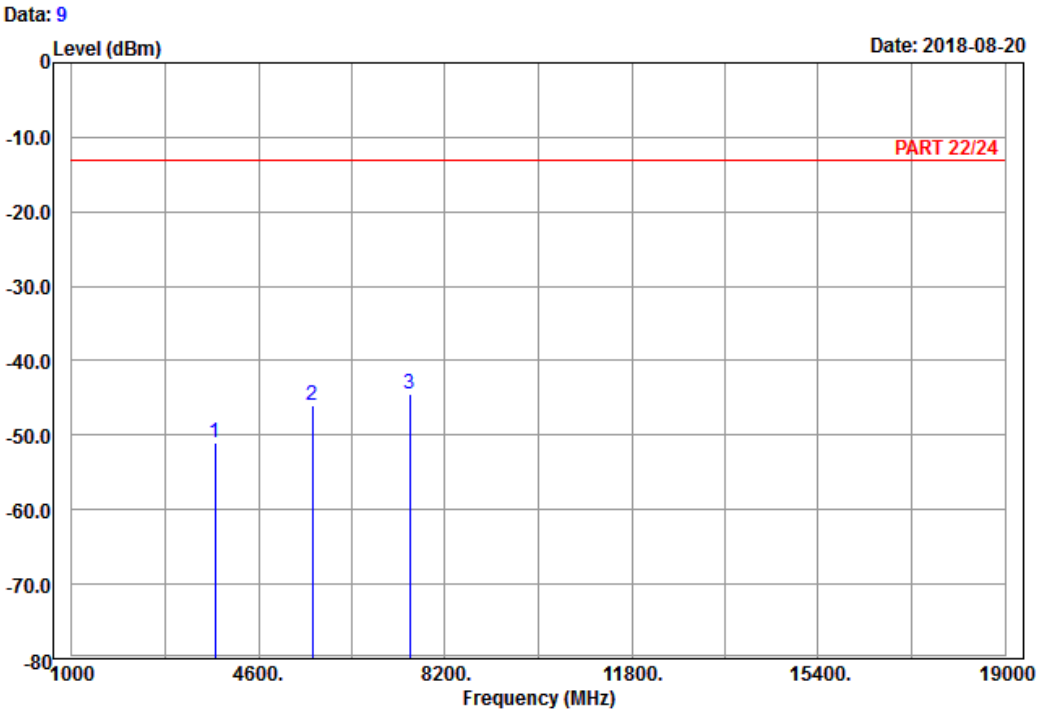


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18625
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3705.00	-50.81	-66.69	-13.00	-37.81	15.88	Peak

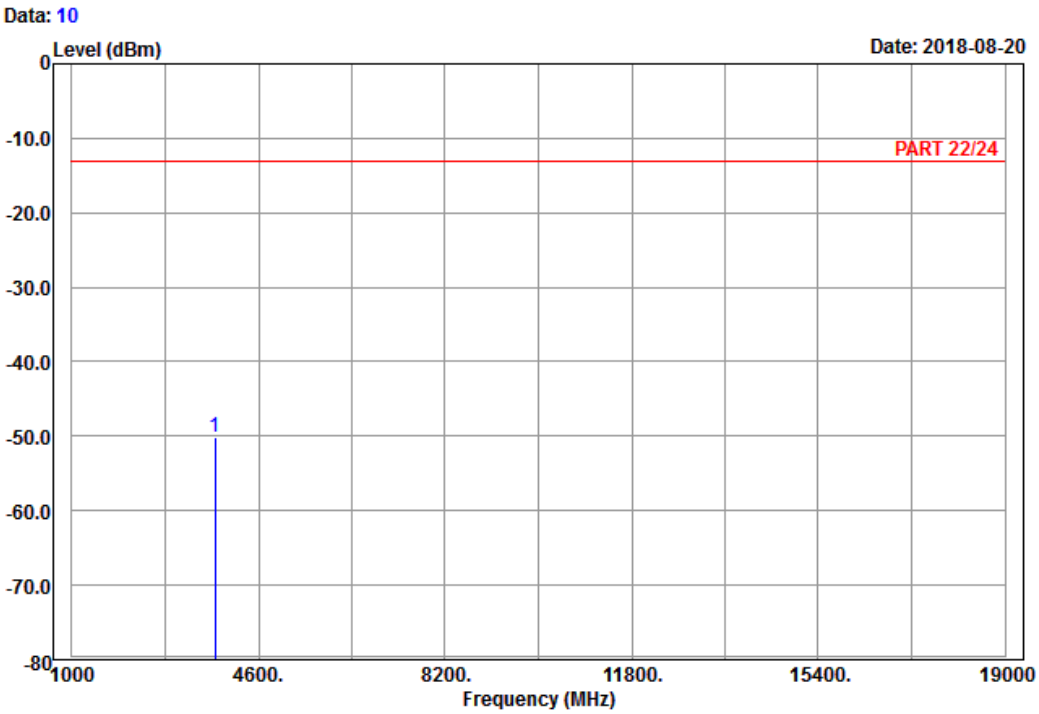
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18900
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-51.09	-67.23	-13.00	-38.09	16.14	Peak
2	5640.00	-45.96	-66.43	-13.00	-32.96	20.47	Peak
3 pp	7520.00	-44.38	-67.06	-13.00	-31.38	22.68	Peak

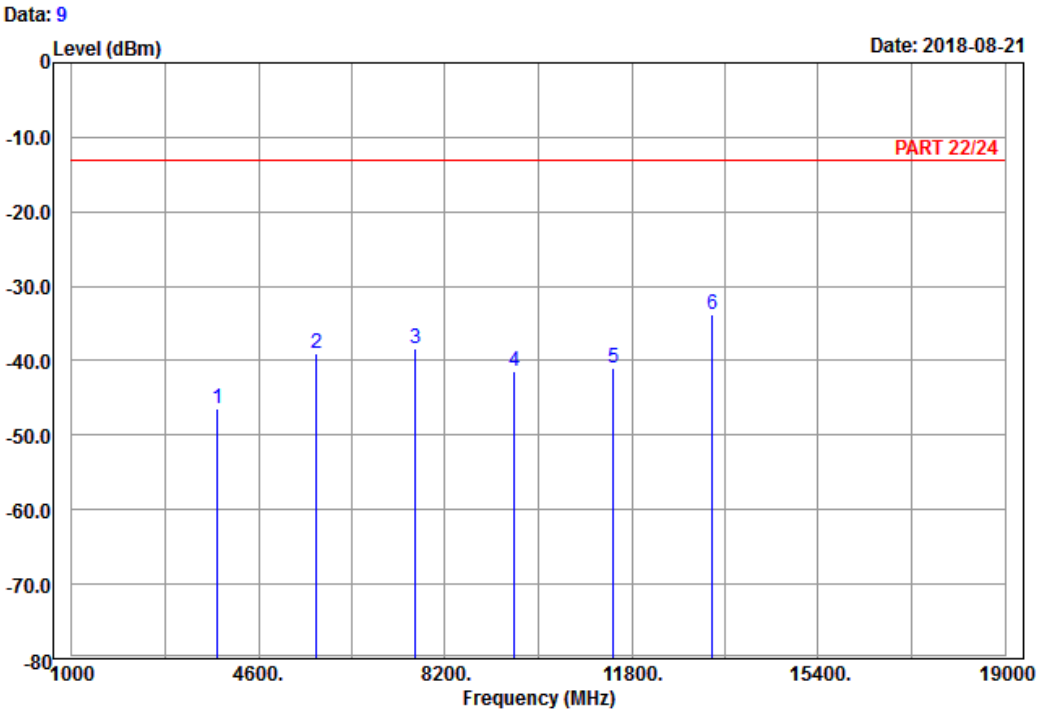


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-50.18	-66.32	-13.00	-37.18	16.14	Peak

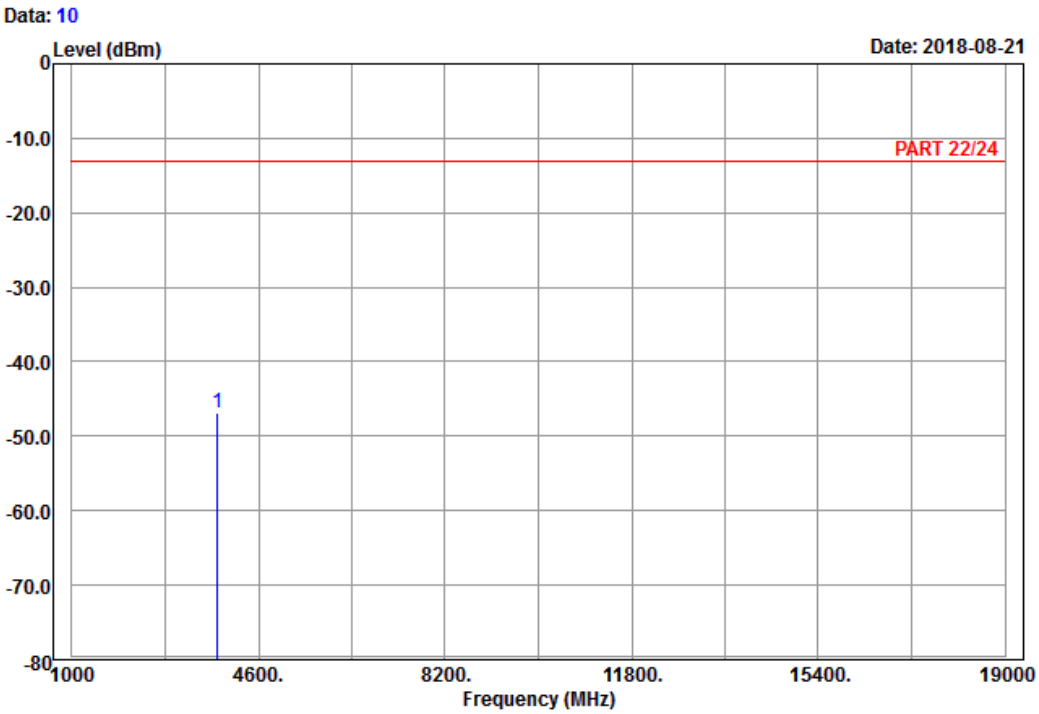
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH19175
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3815.00	-46.40	-62.81	-13.00	-33.40	16.41	Peak
2	5722.50	-39.06	-59.33	-13.00	-26.06	20.27	Peak
3	7630.00	-38.44	-61.46	-13.00	-25.44	23.02	Peak
4	9537.50	-41.34	-67.38	-13.00	-28.34	26.04	Peak
5	11445.00	-40.94	-68.76	-13.00	-27.94	27.82	Peak
6 pp	13352.50	-33.76	-65.02	-13.00	-20.76	31.26	Peak

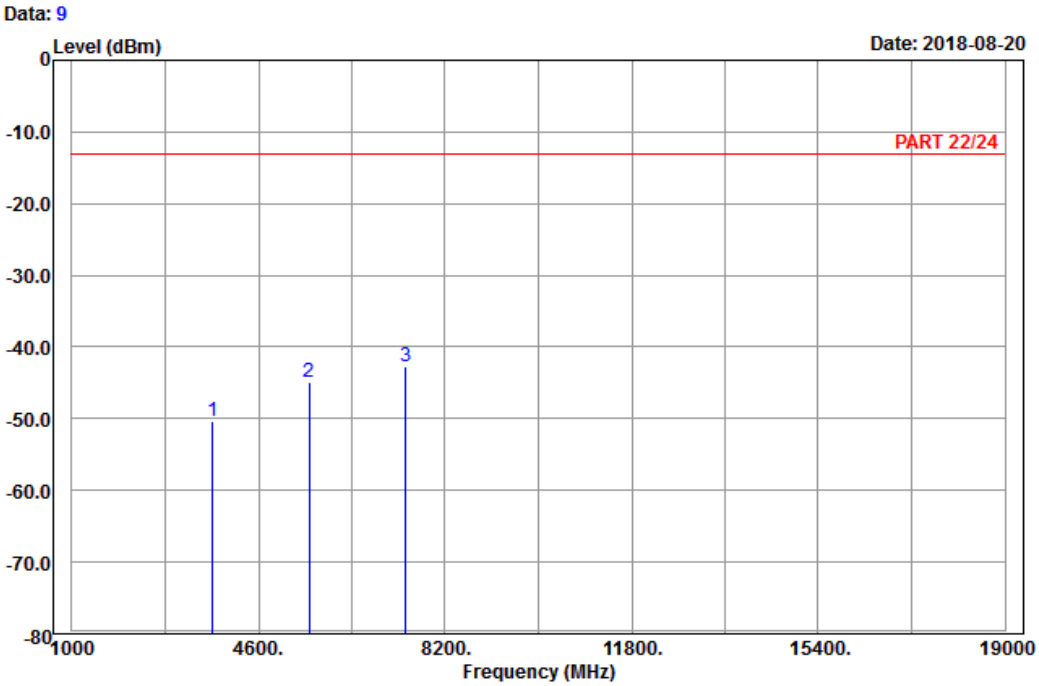


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19175
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.00	-46.80	-63.21	-13.00	-33.80	16.41	Peak

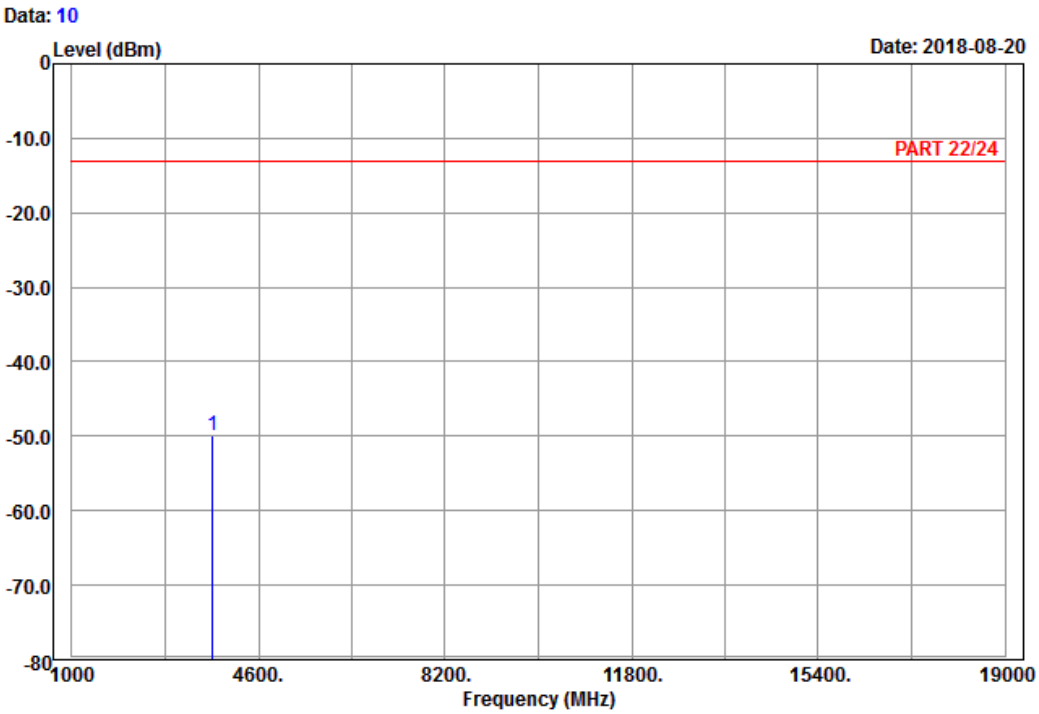
Channel Bandwidth: 20 MHz / QPSK
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18700
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3720.00	-50.31	-66.28	-13.00	-37.31	15.97	Peak
2	5580.00	-44.96	-65.33	-13.00	-31.96	20.37	Peak
3 pp	7440.00	-42.67	-64.92	-13.00	-29.67	22.25	Peak

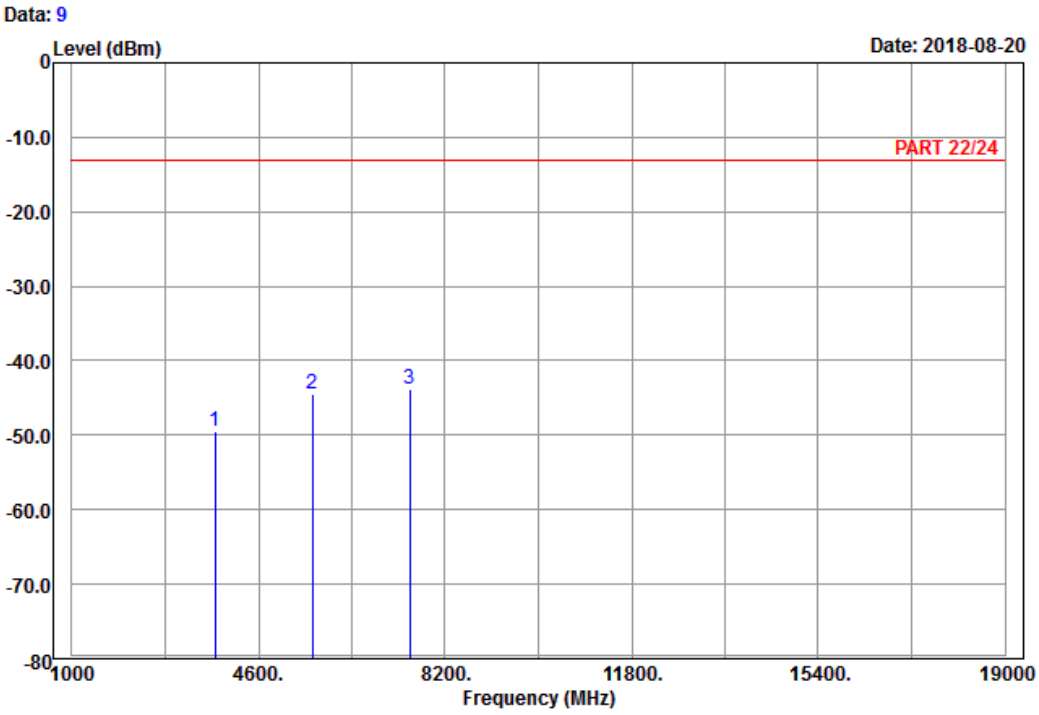


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18700
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3720.00	-49.87	-65.84	-13.00	-36.87	15.97	Peak

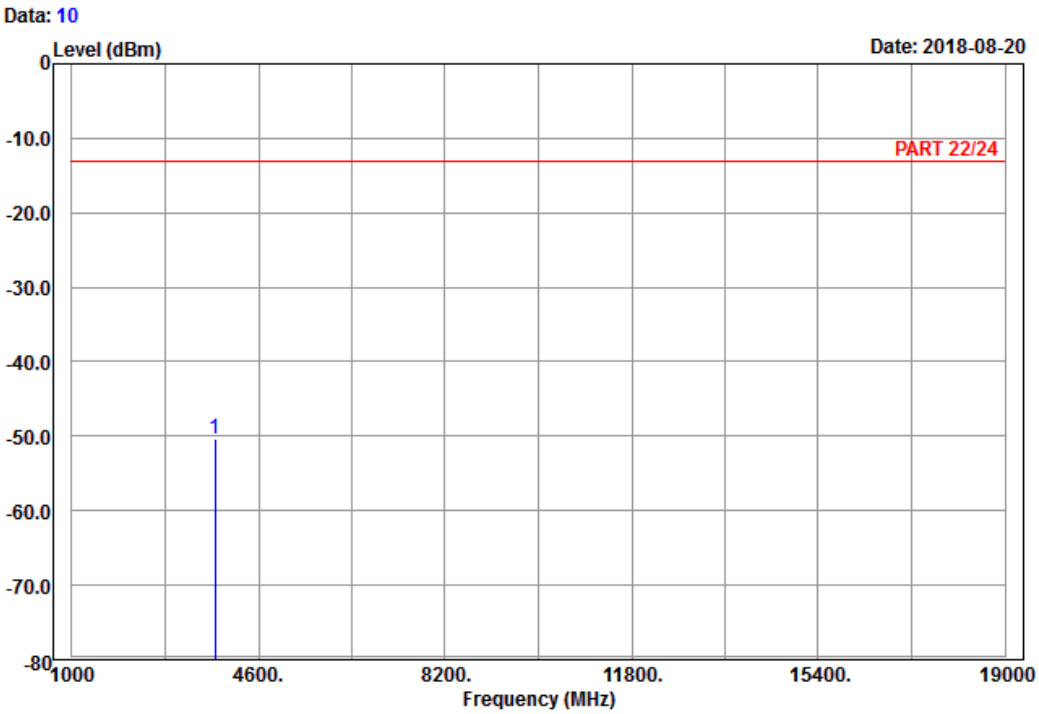
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH18900
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-49.42	-65.56	-13.00	-36.42	16.14	Peak
2	5640.00	-44.54	-65.01	-13.00	-31.54	20.47	Peak
3 pp	7520.00	-43.77	-66.45	-13.00	-30.77	22.68	Peak

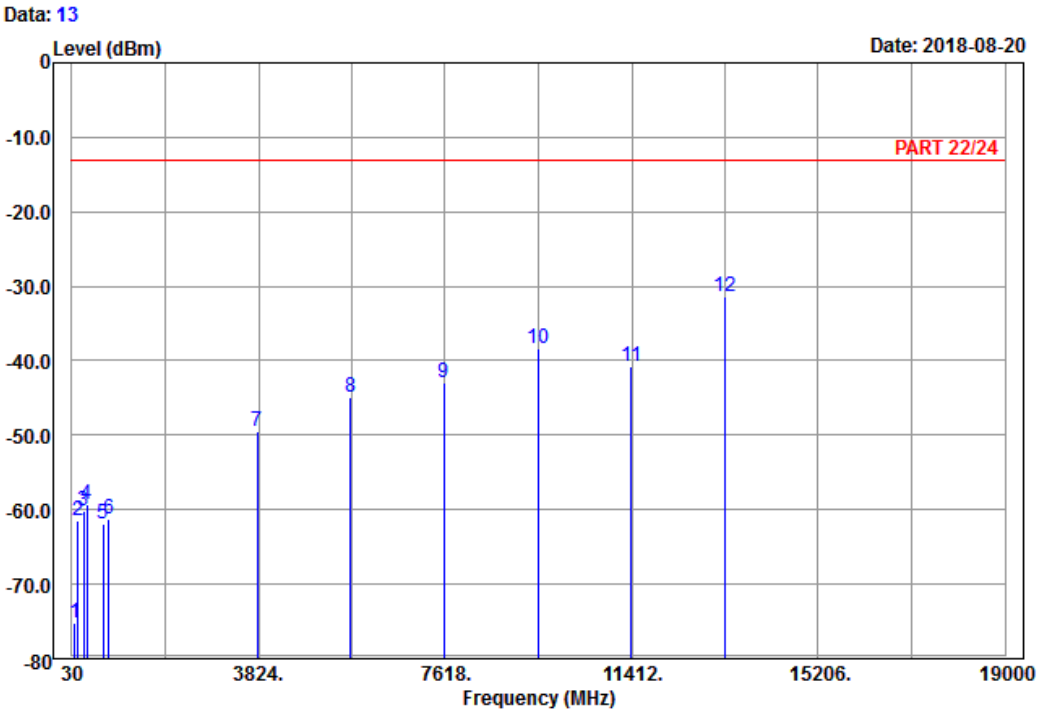


Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH18900
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-50.29	-66.43	-13.00	-37.29	16.14	Peak

High Channel

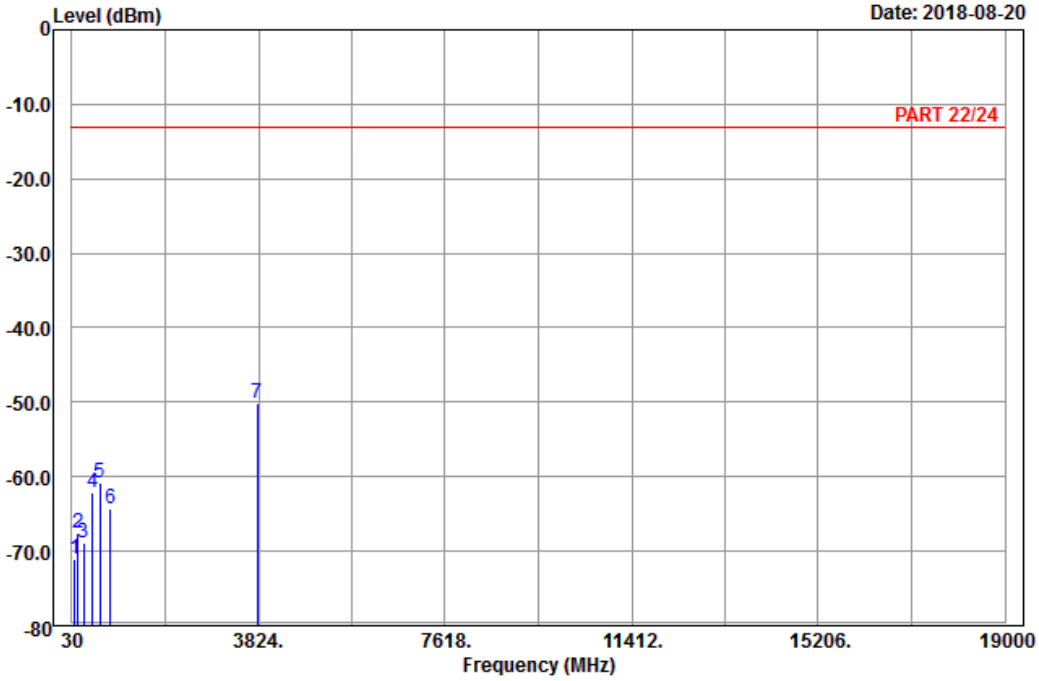
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 2_Link_CH19100
Tested by: Harry Hsueh

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
		MHz	dBm	dBm	dBm	dB	dB	
1		85.62	-75.20	-63.98	-13.00	-62.20	-11.22	Peak
2		158.79	-61.57	-53.87	-13.00	-48.57	-7.70	Peak
3		261.39	-60.26	-54.65	-13.00	-47.26	-5.61	Peak
4		343.40	-59.20	-53.74	-13.00	-46.20	-5.46	Peak
5		667.50	-61.95	-61.73	-13.00	-48.95	-0.22	Peak
6		784.40	-61.15	-62.14	-13.00	-48.15	0.99	Peak
7		3800.00	-49.41	-65.82	-13.00	-36.41	16.41	Peak
8		5700.00	-44.86	-65.07	-13.00	-31.86	20.21	Peak
9		7600.00	-42.88	-65.87	-13.00	-29.88	22.99	Peak
10		9500.00	-38.37	-64.39	-13.00	-25.37	26.02	Peak
11		11400.00	-40.66	-68.48	-13.00	-27.66	27.82	Peak
12	pp	13300.00	-31.30	-62.48	-13.00	-18.30	31.18	Peak

Data: 14



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 2_Link_CH19100
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	84.54	-71.01	-59.68	-13.00	-58.01	-11.33	Peak
2	159.87	-67.58	-59.91	-13.00	-54.58	-7.67	Peak
3	262.47	-68.97	-63.35	-13.00	-55.97	-5.62	Peak
4	454.70	-62.12	-58.14	-13.00	-49.12	-3.98	Peak
5	593.30	-60.89	-61.04	-13.00	-47.89	0.15	Peak
6	806.10	-64.38	-66.32	-13.00	-51.38	1.94	Peak
7 pp	3800.00	-50.15	-66.56	-13.00	-37.15	16.41	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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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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.

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