Partial FCC Test Report

(PART 24)

Report No.:	RF191119C05-3
FCC ID:	LHJ-BL28NA003
Test Model:	BL28NA-003
Received Date:	Nov. 19, 2019
Test Date:	Dec. 01 ~ Dec. 03, 2019
Issued Date:	Dec. 26, 2019
Applicant:	Continental Automotive Systems, Inc.
Address:	21440 West Lake Cook Road Deer Park, IL 60010 United States
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF191119C05-3	Original Release	Dec. 26, 2019

1 Certificate of Conformity

Product:	Module with Mulit-Band LTE, WCDMA,GSM
Brand:	Continental
Test Model:	BL28NA-003
Sample Status:	Identical Prototype
Applicant:	Continental Automotive Systems, Inc.
Test Date:	Dec. 01 ~ Dec. 03, 2019
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 : Lena Wang , **Date:** Dec. 26, 2019

Lena Wang / Specialist

Approved by : , **Date:** Dec. 26, 2019

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	Occupied Bandwidth	N/A	Refer to Note
24.238	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 -36.71 dB at 38.73 MHz.

Note:

1. This report is a Class II change Partial report. Therefore, only test item of Effective Radiated Power and Radiated Spurious Emissions tests were performed for this report. Other testing data please refer to SGS report no.: 4323476EMC01, 4323476EMC02, 4323476EMC03 for module (Brand: Continental, Model: BL28NA-003)
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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**	**Expanded Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	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	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
Fixed Attenuator WORKEN	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2019	Nov. 24, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 14, 2019	Oct. 13, 2020
Preamplifier EMCI	EMC 012645	980115	Oct. 08, 2019	Oct. 07, 2020
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
Power Meter Anritsu	ML2495A	1012010	Sep. 04, 2019	Sep. 03, 2020
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2019	Sep. 03, 2020
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jul. 01, 2019	Jun. 30, 2021
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 19, 2019	Aug. 18, 2021

Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 06, 2019	Sep. 05, 2020
DC Power Supply Topward	33010D	807748	NA	NA

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 General Information

3.1 General Description of EUT

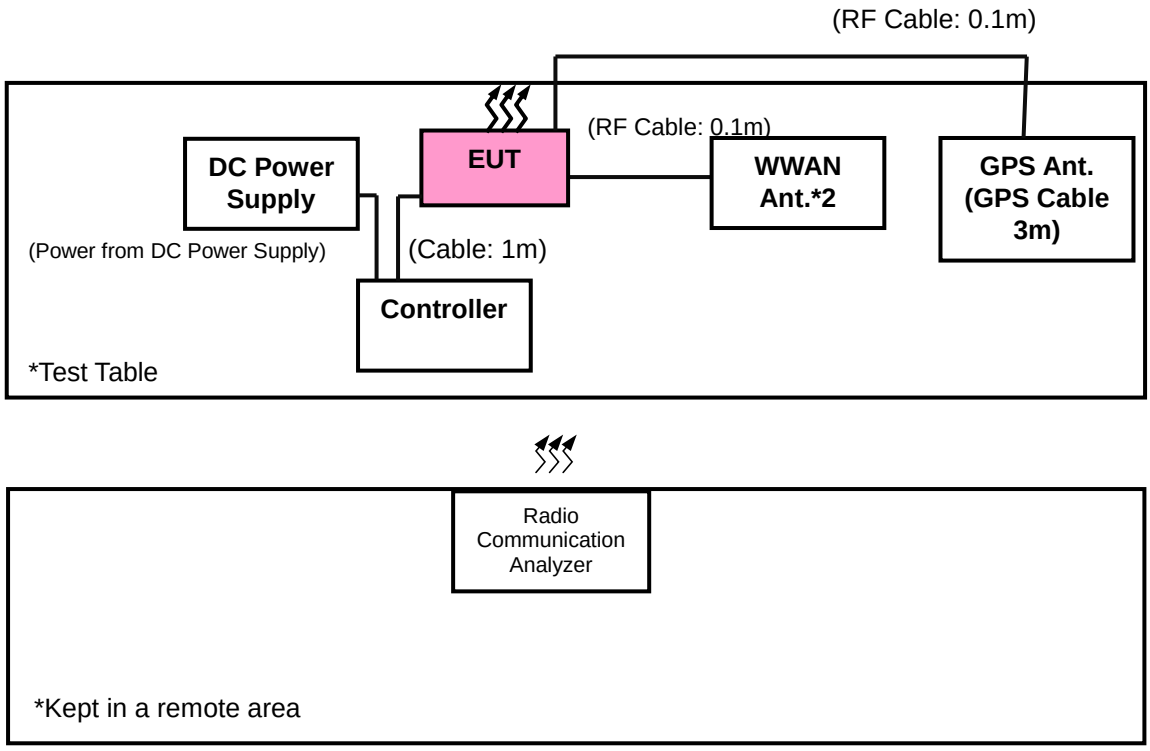
Product	Module with Mulit-Band LTE, WCDMA,GSM	
Brand	Continental	
Test Model	BL28NA-003	
Status of EUT	Identical Prototype	
Power Supply Rating	12 Vdc (Power Supply)	
Modulation Type	GSM/GPRS	GMSK
	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	GSM/GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
	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	GSM/GPRS	1415.79 mW
	WCDMA	254.10 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	328.10 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	327.34 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	331.89 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	337.29 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	345.14 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	347.54 mW
Antenna Type	Fixed External Antenna with 2.0 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

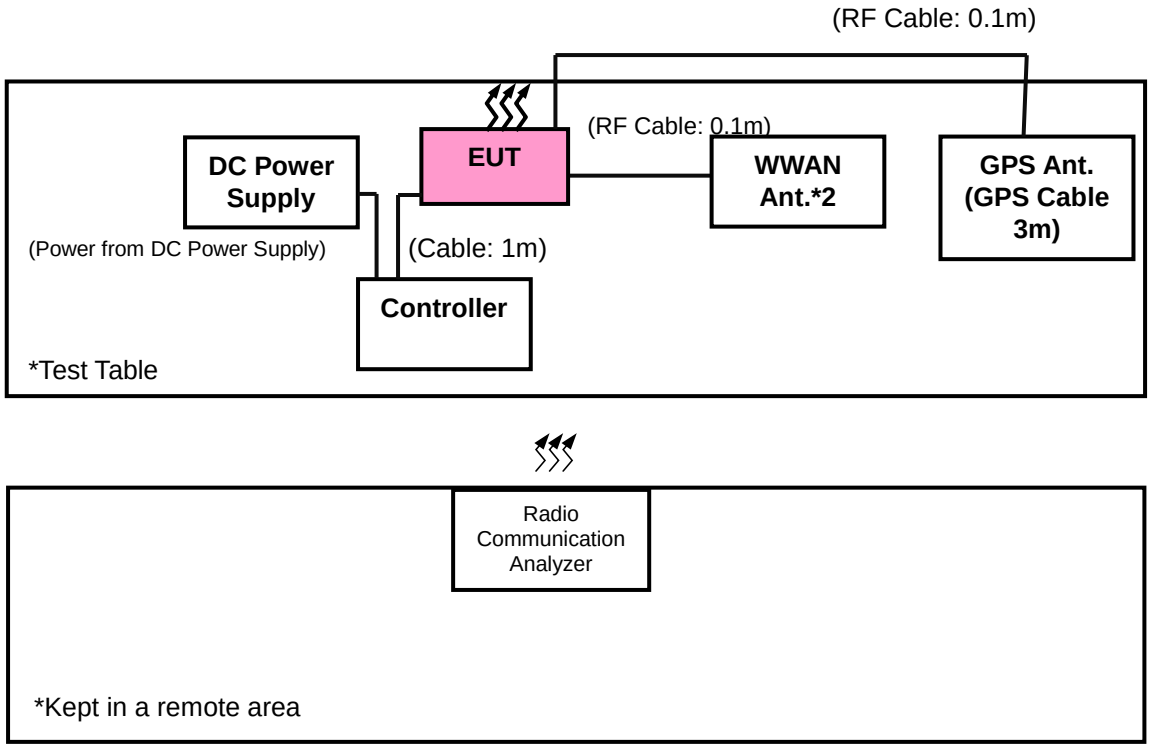
1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.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.	DC Power Supply	Torward	33010D	807748	N/A
2.	Controller	N/A	N/A	N/A	N/A
3.	WWAN Ant.*2	N/A	N/A	N/A	N/A
4.	GPS Ant.	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	RF Cable: 0.1m
2.	RF Cable: 0.1m
3.	Cable: 1m

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. DC Power Supply under test table

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	Z-plane	Z-plane
WCDMA	Z-plane	Z-plane
LTE Band 2	Z-plane	Z-plane

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	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
-	Radiated Emission	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	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:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	12 Vdc	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	12 Vdc	Tim Chen, Getaz Yang

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:

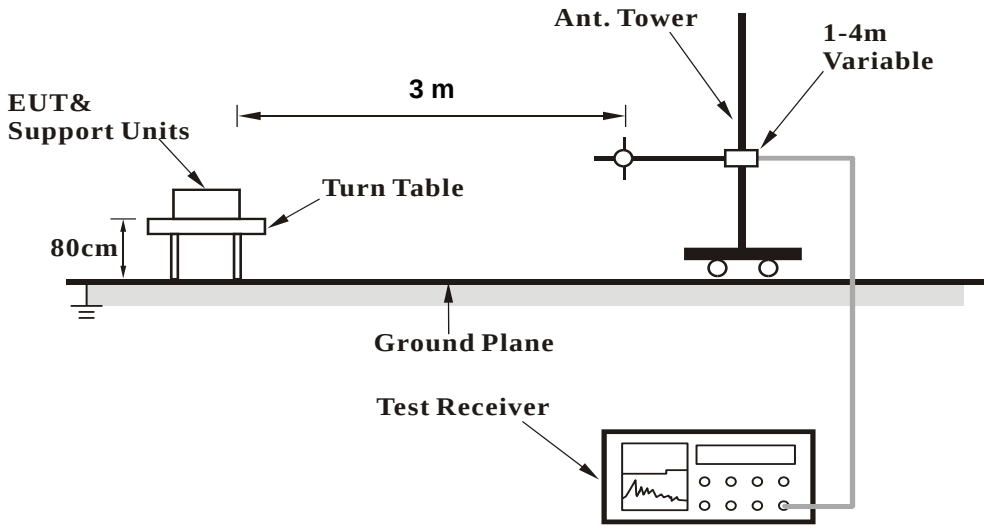
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, 5 MHz for WCDMA, and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m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

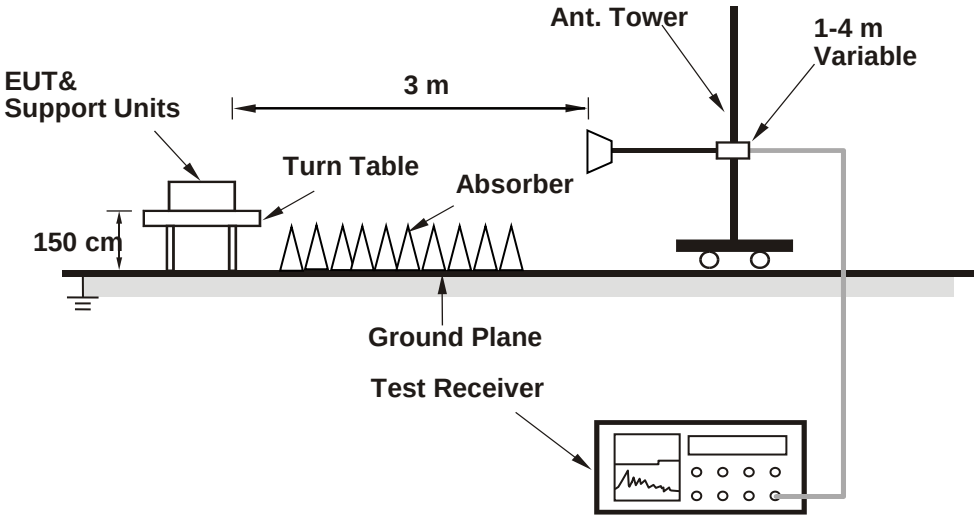
The EUT was set up for the maximum power with GSM, WCDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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).

4.1.4 Test Results

EIRP Power (dBm)

GSM							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	512	1850.2	-5.23	36.57	31.34	1361.44	H
	661	1880.0	-6.06	37.22	31.16	1306.17	
	810	1909.8	-5.67	37.18	31.51	1415.79	
	512	1850.2	-17.43	37.65	20.22	105.20	V
	661	1880.0	-17.52	37.58	20.06	101.39	
	810	1909.8	-17.09	37.48	20.39	109.40	

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

WCDMA							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	9262	1852.4	-12.52	36.57	24.05	254.10	H
	9400	1880.0	-13.23	37.22	23.99	250.61	
	9538	1907.6	-13.31	37.18	23.87	243.78	
	9262	1852.4	-20.83	37.65	16.82	48.08	V
	9400	1880.0	-20.86	37.58	16.72	46.99	
	9538	1907.6	-20.82	37.48	16.66	46.34	

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	-11.55	36.57	25.02	317.69	H
	18900	1880.0	-12.06	37.22	25.16	328.10	
	19193	1909.3	-12.16	37.18	25.02	317.69	
	18607	1850.7	-19.12	37.65	18.53	71.29	V
	18900	1880.0	-18.87	37.58	18.71	74.30	
	19193	1909.3	-19.07	37.48	18.41	69.34	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	18607	1850.7	-13.86	36.57	22.71	186.64	H
	18900	1880.0	-14.50	37.22	22.72	187.07	
	19193	1909.3	-14.56	37.18	22.62	182.81	
	18607	1850.7	-21.36	37.65	16.29	42.56	V
	18900	1880.0	-21.27	37.58	16.31	42.76	
	19193	1909.3	-21.30	37.48	16.18	41.50	

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	-11.49	36.57	25.08	322.11	H
	18900	1880.0	-12.07	37.22	25.15	327.34	
	19185	1908.5	-12.17	37.18	25.01	316.96	
	18615	1851.5	-19.08	37.65	18.57	71.94	V
	18900	1880.0	-18.83	37.58	18.75	74.99	
	19185	1908.5	-18.92	37.48	18.56	71.78	
Channel Bandwidth: 3 MHz / 16QAM							
Z	18615	1851.5	-12.79	36.57	23.78	238.78	H
	18900	1880.0	-13.38	37.22	23.84	242.10	
	19185	1908.5	-13.53	37.18	23.65	231.74	
	18615	1851.5	-20.34	37.65	17.31	53.83	V
	18900	1880.0	-20.19	37.58	17.39	54.83	
	19185	1908.5	-20.19	37.48	17.29	53.58	

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	-11.46	36.57	25.11	324.34	H
	18900	1880.0	-12.01	37.22	25.21	331.89	
	19175	1907.5	-12.08	37.18	25.10	323.59	
	18625	1852.5	-19.00	37.65	18.65	73.28	V
	18900	1880.0	-18.76	37.58	18.82	76.21	
	19175	1907.5	-18.87	37.48	18.61	72.61	
Channel Bandwidth: 5 MHz / 16QAM							
Z	18625	1852.5	-12.68	36.57	23.89	244.91	H
	18900	1880.0	-13.27	37.22	23.95	248.31	
	19175	1907.5	-13.30	37.18	23.88	244.34	
	18625	1852.5	-20.29	37.65	17.36	54.45	V
	18900	1880.0	-20.03	37.58	17.55	56.89	
	19175	1907.5	-20.17	37.48	17.31	53.83	

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	-11.38	36.57	25.19	330.37	H
	18900	1880.0	-11.94	37.22	25.28	337.29	
	19150	1905.0	-12.04	37.18	25.14	326.59	
	18650	1855.0	-18.98	37.65	18.67	73.62	V
	18900	1880.0	-18.67	37.58	18.91	77.80	
	19150	1905.0	-18.83	37.48	18.65	73.28	
Channel Bandwidth: 10 MHz / 16QAM							
Z	18650	1855.0	-12.60	36.57	23.97	249.46	H
	18900	1880.0	-13.08	37.22	24.14	259.42	
	19150	1905.0	-13.19	37.18	23.99	250.61	
	18650	1855.0	-20.11	37.65	17.54	56.75	V
	18900	1880.0	-19.96	37.58	17.62	57.81	
	19150	1905.0	-20.02	37.48	17.46	55.72	

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	-11.29	36.57	25.28	337.29	H
	18900	1880.0	-11.84	37.22	25.38	345.14	
	19125	1902.5	-11.99	37.18	25.19	330.37	
	18675	1857.5	-18.90	37.65	18.75	74.99	V
	18900	1880.0	-18.66	37.58	18.92	77.98	
	19125	1902.5	-18.75	37.48	18.73	74.64	
Channel Bandwidth: 15 MHz / 16QAM							
Z	18675	1857.5	-12.40	36.57	24.17	261.22	H
	18900	1880.0	-13.03	37.22	24.19	262.42	
	19125	1902.5	-13.07	37.18	24.11	257.63	
	18675	1857.5	-20.03	37.65	17.62	57.81	V
	18900	1880.0	-19.79	37.58	17.79	60.12	
	19125	1902.5	-19.87	37.48	17.61	57.68	

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	-11.24	36.57	25.33	341.19	H
	18900	1880.0	-11.81	37.22	25.41	347.54	
	19100	1900.0	-11.94	37.18	25.24	334.20	
	18700	1860.0	-18.84	37.65	18.81	76.03	V
	18900	1880.0	-18.61	37.58	18.97	78.89	
	19100	1900.0	-18.72	37.48	18.76	75.16	
Channel Bandwidth: 20 MHz / 16QAM							
Z	18700	1860.0	-12.28	36.57	24.29	268.53	H
	18900	1880.0	-12.86	37.22	24.36	272.90	
	19100	1900.0	-13.00	37.18	24.18	261.82	
	18700	1860.0	-19.90	37.65	17.75	59.57	V
	18900	1880.0	-19.65	37.58	17.93	62.09	
	19100	1900.0	-19.77	37.48	17.71	59.02	

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.

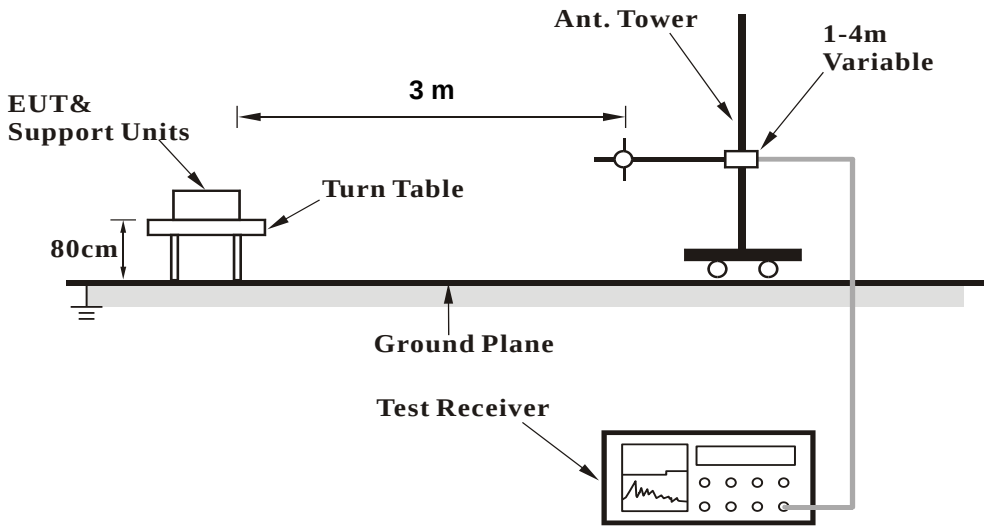
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.2.3 Deviation from Test Standard

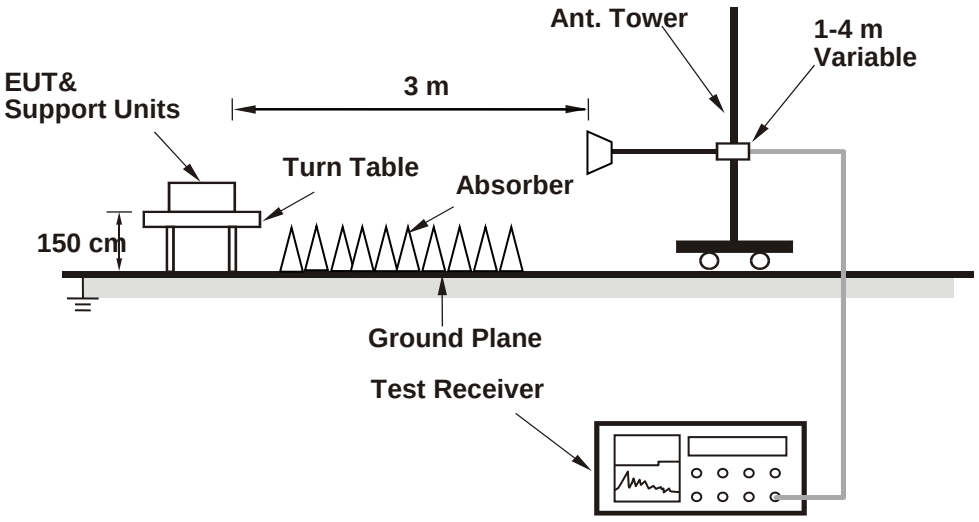
No deviation.

4.2.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



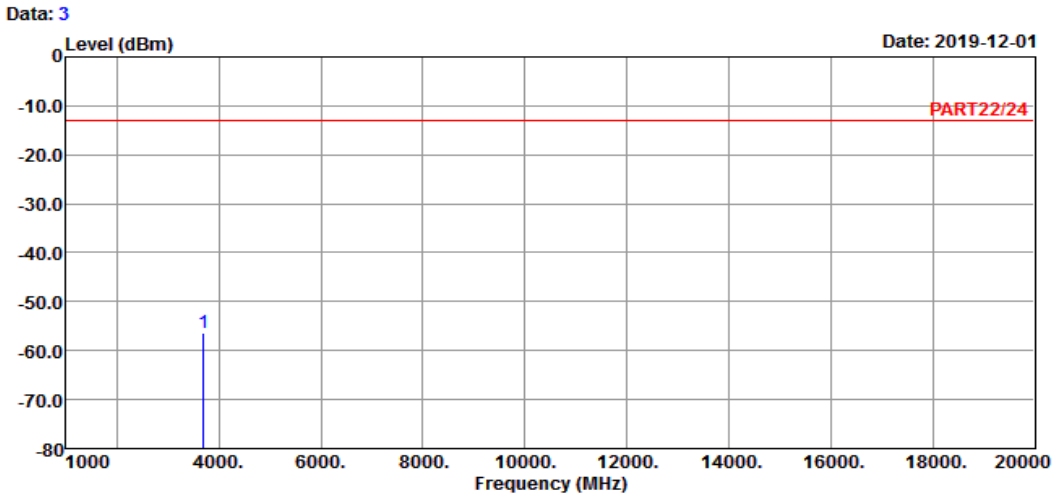
For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.5 Test Results

GSM:

Low Channel

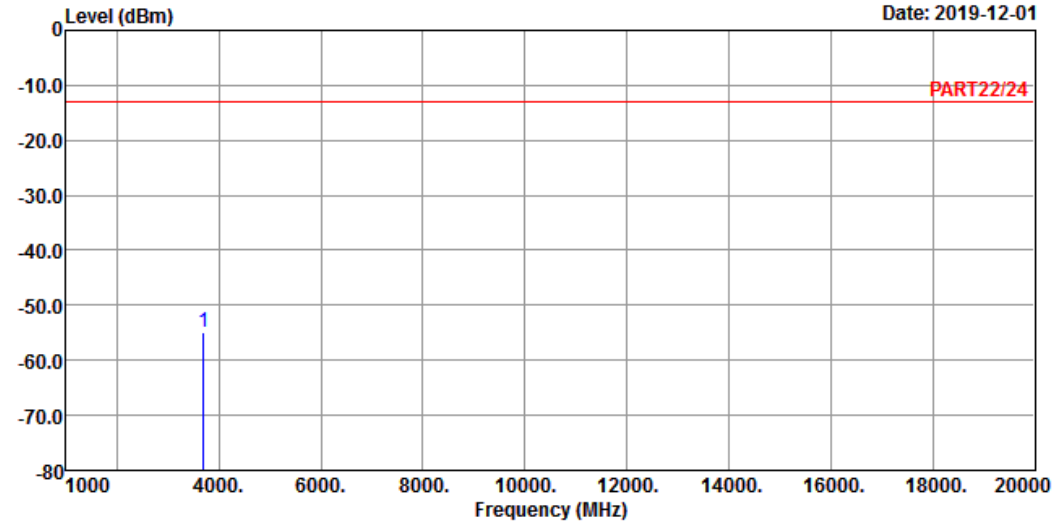
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : PCS 1900 Link_L-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-56.53	-49.60	-13.00	-6.93	-43.53	Peak

Data: 4

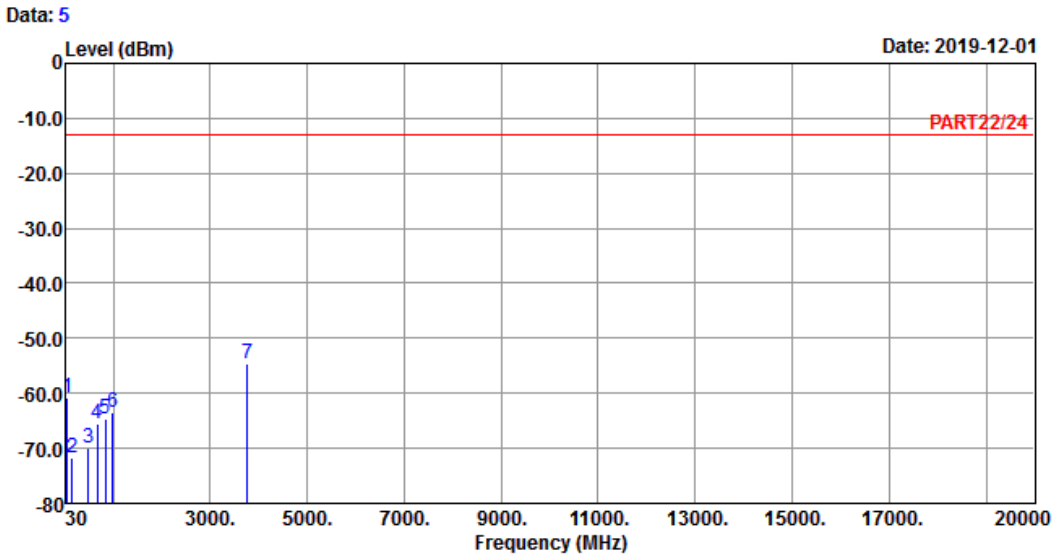


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : PCS 1900 Link_L-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3700.40	-54.89	-47.96	-13.00	-6.93	-41.89	Peak

Middle Channel

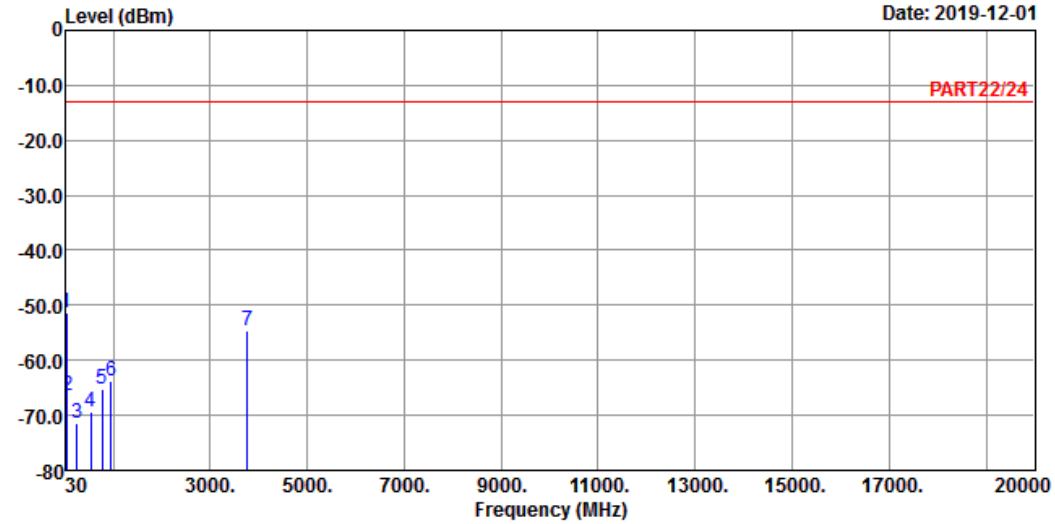
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : PCS 1900 Link_M-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.58	-60.80	-59.33	-13.00	-1.47	-47.80	Peak
2	158.04	-71.62	-66.23	-13.00	-5.39	-58.62	Peak
3	484.93	-69.92	-65.02	-13.00	-4.90	-56.92	Peak
4	676.02	-65.55	-65.07	-13.00	-0.48	-52.55	Peak
5	837.04	-64.71	-65.11	-13.00	0.40	-51.71	Peak
6	982.54	-63.57	-66.53	-13.00	2.96	-50.57	Peak
7 pp	3760.00	-54.68	-48.03	-13.00	-6.65	-41.68	Peak

Data: 6

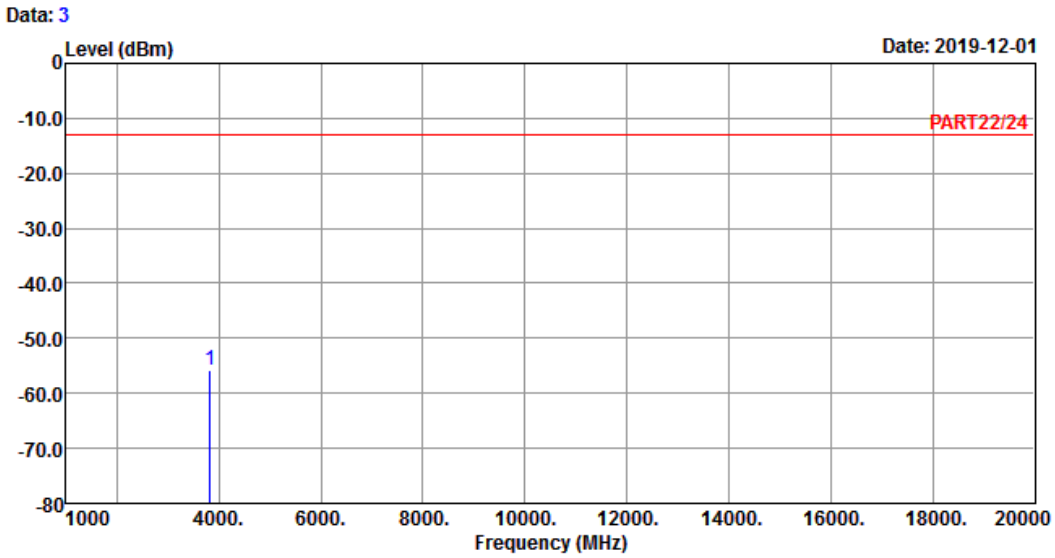


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : PCS 1900 Link_M-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	38.73	-51.23	-51.33	-13.00	0.10	-38.23	Peak
2	52.31	-66.43	-60.89	-13.00	-5.54	-53.43	Peak
3	246.31	-71.42	-65.27	-13.00	-6.15	-58.42	Peak
4	534.40	-69.38	-65.98	-13.00	-3.40	-56.38	Peak
5	769.14	-65.39	-66.21	-13.00	0.82	-52.39	Peak
6	962.17	-63.70	-65.94	-13.00	2.24	-50.70	Peak
7	3760.00	-54.54	-47.89	-13.00	-6.65	-41.54	Peak

High Channel

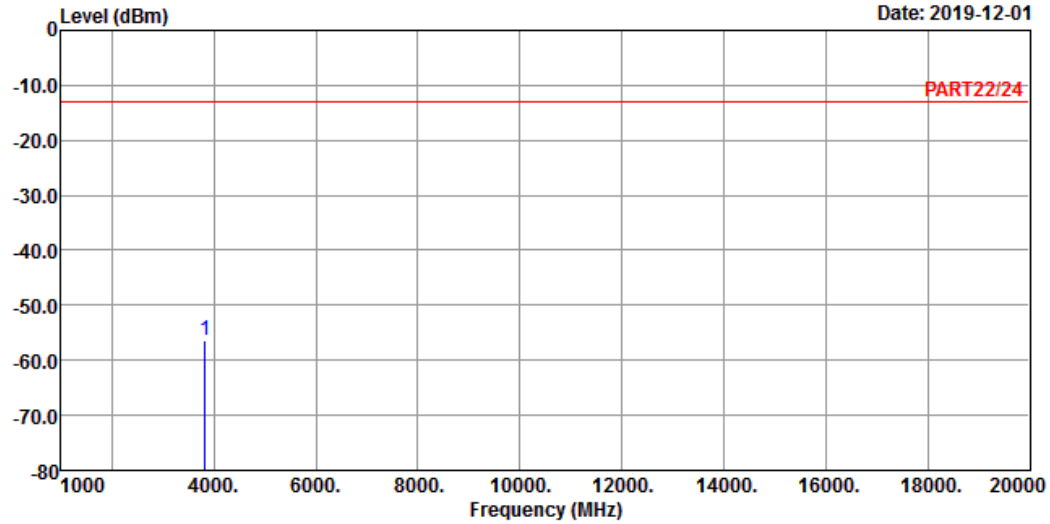
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : PCS 1900 Link_H-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3819.60	-55.83	-49.43	-13.00	-6.40	-42.83	Peak

Data: 4



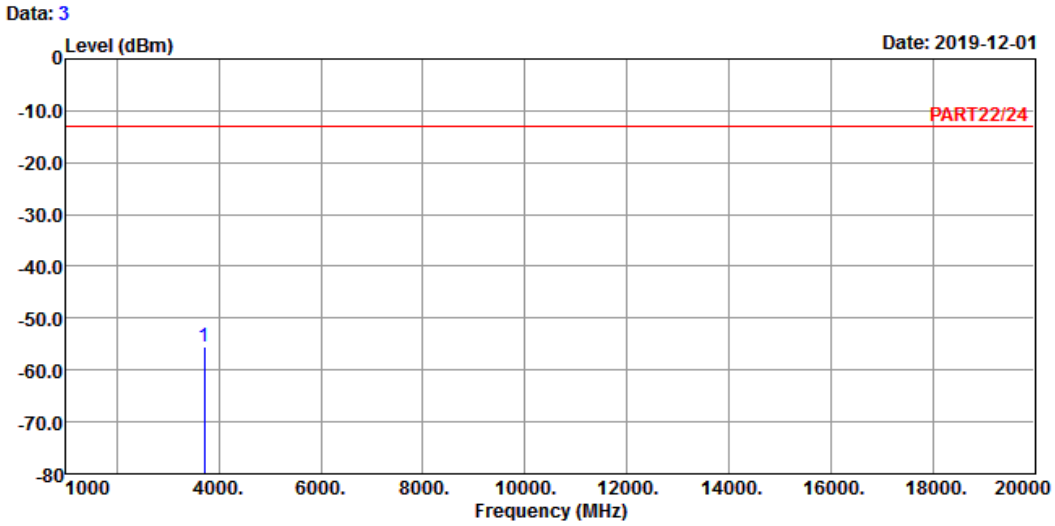
Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : PCS 1900 Link_H-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3819.60	-56.27	-49.87	-13.00	-6.40	-43.27	Peak

WCDMA:

Low Channel

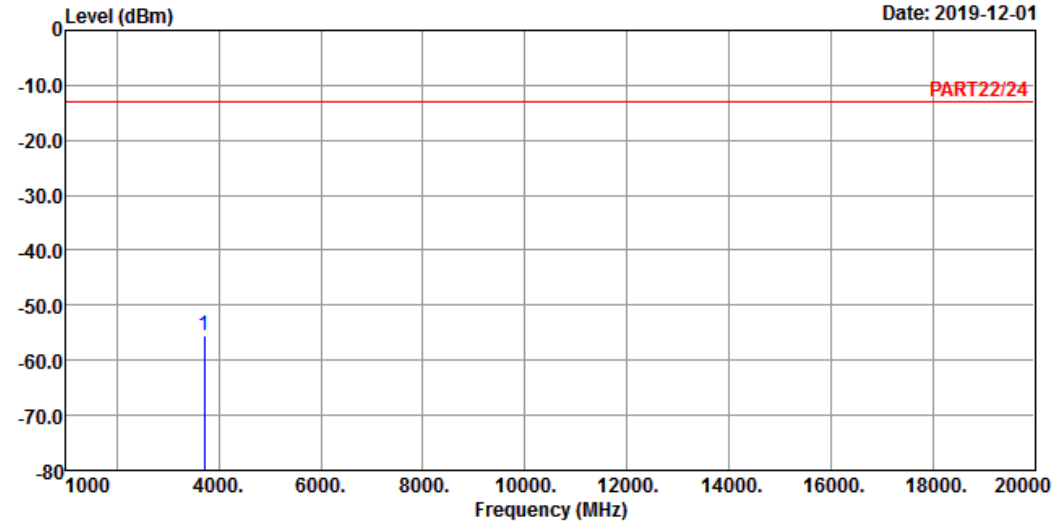
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_L-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-55.44	-48.51	-13.00	-6.93	-42.44	Peak

Data: 4

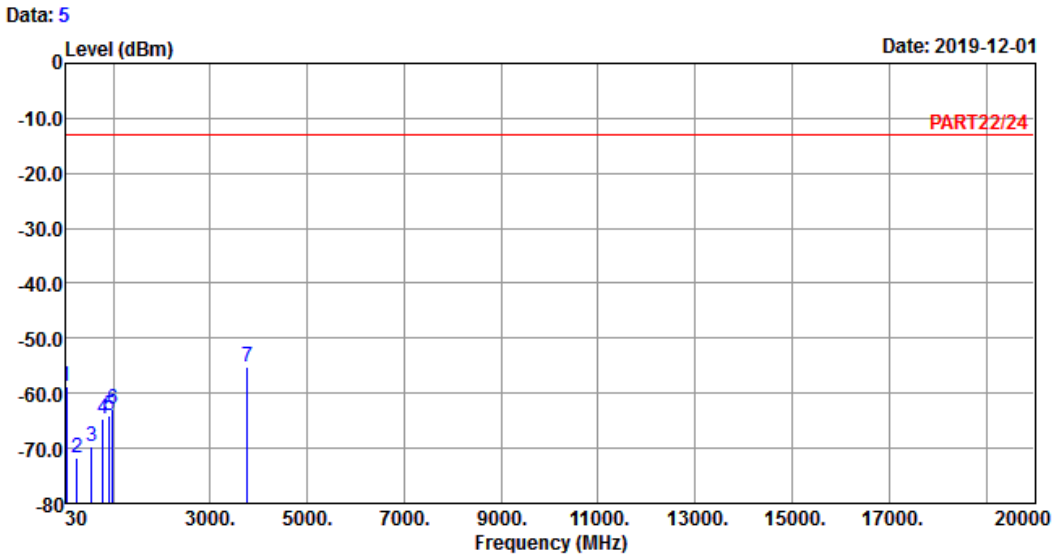


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : WCDMA Band 2 Link_L-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-55.64	-48.71	-13.00	-6.93	-42.64	Peak

Middle Channel

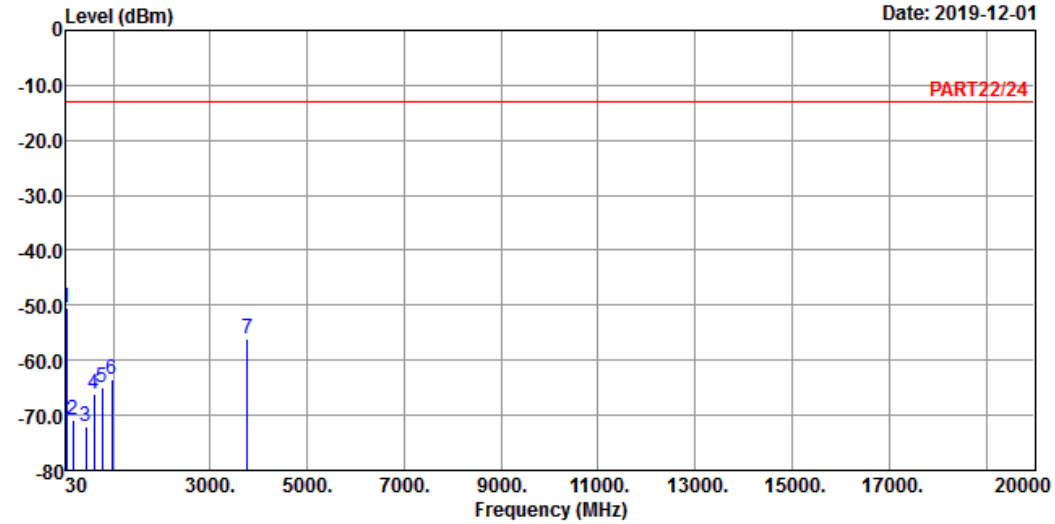
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_M-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	40.67	-58.86	-58.98	-13.00	0.12	-45.86	Peak
2	259.89	-71.86	-65.67	-13.00	-6.19	-58.86	Peak
3	546.04	-69.64	-66.65	-13.00	-2.99	-56.64	Peak
4	783.69	-64.67	-65.45	-13.00	0.78	-51.67	Peak
5	916.58	-64.07	-65.05	-13.00	0.98	-51.07	Peak
6	985.45	-63.01	-66.07	-13.00	3.06	-50.01	Peak
7 pp	3760.00	-55.08	-48.43	-13.00	-6.65	-42.08	Peak

Data: 6

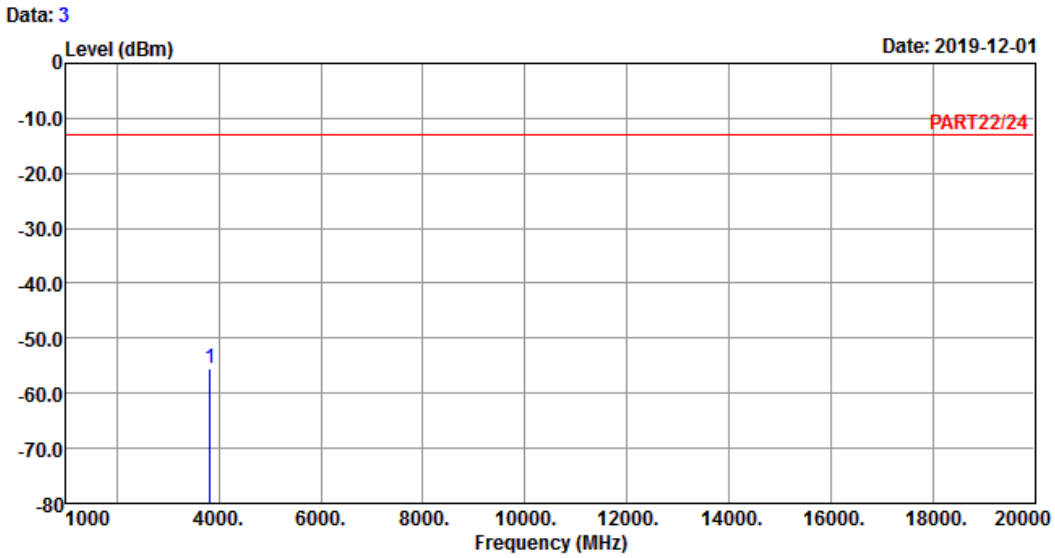


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : WCDMA Band 2 Link_M-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	37.76	-50.53	-50.09	-13.00	-0.44	-37.53	Peak
2	163.86	-70.77	-65.65	-13.00	-5.12	-57.77	Peak
3	432.55	-72.02	-66.33	-13.00	-5.69	-59.02	Peak
4	598.42	-66.18	-65.35	-13.00	-0.83	-53.18	Peak
5	769.14	-64.93	-65.75	-13.00	0.82	-51.93	Peak
6	967.02	-63.43	-65.84	-13.00	2.41	-50.43	Peak
7	3760.00	-56.17	-49.52	-13.00	-6.65	-43.17	Peak

High Channel

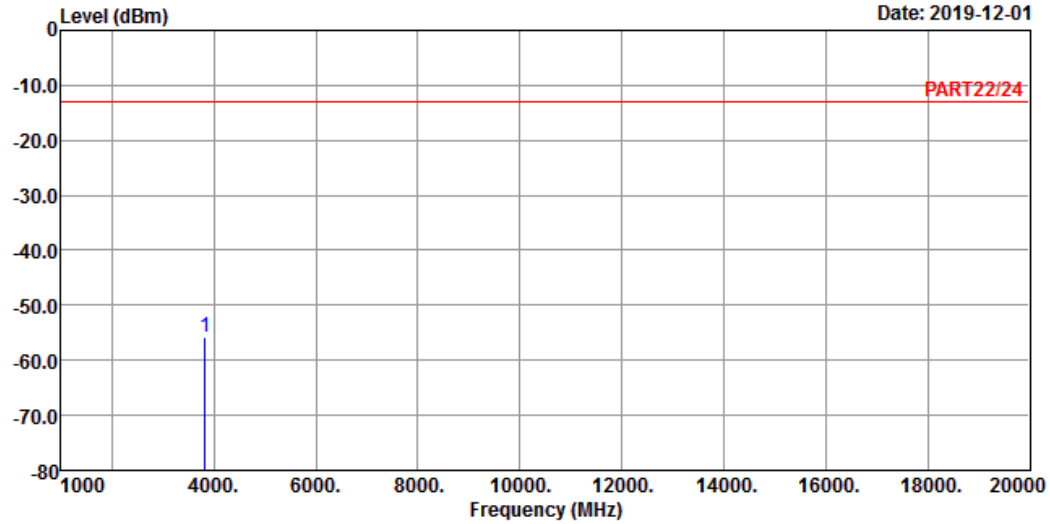
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_H-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.20	-55.36	-48.96	-13.00	-6.40	-42.36	Peak

Data: 4

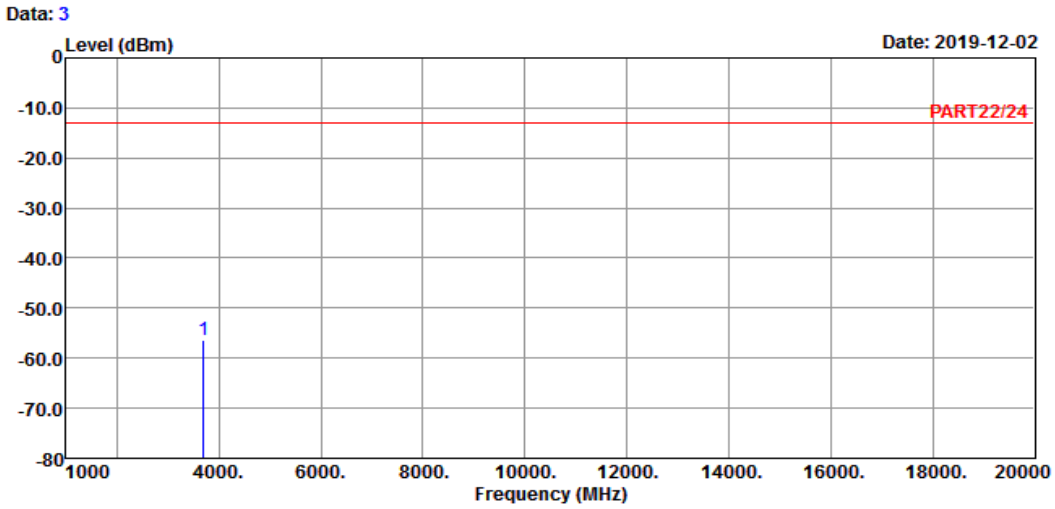


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : WCDMA Band 2 Link_H-CH
Tested by: tim-chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.20	-55.74	-49.34	-13.00	-6.40	-42.74	Peak

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

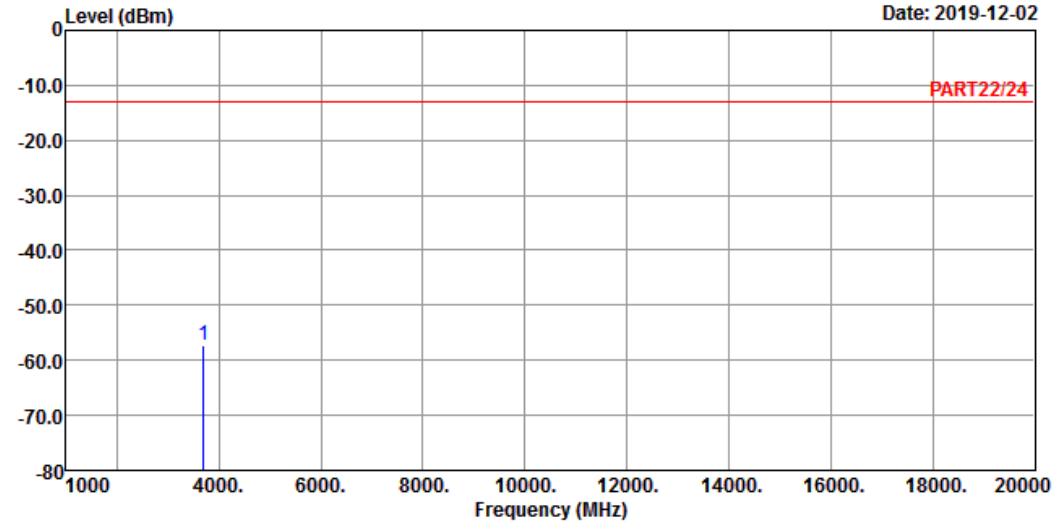
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_1.4M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3701.40	-56.51	-49.58	-13.00	-6.93	-43.51	Peak

Data: 4

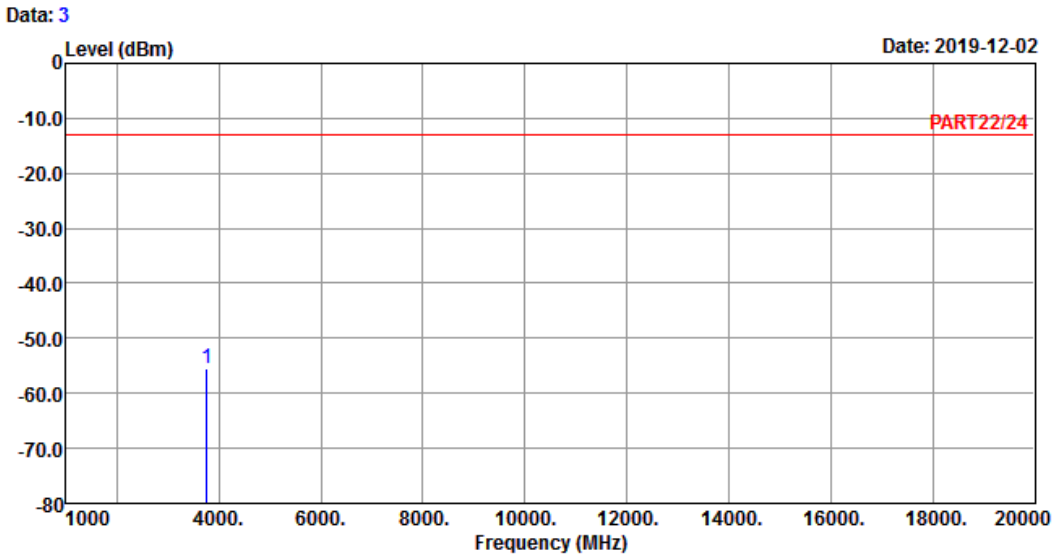


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_1.4M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3701.40	-57.14	-50.21	-13.00	-6.93	-44.14	Peak

Middle Channel

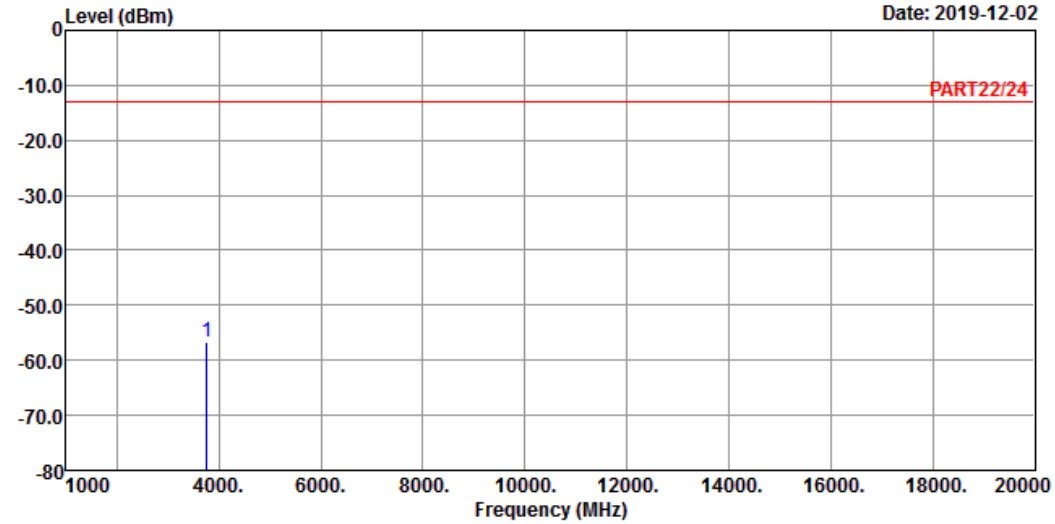
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_1.4M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-55.61	-48.96	-13.00	-6.65	-42.61	Peak

Data: 4



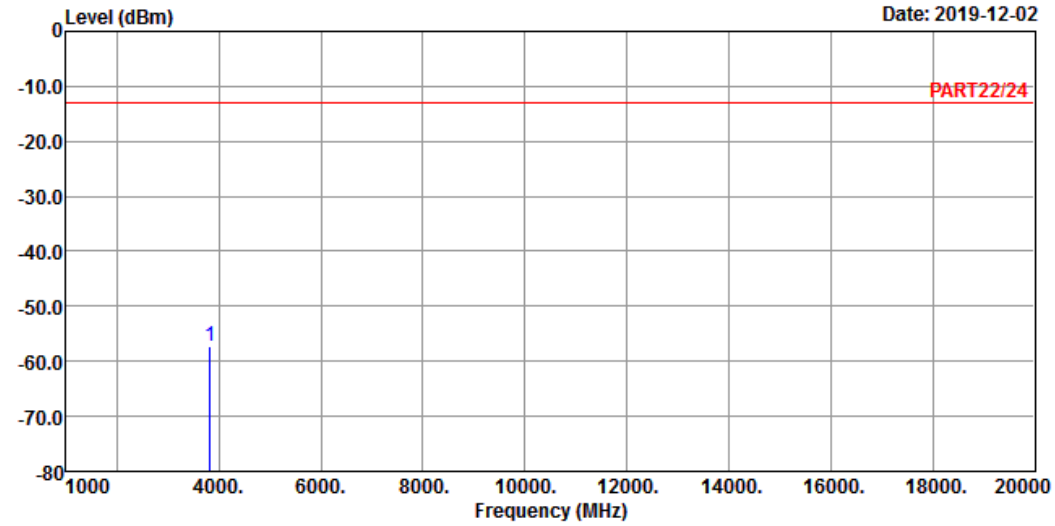
Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_1.4M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-56.68	-50.03	-13.00	-6.65	-43.68	Peak

High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

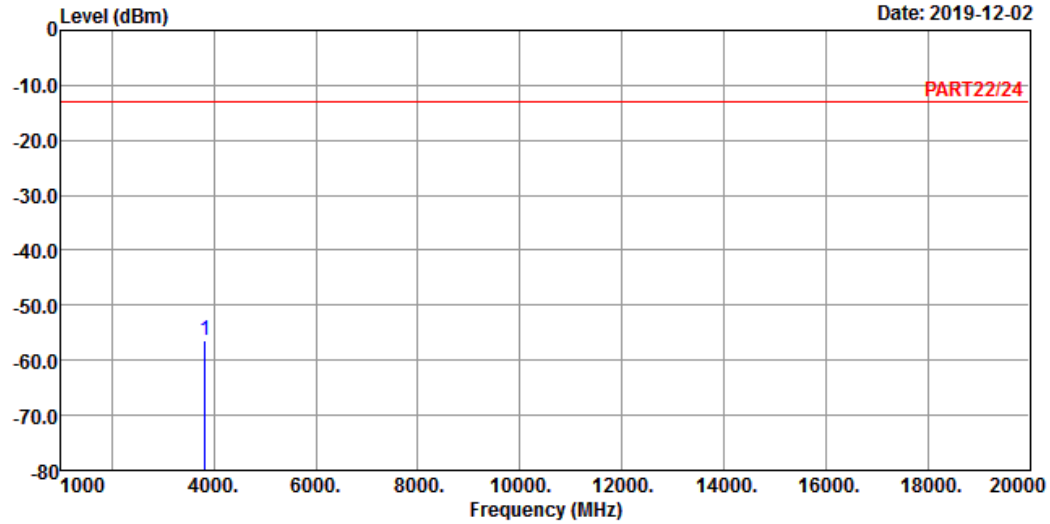
Data: 3



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_1.4M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3818.60	-57.32	-50.92	-13.00	-6.40	-44.32	Peak

Data: 4

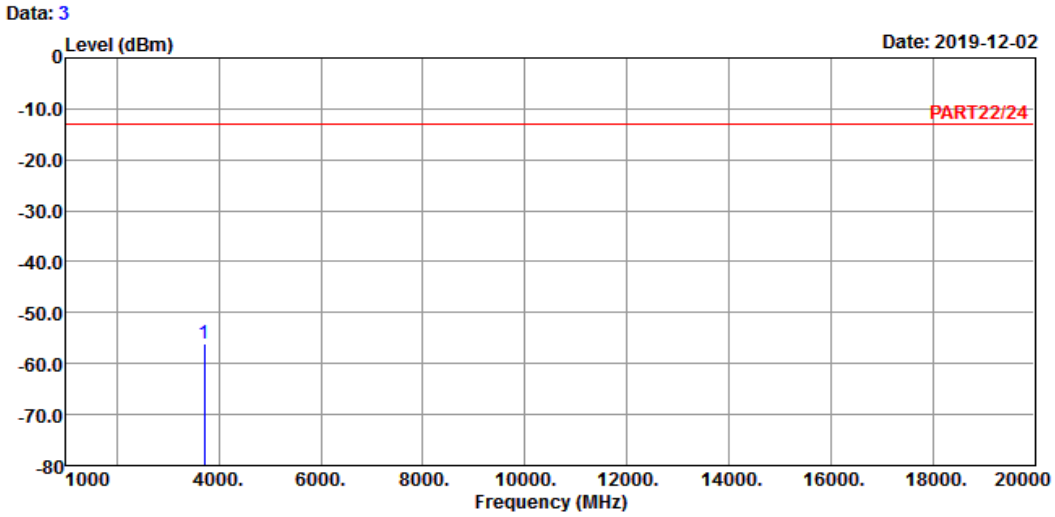


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_1.4M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3818.60	-56.42	-50.02	-13.00	-6.40	-43.42	Peak

Channel Bandwidth: 5 MHz / QPSK
Low Channel

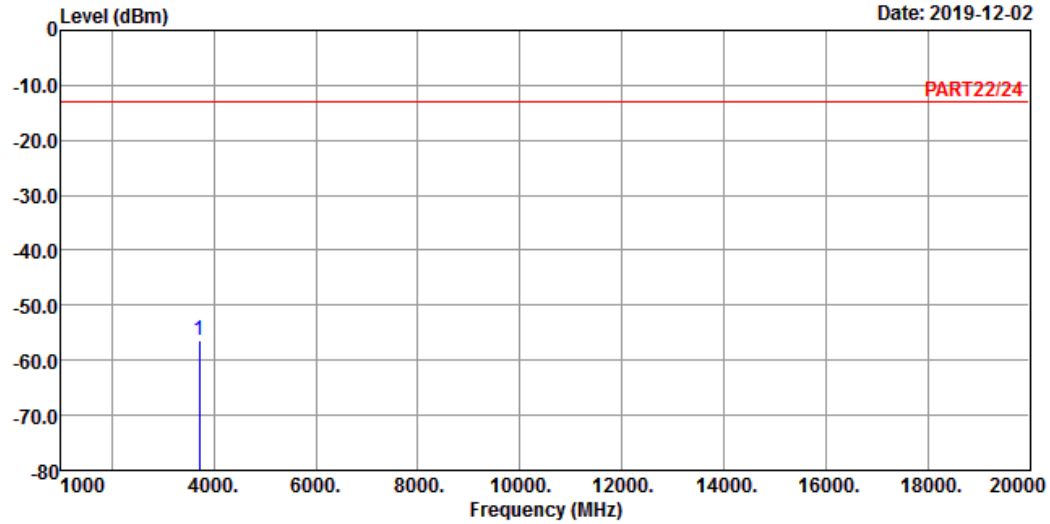
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_5M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3705.00	-55.96	-49.03	-13.00	-6.93	-42.96	Peak

Data: 4

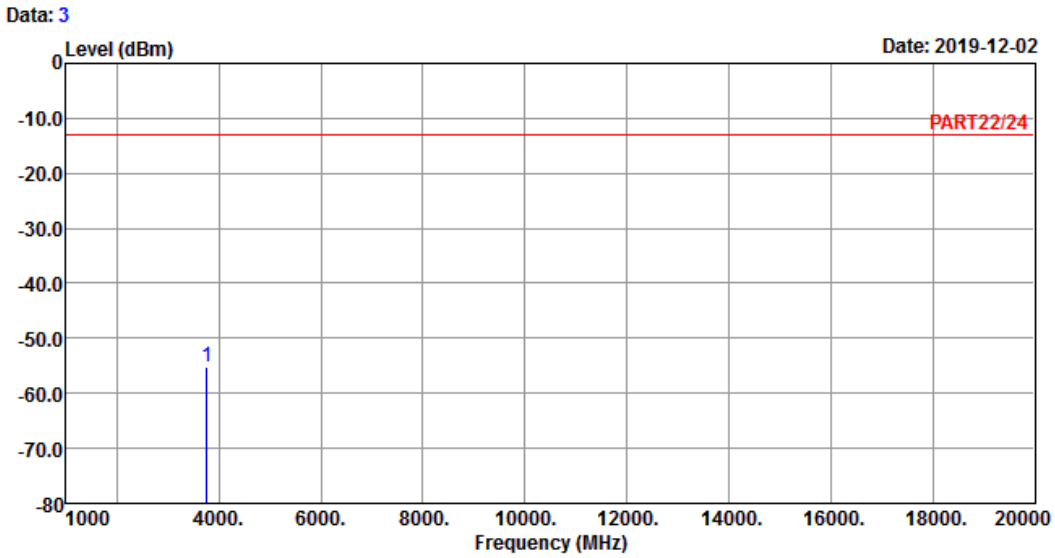


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_5M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3705.00	-56.53	-49.60	-13.00	-6.93	-43.53	Peak

Middle Channel

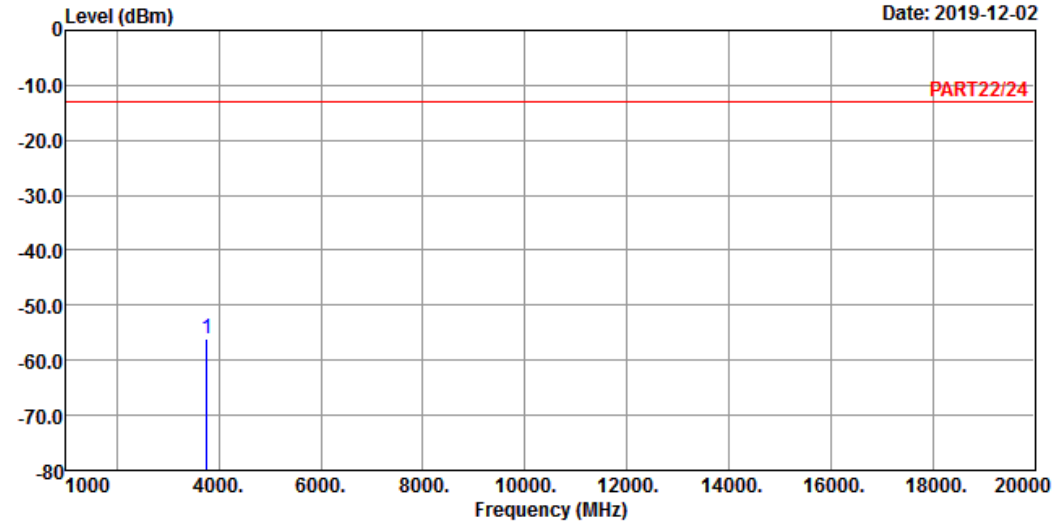
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_5M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-55.06	-48.41	-13.00	-6.65	-42.06	Peak

Data: 4

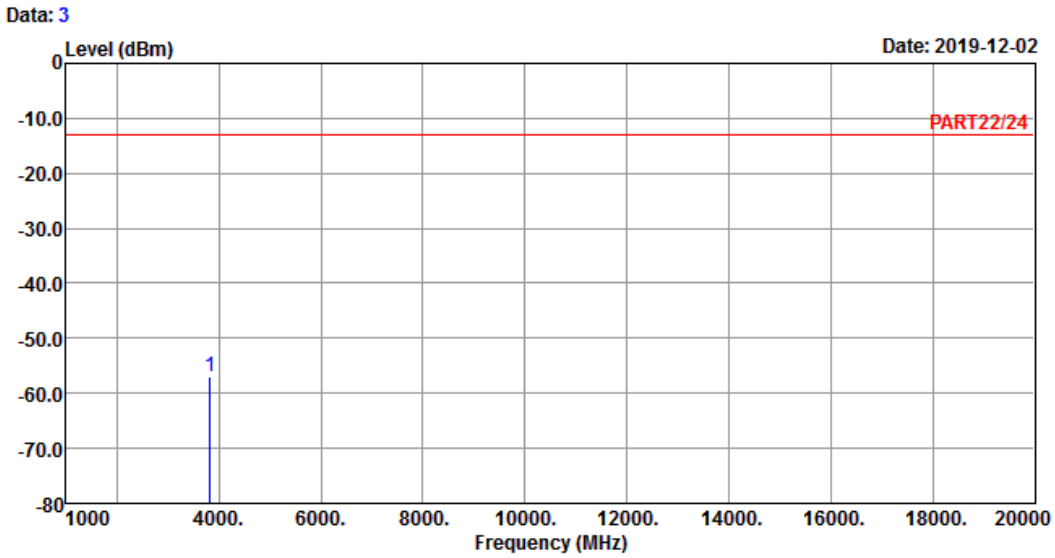


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_5M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-56.17	-49.52	-13.00	-6.65	-43.17	Peak

High Channel

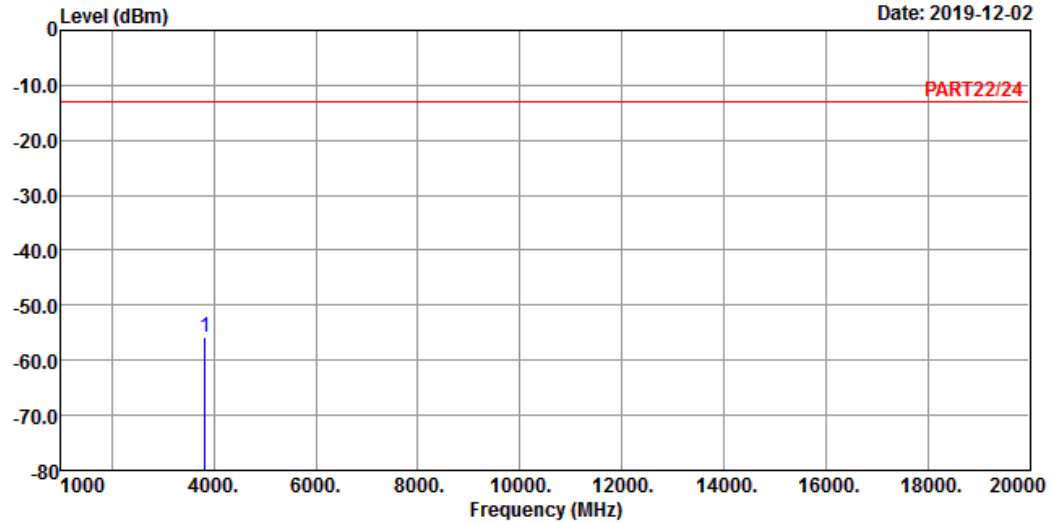
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_5M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.00	-56.84	-50.44	-13.00	-6.40	-43.84	Peak

Data: 4

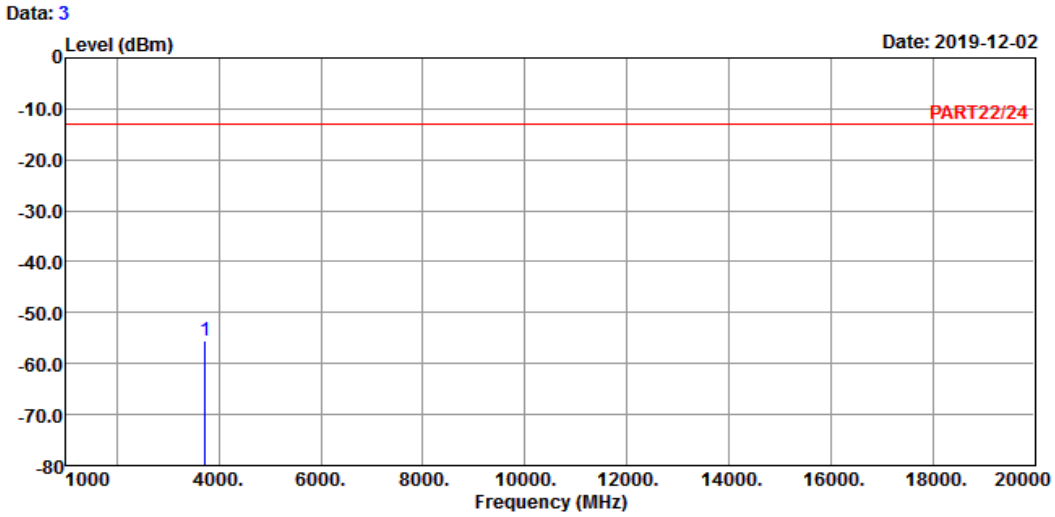


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_5M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3815.00	-55.91	-49.51	-13.00	-6.40	-42.91	Peak

Channel Bandwidth: 20 MHz / QPSK
Low Channel

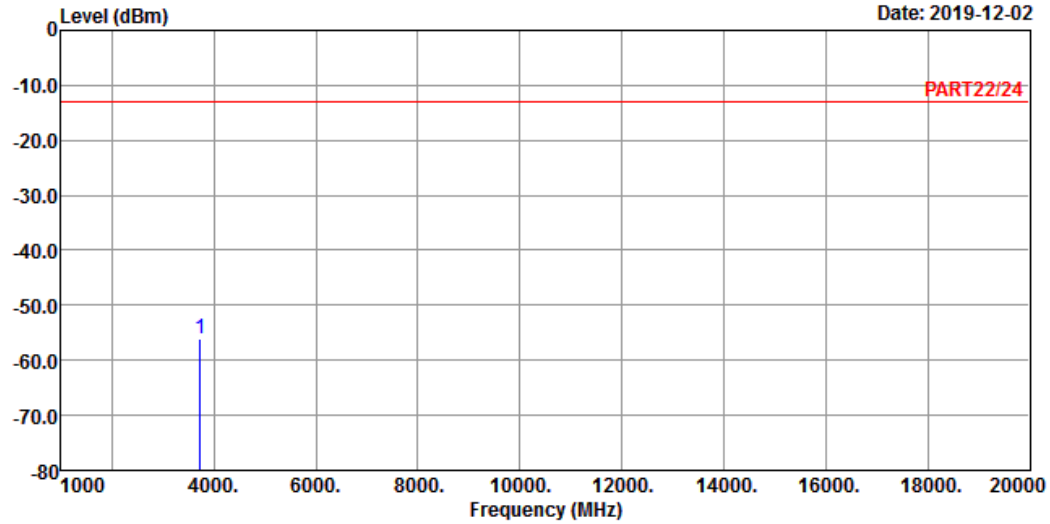
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3720.00	-55.47	-48.65	-13.00	-6.82	-42.47	Peak

Data: 4



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_L-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3720.00	-56.04	-49.22	-13.00	-6.82	-43.04	Peak

Middle Channel

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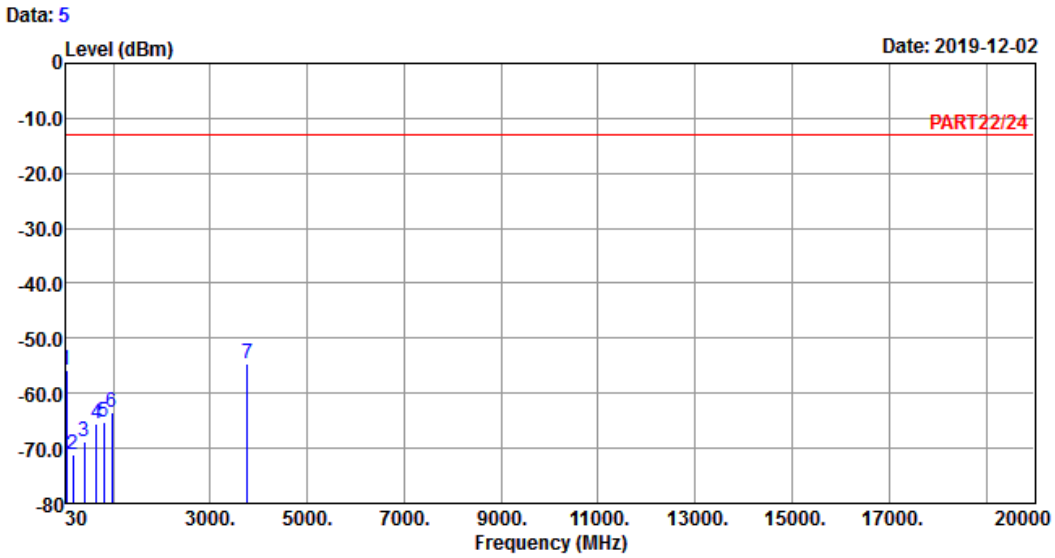
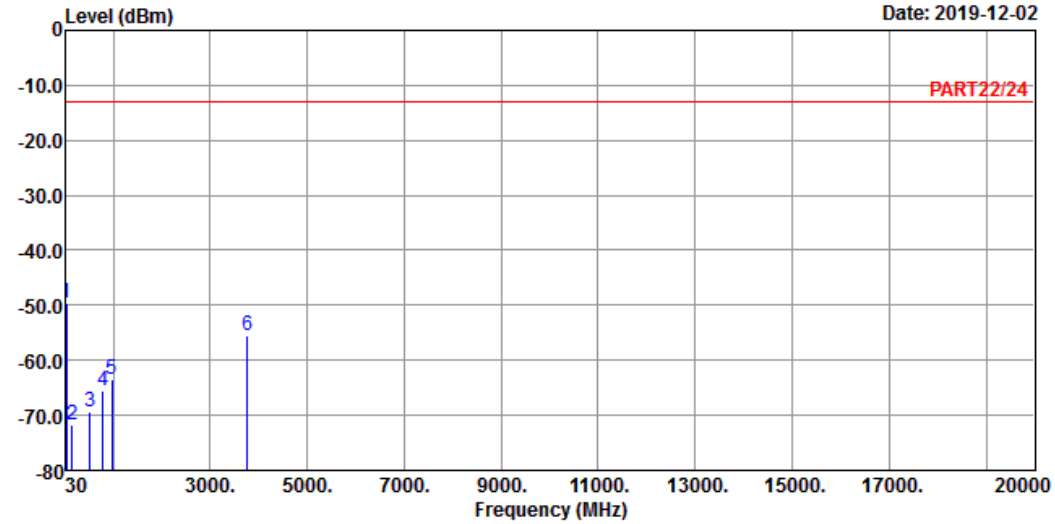


Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	38.73	-55.86	-55.96	-13.00	0.10	-42.86	Peak
2	164.83	-71.24	-66.05	-13.00	-5.19	-58.24	Peak
3	410.24	-68.92	-63.06	-13.00	-5.86	-55.92	Peak
4	661.47	-65.57	-64.87	-13.00	-0.70	-52.57	Peak
5	801.15	-65.31	-66.04	-13.00	0.73	-52.31	Peak
6	977.69	-63.41	-66.20	-13.00	2.79	-50.41	Peak
7 pp	3760.00	-54.56	-47.91	-13.00	-6.65	-41.56	Peak

Data: 6

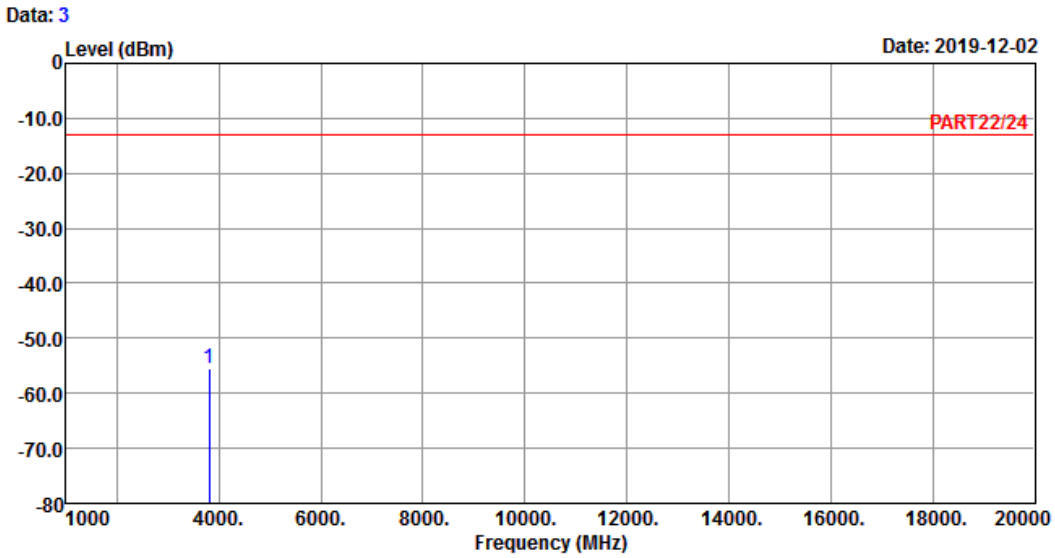


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	38.73	-49.71	-49.81	-13.00	0.10	-36.71	Peak
2	159.01	-71.75	-66.63	-13.00	-5.12	-58.75	Peak
3	513.06	-69.40	-65.24	-13.00	-4.16	-56.40	Peak
4	791.45	-65.47	-66.23	-13.00	0.76	-52.47	Peak
5	965.08	-63.42	-65.77	-13.00	2.35	-50.42	Peak
6	3760.00	-55.62	-48.97	-13.00	-6.65	-42.62	Peak

High Channel

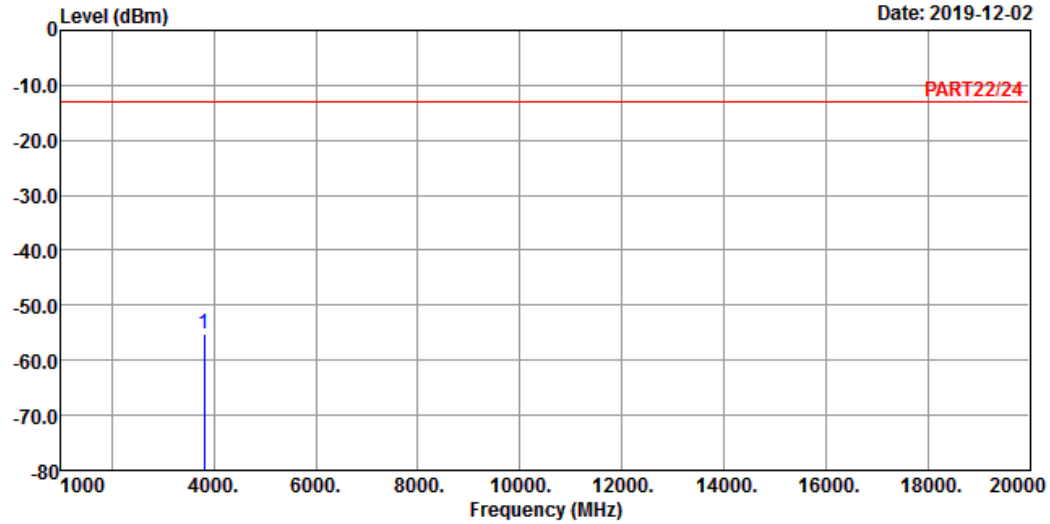
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3800.00	-55.62	-49.19	-13.00	-6.43	-42.62	Peak

Data: 4



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_H-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3800.00	-55.24	-48.81	-13.00	-6.43	-42.24	Peak

5 Pictures of Test Arrangements

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

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

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