

Variant FCC Test Report

(PART 22)

Report No.: RF170425C26A

FCC ID: MSQZ01KD

Test Model: ASUS_Z01KD

Received Date: Aug. 24, 2017

Test Date: Sep. 13, 2017

Issued Date: Nov. 13, 2017

Applicant: ASUSTek COMPUTER INC.

Address: 4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, TAIWAN

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 Tsuen, Kwei Shan Hsiang, Taoyuan
Hsien 333, Taiwan, R.O.C.

Test Location (2): No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan,
R.O.C



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Release Control Record

Issue No.	Description	Date Issued
RF170425C26A	Original Release	Nov. 13, 2017

1 Certificate of Conformity

Product: ASUS Phone

Brand: ASUS

Test Model: ASUS_Z01KD

Sample Status: Production Unit

Applicant: ASUSTek COMPUTER INC.

Test Date: Sep. 13, 2017

Standards: FCC Part 22, Subpart H

This report is issued as a supplementary report to BV CPS report no.: RF170426C26. This report shall be used by combining with its original report.

Prepared by : Ivonne Wu , **Date:** Nov. 13, 2017
Ivonne Wu / Supervisor

Approved by : Dylan Chiou , **Date:** Nov. 13, 2017
Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective Radiated Power	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	N/A	Refer to Note
2.1055 22.355	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
22.917	Band Edge Measurements	N/A	Refer to Note
2.1051 22.917	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -32.09 dB at 2509.20 MHz.

Note: Only ERP and radiated spurious emissions tests had been performed for the addendum. Refer to original report for other test data.

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) ($\pm$)
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	MY52260177	Jul. 05, 2017	Jul. 04, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Jun. 26, 2017	Jun. 25, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Dec. 15, 2016	Dec. 14, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 13, 2016	Dec. 12, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 07, 2017	Jul. 06, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 19, 2016	Oct. 18, 2017
Preamplifier Agilent	310N	187226	Jun. 23, 2017	Jun. 22, 2018
Preamplifier Agilent	83017A	MY39501357	Jun. 23, 2017	Jun. 22, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 26, 2017	Jun. 25, 2018
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 26, 2017	Jun. 25, 2018
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	6201300640	Aug. 16, 2017	Aug. 15, 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

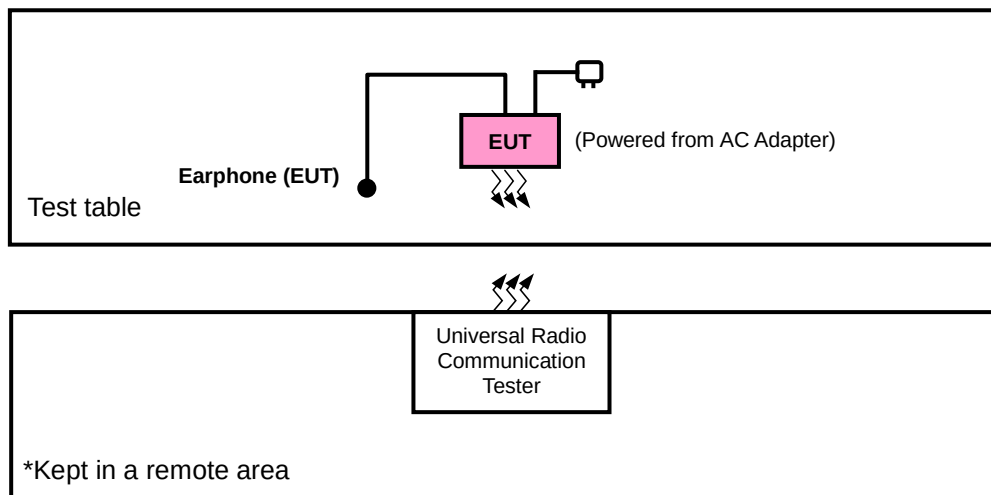
Product	ASUS Phone	
Brand	ASUS	
Test Model	ASUS_Z01KD	
SKU	BR/NA/SA-2CA US/BR/CO/PE/CL	
Status of EUT	Production Unit	
Power Supply Rating	5.0 Vdc or 9 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)	
Modulation Type	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	GSM/GPRS/EDGE	824.2 ~ 848.8 MHz
	WCDMA	826.4 ~ 846.6 MHz
	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
Max. ERP Power	GSM/GPRS	359.09 mW
	LTE 5 (Channel Bandwidth: 10 MHz)	32.30 mW
Antenna Type	Fixed Internal Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

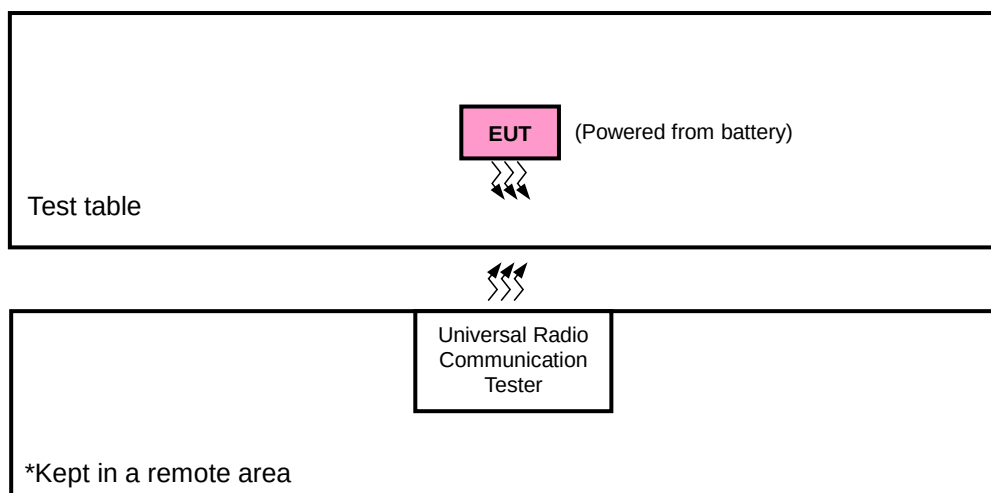
1. This report is issued as a supplementary report to BV CPS report no.: RF170425C26. The difference compared with original report is adding 2nd source of front camera and rear camera. Therefore, only ERP and radiated spurious emissions tests had been performed for this report.
2. The EUT's accessories list refers to Ext. Pho.
3. 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

<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.

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:

SIM	Band	ERP	Radiated Emission
1	GSM	Y-plane	Z-axis
	LTE Band 5	Y-plane	Y-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	128 to 251	128, 189, 251	GSM
-	Radiated Emission	128 to 251	128, 189, 251	GSM

LTE Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	20450 to 20600	20450, 20525, 20600	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Radiated Emission	20450 to 20600	20450, 20525, 20600	10 MHz	QPSK	1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25 deg. C, 65 % RH	3.85 Vdc	Karl Lee
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	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 22

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-D 2010

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

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

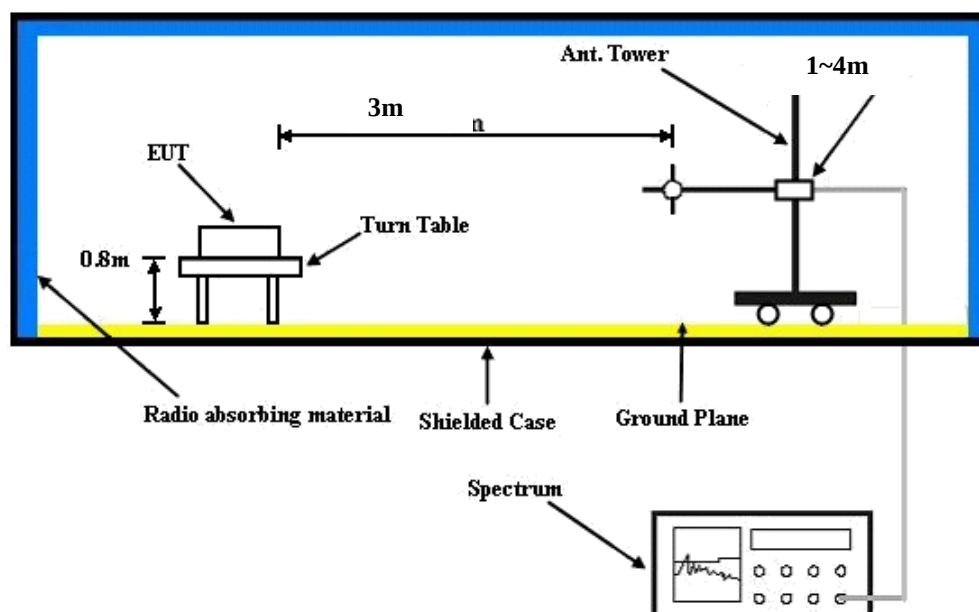
4.1.2 Test Procedures

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM 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 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}$.

4.1.3 Test Setup

EIRP / ERP Measurement:



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

4.1.4 Test Results

ERP Power (dBm)

GSM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
Y	128	824.2	-3.57	31.208	25.49	353.83	H
	189	836.4	-3.60	31.3	25.55	358.92	
	251	848.8	-3.52	31.222	25.55	359.09	
	128	824.2	-7.86	31.504	21.49	141.06	V
	189	836.4	-7.51	31.117	21.46	139.86	
	251	848.8	-8.32	31.922	21.45	139.70	

LTE Band 5							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
Y	20450	829.0	-14.02	31.208	15.04	31.90	H
	20525	836.5	-14.08	31.3	15.07	32.14	
	20600	844.0	-13.98	31.222	15.09	32.30	
	20450	829.0	-18.30	31.504	11.05	12.75	V
	20525	836.5	-17.96	31.117	11.01	12.61	
	20600	844.0	-18.65	31.922	11.12	12.95	
Channel Bandwidth: 10 MHz / 16QAM							
Y	20450	829.0	-14.99	31.208	14.07	25.52	H
	20525	836.5	-15.11	31.3	14.04	25.35	
	20600	844.0	-15.00	31.222	14.07	25.54	
	20450	829.0	-19.22	31.504	10.13	10.31	V
	20525	836.5	-18.90	31.117	10.07	10.16	
	20600	844.0	-19.72	31.922	10.05	10.12	

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

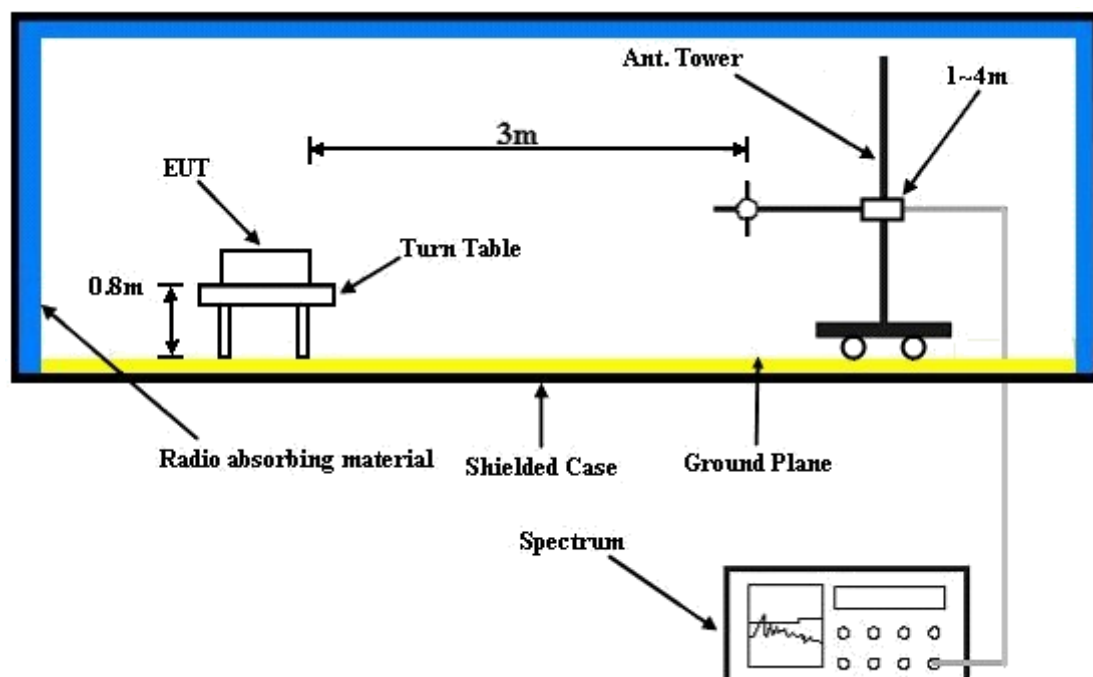
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}.$

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



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

4.2.5 Test Results

GSM:

Low Channel

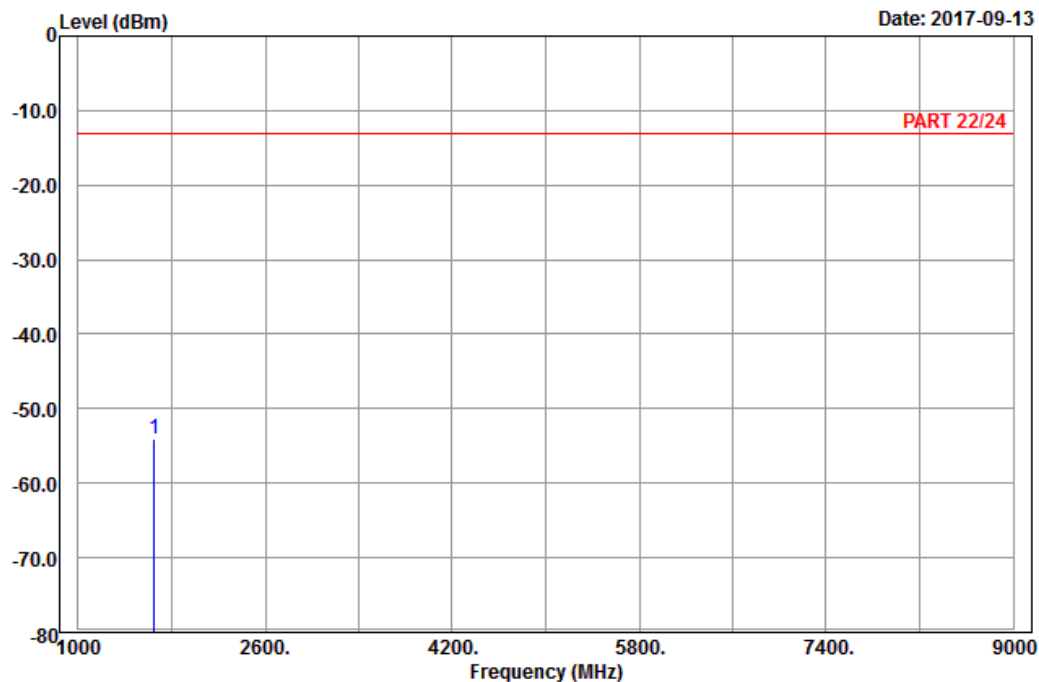


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Data: 5

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : GSM 850_Link_CH128
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	1648.40	-54.04	-61.77	-13.00	-41.04	7.73	Peak

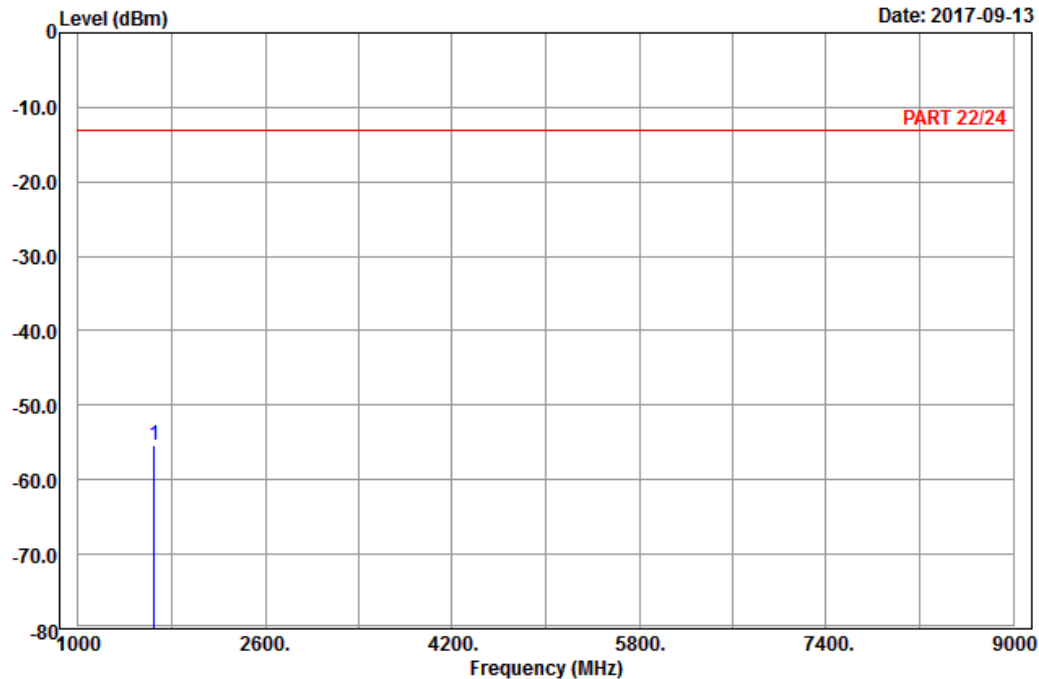


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Data: 6

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : GSM 850_Link_CH128
Tested by: Karl Lee

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 1648.40	-55.47	-63.20	-13.00	-42.47	7.73	Peak

Middle Channel

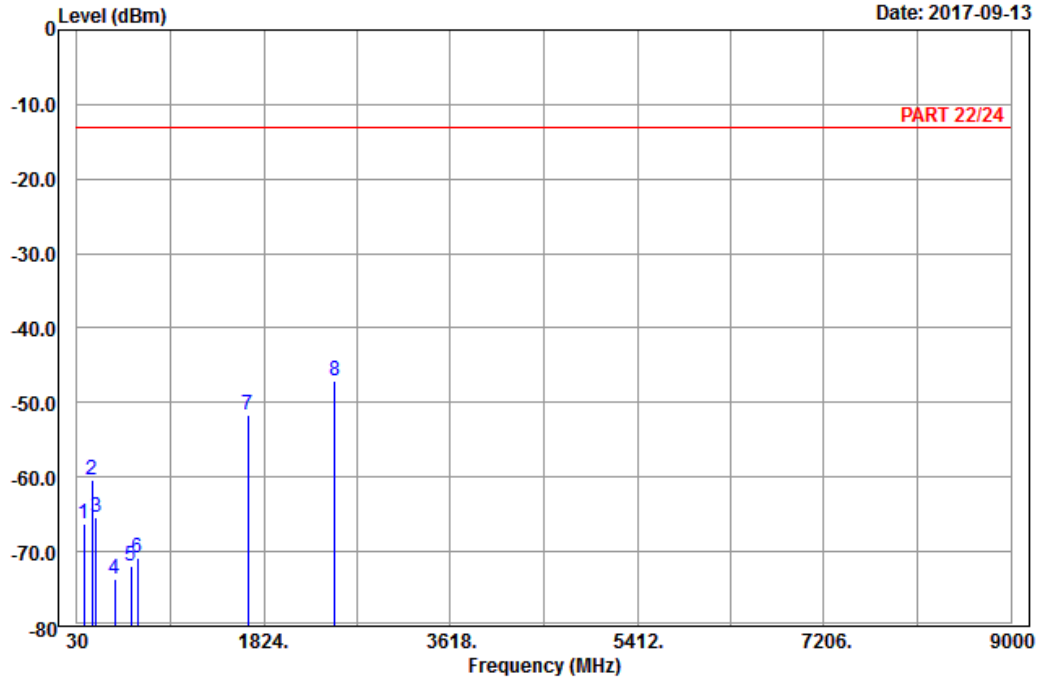


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Data: 9

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : GSM 850_Link_CH189
Tested by: Karl Lee

		Read	Limit	Over			
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		
1	98.58	-66.16	-55.98	-13.00	-53.16	-10.18	Peak
2	170.40	-60.47	-53.87	-13.00	-47.47	-6.60	Peak
3	210.36	-65.40	-59.36	-13.00	-52.40	-6.04	Peak
4	394.50	-73.72	-70.72	-13.00	-60.72	-3.00	Peak
5	551.30	-71.88	-70.26	-13.00	-58.88	-1.62	Peak
6	607.30	-70.82	-71.17	-13.00	-57.82	0.35	Peak
7	1672.80	-51.64	-59.55	-13.00	-38.64	7.91	Peak
8 pp	2509.20	-47.08	-58.36	-13.00	-34.08	11.28	Peak

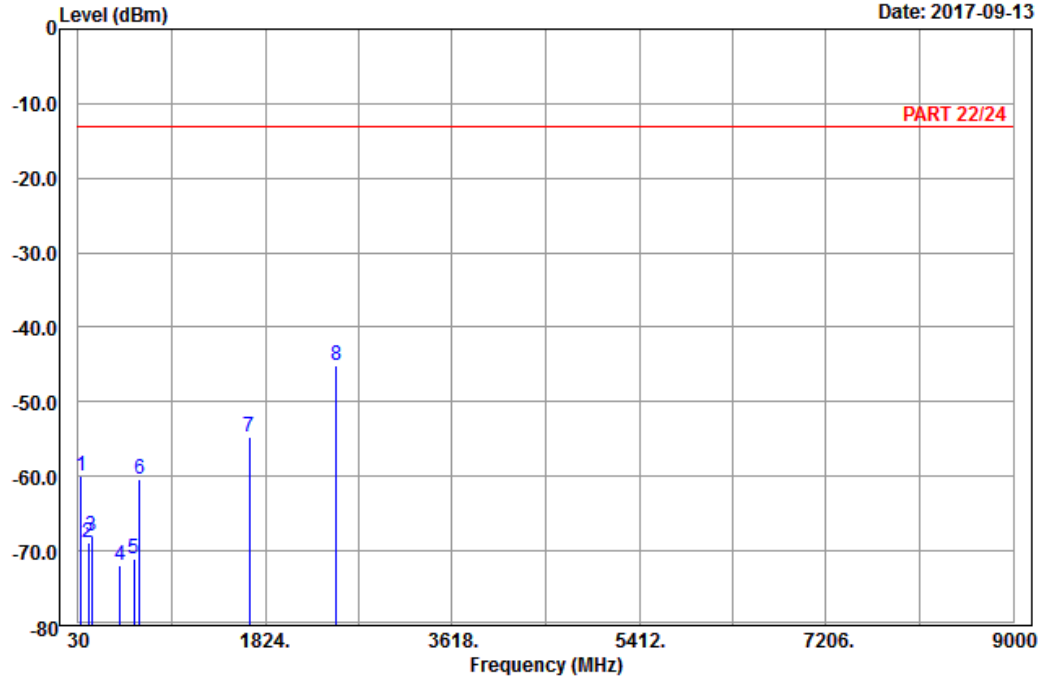


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Data: 10

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : GSM 850_Link_CH189
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	58.08	-60.05	-45.99	-13.00	-47.05	-14.06	Peak
2	130.98	-68.99	-61.34	-13.00	-55.99	-7.65	Peak
3	155.28	-68.01	-60.20	-13.00	-55.01	-7.81	Peak
4	434.40	-71.92	-68.41	-13.00	-58.92	-3.51	Peak
5	562.50	-70.96	-69.82	-13.00	-57.96	-1.14	Peak
6	618.50	-60.44	-60.66	-13.00	-47.44	0.22	Peak
7	1672.80	-54.61	-62.52	-13.00	-41.61	7.91	Peak
8 pp	2509.20	-45.09	-56.37	-13.00	-32.09	11.28	Peak

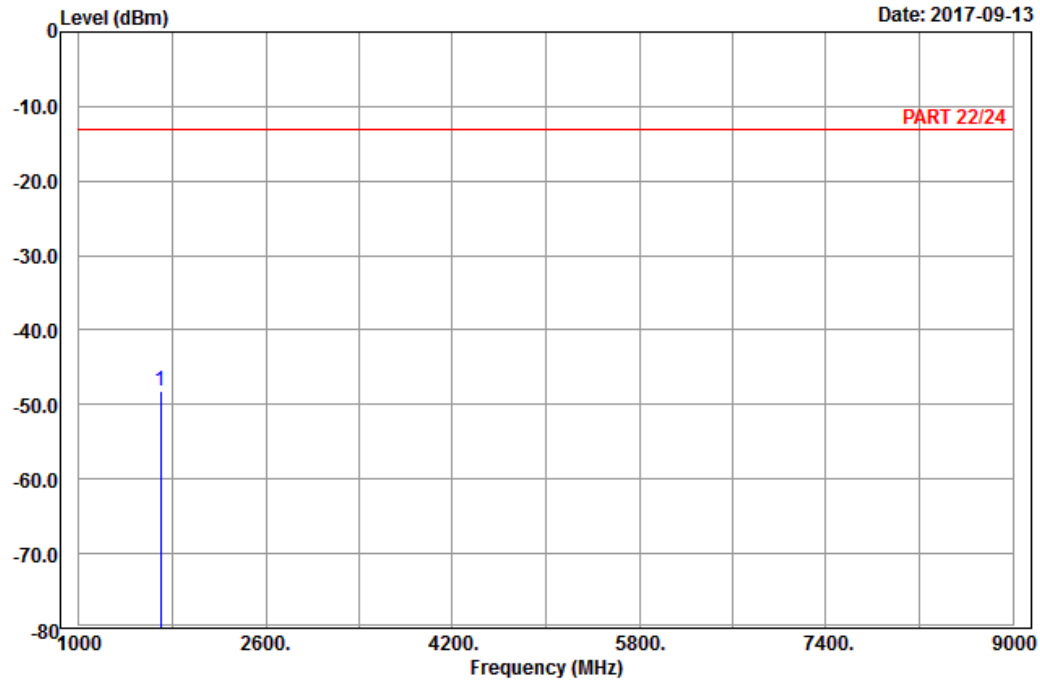
High Channel



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Data: 5



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : GSM 850_Link_CH251
 Tested by: Karl Lee

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 1697.60	-48.24	-56.38	-13.00	-35.24	8.14	Peak

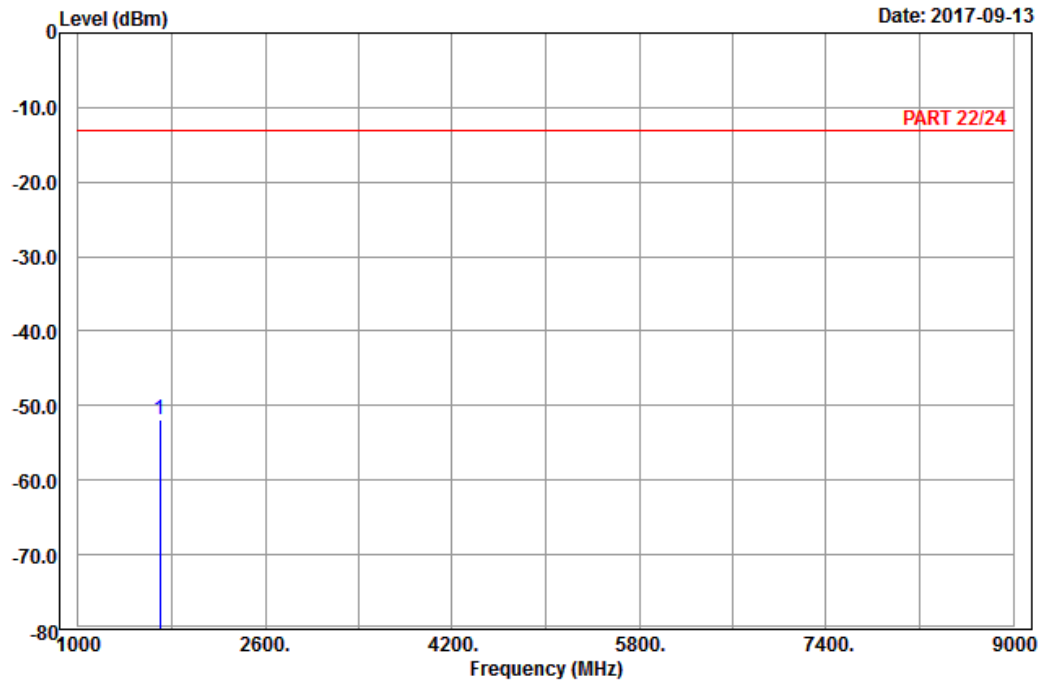


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Data: 6

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : GSM 850_Link_CH251
Tested by: Karl Lee

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 1697.60	-51.92	-60.06	-13.00	-38.92	8.14	Peak

LTE Band 5
Channel Bandwidth: 10 MHz / QPSK
Low Channel

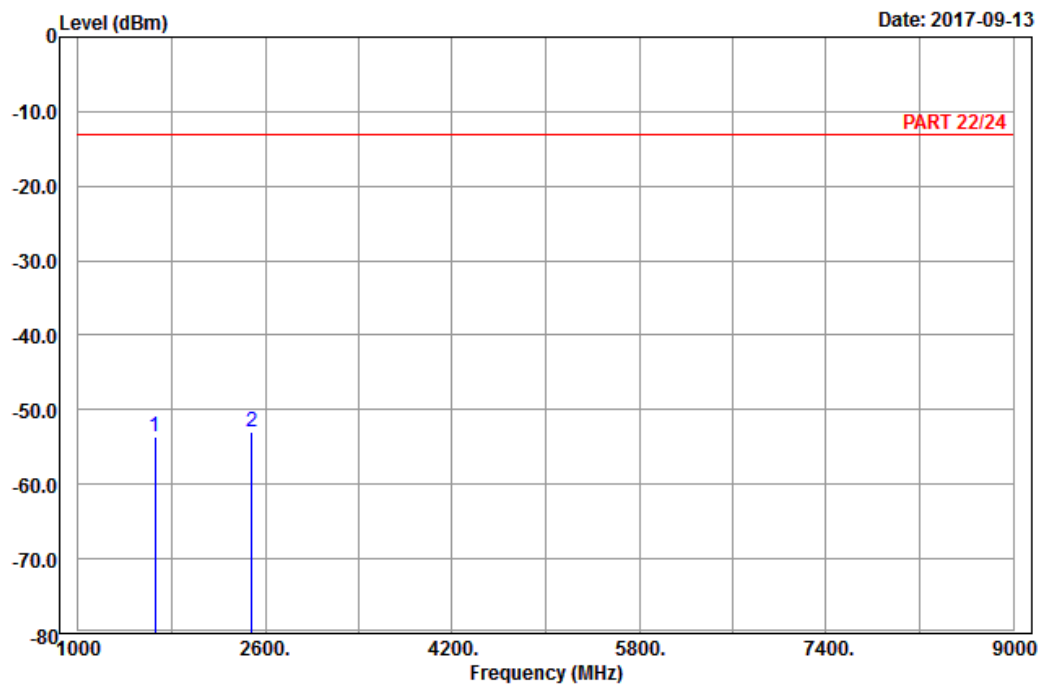


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A D T

Data: 5

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 5_Link_CH20450
Tested by: Karl Lee

		Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor Remark
	MHz	dBm	dBm	dBm	dB	dB
1	1658.00	-53.54	-61.45	-13.00	-40.54	7.91 Peak
2 pp	2487.00	-52.88	-63.92	-13.00	-39.88	11.04 Peak

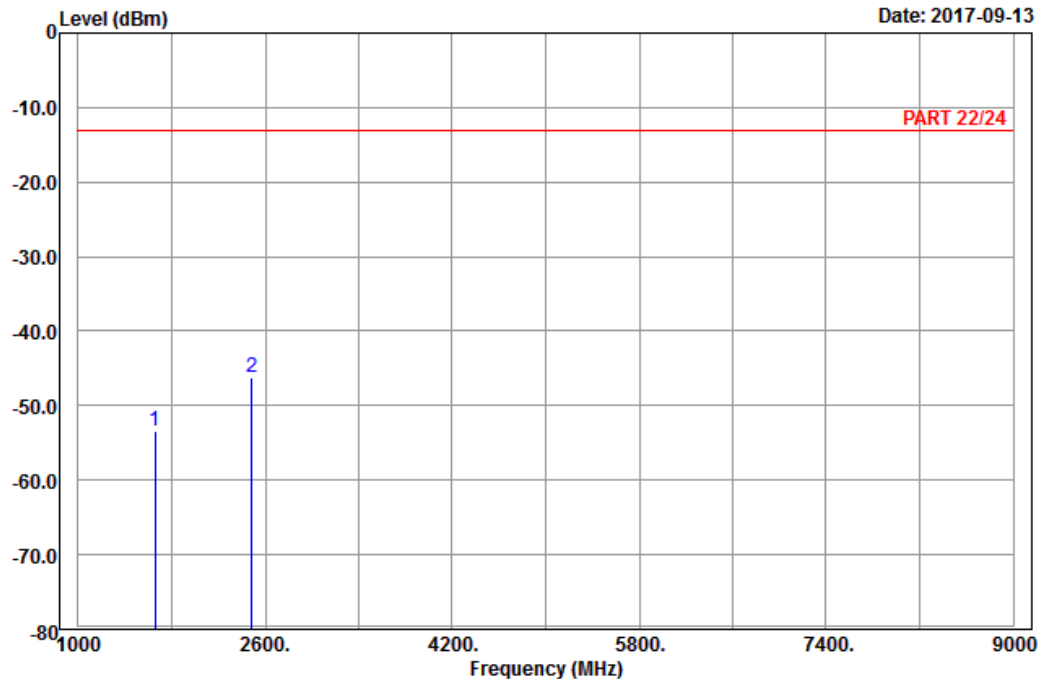


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Data: 6

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 5_Link_CH20450
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	1658.00	-53.47	-61.38	-13.00	-40.47	7.91	Peak
2 pp	2487.00	-46.28	-57.32	-13.00	-33.28	11.04	Peak

Middle Channel

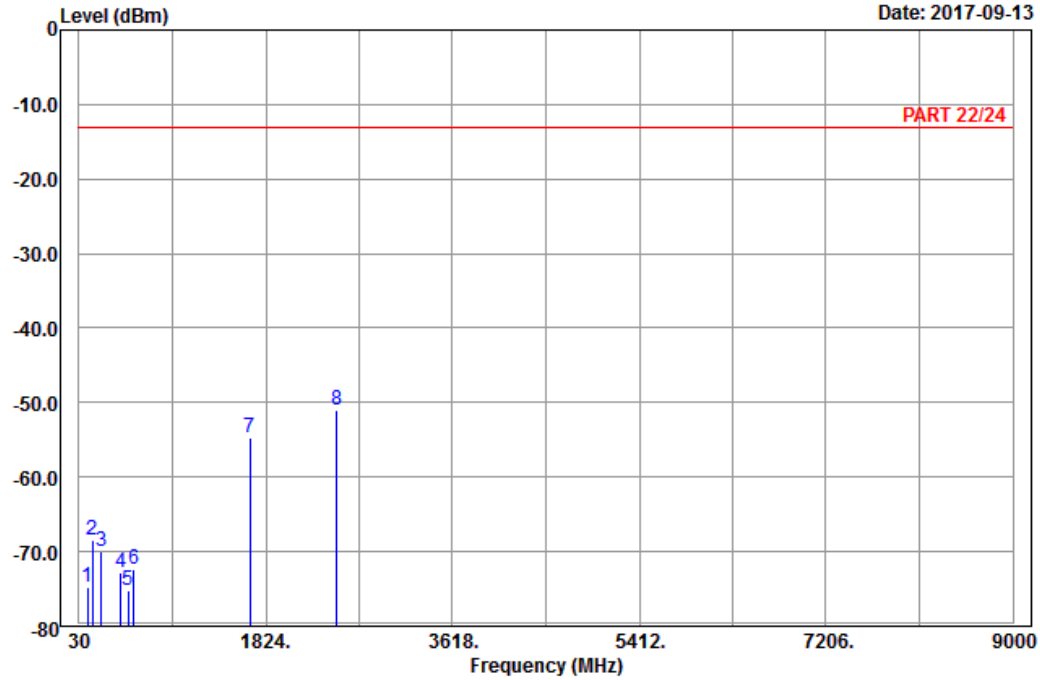


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A D T

Data: 9

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Horizontal
Remark : LTE_Band 5_Link_CH20525
Tested by: Karl Lee

		Read	Limit	Over			
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		
1	114.24	-74.85	-66.22	-13.00	-61.85	-8.63	Peak
2	159.87	-68.55	-60.88	-13.00	-55.55	-7.67	Peak
3	242.22	-70.02	-64.41	-13.00	-57.02	-5.61	Peak
4	433.00	-72.89	-69.43	-13.00	-59.89	-3.46	Peak
5	500.90	-75.29	-70.01	-13.00	-62.29	-5.28	Peak
6	559.00	-72.39	-71.09	-13.00	-59.39	-1.30	Peak
7	1673.00	-54.77	-62.68	-13.00	-41.77	7.91	Peak
8 pp	2509.50	-51.09	-62.37	-13.00	-38.09	11.28	Peak

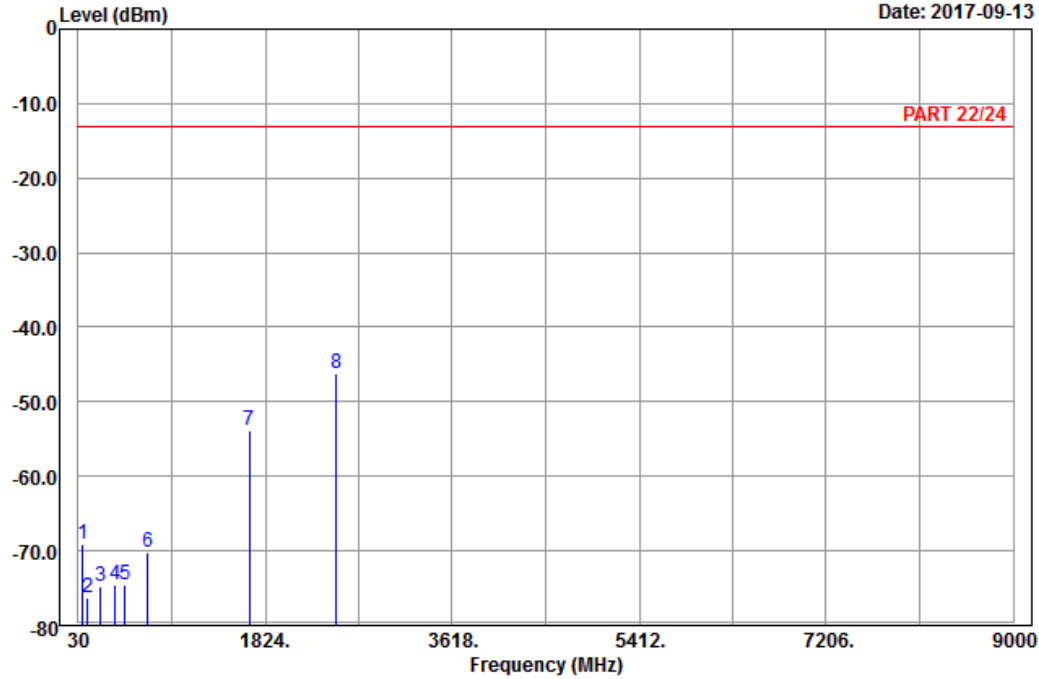


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A D T

Data: 10

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 5_Link_CH20525
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	70.23	-69.14	-56.46	-13.00	-56.14	-12.68	Peak
2	122.34	-76.29	-68.16	-13.00	-63.29	-8.13	Peak
3	247.08	-74.79	-69.24	-13.00	-61.79	-5.55	Peak
4	382.60	-74.65	-71.03	-13.00	-61.65	-3.62	Peak
5	479.20	-74.56	-69.88	-13.00	-61.56	-4.68	Peak
6	696.20	-70.28	-69.92	-13.00	-57.28	-0.36	Peak
7	1673.00	-53.94	-61.85	-13.00	-40.94	7.91	Peak
8 pp	2509.50	-46.13	-57.41	-13.00	-33.13	11.28	Peak

High Channel

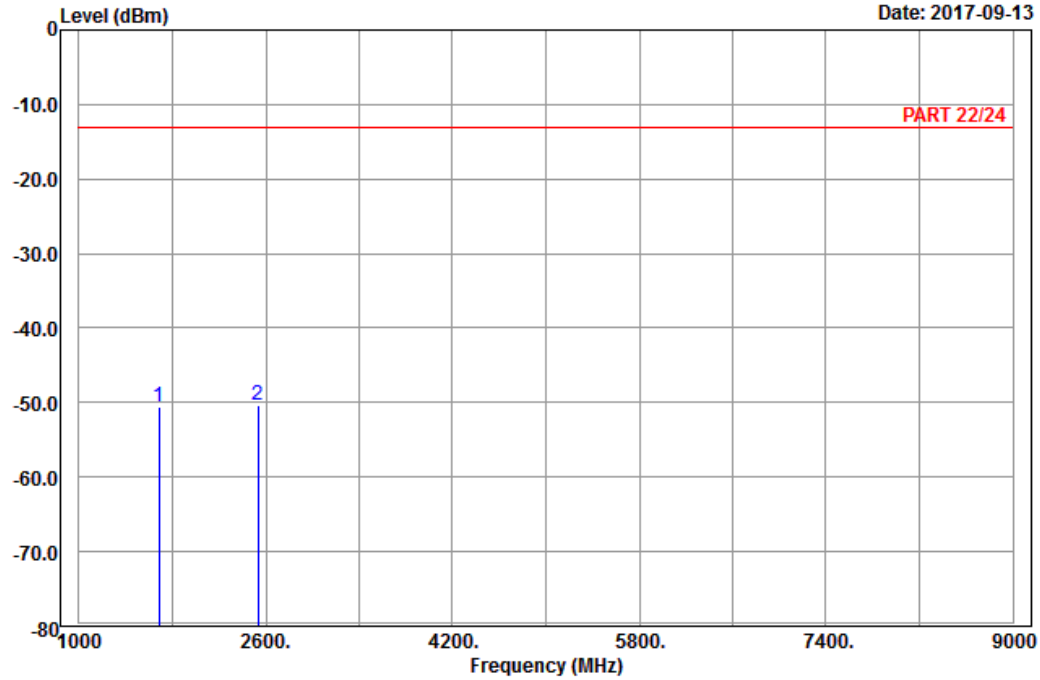


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2017-09-13



Site : 966 chamber 1
 Condition: PART 22/24 Horizontal
 Remark : LTE_Band 5_Link_CH20600
 Tested by: Karl Lee

			Read	Limit	Over		
Freq	Level	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dBm	dB	dB	
1	1688.00	-50.62	-58.64	-13.00	-37.62	8.02	Peak
2	2532.00	-50.25	-61.63	-13.00	-37.25	11.38	Peak

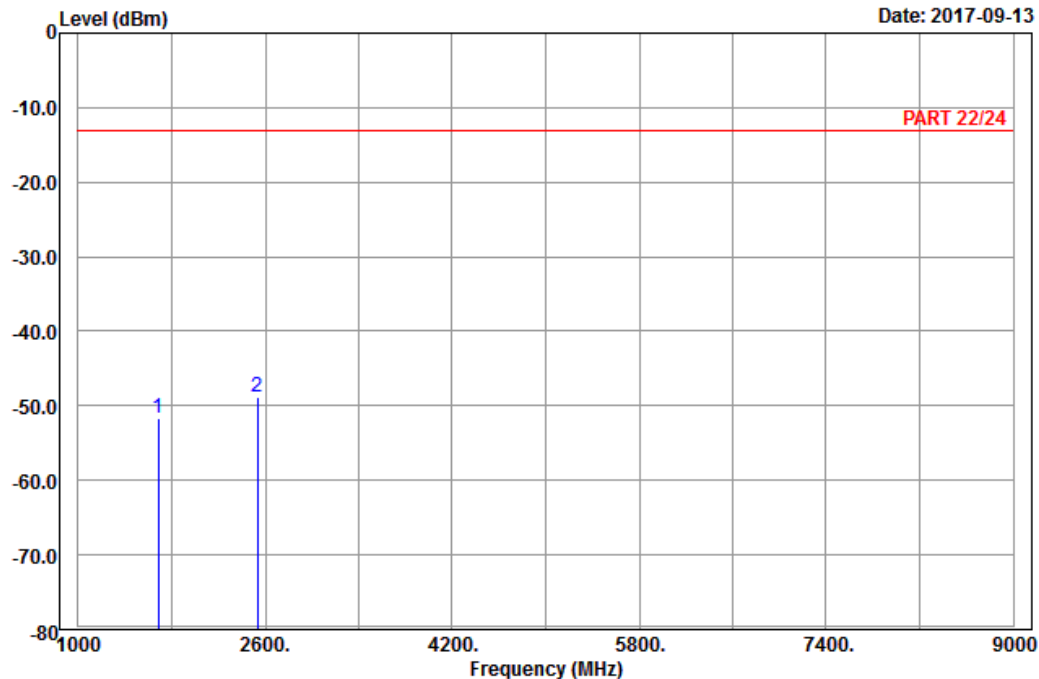


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Data: 6

Date: 2017-09-13



Site : 966 chamber 1
Condition: PART 22/24 Vertical
Remark : LTE_Band 5_Link_CH20600
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	1688.00	-51.77	-59.79	-13.00	-38.77	8.02	Peak
2 pp	2532.00	-48.87	-60.25	-13.00	-35.87	11.38	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 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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Hsin Chu EMC/RF/Telecom Lab

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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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