

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



**FCC Applicant:** Arlo Technologies Inc  
2200 Faraday Avenue, Suite 150, Carlsbad, CA 92008, USA  
**Product Name:** Go 2 LTE/Wi-Fi Security Camera  
**Brand Name:** Arlo  
**Model No.:** VML2030  
**Model Difference:** N/A  
**Report Number:** ER/2021/70071  
**FCC ID** 2APLE18300416  
**Issue Date:** Aug. 25, 2021  
**Date of Test:** Jul. 23, 2021 ~ Aug. 23, 2021  
**Date of EUT Received:** Jul. 22, 2021

Jet Lu

Approved By \_\_\_\_\_

Jet Lu

### We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT comply with FCC rule part 2, 27 C and ISSED RSS-Gen, 130, 139.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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## Revision History

Report Number	Revision	Description	Issue Date	Revised By
ER/2021/70071	Rev.00	Original.	Aug. 25, 2021	Yami Kuo

**Note:**

- 1、Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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## 1 GENERAL PRODUCT INFORMATION

### 1.1 Product Description

Product Name:	Go 2 LTE/Wi-Fi Security Camera	
Brand Name:	Arlo	
Model No.:	VML2030	
Model Difference:	N/A	
Hardware Version:	H4	
Firmware Version:	EC25V.R02.A14	
EUT Series No.:	A8KU1679A00D0	
WWAN Module:	Model No.:EC25-V Supplier:Quectel Wireless Solutions Company Limited	
Power Supply:	3.6Vdc from Rechargeable Li-polymer Battery or 5 / 9 / 12 / 15 / 20Vdc from AC/DC Adapter	
	Battery:	Model No.: A-14 Supplier: Celxpert
IMEI:	353150660000460	

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## 1.2 Operation Frequency Range

LTE Band 4			
BW (MHz)	Operation Frequency (MHz)		
1.4	1710.7	-	1754.3
3	1711.5	-	1753.5
5	1712.5	-	1752.5
10	1715.0	-	1750.0
15	1717.5	-	1747.5
20	1720.0	-	1745.0

LTE Band 13			
BW(MHz)	Operation Frequency(MHz)		
5	779.5	-	784.5
10	782.0	-	782.0

## 1.3 Antenna Designation

Antenna Type	Antenna Model No.
PIFA	Ant0
<b>Note:</b> Transmission in frequencies in this test report are only available by the above antenna(s).	

Type	Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
			Ant0
PIFA	LTE-Band 4	1710 ~ 1755	2.5
	LTE-Band 13	777 ~ 787	-0.8

**Note:** Antenna information is provided by the applicant.

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#### 1.4 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 27C.

ISED RSS-130 Issue 2 Feb. 2019,

ISED RSS-139 Issue 3 July 16, 2015

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB412172 D01 Determining ERP and EIRP v01r01

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## 1.5 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
		Conducted G		

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

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## 1.6 Special Accessories

No special accessories were used during testing.

## 1.7 Equipment Modifications

There was no modifications incorporated into the EUT.

## 1.8 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

#### 2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	3.83	10	13.83
High Band (Above 1 GHz)	4.01	10	14.01

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**2.5 Final Amplifier Voltage and Current Information:**

Test Mode	DC voltage (V)	DC current (mA)
LTE Band 4	3.6	13000
LTE Band 13		13000

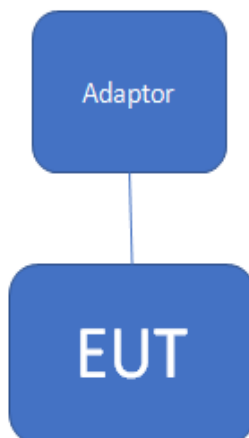
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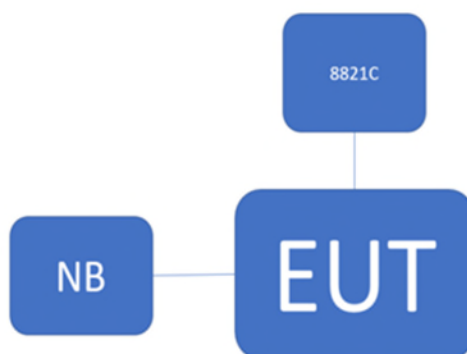
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## 2.6 Test Configuration

### 2.6.1 Radiated Emission



### Conducted \_ 4G



### 2.6.2 Equipment used for test

Equipment	Mfr/Brand	Model/Type No.	Series No.
Tera Term	N/A	N/A	4.105.0.0
Adapter	arlo	AD2151320	N/A
Notebook	Lenovo	L480	PF-1S9NT5
Radio Communication Analyzer	Anritsu	MT8821C	6261786084

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	RSS-GEN §6.12	RF Power Output	Compliant
§27.50(b)(10) §27.50(d)(4)	RSS-130 §4.6 RSS-139 §6.5	ERP/ EIRP measurement	N/A
§2.1049(h)	RSS-GEN §6.7	99% & 26dB Occupied Bandwidth	N/A
§2.1051 §27.50(c)(5) §27.53(h)	RSS-GEN §6.13 RSS-130 §4.6 RSS-139 §6.5	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	N/A
§2.1053§27.53(c) (2),(4) §27.53(f) §27.53(h)	RSS-GEN §6.13 RSS-130 §4.6 RSS-139 §6.5	Field Strength of Spurious Radiation	Compliant
§27.50(a)(1)(B)	RSS-130 §4.6 RSS-139 §6.5	Peak to Average Ratio	N/A
§2.1055(a)(1)	RSS-130 §4.6 RSS-139 §6.5	Frequency Stability	N/A

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## 4 DESCRIPTION OF TEST MODES

### 4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

BAND	H PLANE	E1 PLANE	E2 PLANE
LTE Band 4	V		
LTE Band 13	V		

### 4.2 Measurement Configuration

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full
Max. Output Power	4	v	v	v	v	v	v	v	v	v	v	v			v	v	v
	13	v	v	v	-	-	v	v	-	-	v	v			v	v	v

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full
Radiated Emission	4	v	v	v						v	v				v		
	13	v	v	v	-	-		v	-	-	v				v		

Observations upon RB combinations were done for radiated emissions to determine the worst case scenario with combinations generate higher emissions which recorded in this report.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1 dB
ERP/ EIRP measurement	+/- 3 dB
	+/- 3 dB
Emission Bandwidth	+/- 1.53 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 1.69 dB
Peak to Average Ratio	+/- 1 dB
Frequency Stability vs. Temperature	+/- 1.53 Hz
Frequency Stability vs. Voltage	+/- 1.53 Hz
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty			
Polarization: Vertical	+/- 2.64 dB	9kHz~30MHz	
	+/- 4.93 dB	30MHz - 1000MHz	
	+/- 4.81 dB	1GHz - 18GHz	
	+/- 4.52 dB	18GHz - 40GHz	
Polarization: Horizontal	+/- 2.64 dB	9kHz~30MHz	
	+/- 4.45 dB	30MHz - 1000MHz	
	+/- 4.81 dB	1GHz - 18GHz	
	+/- 4.52 dB	18GHz - 40GHz	

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

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## 6 MAXMUM OUTPUT POWER

### 6.1 Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

#### 6.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

##### FCC 27.50 (b)

(9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 30 watts ERP.

##### FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

##### RSS-130 §4.6

The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment operating in 698-756 and 777-787 MHz.

##### RSS-139 §6.5

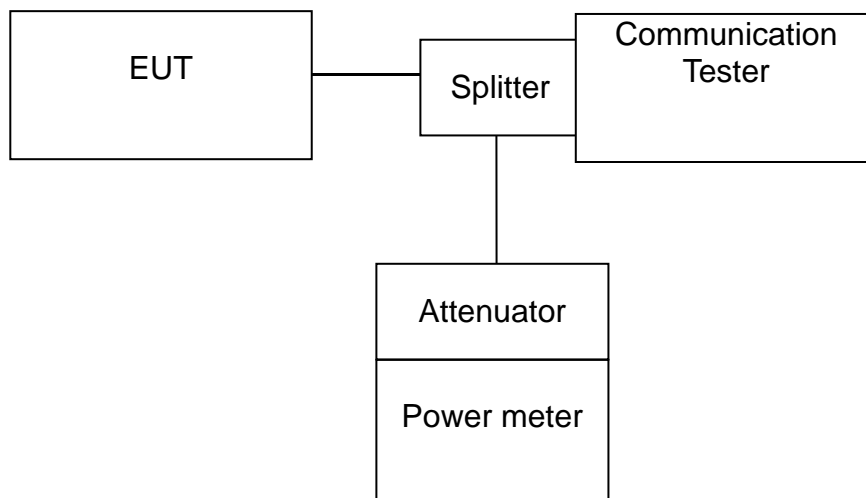
The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters in the Bands 1710-1780MHz shall not exceed one watt.

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## 6.2 Test Set-up



**Note:** Measurement setup for testing on Antenna connector

## 6.3 Output Power Measurement Applicable Guidance

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.

All LTE bands conducted average power is obtained from the simulator telecommunication test set.

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## 6.4 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$$EIRP = P_T + G_T - L_C,$$

$$ERP = EIRP - 2.15,$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as  $P_T$ , typically dBW, dBm, or power spectral density (PSD)<sup>2</sup>), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);

$P_T$  = transmitter output power, expressed in dBW, dBm, or PSD;

$G_T$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

## 6.5 Measurement Equipment Used

Conducted Emission Test Site: Conducted 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Radio Communication Analyser	Anritsu	MT8815B	6200711454	04/07/2021	04/06/2022
Radio Communication Analyser	Anritsu	MT8821C	6261786084	01/20/2021	01/19/2022
Attenuator	Mini-Circuit	BW-S10W2+	4	12/16/2020	12/15/2021
Notebook	Lenovo	L480	PF-1S9NT5	N/A	N/A
1M USB	Baoyuanda	B015W003	N/A	N/A	N/A

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## 6.6 Measurement Results:

Antenna gain (dBi)		2.5							
LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	19957	1710.7	QPSK	1	0	22.15	24.65	30	-5.35
				1	5	22.76	25.26	30	-4.74
				3	2	23.00	25.50	30	-4.5
				6	0	21.86	24.36	30	-5.64
	20175	1732.5	QPSK	1	0	22.85	25.35	30	-4.65
				1	5	22.62	25.12	30	-4.88
				3	2	21.70	24.20	30	-5.8
				6	0	21.90	24.40	30	-5.6
	20393	1754.3	QPSK	1	0	22.45	24.95	30	-5.05
				1	5	21.91	24.41	30	-5.59
				3	2	21.99	24.49	30	-5.51
				6	0	22.47	24.97	30	-5.03
1.4	19957	1710.7	16QAM	1	0	21.62	24.12	30	-5.88
				1	5	21.89	24.39	30	-5.61
				3	2	21.87	24.37	30	-5.63
				6	0	20.87	23.37	30	-6.63
	20175	1732.5	16QAM	1	0	22.06	24.56	30	-5.44
				1	5	21.89	24.39	30	-5.61
				3	2	21.82	24.32	30	-5.68
				6	0	20.91	23.41	30	-6.59
	20393	1754.3	16QAM	1	0	21.35	23.85	30	-6.15
				1	5	21.15	23.65	30	-6.35
				3	2	21.67	24.17	30	-5.83
				6	0	20.22	22.72	30	-7.28

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Antenna gain (dBi)		2.5							
LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	19965	1711.5	QPSK	1	0	22.63	25.13	30	-4.87
				1	14	23.05	25.55	30	-4.45
				8	4	22.01	24.51	30	-5.49
				15	0	21.98	24.48	30	-5.52
	20175	1732.5	QPSK	1	0	22.24	24.74	30	-5.26
				1	14	21.73	24.23	30	-5.77
				8	4	21.92	24.42	30	-5.58
				15	0	21.94	24.44	30	-5.56
	20385	1753.5	QPSK	1	0	21.70	24.20	30	-5.8
				1	14	22.82	25.32	30	-4.68
				8	4	21.91	24.41	30	-5.59
				15	0	21.93	24.43	30	-5.57
3	19965	1711.5	16QAM	1	0	21.89	24.39	30	-5.61
				1	14	21.93	24.43	30	-5.57
				8	4	21.04	23.54	30	-6.46
				15	0	20.91	23.41	30	-6.59
	20175	1732.5	16QAM	1	0	21.65	24.15	30	-5.85
				1	14	21.56	24.06	30	-5.94
				8	4	20.90	23.40	30	-6.6
				15	0	20.96	23.46	30	-6.54
	20385	1753.5	16QAM	1	0	21.49	23.99	30	-6.01
				1	14	21.44	23.94	30	-6.06
				8	4	20.96	23.46	30	-6.54
				15	0	21.06	23.56	30	-6.44

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Antenna gain (dBi)		2.5							
LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	19975	1712.5	QPSK	1	0	22.14	24.64	30	-5.36
				1	24	21.95	24.45	30	-5.55
				12	6	21.80	24.30	30	-5.7
				25	0	21.91	24.41	30	-5.59
	20175	1732.5	QPSK	1	0	21.79	24.29	30	-5.71
				1	24	21.78	24.28	30	-5.72
				12	6	22.04	24.54	30	-5.46
				25	0	22.04	24.54	30	-5.46
	20375	1752.5	QPSK	1	0	22.78	25.28	30	-4.72
				1	24	21.89	24.39	30	-5.61
				12	6	21.78	24.28	30	-5.72
				25	0	21.71	24.21	30	-5.79
5	19975	1712.5	16QAM	1	0	21.87	24.37	30	-5.63
				1	24	21.73	24.23	30	-5.77
				12	6	20.87	23.37	30	-6.63
				25	0	21.01	23.51	30	-6.49
	20175	1732.5	16QAM	1	0	21.95	24.45	30	-5.55
				1	24	21.75	24.25	30	-5.75
				12	6	20.99	23.49	30	-6.51
				25	0	21.00	23.50	30	-6.5
	20375	1752.5	16QAM	1	0	21.50	24.00	30	-6
				1	24	21.80	24.30	30	-5.7
				12	6	20.64	23.14	30	-6.86
				25	0	20.90	23.40	30	-6.6

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BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	20000	1715	QPSK	1	0	22.64	25.14	30	-4.86
				1	49	22.51	25.01	30	-4.99
				25	12	21.97	24.47	30	-5.53
				50	0	22.13	24.63	30	-5.37
	20175	1732.5	QPSK	1	0	22.87	25.37	30	-4.63
				1	49	22.77	25.27	30	-4.73
				25	12	21.92	24.42	30	-5.58
				50	0	21.88	24.38	30	-5.62
	20350	1750	QPSK	1	0	22.88	25.38	30	-4.62
				1	49	22.61	25.11	30	-4.89
				25	12	21.82	24.32	30	-5.68
				50	0	21.95	24.45	30	-5.55
10	20000	1715	16QAM	1	0	21.99	24.49	30	-5.51
				1	49	21.68	24.18	30	-5.82
				25	12	20.99	23.49	30	-6.51
				50	0	20.94	23.44	30	-6.56
	20175	1732.5	16QAM	1	0	21.74	24.24	30	-5.76
				1	49	21.83	24.33	30	-5.67
				25	12	20.98	23.48	30	-6.52
				50	0	20.96	23.46	30	-6.54
	20350	1750	16QAM	1	0	21.61	24.11	30	-5.89
				1	49	21.75	24.25	30	-5.75
				25	12	20.77	23.27	30	-6.73
				50	0	20.97	23.47	30	-6.53

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BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	20025	1717.5	QPSK	1	0	23.05	25.55	30	-4.45
				1	74	22.08	24.58	30	-5.42
				36	18	22.17	24.67	30	-5.33
				75	0	21.80	24.30	30	-5.7
	20175	1732.5	QPSK	1	0	22.97	25.47	30	-4.53
				1	74	22.27	24.77	30	-5.23
				36	18	22.06	24.56	30	-5.44
				75	0	21.73	24.23	30	-5.77
	20325	1747.5	QPSK	1	0	22.79	25.29	30	-4.71
				1	74	22.84	25.34	30	-4.66
				36	18	21.86	24.36	30	-5.64
				75	0	21.85	24.35	30	-5.65
15	20025	1717.5	16QAM	1	0	22.06	24.56	30	-5.44
				1	74	21.73	24.23	30	-5.77
				36	18	21.20	23.70	30	-6.3
				75	0	21.24	23.74	30	-6.26
	20175	1732.5	16QAM	1	0	21.91	24.41	30	-5.59
				1	74	21.75	24.25	30	-5.75
				36	18	20.97	23.47	30	-6.53
				75	0	21.01	23.51	30	-6.49
	20325	1747.5	16QAM	1	0	22.11	24.61	30	-5.39
				1	74	21.97	24.47	30	-5.53
				36	18	20.92	23.42	30	-6.58
				75	0	20.97	23.47	30	-6.53

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LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	20050	1720	QPSK	1	0	22.99	25.49	30	-4.51
				1	99	22.85	25.35	30	-4.65
				50	25	21.94	24.44	30	-5.56
				100	0	22.13	24.63	30	-5.37
	20175	1732.5	QPSK	1	0	22.97	25.47	30	-4.53
				1	99	22.80	25.30	30	-4.7
				50	25	21.87	24.37	30	-5.63
				100	0	21.91	24.41	30	-5.59
	20300	1745	QPSK	1	0	22.25	24.75	30	-5.25
				1	99	23.16	25.66	30	-4.34
				50	25	21.93	24.43	30	-5.57
				100	0	21.93	24.43	30	-5.57
20	20050	1720	16QAM	1	0	21.86	24.36	30	-5.64
				1	99	21.71	24.21	30	-5.79
				50	25	20.89	23.39	30	-6.61
				100	0	21.10	23.60	30	-6.4
	20175	1732.5	16QAM	1	0	22.05	24.55	30	-5.45
				1	99	21.64	24.14	30	-5.86
				50	25	20.86	23.36	30	-6.64
				100	0	20.88	23.38	30	-6.62
	20300	1745	16QAM	1	0	22.24	24.74	30	-5.26
				1	99	21.96	24.46	30	-5.54
				50	25	20.61	23.11	30	-6.89
				100	0	20.88	23.38	30	-6.62

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Antenna gain (dBi)		-0.8								
LTE Band 13_Uplink frequency band : 777 to 787 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	23205	779.5	QPSK	1	0	22.32	19.37	21.52	44.77	-25.40
				1	24	22.34	19.39	21.54	44.77	-25.38
				12	6	22.16	19.21	21.36	44.77	-25.56
				25	0	22.13	19.18	21.33	44.77	-25.59
	23230	782	QPSK	1	0	22.94	19.99	22.14	44.77	-24.78
				1	24	22.27	19.32	21.47	44.77	-25.45
				12	6	22.09	19.14	21.29	44.77	-25.63
				25	0	22.20	19.25	21.40	44.77	-25.52
	23255	784.5	QPSK	1	0	22.77	19.82	21.97	44.77	-24.95
				1	24	22.89	19.94	22.09	44.77	-24.83
				12	6	21.88	18.93	21.08	44.77	-25.84
				25	0	21.89	18.94	21.09	44.77	-25.83
5	23205	779.5	16QAM	1	0	22.11	19.16	21.31	44.77	-25.61
				1	24	21.75	18.80	20.95	44.77	-25.97
				12	6	21.20	18.25	20.40	44.77	-26.52
				25	0	21.05	18.10	20.25	44.77	-26.67
	23230	782	16QAM	1	0	21.87	18.92	21.07	44.77	-25.85
				1	24	21.76	18.81	20.96	44.77	-25.96
				12	6	20.99	18.04	20.19	44.77	-26.73
				25	0	21.05	18.10	20.25	44.77	-26.67
	23255	784.5	16QAM	1	0	21.58	18.63	20.78	44.77	-26.14
				1	24	21.78	18.83	20.98	44.77	-25.94
				12	6	20.88	17.93	20.08	44.77	-26.84
				25	0	21.12	18.17	20.32	44.77	-26.60

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Antenna gain (dBi)		-0.8								
LTE Band 13_Uplink frequency band : 777 to 787 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	23230	782	QPSK	1	0	23.17	20.22	22.37	44.77	-24.55
				1	49	22.06	19.11	21.26	44.77	-25.66
				25	12	22.14	19.19	21.34	44.77	-25.58
				50	0	22.16	19.21	21.36	44.77	-25.56
10	23230	782	16QAM	1	0	22.16	19.21	21.36	44.77	-25.56
				1	49	22.15	19.20	21.35	44.77	-25.57
				25	12	21	18.05	20.20	44.77	-26.72
				50	0	21.13	18.18	20.33	44.77	-26.59

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## 7 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### 7.1 Standard Applicable

According to FCC §2.1053,

**FCC §27.53(h)**

**RSS-130 §4.7, RSS-139 §6.6**

Out of band emissions. 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.

#### **RSS-130 §4.7.1**

Compliance for operations in the 617-652 MHz, 663-698 MHz, 698-756 MHz and the 777-787 MHz band, the unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

#### **RSS-130 §4.7.2**

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:

$76 + 10 \log_{10} p$  (watts), dB, for base and fixed equipment and

$65 + 10 \log_{10} p$  (watts), dB, for mobile and portable equipment

the e.i.r.p. in the band 1559-1610 MHz shall not exceed  $-70$  dBW/MHz for wideband signal and  $-80$  dBW for discrete emission with bandwidth less than 700 Hz.

#### **FCC §27.53(h)(1)**

(h) *AWS emission limits*—(1) *General protection levels*. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### **RSS-139 §6.6**

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

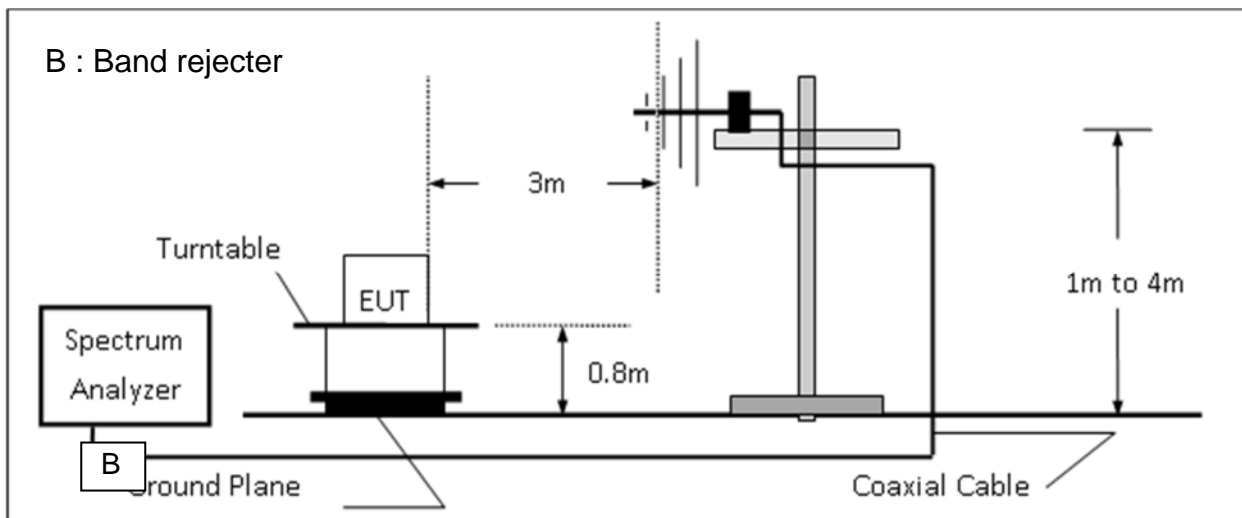
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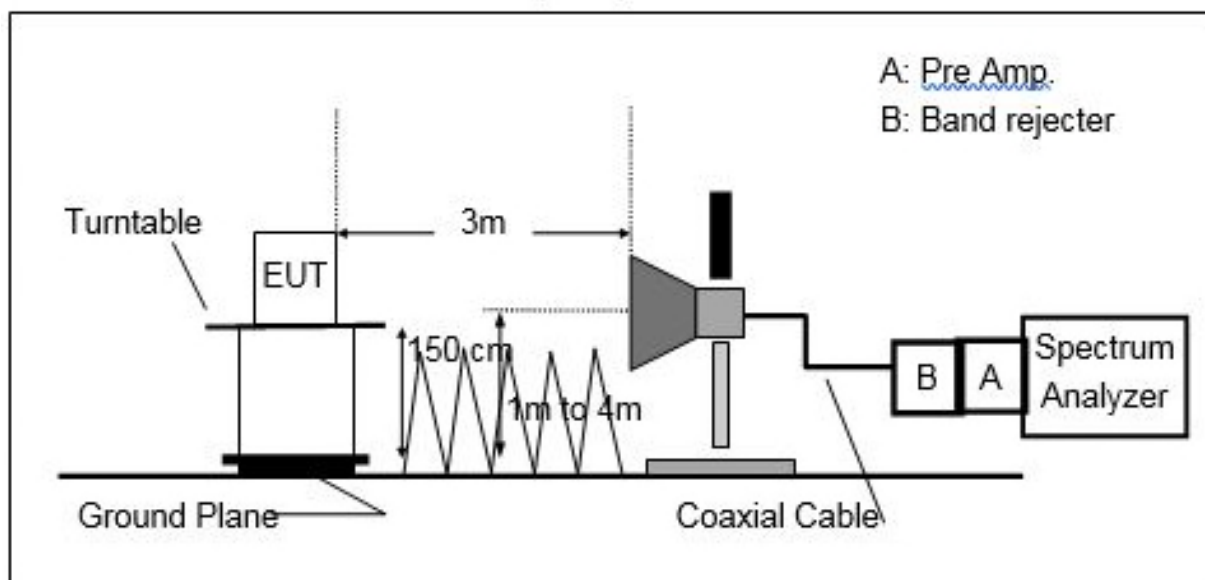
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## 7.2 EUT Setup

### Radiated Emission Test Set-Up, Frequency Below 1000MHz



### Radiated Emission Test Set-UP Frequency Over 1 GHz



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### 7.3 Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

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#### 7.4 Measurement Equipment Used:

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	443	01/19/2021	01/18/2022
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	10/16/2020	10/15/2021
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/11/2020	12/10/2021
Bi-log Antenna	SCHWARZBECK	VULB9168	300	11/18/2020	11/17/2021
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/18/2021	05/17/2022
Horn Antenna	SCHWARZBECK	BBHA9170	185	08/02/2021	08/01/2022
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/27/2021	04/26/2022
Signal Generator	Agilent	N5183A	MY50140591	12/27/2020	12/26/2021
Pre-Amplifier	HP	8449B	3008A00578	12/16/2020	12/15/2021
Pre-Amplifier	HP	8447D	2944A07676	12/16/2020	12/15/2021
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2020	10/26/2021
Filter 635-920	Micro-Tronics	WI	4	12/16/2020	12/15/2021
Filter 1700-2000	Micro-Tronics	EWT	M3	12/16/2020	12/15/2021
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	12/16/2020	12/15/2021
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2636/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104	340057/4	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104PEA	800052/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2621/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2617/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 104	160125	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 106	76096/6	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2630/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY22962/2	12/16/2020	12/15/2021
Coaxial Cable	Huber Suhner	SUCOFLEX 102	SN 520430/2	12/16/2020	12/15/2021
Radio Communication Analyser	Anritsu	MT8821C	6261786084	01/20/2021	01/19/2022
Site Cal	SGS	SAC 3	N/A	01/01/2021	12/31/2021
Test Software	audix	e3	Ver. 6.11812c	N.C.R	N.C.R
Adapter	arlo	AD2151320	N/A	N/A	N/A

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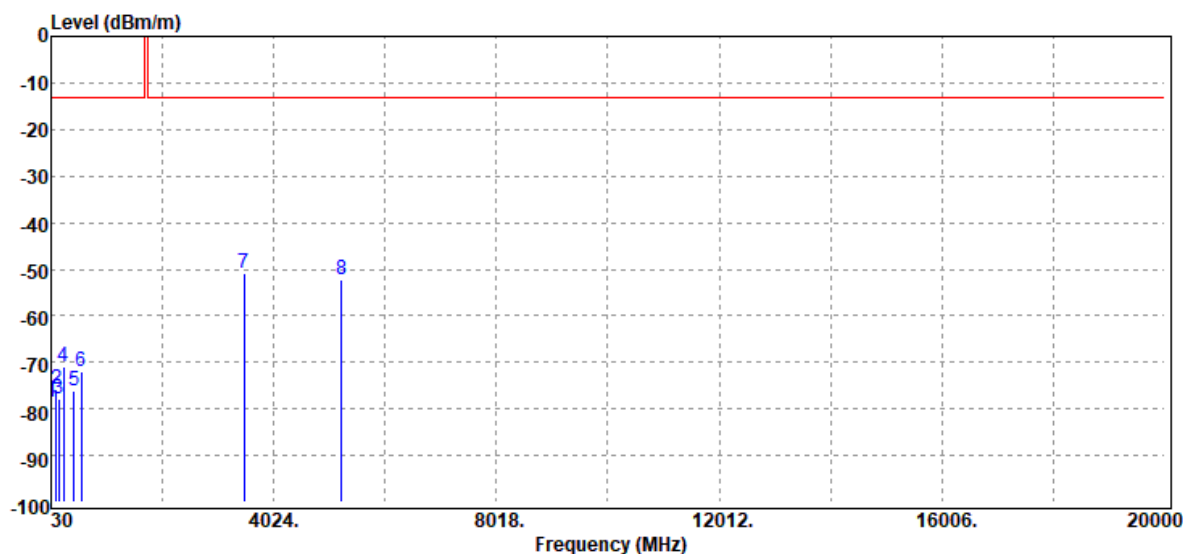
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## 7.5 Measurement Result:

Report Number :ER-2021-70071  
Operation Mode :LTE B4  
Test Mode :Tx CH High  
EUT Pol :H Plane  
Test Frequency :1745 MHz

Test Site :SAC 3  
Test Date :2021-08-12  
Temp./Humi. :27.4/51  
Antenna Pol. :VERTICAL  
Engineer :Nick Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
39.70	-78.69	-64.53	-13.48	-0.68	-13.00	-65.69
124.09	-75.64	-72.64	-1.85	-1.15	-13.00	-62.64
168.71	-77.75	-76.08	-0.41	-1.26	-13.00	-64.75
255.04	-70.84	-73.53	4.31	-1.62	-13.00	-57.84
439.34	-76.22	-78.06	4.04	-2.20	-13.00	-63.22
575.14	-72.02	-73.33	3.97	-2.66	-13.00	-59.02
3490.00	-50.85	-57.01	12.42	-6.26	-13.00	-37.85
5235.00	-52.35	-57.04	12.68	-7.99	-13.00	-39.35

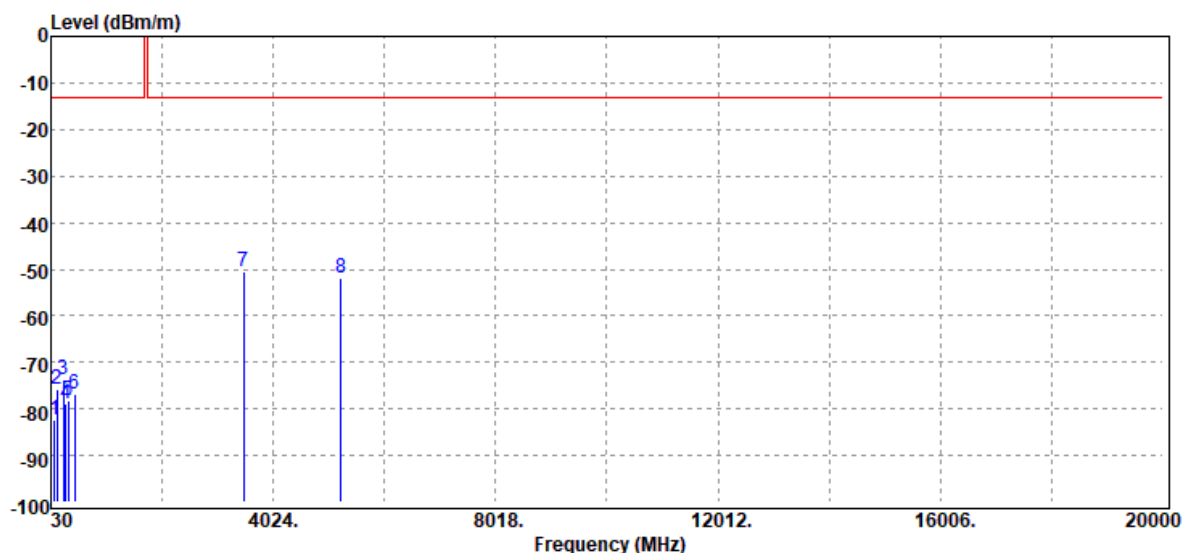
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Report Number :ER-2021-70071  
 Operation Mode :LTE B4  
 Test Mode :Tx CH High  
 EUT Pol :H Plane  
 Test Frequency :1745 MHz

Test Site :SAC 3  
 Test Date :2021-08-12  
 Temp./Humi. :27.4/51  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
99.84	-82.21	-80.41	-0.79	-1.01	-13.00	-69.21
141.55	-75.94	-72.74	-1.91	-1.29	-13.00	-62.94
255.04	-73.65	-76.34	4.31	-1.62	-13.00	-60.65
296.75	-78.93	-81.29	4.13	-1.77	-13.00	-65.93
347.19	-78.18	-80.68	4.49	-1.99	-13.00	-65.18
451.95	-76.91	-78.83	4.14	-2.22	-13.00	-63.91
3490.00	-50.41	-56.57	12.42	-6.26	-13.00	-37.41
5235.00	-51.84	-56.53	12.68	-7.99	-13.00	-38.84

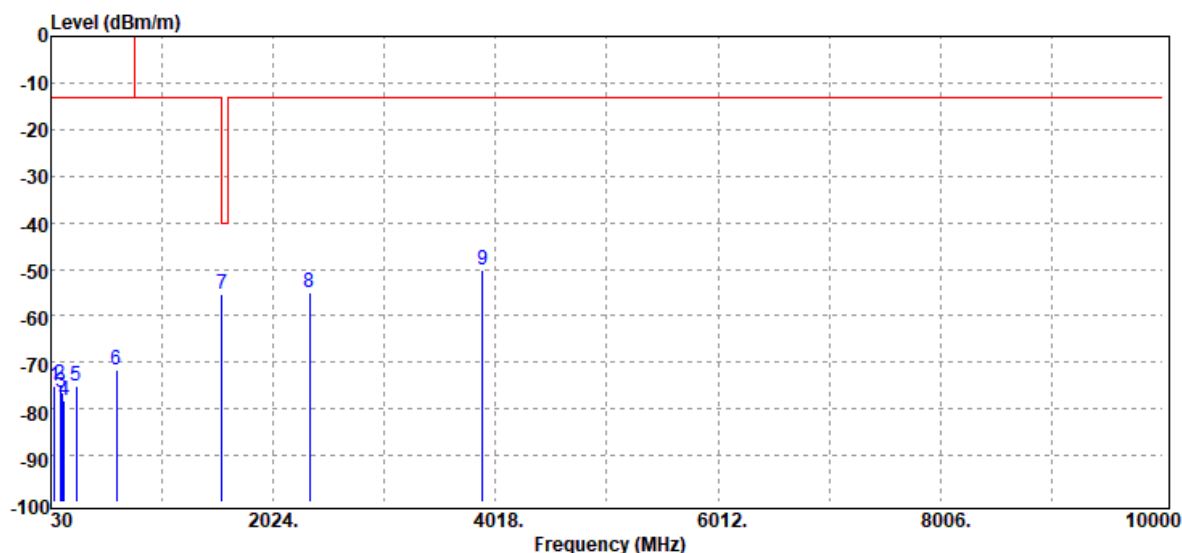
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Report Number :ER-2021-70071  
 Operation Mode :LTE B13  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane  
 Test Frequency :782 MHz

Test Site :SAC 3  
 Test Date :2021-08-12  
 Temp./Humi. :27.4/51  
 Antenna Pol. :VERTICAL  
 Engineer :Nick Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
62.01	-75.11	-65.48	-8.87	-0.76	-13.00	-62.11
109.54	-74.91	-72.32	-1.54	-1.05	-13.00	-61.91
124.09	-76.60	-73.60	-1.85	-1.15	-13.00	-63.60
148.34	-78.05	-75.12	-1.76	-1.17	-13.00	-65.05
257.95	-74.96	-77.68	4.35	-1.63	-13.00	-61.96
614.91	-71.69	-72.75	3.46	-2.40	-13.00	-58.69
1564.00	-55.21	-60.29	9.18	-4.10	-40.00	-15.21
2346.00	-54.89	-59.46	9.58	-5.01	-13.00	-41.89
3900.00	-50.12	-55.12	12.40	-7.40	-13.00	-37.12

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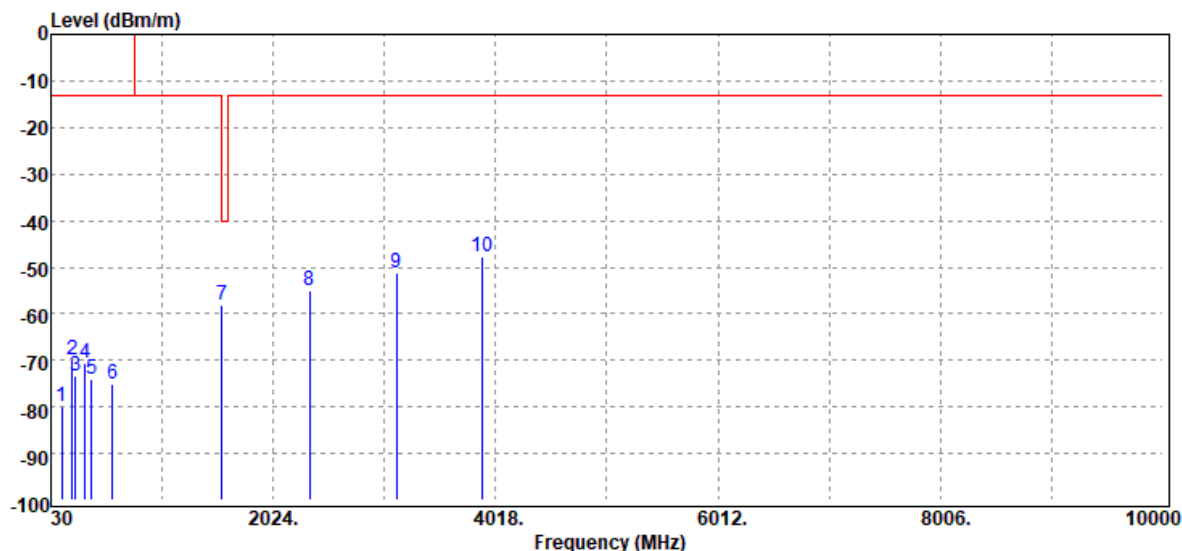
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Report Number :ER-2021-70071  
 Operation Mode :LTE B13  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane  
 Test Frequency :782 MHz

Test Site :SAC 3  
 Test Date :2021-08-12  
 Temp./Humi. :27.4/51  
 Antenna Pol. :HORIZONTAL  
 Engineer :Nick Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
127.97	-79.87	-76.83	-1.88	-1.16	-13.00	-66.87
222.06	-69.84	-73.37	5.03	-1.50	-13.00	-56.84
253.10	-73.51	-76.23	4.32	-1.60	-13.00	-60.51
338.46	-70.50	-72.91	4.30	-1.89	-13.00	-57.50
396.66	-74.06	-76.28	4.32	-2.10	-13.00	-61.06
580.96	-75.02	-76.23	3.92	-2.71	-13.00	-62.02
1564.00	-57.97	-63.05	9.18	-4.10	-40.00	-17.97
2346.00	-54.86	-59.43	9.58	-5.01	-13.00	-41.86
3128.00	-51.38	-57.43	11.34	-5.29	-13.00	-38.38
3900.00	-47.61	-52.61	12.40	-7.40	-13.00	-34.61

~ End of Report ~

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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