Regulatory WWAN Antenna Information

Platform information				
Brand	**ODM**	**Platform model name**	**Platform type (ex: regular NB, convertible PC, AIO…etc)**	**˙SAR minimum separation (mm)**
HP Inc.	Inventec	HSN-I45C-4	Notebook PC	19.85 mm

Antenna information					Maximum Peak gain
Vendor	**Type**	**Antenna Part number (Ant5 TX/RX)**	**Antenna Part number (Ant6 RX)**	**Antenna Part number (Ant7 RX)**	**Antenna Part number (Ant8 TX/RX)**	**1850MHz**
HONG-BO	PIFA	6036B0308701 (00-3302700250)	6036B0308601 (00-3302700350)	6036B0309801 (00-2602749450)	6036B0310001 (00-2602749550)	1.75 dBi

Module information	
Model	**Form factor and suffixes (NGW/ HMW AND AN/ NB/ BN….)**
Kavalan 4	Fibocom FM350-GL WWAN 4x4 5G NR radio module

Antenna vendor connect person	
Antenna Vendor	HONGBO Wireless Communication Technology Co., LTD
contact person	Mirabelle Chou
E-mail	mirabellechou@hong-bo.com.tw
Tel/Mobile	02-2792-6009 EXT: 683
Web address	https://www.hong-lin.com.cn/index.php

Antenna Sample / Antenna Data
Requirements for worldwide regulatory approval

Section	Description of Required OEM / ODM Antenna Information	US / IC	EU	Japan	Taiwan	S.Korea
1A	Part Number for Antenna Assembly	Required	Required	Required	Required	Required
1B	Antenna Manufacturer Name	Required	Required	Required	Required	Required
1C	Description of Antenna Type	Required	N/A	N/A	N/A	N/A
1D	Tx antenna Gain (Peak Gain W/ cable loss) *	Required	Required	Required	Required	Required
2	Dimensioned Photographs and Drawings of Tx and Rx antennas	Required	Required	Required	Required	Required
3	Radiation patterns of antennas loaded in the host platform.	N/A	Required	Required	Required	N/A
4	Platform model name / number - correlated to antenna manufacturer and antenna part number	Required	Required	Desired	Required	Desired
5	Photograph(s) or Drawings showing location of antennas in platform. (S. Korea requires photographs of antennas for approval submission). Taiwan requires pictures of each antenna type shown in the system.	Required	Required	Desired	Required (Photos)	Required (Photos)
6	Mech. drawings / photos with dimensions of antenna locations and distance from end-user (For evaluation of SAR testing requirement).	Required	N/A	N/A	N/A	N/A
7	Photograph(s) or Drawings showing the location of all antennas (WLAN, other) and distance between those transmitting antennas. Information will be used to evaluate whether co-location testing is required.	Required	N/A	N/A	N/A	N/A
8	Local representative contact information for LMA/ PARS process.	Required	N/A	N/A	N/A	N/A

Test location: 1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road Neihu District, Taipei City 11493, Taiwan

Testing date: 2022/12/20

Equipment list

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
Network analyzer	Agilent	E5071C	2022/01/07	2023/01/06
Measurement software	ETS-Lindgren	EMQuest	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2115	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2110	N/A	N/A
MAPSTM controller	ETS-Lindgren	EMCO 2090	N/A	N/A
Horn antenna	ETS-Lindgren	3164-10	2022/03/03	2023/03/03
ETS OTA Chamber	ETS-Lindgren	AMS-8500	2022/03/03	2023/03/03
Cable	ETS-Lindgren	RFC SMS-100-NMR Series	N/A	N/A

Note: Chamber calibration included full set of implement

Antenna Information
Section 1. Antenna Assembly Specifications

| Communication System	Band	Frequency(MHz) from low to high spectrum		1A Part Number for Antenna Assembly	1B Antenna Manufacturer Name	1C Description of Antenna Type	1D Tx Antenna Gain (dBi) Ant5
WCDMA/ LTE/5G NR FR1	1	1920	1980	Ant5 : 036B0308701	00-3302700250	PIFA	1.04
WCDMA/ LTE/5G NR FR1	2	1850	1910				1.58
LTE/5G NR FR1	3	1710	1785				0.99
WCDMA/ LTE	4	1710	1755				-0.82
WCDMA/ LTE/5G NR FR1	5	824	849				-3.82
LTE/5G NR FR1	7	2500	2570				1.03
WCDMA/ LTE/5G NR FR1	8	880	915				-3.49
LTE	12	699	716				-2.61
LTE	13	777	787				-1.3
LTE	14	788	798				-1.84
LTE	17	704	716				-2.61
LTE	18	815	830				-3.37
LTE	19	830	845				-3.75
LTE/5G NR FR1	20	832	862				-3.73
LTE/5G NR FR1	25	1850	1915				1.75
LTE	26	814	849				-3.37
LTE/5G NR FR1	28	703	748				-1.8
LTE/5G NR FR1	30	2305	2315				-0.38
LTE	34	2010	2025				0.43
LTE/5G NR FR1	38	2570	2620				1.26
LTE	39	1880	1920				1.58
LTE/5G NR FR1	40	2300	2400				0.17
LTE/5G NR FR1	41	2496	2690				1.26
LTE	42	3400	3600				0.86
LTE	43	3600	3800				0.86
LTE/5G NR FR1	66	1710	1780				0.83
LTE/5G NR FR1	71	663	698				-3.12
5G NR FR1	77	3300	4200				0.86
5G NR FR1	78	3300	3800				0.86
5G NR FR1	79	4400	5000				-2.96

Communication System	Band	Frequency(MHz) from low to high spectrum		1A Part Number for Antenna Assembly	1B Antenna Manufacturer Name	1C Description of Antenna Type	1D Tx Antenna Gain (dBi) Ant8
5G NR FR1	1	1920	1980	Ant8 :6036B03100001	00-2602749550	PIFA	-3.76
LTE/5G NR FR1	2	1850	1910				-2.53
5G NR FR1	3	1710	1785				-1.92
LTE	4	1710	1755				-1.92
5G NR FR1	5	824	849				-2.33
LTE/5G NR FR1	7	2500	2570				1.29
LTE/5G NR FR1	25	1850	1915				-2.96
LTE/5G NR FR1	30	2305	2315				-2.63
5G NR FR1	38	2570	2620				1.69
5G NR FR1	40	2300	2400				-2.54
LTE/5G NR FR1	41	2496	2690				1.69
5G NR FR1	48	3550	3700				0.43
LTE/5G NR FR1	66	1710	1780				-1.92
5G NR FR1	77	3300	4200				0.43
5G NR FR1	78	3300	3800				0.43
5G NR FR1	79	4400	5000				-2.23

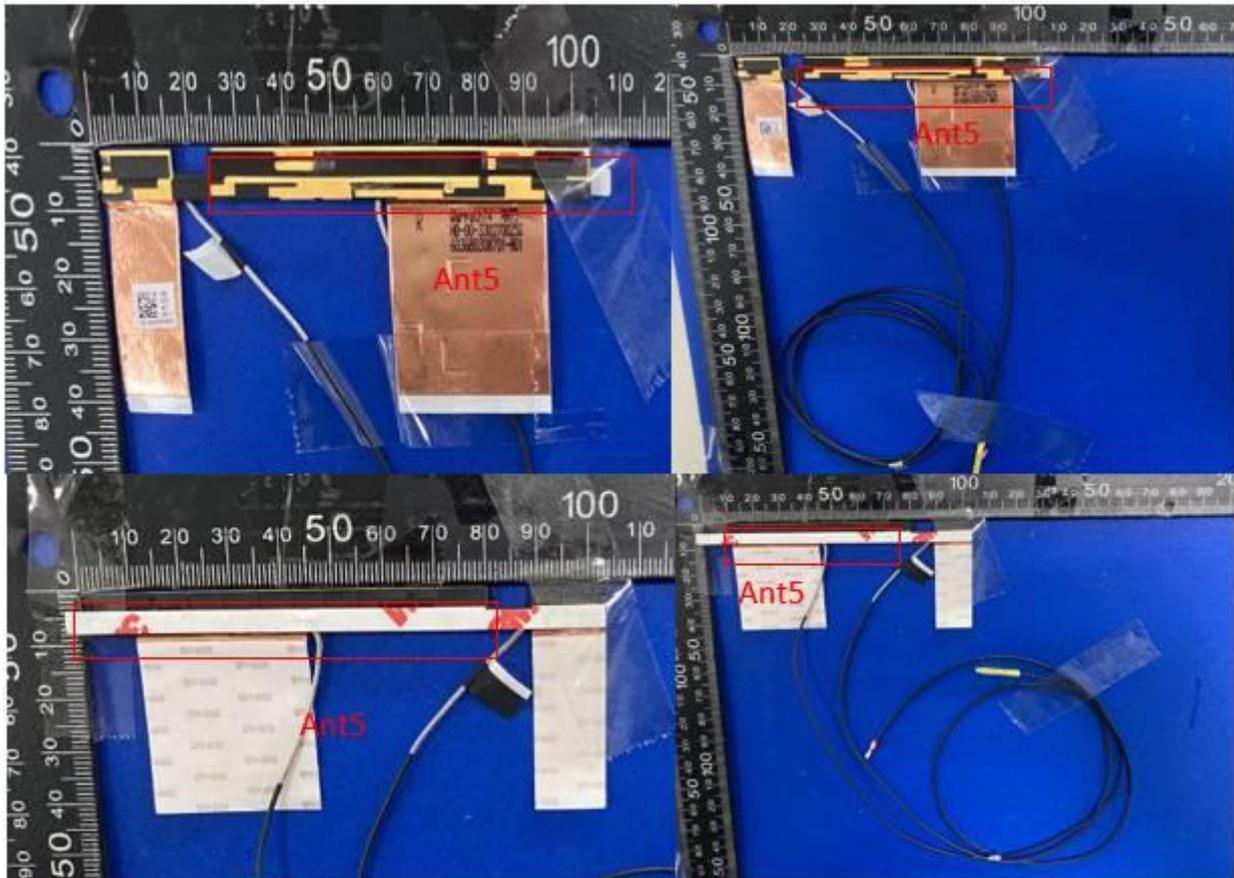**Antenna Peak Gain required being test in system basis.**

Section 2. Dimensioned Photos or Drawings of Antennas

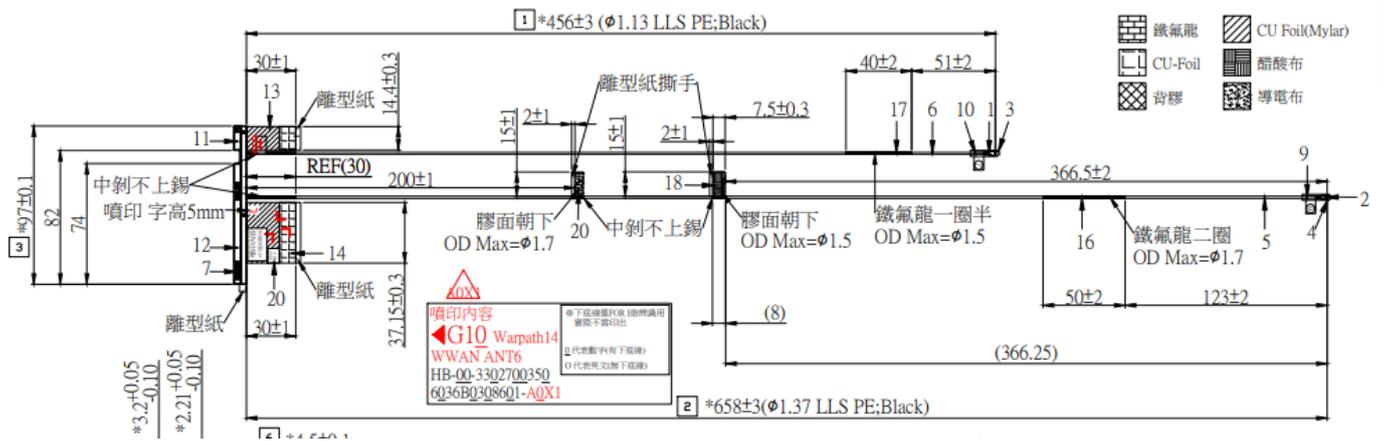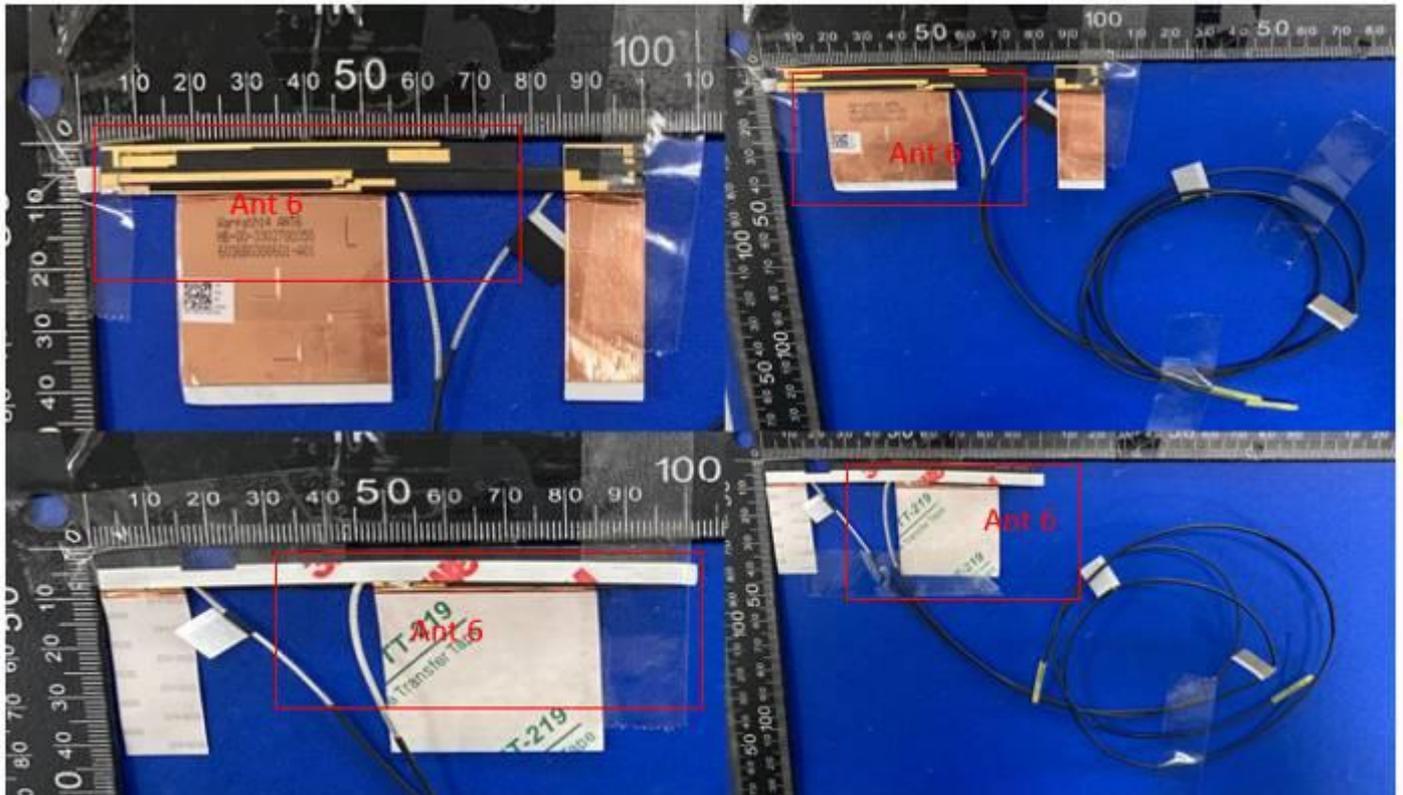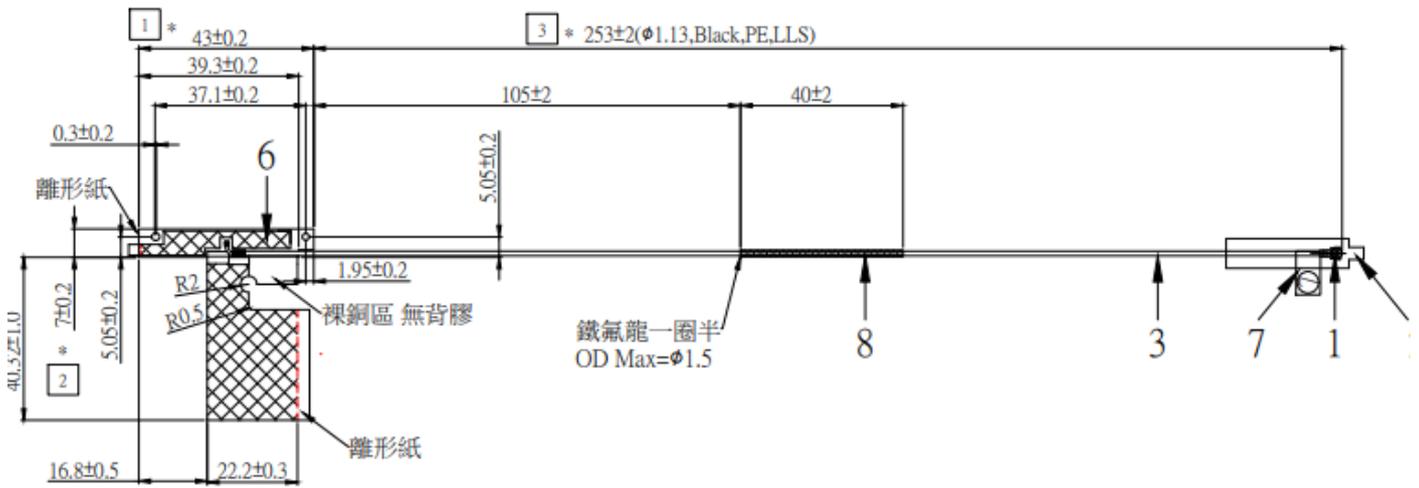|	Ant supplier	Part number	Drawing	Photo
Ant5	6036B0308701	00-3302700250	V	V
Ant6	6036B0308601	00-3302700350	V	V
Ant7	6036B0309801	00-2602749450	V	V
Ant8	6036B0310001	00-2602749550	V	V

Ant5 Dimensioned Drawing:
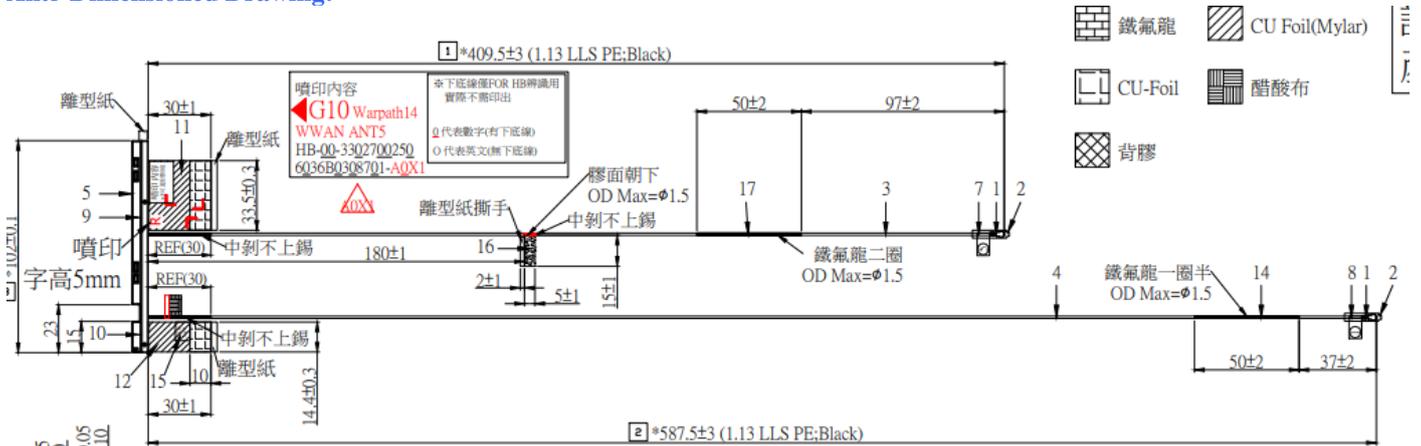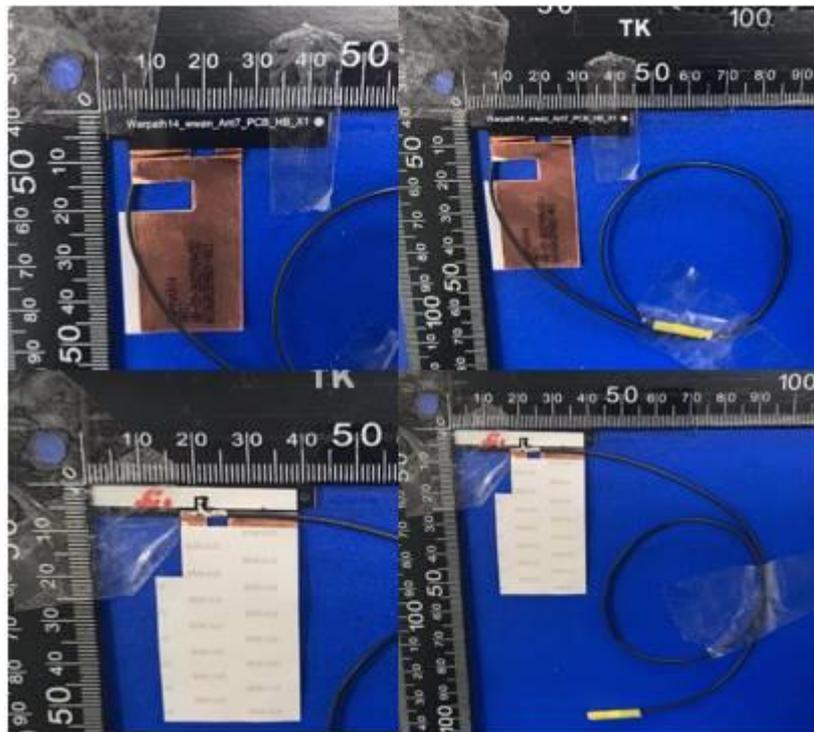

Ant5 Photo:

Ant6 Dimensioned Drawing:

Ant6 Photo:

Ant7 Dimensioned Drawing:

Ant7 Photo:

Ant8 Dimensioned Drawing:

Regulatory WWAN Antenna Information
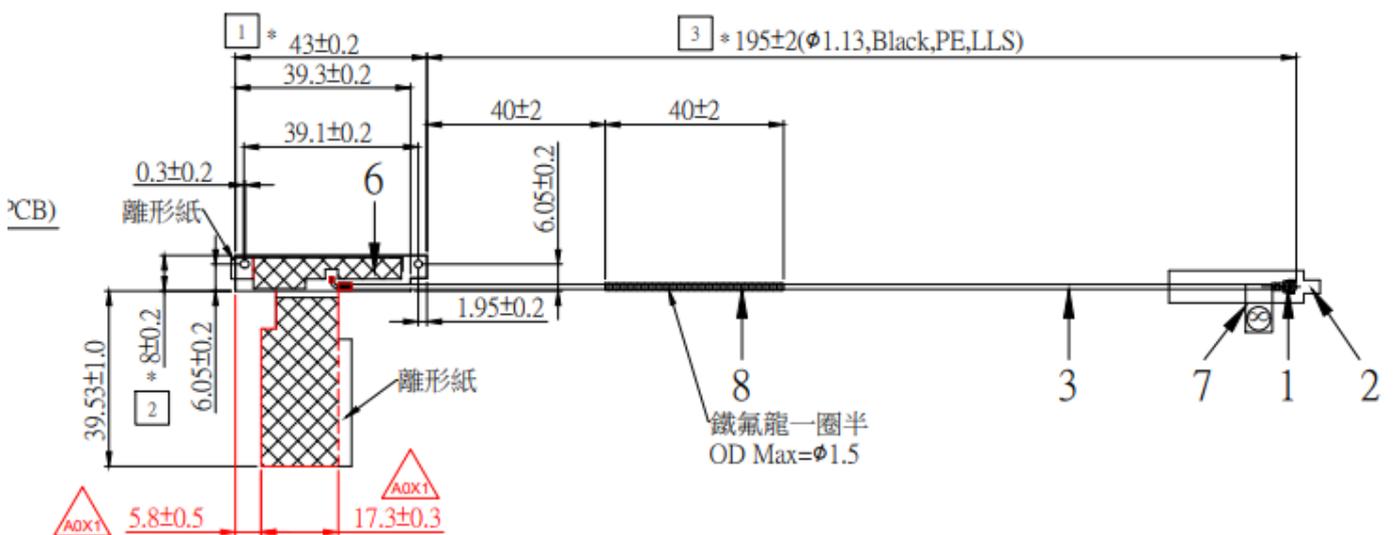
Ant8 Photo:
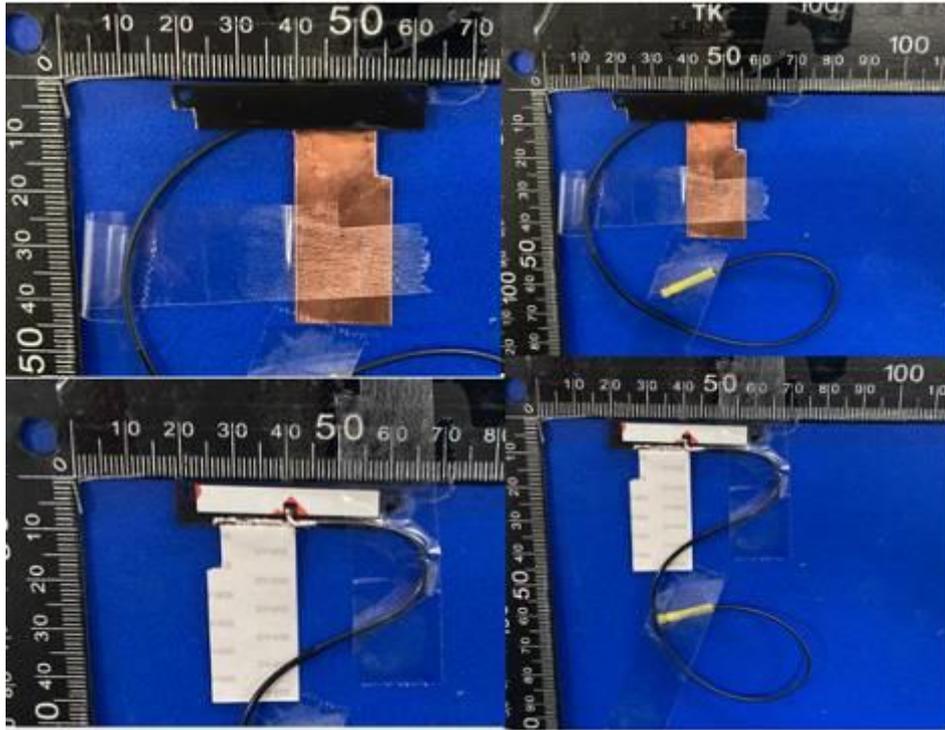
- **The listed frequency 2D radiation pattern is required**
- **Ant5:**
814MHz
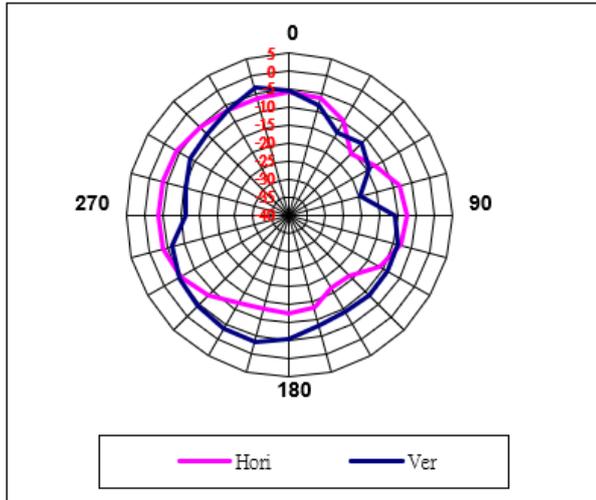
Center Frequency	814MHz
Horizontal (dBi) peak	-3.69
Vertical (dBi) peak	-3.37

832MHz
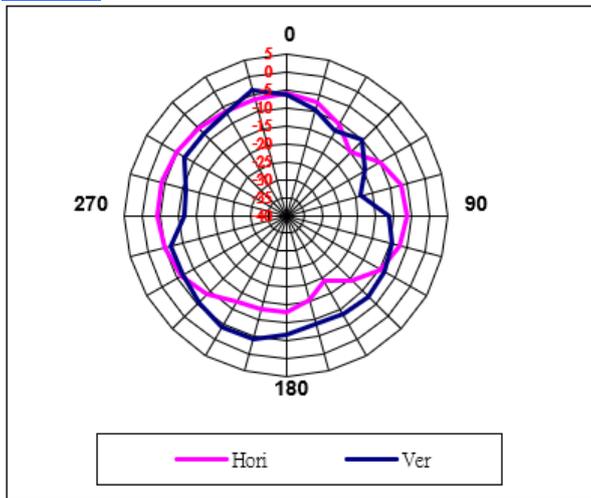
Center Frequency	832MHz
Horizontal (dBi) peak	-4.02
Vertical (dBi) peak	-3.82

837MHz
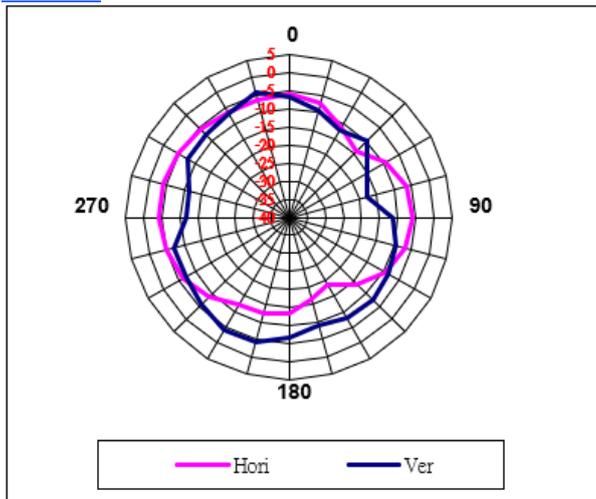
Center Frequency	837MHz
Horizontal (dBi) peak	-4.13
Vertical (dBi) peak	-3.89

845MHz
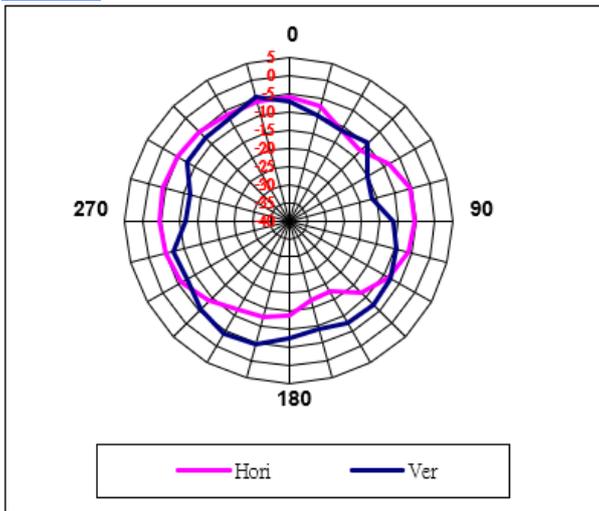
Center Frequency	845MHz
Horizontal (dBi) peak	-4.29
Vertical (dBi) peak	-3.86

849MHz
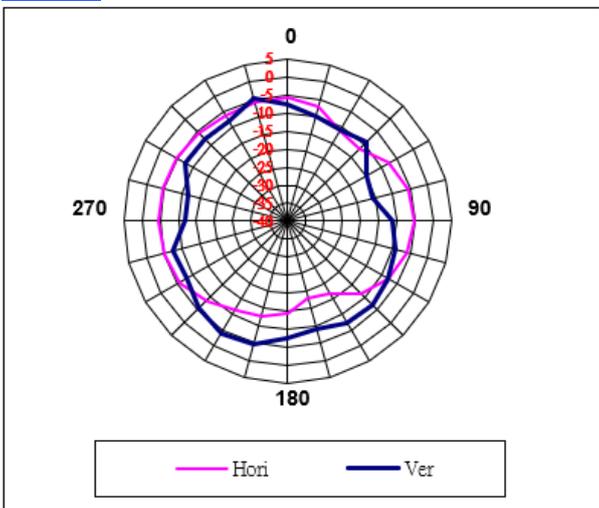
Center Frequency	849MHz
Horizontal (dBi) peak	-4.50
Vertical (dBi) peak	-3.86

880MHz
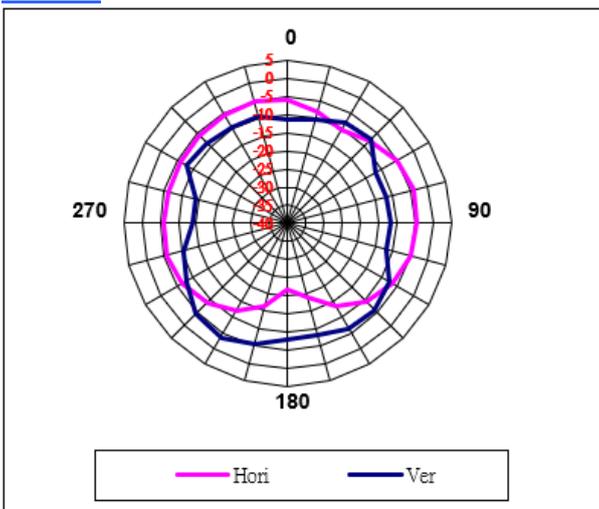
Center Frequency	880MHz
Horizontal (dBi) peak	-4.14
Vertical (dBi) peak	-3.49

894MHz
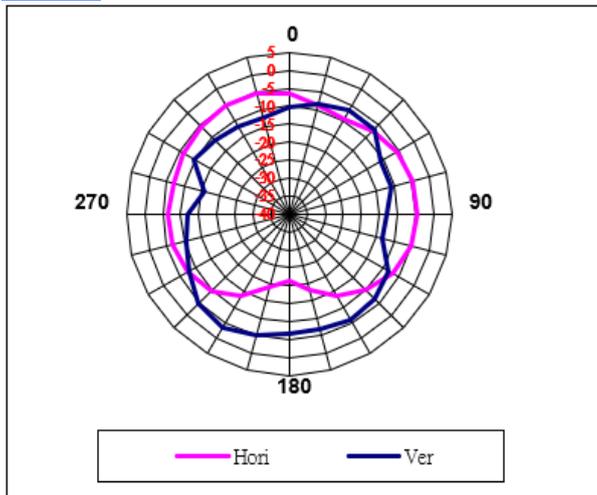
Center Frequency	894MHz
Horizontal (dBi) peak	-4.47
Vertical (dBi) peak	-3.52

915MHz
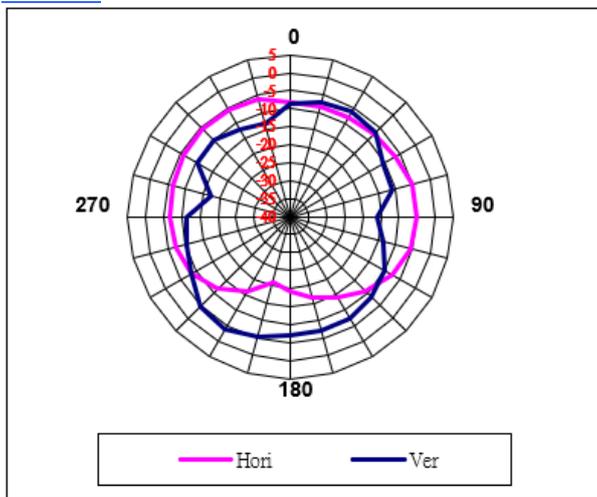
Center Frequency	915MHz
Horizontal (dBi) peak	-4.95
Vertical (dBi) peak	-3.69

1710MHz
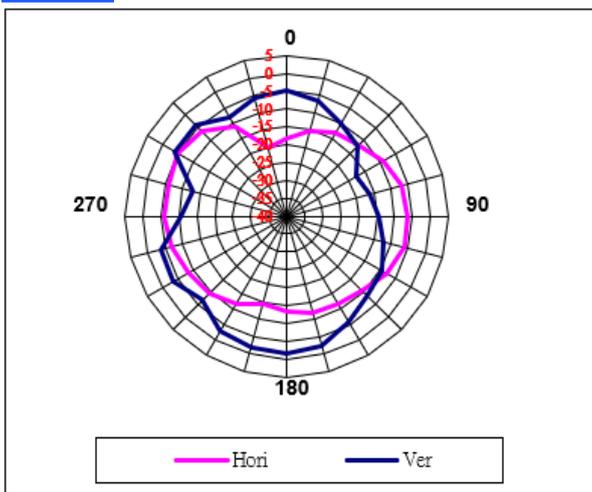
Center Frequency	1710MHz
Horizontal (dBi) peak	-5.18
Vertical (dBi) peak	-1.39

Regulatory WWAN Antenna Information
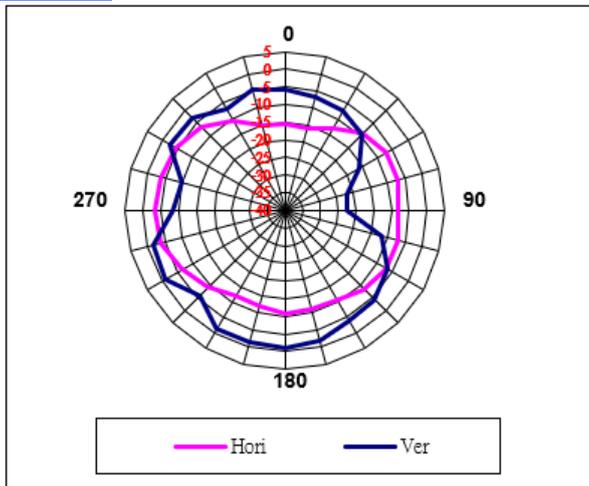
1750MHz

Center Frequency	1750MHz
Horizontal (dBi) peak	-3.34
Vertical (dBi) peak	-0.82

1780MHz
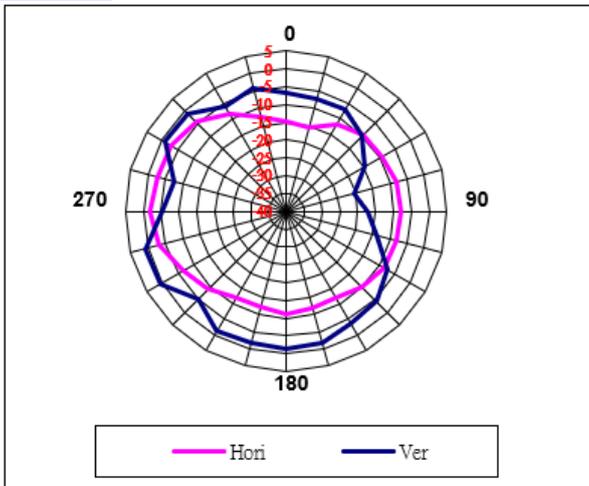
Center Frequency	1780MHz
Horizontal (dBi) peak	-2.01
Vertical (dBi) peak	0.83

1785MHz
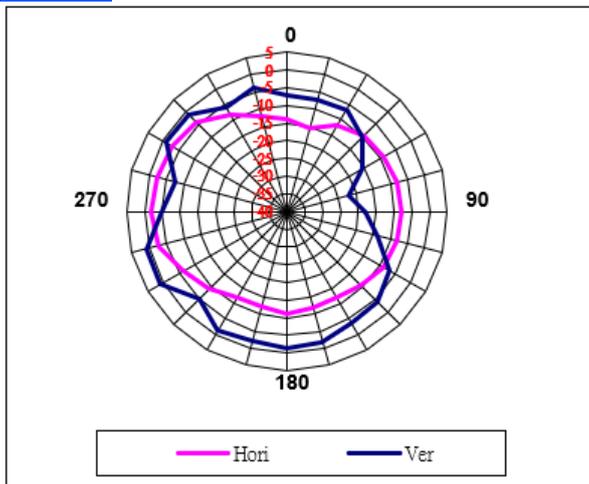
Center Frequency	1785MHz
Horizontal (dBi) peak	-1.76
Vertical (dBi) peak	0.99

1880MHz
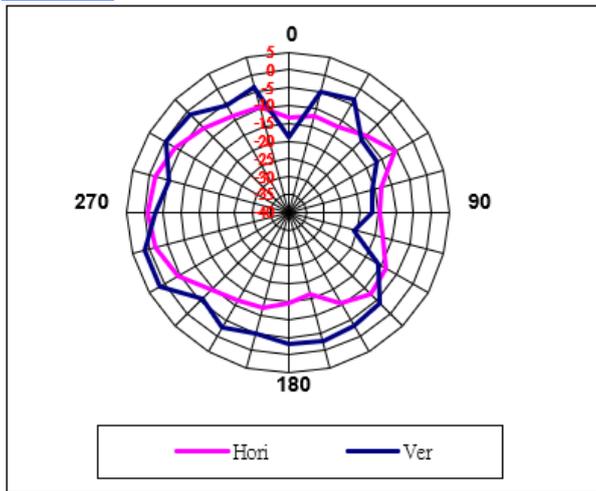
Center Frequency	1880MHz
Horizontal (dBi) peak	-0.71
Vertical (dBi) peak	1.58

1900MHz
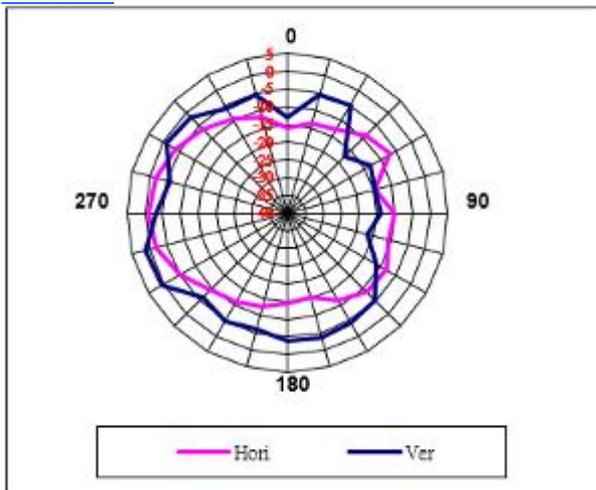
Center Frequency	1900MHz
Horizontal (dBi) peak	-1.12
Vertical (dBi) peak	1.38

1920MHz
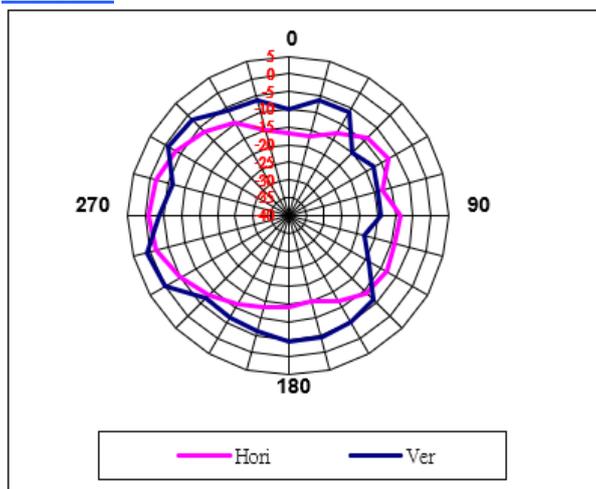
Center Frequency	1920MHz
Horizontal (dBi) peak	-0.94
Vertical (dBi) peak	1.04

1950MHz
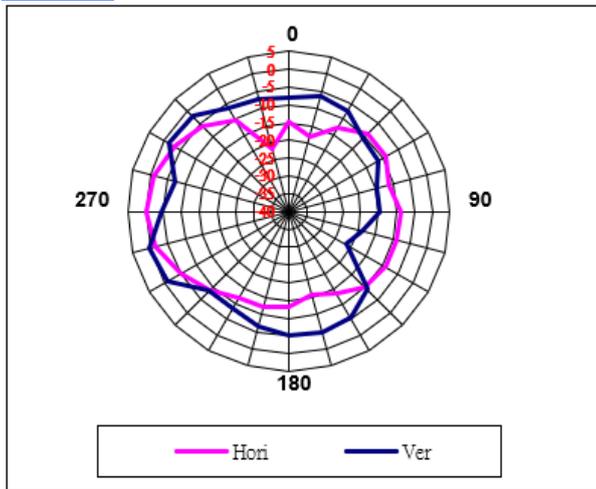
Center Frequency	1950MHz
Horizontal (dBi) peak	-0.24
Vertical (dBi) peak	0.44

1980MHz
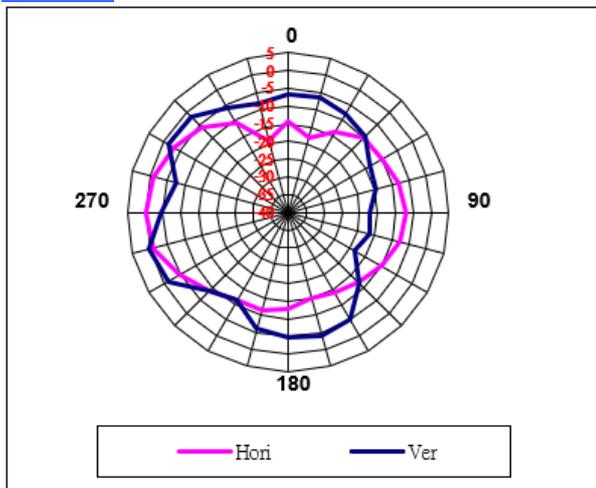
Center Frequency	1980MHz
Horizontal (dBi) peak	-0.10
Vertical (dBi) peak	0.26

2496MHz
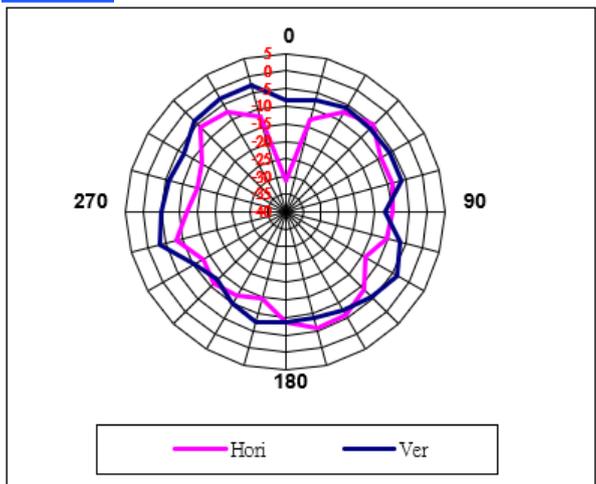
Center Frequency	2496MHz
Horizontal (dBi) peak	-4.86
Vertical (dBi) peak	-0.06

Regulatory WWAN Antenna Information
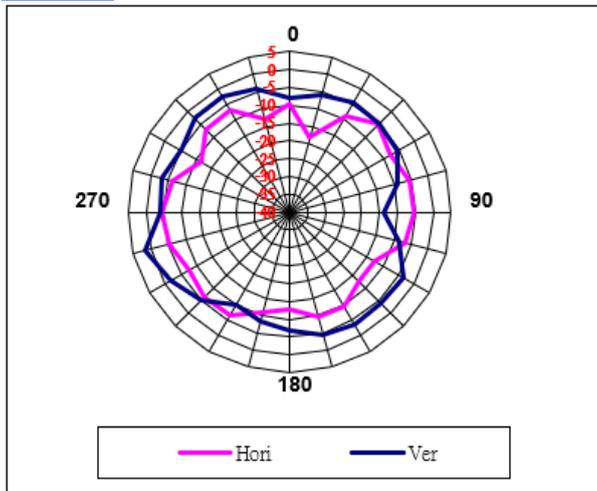
2595MHz

Center Frequency	2595MHz
Horizontal (dBi) peak	-5.61
Vertical (dBi) peak	0.95

2690MHz
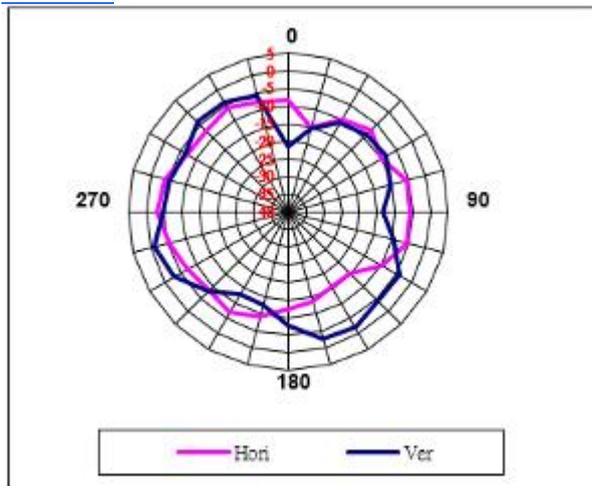
Center Frequency	2690MHz
Horizontal (dBi) peak	-5.69
Vertical (dBi) peak	0.56

3300MHz
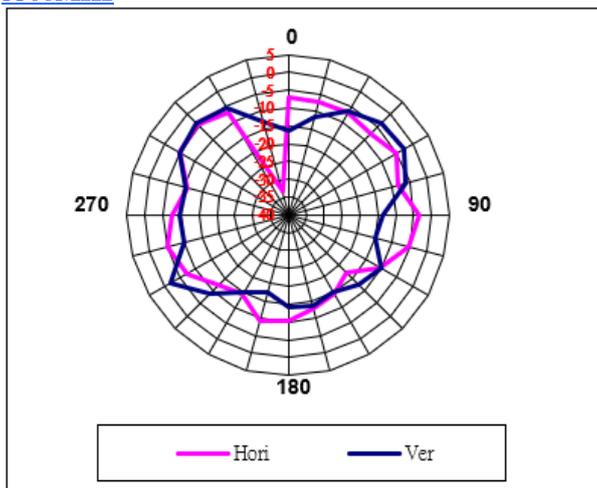
Center Frequency	3300MHz
Horizontal (dBi) peak	-3.51
Vertical (dBi) peak	-4.00

3400MHz
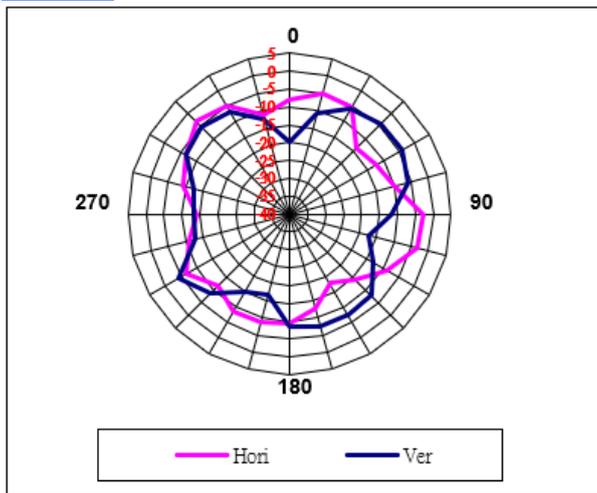
Center Frequency	3400MHz
Horizontal (dBi) peak	-4.51
Vertical (dBi) peak	-2.59

3500MHz
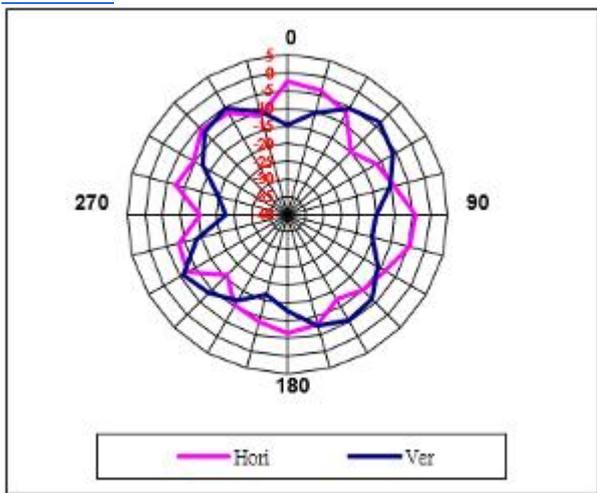
Center Frequency	3500MHz
Horizontal (dBi) peak	-2.83
Vertical (dBi) peak	-0.34

3600MHz
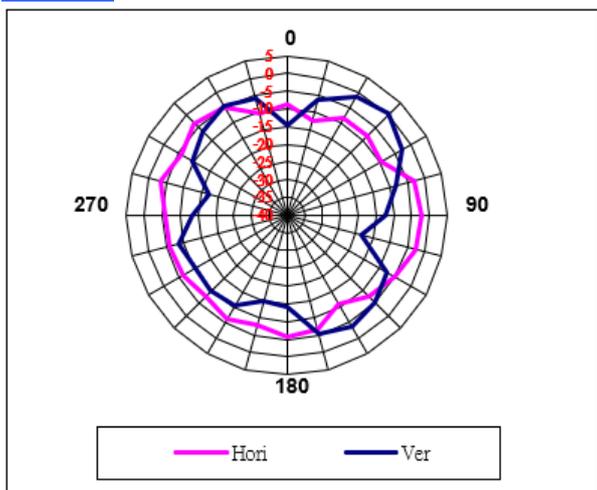
Center Frequency	3600MHz
Horizontal (dBi) peak	-2.49
Vertical (dBi) peak	0.86

3750MHz
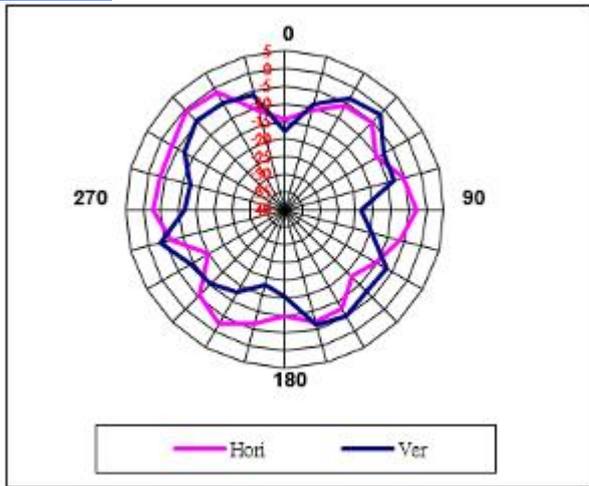
Center Frequency	3750MHz
Horizontal (dBi) peak	-3.63
Vertical (dBi) peak	-1.88

4200MHz
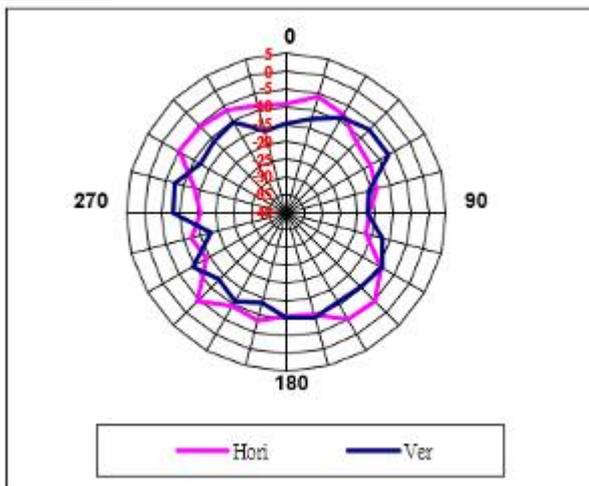
Center Frequency	4200MHz
Horizontal (dBi) peak	-4.46
Vertical (dBi) peak	-3.16

4400MHz
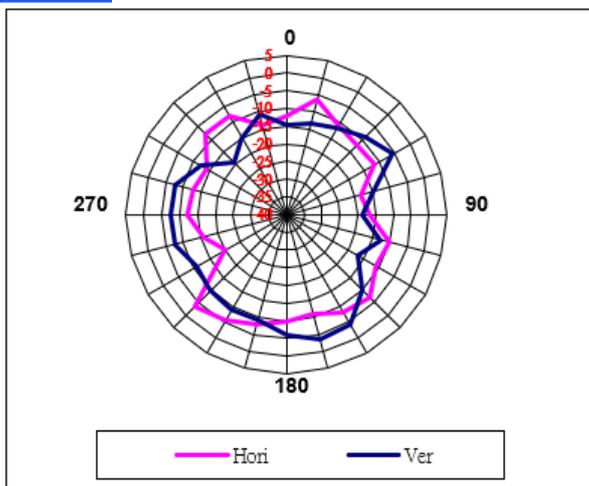
Center Frequency	4400MHz
Horizontal (dBi) peak	-4.24
Vertical (dBi) peak	-2.96

Regulatory WWAN Antenna Information
18/31
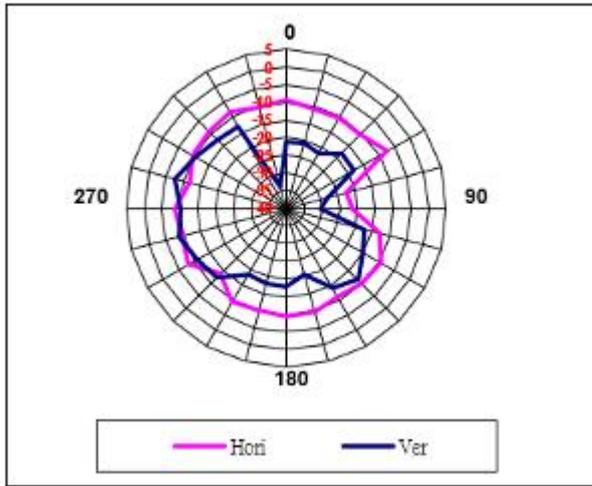
4800MHz

Center Frequency	**4800MHz**
Horizontal (dBi) peak	**-4.94**
Vertical (dBi) peak	**-6.41**

5000MHz
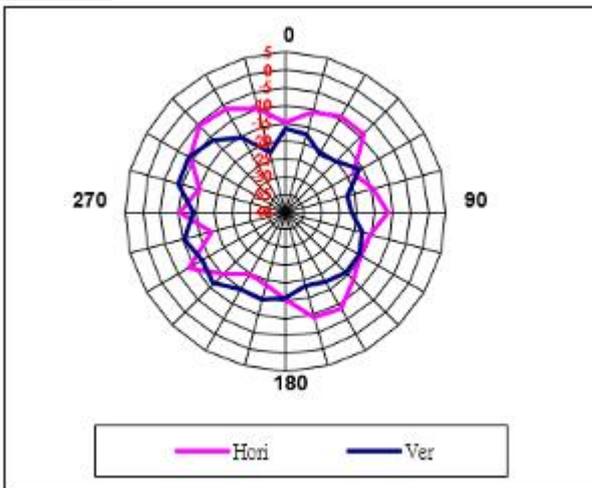
Center Frequency	**5000MHz**
Horizontal (dBi) peak	**-3.49**
Vertical (dBi) peak	**-4.75**

Regulatory WWAN Antenna Information
19/31

Ant8:
1710 MHz
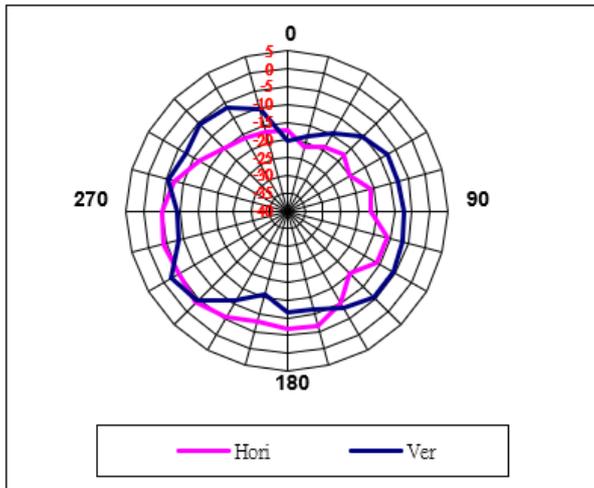
Center Frequency	1710MHz
Horizontal (dBi) peak	-3.74
Vertical (dBi) peak	-2.34

1750 MHz
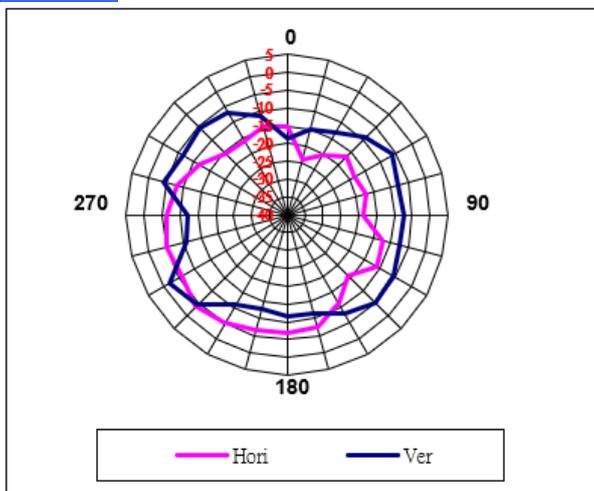
Center Frequency	1750MHz
Horizontal (dBi) peak	-3.61
Vertical (dBi) peak	-1.92

1780 MHz
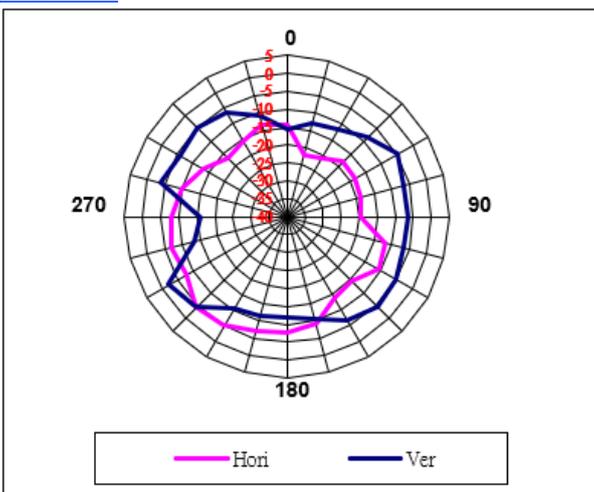
Center Frequency	1780MHz
Horizontal (dBi) peak	-4.38
Vertical (dBi) peak	-2.15

1785 MHz
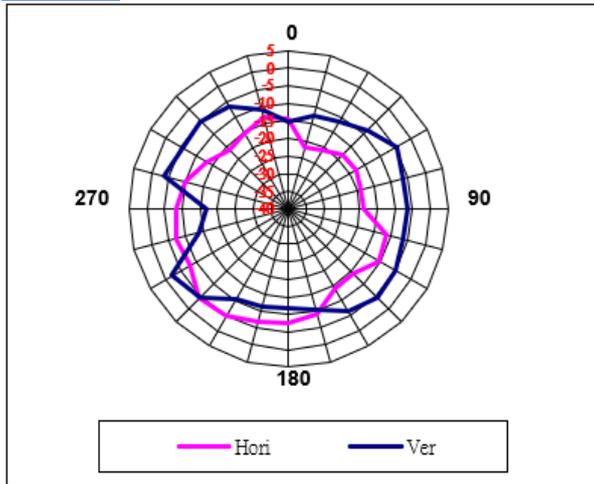
Center Frequency	1785MHz
Horizontal (dBi) peak	-4.40
Vertical (dBi) peak	-2.15

1880 MHz
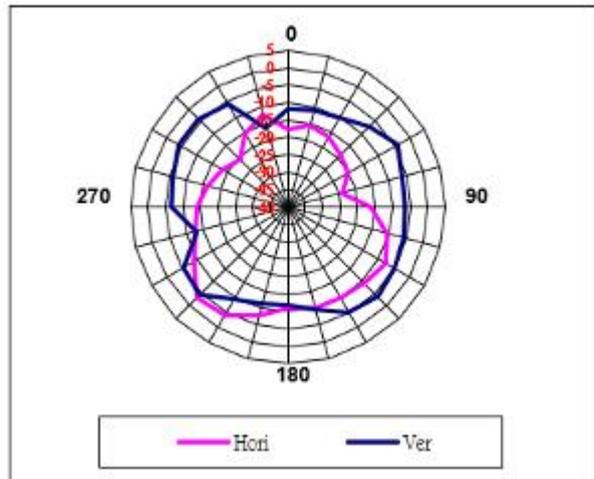
Center Frequency	1880MHz
Horizontal (dBi) peak	-3.35
Vertical (dBi) peak	-3.62

1900 MHz
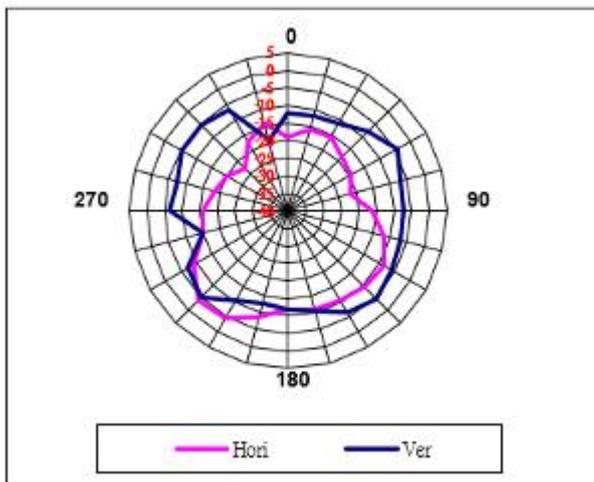
Center Frequency	1900MHz
Horizontal (dBi) peak	-3.79
Vertical (dBi) peak	-4.38

1920 MHz

Regulatory WWAN Antenna Information

21/31
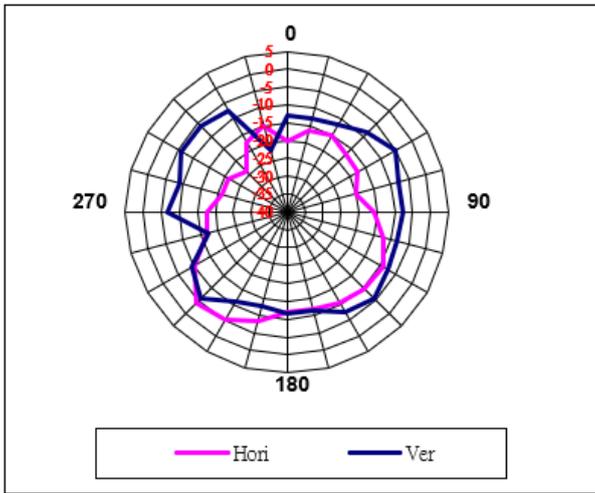
Center Frequency	1920MHz
Horizontal (dBi) peak	-4.08
Vertical (dBi) peak	-5.07

1950 MHz
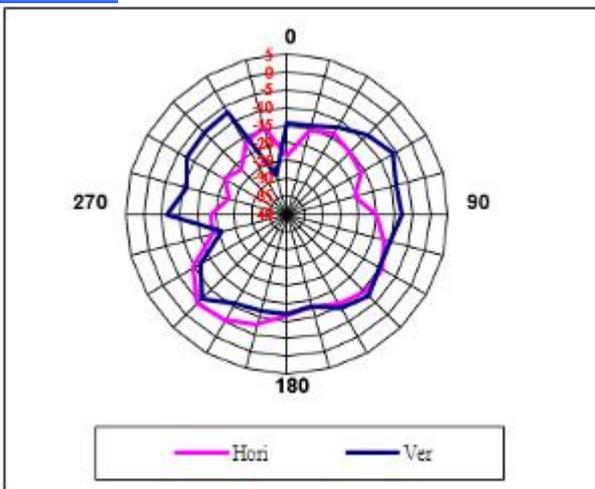
Center Frequency	1950MHz
Horizontal (dBi) peak	-4.69
Vertical (dBi) peak	-5.65

1980 MHz
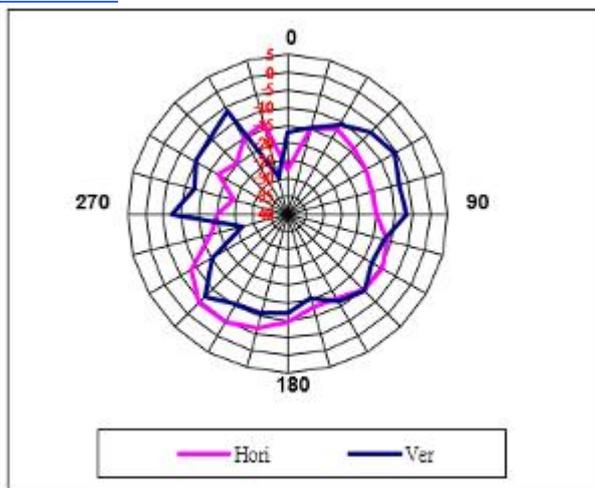
Center Frequency	1980MHz
Horizontal (dBi) peak	-4.69
Vertical (dBi) peak	-5.47

Regulatory WWAN Antenna Information
22/31
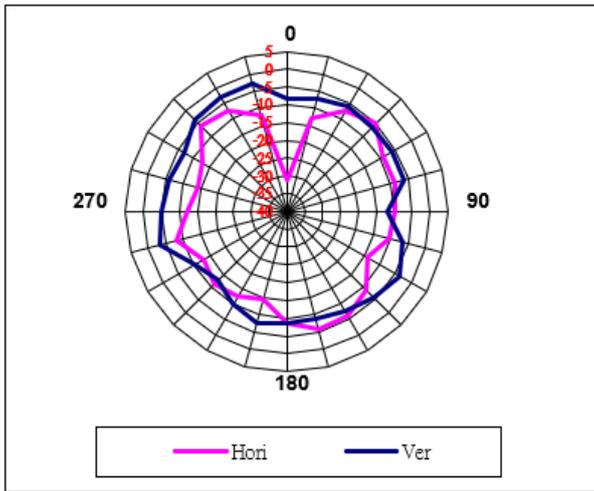
2496 MHz

Center Frequency	2496MHz
Horizontal (dBi) peak	-4.83
Vertical (dBi) peak	-2.91

2595 MHz
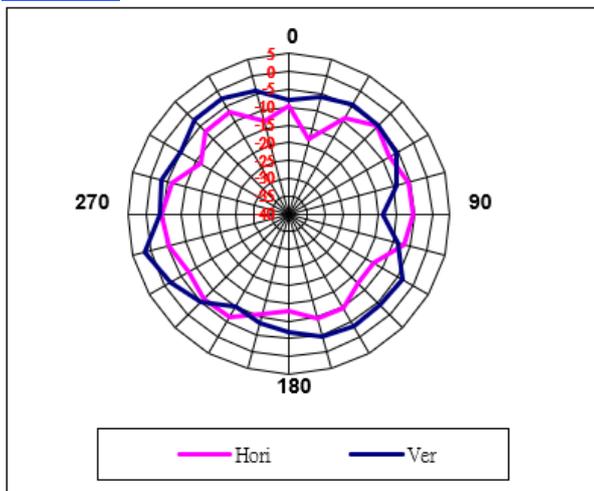
Center Frequency	2595MHz
Horizontal (dBi) peak	-4.36
Vertical (dBi) peak	1.69

2690 MHz
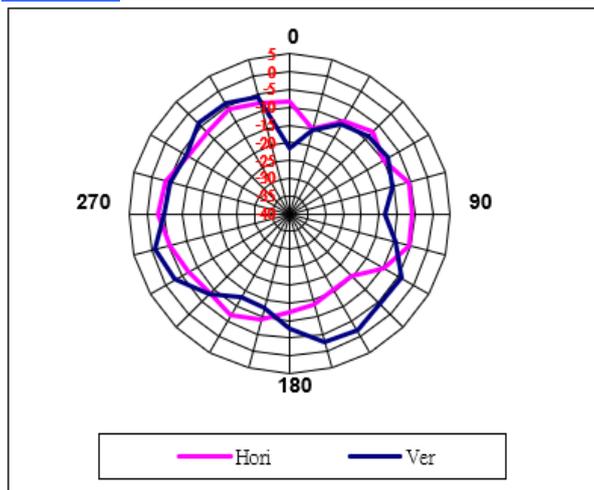
Center Frequency	2690MHz
Horizontal (dBi) peak	-3.08
Vertical (dBi) peak	-1.14

3300 MHz
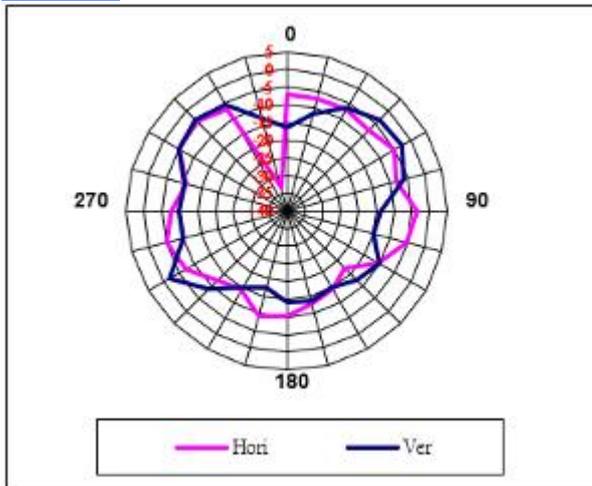
Center Frequency	3300MHz
Horizontal (dBi) peak	-3.50
Vertical (dBi) peak	-2.00

3400 MHz
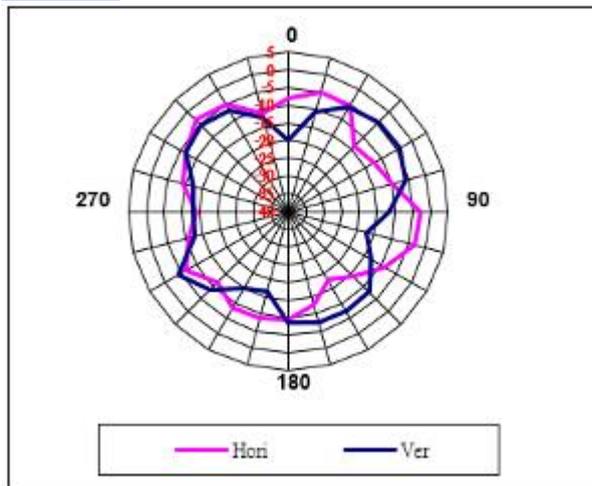
Center Frequency	3400MHz
Horizontal (dBi) peak	-2.57
Vertical (dBi) peak	-4.03

3500 MHz
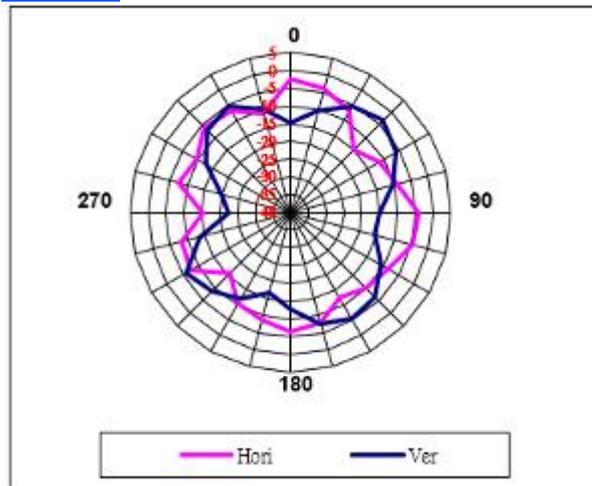
Center Frequency	3500MHz
Horizontal (dBi) peak	-2.51
Vertical (dBi) peak	-3.37

Regulatory WWAN Antenna Information
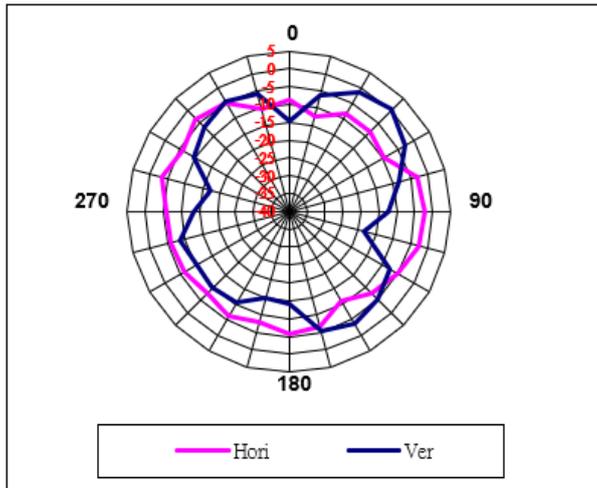
3600 MHz

Center Frequency	3600MHz
Horizontal (dBi) peak	-2.25
Vertical (dBi) peak	0.43

3750 MHz
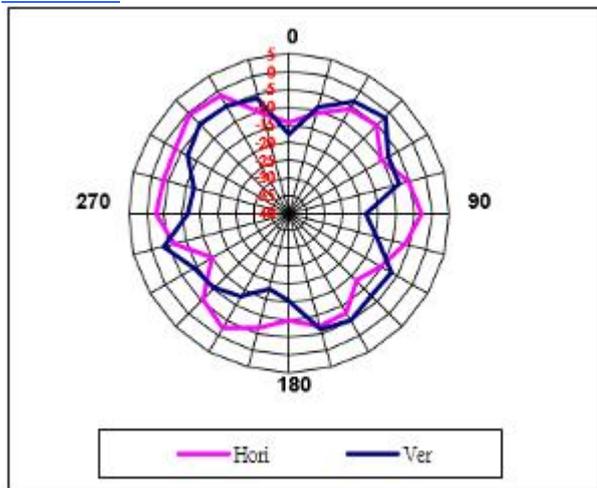
Center Frequency	3750MHz
Horizontal (dBi) peak	-0.61
Vertical (dBi) peak	-1.95

4200 MHz
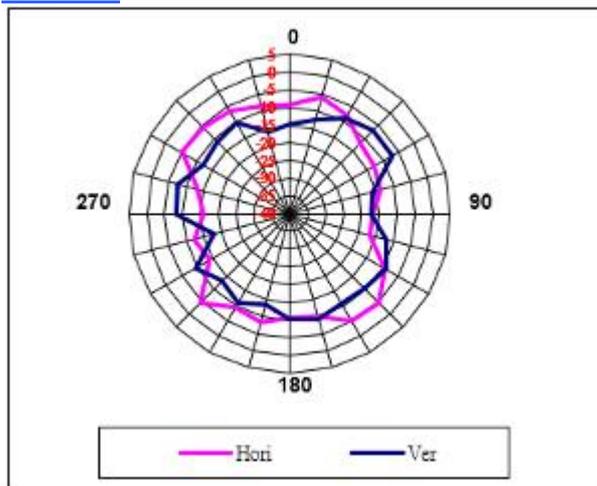
Center Frequency	4200MHz
Horizontal (dBi) peak	-4.41
Vertical (dBi) peak	-6.94

Regulatory WWAN Antenna Information
25/31

4400 MHz
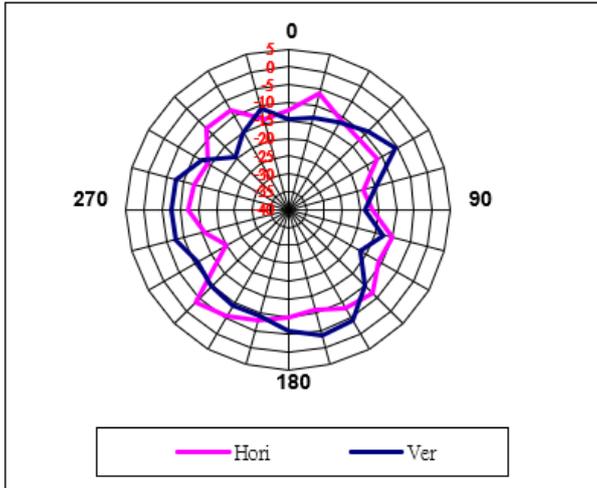
Center Frequency	1950MHz
Horizontal (dBi) peak	-3.66
Vertical (dBi) peak	-3.44

4800 MHz
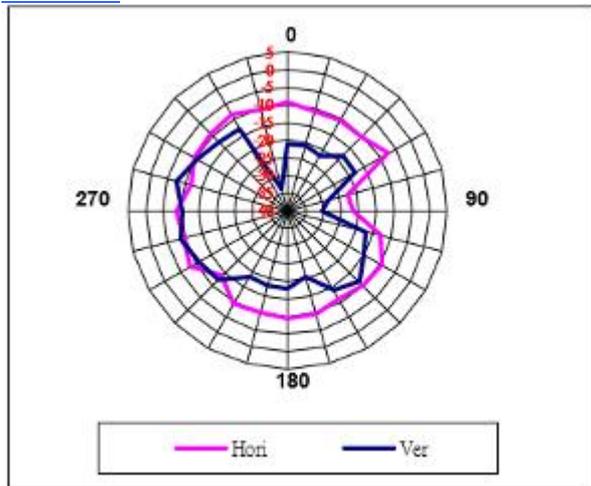
Center Frequency	4800MHz
Horizontal (dBi) peak	-7.12
Vertical (dBi) peak	-7.44

5000 MHz
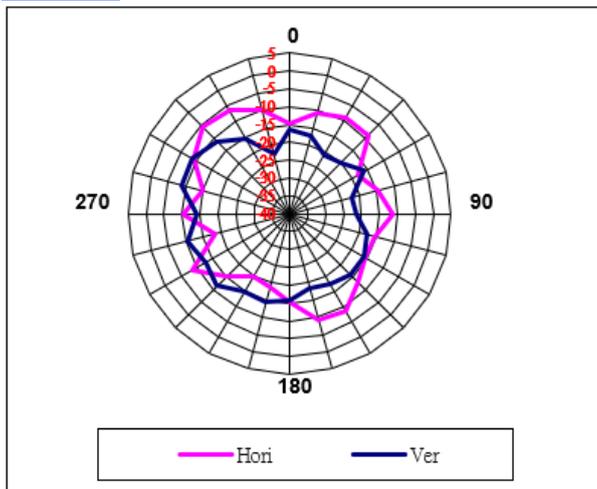
Center Frequency	5000MHz
Horizontal (dBi) peak	-5.68
Vertical (dBi) peak	-8.59

Section 4. Host Platform Information

OEM / ODM Host platform:
Rating Label Photo:

WWAN 6 WLAN 2 WLAN 1 WWAN 5

G11 14 WWAN SKU

WWAN 7   WWAN 8

Regulatory WWAN Antenna Information
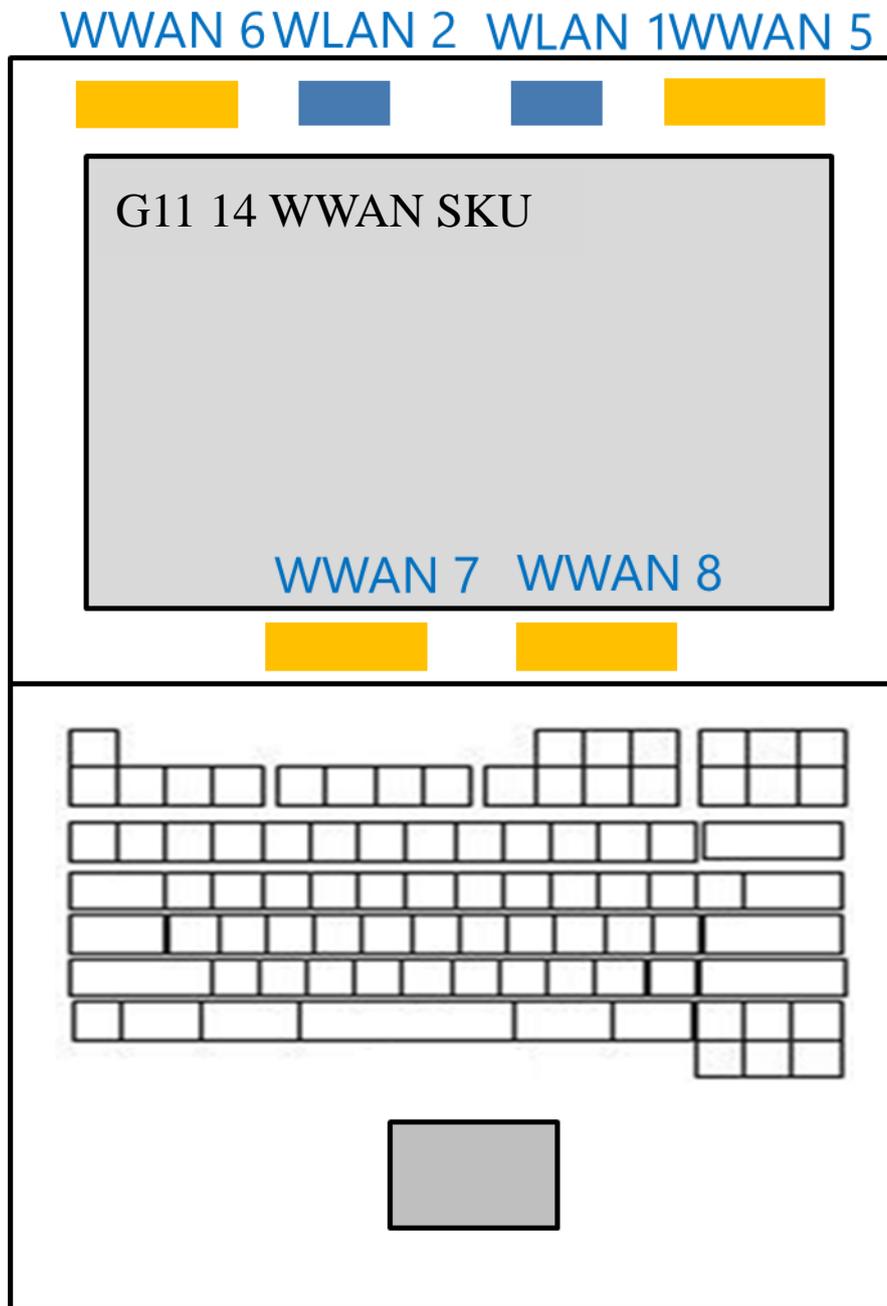
Section 5. Antenna Host Platform Location Information

Include a **dimensioned photo(s) or dimensioned drawing(s)** of Ant5,Ant6,Ant7,Ant8
placements (measurements are not required for receive-only antenna).
Any antenna that transmits must show dimensions to bottom of laptop.   Provide a
description of the materials that are used for supporting or surrounding transmit antennas; for
example, non-conductive plastics vs. conductive coated plastic or metallic materials.

Example:

A	229.5mm
B	19.85mm
C	1.5mm
D	197.855mm
E	200.901mm
F	83.1mm
G	17.755mm
H	15.801mm
I	122.60mm
J	43.00mm
K	20.75mm
L	43.00mm
M	85.85mm
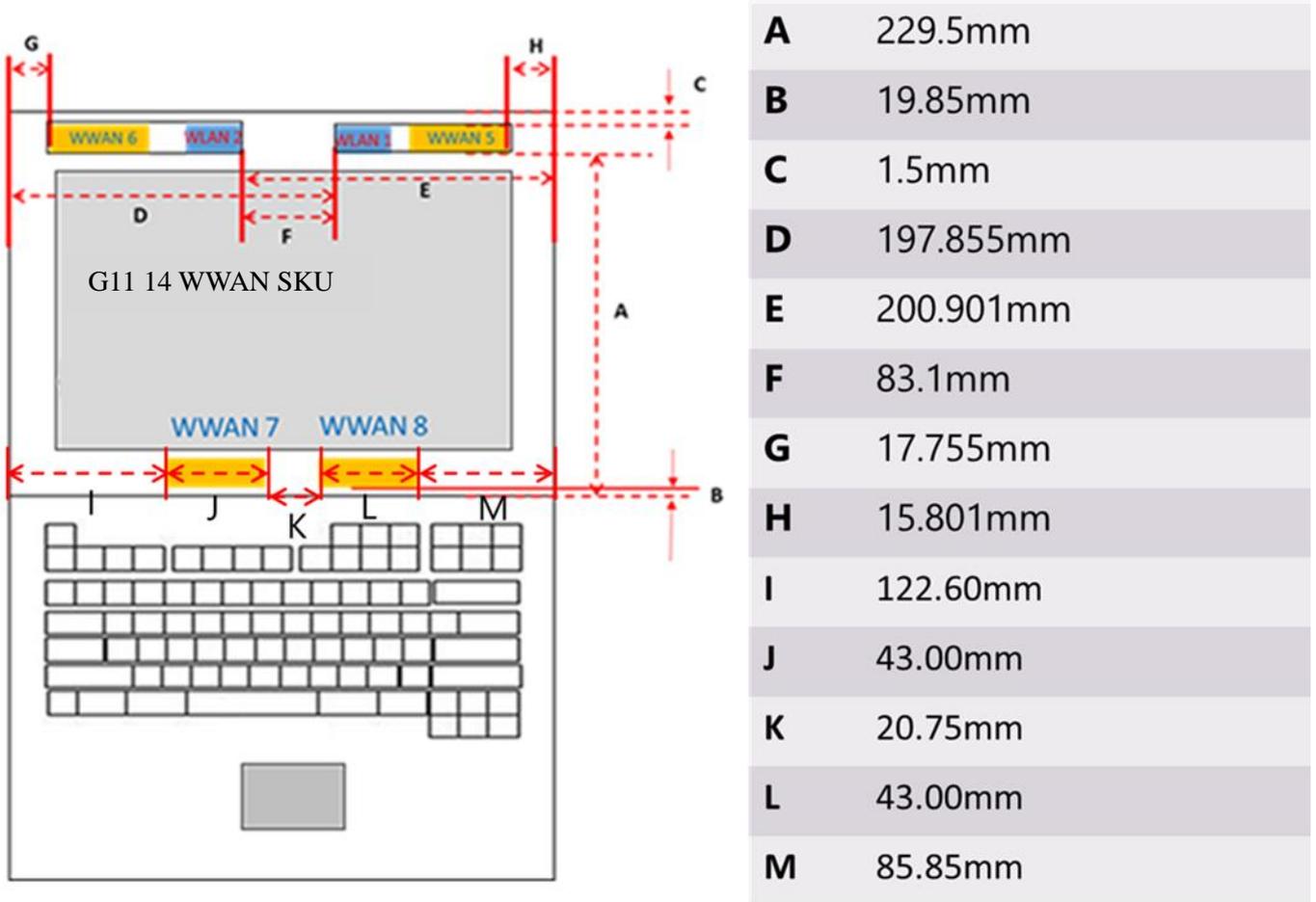
Section 6. Antenna dimensional information for SAR evaluation

Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user (excluding hands, wrist, feet, and ankle).   For notebook/laptop hosts show lapheld position (example below).   For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary landscape positions.   Include a description of any proximity sensors or power throttling implementations that limit or exclude use of any host orientation.

Example:
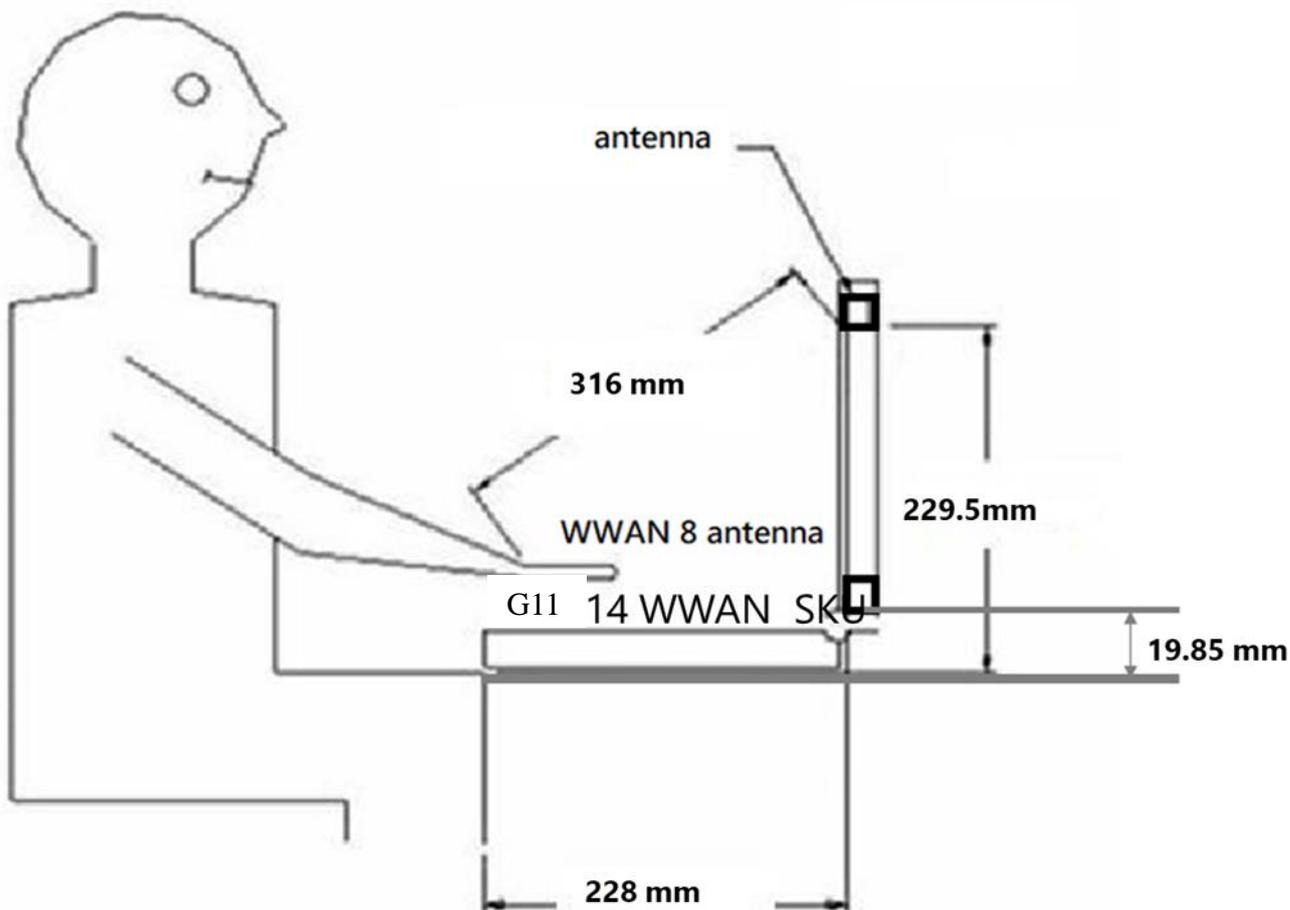
Section 7. Diagram Example of Co-Location Antenna Separation

Include a **dimensioned photo or dimensioned drawing** showing the distance (mm) between **all WLAN transmit antennas** and other co-located radiator transmit antenna such as Bluetooth, WWAN,..

Example:
(Note: Due to the evolving rules regarding co-location, each platform will need to be reviewed on a case by case basis)
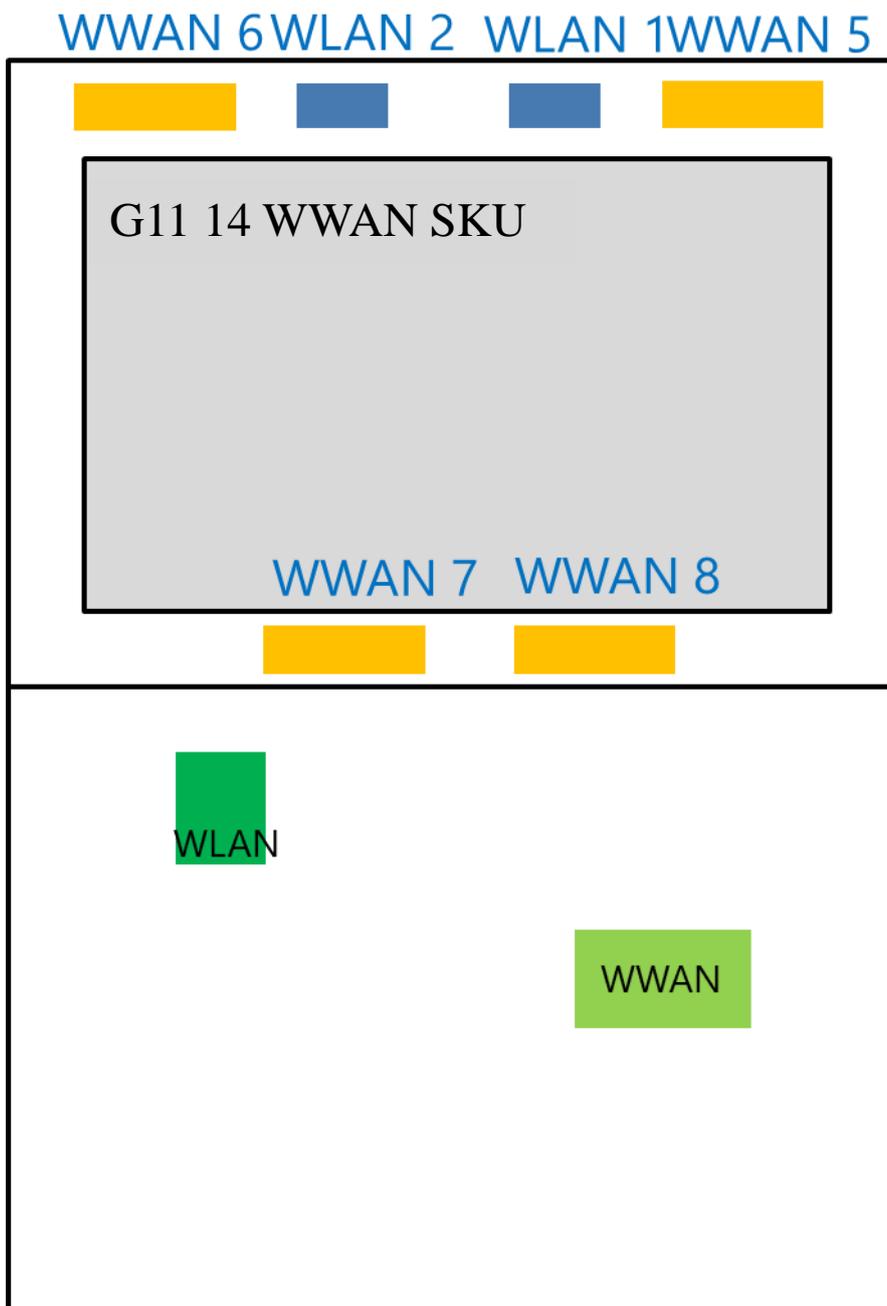
Section 8. Local representative contact information

Local representative contact information is required for regulatory support for target countries below.

	Local company name	Contact name	Phone number	FAX Number	e-Mail Address	Notes
Argentina						
Azerbaijan						
Cambodia						
Indonesia						
Israel						
Malaysia						
Philippines						
Singapore						Telecommunication Equipment Dealer License Required
South Africa						
USA, Canada						
Vietnam						