



Antenna Datasheet

Product OC: YB0027AA

Version: 2.1

Date: 2023-05-23

Status: Released

Product Name: 5G & GNSS 9IN1 Combo Antenna

Key Features:

8 × 8 5G MIMO + GNSS L1 & L5

Optimized for 5G and 4G Networks

Terminal Mounting

Screw Mount

SMA Male Connector

IP Rating: IP67 & IP69K

Durable KIBILAC® ASA Housing

Overview

This ultra-wide-band 5G/4G antenna box provides broad coverage from 600-6000MHz whilst backward-compatible to support 3G/2G networks as well as Cat-M and NB-IoT. The antenna is designed to work with various GND plane sizes or in free space for ease of integration with connection via 9 various cable lengths from 300-5000mm, terminated with SMA connectors. This screw mount omnidirectional antenna is easy to install with maximum durability with its IP69 KIBILAC® ASA enclosure. It is compatible with Quectel's RM520x Series modules. Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs.

Contents

Overview.....	1
Contents	2
1 Specification.....	3
1.1. Electrical.....	3
1.1.1. LMHs	3
1.1.2. MHs	4
1.1.3. GNSS	5
1.2. Supported Bands	6
1.3. Mechanical, Environment & Storage	9
2 Drawing	11
3 Detailed Performance	12
3.1. S-Parameter Test.....	12
3.1.1. VSWR.....	12
3.1.2. Return Loss	15
3.1.3. Isolation	18
3.1.3.1. Test Status: In Free Space	18
3.1.3.2. Test Status: On 300 × 400 mm Metal Plane	22
3.1.4. GNSS Axial Ratio	27
3.1.5. GNSS LNA Gain.....	28
3.2. Radiation Performance Test.....	29
3.2.6. Efficiency	29
3.2.7. Average Gain	32
3.2.8. Peak Gain.....	35
3.2.9. 3D & 2D Radiation Pattern.....	38
3.2.9.1. Test Status: In Free Space	38
3.2.9.2. Test Status: On 300 × 400 mm Metal Plane	68
3.3. Active OTA Test	98
4 Packaging	102
Contact US	104
Legal Notices	105
Revision History	107

1 Specification

Test Condition: Free Space & On 300 × 400 mm metal plane

1.1. Electrical

Electrical Specifications		
Frequency Range	LMHs	600–960 MHz, 1400–6000 MHz
	MHs	1400–6000 MHz
	GNSS	1164–1189 MHz, 1559–1606 MHz
Radiation Pattern	LMHs & MHs	Omni-directional
	GNSS	Directional
Polarization	LMHs & MHs	Linear
	GNSS	RHCP
Impedance		50 Ω
Isolation		≤ -8 dB
Axial Ratio (GNSS)		< 3 dB

1.1.1. LMHs

SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	N74 /N75 /N76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /N77	N79	Wi-Fi 5G
	Freq. (MHz)	600– 700	700– 810	820– 960	1420– 1520	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150– 5850	
Max VSWR	FS	2.7	2.3	2.5	3.7	3.2	1.9	1.9	2.6	3.2	2.3	1.8	
	MP	2.8	2.8	2.4	3.4	2.6	1.8	1.8	2.5	3.0	2.4	1.6	
Max Return Loss (dB)	FS	-6.8	-8.3	-7.2	-4.8	-5.7	-10.0	-10.3	-7.0	-5.6	-7.9	-10.9	
	MP	-6.4	-6.6	-7.8	-5.3	-7.0	-11.0	-10.7	-7.4	-6.0	-7.8	-12.7	
AVG Eff.	FS	32.7	44.5	43.0	31.8	43.1	57.6	59.3	56.4	47.4	56.1	55.9	

(%)	MP	14.7	20.8	19.7	28.2	40.7	57.7	57.3	53.6	46.1	56.7	56.7
AVG Gain (dB)	FS	-4.9	-3.5	-3.7	-5.0	-3.7	-2.4	-2.3	-2.5	-3.3	-2.5	-2.5
	MP	-8.4	-6.9	-7.1	-5.5	-3.9	-2.4	-2.4	-2.7	-3.4	-2.5	-2.5
Max Peak Gain (dBi)	FS	-0.5	0.2	1.0	0.9	2.0	3.9	4.1	3.8	3.4	4.9	4.1
	MP	0.9	4.5	4.3	3.1	5.6	6.6	6.7	6.5	8.2	5.5	7.0
VSWR	FS	≤ 3.7										
	MP	≤ 3.4										
Return Loss	FS	≤ -4.8 dB										
	MP	≤ -5.3 dB										
Peak Gain	FS	≤ 4.9 dB										
	MP	≤ 8.2 dB										

- LMHs: LMH1, LMH2, LMH3, LMH4 Antennas
- MHs: MH1, MH2, MH3, MH4 Antennas
- FS: In Free Space
- MP: On 300 × 400 mm Metal Plane

1.1.2. MHs

SPEC	Band	Band	B71	B12 /B13 /B28	B5 /B8 /B26	N74 /N75 /N76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /N77	N79	Wi-Fi 5G
	Freq. (MHz)	600– 700	700– 810	820– 960	1420– 1520	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150– 5850	
Max VSWR	FS	-	-	-	4.3	2.7	1.5	2.2	2.6	3.6	3.1	2.8	
	MP	-	-	-	3.7	3.5	1.3	1.9	2.6	3.6	2.7	2.6	
Max Return Loss (dB)	FS	-	-	-	-4.1	-6.8	-13.4	-8.6	-7.0	-5.0	-5.8	-6.4	
	MP	-	-	-	-4.8	-5.1	-17.5	-10.3	-7.1	-4.9	-6.8	-7.0	
AVG Eff. (%)	FS	-	-	-	34.7	51.1	66.3	60.5	56.0	50.3	58.6	56.1	
	MP	-	-	-	26.7	40.9	60.0	55.8	54.7	44.3	56.0	54.5	
AVG Gain (dB)	FS	-	-	-	-4.6	-2.9	-1.8	-2.2	-2.5	-3.0	-2.3	-2.5	
	MP	-	-	-	-5.8	-4.1	-2.2	-2.5	-2.6	-3.6	-2.5	-2.6	
Max Peak Gain (dBi)	FS	-	-	-	2.7	3.5	3.2	2.8	2.6	3.1	3.9	4.1	
	MP	-	-	-	1.5	5.8	6.4	6.4	5.5	6.6	8.1	8.0	
VSWR	FS	≤ 4.3											

	MP	≤ 3.7
Return Loss	FS	≤ -4.1 dB
	MP	≤ -4.8 dB
Peak Gain	FS	≤ 4.1 dB
	MP	≤ 8.1 dB

- LMHs: LMH1, LMH2, LMH3, LMH4 Antennas
- MHs: MH1, MH2, MH3, MH4 Antennas
- FS: In Free Space
- MP: On 300 × 400 mm Metal Plane

1.1.3. GNSS

Specification	Band	Band	GNSS L5	GNSS L2	GNSS L1
		Freq. (MHz)	1164 - 1189	1217 - 1238	1559 - 1606
Max VSWR		FS	2.0	-	2.1
		MP	2.1	-	2.0
Max Return Loss (dB)		FS	-9.7	-	-9.1
		MP	-8.8	-	-9.4
AVG Eff. (%)		FS	58.9	-	52.5
		MP	57.7	-	52.1
AVG Gain (dB)		FS	-2.3	-	-2.8
		MP	-2.4	-	-2.8
Max Peak Gain (dBi)		FS	2.8	-	4.5
		MP	4.0	-	6.3
VSWR		FS	≤ 2.1		
		MP	≤ 2.1		
Return Loss		FS	≤ -9.1 dB		
		MP	≤ -8.8 dB		
Peak Gain		FS	≤ 4.5 dBi		
		MP	≤ 6.3 dBi		

- LMHs: LMH1, LMH2, LMH3, LMH4 Antennas
- MHs: MH1, MH2, MH3, MH4 Antennas
- FS: In Free Space

- MP: On 300 × 400 mm Metal Plane

GNSS LNA Electrical	
LNA Gain	20 ±3 dB
Noise Figure	≤ 2.5 dB
Output VSWR	< 2.0
Input VSWR	< 2.0
Working Voltage	DC 2.8–3.6 V
Working Current	Max. 24 mA (Typ. 3 V)
Impedance	50 Ω

- LMHs: LMH1, LMH2, LMH3, LMH4 Antennas
- MHs: MH1, MH2, MH3, MH4 Antennas
- FS: In Free Space
- MP: On 300 × 400 mm Metal Plane

1.2. Supported Bands

5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT					
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	LMHs	MHs
1	2100	1920–1980	2110–2170	√	√
2	1900	1850–1910	1930–1990	√	√
3	1800	1710–1785	1805–1880	√	√
4	1700	1710–1755	2110–2155	√	√
5	850	824–849	869–894	√	-
7	2600	2500–2570	2620–2690	√	√
8	900	880–915	925–960	√	-
9	1800	1749.9–1784.9	1844.9–1879.9	√	√
11	1500	1427.9–1447.9	1475.9–1495.9	-	√

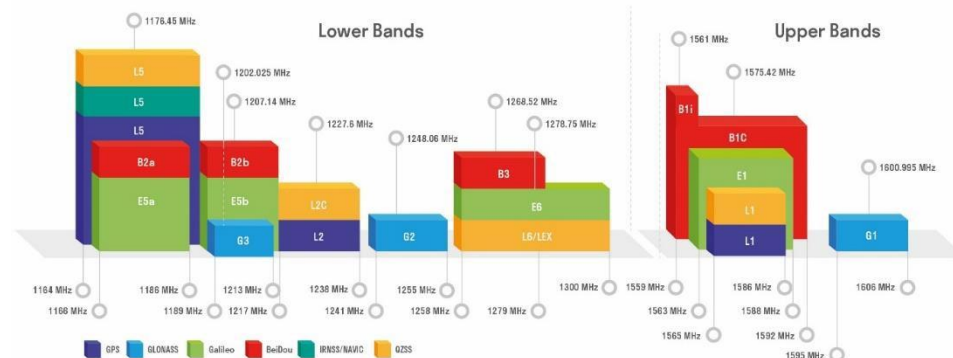
5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT					
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	LMHs	MHs
12	700	699–716	729–746	√	-
13	700	777–787	746–756	√	-
14	700	788–798	758–768	√	-
17	700	704–716	734–746	√	-
18	850	815–830	860–875	√	-
19	850	830–845	875–890	√	-
20	800	832–862	791–821	√	-
21	1500	1447.9–1462.9	1495.9–1510.9	-	√
22	3500	3410–3490	3510–3590	√	√
23	2100	2000–2020	2180–2200	√	√
24	1600	1626.5–1660.5	1525–1559		√
25	1900	1850–1915	1930–1995	√	√
26	850	814–849	859–894	√	-
28	700	703–748	758–803	√	-
31	450	452.5–457.5	462.5 - 467.5	-	-
34	2100	2010 – 2025		√	√
38	2600	2570 - 2620		√	√
39	1900	1880 - 1920		√	√
40	2300	2300 - 2400		√	√
41	2500	2496 - 2690		√	√
42	3500	3400 - 3600		√	√
48	3500	3550 - 3700		√	√
66	1700	1710 - 1780	2110 - 2200	√	√
71	600	663 - 698	617 - 652	√	-

5G NR/ LTE/ LTE-Advanced/ WCDMA/ HSPA/ HSPA+/ GPRS/ GSM/ NB-IoT					
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	LMHs	MHs
74	1500	1427 - 1470	1475 - 1518	-	√
77	3500	3300 - 4200		√	√
78	3500	3300 - 3800		√	√
79	4500	4400 - 5000		√	√
Note: Covered √ means efficiency > 20%					

GNSS Frequency Bands (MHz)					
GPS	L1	L2	L5		
	Centre 1575.42 (1565–1586)	Centre 1227.6 (1217–1238)	Centre 1176.45 (1164–1189)		
	√	-	√		
GLONASS	G1-L10C-L10F	G2-L20C-L20F	G3-L30C		
	Centre 1601 (1595–1606)	Centre 1248.06 (1241–1255)	Centre 1202.025 (1189–1213)		
	√	-	-		
GALILEO	E1	E5a	E5b	E6	
	Centre 1575.42 (1563–1588)	Centre 1176.45 (1166–1187)	Centre 1207.14 (1197–1218)	Centre 1278.75 (1258–1300)	
	√	√	-	-	
BEIDOU	B1I	B1C (BeiDou-3)	B2a-B2I	B2b	B3
	Centre 1561.098 (1559–1564)	Centre 1575.42 (1559–1592)	Centre 1176.45 (1166–1187)	Centre 1207.14 (1197–1217)	Centre 1268.52 (1258–1279)
	√	√	√	-	-
QZSS	L1	L2C	L5	L6	
	Centre 1575.42 (1573–1578)	Centre 1227.6 (1226–1229)	Centre 1176.45 (1166–1187)	Centre 1278.75 (1257–1300)	
	√	-	√	-	
IRNSS	L5				
	Centre 1176.45 (1164–1189)				

	√				
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GNSS Bands and Constellations



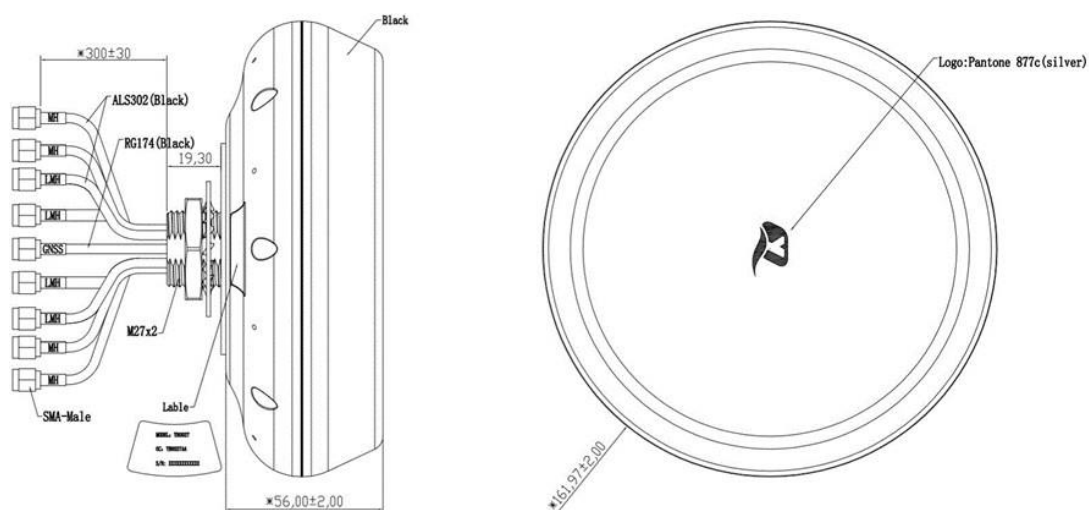
1.3. Mechanical, Environment & Storage

Mechanical		
Antenna Size		Φ 162 × 56 mm
Casing Material & Color		ASA & Black
Cable Type & Length	LMHs & MHs	ALS302 Black & 300 mm
	GNSS	RG174 Black & 300 mm
Connector Type		SMA Male
Weight		Typ. 535 g
Mounting Type		Screw (M27 Nut)
Environmental		
Operation Temperature		-40 °C to +85 °C
Humidity		Non-condensing 65 °C 95 % RH
Ingress Protection (IP) Rating		IP67 (After Installation) IP69K (After Installation)
Impact Protection (IK) Rating		IK09
RoHS & REACH Compliant		Yes
Storage		
Storage Temperature		-40 °C to +85 °C
Storage Humidity		Less than 75% RH
Storage Place		Away from corrosive gas and direct sunlight

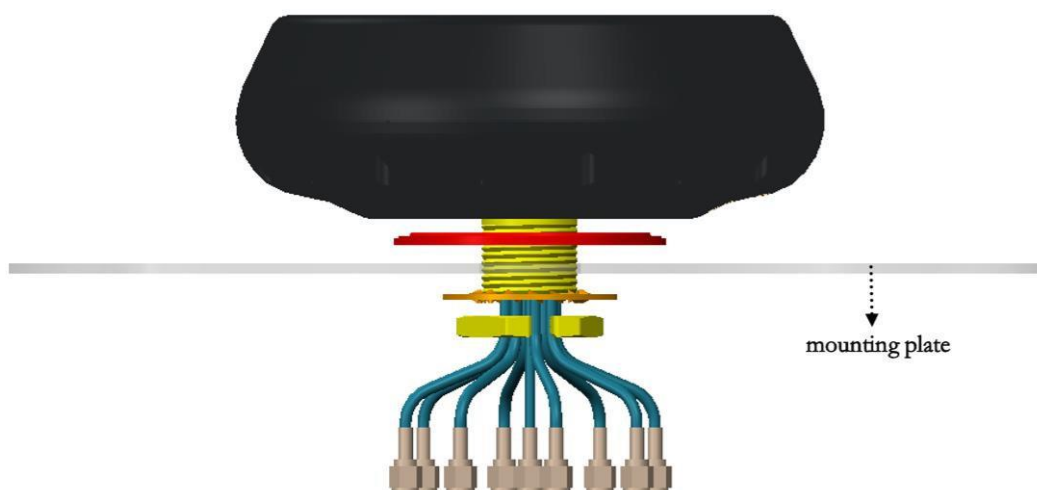
Packaging	Antennas should be stored in unopened sealed manufacturer's plastic packaging.
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- LMHs: LMH1, LMH2, LMH3, LMH4 Antennas
- MHs: MH1, MH2, MH3, MH4 Antennas
- FS: In Free Space
- MP: On 300 × 400 mm Metal Plane

2 Drawing



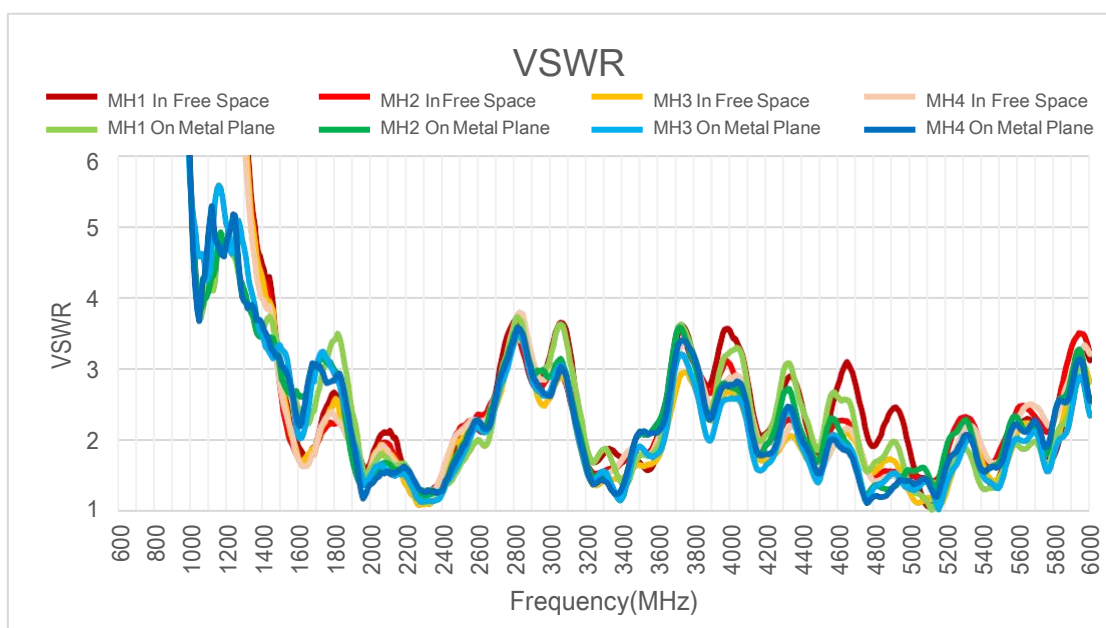
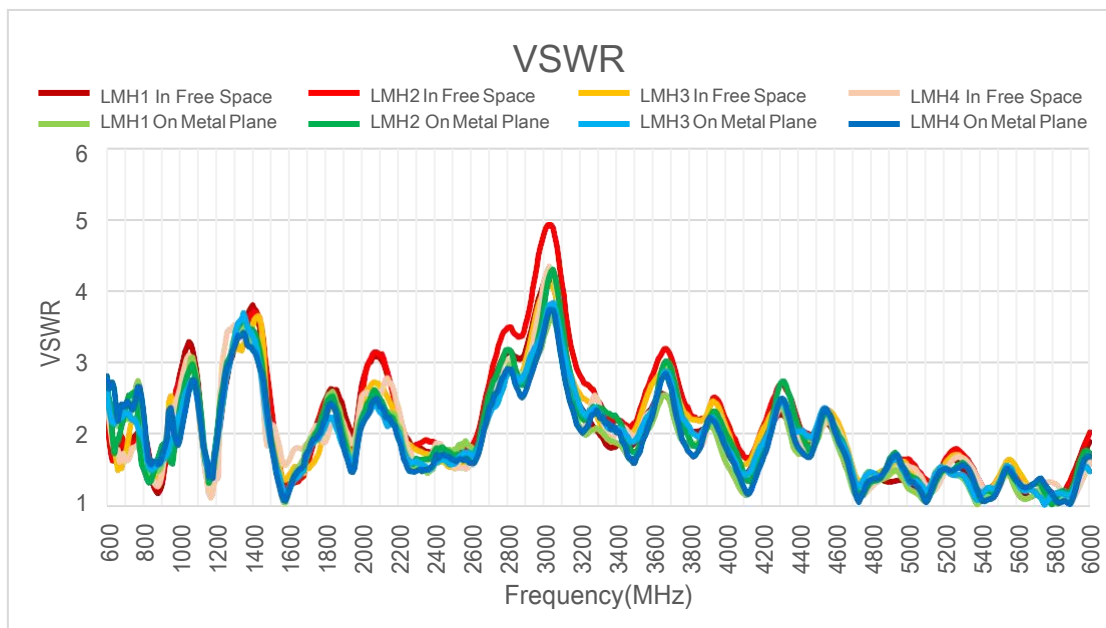
- LMHs can be connected arbitrarily, and 4 MHs can be connected arbitrarily.
- Recommended assembly hole diameter: 28.0 mm.
- Recommended mounting plane thickness: 3.0 mm.

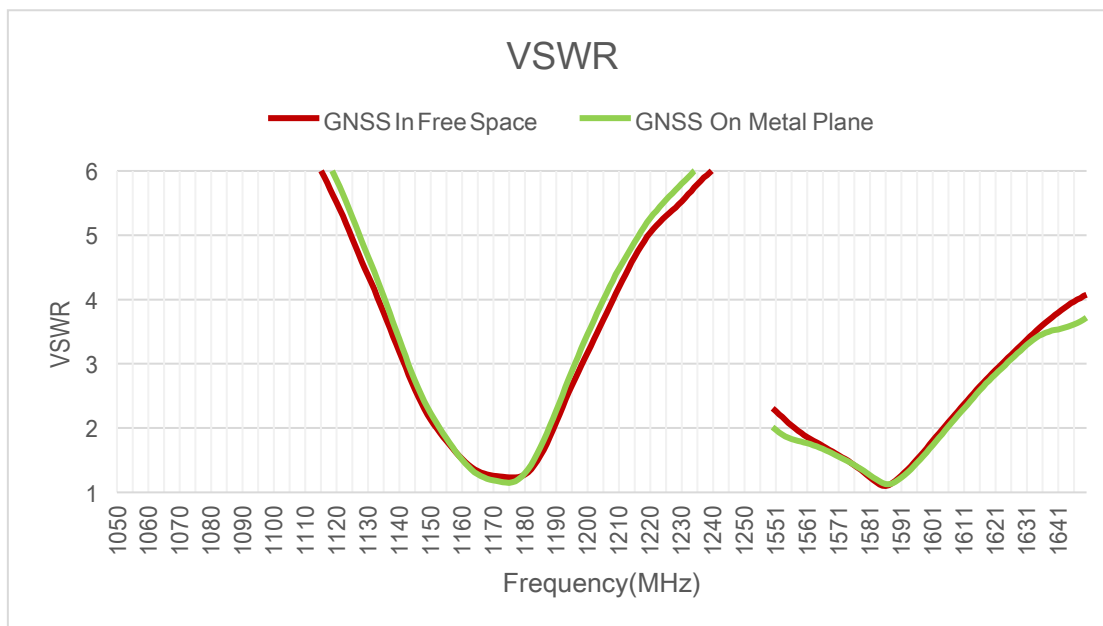


3 Detailed Performance

3.1. S-Parameter Test

3.1.1. VSWR





VSWR - LMH

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	2.4	1.8	1.8	1.6	1.3	2.3	3.5	1.8	2.1	2.5
	MP	2.6	2.4	2.2	1.5	1.6	2.1	3.0	1.9	2.0	2.3
LMH2	FS	2.3	1.6	1.8	1.7	1.4	2.3	3.6	1.7	1.9	2.2
	MP	2.7	2.0	2.5	1.3	1.8	1.6	3.2	1.8	2.0	2.2
LMH3	FS	2.7	2.0	1.8	1.4	1.5	2.4	3.6	1.5	1.6	2.2
	MP	2.6	2.2	2.3	1.5	1.6	1.9	2.9	1.8	1.9	1.9
LMH4	FS	2.6	1.9	1.6	1.6	1.4	2.2	3.0	1.9	2.1	2.3
	MP	2.8	2.7	2.5	1.6	1.7	2.2	2.9	1.8	1.9	2.1
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
LMH1	FS	2.0	2.8	1.8	1.8	1.8	2.4	1.3	1.3	1.4	1.9
	MP	1.6	2.3	1.5	1.7	1.8	2.2	1.2	1.2	1.3	1.7
LMH2	FS	1.8	2.9	1.9	1.8	1.8	2.8	1.5	1.7	1.4	2.0
	MP	1.5	2.3	1.7	1.8	1.7	2.3	1.4	1.4	1.3	1.7
LMH3	FS	1.6	2.5	1.7	1.6	1.7	2.7	1.5	1.6	1.4	1.6
	MP	1.6	2.1	1.6	1.7	1.7	2.4	1.4	1.4	1.3	1.5
LMH4	FS	1.9	2.8	1.6	1.8	1.6	2.3	1.5	1.6	1.2	1.6

	MP	1.5	2.2	1.5	1.7	1.6	2.3	1.3	1.4	1.3	1.7
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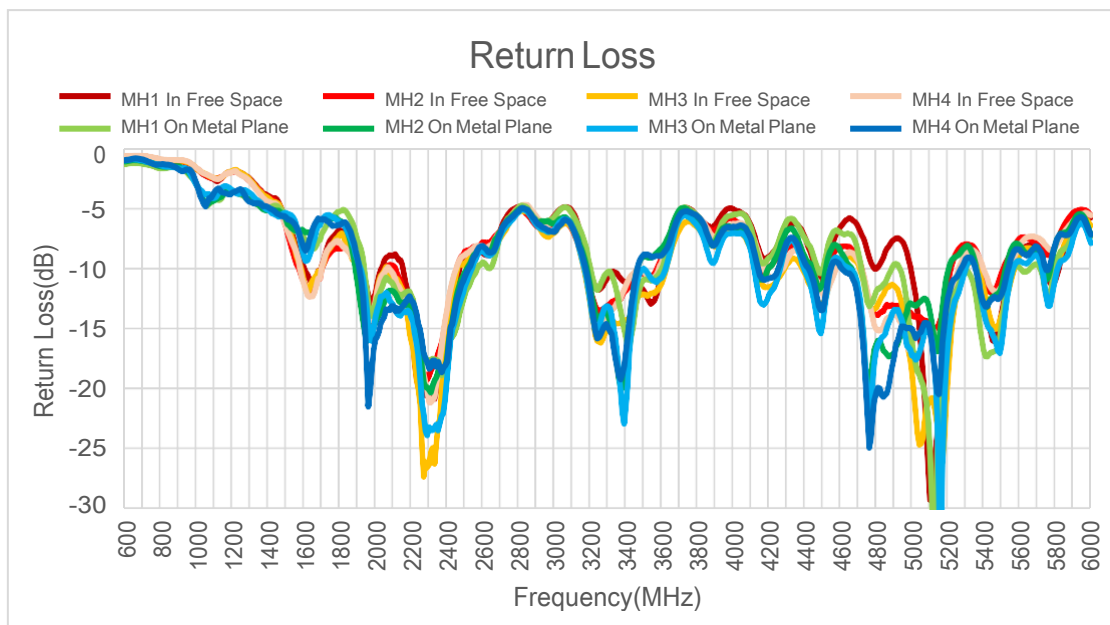
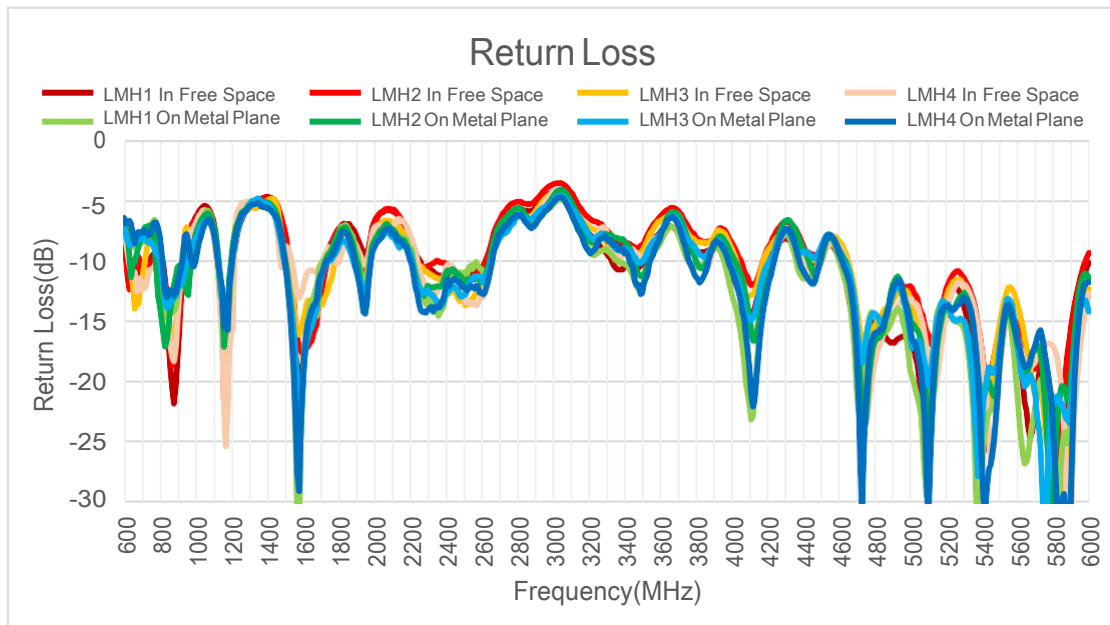
VSWR - MH

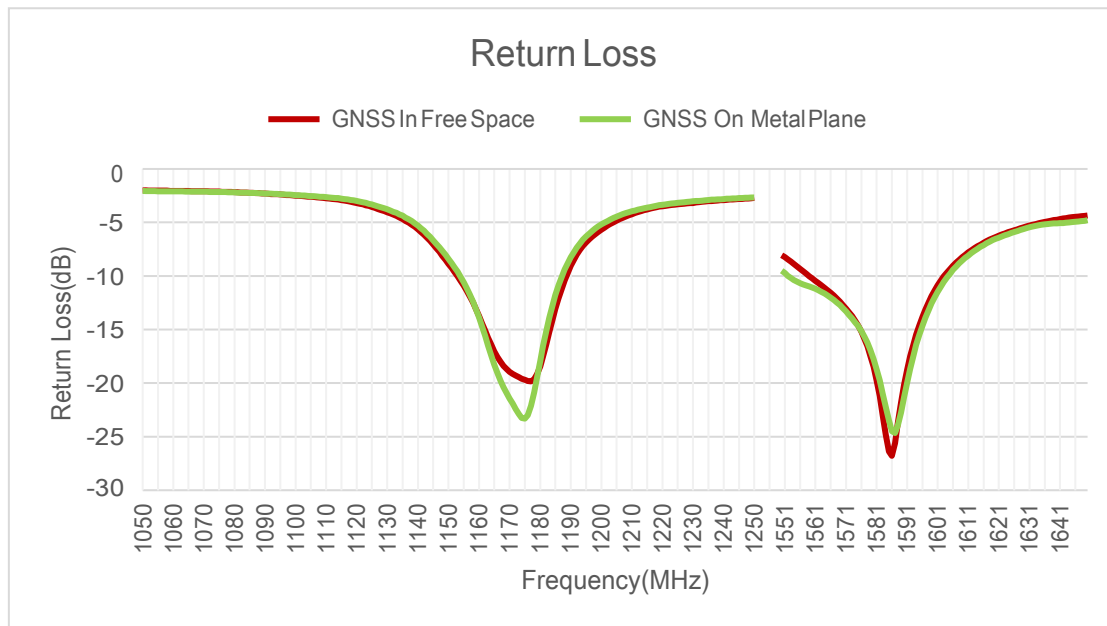
Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	4.3	2.0	2.4	2.2
	MP	-	-	-	-	-	-	3.7	2.7	3.0	2.8
MH2	FS	-	-	-	-	-	-	4.0	2.0	2.1	2.1
	MP	-	-	-	-	-	-	3.5	3.1	3.1	2.0
MH3	FS	-	-	-	-	-	-	4.0	2.0	2.2	2.0
	MP	-	-	-	-	-	-	3.2	3.1	3.2	2.3
MH4	FS	-	-	-	-	-	-	3.9	2.0	2.2	2.1
	MP	-	-	-	-	-	-	3.4	3.0	2.9	2.3
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
MH1	FS	1.7	2.0	1.2	1.7	2.2	1.9	2.8	1.8	1.5	3.1
	MP	1.7	1.6	1.3	1.4	2.0	1.9	2.2	1.4	1.4	2.5
MH2	FS	1.5	1.8	1.3	1.9	2.4	2.1	2.1	1.5	1.9	3.2
	MP	1.4	1.6	1.3	1.6	2.2	2.2	1.7	1.6	1.7	2.6
MH3	FS	1.5	1.7	1.2	1.9	2.3	1.8	2.0	1.3	1.5	2.8
	MP	1.6	1.5	1.1	1.5	2.2	1.8	1.7	1.3	1.4	2.3
MH4	FS	1.6	1.7	1.3	1.9	2.3	2.0	2.0	1.4	1.7	3.2
	MP	1.3	1.5	1.3	1.6	2.3	2.1	1.6	1.4	1.7	2.6

VSWR

Frequency (MHz)		1176	1227	1561	1575	1602
GNSS	FS	1.2	-	1.9	1.5	1.9
	MP	1.2	-	1.8	1.5	1.8

3.1.2. Return Loss





Return Loss (dB)

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
LMH1	FS	-7.6	-11.0	-11.2	-13.2	-18.3	-8.2	-5.1	-10.7	-9.3	-7.4
	MP	-7.0	-7.6	-8.5	-13.7	-12.8	-8.8	-6.0	-10.1	-9.5	-8.0
LMH2	FS	-8.0	-12.4	-11.0	-11.4	-16.3	-7.9	-4.9	-12.2	-9.9	-8.5
	MP	-6.7	-9.4	-7.5	-17.1	-10.6	-12.9	-5.7	-11.0	-9.6	-8.6
LMH3	FS	-6.8	-9.8	-10.8	-15.3	-13.7	-7.8	-4.9	-13.7	-12.5	-8.7
	MP	-7.0	-8.7	-8.1	-13.4	-12.4	-9.9	-6.2	-11.1	-10.2	-9.9
LMH4	FS	-7.2	-10.3	-12.3	-12.3	-14.9	-8.5	-6.0	-10.2	-9.0	-8.3
	MP	-6.4	-6.7	-7.5	-12.5	-11.9	-8.5	-6.2	-11.0	-9.9	-9.2
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
LMH1	FS	-9.8	-6.4	-11.1	-11.3	-10.8	-7.6	-17.7	-17.3	-15.8	-10.2
	MP	-12.5	-8.0	-14.0	-11.5	-10.7	-8.5	-20.7	-19.1	-17.6	-11.6
LMH2	FS	-10.9	-6.3	-10.0	-11.2	-10.7	-6.4	-14.3	-12.1	-15.9	-9.4
	MP	-14.1	-8.2	-12.1	-10.8	-11.8	-8.0	-15.3	-14.8	-18.5	-11.4
LMH3	FS	-12.2	-7.3	-11.5	-12.6	-12.0	-6.7	-13.8	-13.3	-15.3	-12.3
	MP	-13.0	-9.0	-13.3	-12.2	-11.5	-7.8	-15.3	-16.3	-17.1	-14.2
LMH4	FS	-10.3	-6.5	-12.7	-11.0	-13.0	-8.0	-14.7	-13.2	-19.1	-12.7

	MP	-14.4	-8.4	-13.9	-11.5	-12.7	-8.0	-17.6	-15.5	-18.3	-11.8
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Return Loss(dB)

Frequency (MHz)		600	630	710	830	900	960	1440	1710	1740	1880
MH1	FS	-	-	-	-	-	-	-9.3	-7.8	-8.4	-8.4
	MP	-	-	-	-	-	-	-6.9	-6.0	-6.6	-6.6
MH2	FS	-	-	-	-	-	-	-9.7	-8.8	-8.9	-8.9
	MP	-	-	-	-	-	-	-5.9	-5.7	-9.3	-9.3
MH3	FS	-	-	-	-	-	-	-9.6	-8.4	-9.4	-9.4
	MP	-	-	-	-	-	-	-5.8	-5.5	-8.3	-8.3
MH4	FS	-	-	-	-	-	-	-9.4	-8.3	-9.2	-9.2
	MP	-	-	-	-	-	-	-6.0	-6.2	-7.9	-7.9
Frequency (MHz)		1950	2140	2350	2450	2600	3600	4700	5000	5500	6000
MH1	FS	-9.3	-19.7	-11.6	-8.7	-10.3	-6.6	-10.6	-13.7	-5.8	-5.8
	MP	-12.4	-17.8	-15.0	-9.5	-10.0	-8.7	-16.2	-14.8	-7.3	-7.3
MH2	FS	-11.1	-17.1	-10.3	-7.8	-9.1	-9.2	-13.8	-10.4	-5.6	-5.6
	MP	-12.9	-18.6	-12.6	-8.3	-8.3	-11.9	-13.0	-11.6	-7.1	-7.1
MH3	FS	-11.5	-23.0	-10.4	-8.2	-11.2	-9.7	-18.7	-13.9	-6.4	-6.4
	MP	-14.0	-23.5	-14.0	-8.6	-10.8	-11.7	-17.3	-16.5	-7.9	-7.9
MH4	FS	-11.8	-18.8	-10.0	-8.2	-9.5	-9.4	-16.3	-11.5	-5.6	-5.6
	MP	-13.4	-17.8	-12.9	-8.1	-8.9	-12.9	-15.0	-12.2	-7.2	-7.2

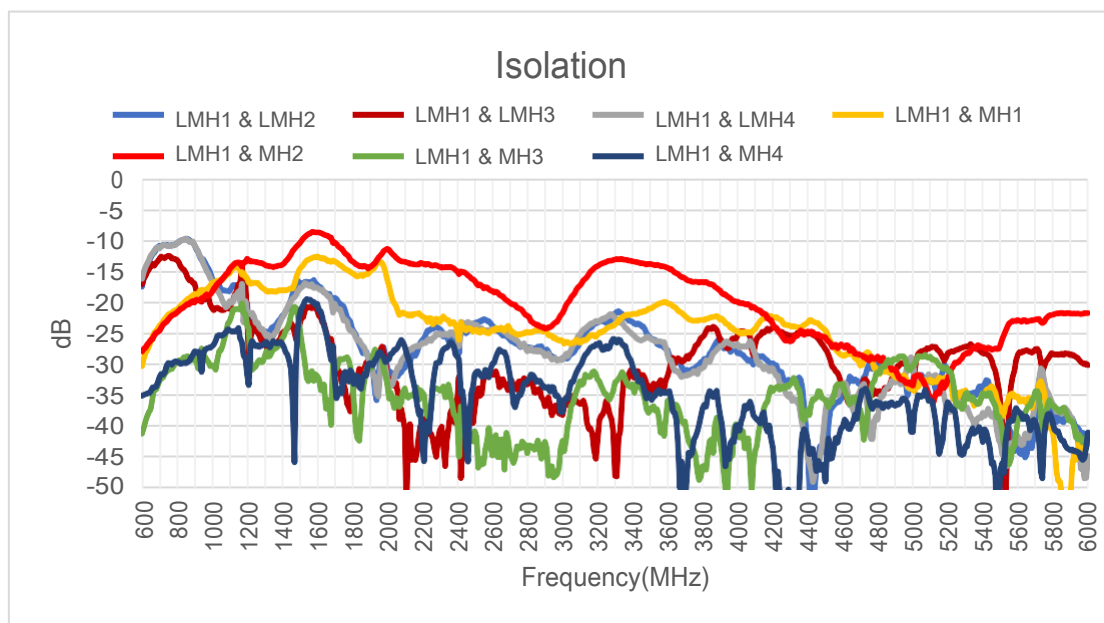
Return Loss(dB)

Frequency (MHz)		1176	1227	1561	1575	1602
GNSS	FS	-19.8	-	-10.5	-14.6	-10.4
	MP	-23.0	-	-11.2	-14.7	-11.0

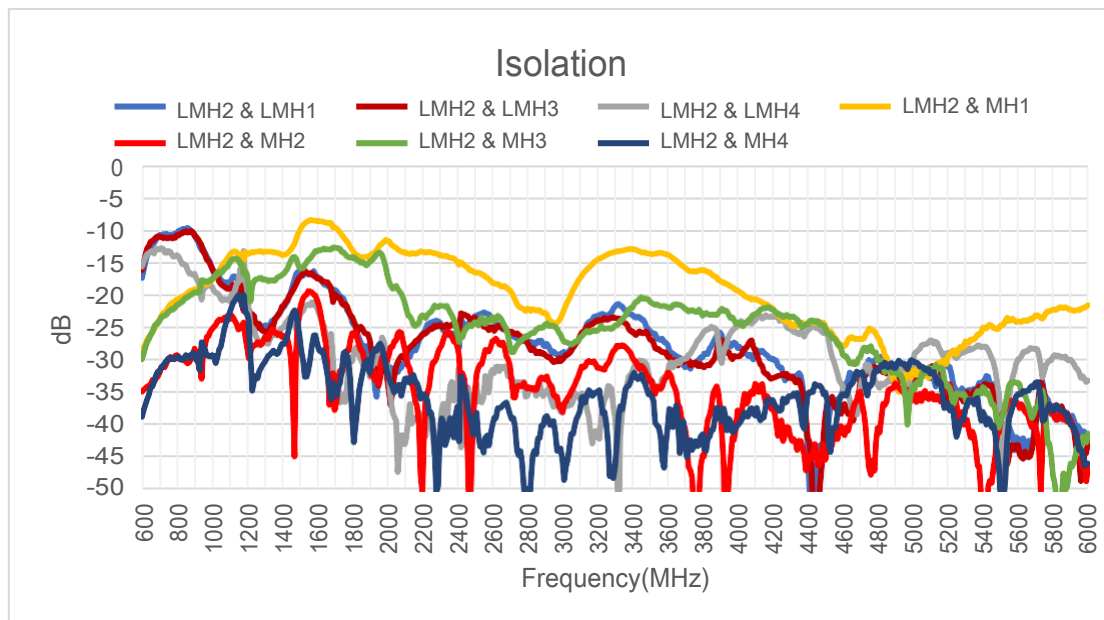
3.1.3. Isolation

3.1.3.1. Test Status: In Free Space

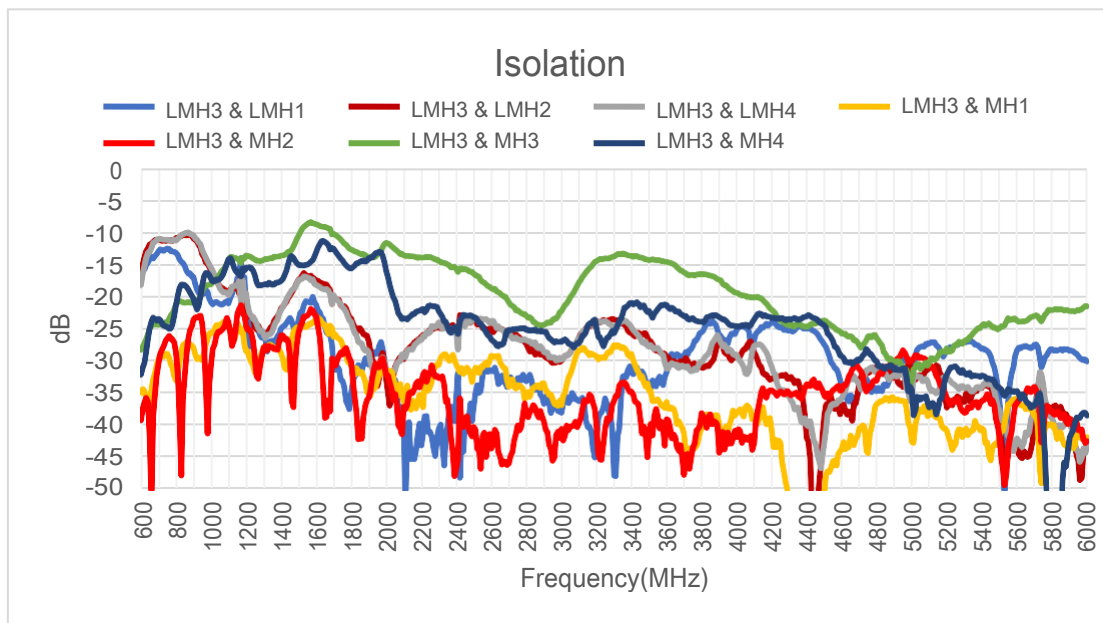
3.1.3.1.1. LMH1



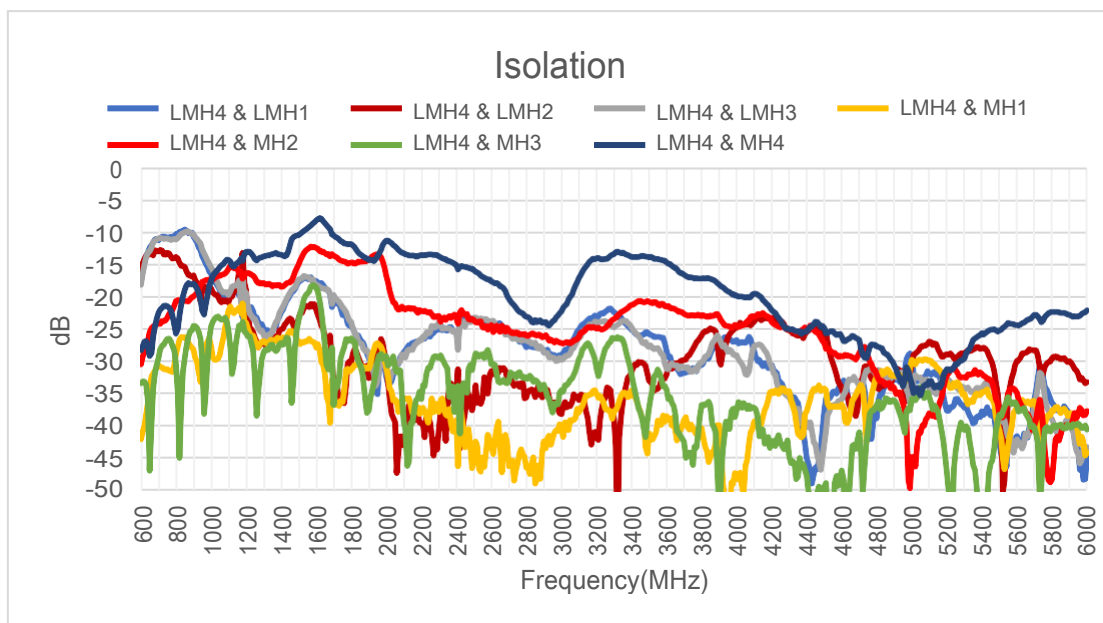
3.1.3.1.2. LMH2



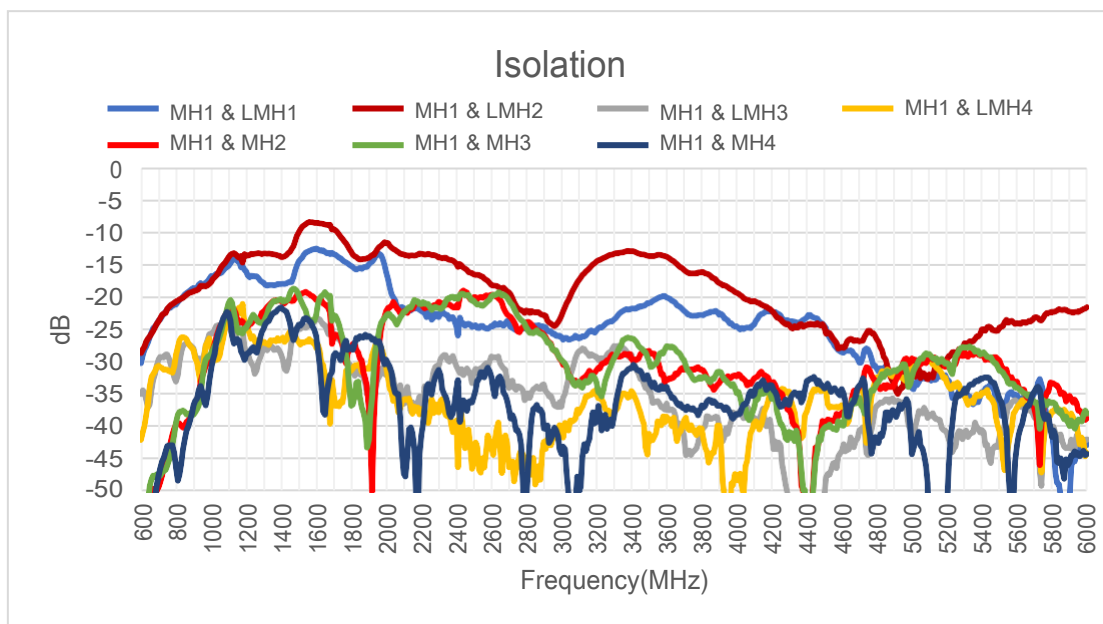
3.1.3.1.3. LMH3



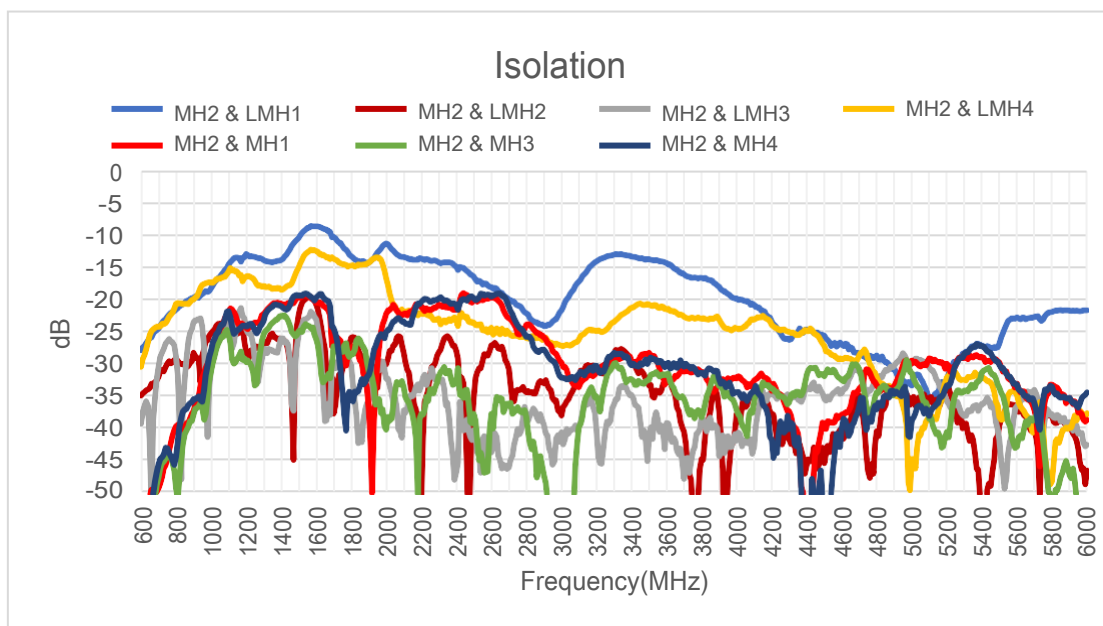
3.1.3.1.4. LMH4



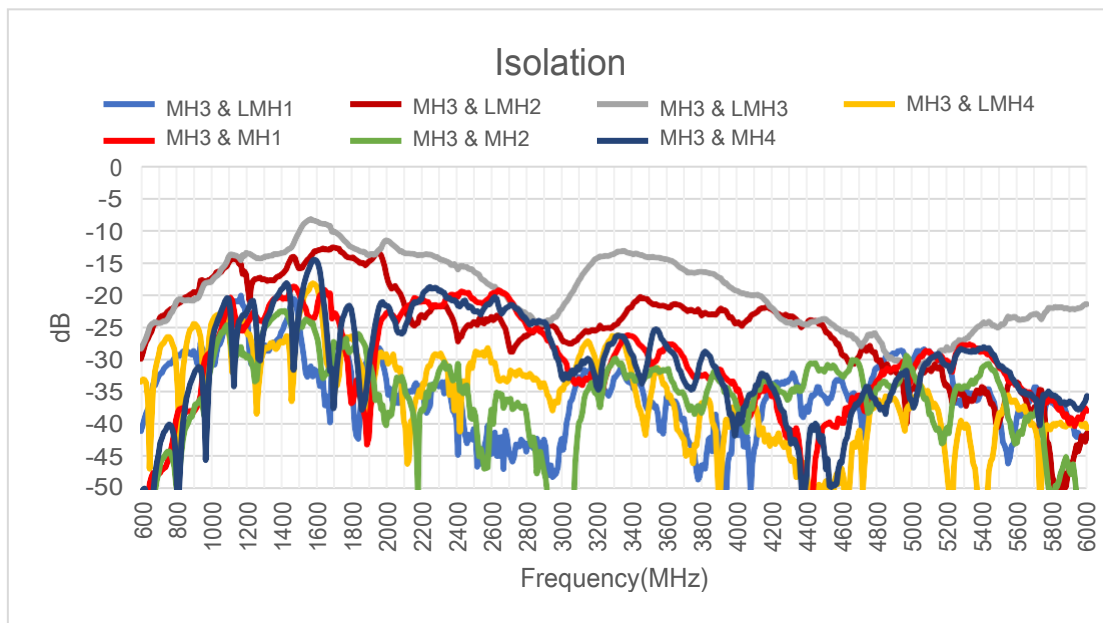
3.1.3.1.5. MH1



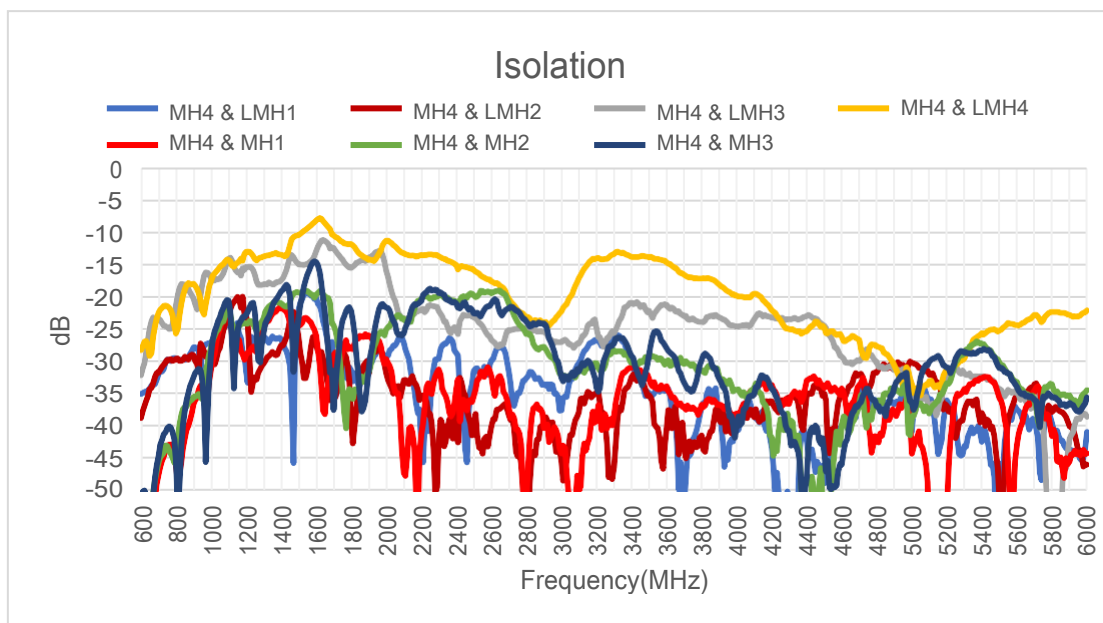
3.1.3.1.6. MH2



3.1.3.1.7. MH3

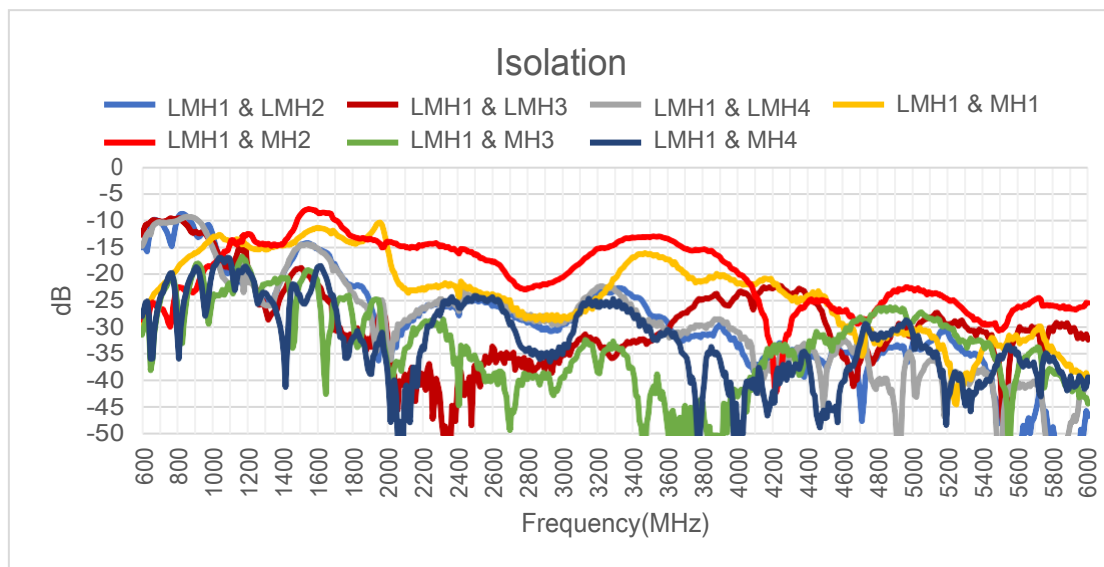


3.1.3.1.8. MH4

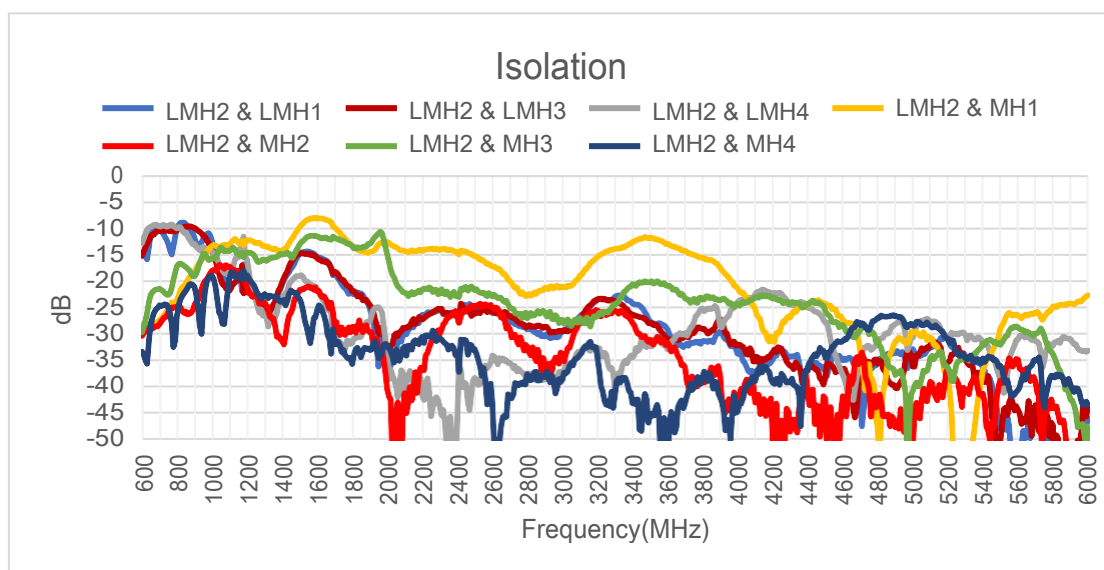


3.1.3.2. Test Status: On 300 × 400 mm Metal Plane

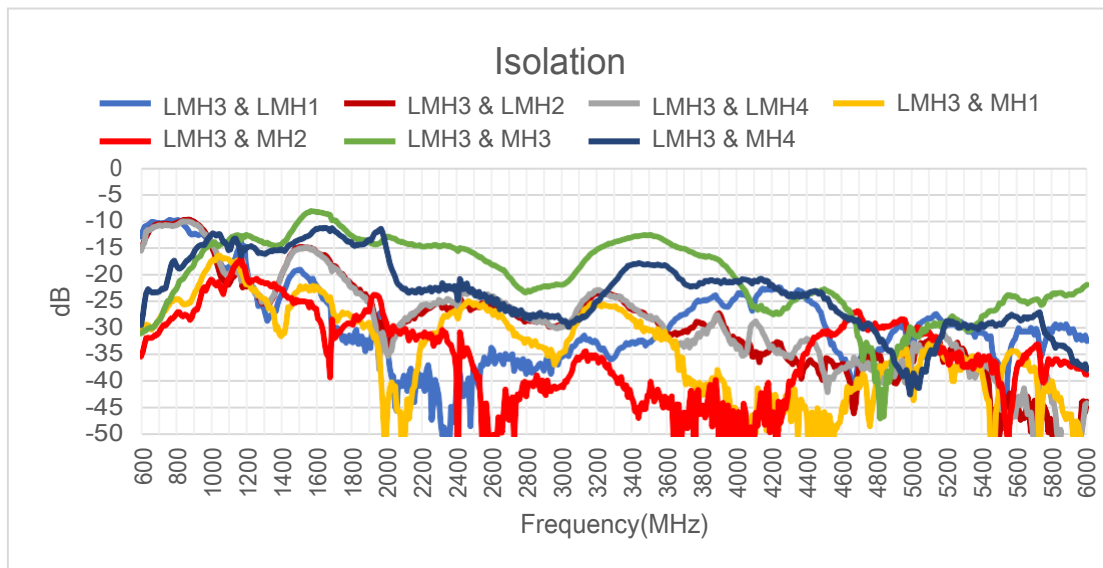
3.1.3.2.1. LMH1



3.1.3.2.2. LMH2



3.1.3.2.3. LMH3



3.1.3.2.4. LMH4

