

Antenna for Sub6 compatible 4G and 5G wireless modules

**FMS5G-H2.5M-BP2.5D / FMS5G-H5M-BP2.5D
Specification**

Rev. 1.3

**19/10/2021
Nissei Limited**

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Revision Details

Rev. No.	Date	Contents/Purpose
1.0	18/01/2021	First Issue
1.1	26/04/2021	Changed the mounting with magnet to double-sided tape mounting. 1.1 Antenna Basic Specification: Changes are shown in bold blue. 1.3 Antenna Configuration and Mounting Position of Cable: Replacement of drawings 1.6 Packing Specification: Replacement of drawings
1.2	6/08/2021	The following changes due to the addition of Band39 data 1.1 Antenna Basic Specification 1.4.1 VSWR value of FMS5G-H2.5M-BP2.5D 1.4.2 VSWR value of FMS5G-H5M-BP2.5D 1.5.1 Antenna gain of FMS5G-H2.5M-BP2.5D 1.5.2 Antenna gain of FMS5G-H5M-BP2.5D
1.3	19/10/2021	Added 5 frequency gains of 2496,2690,4600,4800,4900MHz Change the following 1.1 Antenna Basic Specification 1.4.1 VSWR value of FMS5G-H2.5M-BP2.5D 1.5.1 Antenna gain of FMS5G-H2.5M-BP2.5D

1. Antenna Specification

This specification is compatible with 4G and 5G wireless modules and describes antennas with cable lengths of 2.5m and 5m.

1.1 Antenna Basic Specification

① Product Name

FMS5G-H2.5M-BP2.5D
FMS5G-H5M-BP2.5D

② Basic Specification

Items		Specification		Remarks
Product name		FMS5G-H2.5M-BP2.5D	FMS5G-H5M-BP2.5D	When used with 4x4 MIMO, 4 units are required for each.
Individual product name of each antenna		Cable length 2.5m antenna	Cable length 5m antenna	Antenna patterns can be used for both the main and sub antennas.
Antenna mounting way		-8		The standard product is "combination of double-sided tape and screw mounting".
Form and Composition		Single Form (V), $\lambda/2$		-
Size	Antenna pattern	34.0mm × 68.0mm × 0.7mm		See 1.2 "Antenna Pattern Configuration"
	Antenna configuration	80mm × 40mm × 20mm		See 1.3 "Antenna Configuration and Mounting Position of Cable"
Weight		Approx 93g	Approx 157g	Typical incide cable
Operation Frequency [MHz]	Band28	703~748, 758~803		Measured both upward and downward frequencies. Both frequencies are operatable for both main antenna and for sub antenna.
	Band26	814~849, 859~894		
	Band18	815~830, 860~875		
	Band19	830~845, 875~890		
	Band8	880~915, 925~960		
	Band11	1428~1448, 1476~1496		
	Band21	1448~1463, 1496~1511		
	Band3	1710~1785, 1805~1880		
	Band1	1920~1980, 2110~2170		
	*1 Band39	1880~1920		
	Band41	2496~2690		
	Band42	3400~3560		
	n77	3300~4200		
	n78	3300~3800		
	n79	4400~5000		
GPS	1575.42			
*2 Local 5G	4600~4800, 4800~4900			
IEEE802.11b	2400~2485			
VSWR		See 1.4.1 "VSWR value of FMS5G-H2.5M-BP2.5D"	See 1.4.2 "VSWR value of FMS5G-H5M-BP2.5D"	-
Isolation		See 1.5.3 "Isolation"		-
Maximum Gain [dBi]	Band28	1.73	-0.29	See 1.5.1 "Antenna gain of FMS5G-H2.5M-BP2.5D"
	Band26	1.09	-0.83	
	Band18	0.95	-0.92	
	Band19	1.09	-0.83	
	Band8	1.09	-0.60	
	Band11	-0.57	-6.22	
	Band21	-0.30	-6.65	
	Band3	2.35	-0.24	
	Band1	2.50	-0.59	
	*1 Band39	2.36	-0.24	
	*2 Band41	-2.38	-	
	Band42	1.93	-0.51	See 1.5.2 "Antenna gain of FMS5G-H5M-BP2.5D"
	n77	2.86	-0.42	
	n78	2.86	-0.42	
	*2 n79	2.47	-1.43	
GPS	-	-		
*2 Local 5G	2.47	-		
IEEE802.11b	-	-		
Characteristic Impedance		50 Ω		-
Plane of Polarization		Vertical Polarization		-
Directivity		Nondirectional		-
Mounting way	Screw	○		Screws are not included.
	Double-sided tape	○		-
Connector		SMA-P		-
Cable	Length	2.5m	5m	-
	Diameter	Cable diameter: ϕ 3.8mm (2.5D)		
	Color	Black		
	Minimum bending radius	30mm or more		
Attenuation		See 1.5.4 "Cable attenuation"		-
Antenna case		Polycarbonate resin		-
Antenna pasting adhesive		Case color: Black		-
Antenna board material		Synthetic rubber		-
Antenna board material		Glass epoxy material, 0.3mm		-
Antenna board material		Double sided copper foil, 18/18micron		-
Operation environment	Power handling capability	1W		-
	Operation temperature	-30°C~90°C		-
	Storage temperature	-40°C~110°C		-
	Waterproof property	○ (Equivalent to IP67)		-
	Mounting at outdoor	○		-
	Mounting on metal plate	○		-
	Electrostatic resistance	DC \pm 7.5kV		-
	Lightning countermeasure	-		-
Vibration condition		After adding vibration at an acceleration of 19.6 m/s ² (2G) and a vibration frequency of 30 Hz to 100 Hz (1 sweep time: 20 minutes) from up to down, from side to side and from front to back, there shall be no damage to each part, no dropping of parts, and no functional or performance problems.		-
Environmental countermeasure		RoHS Compliant: ○		-
Packing		1pc/bag, 10pcs/small box, 5small boxes(50pcs) /large box		See 1.6 "Packing Specification"

*1:Changed in V1.2

*2:Changed in V1.3

③ Manufacturer
Faverights,inc.

④ Method for Product Name

	Series name	Cable length	Case color	Cable specifications	Mounting way
Product name	FMS5G	H2.5M/H5M	-BP	2.5D	-8
Specifications	Sub6 compatible antenna for 4G and 5G	2.5M:2.5m	Black color polycarbonate resin	2.5D cable	Bottom plate for mounting with double-sided tape /screw
		5M:5m			

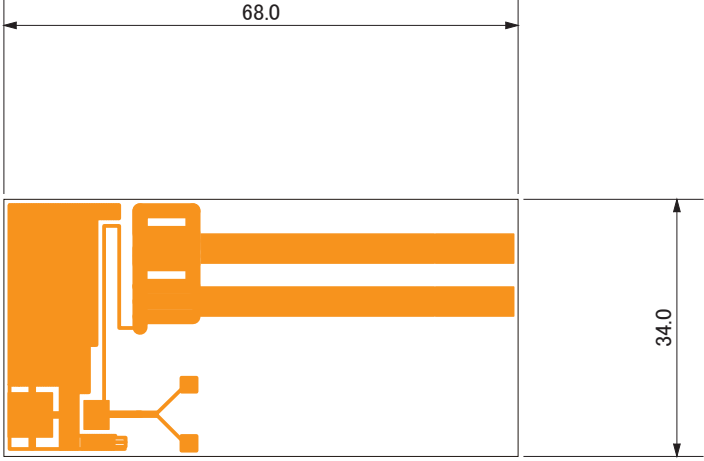
⑤ Warranty Period
Warranty Period: 1 year after delivery
Product life cycle is 7 years

⑥ Note and Caution

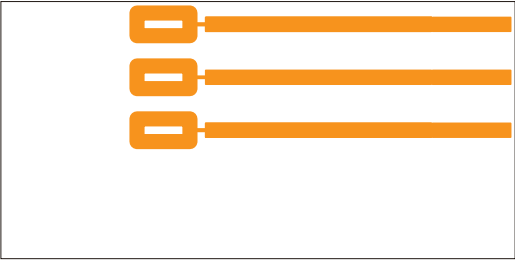
- **Since the high-frequency radio waves are straight and it is difficult to communicate from the back side where radio waves such as metal plates do not pass, we stopped installing magnets.**
- The 2.5m model and the 5m model use the same antenna pattern and the same cable specifications.
- Change the position of the antenna in a place where the radio wave condition of the mobile phone is poor.
- When connecting the antenna to an extension cable, you are responsible for considering the attenuation rate of the cable.
- As a phenomenon peculiar to wireless devices, wireless communication may become unavailable or unstable because of natural phenomena.
- Ensure system redundancy if there is a potential for high loss due to communication failures.
- Do not reuse the antenna. It will cause contact failure of the connector.
- Keep a distance between the antennas for use in MIMO.
Isolation with other radios when other radios are nearby is not guaranteed.
- This product is not designed for overseas use.
For overseas use, we will quote separately after discussing the applicable regulations.
- The specifications may be changed because of unavoidable circumstances.
- The maximum amount of damages is the product price.

1.2 Antenna Board Configuration

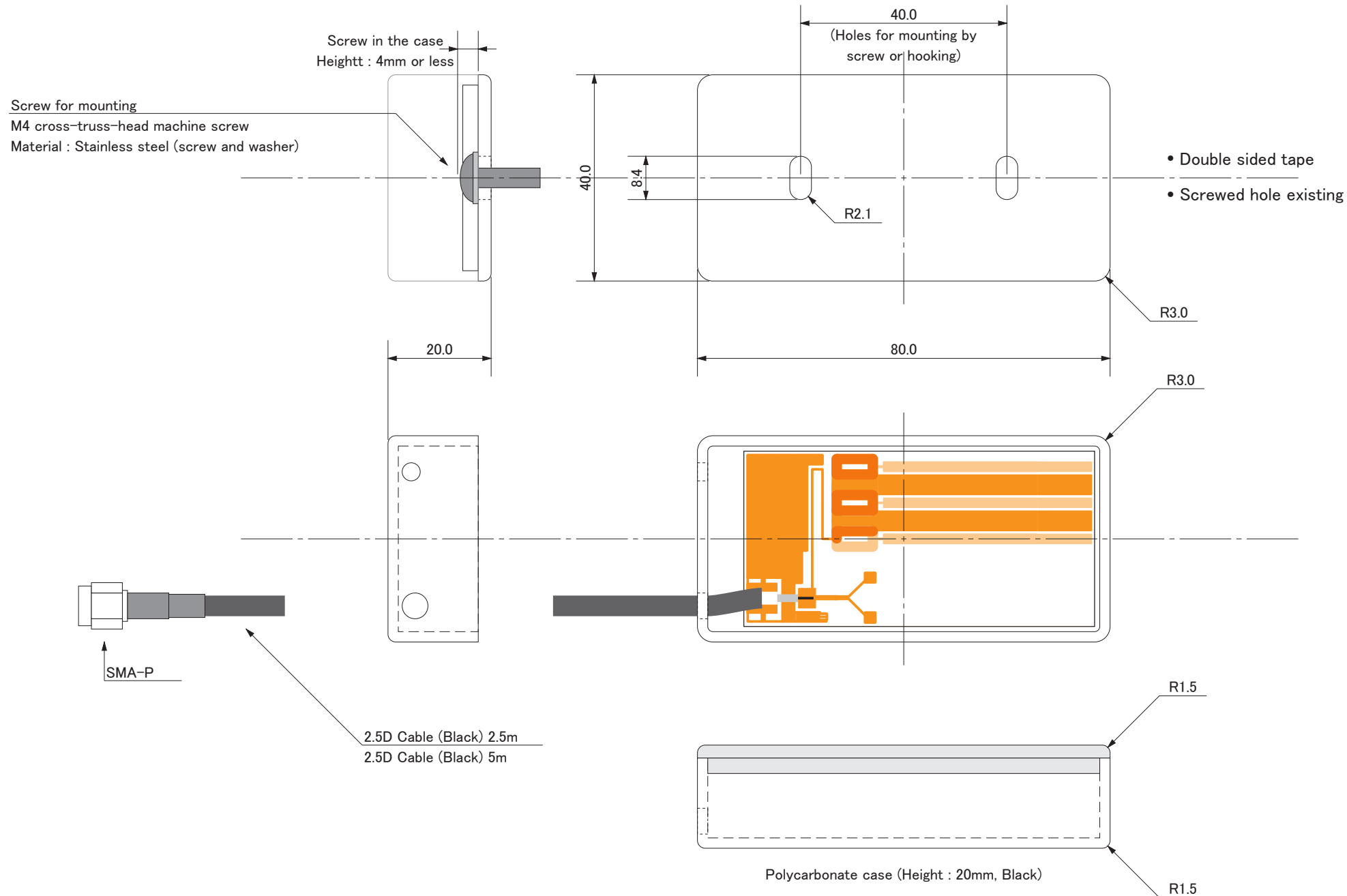
Solder side
(topview)



Component side
(through-view)



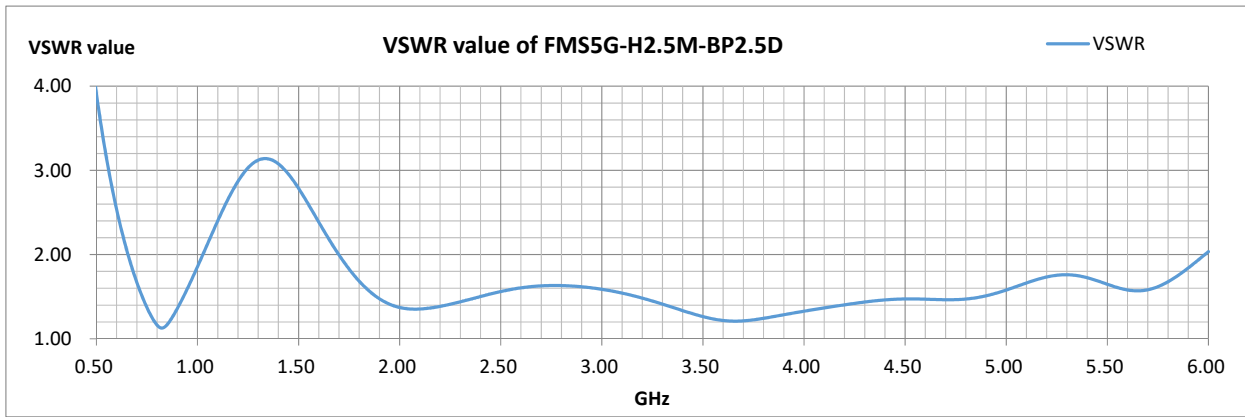
1.3 Antenna Configuration and Mounting Position of Cable



1.4 VSWR value

1.4.1 VSWR value of FMS5G-H2.5M-BP2.5D

① VSWR value diagram of FMS5G-H2.5M-BP2.5D



② Minimum and maximum VSWR value for each frequency band of FMS5G-H2.5M-BP2.5D

Band	Operation Frequency(MHz)	Min	Max	Remark
Band28	703~748、758~803	1.15	1.67	-
	718~728、773~783	1.21	1.57	au
	728~738、783~793	1.18	1.51	docomo
	738~748、793~803	1.15	1.45	Softbank
Band26	814~849、859~894	1.13	1.34	-
Band18	815~830、860~875	1.13	1.25	au
Band19	830~845、875~890	1.13	1.32	docomo
Band8	880~915、925~960	1.27	1.65	-
	900~915、945~960	1.36	1.65	Softbank
Band11	1428~1448、1476~1496	2.79	3.02	-
	1428~1438、1476~1486	2.82	3.02	Softbank
	1438~1448、1486~1495	2.80	3.00	au
Band21	1448~1463、1496~1511	2.73	2.97	docomo
Band3	1710~1785、1805~1880	1.51	1.96	-
	1710~1730、1805~1825	1.62	1.96	au
	1750~1765、1845~1860	1.55	1.83	Softbank
	1765~1785、1860~1880	1.51	1.78	docomo
Band1	1920~1980、2110~2170	1.36	1.45	-
	1920~1940、2110~2130	1.36	1.45	au
	1940~1960、2130~2150	1.36	1.42	docomo
	1960~1980、2150~2170	1.37	1.40	Softbank
*1 Band39	1880~1920	1.45	1.51	-
Band41	2496~2690	1.56	1.63	-
	2545~2575	1.58	1.60	Wireless City P(SB)
	2595~2645	1.60	1.62	UQ(au)
Band42	3400~3560	1.23	1.33	-
	3400~3440	1.30	1.33	Softbank
	3440~3480	1.28	1.30	docomo
	3480~3520	1.25	1.28	docomo
	3520~3540	1.24	1.25	au
	3540~3560	1.23	1.24	au
n77	3300~4200	1.21	1.41	-
	3600~3700	1.21	1.22	docomo
	3700~3800	1.21	1.24	au
	3800~3900	1.24	1.29	らくてん
	3900~4000	1.29	1.33	Softbank
	4000~4100	1.33	1.37	au
n78	3300~3800	1.21	1.41	-
	3400~3440	1.30	1.33	Softbank
	3440~3480	1.28	1.30	docomo
	3480~3520	1.25	1.28	docomo
	3520~3540	1.24	1.25	au
	3540~3560	1.23	1.24	au
	3600~3700	1.21	1.22	docomo
3700~3800	1.21	1.24	au	
n79	4400~5000	1.46	1.58	-
	4500~4600	1.47	1.47	docomo
GPS	1575.42	2.49	-	-
*2 Local 5G	4600~4800、4800~4900	1.46	1.51	-
IEEE802.11b	2400~2485	1.50	1.55	-

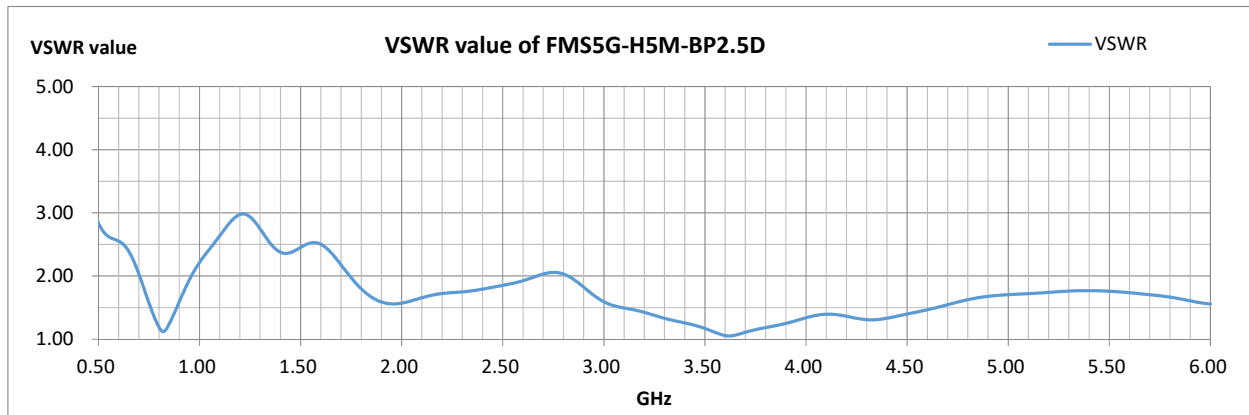
Note: Measurements are made in the time domain method.

*1: Changed in V1.2

*2: Changed in V1.3

1.4.2 VSWR value of FMS5G-H5M-BP2.5D

① VSWR value diagram of main antenna



② Minimum and maximum VSWR value for each frequency band of the main antenna

Band	Operation Frequency(MHz)	Min	Max	Remark
Band28	703~748、758~803	1.16	2.03	-
	718~728、773~783	1.29	1.90	au
	728~738、783~793	1.22	1.80	docomo
	738~748、793~803	1.16	1.71	Softbank
Band26	814~849、859~894	1.12	1.56	-
Band18	815~830、860~875	1.12	1.41	au
Band19	830~845、875~890	1.14	1.52	docomo
Band8	880~915、925~960	1.45	2.00	-
	900~915、945~960	1.59	2.00	Softbank
Band11	1428~1448、1476~1496	2.36	2.45	-
	1428~1438、1476~1486	2.36	2.43	Softbank
	1438~1448、1486~1495	2.36	2.44	au
Band21	1448~1463、1496~1511	2.37	2.48	docomo
Band3	1710~1785、1805~1880	1.61	2.14	-
	1710~1730、1805~1825	1.73	2.14	au
	1750~1765、1845~1860	1.65	1.97	Softbank
	1765~1785、1860~1880	1.61	1.92	docomo
Band1	1920~1980、2110~2170	1.56	1.71	-
	1920~1940、2110~2130	1.56	1.68	au
	1940~1960、2130~2150	1.56	1.70	docomo
	1960~1980、2150~2170	1.56	1.71	Softbank
*1 Band39	1880~1920	1.57	1.61	-
Band41	2496~2690	1.85	2.02	-
	2545~2575	1.88	1.90	Wireless City P(SB)
	2595~2645	1.92	1.97	UQ(au)
Band42	3400~3560	1.10	1.26	-
	3400~3440	1.23	1.26	Softbank
	3440~3480	1.19	1.23	docomo
	3480~3520	1.15	1.19	docomo
	3520~3540	1.12	1.15	au
n77	3540~3560	1.10	1.12	au
	3300~4200	1.05	1.40	-
	3600~3700	1.05	1.11	docomo
	3700~3800	1.11	1.18	au
	3800~3900	1.18	1.25	らくてん
n78	3900~4000	1.25	1.34	Softbank
	4000~4100	1.34	1.40	au
	3300~3800	1.05	1.33	-
	3400~3440	1.23	1.26	Softbank
	3440~3480	1.19	1.23	docomo
	3480~3520	1.15	1.19	docomo
	3520~3540	1.12	1.15	au
3540~3560	1.10	1.12	au	
n79	3600~3700	1.05	1.11	docomo
	3700~3800	1.11	1.18	au
GPS	4400~5000	1.33	1.71	-
	4500~4600	1.40	1.47	docomo
IEEE802.11b	1575.42	2.53	-	-
IEEE802.11b	2400~2485	1.79	1.84	-

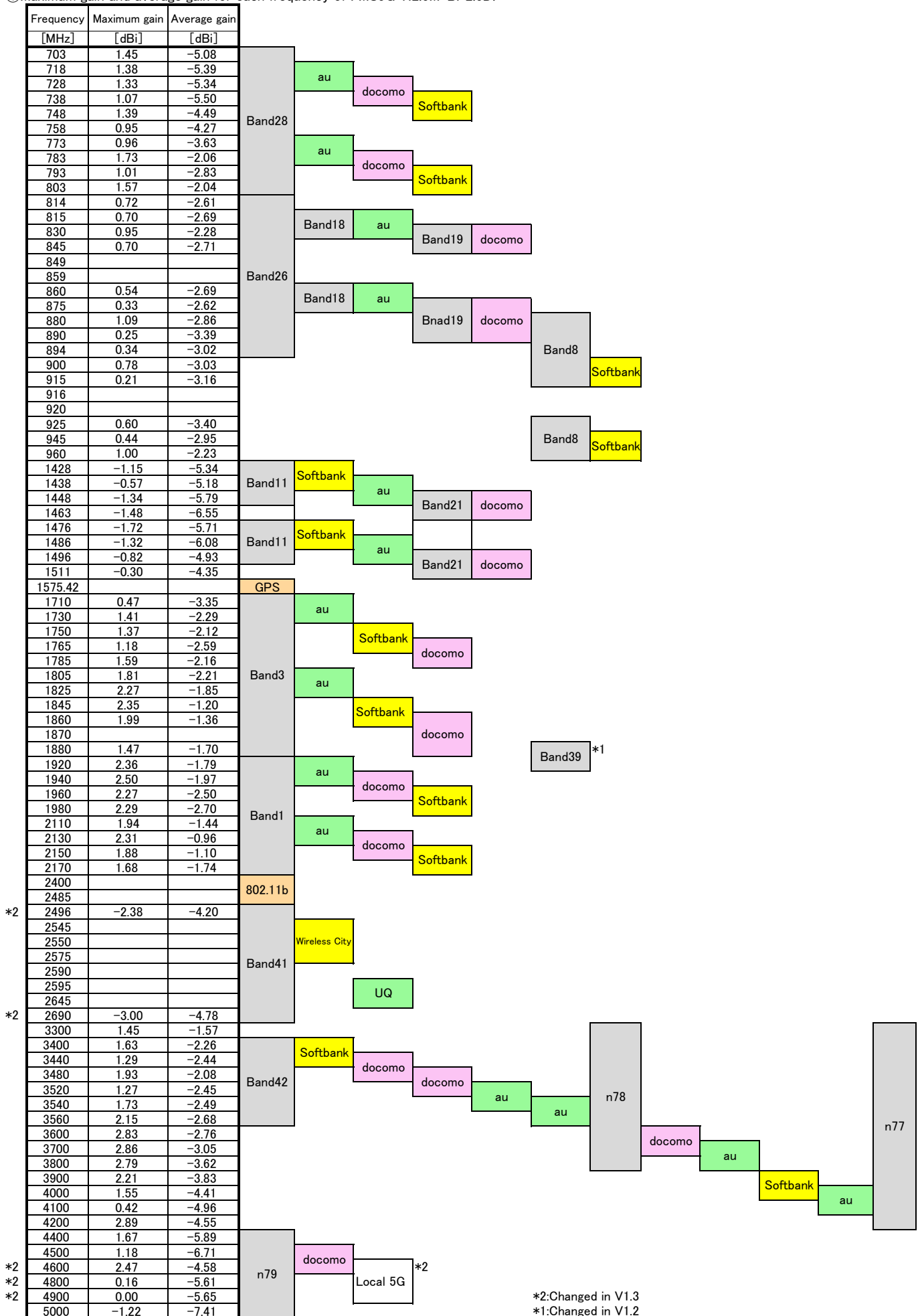
Note: Measurements are made in the time domain method.

*1: Changed in V1.2

1.5 Antenna Gain

1.5.1 Antenna gain of FMS5G-H2.5M-BP2.5D

① Maximum gain and average gain for each frequency of FMS5G-H2.5M-BP2.5D.



*2: Changed in V1.3
*1: Changed in V1.2

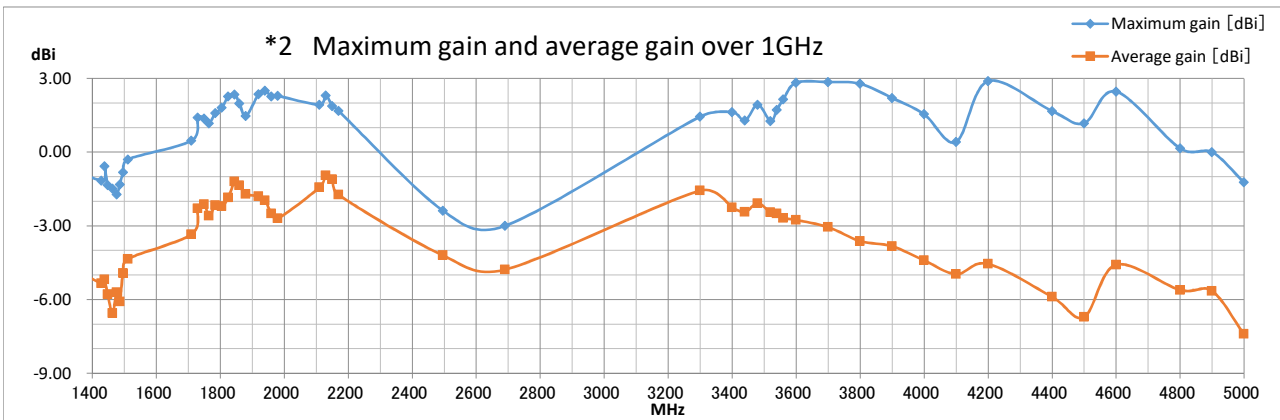
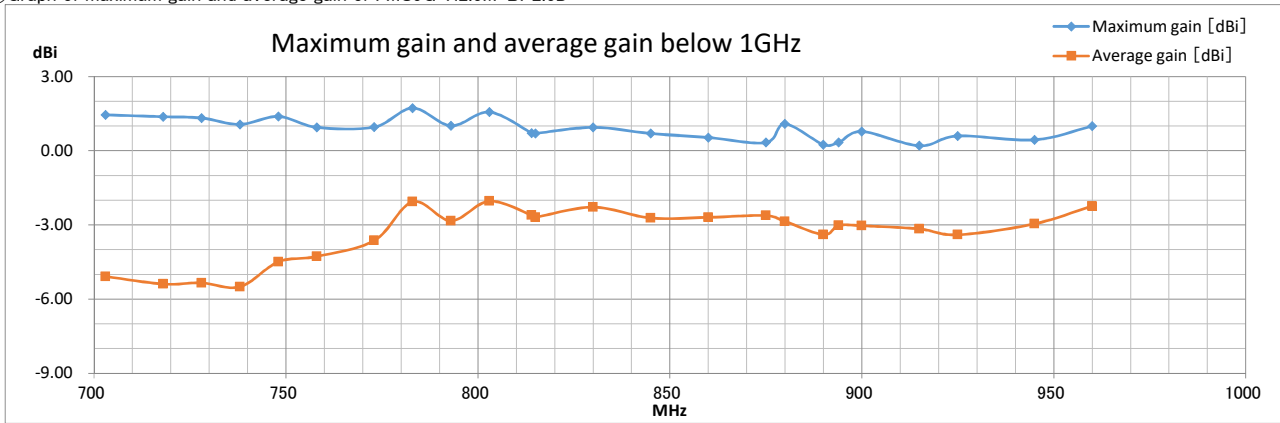
② Maximum gain and average gain for each Band of FMS5G-H2.5M-BP2.5D

	Maximum Gain [dBi]	Average	
Band	Band28	1.73	-4.06
	Band26	1.09	-2.76
	Band18	0.95	-2.57
	Band19	1.09	-2.77
	Band8	1.09	-3.00
	Band11	-0.57	-5.50
	Band21	-0.30	-5.40
	Band3	2.35	1.59
	Band1	2.50	-1.77
	*1 Band39	2.36	-1.75
	*2 Band41	-2.38	-4.49
	Band42	1.93	-2.21
	n77	2.86	-3.10
	n78	2.86	-2.54
	*2 n79	2.47	-5.97
	GPS	-	-
	*2 Local 5G	2.47	-5.28
IEEE802.11b	-	-	

*1: Changed in V1.2

*2: Changed in V1.3

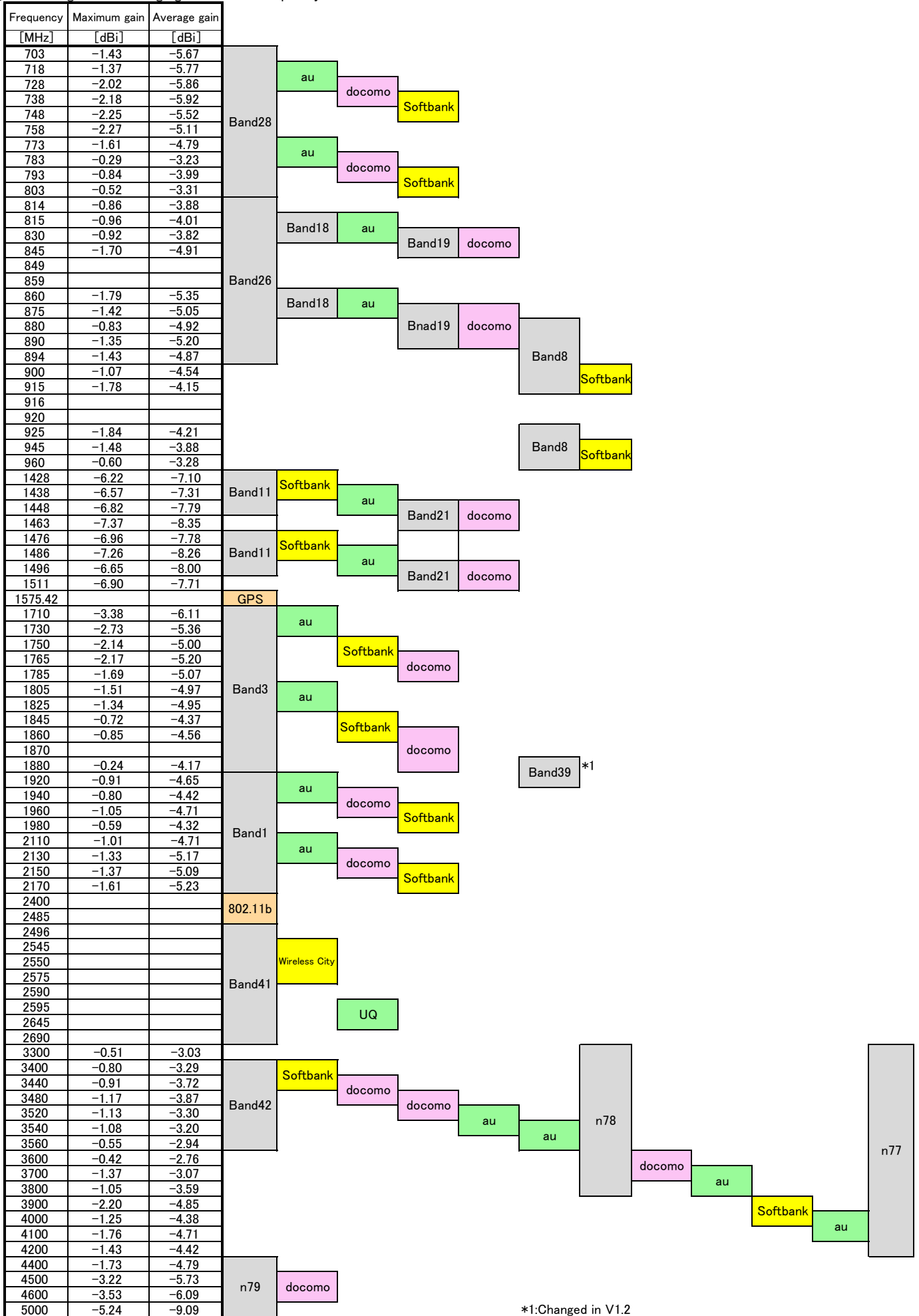
③ Graph of maximum gain and average gain of FMS5G-H2.5M-BP2.5D



*2: Changed in V1.3

1.5.2 Antenna gain of FMS5G-H5M-BP2.5D

① Maximum gain and average gain for each frequency of FMS5G-H5M-BP2.5D

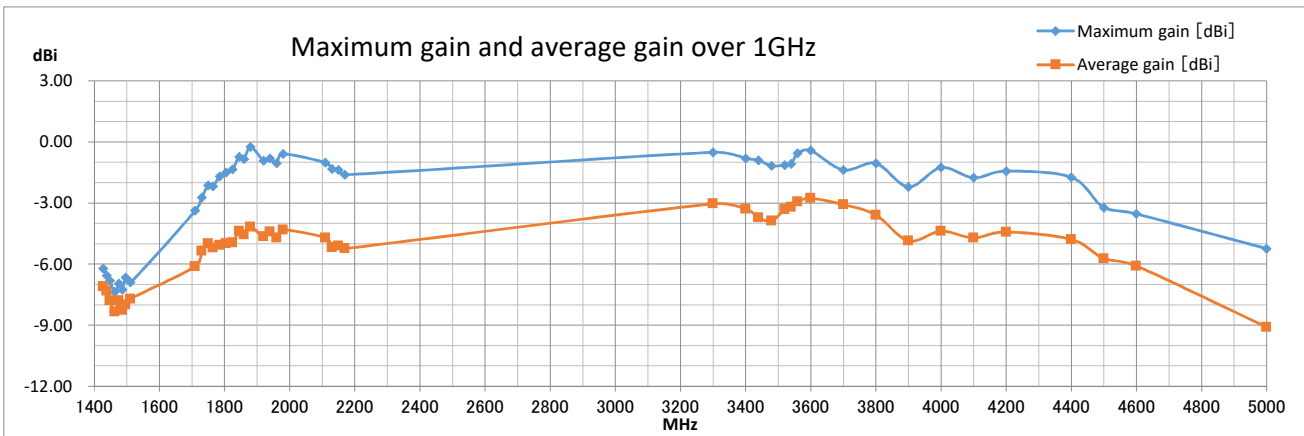
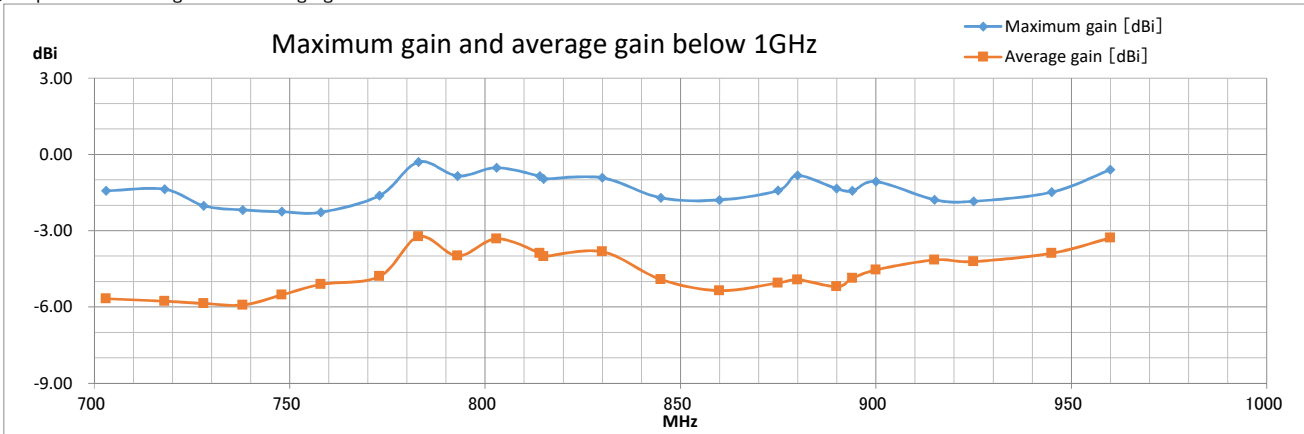


② Maximum gain and average gain for each Band of FMS5G-H5M-BP2.5D

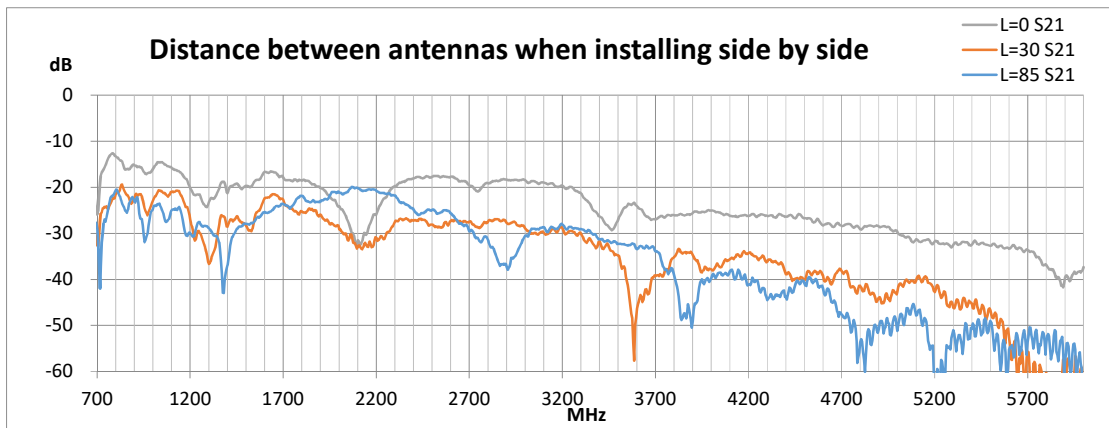
	Maximum Gain [dBi]	Average	
Band	Band28	-0.29	-4.92
	Band26	-0.83	-4.67
	Band18	-0.92	-4.56
	Band19	-0.83	-4.78
	Band8	-0.60	-4.38
	Band11	-6.22	-7.71
	Band21	-6.65	-7.96
	Band3	-0.24	-1.68
	Band1	-0.59	-4.79
	*1 Band39	-0.24	-4.41
	Band41	-	-
	Band42	-0.51	-3.40
	n77	-0.42	-3.59
	n78	-0.42	-3.28
	n79	-1.43	-5.26
	GPS	-	-
	IEEE802.11b	-	-

*1: Changed in V1.2

③ Graph of maximum gain and average gain of FMS5G-H5M-BP2.5D



1.5.3 Isolation



FMS5G-H2.5M-BP2.5D

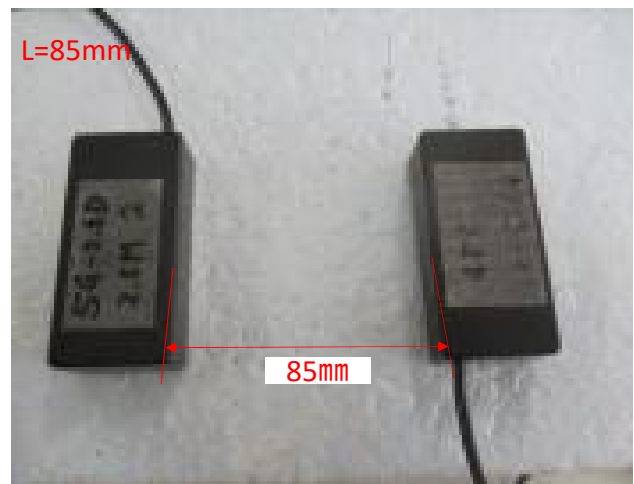
L=0mm



L=30mm



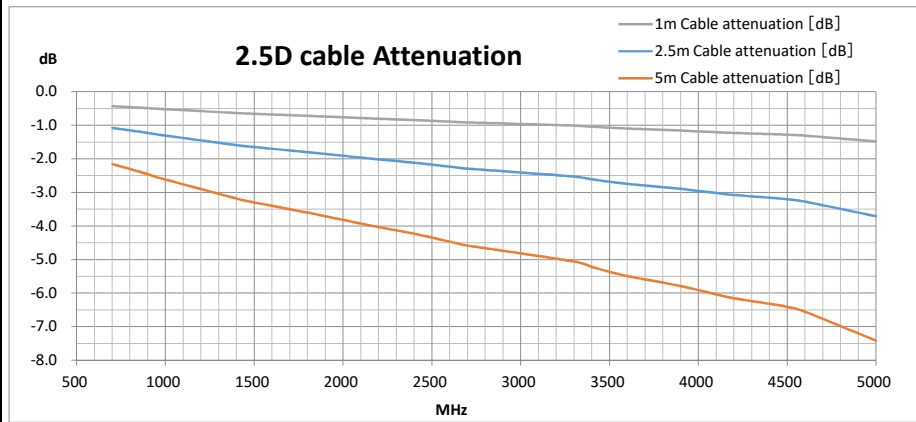
L=85mm



1.5.4 Cable attenuation.

Frequency	*1	*2	*3
	1m Cable attenuation	2.5m Cable attenuation	5m Cable attenuation
[MHz]	[dB]	[dB]	[dB]
703	-0.43	-1.08	-2.16
718	-0.44	-1.09	-2.18
728	-0.44	-1.10	-2.20
738	-0.44	-1.11	-2.21
748	-0.45	-1.11	-2.23
758	-0.45	-1.12	-2.24
773	-0.45	-1.13	-2.26
783	-0.46	-1.14	-2.28
793	-0.46	-1.15	-2.29
803	-0.46	-1.15	-2.31
814	-0.46	-1.16	-2.32
815	-0.47	-1.16	-2.33
830	-0.47	-1.18	-2.35
845	-0.47	-1.19	-2.37
849	-0.47	-1.19	-2.37
859	-0.48	-1.19	-2.39
860	-0.48	-1.20	-2.40
875	-0.48	-1.21	-2.42
880	-0.49	-1.21	-2.43
890	-0.49	-1.22	-2.44
894	-0.49	-1.22	-2.44
900	-0.49	-1.23	-2.46
915	-0.50	-1.24	-2.48
916	-0.50	-1.24	-2.48
920	-0.50	-1.25	-2.49
925	-0.50	-1.25	-2.50
945	-0.51	-1.27	-2.54
960	-0.51	-1.28	-2.56
1428	-0.64	-1.61	-3.22
1438	-0.65	-1.62	-3.24
1448	-0.65	-1.62	-3.25
1463	-0.65	-1.63	-3.26
1476	-0.66	-1.64	-3.28
1486	-0.66	-1.64	-3.29
1496	-0.66	-1.65	-3.30
1511	-0.66	-1.66	-3.31
1575.42	-0.68	-1.69	-3.38
1710	-0.70	-1.76	-3.51
1730	-0.71	-1.77	-3.53
1750	-0.71	-1.78	-3.55
1765	-0.71	-1.78	-3.57
1785	-0.72	-1.79	-3.59
1805	-0.72	-1.81	-3.61
1825	-0.73	-1.82	-3.63
1845	-0.73	-1.83	-3.65
1860	-0.73	-1.83	-3.67
1870	-0.74	-1.84	-3.68
1880	-0.74	-1.84	-3.69
1920	-0.75	-1.87	-3.73
1940	-0.75	-1.88	-3.75
1960	-0.76	-1.89	-3.78
1980	-0.76	-1.90	-3.80
2110	-0.79	-1.97	-3.94
2130	-0.79	-1.98	-3.96
2150	-0.80	-1.99	-3.98
2170	-0.80	-2.00	-4.00
2400	-0.85	-2.12	-4.23
2485	-0.87	-2.16	-4.33
2496	-0.87	-2.17	-4.34
2545	-0.88	-2.20	-4.40
2550	-0.88	-2.20	-4.41
2575	-0.89	-2.22	-4.44
2590	-0.89	-2.23	-4.46
2595	-0.89	-2.23	-4.46
2645	-0.90	-2.26	-4.52
2690	-0.92	-2.29	-4.58
3300	-1.01	-2.53	-5.06
3400	-1.04	-2.61	-5.22
3440	-1.06	-2.64	-5.28
3480	-1.07	-2.67	-5.34
3520	-1.08	-2.70	-5.39
3540	-1.08	-2.71	-5.42
3560	-1.09	-2.72	-5.45
3600	-1.10	-2.75	-5.49
3700	-1.12	-2.80	-5.59
3800	-1.14	-2.84	-5.69
3900	-1.16	-2.90	-5.79
4000	-1.18	-2.96	-5.91
4100	-1.21	-3.02	-6.04
4200	-1.23	-3.08	-6.15
4400	-1.26	-3.16	-6.32
4500	-1.28	-3.20	-6.41
4600	-1.31	-3.28	-6.55
5000	-1.48	-3.71	-7.42

- * 1: This is the amount of cable attenuation at each frequency when the cable length of the 2.5D cable is 1 m.
- * 2: This is the amount of cable attenuation at each frequency when the cable length of the 2.5D cable is 2.5 m.
- * 3: This is the amount of cable attenuation at each frequency when the cable length of the 2.5D cable is 5 m.

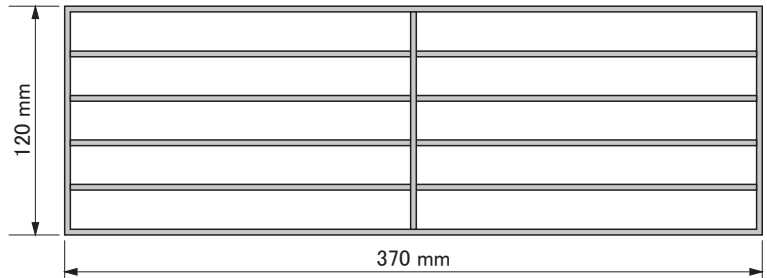


1.6 Packing Specification FMS5G-H2.5M-BP2.5D / FMS5G-H5M-BP2.5D

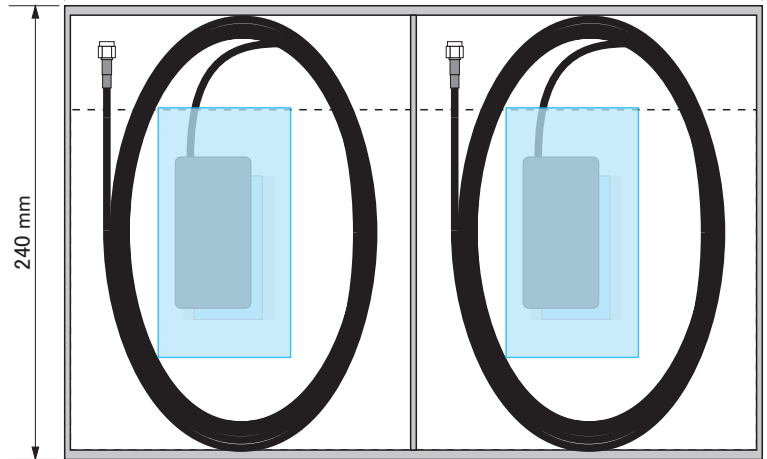
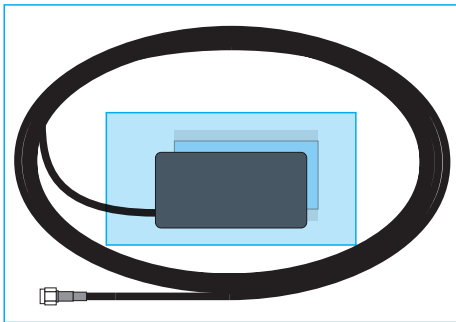
Individual packing: wrap antenna part with bubble wrap

Including double sided tape and Note Card for "mounting with double sided tape"

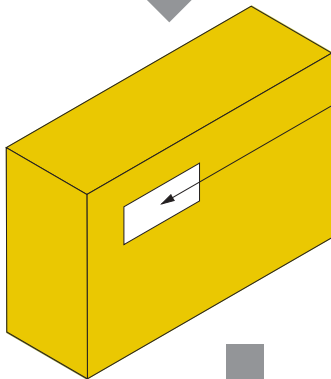
Mounting with double sided tape :
 Remove dust, moisture and oil from the adhered surface, thoroughly dry the surface, and paste the antenna while applying sufficient pressure. If the temperature at the time of pasting the antenna is 15 degrees or less, warm the adhered surface and the double sided tape. The adhesive strength reaches maximum after approximately 72 hours. (The bottom plate side of the case is the mounting surface.)



Individual packing with transparent plastic bag



Small box for 10pcs



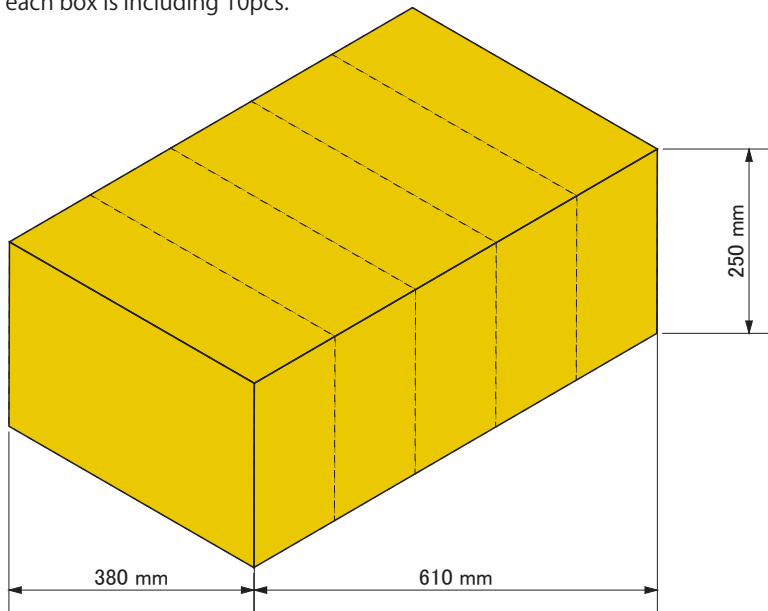
Label on the small box for 10pcs



Packing example for 5 small boxes, each box is including 10pcs.

(Label example)

Product name	FMS5G-H x M-BP2.5D
Specification	20mm case (black), 2.5D cable (black) Including double sided tape Connector : SMA-P, Cable length : x m
	10pcs



1.7 Measurement Method of Front Polarization and Cross Polarization

