vizmo

FREEDOM FROM WIRES

DATASHEET

R-6LP-G1H-15D-A1

Wi-SUN Transceiver

High-Performance, Wi-SUN Transceiver Module built around Renesas RL78-G1H Chipset

Sub GHz ISM Band

863 MHz to 928 MHz operating Frequency in license-free Band

Industrial grade

-40 deg C to +85 deg C operation temperature

dun & bradstreet

Business Eminence Awards 2020 Singapore

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TECHNICAL SPECIFICATION

RADIO MODULE – GENERAL INFO	
Chipset Info	Renesas RL78/G1H, 16 bit MCU, 32 MHz, 44 DMIPS
Memory (Max Option)	Program Flash 512 KB, Data flash 8 KB, SRAM 48 KB
Operating Frequency	863 MHz to 928 MHz
Data Modulation	2GFSK/4GFSK
Operating Mode	Fixed Frequency mode & Frequency Hopping (SW Configurable)
Number of Channels (50 Kbps) Number of Channels (100 Kbps) Number of Channels (150 Kbps) Number of Channels (200 Kbps)	EU-69, NA-129, JP-38, IN-19 EU-35, JP-37, IN-10 EU-35, NA-64 NA-64, JP-36
RoHS Compliance	Compliant
INTERFACE SPECIFICATIONS	
Interface	UART Interface, 115,200 baud, Berg Stick Connectors, 2.0 mm Pitch
Operating Voltage	3.3V +/- 10%
Stand by Current in RX Mode	6 mA
RF Antenna	Integrated Chip Antenna
ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature Range	-40 deg C to +85 deg C
PHYSICAL SPECIFICATIONS	
Mechanical Dimension (Assembled condition)	(L) 25 mm x (W) 25 mm x (H) 8.4 mm
Weight of the Module without ESD Bag	5 g
REGULATORY INFORMATION	
Compliance	TBD Regions Supported – USA, CANADA, EUROPE, JAPAN, INDIA Please contact enquiry@vizmonet.com for any other regions not listed here.
PACKAGING INFORMATION	
No of units - TBD	Carton Size - TBD

ORDERING INFORMATION	
R-6LP-G1H-15D-A1	RF Transceiver Module, 6LoWPAN, 863 to 928 MHz, Internal Antenna, 15 dBm

RADIO SPECIFICATION

TX Power and RX Sensitivity

902 MHz to 928 MHz, +/-1 dBm

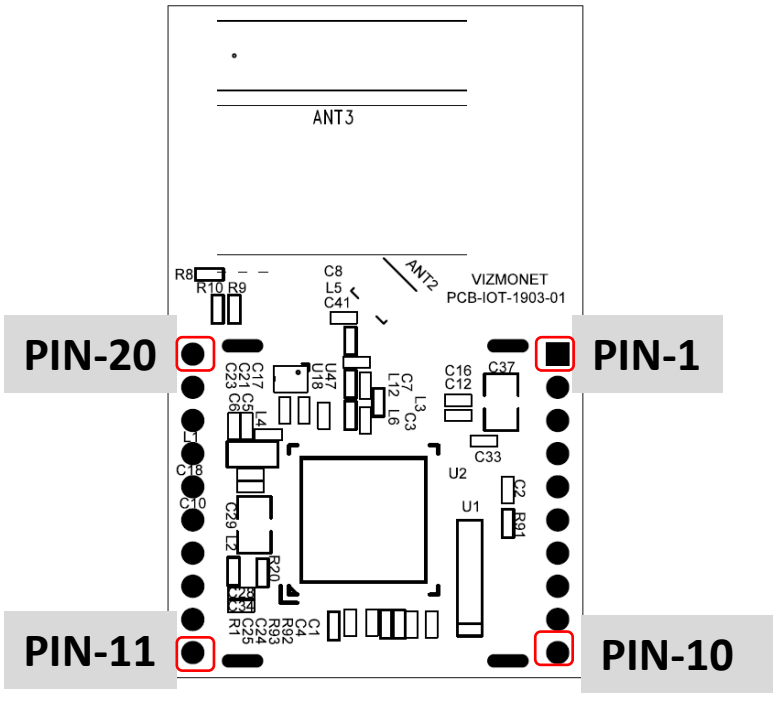
TX Power Setting	Power (dBm)	Current at 3.3V (mA)
20	0.50	20
30	0.75	20
40	5.00	30
50	7.00	30
60	9.00	30
70	10.00	30
80	11.5	40
90	13.5	40
100	15.5	50
103	15.8	60

902 MHz to 928 MHz, BER <1%, +/-1 dBm

Data Rate (Kbps)	Modulation	RX Sensitivity (dBm)
50	2GFSK	-110
100	2GFSK	-104
150	2GFSK	-101
200	2GFSK	-98

Connector Pin layout

Pin Number	Function	Pin Number	Function
1	VDD	20	TOOL0 (P40)
2	TXD (P02)	19	LED1 (P60)
3	RXD (P03)	18	LED1 (P61)
4	NC	17	LED1 (P62)
5	RESET	16	RXD3(P143)
6	ANI12(P156)	15	TXD3(P144)
7	ANI13(P155)	14	SCK30(P142)
8	ANI14(P22)	13	SCK21(P70)
9	INTP0(P137	12	SI71(P71)
10	GND	11	SO21(P72)



Connector Pin Description

Pin No	Pin Name	Description
1	VDD	Module Power supply input, 3.3V +/- 10 %
2	TXD (P02)	UART OUT (TX), connected to Port P02 of R7L78/G1H
3	RXD (P03)	UART OUT (RX), connected to Port P03 of RL78/G1H
5	RESET	Reset input
10	GND	GND
20	TOOL0(P40)	Data Input / Output for Renesas Programming Tool

Fan-out GPIO

Pin No	Pin Name	Description
6	ANI12(P156)	ADC Input connected to Port P156 of RL78/G1H
7	ANI13(P155)	ADC Input connected to Port P155 of RL78/G1H
8	ANI14(P22)	ADC Input connected to Port P22 of RL78/G1H
9	INTP0(P137)	External Interrupt input connected to Port P137 of RL78/G1H
11	SO21(P72)	GPIO connected to Port P72 of RL78/G1H, can be used for Serial data I/O
12	SI71(P71)	GPIO connected to Port P71 of RL78/G1H, can be used for Serial data I/O
13	SCK21(P70)	GPIO connected to Port P70 of RL78/G1H, can be used for Serial data I/O
14	SCK30(P142)	GPIO connected to Port P142 of RL78/G1H, can be used for Serial data I/O
15	TXD3(P144)	GPIO connected to Port P144 of RL78/G1H, can be used for additional UART
16	RXD3(P143)	GPIO connected to Port P143 of RL78/G1H, can be used for additional UART
17	LED1 (P62)	GPIO Connected to Port P60 of RL78/G1H. It can be connected to LED (Active Low) in Base Board for Wi-SUN Status
18	LED1 (P61)	GPIO Connected to Port P60 of RL78/G1H. It can be connected to LED (Active Low) in Base Board for Wi-SUN Status
19	LED1 (P60)	GPIO Connected to Port P60 of RL78/G1H. It can be connected to LED (Active Low) in Base Board for Wi-SUN Status

Fan-out GPIO must be NC, when not used in the Target Board, where the module is mounted

Supported Frequency Bands and Channel Wi-SUN Parameters

NA- North America that includes USA & CANADA

Frequency (MHz)	Region	Wi-SUN PHY Mode	G1H Band ID	Data Rate (Kbps)	Modulation	Modulation Index	No of Channels	Channel Spacing (KHz)
863-870	Europe	0	4	50	2GFSK	0.5	69	100
863-870	Europe	1	4	100	2GFSK	0.5	35	200
863-870	Europe	2	4	150	2GFSK	0.5	35	200
902-928	NA	3	7	50	2GFSK	1	129	200
902-928	NA	4	7	150	2GFSK	0.5	64	400
902-928	NA	5	7	200	2GFSK	0.5	64	400
920-928	Japan	8	9	50	2GFSK	1	38	200
920-928	Japan	9	9	100	2GFSK	1	37	200
920-928	Japan	11	9	200	2GFSK	1	36	200
865-867	India	13	4	50	2GFSK	0.5	19	100
865-867	India	14	4	100	2GFSK	0.5	10	200

Frequency Channel Mapping

(Europe) Band ID 4, Channel setting of the Wi-SUN PHY Mode 0, 50 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	863.1	1 (0x01)	863.2	2 (0x02)	863.3	3 (0x03)	863.4
4 (0x04)	863.5	5 (0x05)	863.6	6 (0x06)	863.7	7 (0x07)	863.8
8 (0x08)	863.9	9 (0x09)	864	10 (0xA)	864.1	11 (0xB)	864.2
12 (0xC)	864.3	13 (0xD)	864.4	14 (0xE)	864.5	15 (0xF)	864.6
16 (0x10)	864.7	17 (0x11)	864.8	18 (0x12)	864.9	19 (0x13)	865
20 (0x14)	865.1	21 (0x15)	865.2	22 (0x16)	865.3	23 (0x17)	865.4
24 (0x18)	865.5	25 (0x19)	865.6	26 (0x1A)	865.7	27 (0x1B)	865.8
28 (0x1C)	865.9	29 (0x1D)	866	30 (0x1E)	866.1	31 (0x1F)	866.2
32 (0x20)	866.3	33 (0x21)	866.4	34 (0x22)	866.5	35 (0x23)	866.6
36 (0x24)	866.7	37 (0x25)	866.8	38 (0x26)	866.9	39 (0x27)	867
40 (0x28)	867.1	41 (0x29)	867.2	42 (0x2A)	867.3	43 (0x2B)	867.4
44 (0x2C)	867.5	45 (0x2D)	867.6	46 (0x2E)	867.7	47 (0x2F)	867.8
48 (0x30)	867.9	49 (0x31)	868	50 (0x32)	868.1	51 (0x33)	868.2
52 (0x34)	868.3	53 (0x35)	868.4	54 (0x36)	868.5	55 (0x37)	868.6
56 (0x38)	868.7	57 (0x39)	868.8	58 (0x3A)	868.9	59 (0x3B)	869
60 (0x3C)	869.1	61 (0x3D)	869.2	62 (0x3E)	869.3	63 (0x3F)	869.4
64 (0x40)	869.5	65 (0x41)	869.6	66 (0x42)	869.7	67 (0x43)	869.8
68 (0x44)	869.9						

(Europe) Band ID 4, Channel setting of the Wi-SUN PHY Mode 0, 50 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	863.1	1 (0x01)	863.3	2 (0x02)	863.5	3 (0x03)	863.7
4 (0x04)	863.9	5 (0x05)	864.1	6 (0x06)	864.3	7 (0x07)	864.5
8 (0x08)	864.7	9 (0x09)	864.9	10 (0xA)	865.1	11 (0xB)	865.3
12 (0xC)	865.5	13 (0xD)	865.7	14 (0xE)	865.9	15 (0xF)	866.1
16 (0x10)	866.3	17 (0x11)	866.5	18 (0x12)	866.7	19 (0x13)	866.9
20 (0x14)	867.1	21 (0x15)	867.3	22 (0x16)	867.5	23 (0x17)	867.7
24 (0x18)	867.9	25 (0x19)	868.1	26 (0x1A)	868.3	27 (0x1B)	868.5
28 (0x1C)	868.7	29 (0x1D)	868.9	30 (0x1E)	869.1	31 (0x1F)	869.3
32 (0x20)	869.5	33 (0x21)	869.7	34 (0x22)	869.9		

(North America) Band ID 7, Channel setting of the Wi-SUN PHY Mode 3, 50 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	902.2	1 (0x01)	902.4	2 (0x02)	902.6	3 (0x03)	902.8
4 (0x04)	903	5 (0x05)	903.2	6 (0x06)	903.4	7 (0x07)	903.6
8 (0x08)	903.8	9 (0x09)	904	10 (0x0A)	904.2	11 (0x0B)	904.4
12 (0x0C)	904.6	13 (0x0D)	904.8	14 (0x0E)	905	15 (0x0F)	905.2
16 (0x10)	905.4	17 (0x11)	905.6	18 (0x12)	905.8	19 (0x13)	906
20 (0x14)	906.2	21 (0x15)	906.4	22 (0x16)	906.6	23 (0x17)	906.8
24 (0x18)	907	25 (0x19)	907.2	26 (0x1A)	907.4	27 (0x1B)	907.6
28 (0x1C)	907.8	29 (0x1D)	908	30 (0x1E)	908.2	31 (0x1F)	908.4
32 (0x20)	908.6	33 (0x21)	908.8	34 (0x22)	909	35 (0x23)	909.2
36 (0x24)	909.4	37 (0x25)	909.6	38 (0x26)	909.8	39 (0x27)	910
40 (0x28)	910.2	41 (0x29)	910.4	42 (0x2A)	910.6	43 (0x2B)	910.8
44 (0x2C)	911	45 (0x2D)	911.2	46 (0x2E)	911.4	47 (0x2F)	911.6
48 (0x30)	911.8	49 (0x31)	912	50 (0x32)	912.2	51 (0x33)	912.4
52 (0x34)	912.6	53 (0x35)	912.8	54 (0x36)	913	55 (0x37)	913.2
56 (0x38)	913.4	57 (0x39)	913.6	58 (0x3A)	913.8	59 (0x3B)	914
60 (0x3C)	914.2	61 (0x3D)	914.4	62 (0x3E)	914.6	63 (0x3F)	914.8
64 (0x40)	915	65 (0x41)	915.2	66 (0x42)	915.4	67 (0x43)	915.6
68 (0x44)	915.8	69 (0x45)	916	70 (0x46)	916.2	71 (0x47)	916.4
72 (0x48)	916.6	73 (0x49)	916.8	74 (0x4A)	917	75 (0x4B)	917.2
76 (0x4C)	917.4	77 (0x4D)	917.6	78 (0x4E)	917.8	79 (0x4F)	918
80 (0x50)	918.2	81 (0x51)	918.4	82 (0x52)	918.6	83 (0x53)	918.8
84 (0x54)	919	85 (0x55)	919.2	86 (0x56)	919.4	87 (0x57)	919.6
88 (0x58)	919.8	89 (0x59)	920	90 (0x5A)	920.2	91 (0x5B)	920.4
92 (0x5C)	920.6	93 (0x5D)	920.8	94 (0x5E)	921	95 (0x5F)	921.2
96 (0x60)	921.4	97 (0x61)	921.6	98 (0x62)	921.8	99 (0x63)	922
100(0x64)	922.2	101(0x65)	922.4	102(0x66)	922.6	103(0x67)	922.8
104(0x68)	923	105(0x69)	923.2	106(0x6A)	923.4	107(0x6B)	923.6
108(0x6C)	923.8	109(0x6D)	924	110(0x6E)	924.2	111(0x6F)	924.4
112(0x70)	924.6	113(0x71)	924.8	114(0x72)	925	115(0x73)	925.2
116(0x74)	925.4	117(0x75)	925.6	118(0x76)	925.8	119(0x77)	926
120(0x78)	926.2	121(0x79)	926.4	122(0x7A)	926.6	123(0x7B)	926.8
124(0x7C)	927	125(0x7D)	927.2	126(0x7E)	927.4	127(0x7F)	927.6
128(0x80)	927.8						

(North America) Band ID 7, Channel setting of the Wi-SUN PHY Mode 4, 150 Kbps, PHY Mode 5, 200 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	902.4	1 (0x01)	902.8	2 (0x02)	903.2	3 (0x03)	903.6
4 (0x04)	904	5 (0x05)	904.4	6 (0x06)	904.8	7 (0x07)	905.2
8 (0x08)	905.6	9 (0x09)	906	10 (0x0A)	906.4	11 (0x0B)	906.8
12 (0x0C)	907.2	13 (0x0D)	907.6	14 (0x0E)	908	15 (0x0F)	908.4
16 (0x10)	908.8	17 (0x11)	909.2	18 (0x12)	909.6	19 (0x13)	910
20 (0x14)	910.4	21 (0x15)	910.8	22 (0x16)	911.2	23 (0x17)	911.6
24 (0x18)	912	25 (0x19)	912.4	26 (0x1A)	912.8	27 (0x1B)	913.2
28 (0x1C)	913.6	29 (0x1D)	914	30 (0x1E)	914.4	31 (0x1F)	914.8
32 (0x20)	915.2	33 (0x21)	915.6	34 (0x22)	916	35 (0x23)	916.4
36 (0x24)	916.8	37 (0x25)	917.2	38 (0x26)	917.6	39 (0x27)	918
40 (0x28)	918.4	41 (0x29)	918.8	42 (0x2A)	919.2	43 (0x2B)	919.6
44 (0x2C)	920	45 (0x2D)	920.4	46 (0x2E)	920.8	47 (0x2F)	921.2
48 (0x30)	921.6	49 (0x31)	922	50 (0x32)	922.4	51 (0x33)	922.8
52 (0x34)	923.2	53 (0x35)	923.6	54 (0x36)	924	55 (0x37)	924.4
56 (0x38)	924.8	57 (0x39)	925.2	58 (0x3A)	925.6	59 (0x3B)	926
60 (0x3C)	926.4	61 (0x3D)	926.8	62 (0x3E)	927.2	63 (0x3F)	927.6

(Japan) Band ID 9, Channel setting of the Wi-SUN PHY Mode 8, 50 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	920.6	1 (0x01)	920.8	2 (0x02)	921	3 (0x03)	921.2
4 (0x04)	921.4	5 (0x05)	921.6	6 (0x06)	921.8	7 (0x07)	922
8 (0x08)	922.2	9 (0x09)	922.4	10 (0x0A)	922.6	11 (0x0B)	922.8
12 (0x0C)	923	13 (0x0D)	923.2	14 (0x0E)	923.4	15 (0x0F)	923.6
16 (0x10)	923.8	17 (0x11)	924	18 (0x12)	924.2	19 (0x13)	924.4
20 (0x14)	924.6	21 (0x15)	924.8	22 (0x16)	925	23 (0x17)	925.2
24 (0x18)	925.4	25 (0x19)	925.6	26 (0x1A)	925.8	27 (0x1B)	926
28 (0x1C)	926.2	29 (0x1D)	926.4	30 (0x1E)	926.6	31 (0x1F)	926.8
32 (0x20)	927	33 (0x21)	927.2	34 (0x22)	927.4	35 (0x23)	927.6
36 (0x24)	927.8	37 (0x25)	928				

(Japan) Band ID 9, Channel setting of the Wi-SUN PHY Mode 9, 100 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	920.7	1 (0x01)	920.9	2 (0x02)	921.1	3 (0x03)	921.3
4 (0x04)	921.5	5 (0x05)	921.7	6 (0x06)	921.9	7 (0x07)	922.1
8 (0x08)	922.3	9 (0x09)	922.5	10 (0x0A)	922.7	11 (0x0B)	922.9
12 (0x0C)	923.1	13 (0x0D)	923.3	14 (0x0E)	923.5	15 (0x0F)	923.7
16 (0x10)	923.9	17 (0x11)	924.1	18 (0x12)	924.3	19 (0x13)	924.5
20 (0x14)	924.7	21 (0x15)	924.9	22 (0x16)	925.1	23 (0x17)	925.3
24 (0x18)	925.5	25 (0x19)	925.7	26 (0x1A)	925.9	27 (0x1B)	926.1
28 (0x1C)	926.3	29 (0x1D)	926.5	30 (0x1E)	926.7	31 (0x1F)	926.9
32 (0x20)	927.1	33 (0x21)	927.3	34 (0x22)	927.5	35 (0x23)	927.7
36 (0x24)	927.9						

(Japan) Band ID 9, Channel setting of the Wi-SUN PHY Mode 11, 200 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
0 (0x00)	920.8	1 (0x01)	921	2 (0x02)	921.2	3 (0x03)	921.4
4 (0x04)	921.6	5 (0x05)	921.8	6 (0x06)	922	7 (0x07)	922.2
8 (0x08)	922.4	9 (0x09)	922.6	10 (0x0A)	922.8	11 (0x0B)	923
12 (0x0C)	923.2	13 (0x0D)	923.4	14 (0x0E)	923.6	15 (0x0F)	923.8
16 (0x10)	924	17 (0x11)	924.2	18 (0x12)	924.4	19 (0x13)	924.6
20 (0x14)	924.8	21 (0x15)	925	22 (0x16)	925.2	23 (0x17)	925.4
24 (0x18)	925.6	25 (0x19)	925.8	26 (0x1A)	926	27 (0x1B)	926.2
28 (0x1C)	926.4	29 (0x1D)	926.6	30 (0x1E)	926.8	31 (0x1F)	927
32 (0x20)	927.2	33 (0x21)	927.4	34 (0x22)	927.6	35 (0x23)	927.8

(India) Band ID 4, Channel setting of the Wi-SUN PHY Mode 13, 50 Kbps

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
20 (0x14)	865.1	21 (0x15)	865.2	22 (0x16)	865.3	23 (0x17)	865.4
24 (0x18)	865.5	25 (0x19)	865.6	26 (0x1A)	865.7	27 (0x1B)	865.8
28 (0x1C)	865.9	29 (0x1D)	866	30 (0x1E)	866.1	31 (0x1F)	866.2
32 (0x20)	866.3	33 (0x21)	866.4	34 (0x22)	866.5	35 (0x23)	866.6
36 (0x24)	866.7	37 (0x25)	866.8	38 (0x26)	866.9		

(India) Band ID 4, Channel setting of the Wi-SUN PHY Mode 14, 100 Kbps

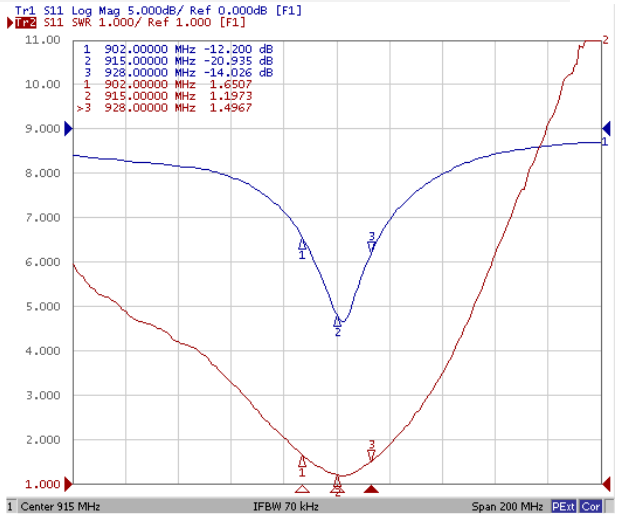
Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
					865.1	11 (0xB)	865.3
12 (0xC)	865.5	13 (0xD)	865.7	14 (0xE)	865.9	15 (0xF)	866.1
16 (0x10)	866.3	17 (0x11)	866.5	18 (0x12)	866.7	19 (0x13)	866.9

ANTENNA PERFORMANCE SPECIFICATION

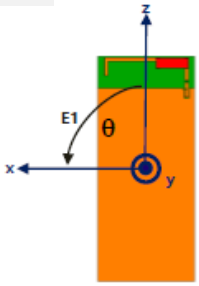
Gain Vs Frequency

Freq. [MHz]	Peak Gain (dBi)	Avg. Gain (dBi)	Efficiency(%)
902	1.1	-2.9	51
915	1.3	-2.7	54
928	0.9	-3.4	46

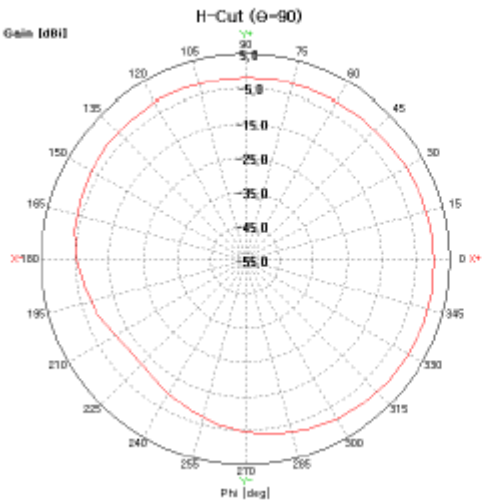
Return Loss Vs Frequency



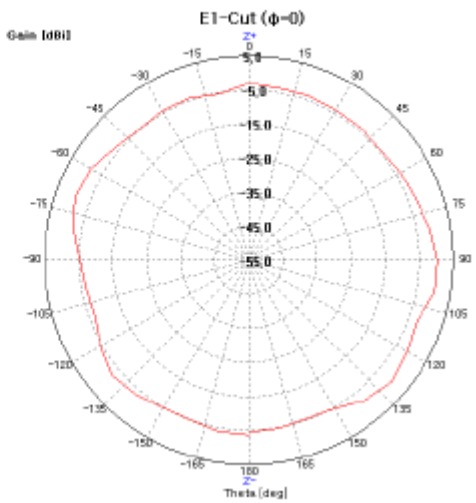
3D Radiation Pattern

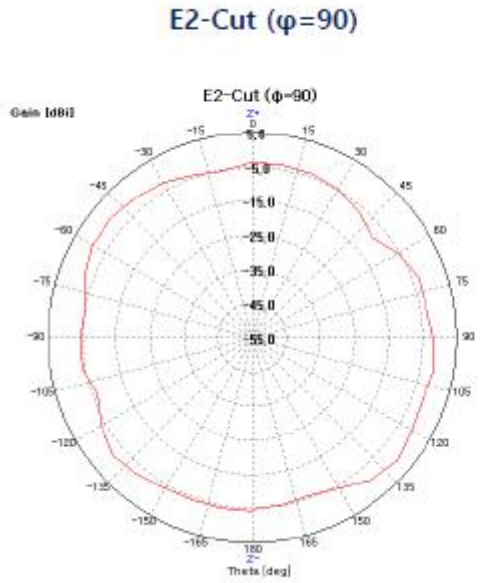


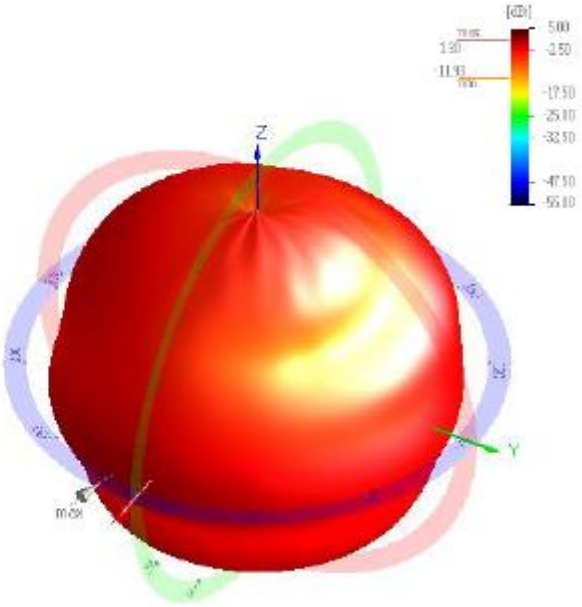
H-Cut (θ=90)



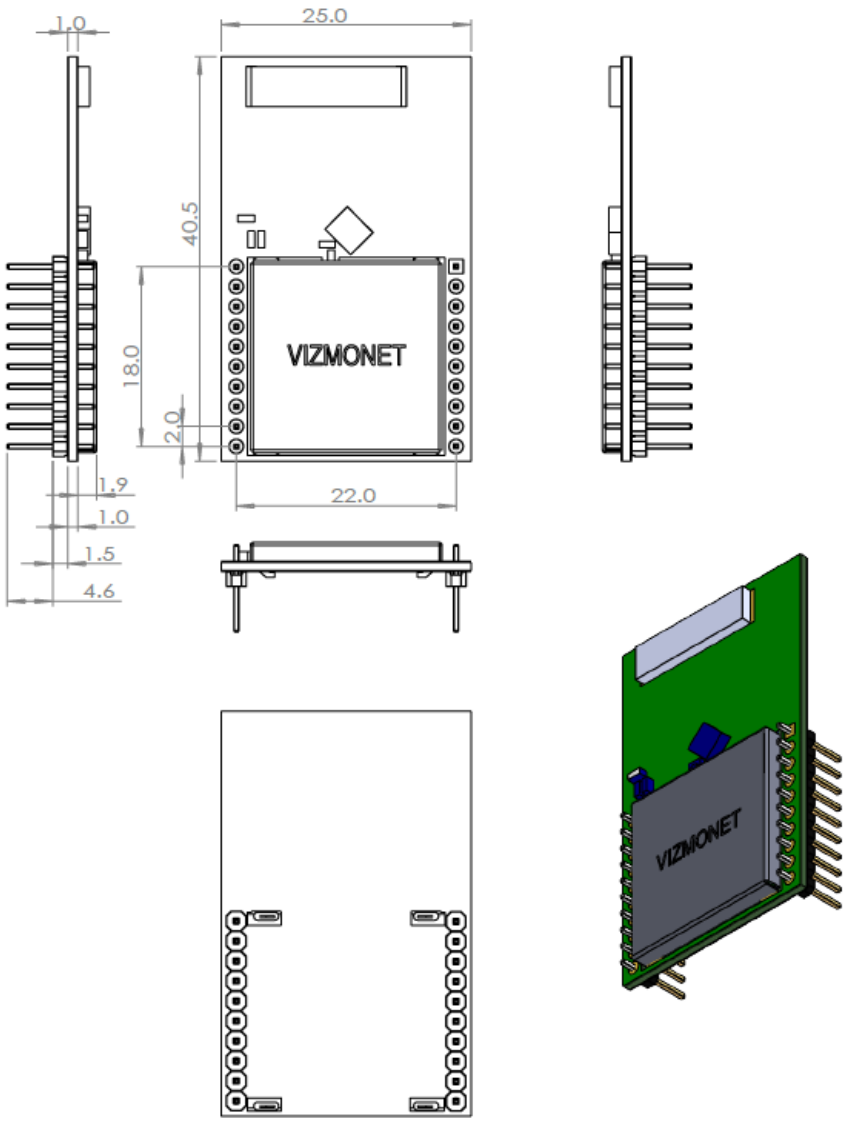
E1-Cut (φ=0)




E2-Cut (φ=90)
E2-Cut (ϕ=90)
Gain [dBi]
Theta [deg]


Z
Y

MECHANICAL DIMENSIONS



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FREEDOM FROM WIRES

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