10. Bluetooth WIFI Operational Description

The GT-P6200L supports the following frequency ranges and is only client device in 5GHz bands.
The following table lists the actual channel/frequency plan for the 2.4GHz and 5GHz operation in USA.
This device only supports Active scanning on non-DFS frequencies.

WLAN: 2412-2462 MHz. 5745 – 5825MHz

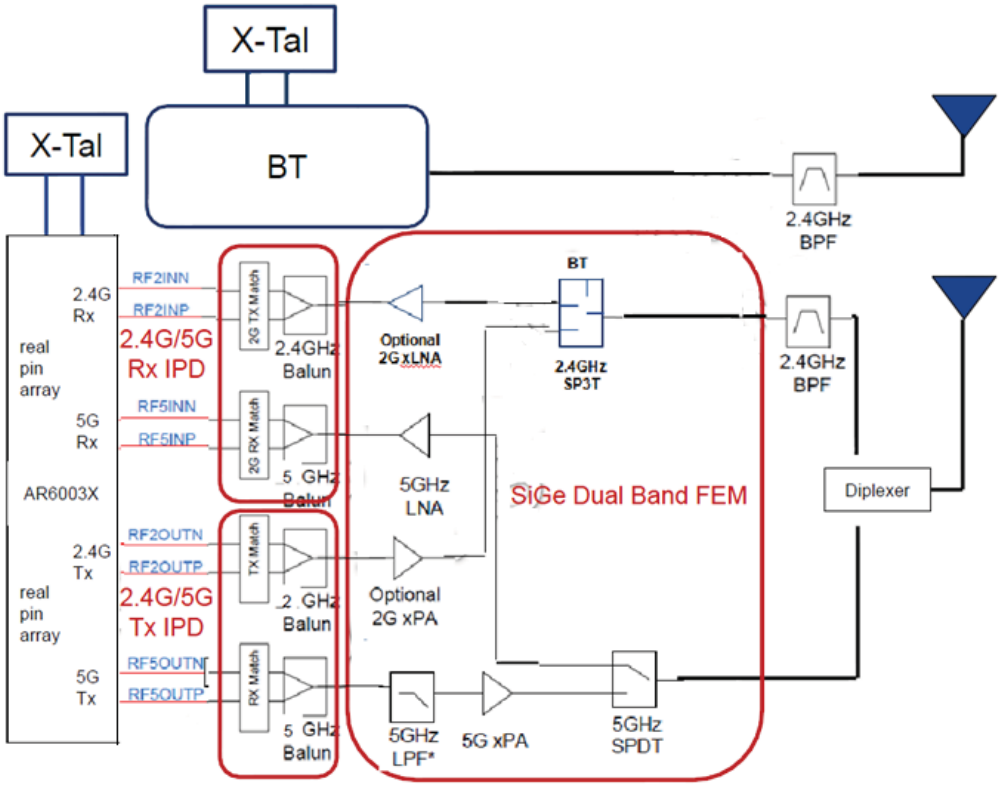
UNII: 5180 – 5240MHz, 5260 – 5320MHz, 5500 – 5700MHz

Channel	Freq.(MHz)	Scanning	Channel	Freq.(MHz)	Scanning
1	2412	**Active**	7	2442	**Active**
2	2417	**Active**	8	2447	**Active**
3	2422	**Active**	9	2452	**Active**
4	2427	**Active**	10	2457	**Active**
5	2432	**Active**	11	2462	**Active**
6	2437	**Active**			

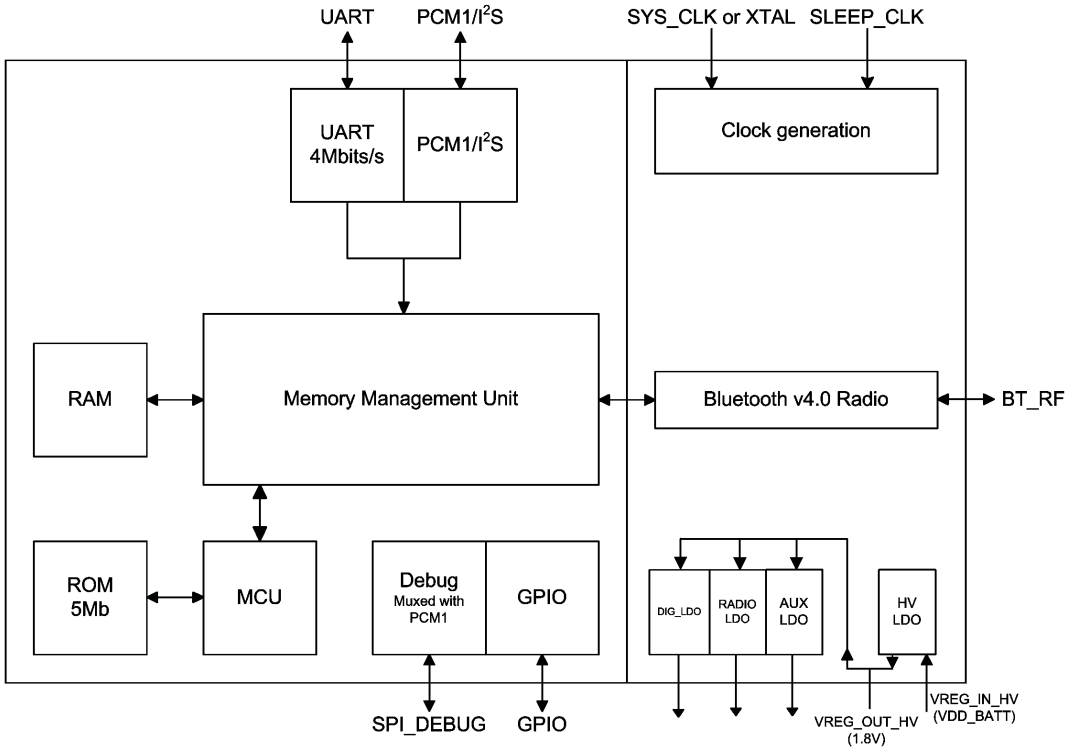
Channel	Freq. (MHz)	Scanning	Channel	Freq. (MHz)	Scanning	Channel	Freq. (MHz)	Scanning
36	5180	**Active**	64	5320	**Passive**	140	5700	**Passive**
40	5200	**Active**	100	5500	**Passive**	149	5745	**Active**
44	5220	**Active**	104	5520	**Passive**	153	5765	**Active**
48	5240	**Active**	108	5540	**Passive**	157	5785	**Active**
52	5260	**Passive**	112	5560	**Passive**	161	5805	**Active**
56	5280	**Passive**	116	5580	**Passive**	165	5825	**Active**
60	5300	**Passive**	136	5680	**Passive**			

Ad-hoc or peer-to-peer modes are not supported operating in the UNII bands. This NII transmitter is a client-only device without radar detection capability. The client software and associated drivers can not initiate any transmission on DFS frequencies, which includes transmissions for beacon, ad-hoc, and peer-to- peer modes. Operation as an access point on non-DFS legacy frequencies is also not supported. The software is locked by the module manufacturer such that there is no access and the settings can not be changed by the integrator of the module or the end user of the device. When Hotspot Mode is activated by the end-user, all 5GHz WIFI bands are disabled

This NII transmitter is a client- only device without radar detection capability, and that the client software and associated drivers will not initiate any transmission on DFS frequencies, which includes transmissions for beacon ad-hoc peer-to- peer modes. In 5GHz band, GT-P6200L works only for necessary data transmission. When data transmission is not needed, this device actually shutdown Tx path. So, This device automatically discontinues its transmission in case of either absence of information to transmit or operational failure.



Xtal Oscillator clock : 26MHz



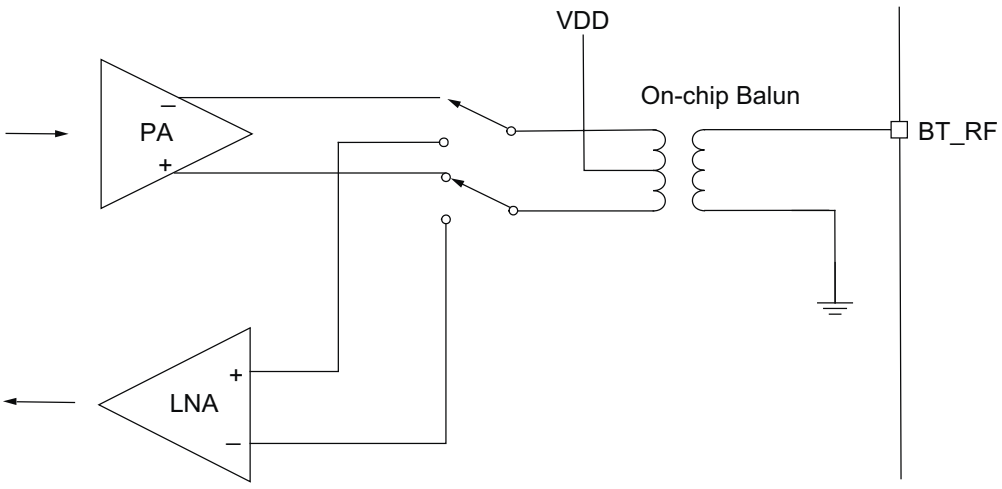
G-TW-0008493.1.2

BT Operational Description

1 Bluetooth Radio Ports

1.1 BT_RF

CSR8811 contains an on-chip balun which combines the balanced outputs of the PA on transmit and produces the balanced input signals for the LNA required on receive. No matching components are needed as the receive mode impedance is 50Ω and the transmitter has been optimised to deliver power in a 50Ω load.



G-TW-0004799.1.2

2 Bluetooth Receiver

The receiver features a near-zero IF architecture that enables the channel filters to be integrated onto the die. Sufficient out-of-band blocking specification at the LNA input enables the receiver to operate in close proximity to GSM and W-CDMA cellular phone transmitters without being desensitised.

For both basic rate and EDR, an ADC digitises the IF received signal.

2.1 Low Noise Amplifier

The LNA operates in differential mode and takes its input from the balanced port of the on-chip balun.

2.2 RSSI Analogue to Digital Converter

The ADC implements fast AGC. The ADC samples the RSSI voltage on a slot-by-slot basis. The front-end LNA gain is changed according to the measured RSSI value, keeping the mixer input signal within a limited range. This improves the dynamic range of the receiver, so improving performance in interference limited environments.

3 RF Transmitter

3.1 IQ Modulator

The transmitter features a direct IQ modulator to minimise frequency drift during a transmit timeslot, which results in a controlled modulation index. Digital baseband transmit circuitry provides the required spectral shaping.

3.2 Power Amplifier

The internal PA output power is software controlled and configured through a PS Key. The internal PA on the CSR8811 has a maximum output power that enables it to operate as a Class 1, Class 2 and Class 3 Bluetooth radio without requiring an external RF PA

4 Bluetooth Radio Synthesiser

The Bluetooth radio synthesiser is fully integrated onto the die with no requirement for an external VCO screening can, varactor tuning diodes, LC resonators or loop filter. The synthesiser is guaranteed to lock in sufficient time across the guaranteed temperature range to meet the Bluetooth v4.0 specification.

5 Baseband

5.1 Burst Mode Controller

During transmission the BMC constructs a packet from header information previously loaded into memory-mapped registers by the software and payload data/voice taken from the appropriate ring buffer in the RAM. During reception, the BMC stores the packet header in memory-mapped registers and the payload data in the appropriate ring buffer in RAM. This architecture minimises the intervention required by the processor during transmission and reception.

5.2 Physical Layer Hardware Engine

Dedicated logic performs the following:

- Forward error correction
- Header error control
- Cyclic redundancy check
- Encryption
- Data whitening
- Access code correlation
- Audio transcoding

Firmware performs the following voice data translations and operations:

- A-law/μ-law/linear voice data (from host)
- A-law/μ-law/CVSD (over the air)
- Voice interpolation for lost packets
- Rate mismatches

WLAN Operational Description

The Atheros AR6003 is a single chip, small form factor IEEE802.11 a/b/g/n MAC/baseband/radio optimized for low-power mobile applications. It is the 3rd generation WLAN design in the ROCm® family, employing the world'w lowest power consumption WLAN architecture in the smallest possible form factor.

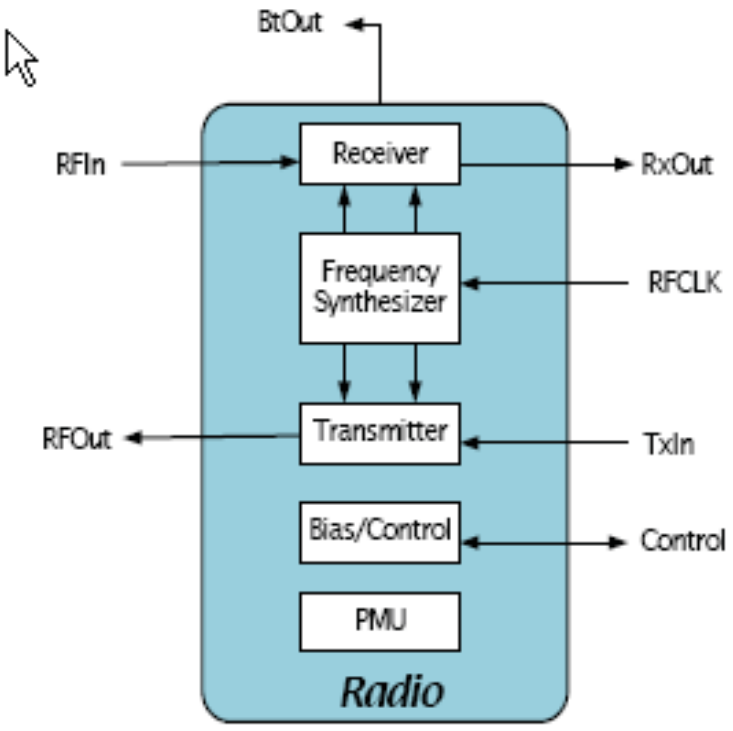


Figure 2-1. **Radio Functional Block Diagram**

WLAN operation

1.1 Receiver (Rx) Block

The receiver converts an RF signal (with 40 MHz bandwidth) to baseband I and Q outputs. The receiver is tuned to 2.4 GHz and 5 GHz for IEEE 802.11 b/g/n and 802.11a/n signals, respectively.

For 5 GHz operation, the receiver is comprised of a low noise amplifier (LNA) followed by a variable gain amplifier (VGA), a radio frequency (RF) mixer, an intermediate frequency (IF) mixer, and a baseband programmable gain filter. This receiver is implemented using the sliding IF topology.

For 2 GHz operation, the receiver is comprised of an LNA, a direct conversion mixer, and a baseband programmable gain filter. This receiver is implemented using the direct conversion topology.

For both 5 GHz and 2 GHz paths, mixers down convert the signal to baseband in-phase (I) and quadrature-phase (Q) signals. The I and Q signals are low-pass filtered and amplified by the baseband programmable gain filter controlled by digital logic. The baseband I and Q signals are sent to the ADC. The baseband programmable gain filter is shared between the 2 GHz and 5 GHz paths.

The DC offset of the receive chain is reduced using multiple digital to analog converters (DACs) controlled by the MAC/baseband block. Additionally, the receive chain can be digitally powered down to conserve power.

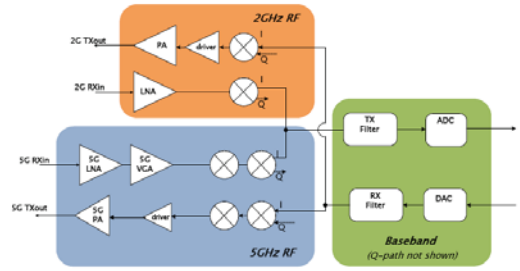


Figure 1. **Radio Tx/Rx Block Diagram**

1.2 Transmitter (Tx) Block

The transmitter converts baseband I and Q inputs to bands centered around 2.4 GHz and 5 GHz for IEEE 802.11 b/g/n and 802.11a/n signals respectively. A block diagram is shown in Figure 1.
The outputs of the DAC are low pass filtered through an on-chip reconstruction filter to remove spectral images and out-of-band quantization noise.

For 5 GHz operation, the transmitter is comprised of a programmable reconstruction filter, an IF mixer, an RF mixer, a preamplifier and a PA. The IF mixer converts baseband signals to an intermediate frequency. The RF mixer converts the IF signal into radio frequency signals, which are driven off chip through a preamplifier and the PA. This transmitter is implemented using the sliding IF topology.

For 2 GHz operation, the transmitter is comprised of a programmable reconstruction filter, a direct conversion mixer, a preamplifier and a PA. This transmitter is implemented using the direct conversion topology.
The transmit chain can be digitally powered down to conserve power. To ensure that FCC limits are observed and that output power stays close to the maximum allowed, the transmit output power is adjusted by a digitally programmable control loop at the start of each packet. The power control can also compensate for temperature variation.

1.3 Synthesizer (SYNTH) Block

The radio supports an on-chip synthesizer to generate local oscillator (LO) frequencies for the receiver and transmitter mixers. Figure 2 shows the synthesizer topology.

The synthesizer can use several crystals such as 19.2, 24, 26, 38.4, 40, and 52 MHz. For AR6003, the default crystal frequency is 26 MHz.

A reference circuitry generates a signal used as the synthesizer reference input. An on-chip voltage controlled oscillator (VCO) provides the desired LO signal based on a phase/ frequency locked loop. The loop filter components are all integrated on-chip and can be digitally controlled.

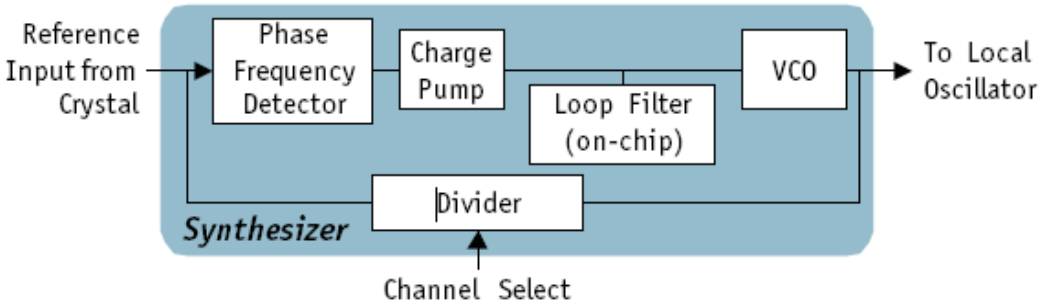


Figure 2. **Radio Synthesizer Block Diagram**

1.4 Bias/Control (BIAS) Block

The bias/control block provides reference voltages and currents for all other circuit blocks (see Figure 2-4). An on-chip bandgap reference circuit provides the needed voltage and current references based on an external 6.19 KΩ ± 1% shunted to GND resistor.

Figure 2-4. **Bias/Control Block Diagram**

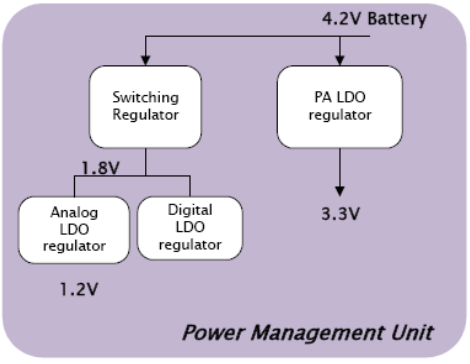


Figure 4. **PMU Block Diagram**

Spec No.	KSPC-177-01

SAMSUNG ELECTRONICS CO., LTD.

SPECIFICATION

DATE 2011/09/29

Name of Product	Intenna(BT/GPS Antenna)
Model Name	SGH-N024
Part Number	K177- BT/GPS
SEC CODE	
Manufacturer	Yokowo.Co.ltd.
DWG. No.	K4-17700E-00
Producing Center	Korea
Mold	AL

REMARKS

yokowo co.,ltd.		
PCA		
Drawing	Checked	Approval
2011/09/29	2011/09/29	2011/09/29
WS.JANG	IH.LEE	

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yokowo co.,ltd.

Contents

1. General Information

- MODEL : SGH-N024_BT/GPS
- ANTENNA TYPE : INTERNAL
- ANTENNA PART NO. : K177-BT/GPS
- Sec Code : -
- Revision : REV. 0.5

2. Electrical properties

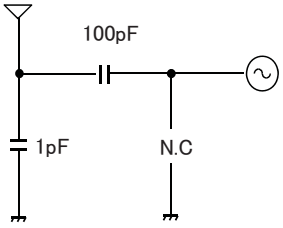
2.1 Electrical Specification

BAND (Frequency Range)	GPS (1575MHz)	GLONASS (1596-1607MHz)	BT (2400-2500MHz)				
GAIN (2D)	More than -10.5dBi	More than -10.0dBi	More than -3.5dBi				

SWR MARKER NO. & Frequence	1 1575Mhz	2 1596Mhz	3 1607Mhz	4 2400MHz	5 2500MHz						
SWR	Less than 2.4 : 1	Less than 2.5 : 1	Less than 2.6 : 1	Less than 3.4 : 1	Less than 3.7 : 1						

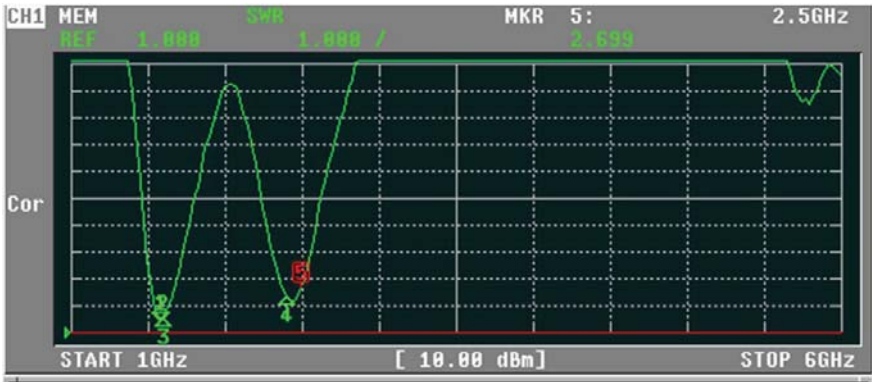
Impedance	50Ω
Polarization	Vertical
Radiation Pattern	Omni Directional
Max. Power	2 Watt

2.2 Matching



2.3 Electrical properties Data

2.3.1 VSWR



CH1 MARKER LIST

1:	1.575 000GHz	1.441
2:	1.596 000GHz	1.491
3:	1.607 000GHz	1.589
4:	2.400 000GHz	2.378
5:	2.500 000GHz	2.699
6:		
7:		
8:		
9:		
10:		

CH2 MARKER LIST

1:	1.575 000GHz	51.335 Ω	-18.656 Ω	5.416pF
2:	1.596 000GHz	36.589 Ω	-7.163 Ω	13.920pF
3:	1.607 000GHz	32.301 Ω	-2.651 Ω	37.352pF
4:	2.400 000GHz	45.282 Ω	-41.806 Ω	1.586pF
5:	2.500 000GHz	61.434 Ω	-56.555 Ω	1.125pF
6:				
7:				
8:				
9:				
10:				

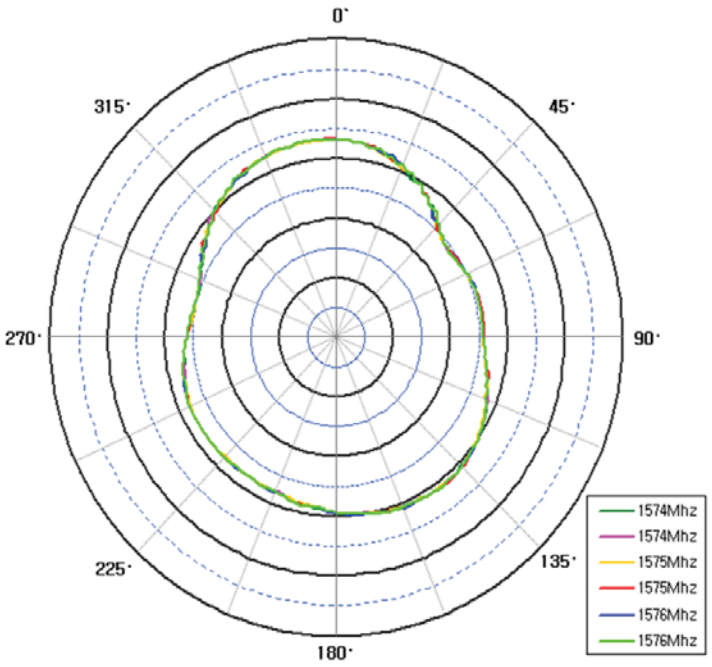
2.4 2D Radiation Pattern

2.4.1 GPS Band Radiation Pattern H-Plane

Gain & Radiation Pattern

Model Name:	SGH-N024
Test Band :	GPS
Test Date :	
Tester Name:	
User Name :	
Memo :	

Frequency	Max.	Min.	Avg.	Beam Peak
1574Mhz	-6.91	-15.56	-10.70	354`
1574Mhz	-6.90	-15.56	-10.70	354`
1575Mhz	-6.93	-15.63	-10.80	354`
1575Mhz	-6.80	-15.51	-10.60	354`
1576Mhz	-6.83	-15.56	-10.70	354`
1576Mhz	-6.83	-15.57	-10.70	350`

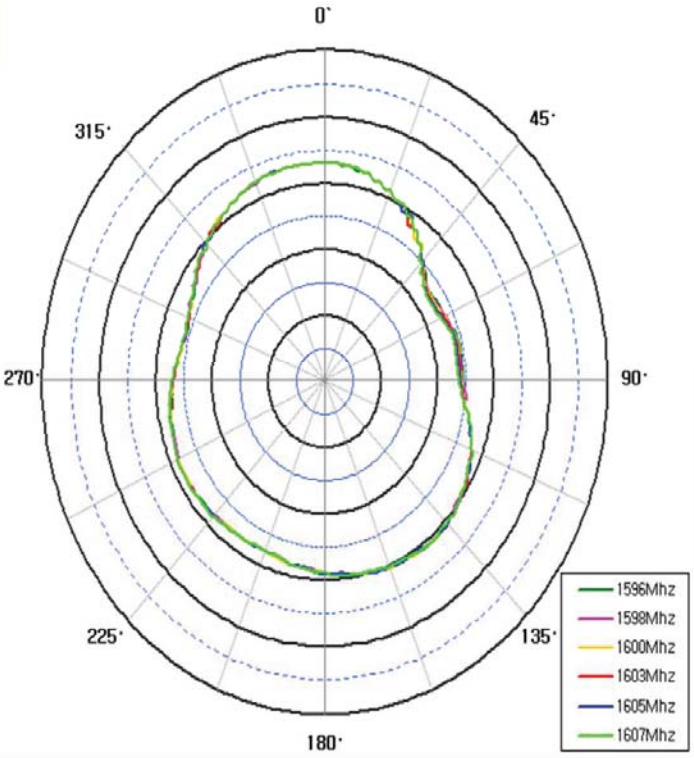


2.4.2 GLONASS Band Radiation Pattern H-Plane

Gain & Radiation Pattern

Model Name:	SGH-N024
Test Band :	GLONASS
Test Date :	
Tester Name:	
User Name :	
Memo :	

Frequency	Max.	Min.	Avg.	Beam Peak
1596Mhz	-7.04	-17.08	-11.00	354`
1598Mhz	-7.03	-17.22	-10.90	354`
1600Mhz	-7.02	-17.36	-10.90	354`
1603Mhz	-7.00	-17.56	-10.90	354`
1605Mhz	-7.00	-17.69	-10.90	356`
1607Mhz	-7.00	-17.86	-10.90	356`

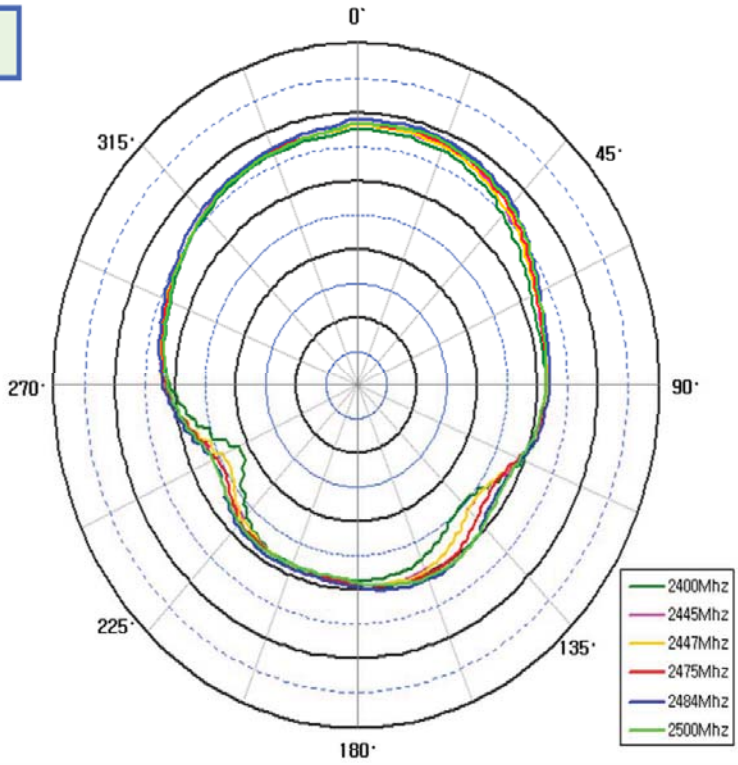


2.4.3 BT Band Radiation Pattern H-Plane

Gain & Radiation Pattern

Model Name:	SGH-N024
Test Band :	BlueTooth
Test Date :	
Tester Name:	
User Name :	
Memo :	

Frequency	Max.	Min.	Avg.	Beam Peak
2400Mhz	-2.65	-18.73	-7.21	2`
2445Mhz	-2.00	-16.00	-6.59	2`
2447Mhz	-2.05	-16.01	-6.63	0`
2475Mhz	-1.68	-14.88	-6.41	12`
2484Mhz	-1.06	-14.01	-5.82	12`
2500Mhz	-1.49	-13.93	-6.28	14`

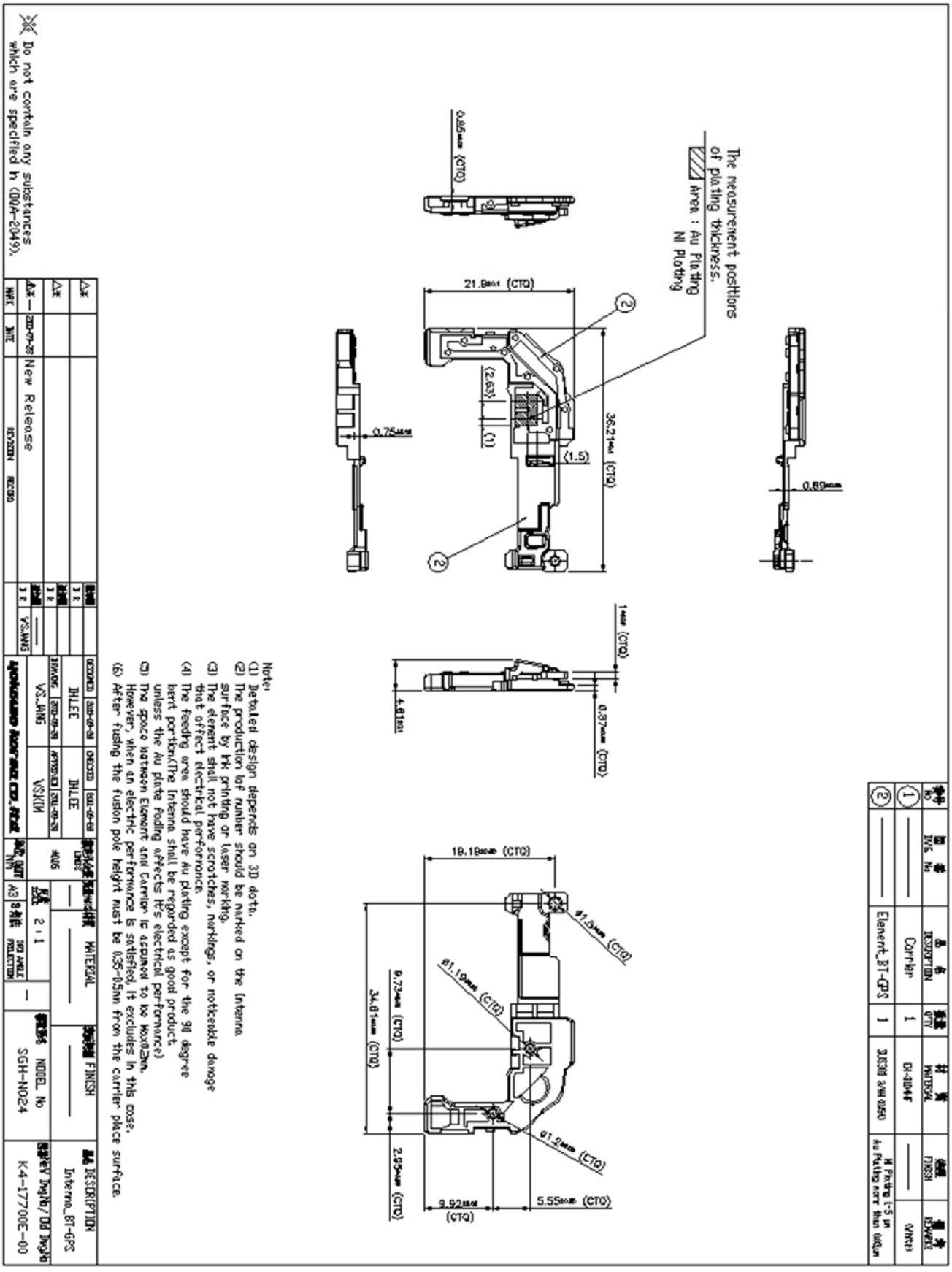


2.5 3D Efficiency & Peak Gain

Frequency	Eff. (%)	Ave. Gain (dBi)	Peak Gain (dBi)	Directivity (dBi)
1574 MHz	46	-3.40	1.35	4.75
1574.4 MHz	46	-3.40	1.34	4.74
1574.8 MHz	46	-3.40	1.34	4.74
1575.2 MHz	46	-3.38	1.45	4.83
1575.6 MHz	46	-3.39	1.45	4.84
1576 MHz	46	-3.39	1.44	4.83
1596 MHz	45	-3.45	1.05	4.50
1598.2 MHz	45	-3.48	1.02	4.50
1600.4 MHz	45	-3.48	1.00	4.48
1602.6 MHz	45	-3.48	1.00	4.48
1604.8 MHz	45	-3.43	0.99	4.42
1607 MHz	45	-3.50	0.98	4.48
2400 MHz	45	-3.50	0.29	3.79
2445 MHz	44	-3.52	0.20	3.72
2447 MHz	44	-3.52	0.07	3.59
2475 MHz	44	-3.55	0.00	3.55
2484 MHz	44	-3.60	0.10	3.70
2500 MHz	41	-3.83	0.00	3.83

3. Mechanical properties

3.1 Antenna Drawing



3.2 Antenna Information

Size	See 3.1 Antenna Drawing
Operation temperature	-40℃ ~ +80℃
Weight	Less than 3g

3.3 PART LIST

Parts	Manufacture spec.	IM	Plating	Q'TY	Remarks
Carrier	Material	EH-3104HF	-	1	(White)
	Material No	EH-3104HF			
	Material Company	Cheil Industries			
	Manufacture	Parang			
Element	Material	SUS	Ni Plating 1～5 μm Au Plating more than 0.03μm	1	(0.15t)
	Material No	SUS301 3/4H			
	Material Company	POSCO			
	Manufacture	Parang			

Spec No.	KSPC-176-01

SAMSUNG ELECTRONICS CO., LTD.

LEAD-FREE

SPECIFICATION

DATE 2011/09/29

Name of Product	Intenna(WIFI Antenna)
Model Name	SGH-N024
Part Number	K176-WIFI
SEC CODE	-
Manufacturer	Yokowo.Co.ltd.
DWG. No.	K4-17600E-01
Producing Center	Korea
Mold	Steel

REMARKS

yokowo co.,ltd.		
PCA		
Drawing	Checked	Approval
2011/09/29	2011/09/29	2011/09/29
WS.JANG	IH.LEE	

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yokowo co.,ltd.

Contents

1. General Information

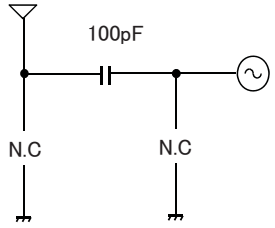
- MODEL : SGH-N024_WIFI
- ANTENNA TYPE : INTERNAL
- ANTENNA PART NO. : K176-WIFI
- Sec Code : -
- Revision : REV. 0.5

2. Electrical properties

2.1 Electrical Specification

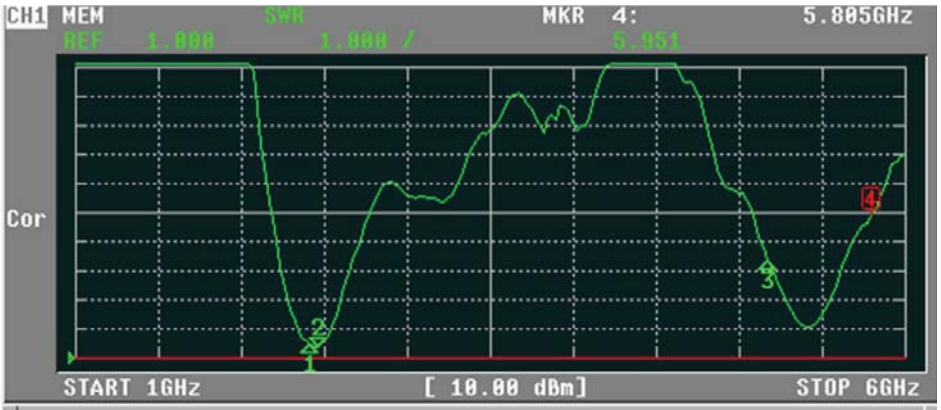
BAND (Frequency Range)	WIFI 2GHz (2412-2472MHz)		WIFI 5GHz (5180-5805MHz)								
GAIN (2D)	More than -5.9dBi		More than -13.2dBi								
SWR MARKER NO. & Frequence	1 2400MHz	2 2500MHz	3 5180MHz	4 5805MHz							
SWR	Less than 2.5 : 1	Less than 2.4 : 1	Less than 5.3 : 1	Less than 7.0 : 1							
Impedance	50Ω										
Polarization	Vertical										
Radiation Pattern	Omni Directional										
Max. Power	2 Watt										

2.2 Matching



2.3 Electrical properties Data

2.3.1 VSWR



CH1 MARKER LIST

1:	2.412 000GHz	1.493
2:	2.472 000GHz	1.406
3:	5.180 000GHz	4.306
4:	5.805 000GHz	5.951
5:		
6:		
7:		
8:		
9:		
10:		

CH2 MARKER LIST

1:	2.412 000GHz	33.926 Ω	-1.549 Ω	42.576pF
2:	2.472 000GHz	47.512 Ω	16.068 Ω	1.034nH
3:	5.180 000GHz	136.867 Ω	-96.385 Ω	318fF
4:	5.805 000GHz	21.828 Ω	-60.597 Ω	452fF
5:				
6:				
7:				
8:				
9:				
10:				

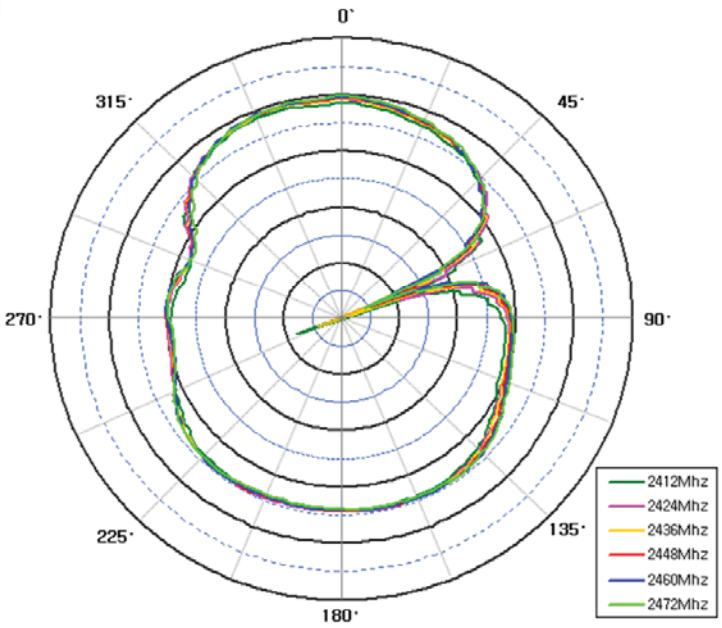
2.4 2D Radiation Pattern

2.4.1 WIFI(2GHz) Band Radiation Pattern H-Plane

Gain & Radiation Pattern

Model Name:	SGH-N024
Test Band :	WIFI(2GHz)
Test Date :	
Tester Name:	
User Name :	
Memo :	

Frequency	Max.	Min.	Avg.	Beam Peak
2412Mhz	-1.48	-48.17	-5.96	342`
2424Mhz	-0.99	-30.37	-5.52	0`
2436Mhz	-0.95	-44.33	-5.60	0`
2448Mhz	-0.70	-34.99	-5.46	2`
2460Mhz	-0.51	-29.85	-5.38	0`
2472Mhz	-0.43	-35.37	-5.42	2`

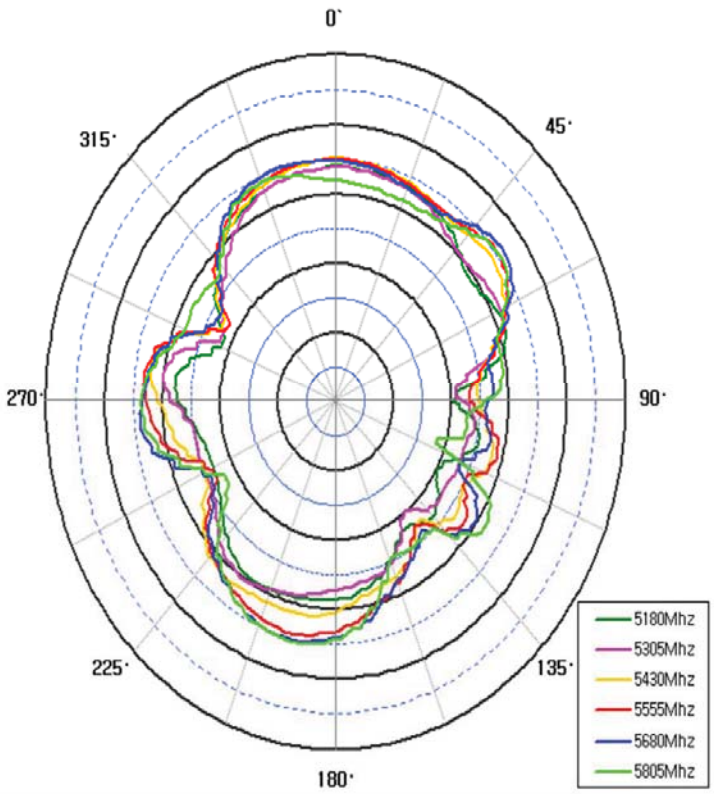


2.4.2 WIFI(5GHz) Band Radiation Pattern H-Plane

Gain & Radiation Pattern

Model Name:	SGH-N024
Test Band :	WIFI(5GHz)
Test Date :	
Tester Name:	
User Name :	
Memo :	

Frequency	Max.	Min.	Avg.	Beam Peak
5180Mhz	-6.09	-19.87	-10.90	2`
5305Mhz	-6.18	-20.17	-10.90	0`
5430Mhz	-5.00	-17.81	-9.22	0`
5555Mhz	-4.78	-18.50	-8.45	50`
5680Mhz	-3.80	-16.70	-7.99	52`
5805Mhz	-4.62	-21.67	-8.66	52`

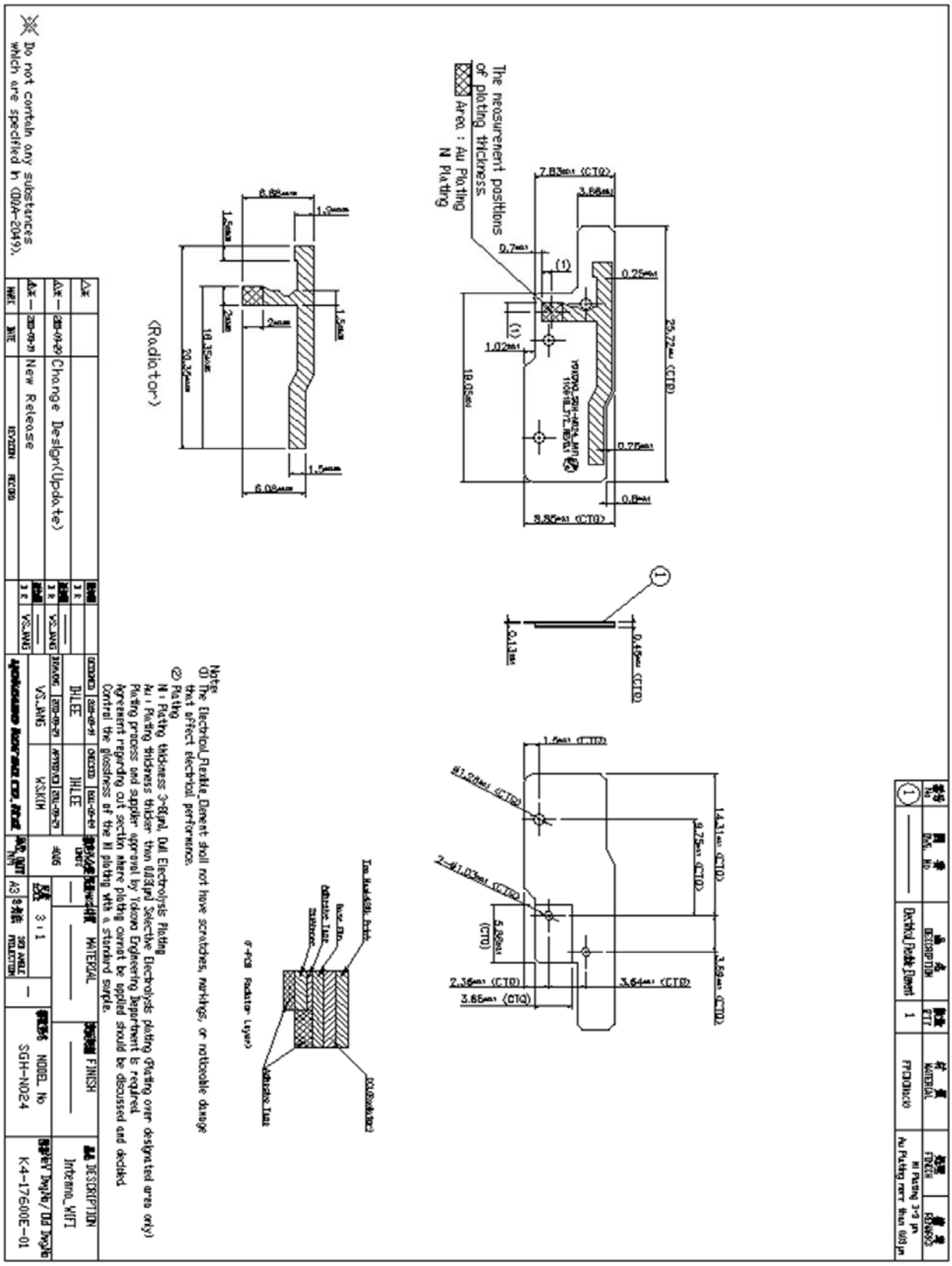


2.5 3D Efficiency & Peak Gain

Frequency	Eff. (%)	Ave. Gain (dBi)	Peak Gain (dBi)	Directivity (dBi)
2412 MHz	42	-3.80	0.12	3.92
2424 MHz	41	-3.90	0.12	4.02
2436 MHz	41	-3.86	0.28	4.14
2448 MHz	40	-3.97	0.31	4.28
2460 MHz	36	-4.39	-0.01	4.38
2472 MHz	40	-3.95	0.48	4.43
5180 MHz	52	-2.82	3.20	6.02
5305 MHz	60	-2.25	3.61	5.86
5430 MHz	60	-2.22	3.41	5.63
5555 MHz	54	-2.70	2.79	5.49
5680 MHz	28	-5.48	-0.12	5.36
5805 MHz	24	-6.24	-0.91	5.33

3. Mechanical properties

3.1 Antenna Drawing



3.2 Antenna Information

Size	See 3.1 Antenna Drawing
Operation temperature	-40℃ ~ +80℃
Weight	Less than 3g

3.3 PART LIST

Parts	Manufacture	Unit	Manufacture spec.	IM	Plating	Q'TY	Remarks
Element	CST	COVERLAY	Material	COVERLAY	Ni Plating 3～8 μm Au Plating more than 0.03 μm	1	-
			Material No	WHITE INK SCM500HF BLACK COVERLAY HGCS-A505RB			
			Material Company	HANWHA			
		CCL	Material	CCL			
			Material No	HGLS-S222EM			
			Material Company	HANWHA			
		EPOXY	Material	EPOXY			
			Material No	DS-7402			
			Material Company	DOOSAN			
		Adhesive Tape	Material	Adhesive Tape			
			Material No	3M 467			
			Material Company	3M			