

Application PKLWBG-1000**Additional Information for FCC approval of Widcomm Inc.'s Bluegate 1000**

Operating Description

May 22, 2001

The Bluegate 1000 is a network access product designed to provide a concurrent wireless bi-directional link between a 10/100 Base-T Ethernet port and up to 7 other Bluetooth devices. The Bluegate 1000 device contains an Alps integrated Bluetooth transceiver component, network processor, field programmable gate array, interface components, and power management. The device field programmable gate array, and software work in conjunction allowing a seamless connection that is designed to operate simultaneously with neighboring wireless Bluetooth devices. The Bluetooth topology, concept, and algorithms handle multiple user environments.

The transceiver is implemented using Bluetooth radio module from Alps(see "Item 6-BG FCC-Alps Module DS.pdf"). This module contains a 2.4GHz Bluetooth radio which is designed for fast frequency hopping over 79 one megahertz channels. The design is separated into two circuit boards, one containing the baseband components and one containing the analog components, RF components, and connectors. These two circuit boards are interconnected using board to board connectors. The RF board contains one antenna in a vertical polarization and one antenna in a horizontal polarization. The antenna's are from Rangestar and are PCB mounted(see "Item 6-BG FCC-Rangestar Antenna DS.pdf"). Antenna selection is performed by the user and is a static operating mode. The unit is powered from a 6VDC/2A wall wart. Major support IC's internal to the device are, a network processor, Flash memory, synchronous DRAM, 10/100 Base-T Ethernet Phy, a crystal oscillator at 16 MHz, PLL based clock generator, Bluetooth RF Transceiver, and interface components.

ALPS Radio Module Specification for 2.4GHz BLUETOOTH

Model number	Function	Specification revision
UGSA4XD05B	With antenna diversity	REV.1.3.5

					DSGD.				
									XD05B
					CHKD.	TITLE		PRODUCT	
						UGSA4		SPECIFICATION	
					APPD.	DOCUMENT NO.			
									(1 / 23)
					ALPS ELECTRIC CO., LTD.				
SYMB.	DATA OR NO.	APPD.	CHKD.	DSGD.					

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1 PURPOSE AND SCOPE

This document contains the specifications pertinent to 2.4GHz BLUETOOTH radio module which comply with Specification of the Bluetooth System Core v1.0b Radio Specification. It includes GENERAL MECHANICAL, ELECTRICAL REQUIREMENTS.

2 ABBREVIATIONS

BER	Bit Error Ratio
dBm	dB relative to 1 mW
TDD	Time Division Duplex
RSSI	Receiver Signal Strength Indication

3 ABSOLUTE MAXIMUM RATINGS

3-1 POWER SUPPLY VOLTAGE

VCC PA:	-0.3V to +6V
VCC OC:	-0.3V to +6.5V

3-2 VOLTAGE ON I/O PIN

-0.3V to VCC OC

3-3 STORAGE TEMPERATURE RANGE

-40°C to +85°C

3-4 DUTY CYCLE OF POWER AMP

85%

Condition: Transmit power +20dBm max
: Ambient Temperature 0°C to +35 °C

NOTE1: Output power is controlled to less than 20dBm due to power amp derating.

4 STANDARD OPERATING CONDITIONS

4-1 OPERATING TEMPERATURE RANGE

0°C to +35 °C

4-2 POWER SUPPLY VOLTAGE

VCC PA:	+3.8V to +4.2V
VCC OC:	+3.2V to +4.2V

4-3 REFERENCE OSCILLATOR

The radio module does not include reference oscillator, which shall be supplied externally. The all specification related items have been guaranteed based on ± 5 ppm stability over operating temperature.

NOTE2:In RECOMMENDED OPERATING CONDITIONS, the module is intended to be functional. GENERAL ELECTRIC CHARACTERISTICS limits are not guaranteed.

NOTE3: The module could not be guaranteed in the case of removing after soldering due to any reason.

NOTE4: This module contains high performance RF circuits with an ESD rating <2KeV and is ESD sensitive. Handling and assembly of this module should only be done ESD work stations.

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5 MECHANICAL CHARACTERISTICS**5-1 ASPECT**

There should not be contamination, scratches nor strains on body.

5-2 DIMENSIONS

Refer to assembly drawings.

5-3 WEIGHT

10 g TYP.

6 ANTENNA CONNECTION

Refer to assembly drawings.

7 GENERAL ELECTRICAL CHARACTERISTICS

The specifications are guaranteed for the following conditions.

Supply voltage

VCC PA: +3.8V to +4.2V

VCC OC: +3.8V to +4.2V

Ambient Temperature

NTC: 15°C to +35 °C

ETC: 0°C to +35 °C

7-1 COMMON SPECIFICATIONS**7-1-1 Operating Frequency Bands**

2400 MHz to 2483.5 MHz

7-1-2 Channel Spacing

1MHz

7-1-3 Duplexing

TDD

7-1-4 Bit Rate

1 Mbps/s

7-1-5 Modulation Method

GFSK BbT = 0.5

7-1-6 Impedance

All electrical specifications shall be measured

with 50 Ω load impedance unless otherwise specified.

7-1-7 VSWR

2.7:1 Typ. 3.75:1 MAX.

(RF port Impedance ... see the "Appendix 12-5")

7-1-8 Diversity Isolation

20dB Typ. 15dB min.

7-1-9 PA On Delay Time

25.7 $\pm$ 7 μ s

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7-2 TX SPECIFICATIONS

7-2-1 TX Initial Center Frequency Accuracy <Temp ETC >
 $\pm 55 \text{ kHz}$

7-2-2 TX Center Frequency Drift <Temp ETC >

One-Slot packet $\pm 25 \text{ kHz}$

Three-Slot packet $\pm 40 \text{ kHz}$

Five-Slot packet $\pm 40 \text{ kHz}$

TX initial Center frequency accuracy is not included

Maximum drift rate $\pm 400 \text{ Hz}/\mu\text{s}$

The maximum drift rate is allowed anywhere in a packet

7-2-3 PLL Lockup Time <Temp ETC >
 $160 \mu\text{s}$ MAX (within $\pm 20 \text{ kHz}$)

7-2-4 Normal Transmitter Power <Temp ETC >

Maximum Output Power Average $+20 \text{ dBm}$ MAX.

Peak $+23 \text{ dBm}$ MAX

$+18 \text{ dBm}$ typ. at Power control voltage 2.8 V

Possible to down to $+4 \text{ dBm}$ typ. with external control circuit and programmable current source and programmable voltage source.

Level control transfer function is monotonic.

*Please refer to recommended external circuit.

7-2-5 Modulation Polarity <Temp ETC >

TX_DATA Binary "HIGH" (V_{IH}) ---- $F_c - \Delta F$

TX_DATA Binary "LOW" (V_{IL}) ----- $F_c + \Delta F$

7-2-6 Maximum Frequency Deviation <Temp ETC >
 140 kHz MIN.
 175 kHz MAX.

7-2-7 Minimum Frequency Deviation <Temp ETC >
 F_{min} at 1010 sequence should be no smaller than $\pm 80\%$ of F_{dev} at 11110000 sequence.
 115 kHz MIN.

7-2-8 In-Band Spurious Emission <Temp ETC >

Transmit data should be pseudo random data pattern.

Frequency Offset	Transmit Power
$\pm 550 \text{ kHz}$	-20 dBc Max
$ M - N = 2$	-20 dBm Max
$ M - N \geq 3$	-40 dBm Max

M: Transmit Channel

N: Adjacent Channel

The spectrum shall comply with the FCC's 20 dB bandwidth definition and should be measured accordingly. The transmitted power shall be measured in a 100 kHz bandwidth with maximum hold.

Exceptions are allowed in up to three bands of 1 MHz width centered on a frequency which is an integer multiple of 1 MHz . They must, however, comply with an absolute values of -20 dBm .

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7-2-9 Out-of-Band Spurious Emission

<Temp ETC >

The measured power should be measured in a 100kHz Bandwidth.

Frequency Band	Operation Mode	Idle Mode
30MHz – 1GHz	- 36dBm Max.	-57dBm Max
1GHz – 12.75GHz	- 30dBm Max.	-47dBm Max
1.8GHz – 1.9GHz	- 47dBm Max	-47dBm Max
5.15GHz – 5.3GHz	- 47dBm Max	-47dBm Max

7-3 RX SPECIFICATIONS

7-3-1 Actual Sensitivity

<Temp ETC >

BER shall be less than 0.1% under the following conditions.

Carrier Signal level: -80dBm MAX. *over the operating temperature range.*
-88dBm TYP. *at Ta=+25 deg.C*

(Noise Figure ... see the "Appendix 12-4")

7-3-2 Maximum usable level

<Temp NTC >

The maximum usable input level the receiver shall operate at shall be better than -20dBm.

BER shall be less than 0.1% under the following conditions.

Carrier Signal level: -20 dBm

7-3-3 Interference Performance

<Temp NTC >

BER shall be less than 0.1% under the following conditions.

Modulated Interference Signal Level (Channel Y) :

Interfere on RF channel "Y"	Carrier Signal Level(Channel M)	Interfere Signal level (Channel Y)
Y=M	-60dBm	-74dBm
Y=M±1	-60dBm	-69dBm
Y=M±2	-60dBm	-30dBm
Y≥M±3	-67dBm	-27dBm

All interference to be measured at center channel

Frequencies where the requirements are not met are called spurious response frequencies.

Five spurious response frequencies are allowed at frequencies with a distance of ≥ 2 MHz from the wanted signal. On these spurious frequencies a relaxed interference requirement level shall be met as below.

Interfere Signal level -43dBm Y=M±2

Interfere Signal level -50dBm Y≥M±3

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7-3-4 Out of Band Blocking <Temp NTC >

BER shall be less than 0.1% under the following conditions.

Carrier Signal level : -67dBm

Interference Signal Level :

Frequency(f)	Continuous sine wave carrier level
30MHz – 2000MHz	-10dBm
2000MHz – 2400MHz	-27dBm
2500MHz – 3000MHz	-27dBm
3000MHz – 12.75GHz	-10dBm

24 exceptions are permitted which are dependent upon the given receive channel frequency and are centered at a frequency which is an integer multiple of 1MHz . At 19 of these spurious response frequencies a relaxed power level –50dBm of the interferer may used to achieve a BER of 0.1% and the remaining 5 spurious response frequencies the power level is arbitrary.

7-3-5 Intermodulation Characteristics <Temp NTC >

BER shall be less than 0.1% under the following conditions.

Carrier Signal Level at f_0 : -64dBm

A Static Sine Wave Signal Level at f_1 : -39dBm

A BLUETOOTH Modulated Signal Level at f_2 : -39dBm

$$f_0 = 2 f_1 - f_2$$

$$|f_1 - f_2| = n * 1\text{MHz} \quad n = 3, 4, \text{ or } 5$$

Intermodulation performance must fulfil one of the three alternatives.

7-3-6 Spurious Emissions for a Receiver <Temp NTC >

Out of Band (with 100 kHz measurement bandwidth)

30MHz ~ 1GHz : -57dBm MAX.

1GHz ~ 12.75GHz : -47dBm MAX

7-3-7 RSSI

a) RSSI Output Voltage <Temp NTC>

RF input -40dBm

V-40: 0.9V MIN. 1.2VTYP.

RF input -60dBm

V-60: 0.5V MIN. 1.1VTYP. 1.5V MAX.

The slope of RSSI vs. RF input level should be kept always-positive between V-60 and V-40.

V-40-V-60: 0.12V TYP.

b) Ready Time: <Temp NTC >

RF input carrier signal "OFF → ON" to RSSI ready.

RF input level -53dBm

10μs MAX.

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7-3-8 RX DATA DC output level<Temp NTC >

Signal Amplitude : 0.30V TYP.
 DC output Voltage : 1.3V MIN. 1.5V TYP. 1.7V MAX.
 Input Level : -53dBm
 Modulation Deviation : 160 kHz
 Modulation Data Pattern : "11110000" Sequence
 Load Impedance : 10MΩ
 Response attenuation : Amplitude at 1010 sequence shall be greater than 33% of Amplitude 111110000 sequence with respect to Bluetooth Reference modulation as defined in Bluetooth radio specification V1.0B section 4.8.

7-3-9 Demod. Out Polarity

$F_c + \Delta F$ ----- "H"
 $F_c - \Delta F$ ----- "L"

7-4 CURRENT CONSUMPTION <TEMP NTC>

7-4-1 in Transmit Slot : 450mA TYP. 500mA MAX. *at 20dBm output
 7-4-2 in TX Blind Slot : 58mA TYP. 73mA MAX.
 7-4-3 in Receive Slot : 67mA TYP. 84mA MAX.
 7-4-4 in RX Blind Slot : 74mA TYP. 92mA MAX.
 7-4-5 Standby Mode : 200μA MAX.

NOTE5 : All interface signal shall be kept "LOW" during RFON and PLL PWR DWN "LOW". Otherwise interface leakage current must be taken in account for active "LOW" interface and PLL CLOCK, PLL DATA and PLL ENABLE.

7-5 COLD START UP TIME

Radio module shall be work 100μs after the RFON and PLL PWR DWN turned on.

8 RELIABILITY TEST

8-1 TEST METHOD

8-1-1 High Temperature Test :

The unit shall be subjected to unpowered storage at 85°C for a period of 96 hours After removal from storage, the unit shall be left during 1 hour minimum in the room temperature. The unit shall meet the specification of table-1.

8-1-2 Temperature Test :

The unit shall be subjected to unpowered storage at -40°C for a period of 96 hours. After removal from storage, the unit shall be left during 1 hour minimum in the room temperature. The unit shall meet the specifications of table-1.

8-1-3 Temperature Shock :

The unpowered unit shall be subjected to 10 cycles of temperature cycle testing as follows. After removal from cycle testing, the unit shall be left during 1 hour minimum in the room temperature.

The unit shall then meet the specifications of table-1.

-20°C for 20 minutes }
 +80°C for 20 minutes } 1 cycle

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8-1-4 Humidity Test :

The unit shall be subjected to unpowered storage at 40°C and 95% for a period of 96 hours. After removal from storage, the unit shall be left during 1 hour minimum in the room temperature. The unit shall meet the specifications of table-1.

8-1-5 Vibration Test :

The unit shall unpowered and shall be subjected to a swept frequency vibration test as follows. After removal from vibration, the unit shall be left during 1 hour minimum in the room temperature. The unit shall meet the specification of table-1.

Vibration Frequency	:	5 to 55 Hz with 0.15 mm amplitude constant
Total Amplitude	:	1 mm
Direction	:	X,Y,Z (Each direction 40minutes)

8-1-6 Drop Test :

The unit shall be subjected to unpowered drop test follows. After removal from test, the unit shall be left during 1 hour minimum in the room temperature. And then the unit shall be measured and meet the specification of table-1.

Drop Point (Height)	:	1 m
Receiving board	:	Wooden board (20 x 20 x 3 cm.)
Drop times	:	1 time
Direction	:	Any direction without the part of connector

8-1-7 Resistance to Reflow Soldering:

The unit shall meet the electric characteristics (section 7), after reflow soldering based on the sub-clause 12-3.

TABLE-1

TX Frequency Accuracy	±75 kHz MAX.
Normal Transmitter Power	+0 to +20 dBm
Deviation Limit	115 kHz MIN.
Input Sensitivity	-70 dBm MAX.

9 LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices or systems where malfunction of these products can reasonably be expected to result in personal injury. ALPS customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify ALPS for any damages resulting from such improper use or sale.

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10 PIN DESCRIPTION

Pin No.	Pin Name	I / O	Description
1	GND	---	Ground pin
2	TX/RX SWITCH	I	Transmit receive selector V_{IH} = Transmit V_{IL} = Receive
3	ANT SW1	---	Connect to GND V_{IH} =RFR1(ANT1) active V_{IL} =RF1(ANT1)non active
4	VPA_CTRL	I	Switched supply Voltage for 3 rd stage of Power amplifier. Output power is Controlled by this voltage.
5	Vcc PA	I	Supply voltage for Power amplifier circuits. +4.0V typ.
6,7	GND	---	Ground pin
8	RFON	I	Radio module main power switch V_{IH} = Power on V_{IL} = Power down
9,10	GND	---	Ground pin
11	N.C.	O	This terminal do not connect any signals (include GND and Vcc)
12	PLLPD	I	Power control of synthesizer. V_{IH} = Power down V_{IL} = Power ON
13,14	N.C.	O	This terminal do not connect any signals (include GND and Vcc)
15	GND	---	Ground pin
16	N.C.	O	This terminal do not connect any signals (include GND and Vcc)
17	PLL PWR DWN	I	Radio module VCO power switch. Normally this pin connect to RFON V_{IH} = Power ON V_{IL} = Power down
18	VCC OC	I	Supply voltage for other circuits. +4.0V typ.
19	TX DATA	I	Gaussian filtered transmit data input. Input data polarity shall be reversed. This terminal is built-in for LPF so as to reduce a logic noise. Maximum peak amplitude shall be set to 670mVp-p (Loaded) when bit pattern would be "...11110000...".
20	PLL CLOCK	I	Synthesizer clock input for serial registers.
21	PLL DATA	I	Synthesizer binary data input.
22	PLL ENABLE	I	Load enable input for synthesizer.
23~27	GND	---	Ground pin
28	N.C.	I/O	Non connection
29	RX DATA	O	Demodulated output signal Polarity : binary "1" = DC output - ΔV Binary "0" = DC output + ΔV
30	SLICE CTRL	I	Switch tracking and hold of data slicer circuit. V_{IL} = tracking V_{IH} = Hold
31	SLICE OUT	O	Data comparator reference voltage output. SLICE CTRL V_{IL} = S-field tracking(sampling) SLICE CTRL V_{IH} = hold reference voltage
32	RSSI	O	Voltage output of the received signal strength indicator (RSSI).
33	GND	---	Ground pin
34	SYS CLOCK	I	System clock input. 10MHz
35~38	GND	---	Ground pin
39	PA RAMP	I	Controls ON / OFF of transmit power amplifier. V_{IH} =TX P.A. ON V_{IL} =TX P.A. OFF
40	ANT SW2	I	Antenna diversity control V_{IH} =RF2(ANT2) active V_{IL} =RF2(ANT2) non active
41	GND	---	Ground pin
42	N.C.	I/O	Non connection
43~48	GND	---	Ground pin
49	RF1	I/O	RF In/Out Port 1

There is a possibility to change an arrangement of a terminal for a performance improvement and PWB design.

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12 APPENDIX**12-1 PLL FREQUENCY AND CONTROL DATA TABLE**

attention: There is a possibility to change PLL data for a performance improvement.

12-1-1 The Programmable Reference Divider

	MSB				LSB
N=20	Xxxx	xxxx	xxxx	x101	0010

12-1-2 The Programmable Function Resister

	MSB				LSB
TX setup	0110	1000	0000	1001	10x1
RX setup	0110	1100	1001	0001	10x1

12-1-3 The Programmable Divider (PLL frequency table)

BAND	CHAN NEL	FRF	Fvco	MSB				LSB
TX	0	2402.0000	1201.0000	xxxx	X100	1011	0000	1000
	1	2403.0000	1201.5000	xxxx	X100	1011	0000	1100
	2	2404.0000	1202.0000	xxxx	X100	1011	0001	0000
	3	2405.0000	1202.5000	xxxx	X100	1011	0001	0100
	4	2406.0000	1203.0000	xxxx	X100	1011	0001	1000
	5	2407.0000	1203.5000	xxxx	X100	1011	0001	1100
	6	2408.0000	1204.0000	xxxx	X100	1011	0010	0000
	7	2409.0000	1204.5000	xxxx	X100	1011	0010	0100
	8	2410.0000	1205.0000	xxxx	X100	1011	0010	1000
	9	2411.0000	1205.5000	xxxx	X100	1011	0010	1100
	10	2412.0000	1206.0000	xxxx	x100	1011	0011	0000
	11	2413.0000	1206.5000	xxxx	x100	1011	0011	0100
	12	2414.0000	1207.0000	xxxx	x100	1011	0011	1000
	13	2415.0000	1207.5000	xxxx	x100	1011	0011	1100
	14	2416.0000	1208.0000	xxxx	x100	1011	0100	0000
	15	2417.0000	1208.5000	xxxx	x100	1011	0100	0100
	16	2418.0000	1209.0000	xxxx	x100	1011	0100	1000
	17	2419.0000	1209.5000	xxxx	x100	1011	0100	1100
	18	2420.0000	1210.0000	xxxx	x100	1011	0101	0000
	19	2421.0000	1210.5000	xxxx	x100	1011	0101	0100
	20	2422.0000	1211.0000	xxxx	x100	1011	0101	1000
	21	2423.0000	1211.5000	xxxx	x100	1011	0101	1100
	22	2424.0000	1212.0000	xxxx	x100	1011	0110	0000
	23	2425.0000	1212.5000	xxxx	x100	1011	0110	0100
	24	2426.0000	1213.0000	xxxx	x100	1011	0110	1000
	25	2427.0000	1213.5000	xxxx	x100	1011	0110	1100
	26	2428.0000	1214.0000	xxxx	x100	1011	0111	0000
	27	2429.0000	1214.5000	xxxx	x100	1011	0111	0100
	28	2430.0000	1215.0000	xxxx	x100	1011	0111	1000
	29	2431.0000	1215.5000	xxxx	x100	1011	0111	1100
	30	2432.0000	1216.0000	xxxx	x100	1100	0000	0000
	31	2433.0000	1216.5000	xxxx	x100	1100	0000	0100

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ALPS ELECTRIC CO., LTD.

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32	2434.0000	1217.0000	xxxx	x100	1100	0000	1000
33	2435.0000	1217.5000	xxxx	x100	1100	0000	1100
34	2436.0000	1218.0000	xxxx	x100	1100	0001	0000
35	2437.0000	1218.5000	xxxx	x100	1100	0001	0100
36	2438.0000	1219.0000	xxxx	x100	1100	0001	1000
37	2439.0000	1219.5000	xxxx	x100	1100	0001	1100
38	2440.0000	1220.0000	xxxx	x100	1100	0010	0000
39	2441.0000	1220.5000	xxxx	x100	1100	0010	0100
40	2442.0000	1221.0000	xxxx	x100	1100	0010	1000
41	2443.0000	1221.5000	xxxx	x100	1100	0010	1100
42	2444.0000	1222.0000	xxxx	x100	1100	0011	0000
43	2445.0000	1222.5000	xxxx	x100	1100	0011	0100
44	2446.0000	1223.0000	xxxx	x100	1100	0011	1000
45	2447.0000	1223.5000	xxxx	x100	1100	0011	1100
46	2448.0000	1224.0000	xxxx	x100	1100	0100	0000
47	2449.0000	1224.5000	xxxx	x100	1100	0100	0100
48	2450.0000	1225.0000	xxxx	x100	1100	0100	1000
49	2451.0000	1225.5000	xxxx	x100	1100	0100	1100
50	2452.0000	1226.0000	xxxx	x100	1100	0101	0000
51	2453.0000	1226.5000	xxxx	x100	1100	0101	0100
52	2454.0000	1227.0000	xxxx	x100	1100	0101	1000
53	2455.0000	1227.5000	xxxx	x100	1100	0101	1100
54	2456.0000	1228.0000	xxxx	x100	1100	0110	0000
55	2457.0000	1228.5000	xxxx	x100	1100	0110	0100
56	2458.0000	1229.0000	xxxx	x100	1100	0110	1000
57	2459.0000	1229.5000	xxxx	x100	1100	0110	1100
58	2460.0000	1230.0000	xxxx	x100	1100	0111	0000
59	2461.0000	1230.5000	xxxx	x100	1100	0111	0100
60	2462.0000	1231.0000	xxxx	x100	1100	0111	1000
61	2463.0000	1231.5000	xxxx	x100	1100	0111	1100
62	2464.0000	1232.0000	xxxx	x100	1101	0000	0000
63	2465.0000	1232.5000	xxxx	x100	1101	0000	0100
64	2466.0000	1233.0000	xxxx	x100	1101	0000	1000
65	2467.0000	1233.5000	xxxx	x100	1101	0000	1100
66	2468.0000	1234.0000	xxxx	x100	1101	0001	0000
67	2469.0000	1234.5000	xxxx	x100	1101	0001	0100
68	2470.0000	1235.0000	xxxx	x100	1101	0001	1000
69	2471.0000	1235.5000	xxxx	x100	1101	0001	1100
70	2472.0000	1236.0000	xxxx	x100	1101	0010	0000
71	2473.0000	1236.5000	xxxx	x100	1101	0010	0100
72	2474.0000	1237.0000	xxxx	x100	1101	0010	1000
73	2475.0000	1237.5000	xxxx	x100	1101	0010	1100
74	2476.0000	1238.0000	xxxx	x100	1101	0011	0000
75	2477.0000	1238.5000	xxxx	x100	1101	0011	0100
76	2478.0000	1239.0000	xxxx	x100	1101	0011	1000
77	2479.0000	1239.5000	xxxx	x100	1101	0011	1100
78	2480.0000	1240.0000	xxxx	x100	1101	0100	0000

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BAND	CHAN NEL	FRF	fvco	MSB				LSB
RX	0	2402.0000	1146.000	xxxx	x100	0111	0101	0000
	1	2403.0000	1146.500	xxxx	x100	0111	0101	0100
	2	2404.0000	1147.000	xxxx	x100	0111	0101	1000
	3	2405.0000	1147.500	xxxx	x100	0111	0101	1100
	4	2406.0000	1148.000	xxxx	x100	0111	0110	0000
	5	2407.0000	1148.500	xxxx	x100	0111	0110	0100
	6	2408.0000	1149.000	xxxx	x100	0111	0110	1000
	7	2409.0000	1149.500	xxxx	x100	0111	0110	1100
	8	2410.0000	1150.000	xxxx	x100	0111	0111	0000
	9	2411.0000	1150.500	xxxx	x100	0111	0111	0100
	10	2412.0000	1151.000	xxxx	x100	0111	0111	1000
	11	2413.0000	1151.50	xxxx	x100	0111	0111	1100
	12	2414.0000	1152.000	xxxx	x100	1000	0000	0000
	13	2415.0000	1152.500	xxxx	x100	1000	0000	0100
	14	2416.0000	1153.000	xxxx	x100	1000	0000	1000
	15	2417.0000	1153.500	xxxx	x100	1000	0000	1100
	16	2418.0000	1154.000	xxxx	x100	1000	0001	0000
	17	2419.0000	1154.500	xxxx	x100	1000	0001	0100
	18	2420.0000	1155.000	xxxx	x100	1000	0001	1000
	19	2421.0000	1155.500	xxxx	x100	1000	0001	1100
	20	2422.0000	1156.000	xxxx	x100	1000	0010	0000
	21	2423.0000	1156.500	xxxx	x100	1000	0010	0100
	22	2424.0000	1157.000	xxxx	x100	1000	0010	1000
	23	2425.0000	1157.500	xxxx	x100	1000	0010	1100
	24	2426.0000	1158.000	xxxx	x100	1000	0011	0000
	25	2427.0000	1158.500	xxxx	x100	1000	0011	0100
	26	2428.0000	1159.000	xxxx	x100	1000	0011	1000
	27	2429.0000	1159.500	xxxx	x100	1000	0011	1100
	28	2430.0000	1160.000	xxxx	x100	1000	0100	0000
	29	2431.0000	1160.500	xxxx	x100	1000	0100	0100
	30	2432.0000	1161.000	xxxx	x100	1000	0100	1000
	31	2433.0000	1161.500	xxxx	x100	1000	0100	1100
	32	2434.0000	1162.000	xxxx	x100	1000	0101	0000
	33	2435.0000	1162.500	xxxx	x100	1000	0101	0100
	34	2436.0000	1163.000	xxxx	x100	1000	0101	1000
	35	2437.0000	1163.500	xxxx	x100	1000	0101	1100
	36	2438.0000	1164.000	xxxx	x100	1000	0110	0000
	37	2439.0000	1164.500	xxxx	x100	1000	0110	0100
	38	2440.0000	1165.000	xxxx	x100	1000	0110	1000
	39	2441.0000	1165.500	xxxx	x100	1000	0110	1100
	40	2442.0000	1166.000	xxxx	x100	1000	0111	0000
	41	2443.0000	1166.500	xxxx	x100	1000	0111	0100
	42	2444.0000	1167.000	xxxx	x100	1000	0111	1000
	43	2445.0000	1167.500	xxxx	x100	1000	0111	1100

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44	2446.0000	1168.000	xxxx	x100	1001	0000	0000
45	2447.0000	1168.500	xxxx	x100	1001	0000	0100
46	2448.0000	1169.000	xxxx	x100	1001	0000	1000
47	2449.0000	1169.500	xxxx	x100	1001	0000	1100
48	2450.0000	1170.000	xxxx	x100	1001	0001	0000
49	2451.0000	1170.500	xxxx	x100	1001	0001	0100
50	2452.0000	1171.000	xxxx	x100	1001	0001	1000
51	2453.0000	1171.500	xxxx	x100	1001	0001	1100
52	2454.0000	1172.000	xxxx	x100	1001	0010	0000
53	2455.0000	1172.500	xxxx	x100	1001	0010	0100
54	2456.0000	1173.000	xxxx	x100	1001	0010	1000
55	2457.0000	1173.500	xxxx	x100	1001	0010	1100
56	2458.0000	1174.000	xxxx	x100	1001	0011	0000
57	2459.0000	1174.500	xxxx	x100	1001	0011	0100
58	2460.0000	1175.000	xxxx	x100	1001	0011	1000
59	2461.0000	1175.500	xxxx	x100	1001	0011	1100
60	2462.0000	1176.000	xxxx	x100	1001	0100	0000
61	2463.0000	1176.500	xxxx	x100	1001	0100	0100
62	2464.0000	1177.000	xxxx	x100	1001	0100	1000
63	2465.0000	1177.500	xxxx	x100	1001	0100	1100
64	2466.0000	1178.000	xxxx	x100	1001	0101	0000
65	2467.0000	1178.500	xxxx	x100	1001	0101	0100
66	2468.0000	1179.000	xxxx	x100	1001	0101	1000
67	2469.0000	1179.500	xxxx	x100	1001	0101	1100
68	2470.0000	1180.000	xxxx	x100	1001	0110	0000
69	2471.0000	1180.500	xxxx	x100	1001	0110	0100
70	2472.0000	1181.000	xxxx	x100	1001	0110	1000
71	2473.0000	1181.500	xxxx	x100	1001	0110	1100
72	2474.0000	1182.000	xxxx	x100	1001	0111	0000
73	2475.0000	1182.500	xxxx	x100	1001	0111	0100
74	2476.0000	1183.000	xxxx	x100	1001	0111	1000
75	2477.0000	1183.500	xxxx	x100	1001	0111	1100
76	2478.0000	1184.000	xxxx	x100	1010	0000	0000
77	2479.0000	1184.500	xxxx	x100	1010	0000	0100
78	2480.0000	1185.000	xxxx	x100	1010	0000	1000

NOTE 7: x = Don't Care Condition

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12-1-4 Timing Chart (Please firstly send MSB.)

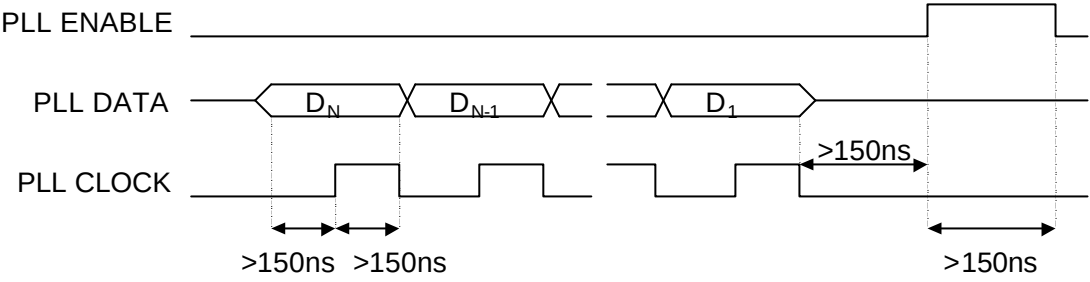


Fig-2. PLL timing chart

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12-3 Recommended soldering condition

12-3-1 Heating Method

Double heating method with hot air.

12-3-2 Temperature Measurement

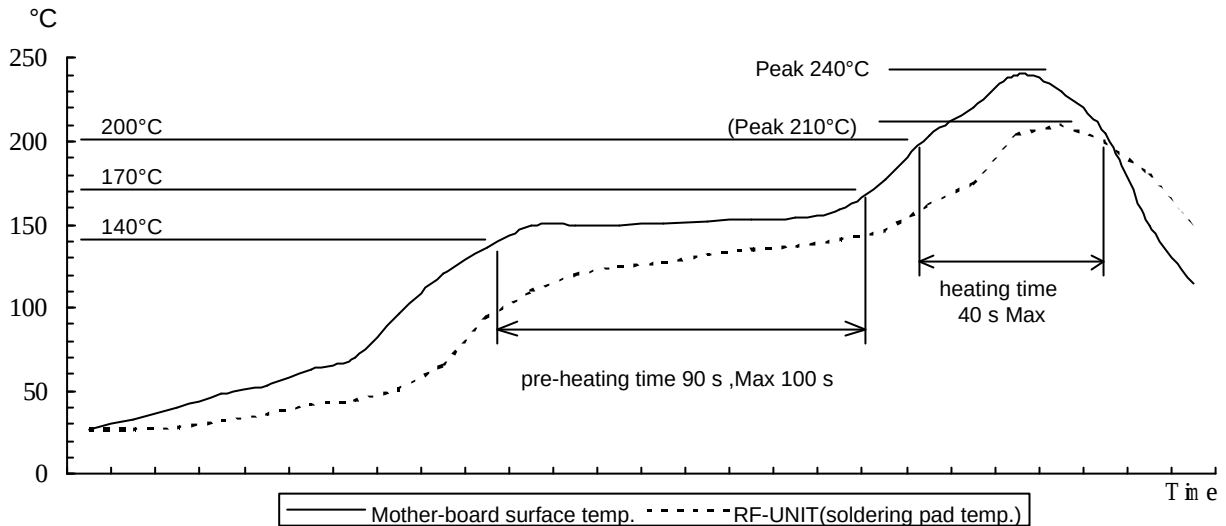
Thermocouple 0.1~0.2 Φ CA(K) or CC(T) at soldering portion.

12-3-3 Solder Condition.

Sn/63% Pb/37%

12-3-4 Temperature Profile

Temperature profile (Allowable soldering number of times "1 time")



12-4 Noise Figure

Based upon the Widcomm – ALPS engineering meeting on SEP 7th, 2000, the following NF measurement methodology has discussed and agreed to use "HP Noise Figure meter". However, the measurement of NF is not practical at production line. This figure is for the engineering reference only.

NF= 9.3dB TYP. at the pin #44 of LMX3162

12-5 RF port Impedance

RF port Impedance: 25-6.3j Ω TYP. at Channel 39

NOTE: This figure is for the engineering reference only.

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							ALPS ELECTRIC CO., LTD.		
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Diagram illustrating the bottom view of the ALPS-1000. The device is square-shaped with a central rectangular area containing three horizontal slots. The overall width is 25mm and the overall height is 18mm. The central area is labeled with "CUSTOMER'S MODEL NO.", "ALPS MODEL NO.", and "LOT NO.".

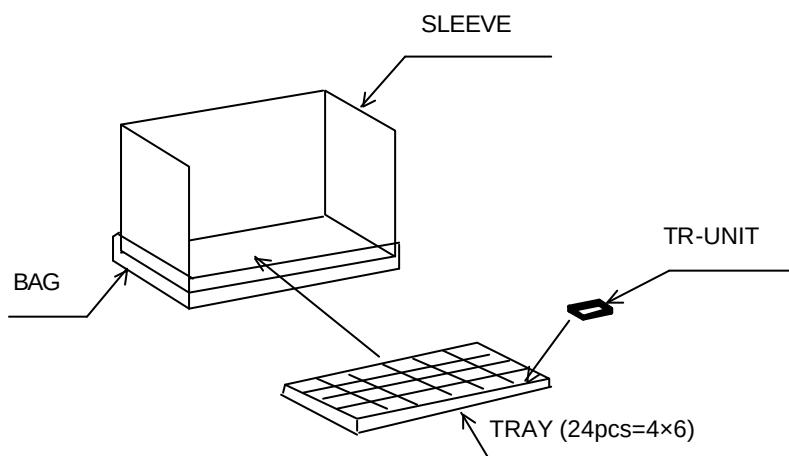
--	--	--	--	--	--	--

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

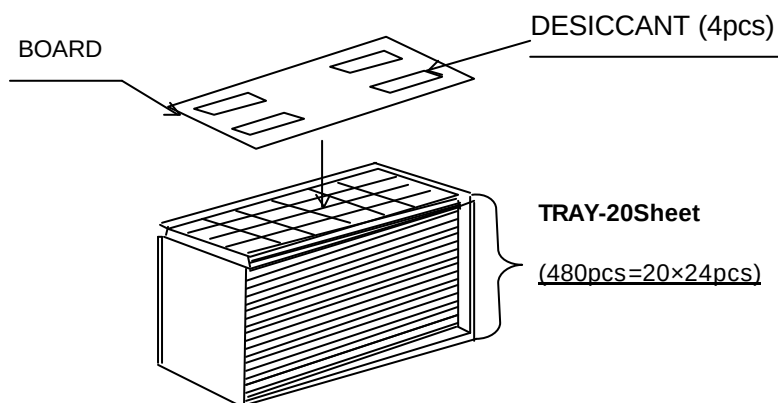
								XD05B
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						DOCUMENT NO. (20 /)		
<i>ALPS ELECTRIC CO., LTD.</i>								
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14 Packing Specification

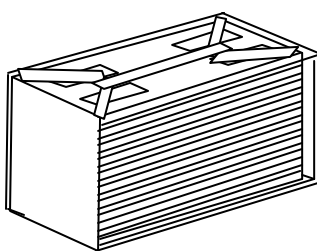
1. Put TR-UNITs on the trays in order, then pile trays up to 20 sheets parallel to the partition boards laid in bag.



2. After piling up, put a board with desiccant on the top of the tray sheets.



3. Tape the bag.



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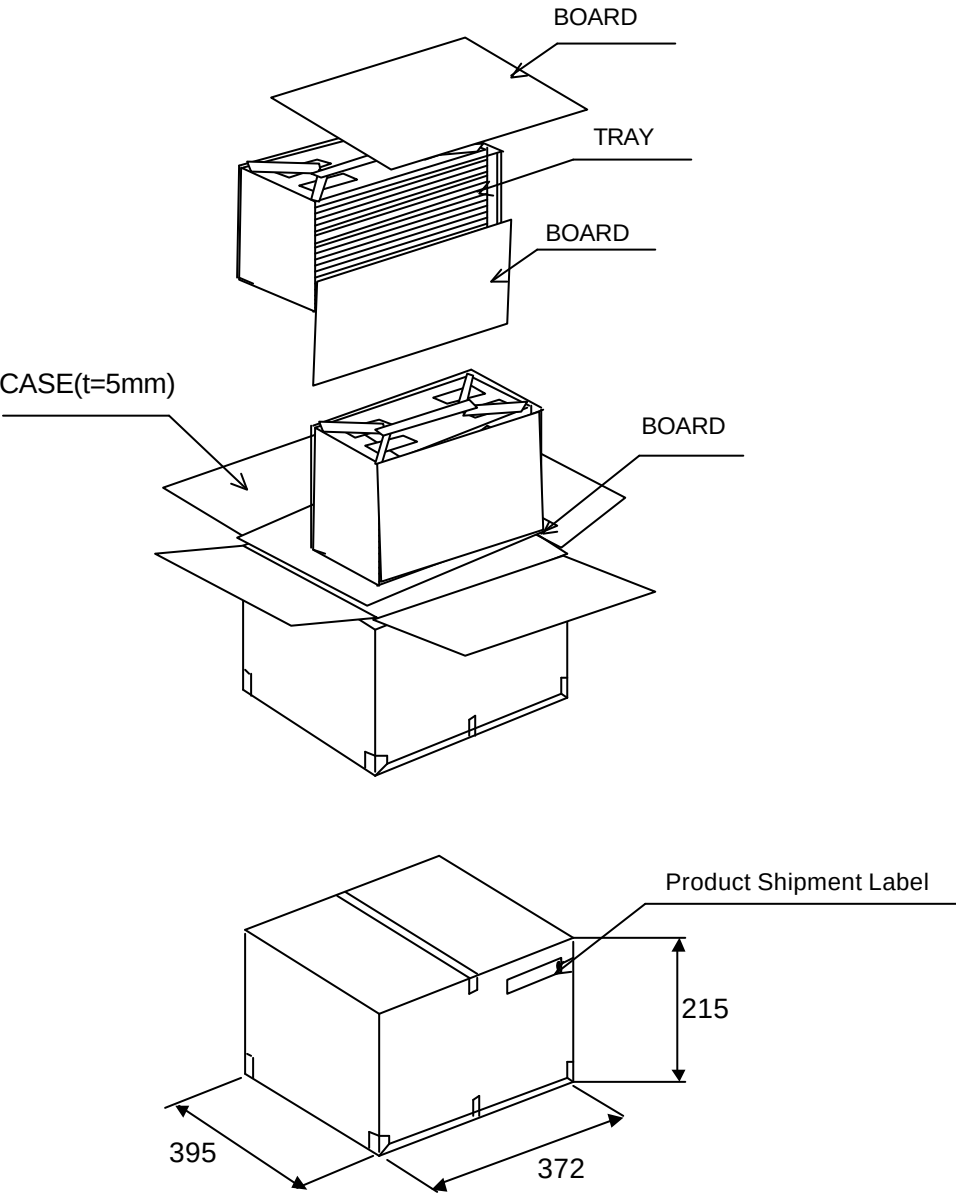
DOCUMENT NO.

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4. Pack in a case.



NOTE1 : For more detail of Product Shipment Label, please refer to Product Shipment Label Description.
2 : Q'ty of goods : 960pcs/carton

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15 PRODUCT SHIPMENT LABEL DESCRIPTION

① CUSTOMER 御中		納入数量★QTY 個	製品番号 ALPS P/N ②		区分 ③	検査印 INSPECTED BY ALPS	⑪
得意先品番 CUSTOMER P/N ④		PCS 個入 ⑤	受注 No. ⑥	品種名 ⑦	販売課 ⑧	⑩	
納入月日★ 年 月 日	ALPS	★個口	LOTNo.(製作番号)		倉庫 ⑨		

220.0±0.3

3.4±0.3

(1) CUSTOMER CODE and CUSTOMER NAME

(2) ALPS PART NO.

(3) ORDER CLASSIFICATION

[] (BLANK) : MASS PRODUCTUION ORDER
 [T] : SPECIAL ORDER
 [H] : RETURN ORDER
 [S] : ENGNEIERING SAMPLE ORDER

(4) CUSTOMER PART NO.

(5) PACKING UNIT (Q'TY)

(6) ALPS ENTRY NO.

(7) ALPS PRODUCT CLASSIFICATION CODE : (EX. DECT TR UNIT => TR)

(8) ALPS SALES SECITION CODE

(9) ALPS WAREHOUSE CODE

(10) INSPECTION STAMP

(11) PRODUCT LABEL

Remark : All * marked areas are ALPS internal use and might be kept as blank.

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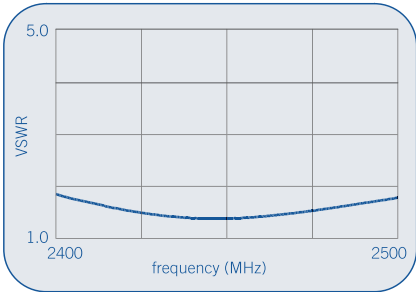
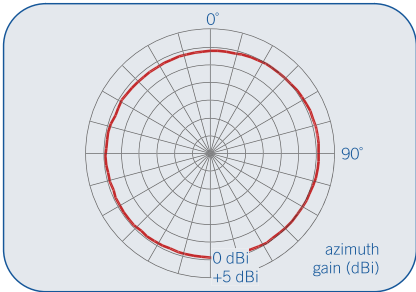
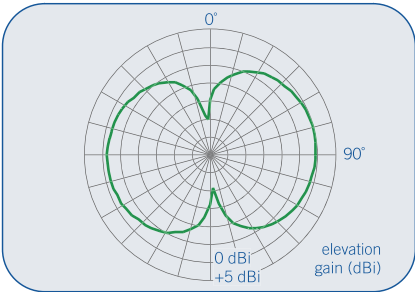
Specifications

Frequency Range (MHz)	2400 - 2500
Peak Gain	0 dBi
VSWR	< 2.0 : 1
Polarization	linear, vertical
Powerhandling	10 Watt cw
Feedpoint Impedance	50 Ohms

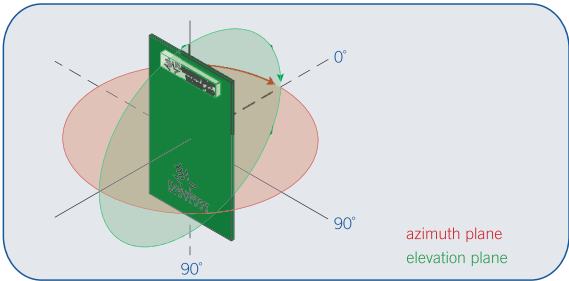
Features

- Small and lightweight
- No tuning components
- Available in tape and reel or tray packaging for automatic mounting

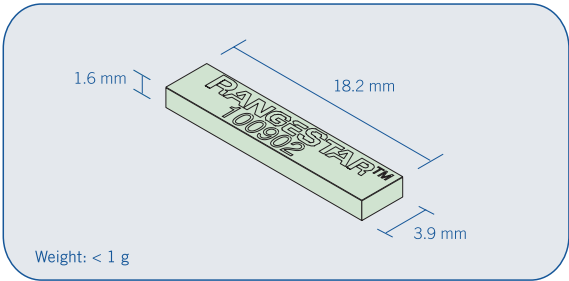
2400 MHz Band



Legend



Approximate Dimensions



Application PKLWBG-1000

Additional Information for the FCC approval of Widcomm Inc.'s Bluegate 1000

Frequency Hopping Compliance Statement

The Frequency Hopping Sequence follows the Bluetooth Pseudorandom Hop Sequence Specification. Version 11 of the specification for the Bluetooth baseband is attached(see "*Bluetooth_11_PartB_Baseband.pdf*") and is referenced below. Specific items related to frequency hopping compliance are addressed as follows.

The Widcomm Bluegate 1000 adopts the 79-hop frequency hopping protocol specified in Bluetooth standard. Since Bluetooth has been approved by FCC, the hopping scheme complies with the FCC frequency hopping spread spectrum definition. A description is contained in Section 2.1(page 11) of the Bluetooth baseband specification.

The Bluetooth frequency hopping protocol can be found in Part B, Section 11 of the Bluetooth specifications version 1.1 (pages 126-137). The descriptions in the specification (page 127 in particular) answer why the generated hop sequence has a near term distribution that appears random and a long term distribution that appears evenly distributed over the hop set. Briefly, the selection scheme visits hops in each 32-hop segment randomly where each 32-hop segment spans about 64 MHz. In connection state, the hop sequence will slide through all 79 hops by selecting different hop segments.

The inputs to the hopping frequency generator are the Bluetooth address(unique to each bluetooth device) and clock. It is defined in the Bluetooth specification(section 9,pages 84-91) that once the slave and master go through a paging stage, the slave will receive a packet that contains the unique address for the master device in the Bluetooth network along with the specific Bluetooth clock associated with that packet's slot timing. From there on, the slave's receiver will be able to synchronize to the master's transmit frequency and vica-versa.

Each BlueGate has a unique Bluetooth address and free running Bluetooth clock. Therefore, the EUT will not be able to synchronize to any other frequency hopping spread spectrum system since they all operate independently.