

# PRODUCT COMPARISON GUIDE

2014

## ABOUT US

Founded in 2000 and headquartered in Espoo, Finland, Bluegiga is committed to providing innovative, easy-to-use, short-range wireless connectivity solutions to product designers throughout the world. Our competitive advantage comes from a unique combination of high performance radios, connectivity software, and superior customer support.

Our product line-up includes ultra-low power Bluetooth Smart modules, high performance Bluetooth Classic audio and data modules, and high-speed Wi-Fi modules. Bluegiga customers include industry leaders in consumer electronics, health and wellness, automotive aftermarket, sports and fitness, M2M and industrial telemetry.

## OUR VALUE PROPOSITION

**RF EXPERTISE AND PERFORMANCE** – We design high quality and certified radio modules that deliver the reliability and performance required, even for the most demanding applications.

**INTEGRATED CONNECTIVITY SOFTWARE** – Bluegiga has developed our own Bluetooth classic, Smart and Wi-Fi software stacks giving us a unique advantage to support, maintain, and further develop or customize our software to match our customers' needs.

**CUSTOMER SERVICE** - We have a highly skilled and global Field Application Engineering team, who will review your design, help optimize your software, and instruct you in how to use our products.

**QUALITY AND PRODUCT LIFE TIMES** - The products we manufacture are designed to last for many, many years and meet the most rigorous operating specifications.

**GLOBAL CHANNELS AND PARTNERS** – Our products are available globally through a network of more than 50 partners ranging from worldwide distributors and online stores to locally focused distributors and representatives who sell and support our products in over 60 countries.



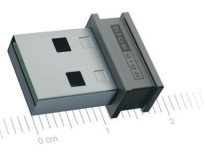
TECHNICAL SPECIFICATIONS	CLASSIC BLUETOOTH	BLUETOOTH SMART	BLUETOOTH SMART READY	WI-FI
Radio frequency	2.4GHz	2.4GHz	2.4GHz	2.4GHz or 5.8GHz
Distance/Range	~10-100 meters	~10-100 meters	~10-100 meters	~10-100 meters
Symbol rate	1-3Mbps	1Mbps	1-3Mbps	1.69Gbps
Application throughput	up to 2.1 Mbps	up to 250 kbps	up to 2.1 Mbps or 250kbps*	up to 100 Mbps
Nodes/Active slaves	7	Unlimited	7 / unlimited*	32
Security	56 to 128 bit	128-bit AES	128 bit AES	WPA2/AES
Modulation	FHSS	FHSS	FHSS	DSSS and OFDM
Latency (not from connected state to send data)	100+ ms	<6ms	<6ms or 100+ms''	150ms
Government regulation	Worldwide	Worldwide	Worldwide	Worldwide
Certification body	Bluetooth SIG	Bluetooth SIG	Bluetooth SIG	IEEE/WECA
Voice capable	Yes	No	Yes	Yes
Network topology	Point-to-point, star, scatternet	Point-to-point, star, scatternet	Point-to-point, star, scatternet*	Star, point-to-point
Power consumption	1 (reference value)	0.01 to 0.5 (use case dependent)	1 (reference value)	2 (use case dependent)
Service discover	Yes	Yes	Yes	N/A
Profile concept	Yes	Yes	Yes	No
Primary use cases	Mobile phones, headsets, stereo audio, automotive, PCs etc.	Mobile phones, tablets, gaming, PCs, sport & fitness, medical, automotive, industrial automation, home electronics etc.	Mobile phones, headsets, stereo audio, automotive, PCs etc.	Mobile phones, Tablets, PCs, Servers, medical, industrial automation, home electronics, etc.
Profiles	Serial Port, Hands-free, HID, A2DP, AVRCP, etc.	Proximity profile, battery status, weight scale, heart rate monitor, humidity, etc.	Classic Bluetooth profiles and/or Bluetooth smart profiles*	N/A

\*Capabilities will vary based on operating mode between classic Bluetooth or Bluetooth Smart

**BLE112**  
Bluetooth  
Smart Module



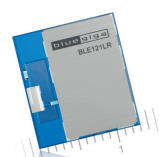
**BLED112**  
Bluetooth  
Smart Dongle



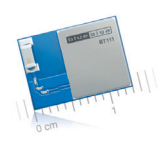
**BLE113**  
Bluetooth  
Smart Module



**BLE121LR**  
Bluetooth  
Smart Long  
Range Module



**BT111**  
Bluetooth  
Smart Ready  
HCI Module



## BLUETOOTH

Version	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
Single mode	Yes	Yes	Yes	Yes	-
Dual mode	-	-	-	-	Yes
Roles	central/peripheral	central/peripheral	central/peripheral	central/peripheral	

## RADIO

TX power	+2-3 dBm	0 dBm	0 dBm	+8 dBm	+8 dBm
RX sensitivity	-92 dBm	-89 dBm	-93 dBm	-98 dBm	-89 dBm
Class	-	-	-	1	1
Typical Range*	150m	30m	100m	250-450m	100m

## ANTENNA OPTIONS

Integrated	Yes	Yes	Yes	Yes	Yes
U.FL	Yes	-	-	-	-

## INTERFACES

UART	2 (or SPI)	-	2 (or SPI)	2 (or SPI)	-
USB	2.0 device	2.0 device	-	-	2.0 device
SPI	2 (or UART)	-	2 (or UART)	2 (or UART)	-
I2C	1 (soft I2C)	-	1	1	-
PWM	4 (or timer)	-	4 (or timer)	4 (or timer)	-
GPIO	19 configurable (shared)	-	19 configurable (shared)	16 configurable (shared)	6
ADC	7 x 12 bit	-	7 x 12-bit	7 x 12-bit	-
Wake-up interrupt	Yes	-	Yes	Yes	-
Comparator	1	-	1	1	-
Timers	2x8-bit and 1x16-bit (or PWM)	-	2x8-bit and 1x16-bit (or PWM)	2x8-bit and 1x16-bit (or PWM)	-
Op-amp	Yes	-	Yes	Yes	-
Battery monitor	Yes	-	Yes	Yes	-
Temperature sensor	Yes	Yes	Yes	Yes	-
Debug	Yes	-	Yes	Yes	Yes
IR generation	Yes	-	Yes	Yes	-
PCM	-	-	-	-	Yes
I2S	-	-	-	-	Yes

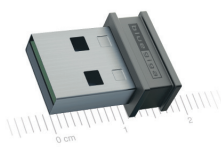
## MICROCONTROLLER

Architecture	8051	8051	8051	8051	16-bit RISC (XAP2)
RAM	8 kB	8 kB	8 kB	8 kB	-
Flash	128 kB	128 kB	128 kB / 256 kB	256 kB	-
EEPROM	-	-	-	-	64kB

**BLE112**  
Bluetooth  
Smart Module



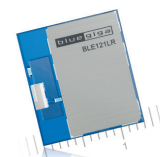
**BLED112**  
Bluetooth  
Smart Dongle



**BLE113**  
Bluetooth  
Smart Module



**BLE121LR**  
Bluetooth  
Smart Long  
Range Module



**BT111**  
Bluetooth  
Smart Ready  
HCI Module



**CURRENT CONSUMPTION**

TX peak	27 mA	N/A	18.2 mA	27 mA	70 mA
RX peak	19.6 mA	N/A	17.9 mA	19.6 mA	52 mA
Sleep (timer active)	1 uA	N/A	1 uA	1 uA	-
Sleep (external wake-up)	0.5 uA	N/A	0.5 uA	0.5 uA	370uA

**OPERATING VOLTAGE**

Operating voltage	2.0 - 3.6V	5V	2.0 - 3.6V	2.0 - 3.6V	2.3 - 5.7V
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**BLUETOOTH SOFTWARE STACK**

Integrated stack	Yes	Yes	Yes	Yes	No
ATT	Yes	Yes	Yes	Yes	-
GATT	Yes	Yes	Yes	Yes	-
GAP	Yes	Yes	Yes	Yes	-
L2CAP	Yes	Yes	Yes	Yes	-
Security manager	Yes	Yes	Yes	Yes	-
Host API	BGAPI™ protocol	BGAPI™ protocol	BGAPI™ protocol	BGAPI™ protocol	HCI
Connections	up to 8	up to 8	up to 8	up to 8	7 x Bluetooth classic 5 x Bluetooth LE
HCI	-	-	-	-	HCI over USB
IP licensing	Yes	Yes	Yes	Yes	-

**SUPPORTED PROFILES**

GAP	Yes	Yes	Yes	Yes	Yes*
Manufacturer service	Yes	Yes	Yes	Yes	Yes*
Battery service	Yes	Yes	Yes	Yes	Yes*
Proximity profile	Yes	Yes	Yes	Yes	Yes*
HR profile	Yes	Yes	Yes	Yes	Yes*
Temperature profile	Yes	Yes	Yes	Yes	Yes*

**SOFTWARE DEVELOPMENT**

On-board app support	Yes	Yes	Yes	Yes	-
BGScript™	Yes	Yes	Yes	Yes	-
Profile toolkit™	Yes	Yes	Yes	Yes	-
BGLib™ (Host C library)	Yes	Yes	Yes	Yes	Stack dependent
Software dev service	Yes	Yes	Yes	Yes	-
SDK/IDE	Bluegiga SDK	Bluegiga SDK	Bluegiga SDK	Bluegiga SDK	Stack dependent
C SDK	IAR Embedded Workbench	-	IAR Embedded Workbench	IAR Embedded Workbench	Stack dependent

**CERTIFICATIONS**

Certifications	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea, Japan and Brazil	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea and Japan
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**DIMENSIONS**

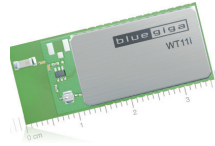
Dimensions (W x L x H)	12 x 18 x 2.3 mm	17 x 12 x 6.5 mm	9.15 x 15.75 x 1.9 mm	14.7 x 13.0 x 1.8 mm	9.3 x 13.05 x 2.3 mm
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\* Depends on the host Bluetooth stack

**WT12**  
Class 2  
Module



**WT11i**  
Class 1  
Module



**WT41**  
Long Range  
Module



**WT32i**  
Class 2  
Audio Module



**WT32**  
Class 2  
Audio Module



**BLUETOOTH**

Version	Bluetooth 2.1 + EDR	Bluetooth 2.1 + EDR	Bluetooth 2.1 + EDR	Bluetooth 3.0	Bluetooth 2.1+EDR
Bluetooth low energy support	-	-	-	-	-
BR/EDR support	Yes	Yes	Yes	Yes	Yes

**RADIO**

Typical TX power	+3 dBm	+17 dBm	+19 dBm	+6.5 dBm	0 dBm
Typical RX sensitivity	-83 dBm	-85 dBm	-93 dBm	-90 dBm	-90 dBm
Class	2	1	1	1.5	1.5
Typical range*	30-50m	200-400m	500-1000m	100-200m	30m

**ANTENNA OPTIONS**

Integrated chip	Yes	Yes	Yes	Yes	Yes
U.FL	-	Yes	Yes	Yes	Yes (W.FL)

**INTERFACES**

UART	1	1	1	1	1
USB	2.0 device	2.0 device	2.0 device	2.0 device	2.0 device
GPIO	6 configurable	6 configurable	6 configurable	10 configurable	10 configurable
AIO	-	1 x 8-bit	1 x 8-bit	2 x 10-bit	2 x 10-bit
Debug (SPI)	1	1	1	1	1

**AUDIO INTERFACES**

PCM	1	1	1	1	1
I2S	-	-	-	1	1
SPDIF	-	-	-	1	1
Analogue	-	-	-	2 inputs/outputs	2 inputs/outputs

**MICROCONTROLLER**

Architecture	16-bit RISC (XAP2)	16-bit RISC (XAP2)	16-bit RISC (XAP2)	16-bit RISC (XAP2)	16-bit RISC (XAP2)
RAM	48 kB	48 kB	48 kB	48 kB	48 kB
Flash	8 Mbit	8 Mbit	8 Mbit	16 Mbit	8 Mbit
DSP	-	-	-	Kalimba DSP	Kalimba DSP

**OPERATING VOLTAGE**

Operating voltage	2.7 - 3.6V	2.7 - 3.6V	2.7 - 3.6V	1.8 - 4.4V	1.8 - 4.4V
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**PHYSICAL CONNECTION**

Type	solder pads	castellated edges	castellated edges	solder pads	castellated edges
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\* Line-of-sight unobstructed range measured between two identical modules

**WT12**  
Class 2  
Module



**WT11i**  
Class 1  
Module



**WT41**  
Long Range  
Module



**WT32i**  
Class 2  
Audio Module



**WT32**  
Class 2  
Audio Module



**BLUETOOTH STACK FEATURES**

Version	2.1 + EDR / 3.0	2.1 + EDR / 3.0	2.1 + EDR / 3.0	3.0	2.1 + EDR / 3.0
Integrated Bluetooth stack	Yes	Yes	Yes	Yes	Yes
Security Simple Pairing	Yes	Yes	Yes	Yes	Yes
Connections	1-7	1-7	1-7	1-6	1-6
Host API	ASCII commands / HCI	ASCII commands / HCI	ASCII commands / HCI	ASCII commands	ASCII commands
HCI interface	UART/USB	UART/USB	UART/USB	-	-

**SUPPORTED PROFILES**

SPP	Yes	Yes	Yes	Yes	Yes
OBEX OPP	Yes	Yes	Yes	Yes	Yes
OBEX FTP	Yes	Yes	Yes	Yes	Yes
DUN	Yes	Yes	Yes	Yes	Yes
HID	Yes	Yes	Yes	Yes	Yes
A2DP	-	-	-	Yes	Yes
AVRCP	Yes	Yes	Yes	v. 1.5	v. 1.3
HFP v.1.6	Yes	Yes	Yes	Yes	Yes
HSP	Yes	Yes	Yes	Yes	Yes
PBAP	Yes	Yes	Yes	Yes	Yes
HDP	Yes	Yes	Yes	Yes	-
MAP	Yes	Yes	Yes	Yes	Yes
DI	Yes	Yes	Yes	Yes	Yes
Apple iAP support	Yes	Yes	Yes	iAP1 and iAP2	iAP1
Over-the-Air configuration*	Yes	Yes	Yes	Yes	Yes
BGIO*	Yes	Yes	Yes	Yes	Yes

**SOFTWARE DEVELOPMENT**

On-board applications	Yes	Yes	Yes	Yes	Yes
Software development service	Yes	Yes	Yes	Yes	Yes
SDK/IDE	CSR BlueLab	CSR BlueLab	CSR BlueLab	CSR BlueLab	CSR BlueLab

**CERTIFICATIONS**

Bluetooth	Yes	Yes	Yes	Yes	Yes
CE	Yes	Yes	Yes	Yes	Yes
FCC	Yes	Yes	Yes	Yes	Yes
IC	Yes	Yes	Yes	Yes	Yes
South Korea	Yes	-	Yes	Yes	-
Japan	Yes	Yes	Yes	Yes	Yes
NCC (Taiwan)	-	-	WT41-E	-	-

**DIMENSIONS**

Dimensions (W x L x H)	14 x 25.6 x 2.4 mm	14.5 x 35.8 x 2.6 mm	14.5 x 35.8 x 2.6 mm	15.9 x 23.9 x 2.4 mm	15.9 x 23.9 x 2.5 mm
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iWRAP 5.0.2  
build 764  
**GENERIC**iWRAP 5.0.2  
build 765  
**AUDIO  
SOURCE**iWRAP 5.0.2  
build 763  
**iAP**iWRAP 5.0.2  
build 767  
**aptX®**iWRAP 5.0.2  
build 768  
**aptX®  
SOURCE**

Ordering code	AI5	AI5S	AI5IAP	AI5-APT-X	AI5S-APT-X
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**SUPPORTED HARDWARE**

WT32i	-	-	-	-	-
WT32	Yes	Yes	Yes	Yes	Yes
WT41	-	-	-	-	-
WT11i	-	-	-	-	-
WT12	-	-	-	-	-

**BLUETOOTH STACK FEATURES**

Version	3.0	3.0	3.0	3.0	3.0
Secure Simple Pairing	Yes	Yes	Yes	Yes	Yes
Max connections	6	6	6	6	6
Host API	ASCII commands	ASCII commands	ASCII commands	ASCII commands	ASCII commands
Host interfaces	UART	UART	UART	UART	UART
Encryption	56/128-bits	56/128-bits	56/128-bits	56/128-bits	56/128-bits

**SUPPORTED PROFILES**

SPP	Yes	Yes	Yes	Yes	Yes
OBEX OPP <sup>1</sup>	Yes	Yes	Yes	Yes	Yes
OBEX FTP <sup>2</sup>	Yes	Yes	Yes	Yes	Yes
DUN <sup>3</sup>	Yes	Yes	Yes	Yes	Yes
HID <sup>4</sup>	Yes	-	Yes	Yes	-
A2DP	A2DP sink	A2DP source	A2DP sink	A2DP sink	A2DP source
HFP	Hands-free	Hands-free AG	Hands-free	Hands-free	Hands-free AG
HSP	Headset	Headset AG	-	Headset	Headset AG
AVRCP	Yes	Yes	Yes	Yes	Yes
PBAP <sup>5</sup>	Yes	-	Yes	Yes	-
HDP	-	-	-	-	-
DI	Yes	Yes	Yes	Yes	Yes
MAP <sup>7</sup>	Yes	-	Yes	Yes	-
Apple iAP support <sup>6</sup>	-	-	iAP1	-	-
Over-the-Air configuration	Yes	-	-	-	-
BGIO	Yes	-	-	-	-

**IEEE AGENTS (FOR HDP)**

Blood pressure monitor	-	-	-	-	-
Blood glucose	-	-	-	-	-
Weight scale	-	-	-	-	-
Pulse oximeter	-	-	-	-	-
Thermometer	-	-	-	-	-

**AUDIO FEATURES**

CVC echo cancellation	-	-	-	-	-
aptX audio codec	-	-	-	Yes	Yes
AAC audio codec	-	-	-	-	-
mSBC (Wide-Band Speech)	Yes	Yes	Yes	Yes	Yes

**BLUETOOTH QUALIFICATION**

QDID	37931	37931	37931	37931	37931
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1) OPP server only  
2) FTP client only  
3) DUN terminal only

4) HID device only  
5) PBAP client only  
6) Delivered only to Apple MFI licensees. Please contact Bluegiga support for more information.  
7) MAP client only



iWRAP 5.0.2  
build 766  
**CVC5**

iWRAP 5.5.0  
build 891  
**GENERIC**

iWRAP 5.5.0  
build 893  
**iAP**

iWRAP 6.0.0  
build 891  
**GENERIC**

iWRAP 6.0.0  
build 892  
**aptX®**

iWRAP 6.0.0  
build 893  
**iAP**

CVC5	AI55	AI55IAP	AI6	AI6-APT	AI6IAP
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-	-	-	Yes	Yes	Yes
Yes	-	-	-	-	-
-	Yes	Yes	-	-	-
-	Yes	Yes	-	-	-
-	Yes	Yes	-	-	-

3.0	3.0	3.0	3.0	3.0	3.0
Yes	Yes	Yes	Yes	Yes	Yes
6	7	7	6	6	6
ASCII commands	ASCII commands	ASCII commands	ASCII commands	ASCII commands	ASCII commands
UART	UART	UART	UART	UART	UART
56/128-bits	56/128-bits	56/128-bits	56/128-bits	56/128-bits	56/128-bits

Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
-	Yes	Yes	Yes	Yes	Yes
A2DP sink	-	-	Yes	Yes	Yes
Hands-free	Yes	Hands-free	Yes	Yes	Yes
Headset	Yes	-	Yes	Yes	Yes
Yes	-	-	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
-	Yes	-	Yes	-	-
Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes
-	-	iAP1 and iAP2	-	-	iAP1 and iAP2
-	Yes	Yes	Yes	Yes	Yes
-	Yes	Yes	Yes	Yes	Yes

-	Yes	-	Yes	-	-
-	Yes	-	Yes	-	-
-	Yes	-	Yes	-	-
-	Yes	-	Yes	-	-
-	Yes	-	Yes	-	-

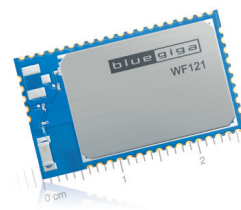
Yes	-	-	-	-	-
-	-	-	-	Yes	-
-	-	-	Yes	Yes	Yes
-	-	-	Yes	Yes	Yes

37931	37931	37931	56758	56758	56758
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## WF111 Wi-Fi Module



## WF121 Wi-Fi Module



### WI-FI FEATURES

Version	802.11 b/g/n	802.11 b/g/n
Frequency	2.4GHz	2.4GHz
Max. symbol rate	72.2Mbps	72.2Mbps
Soft AP mode	Yes (8 clients)	Yes (5 clients)

### RADIO PERFORMANCE

Typical TX power	+17 dBm	+17 dBm
Typical RX sensitivity	-97 dBm	-97 dBm
Typical range *	300-500m	300-500m

### ANTENNA OPTIONS

Integrated chip	Yes	Yes
U.FL	Yes	Yes

### HOST INTERFACES

SDIO	Yes	No
CSPI	Yes	No
UART	No	Yes
USB	No	Yes
SPI	No	Yes

### PERIPHERAL INTERFACES

SPI	-	up to 2
UART	-	up to 4
USB	-	1
Ethernet RMII	-	1
I2C	-	up to 2
GPIO	6	up to 38
AIO	-	up to 10

### MICROCONTROLLER

Architecture	-	MIPS 4K
MHz	-	80 Mhz
RAM	-	128 kB (<64 kB free)
Flash	-	512 kB (<256 kB free)

### AVG. CURRENT CONSUMPTION

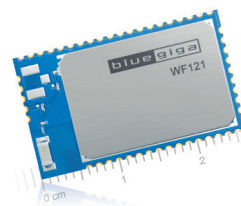
TX (17dBm, 802.11g)	192 mA	142 mA
RX	88 mA	127 mA
Idle, Associated to an AP	1.7mA	6.1mA
Sleep	70 uA	62 uA

\* Line-of-sight unobstructed range measured between two identical modules

## WF111 Wi-Fi Module



## WF121 Wi-Fi Module



### OPERATING VOLTAGE

Operating voltage	1.8V and 3.3V	2.7V - 3.6V
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### PHYSICAL CONNECTION

Type	castellated edges	castellated edges
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### TCP/IP STACK FEATURES

Integrated TCP/IP stack	-	Yes
DHCP	-	Yes
DNS	-	Yes
TCP client	-	Yes
UDP client	-	Yes
TCP server	-	Yes
UDP server	-	Yes
ICMP server	-	Yes
HTTP server	-	Yes
DHCP server	-	Yes
DNS server	-	Yes

### HOST API

BGAPI™ binary protocol	-	Yes
BGLib™ host library	-	Yes

### OS DRIVERS

Linux	Yes	Not needed
Windows	No	Not needed
Android	Yes	Not needed

### SOFTWARE DEVELOPMENT

On-board applications	-	Yes
BGScript™ support	-	Yes
Native C development	-	No
Software dev service	-	Yes
SDK	-	Bluegiga SDK

### CERTIFICATIONS

CE	Yes	Yes
FCC	Yes	Yes
IC	Yes	Yes
South Korea	Yes	Yes
Japan	Yes	Yes

### DIMENSIONS

Dimensions (W x L x H)	12 x 19 x 2.1 mm	15.4 x 26.2 x 2.1 mm
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