

PRODUCT COMPARISON GUIDE

2014

ABOUT US

Bluegiga, a Silicon Labs company

Bluegiga's mission is to design and create easy-to-use, wireless connectivity solutions for OEMs, device manufacturers and system integrators. We supply a wide range of *Bluetooth*® and *Wi-Fi*® modules in order to serve industry leaders and start-ups in all sectors: beacons, consumer electronics, health and wellness, automotive aftermarket, sports and fitness, M2M and industrial. Bluegiga understands that certified, high performance radios are key to your application's success, and our passion is building trusted relationships with our customers that span the entire product life cycle.

Silicon Labs (NASDAQ: SLAB) is a leading provider of silicon, software and system solutions for the Internet of Things, Internet infrastructure, industrial control, consumer and automotive markets. We solve the electronics industry's toughest problems, providing customers with significant advantages in performance, energy savings, connectivity and design simplicity. Backed by our world-class engineering teams with unsurpassed software and mixed-signal design expertise, Silicon Labs empowers developers with the tools and technologies they need to advance quickly and easily from initial idea to final product.

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.

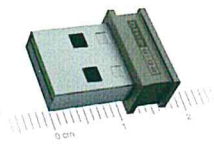
TECHNICAL SPECIFICATIONS	CLASSIC BLUETOOTH	BLUETOOTH SMART	BLUETOOTH SMART READY	WI-FI
Radio frequency	2.4GHz	2.4GHz	2.4GHz	2.4GHz or 5.8GHz
Distance/Range	~10-100 meters	~10-100 meters	~10-100 meters	~10-100 meters
Symbol rate	1-3Mbps	1Mbps	1-3Mbps	1.69Gbps
Application throughput	up to 2.1 Mbps	up to 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 discovery	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 <i>Bluetooth</i> 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



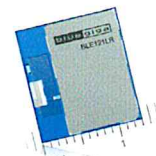
BLED112
Bluetooth
Smart Dongle



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

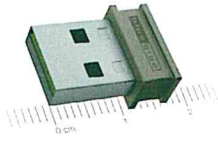
MICROCONTROLLER

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



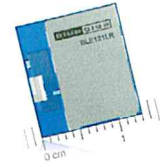
BLED112
Bluetooth
Smart Dongle



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

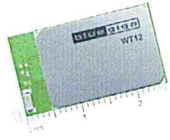
Certifications	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea, Japan and Brazil	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea and Japan	Bluetooth, CE, FCC, IC, South Korea and Japan
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DIMENSIONS

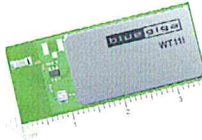
Dimensions (W x L x H)	12 x 18 x 2.3 mm	17 x 12 x 6.5 mm	9.15 x 15.75 x 1.9 mm	14.7 x 13.0 x 1.8 mm	9.3 x 13.05 x 2.3 mm
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* Depends on the host Bluetooth stack

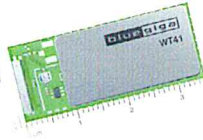
WT12
Class 2
Module



WT11i
Class 1
Module



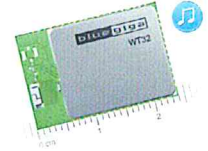
WT41
Long Range
Module



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

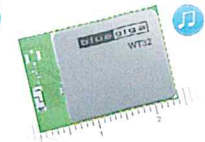
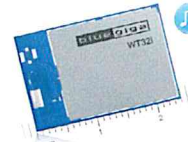
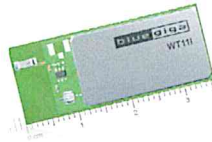
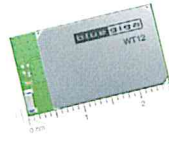
WT12
Class 2
Module

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

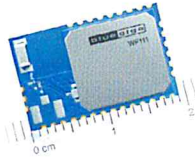
CERTIFICATIONS

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	-	-

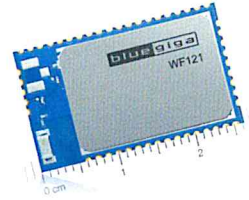
DIMENSIONS

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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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)
Encryption	WPA, WPA2	WEP, WPA, WPA2, WPA2 Enterprise

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

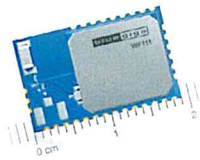
Architecture	-	MIPS 4K
MHz	-	80 Mhz
RAM	-	128 kB (<64 kB free)
Flash	-	512 kB (<256 kB free)

AVG. CURRENT CONSUMPTION

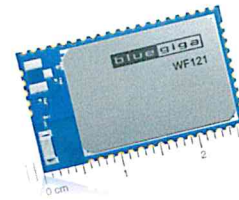
TX (17dBm, 802.11g)	192 mA	142 mA
RX	88 mA	127 mA
Idle, Associated to an AP	1.7mA	6.1mA
Sleep	70 uA	62 uA

* 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
TLS / SSL	-	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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