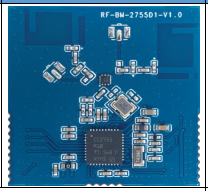
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TI CC2340R5 Multi-Protocol Modules											
Part Number	**RF-BM-2340A1**	**RF-BM-2340A1I**	**RF-BM-2340B1**	**RF-BM-2340B1I**	**RF-BM-2340A2**	**RF-BM-2340A2I**	**RF-BM-2340C2**	**RF-BM-2340T1**	**RF-BM-2340T2**	**RF-BM-2340T3**	**RF-BM-2340B2**
Photo											
IC	CC2340R52										CC2340R53
RAM	36 kB										64 kB
Flash	512 kB										
Max. TX Power	+8 dBm										
Core	48 MHz ARM® Cortex®-M0+										
Receiving Sensitivity	-102 dBm for 125 kbps LE Coded PHY -96.5 dBm for BLE 1 Mbps										
Working Temperature	-40 ℃ ~ +85 ℃										
Storage Temperature	-40 ℃ ~ +125 ℃										
Protocols	BLE5.3, ZigBee, SimpleLink™ TI 15.4-stack, Proprietary systems										
Application	ESL, Medical Electronics, Intelligent Vehicle, Consumer Electronics, IoT Industry 4., Logistics, Smart Home, Smart City, Smart Buildings										
Power Supply	GLDO mode: 1.71 V ~ 3.8 V, 3.3 V is recommended		DCDC mode: 2.2 V ~ 3.8 V, 3.3 V is recommended GLDO mode: 1.71 V ~ 3.8 V, 3.3 V is recommended Remark: When set to DCDC mode, if the supply voltage is lower than 2.2 V, it will automatically switch to GLDO mode.								
Transmission Range @ open-air	200 m @ 1M PHY	475 m @ 1M PHY (external PCB antenna)	175 m @ 1M PHY	340 m @ 1M PHY (external PCB antenna)	200 m @ 1M PHY	330 m @ 1M PHY (external PCB antenna)	80 m @ 1M PHY	150 m @ 1M PHY	90 m @ 1M PHY	130 m @ 1M PHY	175 m @ 1M PHY
Antenna	PCB/RF ANT interface	IPEX/RF ANT interface	PCB	IPEX/RF ANT interface	PCB	IPEX/RF ANT interface	Chip/RF ANT interface	PCB/RF ANT interface	Chip/RF ANT interface	PCB	PCB
Dimension (mm)	11.6 x 16.5 x 2.3	11.6 x 16.5 x 2.3	15.55 x 22.5 x 2.35	15.55 x 22.5 x 2.35	11.2 x 16.6 x 2.25	11.2 x 15.2 x 2.25	8.0 x 8.0 x 1.7	12.0 x 15.8 x 2.0	12.0 x 15.8 x 2.0	15.0 x 15.0 x 2.0	15.55 x 22.5 x 2.35
GPIO	12	12	24	24	12	12	12	14	14	11	24
UART Protocol	BLE 5.0 Master-slave (5 connections), ZigBee (coordinator, router,	BLE 5.0 Master-slave (5 connections), ZigBee (coordinator, router,	BLE 5.0 Master-slave (5 connections), ZigBee (coordinator, router,	BLE 5.0 Master-slave (5 connections), ZigBee (coordinator, router,	BLE 5.0 Master-slave (5 connections at most)	BLE 5.0 Master-slave (5 connections at most)	BLE 5.0 Master-slave (5 connections at most)	BLE 5.0 Master-slave (5 connections at most)	BLE 5.0 Master-slave (5 connections at most)	BLE 5.0 Master-slave (5 connections at most)	N/A
Certificates	BQB, FCC FCC. SRRC, NCC	BQB	BQB, FCC, IC, SRRC, CE, RoHS	BQB	BQB	BQB	BQB	BQB	BQB	BQB	BQB

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TI SimpleLink Series Multi-Protocol Modules (Table 1)									
Part Number	**RF-TI1354P1**	**RF-TI1352P2**	**RF-TI1352P1**	**RF-TI1352B1**	**RF-BM-2755B1I**	**RF-BM-2755B1**	**RF-BM-2755D1**	**RF-BM-2755P1I**	**RF-BM-2755P1**
Photo									
IC	CC1354P10	CC1352P7	CC1352P	CC1352R	CC2755R10			CC2755P10	
Protocols	Thread, ZigBee, Matter, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, Matter, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Bluetooth ® 6.0 Low Energy for Channel Sounding, Matter, ZigBee ® 3.0, Proprietary, Multi-Protocol			Bluetooth ® 6.0 Low Energy for Channel Sounding, Matter, ZigBee ® 3.0, Proprietary, Multi-Protocol	
Frequency	800 MHz ~ 928 MHz, 2.4 GHz	800 MHz ~ 928 MHz, 2.4 GHz	800 MHz ~ 928 MHz, 2.4 GHz	800 MH ~ 928 MH, 2.4 GHz	2360 MHz ~ 2500 MHz			2360 MHz ~ 2500 MHz	
Max. TX Power	+20 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+20 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+14 dBm @ Sub-1 GHz +20 dBm @ 2.4 GHz	+14 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+10 dBm			+20 dBm	
Receiving Sensitivity	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @ 50 Kbps Sub-1G –104 dBm @125 kbps LE Coded PHY	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @ 50 Kbps Sub-1G –104 dBm @125 kbps LE Coded PHY	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @Sub-1G (50 Kbps) –105 dBm @125 kbps LE Coded PHY	–121 dBm @Sub G (Long-Range Mode) –110 dBm @Sub G (50 Kbps) –105 dBm @125 kbps LE Coded PHY	-103.5 dBm sensitivity @ 125 kbps GFSK -97.0 dBm sensitivity @ 1 Mbps GFSK -103.0 dBm sensitivity @ IEEE 802.15.4(2.4 GHz)			-103.5 dBm sensitivity @ 125 kbps GFSK -97.0 dBm sensitivity @ 1 Mbps GFSK -103.0 dBm sensitivity @ IEEE 802.15.4(2.4 GHz)	
RAM	256 kB	152 kB	88 kB	88 kB	32 kB			32 kB	
Flash	1024 kB	704 kB	352 kB	352 kB	1 MB			1 MB	
GPIO	24	24	23	28	21	21	21	21	21
Antenna	IPEX/RF ANT interface	IPEX/RF ANT interface	RF ANT interface	IPEX/RF ANT interface	IPEX/RF ANT interface	PCB	Dual PCB	IPEX/RF ANT interface	PCB
Transmission Range	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	400 m @ 1M PHY (external PCB antenna) 600 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 400 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	270 m @ 1M PHY (external PCB antenna) 420 m @ LE Coded PHY (external PCB antenna) 600 m @ 802.15.4 (external PCB antenna)	220 m @ 1M PHY 360 m @ LE Coded PHY 470 m @ 802.15.4	300 m @ 1M PHY	380 m @ 1M PHY (external PCB antenna) 570 m @ LE Coded PHY (external PCB antenna) 800 m @ 802.15.4 (external PCB antenna)	360 m @ 1M PHY 500 m @ LE Coded PHY 600 m @ 802.15.4
Dimension (mm)	26.5 x 16.9 x 2.1	26.5 x 16.8 x 2.2	25.0 x 16.4 x 2.2	26.5 x 16.8 x 2.2	15.55 x 22.5 x 2.35	15.55 x 22.5 x 2.35	32.5 x 32 x 1.8	15.55 x 22.5 x 2.35	15.55 x 22.5 x 2.35
UART Protocol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Certifications	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Core	48 MHz ARM® Cortex®-M4F								
Power Supply	1.8 V ~ 3.8 V, recommend to 3.3 V								
Working Temperature	-40 ℃ ~ +85 ℃								
Storage Temperature	-40 ℃ ~ +125 ℃								
Application	Smart grid, industrial monitoring and control, Smart agriculture, sensor control, Wireless M-Bus, energy-harvesting								

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TI SimpleLink Series Multi-Protocol Modules (Table 2)									
Part Number	**RF-BM-2652P4I**	**RF-BM-2652P4**	**RF-BM-2652P3**	**RF-BM-2652P2I**	**RF-BM-2652P2**	**RF-BM-2652P1**	**RF-BM-2652B2**	**RF-BM-2652B1**	**RF-BM-2651B1**
Photo									
IC	CC2652P7		CC2652P				CC2652R7	CC2652R	CC2651R3
Protocols	Matter, Thread, ZigBee, Matter, BLE5.3, IEEE 802.15.4, 6LoWPAN, proprietary systems, SimpleLink™ TI 15.4 stack (2.4 GHz)		Thread, ZigBee, BLE5.3, IEEE 802.15.4, 6LoWPAN, proprietary systems, SimpleLink™ TI 15.4 stack (2.4 GHz)				Thread, ZigBee, BLE5.3, IEEE 802.15.4, 6LoWPAN, proprietary systems, SimpleLink™ TI 15.4 stack (2.4 GHz)	Thread, ZigBee, BLE5.3, IEEE 802.15.4, 6LoWPAN, proprietary systems, SimpleLink™ TI 15.4 stack (2.4 GHz)	ZigBee, BLE5.3, SimpleLink™ TI 15.4-stack, Proprietary systems
Frequency	2.4 GHz		2.4 GHz				2.4 GHz	2.4 GHz	2.4 GHz
Max. TX Power	+20 dBm		+20 dBm				+5 dBm	+5 dBm	+5 dBm
Receiving Sensitivity	-99 dBm @ 802.15.4 (2.4 GHz) -104 dBm @ 125 kbps BLE Coded PHY		-100 dBm @ 802.15.4 (2.4 GHz) -105 dBm @ 125 kbps BLE Coded PHY				-99 dBm @ 802.15.4 (2.4 GHz) -104 dBm @ 125 kbps BLE Coded PHY	-100 dBm @ 802.15.4 (2.4 GHz) -105 dBm @ 125 kbps BLE Coded PHY	-100 dBm @ 802.15.4 (2.4 GHz) -104 dBm @ 125 kbps BLE Coded PHY
RAM	152 kB		88 kB				152 kB	88 kB	40 kB
Flash	704 kB		352 kB + 1 MB	352 kB	352 kB	352 kB	704 kB	352 kB	352 kB
GPIO	23	23	11	23	23	23	31	31	23
Antenna	IPEX/RF ANT interface	PCB	PCB	IPEX/RF ANT interface	PCB	RF ANT interface	PCB	PCB	PCB
Transmission Range	380 m @ 1M PHY (external PCB antenna) 570 m @ LE Coded PHY (external PCB antenna) 800 m @ 802.15.4 (external PCB antenna)	260 m @ 1M PHY 420 m @ LE Coded PHY 500 m @ 802.15.4	370 m @ 1M PHY 500 m @ LE Coded PHY 600 m @ 802.15.4	380 m @ 1M PHY (external PCB antenna) 570 m @ LE Coded PHY (external PCB antenna) 800 m @ 802.15.4 (external PCB antenna)	360 m @ 1M PHY 500 m @ LE Coded PHY 600 m @ 802.15.4	380 m @ 1M PHY (external PCB antenna) 570 m @ LE Coded PHY (external PCB antenna) 800 m @ 802.15.4 (external PCB antenna)	200 m @ 1M PHY 330 m @LE Coded PHY 350 m @ 802.15.4	200 m @ 1M PHY 330 m @LE Coded PHY 350 m @ 802.15.4	140 m @ 1M PHY 260 m @LE Coded PHY 280 m @ 802.15.4
Dimension (mm)	30.0 x 16.4 x 2.2	30.0 x 16.4 x 2.2	24.0 x 16.0 x 2.1	30.0 x 16.4 x 2.2	30.0 x 16.4 x 2.2	25.0 x 16.4 x 2.2	23.5 x 17.0 x 2.2	23.5 x 17.0 x 2.2	22.5 x 15.55 x 2.3
UART Protocol	N/A	N/A	N/A	BLE 5.0 Master-Slave	BLE 5.0 Master-Slave	N/A	N/A	BLE 5.0 Master-Slave	N/A
Certifications	N/A	FCC (BLE, ZIgBee, Thread)	FCC and CE (BLE, ZIgBee)	With RF-star extrenal PCB antenna, FCC and CE (BLE, ZIgBee, Thread)	FCC and CE (BLE, ZIgBee, Thread)	N/A	CE (BLE)	N/A	N/A
Core	48 MHz ARM® Cortex®-M4F								
Power Supply	1.8 V ~ 3.8 V, recommend to 3.3 V								
Working Temperature	-40 ℃ ~ +85 ℃								
Storage Temperature	-40 ℃ ~ +125 ℃								
Application	Smart home gateway, building automation, Home automation, fire alarm control panel (FACP), Smoke and heat detector, asset tracking, Smart grid, wireless sensor networks, Access control, IP network camera								

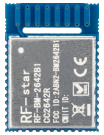
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TI-Based Automotive BLE Modules		
Part Number	**RF-BM-2642QB1I**	**RF-BM-2340QA2**
Photo		
IC	CC2642R-Q1	CC2340R5-Q1
Core	48 MHz ARM® Cortex®-M4	48 MHz ARM® Cortex®-M0+
RAM	80 kB + 8 kB	36 kB
Flash	352 kB	512 kB
Max. TX Power	+5 dBm	+8 dBm
Power Supply	1.8 V ~ 3.63 V, recommend to 3.3 V	DCDC mode: 2.2 V ~ 3.8 V, 3.3 V is recommended GLDO mode: 1.71 V ~ 3.8 V, 3.3 V is recommended Remark: When set to DCDC mode, if the supply voltage is lower than 2.2 V, it will automatically switch to GLDO mode.
Protocols	BLE5.3	BLE5.3, ZigBee, SimpleLink™ TI 15.4-stack, Proprietary systems
Receiving Sensitivity	-105 dBm for 125 kbps LE Coded PHY -97 dBm for BLE 1 Mbps	-102 dBm for 125 kbps LE Coded PHY -96 dBm for BLE 1 Mbps
Transmission Range	External PCB antenna 230 m @ 1M PHY 340 m @ LE Coded PHY	200 m @ 1M PHY
Antenna	IPEX/RF ANT interface	PCB
Dimension (mm)	21.5 x 17.0 x 2.2	11.2 x 16.6 x 2.1
GPIO	31	13
Certifications	N/A	N/A
UART Protocol	BLE 5.0 Master-slave (8 connction at most)	BLE 5.0 Master-slave (5 connction at most)
Working Temperature	-40 ℃ ~ +105 ℃	
Storage Temperature	-40 ℃ ~ +125 ℃	
Application	Passive entry passive start (PEPS), PaaK (Phone as a Key), remote keyless entry (RKE), ADAS(Advanced driver assistance systems), Telematics control unit (TCU), TPMS(Tire Pressure Monitor System), car sharing, piloted parking, cable replacement	

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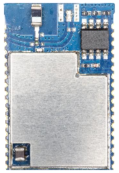
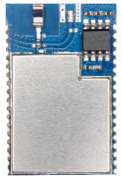
TI CC264x Series BLE Modules								
Part Number	**RF-BM-2642B1**	**RF-BM-2642B2**	**RF-BM-4044B2**	**RF-BM-4044B3**	**RF-BM-4044B4**	**RF-BM-4044B5**	**RF-BM-4077B1**	**RF-BM-4077B1L**
Photo								
IC	CC2642R		CC2640R2FRSM				CC2640R2FRGZ	CC2640R2LRGZ
Protocols	BLE5.3, Bluetooth Mesh, AoA/AoD, BLE 2M, BLE Long Range		BLE5.3, AoA/AoD, BLE 2M, BLE Long Range				BLE5.3, BLE 2M, BLE Long Range	
UART Protocol	BLE 5.0 Master-slave (8 connction at most)		Master/Slave				Master/Slave	
Max. TX Power	5 dBm		2 dBm				5 dBm	
Receiving Sensitivity	-97 dBm @ BLE 1M PHY -105 dBm @ 125 kbps LE Coded PHY		-97 dBm @ BLE 1M PHY -103 dBm @ 125 kbps LE Coded PHY				-97 dBm @ BLE 1M PHY -103 dBm @ 125 kbps LE Coded PHY	
GPIO	31	31	10	10	10	10	31	31
Antenna	PCB	PCB	PCB	IPEX	Chip/RF ANT interface	Chip/RF ANT interface	PCB	PCB
Transmission Range	110 m @ 1M PHY 160 m @ LE Coded PHY	130 m @ 1M PHY 230 m @ LE Coded PHY	260 m @ 1M PHY 320 m @ LE Coded PHY	External PCB antenna 320 m @ 1M PHY 400 m @ LE Coded PHY	Chip Antenna 80 m @ 1M PHY 110 m @ LE Coded PHY	Chip Antenna 80 m @ 1M PHY 110 m @ LE Coded PHY	150 m @ 1M PHY 280 m @ LE Coded PHY	150 m @ 1M PHY 280 m @ LE Coded PHY
Dimension (mm)	23.5 x 17.0 x 2.2	23.5 x 17.0 x 2.2	16.6 x 11.2 x 1.7	15.2 x 11.2 x 2.1	8.0 x 8.0 x 1.5	10.5 x 8.5 x 2.0	23.5 x 17.0 x 1.7	23.5 x 17.0 x 1.7
Certifications	FCC, IC, CE	N/A	FCC, SRRC	N/A	N/A	N/A	N/A	N/A
Core	48 MHz ARM® Cortex®-M4F		48 MHz ARM® Cortex®-M3					
RAM	88 kB		28 kB					
Flash	352 kB		128 kB					
Working Temperature	-40 ℃ ~ +85 ℃							
Storage Temperature	-40 ℃ ~ +125 ℃							
Power Supply	1.8 V ~ 3.8 V, recommend to 3.3 V							
Functions	High anti-interference performance							

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TI CC13xx Series Sub-1G Modules								
Part Number	**RF-TI1354P1**	**RF-TI1352P2**	**RF-TI1352P1**	**RF-TI1352B1**	**RF-SM-1277B2**	**RF-SM-1277B1**	**RF-SM-1077B2**	**RF-SM-1077B1**
Photo								
IC	CC1354P10	CC1352P7	CC1352P	CC1352R	CC1312R		CC1310R	
Core	48 MHz ARM® Cortex®-M4F	48 MHz ARM® Cortex®-M4F	48 MHz ARM® Cortex®-M4F	48 MHz ARM® Cortex®-M4F	48 MHz ARM® Cortex®-M4F		48 MHz ARM® Cortex®-M3	
RAM	256 kB	152 kB	88 kB	88 kB	88 kB		28 kB	
Flash	1024 kB	704 kB	352 kB	352 kB	352 kB		128 kB	
Receiving Sensitivity	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @ 50 Kbps Sub-1G –104 dBm @125 kbps LE Coded PHY	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @ 50 Kbps Sub-1G –104 dBm @125 kbps LE Coded PHY	–121 dBm @Sub-1G (Long-Range Mode) –110 dBm @Sub-1G (50 Kbps) –105 dBm @125 kbps LE Coded PHY	–121 dBm @Sub G (Long-Range Mode) –110 dBm @Sub G (50 Kbps) –105 dBm @125 kbps LE Coded PHY	–121 dBm @ Sub-1 GHz (Long-Range Mode) –110 dBm @ Sub-1 GHz (50 kbps)		–114 dBm @ Sub-1 GHz (Long-Range Mode) –110 dBm @ Sub-1 GHz (50 kbps)	
Protocols	Thread, ZigBee, Matter, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, Matter, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	Thread, ZigBee, BLE5.3, IEEE 802.15.4g, 6LoWPAN, MIOTY, Wireless M-Bus, Wi-SUN, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4-Stack (Sub-1 GHz)	IEEE 802.15.4g, IPv6-enabled smart objects(6LoWPAN),MIOTY®, Wireless M-Bus(T, S, C mode), Wi-SUN®, KNX RF, Amazon Sidewalk, proprietary systems, SimpleLink™ TI 15.4 stack (Sub-1 GHz)		IEEE 802.15.4g, Wireless M-Bus (T, S, C mode), 6LoWPAN, MIOTY, SimpleLink™ TI 15.4 stack (Sub-1 GHz)	
Frequency	800 MHz ~ 928 MHz, 2.4 GHz	800 MHz ~ 928 MHz, 2.4 GHz	800 MHz ~ 928 MHz, 2.4 GHz	800 MHz ~ 928 MH, 2.4 GHz	431 MHz ~ 527 MHz	779 MHz ~ 930 MHz	431 MHz ~ 527 MHz	779 MHz ~ 930 MHz
Max. TX Power	+20 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+20 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+14 dBm @ Sub-1 GHz +20 dBm @ 2.4 GHz	+14 dBm @ Sub-1 GHz +5 dBm @ 2.4 GHz	+13 dBm	+14 dBm	+15 dBm	+14 dBm
GPIO	24	24	23	28	30	30	30	30
Antenna	IPEX/RF ANT interface	IPEX/RF ANT interface	ANT RF interface	IPEX/ANT RF interface	IPEX/ANT RF interface	IPEX/ANT RF interface	IPEX/ANT RF interface	IPEX/ANT RF interface
Transmission Range	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	400 m @ 1M PHY (external PCB antenna) 600 m @ LE Coded PHY (external PCB antenna) 900 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	120 m @ 1M PHY (external PCB antenna) 180 m @ LE Coded PHY (external PCB antenna) 400 m @ 802.15.4 (external glue stick antenna) 1200 m @ Sub-1G (external glue stick antenna)	1000 m (external glue stick antenna)	1000 m (external glue stick antenna)	1000 m (external glue stick antenna)	1000 m (external glue stick antenna)
Dimension (mm)	26.5 x 16.8 x 2.2	26.5 x 16.8 x 2.2	25.0 x 16.4 x 2.2	26.5 x 16.8 x 2.2	26.0 x 18.0 x 2.3	26.0 x 18.0 x 2.3	26.0 x 18.0 x 2.3	26.0 x 18.0 x 2.3
Power Supply	1.8 V ~ 3.8 V, recommend to 3.3 V							
Working Temperature	-40 ℃ ~ +85 ℃							
Storage Temperature	-40 ℃ ~ +125 ℃							
Functions	Wireless M-Bus, energy-harvesting, smart agriculture, sensor control, sSmart grid, industrial monitoring and control							

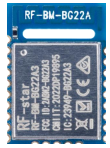
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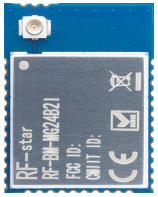
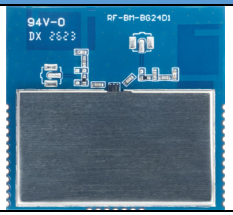
TI CC32xx Series Wi-Fi Modules							
Part Number	**RF-WM-3235B1S**	**RF-WM-3235A1S**	**RF-WM-3235B1**	**RF-WM-3235A1**	**RF-WM-3220B1**	**RF-WM-3200B3**	**RF-WM-3200B1**
Photo							
IC	CC3235S	CC3235S	CC3235SF	CC3235SF	CC3220SF	CC3200	CC3200
Antenna	Pad	PCB/Pad	Pad	PCB/Pad	Chip/IPEX/Pad	Pad	Chip/IPEX/Pad
Flash	4 MB (Module Embedded)	4 MB (Module Embedded)	1 MB (IC Embedded) 4 MB (Module Embedded)	1 MB (IC Embedded) 4 MB (Module Embedded)	1 MB(IC Embedded) 4 MB (Module Embedded)	1 MB (Module Embedded)	1 MB (Module Embedded)
Transmission Range	200 m (external PCB antenna)	150 m	200 m (external PCB antenna)	150 m	100 m (Chip antenna)	200 m (external PCB antenna)	100 m (Chip antenna)
Dimension (mm)	20.5 x 17.5 x 1.7	25.0 x 20.5 x 2.3	20.5 x 17.5 x 1.7	25 x 20.5 x 2.3	31.0 x 20.0 x 2.3	20.5 x 17.5 x 2.3	31.0 x 20.0 x 2.3
Functions	Compatible with TI CC3232MODS	Compatible with TI CC3232MODAS	Compatible with TI CC3232MODSF	Compatible with TI CC3232MODASF	Multiple antenna output modes	Compatible with TI CC3200MOD	Lower power consmption, Support AT commands
Protocols	802.11 a/b/g/n: 2.4 GHz and 5 GHz				802.11 b/g/n: 2.4 GHz	802.11 b/g/n: 2.4 GHz	
Frequency	Shutdown: 1 μA Hibernate: 4.5 μA Low-power deep sleep (LPDS): 120 μA Idle connected (MCU in LPDS): 710 μA RX traffic (MCU active): 59 mA TX traffice (MCU active): 223 mA				Shutdown: 1 μA Hibernate: 4.5 μA Low-power deep sleep (LPDS): 135 μA Idle connected (MCU in LPDS): 710 μA RX traffic (MCU active): 59 mA TX traffice (MCU active): 223 mA	Hibernate: 4.0 μA Low-power deep sleep (LPDS): 250 μA Idle connected (MCU in LPDS): 825 μA RX traffic (MCU active): 59 mA TX traffice (MCU active): 229 mA	
Max. TX Power	+18.0 dBm @ 2.4 GHz (1 DSSS) +18.1 dBm @ 5 GHz (6 OFDM)				+18 dBm @ 1 DSSS +14.5 dBm @ 54 OFDM	+18.0 dBm @ 1 DSSS +14.5 dBm @ 54 OFDM	
Receiving Sensitivity	-96 dBm @2.4 GHz (1 DSSS) -92 dBm @5 GHz (6 OFDM)				-96 dBm @ 1 DSSS -74.0 dBm @ 54 OFDM	-95.7 dBm @ 1 DSSS -74.0 dBm @ 54 OFDM	
Security	WEP, WPA™/ WPA2™ PSK, WPA2 Enterprise, WPA3™ Personal, Crypto Engine: (AES, DES, SHA/MD5, CRC)				WPA2 Personal and Enterprise Security: WEP, WPA™/ WPA2™ PSK, WPA2 Enterprise (802.1x), Crypto Engine: AES, DES, 3DES, SHA2, MD5, CRC, and Checksum; Secure Sockets (SSLv3, TLS1.0, TLS1.1, TLS1.2)	Crypto Engine: AES, DES, and 3DES, SHA2 and MD5, CRC and Checksum	
Peripheral	PWM, UART, I2S, I2C, SPI, SD, ADC, 8-bit parallel interface				PWM, UART, I2S, I2C, SPI, SD, ADC, 8-bit parallel interface	PWM, McASP, UART, I2S, I2C, SPI, SD/MMC, ADC, 8-bit parallel camera interface	
Core	80 MHz ARM® Cortex®-M4						
RAM	256 kB						
GPIO	27						
Power Supply	2.7 V ~ 3.6 V, recommend to 3.3 V						
Working Temperature	-40 ℃ ~ +85 ℃						
Storage Temperature	-45 ℃ ~ +125 ℃						

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Silicon Labs EFR32BG2X Wireless Gecko Series BLE Modules								
Part Number	**RF-BM-BG24B1**	**RF-BM-BG24B2**	**RF-BM-BG22A1**	**RF-BM-BG22A1I**	**RF-BM-BG22B1**	**RF-BM-BG22A3**	**RF-BM-BG22A3I**	**RF-BM-BG22C3**
Photo								
IC	EFR32BG24A010F1024IM48 -B	EFR32BG24A020F1024IM48 -B	EFR32BG22C112F352GM32 -C			EFR32BG22C224F512GM32 -C		
Core	76.8 MHz ARM® Cortex®-M33	76.8 MHz ARM® Cortex®-M33	38.4 MHz ARM® Cortex®-M33			76.8 MHz ARM® Cortex®-M33		
RAM	128 kB	128 kB	32 kB			32 kB		
Flash	1024 kB	1024 kB	352 kB			512 kB		
Max. TX Power	+10 dBm	+19.5 dBm	0 dBm			6 dBm		
Receiving Sensitivity	-105.7 dBm (125 kbps GFSK) -97.6 dBm (1 Mbit/s GFSK) -94.8 dBm (2 Mbit/s GFSK)	-105.7 dBm (125 kbps GFSK) -97.6 dBm (1 Mbit/s GFSK) -94.8 dBm (2 Mbit/s GFSK)	-98.9 dBm (1 Mbit/s GFSK) -96.2 dBm (2 Mbit/s GFSK)			-106.7 dBm (125 kbps GFSK) -98.9 dBm (1 Mbit/s GFSK) -96.2 dBm (2 Mbit/s GFSK)		
Protocols	BLE5.3, Proprietary, BLE 2M, BLE Long Range, Bluetooth Mesh, AoA/AoD		BLE5.3, Proprietary, BLE 2M			BLE5.3, Proprietary, BLE 2M, BLE Long Range, Bluetooth Mesh LPN, AoA/AoD		
UART Protocol	N/A	N/A	UART Master-slave, IIC Master-slave			UART Master-slave, IIC Master-slave, UART Masters-slaves		UART Master-slave
Antenna	PCB	PCB	PCB/Half-hole interface	IPEX/Half-hole interface	PCB	PCB/Half-hole interface	IPEX/Half-hole interface	Chip/Half-hole interface
GPIO	30	30	18	18	10	18	18	12
Transmission Range	230 m @ 1M PHY 450 m @ LE CODE	360 m @ 1M PHY 600 m @ LE CODE	105 m @ 1M PHY	440 m (external PCB antenna)	80 m @ 1M PHY	135 m @ 1M PHY 375 m @ LE CODE	External PCB antenna 475 m @ 1M PHY 660 m @ LE CODE	Chip antenna 105 m @ 1M PHY 142 m @ LE CODE
Dimension (mm)	23.35 x 17.0 x 2.2	23.35 x 17.0 x 2.2	16.5 x 11.6 x 2.06	16.5 x 11.6 x 2.06	16.6 x 11.2 x 2.06	16.5 x 11.6 x 2.06	16.5 x 11.6 x 2.06	8 x 8 x 1.82
Certifications	N/A	N/A	FCC, CE, SRRC, NCC	N/A	FCC, CE, SRRC	FCC, IC, CE, SRRC, TELEC, RCM	N/A	N/A
UART Protocol	N/A	N/A	BLE 5.0 Master-slave, 8 connections at most	BLE 5.0 Master-slave, 8 connections at most	BLE 5.0 slave	BLE 5.0 Master-slave, 8 connections at most	BLE 5.0 Master-slave, 8 connections at most	BLE 5.0 Master-slave, 8 connections at most
Power Supply	2.2 V ~ 3.8 V (DC-DC mode) 1.8 V ~ 3.8 V (Bypass mode) 3.3 V is recommended							
Working Temperature	-40 ℃ ~ +85 ℃							
Storage Temperature	-40 ℃ ~ +125 ℃							
Applications	ESL, Medical Electronics, Intelligent Vehicle, Consumer Electronics, IoT Industry 4., Logistics, Smart Home, Smart City, Smart Buildings							

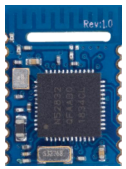
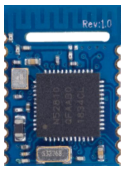
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Silicon Labs EFR32MG24 Series Wireless Modules				
Part Number	**RF-BM-MG24B1**	**RF-BM-MG24B2**	**RF-BM-MG24B2I**	**RF-BM-MG24D1**
Photo				
IC	EFR32MG24A410F1536IM48-B	EFR32MG24A420F1536IM48-B	EFR32MG24A420F1536IM48-B	EFR32MG24A420F1536IM48-B
Max. TX Power	+10 dBm	+19.5 dBm	+19.5 dBm	+19.5 dBm
Transmission Range	240 m @ 1M PHY 470 m @ LE CODE 800 m @ 802.15.4	370 m @ 1M PHY 610 m @ LE CODE 1000 m @ 802.15.4	450 m @ 1M PHY 700 m @ LE CODE 1200 m @ 802.15.4	400 m @ 1M PHY
Antenna	PCB	PCB	IPEX Connector	Dual PCB
Dimension (mm)	23.35 x 17.0 x 2.2			32.0 x 32.5 x 2.2
GPIO	30			28
Core	76.8 MHz ARM® Cortex®-M33			
RAM	256 kB			
Flash	1536 kB			
Power Supply	2.2 V ~ 3.8 V (DC-DC mode) 1.8 V ~ 3.8 V (Bypass mode) 3.3 V is recommended			
Protocols	Matter, OpenThread, ZigBee, BLE5.3, Proprietary, Bluetooth Mesh, AoA/AoD, Channel Sounding			
Receiving Sensitivity	-105.7 dBm (125 kbps GFSK) -97.6 dBm (1 Mbit/s GFSK) -94.8 dBm (2 Mbit/s GFSK)			
Working Temperature	-40 ℃ ~ +85 ℃			
Storage Temperature	-40 ℃ ~ +125 ℃			
Applications	Gateway, home automation, direction			

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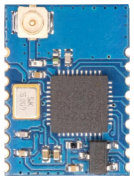
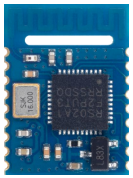
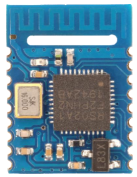
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NORDIC nRF52 Series Multi-Protocols Modules

Part Number	RF-BM-ND06	RF-BM-ND05I	RF-BM-ND05	RF-BM-ND08	RF-BM-ND04I	RF-BM-ND04	RF-BM-ND08C	RF-BM-ND04CI	RF-BM-ND04C
Photo									
IC	nRF52840			nRF52832			nRF52810		
Core	64 MHz ARM® Cortex®-M4F			64 MHz ARM® Cortex®-M4F			64 MHz ARM® Cortex®-M4		
RAM	256 kB			64 kB			24 kB		
Flash	1 MB			512 kB			192 kB		
Protocols	BLE5.3, BLE 2M, BLE Long Range, Proprietary, Thread, ZigBee, ANT, NFC, Matter, Bluetooth Mesh			BLE5.3, BLE 2M, Proprietary, ANT, NFC, Bluetooth Mesh			BLE5.3, BLE 2M, Proprietary, ANT		
Max. TX Power	+8 dBm			+4 dBm			+4 dBm		
Receiving Sensitivity	-103 dBm @ 125 kbps LE Coded PHY -95 dBm @1 Mbit/s BLE			-96 dBm @1 Mbit/s BLE			-96 dBm @1 Mbit/s BLE		
UART Protocol	Master-slave, 8 connections at most			Master-slave, 8 connections at most			Slave only		
Power Supply	1.7 V ~ 5.5 V, recommend to 3.3 V	1.7 V ~ 3.6 V, recommend to 3.3 V							
Antenna	PCB	IPEX//RF ANT interface	PCB	PCB//RF ANT interface	IPEX//RF ANT interface	PCB	PCB/RF ANT interface	IPEX//RF ANT interface	PCB
Transmission Range	210 m @ 1M PHY 440 m @ LE CODE	External PCB antenna 125 m @ 1M PHY 560 m @ LE CODE	200 m @ 1M PHY 430 m @ LE CODE	180 m	350 m (external PCB antenna)	270 m	175 m	350 m (external PCB antenna)	270 m
GPIO	48	29	29	16	29	29	16	29	29
Dimension (mm)	24.0 x 20.5 x 2.2	24.8 x 15.0 x 2.3	24.8 x 15.0 x 2.3	15.2 x 11.2 x 1.7	24.8 x 15.0 x 2.3	24.8 x 15.0 x 2.3	15.2 x 11.2 x 1.7	24.8 x 15.0 x 2.3	24.8 x 15.0 x 2.3
Certifications	FCC, CE	N/A	FCC, IC, CE	N/A	N/A	FCC, CE	N/A	N/A	FCC
Working Temperature	-40 ℃ ~ +85 ℃								
Storage Temperature	-40 ℃ ~ +125 ℃								
Applications	Gateway, sensors, intelligent industry, medical industry, ESL								

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RF-star IC-Based Series BLE Modules					
Part Number	**RSBRS02ABRI**	**RSBRS02ABR-01**	**RSBRS02ABR**	**RSBRS02AI**	**RSBRS02AA**
Photo					
IC	RS02A1-B			RS02A1-A	
Core	48 MHz ARM® Cortex®-M0+			48 MHz ARM® Cortex®-M0+	
RAM	36 kB + 4 kB			32 kB	
Flash	256 kB			256 kB	
Protocols	BLE5.0, BLE 2M PHY			BLE5.0, BLE 2M PHY	
UART Protocol	Slave only			Master-slave	
Power Supply	2.3 V ~ 3.6 V, recommend to 3.3 V			1.8 V ~ 3.6 V, recommend to 3.3 V	
Max. TX Power	+5 dBm			+7 dBm	
Receiving Sensitivity	-94 dBm @1 Mbit/s BLE			-95 dBm @1 Mbit/s BLE	
GPIO	11			13	
Antenna	IPEX	PCB	PCB	IPEX	PCB
Transmission Range	200 m (exteral PCB antenna)	130 m	130 m	180 m (exteral PCB antenna)	50 m
Dimension (mm)	15.2 x 11.2 x 2.3	15.2 x 11.2 x 2.0	15.2 x 11.2 x 1.8	15.2 x 11.2 x 2.1	15.2 x 11.2 x 1.7
Certifications	BQB	BQB, FCC, CE, SRRC	BQB, FCC, CE,	N/A	N/A
Working Temperature	- 40 ℃ ~ +85 ℃				
Storage Temperature	-40 ℃ ~ +125 ℃				
Functions	EV charger, consumer electronics				

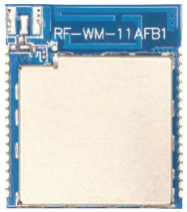
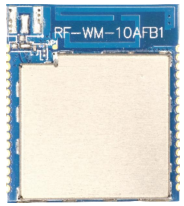
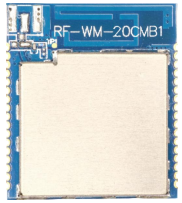
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Low- Power Beacon Devices	
Part Number	**RF-B-SR1**
Photo	
Material	ABS
Color	White
Dimension (mm)	Φ51 x 21
Power Supply	1.71 V ~ 3.8 V
IC	EFR32BG22C224F512GM32 -C
Assmebly	3M Adhesive Mounting
Battery	CR2477
Battery Capacity	1000 mAh
Working Temperature	-20 ℃ ~ +60 ℃
Storage Temperature	-40 ℃ ~ +85 ℃
Protocol	BLE5.0
Max. TX Power	+6 dBm
Transmission Range	100 m
Sensor	N/A
Weight	29.1 g
Power Comsumption	15.46 μA @ 1 s & 0 dBm
Battery Life	5.9 years
Safety	Support password authentication, can set connectable and non-connectable mode, anti-malicious connections
Support System	Compatible with iOS 7.0+ and Android 4.3+ system
Applications	Personnel management, asset management, indoor and outdoor navigation, information push

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Espressif ESP32 Series Wi-Fi Module	
Part Number	**RF-WM-C3B1**
Photo	
IC	ESP32-C3FN4
Core	160 MHz RISC-V
Antenna	PCB/IPEX/ANT RF interface
RAM	SRAM: 400 KB
Flash	4 MB (IC embedded)
Protocols	802.11 b/g/n 1x1, 2.4 GHz; 802.11e QoS Enbancemant (WMM); 802.11i (WPA, WPA2) BLE 5.0
Power Supply	3.0 V ~ 3.6 V, recommend to 3.3 V
Frequency	2.4 GHz
Max. TX Power	**Wi-Fi:** 11b(11 Mbps@CCK): 21.0 dBm 11g(54 Mbps@OFDM): 19.0 dBm 11n(HT20@MCS7): 18.5 dBm 11n(HT40@MCS7): 18.5 dBm **BLE**: 0 dBm @ 1 Mbps 0 dBm @ 2 Mbps 0 dBm @ 125 kbps 0 dBm @ 500 kbps
Receiving Sensitivity	**Wi-Fi:** 0 dBm @ 1 Mbps 0 dBm @ 2 Mbps 0 dBm @ 125 kbps 0 dBm @ 500 kbps **BLE**: -97 dBm @ 1 Mbps -93dBm @ 2 Mbps -105 dBm @ 125 kbps -100 dBm @ 500 kbps
Security	Secure boot, Flash encryption, 4096-bit OTP, Cryptographic hardware acceleration: AES-128/256 (FIPS PUB 197), SHA Accelerator (FIPS PUB 180-4), RSA Accelerator, Random Number Generator (RNG), HMAC, Digital signature
Peripheral	UART, I2C, SPI, ADC, PWM, I2S, DMA, CAN Specificatioon 2.0, USB
GPIO	15
Working Temperature	-40 ℃ ~ +85 ℃
Storage Temperature	-40 ℃ ~ +125 ℃
Transmission Range	Wi-Fi: 200 m (PCB antenna) BLE: 70 m (PCB antenna)
Dimension (mm)	23.0 × 20.0 × 2.3
Package	1.27-mm pitch half-hole
Functions	Support AP/STA, Support transparent transmission protocol, Support distribution network

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Realtek RTL87xx Series Wi-Fi Modules			
Part Number	**RF-WM-11AFB1**	**RF-WM-10AFB1**	**RF-WM-20CMB1**
Photo			
IC	RTL8711AF	RTL8710AF	RTL8720CM
Core	166 MHz ARM® Cortex®-M3	83 MHz ARM® Cortex®-M3	100 MHz Real-M300 KM4
RAM	SRAM: 512 kB SDRAM: 2 MB	SRAM: 512 kB	SRAM: 256 kB PSRAM: 4 MB
Flash	1 MB (IC embedded)	1 MB (IC embedded)	2 MB (Module embedded)
Protocols	802.11 b/g/n 1x1, 2.4 GHz; 802.11e QoS Enbancemant (WMM); 802.11i (WPA, WPA2)	802.11 b/g/n 1x1, 2.4 GHz; 802.11e QoS Enbancemant (WMM); 802.11i (WPA, WPA2)	802.11 b/g/n 1x1, 2.4 GHz; 802.11e QoS Enbancemant (WMM); 802.11i (WPA, WPA2) BLE4.2
Peripheral	UART, SPI, I2C, I2S, SDIO, NFC, PWM, GPIO	UART, SPI, I2C, I2S, SDIO, GPIO	UART, SPI, I2C, I2S, SDIO, PWM, GPIO, GDMA
Transmission Range	200 m (PCB antenna)	200 m (PCB antenna)	Wi-Fi: 200 m (PCB antenna) BLE: 70 m ((PCB antenna)
Max. TX Power	11b(11 Mbps@CCK): +17.0 dBm 11g (54 Mbps@OFDM): +13.5 dBm 11n (HT20@MCS7): +13.5 dBm 11n (HT40@MCS7): +13.5 dBm		Wi-Fi: 11b(11 Mbps@CCK): +17.0 dBm 11g(54 Mbps@OFDM): +15.0 dBm 11n(72 Mbps@MCS7): +13.0 dBm BLE: +4.5 dBm
Receiving Sensitivity	11b(11 Mbps@CCK): -82 dBm 11g (54 Mbps@OFDM): -69 dBm 11n (HT20@MCS7): -66 dBm 11n (HT40@MCS7): -63 dBm		Wi-Fi: 11b(11 Mbps@CCK): -86dBm 11g(54 Mbps@OFDM): -73dBm 11n(72 Mbps@MCS7): -69dBm BLE: -96 dBm
Security	Wi-Fi WPA, WPA2, WPS Crypto engine: MD5, SHA-1, SHA2-224, SHA2-256, HMAC, AES, DES, 3DES		Wi-Fi WEP, WPA, WPA2, WPS Crypto engine: MD5, SHA-1, SHA2-224, SHA2-256, HMAC, AES
Functions	Support AP/STA, Support transparent transmission protocol		Wi-Fi BLE Combo module, Support Wi-Fi transparent transmission protocol
Dimension (mm)	23.0 × 20.0 × 2.4		
Antenna	PCB/IPEX/Half-hole		
Power Supply	2.3 V ~ 3.6 V, recommend to 3.3 V		
Frequency	2.4 GHz		
GPIO	21		
Working Temperature	-20 ℃ ~ +85 ℃		
Storage Temperature	-55 ℃ ~ +125 ℃		

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USB Dongles

Part Number	RF-DG-22A	RF-DG-40A	RF-DG-32B	RF-DG-52PAS	USB Dongle
Photo					
IC	EFR32BG22C224	nRF52840	nRF52832	CC2652P	CC2540
Core	76.8 MHz ARM Cortex-M33	64 MHz ARM® Cortex®-M4F	64 MHz ARM® Cortex®-M4F	48 MHz ARM® Cortex®-M4F	8051
Antenna	PCB	PCB (IPEX connector leads out the NFC signal)	PCB	SMA Connector	PCB
RAM	32 kB	256 kB	64 kB	88 kB	8 kB
Flash	512 kB	1 MB	512 kB	352 kB	256 kB
Protocols	Observer, BLE master-slave protocol	Sniffer (ZigBee/BLE), Bootloader	Sniffer (BLE only), BLE master-slave protocol	ZigBee Coordinator	Beacon, Sniffer, HID, HCI, , BLE slave protocol
Max. TX Power	+6 dBm	+8 dBm	+4 dBm	+20 dBm	+4 dBm
PCBA Dimension (mm)	56.7 x 13.9 x 4.5	60 x 18.5 x 4.5	56.7 × 13.9 × 4.5	73.3 × 20 × 7.5	19.8 × 9.7 × 4.5
Overal Dimension (mm)	62.9 x 20.2 x 8.0	N/A	62.9 x 20.2 x 8.0	73.3 × 23.6 × 14.1	21.7 × 14.3 × 5.3
Functions	Beacon data monitor, BLE data packets capture, BLE gateway	Support PC nRF Connect, Support capture all BLE5.0 data packets, Can replace NORDIC Dongle	Support capture BLE5.0 data packets (except Long Range and Mesh)	Support open source platform ZHA and Zigbee2MQTT, SMA connector for feasible external antennas, Smart home gateway	Small dimension, High cost-effective, Support TI Sniffer desktop tool, USB sensor, USD adapter

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