

WS2118/WS2119 EVB

AT CMD USER GUIDE

Version: 1.0.2

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Changed History

version	Date	Description	Author
1.0.0	2018.3.8	Initial version for AT command in WS2118	Joshua Guo
		and WS2119 module.	
1.0.1	2018.3.9	Added return value.	Joshua Guo
1.0.2	2018.3.14	Modified doc title as "WS2118/WS2119	Austin Huang
		EVB"	



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1 RELEASED NOTE

This document is AT command for BLE and Sigofx to UART. The AT command included BLE Peripheral role.

- 1. The firmware with UART baud rate 115200 as default.
- 2. FW file version.

FW version	Zone(Ref.2)	PCB(Ref.3)
WS2118_AT_CMD_3.1.1	ETSI(1)	D03
WS2118_AT_CMD_4.1.1	ETSI(1)	D04
WS2119_AT_CMD_3.1.1	FCC(2.4)	D03

1.1 LIMITATION

NONE

1.2 BUG/ISSUE FIXED

NONE

1.3 REFERENCE

WS2119E20A-UG-D01_20170802.pdf



2 FW PROGRAMMING

2.1 PROGRAMMER TOOL

• STLINK debugger/programmer

Download Link: http://www.st.com/en/development-tools/st-link-v2.html



• STSW-BNRG1STLINK

Download Link: <u>http://www.st.com/en/embedded-software/stsw-bnrg1stlink.html</u> User Guide:

http://www.st.com/content/ccc/resource/technical/document/user_manual/group0/70/7 2/18/26/b7/51/47/f2/DM00326881/files/DM00326881.pdf/jcr:content/translations/en. DM00326881.pdf

SlueNRG-1 ST-LINK Utility	-		×
<u>E</u> ile <u>E</u> dit <u>V</u> iew <u>I</u> arget ST-LINK <u>H</u> elp			
🖴 🖥 🖕 🗣 🥔 👹 🥬			
Memory display Device			
Address: 0x10040000 V Size: 0x16079 Data Width: 32 hits V			
Fight Control			
Device Memory Binary File		Li	veUpdate
Device Memory			
(I			



Tool bar					
Figure		4	i	Ŷ	1 1 1
Description	Open file	Connect	Disconnect	Full chip erase	Program verify

2.2 WS2119 EVB SETUP

Connect the power and ST-link then open BlueNRG-1 ST-LINK Utility.



2.3 PROGRAMMING BY ST-LINK (PCB-D04 ONLY)

1. Make sure PCB version



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2. Open ST-link utility GUI



3. Click "Connect" button.

🝓 BlueNRG-1 ST-LINK Utility		– 🗆 X
<u>File E</u> dit <u>View</u> <u>T</u> arget ST-LINK <u>H</u> elp		
🖴 🖥 🔮 🌾 🖉 🗒 🌿 🔌 .		
Memory display	Device	
Address: 0x10040000 ~ Size: 0x17002	Data Width: 32 bits Version I Revision	
	Flash size	
Device Memory Binary File		LiveUpdate
Device Memory		
Disconnected	Device :	Core State : No Memory Loaded

4. Click "Open file" button.

😼 BlueNRG-1 ST	-LINK Utility							-		×
<u>File E</u> dit <u>V</u> iew	<u>T</u> arget ST-	LINK <u>H</u> elp								
🖴 🖥 🖕 «	🖴 🖬 🖞 🕼 🖉 🔘 🖉 🔎									
Memory display						Device	BlueNRG-1			
Address: 0x1004	10000 🗸 Size	: 0x17DD2	Data Widt	th: 32 bits 🗸		Version ID	Ver 1			
						Revision ID Flash size	Rev 1 160KBytes			
Device Memory @ 0	x10040000: Bi	nary File				T IGST SIZE	100/09/023		LiveU	pdate
Target memory, Addr	ess range: [0x10	0040000 0×1005	DD2]							
Address	0	4	8	С	ASCII					^
0x10040000	20006000	10057C3D	10056F49	10056F4B	=	loKo				
0x10040010	AA5555AA	424C5545	00000000	00000000	?U U ?E	ULB				
0x10040020	00000000	00000000	00000000	10056F4F		0				
0x10040030	00000000	00000000	10041CFB	10056F51		.?Qo				
0x10040040	10056F59	10043F83	00000000	00000000	Yo?	?				
0x10040050	10056F75	100443FF	10056F77	100470FF	u o	Cwo	p			
0x10040060	00000000	00000000	00000000	00000000						
0x10040070	00000000	100474DF	10047757	100484AB	?t.	. W w ??				
0x10040080	00000000	1004472F	10044CBF	1004605F	/G	?L`				
<	1			1						>
09:46:54 : ST-LINK SN : 48FF6E065185525432460287 09:46:54 : ST-LINK Firmware version : V2J2856 09:46:54 : SCNOREcted via SVD. 09:46:55 : Connected via Pre-Reset. 09:46:55 : Connector mode : Connect via Pre-Reset. 09:46:55 : Debug in Low Power mode enabled. 09:46:55 : Device : BlueNRG-1 09:46:55 : Device : BlueNRG-1 09:46:55 : Device finally :BlueNRG-1 09:46:55 : Device finally :BlueNRG-1 09:46:55 : Device finally :BlueNRG-1 09:46:55 : Device finally :BlueNRG-1										
Debug in Low Power r	mode enabled.		Device : BlueNRG-1			1	Core State : Live Update	e Disabled		



5. Select the file which is going to program.

👼 BlueNRG-1 ST-LINK Utility				- 🗆	\times			
File Edit View Target S	T-LINK Help							
🧧 🔜 開啟								×
$\leftarrow \rightarrow \checkmark \uparrow$ sle	_SigFoxLib_CLI_Project > EWARM > BLUEN	RG1_FCC > Exe		✓ ³	尋 Exe			٩
組合管理 ▼ 新増資料夾	E Contraction of the second					-		?
ConeDrive	名稱 ^	修改日期	類型	大小				
	BLE_SigFoxLib_CLI_FCC.bin	2018/2/8 9:57	BIN 檔案	93 KB				
🧊 3D 物件								
👃 下戴								
🔮 文件								
♪ 音樂								
三 桌面								
▶ 圖片								
- 影片								
🏪 本機磁碟 (C:)								
👝 本機磁碟 (D:)								
BLUENRG-1 (F:)								
🗙 jjdata (\\192.16								
🛖 BLUENRG-1 (F:) 🗸								
檔案名	稱(N): BLE_SigFoxLib_CLI_FCC.bin			~ 9	Supported F	iles (*.bin	*.hex *.	~
				[開啟(O)		取満	
Debug in Low Power mode enabled.	. Device : BlueNRG-1		ore State : Live Update D	Disabled				.::

6. Ensure the file name.

Click the "Program verify" button.

遍 BlueNRG-1 ST-LI	INK Utility							-		×
<u>File E</u> dit <u>V</u> iew]	Target ST-L	INK <u>H</u> elp								
🖴 🖥 🖕 🍕	F 🥢 🔳	🐒 💋								
Memory display	I					Device	BlueNRG-1			
						Version ID	Ver 1			
Address: 0x100400	000 V Size:	0x1/DD2	Data Widt	n: 32 bits V		Revision ID	Rev 1			
	-		out soo li	-		Flash size	160KBytes			
Device Memory @ 0x1	10040000 File	e : BLE_SigFoxLit	5_CLI_FCC.bin							
[BLE_SIGFOXLID_CLI_FO	.C.binj, File size	: 95190 Bytes								-
Address (0	4	8	С	ASCII					_^
0x0000000 2	20006000	10057195	10056459	1005645B	.`. ?q.	.Yd[d				- 1
0x0000010 A	AA5555AA	424C5545	0000000	00000000	?U U ?E	U L B				
0x0000020	0000000	00000000	00000000	1005645F		d				
0x0000030 0	00000000	00000000	10043F83	10056461		??ad				
0x0000040 1	10056469	100443FF	00000000	0000000	id (с				
0x0000050 1	1004728B	1004472F	1005648D	100462AB	?r/G	?d?b				
0x0000060	0000000	00000000	00000000	0000000						
0x0000070 0	00000000	10046B17	10047893	100480DB	k.	.?x?				
0x0000080	0000000	10044CBB	10046083	100460B3	?L.	. ?` ?`				~
<										>
09:47:44 : Connection	mode : Connec	t with Pre-Reset								^
09:47:44 : Debug in Lo	w Power mode	enabled.								
09:47:44 : Device : Blue 09:47:44 : Device famil	eNRG-1 lv :BlueNRG-1									- 11
09:47:44 : Device flash	Size : 160KByt	es								
09:48:26 : [BLE_SigFox	x_SensorDemo_ x_SensorDemo	FCC.hex] opene FCC bex] checks	d successfully. sum : 0x0085466	54						
09:48:47 : [BLE_SigFox	xLib_CLI_FCC.b	in] opened succe	essfully.							
09:48:47 : [BLE_SigFox	xLib_CLI_FCC.b	inj checksum : 0:	x0082882D							~
Debug in Low Power mo	de enabled		Device : BlueND	G-1			Core State : No Memory Grid	Selector	1	_
peoug in cow Power mo	ac chables.		perice . Didente	.01			core scace and Memory and	5000000		



7. Ensure the file name.

Click "Start".

😼 BlueNRG-1 ST-	LINK Utility	- D >	<
File Edit View	Target ST-	LINK Help	
🖴 🖥 🛛 🖖 <	i 🤣 🛄	1 🕸 🔎	
Memory display		Device BlueNRG-1	
Address: 0x1004	0000 V Size	Version ID Ver 1	
		Revision ID Rev 1	
Device Memory @ 0>	(10040000 ; Fi	ile : BLE_SigFoxLib_CLI_FCC.bin	
[BLE_SigFoxLib_CLI_F	CC.bin], File size	e: 95190 Byt	_
Address	0	Download [BLE_SigFoxLib_CLI_FCC.bin]	^
0x0000000	20006000	Start address : 0v10040000	
0x00000010	AA5555AA		
0x0000020	00000000	Hielpath : D:\work\W52TIx_Dev_Tools\ULI\Projects\SigFox_Applix Browse	
0x0000030	00000000	Verify while programming O Verify after programming	
0x00000040	10056469	Click "Start" to program target	
0x0000050	1004728B		
0x0000060	00000000		
0x0000070	00000000	Reset after programming	
0x0000080	00000000	Start Cancel	.
<	1	,	
09:47:44 : Connectio	n mode : Conne	z. ct with Pre-Reset.	^
09:47:44 : Debug in L 09:47:44 : Device : B	low Power mode		
09:47:44 : Device far	nily :BlueNRG-1		
09:47:44 : Device fla: 09:48:26 : [BLE_SigF	sn Size : 160KBy ox SensorDemo	rtes FCC.hex] opened successfully.	
09:48:26 : [BLE_SigF	ox_SensorDemo	FCC.hex] checksum : 0x0085A664	
09:48:47 : [BLE_SigF 09:48:47 : [BLE_SigF	oxLib_CLI_FCC. oxLib_CLI_FCC.	binj opened successfully. binj checksum : 0x0082882D	
]		•	۷.
Debug in Low Power n	node enabled.	Device : BlueNRG-1 Core State : No Memory Grid Selected	

8. Programming.

👼 BlueNRG-1 ST-	LINK Utility				_		\times
File Edit View	Target ST-	LINK Help					
🖴 🖥 🖕 🖑	¥ 🖉 📖	1 🗭 ┢					
Memory display Address: 0x1004	0000 🗸 Size	: 0x17DD2 Data Width: 32 bits v	Device Version ID Revision ID Flash size	BlueNRG-1 Ver 1 Rev 1 160KBytes			
Device Memory @ 0x	x10040000: Fi	le : BLE_SigFoxLib_CLI_FCC.bin					
[BLE_SigFoxLib_CLI_F	CC.bin], File size	e: 95190 Bytes					
Address	0	Download [BLE_SigFoxLib_CLI_FCC.bin]		×			_ ^ _
0x0000000	20006000	Start address : 0x10040000					
0x0000010	AA5555AA			Diaman			
0x0000020	00000000	File path : D. Wolk (WS211x_Dev_100is/CE1/Fid	ijectsvolgnox_App	III DIOVISE			
0x0000030	00000000	Verify while programming Verify	after programming]			
0x00000040	10056469	Flash memory programming and verification					
0x00000050	1004728B						
0x0000060	00000000						
0x00000070	00000000	Reset after programming					
0×00000080	00000000	Start Cancel					
<	1						>
1	uency - 270 Mil	۷.					-
09:47:44 : Connectio	n mode : Conne .ow Power mode	ct with Pre-Reset. enabled.					~
09:47:44 : Device : B	lueNRG-1						
09:47:44 : Device far	nily :BlueNRG-1 sh Size : 160KBv	tes					
09:48:26 : [BLE_SigF	ox_SensorDemo	_FCC.hex] opened successfully.					
09:48:26 : [BLE_SigF 09:48:47 : [BLE_SigF	ox_SensorDemo oxLib CLI FCC.	_FCC.nexj checksum : 0x0085A664 bin] opened successfully.					
09:48:47 : [BLE_SigF	oxLib_CLI_FCC.	bin] checksum : 0x0082882D					
Debug in Low Power n	node enabled	Device • BlueNPG-1		Core State : No Memor	ru Grid Selecte	d	-
peoug in cow Power n	noue enabled.	hence . pincinko-1		core state i no Memor	y and belette	u	



9. Success log

😼 BlueNRG-1 ST-LINK Utility				-		×
<u>File Edit View T</u> arget ST-LINK <u>H</u> elp						
🖴 🖥 🖕 🜾 🖉 🗒 🌾 🔎						
Memory display		Device				
Address: 0x10040000 v Size: 0x173D6	Data Width: 32 bits 🗸	Version ID Revision ID				
Device Memory Etc., PLE SizEard in CLI ECC his		Flash size			Livel	adata
Device Memory					Liveo	puate
109:48:26 : [BLE_SigFox_SensorDemo_FCC.hex] opene 09:48:26 : [BLE_SigFox_SensorDemo_FCC.hex] obeds 09:48:47 : [BLE_SigFoxLib_CLI_FCC.hein] obeds ducce 09:48:47 : [BLE_SigFoxLib_CLI_FCC.hein] obeds un - 0 09:51:53 : Memory programmed in 24s and 703ms. 09:51:53 : Verification0K 09:51:53 : Verification0K 09:51:53 : Verification0K 09:51:53 : Verification to device is lost: check power su 09:51:54 : Connection to device is lost: check power su	d successfully. sum: 0x0085A664 ssfully. solution: pply and debug connection spla "Debug to law Geves mode"time 6	on Target Section				
05.51.54.11 the target is in low power mode, please er	nable bebug in com Power mode option in	om rarget->setun	ys menu.			~
Disconnected	Device :	Cor	e State : No Memory Loa	aded		

2.4 PROGRAMMING BY USB (WINDOWS ONLY)



1. Connected USB will show removable device.



2. Copy the firmware file.

📙 🛃 🔜 🖛 Exe					-	×
檔案 常用 共用 檢視	ð					~ 🕐
← → · ↑ 📙 « BLE_SigFe	搜尋 Exe		Q			
	名稱 ^	修改日期	類型	大小		
> 📌 快速存取	BLE_SigFoxLib_CLI_FCC.bin	2018/3/1 11:32	BIN 檔案	103 KB		
> 🗦 Dropbox	BLE_SigFoxLib_CLI_FCC.out	2018/3/1 11:32	OUT 檔案	667 KB		
🐔 OneDrive	BLE_SigFoxLib_CLI_FCC.sim	2018/2/22 17:35	SIM 檔案	103 KB		
> 🛄 本機						
> 🚘 BLUENRG-1 (F:)						
> 🥩 網路						

3. Paste in the BLUENRG

🚘 🕑 📙 🖛	磁碟機工具 BLUENRG-1 (F:)		-		×
檔案 常用 共用 檢視	管理				~ 🕐
← → × ↑ 🚍 > BLUENRO	5 √	搜尋 BLUENRG-1	(F:)	<i>م</i>	
	名稱	修改日期~	類型	大小	
> 者 快速仔取	BlueNRG-1.htm	2016/7/5 8:28	HTM 檔案		1 KB
> 🗦 Dropbox	USB_to_SERIAL_version.txt	2016/6/14 14:59	文字文件		1 KB
> 🐔 OneDrive					
> 💻 本機					
> 🚔 BLUENRG-1 (F:)					
> 💣 網路					

4. Programming

Must have this block, it will flash successful.





5. Check built date to confirm firmware version. Please check the release note.

NAT+REBOOT	
Jorjin WS211x application ** Mar	1 2018 14:24:57 **
MAC = 001994FFFFF	
BLE Stack Initialized	
Frequency offset = -2758	
DeviceID = FEDCBA98	
Key Saved.	
PAC = E74E3ECB0720057F	
Sigfox RCZ4	
Ready	



3 AT COMMAND LIST

3.1 COMMAND FORMAT

- Command With data (parameter > 0): AT+COMMAND {X1X2X3X4}<CR> Parameter format is hex. ASCII table (Ref.1).
- Command Without data (parameter = 0): AT+COMMAND<CR>
- Response code format: Success message: OK<CR>

3.2 COMMON COMMAND

AT Command	Description	Result/Return Value	
HELP	Display command list	Command list	
fwVersion	Display FW version	FW version	

3.3 DEVICE SETTING COMMAND:

AT Command	Description	Result/Return Value
AT+SETDEVICEID	Write Sigfox ID. Parameter length 4 bytes. If ID is 0xFEDCBA98. Ex: AT+SETDEVICEID {FEDCBA98} If ID is 0x0000BA98. Ex: AT+SETDEVICEID {0000BA98} MUST reboot after set device ID.	ОК 0
AT+SETSIGFOXKEY	Write Sigfox private key. Parameter length 16 bytes. Ex: AT+SETSIGFOXKEY {00112233445566778899AABBCCDDEEFF}	ОК 0
AT+SETSIGFOXPAC	Write Sigfox PAC. Parameter length 8 bytes. If ID is 0x7A7EE94E51A4A31B. Ex: AT+SETSIGFOXPAC {7A7EE94E51A4A31B} If ID is 0x0000000051A4A31B. Ex: AT+SETSIGFOXPAC {000000051A4A31B}	ОК 0



AT+SETDEVMAC	Set MAC address. Parameter length 6 bytes. Ex: AT+SETDEVMAC {001994FFFFFF} MUST reboot after set mac address.	Current MAC and rebooting request 0
AT+READSIGFOXPAC	Read Sigfox PAC.	Sigfox PAC
AT+READDEVMAC	Read active BLE MAC address.	MAC address
AT+SETSIGFOXRCZ	(Only for FCC) MUST reboot after set rcz. Zone 2. Ex: AT+SETSIGFOXRCZ 2 Zone 4. Ex: AT+SETSIGFOXRCZ 4	OK ERROR
AT+REBOOT	Reboot module.	Reboot and display booting message

3.4 PERIPHERAL BLE COMMAND LIST

AT Command	Description	Result/Return Value	
		0(Standby)	
AT+STA	Check BLE status. (Default STA=1)	1(Advertising)	
		2(Connected)	
	Start advertising (STA=1). If device has connected it	OK	
AT+ADV	won't change status (STA=2).	OK	
ATISTOD	Stop advertising (STA=0). If device has connected it	OK	
AI+SIOP	will disconnect and stop advertising.	OK	
	Save BLE using status. When boot to enable	OK	
AI+SAVEDLESIA	standby/advertising status.	OK	
AT+DISCON	Disconnect from current connection.	ОК	
	Update the information for new device name. 8 bytes		
	limit, if exceed 8 bytes it will read top 8 bytes only.		
AT INAME	Default name is "WS211x", to return default name	ОК	
AI+NAME	input AT+NAME {FFFFFFFFFFFFFFFFFFF}	0	
	Ex: AT+NAME {575332313139}		
	0x575332313139(hex) = WS2119(ASCII)		
	Send packet through BLE. 20 bytes limit, if exceed		
AT I NOTIEV	20 bytes it will read top 20 bytes only.	ОК	
	Ex: AT+NOTIFY {4A4F524A494E}	0	
	0x4A4F524A494E(hex) = JORJIN(ASCII)		



3.5 SIGFOX COMMAND

AT Command	Description	Result/Return Value
	Send Sigfox frame. 12 bytes limit, if exceed 12 bytes	OV
AT+SENDSIGFOX	it will read top 12 bytes only.	0
	Ex: AT+SENDSIGFOX {4A4F524A494E}	0
	Use private key. Ex: AT+PUBLICKEY 0	OV
AT+PUBLICKEY	Use public key. Ex: AT+PUBLICKEY 1	UK .

3.6 RETUEN VALUE

Return Value	Description
ОК	Success.
ERROR	RCZ is not 2 or 4.
0	Input parameter is null.
wrong number of arguments	There has no parameter.
argument syntax error	Parameter format is wrong.
no such command	Command format is wrong.

3.7 SIGFOX PUBLIC KEY

How to use Public key:

- 1. Hold SW1
- 2. Pressed and released SW2
- 3. Released SW1
- 4. Check the log as below





3.8 AT COMMAND SAMPLE

• Booting log without sigfox ID/KEY/PAC



• Example of device setting command





• AT+SENDSIGFOX

Ready											
>AT+SENDSIGFOX {4A4F524A494E} OK >											~
X sigfox	DEVICE	DEVICE TYPE	USER	GROUP						4 A 6) 🕩
INFORMATION	Device	890A67 - Mes	sages								
LOCATION											
MESSAGES		From date									
EVENTS		To date									
STATISTICS											
EVENT CONFIGURATION								RE	SET	LTER	<u></u>
		_		page	1 🖸						
			Time	Data / Decoding		Location	Link quality	Callbacks			
			2018-02-13 0	2:34:36 4a4f524a494e		¢	att	o			

• AT+SETPUBLICKEY





• Example of BLE command:



• AT+NAME

Doc No: WS2xxx BLE/Sigfox AT CMD doc-01





• AT+DISCON



- AT+STA
- AT+ADV
- AT+STOP
- AT+SAVEBLESTA



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4 HW PIN DEFINATION

- UART pins on Module: UART TX: DIO 8 UART RX: DIO 11
- How to jump wired UART on EVB Remove jumpers J3 and J5 to use UART from host MCU.



- 20-



5 **REFERENCE**

1. ASCII Table

	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
1	32	20	[SPACE]	64	40	0	96	60	×
	33	21	1	65	41	Α	97	61	а
	34	22		66	42	В	98	62	b
	35	23	#	67	43	С	99	63	с
I	36	24	\$	68	44	D	100	64	d
	37	25	%	69	45	E	101	65	е
	38	26	&	70	46	F	102	66	f
	39	27	1.00	71	47	G	103	67	g
	40	28	(72	48	н	104	68	h
Į	41	29)	73	49	1.0	105	69	i.
	42	2A	*	74	4A	J	106	6A	j
	43	2B	+	75	4B	ĸ	107	6B	k
	44	2C	,	76	4C	L.	108	6C	1
	45	2D	-	77	4D	M	109	6D	m
l	46	2E		78	4E	N	110	6E	n
	47	2F	1	79	4F	0	111	6F	0
	48	30	0	80	50	Р	112	70	р
	49	31	1	81	51	Q	113	71	q
	50	32	2	82	52	R	114	72	r
I	51	33	3	83	53	S	115	73	S
	52	34	4	84	54	т	116	74	t
	53	35	5	85	55	U	117	75	u
	54	36	6	86	56	v	118	76	v
	55	37	7	87	57	w	119	77	w
Į	56	38	8	88	58	X	120	78	x
	57	39	9	89	59	Y	121	79	У
	58	ЗA		90	5A	z	122	7A	z
	59	3B	;	91	5B	[123	7B	{
	60	3C	<	92	5C	١	124	7C	
I	61	3D	=	93	5D	1	125	7D	}
	62	3E	>	94	5E	^	126	7E	~
	63	3F	?	95	5F	_	127	7F	[DEL]

2. Module kinds

WS2118 module is for ETSI, WS2119 module is for FCC.





3. PCB versions

D03



D04



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