AT Command Reference

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DOCUMENTATION

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BlueMod+S/ADC

AT Command Reference

Release r02

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Table of contents

1 Introduction

This documentation specifies the command interface for the BlueMod+S ADC firmware.

The BlueMod+S ADC firmware supports AT command mode.

1.1 AT Command Mode

Each command line consists of a prefix, a body and a terminator.

All command lines begin with the prefix **AT** (ASCII 065, 084) or **at** (ASCII 097, 116).

The body is a string of characters in the ASCII range 032-255. Control characters other than <CR> (carriage return; ASCII 013) and <BS> (back space; ASCII 008) in a command line are ignored.

The terminator is <CR>.

There is no distinction between upper-case and lower-case characters. A command line can have a maximum length of 80 characters. It is automatically discarded if the input is longer. Corrections are made using <BS>. Multiple commands on the same command line are not allowed.

Commands have the following syntax:

Syntax	Description
AT<command>=<value><CR>	Write the value of the command

Responses are sent back to the host and can be any of the following:

Responses	Description
<CR><LF>value<CR><LF>	Read only value (e.g. AT+BOAD)
<CR><LF>OK<CR><LF>	Successful final message
<CR><LF>ERROR<CR><LF>	Error message, command not supported

Note: Exceptions of this syntax are marked seperately.

2 Commands

The description of the commands is structured into the following parts:

- General commands
- Bluetooth Low Energy (BLE) specific commands
- Generic Attribute Profile (GATT) specific commands

The factory-default values of the commands are marked using the bold letter format.

2.1 General

%B	Baud Rate

AT syntax: **AT%B<value>**

This command determines the baud rate for the UART.

The following standard baud rates are supported:

Value	Description
4	9,600 bps
5	19,200 bps
6	38,400 bps
7	57,600 bps
8	115,200 bps
9	230,400 bps
22	460,800 bps
23	921,600 bps

Additionally to the standard baud rates described above, it is possible to set the following baud rates.

Value	Description
1200	1,200 bps
2400	2,400 bps
4800	4,800 bps
9600	9,600 bps
14400	14,400 bps
19200	19,200 bps
28800	28,800 bps
38400	38,400 bps
57600	57,600 bps
76800	76,800 bps
115200	115,200 bps
230400	230,400 bps
250000	250,000 bps
460800	460,800 bps
921600	921,600 bps
1000000	1,000,000 bps

To set a baud rate write the desired value in the command.

Examples:

AT%B9	Set baud rate to 230,400 bps
AT%B250000	Set baud rate to 250,000 bps

Note: Information regarding the deviation of the real baud rate to the value set can be found in the BlueMod+S Hardware Reference [1].

&F Load Factory Defaults

AT syntax: **AT&F<value>**

The factory-default values will be loaded. For storing values in non-volatile memory, use the **AT&W** command.

Value	Description
0	Set all parameters except **bndlist** to factory defaults
1	Set all parameters to factory defaults

Note: In case of value=1 the non volatile bonding information will be deleted.

&W Store Active Configuration

AT syntax: **AT&W**

The active configuration is stored in non-volatile memory.

+ADCREF Set ADC Reference Source

AT syntax: **AT+ADCREF=<selector>,…**

This command sets the ADC reference source and prescaling factor.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active during the next system startup if saved persistently.

Additional mandatory parameters depend on the value of <selector>:

<selector> = int:

AT+ADCREF=int,p=<prescaler>

<selector> = ext:

AT+ADCREF=ext,p=<prescaler>,v=<refvolt>

selector	Description
int	Internal reference voltage 1.2 V (Voltage band gap VBG) is used (default)
ext	External reference voltage on pin AREF is used

Parameter <prescaler> will select the factor used to scale down the input voltage before it is exposed to the internal ADC:

prescaler	Description
1	Input voltage prescaler is 1/3 (default)
2	Input voltage prescaler is 2/3
3	Input voltage prescaler is 1 (=3/3)

refvolt	Description
value	Reference voltage in mV if <selector> = ext Valid range is 0 to 1300 (see notes on general constraints below)

The maximum input voltage on the analog input AIN depends on various parameters:

General constraints:

- The internal ADC should not be exposed to higher voltage than 2.4 V on the analog IO after prescaling: maximum input voltage * prescaling <= 2.4 V.
- The analog IO must not be exposed to higher voltage than VDD + 0.3 V.

Depending on the selected reference voltage source **additional** constraints apply:

<selector> = int:

- Maximum input voltage on the analog input AIN depends on the <prescaler> value:
  - <prescaler> = 1: 3.6 (=1.2/(1/3)) V
  - <prescaler> = 2: 1.8 (=1.2/(2/3)) V
  - <prescaler> = 3: 1.2 (=1.2/(3/3)) V

<selector> = ext:

- Maximum input voltage on the analog IO depends on the <prescaler> value and the reference voltage <refvolt>:
  - <prescaler> = 1: <refvolt>/(1/3) V
  - <prescaler> = 2: <refvolt>/(2/3) V
  - <prescaler> = 3: <refvolt>/(3/3) V

+ADCSR Set ADC Sample Rate

AT syntax: **AT+ADCSR=<sample rate>**

This command sets the ADC sample rate.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active instantly in case ADC sampling is not active or after the next ADC sample in case ADC sampling is active.

sample rate	Description
0	Sample on request only (default)
5-2000	Sample Rate in ms

Note: To configure mean value calculation to reduce signal noise see command ADCSM.

+ADCSM Set Number of ADC Samples for Mean Value calc.

AT syntax: **AT+ADCSM=<nbr. of samples>**

This command specifies the number of ADC samples used to calculate a mean value.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active instantly; no system restart is required for activation.

If this command is used to define a number of ADC samples, the new configuration will be active for the next mean value calculation.

nbr. of samples	Description
value	Number of samples used for mean value calculation. Valid range is 1 to 16, Default is 1.

Note: To configure sampling rate see command ADCSR.

+ADCTHLD Set ADC Threshold Value

AT syntax: **AT+ADCTHLD=<threshold>,edge=<dir>**

This command defines a threshold for an ADC value and the type of action to be taken when the value is reached.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active instantly; no system restart is required for activation.

If this command is used to define a threshold value, an alarm will be instantaneously generated.

threshold	Description
Value	Threshold value in mV Valid Range is 0 t0..3900

Dir	Description
r	Mean Voltage rising above threshold triggers alarm
f	Mean Voltage falling below threshold triggers alarm
c	Mean Voltage crossing threshold triggers alarm
d	Threshold detection disabled (threshold value is ignored) (default)

Note: To reduce noise of the measured voltage the mean voltage calculatuion mechanism can be used.

To configure mean value calculation see command ADCSM in this document.

Behavior for dir=r

In case the dir (direction) parameter is configured to “r” (rise) the alarm will be triggered once as soon as the current mean voltage rises to or above the configured threshold value.

To trigger the next alarm the current mean voltage must fall below the the configured threshold value first.

Behavior for dir=f:

In case the dir (direction) parameter is configured to “f” (fall) the alarm will be triggered once as soon as the current mean voltage falls to or below the configured threshold value.

To trigger the next alarm the current mean voltage must rise above the the configured threshold value first.

Behavior for dir=c:

In case the dir (direction) parameter is configured to “c” (cross) the alarm will be triggered once as soon as the current mean voltage crosses the configured threshold value. So if the current mean voltage is below the configured threshold value the next alarm will be triggered when the voltage rises above the configured threshold value. If the current mean voltage is above the configured threshold value the next alarm will be triggered when the voltage falls below the configured threshold value.

Behavior for dir=d:

In case the dir (direction) parameter is configured to “d” (disabled) the alarm will be triggered for every new mean voltage calculated. The configured threshold value will be ignored.

+BIOCAP SSP I/O Capabilities

AT syntax: **AT+BIOCAP=<value>**

This command sets the input and output capabilities of the device used for SSP.

The settings defined with this command will be reset to default configuration by activating the CNF-RES# hardware signal.

Value	Description
0	Display only
1	Display Yes/No
2	Keyboard only
3	No input no output
4	Display and keyboard

+BNAME Local Device Name

AT syntax: **AT+BNAME=<name>**

This command allows the modification of the local device name. The device name is shown on a remote Bluetooth device during device/service discovery. It is limited to 19 characters.

The device name can contain a format element to include the device's own address or parts of it in the name.

In BLE advertising the name is truncated to the first 8 characters.

Format: "%[<s>][<d>]a"

"%"	Identifier start format element
<s>	Character separator on byte order (optional)
<d>	Number (1-12) of digits included in device name (optional, default is 4)
"a"	Identifier end format element

Examples: Device address = "0123456789AB"

AT+BNAME=BM+S %4a	Display on remote end: BM+S 89AB
AT+BNAME=BM+S %4a	Display on remote end: BM+S 89AB
AT+BNAME=BM+S %:3a	Display on remote end: BM+S 9:AB
AT+BNAME=BM+S %3a	Display on remote end: BM+S 9AB
AT+BNAME=BM+S %:12a	Display on remote end: BM+S 01:23:45:67:89:AB

+BNDDEL Delete Bonding Information

AT syntax: **AT+BNDDEL=<value>**

This command deletes the bonding information stored by the BlueMod+S.

Value	Description
Bluetooth address	Delete the bond of the device with specified address from the bonded-device list
*	Delete all bonded devices from the bonded-device list

+BNDLIST Show Bonded Device List

AT syntax: **AT+BNDLIST**

This command shows information about the devices bonded with the BlueMod+S.

Each entry in the **bonded-device list** contains the Bluetooth address and the linktype:

Linktype	Meaning
0x02	Bluetooth low energy using public address
0x03	Bluetooth low energy using random address

Example:

AT+BNDLIST	0080254800DA 0x02 OK

+BNDS Storage Mode for Bonds

AT syntax: **AT+BNDS=<mode>**

This command controls the storage mode for bonding information (link keys).

Mode	Description
0	Bonds persists for the duration of the authenticated connection
1	Bonds are permanently stored in the NVRAM of the BlueMod+S

*Note: By setting **AT+BNDS** the bonded-device list is deleted internally.*

Note: The bonding information is stored in the module flash. If your application does not need to store bonds switch this parameter to 0, to protect the module flash from unnecessary clear and write operations. Every flash has a limited number of clear cycles.

+BNDSIZE Bonded Devices List Size

AT syntax: **AT+BNDSIZE=<value>**

This command reduces the number of entries (1…4) the bonded-device list can hold.

The BlueMod+S can store up to 4 devices. The default size is **4**.

Note: Modification of this parameter will delete all entries in the bonded-device list.

Example:

AT+BNDSIZE=1	Limit the number of bonded devices to 1

+BOAD Bluetooth Own Device Address

AT syntax: **AT+BOAD**

This command reads the Bluetooth devices' own device address.

Note: This command is read only.

+BPAIRMODE Configure Pairable Mode

AT syntax: **AT+BPAIRMODE=<mode>**

This command controls the pairable mode of the BlueMod+S.

The settings defined with this command will be reset to default configuration by activating the CNF-RES# hardware signal.

When set to "0" the module denies the access to security enabled services or characteristics for clients that are not listed in the local bondlist. New pairing requests will be rejected.

Mode	Description
0	No pairing allowed, BlueMod+S will reject any pairing attempts from non bonded devices
1	Pairing allowed, BlueMod+S will support any pairing attempts

+BSSPPIN SSP Passkey Response

AT syntax: **AT+BSSPPIN <Bluetooth address>,<SSP passkey>**

If a SSP is initiated and MITM is active (**AT+ SECAIOS =3 or AT+ SECSCIS=3**), depending on the I/O capabilities (**AT+BIOCAP**) the AT interface generates an event SSPPIN and asks the user for the SSP passkey.

Event: SSPPIN <Bluetooth address> ?

The user has to answer this request with the SSP passkey displayed on the remote device.

Event: SSPPIN <Bluetooth address>, <SSP passkey>

The user has to enter the SSP passkey on the remote device side, no action required on the AT interface.

Example:

SSPPIN 00802507C08D ? AT+BSSPPIN 00802507C08D,314546 OK RING CONNECT	Receive SSP passkey request Send SSP passkey response

+DFUMODE Device Firmware Update Mode

AT syntax: **AT+DFUMODE=<value>**

This command sets the device firmware update mode.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active during the next system Startup if saved persistently.

To activate the mode it is necessary to store the settings and perform a reset with BOOT# activated or use the command DFUSTART.

Value	Description
1	Device firmware update over serial interface (default)
2	Device firmware update over the air (OTA)

+DFUNAME Over The Air Update Name

AT syntax: **AT+DFUNAME=<name>**

This command sets the device name for the over the air firmware update mode.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active during the next system startup if saved persistently.

Valid name length is 0 to 8 characters.

Name	Description
BM+S_DFU	Device firmware update name is “BM+S_DFU” (default)

+DFUSTART Start Bootloader

AT syntax: **AT+DFUSTART**

This command sets the device into the configured firmware update mode. The command times out after 2 minutes.

The settings defined with this command will not become persistently stored with the “save” command.

The settings defined with this command will become active instantly; no system restart is required for activation.

If the firmware receives this command OTA via the SCIS service, the connection will be automatically disconnected and the switch to update mode will be made after transmission of “OK” result code.

E Local Echo

AT syntax: **ATE<value>**

This command selects the local echo in command mode.

Value	Description
0 or empty	No local echo
1	Local echo on in command phase

I Display Version Information

AT syntax: **ATI<value>**

Displays different information about version number and settings.

Value	Description
0 or empty	Returns the device name (e.g. “BlueMod+S“)
1	Returns “0”
2	Returns “OK”
3	Returns the version string: “V1.xyz”
4	Returns the manufacturers name: “Stollmann E+V GmbH”
5	Returns “ERROR”
6	Returns the copyright string: “(c) Copyright Stollmann E+V GmbH”
7	Returns “OK”
8	Returns “ERROR”
9	Returns “OK”
77	Returns bootloader version
99	Returns the firmware creation date

+GPIO Configure IO Pin

AT syntax: **AT+GPIO=<logical pin>,dir=<dir>,…**

This command is used to configure the DIO pins of the device.

For each of the 8 supported DIOs the direction (dir) can be configured.

For DIOs that are configured as input a pull resistor (pull) configuration is required

For DIOs that are configured as output the default signal level for device startup configuration is required as well as a configuration that defines the DIO behavior in case a connection is terminated intentionally or unintentionally (fallback value).

The settings defined with this command will become active instantly; no system restart is required for activation.

The settings defined with this command will become active during the next system Startup if saved persistently.

Additional mandatory parameters depend on the value of <dir>:

<dir> = d (no additional parameters):

AT+GPIO=<logical pin>,dir=d

<dir> = i:

AT+GPIO=<logical pin>,dir=i,pull=<pull type>

<dir> = o:

AT+GPIO=<logical pin>,dir=o,fbv=<fallback value>

logical pin	Description
value	Logical number of GPIO: 0,1,..,7. The logical number identifies the GPIO in the array of the 2-bit values of the digital characteristic (see [4]): index = logical number. For the mapping of logical Pin number an physical pin refer to [X1] Valid Range is 0 to 7

dir	Description
d	GPIO is disabled (default).
i	Direction of GPIO is input.
o	Direction of GPIO is output (drive strength 0.5 mA).

Type of pull resistor for input type GPIO:

pull type	Description
n	GPIO has no pull resistor applied (default)
u	GPIO has Pull up resistor appied.
d	GPIO has Pull down resistor appied.

Fallback value for output type GPIO:

fallback value	Description
0n	Startup default output signal is low, fallback to low if connection is shutdown.
0p	Startup default output signal is low current signal level is preserved if connection is shutdown.
1n	Startup default output signal is high, fallback to high if connection is shutdown.
1p	Startup default output signal is high, current signal level is preserved if connection is shutdown.

Note: If a GPIO is configured as input to detect signal changes, a changed signal must be stable for at least 50ms to be detected reliable. A non reliable debouncing

mechanism is in place to reduce GPIO state change detection due to signal glitches shorter than 30ms.

Note: In case a the GPIO configuration of a device is changed with this commands while conection is established an GATT notification for the digital input characteristic (see [4]) will be triggered when the characteristic value is changed due to this configuration.

+IOACFG Config of Pin IOA

AT syntax: **AT+IOACFG=<value>**

This command configures the function of the IOA pin (GPIO8). GPIO8 can be configured as output signal “Device Ready". The signal is low active, a low level shows the device ready to process commands and establish Bluetooth connections after startup.

Value	Description
0	Input: Analog (no function, lowest power consumption)
1	Output: Signal “Device Ready”

+LOAD Load Stored Parameter Setting

AT syntax: **AT+LOAD**

This command loads all parameters stored in non-volatile RAM.

Q Suppress Results

AT syntax: **ATQ<value>**

This command allows/suppresses result codes and messages.

Value	Description
0 or empty	Enable result messages after command input
1	Suppress result messages after command input

+RESET Reset Device

AT syntax: **AT+RESET**

This command resets the whole functionality of the BlueMod+S by a forced hardware reset (like power off/on).

Note: No OK response will be sent before the device performs a reset.

Note: If this command is initiated via the SCIS (OTA) interface, the command will be executed and the connection will be terminated.

+RFMAXTXPWR Maximum Output Power

AT syntax: **AT+RFMAXTXPWR=<value>**

This command sets the maximum output power of the Bluetooth radio of the device. A changed value becomes active immediately.

Value	Description
-128	Use factory default maximum output power of 4 dBm
4	4 dBm
0	0 dBm
-4	-4 dBm
-8	-8 dBm
-12	-12 dBm
-16	-16 dBm
-20	-20 dBm
-30	-30 dBm

All other values in the range of -127 to 127 could be set with this command as well, but the equal or next lower value from the power table will be set internally. Furthermore the value will be set to a value amongst minimum and maximum output power value of the device.

Example:

AT+RFMAXTXPWR=0	The maximum output power will be set to 0 dBm

+SECAIOS Set Security Level Automation I/O

AT syntax: **AT+SECAIOS=<level>**

This command sets the security level required for the OTA access to the AIOS characteristic values.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active during the next system startup if saved persistently.

level	Description
1	No security requirements default for AIOS
2	Unauthenticated pairing with encryption (SSP without MITM)
3	Authenticated pairing with encryption (SSP with MITM)

Note: To allow authentication with MITM, a fixed PIN must be configured (see command LEFIXPIN).

+SECSCIS Set Security Level OTA Configuration

AT syntax: **AT+SECSCIS =<level>**

This command sets the security level required for the OTA access to the SCIS characteristic values.

The settings defined with this command will become persistently stored with the “save” command.

The settings defined with this command will become active during the next system startup if saved persistently.

level	Description
2	Unauthenticated pairing with encryption (SSP without MITM)
3	Authenticated pairing with encryption (SSP with MITM) default for SCIS

Note: To allow authentication with MITM, a fixed PIN must be configured (see command LEFIXPIN).

+SYSTEMOFF Enter System Off Mode

AT syntax: **AT+SYSTEMOFF**

This command sets the module into low power mode during the time the module is not used. The module will restart on GPIO activity. The host can use the IOA pin to monitor the system status.

Possible use cases and an usage example are described in the *BlueMod+S User Guide [2].*

Note: If this command is initiated via the SCIS (OTA) interface, the command will be executed but no OK response will be sent before the connection will be terminated.

+UICP Set UART Interface Control Protocol

AT syntax: **AT+UICP=<mode>**

This command sets the mode of the UART Interface Control Protocol (UICP).

To activate UICP, it is necessary to store the settings and perform a reset.

Mode	Description
0	UICP off
1	UICP on

The valid sequence to e.g. activate UICP is:

AT+UICP=1

AT&W

AT+RESET

V Result Message Format

AT syntax: **ATV<value>**

This command determines the format of the result messages.

Value	Description
0 or empty	Result message is presented numerically (followed by <CR>)
1	Result message is presented as text

2.2 Bluetooth Low Energy

+LEFIXPIN Fix Pin for Pairing Procedure

AT syntax: **AT+LEFIXPIN=<fixpin>**

This command specifies a 6 digit SSP passkey, to be used for the security procedure. If this value has a length of 0 (no digit specified in command) “AT+LEFIXPIN=” a randomly generated PIN is used instead. To use this feature see also commands AT+ SECSCIS, AT+ SECAIOS, AT+BIOCAP and Hayes event SSPPIN.

The settings defined with this command will be reset to default configuration by activating the CNF-RES# Hardware signal.

For further information see *BlueMod+S User Guide* [2].

Param.	Description
fixpin	6 digits pin value (digit 0..9 only) (default is “890880”)

+LEADINTMAX Maximum Advertising Interval

AT syntax: **AT+LEADINTMAX=<value>**

This command configures the maximum advertising interval (in milliseconds) for a Bluetooth Low Energy Peripheral.

Value	Description
n=20…10240	Use maximum advertising interval of *n* ms
1280	Use maximum advertising interval of 1280 ms

+LECONINTMAX Maximum Connection Interval

AT syntax: **AT+LECONINTMAX=<value>**

This command configures the maximum connection interval for a Bluetooth Low Energy connection. The unit is in 1.25 milliseconds timeslots.

Value	Description
n=6…3200	Use maximum connection interval of *n* * 1.25 ms
32	Use maximum connection interval of 40 ms

*Note: Make sure that the value of **AT+LECONINTMAX** is higher or equal the value of **AT+LECONINTMIN**.*

+LECONINTMIN Minimum Connection Interval

AT syntax: **AT+LECONINTMIN=<value>**

This command configures the minimum connection interval for a Bluetooth Low Energy connection. The unit is in 1.25 milliseconds timeslots.

Value	Description
n=6…3200	Use minimum connection interval of *n* * 1.25 ms
16	Use minimum connection interval of 20 ms

*Note: Make sure that the value of **AT+LECONINTMAX** is higher or equal the value of **AT+LECONINTMIN**.*

+LECONPARAM Connection Parameter Handling

AT syntax:
AT+LECONPARAM=connHnd,[connIntMin],connIntMax,slaveLat[,connTimeout]

AT+LECONPARAM?connHnd

The command “AT+LECONPARAM” used with “=” requests new connection parameters to be used for the connection defined by connHnd.

The command “AT+LECONPARAM” used with “?” shows the active connection parameters used by the connection defined by connHnd. A LECONPARAM event is generated containing the active connection parameters.

Param.	Description
connHnd	Set to zero
connIntMin	6…3200 minimum connection interval in steps of 1.25 ms (mandatory for peripheral)
connIntMax	6…3200 maximum connection interval in steps of 1.25 ms
slaveLat	0…499 connection intervals
connTimeout	Optional connection supervision timeout in steps of 10 ms. Will be calculated internally if not specified. Has to be calculated according to Bluetooth core spec.

The new connection parameters are signalled by event LECONPARAM.

+LECPEVENT Enable LECONPARAM event signaling

AT syntax: **AT+LECPEVENT =<enable>**

This command enables/disables the automatic signaling of LECONPARAM events.

enable	Description
0	Disable automatic LECONPARAM event signaling
1	Enable automatic LECONPARAM event signaling

+LESLAVELAT Slave Latency

AT syntax: **AT+LESLAVELAT=<value>**

This command configures the slave latency (in connection intervals) for a Bluetooth Low Energy connection.

Value	Description
n=0…499	Use a slave latency of *n* connection intervals
0	Use no slave latency

+LEADDATA Setup Advertise Data for Customized Advertising

AT syntax: **AT+LEADDATA=<value$_1$> .. <value$_n$>**

This command is used to setup the advertise data for a customized advertising.

Value$_k$ represents an octet in hexadecimal format, k <= 31.

The coding of the data is according to the *Bluetooth 4.0 Core Specification / Vol. 3, Part C, Chapter 11 and 18 (Length/Type/Value coding) [3]*.

Example:

41 54 2B 4C 45 41 44 44 41 54 41 3D 30 32 30 31 30 36 30 33 30 32 30 46 31 38 0D *(human readable: AT+LEADDATA=02010603020F18)*	Set flags + UUID of battery service

+LEADE Enable Customized Advertising

AT syntax: **AT+LEADE=<value>**

This command controls the advertising behavior.

The settings defined with this command will be reset to default configuration by activating the CNF-RES# hardware signal.

With **AT+LEADE=4** only the build in AIOS service is advertised.

With **AT+LEADE=1** only the customized advertising value is advertised.

With **AT+LEADE=3** the module stops all advertising. With disabled advertising the client (e.g. iPhone) is not able to discover the device or to connect to the device. This should only be done when the service is not in use to save battery power.

Value	Description
0	Reserved for future use
1	Customized advertising enabled, internal ADC advertising disabled
2	Reserved for future use
3	Advertising off, customized advertising disabled, AIOS advertising disabled
4	Customized advertising disabled, internal ADC advertising enabled

+LEADPAR Setup Parameters for Customized Advertising

AT syntax: **AT+LEADPAR=par1=<value1>[, .. [,parn=<valuen>]]**

This command is used to setup parameters for a customized advertising.

par$_n$	**value$_n$**
advtype Optional Coding: decimal.	Type of advertising: **0: undirected (default)** 2: scannable 3: non-connectable

This command is optional, if not submitted these defaults apply:

- advtype = 0 - advertising type “undirected”

*Note: The value for the advertising interval may be set with the **AT+LEADINTMAX** command.*

Example:

AT+LEADPAR=ADVTYPE=0	Set type of advertising “undirected”

+LESCDATA Setup Scan Response Data for Customized Advertising

AT syntax: **AT+LESCDATA=<value$_1$> .. <value$_n$>**

This command is used to setup the scan response data for a customized advertising.

Value$_k$ represents an octet in hexadecimal format, k <= 31.

The coding of the data is according to the *Bluetooth 4.0 Core Specification / Vol. 3, Part C, Chapter 11 and 18 (Length/Type/Value coding) [3]*.

Example:

41 54 2B 4C 45 53 43 44 41 54 41 3D 30 33 30 32 30 46 31 38 0D *(human readable: AT+LESCDATA=03020F18)*	Set UUID of battery service

3 Appendix

3.1 AT Result Codes

Result codes (numerical and verbose):

Numeric	Text	Meaning
0	OK	Command completed
4	ERROR	Illegal command or error that cannot be indicated otherwise

3.2 Events

SSPPIN — SSP Passkey Request

Syntax: **SSPPIN Bdaddr, tx ?**

With these event the module requests the entry of the passkey displayed on the remote device.

Param.	Description
Bdaddr	Remote Bluetooth address
tx	x is the remote Bluetooth address type see Linktype table below

Linktype	Meaning
0x02	Bluetooth low energy using public address
0x03	Bluetooth low energy using random address

Note: To receive this event via the SCIS (OTA) configuration interface, the SCIS client characteristics must be configured accordingly in advance.

SSPPIN — SSP Passkey Display

Syntax: **SSPPIN Bdaddr, tx Passkey**

With these event the module shows the passkey to be entered on the remote device.

Param.	Description
Bdaddr	Remote Bluetooth address
tx	x is the remote Bluetooth address type see Linktype table below
Passkey	Passkey to be displayed on the local device

Linktype	Meaning
0x02	Bluetooth low energy using public address
0x03	Bluetooth low energy using random address

Note: To receive this event via the SCIS (OTA) configuration interface, the SCIS client characteristics must be configured accordingly in advance.

LECONPARAM Connection Parameters Updated

Syntax: **LECONPARAM:connHnd,connInt,slaveLat,connTimeout**

With this event the user is informed about a connection parameter update.

Param.	Description
connHnd	Connection handle from CONNECT event
connInt	Actual connection interval in steps of 1.25 ms
slaveLat	Actual slave latency in connection intervals
connTimeout	Actual connection supervision timeout in steps of 10 ms

Note: To receive this event via the SCIS (OTA) configuration interface, the SCIS client characteristics must be configured accordingly in advance.

4 Related Documents

[1] BlueMod+S Hardware Reference

[2] BlueMod+S User Guide

[3] Bluetooth 4.0 Core Specification

[4] AIOS Profile Specification

5 History

Version	Release Date	By	Change description
r01	29.01.2016	ka	Initial version
r02	25.05.2016	bg	Telit cover page added

Telit Wireless Solutions GmbH
Mendelssohnstraße 15 D
22761 Hamburg
Germany

Phone: +49 (0)40 890 88-0
Fax: +49 (0)40 890 88-444
E-mail: ts-srd@telit.com
www.telit.com

SUPPORT INQUIRIES

Link to **www.telit.com** and contact our technical support team for any questions related to technical issues.

www.telit.com

Telit Communications S.p.A.
Via Stazione di Prosecco, 5/B
I-34010 Sgonico (Trieste), Italy

Telit IoT Platforms LLC
5300 Broken Sound Blvd, Suite 150
Boca Raton, FL 33487, USA

Telit Wireless Solutions Inc.
3131 RDU Center Drive, Suite 135
Morrisville, NC 27560, USA

Telit Wireless Solutions Co., Ltd.
8th Fl., Shinyoung Securities Bld.
6, Gukjegeumyung-ro8-gil, Yeongdeungpo-gu
Seoul, 150-884, Korea

Telit Wireless Solutions Ltd.
10 Habarzel St.
Tel Aviv 69710, Israel

Telit Wireless Solutions
Technologia e Servicos Ltda
Avenida Paulista, 1776, Room 10.C
01310-921 São Paulo, Brazil

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