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BRF6300 IO Configuration Application Note

Revision Control

Revision 0.2

- Add WSP package IOs options

Abstract

This document describes all the available IO's in the BRF6300 and how to use and configure each IO in order to explore all the available functions.

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1. Introduction

The BRF6300 includes several IO terminals which can be used to perform control and monitoring tasks that depend on the specific board implementation.

Controlling and monitoring each IO is performed via dedicated hardware registers that can be accessed by vendor specific HCI commands.

The following sections describe in details how to perform this operation.

This document is complementary to the BRF6300 data sheet, and is not intended to replace it. It is strongly recommended that the designer will use all the application notes and data sheets when going into a system design.

2. BRF6300 IOs General Description

The BRF6300 includes several IO pins which can be used for specific function (WLAN coexistence, class 1 interface), or as a general purpose IO terminal. These pins are controlled through the ARM processor and can be configured using vendor specific commands.

Note:

- The BRF6300 and the BRF6150 are pin replaceable; hence all the BRF6150 multiplexing options are retained while additional multiplexing options were added.
- While the BRF6150 supports configurable Pull polarity (pull up/pull down) during active state (fixed polarity in shutdown according to the design), the BRF6300 supports single Pull polarity for each IO pin (either pull up or pull down).
- The BRF6300 VDD_IO supports 1.62V-1.89V while the 6150 VDD_IO supports 1.65V-3.6V.
- Each IO terminal can drive up to 8mA.

2.1 IOs Default configuration

Each IO has a default function and value upon device wakeup. Additional functions can be selected with the use of HCI vendor specific commands.
Note that some of these signals are multiplexed with additional signals and not all the IO's are routed to the output by default.
The default configuration of the BGA device is described in the table below:

No.	Pin Name	Functionality	Description (IO not included)	Default Functionality (after power up)	Default Reset Value
IO0	IO0/EXT_CLK_REQ_OUT	IO0, EXT_CLK_REQ_OUT	Clock request output to the external clock source.	EXT_CLK_REQ _OUT	PD
IO1	IO1	IO1, BT_TX_CONF, EXT_PA_EN	RF Shutdown External PA control	IO1	PD
IO2	IO2	IO2, System sync EXT_PA_CMD1 EXT_PA_EN, BT_RF_ACTIVE	Scan sync to host External PA control WLAN control	IO2	PD
IO3	IO3/SDA	IO3/SDA, EXT_PA_CMD2 nEXT_PA_EN	I2C data External PA control	IO3/SDA	PU
IO4	IO4	IO4, BT_PRIORITY BT_RF_ACTIVE EXT_PA_CMD1 nEXT_PA_EN	WLAN control External PA control	IO4	PD
IO5	IO5	IO5, BT_RF_ACTIVE System sync	WLAN control scan sync to host	IO5	PD
IO7	IO7	IO7, EXT_PA_CMD1 EXT_PA_CMD2 BT_RF_ACTIVE	External PA control WLAN control	IO7	PD
IO14	IO14	IO14, BT_RF_ACTIVE EXT_PA_EN EXT_PA_CMD2	WLAN control External PA control	IO14	PD
IO15	IO15/EXT_CLK_REQ_IN	IO15, EXT_CLK_REQ_IN nEXT_PA_EN EXT_PA_CMD2 BT_PRIORITY	Clock request input External PA control WLAN control	EXT_CLK_REQ _IN	PD
IO16	IO16	IO16, nEXT_PA_EN EXT_PA_CMD1	External PA control	IO16	PU
IO17	IO17/SCL	IO17/SCL EXT_PA_CMD1 EXT_PA_CMD12 BT_RF_ACTIVE	I2C clock External PA control WLAN control	IO17	PD

Table 1: BGA device general purpose IO terminals

The default configuration of the WSP device is described in the table below:

No.	Pin Name	Functionality	Description (IO not included)	Default Functionality (after power up)	Default Reset Value
IO0	IO0/EXT_CLK_REQ_OUT	IO0, EXT_CLK_REQ_OUT	Clock request output to the external clock source.	EXT_CLK_REQ _OUT	PD
IO1	IO1	IO1, BT_TX_CONF, EXT_PA_EN	RF Shutdown External PA control	IO1	PD
IO2	IO2	IO2, System sync EXT_PA_CMD1 EXT_PA_EN, BT_RF_ACTIVE	Scan sync to host External PA control WLAN control	IO2	PD
IO3	IO3/SDA	IO3/SDA, EXT_PA_CMD2 nEXT_PA_EN	I2C data External PA control	IO3/SDA	PU
IO4	IO4	IO4, BT_PRIORITY BT_RF_ACTIVE EXT_PA_CMD1 nEXT_PA_EN	WLAN control External PA control	IO4	PD
IO7	IO7	IO7, EXT_PA_CMD1 EXT_PA_CMD2 BT_RF_ACTIVE	External PA control WLAN control	IO7	PD
IO15	IO15/EXT_CLK_REQ_IN	IO15, EXT_CLK_REQ_IN nEXT_PA_EN EXT_PA_CMD2 BT_PRIORITY	Clock request input External PA control WLAN control	EXT_CLK_REQ _IN	PD
IO17	IO17/SCL	IO17/SCL EXT_PA_CMD1 EXT_PA_CMD12 BT_RF_ACTIVE	I2C clock External PA control WLAN control	IO17	PD

Table 2: WSP device general purpose IO terminals

In order to control and configure the BRF6300 IOs, it is important to understand the system constraints and limitations according to a specific board design.
Make sure before attempting to use any of the IO's that this signal is not used and that changing its configuration does not cause any collision.

2.2 Changing the IOs Default Functionality

In order to change the default configuration, the user needs to access a hardware configuration register and set its value.

The HCI_VS_Write_Hardware_Register and HCI_VS_Read_Hardware_Register commands enable to modify and read the various configuration registers (refer to the HCI vendor specific commands section and register configuration section for additional details).

There are two IO's that are not configured by default to be used as IO, IO0 and IO15, as they are configured by default as the EXT_CLK_REQ_OUT and EXT_CLK_REQ_IN respectively, and are used for the clock sharing mechanism.

2.2.1 IO0

IO0 is set by default as the EXT_CLK_REQ_OUT signal used by the BRF6300 to request the clock.

2.2.1.1 Using IO0 as general purpose IO terminal

In order to use IO0 as an IO terminal the user must set bits #12 in **'IO Configuration Register 2'** (enable IO0):

Send_HCI_VS_Write_Hardware_Register 0xFF01, 0x001AF602, 0x1000

Wait_HCI_Command_Complete_Event 5000, Any, 0xFF01, 0x00

2.2.2 IO1

IO1 is set by default as IO and can also be used as the WLAN signal BT_TX_CONF and Class 1 EXT_PA_EN.

2.2.2.1 Using IO1 as BT_TX_CONF

In order to use IO1 as the BT_TX_CONF signal and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.

Please refer to section 6.8 for detailed description of this command.

2.2.2.2 Using IO1 as EXT_PA_EN

In order to use IO1 as the Class1 EXT_PA_EN signal and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.

Please refer to section 6.9 for detailed description of this command.

2.2.3 IO2

IO2 is set by default as IO and can also be used as System Sync, EXT_PA_CMD1, EXT_PA_EN and BT_RF_ACTIVE.

2.2.3.1 Using IO2 for the System Sync feature

The system sync feature is used for synchronizing the Bluetooth scans to the cellular host wake-up instances, when the host is in standby mode, for minimizing the over whole system current consumption.

For more details about the system sync feature please refer to BT-AN-0056 BRF6300 sync to host.

In order to use IO2 for the System Sync signal, the command HCI_VS_Write_GSM_Configuration (0xFD19) is used:

Send_HCI_VS_Write_GSM_Configuration 0xFD19, 0x0, 0xFF, 0x0800, 0x0800, 0xFF

Wait_HCI_Command_Complete_Event 5000, Any, 0xFF01

2.2.3.2 Using IO2 as EXT_PA_CMD1 or EXT_PA_EN

In order to use IO2 as the Class 1 EXT_PA_CMD1 or EXT_PA_EN signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.3.3 Using IO2 as BT_RF_ACTIVE

In order to use IO2 as BT_RF_ACTIVE signals and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.
Please refer to section 6.8 for detailed description of this command.

2.2.4 IO3

IO3 is set by default as IO and can also be used as I2C SDA, Class1 EXT_PA_CMD2 or nEXT_PA_EN.

2.2.4.1 Using IO3 as SDA

In order to use IO3 as the I2C SDA signal:

- Set bit #6 in '**IO Configuration Register 3**'.

Send_HCI_VS_Write_Hardware_Register, 0xFF01, 0x001AF604, 0x0040
Wait_HCI_Command_Complete_Event 5000, Any, 0xFF01, 0x00

2.2.4.2 Using IO3 as EXT_PA_CMD2 or nEXT_PA_EN

In order to use IO3 as the Class1 EXT_PA_CMD2 or nEXT_PA_EN signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.5 IO4

IO4 is set by default as IO4 and can also be used as WLAN signal BT_PRIORITY, BT_RF_ACTIVE, Class1 nEXT_PA_EN or EXT_PA_CMD1.

2.2.5.1 Using IO4 as BT_PRIORITY or BT_RF_ACTIVE

In order to use IO4 as the WLAN BT_PRIORITY signal or BT_RF_ACTIVE and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.
Please refer to section 6.8 for detailed description of this command.

2.2.5.2 Using IO4 as nEXT_PA_EN or EXT_PA_CMD1

In order to use IO4 as the Class1 nEXT_PA_EN or EXT_PA_CMD1 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.6 IO5

IO5 is set by default as IO5 and can also be used as WLAN signal BT_RF_ACTIVE or for the System Sync feature.
IO5 is not available in the WSP package.

2.2.6.1 Using IO5 as BT_RF_ACTIVE

In order to use IO5 as the WLAN BT_RF_ACTIVE signal and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.
Please refer to section 6.8 for detailed description of this command.

2.2.6.2 Using IO5 for the System Sync feature

For more details about the system sync feature (synchronization of the Bluetooth scan activity to the cellular host wake up periods) please refer to BT-AN-0056 BRF6300 sync to Host.

In order to use IO5 for the System Sync feature, the command HCI_VS_Write_GSM_Configuration (0xFD19) is used:
Send_HCI_VS_Write_GSM_Configuration 0xFD19, 0x2, 0xFF, 0x0800, 0x0800, 0xFF
Wait_HCI_Command_Complete_Event 5000, Any, 0xFF01

2.2.7 IO7

IO7 is set by default as IO7 and can also be used as the Class1 EXT_PA_CMD1, EXT_PA_CMD2 or WLAN BT_RF_ACTIVE.

2.2.7.1 Using IO7 as EXT_PA_CMD1 or EXT_PA_CMD2

In order to use IO7 as the Class1 EXT_PA_CMD1 or EXT_PA_CMD2 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.8 IO14

IO14 is set by default as IO14 and can also be used as the WLAN BT_RF_ACTIVE, Class1 EXT_PA_EN or EXT_PA_CMD2.
IO14 is not available in the WSP package.

2.2.8.1 Using IO14 as BT_RF_ACTIVE

In order to use IO14 as the WLAN BT_RF_ACTIVE signal and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.
Please refer to section 6.8 for detailed description of this command.

2.2.8.2 Using IO14 as EXT_PA_EN or EXT_PA_CMD2

In order to use IO14 as the Class1 EXT_PA_EN or EXT_PA_CMD2 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.9 IO15

IO15 is set by default as the EXT_CLK_REQ_IN for the clock sharing mechanism, and can also be used as Output, Class1 nEXT_PA_EN, EXT_PA_CMD2 or WLAN BT_PRIORITY.

2.2.9.1 Using IO15 as output

IO15 is used by default as the EXT_CLK_REQ_IN signal coming from external source (the system host or other device) and is combined with the BRF6300 internal clock request signal (through the internal OR/AND), and outputs as the EXT_CLK_REQ_OUT signal requesting the clock from the clock source (CLK_MODE_SEL=1).

When not using the BRF6300 clock sharing mechanism (CLK_MODE_SEL=0), EXT_CLK_REQ_IN should not be driven as an input by an external device, since if EXT_CLK_REQ_IN is driven high, the EXT_CLK_REQ_OUT output buffer drives high and this would be interpreted wrongly as a clock request. Moreover there will be a current drawn from the pull down on EXT_CLK_REQ_IN. **Therefore, when CLK_MODE_SEL=0, EXT_CLK_REQ_IN should be used as an output only.**

The first stage therefore is to disconnect internally IO15 terminal from the internal BRF6300 mechanism used to combine the BRF6300 clock request and the host clock request, so it will not affect the clock request mechanism.

This is done b using the command HCI_VS_Configure_Clock_Sharing which is used to set the clock sharing mode of the BRF6300. The first parameter "Internal OR/AND enable" should be reset In order to disable the internal clock sharing mechanism and the fourth parameter "Input pull enable" is reset to disable the pull down on EXT_CLK_REQ_IN .

HCI_VS_Configure_Clock_Sharing 0xFD0A, 0x0, 0x1, 0x0, 0x0, 0x2
Wait_HCI_Command_Complete_Event 5000, any, 0XFD0A

For more details about the BRF6300 clock sharing capabilities please refer to BT-AN-0055 BRF6300 clock sharing document.

2.2.9.2 Using IO15 as nEXT_PA_EN and EXT_PA_CMD2

In order to use IO15 as the Class1 nEXT_PA_EN or EXT_PA_CMD2 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.

Please refer to section 6.9 for detailed description of this command.

2.2.9.3 Using IO15 as BT_PRIORITY

In order to use IO15 as the WLAN BT_PRIORITY signal and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.

Please refer to section 6.8 for detailed description of this command.

2.2.10 IO16

IO16 is set by default as IO16 and can also be used as the Class1 nEXT_PA_EN or EXT_PA_CMD1.
IO16 is not available in the WSP package.

2.2.10.1 Using IO16 as nEXT_PA_EN or EXT_PA_CMD1

In order to use IO16 as the Class1 nEXT_PA_EN or EXT_PA_CMD1 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.11 IO17

IO17 is set by default as IO17 and can also be used as the I2C SCL, Class1 EXT_PA_CMD1, EXT_PA_CMD2 and WLAN BT_RF_ACTIVE.
Upon the device power up or after an HCI_Reset, IO17 is checked to determine the existence of an I2C device (High level indicates that an I2C device is connected.
If a high level is sensed on IO17, IO17 and IO3 are set automatically to SCL and SDA signals and the BRF6300 attempts to read the first byte in the EEPROM (this verifies that an EEPROM is on the I2C bus).
Any failure occurring in this process (whether due to an error of the EEPROM configuration, or in case there is no EEPROM connected), the following actions will take place:

- Automatic termination of the remainder of the EEPROM Init process.
- Return of the IO17 and IO3 signals to their general-purpose IO roles.
- BRF6300 continuing it's initialization process to completion (indicated to the host by lowering the RTS signal).

2.2.11.1 Using IO17 as SCL

In order to set manually IO17 as the I2C SCL signal:

- Set bit #3 in **'IO Configuration Register 12'**.

Send_HCI_VS_Write_Hardware_Register 0XFF01, X001AF616, 0X0004
Wait_HCI_Command_Complete_Event 5000, any, 0XFF01

2.2.11.2 Using IO17 as EXT_PA_CMD1 or EXT_PA_CMD2

In order to use IO17 as the Class1 EXT_PA_CMD1 or EXT_PA_CMD2 signals and to select the other Class1 signals, the command HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26) is used.
Please refer to section 6.9 for detailed description of this command.

2.2.11.3 Using IO17 as BT_RF_ACTIVE

In order to use IO17 as the WLAN BT_RF_ACTIVE signal and to set the other WLAN signals, the command HCI_VS_Write_Wlan_Configuration (0xFD1D) is used.
Please refer to section 6.8 for detailed description of this command.

3. IOs Input/Output and Level Selection

Each IO can be set as input or output and the level can be set to high or low.

The commands HCI_VS_Configure_ARMIO (0xFF1A) and HCI_VS_Write_ARMIO_Port (0xFF1B) are used to set the direction and level of the IO's.

3.1.1 Setting the IO's as Input/Output

The commands HCI_VS_Configure_ARMIO (0xFF1A) is used to set the IO's as input or output.

The first command parameter "Port Number" selects the IO to set (0-17) and the second parameter "Port Direction" selects the direction: 0 – output, 1 – input.

The following example shows how to set IO7 as an output:

Send_HCI_VS_Configure_ARMIO 0XFF1A, 0X7, 0X0

Wait_HCI_Command_Complete_Event, 5000, any, 0XFF1A

3.1.2 Configuring the IOs output level

An IO that is configured as an output pin can be set to a high or low level with the command HCI_VS_Write_ARMIO_Port.

The first command parameter "ARMIO Port Number" selects the IO to set (0-17) and the second parameter "ARMIO Port Level" selects the level: 0 – low, 1 – high.

The following example shows how to set IO7 to high level:

Send_HCI_VS_Write_ARMIO 0XFF1B, 0X7, 0X1

Wait_HCI_Command_Complete_Event, 5000, any, 0XFF1B

3.1.3 Reading the IOs input level

If a specific IO is configured as an input, the input level on that terminal can be read with the command HCI_VS_Read_ARMIO_Port.

The commands return a value that reflects the level of the specific IO.

In the following example the input level of IO3 is read.

Send_HCI_VS_Read_ARMIO_Port 0XFF1C, 0X7, 0X1

Wait_HCI_Command_Complete_Event, 5000, any, 0XFF1C

3.1.4 Enabling/Disabling the IOs pull up/down

The BRF6300 has a pull resistor on each digital IO terminal. This command allows disable/enables the pull resistors on each IO. The pull can be disabled while its polarity is fixed (either Pull Up or Pull Down). The BRF6300 does not support configurable pull polarity.

By default, during power-up, all the IO terminals are with pull resistors enabled (except to IO0 & IO15 which are used for the clock sharing mechanism and their pulls are configured according to the CLK_SEL pad). Some IOs pull resistors are disabled by the SW during the init sequence (e.g. UART lines, TX DBG).

The command HCI_VS_Write_Pull_Resistors_Island3 (0XFD0B) is used to disable/enable the pull resistor on a specific IO. A value of 0 disables the pull and a value of 1 enables the pull.

For more details on this command please refer to BT-SW-0029 (BRF3000 HCI Vendor Specific Command).

In the following example, the pull on IO4 (the fifth parameter in bold) is disabled (oX00), and all other pull are not changed (0XFF).

HCI_VS_Write_Pull_Resistors_Island3 0xFD0B, 0xFF, 0xFF, 0xFF, 0xFF, **0x00**, 0xFF

Wait_HCI_Command_Complete_Event, 5000, any, 0XFD0B

4. Wireless LAN Interoperability

General description

The BRF6300 WLAN interface offers the capability of simultaneous and efficient use of the 2.4GHz bandwidth for Bluetooth and WLAN applications. For example: Bluetooth voice connection at the same time as WLAN data transfer such as WEB browsing. The coexistence mechanism is a collaborative solution between the BRF6300 and WLAN chip, using time division multiplexing and other means, to allocate the bandwidth between the two devices and to minimize interference between the WLAN and BT RF signals. This results in a user perception of "simultaneous" operation of BT and WLAN traffic.

The coexistence mechanism also allows the same antenna to be shared between the BT and WLAN devices. A choice has to be made at the system design level, whether to use RF switches or splitters in order to obtain the necessary trade-offs between antenna sharing time and isolation between BT and WLAN devices.

There are several options to multiplex the WLAN signals on the 6300 IOs, which are set by the vendor specific command HCI_VS_Write_Wlan_Configuration (0xFD1D).

Please refer to section 6.8 for more details on this command, and to the BT-AN-0047 (BRF6300_WLAN Coexistence).

The Coexistence signals can be set as described in the following table:

IO Pin options	Functionality	Description	Direction
IO1 TX_DBG**	BT_TX_CONF (RF shutdown)	When asserted, this signal disables the internal PA of the BRF6300. When the signal is not asserted, the PA state is controled by the internal BRF6300 logic. Note that this signal immediately turns the PA on or off. There is no soft shutdown, in order to prevent broadband noise from the PA. When the BRF6300 is attempting to transmit (as indicated by BT_RF_ACTIVE being valid), and BT_TX_CONF is asserted, the BRF6300 will finish to transmit the current packet and only then will shut off the PA.. This signal polarity (active High/Low) is set by a vendor specific command.	WLAN to BT
IO4 IO15	BT_PRIORITY (Priority Data)	This signal is asserted by the BRF6300 to indicate that a priority data transaction is about to occur or is occurring on the Bluetooth link. This signal is used for high priority traffic, such as voice, high priority ACL, Page, Inquiry and Sniff.	BT to WLAN
IO2, IO4 IO5, IO7 IO14,IO17	BT_RF_ACTIVE (RF active)	This signal is active when the BRF6300 PA is on or when the BRF6300 is receiving.	BT to WLAN

** Not recommended due to PU on TX_DBG; TX_DBG is not available in the WSP package.

Table 3: BRF6300 WLAN interface signals

5. Support for Class 1 Applications

The BRF6300 supports Class 1 applications using an external Power Amplifier (PA).

Support is provided for both analog and digitally controlled external PA's - selectable by the vendor specific command HCI_VS_DRP_SET_ XTERNAL_PA_MODE (0XFD26).

The BRF6300 supports different control levels for the external PA, on a per-handle basis.

For more details about the class 1 implementation please refer to BT-AN-0051 (BRF6300 Class 1 implementation).

5.1 Class 1 Control Signals

The Class 1 control signals are multiplexed on the IO terminals. There are several multiplexing options, as described in the following table:

Functionality	IO Pin
EXT_PA_CMD1	TX_DBG , IO2, IO4, IO7, IO16, IO17
EXT_PA_CMD2	TX_DBG , IO3, IO7, IO14, IO15, IO17
EXT_PA_EN	IO1, IO2, IO14
nEXT_PA_EN	TX_DBG , IO3, IO4, IO15, IO16

Table 4: Class 1 control signals

6. HCI vendor Specific Commands

The following section describes the vendor specific commands used to control the IO's signals.

6.1 HCI_VS_Write_Hardware_Register

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Write_Hadrware_Register	0xFF01	Register_Address, Register_Value	Status

Description:
This command is used to write a value to a hardware register.

Command Parameters:

Register_Address: Size: 4 Bytes

Value	Parameter Description
0xXXXXXXXX	Address of register

Register_Value: Size: 2 Bytes

Value	Parameter Description
0xXXXX	Value to assign

Return Parameters:

Status: Size: 1 Byte

Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded Command failed.

Events Generated:
Command Complete Event.

6.2 HCI_VS_Read_Hardware_Register

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Read_Hardware_Register	0xFF00	Register_Address	Status, Register_Value

Description:
This command returns the value of a specific hardware register.

Command Parameters:

Register_Address: Size: 4 Bytes

Value	Parameter Description
0xXXXXXXXX	Address of register

Return Parameters:

Status: Size: 1 Byte

Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded Command failed.

Register value Size: 2 Bytes

Value	Parameter Description
0xXXXX	Value of register

Events Generated:
Command Complete Event.

6.3 HCI_VS_Write_GSM_Configuration (0xFD19)

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Write_GSM_Configuration	0xFD19	Scan_Sync_Enable Clock_is_active_pull_enable Minimum page scan interval Minimum inquiry scan interval	

Description:

This command enables or disables the feature of synchronizing the Bluetooth scans to the cellular host wake-up instances, when the host is in standby mode.

In systems where the host wakes up every time the Bluetooth needs a clock, it is possible to synchronize the Bluetooth scan activities (Page and Inquiry scans) to the cellular host wake-up instances (network synchronization), when the host is in standby mode. This feature can save significant amount of power since it consolidates most of the wake up events in the system (the cellular host and the Bluetooth) during standby mode (when both are in standby).

Synchronization is achieved by giving up the periodicity of the Bluetooth scans, and scanning in a variable period that is determined by the host wake up intervals.

Command Parameters :

Scan_Sync_Enable:	1 Byte	
Value	**Parameter Description**	**Default Value**
0x0 - Enable scan synchronization, "clock is active" line is connected to IO2. 0x1 - Reserved. 0x2 - Enable scan synchronization, "clock is active" line is connected to IO5. 0x3 - Disable scan synchronization.	Enables or disables sync scan feature.	0
Clock_is_active_pull_enable	1 Byte	
Value	**Parameter Description**	**Default Value**
0x0 - Input pull (on selected input IO) is disabled. 0x1 - Input pull (on selected input IO) is enabled. 0xFF – Do not Change	Enables or disables input pull while clock is active	0xFF
Minimum page scan interval	2 Byte	
Value	**Parameter Description**	**Default Value**
0x0012 – 0x1000	The minimal value between the page scans in base band slots	0x0800
Minimum inquiry scan interval	2 Byte	
Value	**Parameter Description**	**Default Value**
0x0012 – 0x1000	The minimal value between the inquiry scans in base band slots	0x0800

Return Parameters:

Status:	Size: 1 Byte
Value	**Parameter Description**
0x00 0x01-0xFF	Command Succeeded. Command failed.

Events Generated:
Command Complete Event

6.4 HCI_VS_Configure_ARMIO (0xFF1A)

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Configure_ARMIO	0xFF1A	Port_Number, Port_Direction	Status

Description:
This command is used to set the direction (Input or Output) of the IO terminals.

Command Parameters:

Port_Number	Size: 1 Byte
Value	**Parameter Description**
0 - 17	The selected IO terminal (0 for IO0, 1 for IO1, etc.)

Port_Direction	Size: 1 Byte
Value	**Parameter Description**
0x00 0x01	Direction is output Direction is input

Return Parameters:

Status:	Size: 1 Byte
Value	**Parameter Description**
0x00 0x01-0xFF	Command Succeeded Command failed.

Events Generated:
Command Complete Event

6.5 HCI_VS_Write_ARMIO_Port (0xFF1B)

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Write_ARMIO_Port	0xFF1B	ARMIO_Port_Number, ARMIO_Port_Level	Status

Description:
This command is used to determine the output level of a specific IO terminal. Note that the selected IO must be first configured to Output (see 6.3)

Command Parameters:

ARMIO_Port_Number Size: 1 Byte

Value	Parameter Description
0 - 17	The selected IO terminal (0 for IO0, 1 for IO1, etc.)

ARMIO_Port_Level Size: 1 Byte

Value	Parameter Description
0x00 0x01	Selected IO will be driven low Selected IO will be driven high

Return Parameters:

Status: Size: 1 Byte

Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded Command failed.

Events Generated:
Command Complete Event

6.6 HCI_VS_Read_ARMIO_Port (0xFF1C)

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_Read_ARMIO_Port	0xFF1C	ARMIO_Port_Number	Status, Port_Value

Description:
This command is used to read the level of a specific IO terminal.

Command Parameters:

ARMIO_Port_Number Size: 1 Byte

Value	Parameter Description
0 - 17	The selected IO terminal to be read (0 for IO0, 1 for IO1, etc.)

Return Parameters:

Status: Size: 1 Byte

Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded Command failed.

Port_Value Size: 1 BYTE

Value	Parameter Description
0x00 0x01	The input signal is low The input signal is high

Events Generated:
Command Complete Event

6.7 HCI_VS_Write_Pull Resistor_Island3 (0xFD0B)

Command	Opcode	Command Parameters
HCI_VS_Write_Pull_Resistors_Island3	0xFD0B	IO0 (EXT_CLK_REQ_OUT) IO1 IO2 IO3 IO4 IO5 IO6 (RTS HCI) IO7 IO8 (AUD_IN) IO9 (AUD_OUT) IO10 (AUD_CLK) IO11 (AUD_FSYNC) IO12 (CTS_HCI) IO13 (RTS_HCI) IO14 IO15 (EXT_CLK_REQ_IN) IO16 IO17 IO18 (TX_DBG) IO19 (RX_HCI)

Description:
The BRF6300 has a pull resistor on each digital IO pad. This command configures the disabling / enabling the pull resistors on each IO pad. The pull can be disabled while its polarity is fixed (either Pull Up or Pull Down). The BRF6300 does not support configurable pull polarity.

By default, during power-up, all IO terminals are with pull resistors enabled (except IO0 & IO15 which are used for the clock sharing mechanism and their pulls are configured according to the CLK_SEL pad). Some pull resistors of some IO pads are disabled by the SW during the init sequence (e.g. UART lines, TX DBG).

Default values:
For default values please see section 2.1 and the BRF6300 Data Sheet.
Command Parameters:

IOX	Size: 1 Byte
Value	**Parameter Description**
0x0	Disable pull resistor on IOX
0x1	Enable pull resistor on IOX
0xFF	Don't change

Return Parameters:

Status:	Size: 1 Byte
Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded. Command failed.

6.8 HCI_VS_Write_Wlan_Configuration (0xFD1D)

Command	**Opcode**	**Command Parameters**
HCI_VS_Write_Wlan_Configuration	0xFD1D	Enable Mode PA_OFF_polarity Priority_select Connection_handle_select Connection_handle_enable_disable Freq_mask_enable Freq_mask WLAN0_mux WLAN0_pull_enable WLAN1_mux WLAN1_pull_enable WLAN2_mux WLAN2_pull_enable WLAN3_mux WLAN3_pull_enable Disable_WLAN

Description:
The WLAN coexistence mechanism is activated by the above command.

Command Parameters:

Enable Mode	1 Byte
Value	**Parameter Description**
0x0 – SG 1.0 Mode 0x1 – Reserved 0x2 – Reserved 0x3 – Reserved 0x4 – SG 2.0 Mode 0x5 – Reserved 0xff – Do not change	Defines the operation mode of the WLAN interface

PA_OFF_polarity	1 Byte
Value	**Parameter Description**
0x0 – PA off is active low 0x1 – PA off is active high 0xff – Do not change	Defines operation of PA

Priority_select	
Value	**Parameter Description**
0x0000 – Priority disabled 0x0001 – SCO/eSCO instant 0x0002 – Priority asserted during eSCO window 0x0004 – Priority asserted during FHS/ID slots 0x0008 – Priority asserted during SNIFF 0x0010 – Priority asserted during Hold attempts 0x0020 – During Inquiry Scan 0x0040 – During Inquiry 0x0080 – During Page Scan 0x0100 – During Page 0x0200 – During Park 0x0400 – During during TDD 0x0800 – During first successful sniff attempt only 0x1000 – During park beacon only 0x2000 – During eSCO window only in master mode	Defines operations that should have priority lines on

Connection_handle_select	
Value	**Parameter Description**
0x0 – 0xEFF – Connection handle 0xF000 – Disable at all handles 0xFFFF – Do not change	Defines the behavior with respect to connection handles

Connection_handle_enable_disable	
Value	**Parameter Description**
0x0 – Disable 0x1 - Enable	Disable/Enable priority on the given handle

Freq_mask_enable	
Value	**Parameter Description**
0x0 – No freq mask is given 0x1 – Enable on WLAN0 pin (BT_RF_ACTIVE) 0x2 – Enable on WLAN1 pin (BT_PRORITY) 0x3 – For future use 0xFF – Do not change value	Defines behavior with respect to the freq mask

Freq_mask	
Value	**Parameter Description**
0xffff:ffff:ffff:ffff:ffff – Do not change 0x1-0x7fff:ffff:ffff:ffff:ffff - Enable each one of the frequencies that should be masked by this bit map	Defines frequency mask to give rise to the priority signals

WLAN0_mux	
Value	**Parameter Description**
0x0 - WLAN0 on IO2 0x1 - WLAN0 on IO4 0x2 - WLAN0 on IO5 0x3 - WLAN0 on IO7 0x4 - WLAN0 on IO14 0x5 - WLAN0 on IO17 0xff - Don't Change	Defines the output of WLAN0 signal (BT_RF_ACTIVE)

WLAN0_pull_enable	
Value	**Parameter Description**
0x0 - Input pull (on selected input IO) is disabled 0x1 - Input pull (on selected input IO) is enabled 0xff - Don't Change	Defines WLAN0 pull (BT_RF_ACTIVE)

WLAN1_mux	
Value	**Parameter Description**
0x0 - WLAN1 on IO4 0x1 - WLAN1 on IO15 0xff - Don't Change	Defines the output of WLAN1 signa (BT_PRIORITY)

WLAN1_pull_enable	
Value	**Parameter Description**
0x0 - Input pull (on selected input IO) is disabled 0x1 - Input pull (on selected input IO) is enabled 0xff - Don't Change	Defines the behavior of the pull on the WLAN1

WLAN2_mux	
Value	**Parameter Description**
For future use	For future use

WLAN2_pull_enable	
Value	**Parameter Description**
For future use	For future use

WLAN3_mux	
Value	**Parameter Description**
0x0 - BT_TX_CONFX on IO1 0x1 - BT_TX_CONFX on TX_DBG 0xff - Don't Change	Defines the output of WLAN3 signal (BT_TX_CONFX)

WLAN3_pull_enable	
Value	**Parameter Description**
0x0 - Input pull (on selected input IO) is disabled 0x1 - Input pull (on selected input IO) is enabled 0xff - Don't Change	Defines the behavior of the pull on the WLAN3 input

Disable	
Value	**Parameter Description**
0x1 – Disable WLAN interface 0x0 – Do not do anything	Disables WLAN interface

Return Parameters:

Status:	Size: 1 Byte
Value	**Parameter Description**
0x00 0x01-0xFF	Command Succeeded. Command failed.

Events Generated: Command Complete Event

6.9 HCI_VS_ DRP_ Set_External_PA_Mode (0xFD26)

Command	Opcode	Command Parameters	Return Parameters
HCI_VS_DRP_SET_ XTERNAL_ PA_MODE	0xFD26	PA Mode Setting1 Setting2 EXT_PA_CMD1 Select EXT_PA_CMD2 Select EXT_PA_EN Select nEXT_PA_EN Select	Status

Description:

This command controls the multiplexing activation for Analog / Digital PA.

OFF Mode – hardware is connected to external PA, but RF path is configured through RX path (so PA can be off all the time).

Command Parameters:

PA Mode	Size: 1 Byte
Value	**Parameter Description**
0x00	Class 2 configuration with class 1 hardware, External PA off route RF path to receive (switches set to RX, EXT_PA_EN low, nEXT_PA_EN is high).
0x01	DAC controls analog PA
0x02	PWM controls analog PA
0x03	Digital PA
0xFF	Don't change

Setting1	Size: 1 Byte
Value	**Parameter Description**
When in DAC mode	
0x00 – 0xFE	Values for resistance trim
0xFF	Don't change
When in PWM mode	
0x00 – 0xFE	Values for ramp up / down
0xFF	Don't change
When in Digital PA mode	
0x00 – 0xFE	Values for ramp up / down step size
0xFF	Don't change

Setting2	Size: 1 Byte
Value	**Parameter Description**
When in PWM mode	
0x00 – 0xFE 0xFF	Duration of fast charge activation Don't change
When in Digital PA mode	
0x00 – 0x0FE 0xFF	Values for ramp down step size Don't change

EXT_PA_CMD1 Select	Size: 1 Byte
Value	**Parameter Description**
0 1 2 3 4 5 0xFF	TX_DBG IO2 IO4 IO7 IO16 IO17 Don't change

EXT_PA_CMD2 Select	Size: 1 Byte
Value	**Parameter Description**
0 1 2 3 4 5 0xFF	TX_DBG IO3 IO7 IO14 IO15 IO17 Don't change

EXT_PA_EN Select	Size: 1 Byte
Value	**Parameter Description**
0 1 2 0xFF	IO1 IO2 IO14 Don't change

nEXT_PA_EN Select	Size: 1 Byte
Value	**Parameter Description**
0 1 2 3 4 0xFF	TX_DBG IO3 IO4 IO15 IO16 Don't change

Return Parameters:

Status:	Size: 1 Byte
Value	Parameter Description
0x00 0x01-0xFF	Command Succeeded. Command failed. See **Error! Reference source not found.**.

Events Generated:
Command Complete Event

Reference Docs

Document	Reference
BRF6300 Product Review	BT-DS-0023
BRF3000 HCI Vendor Specific Command,	BT-SW-0029
BRF6300 WLAN Coexistence	BT-AN-0047
BRF6300 Class1 Implementation	BT-AN-0051
BRF6300 Clock Sharing	BT-AN-0055
BRF6300 Sync to Host	BT-AN-0056

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