Bluetooth Message Protocol State Machine

Settings Characteristic: uint8\_t [10]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bluetooth Header | Module | Sub Message #1 | Sub Message #2 | Sub Message #3 | Sub Message #4 | Sub Message #5 | Sub Message #6 | Sub Message #7 | Bluetooth Footer |

Response Characteristic: uint8\_t [4]

|  |  |  |  |
| --- | --- | --- | --- |
| Response #1 | Response #2 | Response #3 | Response #4 |

Bluetooth Header = 0XBA

Bluetooth Footer = 0XBB

**Module**

enum MODULE\_COMMAND\_CONSTANTS

{

NRF52\_MODULE = 0X01,

TMP117\_MODULE = 0X02,

BMI160\_MODULE = 0X03,

MAX30003\_MODULE = 0X04,

FT201X\_MODULE = 0X05,

BLUETOOTH\_MODULE = 0X06,

CY15B108QI\_MODULE = 0X07,

SERIAL\_SLAVE\_MODULE = 0X08,

FDC1004\_MODULE = 0X09

};

**Sub Message #1**

enum NRF52\_COMMAND\_CONSTANTS

{

NRF52\_HF\_CLOCK\_COMMAND = 0X01,

NRF52\_LF\_CLOCK\_COMMAND = 0X02,

NRF52\_CLOCK\_COMMAND = 0X03,

NRF52\_RTC\_CLOCK\_COMMAND = 0X04,

NRF52\_POWER\_COMMAND = 0X05,

NRF52\_COMMON\_COMMAND = 0X06,

NRF52\_I2C\_COMMAND = 0X07,

NRF52\_SPI\_COMMAND = 0X08

};

enum SERIAL\_SLAVE\_COMMAND\_CONSTANTS

{

USB\_COMMAND\_HEADER = 0XAA,

USB\_COMMAND\_FOOTER = 0XAB,

USB\_LOG\_HEADER = 0XAC,

USB\_LOG\_FOOTER = 0XAD,

ENABLE\_USB\_HANDLER\_COMMAND = 0XAE,

DISABLE\_USB\_HANDLER\_COMMAND = 0XAF,

BLUETOOTH\_COMMAND\_HEADER = 0XBA,

BLUETOOTH\_COMMAND\_FOOTER = 0XBB,

BLUETOOTH\_LOG\_HEADER = 0XBC,

BLUETOOTH\_LOG\_FOOTER = 0XBD,

NRF52\_INITIALIZATION\_COMMAND = 0X01,

TMP117\_INITIALIZATION\_COMMAND = 0X02,

CY15B108QI\_INITIALIZATION\_COMMAND = 0X03,

MAX30003\_INITIALIZATION\_COMMAND = 0X04,

STARTUP\_INITIALIZATION\_COMMAND = 0X05,

ENABLE\_BLUETOOTH\_HANDLER\_COMMAND = 0X06,

FDC1004\_INITIALIZATION\_COMMAND = 0X07,

};

enum NRF52\_COMMAND\_CONSTANTS

{

NRF52\_HF\_CLOCK\_COMMAND = 0X01,

NRF52\_LF\_CLOCK\_COMMAND = 0X02,

NRF52\_CLOCK\_COMMAND = 0X03,

NRF52\_RTC\_CLOCK\_COMMAND = 0X04,

NRF52\_POWER\_COMMAND = 0X05,

NRF52\_COMMON\_COMMAND = 0X06,

NRF52\_I2C\_COMMAND = 0X07,

NRF52\_SPI\_COMMAND = 0X08,

};

enum FT201X\_COMMAND\_CONSTANTS

{

FT201X\_READ\_CHIP\_ID\_COMMAND = 0X01,

FT201X\_SET\_VCP\_COMMAND = 0X02,

FT201X\_WRITE\_EEPROM\_COMMAND = 0X03,

FT201X\_READ\_EEPROM\_COMMAND = 0X04,

FT201X\_WRITE\_DATA\_ARRAY\_COMMAND = 0X05,

FT201X\_READ\_DATA\_COMMAND = 0X06,

};

enum BMI160\_COMMAND\_CONSTANTS

{

BMI160\_READ\_CHIP\_ID\_COMMAND = 0X01,

BMI160\_INIT\_COMMAND = 0X02,

BMI160\_READ\_ACCEL\_GYRO\_COMMAND = 0X03,

};

enum TMP117\_COMMAND\_CONSTANTS

{

TMP117\_INIT\_COMMAND = 0X01,

TMP117\_SET\_AVERAGING\_MODE\_COMMAND = 0X02,

TMP117\_SET\_CONVERSION\_MODE\_COMMAND = 0X03,

TMP117\_GET\_TEMPERATURE\_COMMAND = 0X04,

TMP117\_GET\_REVISION\_NUMBER\_COMMAND = 0X05,

TMP117\_GET\_DEVICE\_ID\_COMMAND = 0X06,

TMP117\_UNINIT\_COMMAND = 0X07,

TMP117\_ENABLE\_LONG\_TERM\_STORAGE\_COMMAND = 0X08,

TMP117\_DISABLE\_LONG\_TERM\_STORAGE\_COMMAND = 0X09,

TMP117\_TRANSMIT\_TEMPERATURE\_RECORDING\_SESSION\_COMMAND = 0X0A,

TMP117\_START\_DATA\_COLLECTION\_COMMAND = 0X0B,

TMP117\_STOP\_DATA\_COLLECTION\_COMMAND = 0X0C,

};

enum MAX30003\_COMMAND\_CONSTANTS

{

MAX30003\_SOFT\_RESET\_COMMAND = 0X01,

MAX30003\_SYNC\_COMMAND = 0X02,

MAX30003\_INIT\_INTERRUPT\_COMMAND = 0X03,

MAX30003\_ENABLE\_PIN\_INTERRUPT\_COMMAND = 0X04,

MAX30003\_DISABLE\_PIN\_INTERRUPT\_COMMAND = 0X05,

MAX30003\_GET\_ECG\_VOLTAGE\_COMMAND = 0X06,

MAX30003\_INIT\_COMMAND = 0X07,

MAX30003\_INTERRUPT1\_DISABLE\_COMMAND = 0X08,

MAX30003\_START\_RECORDING\_COMMAND = 0X09,

MAX30003\_FIFO\_RESET\_COMMAND = 0X0A,

MAX30003\_READ\_ECG\_FIFO\_MEMORY\_COMMAND = 0X0B,

MAX30003\_ENABLE\_LONG\_TERM\_STORAGE\_COMMAND = 0X0C,

MAX30003\_DISABLE\_LONG\_TERM\_STORAGE\_COMMAND = 0X0D,

MAX30003\_START\_DATA\_COLLECTION\_COMMAND = 0X0E,

MAX30003\_STOP\_DATA\_COLLECTION\_COMMAND = 0x0F,

MAX30003\_TRANSMIT\_ECG\_RECORDING\_SESSION\_COMMAND = 0X10,

};

enum NRF52\_BLUETOOTH\_COMMAND\_CONSTANTS

{

BLUETOOTH\_INIT\_GAP\_PARAMS\_COMMAND = 0X01,

BLUETOOTH\_INIT\_GATT\_COMMAND = 0X02,

BLUETOOTH\_INIT\_SERVICES\_COMMAND = 0X03,

BLUETOOTH\_INIT\_CONN\_PARAMS\_COMMAND = 0X04,

BLUETOOTH\_INIT\_BLE\_STACK\_COMMAND = 0X05,

BLUETOOTH\_INIT\_PEER\_MANAGER\_COMMAND = 0X06,

BLUETOOTH\_INIT\_ADVERTISING\_COMMAND = 0X07,

BLUETOOTH\_SET\_ADVERTISING\_POWER\_COMMAND = 0X09,

BLUETOOTH\_START\_ADVERTISING\_COMMAND = 0X0A,

BLUETOOTH\_WRITE\_RESPONSE\_CHAR\_COMMAND = 0X0B,

BLUETOOTH\_WRITE\_CRC\_CHAR\_COMMAND = 0X0C,

BLUETOOTH\_TRANSMIT\_FIRMWARE\_VERSION\_COMMAND = 0X10,

BLUETOOTH\_TRANSMIT\_HARDWARE\_BOARD\_VERSION\_COMMAND = 0X11,

BLUETOOTH\_WRITE\_TEMP\_CHAR\_COMMAND = 0X0D,

BLUETOOTH\_WRITE\_INSTANT\_TEMP\_CHAR\_COMMAND = 0X13,

BLUETOOTH\_WRITE\_INSTANT\_PRESSURE\_CHAR\_COMMAND = 0X14,

BLUETOOTH\_WRITE\_INSTANT\_ECG\_CHAR\_COMMAND = 0X0E,

BLUETOOTH\_TRANSMIT\_ECG\_RECORDING\_SESSION\_COMMAND = 0X08,

BLUETOOTH\_DISCONNECT\_COMMAND = 0X12,

BLUETOOTH\_RESTART\_ADVERTISING\_COMMAND = 0X16,

BLUETOOTH\_INIT\_DFU\_ASYNC\_SVCI\_COMMAND = 0X17,

BLUETOOTH\_ENABLE\_ADVERTISING\_AFTER\_DISCONNECTION\_COMMAND = 0X18,

};

enum NRF52\_BLUETOOTH\_TRANSMITTING\_POWER\_CONSTANTS

{

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_40\_DB = 0X00,

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_20\_DB = 0X01,

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_16\_DB = 0X02,

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_12\_DB = 0X03,

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_8\_DB = 0X04,

BLUETOOTH\_ADVERTISING\_POWER\_NEG\_4\_DB = 0X05,

BLUETOOTH\_ADVERTISING\_POWER\_0\_DB = 0X06,

BLUETOOTH\_ADVERTISING\_POWER\_3\_DB = 0X07,

BLUETOOTH\_ADVERTISING\_POWER\_4\_DB = 0X08,

};

enum NRF52\_CLOCK\_COMMAND\_CONSTANTS

{

NRF52\_HF\_CLOCK\_START = 0X01,

NRF52\_HF\_CLOCK\_STOP = 0X02,

NRF52\_NRFX\_CLOCK\_DRIVER\_INIT = 0X03,

NRF52\_NRFX\_CLOCK\_DRIVER\_UNINIT = 0X04,

NRF52\_LF\_CLOCK\_START = 0X05,

NRF52\_LF\_CLOCK\_STOP = 0X06,

};

enum NRF52\_RTC\_FT201X\_COMMAND\_CONSTANTS

{

NRF52\_RTC\_FT201X\_INIT = 0X01,

NRF52\_RTC\_FT201X\_SET\_COUNTER = 0X02,

NRF52\_RTC\_FT201X\_START = 0X03,

NRF52\_RTC\_FT201X\_STOP = 0X04,

NRF52\_RTC\_FT201X\_RESTART = 0X05,

NRF52\_RTC\_FT201X\_UNINIT = 0X06,

};

enum NRF52\_RTC\_SENSOR\_COMMAND\_CONSTANTS

{

NRF52\_RTC\_SENSOR\_INIT = 0X07,

NRF52\_RTC\_SENSOR\_SET\_COUNTER = 0X08,

NRF52\_RTC\_SENSOR\_START = 0X09,

NRF52\_RTC\_SENSOR\_STOP = 0X10,

NRF52\_RTC\_SENSOR\_RESTART = 0X11,

NRF52\_RTC\_SENSOR\_UNINIT = 0X12,

};

enum NRF52\_POWER\_COMMAND\_CONSTANTS

{

NRF52\_POWER\_DCDC\_CONVERTER\_ENABLE = 0X01,

NRF52\_POWER\_DCDC\_CONVERTER\_DISABLE = 0X02,

NRF52\_POWER\_SLEEP\_MODE\_ENTER = 0X03,

NRF52\_POWER\_DEEP\_SLEEP\_MODE\_ENTER = 0X04,

NRF52\_POWER\_MANAGER\_HANDLER = 0X05,

NRF52\_POWER\_MANAGER\_INIT = 0X06,

};

enum NRF52\_LED\_COMMAND\_CONSTANTS

{

NRF52\_LED\_INIT = 0X10,

NRF52\_LED\_IND\_LED\_ON = 0X11,

NRF52\_LED\_IND\_LED\_OFF = 0X12,

NRF52\_LED\_IND\_BLINK = 0X13,

NRF52\_LED\_BLE\_LED\_ON = 0X14,

NRF52\_LED\_BLE\_LED\_OFF = 0X15,

NRF52\_LED\_BLE\_BLINK = 0X16,

};

enum NRF52\_COMMON\_COMMANDS\_CONSTANTS

{

NRF52\_LOG\_INIT = 0X01,

NRF52\_GPIOTE\_INIT = 0X02,

NRF52\_LDO\_INIT = 0X03,

NRF52\_VCC\_LDO\_EN = 0X04,

NRF52\_INPUT\_OUTPUT\_INIT = 0X05,

NRF52\_MAX30003\_POWER\_LDO\_EN = 0X06,

};

enum NRF52\_I2C\_COMMANDS\_CONSTANTS

{

NRF52\_I2C\_TWIM\_INIT = 0X01,

NRF52\_I2C\_TWIM\_UNINIT = 0X02,

NRF52\_I2C\_TWIM\_SETUP = 0X03,

NRF52\_I2C\_TWIM\_ENABLE = 0X04,

NRF52\_I2C\_TWIM\_DISABLE = 0x05,

};

enum NRF52\_SPI\_COMMANDS\_CONSTANTS

{

NRF52\_SPI\_SPIM\_INIT = 0X01,

NRF52\_SPI\_SPIM\_ENABLE = 0X02,

NRF52\_SPI\_SPIM\_DISABLE = 0X03,

NRF52\_SPI\_SPIM\_UNINIT = 0X04,

NRF52\_SPI\_SPIM\_SELECT\_CS\_PIN = 0X05,

NRF52\_SPI\_SPIM\_SETUP = 0X06,

NRF52\_SPI\_SPIM\_INIT\_CS\_PIN = 0X07,

};

enum NRF52\_LED\_COMMANDS\_CONSTANTS

{

NRF52\_LED\_IND\_CUSTOM\_BLINK = 0X01,

NRF52\_LED\_IND\_SHORT\_BLINK = 0X02,

NRF52\_LED\_IND\_MEDIUM\_BLINK = 0X03,

NRF52\_LED\_IND\_LONG\_BLINK = 0X04,

};

enum CY15B108QI\_COMMANDS\_CONSTANTS

{

CY15B108QI\_INIT\_COMMAND = 0X01,

CY15B108QI\_UNINIT\_COMMAND = 0X02,

CY15B108QI\_ENTER\_DEEP\_POWER\_DOWN\_MODE\_COMMAND = 0X03,

CY15B108QI\_EXIT\_DEEP\_POWER\_DOWN\_MODE\_COMMAND = 0X04,

CY15B108QI\_ENTER\_HIBERNATION\_MODE\_COMMAND = 0X05,

CY15B108QI\_EXIT\_HIBERNATION\_MODE\_COMMAND = 0X06,

CY15B108QI\_GET\_MANUFACTURER\_ID\_COMMAND = 0X07,

CY15B108QI\_GET\_UNIQUE\_ID\_COMMAND = 0X08,

CY15B108QI\_WRITE\_REGISTERS\_COMMAND = 0X09,

CY15B108QI\_READ\_SINGLE\_REGISTER\_COMMAND = 0X0A,

};

enum FDC1004\_COMMANDS\_CONSTANTS

{

FDC1004\_INIT\_COMMAND = 0X01,

FDC1004\_SOFT\_RESET\_COMMAND = 0X02,

FDC1004\_SET\_OFFSET\_CALIBRATION\_COMMAND = 0X03,

FDC1004\_SET\_GAIN\_CALIBRATION\_COMMAND = 0X04,

FDC1004\_SET\_MEASUREMENT\_RATE\_COMMAND = 0X05,

FDC1004\_SET\_REPEAT\_MEASUREMENT\_COMMAND = 0X06,

FDC1004\_GET\_MANUFACTURER\_ID\_COMMAND = 0X07,

FDC1004\_GET\_DEVICE\_ID\_COMMAND = 0X08,

FDC1004\_SET\_CAPDAC\_COMMAND = 0X09,

FDC1004\_GET\_MEASUREMENT\_COMMAND = 0X0A,

FDC1004\_UNINIT\_COMMAND = 0X0B,

FDC1004\_ENABLE\_CHANNEL\_COMMAND = 0X0C,

FDC1004\_DISABLE\_CHANNEL\_COMMAND = 0X0D,

FDC1004\_START\_DATA\_COLLECTION\_COMMAND = 0X0E,

FDC1004\_STOP\_DATA\_COLLECTION\_COMMAND = 0X0F,

};

**Response Values**

enum NRF52\_BLUETOOTH\_RESPONSE\_CHAR\_CONSTANTS

{

BLUETOOTH\_RESPONSE\_CHAR\_MESSAGE\_RECEIVED = 0X01,

BLUETOOTH\_RESPONSE\_CHAR\_HEADER\_FOOTER\_INCORRECT = 0X02,

BLUETOOTH\_RESPONSE\_CHAR\_ECG\_DATA\_COLLECTION\_STARTED = 0X03,

BLUETOOTH\_RESPONSE\_CHAR\_ECG\_DATA\_COLLECTION\_FINISHED = 0X04,

BLUETOOTH\_RESPONSE\_CHAR\_TEMP\_DATA\_COLLECTION\_STARTED = 0X05,

BLUETOOTH\_RESPONSE\_CHAR\_TEMP\_DATA\_COLLECTION\_FINISHED = 0X06,

BLUETOOTH\_RESPONSE\_CHAR\_ECG\_DATA\_READY\_FOR\_TRANSMISSION = 0X07,

BLUETOOTH\_RESPONSE\_CHAR\_TRANSMIT\_ECG\_DATA\_FINISHED = 0X08,

BLUETOOTH\_RESPONSE\_CHAR\_TRANSMIT\_ECG\_DATA\_EMPTY\_VALUES = 0x09,

BLUETOOTH\_RESPONSE\_CHAR\_ECG\_DATA\_INVALID = 0X0F,

BLUETOOTH\_RESPONSE\_CHAR\_TEMP\_DATA\_READY\_FOR\_TRANSMISSION = 0X0A,

BLUETOOTH\_RESPONSE\_CHAR\_TRANSMIT\_TEMP\_DATA\_FINISHED = 0X0B,

BLUETOOTH\_RESPONSE\_CHAR\_TRANSMIT\_TEMP\_DATA\_EMPTY\_VALUES = 0x0C,

BLUETOOTH\_RESPONSE\_CHAR\_PRESSURE\_DATA\_COLLECTION\_STARTED = 0X0D,

BLUETOOTH\_RESPONSE\_CHAR\_PRESSURE\_DATA\_COLLECTION\_FINISHED = 0X0E,

};

Example Commands:

**BLINK IND LED, MEDIUM DURATION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 COMMON COMMAND | NRF52 LED IND BLINK | NRF52 LED IND MEDIUM BLINK | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X06 | 0X13 | 0X03 | 0 | 0 | 0 | 0 | 0XBB |

**BLINK BLE LED, MEDIUM DURATION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 COMMON COMMAND | NRF52 LED BLE BLINK | NRF52 LED IND MEDIUM BLINK | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X06 | 0X16 | 0X03 | 0 | 0 | 0 | 0 | 0XBB |

**TURN ON IND LED COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 COMMON COMMAND | NRF52 LED IND LED\_ON | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X06 | 0X11 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**MAX30003 START DATA COLLECTION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**MAX30003 STOP DATA COLLECTION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**MAX30003 TRANSMIT RECORDING SESSION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 TRANSMIT ECG RECORDING SESSION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**TMP117 TRANSMIT TEMPERATURE RECORDING SESSION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 TRANSMIT TEMPERATURE RECORDING SESSION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0A | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**GET FIRMWARE VERSION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | BLUETOOTH MODULE | BLUETOOTH TRANSMIT FIRMWARE VERSION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X06 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**GET HARDWARE BOARD VERSION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | BLUETOOTH MODULE | BLUETOOTH TRANSMIT HARDWARE BOARD VERSION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X06 | 0X11 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**SET RTC SENSOR COUNTER COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR SET COUNTER | COUNTER[0] | COUNTER[1] | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X08 | X | X | 0 | 0 | 0 | 0XBB |

The X values signify a byte in an unit16\_t data type. Counter[0] is the MSB and Counter[1] is the LSB. The counter / 8 = seconds per sample

**START RTC SENSOR COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR START | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**STOP RTC SENSOR COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR STOP | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**FDC1004 START DATA COLLECTION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**FDC1004 STOP DATA COLLECTION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**FDC1004 ENABLE CHANNEL COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 ENABLE CHANNEL COMMAND | CHANNEL | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0C | X | 0 | 0 | 0 | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4.

**FDC1004 DISABLE CHANNEL COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 DISABLE CHANNEL COMMAND | CHANNEL | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0D | X | 0 | 0 | 0 | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4.

**FDC1004 SET CAPDAC COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 SET CAPDAC COMMAND | CHANNEL | CAPDAC | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X09 | X | X | 0 | 0 | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4. The CAPDAC is a uint8\_t data type. This value sets the offset capacitance. This is the single-ended measurement capacitance offset: C\_offset = CAPDAC x 3.125 pF

**FDC1004 SET OFFSET CALIBRATION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 SET OFFSET CALIBRATION COMMAND | CHANNEL | INTEGER | DECIMAL MSB | DECIMAL  LSB | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X03 | X | X | X | X | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4. The integer is a uint8\_t data type containing 5 bits. This value sets the integer portion of the offset capacitance. This decimal is a uint8\_t[2] array containing 11 bits. The first sets the MSB and the second sets the LSB. This is formatted as Two’s complement format. It is configured as a digitized capacitance value in the range of – 16 pF to 16 pF.

**FDC1004 SET GAIN CALIBRATION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 SET GAIN CALIBRATION COMMAND | CHANNEL | INTEGER | DECIMAL MSB | DECIMAL  LSB | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X04 | X | X | X | X | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4. The integer is a uint8\_t data type containing 2 bits. This value sets the integer portion of the offset capacitance. This decimal is a uint8\_t[2] array containing 14 bits. The first sets the MSB and the second sets the LSB. This register contains a gain factor correction in the range of 0 to 4 that can be applied to each channel to remove gain mismatch due to external circuitry.

**FDC1004 GET MEASUREMENT COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 GET MEASUREMENT COMMAND | CHANNEL | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0A | X | 0 | 0 | 0 | 0 | 0 | 0XBB |

The X values signify an input value. The channel is a uint8\_t data type accepting numbers 1-4.

**BLUETOOTH DISCONNECT COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | BLUETOOTH MODULE | BLUETOOTH DISCONNECT COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X06 | 0X12 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**TURN OFF BOARD COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 COMMON COMMAND | NRF52 VCC LDO DISABLE | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X06 | 0X07 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**ENABLE BLUETOOTH ADVERTISING AFTER DISCONNECTION COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | BLUETOOTH MODULE | BLUETOOTH ENABLE ADVERTISING AFTER DISCONNECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X06 | 0X18 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**Operation Commands**

\*Make sure to enable notifications on all characteristics.

**-START INSTANT TEMPERATURE DATA RECORDING COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0B | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR START | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-STOP INSTANT TEMPERATURE DATA RECORDING COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0C | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR STOP | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-START TEMPERATURE DATA RECORDING USING LONG TERM STORAGE COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 ENABLE LONG TERM STORAGE COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X08 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0B | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR START | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-STOP TEMPERATURE DATA RECORDING USING LONG TERM STORAGE COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 DISABLE LONG TERM STORAGE COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | TMP117 MODULE | TMP117 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X02 | 0X0C | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR STOP | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-START INSTANT ECG DATA RECORDING COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-STOP INSTANT ECG DATA RECORDING COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-START ECG RECORDING USING LONG TERM STORAGE COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 ENABLE LONG TERM STORAGE COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0C | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-STOP ECG RECORDING USING LONG TERM STORAGE COMMAND**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 DISABLE LONG TERM STORAGE COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0D | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | MAX30003 MODULE | MAX30003 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X04 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

**-START INSTANT PRESSURE DATA RECORDING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 START DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0E | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR START | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X09 | 0 | 0 | 0 | 0 | 0 | 0XBB |

\*Only call this function once to stop all timer enabled sensor data collection.

**-STOP INSTANT PRESSURE DATA RECORDING**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | FDC1004 MODULE | FDC1004 STOP DATA COLLECTION COMMAND | 0 | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X09 | 0X0F | 0 | 0 | 0 | 0 | 0 | 0 | 0XBB |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BLUETOOTH HEADER | NRF52 MODULE | NRF52 RTC CLOCK COMMAND | NRF52 RTC SENSOR STOP | 0 | 0 | 0 | 0 | 0 | BLUETOOTH FOOTER |
| 0XBA | 0X01 | 0X04 | 0X10 | 0 | 0 | 0 | 0 | 0 | 0XBB |

\*Only call this function once to stop all timer enabled sensor data collection.