
Application Note
TOSHIBA TC35661 *Chiron*
RF parameter adjustment

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1 Purpose

The purpose of this document is to explain the RF parameter adjustment possibilities for TOSHIBA TC35661 *Chiron*.

2 Target

This application note is applicable for TOSHIBA TC35661 *Chiron* ROM-Version 500 and ROM-Version 501 only.

3 Feedback

The goal is to make TOSHIBA TC35661 *Chiron* as good as possible. If you have a problem, please drop a short note to

TEEWirelessProducts@tee.toshiba.de

and we'll try to help you out. Thank you for your feedback!

4 Vendor-specific HCI commands

TOSHIBA TC35661 *Chiron* can be configured with vendor-specific HCI commands when in HCI mode.

The following commands will be used in this application note:

- *HCI_LOC_DBUS_WRITE*
- *HCI_M2_MESSAGE_SET*

Please refer to *Extension_HCI* document for further details about these commands.

4.1 *HCI_LOC_DBUS_WRITE*

Please note that TOSHIBA TC35661 *Chiron* will answer the *HCI_LOC_DBUS_WRITE* command in two steps.

First the HCI command itself will be acknowledged with a *HCI_COMMAND_STATUS* event, indicating that the HCI command itself was received correctly.

In the second step, a *HCI_LOC_DBUS_WRITE* event will be sent that contains the result of the *HCI_LOC_DBUS_WRITE* command itself.

4.2 *HCI_M2_MESSAGE_SET*

TOSHIBA TC35661 *Chiron* will answer the *HCI_M2_MESSAGE_SET* command directly with a *HCI_M2_MESSAGE_SET* event.

5 Adjustment of the crystal frequency parameter

The crystal frequency parameter can be adjusted when TOSHIBA TC35661 *Chiron* is still in HCI mode using the *HCI.LOC.DBUS.WRITE* command.

The crystal frequency parameter can be found at address 0xa6, the default value is 0x0100. Usually the crystal frequency parameter is 1 - 2kHz per single step. Refer to the datasheet of your crystal in order to get more detailed informations.

5.1 Example

If you want to change the crystal frequency to parameter to 0x0101, the following *HCI.LOC.DBUS.WRITE* command has to be given to TOSHIBA TC35661 *Chiron*:

01	HCI command
03	OCF
fc	OCF + OGF
05	Length
00	Reserverd
c2	<i>HCI.LOC.DBUS.WRITE</i>
a6	Crystal frequency parameter address
01	Parameter (LSB)
01	Parameter (MSB)

You will receive a *HCI.COMMAND.STATUS* event, followed by a *HCI.LOC.DBUS.WRITE* event as explained in section 4.1.

6 General improvement of RF characteristics

TOSHIBA TC35661 *Chiron* ROM-Version 500 and ROM-Version 501 need some special configuration to improve RF characteristics. We strongly recommend to always apply these settings after reset.

This is only necessary when using the BLE functionality of TOSHIBA TC35661 *Chiron*. If you plan to use HCI or SPP mode of TOSHIBA TC35661 *Chiron* only, then this special setup can be omitted.

A series of *HCI_LOC_DBUS_WRITE* and *HCI_M2_MESSAGE_SET* needs to be executed to apply the special settings.

If you have problems applying these settings, please check the log output of *EasyBLE*. *EasyBLE* will apply these settings after startup as well, if it detects a TOSHIBA TC35661 *Chiron* with ROM-Version 500 or ROM-Version 501.

6.1 Implementation

First, the following series of *HCI_LOC_DBUS_WRITE* commands need to be executed, one after another. Please make sure to follow the sequence as described in section 4.1.

```
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0xAE, 0x18, 0xCD
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0xEE, 0x00, 0xD9
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0xFA, 0xA4, 0xA4
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x81, 0xF3, 0xC7
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x63, 0xF4, 0x04
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x83, 0x00, 0xE6
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x64, 0xAF, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x84, 0xFF, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x65, 0xB0, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x85, 0x1B, 0x60
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x66, 0xED, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x86, 0x6E, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x67, 0xEA, 0x0E
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x87, 0x80, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x68, 0xF4, 0x49
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x88, 0x00, 0xEE
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x69, 0xF4, 0x27
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x89, 0x00, 0xFE
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6A, 0x00, 0xFF
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8A, 0x00, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6B, 0xEA, 0x09
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8B, 0x80, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6C, 0xF4, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8C, 0x00, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6D, 0xE2, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8D, 0x08, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6E, 0xA4, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8E, 0x80, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6F, 0x00, 0xFF
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8F, 0x00, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0xA0, 0x21, 0x10
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x81, 0xD3, 0xC7
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x82, 0xA8, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x63, 0xF4, 0x04
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x83, 0x00, 0xE2
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x64, 0xAF, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x84, 0xF8, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x65, 0xB0, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x85, 0x18, 0x60
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x66, 0xED, 0x00
```

```

0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x86, 0x6E, 0x70
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x67, 0xEA, 0x0E
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x87, 0x80, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x68, 0xF4, 0x14
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x88, 0x00, 0xE6
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x69, 0xF4, 0x04
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x89, 0x00, 0xFE
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6A, 0x00, 0xFF
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8A, 0x00, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6B, 0xEA, 0x02
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8B, 0x80, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6C, 0xF4, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8C, 0x00, 0x80
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6D, 0xE2, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8D, 0x08, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6E, 0xA4, 0x01
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8E, 0x80, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x6F, 0x00, 0xFF
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0x8F, 0x00, 0x00
0x01, 0x03, 0xFC, 0x05, 0x00, 0xC2, 0xA0, 0x21, 0x00

```

Second, the following series of *HCI_M2_MESSAGE_SET* commands need to be executed, one after another. Please make sure to follow the sequence as described in section 4.2.

```

0x01, 0x08, 0xfc, 0x2f, 0x00, 0xa0, 0x00, 0x00, 0x00, 0x14, 0x55, 0xff, 0x10, 0x25, 0x03,
    0x9c, 0xad, 0x09, 0x00, 0xe0, 0x7b, 0x00, 0x28, 0x01, 0xd0, 0x02, 0x21, 0x38, 0xe0,
    0xbb, 0xf7, 0xab, 0xfe, 0x4a, 0xe1, 0x01, 0xd0, 0xe5, 0xf7, 0x7e, 0xff, 0x01, 0x2e,
    0x00, 0xd0, 0x00, 0x27, 0x20, 0x7c, 0x04, 0x28

```

```

0x01, 0x08, 0xfc, 0xee, 0x00, 0xa0, 0x00, 0x00, 0x00, 0x14, 0x56, 0xff, 0x10, 0xe4, 0x00,
    0x6B, 0x05, 0x00, 0x26, 0x4a, 0x05, 0x20, 0x30, 0xb4, 0x10, 0x80, 0x26, 0x48, 0x25,
    0x49, 0x88, 0x82, 0xff, 0x20, 0xc8, 0x82, 0xc8, 0x8a, 0xc0, 0x07, 0xfc, 0xd1, 0x01,
    0x20, 0x80, 0x03, 0x88, 0x82, 0x48, 0x8b, 0x00, 0x09, 0x00, 0x01, 0x08, 0x21, 0x01,
    0x43, 0x51, 0x83, 0xff, 0x21, 0xff, 0x31, 0x91, 0x83, 0x1d, 0x4c, 0x00, 0x22, 0xa2,
    0x80, 0xff, 0x23, 0xe4, 0x33, 0xe3, 0x80, 0x0c, 0x24, 0x04, 0x43, 0x1a, 0x48, 0x84,
    0x81, 0xc1, 0x81, 0x82, 0x82, 0xc3, 0x82, 0x19, 0x49, 0x08, 0x88, 0x01, 0x23, 0x02,
    0x1c, 0x9a, 0x43, 0x0a, 0x80, 0x17, 0x4a, 0x03, 0x23, 0x5b, 0x04, 0x5a, 0x62, 0x60,
    0x32, 0xda, 0x62, 0x16, 0x4a, 0x14, 0x4d, 0x5a, 0x66, 0x15, 0x4a, 0x17, 0x4c, 0x9a,
    0x66, 0x15, 0x4a, 0x5a, 0x67, 0xda, 0x1d, 0xf9, 0x32, 0x9d, 0x62, 0x54, 0x62, 0x08,
    0x34, 0xd4, 0x62, 0x95, 0x62, 0x13, 0x4a, 0x12, 0x4c, 0x54, 0x62, 0x13, 0x4c, 0x94,
    0x62, 0x13, 0x4c, 0xd4, 0x62, 0x1b, 0x68, 0x12, 0x4a, 0x93, 0x42, 0xfd, 0xd1, 0x08,
    0x80, 0x30, 0xbc, 0x70, 0x47, 0x20, 0x02, 0x06, 0x00, 0xc0, 0x08, 0x06, 0x00, 0xbe,
    0x2f, 0x00, 0x00, 0x60, 0x03, 0x06, 0x00, 0x60, 0x0b, 0x06, 0x00, 0xa0, 0x02, 0x06,
    0x00, 0x0b, 0x20, 0x00, 0x20, 0x00, 0x20, 0x18, 0x20, 0x07, 0xa0, 0x01, 0x21, 0x00,
    0xa0, 0x1d, 0x21, 0x0c, 0xa0, 0x01, 0x21, 0x0f, 0x20, 0x00, 0x20, 0x01, 0x20, 0x01,
    0x20, 0x40, 0x01, 0x06, 0x00, 0x00, 0x20, 0x1d, 0x20, 0x03, 0x20, 0x01, 0x20, 0xff,
    0x0f, 0x00, 0x00

```

```

0x01, 0x08, 0xfc, 0x0b, 0x00, 0xa0, 0x00, 0x00, 0x00, 0x14, 0x57, 0xff, 0x02, 0x03, 0x01

```

```

0x01, 0x08, 0xfc, 0x09, 0x00, 0xa0, 0x00, 0x00, 0x00, 0x14, 0x01, 0xff, 0x00

```

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