Internal Document
SOFTWARE
DESIGN DESCRIPTION

Toronto MicroElectronics Inc.
TAB101 Protocol

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Contents

Section 1. Overview

1.1 Purpose

This document describes the communication protocol used in the new TAB101 design, which will integrate 0G compensation and direction conversion inside the TAB101 firmware. This new design will make installation procedures more flexible and the installation direction can be changed by the user in the field more easily just changing the configuration in the web setup page of the connected DVR.

Using the new protocol can make the new firmware backward compatible with the old TAB101 firmware.

Section 2. Communication protocol overview

2.1 Serial port setup

19200bps, 8N1, No flow control.

2.2 Packet format

Byte 1   : total length (n)

Byte 2   : Destination address (0 for DVR, 4 for Tab102)

Byte 3   : Source address (0 for DVR, 4 for Tab102)

Byte 4   : Command code

Byte 5   : Request/Reply indicator

- 0x02: The command is sent by the initiator

- 0x03: The command is sent as the reply to the initiator.

Byte 6 to (n-1)   : command specific data

Byte n   : checksum

= 0xff – (sum of all bytes value up up byte (n-1) in byte size) + 1

Section 3. Protocol description

3.1 Overall procedures

The messages are exchanged in the following order:

- DVR sets the TAB101's RTC

- DVR checks if any car crash data is pending to be downloaded, and download it if necessary

- In case of post processing, DVR checks if any peak data is pending to be downloaded, and download it if necessary

- DVR sends Trigger values and the installation orientation information to TAB101

- DVR sends Boot Ready message to start the sampling.

- In the case of live processing, DVR enables Peak value reporting

- Optionally, DVR enables Digital Input reporting.

- In case of post processing, DVR can close the RS-232 connection until Ignition off.

- When enabled, TAB101 sends peak values. To avoid the missed messages, TAB101 should repeat sending the report until it is acknowledged by DVR.

- Before DVR shutdown, DVR checks if any car crash data is to be downloaded, and download it if necessary

- In case of post processing, before DVR shutdown, DVR checks if any peak data is to be downloaded, and download it if necessary

- Any time after "set trigger"(command# 0x12) has been sent, DVR can send calibration command to TAB101, and TAB101 sends acknowledgement first, then sends the new calibration data to DVR later once TAB101 finishes the calibration.

Section 4. Communication protocol list

4.1 set_RTC (0x07)

DVR send the current time in UTC.

TAB101 replies with acknowledgement.

4.1.1   Data (DVR ⊐ TAB101)

Byte 6   : second in BCD format

Byte 7   : minute in BCD format

Byte 8   : hour in BCD format

Byte 9   : day of the week (Sunday: 1)

Byte 10   : day in BCD format

Byte 11   : month in BCD format

Byte 12   : year in BCD format (2000 = 00)

4.1.2 Data (TAB101 ⊐ DVR)

Acknowledgement : No data portion in the packet.

4.2 upload_crash_data (0x19)

DVR asks TAB101 to upload the crash data.

TAB101 uploads the crash data to DVR or report the size as 0 if no data is available

4.2.1   Data (DVR ⊐ TAB101)

No data portion in the packet.

4.2.2 Data (TAB101 ⊐ DVR)

Byte 6…9   : upload data size (Byte 6 MSB)

Byte 10…17   : Data header (0G values and installation orientation code)

Byte 18…(18+n-1)   : crash data

4.3 upload_crash_data_ack (0x1A)

DVR acknowledges the good reception of the crash data

4.3.*1* Data (DVR ⊟ TAB101)

Byte 6   : 0x01 (Success), 0x00(Fail)

4.4 upload_peak_data (0x1F)

Same as upload_crash_data.

4.5 upload_peak_data_ack (0x20)

Same as upload_crash_data.

4.6 set_trigger (0x12)

DVR supplies the trigger values (Base/Peak/Crash) and the installation orientation code.

4.6.1 Data (DVR ⊟ TAB101)

Byte 6…7   *: base trigger forward (MSB first)*

Byte 8…9   *: base trigger backward (MSB first)*

Byte 10…11   *: base trigger right (MSB first)*

Byte 12…13   *: base trigger left (MSB first)*

Byte 14…15   *: base trigger down (MSB first)*

Byte 16…17   *: base trigger up (MSB first)*

Byte 18…19   *: peak trigger forward (MSB first)*

Byte 20…21   *: peak trigger backward (MSB first)*

Byte 22…23   *: peak trigger right (MSB first)*

Byte 24…25   *: peak trigger left (MSB first)*

Byte 26…27   *: peak trigger down (MSB first)*

Byte 28…29   *: peak trigger up (MSB first)*

Byte 30…31   *: crash trigger forward (MSB first)*

Byte 32…33   *: crash trigger backward (MSB first)*

Byte 34…35   *: crash trigger right (MSB first)*

Byte 36…37   *: crash trigger left (MSB first)*

Byte 38…39   *: crash trigger down (MSB first)*

Byte 40…41   *: crash trigger up (MSB first)*

Byte 42   *: installation orientation code (Should not be used by DVR software for any conversion)*

Byte 43…44   *: #1 Calibration data (MSB first)*

Byte 45…46   *: #1 Calibration data (MSB first)*

Byte 47…48   *: #1 Calibration data (MSB first)*

If no calibration data available, DVR will use 0x200 for each calibration data as default.

If calibration data is available, DVR will send the calibration data to TAB101 in the order which TAB101sends to DVR previously.

Installation Orientation Code:

0x62 : Forward:front, Upward:right   Leftward:top

0x52 : Forward:Front, Upward:left,   Leftward:bottom

0x22 : Forward:Front, Upward:bottom,   Leftward:right

0x12 : Forward:Front, Upward:top,   Leftward:left

0x61 : Forward:back, Upward:right,   Leftward:bottom

0x51 : Forward:back, Upward:left,   Leftward:top

0x21 : Forward:back, Upward:bottom,   Leftward:left

0x11 : Forward:back, Upward:top,   Leftward:right

0x42 : Forward:right, Upward:front,   Leftward:bottom

0x32 : Forward:right, Upward:back,   Leftward:top

0x28 : Forward:right, Upward:bottom,   Leftward:back

0x18 : Forward:right, Upward:top,   Leftward:front

0x41 : Forward:left, Upward:front,   Leftward:top

0x31 : Forward:left, Upward:back,   Leftward:bottom

0x24 : Forward:left, Upward:bottom,   Leftward:front

0x14 : Forward:left, Upward:top,   Leftward:back

0x48 : Forward:bottom, Upward:front,   Leftward:left

0x38 : Forward:bottom, Upward:back,   Leftward:right

0x68 : Forward:bottom, Upward:right,   Leftward:front

0x58 : Forward:bottom, Upward:left,   Leftward:back

0x44 : Forward:top, Upward:front,   Leftward:right

0x34 : Forward:top, Upward:back,   Leftward:left

0x64 : Forward:top, Upward:right,   Leftward:back

0x54 : Forward:top, Upward:left,   Leftward:front

4.7 Boot ready (0x08)

DVR sends ready command to start the Gforce sampling.

4.7.1   Data (DVR ⊨ TAB101)

No data portion in the packet.

4.7.2   Data (TAB101 ⊨ DVR)

Acknowledgement: No data portion in the packet.

4.8 Enable peak (0x0f)

DVR enables peak value reporting.

4.8.1 Data (DVR ⊨ TAB101)

No data portion in the packet.

4.8.2. Data (TAB101 ⊨ DVR)

Acknowledgement: No data portion in the packet.

4.9 Peak report (0x1E)

TAB101 reports peak value. This value is already 0G compensated and does not require any direction conversion.

Example values: 0g =0x200, 1g=0x225, -1g=0x1db

4.9.1 Data (TAB101 ⊢ DVR)

Byte 6…7   : Front Back Gforce value (MSB first), Front Positive.

Byte 8…9   : Left Right Gforce value (MSB first). Right Positive.

Byte 10…11   : Up Down Gforce value (MSB first). Down Positive.

4.9.2. Data (DVR ⊢ TAB101)

Acknowledgement: No data portion in the packet.

4.10   Get_firmware_version (0x0E)

DVR request the version number of the TAB101 firmware.

4.10.1 Data (DVR ⊢ TAB101)

No data portion in the packet.

4.10.2. Data (TAB101 ⊢ DVR)

Byte 6…23   : Firmware version string

4.11   Reset (0x00)

Used to reset TAB101.

This command should be sent only after "setRTC" command, and can be sent anytime after "setRTC".

DVR should wait 5 seconds after receiving the reply from TAB101 to proceed to other commands.

4.11.1 Data (DVR ⊢ TAB101)

No data portion in the packet.

4.11.2. Data (TAB101 ⊢ DVR)

Acknowledgement: No data portion in the packet.

4.12   Calibration (0x21)

Used to Calibrate TAB101 0G Value.

This command should be sent only after "set Trigger" command, and can be sent anytime after "set Trigger".

4.12.1 Data (DVR ⊟ TAB101)

No data portion in the packet.

4.11.2. Data (TAB101 ⊟ DVR)

Acknowledgement: No data portion in the packet.

4.13   Calibration Data Store Request (0x22)

Used to store calibration data in DVR.

4.13.1 Data (TAB101 ⊟ DVR)

Byte 6…7   : #1 Gforce 0G value (MSB first).

Byte 8…9   : #2 Gforce 0G value (MSB first).

Byte 10…11   : #2 Gforce 0G value (MSB first).

4.13.2. Data (DVR ⊟ TAB101)

Acknowledgement: No data portion in the packet.

Section 5. Revision History

Version	Date	Name	Description
1.0	Nov 08, 2011	Initial version, modified based on TAB102 doc V1.3	
1.1	July 18, 2012	Change command 0x09 to 0x00	