NT38350 Android Touch Driver Detail V1.1

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Revision History

Version	Contents	Prepared by	Checked by	Date
V1.0	- First Version	Amber Huang	J X Lee Taylor Chuang	2020/07/21
V1.1	- Update the Self-Test Criteria Setting of page15 for google	Amber Huang	J X Lee Taylor Chuang	2020/10/12

List of Content (English)

List of Content (中文)

NT38350 I2C address (7-Bit Addressing)

- (ISP) HW i2c address
  1. 0x62
  2. It is used for chip bootloader commands. Ex. Firmware update…etc.
  3. Please use HW i2c address to register touch driver. Ex. dts file…etc.
- FW i2c address
  1. 0x01
  2. It is used for firmware protocol. Ex. Pointer report…etc.

DTS Example

- DTS(Device Tree) Example for Novatek touch driver.
  1. **compatible**: Should be “novatek,NVT-ts”.
  2. **reg**: I2C slave address of the device should be set as 0x62.
  3. **novatek,irq-gpio**: Irq gpio which is to provide interrupts to host.

```
novatek@62 {
    compatible = "novatek,NVT-ts";
    reg = <0x62>
    novatek,irq-gpio = <&msm_gpio 13 0x2001>;
};
```

Supported Interrupt Trigger Type

- Only support edge trigger type interrupt by FW
- INT trigger type be configured in *nt38350.h*

```
//---INT trigger mode---
//#define IRQ_TYPE_EDGE_RISING 1
//#define IRQ_TYPE_EDGE_FALLING 2
#define INT_TRIGGER_TYPE IRQ_TYPE_EDGE_RISING
```

Enable Wakeup Gesture Feature

- Enable WAKEUP_GESTURE in *nt38350.h*

```
#define WAKEUP_GESTURE 1
```

Extra Touch Information

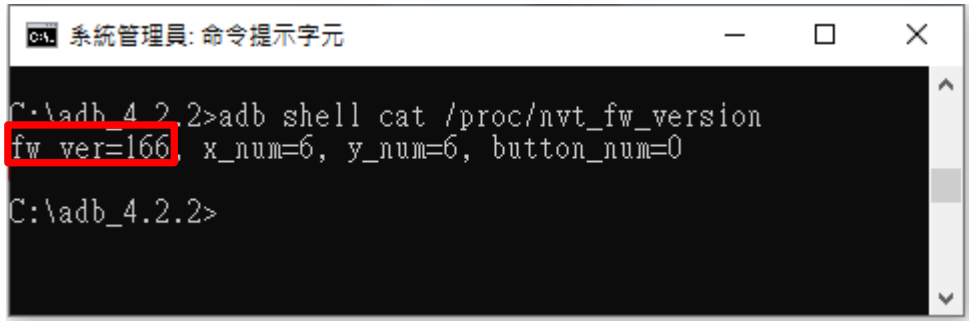
- Enable NVT_TOUCH_EXT_PROC in *nt38350.h*

```
#define NVT_TOUCH_EXT_PROC 1
```

- Touch driver will create four proc system nodes. You can use “adb shell cat /proc/xxxxx” command to get extra touch information by these system nodes.
  1. /proc/**nvt_fw_version**: Get fw version, x channel number and y channel number
  2. /proc/**nvt_raw**: Get raw data
  3. /proc/**nvt_baseline**: Get baseline data
  4. /proc/**nvt_diff**: Get difference data

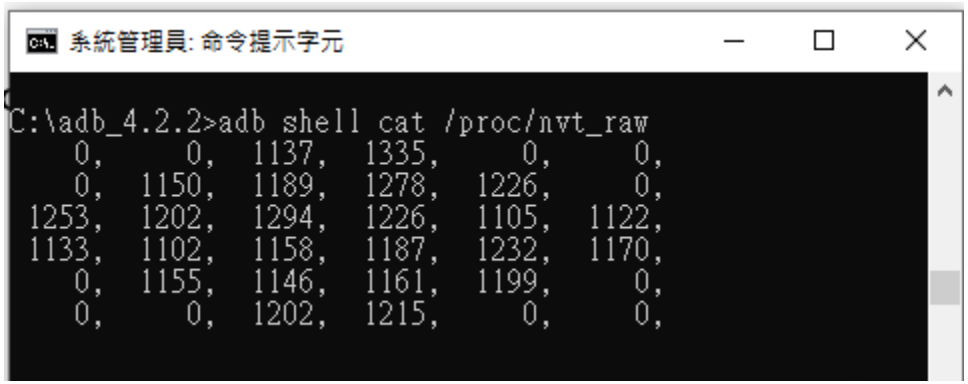
Check FW Version

- adb shell cat /proc/nvt_fw_version



Read Raw Data

- adb shell cat /proc/nvt_raw

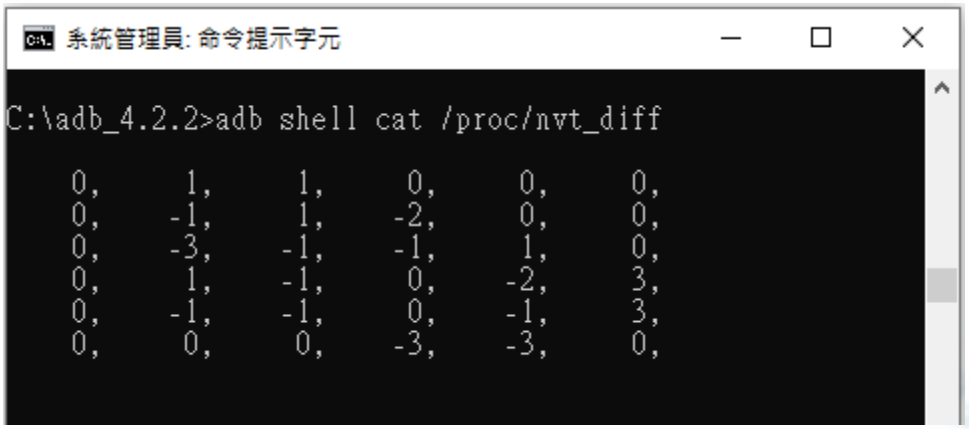


Read Baseline Data

- adb shell cat /proc/nvt_baseline

Read Diff Data

- adb shell cat /proc/nvt_diff

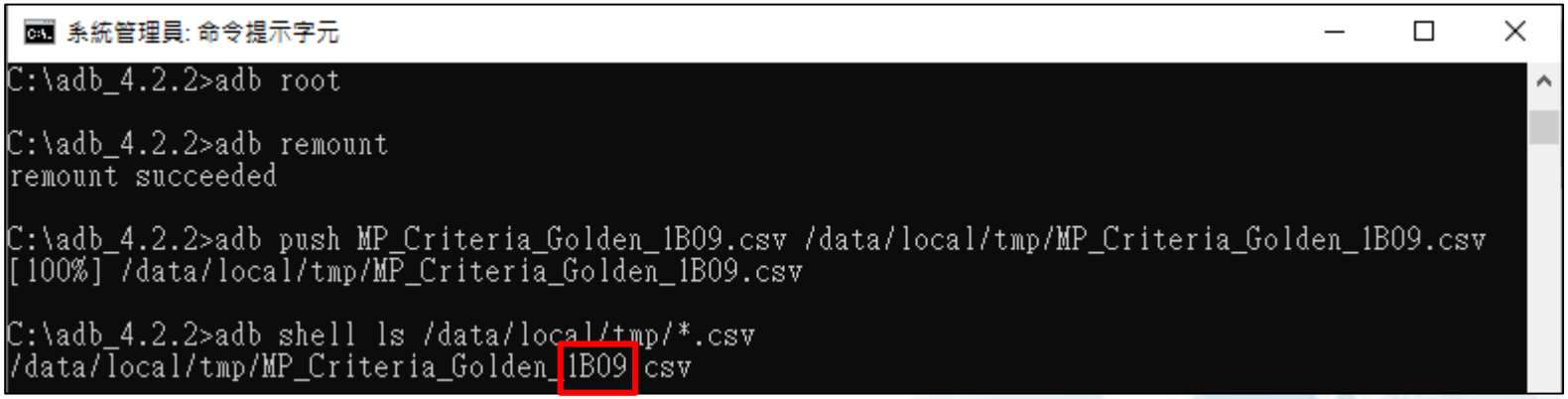


MP Self-Test

- Self-Test items
  1. Open Test
  2. Short Test
  3. FW Rawdata (also include FW CC) Test
  4. Noise Test

MP Self-Test

- Self-Test Criteria Setting
  1. The criteria settings (test limits) of each test item are in *MP_Criteria_Golden_PID.csv*
  2. Put *MP_Criteria_Golden_PID.csv* into device */data/local/tmp/* before running selftest
  3. In addition, the string "PID" in filename is the Novatek internal project id, setting example is as bellow.
     Ex. “PID” is **1B09**



MP Self-Test Configuration

- Test Configuration

1. IC maximum sensor number in x, y direction
   - IC_X_CFG_SIZE
   - IC_Y_CFG_SIZE
2. Used sensor number in x, y direction
   - X_Channel
   - Y_Channel
3. Open test output data remapping table in x, y direction
   - AIN_X[]
   - AIN_Y[]
4. Please contact Novatek MP owner to get configurations of your panel module, and set it before running Self-Test.

MP Self-Test Criteria Setting

- Test Criteria Setting

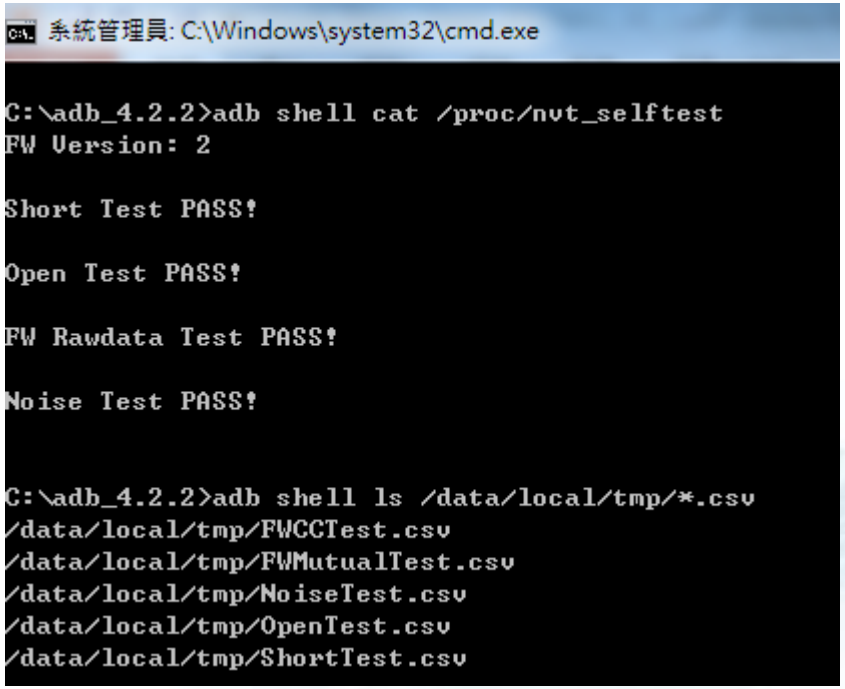
1. Open test
   - Upper bound: PS_Config_Lmt_Open_Rawdata_P[ ]
   - Lower bound: PS_Config_Lmt_Open_Rawdata_N[ ]
2. Short test
   - Upper bound: PS_Config_Lmt_Short_Rawdata_P[ ]
   - Lower bound: PS_Config_Lmt_Short_Rawdata_N[ ]
3. FW Rawdata (also include FW CC) Test
   - Upper bound: PS_Config_Lmt_FW_Rawdata_P [ ]
   - Lower bound: PS_Config_Lmt_FW_Rawdata_N [ ]
   - Upper bound: PS_Config_Lmt_FW_CC_P[ ]
   - Lower bound: PS_Config_Lmt_FW_CC_N[ ]
4. Noise Test
   - Upper bound: PS_Config_Lmt_FW_Diff_P[ ]
   - Lower bound: PS_Config_Lmt_FW_Diff_N[ ]
5. Please contact Novatek MP owner to get criteria settings of your panel module, and set it before running Self-Test.

How to Run Self-Test

- Enable NVT_TOUCH_MP in *nt38350.h*

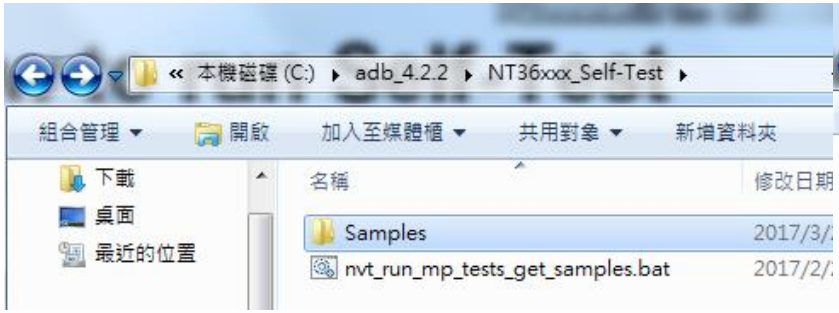
```
#define NVT_TOUCH_MP 1
```

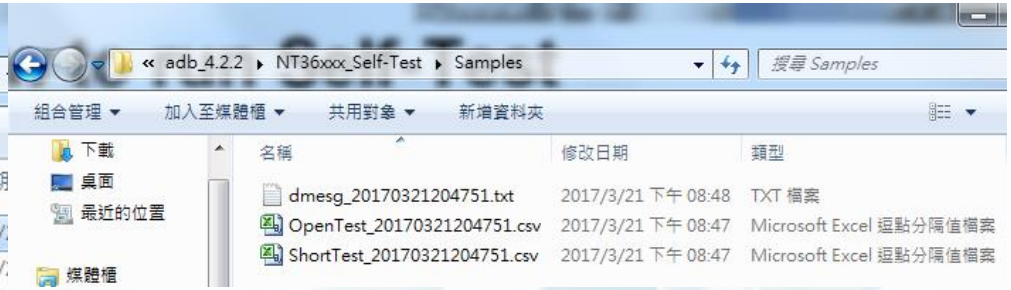
- Test command is “adb shell cat /proc/nvt_selftest”
- Test data samples are saved in *.csv
  1. Open Test sample is saved in /data/local/tmp/OpenTest.csv
  2. Short Test sample is saved in /data/local/tmp/ShortTest.csv
  3. FW Rawdata Test sample is saved in /data/local/tmp/FWMutualTest.csv
     FW CC Test sample is saved in /data/local/tmp/FWCCTest.csv
  4. Noise Test sample is saved in /data/local/tmp/NoiseTest.csv



How to Run Self-Test (cont.')

- You can use batch file ***nvt_run_mp_tests_get_samples.bat*** to run Self-Test and get test samples
  1. Change filename from "*nvt_run_mp_tests_get_samples.**txt***" to "*nvt_run_mp_tests_get_samples.**bat***"
  2. Double click "*nvt_run_mp_tests_get_samples.bat*"
  3. Test samples CSV files and dmesg log will be pulled to "Samples" folder with date time in filename.





Novatek Tools Usage Support

- We have **command line tool** and **android apk** for debug. It supports read/write command and data thru created system nodes /proc/NVTflash.
- Enable NVT_TOUCH_PROC in *nt38350.h*

```
#define NVT_TOUCH_PROC 1
```

- Make sure system node /proc/NVTflash has been created.
- This node is configured with only read permission that it is not banned in CTS test.

Do not set NVT_TOUCH_PROC to 0 !!

Boot-UP FW Update

- Enable BOOT_UPDATE_FIRMWARE in *nt38350.h*

```
#define BOOT_UPDATE_FIRMWARE 1
#define BOOT_UPDATE_FIRMWARE_NAME "novatek_ts_fw.bin"
```

- Put firmware binary file in your device with path “/etc/firmware/novatek_ts_fw.bin”
- The firmware file name should be same as driver code. The default file name is novatek_ts_fw.bin

- Update Check Rules
  1. FW binary file size equals 116KB
  2. FW binary (FW version + FW version bar) equals 0xFF
  3. Checksum not match
  4. Binary FW version >= IC FW version
     - You can modify this checking rules with your use case.