FINTEK

Linux API Guide

v1.20

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Datasheet Revision History

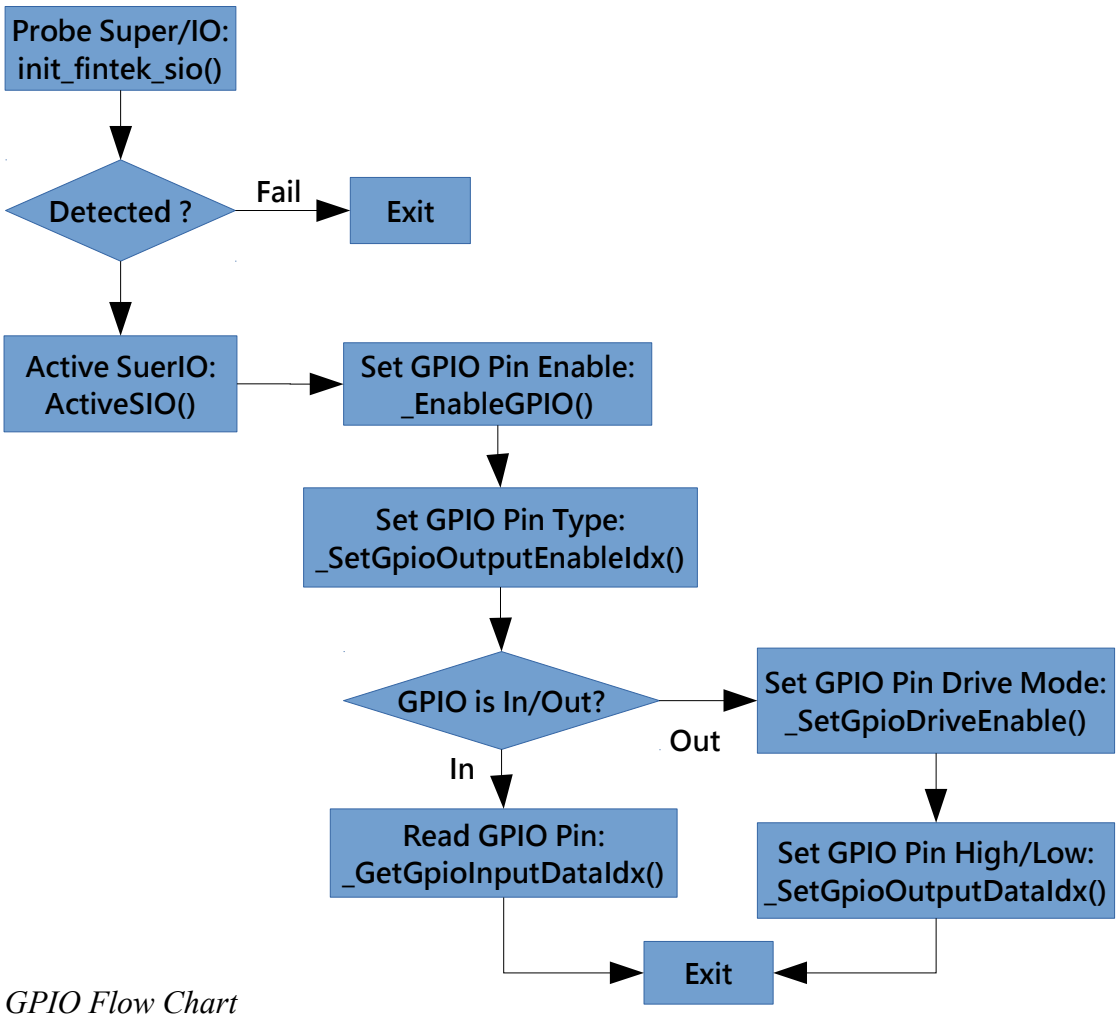
Date	Version	Revision History
2014/9/22	V1.00	1. Initial version.
2014/9/24	V1.01	1. SuperIO detection function modified. 2. Function SetWdtConfiguration parameter modified. Sample code & Library version: 854091fe7
2015/6/9	V1.02	1. Add support for F81768 SuperIO. 2. Static Library released with x86/x86_64. Sample code & Library version: 38a40dea5e
2015/8/10	V1.03	1. Add support GPIO for F81504/508/512 PCIE to UARTs. 2. Fix F81866 GPIO 0x/1x/2x/8x setting loss. 3. Add demo app compile & operate section. Sample code & Library version: 1088a3cc9d
2015/8/19	V1.04	1. Add support EEPROM modification for F81504/508/512 PCIE to UARTs. Sample code & Library version: 7c55f05304
2015/8/25	V1.05	1. Add support for F71808A Watchdog. Sample code & Library version: f28939d0f6
2015/8/26	V1.06	1. Fix detecting multi-SuperIO Issue. Sample code & Library version: f1a336a001
2015/9/10	V1.07	1. Add support for F71869A SuperIO with WDT function. Sample code & Library version: 9dffe67749
2015/10/13	V1.08	1. Add support for F81866 SuperIO with I2C function. Sample code & Library version: eb4ee4f830
2015/12/25	V1.09	1. Add support for F71869A SuperIO with GPIO function. Sample code & Library version: 8005078325
2015/12/28	V1.10	1. Fix for init_fintek_sio() error when multiple SuperIO exist. 2. Add more debug message option. Sample code & Library version: f216964384
2016/9/22	V1.11	1. Fix GPIO mapping for F81803 & F81768. Sample code & Library version: 97527cc592

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2016/10/11	V1.12	Increase F81886 GPIO read/write performance with 3.7us pulse width. Sample code & Library version: 6627a95cb9
2017/3/16	V1.13	1. Add support for F75113 GPIO & WatchDog function. Sample code & Library version: 7cce21887d
2017/5/16	V1.14	1. Fix for F75113 GPIO4x. Sample code & Library version: fa0b58cd29
2017/5/24	V1.15	1. Add multi-WDT support. (F75113). Sample code & Library version: 5f26f0e4fe
2017/6/6	V1.16	1. Fix for newer GCC build failed issue. Sample code & Library version: ef7eba4668
2017/10/2	V1.17	1. Add support for F75114 GPIO function. Sample code & Library version: d609ca08ff
2017/12/5	V1.18	1. Add support for F81801 GPIO/WDT function. Sample code & Library version: 9f90d44fa9
2017/12/5	V1.19	1. Fix support for F81801 GPIO/WDT function. Sample code & Library version: 1d4dd6b7be
2017/12/28	V1.20	1. Add support for F81804/F81966 GPIO/WDT function. 2. Fix API for demo code “demo_list_device.c” crash on non-HID device. Sample code & Library version: e2476b4759

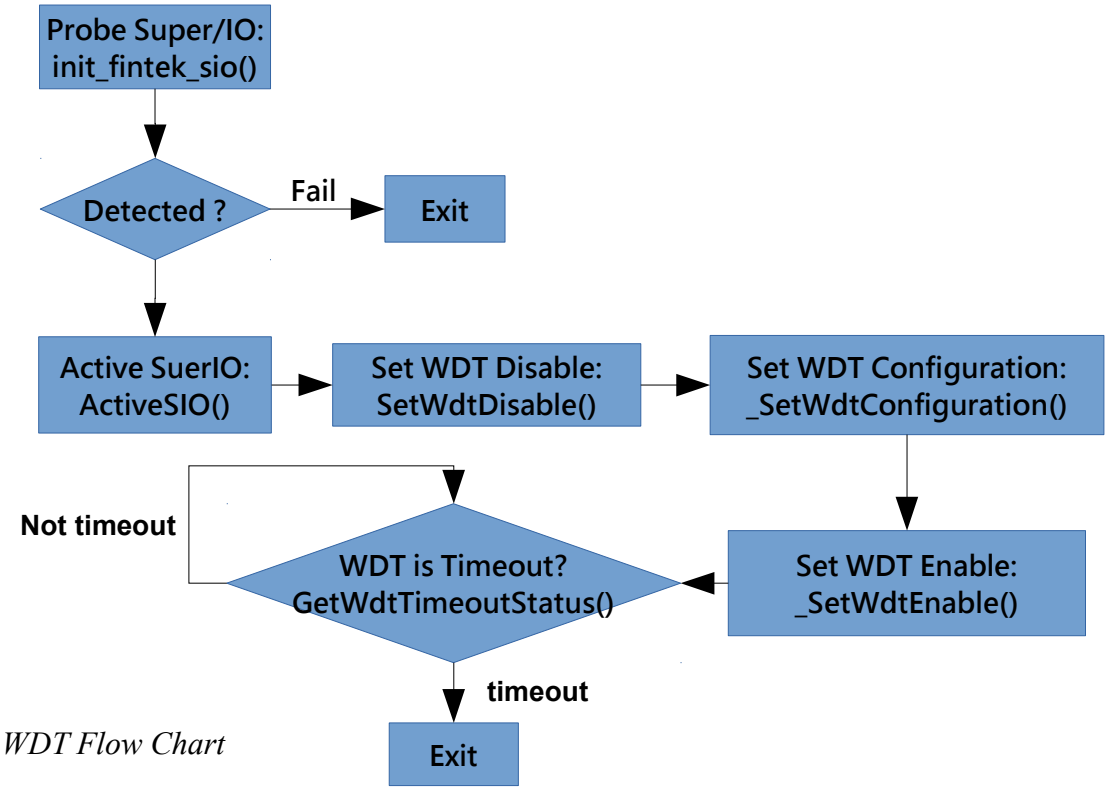
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Flow Control



GPIO Flow Chart

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WDT Flow Chart

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Demo API Function

This documents contains GPIO / WDT / EEPROM / I2C configuration API for Fintek IC. The support list is below:

- GPIO
  - F81866/F81803/F81768/F71869A/F81504/F81508/F81512/F75113/F75114/F81801/F81804/F81966
- Watch Dog
  - F81866/F81803/F81768/F71808A/F71869A/F75113/F81801/F81804/F81966
- EEPROM
  - F81504/F81508/F81512
- I2C
  - F81866

2.1 GPIO Function:

2.1.1 Function List

- int _EnableGPIO(unsigned int uIdx, eGPIO_Mode eMode)
- int _SetGpioOutputDataIdx(unsigned int uIdx, unsigned int uValue)
- int _GetGpioOutputDataIdx(unsigned int uIdx, unsigned int *uValue)
- int _GetGpioInputDataIdx(unsigned int uIdx, unsigned int *uValue)
- int _SetGpioDriveEnable(unsigned int uIdx, eGPIO_Drive_Mode eMode)
- int _SetGpioOutputEnableIdx(unsigned long uIdx, eGPIO_Direction eMode)

2.1.2 Value Description

Define	Value	Description
_EnableGPIO	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	eMode	Enum eGPIO_Mode {eGPIO_Mode_Disable, eGPIO_Mode_Enable}
_SetGpioOutputDataIdx	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	uValue	Set GPIO Output value: 0: Low 1:High
_GetGpioOutputDataIdx	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	*uValue	Read GPIO Current Output value: 0: Low 1:High

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_GetGpioInputDataIdx	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	*uValue	Read GPIO Current Input value: 0: Low 1:High
_SetGpioDriveEnable	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	eMode	Enum eGPIO_Drive_Mode {eGPIO_Drive_Mode_OpenDrain, eGPIO_Drive_Mode_Pushpull}
_SetGpioOutputEnableIdx	uIdx	GPIO Index (ex. GPIO16 => uIdx=0x16)
	eMode	Enum eGPIO_Direction {eGPIO_Direction_In, eGPIO_Direction_Out}

2.2 WDT Function:

2.2.1 Function List

- 1st WDT control
  - int SetWdtDisable()
  - int SetWdtEnable()
  - int SetWdtConfiguration(int iTimerCnt, int iClkSel, int iPulseMode, int iUnit, int iActive, int iPulseWidth)
  - int GetWdtTimeoutStatus(int *Status, int* RemainTime)
- Other WDT control (by index, 1st WDT = 0)
  - int SetWdtIdxConfiguration(int idx, int iTimerCnt, int iClkSel, int iPulseMode, int iUnit, int iActive, int iPulseWidth)
  - int SetWdtIdxEnable(int idx)
  - int SetWdtIdxDisable(int idx)
  - int GetWdtIdxTimeoutStatus(int idx, int *Status, int *RemainTime)

2.2.2 Value Description

Define	Value	Description
SetWdtConfiguration	iTimerCnt	0-255 (second or minute program by "iUnit")
	iClkSel	Watchdog timer clock. -1: Remain default value setting by BIOS (recommend) 0: 10Hz clock divided by CLKIN. 1: Internal 10Hz clock.
	iPulseMode	Watchdog output mode.

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		-1: Remain default value setting by BIOS (recommend) 0: Select level output mode. 1: Select pulse output mode.
	iUnit	Watchdog unit select. -1: Remain default value setting by BIOS (recommend) 0: Select second. 1: Select minute.
	iActive	Watchdog output polarity of WDTRST -1: Remain default value setting by BIOS (recommend) 0: low active. 1: high active.
	iPulseWidth	Watchdog output pulse width -1: Remain default value setting by BIOS (recommend) 0: Select pulse width of 1 ms. 1: Select pulse width of 25 ms. 2: Select pulse width of 125 ms. 3: Select pulse width of 5 sec.
SetWdtDisable		Disable WDT & clear WDTMOUT_STS
SetWdtEnable		Enable WDT & WDTMOUT_STS
GetWdtTimeoutStatus	*Status	0: Timeout event is not occurred 1: Timeout event is occurred
	* RemainTime	Remain time of WDT

2.3 EEPROM function:

2.3.1 Function List

- int InitEEPROM(void)
- int SetEEPROMValue(unsigned int addr, unsigned int data)
- int GetEEPROMValue(unsigned int addr, unsigned int *data)

2.3.2 Value Description

Define	Value	Description
InitEEPROM		Initialize EEPROM Environment
SetEEPROMValue	addr	EEPROM target register address.

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	data	EEPROM data you want to write.
GetEEPROMValue	addr	EEPROM target register address.
	*data	EEPROM data you want to read.

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2.4 I2C function:

2.4.1 Function List

- int GetHWMONAddr(unsigned int *addr)
- int SelectI2CChannel(unsigned int ch)
- int WriteI2CData(unsigned int addr, unsigned int data)
- int ReadI2CData(unsigned int addr, unsigned int *data)

2.4.2 Value Description

Define	Value	Description
GetHWMONAddr	*addr	Get the H/W Monitor io address to manual operation
SelectI2CChannel	ch	Select the I2C channel with ch
WriteI2CData	addr	Set slave address
	data	Set write data to slave
ReadI2CData	addr	Set slave address
	*data	Read data from slave

2.4.3 Notice

The SelectI2CChannel() may had different operation with different Fintek chips.

For F81866

- ch 0: PIN 67/68
- ch 1: PIN 71/76
- ch 2: PIN 61/62

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Linux Demo code Guide：

3.1 Files Description

We provide x86 & x86_64 SDK. It's named with:

- fintek_demo_release_i686-<ver>.tar.gz
- fintek_demo_release_x86_64-<ver>.tar.gz

Each contained:

- libfintek_api.a
- demo_wdt.c
- demo_gpio.c
- demo_eeprom.c
- demo_i2c.c
- fintek_api.h
- Makefile

Support IC List:

- GPIO
  - F81866/F81803/F81768/F71869A/F81504/F81508/F81512/F75113/F75114/F81801/F81804/F81966
- Watch Dog
  - F81866/F81803/F81768/F71808A/F71869A/F75113/F81801/F81804/F81966
- EEPROM
  - F81504/F81508/F81512
- I2C
  - F81866

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Example：

4.1 Decompress & compile demo app

Decompress fintek_demo_release_<arch>-<version>.tar.gz to your working directory.

For examples, We'll decompress to “/home/code/demo” with arch:x86_32 version:e2476b4759

1. mkdir /home/code/demo
2. cd /home/code/demo
3. cp <somewhere>/fintek_demo_release-e2476b4759-i686.tar.gz .
4. tar xf fintek_demo_release-e2476b4759-i686.tar.gz
5. make
6. use demo_gpio & demo_wdt & demo_eeprom & demo_i2c to test on your platform.
   - 4.2.3 for simple command to control GPIO
   - 4.3.2 for simple command to control WDT
   - 4.4.2 for simple command to Read/Write EEPROM
   - 4.5.2 for simple command to Read/Write I2C

If the demo application show the message “Cant Found any Fintek SIO Product”. We should change the first parameter in demo source code with init_fintek_sio(). It can be referenced from file “fintek_api.h”.

```
typedef enum {
    eSIO_TYPE_SIO = 0,
    eSIO_TYPE_F71808A = eSIO_TYPE_SIO,
    eSIO_TYPE_F81866,
    eSIO_TYPE_F81803,
    eSIO_TYPE_F81768,

    eSIO_TYPE_PCI,
    eSIO_TYPE_PCI_F81504 = eSIO_TYPE_PCI,
    eSIO_TYPE_PCI_F81508,
    eSIO_TYPE_PCI_F81512,

    eSIO_TYPE_UNKNOWN,
    eSIO_TYPE_INVALID,
} eSIO_TYPE;
```


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4.2 GPIO Read/Write

- Please reference the function gpio_demo() within demo code “demo_gpio.c” for the detail.
- The following demo code should run with privileged user (root).

4.2.1. GPIO Read Example with API (Read from GPIO06):

```
init_fintek_sio(eSIO_TYPE_F81866, 0 ,&sio_data)
ActiveSIO(sio_data.ic_port, sio_data.key);
CHECK_RET(_EnableGPIO(0x06 , eGPIO_Mode_Enable));
CHECK_RET(_SetGpioOutputEnableIdx( 0x06 , eGPIO_Direction_In));
CHECK_RET(_GetGpioInputDataIdx( 0x06 , &data));
DeactiveSIO(sio_data.ic_port);
```

4.2.2. GPIO Write Example with API (Write to GPIO06 with High):

```
init_fintek_sio(eSIO_TYPE_F81866, 0 ,&sio_data)
ActiveSIO(sio_data.ic_port, sio_data.key);
CHECK_RET(_EnableGPIO(0x06 , eGPIO_Mode_Enable));
CHECK_RET(_SetGpioOutputEnableIdx( 0x06 , eGPIO_Direction_Out));
CHECK_RET(_SetGpioDriveEnable( 0x06 , eGPIO_Drive_Mode_OpenDrain));
CHECK_RET(_SetGpioOutputDataIdx( 0x06 , 1));
DeactiveSIO(sio_data.ic_port);
```

4.2.3. GPIO Write with demo_gpio (Write to GPIO80 with High / Read GPIO81):

The command line format of demo_gpio:

./demo_gpio <idx> <dir> <mode> <value>

<idx>: index of gpio, e.g., 0x80.

<dir>: 0 for input. 1 for output

<mode>: 0 for open-drain. 1 for Push-pull

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<value>: 0 for output low. 1 for output high

We'll use following command to control GPIO80 with Push-Pull & High Level

./demo_gpio 0x80 1 1 1

And read GPIO81 with

./demo_gpio 0x81 0 0 0

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4.3 WDT Set and Monitor

- Please reference the function watchdog_demo() within demo code “demo_wdt.c” for the detail.
- The following demo code should run with privileged user (root).

4.3.1. WDT Set and Monitor Example (Count down for 10 second)

```
init_fintek_sio(eSIO_TYPE_F81866, 0 ,&sio_data)
ActiveSIO(sio_data.ic_port, sio_data.key);
SetWdtDisable();
// countdown 10s, other parameter using original value
SetWdtConfiguration(10, -1, -1, 0, -1, -1);
DeactiveSIO(sio_data.ic_port);

while(  !GetWdtTimeoutStatus(&status, &timer) ) {
        static int old_timer = 0;

        if(old_timer != timer) {
                fprintf(stderr, "status:%d, timer:%d\n", status, timer);
                old_timer = timer;
        }

        if(status) {
                fprintf(stderr, "status:%d, timer:%d\n", status, timer);
                break;
        }

        usleep(10000);
}

DeactiveSIO(sio_data.ic_port);
```

4.3.2. WDT Set and Monitor Example with demo_wdt

```
./demo_wdt
```


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4.3.3. Multi-WDT control

If can be referenced by function “watchdog2_demo()” in demo_wdt.c

4.4 EEPROM Read & Write

- Please reference the function eeprom_demo() within demo code “demo_eeprom.c” for the detail.
- The following demo code should run with privileged user (root).

4.4.1. EEPROM Read & Write Example (Read from 0x30 & Write 0x01 to reg 0x21)

```
unsigned int data;

init_fintek_sio(eSIO_TYPE_PCI_F81504, 0 ,&sio_data)
ActiveSIO(sio_data.ic_port, sio_data.key);

status = InitEEPROM(); // success with status=0, others are failed.
status = GetEEPROMValue(0x30, &data); // read from 0x30
status = SetEEPROMValue(0x21, 0x01); // write reg:0x21 with value:0x01

DeactiveSIO(sio_data.ic_port);
```

4.4.2. EEPROM Read & Write Example with demo_gpio

Example1. Read from reg 0x30:

```
./demo_eeprom r 0x30
```

Example2. Write reg 0x02 with value 0xff:

```
./demo_eeprom w 0x02 0xff
```

Example3. Dump all EEPROM Data:

```
./demo_eeprom d
```


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4.5 I2C

- Please reference the function i2c_demo() within demo code “demo_i2c.c” for the detail.
- The following demo code should run with privileged user (root).

4.5.1. I2C Read & Write Example (Read from slave 0x20 & Write 0xaa to slave from ch 0)

```
unsigned int tmp;

init_fintek_sio(eSIO_TYPE_F81866, 0 ,&sio_data)
ActiveSIO(sio_data.ic_port, sio_data.key);

status = SelectI2CChannel(0); // success with status=0, others are failed.
status = ReadI2CData(0x20, &tmp); // read from slave 0x20
status = WriteI2CData(0x20 0xaa); // write 0xaa to slave 0x20

DeactiveSIO(sio_data.ic_port);
```

4.5.2. I2C Read & Write Example with demo_i2c

Example1. Read from slave 0x20 by channel 0

```
./demo_i2c r 0x00 0x20
```

Example2. Write to slave 0x20 with data 0xaa by channel 0

```
./demo_i2c w 0x00 0x20 0xaa
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