Arrakis Pico Mk3 Series

Version:
v1.0.2

Date:
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1 Copyright

2 Regulatory Compliances

2.1 Complies with the following EU directives

Radio Equipment Directive (2014/53/EU) only applies to devices containing radio module EM05-G.

No	Short Name
2014/35/EU	Low Voltage Directive (LVD)
2014/53/EU	Radio Equipment Directive (RED)
2014/30/EU	Electromagnetic Compatibility (EMC)
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment Directive (RoHS2)
2015/863/EU	Amendment to Annex II in Directive 2011/65/EU regards the list of restricted substances (RoHS3)

2.2 References of standards applied

Standard	Reference	Issue
EN 18031-1	Common security requirements for radio equipment - Part 1: Internet connected radio equipment	2024
EN 55032	Electromagnetic compatibility of multimedia equipment - Emission Requirements	2015+AC:2016
EN 55035	Electromagnetic compatibility of multimedia equipment - Immunity requirements	2017
EN 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions	2014
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems	2013
EN 61000-4-2	Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test	2009
EN 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	2006+A1:2008+A2:2010
EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4 : Testing and measurement techniques - Electrical fast transient/burst immunity test	2012
EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	2014+A1:2017
EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	2014+AC:2015
EN 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	2010
EN IEC 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	2004+A1:2017
EN 301 489-1 (module)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility	V2.2.3
EN 301 489-52 (module)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication User Equipment (UE) radio and ancillary equipment; Harmonised Standard for ElectroMagnetic Compatibility	V1.2.1
Draft EN 301 489-19 (module)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation and timing data	V2.2.0
ETSI EN 301 908-1 (mod- ule)	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements Release 15	V15.1.1

2.3 FCC PART 15 VERIFICATION STATEMENT

WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

May Contain transmitter module:

- N7NEM75T
- XMR2021EM05G

2.4 ICES-003 ISSUE 7 VERIFICATION STATEMENT

CAN ICES3(A)/NMB3(A)

This device complies with CAN ICES-003 Issue 7 Class A. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Cet appareil est conforme à la norme CAN ICES-003 Issue 7 Class A. Le fonctionnement est soumis auxdeux conditions suivantes : (1) cet appareil ne doit pas causer d'interférences nuisibles et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant opération indésirable.

May Contain transmitter module:

- 2417C-EM75T

3 Safety Instructions

Please read these instructions carefully and retain them for future reference.

1. Disconnect this equipment from the power outlet before cleaning. Do not use liquid or sprayed detergent for cleaning. Use a moist cloth or sheet.
2. Keep this equipment away from humidity.
3. Ensure the power cord is positioned to prevent tripping hazards and do not place anything on top of it.
4. Pay attention to all cautions and warnings on the equipment.
5. If the equipment is not used for an extended period, disconnect it from the main power to avoid damage from transient over-voltage.
6. **Prolonged usage with less than 12V may damage the PSU or destroy the mainboard.**
7. Never pour any liquid into openings as this could cause fire or electrical shock.
8. Have the equipment checked by service personnel if:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture in a condensation environment.
    - The equipment does not function properly, or you cannot get it to work by following the user manual.
    - The equipment has been dropped and damaged.
9. Do not leave this equipment in an unconditioned environment, with storage temperatures below -20 degrees or above 60 degrees Celsius for extended periods, as this may damage the equipment.
10. Unplug the power cord when performing any service or adding optional kits.
11. Lithium Battery Caution:
    - Risk of explosion if the battery is replaced incorrectly. Replace only with the original or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
    - Do not remove the cover, and ensure no user-serviceable components are inside. Take the unit to a service center for service and repair.

4 Product Specifications

4.1 Technical Details

Feature	Specification	Details
Processor	CPU	Intel Atom® Quad-core E3940, 1.6/1.8 GHz (Standard)
Memory	RAM	8GB LP-DDR3
Display	Max. Resolution	HDMI, up to 4K resolution
Storage Options		Full-size M.2 2242 bay NVMe
I/O Ports	HDMI	1 port
	LAN	3 RJ45 Gigabit Ethernet ports
	USB 3.0	3 ports
	USB 2.0	1 port
	Serial Ports	1 RS232/422/485 (TX/RX only)
	Digital I/O	1 DI, 1 DO
Networking	Ethernet	Triple Intel i210IT LAN chip (Gigabit)
	WLAN	Optional, via USB/PCIe
	WWAN	Optional 4G/5G via USB
Expansion	SIM Slot	1 push-push type Nano-SIM slot
Additional	Watchdog Timer	Programmable from 1 to 255 seconds
Environmental	Operating Temperature	-20° to 60° C
	Storage Temperature	-20° to 80° C
	Humidity	5% to 95% non-condensing
Power	Supply	12-24V DC, 4-pin terminal block and DC jack
	Adapter	Optional 60W, 12V/5A external desktop power adapter, 40W, 24V/1.7A DIN rail power adapter, CR1220 CMOS battery
Mounting	Options	Optional DIN Rail Mounting Kits
Operating System	Compatibility	All Windows 10 versions, Ubuntu Linux, others upon request
Physical Build	Material/Color	Aluminum / Steel, Silver
	Dimensions	130 x 90 x 30 mm
Compliance	Regulatory	CE/FCC

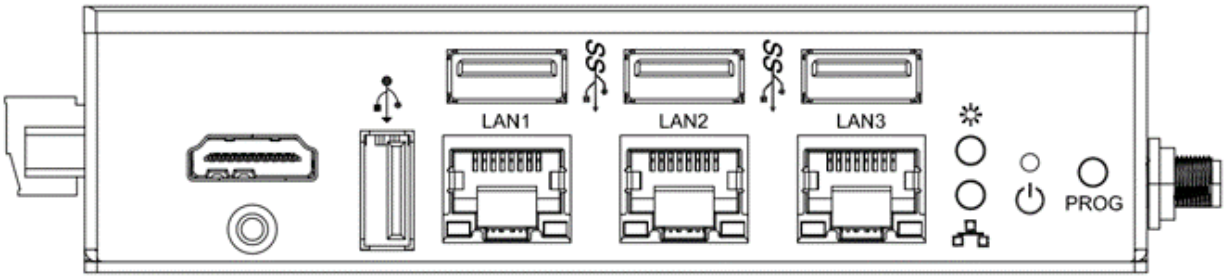
5 System Information

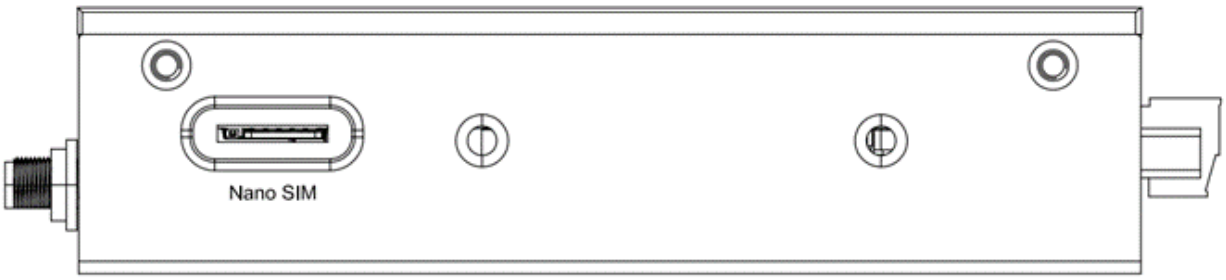
Attention: When opening the chassis make sure to slide the chassis top to the rear. Lifting the top up may shear the SIM Slot from the PCB.

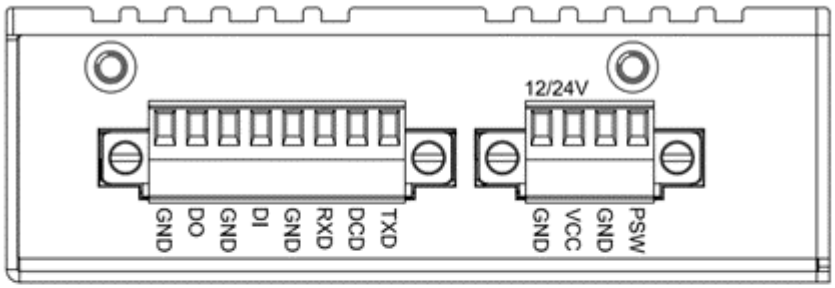
Being a powerful, yet small fanless system, the Arrakis Pico Mk3 may reach very high surface temperatures in excess of 60°C/140°F with risk of injury. Users should ensure sufficient protection against touching.

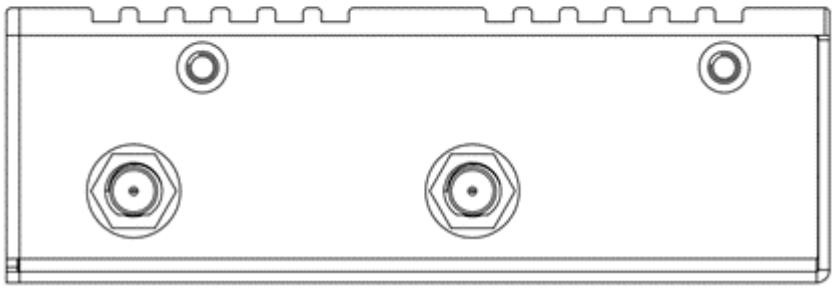
To allow for sufficient heat removal we recommend: 30mm distance on either side of the Arrakis Pico Mk3 when mounted on a DIN-Rail 100mm headroom above the Arrakis Pico Mk3 when mounted horizontally. The heatsink should be on top.

5.1 System Drawing







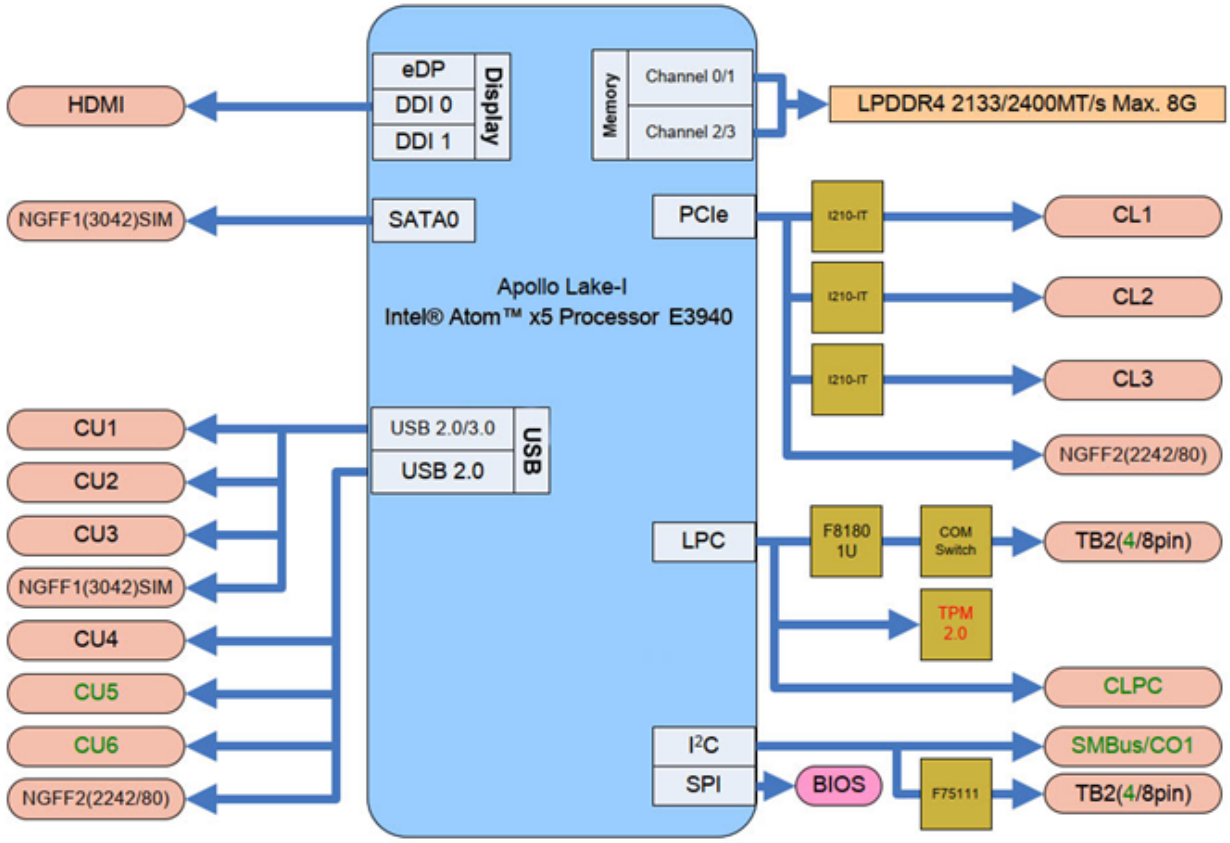


Attention: Do not connect Voltage to the PSW Pin on the Power Connector!

Power Connector Pin-Out	Description
GND	Ground
VCC	12-24V
GND	Ground
PSW	External Power Switch Connector

5.2 Mainboard Block Diagram

This block diagram illustrates the relationships among all interfaces and modules on the mainboard.



6 Power Supply

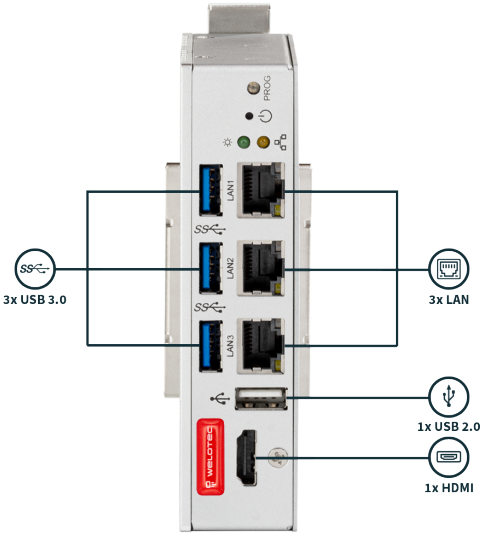
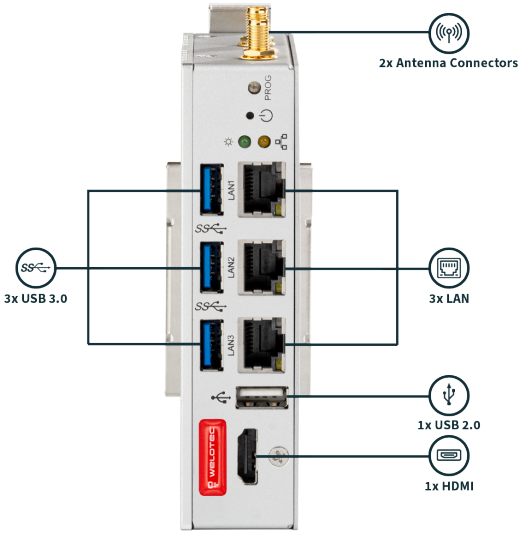
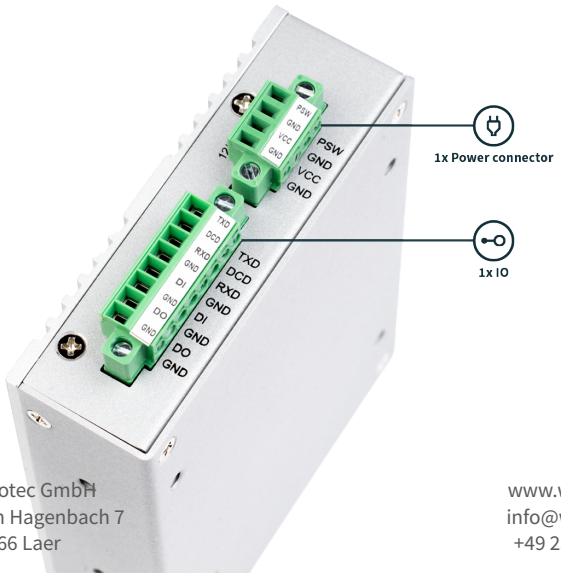
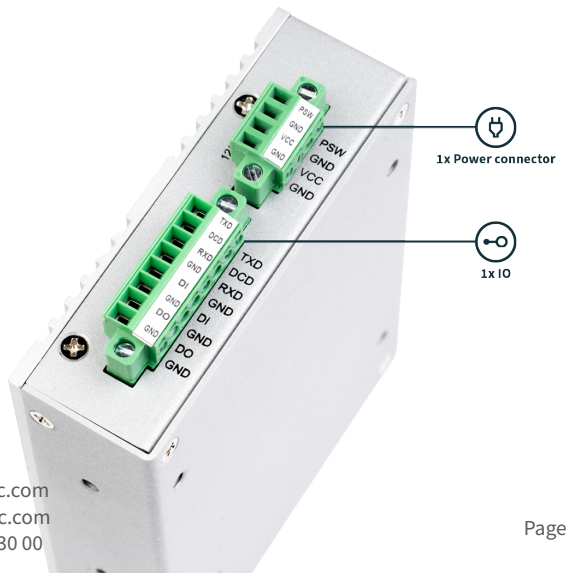
⚠ Please ensure no external voltage is applied to PSW! This could cause damage.

Use the terminal block to connect the Arrakis Pico Mk3 to a 12-24V DC power source.

Pin	Description
Pin 0 – PSW	External power switch
Pin 1 – GND	Ground
Pin 2 – VCC	V+ 12-24V
Pin 3 – GND	Ground

7 Interfaces and Connections

7.1 Arrakis Pico Mk3 Series

Arrakis Pico Mk3	Arrakis Pico Mk3 (with optional Radio Module)
	
	
	

8 Radio Modules (only relevant with optional LTE/WiFi Modules)

8.1 LTE

Band	Frequency Range Down	Frequency Range Up	Max Transmission Power
Band 1	2110 MHz - 2170 MHz	1920 MHz - 1980 MHz	199 mW
Band 3	1805 MHz - 1880 MHz	1710 MHz - 1785 MHz	199 mW
Band 7	2620 MHz - 2690 MHz	2500 MHz - 2570 MHz	199 mW
Band 8	925 MHz - 960 MHz	880 MHz - 915 MHz	199 mW
Band 20	791 MHz - 821 MHz	832 MHz - 862 MHz	199 mW

8.2 UMTS

Band	Frequency Range Down	Frequency Range Up	Max Transmission Power
Band 1	2110 MHz - 2170 MHz	1920 MHz - 1980 MHz	251 mW
Band 8	925 MHz - 960 MHz	880 MHz - 915 MHz	251 mW

8.2.1 Notes

- **Down:** Refers to the downlink frequency range.
- **Up:** Refers to the uplink frequency range.
- **Max Transmission Power:** Maximum power at which the device transmits.

9 BIOS

9.1 Introduction

The BIOS is a program stored in the Flash Memory on the motherboard, acting as a bridge between the hardware and the operating system. When you start the computer, the BIOS gains control and performs an auto-diagnostic test called POST (Power on Self Test) to check all necessary hardware. It detects all hardware devices and configures their parameters for synchronization. Once these tasks are completed, the BIOS hands control over to the operating system (OS).

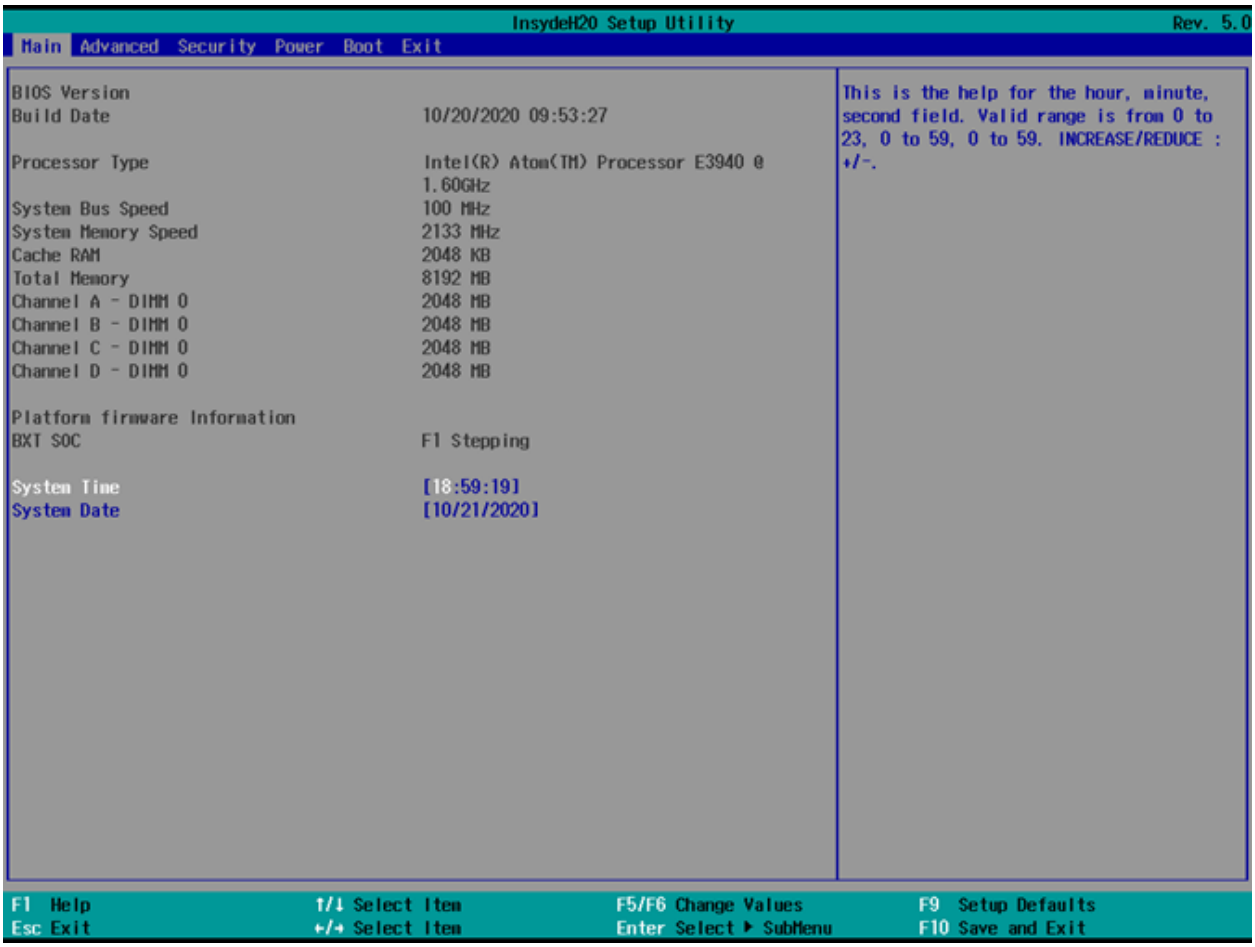
Since the BIOS is the sole channel for hardware and software communication, it is crucial for system stability and optimal performance. In the BIOS Setup main menu, you can see several options. These options will be explained in detail down below. First, let's look at the function keys you may use here:

- Press `Esc` to quit the BIOS Setup.
- Press ↑↓←→ (up, down, left, right) to choose the option you want to confirm or modify.
- Press `F10` to save these parameters and exit the BIOS Setup menu after you complete the setup.
- Press `Page Up`/`Page Down` or +/− keys to modify the BIOS parameters for the active option.

9.2 Enter BIOS

Power on the computer and press the `Del` key immediately to enter Setup. If the message disappears before you respond but you still wish to enter Setup, restart the system by turning it OFF then ON. You may also restart the system by simultaneously pressing `Ctrl`, `Alt`, and `Delete` keys.

9.3 BIOS Menu and Function Keys



In the above BIOS Setup main menu, you can see several options. These options will be explained step by step. First, let's look at a brief description of the function keys you may use here:

- Press ←→ (left, right) to select the screen.
- Press ↑↓ (up, down) to choose the option you want to confirm or modify.
- Press `Enter` to select.
- Press + or − to modify the BIOS parameters for the active option.
- `F1`: General help.
- `F2`: Previous value.
- `F3`: Optimized defaults.
- `F4`: Save & Reset.
- Press `Esc` to quit the BIOS Setup.

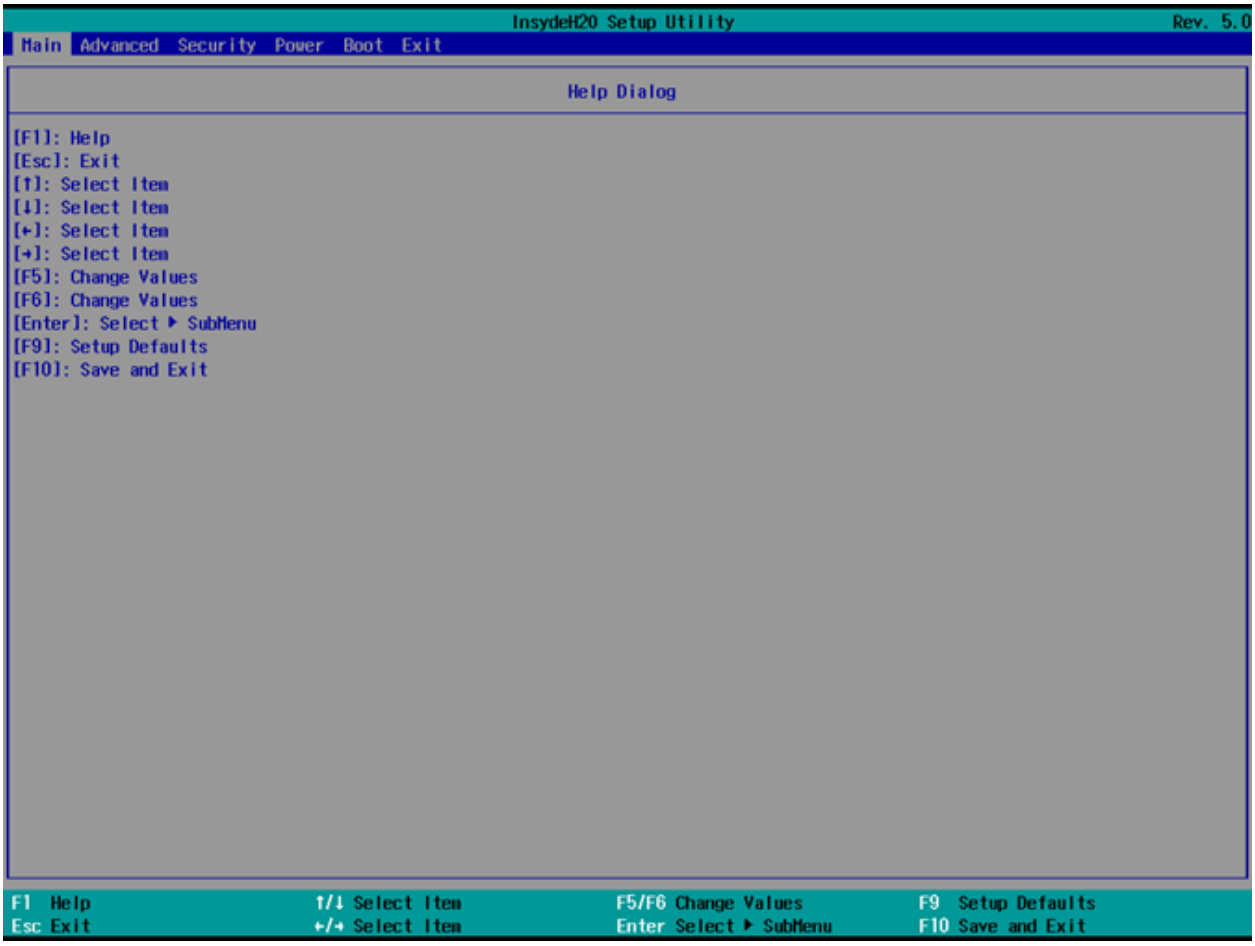
There are six menu bars on top of the BIOS screen:

- **Main**: To change system basic configuration
- **Advanced**: To change system advanced configuration
- **Security**: BIOS Password settings
- **Power**: ACPI and wake device settings

- **Boot**: To change system boot configuration
- **Exit**: Save settings, loading, and exit options

The selected menu bar is highlighted.

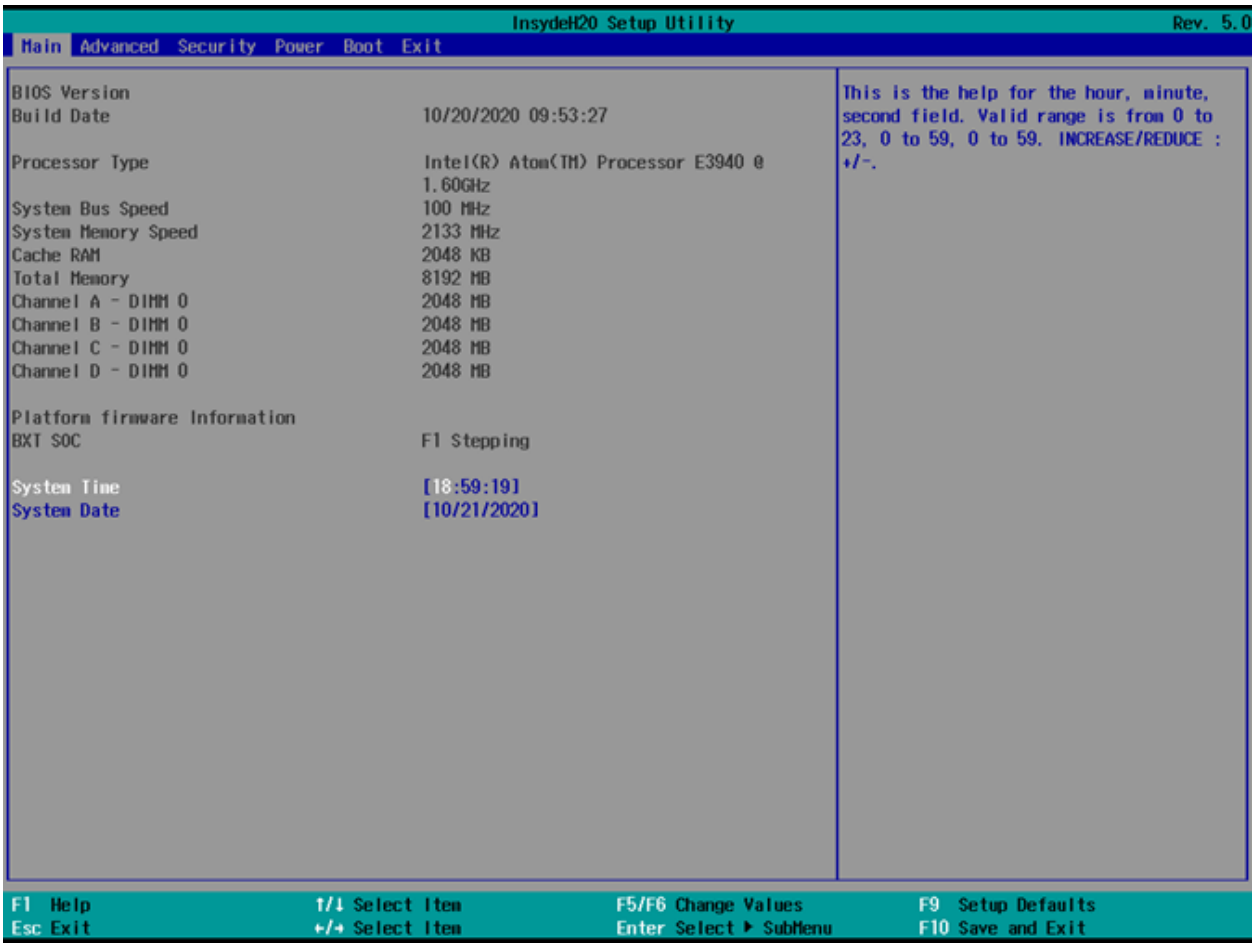
9.4 BIOS Help



Status Page Setup Menu/Option Page Setup Menu

Press `F1` to open a help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press `Esc`.

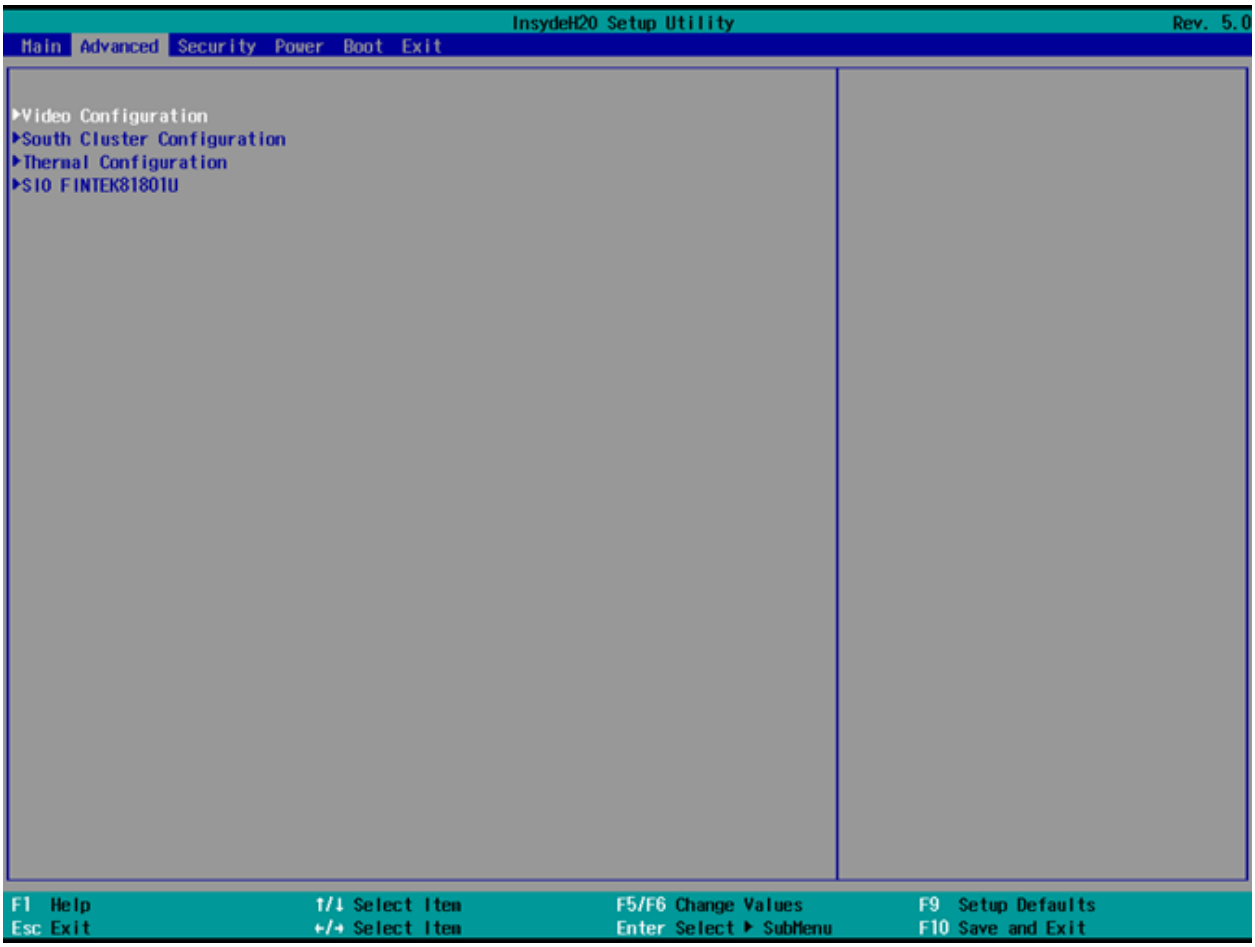
9.5 Main Menu



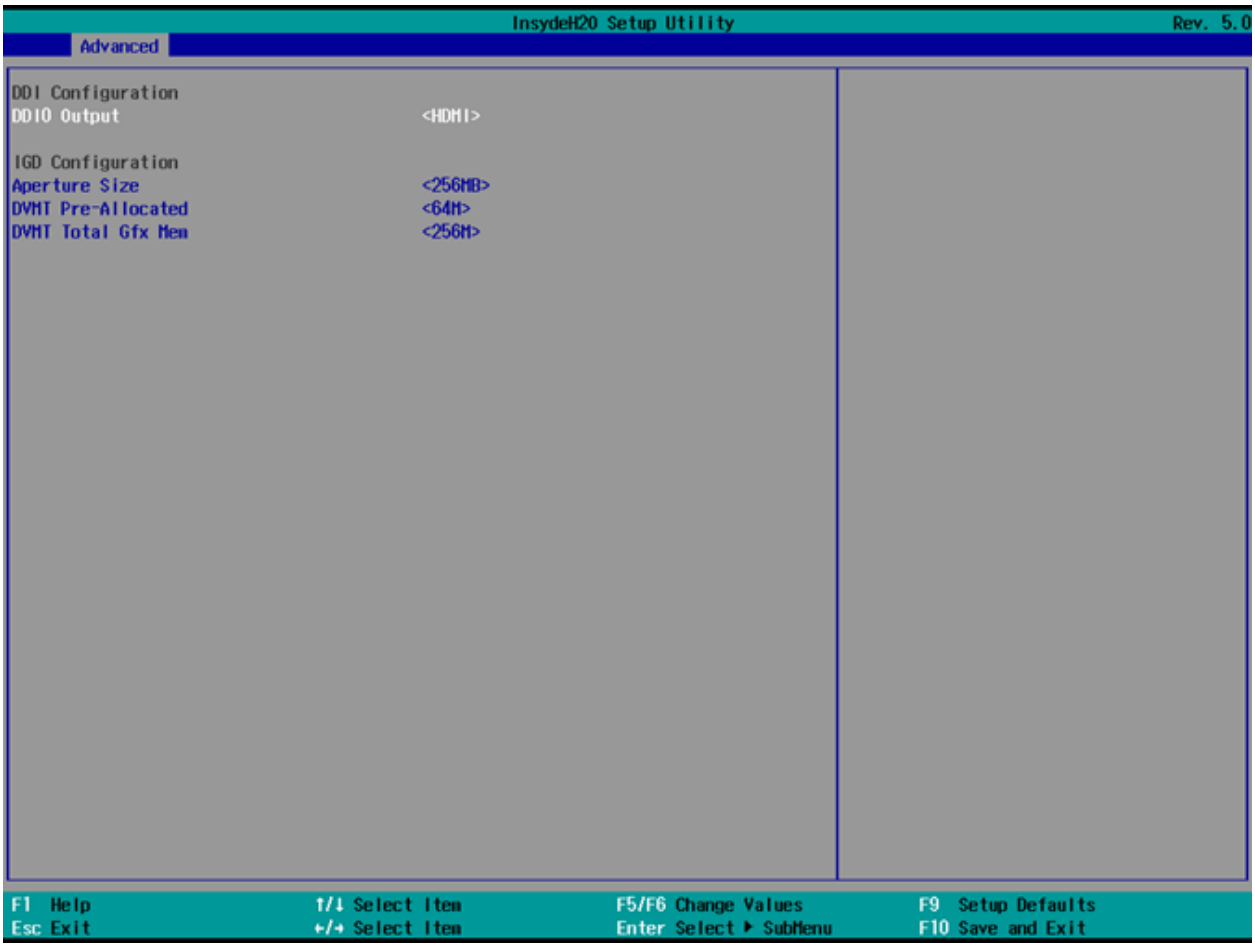
The Main menu screen includes some basic system information. Highlight the item and then use the + or − keys and numerical keyboard keys to select the value you want in each item.

- **System Date**: Set the Date. Use `Tab` to switch between date elements.
- **System Time**: Set the Time. Use `Tab` to switch between time elements.

9.6 Advanced


InsydeH20 Setup Utility
Rev. 5.0
Main
Advanced
Security
Power
Boot
Exit
▶Video Configuration
▶South Cluster Configuration
▶Thermal Configuration
▶SIO FINTEK81801U
F1 Help
Esc Exit
↑/↓ Select Item
←/→ Select Item
F5/F6 Change Values
Enter Select ▶ SubMenu
F9 Setup Defaults
F10 Save and Exit

9.6.1 Video Configuration:

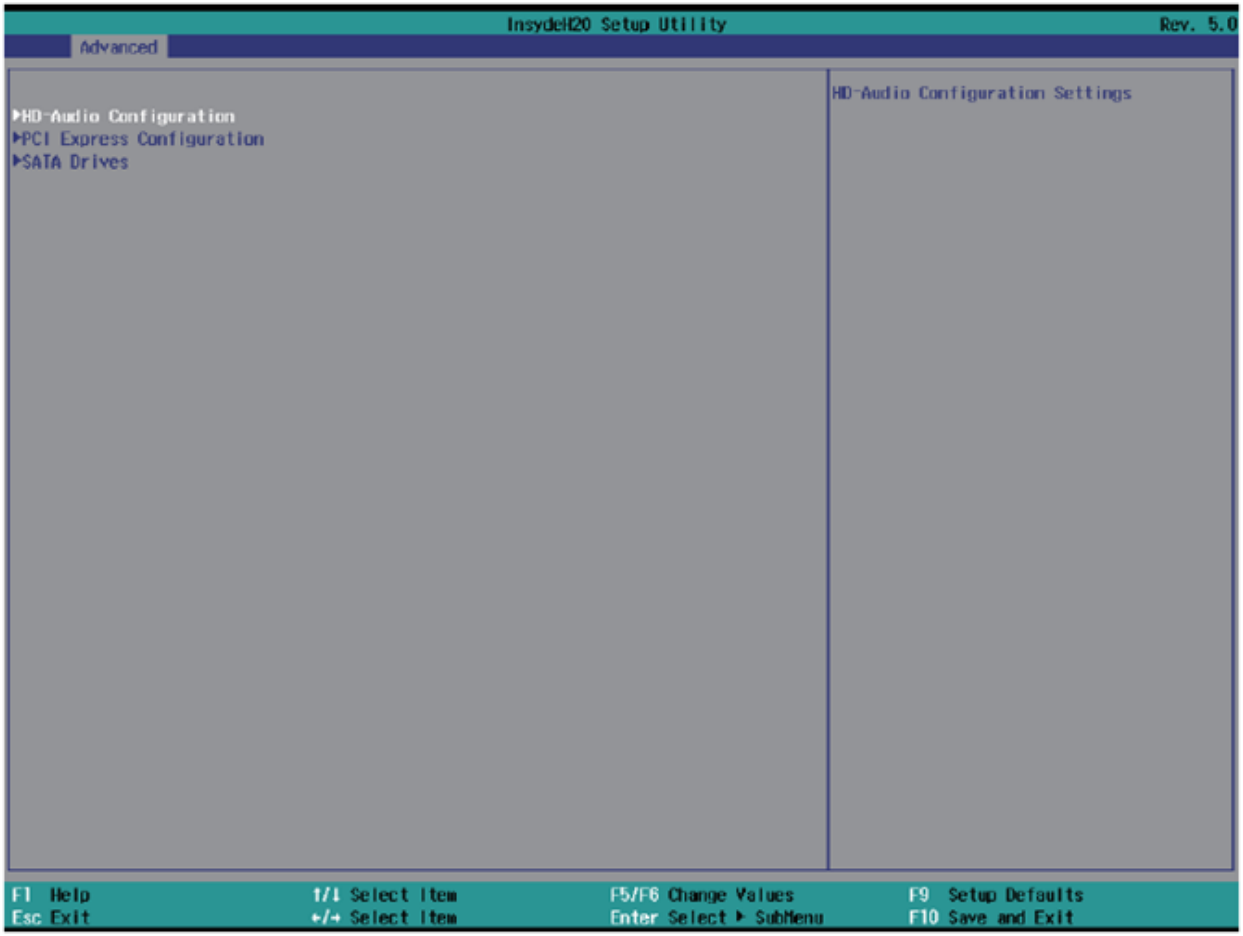


Aperture Size The optional settings are: 128MB, 256MB (default), 512MB.

DVMT Pre-Allocated Select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device. The optional settings are: 64 (default), 128, 256, 512MB.

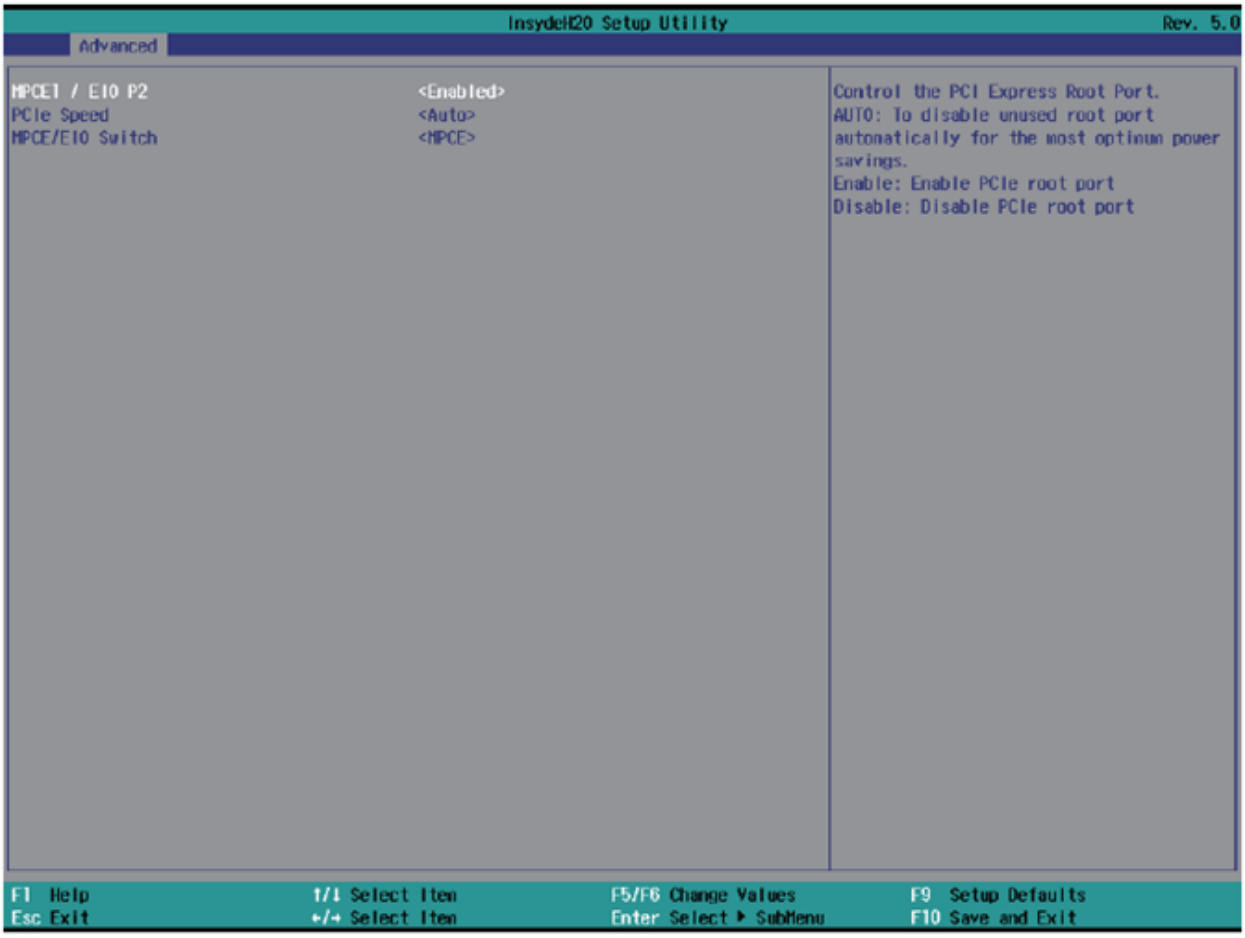
DVMT Total Gfx Mem Select DVMT 5.0 total graphics memory size used by the internal graphics device. The optional settings are: 128MB, 256MB (default), MAX.

9.6.2 HD-Audio Configuration:



HD-Audio Support The optional settings are: Enabled (default), Disabled.

9.6.3 PCI Express Configuration:

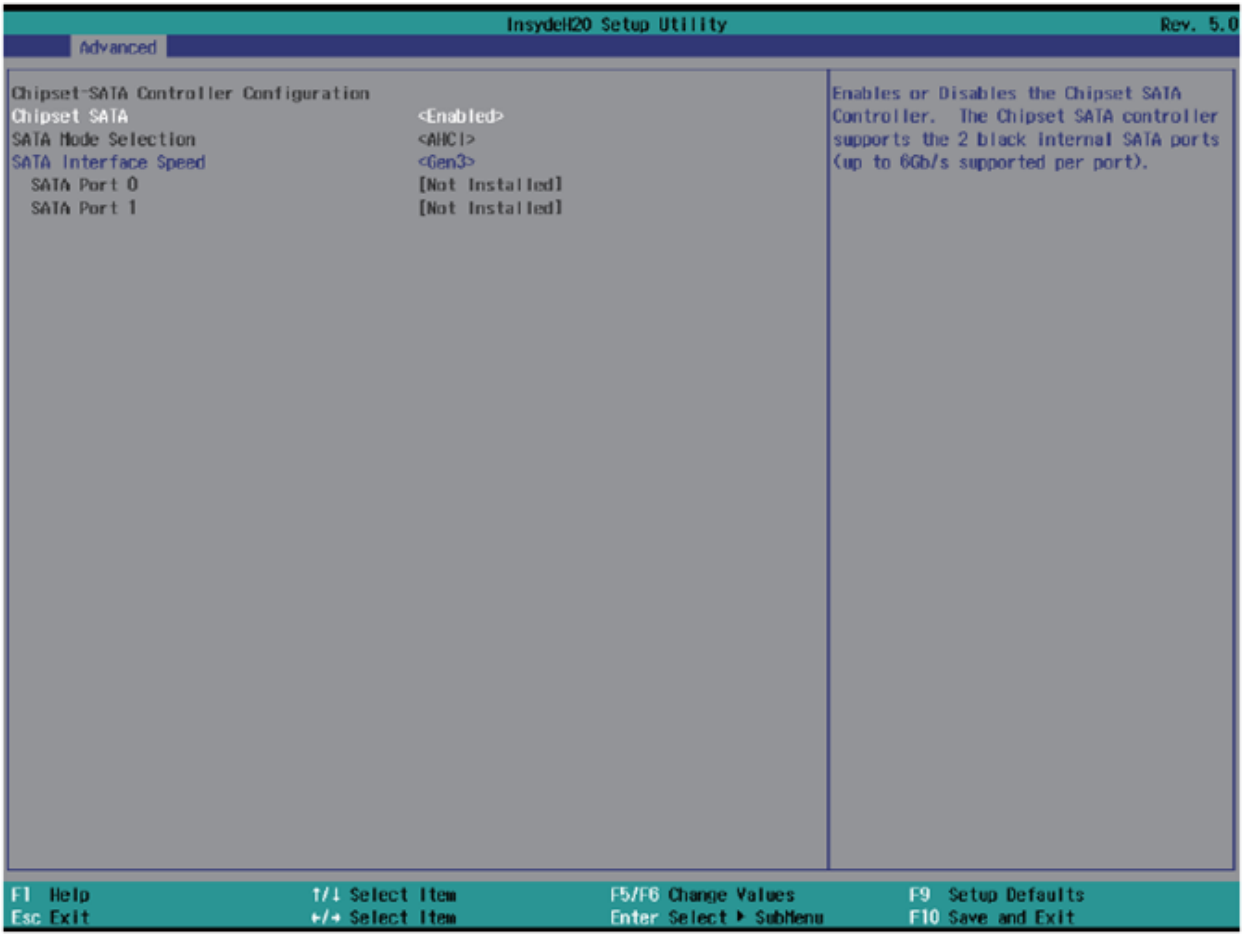


MPCE1 / EIO P2 The optional settings are: Disabled, Enabled (default) for MPCE1.

PCIe Speed Set PCIe speed: Auto (default), Gen1, Gen2.

MPCE / EIO Switch Switch the PCIe signal to MPCE1 (default) or EIO (internal expansion port for OEM I/O or function boards).

9.6.4 SATA Drives Configuration:

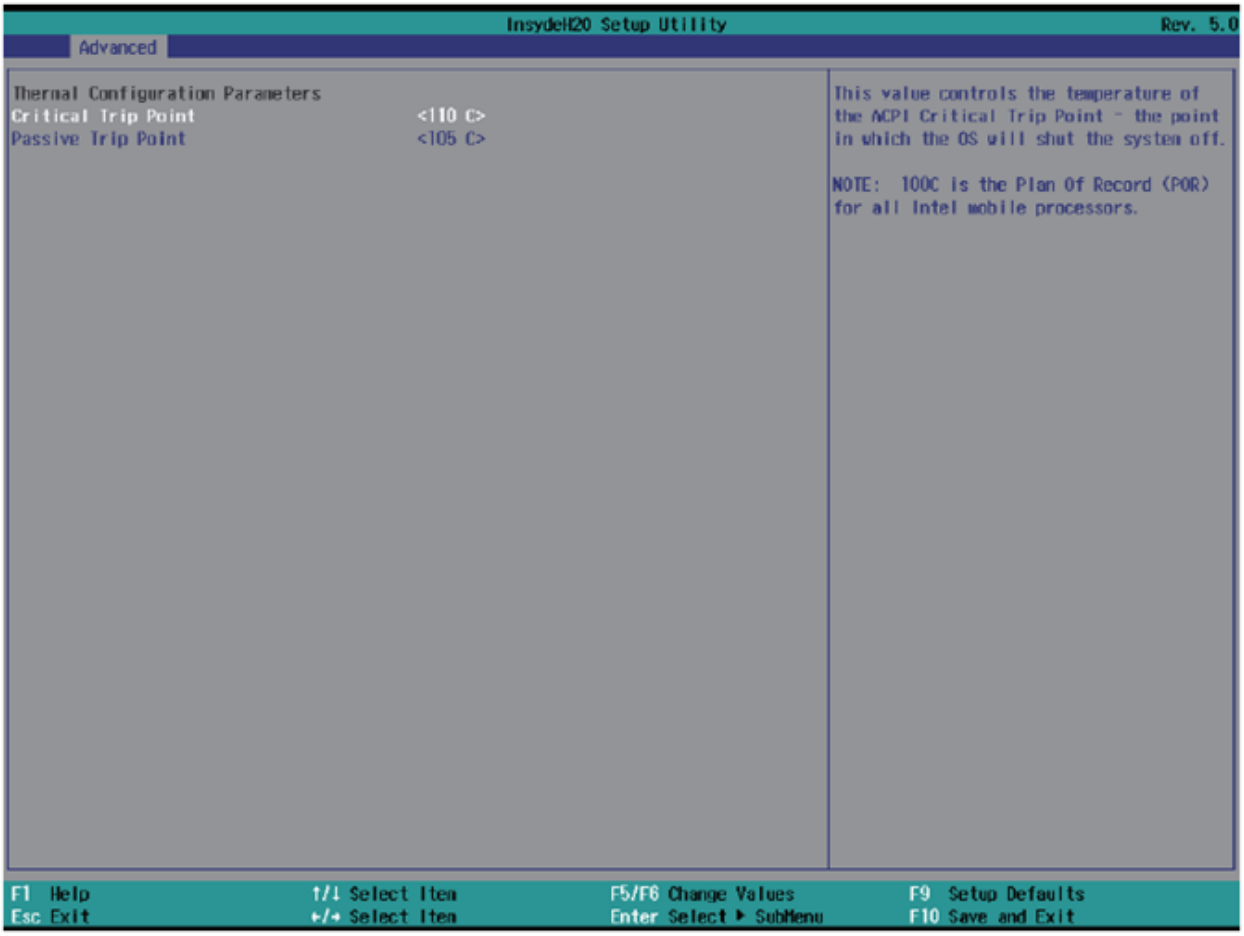


Chipset SATA Enable or Disable SATA function. The optional settings are: Enabled (default), Disabled.

SATA Mode Select This item is for information; the Arrakis Mk3 always operates in ACHI mode.

SATA Interface Speed Determine the SATA speed. The optional settings are: Gen1, Gen2, Gen3 (default).

9.6.5 Thermal:



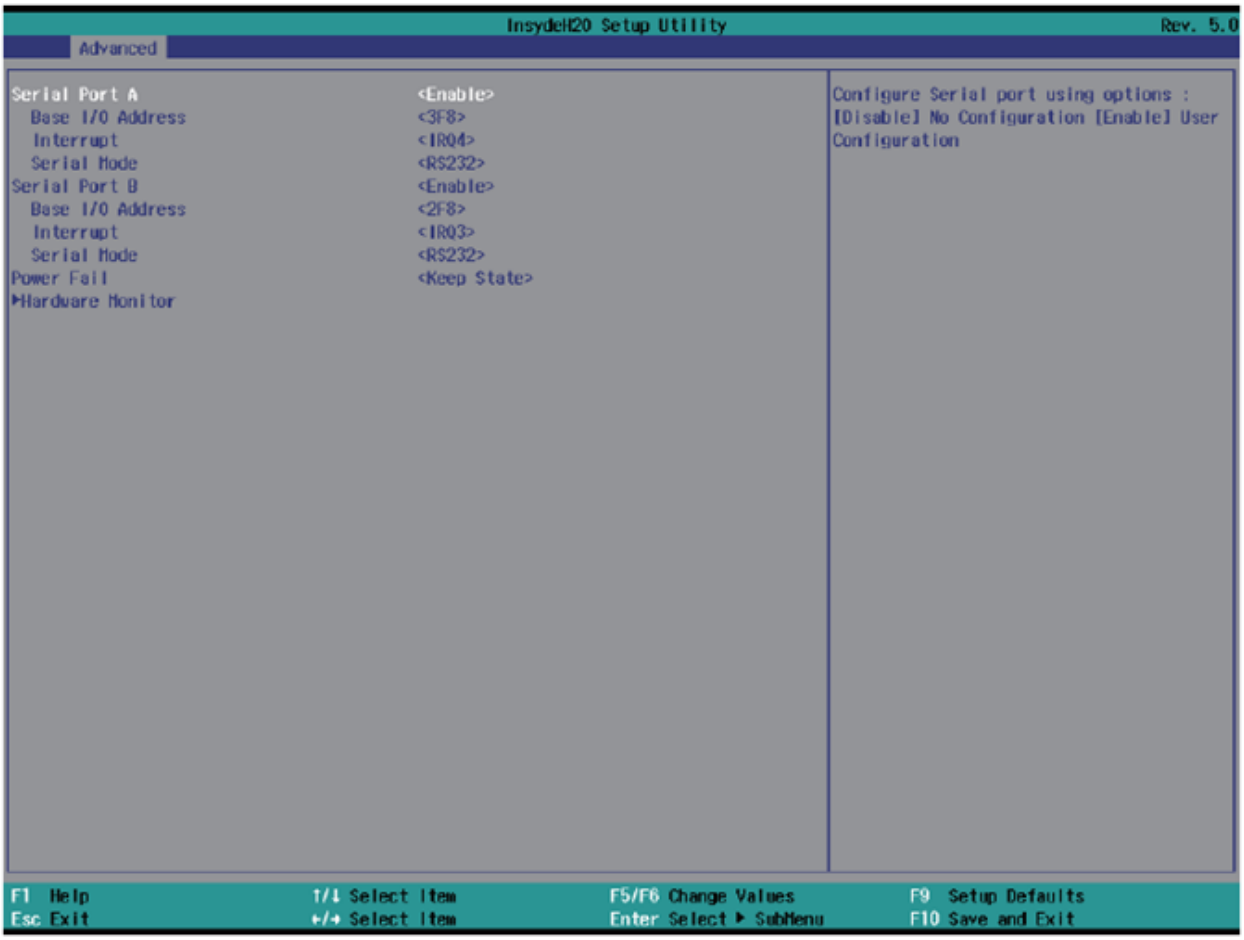
Thermal Configuration Parameters

This value controls the temperature of the ACPI Critical Trip Point, the point at which the OS will shut down the system.

Critical Trip Point The shutdown temperature, with a default value of 110°C.

The CPU frequency will automatically reduce when the CPU temperature reaches the passive Trip Point, which has a default value of 105°C.

9.6.6 SIO FINETEK 81801U:



Serial Port A/B Enable or disable serial port (COM1 or COM2). The default is Enabled.

Serial Port A/B Base IO Address / Interrupt Select an optimal setting for the super IO device. The optional settings are:

- IO=3F8h; IRQ=3,4
- IO=3E8h; IRQ=3,4
- IO=2E8h; IRQ=3,4
- IO=2F8h; IRQ=3,4

The default for port A is IO=3F8h; IRQ=4. The default for port B is IO=2F8h; IRQ=3.

Serial Mode

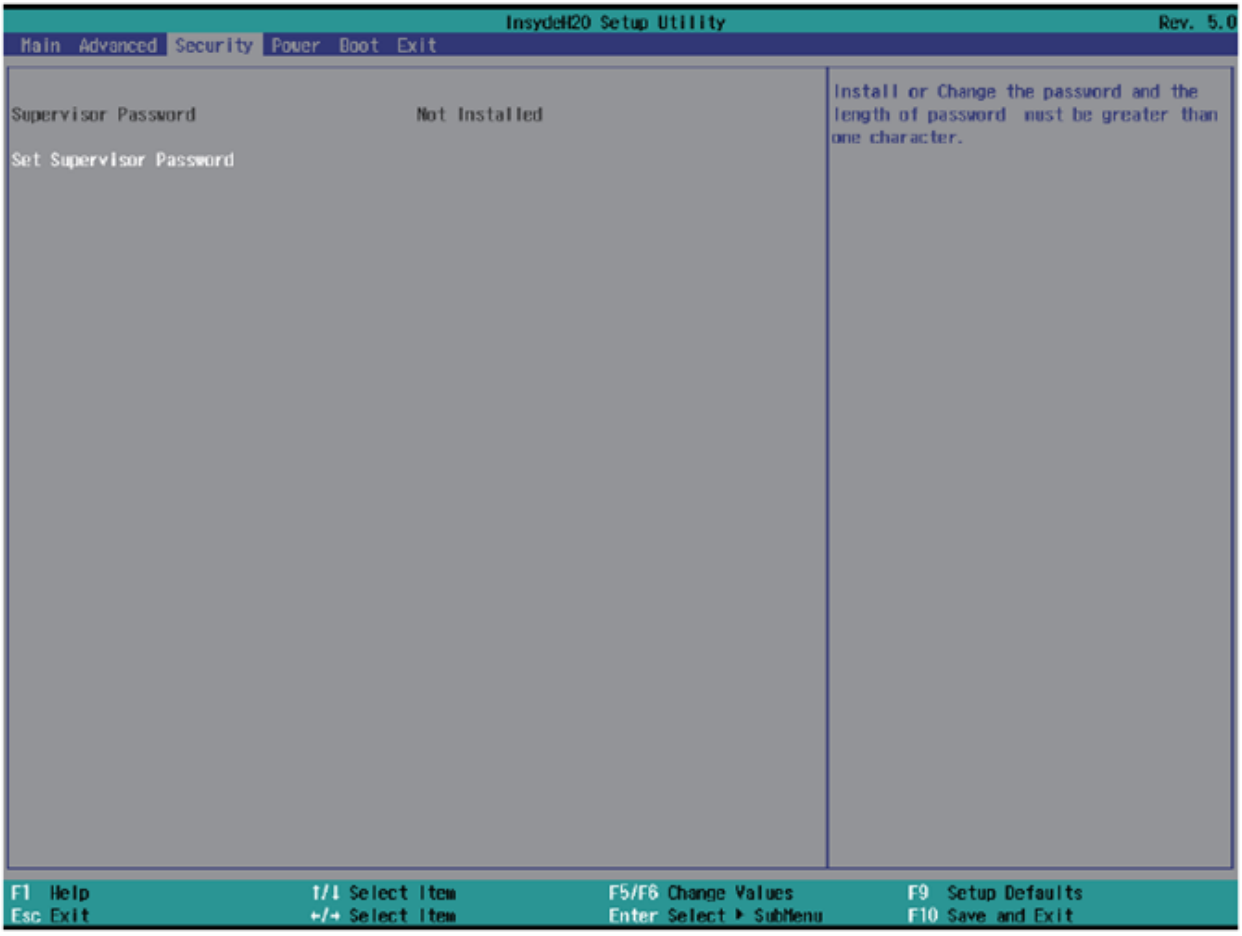
- RS232 driver (default): When hardware is set to RS232/RS422 mode, select RS232 driver.
- RS485 driver: When hardware is set to RS485 mode, select RS485 driver. This enables the auto flow function for RS485.

Power Failure Specify whether your system will reboot after a power failure or interrupt occurs.

- `Keep state`: Restores the system to the status before the power failure or interrupt occurred (default).
- `Always on`: Leaves the computer in the power-on state.
- `Always off`: Leaves the computer in the power-off state.

Hardware Monitor Displays system voltage and temperature messages. The voltage shows three types: VCC3, VCORE, VNN. The temperature is measured via a separate sensor, not by the CPU.

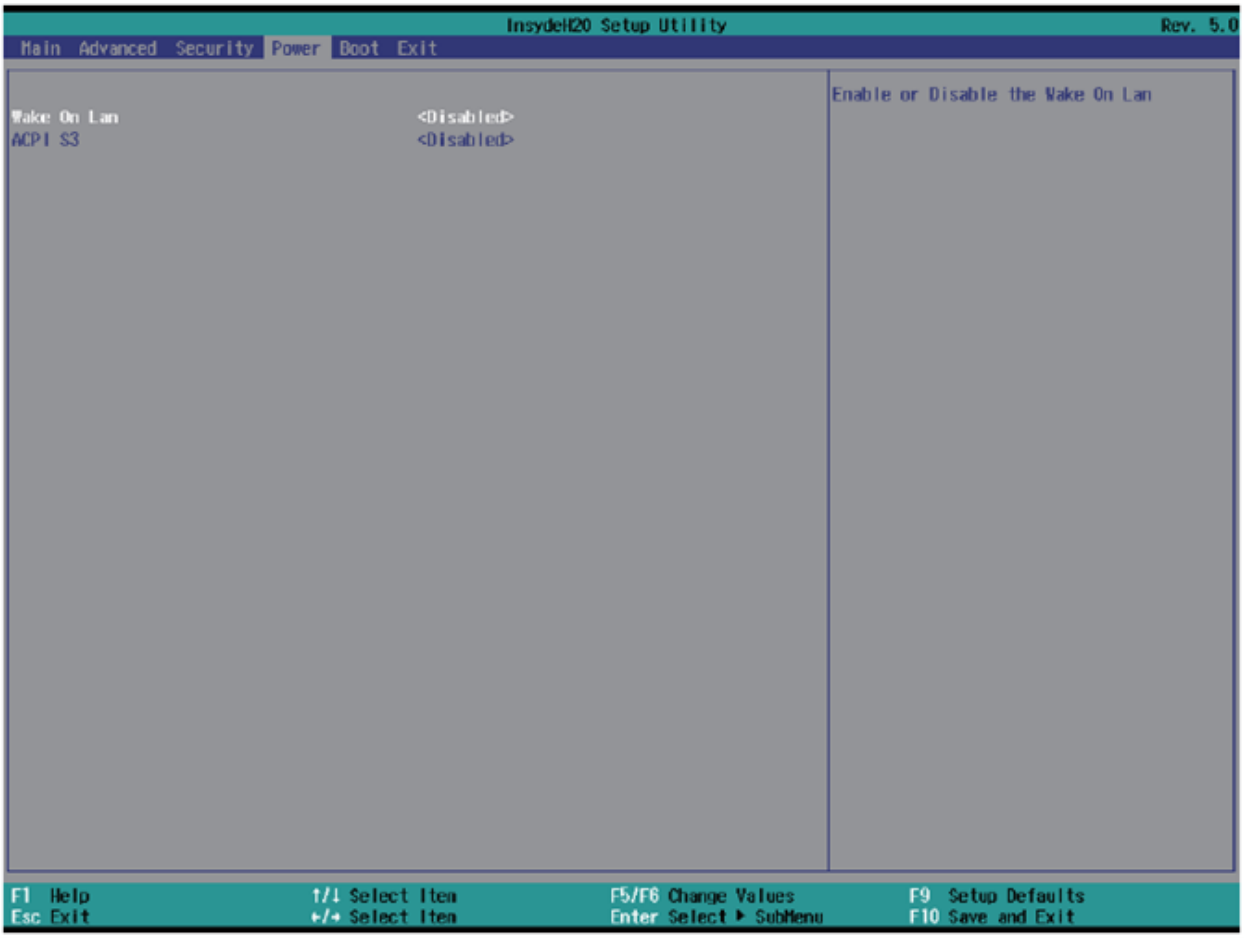
9.7 Security



Supervisor Password To set up a Supervisor password:

1. Select `Supervisor Password`. A “Create New Password” dialog will appear.
2. Enter a password that is between 3 and 10 characters long.
3. Press `Enter` to submit.

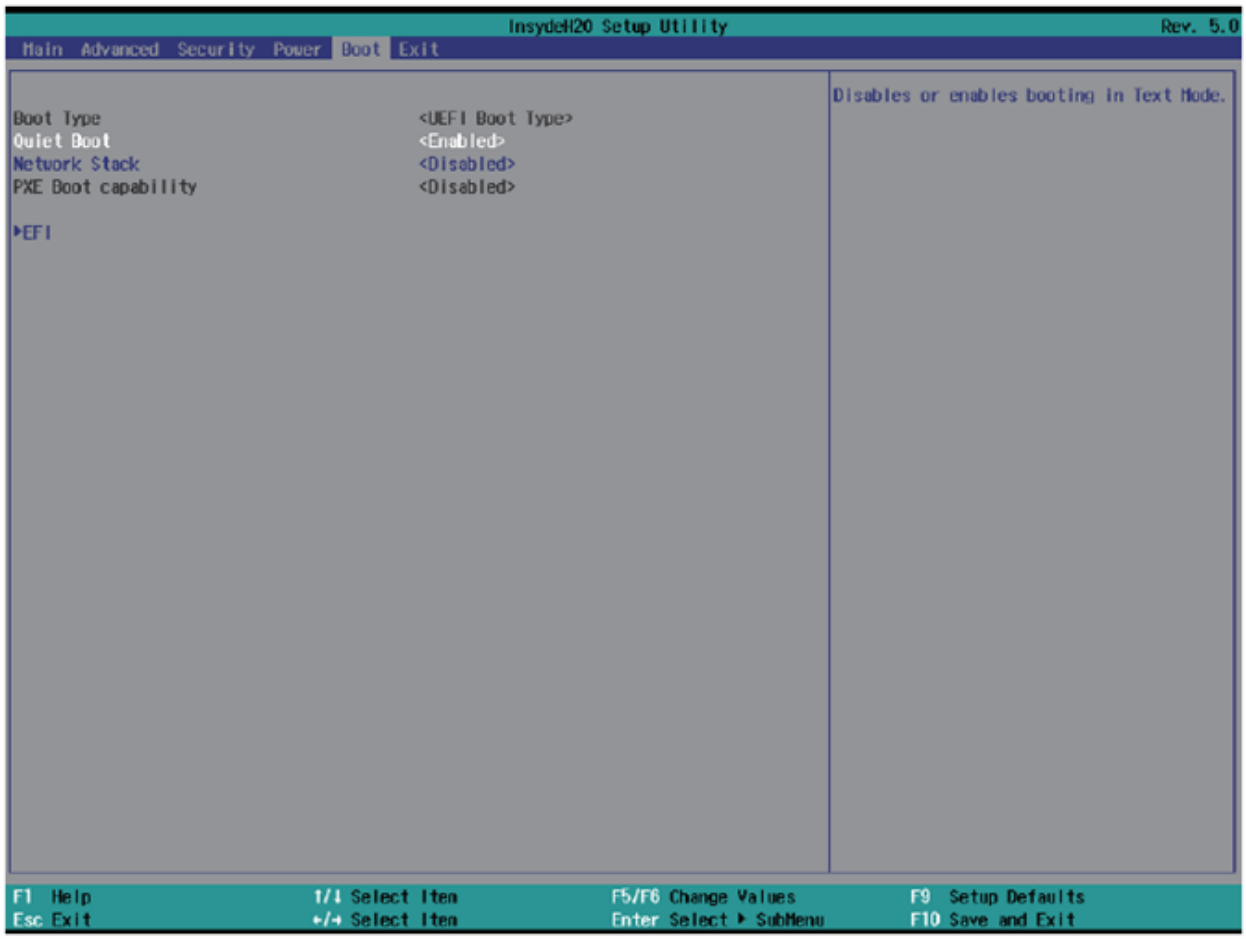
9.8 Power



Wake on LAN Wake On LAN from LAN1 when the system is in S3 or S5 state, or both. The optional settings are: S3, S5, S3/S5, Disabled (default).

ACPI S3 Select ACPI sleep state (S3) support. The optional settings are: Enabled, Disabled (default).

9.9 Boot



Boot Type The Arrakis Mk3 is a UEFI Boot-only system.

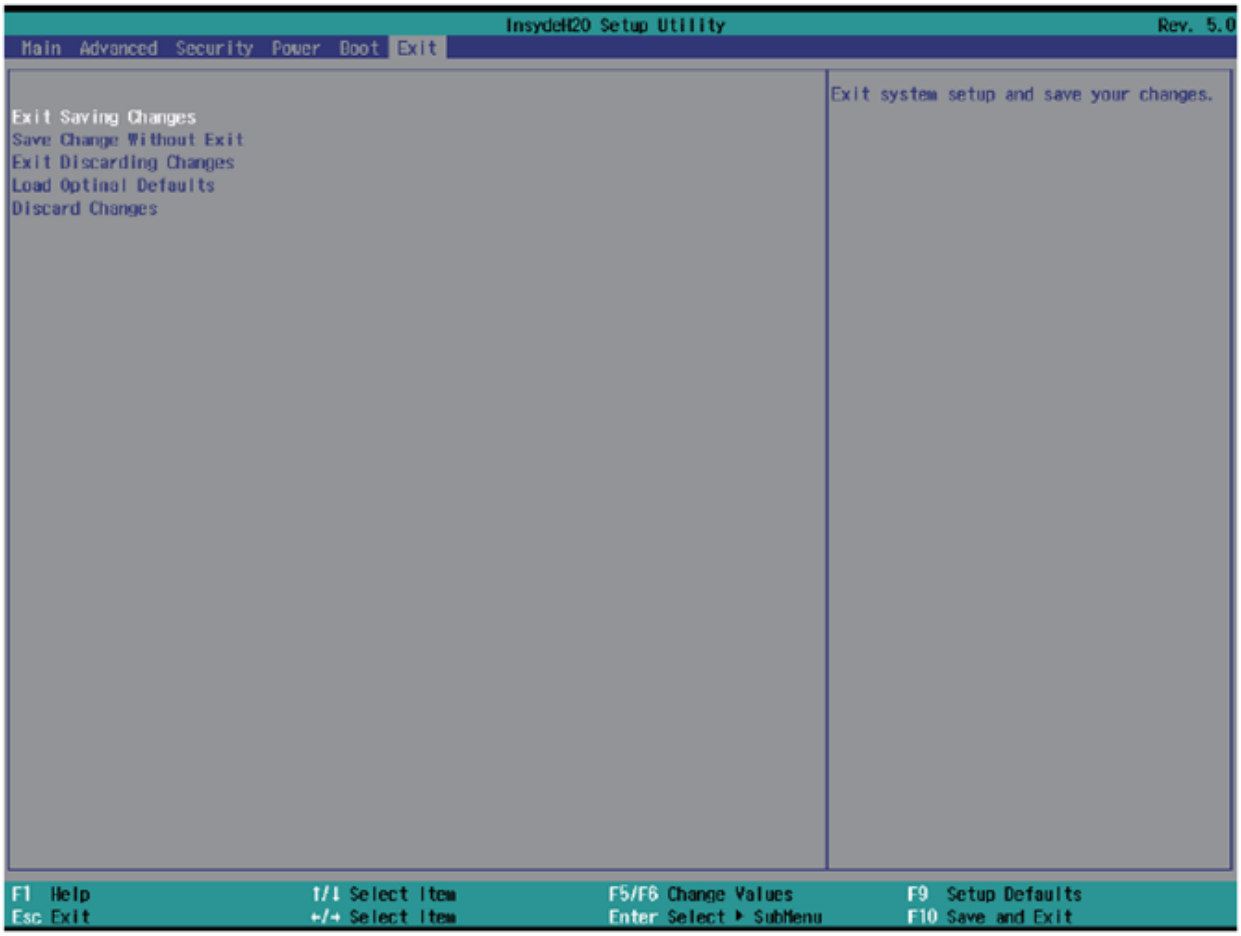
Quiet Boot The optional settings are: Enabled (default), Disabled.

Network Stack Enable if using the PXE function; otherwise, disable (default).

PXE Boot Capability This item determines the protocol operation in PXE. The values are: Disabled (default), UEFI: IPv4, UEFI: IPv6. This item is not modifiable when the above item is disabled.

EFI Determine which EFI storage device the Arrakis will boot from. This item only appears if EFI is present on the storage media.

9.10 Exit



Exit Saving Changes Allows the user to reset the system after saving the changes.

Save Change Without Exit Allows the user to save the changes without restarting.

Exit Discard Changes Allows the user to restart the system without saving the changes.

Load Optimal Default Restores the optimal default settings for all the setup options.

Discard Changes Cancels all the setup options without saving.

10 Driver Installation

The Arrakis Pico Mk3 typically comes with a preinstalled Operating System (recommended).

If you have opted for an Arrakis Pico Mk3 without a preinstalled operating system or need to reinstall it, you can download all available system drivers from the following link:

Download Link

To install the drivers, please run the driver installation programs and follow the on-screen instructions.

11 Appendix A: Power Consumption

Item	Specification
CPU	Intel E3940
RAM	LP-DDR3 8GB
Operating System	Windows 10 IoT 2019 LTSC
Test Program	Passmark
mSATA	64GB

Note: Results are for reference only!

Voltage	Power Off	Start Up Max.	Start Up Stable	Burn-In Max.	Shut Down
12V	0.14A	0.95A	0.62A	1.10A	0.82A
24V	0.09A	0.50A	0.32A	0.57A	0.42A

Note: Power consumption varies depending on options and software configurations.

12 Appendix B: F75111N DIO & Watchdog Device

The Arrakis Mk3 includes optional DIO Ports. This chapter provides an introduction to programming these ports.

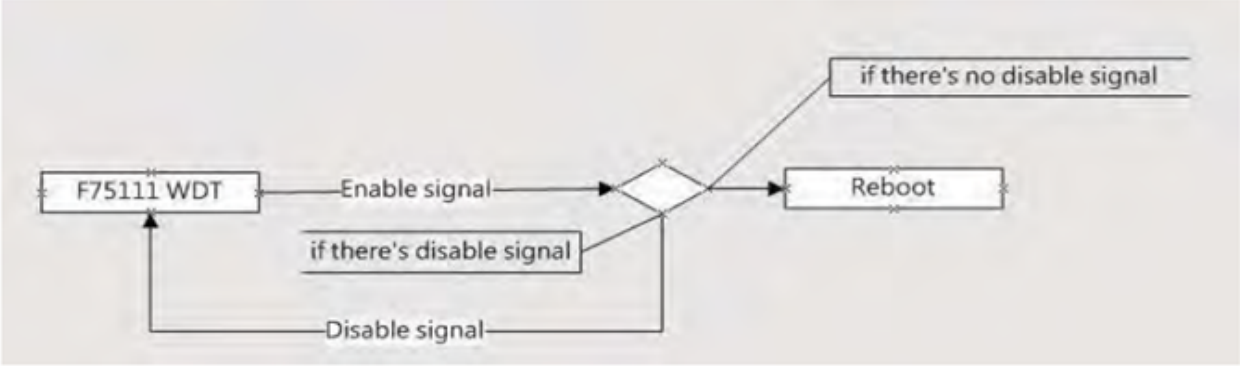
12.1 Watchdog Timer under DOS

The necessary software resources for programming the watchdog timer can be accessed from the Driver Download section:

- **Source file**: F75111_Dos_Src.rar
- **Binary file**: F75111_Dos_Bin.rar
- **USERNAME & PASSWORD**: sf

12.1.1 How to Use the Demo Application:

1. Boot into the MS-DOS Operating System.
2. Execute the `75WDT.EXE` binary file.
3. Input `1` to enable the WDT timer or `0` to disable it.
4. Input the number of seconds for the chip countdown and reset the computer.



12.1.2 Introduction:

How to use the Watchdog Timer Demo in different ways:

```
WriteI2CByte(I2CADDR, CONFIG, 0x03); // Set Watchdog Timer function
WriteI2CByte(I2CADDR, WDT_TIMER, timer); // Set Watchdog Timer range from 0-255
WriteI2CByte(I2CADDR, WDT_TIMER_CTL, 0x73); // Enable Watchdog Timer in second and pulse mode
```

Or:

```
WriteI2CByte(I2CADDR, WDT_TIMER_CTL, 0x00);
```

Or:

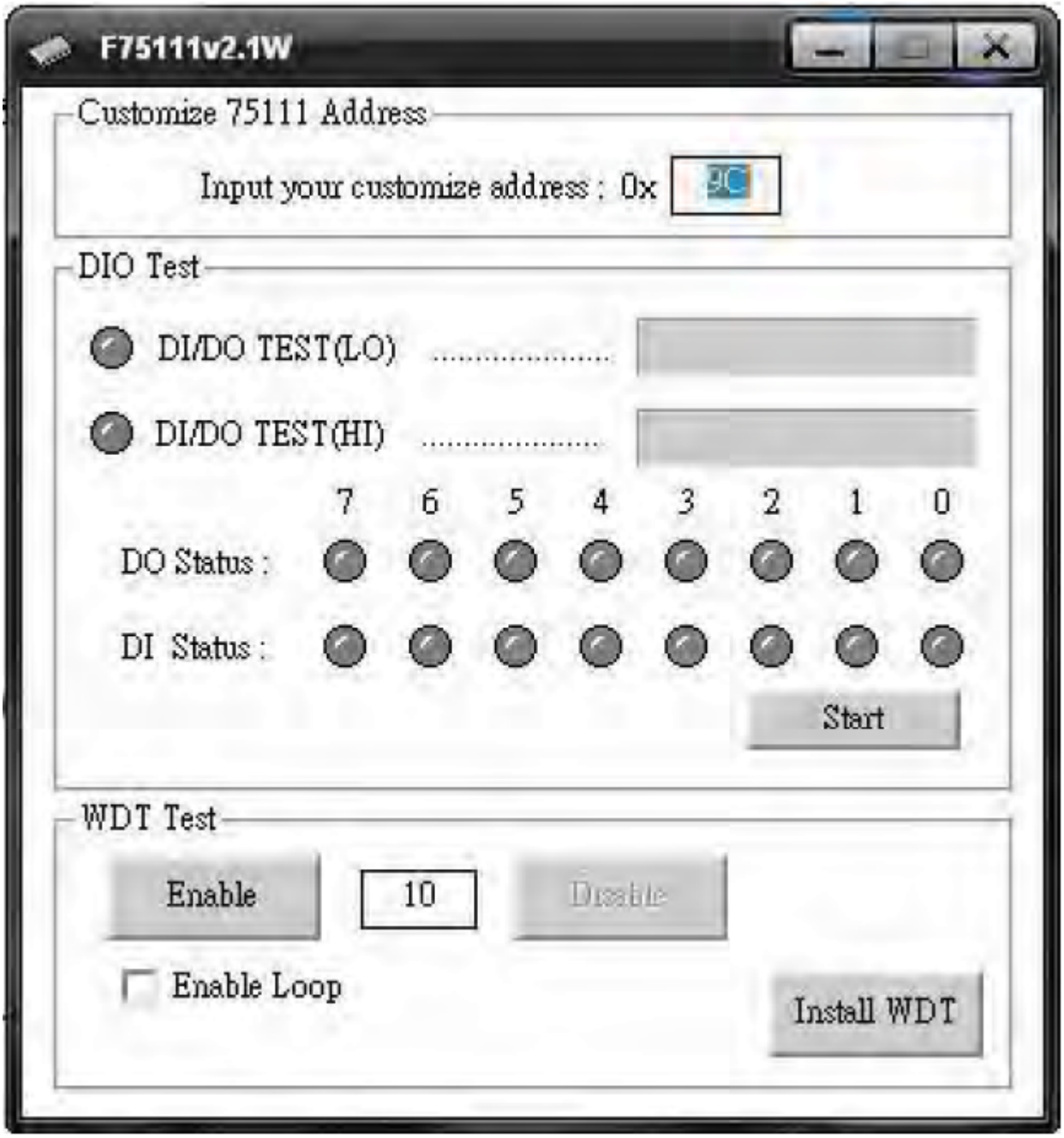
```
void pause(int time) {
    asm mov ah,0h; // Ah = 00 Read System Time Counter
    asm int 1ah;   // Read time from Time Counter and store it in DX register
    asm add dx, time;
    asm mov bx, dx;
label:
    asm int 1ah;
    asm cmp bx, dx;
    asm jne label;
}
```

12.2 Watchdog Timer and DIO under Windows:

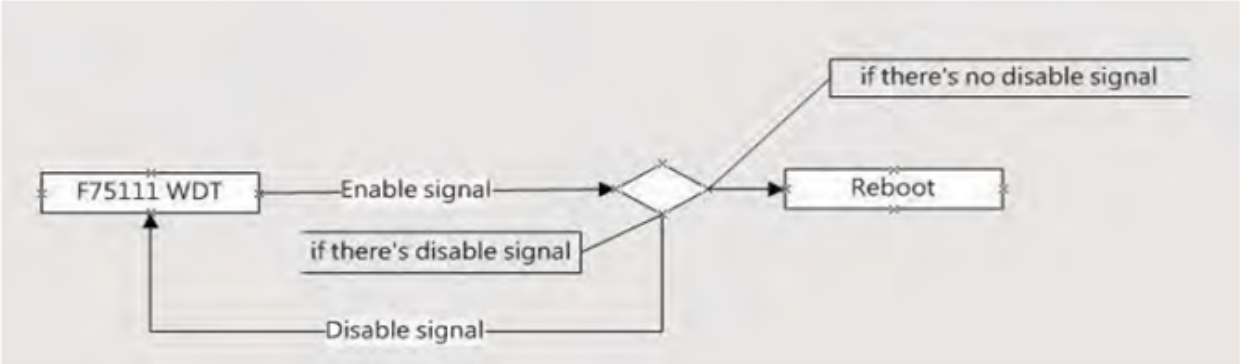
The necessary software resources for programming the watchdog timer can be accessed from the Driver Download section:

- **Source file**: F75111_DIOSrc.rar
- **Binary file**: F75111_DemoBin.rar
- **USERNAME & PASSWORD**: sf

12.2.1 How to Use the Demo Application:



1. Press the `Start` button to test the DIO function.
2. Press the `Enable` button to test the WDT function.
3. Press the `Disable` button to disable the WDT.
4. Check the `Enable Loop` box and press `Enable` to do a WDT loop test.
5. Press `Install WDT` to set the system to autorun this application when booting. Press it again to remove the application from booting. The icon will show when active.



The F75111 will send `F75111_SetWDTEnable(BYTE byteTimer)` including a `timer` parameter. If there's no disable signal (`F75111_SetWDTDisable()`) to stop it before the timer countdown reaches 0, the system will reboot. If a disable signal is received, it will reset the Enable WDT signal to prevent a reboot loop.

12.2.2 Introduction:

Initial Internal F75111 port address (0x9c) Define GPIO1X, GPIO2X, GPIO3X as input or output and enable the WDT function pin.

12.2.3 Set F75111 DI/DO (Sample Code Below to Get Input Value/Set Output Value):

- **DO**: `InterDigitalOutput(BYTE byteValue)`
- **DI**: `InterDigitalInput()`

12.2.4 Enable/Disable WDT:

- **Enable**: `F75111_SetWDTEnable(BYTE byteTimer)`
- **Disable**: `F75111_SetWDTDisable()`

12.2.5 Pulse Mode:

Example to set GP33, 32, 31, 30 output to 1mS low pulse signal:

```
{
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_PULSE_CONTROL, 0x00); // Set low pulse output
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_PULSE_WIDTH_CONTROL, 0x01); // Set pulse width␣
↪to 1mS
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_CONTROL_MODE, 0x0F); // Set GP33, 32, 31, 30 to␣
↪output function
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_Output_Data, 0x0F); // Set GP33, 32, 31, 30␣
↪output data
}
```

12.2.6 Initialize Internal F75111:

```
void F75111::InitInternalF75111() {
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO1X_CONTROL_MODE, 0x00); // Set GPIO1X to input␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_CONTROL_MODE, 0x00); // Set GPIO3X to input␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO2X_CONTROL_MODE, 0xFF); // Set GPIO2X to output␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, F75111_CONFIGURATION, 0x03); // Enable WDT OUT function
}
```

12.2.7 Set Output Value:

```
void F75111::InterDigitalOutput(BYTE byteValue) {
    BYTE byteData = 0;
    byteData = (byteData & 0x01) ? byteValue + 0x01 : byteValue;
    byteData = (byteData & 0x02) ? byteValue + 0x02 : byteValue;
    byteData = (byteData & 0x04) ? byteValue + 0x04 : byteValue;
    byteData = (byteData & 0x80) ? byteValue + 0x08 : byteValue;
    byteData = (byteData & 0x40) ? byteValue + 0x10 : byteValue;
    byteData = (byteData & 0x20) ? byteValue + 0x20 : byteValue;
    byteData = (byteData & 0x10) ? byteValue + 0x40 : byteValue;
    byteData = (byteData & 0x08) ? byteValue + 0x80 : byteValue; // Get value bit by bit
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO2X_OUTPUT_DATA, byteData); // Write byteData value␣
↪via GPIO2X output pin
}
```

12.2.8 Get Input Value:

```
BYTE F75111::InterDigitalInput() {
    BYTE byteGPIO1X = 0;
    BYTE byteGPIO3X = 0;
    BYTE byteData = 0;
    this->Read_Byte(F75111_INTERNAL_ADDR, GPIO1X_INPUT_DATA, &byteGPIO1X); // Get value from GPIO1X
    this->Read_Byte(F75111_INTERNAL_ADDR, GPIO3X_INPUT_DATA, &byteGPIO3X); // Get value from GPIO3X
    byteGPIO1X = byteGPIO1X & 0xF0; // Mask unuseful value
    byteGPIO3X = byteGPIO3X & 0x0F; // Mask unuseful value
    byteData = (byteGPIO1X & 0x10) ? byteData + 0x01 : byteData;
    byteData = (byteGPIO1X & 0x80) ? byteData + 0x02 : byteData;
    byteData = (byteGPIO1X & 0x40) ? byteData + 0x04 : byteData;
    byteData = (byteGPIO3X & 0x01) ? byteData + 0x08 : byteData;
    byteData = (byteGPIO3X & 0x02) ? byteData + 0x10 : byteData;
    byteData = (byteGPIO3X & 0x04) ? byteData + 0x20 : byteData;
    byteData = (byteGPIO3X & 0x08) ? byteData + 0x40 : byteData;
    byteData = (byteGPIO1X & 0x20) ? byteData + 0x80 : byteData; // Get correct DI value from␣
↪GPIO1X & GPIO3X
    return byteData;
}
```

12.2.9 Enable Watchdog:

```
void F75111_SetWDTEnable(BYTE byteTimer) {
    WriteByte(F75111_INTERNAL_ADDR, WDT_TIMER_RANGE, byteTimer); // Set Watchdog range and timer
    WriteByte(F75111_INTERNAL_ADDR, WDT_CONFIGURATION, WDT_TIMEOUT_FLAG | WDT_ENABLE | WDT_PULSE |␣
↪WDT_PSWIDTH_100MS);
    // Enable Watchdog, Setting Watchdog configure
}
```

12.2.10 Disable Watchdog:

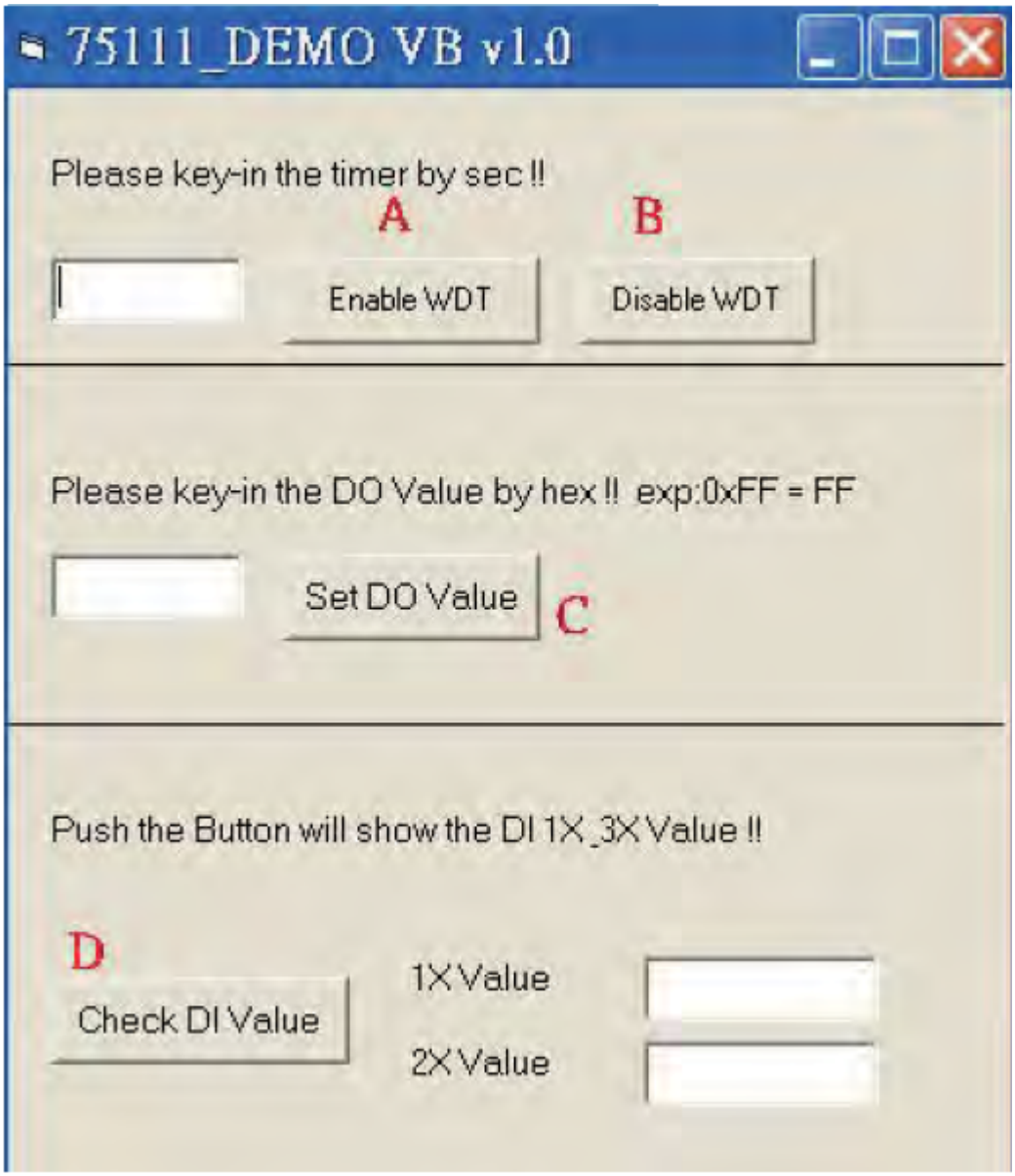
```
void F75111_SetWDTDisable() {
    WriteByte(F75111_INTERNAL_ADDR, WDT_CONFIGURATION, 0x00); // Disable Watchdog
}
```

12.3 IO Device: F75111 VB6 under Windows

The necessary software resources for programming the watchdog timer can be accessed from the Driver Download section:

- **Source file**: 75111_VB_v10.rar
- **Binary file**: 75111_VB_Src.rar111_DemoBin.rar
- **USERNAME & PASSWORD**: sf

12.3.1 How to Use the Demo Application



- **A** Function - Enable WDT timer: Enter the value in seconds, then the system will reboot after the specified time.
- **B** Function - Disable WDT timer: Press the button to clear the WDT timer value.
- **C** Function - Set DO Value: Enter the DO value in hex, then press the button.
- **D** Function - Check DI Value: The two text boxes on the right display DI 1X & 2X values when you press the button.

12.3.2 SDK Function Introduction

Function EnableWDT:

```
Function EnableWDT(timer As Integer)
    Call WriteI2CByte(&H3, &H3)
    Call WriteI2CByte(&H37, timer)
    Call WriteI2CByte(&H36, &H73)
End Function
```

Function DisableWDT:

```
Function DisableWDT()
    Call WriteI2CByte(&H36, &H0)
End Function
```

Function SetDOValue:

```
Function SetDOValue(dovalue As Integer)
    Call WriteI2CByte(&H23, &H0)
    Call WriteI2CByte(&H20, &HFF)
    Call WriteI2CByte(&H2B, &HFF)
    Call WriteI2CByte(&H21, dovalue)
End Function
```

Function CheckDIValue:

```
Function CheckDIValue()
    Dim GPIO1X As Integer
    Dim GPIO3X As Integer
    Dim DI1Xhex As String
    Dim DI3Xhex As String

    Call ReadI2CByte(&H12, GPIO1X)
    Call ReadI2CByte(&H42, GPIO3X)

    DI1Xhex = Hex(GPIO1X)
    DI3Xhex = Hex(GPIO3X)

    Text3.Text = "0x" + DI1Xhex
    Text4.Text = "0x" + DI3Xhex
End Function
```

12.4 Watchdog Timer and DIO under Linux

The necessary software resources for programming the watchdog timer can be accessed from the Driver Download section:

- **Source file**: F75111v2.0L.tar.gz
- **Binary file**: F75111v2.0LBin.tar.gz
- **USERNAME & PASSWORD**: sf

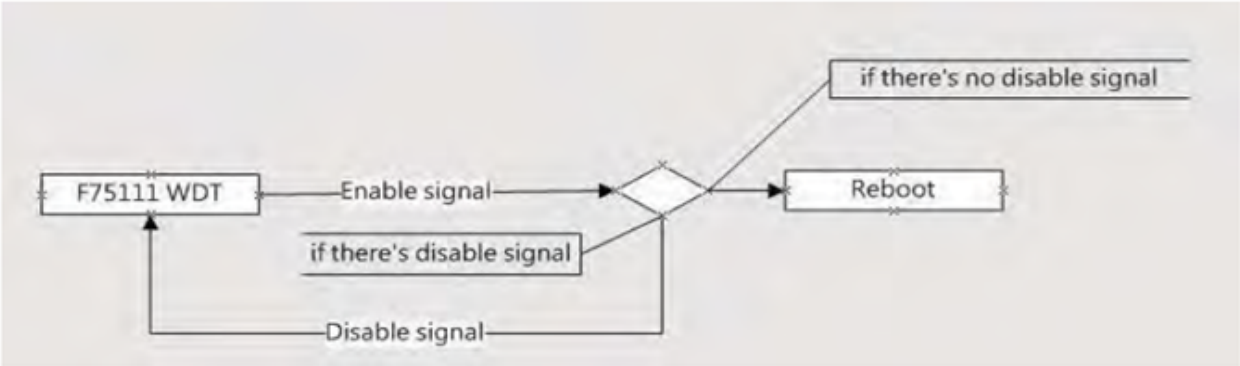
12.4.1 How to Compile the Source Code

1. **Compile with Code::Blocks:**
   - Download and install Code::Blocks with the command `apt-get install codeblocks`.
   - Open the existing project (F75111.cbp) in Code::Blocks and click the compile button.
   - Add the option `pkg-config --libs gtk+-2.0 gthread-2.0` in "Project -> Build Option -> Linker Setting -> Other linker option".
2. **Compile with "make":**
   - Navigate to the F75111 directory: `cd F75111`.
   - Compile the source: `make`.
   - Execute the binary file: `src/f75111`.

12.4.2 How to Use the Demo Application

1. Press the "Start" button to test the DIO function.
2. Press the "Enable" button to test the WDT function.
3. Press the "Disable" button to disable the WDT.
4. Check the "Enable Loop" box and press "Enable" to do a WDT loop test.

5. Press “Install” to set the system to autorun this application at boot, press “Uninstall” to remove it from boot.
6. If WDT is enabled, the system icon will blink.



The F75111 will send `F75111_SetWDTEnable(BYTE byteTimer)` with a parameter `timer`. If no disable signal (`F75111_SetWDTDisable()`) is received before the timer counts down to 0, the system will reboot. If a disable signal is received, it will resend the enable WDT signal to prevent a reboot loop.

12.4.3 Introduction

IO Function in the file SMBus.c:

```
void SMBusIoWrite(BYTE byteOffset, BYTE byteData) {
    outb(byteData, m_SMBusMapIoAddr + byteOffset);
}

BYTE SMBusIoRead(BYTE byteOffset) {
    DWORD dwAddrVal;
    dwAddrVal = inb(m_SMBusMapIoAddr + byteOffset);
    return (BYTE)(dwAddrVal & 0xOFF);
}
```

Init Internal F75111:

```
void F75111::InitInternalF75111() {
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO1X_CONTROL_MODE, 0x00); // Set GPIO1X to Input␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO3X_CONTROL_MODE, 0x00); // Set GPIO3X to Input␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO2X_CONTROL_MODE, 0xFF); // Set GPIO2X to Output␣
↪function
    this->Write_Byte(F75111_INTERNAL_ADDR, F75111_CONFIGURATION, 0x03); // Enable WDT OUT function
}
```

Set Output Value:

```
void F75111::InterDigitalOutput(BYTE byteValue) {
    BYTE byteData = 0;
    byteData = (byteData & 0x01) ? byteValue + 0x01 : byteValue;
    byteData = (byteData & 0x02) ? byteValue + 0x02 : byteValue;
    byteData = (byteData & 0x04) ? byteValue + 0x04 : byteValue;
    byteData = (byteData & 0x80) ? byteValue + 0x08 : byteValue;
    byteData = (byteData & 0x40) ? byteValue + 0x10 : byteValue;
    byteData = (byteData & 0x20) ? byteValue + 0x20 : byteValue;
    byteData = (byteData & 0x10) ? byteValue + 0x40 : byteValue;
    byteData = (byteData & 0x08) ? byteValue + 0x80 : byteValue; // Get value bit by bit
```

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```
    this->Write_Byte(F75111_INTERNAL_ADDR, GPIO2X_OUTPUT_DATA, byteData); // Write byteData value␣
↪via GPIO2X output pin
}
```

Get Input Value:

```
BYTE F75111::InterDigitalInput() {
    BYTE byteGPIO1X = 0;
    BYTE byteGPIO3X = 0;
    BYTE byteData = 0;
    this->Read_Byte(F75111_INTERNAL_ADDR, GPIO1X_INPUT_DATA, &byteGPIO1X); // Get value from GPIO1X
    this->Read_Byte(F75111_INTERNAL_ADDR, GPIO3X_INPUT_DATA, &byteGPIO3X); // Get value from GPIO3X
    byteGPIO1X = byteGPIO1X & 0xF0; // Mask unnecessary value
    byteGPIO3X = byteGPIO3X & 0x0F; // Mask unnecessary value
    byteData = (byteGPIO1X & 0x10) ? byteData + 0x01 : byteData;
    byteData = (byteGPIO1X & 0x80) ? byteData + 0x02 : byteData;
    byteData = (byteGPIO1X & 0x40) ? byteData + 0x04 : byteData;
    byteData = (byteGPIO3X & 0x01) ? byteData + 0x08 : byteData;
    byteData = (byteGPIO3X & 0x02) ? byteData + 0x10 : byteData;
    byteData = (byteGPIO3X & 0x04) ? byteData + 0x20 : byteData;
    byteData = (byteGPIO3X & 0x08) ? byteData + 0x40 : byteData;
    byteData = (byteGPIO1X & 0x20) ? byteData + 0x80 : byteData; // Get correct DI value from␣
↪GPIO1X & GPIO3X
    return byteData;
}
```

Enable WatchDog:

```
void F75111_SetWDTEnable(BYTE byteTimer) {
    WriteByte(F75111_INTERNAL_ADDR, WDT_TIMER_RANGE, byteTimer); // Set WatchDog range and timer
    WriteByte(F75111_INTERNAL_ADDR, WDT_CONFIGURATION, WDT_TIMEOUT_FLAG | WDT_ENABLE | WDT_PULSE |␣
↪WDT_PSWIDTH_100MS);
    // Enable WatchDog, Setting WatchDog configuration
}
```

Disable WatchDog:

```
void F75111_SetWDTDisable() {
    WriteByte(F75111_INTERNAL_ADDR, WDT_CONFIGURATION, 0x00); // Disable WatchDog
}
```