SYS8F377VGA-PICO

(v1.x) Industrial Computer Board

CONTENTS

1 Overview

Thank you for choosing the 8F377-pico, an excellent industrial computer board.

Based on the innovative Intel® Braswell N3000 Series SoC for optimal system effciency, the 8F377-pico supports 2 GB of onboard   DDR3L 1600MHz memory and allows connection to 3 or 2 independent displays with HDMI, DP and LVDS outputs.

With compact design and versatile I/O interfaces, the MS-98H6 provides a low power fanless solution for a wide variety of industrial applications.

Motherboard Specifications

Processor (Optional)

- Intel® Pentium® Processor N3710 (QC/1.6GHz/2.56GHz for Burst/TDP-6W)
- Intel® Celeron® Processor N3160 (QC/1.6GHz/2.24GHz for Burst/TDP-6W)
- Intel® Celeron® Processor N3010 (DC/1.04GHz/2.24GHz for Burst/TDP-4W)

Memory

- Single-channel DDR3L 1600MHz
- Onboard 2GB

LAN

- 1 x Intel® I211-AT Gigabit Fast Ethernet Controller

SATA

- 1 x SATA 6Gb/s Port

Audio

- Realtek® ALC887-VD2-CG HD Audio Codec

Graphics

- HD Graphics integrated in Intel® processor
- Shared system memory up to 1.7 GB SDRAM
- LVDS up to 1920 x 1080 @ 60 Hz
- HDMI1.4b up to 2560 x 1600 @ 60 Hz, 3840 x 2160 @ 30 Hz
- DP1.1a up to 2560 x 1600 @ 60 Hz, 3840 x 2160 @ 30 Hz

Rear Panel I/O

- 2 x USB 3.0 Ports
- 1 x RJ45 GbE LAN Port
- 1 x DisplayPort
- 1 x HDMI Port

Onboard Headers/ Connectors/ Jumpers

- 1 x 4-pin DC Power Connector
- 1 x 2-pin SATA Power Connector
- 1 x System FAN Connector
- 1 x SATA 6Gb/s Port
- 1 x 8-pin USB 2.0 Header (2 ports)
- 1 x LPC Connector
- 1 x RS232/422/485 Serial Port Connector (2 ports)
- 1 x GPIO Connector
- 1 x Front Panel/Front Audio/I2C Connector
- 1 x LVDS Connector
- 1 x LVDS Inverter Connector
- 1 x Clear CMOS Jumper
- 1 x LVDS Power Jumper
- 1 x LVDS Inverter Power Jumper
- 1 x COM Port Power Jumper
- 1 x AT/ATX Select Jumper

Slot

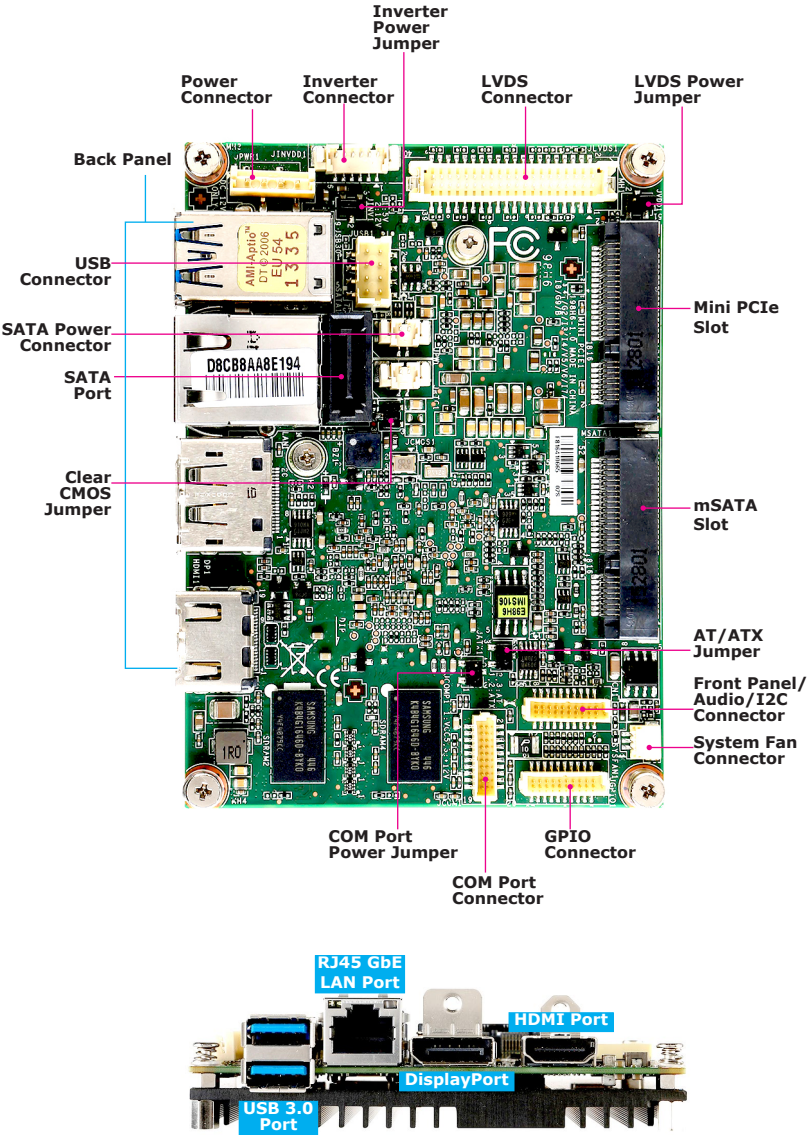- 1 x Half-size Mini-PCIe Slot
- 1 x Full-size mSATA Slot

Form Factor

- Pico-ITX: 100 x 72 mm

Environmental

- Operating Temperature: -10 ~ 60°C
- Storage Temperature: -20 ~ 80°C
- Humidity: 10 ~ 90% RH, non-condensing

Motherboard Layout

Inverter
Power
Jumper

Power
Connector

Inverter
Connector

LVDS
Connector

LVDS Power
Jumper

Back Panel

USB
Connector

SATA Power
Connector

SATA
Port

Clear
CMOS
Jumper

Mini PCIe
Slot

mSATA
Slot

AT/ATX
Jumper

Front Panel/
Audio/I2C
Connector

System Fan
Connector

COM Port
Power Jumper

GPIO
Connector

COM Port
Connector

RJ45 GbE
LAN Port

HDMI Port

DisplayPort

USB 3.0
Port

2 Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.
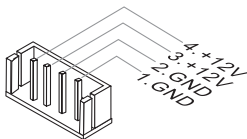
Components Reference Guide

Power Supply

DC-In Power Connector: JPWR1

This connector is used to provide power to the motherboard.

4. +12V
3. +12V
2. GND
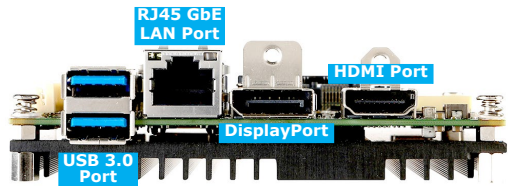1. GND

SATA Power Connector: JPW1

This connector is used to provide power to SATA devices.

1. VCC5
2. GND
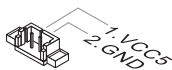
Important

Make sure that all power connectors are connected to the power supply to ensure stable operation of the motherboard.
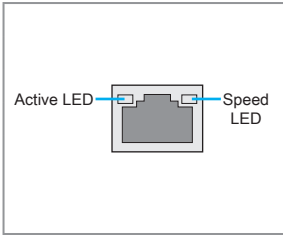
Rear Panel I/O

> ## USB 3.0 Port

The USB 3.0 port is backward-compatible with USB 2.0 devices and supports data transfer rate up to 5 Gbit/s (SuperSpeed).

> ## RJ45 GbE LAN Port

The standard single RJ45 LAN jack is provided for connection to the Local Area Network (LAN). You can connect a network cable to it.

	LED	LED Status	Description
Active LED ——— Speed LED	Active LED	Off	No link
		Yellow	Linked
		Blinking	Data activity
	Speed LED	Off	10 Mbps connection
		Green	100 Mbps connection
		Orange	1 Gbps connection

> ## DisplayPort

DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

> ## HDMI Port

The High-Definition Multimedia Interface (HDMI) is an all-digital audio/video interface capable of transmitting uncompressed streams. HDMI supports all TV format, including standard, enhanced, or high-definition video, plus multi-channel digital audio on a single cable.

Connector

Fan Power Connector: SYSFAN1

The fan power connector supports system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the motherboard has a System Hardware Monitor chipset onboard, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.
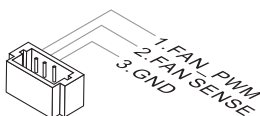
Serial ATA Connector: SATA1

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.
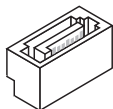
Important

Please do not fold the SATA cable into a 90-degree angle. Otherwise, data loss may occur during transmission.

GPIO Connector: JGPIO1

This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.

20. VCC5F
18. N_GPI7
16. N_GPI6
14. N_GPI5
12. N_GPI4
10. N_GPI3
8. N_GPI2
6. N_GPI1
4. N_GPI0
2. GND

19. VCC5F
17. N_GPO7
15. N_GPO6
13. N_GPO5
11. N_GPO4
9. N_GPO3
7. N_GPO2
5. N_GPO1
3. N_GPO0
1. GND
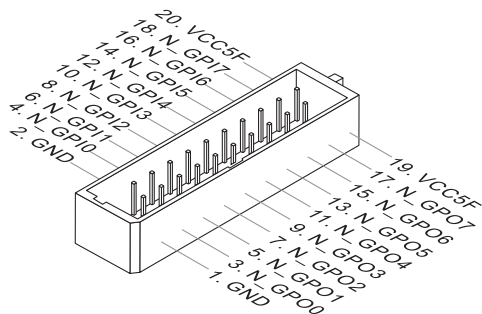
Front Panel/ Audio/ I2C Connector: JFP1/JAUD1/I2C

This front panel connector is provided for electrical connection to the front panel switches & LEDs.

20. AGND
18. SEN_MIC
16. MIC_IN_R_F
14. MIC_IN_L_F
12. GND
10. I2C0_SCL
8. I2C0_SDA
6. PWSW+
4. SLED
2. PLED

19. AGND
17. L_OUT
15. OUT_L_F
13. OUT_R_F
11. GND
9. GND
7. RESET+
5. GND
3. HDD-
1. HDD+
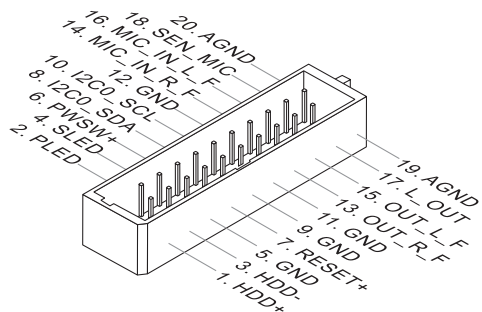
Important

I2C is supported under Windows 7 32/64bit OS only.

RS232/422/485 Serial Port Connector: JCOM1&JCOM2

This connector is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach serial devices to it through the optional serial port bracket.

RS232

PIN		SIGNAL	DESCRIPTION
1	2	DCD	Data Carrier Detect
3	4	SIN	Signal In
5	6	SOUT	Signal Out
7	8	DTR	Data Terminal Ready
9	10	GND	Signal Ground
11	12	DSR	Data Set Ready
13	14	RTS	Request To Send
15	16	CTS	Clear To Send
17	18	VCC_COM1	Voltage select setting by jumper

RS422

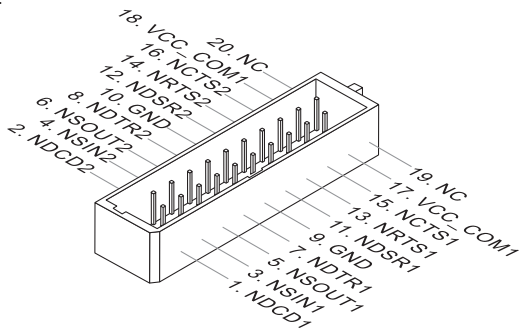| PIN		SIGNAL	DESCRIPTION
1	2	422 TXD-	Transmit Data, Negative
3	4	422 TXD+	Transmit Data, Positive
5	6	422 RXD+	Receive Data, Positive
7	8	422 RXD-	Receive Data, Negative
9	10	GND	Signal Ground
11	12	NC	No Connection
13	14	NC	No Connection
15	16	NC	No Connection
17	18	NC	No Connection

RS485

PIN		SIGNAL	DESCRIPTION
1	2	485 TXD-	Transmit Data, Negative
3	4	485 TXD+	Transmit Data, Positive
5	6	NC	No Connection
7	8	NC	No Connection
9	10	GND	Signal Ground
11	12	NC	No Connection
13	14	NC	No Connection
15	16	NC	No Connection
17	18	NC	No Connection

LVDS Inverter Connector: JINVDD1

The connector is provided for LCD backlight options.

6.GND
5.GND
4.L BKLT CTRL#
3.INV ON
2.JINV_VDD
1.JINV_VDD
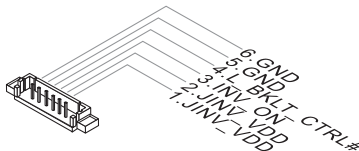
LVDS Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interface flat panel to the JLVDS1, be sure to check the panel datasheet and set the LVDS jumper to proper power voltage.

8.LVDS 6.LCD 2.+12V
12.LVDS_DDC_DATA 4.+12V
10.LVDS_DET VDD
16.LVDSA_DETCT# EN
14.LVDSA_VDD
22.LVDSA_DATA0
20.LVDSA_DATA1
26.LVDSA_18GND
28.LVDSA_24GND
32.LVDSB_DATA#0
34.LVDSB_DATA#2
38.LVDSA_30GND
34.LVDSB_DATA#3
40.LVDSA_CLK
38.LVDSA_GND

1.+12V
3.+LCD_VDD
5.LVDS_VDD
7.LBKLT_PDC_CLK
9.LVDS_DDC_CLK
11.LVDS_B ON
13.LVDSA_DATA1
15.GNDA
17.GNDA
19.LVDSA_DATA#1
21.GND
23.LVDSA_DATA#3
25.GND
27.LVDSB_DATA1
29.LVDSB_GND
31.GND
33.LVDSB_DATA3
35.GND
37.LVDSB_DATA#1
39.LVDSB_CLK
GND
LVDSB_DATA#3
LVDSB_CLK#

Important

Pin 12 is a detect pin. When using a customized LVDS cable, pin 12 should be a signal ground with a low impedance. Otherwise, LVDS will not function.

USB 2.0 Header: JUSB1

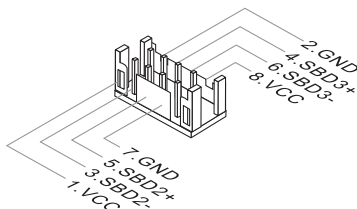This connector, compliant with Intel I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems and the like.

2. GND
4. SBD3+
6. SBD3-
8. VCC

7. GND
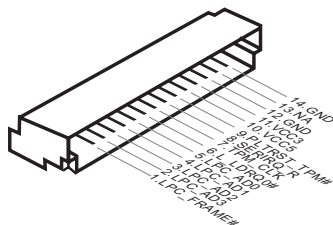5. SBD2+
3. SBD2-
1. VCC

Important

Note that the pins of VCC and GND must be connected correctly to avoid possible damage.

LPC Debug Port Connector: JDP1

This connectoris LPC debug port.

14. GND
13. NA
12. GND
11. VCC3
10. VCC3
9. PLTRST_TPM#
8. SERIRQ
7. PLTRST#
6. LPC_CLK
5. PM_PWROK
4. LPC_LDRQ0#
3. LPC_ADD0
2. LPC_ADD1
1. LPC_ADD3
1. LPC_FRAME#

Jumper

Important

Avoid adjusting jumpers when the system is on; it will damage the motherboard.

Clear CMOS Jumper: JCMOS1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

Normal   Clear CMOS

Important

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the motherboard.

AT/ATX Select Jumper: JATX1

This jumper allows users to select between AT and ATX power.

ATX   AT

Serial Port Power Jumper: JCOMP1&JCOMP2

The jumper specifies the operation voltage of the specified serial port.

VCC5   +12V

LVDS Power Jumper: JVDD1

Use this jumper to specify the operation voltage of the LVDS display.

VCC3   VCC5

LVDS Inverter Power Jumper: JINV1

Use this jumper to specify the operation voltage of the LVDS inverter.

VCC5   +12V

Slot

Mini-PCIe (Peripheral Component Interconnect Express) Slot

The Mini-PCIe slot is provided for mSATA devices, WiFi modules, Bluetooth modules, TV tuner cards and other Mini-PCIe cards.
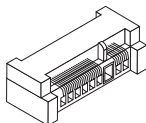
Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

▸**USB from S3/S4**

The item allows the activity of the USB device to wake up the system from S3/S4 sleep state.

▸**RTC**

When [Enabled], your can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

Appendix
WDT & GPIO

This appendix provides the sample codes of WDT (Watch Dog Timer) and GPIO (General Purpose Input/ Output).

WDT Sample Code

```
SIO_INDEX_Port      equ 04Eh
SIO_DATA_Port       equ 04Fh
SIO_UnLock_Value    equ 087h
SIO_Lock_Value      equ 0AAh
WatchDog_LDN        equ 007h
WDT_UNIT            equ  60h    ;60h=second, 68h=minute, 40h=Disabled Watchdog timer
WDT_Timer           equ  30     ;ex. 30 seconds

Sample code:
;Enable config mode
    mov     dx, SIO_INDEX_Port
    mov     al, SIO_UnLock_Value
    out     dx, al
    jmp     short $+2               ;Io_delay
    jmp     short $+2               ;Io_delay
    out     dx, al
;Change to WDT
    mov     dx, SIO_INDEX_Port
    mov     al, 07h
    out     dx, al
    mov     dx, SIO_DATA_Port
    mov     al, WatchDog_LDN
    out     dx, al
;Acive WDT
    mov     dx, SIO_INDEX_Port
    mov     al, 30h
    out     dx, al
    mov     dx, SIO_DATA_Port
    in      al, dx
    or      al, 01h
    out     dx, al
 ;set timer
    mov     dx, SIO_INDEX_Port
    mov     al, 0F6h
    out     dx, al
    mov     dx, SIO_DATA_Port
    mov     al, WDT_Timer
    out     dx, al
;set UINT
    mov     dx, SIO_INDEX_Port
    mov     al, 0F5h
    out     dx, al
    mov     dx, SIO_DATA_Port
    mov     al, WDT_UNIT
    out     dx, al
;enable reset
    mov     dx, SIO_INDEX_Port
    mov     al, 0FAh
    out     dx, al
    mov     dx, SIO_DATA_Port
    in      al, dx
    or      al, 01h
    out     dx, al
;close config mode
    mov     dx, SIO_INDEX_Port
    mov     al, SIO_Lock_Value
    out     dx, al
```

GPIO Sample Code

- GPI 0 ~ GPI 7

	GPI 0	GPI 1	GPI 2	GPI 3	GPI 4	GPI 5	GPI 6	GPI 7
IO Address								
SIO GPIO Register	A2h	A2h	A2h	A2h	A2h	A2h	A2h	A2h
Bit	0	1	2	3	4	5	6	7
Sample code	#1							

- GPO 0 ~ GPO 7

	GPO 0	GPO 1	GPO 2	GPO 3	GPO 4	GPO 5	GPO 6	GPO 7
IO Address								
SIO GPIO Register	89h	89h	89h	89h	89h	89h	89h	89h
Bit	0	1	2	3	4	5	6	7
Sample code	#2							

```
SIO_INDEX_Port        equ    04Eh
SIO_DATA_Port         equ    04Fh
SIO_UnLock_Value      equ    087h
SIO_Lock_Value        equ    0AAh
SIO_LDN_GPIO          equ    06h
SIO_GPIO_Data         equ    089h
SIO_GPIO_Status       equ    0A2h
GPI_0                 equ    00000001b
GPO_0                 equ    00000001b
```

Sample Code:

#1 : Get GPI 0 status

```
; Enable config mode
mov     dx, SIO_INDEX_Port
mov     al, SIO_UnLock_Value
out     dx, al
jmp     short $+2            ;Io_delay
jmp     short $+2            ;Io_delay
out     dx, al
; Switch GPIO Configuration for SIO LDN 0x06
mov     dx, SIO_INDEX_Port
mov     al, 07h
out     dx, al
mov     dx, SIO_DATA_Port
mov     al, SIO_LDN_GPIO
out     dx, al
; Get GPI 0 Pin Status Register
```

```
mov     dx, SIO_INDEX_Port
mov     al, SIO_GPIO_Status
out     dx, al
mov     dx, SIO_DATA_Port
in      al, dx                  ;al bit0 = GPI 0 status
; Exit SIO
mov     dx, SIO_INDEX_Port
mov     al, SIO_Lock_Value
out     dx, al


#2 : Set GPO 0 to high
; Enable config mode
mov     dx, SIO_INDEX_Port
mov     al, SIO_UnLock_Value
out     dx, al
jmp     short $+2               ;Io_delay
jmp     short $+2               ;Io_delay
out     dx, al
; Switch GPIO Configuration for SIO LDN 0x06
mov     dx, SIO_INDEX_Port
mov     al, 07h
out     dx, al
mov     dx, SIO_DATA_Port
mov     al, SIO_LDN_GPIO
out     dx, al
; Set GPO 0 Register
mov     dx, SIO_INDEX_Port
mov     al, SIO_GPIO_Data
out     dx, al
mov     dx, SIO_DATA_Port
in      al, dx
and     al, not GPO_0
or      al, GPO_0
out     dx, al
; Exit SIO
mov     dx, SIO_INDEX_Port
mov     al, SIO_Lock_Value
out     dx, al
```