# User's Manual
# ΣYG-S7G2-MDK

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# 1.0 ΣyG-S7G2 Modular Development Kit (MDK) Overview

### 1.1 Introduction

The Future Designs, Inc. ΣyG$^{TM}$ Family provides a complete and qualified Graphical User Interface (GUI) / Human Machine Interface (HMI) platform for the rapid release of customer products. The core of ΣyG (pronounced, "sig") is Renesas Synergy$^{TM}$ – a comprehensive and integrated software-based microcontroller platform. FDI adds the Synergy platform to its GUI hardware, systems and production expertise. The end result is a sum of high-quality products that provide a robust and proven source for GUI and HMI solutions:

**ΣyG = Renesas <u>S</u>ynergy+ <u>GUI</u>**

The ΣyG-S7G2 Modular Development Kit for the System on Module is the gateway for beginning Renesas Synergy$^{TM}$ projects. The ΣyG-S7G2 Modular Development Kit is compatible with FDI's ΣyG Modular Development LCD Kits but can be used independently as a lower cost option for those embedded applications without the need for a touch screen display. FDI offers low cost customization services for customer specific hardware, software or packaging applications at volumes of 500 units or more.

### 1.2 ESD Warning

The ΣYG-S7G2-MDK is shipped in a protective anti-static package. Do not subject the module to high electrostatic potentials. Exposure to high electrostatic potentials may cause damage to the boards that will not be covered under warranty. General practice for working with static sensitive devices should be followed when working with the kit.

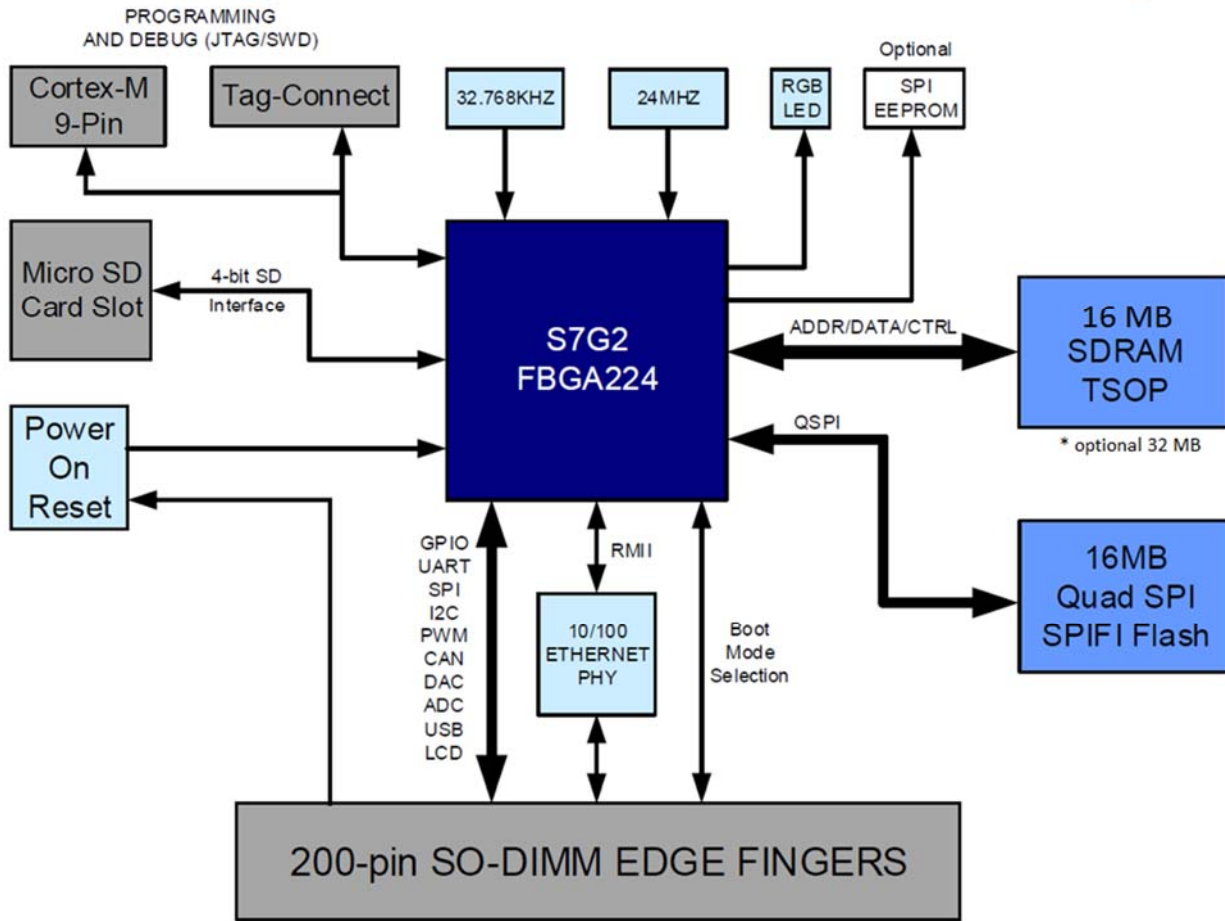## 1.3 Renesas Synergy S7G2 Microcontoller Block Diagram



**Figure 1: S7G2 System Block Diagram**

### 1.4 ΣyG-S7G2 SOM System Block Diagram
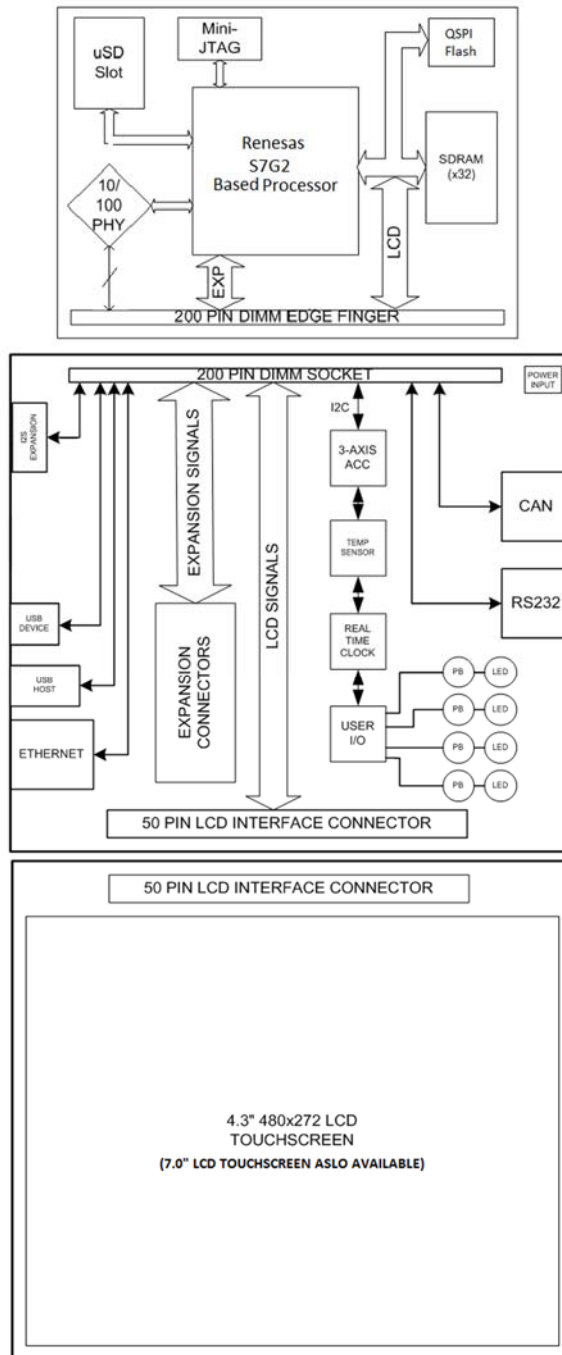


**Figure 2: ΣYG-S7G2 Kit Block Diagram (4.3" display shown)**

### 1.5 Requirements

The ΣYG-S7G2-MDK requires a carrier board with a 200-pin SO-DIMM socket. The socket should have the key at the 1.8V location. The CARRIER Board from Future Designs provides this socket and should be utilized to develop your application for initial verification. Each ΣyG development kit includes:

- ΣyG-S7G2 System on Module (SOM)
- Renesas Synergy Software Platform
- Carrier Board
- 5 VDC, 2.3A North American Power Supply
- USB and Ethernet Cables
- Segger ARM Cortex-M Mini-JTAG debugger and cables
- Optional LCD Carrier Board
- Optional 4.3" or 7.0″ PCAP Touch Screen LCD

### 1.6 ΣyG-S7G2 SOM Power Requirements

The power requirement for the ΣYG-S7G2-MDK is 5V DC Center Positive 2A Power Supply.

## 2.0 Getting Started

### 2.1 Setting up the Hardware

The SOMDIMM should be inserted into the DIMM Socket as shown below and then locked into place by pushing down to the Carrier Board. Ensure the SOMDIMM is inserted completely into the socket prior to locking. The socket utilized on the CARRIER Board is rated for a minimum of 25 insertions.
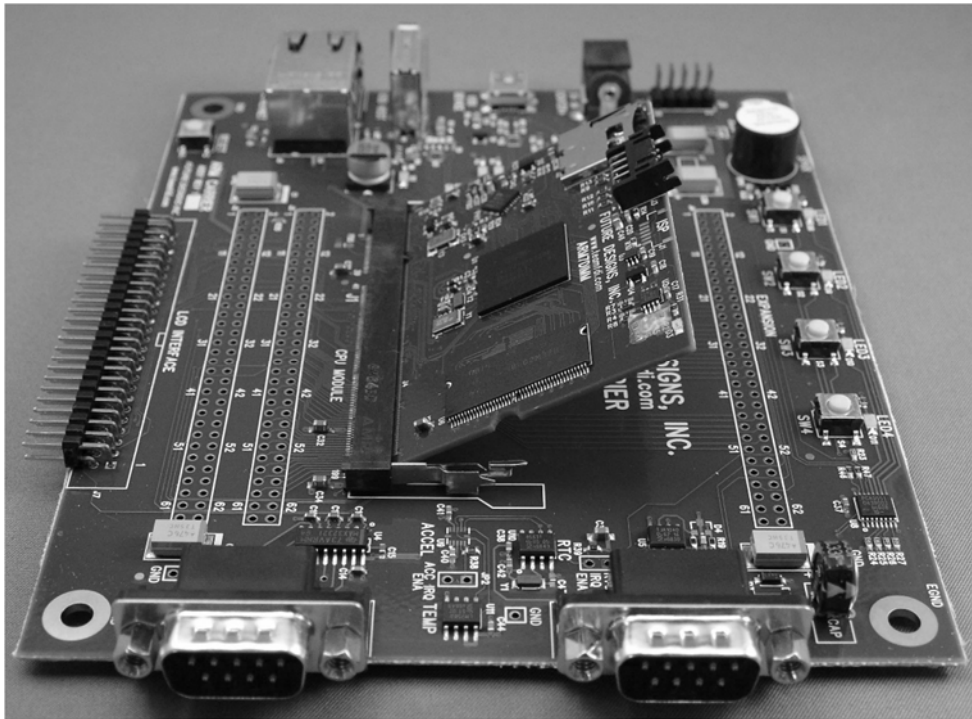
**Figure 3: SOMDIMM Insertion**

The following are step by step instructions for setting up the hardware.
1) Make sure you have a SOMDIMM board plugged into the CARRIER board at J1.
2) Verify the LCD Interface ribbon cable connects the LCD CARRIER board to the CARRIER (J7) board.
3) With the power off, plug the 5V center-positive Power Supply into 5V (P5) of the CARRIER board.
4) Connect an RJ-45 Ethernet cable to the ETHERNET (J5) interface of the CARRIER board.
5) Plug in a female-to-female DB9 serial cable between PC and RS232 (P4) on the CARRIER board.
6) Insert the microSD card with the demonstration files (included) into microSD connector on the SOMDIMM.

### 2.2 Demonstration Software

Connect the ΣYG-S7G2-MDK boards to your PC and set a static IP address on the PC to be on the same network. Once connected, the ΣYG-S7G2-MDK demonstration software will deliver you to a web page at the address http://192.168.0.180. Use the 7 ThreadX tasks outlined on the web page to update the system variables.
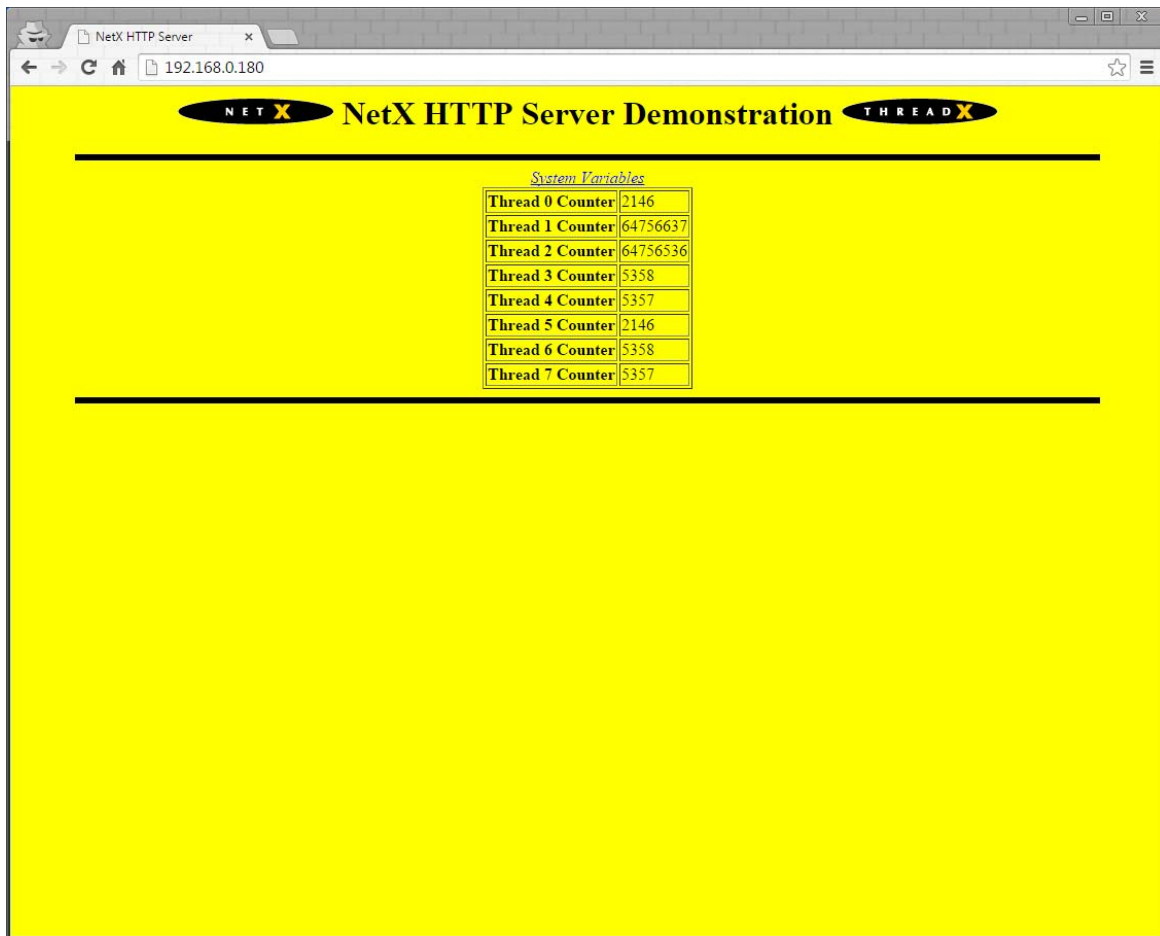
**Figure 4: ThreadX ΣYG-S7G2-MDK Demonstration**

### 2.3  uEZ Doxygen Online HTML Documentation

**µEZ®** has built-in comment documentation that follows the Doxygen comment standard.

This standard allows for code comments and annotations to be written in a certain manner, and then compiled along with source code into HTML documentation.

FDI provides the pre-compiled HTML documentation at this link: http://www.teamfdi.com/uez/docs/

In the uEZ source code, "uEZ/uEZDoxyfile" is the main project file for the Doxygen generator. When Doxygen is recompiled, the new Doxygen files will be found here: uEZ\Docs\Doxygen_Documentation.html

FDI will update the documentation roughly with each new **µEZ®** release or as new drivers are added to the system.

For more information, see the Doxygen website: http://www.doxygen.org/

# 3.0 ΣyG-S7G2 SOM System on Module Board Components

### 3.1 ARM Mini-JTAG J2

The ΣyG-S7G2 SOM uses a JTAG connector based on a 2mm header. This smaller connector provides 100% of the functionality of the standard 20-pin JTAG connector, but utilizes 70% less board space.

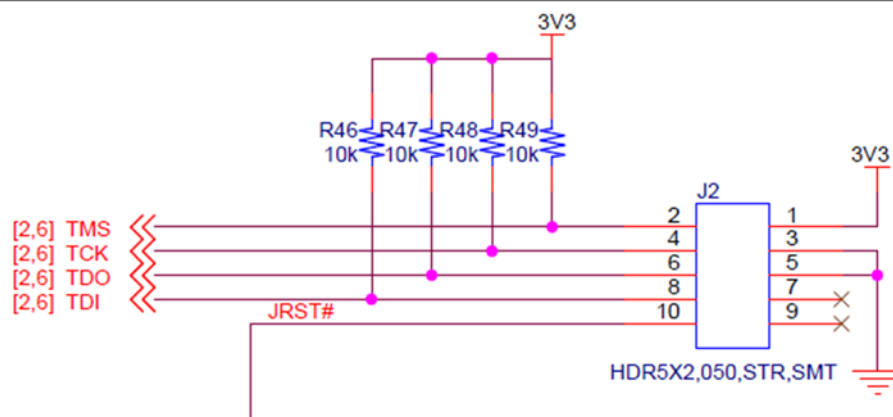| Pin Number | Description | Pin Number | Description |
|:---:|:---:|:---:|:---:|
| 1 | VCC | 6 | TDO |
| 2 | TMS | 7 | X |
| 3 | GND | 8 | TDI |
| 4 | TCK | 9 | GND |
| 5 | GND | 10 | JST# |



**Figure 5: ARM Mini JTAG**

### 3.2 Tag Connect J7

Use the Tag Connect 10-pin cable to program and JTAG the ΣyG-S7G2 SOM using a Segger J-Link device.

Cable: http://www.tag-connect.com/tc2050-arm2010
Cable: http://www.tag-connect.com/TC2050-IDC-NL
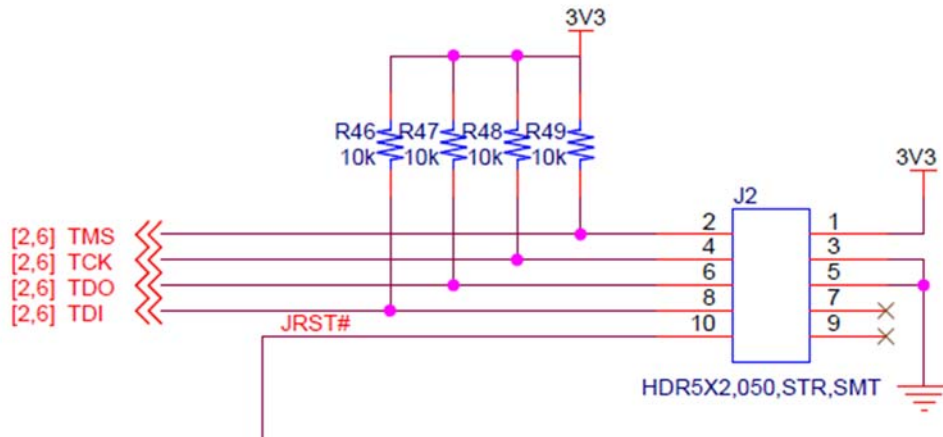
**Figure 6: Tag-Connect JTAG**

### 3.3 MicroSD Socket J1

The ΣyG-S7G2 SOM utilizes a microSD for flexible mass storage. MicroSD flash cards are common, cost effective, and provides a large amount of user-changeable memory.

| Pin Number | Description |
|---|---|
| 1 | DAT2/RSV |
| 2 | CD_DAT3/CS# |
| 3 | CMD/SDI |
| 4 | VDD |
| 5 | CLK/SCLK |
| 6 | VSS |
| 7 | DAT0/SDO |
| 8 | DAT1/RSV |
| 9 | CD |

The microSD card must be removed using the spring loaded "push-pull" mechanism on the microSD socket. Forceful removal of a microSD card will result in permanent damage to the socket that is not covered under warranty. To insert the card, push it into the socket until a "click" sound is heard. Similarly, to remove the card, push the card into the socket. The push-

pull mechanism will "click" again and eject the card from the socket. The card is now available for safe removal.

### 3.3.1  Inserting the microSD card into the microSD socket

| | |
|---|---|
| First, prepare to insert the microSD card into the socket by positioning it with its text facing up. Position the ridge, or "lip", of the card furthest from the socket.<br> | Next, partially insert the card into the socket.<br> |
| Then, use your figure to gently push the card into the socket. When the card "clicks" into place it is in its final, locked position. The card is now ready for use.<br> | Note: Once the microSD card is fully inserted it should not fall out, even if the unit is shaken vigorously.<br> |
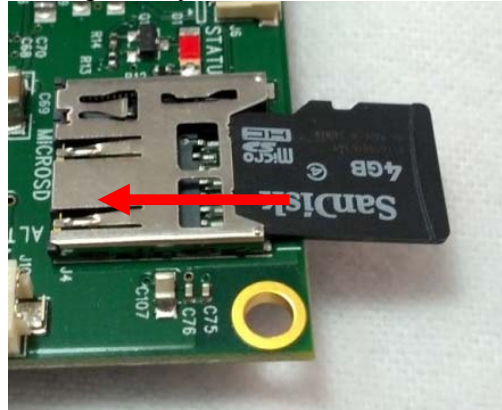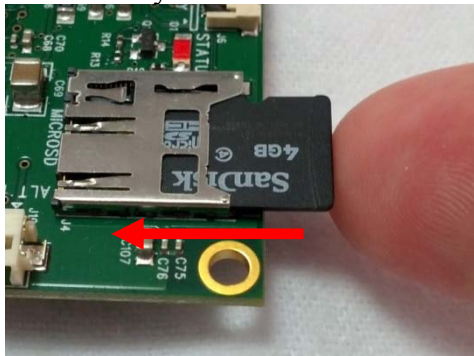
### 3.3.2    Removing the microSD card from the microSD socket

| | |
|---|---|
| Begin to remove the microSD card by gently pushing the card into the socket. The socket will "click" and eject the card. | Once the microSD card is ejected, it will partially extend out from the socket. |
| Carefully grab the ridged edge or sides of the microSD card to gently pull it out. | The microSD card is now fully removed from the socket. |
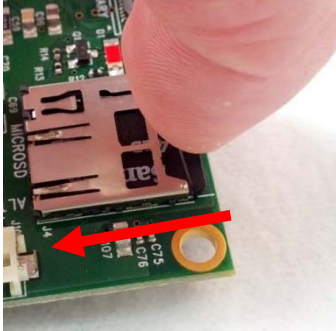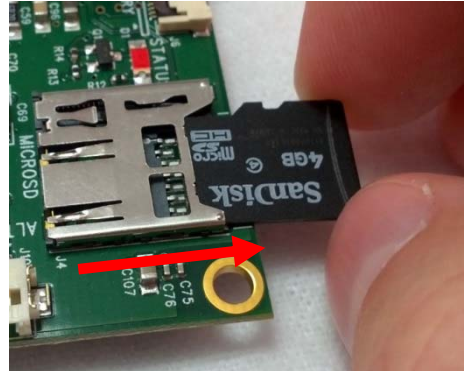
## 3.4  Ethernet PHY U5

The ΣyG-S7G2 SOM provides an Ethernet PHY from SMSC, LAN8720. The LAN8720 is a single chip solution for a 100BASE-TX/10BASE-T physical layer transceiver. It has support for reduced MII (RMII), and HP MDI-X auto crossover allowing for any standard Ethernet cable to be used, even a crossover cable. The LAN8720 is fully compliant to IEEE 802.3u with support for auto-negotiation and manual selection of 10/100Mbps speed as well as full and half-duplex modes.

### 3.5  200-pin SOMDIMM Connector Details J4

| Pin | SOMDIMM Signal Name | Application Details | I/O | SOMDIMM Connection Details |
|-----|---------------------|--------------------|----|----------------------------|
| 1 | ETH_TXP | Ethernet Transmit Positive | O | Output from KSZ8041 Ethernet PHY |
| 2 | ETH_RXP | Ethernet Receive Positive | I | Output from KSZ8041 Ethernet PHY |
| 3 | ETH_TXN | Ethernet Transmit Negative | O | Input to KSZ8041 Ethernet PHY |
| 4 | ETH_RXN | Ethernet Receive Negative | I | Input to KSZ8041 Ethernet PHY |
| 5 | 3V3A | 3.3V Analog | P | Analog 3.3V Output from PHY Circuit |
| 6 | GND | Ground | P | |
| 7 | ETH_LED0 | Ethernet LED0 | O | Ethernet LED0 output from KSZ8041 |
| 8 | ETH_LED1 | Ethernet LED1 | O | Ethernet LED1 output from KSZ8041 |
| 9 | VBAT_IN | Vdd Battery Input | P | Vdd for battery backup of internal RTC |
| 10 | NC | Not Connected | U | |
| 11 | RSTIN# | Reset Input | I | Reset input to POR IC TPS3801 |
| 12 | RST# | | O | Reset output from POR circuit |
| 13 | GPIO13_USB_ID | | | |
| 14 | NC | Not connected | U | |
| 15 | NC | Not connected | U | |
| 16 | NC | Not connected | U | |
| 17 | NC | Not connected | U | |
| 18 | NC | Not connected | U | |
| 19 | NC | Not connected | U | |
| 20 | NC | Not connected | U | |
| 21 | AVCC | | | |
| 22 | AVCC | | | |
| 23 | AVSS | | | |
| 24 | GND | Ground | P | |
| 25 | GPIO25_LCDPWR | LCD Power Enable | O | Connected to S7G2 Port 2 bit 0 |
| 26 | GPIO26_LCDLE | LCD Latch Enable | O | Connected to S7G2 Port 2 bit 1 |
| 27 | GPIO27_LCDCLK | LCD Clock | O | Connected to S7G2 Port 2 bit 2 |
| 28 | GPIO28_LCDFP | | O | Connected to S7G2 Port 2 bit 3 |
| 29 | GPIO29_LCDEN | | O | Connected to S7G2 Port 2 bit 4 |
| 30 | GPIO30_LCDLP | | O | Connected to S7G2 Port 2 bit 5 |
| 31 | GPIO31_LCDVDR4 | LCD Data Bit 4 | O | Connected to S7G2 Port 2 bit 6 |
| 32 | GPIO32_LCDVDR5 | LCD Data Bit 5 | O | Connected to S7G2 Port 2 bit 7 |
| 33 | GPIO33_LCDVDR6 | LCD Data Bit 6 | O | Connected to S7G2 Port 2 bit 8 |
| 34 | GPIO34_LCDVDR7 | LCD Data Bit 7 | O | Connected to S7G2 Port 2 bit 9 |
| 35 | GPIO35_SSLB2 | GPIO | U | Connected to S7G2 Port 2 bit 10 |
| 36 | GPIO36 | GPIO | U | Connected to S7G2 Port 2 bit 11 |
| 37 | 3.3V | 3.3V Power | P | |
| 38 | GND | Ground | P | |
| 39 | 3.3V | 3.3V Power | P | |
| 40 | GND | Ground | P | |
| 41 | USBH_DP | USB Host Data Positive | B | Connected to S7G2 USB Port A D+ |
| 42 | USBD_DP | USB Device Data Postive | B | Connected to S7G2 USB Port B D+ |
| 43 | USBH_DM | USB Host Data Negative | B | Connected to S7G2 USB Port A D- |
| 44 | USBD_DM | USB Device Data Negative | B | Connected to S7G2 USB Port B D- |
| 45 | GPIO45_LCD_B2 | | | |
| 46 | GPIO46_LCD_B3 | | | |
| 47 | GPIO47_RD | GPIO / CAN Receive Data | I | Connected to S7G2 Port 0 bit 0 |
| 48 | GPIO48_TD | GPIO / CAN Transmit Data | O | Connected to S7G2 Port 0 bit 1 |
| 49 | GPIO49 | GPIO | B | Connected to S7G2 Port 0 bit 2 |
| 50 | NC | Not connected | U | |
| 51 | GPIO51_SPCK | | | |
| 52 | GPIO52 | | | |
| 53 | GPIO53_MISO | | | |

| Pin | SOMDIMM Signal Name | Application Details | I/O | SOMDIMM Connection Details |
|-----|---------------------|---------------------|-----|----------------------------|
| 54 | GPIO51_SPCK | | | |
| 55 | GPIO55 | | | |
| 56 | GPIO56_MOSI | | | |
| 57 | GPIO57_TXD | GPIO / Serial Transmit Data – For RS232 | O | Connected to S7G2 Port 0 bit 10 |
| 58 | GPIO58_RXD | GPIO / Serial Receive Data – For RS232 | I | Connected to S7G2 Port 0 bit 11 |
| 59 | NC | Not connected | U | DO NOT USE! |
| 60 | GPIO60_USBD_UPLED | GPIO / USB Device Up LED | O | Connected to S7G2 Port 0 bit 13 |
| 61 | GPIO61_USBD_CON | GPIO / USB Device Connect | O | Connected to S7G2 Port 0 bit 14 |
| 62 | GPIO62_RSCK | GPIO / SPI Clock | O | Connected to S7G2 Port 0 bit 15 |
| 63 | GPIO63 | GPIO | O | Connected to S7G2 Port 0 bit 16 (used for EEPROM CS) |
| 64 | GPIO64_MISO | GPIO / SPI MISO | I | Connected to S7G2 Port 0 bit 17 |
| 65 | GPIO65_MOSI | GPIO / SPI MOSI | O | Connected to S7G2 Port 0 bit 18 |
| 66 | GPIO66 | | | |
| 67 | GPIO67 | | | |
| 68 | GPIO68_USBH_OVC | GPIO / USB Host Over Current | I | Connected to S7G2 Port 0 bit 21 |
| 69 | GPIO69_TPIRQ | GPIO / Touch IC IRQ Input | I | Connected to S7G2 Port 0 bit 22 |
| 70 | GPIO70_AD0.0 | GPIO / AD0 Bit 0 | I | Connected to S7G2 Port 0 bit 23 |
| 71 | GPIO71_AD0.1 | GPIO / AD0 Bit 1 | I | Connected to S7G2 Port 0 bit 24 |
| 72 | GPIO72_AD0.2 | GPIO / AD0 Bit 2 | I | Connected to S7G2 Port 0 bit 25 |
| 73 | GPIO73_AD0.5_DA1 | GPIO / AD0 Bit 3 | I | Connected to S7G2 Port 0 bit 26 |
| 74 | GPIO74_SDA | GPIO / User IO I2C Bus SDA | B | Connected to S7G2 Port 0 bit 27 |
| 75 | GPIO75_SCL | GPIO / User IO I2C Bus SCL | O | Connected to S7G2 Port 0 bit 28 |
| 76 | GND | Ground | P | |
| 77 | GND | Ground | P | |
| 78 | GPIO78_ACC_IRQ | GPIO / Accelerometer IRQ | I | Connected to S7G2 Port 1 bit 2 |
| 79 | NC | | | |
| 80 | GPIO80_RTC_IRQ | GPIO / RTC IRQ Input | I | Connected to S7G2 Port 1 bit 5 |
| 81 | NC | Not connected | U | |
| 82 | NC | Not connected | U | |
| 83 | NC | Not connected | U | |
| 84 | NC | Not connected | U | |
| 85 | NC | Not connected | U | |
| 86 | GPIO86_LED_BR | | | |
| 87 | GPIO87_USBH_PPWR | GPIO / USB Host Power Ctl | O | Connected to S7G2 Port 1 bit 19 |
| 88 | GPIO88_LCD_G2 | LCD Data Bit 10 | O | Connected to S7G2 Port 1 bit 20 |
| 89 | GPIO89_LCD_G3 | LCD Data Bit 11 | O | Connected to S7G2 Port 1 bit 21 |
| 90 | GPIO90_LCD_G4 | LCD Data Bit 12 | O | Connected to S7G2 Port 1 bit 22 |
| 91 | GPIO91_LCD_G5 | LCD Data Bit 13 | O | Connected to S7G2 Port 1 bit 23 |
| 92 | GPIO92_LCD_G6 | LCD Data Bit 14 | O | Connected to S7G2 Port 1 bit 24 |
| 93 | GPIO93_LCD_G7 | LCD Data Bit 15 | O | Connected to S7G2 Port 1 bit 25 |
| 94 | GPIO94_LCD_B4 | LCD Data Bit 16 | O | Connected to S7G2 Port 1 bit 26 |
| 95 | GPIO95_LCD_B5 | LCD Data Bit 17 | O | Connected to S7G2 Port 1 bit 27 |
| 96 | GPIO96_LCD_B6 | LCD Data Bit 22 | O | Connected to S7G2 Port 1 bit 28 |
| 97 | GPIO97_LCD_B& | LCD Data Bit 23 | O | Connected to S7G2 Port 1 bit 29 |
| 98 | GPIO98_USBD_VBUS | USB Device VBus Sense Input | I | Connected to S7G2 Port 1 bit 30 |
| 99 | GPIO99_AD0 | | | |
| 100 | NC | Not connected | B | Unused |
| 101 | GND | Ground | P | |
| 102 | GND | Ground | P | |
| 103 | NC | Not connected | U | Unused |
| 104 | NC | Not connected | U | Unused |
| 105 | NC | Not connected | U | Unused |

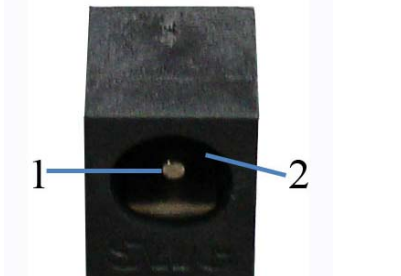| Pin | SOMDIMM Signal Name | Application Details | I/O | SOMDIMM Connection Details |
|-----|--------------------|--------------------|-----|----------------------------|
| 106 | NC | Not connected | U | Unused |
| 107 | NC | Not connected | U | Unused |
| 108 | NC | Not connected | U | Unused |
| 109 | NC | Not connected | U | Unused |
| 110 | NC | Not connected | U | Unused |
| 111 | NC | Not connected | U | Unused |
| 112 | NC | Not connected | U | Unused |
| 113 | 5V0 | 5.0V Power | P | |
| 114 | 5V0 | 5.0V Power | P | |
| 115 | NC | Not connected | U | Unused |
| 116 | GPIO116 | GPIO | B | Connected to S7G2 Port 2 bit 14 / VOL_UD |
| 117 | GPIO117 | GPIO | B | Connected to S7G2 Port 2 bit 15 / AMP_MODE |
| 118 | GPIO118 | GPIO | B | Connected to S7G2 Port 2 bit 19 / RS485 Ren |
| 119 | GPIO119 | GPIO | B | Connected to S7G2 Port 2 bit 21 / RS485 DE |
| 120 | GPIO120 | GPIO | B | Connected to S7G2 Port 2 bit 22 |
| 121 | GPIO121 | GPIO | B | Connected to S7G2 Port 2 bit 23 |
| 122 | GPIO122 | GPIO | B | Connected to S7G2 Port 2 bit 25 |
| 123 | GPIO123_SPKR_DA0 | GPIO | O | Connected to S7G2 Port 2 bit 26 / SPEAKER OUTPUT |
| 124 | GPIO124 | GPIO | B | Connected to S7G2 Port 2 bit 27 |
| 125 | GPIO125 | | | |
| 126 | GPIO126 | | | |
| 127 | GPIO127_LCD_R2 | | | |
| 128 | GPIO128_LCD_R3 | | | |
| 129 | GND | Ground | P | |
| 130 | GND | Ground | P | |
| 131 | GPIO131_LCD18B | | | |
| 132 | GPIO132_LCD19B | | | |
| 133 | GPIO133_LCD20B | | | |
| 134 | GPIO134_LCD21B | | | |
| 135 | GPIO135_LCD22B | | | |
| 136 | GPIO136_LCD23B | | | |
| 137 | NC | Not connected | U | Unused |
| 138 | GPIO138 | | | |
| 139 | GPIO139 | | | |
| 140 | NC | Not connected | U | Unused |
| 141 | GPIO141 | | | |
| 142 | GPIO142 | | | |
| 143 | GPIO143 | | | |
| 144 | GPIO144 | | | |
| 145 | GPIO145 | | | |
| 146 | GPIO146 | | | |
| 147 | GPIO147 | | | |
| 148 | GPIO148 | | | |
| 149 | GPIO149_RX | | | RS485 |
| 150 | GPIO150_TX | | | RS485 |
| 151 | GPIO151 | | | |
| 152 | GPIO152 | | | |
| 153 | GPIO153 | | | |
| 154 | NC | Not connected | U | Unused |
| 155 | NC | Not connected | U | Unused |
| 156 | NC | Not connected | U | Unused |
| 157 | NC | Not connected | U | Unused |
| 158 | NC | Not connected | U | Unused |
| 159 | NC | Not connected | U | Unused |

| Pin | SOMDIMM Signal Name | Application Details | I/O | SOMDIMM Connection Details |
|-----|--------------------|--------------------|-----|----------------------------|
| 160 | GPIO160_MD | | | |
| 161 | NC | Not connected | U | Unused |
| 162 | GPIO162_NMI | Not connected | U | Unused |
| 163 | GND | Ground | P | |
| 164 | GND | Ground | P | |
| 165 | 3.3V | 3.3V Power | P | |
| 166 | GND | Ground | P | |
| 167 | NC | Not connected | U | Unused |
| 168 | NC | Not connected | U | Unused |
| 169 | NC | Not connected | U | Unused |
| 170 | NC | Not connected | U | Unused |
| 171 | NC | Not connected | U | Unused |
| 172 | NC | Not connected | U | Unused |
| 173 | NC | Not connected | U | Unused |
| 174 | NC | Not connected | U | Unused |
| 175 | NC | Not connected | U | Unused |
| 176 | NC | Not connected | U | Unused |
| 177 | NC | Not connected | U | Unused |
| 178 | NC | Not connected | U | Unused |
| 179 | NC | Not connected | U | Unused |
| 180 | NC | Not connected | U | Unused |
| 181 | NC | Not connected | U | Unused |
| 182 | NC | Not connected | U | Unused |
| 183 | NC | Not connected | U | Unused |
| 184 | NC | Not connected | U | Unused |
| 185 | NC | Not connected | U | Unused |
| 186 | NC | Not connected | U | Unused |
| 187 | NC | Not connected | U | Unused |
| 188 | NC | Not connected | U | Unused |
| 189 | NC | Not connected | U | Unused |
| 190 | NC | Not connected | U | Unused |
| 191 | NC | Not connected | U | Unused |
| 192 | NC | Not connected | U | Unused |
| 193 | NC | Not connected | U | Unused |
| 194 | TMS | | | |
| 195 | TCK | | | |
| 196 | TDO | | | |
| 197 | TDI | | | |
| 198 | NC | Not connected | U | Unused |
| 199 | 3.3V | 3.3V Power | P | |
| 200 | GND | Ground | P | |

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# 4.0 Carrier Board Components

### 4.1 DC Power Input

The Touch Screen Kit utilizes a 5VDC 2.3A Power Supply. The connector is 2.1mm with center positive.

| | Pin Number | Description |
|---|---|---|
| | 1 | 5VDC, +/- 10%, 2.0A (min) |
| | 2 | Power Supply Ground |

### 4.2 Alternate Power Input

The CARRIER Board includes an optional alternate power input connector, J8. This connector provides an optional input connection for the on-board DC-DC regulator.

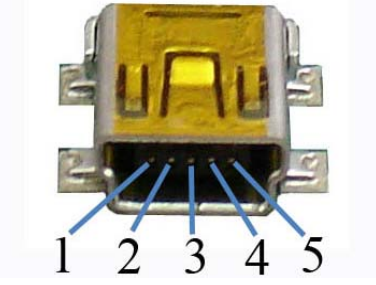| Pin Number | Description |
|---|---|
| 1 | 5VDC, +/- 10%, 2.0A (min) |
| 2 | Power Supply Ground |

### 4.3 USB Power Device

The CARRIER Board includes one USB Device Interface allowing the unit to be connected to a USB Host, such as a PC. Through this connection, the CARRIER represents a peripheral to the USB Host. The operational mode of the port is dependent on the software utilized (i.e. Mass Storage or Human-Interface).

The CARRIER Board may also be powered via the USB Device connector. Care must be taken to not overload the USB Host since 500mA is the maximum current allowable via USB. The LCD Backlight may be disabled or the brightness dimmed to facilitate this USB Powered mode.  When D1 is on it indicates a "good link" on the USB Device port.  When D2 is on it indicates that the USB Device port is enabled.  D2 will also blink during re-enumeration.

| | Pin Number | Description |
|---|---|---|
| | 1 | USB 5V |
| | 2 | D- |

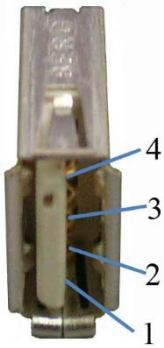| | | |
|---|---|---|
|  | **3** | **D+** |
| | **4** | **NC** |
| | **5** | **Signal Ground** |

### 4.4  USB Power Host

The CARRIER Board includes one USB Host Port allowing the unit to interface to various USB peripherals such as a USB Flash Drive (Thumb Drive). The operational mode of this port is dependent on the software utilized (i.e. driver support)

Please refer to the specific details of the processor module being utilized for support of the USB Host function.
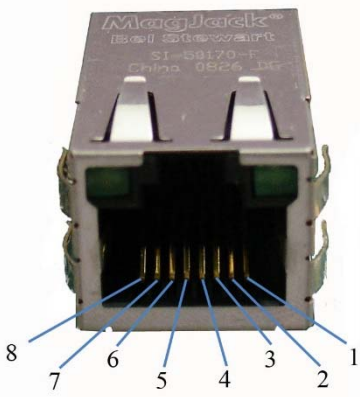D3 indicates VBUS power is good for the USB Host port.

| | Pin Number | Description |
|---|---|---|
|  | 1 | **USB VBus** |
| | 2 | **D-** |
| | 3 | **D+** |
| | 4 | **Signal Ground** |

### 4.5  Ethernet

The CARRIER Board includes one 10/100 Ethernet Port to interface to a local area network via CAT5 cable.
Please refer to the specific details of the processor module being utilized for support of the Ethernet Port function.

| | Pin Number | Description |
|---|---|---|
| | **1** | **Tx+** |

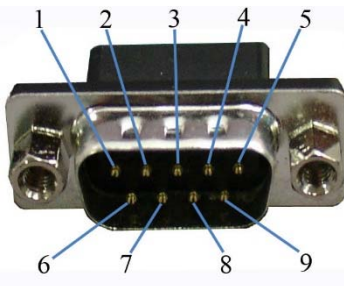| | | 2 | 3.3V |
|---|---|---|---|
| | | 3 | Tx- |
| | | 4 | Rx+ |
| | | 5 | 3.3V |
| | | 6 | Rx- |
| | | 7 | No Connect |
| | | 8 | Signal Ground |

### 4.6  CAN/RS485

The CARRIER Board includes one Male DB9 Interface Connector that supports either CAN or RS485 (Rev 2 and later) depending on the configuration of jumpers JP4 – JP7. The CAN interface utilizes an NXP TJA1040TD high speed transceiver IC to provide fully ISO 11898 standard interface at up to 1MBaud. The TJA1040 allows up to 110 nodes and very low electromagnetic emissions.

Note: Rev 1 PCB only supports CAN on P3

Please refer to the specific details of the processor module being utilized for support of the CAN interface function.

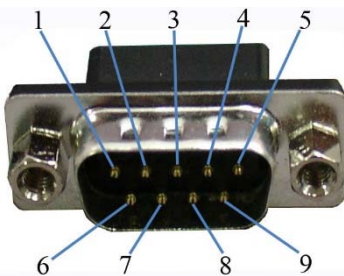| Pin Number | CAN Mode | RS485 Mode (Rev 2 and later only) |
|---|---|---|
| 1 | No Connect | No Connect |
| 2 | CANL | 485_RDB- |
| 3 | Signal Ground | 485_TDA+ |
| 4 | Signal Ground | Signal Ground |
| 5 | Signal Ground | Signal Ground |
| 6 | Signal Ground | Signal Ground |
| 7 | CANH | 485_RDA+ |
| 8 | No Connect | 485_TDB- |
| 9 | 5V | No Connect |

### 4.7 RS232

The CARRIER Board includes one RS232 Serial Port Connector. This connector is a Male DB9 configured as either DCE or DTE (Rev 2 and later only) depending on the configuration of jumper block JP3. The interface includes optional RTS & CTS handshaking signals that are brought to test points that the user may connect as needed (see page 5 of the schematic). Please verify proper connectivity of this connector to the proper TXD<>RXD orientation. TXD is an OUTPUT from the CARRIER Board and RXD is an INPUT to the CARRIER Board.
Note: Rev 1 PCB only supports DCE on P4
Please refer to the specific details of the processor module being utilized for support of the RS232 Serial Port function.



| Pin Number | DCE Mode | DTE Mode (Rev 2 and later only) |
|---|---|---|
| 1 | No Connect | No Connect |
| 2 | TXD (Output) | RXD (Input) |
| 3 | RXD (Input) | TXD (Output) |
| 4 | No Connect | No Connect |
| 5 | Signal Ground | Signal Ground |
| 6 | No Connect | No Connect |
| 7 | (OPT) RTS | (OPT) RTS |
| 8 | (OPT) CTS | (OPT) CTS |
| 9 | No Connect | No Connect |

### 4.8 External I2C

The CARRIER board provides an external I2C connector for users to connect to the I2C bus of the microprocessor.

CARRIER Rev 1

| Pin Number | Description |
|---|---|
| 1 | 3.3V |
| 2 | Signal Ground |
| 3 | GPIO67_ESCL |
| 4 | GPIO66_ESDA |

CARRIER Rev 2 and later

| Pin Number | Description |
|---|---|
| 1 | 5V |
| 2 | 5V |
| 3 | 3.3V |
| 4 | 3.3V |

| 5 | GPIO75_SCL |
|---|---|
| 6 | Signal Ground |
| 7 | GPIO74_SDA |
| 8 | GPIO116 |
| 9 | GPIO117 |

Please refer to the specific details of the processor module for connectivity details.

### 4.9  External I2S Audio

The Rev 1 CARRIER board provides an external I2S Audio Expansion Connector.
Please refer to the specific details of the processor module for connectivity details.

| Description | Pin | Pin | Description |
|---|---|---|---|
| 3.3V | 1 | 2 | Signal Ground |
| GPIO51_I2SRX_CLK | 3 | 4 | GPIO52_I2SRX_WS |
| 5.0V | 5 | 6 | GPIO53_I2SRX_SDA |
| GPIO54_I2STX_CLK | 7 | 8 | GPIO55_I2STX_WS |
| Signal Ground | 9 | 10 | GPIO56_I2STX_SDA |

# 5.0 ΣyG-S7G2 System on Module Board Layout

### 3.1 Schematics
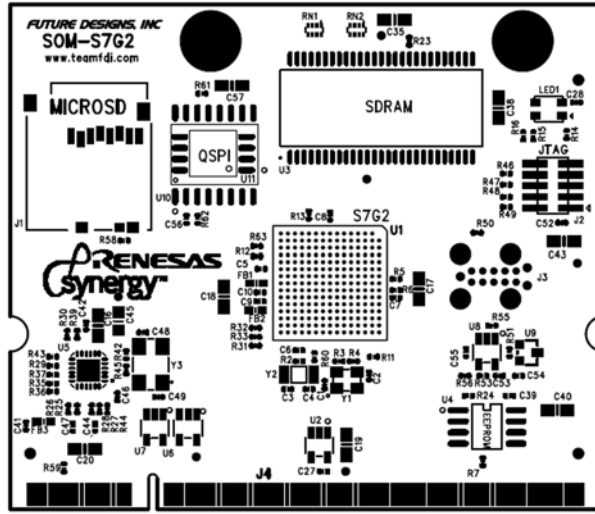
Visit this link for schematics of the SYG-S7G2-SOM: http://www.teamfdi.com/wp-content/uploads/SYG-S7G2-SOM.pdf

### 3.2 Mechanicals



**Figure 7: S7G2 Top**



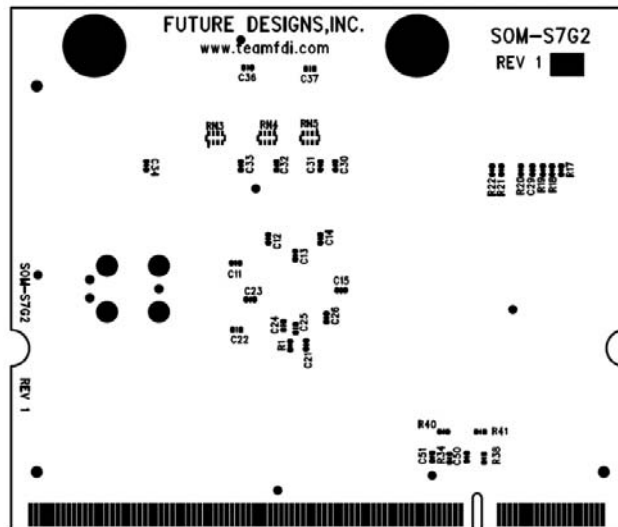**Figure 8: S7G2 Bottom**
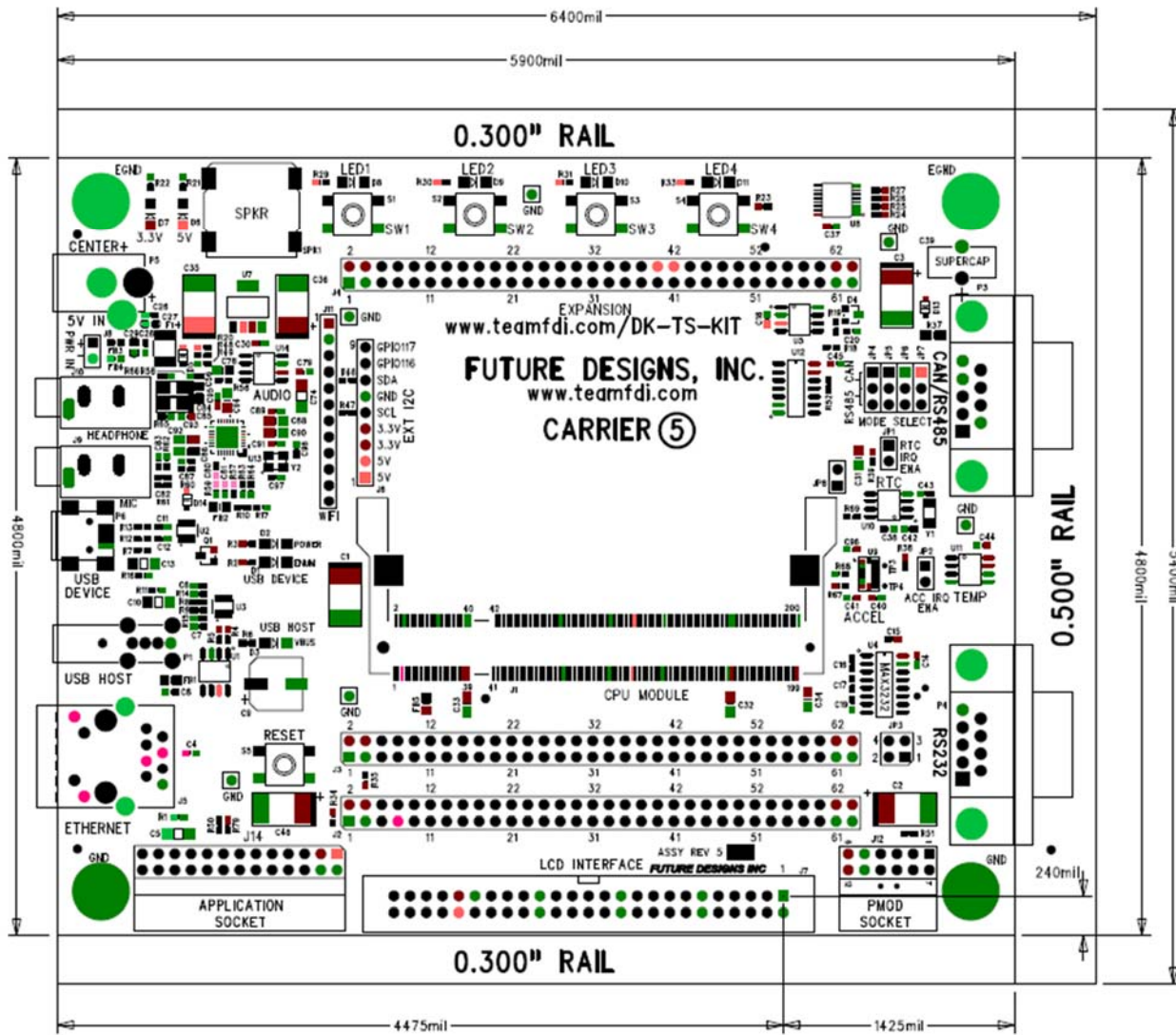
**Figure 9: Carrier Board Top**

# 6.0 Support

## 6.1 Where to Get Help

Online technical support is available at http://www.teamfdi.com/support/.

## 6.2 Useful Links

- Future Designs, Inc. Forums: http://www.teamfdi.com/?post_type=forum
- SYG-S7G2-MDK Product Page: http://www.teamfdi.com/product-details/syg-s7g2-mdk/
- Renesas Synergy: https://synergybeta.renesas.com/
- SEGGER J-Link LITE: https://www.segger.com/jlink-lite-cortexm.html
- Renesas Forums: http://www.renesasrulz.com/