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S32G-VNP-GLDBOX User Guide



Contents

| Get to know the S32G-VNP-GLDBOX | 4 |
|---|---|
| 1.1 S32G-VNP-GLDBOX Reference Design Overview | 4 |
| 1.2 S32G-VNP-GLDBOX Block Diagram | 5 |
| 1.3 S32G-VNP-GLDBOX Hardware Resources | 5 |
| S32G-VNP-GLDBOX Hardware Packages | 7 |
| 2.1 Hardware Package Overview | 7 |
| 2.2 Hardware Connection Instruction | 7 |
| S32G-VNP-GLDBOX Switch Setting | 8 |
| 3.1 Default Switch Setting | 8 |
| 3.2 Switch Setting for Power Selection | 8 |
| 3.3 Switch Setting for SD card Boot | 9 |
| 3.4 Switch Setting for eMMC Boot | 9 |
| 3.5 Switch Setting for NOR Flash Boot | 10 |
| 3.6 Switch Setting for Serial Boot | 10 |
| S32G-VNP-GLDBOX Connectors | 11 |
| 4.1 Connectors Overview | 11 |
| 4.2 Specific Connector Instruction | 13 |
| S32G-VNP-GLDBOX Set Up | 14 |
| Appendix A | 16 |
| | Get to know the S32G-VNP-GLDBOX 1.1 S32G-VNP-GLDBOX Reference Design Overview 1.2 S32G-VNP-GLDBOX Block Diagram. 1.3 S32G-VNP-GLDBOX Hardware Resources S32G-VNP-GLDBOX Hardware Packages 2.1 Hardware Package Overview. 2.2 Hardware Connection Instruction S32G-VNP-GLDBOX Switch Setting 3.1 Default Switch Setting 3.2 Switch Setting for Power Selection 3.3 Switch Setting for SD card Boot. 3.4 Switch Setting for NOR Flash Boot 3.5 Switch Setting for Serial Boot S32G-VNP-GLDBOX Connectors. 4.1 Connectors Overview. 4.2 Specific Connector Instruction S32G-VNP-GLDBOX Set Up. Appendix A. |

1. Get to know the S32G-VNP-GLDBOX

1.1 S32G-VNP-GLDBOX Reference Design Overview

The S32G-VNP-GLDBOX (GoldBox) is a compact, highly-optimized and integrated reference design board with enclosure featuring the S32G Vehicle Network Processor. This board can provide reference for a variety of typical automotive applications such as:

- Service-oriented gateway, vehicle compute nodes
- Domain controller, safety controller
- Vehicle black-box
- FOTA



Figure 1.1 shows the S32G-VNP-GLDBOX.

Figure 1.1 S32G-VNP-GLDBOX

1.2 S32G-VNP-GLDBOX Block Diagram

Figure 1.2 shows the block diagram of the S32G-VNP-GLDBOX.

Figure 1.2 S32G-VNP-GLDBOX block diagram

1.3 S32G-VNP-GLDBOX Hardware Resources

The resources of the GoldBox are listed as below:

- Processor
 - ➢ Four Arm Cortex-A53 cores (with optional cluster lockstep)
 - > Three, dual-core lockstep Arm Cortex-M7 cores
 - Hardware Security Engine (HSE) supports SHE/EVITA
 - > CAN, LIN and FlexRay offload with Low Latency Communications Engine (LLCE)
 - Gigabit Ethernet Packet Forwarding Engine (PFE)
 - ▶ 8 MB Embedded System RAM with ECC
 - ➢ 32KB Standby RAM with ECC
- External Storage
 - ➢ 1 x NOR Flash (64MB)
 - > 1 x SD card slot
 - ➢ 1 x eMMC (32GB)
 - ➢ 1 x LPDDR4 (4GB)
- Ethernet—12ports

- ➤ 1 x 100BASE-TX
- ➢ 6 x 100BASE-T1
- ➤ 5 x 1000BASE-T
- PCIe
 - > 1 x M.2 M-key slot*
 - ➢ 1 x M.2 E-key slot*
 - ➢ 1 x PCIe X1 socket
- LIN
 - \blacktriangleright 4 x LLCE LIN
 - > 1 x LINFlexD
- CAN/CAN FD
 - > 16 x LLCE CAN/CAN FD
 - > 2 x FlexCAN /CAN FD
- FlexRay
 - ▶ 1 x LLCE FlexRay
- USB
 - > 1 x USB 2.0 port as host/device mode
- Scalable interface
 - > 1 x DSPI
 - ➢ 5 x ADC
 - ➤ 1 x I2C
- RTC
 - Support for external RTC
- Debug and Trace
 - ▶ 1 x 20-pin JTAG for S32G
 - > 1 x 10-pin JTAG for SJA1110A
 - ➢ 1 x Aurora Trace
 - ➢ 2 x UART

Note Only one of the M.2 M-key slot and E-key slot can be used at a time.

2. S32G-VNP-GLDBOX Hardware Packages

2.1 Hardware Package Overview

The following section describes the hardware package overview of S32G-VNP-GLDBOX. Hardware and accessories are needed as shown in the figure 2.1.

Figure 2.1 S32G-VNP-GLDBOX hardware and accessories

2.2 Hardware Connection Instruction

To connect any cable to the GoldBox, follow the instructions shown in figure 2.2.

Figure 2.2 S32G-VNP-GLDBOX hardware connection instruction

3. S32G-VNP-GLDBOX Switch Setting

3.1 Default Switch Setting

Figure 3.1 shows the default switch setting of the S32G-VNP-GLDBOX.

Figure 3.1 Default switch setting

3.2 Switch Setting for Power Selection

Figure 3.2 shows the switch setting for power selection.

Figure 3.2 Power selection switch setting S32G-VNP-GLDBOX User Guide, Rev. 0, 03/2021

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3.3 Switch Setting for SD card Boot

Figure 3.3 shows the switch setting for SD card boot.

Figure 3.3 SD card boot switch setting

3.4 Switch Setting for eMMC Boot

Figure 3.4 shows the switch setting for eMMC boot.

Figure 3.4 eMMC boot switch setting

3.5 Switch Setting for NOR Flash Boot

Figure 3.5 shows the switch setting for NOR Flash boot.

Figure 3.5 NOR Flash boot switch setting

3.6 Switch Setting for Serial Boot

Figure 3.6 shows the switch setting for serial boot.

Figure 3.6 Serial boot switch setting

S32G-VNP-GLDBOX User Guide, Rev. 0, 03/2021

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4. S32G-VNP-GLDBOX Connectors

4.1 Connectors Overview

Figure 4.1 shows the part of important connectors of the S32G-VNP-GLDBOX.

Figure 4.1 S32G-VNP-GLDBOX connectors

| Connector | Signals | |
|-----------|--|--|
| J1 | UART1 | |
| J2 | UART0 | |
| J3 | SD card slot | |
| J4 | USB Micro_AB | |
| J5 | LLCE LIN, LINFlexD, ADC, DSPI, I2C, 12V Power In, 12V/5V/3.3V Power Ou | |
| J6 | LLCE CAN, FlexCAN, LLCE FlexRay | |
| J44 | 10-pin JTAG for SJA1110 | |
| J47 | M.2 M-key Slot | |
| J48 | 20-pin JTAG for S32G | |
| J53 | 100BASE-T1(SJA1110A Port5, 6, 7, 8, 9, 10) | |
| J56 | M.2 E-key Slot | |
| J57 | Aurora Trace | |
| J176 | 12V Power Jack | |
| J184 | 1-2(Default): VR5510 in debug mode | |
| P1 | PCIe X1 Socket | |
| P2 | 1000BASE-T(SJA1110A Port2, Port3) | |
| P3 | 1000BASE-T (GMAC0), 1000BASE-T (PFE_MAC2) | |
| P4 | 100BASE-TX(SJA1110A Port1) | |
| Р5 | 1000BASE-T(PFE_MAC1) | |

Table 4.1 shows the connectors of the S32G-VNP-GLDBOX and their corresponding signals.

 Table 4.1 The connectors of the S32G-VNP-GLDBOX

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4.2 Specific Connector Instruction

Figure 4.2 shows the LLCE CAN, FlexCAN, LLCE FlexRay, ADC, LINFlexD and LLCE LIN connectors.

Figure 4.2 FlexRay&CAN&LIN&ADC Connections

Figure 4.3 shows the Ethernet connectors.

| | | P2B |
|--|-------------------|-------------------------------|
| RESET | ASE-TX | |
| P5 P | 4 P. | BA P2A |
| • 100BASE-T1 TRX10 (SJA1110A Port 10*) | Part Number | Pinout |
| • 100BASE-T1 TRX9 (SJA1110A Port 9*) | P5 | 1000BASE-T (PFE_MAC1) |
| • 100BASE-T1 TRX8 (SIA1110A Port 8*) | P4 | 100BASE-TX (SJA1110A Port 1*) |
| = 100D ASE T1 TDY7 (SIA 1110 A Dert 7*) | P3A | 1000BASE-T (GMAC0) |
| • 100DASE-11 1KA / (SJA1110A POIL /*) | P3B | 1000BASE-T (PFE_MAC2) |
| • 100BASE-T1 TRX6 (SJA1110A Port 6*) | P2A | 1000BASE-T (SJA1110A Port 2*) |
| • 100BASE-T1 TRX5 (SJA1110A Port 5*) | P2B | 1000BASE-T (SJA1110A Port 3*) |
| *: In GoldBox, PFE_MAC0 connect to the port 4 of Ethernet switch, SJA1110A. Please refer to Figure | e 1.1 to get know | w the detailed connection. |

Figure 4.3 Ethernet Connections

5. S32G-VNP-GLDBOX Set Up

Following steps show how to run Linux BSP on CortexA53 core:

- 1. Download and install the terminal emulator, if not installed already. About the terminal tool, you can choose any one which is familiar to you, such as Tera Term, Putty and so on.
- 2. Download and install the FT232R USB-to-UART driver, if not installed already. Go to FT232R USB-to-UART driver link .Scroll down and select correct version. Follow the installation guides to install the driver.
- 3. Set S32G-VNP-GLDBOX in SD card boot mode(refer to the Figure 3.2).
- 4. Plug the SD card in J3 slot. The SD card has pre-loaded Linux BSP image which runs on CortexA53 cores.
- 5. Connect the UART0 port(J2) of board and PC by UART cable. Then open serial terminal and configure COM port in PC. Select the corresponding COM port which can be found in "Device Manager" of the PC and set 115200 as the baud rate. The configuration result is shown in the figure 5.1.

| a Term: Serial port set | up and connecti | on | | |
|---|--|----------------------|--|----|
| Port: | COM17 | \sim | New setting | |
| Speed: | 115200 | \sim | | |
| Data: | 8 bit | \sim | Cancel | |
| Parity: | none | \sim | | |
| Stop bits: | 1 bit | \sim | Help | |
| Flow control | none | | | |
| - | lione | ~ | | |
| Transı 0 | nit delay msec/char | ~ 0 | msec/line | |
| Transı Device Friendly Device Instance Device Manufact Provider Name: I Driver Date: 8-16 Driver Version: 2 | nit delay msec/char Name: USB S ID: FTDIBUSY urer: FTDI -7DI -2017 .12.28.0 | erial Por VID_040 | msec/line t (COM17) 3+PID_6001+AU00MCC |)i |

Figure 5.1 COM port configuration

6. Connect power supply though J176 port described in Table 4.1. Open the power switch(refer to figure 3.2), the running logs will appear in the console as shown in Figure 5.2.

Note For other boot mode, building project, making image and so on, refer to S32G-VNP-GLDBOX Reference Manual and S32G-VNP-GLDBOX Software Enablement Guide.

| [5.414637] mdio_bus PFEng Ethernet MDIO.pfe2: MDIO device at |
|--|
| address 2 is missing. |
| [5.481480] loading NXP PHY driver: [autonomous mode] |
| [5.578156] sia1105pars spi1.0: Loading SJA1105P SPI driver |
| [5.583510] sia1105pars spi1.0: Detected device id is invalid: ffffffff |
| [5 590005] sia1105pars spi1 0: SIA1105P SPI Failed to read Device Id |
| [5 612947] FXT4-fs (mmcblk0n2): re-mounted Onts: (null) |
| Fri Δug 28 01·21·01 LITC 2020 |
| 5 897075] urandom read: 3 callbacks suppressed |
| [5.077073] utandom_tedd. 5 canbacks suppressed [5.077074] random; dd; uninitialized urandom read (512 butes read) |
| [5.697064] fandoni. du. uninitianzeu urandoni feau (512 bytes feau) |
| INIT: Entering runlevel: 5 |
| Configuring network interfaces ifup: don't have all variables for eth0/inet |
| Starting syslogd/klogd: done |
| Starting random number generator daemon [6.098288] random: rngd: |
| uninitialized urandom read (4 bytes read) |
| [6.104307] random: rngd: uninitialized urandom read (4 bytes read) |
| |
| [6 111860] random: crng init done |
| [6.115160] random: 1 unondom warning(a) missed due to ratalimiting |
| [0.115100] random: 1 urandom warning(s) missed due to rateminting |
| Starting OpenBSD Secure Shell server: sshd |
| done. |
| Auto Linux BSP 1.0 s32g274ardb /dev/ttyLF0 |
| s32g274ardb login: |
| |

When see the console as shown in the Figure 5.2, it means that the Linux BSP runs successfully. Please input "root" to log in system. And if need to run the M7 project, please refer to the S32G-VNP-GLDBOX Software Enablement Guide.

6. Appendix A

- Documents
 - S32G Data Sheet
 - S32G Reference Manual
 - GoldBox Fact sheet

 - --- Auto_Linux_BSP_XX.X_S32G274A_User_Manual
- Useful links
 - S32 Design Studio
 - S32 Debug Probe
- Support https://community.nxp.com/
- Enablement Tools
 - IDE: S32 Design Studio, Yocto , EB $\rm tresos^{\rm TM}$
 - Software: Linux BSP, FreeRTOSTM, Real-Time Drivers(RTD)
 - Compiler: Green Hills, gcc
 - Debugger: Lauterbach, S32G Debug Probe

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