F269 Emulation with the Nohau *EMUL-ST10* Emulator

Background

The F269 microcontroller from STMicroelectronics is the latest ST10 family member. The F269 and other ST10 devices are supported with the Nohau EMUL-ST10 50 MHz bondout emulator. It is shown connected to the Phytec evaluation board in Figure 1. This emulator uses the ST10-R201 50 MHz bondout controller.

The ST10 Resources

These are the ST10 parts following the original 167. Some are available with FLASH (F), ROMless (R) and some with masked ROM (C). The 2 means the device has a MAC unit. 1 has no MAC.

F167	current	1 CAN
F168	current	1 CAN
F269	new device	2 CAN

Figure 1

The F269 has the ST10 feature set plus:

- 40 MHz clock operation PQFP
- Contact ST for other parts
- 50 ns instruction time (40 MHz)
- Multiply/Accumulate Unit: MAC
- 2 CAN 2.0b ports
- 256K FLASH - 5 volt
- 3 volt core, 5 volt peripherals
- 3 volts is internally generated
- 2K internal RAM (IRAM)
- 10K extension RAM (XRAM)
- 10 bit A/D Conv. - 16 channel
- Idle and Power-Down modes
- 144 pin PQFP package
- Temperature -40 to +125 C
- Real Time Clock
- PAD Driver Control registers
- EXISEL register selects external interrupt sources.

Two Chip Emulation

The ST10-R201 50 MHz bondout does not have the CAN peripheral that needs to be emulated so a two chip emulation system is used. One chip is the bondout and the other is a production chip in emulation mode.

A daughtercard containing a production F269 is plugged into the emulator board of the EMUL-ST10. Figure 2 shows the F269 daughtercard. Figure 3 shows it installed in the emulator.

This F269 chip will provide access to all of its XBUS peripherals to the emulator. This F269 is placed in a special Emulation mode. This disables the CPU and the XBUS peripherals are then available to the bondout controller through the address and data bus.
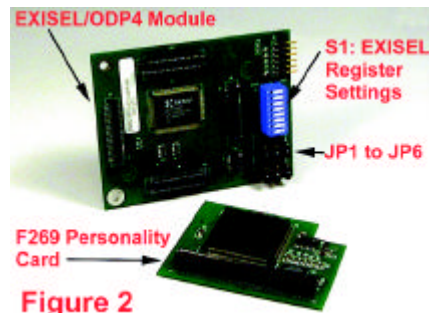

Figure 2

Nohau provides the latest XBUS modules by using all XBUS peripherals from the daughtercard rather than from the bondout controller. The F269 card provides the two CAN, RTC and XRAM XBUS peripherals.

The daughtercard is user installable but it requires dismantling the emulator. There is a small modification necessary to an existing EMUL-ST10 emulator and this must be done by the factory. This modification will not affect the emulator operation for existing projects and is backwards compatible. Your local Nohau representative or the factory can provide more information. To activate the F269 daughtercard and to configure the emulator, select F269 in the Configuration screen during the Seehau Config process.
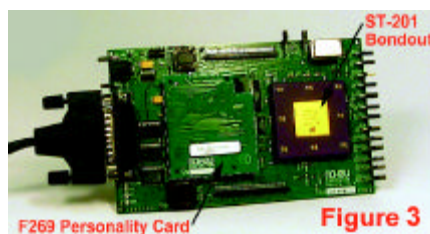

Figure 3

Nohau also has cards for the 167 and the 168. They are activated in the same manner. The EXISEL/ODP4 module is applicable the F269 support

EXISEL and ODP4 Registers

These are new registers on the F269 that are not supported by the current ST10-201 bondout controller. Nohau does an electronic replacement of these registers with the optional EXISEL/ODP4 module as shown in Figure 2.

This module plugs between the emulator and the target adapter, if any. Most applications will use an adapter of some type. Figure 4 shows this module installed on the bottom of the emulator. The target adapter will plug into the module using the four 2x50 and the optional 2x5 Samtec connectors. The layout of these connectors is the same as on the bottom of the emulator.

The EXISEL/ODP4 module is optional. If it is not installed, the features of the ODP4 and EXISEL registers are not provided. It is up to the user to determine if these registers are needed. Please contact Nohau Technical Support (support@nohau.com) or your local Nohau rep for assistance. Recall the emulator will operate standalone.
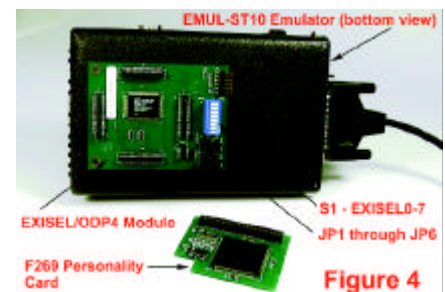

Figure 4

S1 sets the EXISEL register. JP3 to JP6 takes the P2.8 to P2.11 signals from the S1 settings or directly from the bondout controller and sends them to the target adapter.

JP1 and JP2 selects P4.6 (CAN1_TxD) and P4.7 (CAN2_TxD) to the open drain or push-pull mode.

There is no user use for JP7 and JP8. They were used for Nohau development and product testing.

EXISEL Register Recreation

EXISEL means *External Interrupt Source Selection*. This 16 bit R/W register determines how interrupts coming from the CAN and Real Time Clock X-Peripheral modules are combined with the Fast External Interrupts on Port 2.8 through Port 2.11.

The EXISEL register is not located on the ST10-R201 bondout microcontroller. It must be recreated by the emulator hardware or more specifically, by the EXISEL/ODP4 module in conjunction with the F269 daughtercard.

EXISEL is located at F1DA in the ESFR space. There are 8 "sub-registers" each two bits called EXI0SS to EXI7SS. EXI4SS to EXIS7SS are not used.

EXI0SS to EXI3SS are programmed by setting the dip switch S1 and selecting JP3 to JP6 (Figure 2) on the module.

S1 Bit	Ext Int	Selection Source
0, 1	EXI0SS	P2.8, CAN1_RxD
2, 3	EXI1SS	P2.9, CAN2_RxD
4, 5	EXI2SS	P2.10, RTC_SecIT
6, 7	EXI3SS	P2.11, RTC_alarmIT

S1 Bit	Settings for each EXIxSS
00	input from associated P2.x
01	input from alternate source
10	Input P2.x OR alternate source
11	Input P2.x AND alternate source

For more information please see the STMicroelectronics F269 data sheet.

The FPGA on the module uses the settings of S1 to provide the AND and OR function of the EXISEL register.

JP3 to JP6 select whether the Fast Interrupts are fed to the bondout from the target adapter or from the FPGA. If P2.8 to P2.11 are used as general purpose ports, then the appropriate jumper must be set to 1-2 (P2.8 - P2.11). To enable the EXISEL recreation by sending the FPGA outputs to the bondout, the appropriate jumpers must be on 2-3 (EX0IN - EX3IN).

If the EXISEL register is read, all zeroes will be returned.

ODP4 Register Recreation

The 2 bit ODP4 register sets P4.6 and P4.7 output pads to either push-pull or open drain. P4.6 has an alternate function as CAN1_TxD and P4.7 as CAN2_TxD. If the bit is set to 0, the line is set to push-pull and a 1 sets it to open drain. Previous ST10 Port 4 outputs were push-pull only.

The ODP4 register is not located on the ST10-R201 bondout microcontroller. It also must be recreated by the emulator hardware or more specifically, by the EXISEL/ODP4 module in conjunction with the F269 daughtercard.

JP1 selects P4.6 as open drain or push-pull and JP2 sets P4.7 similarly *only when they are configured as CAN outputs*. These jumpers are clearly marked "push-pull" or "open-drain".

If P4.6 and P4.7 are used as segment lines, JP1 and JP2 must be set to push-pull to enable these signals to go directly from the bondout to the target.

Emulator Jumper Settings

There are four jumpers on the end of the emulator. They route either the bondout signals (P4.4 to P4.7) or the daughtercard signals (2 CAN port transmit and receive) to the target system. Recall the ST10-R201 bondout does not contain a CAN module.

Since they are jumpers: it is not possible to switch dynamically from Port 4 IO to CAN ports as these jumpers must be physically moved.

The default position of JP16 to JP20 without a daughtercard is in the lower position (P4.x) which sends the bondout Port 4 to the target. The upper position (XP4.x) connects the CAN ports on the daughtercard to the target.

To use the CAN ports with the F269 daughtercard, set the appropriate jumpers to their upper position.

Some Limitations

There are a few limitations with this setup but none are serious.

- POCONx registers are not implemented in the ST10-R201 bondout. The ability to define the rising edge of Port output signals to control EMI is not possible.

- Bits SWR, SHWR, LHWR, PONR in the WDTCON register always read as 0 because they are not implemented in the ST10-R201 bondout.

Summary

Follow these quick steps to provide F269 support to your emulator:

- Get your existing emulator modified by Nohau if necessary.

- Install the daughtercard in Figure 3.

- Install the EXISEL/ODP4 module if desired. See Figure 4.

- Select F269 in Seehau config menu or by editing the startup .bas file.

- Set the switches and jumpers as to the information in the red headings.

Part Numbers

EMUL-ST10-PC/XP269   daughtercard
EMUL-ST10-PC/ADP269   EXISEL/ODP4 module

Other STMicroelectronics Devices Nohau Supports

Nohau supports all ST10 devices to their current speeds. Nohau supports the "one-clock-per-instruction" Super10 family to 100 MHz and has a 80 (90) MHz ST10 emulator EMUL-ST10/FA in addition to the 50 MHz emulator.

Conclusion

STMicroelectronics F269 support is now available from Nohau worldwide. For pricing or the latest information on this or any Nohau products, consult your local Nohau rep or contact Nohau in the USA.

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