

F280 Emulation with the Nohau *EMUL-ST10* Emulator

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Background

The F280 microcontroller from STMicroelectronics is the latest ST10 family member. The F280 is supported with the Nohau EMUL-ST10-PC (revision C) 50 MHz bondout emulator. It is connected to a target board in Figure 1. This emulator uses the ST10-R201 50 MHz bondout controller.

The *NEW* 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	current	2 CAN
F280	new device	2 CAN, XPWM, etc.



Figure 1

The F280 has the ST10 feature set plus:

- 40 MHz clock operation PBGA
- Contact ST for other parts
- 50 ns instruction time (40 MHz)
- Multiply/Accumulate Unit: MAC
- 2 CAN 2.0b ports
- 512K FLASH - 5 volt
- 3 volt core, 5 volt peripherals
- 3 volts is internally generated
- 2K internal RAM (IRAM)
- 16K extension RAM (XRAM)
- 10 bit A/D Conv. - 2 x 16 channel
- Idle and Power-Down modes
- 208 ball PBGA package
- Temperature -40 to +125 C
- PAD Driver Control registers
- EXISEL register selects external interrupt sources.

Two Chip Emulation

The ST10-R201 50 MHz bondout does not have all the XBUS peripherals that need 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 F280 is plugged into the emulator board of the EMUL-ST10. Figure 2 shows the F280 daughtercard. Figure 3 shows it installed in the emulator.

This F280 chip will provide access to all of its XBUS peripherals to the emulator.

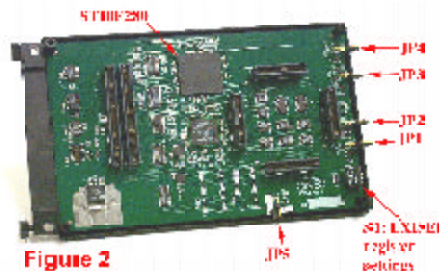


Figure 2

This F280 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.

Nohau provides the latest XBUS modules by using all XBUS peripherals from the daughtercard rather than from the bondout controller. The F280 card provides the two CAN, XPWM and XRAM XBUS peripherals.

The daughtercard is user installable. To activate the F280 daughtercard and to configure the emulator, select F280 in the Configuration screen during the Seehau Config process.

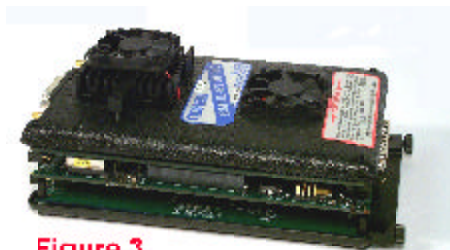


Figure 3

Nohau also has cards for the 167, the 168 and the 269. They are activated in the same manner.

EXISEL and ODP4 Registers

These are new registers on the F280 that are not supported by the current ST10-201 bondout controller. Nohau does an electronic replacement of these registers with the F280 daughtercard.

S1 sets the EXISEL register. JP1 to JP2 takes the P2.8 to P2.9 signals from the S1 settings or directly from the target adapter and sends them to the bondout controller.

JP3 and JP4 selects P4.6 (CAN1_TxD) and P4.7 (CAN2_TxD) to the open drain or push-pull mode.

EXISEL Register Recreation

EXISEL means *External Interrupt Source Selection*. This 16 bit R/W register determines how interrupts coming from the CAN X-Peripheral modules are combined with the Fast External Interrupts on Port 2.8 through Port 2.9.

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 F280 daughtercard.

EXISEL is located at FIDA in the ESFR space. There are 8 "sub-registers" each two bits called EXI0SS to EXI7SS. EXI2SS to EXI5SS are not used.

EXI0SS to EXI1SS are programmed by setting the dip switch S1 and setting JP1 to JP2 on the F280 daughter card.

S1 Bit	Ext Int	Selection Source
0, 1	EXI0SS	P2.8, CAN1_RxD
2, 3	EXI1SS	P2.9, CAN2_RxD

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 F280 data sheet.

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The FPGA on the F280 daughtercard uses the setting of S1 to provide the AND and OR function of the EXISEL register.

JP1 to JP2 select whether the Fast Interrupts are fed to the bondout from the target adapter or from the FPGA. If P2.8 to P2.9 are used as general purpose ports, then the appropriate jumper must be set to 1-2, lower position, (P2.8 - P2.9). To enable the EXISEL recreation by sending the FPGA outputs to the bondout, the appropriate jumpers must be on 2-3, upper position, (AltSrc).

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.

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 F280 daughtercard.

JP3 selects P4.6 as open drain (upper position) or push-pull (lower position) and JP4 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, JP3 and JP4 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.

Since they are jumpers: it is not possible to switch dynamically from Port 4 I/O 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 F280 daughtercard, set the appropriate jumpers to their upper position.

P5DIDIS Register Recreation

The P5DIDIS register is provided for additional disturb protection support on analog inputs for port P5. If the bit is set to 0 then the digital input is enabled. If the bit is set to 1 the digital input is disabled.

The P5DIDIS register is not loaded on the ST10-R201 bondout microcontroller. It also must be recreated by the emulator hardware or more specifically, the F280 daughtercard.

JP5 selects P5DIDIS (P5DIDIS.15...P5DIDIS.0) as "0" or "1". When JP5 is off, JP5 selects P5DIDIS (P5DIDIS.15...P5DIDIS.0) as "0". When JP5 is on, JP5 selects P5DIDIS (P5DIDIS.15...P5DIDIS.0) as "1".

Emulation of PLL Factor 10

There is a new PLL factor 10 on the F280 that is not supported by the current ST10-R201 bondout controller. Nohau implements the emulation of PLL factor 10 with the EMUL-ST10 emulator board (revision C). The user must edit the clock field in the configuration screen such that the value in the clock field exactly equals ten times the value of XTAL1. This can be done either from the on-emulator-board oscillator or from the target board oscillator/crystal.

Emulation of the XTimer

It is the responsibility of the user to connect the P7.7 signal to the X_ADC_INJ signal on the application.

Some Limitations

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

- P4.6 and P4.7 Open-drain choice is static and limited to CAN TXD alternate function. Using P4.6 and P4.7 as I/O in open drain is not provided (same feature as the device itself).
- As no signal from the bondout can command a switch depending on the enabling of the X-peripherals, we lose the possibility to use P4.4, P4.5, P4.6 and P4.7 as I/O before the enabling of the XPER.So, P4.4, P4.5, P4.6 and P4.7 signals must be used either for I/O or for the CAN RXD and TXD but not both.
- As the EXISEL register doesn't exist in the bondout, its value is static and cannot be changed during code execution.
- The ability to define rising edge (POCONn registers), to program the threshold (PICONn registers) for I/O signals is not available.
- P5DIDIS and XP10DIDIS, these two new registers are provided for additional disturb protection support on analog inputs, but they are NOT implemented in the bondout.
- Bits SWR, SHWR, LHWR and PONR in the WDTCN register are always read at value 0, because they are not implemented in the bondout.
- An application where XP10 is used as ADC channels inputs, and P5 is used as digital input port CANNOT be emulated. As a consequence for an application using no more than 16 ADC channels, P5 is the preferred input port.

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continued

Summary

Follow these quick steps to provide F280 support to your emulator:

- EMUL-ST10-PC (revision C) 50MHz is required.
- Install the daughtercard in Figure 3.
- Select F280 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/XP280- daughtercard

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 F280 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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