

Chassis Manager Getting Started

Revision History:

Rev 1.0 09.10.2023 Draft Revision

Table of Contents

Overview	3
Step 1: Setting up the Hardware	4
1 Power	5
2 Voltage Sensors	5
3 Temperature Sensors	6
4 Fan Sensors	7
5 Digital Inputs	8
6 Digital Outputs	8
7 LEDs	9
Step 2: Setting up Chassis Manager Software Configuration.....	10
1 Configuring sensors.....	10
2 Defining the Sensor List	11
3 Defining the Sensor.....	13
...3.1 Voltage and Fan sensors.....	13
...3.2 Temperature Sensors	13
...3.3 Sensor options for the Input Sensors.....	14
...3.4 Sensor options for the Output Sensors.....	14
4 Creating Conditions file.....	15
Configuring the Chassis Manager	18

List of Figures

Figure 1:Chassis Manager	3
Figure 2: VPX Carrier	3
Figure 3: VPX Carrier: Connector positions.....	4
Figure 4: Power connector pin position	5
Figure 5: LED to OUTx connection diagrtam	9
Figure 6: SDR Compiler Tool.....	10
Figure 7: Default SDR Compiler	11

Figure 8: Sensor List	13
Figure 9: Changes for Temp1, Temp2 Sensors.....	14
Figure 10: Changes for Input1 Sensor	14
Figure 11: Changes for Output 1 sensor	14
Figure 12: Changes for Output14 (LED1)	15
Figure 13: Changes for Output 16 (LED3).....	16
Figure 14: Default Terminal Settings	18
Figure 15: CLI login	19
Figure 16: xmodem sdr command	19
Figure 17: Send file via xmodem	20
Figure 18: xmodem conditions command	20
Figure 19: Edit chassis info	21
Figure 20: Edit Chassis address table	21

List of Tables

Table 1: VMEAS1 connector pinout.....	5
Table 2: TEMP1 connector pinout.....	6
Table 3: FAN connector pinout.....	7
Table 4: IN_1/2 connector pinout	8
Table 5: Limiting Values for Digital Input Pins	8
Table 6: OUT_AB connector pinout.....	8
Table 7: Limiting Values for Digital Output Pins	8

Overview

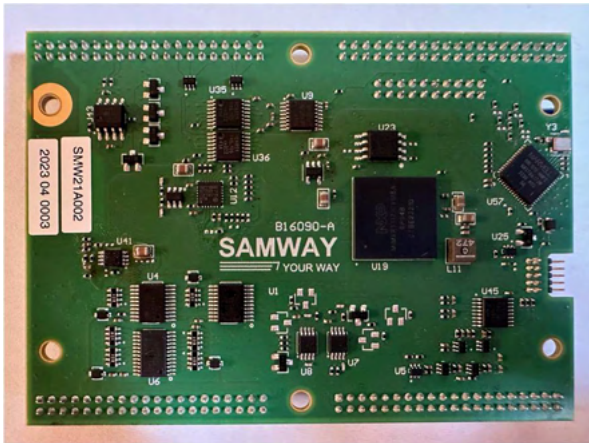


Figure 1: Chassis Manager

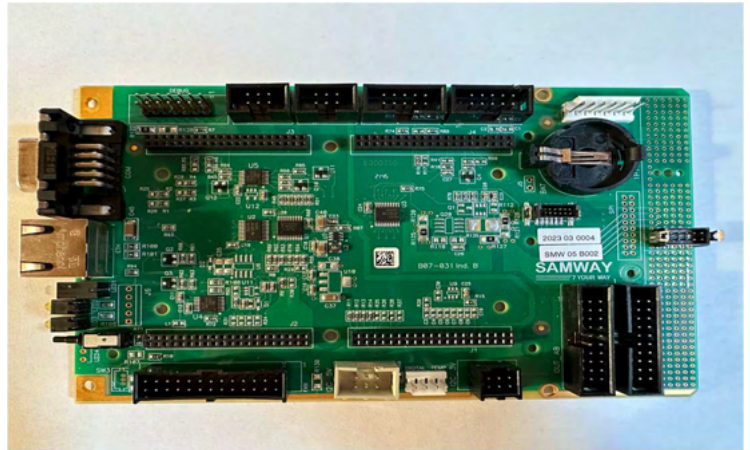


Figure 2: VPX Carrier

This document provides step-by-step instructions and examples for setting up the Samway Chassis Manager for the first time.

Setting up the Chassis Manager is done by simply uploading a sensor data record file (SDR) file (*.sdr) and a conditions file (*.txt). SDR files can be created, saved and edited using a Graphical User Interface software: **SDR Compiler**, while conditions files are regular text files that can be edited using any preferred software following instructions provided in chapter 7 of the user manual.

The Chassis Manager is delivered on Carrier Cards that provide the required form factor and connectors for different specifications. The getting started document was written for the Chassis Manager and VPX Carrier. For other carriers the principles remain the same, only the hardware pins can differ.

This document will provide a set-up example for a simple Chassis Manager monitoring application:

- ⤴ monitor 4 voltages: +3.3V, +5V, +12V, -12V
- ⤴ monitor 2 temperature sensors (thermistors)
- ⤴ monitor and control 3 fans
- ⤴ monitor 1 input (FAL signal from Power supply -active low)
- ⤴ bi-color PowerOK LED
 - Green: all voltages are ok;
 - Red: there is a voltage error.
- ⤴ Temp FAIL led:
 - Flash – temperature fail
 - Off – temperature OK
- ⤴ Fan FAIL led
 - On – fan fail
 - Off – fans ok
- ⤴ ShutDown# output – active low
 - Asserted - when the temperature reaches a critical threshold, or the FAL signal is active
 - Deasserted – when the temperature is not critical

Step 1: Setting up the Hardware

The first step is to connect all the necessary signals to the Chassis Manager. This chapter will address the connectivity for the example set-up described above.

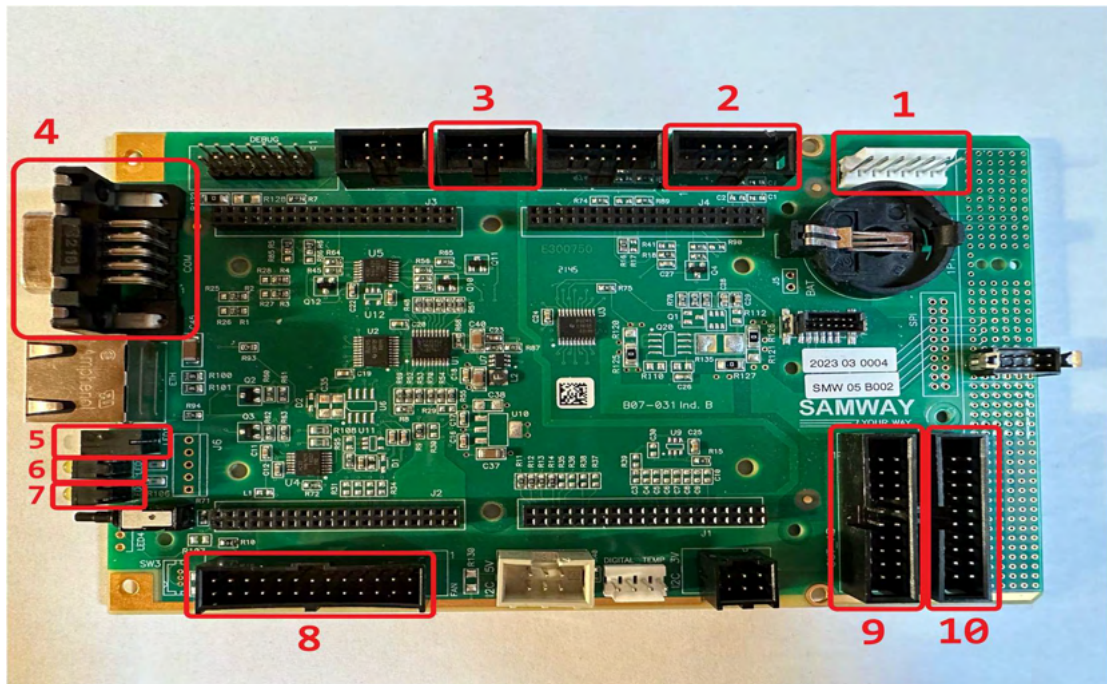


Figure 3: VPX Carrier: Connector positions

VPX carrier card connectors used in this example application:

1. POWER
2. VMEAS1
3. TEMP1
4. COM
5. LED1
6. LED2
7. LED3
8. FAN
9. OUT_AB
10. IN1/2

1 Power

The analogue supply voltage for the VPX carrier is 3.3V. The external voltage supply is provided using the power connector:

Connection List:

- ▲ +3.3V - pin 6
- ▲ GND - pin 3

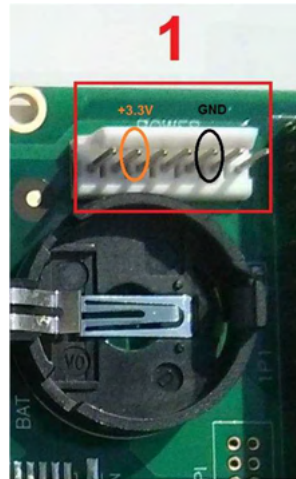


Figure 4: Power connector pin position

2 Voltage Sensors

PIN	SIGNAL	SN	PIN	SIGNAL	SN
1	SYSRESET#	-	2	ACFAIL#	-
3	V4 (-12V)	19	4	GND	-
5	V3 (+12V)	18	6	GND	-
7	V1 (+3.3V)	16	8	GND	-
9	V2 (+5V)	17	10	GND	-

Table 1: VMEAS1 connector pinout

Voltage signals can be monitored using connectors VMEAS1 and VMEAS2. This example will only monitor the 4 standard voltages (+3.3V, +5V, +12V, -12V) and will use only the VMEAS1 connector.

Connect each monitored voltage to its dedicated pin on the VMEAS1 connector. For each voltage also connect its corresponding ground reference to a GND pin on the VMEAS1 connector.

Connection list:

- +5V – pin 9; GND_5V – pin 10
- +3.3V – pin 7; GND_3.3V – pin 8
- +12V – pin 5; GND_12V – pin 6
- -12V – pin 3; GND_-12V – pin 4

*Connector is odd-even numbered.

*SN = Sensor Number: See details in section 6.8 of the reference manual.

3 Temperature Sensors

The Chassis Manager can monitor up to 6 thermistors. The measurements are calibrated for 2 lead NTC thermistors with a resistance of 10K and Beta = 3950. The external temperature sensors are connected to the VPX carrier using connectors TEMP1 and TEMP2.

PIN	SIGNAL	SN	PIN	SIGNAL	SN
1	VREF	-	2	TEMP3	28
3	VREF	-	4	TEMP2	27
5	VREF	-	6	TEMP1	26

The current example only uses 2 temperature sensors so only the TEMP1 connector will be used.

One lead of the thermistor has to be connected to a Temp pin and the other one to a VREF pin, for a correct measurement.

Table 2: TEMP1 connector pinout

Connection List:

- Thermistor 1 lead 1 – pin 6
- Thermistor 1 lead 2 – pin 5
- Thermistor 2 lead 1 – pin 4
- Thermistor 2 lead 2 – pin 3

**Connector is odd-even numbered.*

**SN = Sensor Number: See details in section 6.8 of the reference manual.*

4 Fan Sensors

The Chassis Manager can monitor up to 12 Fans with tachometer output and can control up to 3 individual groups of PWM fans.

PIN	SIGNAL	SN	PIN	SIGNAL	SN
1	+3.3V	-	2		-
3	+3.3V	-	4		-
5	GND	-	6	PWM_1	-
7	GND	-	8	TACH_11	48
9	TACH_10	47	10	TACH_9	46
11	PWM_3	-	12	+5V	-
13	TACH_8	45	14	TACH_7	44
15	GND	-	16	TACH_6	43
17	PWM_2	-	18	TACH_5	42
19	TACH_4	41	20	+5V	-
21	TACH_3	40	22	PWM_1	-
23	GND	-	24	TACH_2	39
25	TACH_1	38	26	TACH_0	37

Table 3: FAN connector pinout

Connection list:

- Fan 1 PWR, Fan 2 PWR, Fan 3 PWR – external voltage power supply Positive terminal
- Fan 1 GND, Fan 2 GND, Fan 3 GND – external voltage power supply Negative terminal
- Fan 1 PWM, Fan 2 PWM, Fan 3 PWM – Fan Connector Pin 6
- Fan 1 Tach – Fan Connector Pin 26
- Fan 2 Tach – Fan Connector Pin 25
- Fan 3 Tach – Fan Connector Pin 24
- External Voltage power supply Negative terminal - Fan Connector Pin 5

*Connector is odd-even numbered.

*SN = Sensor Number: See details in section 6.8 of the Reference Manual.

5 Digital Inputs

The ChMC can monitor up to 32 digital inputs. All signals (16) from IN_1/2 connector can only be used as inputs while each signal (16 total) on connector OUT_AB can be used both as input or output, giving a total of up to 32 input that the ChMC can monitor.

PIN	SIGNAL	SN	PIN	SIGNAL	SN
1	IN1	64	2	IN2	65
3	IN3	66	4	+5V	-
5	IN4	67	6	IN5	68
7	GND	-	8	IN6	69
9	IN7	70	10	IN8	71
11	IN9	72	12	+5V	-
13	IN10	73	14	IN11	74
15	GND	-	16	IN12	75
17	IN13	76	18	IN14	77
19	IN15	78	20	IN16	79

Table 4: IN_1/2 connector pinout

*Connector is odd-even numbered.

*SN = Sensor Number: See details in section 6.8 of the Reference Manual.

Parameter	Min	Max	Unit
Input Voltage	-0.5	5.5	Volts

Table 5: Limiting Values for Digital Input Pins

This example uses only one digital input: a FAL signal from a Power supply.

Connection List:

- FAL signal power supply – Pin 1
- GND power supply – Pin 7

6 Digital Outputs

The Chassis Manager provides up to 16 digital outputs. The outputs have open drain drivers and on-board pull-up resistors. The pull-up voltage is an assembly option and can have a value of either 3.3V, or 5V.

PIN	SIGNAL	SN	PIN	SIGNAL	SN
1	OUT1	80	2	OUT2	81
3	OUT3	82	4	+5V	-
5	OUT4	83	6	OUT5	84
7	GND	-	8	OUT6	85
9	OUT7	86	10	OUT8	87
11	OUT9	88	12	+5V	-
13	OUT10	89	14	OUT11	90
15	GND	-	16	OUT12	91
17	OUT13	92	18	OUT14	93
19	OUT15	94	20	OUT16	95

Table 6: OUT_AB connector pinout

Parameter	Max	Unit
Output current	± 25	mA

Table 7: Limiting Values for Digital Output Pins

The current example uses a single digital output to command a ShutDown# signal.

Connection List:

- ShutDown# signal – Pin 1
- Ground reference – Pin 15

*Connector is odd-even numbered.

*SN = Sensor Number: See details in section 6.8 of the Reference Manual.

Note: On the VPX carrier card, digital outputs 14,15,16 are connected to the front panel LEDs.

7 LEDs

The current example will use 3 LEDs, one already available on the carrier card (LED1) and the other two connected to one of the digital outputs available on the carrier card's OUT_AB connector.

Each output pin of the Chassis manager is an open-drain with 10K pullup to VCC, so any LED must be connected as described in figure 5:

- LED A (anode) – To VCC through current limiting resistor;
- LED K (cathode) – To OUTx pin.

It is very important for LEDs to not be powered from rails higher than VCC as OUTx pins have pullup resistors, if voltage applied to LED exceeds $VCC + V_f$ (LED forward voltage) the LED could start emitting light regardless of the OUTx pin state.

- LED1 – bicolor (green and red) – internally connected on the carrier to digital output 14 (OUT14/controlbit #29)
- LED2 – amber – connected on the carrier to digital output 2 (OUT2/controlbit #30)
- LED3 – amber – connected on the carrier to digital output 3 (OUT3/controlbit #31)

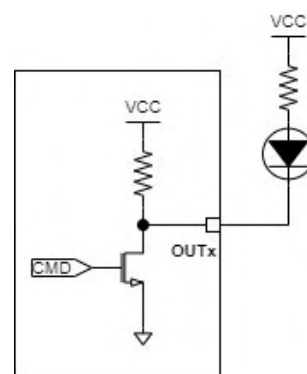


Figure 5: LED to OUTx connection diagram

Step 2: Setting up Chassis Manager Software Configuration

The Chassis Manager is configured by uploading a SDR and conditions file. For creating a SDR file, Graphical User Interface software (SDR Compiler) is provided.

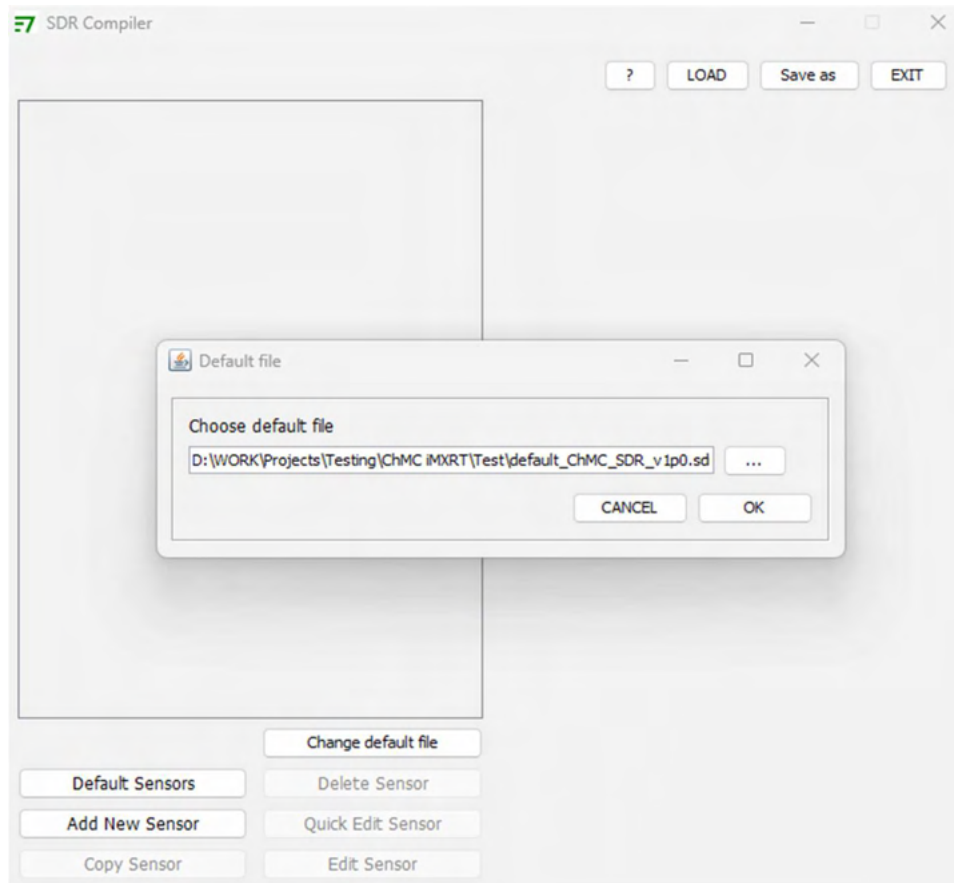


Figure 6: SDR Compiler Tool

When SDR Compiler is opened, a Default file selection window is prompted. A default file contains a list of all sensors supported by Chassis Manager. Browse and select “*default_ChMC_SDR_v1p0.sdr*” provided with this document.

1 Configuring sensors

After selecting a default SDR file, the default window of the SDR Compiler will show up. Here, an existing SDR file can be edited by pressing the **LOAD** button, or a new SDR file could be started. In this example we will create a new SDR file.

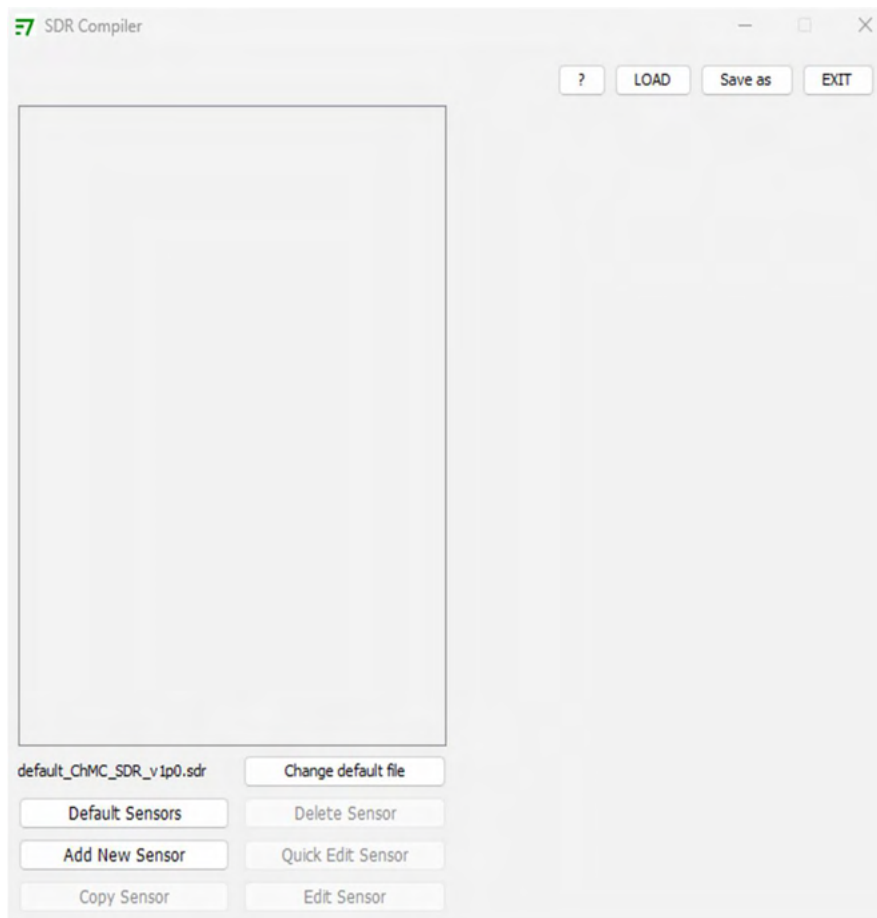


Figure 7: Default SDR Compiler

2 Defining the Sensor List

Default Sensors button is used to start a new sensor list. This will open a new window where desired sensors could be selected. Sensors are added by selecting them from the left-side column (**Available Sensors**) and pressing the ">>" button, thus moving them in the **Selected Sensors** Column.

Removing sensors is done by selecting them from the right-side column (**Selected Sensors**) and pressing the "<<" button, thus moving them back to the **Available Sensors** set.

Only VITA46.11 mandatory sensors and the sensors implemented at Step 1 shall be selected.

Each supported sensor is characterized by a fixed and unique **Sensor Number**, thus providing a way to correlate a signal available on a physical pin of the Chassis manager with a sensor name implemented in the SDR. The sensor numbers are available in the pinouts table above under SN column or a complete list with each supported sensor along with additional info is available in the Reference Manual under section 6.8.

For the described monitoring example, we require:

- 4 voltage sensors: +3.3V (SN:16), +5V (SN:17), +12V (SN:18), -12V (SN:19).
- 2 temperature sensors: Temp1 (SN:26), Temp2 (SN:27).
- 3 fan sensors: Fan1 (SN:37), Fan2 (SN:38), Fan3 (SN:39).
- 1 input sensor: Input1 (SN:64).
- 4 outputs: Output1 (SN:80), Output 14 (LED1 – PowerOK, SN:93), Output 2 (LED2 – TempFAIL, SN:81), Output 3 (LED3 - FanFAIL, SN:82).

Besides the sensors required by the monitoring application the VITA46.11 mandatory sensors have to be added, plus a type 12h SDR for IPMC:

- SDR Type 12h (Management Controller Device Locator Record): This is a mandatory record used to identify the management controllers (IPMC/Chassis Manager)
- SDR for sensor 0: FRU State Sensor
- SDR for sensor 1: System IPMB Link Sensor
- SDR for sensor 2: FRU Health Sensor
- SDR for sensor 3: FRU Voltage Sensor
- SDR for sensor 4: FRU Temperature Sensor
- SDR for sensor 5: Payload Test Results
- SDR for sensor 6: Payload Test Status Sensor

Beside above SDRs we will add also a Type 11h SDR for FRU1. The intention to create FRU1 on Chassis Manager ChMC, to store the Chassis FRU file, as required by VITA46.11

- SDR type 11h (FRU Device Locator Record):

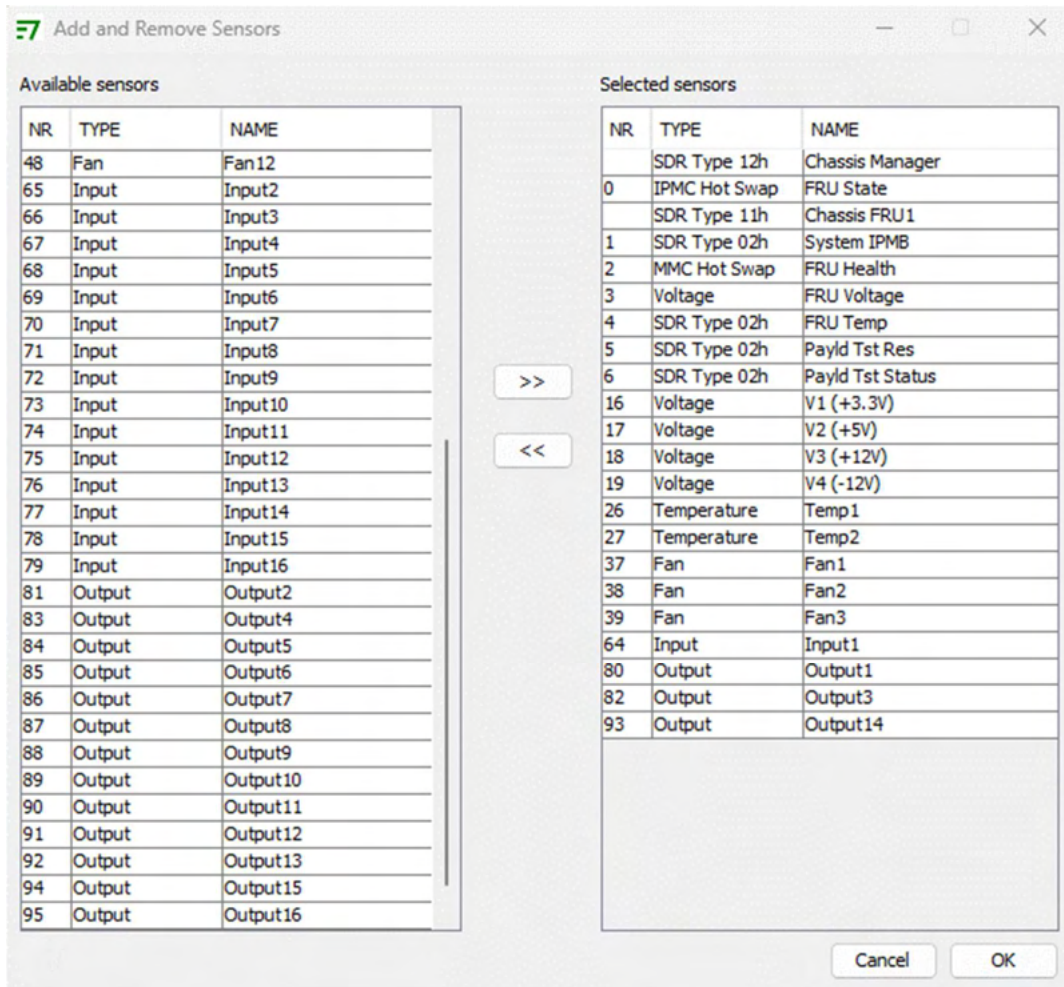


Figure 8: Sensor List

3 Defining the Sensor

After the list is populated with the necessary sensors, each sensor can be customized to address its individual requirements. Depending on the sensor type, different options are available:

...3.1 Voltage and Fan sensors

The monitoring example described by this document uses the default setup for the 4 voltage and 3 fan sensors used, so there are no changes for them.

...3.2 Temperature Sensors

For each temperature sensor (Temp1, Temp2) the following changes are done:

- LC (lower critical) and UC (upper critical threshold) value are entered (5, respectively 55 degrees Celsius) so it can be used to trigger the Temp Fail LED Event generation is also enabled for both assertion and

deassertion. The events will be added into the SEL.

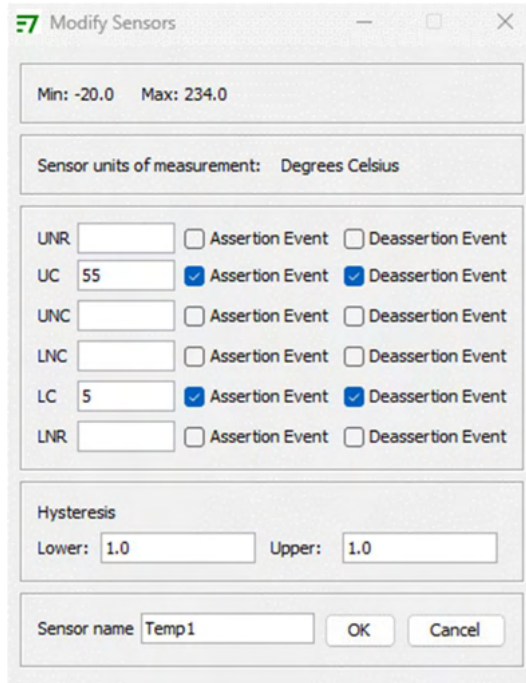


Figure 9: Changes for Temp1, Temp2 Sensors

...3.3 Sensor options for the Input Sensors

Input1 will monitor an active low signal so only the name is changed.

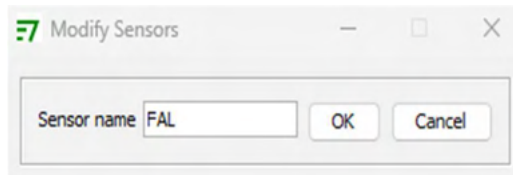


Figure 10: Changes for Input1 Sensor

...3.4 Sensor options for the Output Sensors

Output 1 will be used as an active low ShutDown# signal.

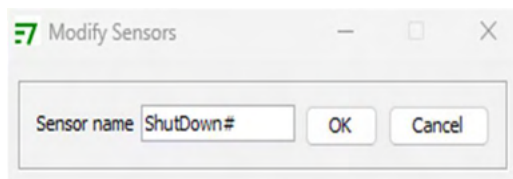


Figure 11: Changes for Output 1 sensor

After all the changes have been done to the sensor list, the file can be saved using the **Save As** button in the main interface.

Existing configuration files can be loaded using the **Load** button in the main interface.

For more information on the SDR Compiler software refer to the SDR Compiler User Manual.

4 Creating Conditions file

Now to obtain the desired functionality for ShutDown# signal (assert when either temp sensor reaches UC threshold of 55 degC), a condition should be added in a new condition file: Open an empty text file (*.txt) in any preferred text editor and type:

```
CONDITION ShutDown#= {
FORMULA: #26=UC OR #27=UC or #80=ASSERTED;
START_DELAY=1000;
BIT=16;
}
```

**See section 7 in the user manual for further details regarding conditions operation and syntax.*

A “START_DELAY” directive was added to force shutdown signal to be asserted if temperature error remains active for at least 1 second. This avoids false shutdowns caused by possible interferences captured by temperature sensors.

Output 14 drives LED1 that is used as a PowerOk LED. The LED will be driven by the UC and LC thresholds of any voltage sensor.

For this configuration if all the voltages are ok, LED1 will be green, and if any of the sensors is below its LC (lower critical) or above its UC (upper critical) threshold, LED1 will be red.

For better understanding sensor 93 name will be changed from “Output 14” to “Power OK”

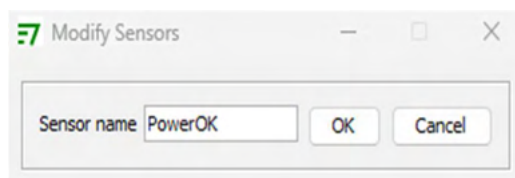


Figure 12: Changes for Output14 (LED1)

Also, the following condition should be added to the conditions file:

```
CONDITION PowerOK= {
FORMULA: #16!=NO_EVENT OR
#17!=NO_EVENT OR
#18!=NO_EVENT OR
#19!=NO_EVENT;
MIN_RUN=300;
BIT=29;
}
```

The “MIN_RUN” directive was added to make sure the LED stays ON for at least 300ms, even the voltage fail was very short.

Output 2 drives LED2 that will be used as a TempFAIL LED. The LED will be off if any threshold of any temperature sensor is not met; Sensor 81 (Output 2) was not added to the SDR file but the output can still be used as it's corresponding controlbit (17).

**See info regarding controlbits in the usermanual (section 6.6)*

For this configuration, if both temperatures are OK, LED2 will be off. If the temperature of any sensor exceeds any of the LC (lower critical) or UC (upper critical) threshold, the LED will shortly flash once every second. The following conditions shall be added to the conditions file:

```
CONDITION TempOK= {
FORMULA: #26 !=NO_EVENT OR #27 !=NO_EVENT;
MAX_RUN=300;
STOP_DELAY=700;
BIT=17;
}
```

Output 3 drives LED3 that will be used as a FanFAIL LED. The LED will be driven by the LC (lower critical) threshold of any fan sensor.

For this configuration if the fans are ok, LED3 will be off, and if the speed of at least one fan is below LC threshold, the LED will be on.

For better understanding sensor 82 name will be changed from “Output 3” to “FanFAIL”

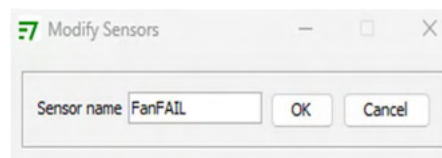


Figure 13: Changes for Output 16 (LED3)

Also, the following condition should be added to the conditions file:

```
CONDITION FanFAIL= {
FORMULA: #37 =LC OR
          #38 =LC OR
          #39 =LC;
BIT=18;
}
```


The final conditions file should contain the following:

```
// Condition to assert Output 1, used as shut down signal
CONDITION ShutDown#= {
    FORMULA: #26=UC OR #27=UC OR #80=ASSERTED;
    START_DELAY=1000;
    BIT=16;
}
// Condition for LED1 used as power ok indicator
CONDITION PowerOK= {
    FORMULA: #16!=NO_EVENT OR
             #17!=NO_EVENT OR
             #18!=NO_EVENT OR
             #19!=NO_EVENT;
    MIN_RUN=300;
    BIT=29;
}
// Condition for LED2, used as temperature fail indicator
CONDITION TempFAIL= {
    FORMULA: #26 !=NO_EVENT OR #27 !=NO_EVENT;
    MAX_RUN=300;
    STOP_DELAY=700;
    BIT=17;
}
// Condition to assert LED3, used as fan fail indicator
CONDITION FanFAIL= {
    FORMULA: #37 =LC OR
             #38 =LC OR
             #39 =LC;
    BIT=18;
}
```

**Comments can be added by typing “//” before the text intended as comment.*

Configuring the Chassis Manager

The configuration is done by loading the SDR file created with the SDR Compiler and the conditions file to the Chassis Manager. The file is sent over CLI, using the xmodem protocol.

The CLI is available on the front panel COM connector. Use a RS232 1:1 serial cable connected to the serial port of a PC or an USB to RS232 serial cable. The CLI DSUB connector (COM) has RS23 signal level.

For connecting to the RS232 Command Line Interface (CLI) use a terminal program. On Windows OS we recommend the use of **Tera Term**.

By default the terminal settings are:

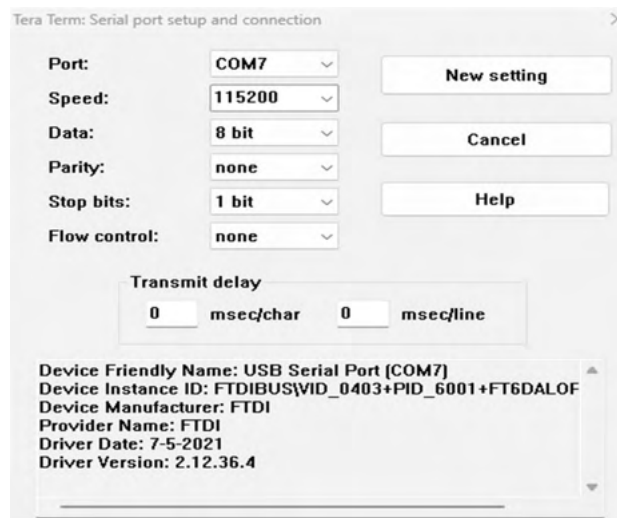


Figure 14: Default Terminal Settings

The **Port** setting should describe the physical port of the computer on which the Chassis Manager is connected.

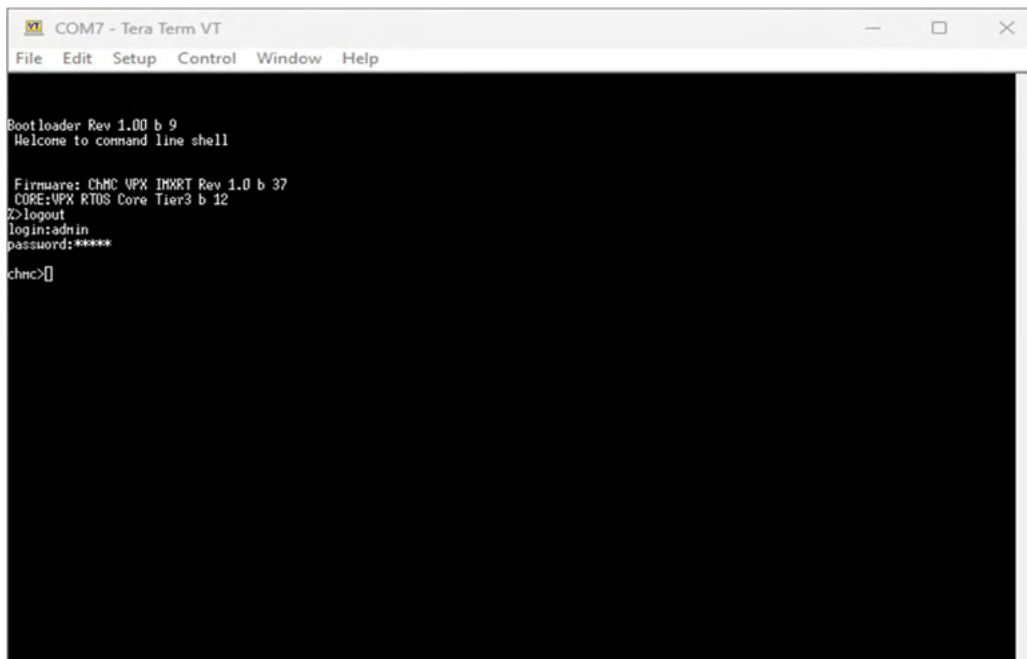
The default Baud rate is 115200.

At start-up the Chassis Manager will boot as a user profile. In order to perform xmodem commands, admin privileges are required. To login with admin privileges send “**logout**” command and login credentials will be requested by the Chassis Manager; the default credentials (case sensitive) for admin profile are:

login: **admin**

password: **ADMIN**

The VPX NVMRO signal must be disabled to allow configuration to be changed.



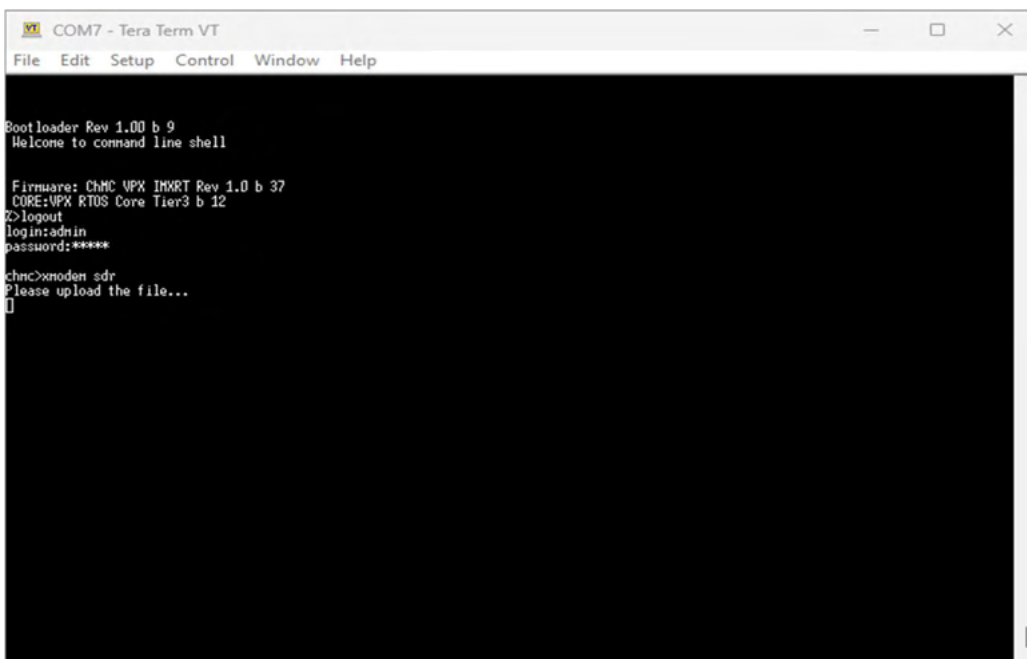
```
COM7 - Tera Term VT
File Edit Setup Control Window Help

Bootloader Rev 1.00 b 9
Welcome to command line shell

Firmware: ChMC VPX IMXRT Rev 1.0 b 37
CORE:VPX RTOS Core Tier3 b 12
>logout
login:admin
password:*****
chmc>
```

Figure 15: CLI login

After a successful login the SDR file can be uploaded using the command: **xmodem sdr**. The command will start the reception protocol and will wait for the beginning of the transfer. At this point you can send the file (*.sdr) using the xmodem protocol.



```
COM7 - Tera Term VT
File Edit Setup Control Window Help

Bootloader Rev 1.00 b 9
Welcome to command line shell

Firmware: ChMC VPX IMXRT Rev 1.0 b 37
CORE:VPX RTOS Core Tier3 b 12
>logout
login:admin
password:*****
chmc>xmodem sdr
Please upload the file...
[]
```

Figure 16: xmodem sdr command

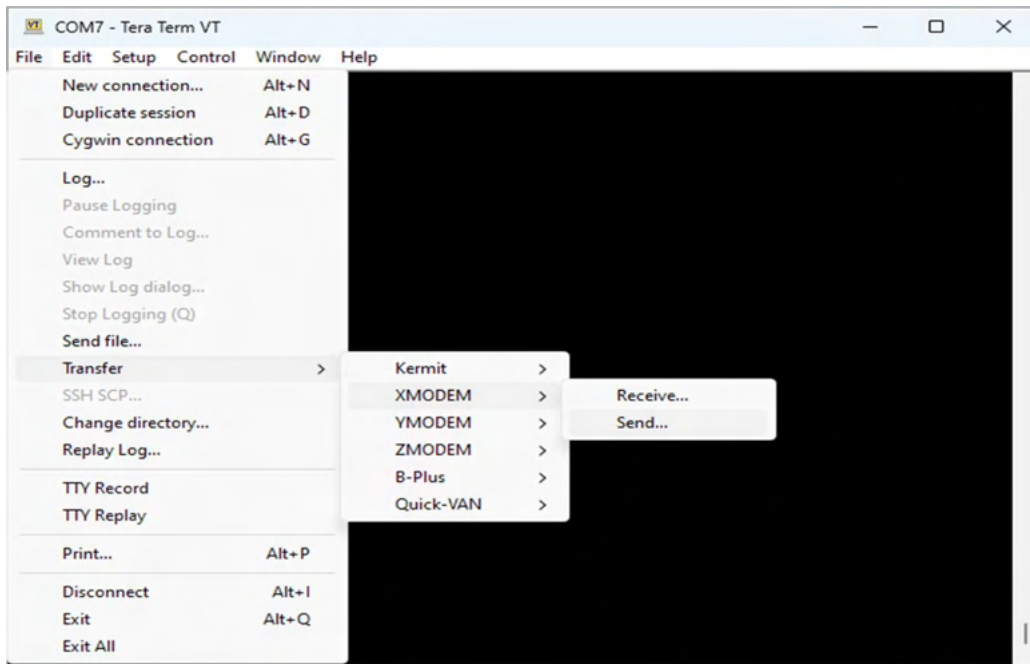


Figure 17: Send file via xmodem

After the file transfer is complete a confirmation message will be displayed: **Done!** . Conditions file must also be uploaded to complete the configuration, by sending **xmodem conditions** command:

Select the before created conditions file (*.txt) and send it using same procedure as for the SDR file above.

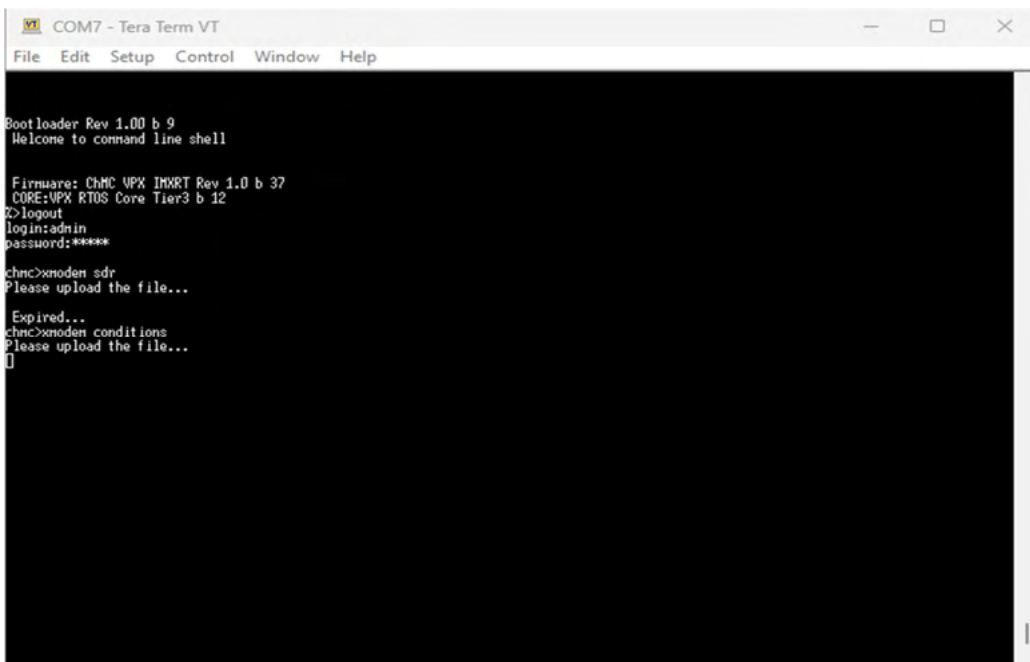


Figure 18: xmodem conditions command

For complete configuration, info regarding the chassis (Chassis FRU file) in which the Chassis Manager is installed must be provided. To compile a Chassis FRU file, load the default ChassisFRU provided in the VPX FRU Compiler GUI software and edit the following settings:

- Change the chassis part number and serial number

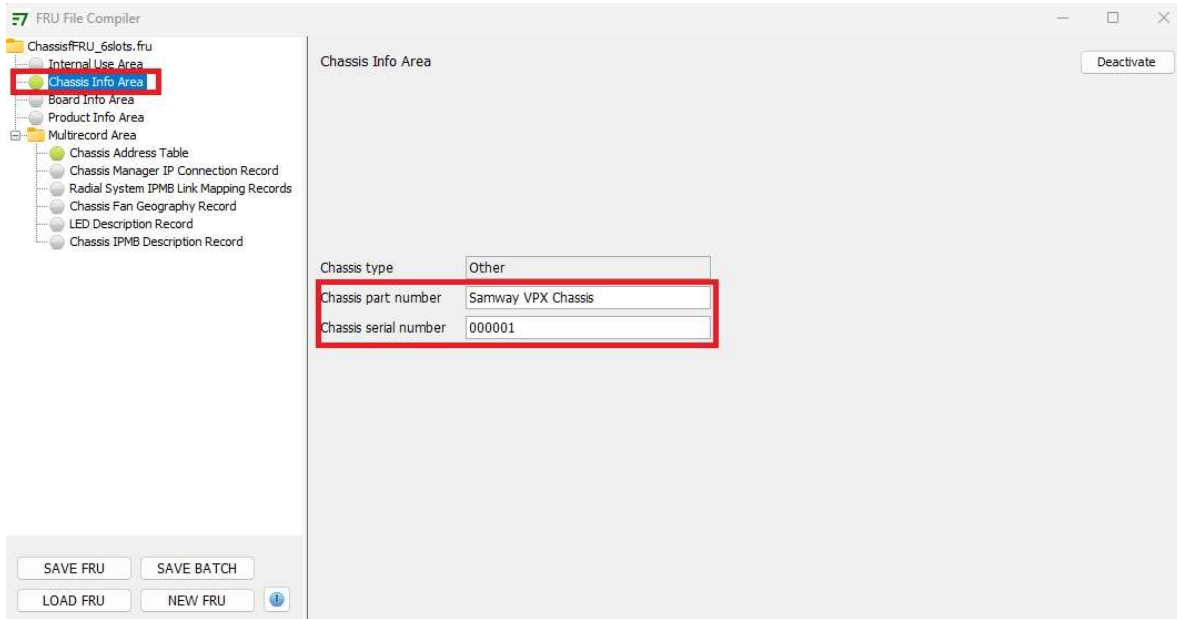


Figure 19: Edit chassis info

- Edit the number and address for each slot present in the system

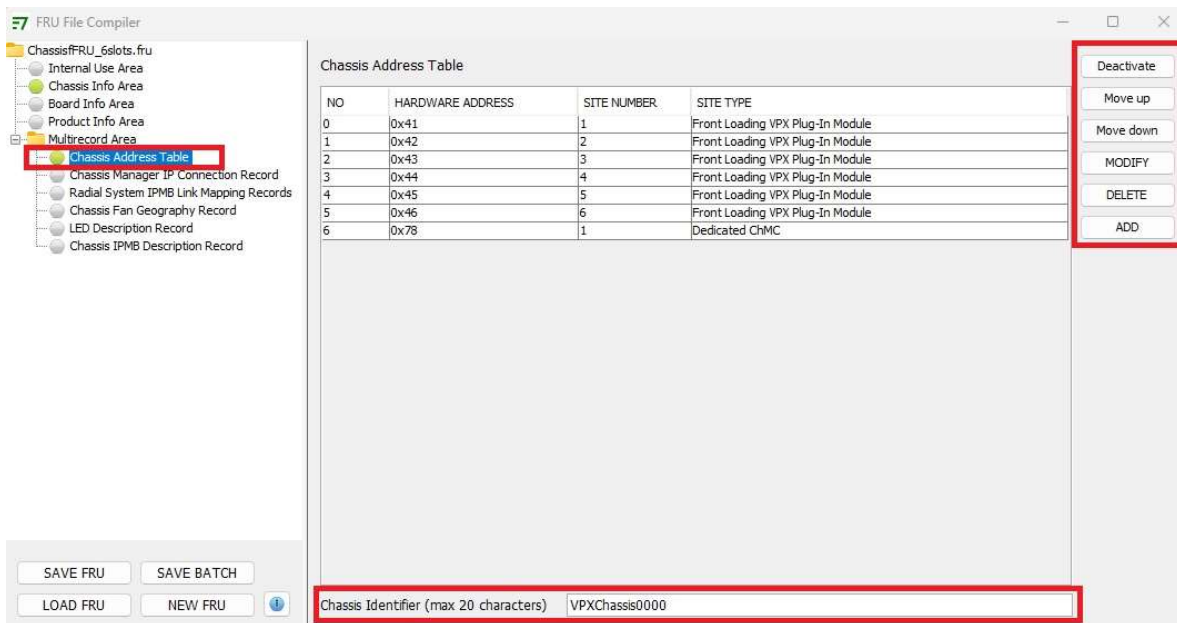


Figure 20: Edit Chassis address table

*See VPX FRU Compiler manual for further info.

Upload the newly created Chassis FRU file (*.fru) using **xmodem chassisfru** command as described above for the previously used xmodem commands.

The settings will be updated at the next restart of the Chassis Manager. You can trigger a restart by using the **reboot** command. At the next restart, the new settings are loaded and the uploaded configuration files becomes active.