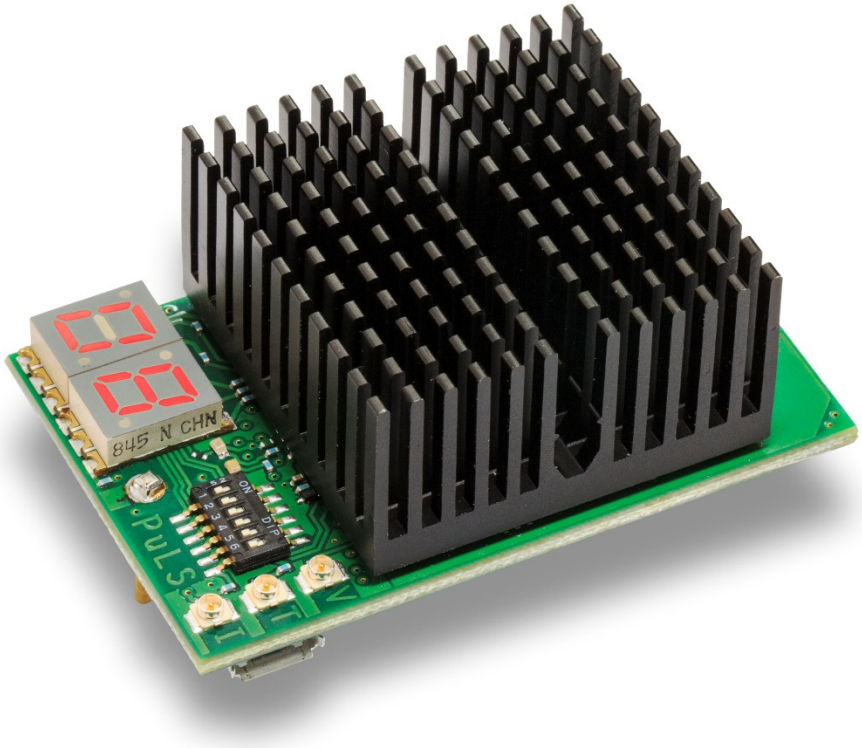
PµLS – Programmable Micro Load
User Manual
V1.2



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Specification

The PuLS can perform load testing on DC/DC converters with a waveform specified in the PC software PuLS Control. It can be configured via USB or PMBUS, when using it in USB mode (address 0) it will act as a virtual COM port against the PC. The current PC software allows the user to set three amplitude levels between 0.5 - 45 A, each with a duration between 10 us – 9999 us. The voltage range for the device is up to 25 V. The PuLS has built in temperature trigger circuit which will shut it off if the temperature exceeds 92°C.

Hardware Description

Numbers refer to figure 1 and 2.

1. Display showing the PMBUS address of the device and error codes.
2. PMBUS connectors. See Table 1 in appendix for pin configuration (IDC 1,27mm 2x5, RPV380253/110)
3. Green LED indicates that the device is running the stored pulse settings. Red LED indicates error, check error code on display and its meaning in Appendix Table 2.
4. Switch 1-5 sets the node address of the device in binary format (1 is MSB). If switch 6 is on the device will boot up in firmware upgrade mode.
5. Current monitor, scaling 0.1 V/A. (U.FL connector)
6. Trigger output, high during pulse duration. Can be used to trigger an oscilloscope. (U.FL connector)
7. Voltage monitor directly connected to the pin in ref.8. (U.FL connector)
8. Micro-USB connector for connecting to PC.
9. Converter under test positive pin. (Fits in SND21615/1 , MILL-MAX 0493)
10. Wide input supply for powering the device, 5.2 – 17 V. (Fits in SND21615/1 , MILL-MAX 0493)
11. GND connector.(Fits in SND21615/1 , MILL-MAX 0493)

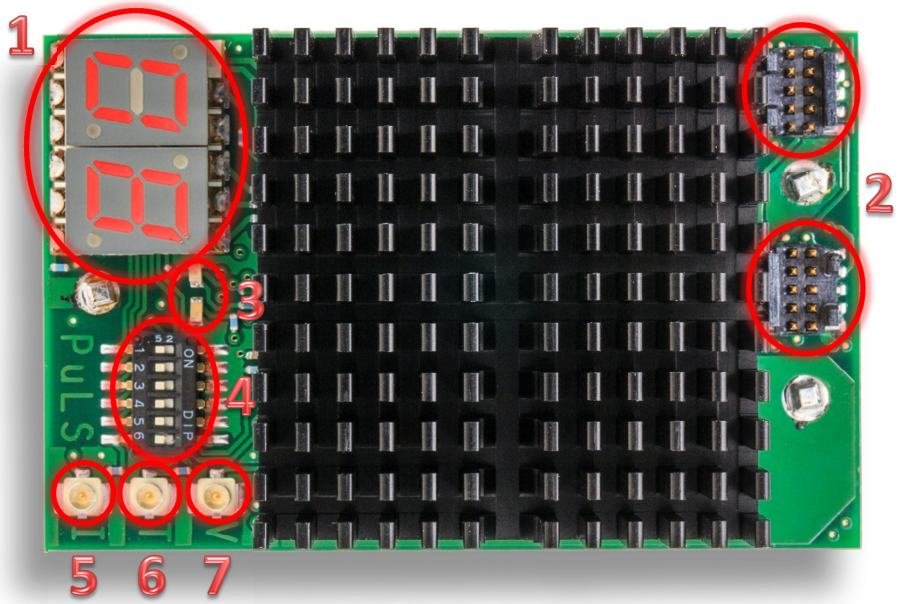

Figure 1: PuLS top view

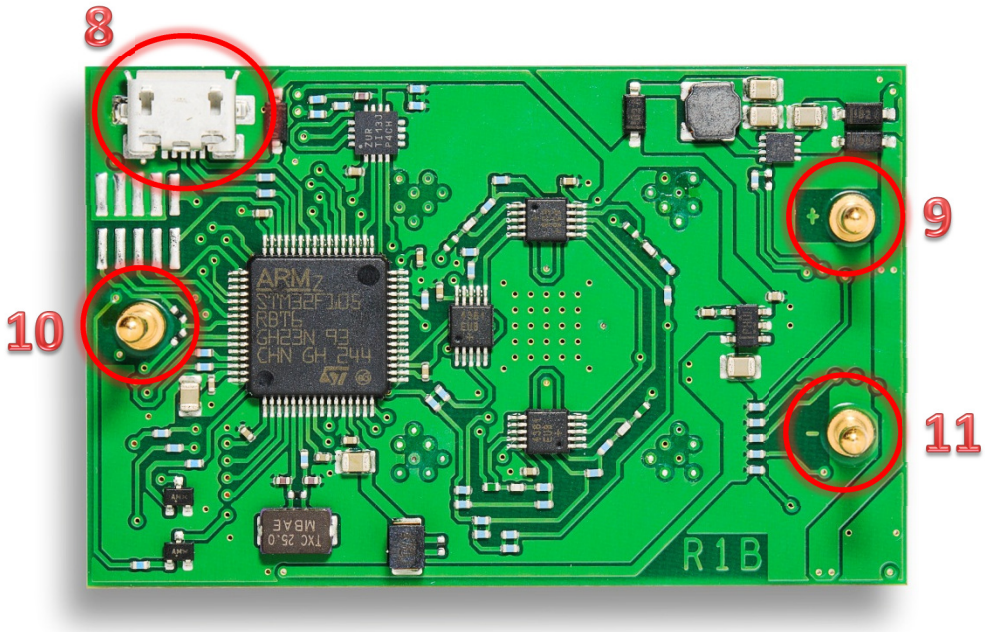

Figure 2: PuLS bottom view

System Setup

Setting Address

Use switches 1 - 5 to assign the device a PMBUS address. The address offset is 32, for example if only switch 1 and 4 is on the PMBUS address will be: 32 + 1x16 + 0x8 + 0x4 + 1x2 + 0x1 = 50. The value shown on the display will not include the address offset; in the case above 18 will be shown on the display. The device reads the switch settings when booting, therefore it is required to reboot the device to change address.

If all switches are off (address 0) the device will boot into PMBUS host mode and will act as a virtual COM port against a computer connected to the USB port. This removes the need of a PMBUS dongle to communicate with the PuLS network.

If a PMBUS dongle is used, none of the devices in the network should be given address 0.

Powering the PuLS

The PuLS can be powered in three different ways. The inputs are protected with “OR” diodes, therefore to power the device use at least one of the following methods:

- Through the USB cable.
- Through the wide input pin 5.2 – 17 V, ref.9 above.
- Through the PMBUS cable 5.2 – 17 V, this will power all units connected to the PMBUS. Supply via pin 1 and 3, GND on pin 4 and 6.

PµLS Control Software

Software Installation

The software works with both 32 and 64-bit versions of Windows XP, Vista, 7. Run setup.exe located in the PuLS Control folder, it will install PuLS Control software and the necessary drivers.

Running the Software

To use the PuLS in USB mode set its address to 0 before connecting the USB cable. When connecting it in USB mode it will show up as a virtual COM port in the PC. It is necessary to know which COM port number the PC assigns the device. This can be seen in the device manager on the PC, accessed from the control panel or by running “devmgmt.msc” from the run promt (Windows button + R). Under ports there should be one with the name ST Microelectronics, check the assigned port number.

Start the PuLS Control software from the PuLS Control folder in the Start Menu. The panel in figure 3 will appear. Start with selecting the COM port in the lower right corner. The function of the interface is as follows with numbers referring to figure 3.

1. This tree shows the devices of the PuLS network, use “Scan bus” to check for devices on the bus or use “Update node status” to update voltage and temperature on the existing nodes. When clicking on a node in the list the configuration of the device will be read and displayed in the window to the right of this box. “Start all” and “Stop all”, starts and stops all found units in the tree. “Standby all” will put all slave units (not address 0) in sleep mode and “Wake up all” will wake the units.
2. In this box the required pulse shape is configured by setting the parameters at the bottom. Current start and current stop cannot be larger than current pulse. The time between pulses box sets the time delay between the pulses, minimum is 5 ms and maximum is 1000 ms. The window will show a preview of the pulse. The text box can be used to give the selected converter a name; it is stored when pressing “Send config to device”. The pulse configuration can be saved to a file by pressing “Save config to file” and choosing a location and name for the file. In the same way the configuration can be read from a file by pressing “Load config from file” and choosing an existing file.
3. At the top the status of the chosen PuLS is shown. The “Start” and “Stop” buttons controls the operation of the device. It will start or stop running the configuration stored in the PuLS. Note that the configuration of the PuLS shown on the PC must be sent to the PuLS before pressing start, otherwise nothing will happen.
4. Pressing “Update status” will update the temperature of the selected PuLS and the output voltage of the connected DC/DC converter being tested. “Clear errors” clears the errors. “Read device info” will read model, revision and the serial number of the device and display it to the user. “Calibrate device” will run an automatic calibration function which requires the device to be connected to a power supply with a voltage between 1.5 – 3.3 V and the ability to source 15 A.
5. The trigger mode can be set to NONE, MASTER or SLAVE. This can be used to run synchronized pulses, the master unit will trigger the slave units to start at the same time. The button “Send config to device” will send all configurations done in the software to the selected PuLS. “Get config from device” will read the configuration currently stored in the PuLS and update the preview to show this. In the box in the lower right corner the PuLS COM port number assigned by the PC should be chosen.

Figure 3: PuLS Control software

Appendix

Table 1: Pin configuration PMBUS connector

Pin	Signal	Comment
1	VCC	Power supply (5.2 - 17 V)
2	LOAD SYNC	Sync signal for pulse start
3	VCC	Power supply (5.2 – 17 V)
4	GND	Signal GND
5	---	Not used
6	GND	Signal GND
7	Ctrl	PMBus control signal
8	Alert	PMBus alert signal
9	SCK	PMBus serial clock
10	SDA	PMBus serial data

Note: Ericsson part number: RPV380253/110

Table 2: Error codes

Code	Description
E0	Over voltage alarm
E1	Over temperature alarm
E2	Packet error check failed (PEC)
E3	Invalid/unsupported command
E4	Invalid/unsupported data
E5	Communication fault
E6	Calibration failed
E7	Over current alarm