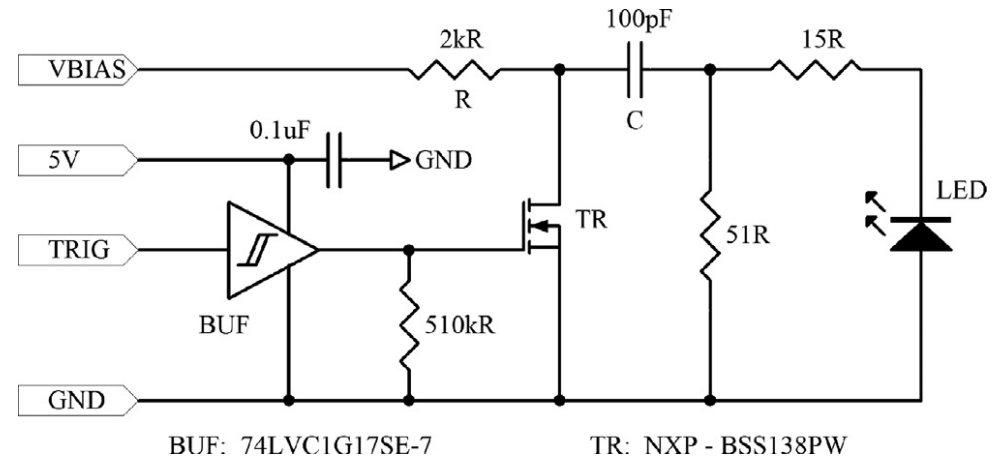


BCAL LED control GUI  
Orlando Soto  
April 3, 2014

# Introduction (1)

In order to perform a bunch of tests on the BCAL and FCAL, dedicated LED boards were built.

Each board is controlled using a Caen VME pulser module for triggering and a Wiener MPOD Voltage module for bias and low voltage. This modules are controlled using Epics.

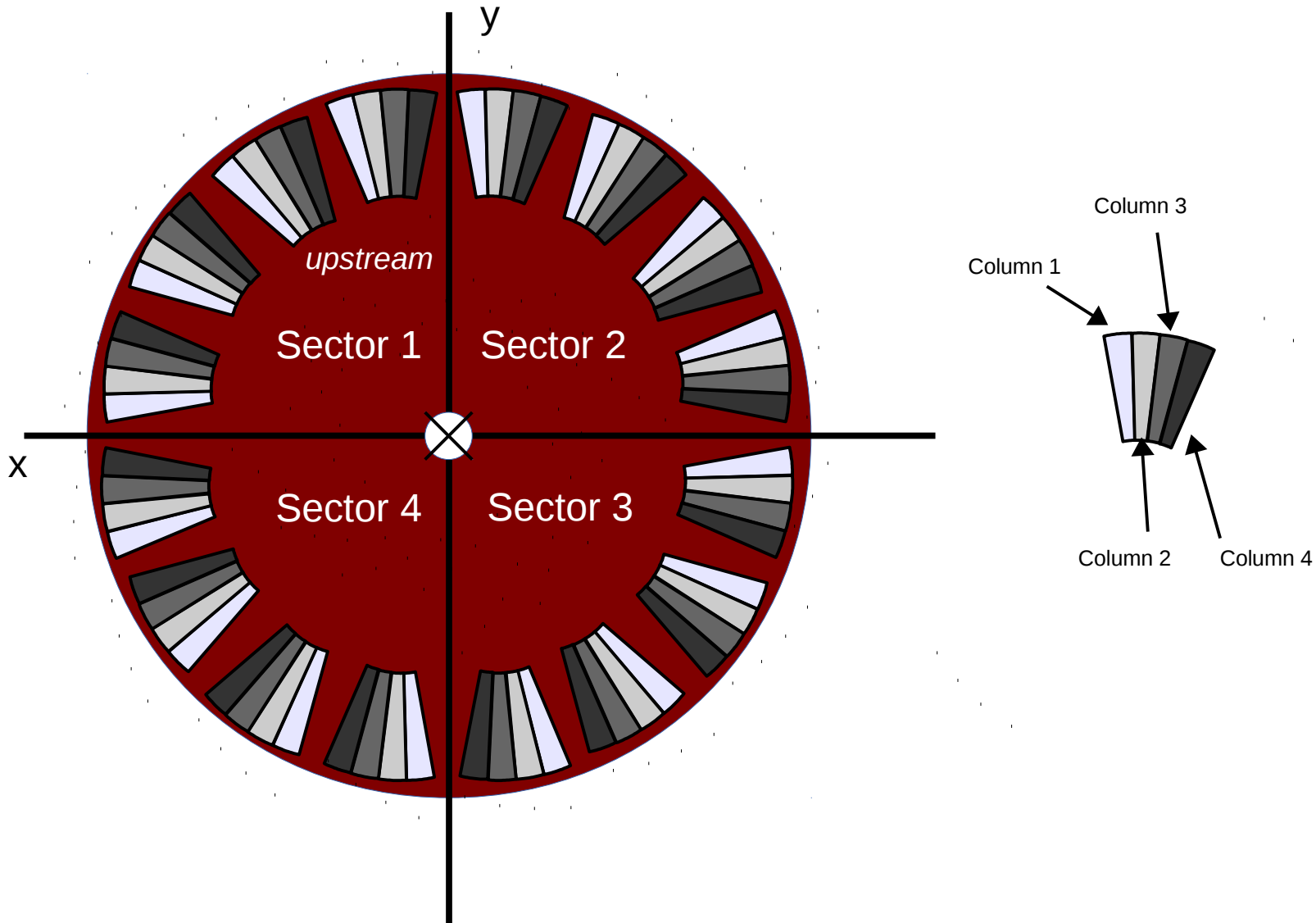


LED board circuit.

Figure 4, NIM A no. 738(2014), pp. 41-49

To ensure an easy control of each test a Graphical user interface was build using Control System Studio (CSS). All communication issues with the different modules and chassis are hidden.

# Introduction (2)



# Scope

The interface includes **LED pulser control**, **voltage controls** and **trigger width control**.

The LED pulser control section consist of:

- One matrix of 4x8 to enable/disable the LED flashing on upstream and downstream.
  - Each row represents a sector.
  - The columns are grouped in two, each group represents the column for upstream and downstream.
- One section for the manipulation of pulse width, frequency and number of pulses of all LED pulser channels. Also includes the button for start the pulsing.

The Trigger section consist of two rows, each one represents the trigger for upstream and downstream, and offers control over the pulse width.

The remaining parameters are shown for reference and take their values from the LED pulser control section.

Each trigger is enabled if at least one LED pulser channel of the corresponding part (UP/DOWN) is enabled and will start when the start button is pressed.

The voltage control section has two rows, Bias and Low voltage. The monitoring shows the average of all LV (BIAS) channels. Each row includes a button for advance setting.

# Graphical user interface (1)

BCAL\_LEDControl.opi

## BCAL LED Pulsar

	Column 1		Column 2		Column 3		Column 4		LED LV		LED Bias	
	UP	Down	UP	Down	UP	Down	UP	Down	UP	Down	UP	Down
Sector 1 Mod. 1 - 12	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>
Sector 2 Mod. 13 - 24	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>
Sector 3 Mod. 25 - 36	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>
Sector 4 Mod. 37 - 48	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="DISABLE"/>	<input type="button" value="ENABLE"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>	<input type="button" value="ON"/>

Status	Start/Stop pulsing Up Down	Pulse width Readback	Pulse width Setpoint	Frequency Readback	Frequency Setpoint	Number of pulses Readback	Num. of pulses Setpoint	Cont. Mode ON/OFF
LEDs	<input type="button" value="START UP"/> <input type="button" value="START DOWN"/>	<input type="text" value="200 (ns)"/>	<input type="text" value="200"/>	<input type="text" value="100.000 (Hz)"/>	<input type="text" value="100"/>	<input type="text" value="INF"/>	<input type="text" value="10"/>	<input type="button" value="OFF"/> <input checked="" type="checkbox"/>
NIM Trigger Up	<input type="checkbox"/>	<input type="text" value="100 (ns)"/>	<input type="text" value="100"/>	<input type="text" value="100.000 (Hz)"/>	<input type="text" value="100"/>	<input type="text" value="INF"/>	<input type="text" value="10"/>	<input type="button" value="OFF"/> <input checked="" type="checkbox"/>
NIM Trigger Down	<input type="checkbox"/>	<input type="text" value="10 (ns)"/>	<input type="text" value="10"/>	<input type="text" value="100.000 (Hz)"/>	<input type="text" value="100"/>	<input type="text" value="INF"/>	<input type="text" value="10"/>	<input type="button" value="OFF"/> <input checked="" type="checkbox"/>

Channel Name	Average Measured Voltage (V)	Voltage Setpoint	Average Voltage Setpoint Readback	Average Measured Current (A)
BIAS	0.000 a.u.	<input type="text" value="6"/>	6.000 a.u.	0.000 a.u.
LV	0.000 a.u.	<input type="text" value="5"/>	5.000 a.u.	0.000 a.u.

Advance Settings

# Graphical user interface (2)

The screenshot shows the BCAL LED Control GUI with the following components:

- BCAL LED Pulsar**: A central control panel with a grid of buttons for four sectors (Mod. 1-12, 13-24, 25-36, 37-48) and four columns (Column 1-4). Each sector and column has 'UP' and 'Down' buttons, which are 'DISABLE' (green) or 'ENABLE' (red).
- Columns**: A label with arrows pointing to the four columns of the pulsar grid.
- LED LV and LED Bias**: Two columns of 'ON' (red) and 'OFF' (green) buttons on the right side of the pulsar grid.
- LED Pulsar parameters**: A table at the bottom with columns for Status, Start/Stop pulsing, Pulse width Readback/Setpoint, Frequency Readback/Setpoint, Number of pulses Readback/Setpoint, Num. of pulses Setpoint, and Cont. Mode ON/OFF.
- LED enable/disable**: A label with a dashed green box around the pulsar grid.
- Sectors**: A label with arrows pointing to the four rows of the pulsar grid.

Status	Start/Stop pulsing Up Down	Pulse width Readback	Pulse width Setpoint	Frequency Readback	Frequency Setpoint	Number of pulses Readback	Num. of pulses Setpoint	Cont. Mode ON/OFF
LEDs	START UP START DOWN	200 (ns)	200	100.000 (Hz)	100	INF	10	OFF
NIM Trigger Up		100 (ns)	100	100.000 (Hz)	100	INF	10	OFF
NIM Trigger Down		10 (ns)	10	100.000 (Hz)	100	INF	10	OFF

Channel Name	Average Measured Voltage (V)	Voltage Setpoint	Average Voltage Setpoint Readback	Average Measured Current (A)
BIAS	0.000 a.u.	6	6.000 a.u.	0.000 a.u.
LV	0.000 a.u.	5	5.000 a.u.	0.000 a.u.

# Graphical user interface (3)

The screenshot shows the BCAL LED Control GUI with the following sections:

- Columns:** Column 1, Column 2, Column 3, Column 4
- LV and BIAS:** LED LV, LED Bias
- Sectors:** Sector 1 (Mod. 1 - 12), Sector 2 (Mod. 13 - 24), Sector 3 (Mod. 25 - 36), Sector 4 (Mod. 37 - 48)
- LED enable/disable:** Green 'DISABLE' and red 'ENABLE' buttons for each sector and column.
- Voltage ON/OFF:** Red 'ON' and 'OFF' buttons for LED LV and LED Bias.
- LED Pulsers parameters:**

Status	Start/Stop pulsing	Pulse width	Pulse width	Frequency	Frequency	Number of pulses	Num. of pulses	Cont. Mode
	Up Down	Readback	Setpoint	Readback	Setpoint	Readback	Setpoint	ON/OFF
LEDs	START UP, START DOWN	200 (ns)	200	100.000 (Hz)	100	INF	10	OFF
NIM Trigger Up	Blue circle	100 (ns)	100	100.000 (Hz)	100	INF	10	OFF
NIM Trigger Down	Blue square	10 (ns)	10	100.000 (Hz)	100	INF	10	OFF
- Voltage Setpoint and monitoring:**

Channel Name	Average Measured Voltage (V)	Voltage Setpoint	Average Voltage Setpoint Readback	Average Measured Current (A)	
BIAS	0.000 a.u.	6	6.000 a.u.	0.000 a.u.	Advance Settings
LV	0.000 a.u.	5	5.000 a.u.	0.000 a.u.	Advance Settings

# Graphical user interface (4)

The screenshot shows the BCAL LED Control GUI with the following sections:

- Columns:** Labeled at the top, pointing to the four columns of LED pulser controls.
- LV and BIAS:** Labeled at the top, pointing to the LED LV and LED Bias controls.
- Sectors:** Labeled on the left, pointing to the four rows of LED pulser controls.
- LED enable/disable:** Labeled on the left, pointing to the green and red circular buttons for each LED.
- LED Pulser parameters:** Labeled on the left, pointing to the parameter settings table.
- Trigger width control and monitoring:** Labeled on the left, pointing to the NIM Trigger Up and Down controls.
- Voltage Setpoint and monitoring:** Labeled on the left, pointing to the voltage monitoring table.
- Voltage ON/OFF:** Labeled on the right, pointing to the LED LV and LED Bias ON/OFF buttons.

Status	Start/Stop pulsing Up Down	Pulse width Readback	Pulse width Setpoint	Frequency Readback	Frequency Setpoint	Number of pulses Readback	Num. of pulses Setpoint	Cont. Mode ON/OFF
LEDs	START UP START DOWN	200 (ns)	200	100.000 (Hz)	100	INF	10	OFF <input checked="" type="checkbox"/>
NIM Trigger Up	<input checked="" type="checkbox"/>	100 (ns)	100	100.000 (Hz)	100	INF	10	OFF <input checked="" type="checkbox"/>
NIM Trigger Down	<input checked="" type="checkbox"/>	10 (ns)	10	100.000 (Hz)	100	INF	10	OFF <input checked="" type="checkbox"/>

Channel Name	Average Measured Voltage (V)	Voltage Setpoint	Average Voltage Setpoint Readback	Average Measured Current (A)	
BIAS	0.000 a.u.	6	6.000 a.u.	0.000 a.u.	Advance Settings
LV	0.000 a.u.	5	5.000 a.u.	0.000 a.u.	Advance Settings



# LED mask and parameters

**BCAL LED Pulsar**

	Column 1		Column 2		Column 3		Column 4		LED LV		LED Bias	
	UP	Down	UP	Down	UP	Down	UP	Down	UP	Down	UP	Down
Sector 1 Mod. 1 - 12	<input type="radio"/> DISABLE	<input type="checkbox"/> ENABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> ENABLE	<input type="radio"/> ON	<input type="checkbox"/> ON	<input type="radio"/> ON	<input type="checkbox"/> ON
Sector 2 Mod. 13 - 24	<input type="radio"/> DISABLE	<input type="checkbox"/> ENABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ENABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ENABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ON	<input type="checkbox"/> ON	<input type="radio"/> ON	<input type="checkbox"/> ON
Sector 3 Mod. 25 - 36	<input type="radio"/> DISABLE	<input type="checkbox"/> ENABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ENABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ENABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> ON	<input type="checkbox"/> ON	<input type="radio"/> ON	<input type="checkbox"/> ON
Sector 4 Mod. 37 - 48	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> DISABLE	<input type="radio"/> DISABLE	<input type="checkbox"/> ENABLE	<input type="radio"/> ON	<input type="checkbox"/> ON	<input type="radio"/> ON	<input type="checkbox"/> ON



Click to enable LED channel

The start button must be pressed to begin the flashing and trigger

Status	Start/Stop pulsing Up Down	Pulse width Readback	Pulse width Setpoint	Frequency Readback	Frequency Setpoint	Number of pulses Readback	Num. of pulses Setpoint	Cont. Mode ON/OFF
LEDs	<input type="radio"/> START UP <input type="radio"/> START DOWN	200 (ns)	200	100.000 (Hz)	100	INF	10	OFF <input type="checkbox"/>
NIM Trigger Up	<input type="checkbox"/>	100 (ns)	100	100.000 (Hz)	100	INF	10	OFF <input type="checkbox"/>
NIM Trigger Down	<input type="checkbox"/>	10 (ns)	10	100.000 (Hz)	100	INF	10	OFF <input type="checkbox"/>

Blinking if it's working

# Voltage basic controller

Channel Name	Average Measured Voltage (V)	Voltage Setpoint	Average Voltage Setpoint Readback	Average Measured Current (A)	
BIAS	0.000 a.u.	6 	6.000 a.u.	0.000 a.u.	Advance Settings
LV	0.000 a.u.	5 	5.000 a.u.	0.000 a.u.	Advance Settings

# Bias advance settings

CSS (on gluon29.jlab.org)

File Edit Search CSS Window Help

100%

BCAL\_VoltageChannels.opi

### BCAL: bias Channels

Channel Name	Crate Slot Channel #	Measured Voltage	Voltage Setpoint	Voltage Setpoint Readback	LV ON/OFF	Channel Status	Measured Current	Max Current Setpoint	Max Current Readback	Trip Current Setpoint	Trip Current Readback	Max Voltage Setpoint	Max Voltage Readback	Ramp Up Rate Setpoint	Ramp Up Rate Readback	Ramp Down Rate Setpoint	Ramp Down Rate Readback	Clear Events and Turn Off
BIAS:U:0	U1-1-MID:100	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:U:1	U1-1-MID:101	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:U:2	U1-1-MID:102	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:U:3	U1-1-MID:103	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:D:0	U1-1-MID:104	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:D:1	U1-1-MID:105	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:D:2	U1-1-MID:106	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	
BIAS:D:3	U1-1-MID:107	0.000	6	6.000		Off	0.000	2.5	2.500	2.525	2.525	30.03	30.030	100	100	100	100	

# Low voltage advance settings

CSS (on gluon29.jlab.org)

File Edit Search CSS Window Help

90%

BCAL\_VoltageChannels.opi

### BCAL: Iv Channels

Channel Name	Crate Slot Channel #	Measured Sense Voltage	Measured Terminal Voltage	Voltage Setpoint	Voltage Setpoint Readback	LV ON/OFF	Channel Status	Measured Current	Max Current Setpoint	Max Current Readback	Trip Current Setpoint	Trip Current Readback	Max Sens Voltage Setpoint	Max Sens Voltage Readback	Max Term Voltage Setpoint	Max Term Voltage Readback	Ramp Up Rate Setpoint	Ramp Up Rate Readback	Ramp Down Rate Setpoint	Ramp Down Rate Readback	Clear Events and Turn Off
LV:U:0	U1-1-MID:0	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:U:1	U1-1-MID:1	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:U:2	U1-1-MID:2	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:U:3	U1-1-MID:3	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:D:0	U1-1-MID:4	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:D:1	U1-1-MID:5	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:D:2	U1-1-MID:6	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>
LV:D:3	U1-1-MID:7	0.000	0.000	5	5.000	■	Off	0.000	5	5.000	5.05	5.050	8.08	8.080	8.08	8.080	100	100	100	100	<input type="checkbox"/>

BCALED:lv:D:3:i\_rd  
2014/04/01 10:20:01.885153143 0.000 OK, OK

Questions, Comments or Doubts?