

# Rubidium Series TCC70XS Series Standalone Systems

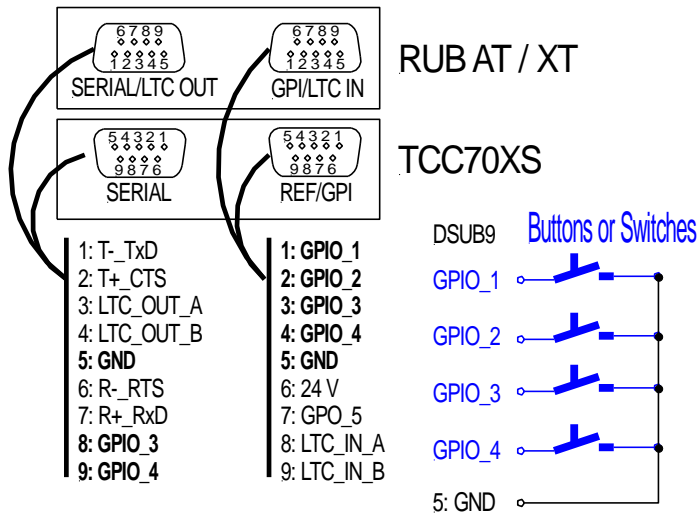


## GPIO Functions

Rubidium AT/XT and TCC70XS Application Note  
Revision: 10  
February 7, 2024



# GPIO used as Input

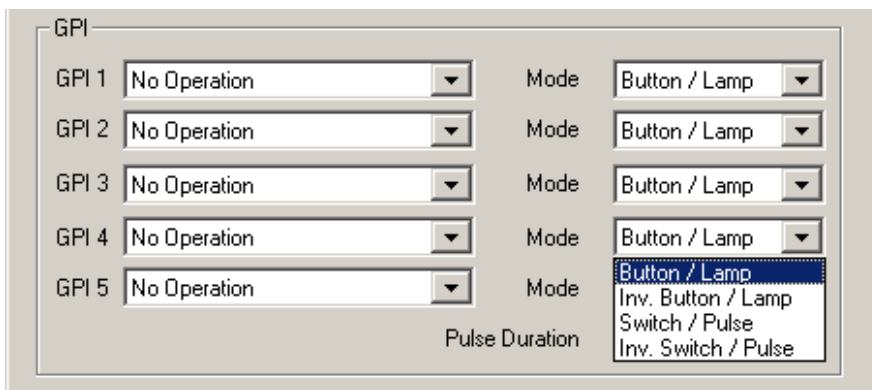


## Input Specifications

GPIO_1 ... GPIO_4: Input specification	Input "Low": -2.0 to +1.0 V Input "High": +3.0 to +24.0 V Impedance: 4.7 kΩ Frequency: 0 - 1 MHz
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## Input Switching Characteristic

The input switching characteristic is programmable utilizing the **Key** function with one of the configuration tools. Example:



The four GPIOs can be programmed to have a switching characteristic as a "Push Button" or a "Toggle Switch". This can be selected independently using the dropdown list at "Mode":

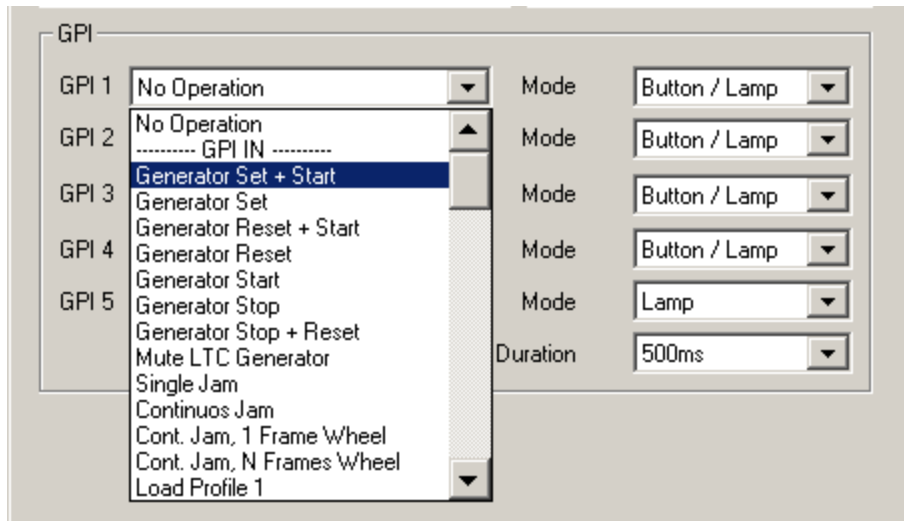
Selection at „Mode“	GPIO Characteristic
Button / Lamp	Trigger at falling edge ("High" → "Low")
Inv. Button / Lamp	Trigger at rising edge ("Low" → "High")
Switch	Level sensitive: "Low" = active, "High" = inactive
Inv. Switch	Level sensitive: "High" = active, "Low" = inactive



## Functionality

The functionality is programmable utilizing the **Key** function with one of the configuration tools.

Example:



The functionality can be selected independently using the dropdown list.

The table gives an overview of the functions presently available with standard firmware:

Function	Description	Recommended "Mode"
No Operation	No input or output functionality.	-
Generator Set/Start	Presets the time code generator to the current set values (= "Set Time" values presented at the <b>Generate</b> function). Generator starts counting. Switches off any "Jam-Sync" mode.	Button
Generator Set	Presets the time code generator to the current set values (= "Set Time" values presented at the <b>Generate</b> function).	Button
Generator Reset+Start	Resets the time addresses of the generated time code to zero; generator starts counting. Switches off any "Jam-Sync" mode.	Button
Generator Reset	Resets the time addresses of the generated time code to zero. Switches off any "Jam-Sync" mode.	Button
Generator Start	Generator starts counting upwards.	Button
Generator Stop	Generator stops counting.	Button
Generator Stop+Reset	Resets the time addresses of the generated time code to zero; generator stops counting. Switches off any "Jam-Sync" mode.	Button
Mute LTC Generator	Mutes the LTC output (on/off toggling).	Switch
Single Jam	Initiates a "Single Jam Sync".	Button
Continuous Jam	Toggles the "Continuous Jam Sync" mode (on/off).	Switch
Continuous Jam ON	Switches on the "Continuous Jam Sync" mode.	Button



Function	Description	Recommended "Mode"
Cont. Jam, 1 Frame Wheel	Toggles the "Cont. 1 Frame" mode (on/off).	Switch
Cont. Jam, 1 Frame Wheel ON	Switches on the "Cont. 1 Frame" mode.	Button
Cont. Jam, N Frames Wheel	Toggles the "Cont. Wheel" mode (on/off).	Switch
Cont. Jam, N Frames Wheel ON	Switches on the "Cont. Wheel" mode.	Button
Load Profile ...	The module gets a new set-up according to the parameters stored in the selected profile.	Button
Insert Bypass	Toggles the <b>Insert Bypass</b> mode (on/off).	Switch
Insert Visible	Toggles the currently selected video window on/off.	Switch
Insert Select	Selects the next video window.	Button
Insert Up Insert Down Insert Left Insert Right	Moves the currently selected video window. Repeated function, if button is pressed constantly.	Button
Insert Size	Selects the next font for the currently selected video window.	Button
Insert Source	Toggles the source between "generator" and "reader" for the currently selected video window.	Switch
Insert Top/Bottom	Moves the currently selected video window either to the top or to the bottom of the screen.	Button
Insert Left/Centre/Right	Moves the currently selected video window either to the left side or to the centre position or to the right side of the screen.	Button
Video Bypass Relay	If video bypass relay (option "B") has been assembled: Switches video channel to bypass via relay. Without option "B" (not for RUB AT modules): Switches video channel to bypass ("pass thru") via software. Switching occurs free from interferences.	Switch
Read Offset to 00:00:00:00	The time code reader calculates an offset so that the currently read time + offset results to 00:00:00:00. Further read time values will be calculated $\pm$ this offset before displaying.	Button
Read Offset to 10:00:00:00	The time code reader calculates an offset so that the currently read time + offset results to 10:00:00:00. Further read time values will be calculated $\pm$ this offset before displaying.	Button
Read Offset Clear	Sets the read offset value to zero.	Button



Function	Description	Recommended "Mode"
TC Bypass Off	Disables the <b>TC Bypass</b> function. <b>TC Bypass</b> means: All video time code outputs (VITC, D-VITC, ATC) of the time code generator will be stopped. This function triggered by a GPIO or key works additionally to the automatic TC Bypass functions for the (D-)VITC and ATC generators as described in the manual of the module.	Button
TC Bypass On	Activates the <b>TC Bypass</b> function.	Button
TC Bypass Toggle	Toggles the <b>TC Bypass</b> function (on/off).	Button

Please contact Plura if you would like to add further functions.

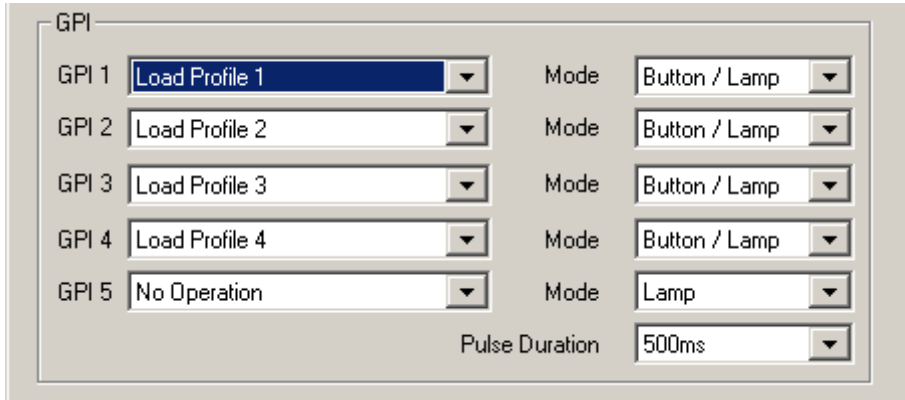


### “Load Profile” Application

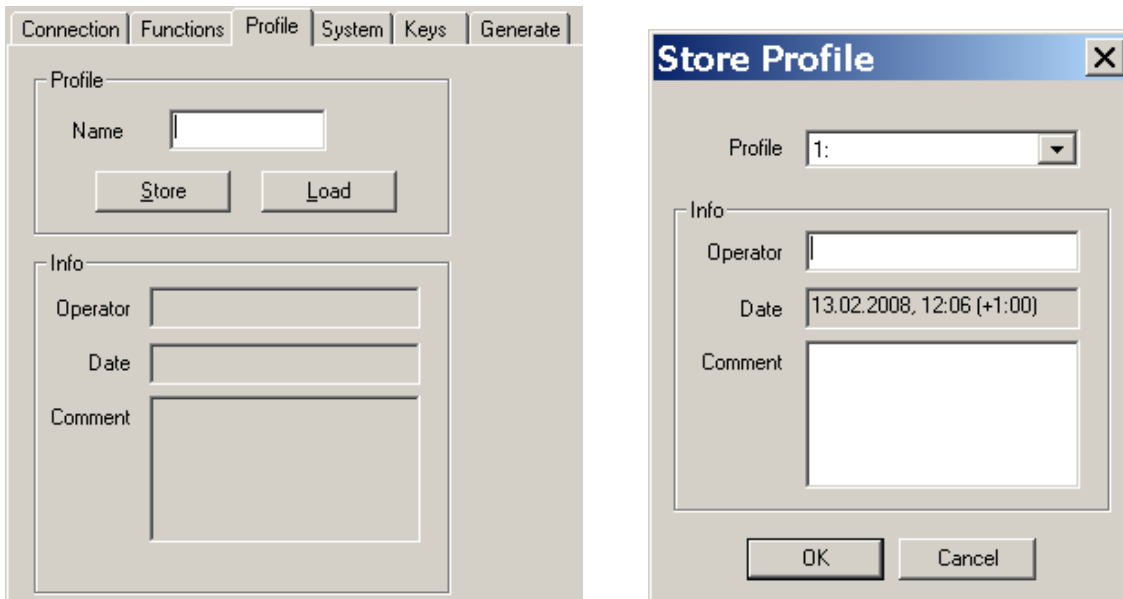
One of the most important usages of a GPIO input is given by the “Load Profile” function. With one “button” you will be able to switch to a completely new configuration. But it will be as well useful if you just want to change the position of one video window.

The following steps walk you through the set-up process.

1. Assign the “Load Profile” function to you GPIO inputs, example:



2. Perform all other set-ups according to your first application.
3. Store this configuration as “Profile 1” using the “Store Profile” function:

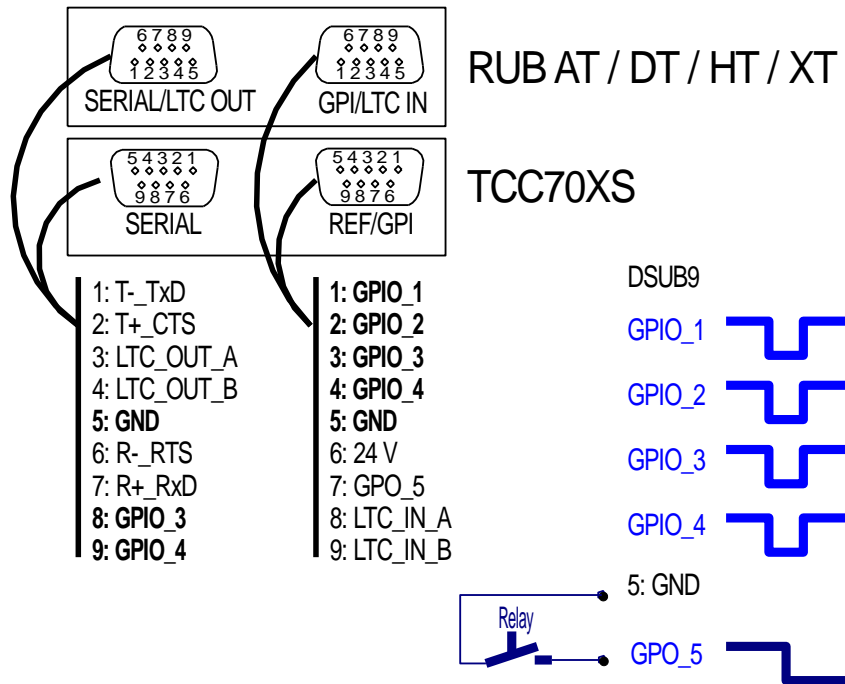


4. Now you perform your set-up according to your second application. If you start with a “Factory Setting” it is important to execute step 1 again!
5. Store this second configuration as “Profile 2” using the “Store Profile” function.

In this way you proceed with further configurations if needed.



# GPIO used as Output



## Output Specifications

GPIO_1 ... GPIO_4: Output specification	Open Collector output of a NPN transistor at 4k7 pull-up resistor (5 VDC). Max. power dissipation: 200 mW. "High" state: 4.3 V (no load). "Low" state: output switched to GND. Max. collector current: 100 mA DC, fused by a 100 mA auto-recovery fuse. Collector-emitter saturation voltage: @100 mA: typ. 200 mV ( $\leq 600$ mV), @10 mA: typ. 90 mV ( $\leq 250$ mV). Frequency: 0 - 150 kHz.
GPO_5: SPST-NO relay	Contact resistance: 0.2 $\Omega$ Max. switching power: 10 W Max. switching voltage: 175 VDC Max. switching current: 0.5 A Max. transportable current: 0.8 A



## Output Switching Characteristic

This is programmable utilizing the **Key** function with one of the configuration tools. Example:

The screenshot shows a configuration window titled 'GPI'. It contains five rows for GPI 1 through GPI 5. Each row has a dropdown menu for the GPIO name (all set to 'No Operation') and a dropdown menu for the 'Mode'. The 'Mode' dropdown for GPI 2 is open, showing four options: 'Button / Lamp', 'Inv. Button / Lamp', 'Switch / Pulse', and 'Inv. Switch / Pulse'. At the bottom right, there is a 'Pulse Duration' dropdown set to '500ms'.

The five GPIOs can be programmed to have a switching characteristic as a “Lamp” or a “Pulse”. This can be selected independently using the dropdown list at “Mode”:

Selection at „Mode“	GPIO Characteristic
Lamp	Active “Low”.
Inv. Lamp	Active “High”.
Pulse	Active “Low”. The pulse duration is selectable (one selection for all GPIOs).
Inv. Pulse	Active “High”. The pulse duration is selectable (one selection for all GPIOs).

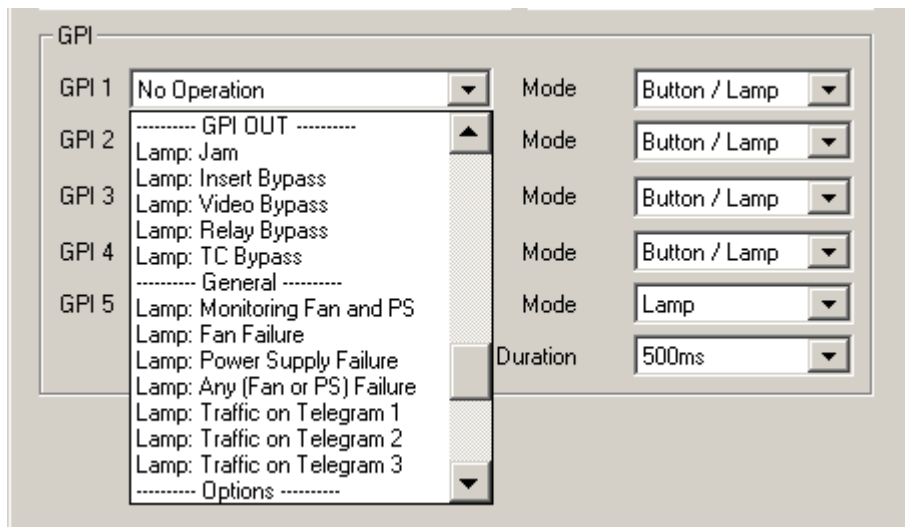
Please remember that GPO\_5 represents a relay.





### Functionality

The functionality is programmable utilizing the **Key** function with one of the configuration tools. Example:



The functionality can be selected independently using the dropdown list.

The following table gives a short overview of the output functions presently available with a standard firmware:

Function	Description	Recommended "Mode"
No Operation	No input or output functionality.	-
Jam	Returns the <b>Jam Sync</b> status: <ul style="list-style-type: none"> <li>• On: Generator receives and accepts time code during a continuous <b>Jam Sync</b>.</li> <li>• Slowly flashing: No time code can be read during a continuous <b>Jam Sync</b>.</li> <li>• Fast flashing: <b>Single Jam</b> currently active.</li> <li>• Off: <b>Jam Sync</b> is switched off.</li> </ul>	Lamp
Insert Bypass	Returns the <b>Insert Bypass</b> status. Output active/inactive = <b>Insert Bypass</b> active/inactive. <b>Insert Bypass</b> (= switching off all video windows of the character inserter) can be selected by assigning the <b>Insert Bypass</b> function to a key or GPIO (GPIO as input) or by unchecking the "Insert Enable" checkbox at the "Video" configuration.	Lamp
Video Bypass	Returns the <b>Video Bypass</b> status. Output active/inactive = <b>Video Bypass</b> active/inactive. <b>Video Bypass</b> (= video input will be passed through to the output) can be selected by assigning the <b>Video Bypass Relay</b> function to a key or GPIO (GPIO as input), or as soon as "Channel" is no longer "On" at the "Video" configuration (not for RUB AT modules).	Lamp



Function	Description	Recommended "Mode"
Video Relay Bypass	Returns the status of the <b>Video Bypass Relay</b> function. The <b>Video Bypass Relay</b> function can be switched on by assigning the <b>Video Bypass Relay</b> function to a key or GPIO (GPIO as input), or as soon as "Channel = Relay Bypass" has been selected at the "Video" configuration (not for RUB AT modules).	Lamp
TC Bypass	Returns the status of the <b>TC Bypass</b> function. This function will be controlled assigning a <b>TC Bypass Off</b> or <b>TC Bypass On</b> or <b>TC Bypass Toggle</b> function to a key or GPIO (GPIO as input). This function works additionally to the automatic TC Bypass functions for the (D-)VITC and ATC generators as described in the manual of the module.	Lamp
Monitoring Fan and PS	Active if this module is monitoring the fans and power supplies within this housing. This module must have the "Fan monitoring" checkbox enabled. Even if more than one module has this checkbox enabled, there will be only one module responsible for monitoring the fans and power supplies.	Lamp
Fan Failure	A fan failure has been detected. This status can be returned even if this module does not actively monitor the fan.	Lamp
Power Supply Failure	A power supply failure has been detected. This status can be returned even if this module does not actively monitor the power supply.	Lamp
Any (Fan or PS) Failure	A fan or power supply failure has been detected. This status can be returned even if this module does not actively monitor the fans and power supplies.	Lamp
Traffic on Telegram ...	Indicates that there is traffic on the "TC_link" channel (1, 2 or 3) – service purpose only.	Lamp

Please contact Plura if you would like to add further functions.



## Contact Us



Corporate Offices:  
Plura Broadcast, Inc.  
Ph: +1-602-944-1044  
[Sales@plurainc.com](mailto:Sales@plurainc.com)



Plura Europe GmbH  
Ph: +49-6725-918006-70  
[Sales@plurainc.com](mailto:Sales@plurainc.com)

GERMANY



Plura MEA  
Ph: +971-50-715-9625  
[Sales@plurainc.com](mailto:Sales@plurainc.com)



Plura Asia  
Ph: +82-10-6688-8826  
[Sales@plurainc.com](mailto:Sales@plurainc.com)

S. KOREA

