



ASiKS-Engineering

User Manual

LPT-Switch V2.0

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This document provides detailed information about ASiKS-Engineering's LPT-Switch V2.0 Module.

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in System Engineering, Prototyping, Hardware and Software Development
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1 Introduction

The LPT-Switch V2.0 is a low power timer switching device ideal for system wake up in duty cycled or battery powered applications. In such systems the LPT-Switch V2.0 device can be used for system wakeup. Consuming only 590 μ A, the LPT-Switch V2.0 allows any other device to be placed in battery powered environment. Such power savings enable the use of significantly smaller batteries. The LPT-Switch V2.0 device provides selectable timing intervals from 0.5s to 65000 years.



Figure 1: LPT-Switch V2.0 Module

2 Features

- Supply voltage from 8V to 15V
- Current consumption (@12V) 590 μ A (typ. while sleep)
- Switching current up to 3.5A
- Selectable time Intervals 0.5s to 65000 years
- Timer Accuracy 1% (typ.)
- Digitally selectable time intervals
- Manual reset and override functionality

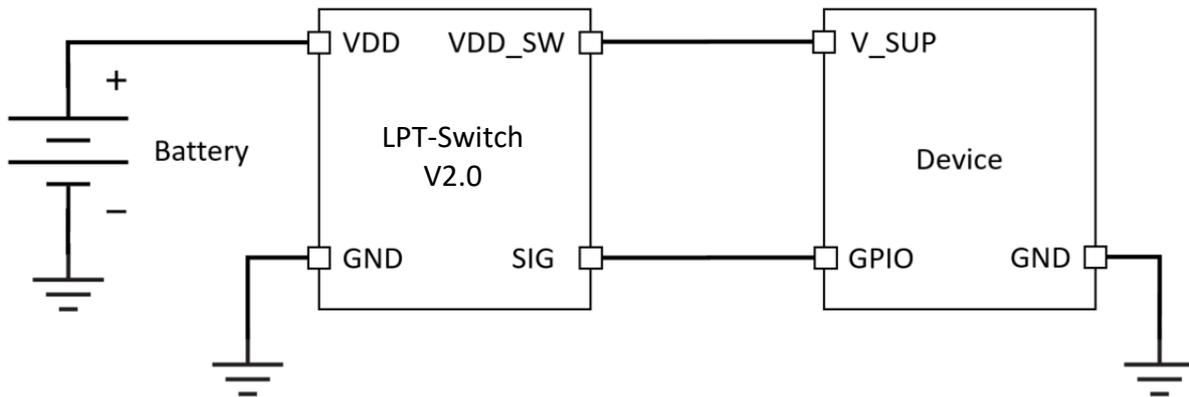
3 Applications

- Battery Powered Systems
- Home Automation
- Consumer Electronics

4 Device Information

PART NUMBER	PACKAGE	BODY SIZE (NOM)
128816	F524-50 IP40	(54 x 55.3 x 24.4)mm

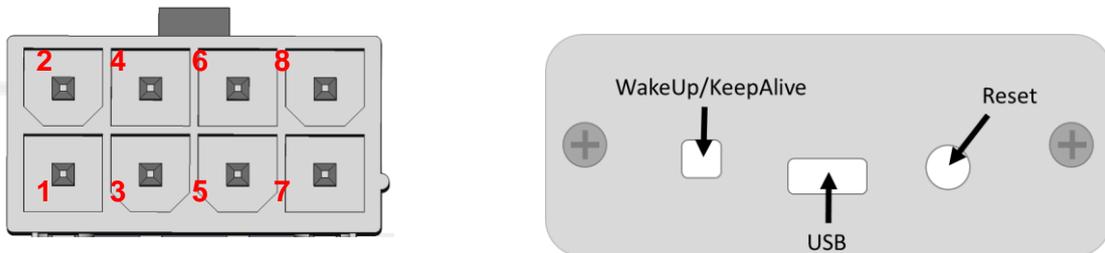
5 Simplified Application Schematic



6 Pin Configuration and Functions

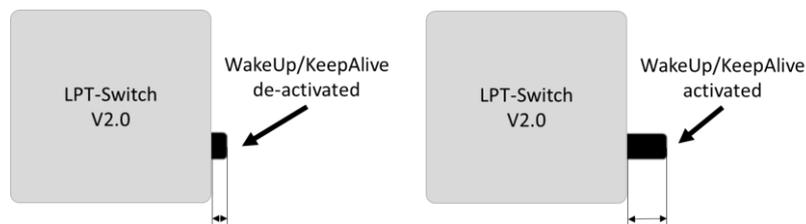
PIN		TYPE	DESCRIPTION
NO.	NAME		
1	VDD	P	Supply voltage
2	VDD_SW	O	Switched power output
3	n.n.	-	n.a.
4	n.n.	-	n.a.
5	n.n.	-	n.a.
6	n.n.	-	n.a.
7	SIG	I	Device alive signalling input
8	GND	G	Ground

G = Ground, P = Power, O = Output, I = Input



7 WakeUp/Keep Alive Function

The LPT-Switch V2.0 implements an override function to wake up and stay alive independent of the current switch cycle. In addition, the build in command line interface is activated / deactivated accordingly.



8 Molex plug specification

The LPT-Switch V2.0 device is shipped with a plug set, consisting of a Molex plug housing and corresponding socket contacts.

	
Manufacturer: Molex	Manufacturer: Molex
Manufacturer No.: 39-01-2085	Manufacturer No.: 39-00-0038

9 Specifications

9.1 Absolut Maximum Ratings

	Min	Typ	Max	Unit
Supply Voltage (VDD)	6	12	18	V
Switched supply voltage output (VDD_SW)			VDD	V
Switched supply current (IDD_SW)		3	4.5	A
Device alive signalling input voltage	6		VDD	V
Ground		0		V

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

9.2 Recommended Operating Ratings

	Min	Max	Unit
Supply Voltage (VDD – GND)	8	15	V
Switched supply current (IDD_SW – GND)		3.5	A
Temperature Range	-40	85	°C

9.3 Electrical Characteristics (1)

	Parameter	Test conditions	Min ⁽²⁾	Typ ⁽³⁾	Max ⁽²⁾	Unit
Power Supply						
IDD	Supply current ⁽⁴⁾	Sleep (IDD_SLP)		590		µA
		Alive, SIG = low (IDD_AS_L), device current = 0mA		1.35		mA
		Alive, SIG = high (IDD_AS_H), device current = 0mA		2.31		mA

Specifications are for TA= 25°C, VDD-GND=12 V, unless otherwise stated.

- (1) Electrical Characteristics Table values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that TJ = TA. No specification of parametric performance is indicated in the electrical tables under conditions of internal self-heating where TJ > TA. Absolute Maximum Ratings indicate junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
- (2) Limits are specified by testing, design, or statistical analysis at 25°C. Limits over the operating temperature range are specified through correlations using statistical quality control (SQC) method.
- (3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration. The typical values are not tested and are not specified on shipped production material.
- (4) The supply current excludes load and pull-up resistor current. Input pins are at GND or VDD.

9.4 Timing Requirements

	Parameter	Test conditions	Min ⁽¹⁾	Typ ⁽²⁾	Max ⁽¹⁾	Unit
t _{SIG}	SIG pulse width ⁽³⁾		200			ms
t _{SRT}	SIG rise time ⁽³⁾	Capacitive load 50 pF, Rpull-up 100kΩ		10		μs
t _{SFT}	SIG fall time ⁽³⁾	Capacitive load 50 pF		50		μs

(1) Limits are specified by testing, design, or statistical analysis at 25°C.

(2) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration. The typical values are not tested and are not specified on shipped production material.

(3) This parameter is specified by design and/or characterization and is not tested in production.

10 Common Line Interface, Settings and Parameters

The LPT-Switch V2.0 has a built-in command line interface that besides others grants access to a set of parameters that are stored in persistency. To command line interface is accessible via USB by pushing the WakeUp / KeepAlive button (refer to chapter 6).

The only need is a terminal program with the following settings:

- Window size: 98 x 35
- Serial: 10417, 8, N, 1

NOTE: Each command needs to be confirmed by pressing “ENTER”!

For TeraTerm a ready defined setup (“LPT-Switch_V2.INI”) is available for download that simply can be used by restoring it in Tera Term.

Follow the following steps:

- Open Tera Term Version 4.102 or higher
- Select the respective COM port (virtual communication port via USB created by LPT-Switch V2.0)
- Goto “Setup” -> “Restore setup...” and select file “LPT-Switch_V2.INI”
- Type ? or help and you will see the welcome screen of the LPT-Switch V2.0 command line interface

The LPT-Switch V2.0 has the following set of parameters:

Identifier	Parameter	Description	Min	Default	Max	Unit
w:	Wake Up Cycle	1: Every half second 2: Every second 3: Every 10 seconds 4: Every minute 5: Every 10 minutes 6: Every hour 7: Once a day 8: Once a week 9: Once a month 10: Once a year	1	4	10	
m:	Multiplier	Multiplies wake up cycle	1	1	65000	
s:	Shut Down Delay	Delay time from SIG line no more serviced until power is switched off	50	2000	65000	ms
t:	Start Up Timeout	Time power is applied to attached device and SIG line needs to be serviced. If SIG is not serviced – meaning attached devices does not power up and device SIG line, power is switched off again when time elapsed	1000	50000	65000	ms

Figure 2 shows the welcome screen of the command line interface entered by typing a ? character followed by pressing “ENTER”.

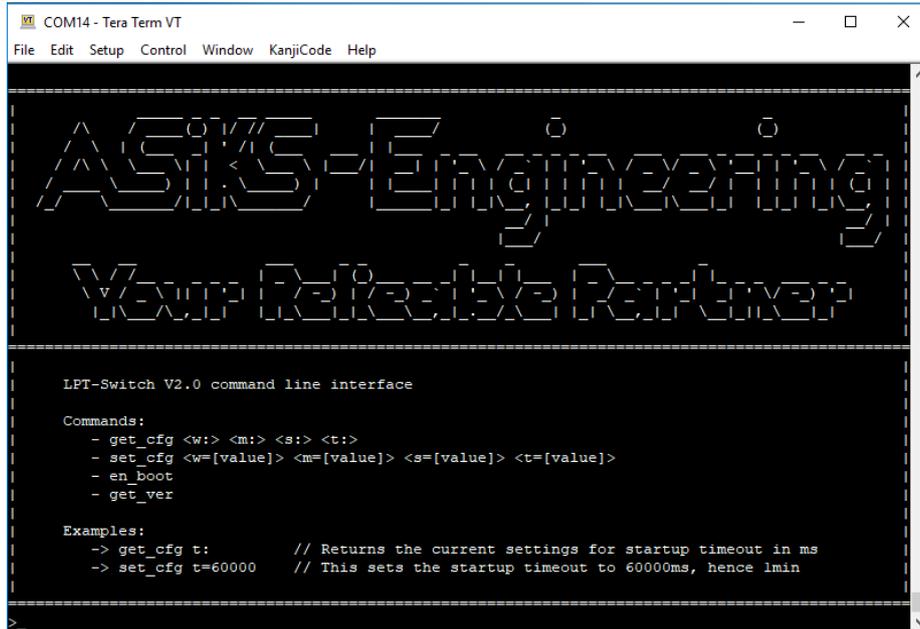


Figure 2: Welcome screen LPT-Switch V2.0 command line interface

The current values can simply be read out by the command “get_cfg” if requesting all values (Figure 3). In addition, each specific value can be read by stating the individual identifier (Figure 4).

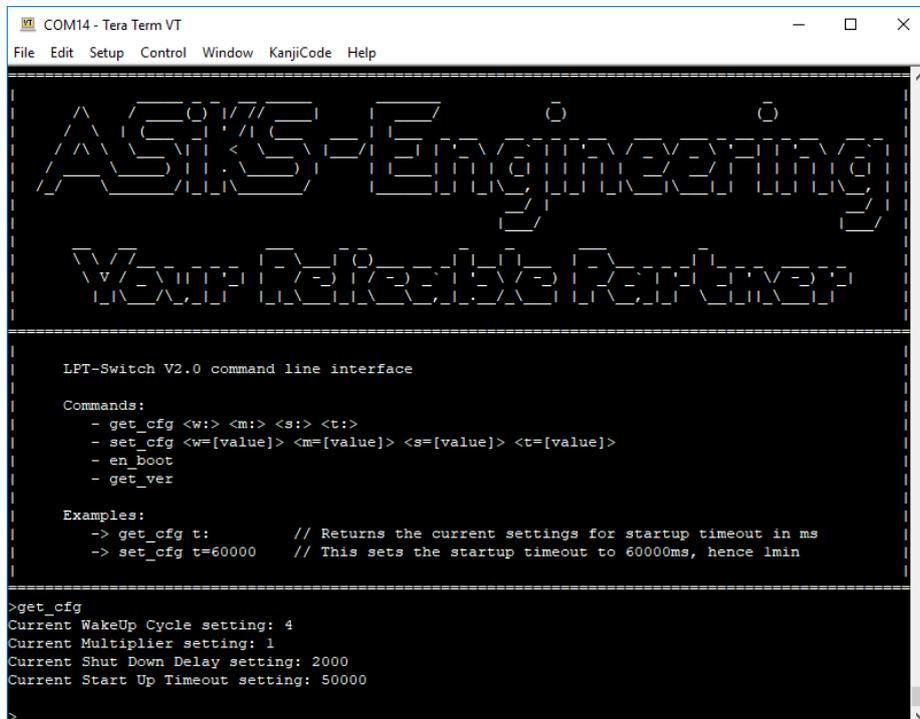
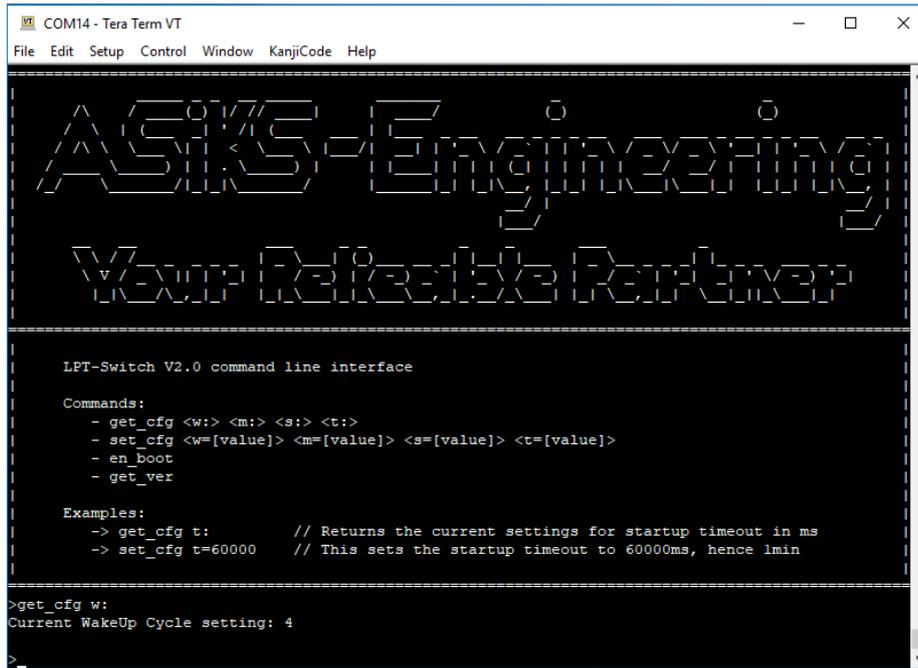


Figure 3: LPT-Switch V2.0 configuration parameters – get all parameters



```

COM14 - Tera Term VT
File Edit Setup Control Window KanjiCode Help

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LPT-Switch V2.0 command line interface

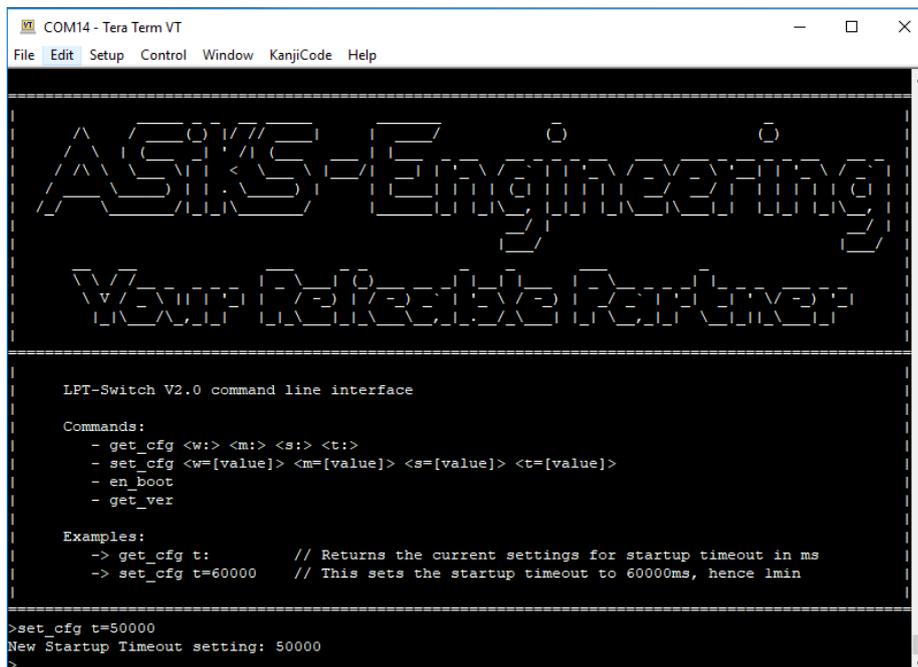
Commands:
- get_cfg <w:> <m:> <s:> <t:>
- set_cfg <w=[value]> <m=[value]> <s=[value]> <t=[value]>
- en_boot
- get_ver

Examples:
-> get_cfg t: // Returns the current settings for startup timeout in ms
-> set_cfg t=60000 // This sets the startup timeout to 60000ms, hence lmin

>get_cfg w:
Current WakeUp Cycle setting: 4
  
```

Figure 4: LPT-Switch V2.0 configuration parameters – get individual parameter

Furthermore a value for each parameter can be set by using the command “set_cfg” in combination with the individual identifier and the desired value (see Figure 5).



```

COM14 - Tera Term VT
File Edit Setup Control Window KanjiCode Help

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LPT-Switch V2.0 command line interface

Commands:
- get_cfg <w:> <m:> <s:> <t:>
- set_cfg <w=[value]> <m=[value]> <s=[value]> <t=[value]>
- en_boot
- get_ver

Examples:
-> get_cfg t: // Returns the current settings for startup timeout in ms
-> set_cfg t=60000 // This sets the startup timeout to 60000ms, hence lmin

>set_cfg t=50000
New Startup Timeout setting: 50000
  
```

Figure 5: LPT-Switch V2.0 configuration parameters – set individual parameter

NOTE: After changing any configuration parameter, a manual reset (refer to chapter 6) is necessary to take over new configuration!

11 Bootloader and Firmware Update

Entering the built-in bootloader simply can be done by entering “en_boot” in the command line interface. The command can not be reverted (see following NOTE!).

NOTE: Once the “en_boot” command is entered, the LPT-Switch V2.0 will directly switch to and stay in bootloader. A Firmware update is mandatory afterwards!

Download and open Unified Host bootloader application provided by Microchip (<https://www.microchip.com/bootloader>).

Step1) Select correct device architecture for LPT-Switch V2.0 (see Figure 6)

➔ PIC10\ PIC12\ PIC16\ PIC18\ MCUs

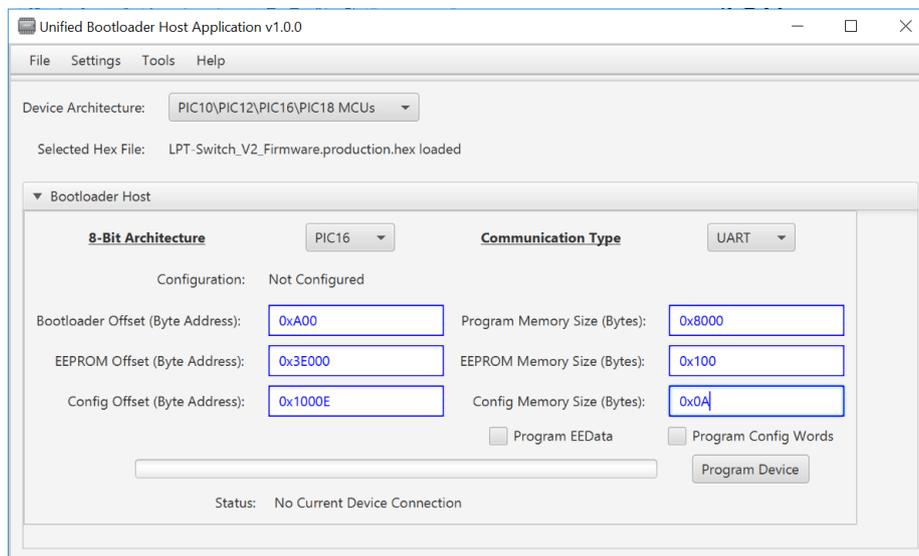


Figure 6: Unified Bootloader Host Application – Device Architecture

Step2) Set serial port settings in “Settings”->“Serial” (see Figure 7)

➔ 19200, 8, 1, Disabled

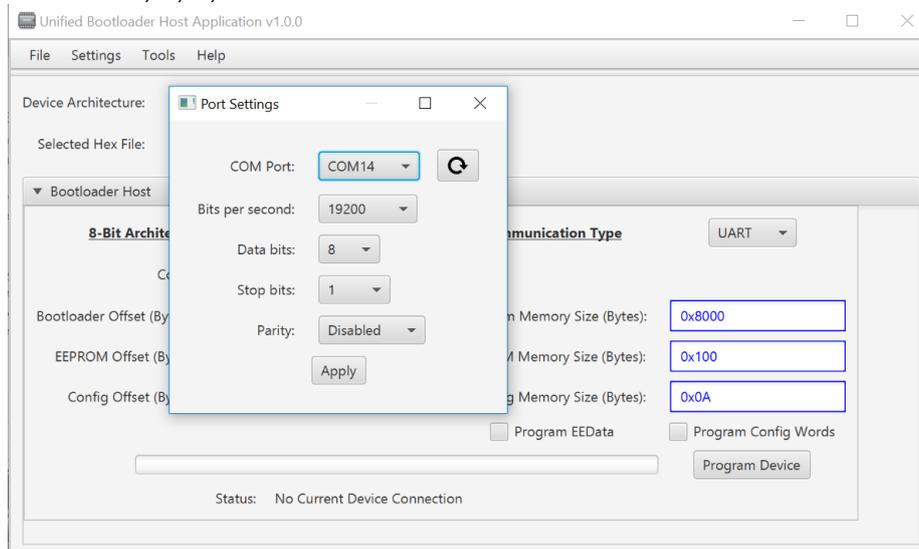


Figure 6: Unified Bootloader Host Application – Serial Port Settings

- Step3) Set correct host settings (see Figure 7)
- ➔ Bootloader Offset (Byte Address): 0xA00
 - ➔ Program Memory Size (Bytes): 0x8000
 - ➔ EEPROM Offset (Byte Address): 0x3E000
 - ➔ EEPROM Memory Size (Bytes): 0x100
 - ➔ Config Offset (Byte Address): 0x1000E
 - ➔ Config Memory Size (Bytes): 0x0A

Uncheck “Program EEData” and “Program Config Words”.

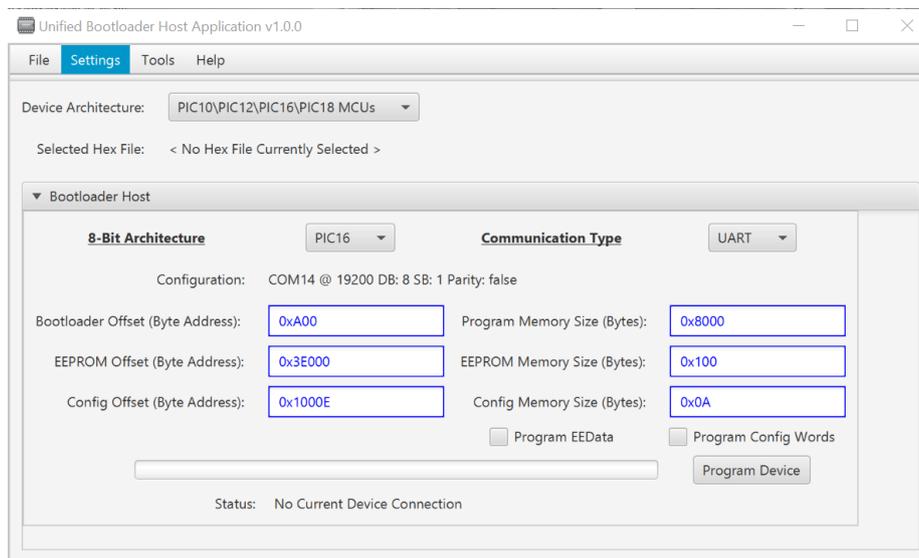


Figure 6: Unified Bootloader Host Application – Host Settings

Step4) Select firmware hex file in “File”->”Open/Load File (*.hex)” and press “Program Device” button.

Unified Bootloader Host Application has a built-in console that provides more detailed information about flash procedure and can be entered in “Tools”->”Console”.

12 Virtual Communication Port USB Driver

The LPT-Switch V2.0 Module simply implements a virtual communication port by using official driver from Future Technology Devices International Ltd. which can be obtained here: <https://www.ftdichip.com/Drivers/VCP.htm>

13 Disclaimer

For damage of any kind, arising by the employment of the LPT-Switch V2.0 Module, no requirements can be made valid opposite the supplier!

14 Contact Information

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Appendix A – Revision History

Revision History
0.9 Draft 29th July, 2019
1.0 Initial Release 21st October, 2019