SmartUSBHub Pro 7CH USB2.0

Technical Specifications

Applies to: HBP_USB2_7CH / HBP_USB2_7CH_ADV

Released v1.0

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Contents

Document item	Details
Applicable product	SmartUSBHub Pro 7CH USB2.0
Order codes	HBP_USB2_7CH, HBP_USB2_7CH_ADV
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1 Product Overview

SmartUSBHub Pro 7CH USB2.0 is a seven-port programmable USB 2.0 High-Speed hub. It independently controls VBUS and USB 2.0 D+ / D- on every downstream port for simulated hot-plugging, power cycling, enumeration-order control and fault recovery. The ADV variant also measures VBUS voltage and output current on every channel.

1.1 Model Differences

Feature	HBP_USB2_7CH	HBP_USB2_7CH_ADV
Independent VBUS control on seven ports	Yes	Yes
Independent D+ / D- control on seven ports	Yes	Yes
Overcurrent-status monitoring	Yes	Yes
Per-channel voltage/current measurement	No	Yes
Measurement streaming	No	Up to 100 Hz

1.2 Key Features

- Seven USB-A downstream ports with independent VBUS and D+ / D- control.
- USB 2.0 High-Speed link rate up to 480 Mbps; compatible with Full-Speed, Low-Speed and USB 1.1 devices.
- Separate USB-C DATA and CMD interfaces isolate the data path from the control path.
- USB BC 1.2 CDP support with up to 1.5 A charging current per port; QC, USB PD and other fast-charging protocols are not supported.
- Approximately 2.1 A overcurrent-protection threshold and per-channel overcurrent-status monitoring.
- Per-channel voltage/current measurement on the ADV variant.
- Normal mode, interlock mode, default power and data-line states, restoration after power loss and configurable device address.

2 System Architecture

2.1 System Block Diagram

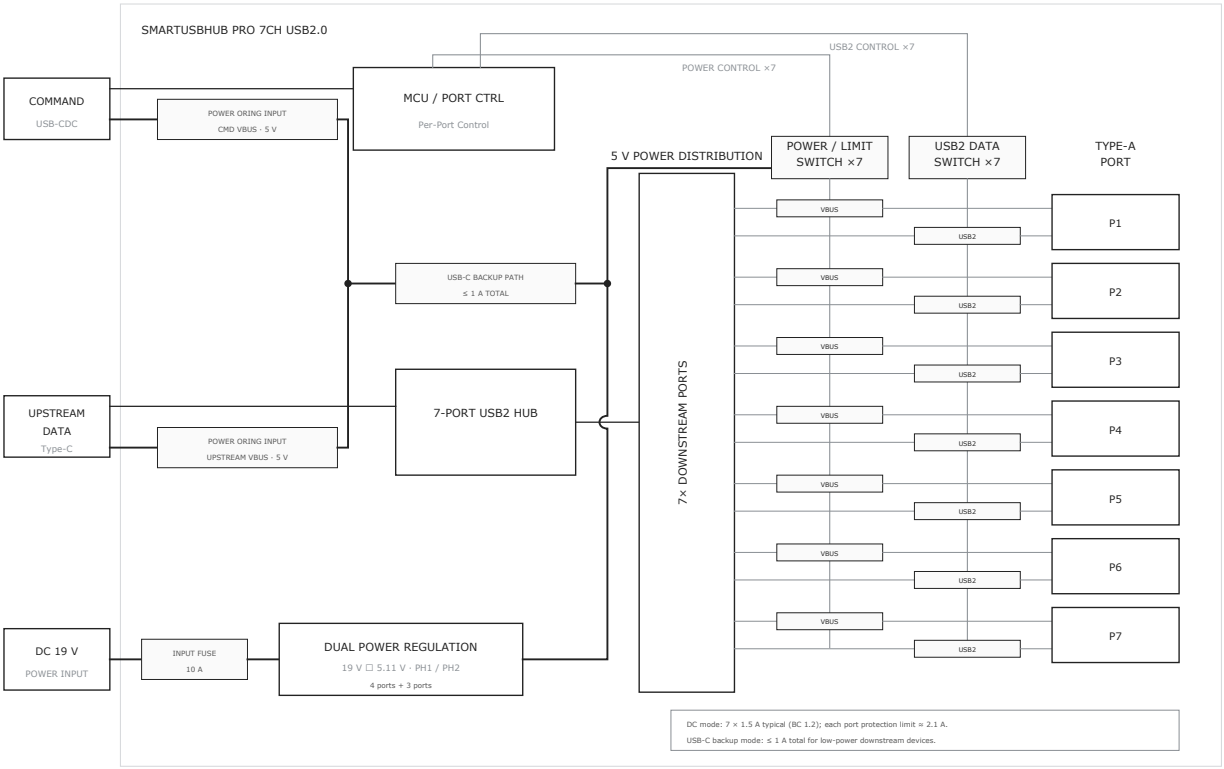

Figure 2-1 SmartUSBHub Pro 7CH USB2.0 system block diagram

The DATA port carries hub traffic for all seven downstream ports. The CMD port enumerates as a USB CDC serial interface and receives control commands. The external DC input supplies the downstream ports through two 5 V power rails.

2.2 Interfaces and Indicators

Interface or component	Quantity	Function
USB-C DATA	1	Connects to the USB host and carries downstream-device data
USB-C CMD	1	Connects to the control host and provides the USB CDC command interface
DC IN	1	DC5525, center-positive; accepts a protected DC supply
USB-A downstream ports	7	Connect controlled USB devices
Status indicator	1	Indicates device operating state
Channel indicators	7	Indicate the VBUS state of the corresponding channels

3 Functional Specifications

3.1 USB Data Path

Parameter	Specification
USB standard	USB 2.0 High-Speed
Maximum link rate	480 Mbps
Compatible speeds	Full-Speed 12 Mbps, Low-Speed 1.5 Mbps, USB 1.1
Upstream data port	1 × USB-C
Downstream ports	7 × USB-A
Hub mode	MTT / STT supported

3.2 Channel Control

Parameter	Specification
Channel numbers	CH1–CH7
VBUS control	Independent on every downstream port
D+ / D- control	Independent on every downstream port
Power/data relationship	USB data can be disconnected while VBUS remains powered
Control methods	Single-channel, batch, normal and interlock control; only one channel can be enabled at a time in interlock mode
Default state and restoration	Configurable default power state, default data-line state and restoration after power loss
Local channel buttons	None

3.3 Charging and Overcurrent Protection

Parameter	Specification
Charging protocol	USB BC 1.2 CDP
BC 1.2 charging current	Up to 1.5 A per port
Per-port protection threshold	Approximately 2.1 A
Maximum total output current	10 A shared by all seven ports
Overcurrent status	Readable per channel
Other fast-charging protocols	QC, USB PD and other fast-charging protocols are not supported

3.4 Voltage and Current Measurement (ADV Variant)

Parameter	Range	Resolution	Accuracy
VBUS voltage	0–5.5 V per channel	8 mV	±32.5 mV at 5 V and 25 °C
Output current	0–2.7 A per channel	1 mA	±(1.25% × reading + 2.5 mA) at 25 °C
Measurement stream	-	Up to 100 Hz	Depends on host and software configuration

4 Electrical Specifications

> ⚠ WARNING：Warning: use only the specified DC supply
>
> The normal input range is 9–20 V DC. Use a qualified 19–20 V / 5 A supply with current limiting and short-circuit protection. The 24.5 V absolute maximum is not an allowed operating voltage.

4.1 Absolute Maximum Ratings

Exceeding these limits may permanently damage the device. Do not operate continuously near an absolute maximum rating.

Parameter	Minimum	Maximum	Unit	Notes
DC input voltage	0	24.5	V	Absolute maximum, not an operating rating
Downstream-port VBUS	0	5.5	V	USB-A downstream ports
USB D+ / D- signal voltage	-0.3	5.3	V	USB signal pins

4.2 Recommended Operating Conditions

Parameter	Condition	Minimum	Typical	Maximum	Unit
DC input voltage	External DC input	9	19–20	20	V
Recommended power adapter	Current-limited and short-circuit protected	-	20 V / 5 A	-	-
5 V output voltage	No load	4.97	5.11	5.25	V
Port VBUS	Typical 1.5 A load	4.87	5.00	5.25	V
Maximum total output current	All seven ports combined	-	-	10	A
Operating ambient temperature	Non-condensing	0	25	50	°C
Relative humidity	Non-condensing	5	-	95	%RH
Altitude	Indoor use	-	-	2000	m

> ⚠ CAUTION：Important: also account for the total device output current
>
> The approximately 2.1 A per-port threshold is a protection limit; it does not mean all seven ports can continuously supply that current. Combined output current must not exceed 10 A. Seven ports each drawing the USB BC 1.2 maximum of 1.5 A would require 10.5 A, which exceeds the device limit.

5 Protection and Safety Limits

Item	Specification
DC input	Input fuse and overvoltage protection
Per-port current limit	Approximately 2.1 A
Short-circuit and overtemperature protection	Supported; remove the faulty load and allow the unit to cool before recovery
Overcurrent-status signal	Monitored per channel
USB-signal ESD	Board-level ESD protection; certification level is subject to the formal test report
Fast-charging protocols	QC, USB PD and other fast-charging negotiation are not supported

- Combined output current across all seven ports must not exceed 10 A.
- Maintain ventilation during prolonged operation near the maximum total output current. Do not cover the device or place it near flammable materials.
- Turning off VBUS or D+ / D- is equivalent to unplugging a device. Stop file writes, firmware updates and other non-interruptible operations first.
- This product is intended for USB automation testing and device control. Do not use it as the sole protective device in medical, life-safety, vehicle-safety or other high-safety-level systems.

6 Mechanical and Environmental Specifications

Parameter	Specification
Dimensions	84 mm × 56.8 mm × 28 mm
Device weight	Approximately 142 g
Enclosure material	Aluminum alloy
Mounting	Desktop placement; custom brackets can be used
Operating temperature	0–50 °C, non-condensing
Storage temperature	-10–85 °C, non-condensing
Relative humidity	5%–95% RH, non-condensing
Maximum operating altitude	2000 m

Allow room for cable bend radius, connector access and ventilation; do not design an installation only around the product envelope dimensions.

7 Related Documentation

Document	Link
SmartUSBHub Pro 7CH USB2.0 User Manual	View manual
SmartUSBHub communication protocol	View documentation
SmartUSBHub documentation center	View documentation
SmartUSBHub Python library guide	View documentation