

TI Automotive USB Charging Port Solution



Introduction

TI provides an easy-to-use USB-A and USB Type-C®, USB PD charging port solution with high-efficiency, low EMI, and robust protection in Automotive Head Unit, Media Hub, and USB charge applications.

A TI Automotive USB charging port solution integrates a synchronous DC/DC converter, USB Type-C, USB Power Delivery, BC1.2 charging port controller, precision power switch, short-to-battery protection, and IEC ESD protection.

To pass CISPR 25 Class 5 EMI, TI provides a variety of resources including reference designs and application notes, which shortens design cycles and accelerates time-to-market.

Find more: [Automotive USB power solution](#)

All-in-One USB Type-C®, USB-A Charging Port Product Summary (Without USB Type-C® Power Delivery)

Table 1-1. Single USB Type-C® and USB-A Charging Port Solution (DCP and CDP, Integrated Sync Buck DC/DC)

Part	Port Type	BC1.2 Modes Supported	Fault Indication	Short to Battery Protection	IEC ESD	Thermal Management	MFi OCP	f _{sw}	Package
TPS25830A	C	SDP, CDP	Yes	Yes	Yes	n/a	Yes	300 kHz to 2.2 MHz	VQFN (32) 5 mm × 5 mm
TPS25832A	C	SDP, CDP	Yes	No	Yes	n/a	Yes	300 kHz to 2.2 MHz	
TPS25840	A	SDP, CDP	Yes	Yes	Yes	n/a	Yes	300 kHz to 2.2 MHz	
TPS25842	A	SDP, CDP	Yes	No	Yes	n/a	Yes	300 kHz to 2.2 MHz	
TPS25846	A	SDP, CDP	Yes	Yes	Yes	n/a	Yes	300 kHz to 2.2 MHz	
TPS25831	C, A	DCP	Yes	Yes	Yes	NTC Adj.	No	300 kHz to 2.2 MHz	
TPS25833	C, A	DCP	Yes	No	Yes	NTC Adj.	No	300 kHz to 2.2 MHz	
TPS25854	C, A	DCP	Yes	No	No	NTC Adj.	Yes	200 kHz to 800 kHz	VQFN-HR (25) 3.5 mm × 4.5 mm
TPS25855	C, A	DCP	Yes	No	No	NTC Adj.	Yes	200 kHz to 3 MHz	

Table 1-2. Dual USB Type-C® and USB-A Charging Port Solution (DCP, Integrated Sync Buck DC/DC)

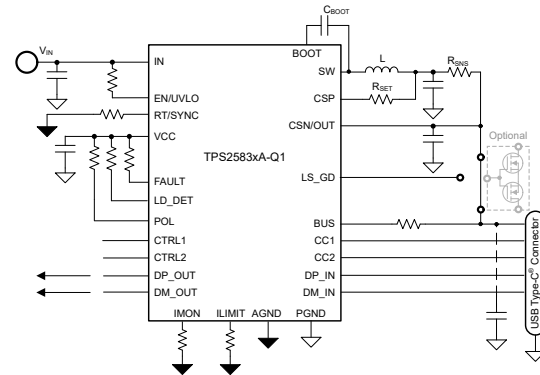
Part	Port Type	BC1.2 Modes Supported	Fault Indication	Short to Battery Protection	IEC ESD	Thermal Management	MFi OCP	f _{sw}	Package
TPS25850	C + C	DCP	No	No	No	Yes	Yes	200 kHz to 3 MHz	VQFN-HR (25) 3.5 mm × 4.5 mm
TPS25858	C + C	DCP	No	No	No	Yes	Yes	200 kHz to 800 kHz	
TPS25851	C + C	No	Yes	No	No	Yes	Yes	200 kHz to 3 MHz	
TPS25852	C + C	No	Yes	No	No	Yes	Yes	200 kHz to 3 MHz	
TPS25859	C + C	No	Yes	No	No	Yes	Yes	200 kHz to 800 kHz	
TPS25860	A + C	DCP	No	No	No	Yes	Yes	200 kHz to 3 MHz	
TPS25868	A + C	DCP	No	No	No	Yes	Yes	200 kHz to 800 kHz	
TPS25862	A + C	DCP	Yes	No	No	Yes	Yes	200 kHz to 3 MHz	
TPS25869	A + C	DCP	Yes	No	No	Yes	Yes	200 kHz to 800 kHz	
TPS25864	A + A	DCP	No	No	No	Yes	Yes	200 kHz to 3 MHz	
TPS25865	A + A	DCP	No	No	No	Yes	Yes	200 kHz to 800 kHz	

TPS25830A-Q1

USB Type-C® and SDP Mode and CDP Charge Port Converter With Short to BATT Protection and MFi Functionality

Features

- AEC-Q100 qualified for automotive applications
- 4.5-V to 36-V Input operating voltage range, 40-V transient voltage
- Integrated 3.5-A buck regulator with spread-spectrum
- Adjustable frequency: 300 kHz to 2.2 MHz
- Supports USB Type-C, BC1.2 SDP and CDP schemes
- Programmable linear cable compensation
- User-selectable current limit
- Compatible with MFi overcurrent limit
- Client mode to support USB firmware update
- Compatible with 3.3 V I/O for clock synchronization
- VBUS, DP_IN, DM_IN, CCx short to battery protection
- DP_IN, DM_IN, CCx IEC61000-4-2 ESD
 - ± 8 -kV contact and ± 15 -kV air discharge
- High bandwidth (800 MHz) USB D+ and D– switches



Applications

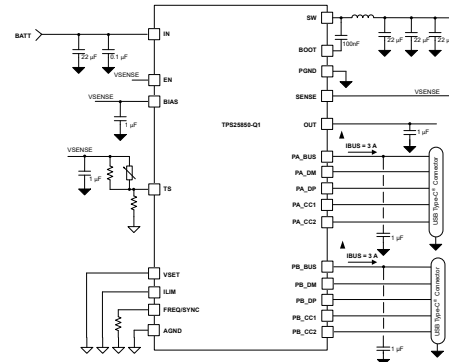
- [Infotainment and cluster](#)
- [Automotive media hub](#)
- [Automotive USB charge](#)

TPS25850-Q1

2.2-MHz, Low-EMI, Dual, 3-A USB Type-C® Charging Ports Converter With Thermal Management

Features

- AEC-Q100 qualified for automotive applications
- 5.5-V to 26-V Input operating voltage range, 36-V transient voltage
- Integrated 6.6-A buck regulator with spread-spectrum
- Adjustable frequency: 200 kHz to 3 MHz
- High efficiency at 2.1 MHz: 93.4% at $V_{IN} = 13.5$ V, $IPB_BUS = 3$ A and $IPB_BUS = 3$ A
- Selectable output voltage: 5.1 V, 5.17 V, 5.3 V, 5.4 V
- Cable compensation when VBUS set to 5.17 V
- Adjustable output short current limit
- **Supports dual 3-A USB Type-C, BC1.2 DCP schemes, divider 3 and 1.2 V/1.2 V mode**
- **Smart thermal management:**
 - Thermal management with adjustable threshold
 - Thermal shutdown



Applications

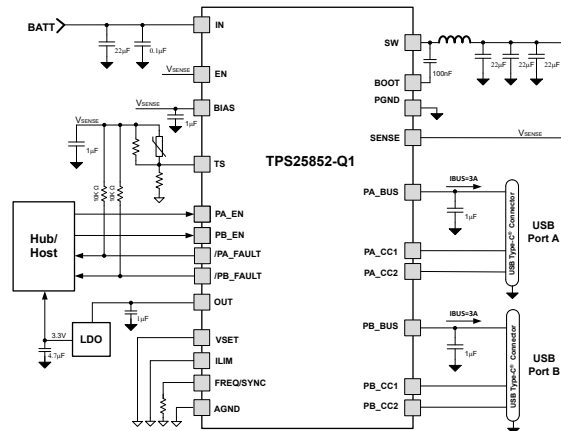
- [Automotive media hub](#)
- [Automotive USB charge](#)

TPS25852-Q1

2.2-MHz, Low-EMI, Dual, 3-A USB Type-C® Charging Ports Converter with USB ports ON/OFF control

Features

- AEC-Q100 qualified for automotive applications
- 5.5-V to 26-V Input operating voltage range, 36-V transient voltage
- Integrated 6.6-A buck regulator with spread-spectrum
- Adjustable frequency: 200 kHz to 3 MHz
- High efficiency at 2.1 MHz: 93.4% at $V_{IN} = 13.5\text{ V}$, $IP_{A_BUS} = 3\text{ A}$ and $IP_{B_BUS} = 3\text{ A}$
- Selectable output voltage: 5.1 V, 5.17 V, 5.3 V, 5.4 V
- Cable compensation when VBUS set to 5.17 V
- Adjustable output short current limit
- **OUT** pin enables 5.1 V, 200-mA supply for auxiliary loads
- **USB enable on and off control respectively for PA_USB and PB_USB**
- **Smart thermal management:**
 - Thermal management with adjustable threshold
 - Thermal shutdown
- **Fault detection**
 - VBUS OC
 - Thermal shutdown



Applications

- [Automotive media hub](#)
- [Automotive USB charge](#)

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