

WT6632F
USB Power Delivery Controller
(Standard Code Version)

Data Sheet

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1. General Description

The WT6632F (Standard Code Version) is a highly integrated USB Power Delivery (PD) controller built-in with Weltrend's proprietary standard codes that supports USB PD 2.0 specifications and Qualcomm® Quick Charge™ 3.0 technology designed for USB Type-C Downstream Facing Port (Source) charging applications such as travel adapters, chargers, and etc.

The WT6632F minimizes external components by integrating USB PD baseband PHY, Type-C detection, shunt regulator, voltage and current monitors, control circuits of blocking MOSFET, and an 8-bit MCU to allow small form factor and low BOM cost. It supports wide operating voltage range from 3V to 30V without the need of an external LDO.

2. Features

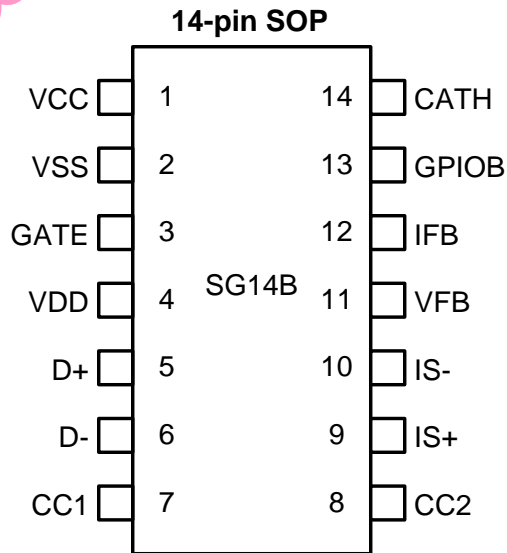
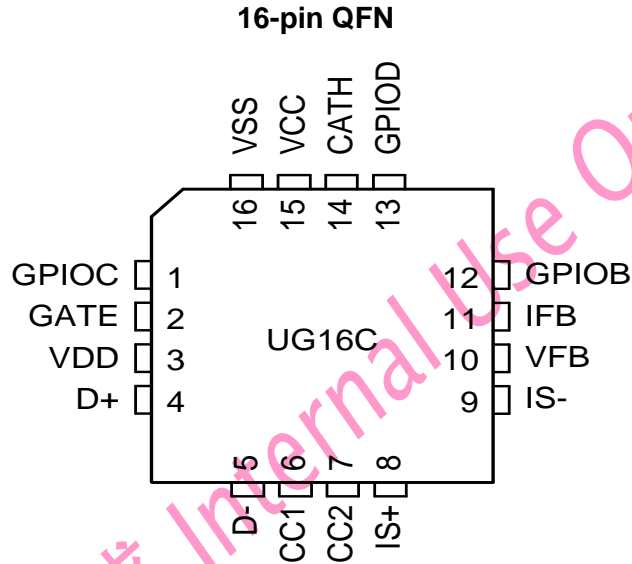
- USB Type-C Downstream Facing Port (Source)
- USB PD 2.0 baseband communication
- USB Battery Charging specification, revision 1.2 (BC 1.2) Dedicated Charging Port (DCP)
- Quick Charge 2.0 class A, 5V/9V/12V, High Voltage DCP (HVDCP)
- Quick Charge 3.0 class A, 3.6V to 12V, HVDCP
- Built-in shunt regulator for Constant Voltage (CV) and Constant Current (CC)
 - ◆ provide USB PD 5V, 9V, 12V, 15V and 20V source power outputs
 - ◆ provide high-resolution voltage steps according to Quick Charge 3.0 requirements
 - ◆ compliant with Quick Charge 3.0 power profile design recommendations
- Over Voltage Protection (OVP)
- Over Current Protection (OCP)
- Low side voltage output current shunt monitor
- 10-bit ADC for voltage and current monitoring
- External blocking MOSFET control
- Built-in discharge MOS
- Internal RC oscillator
- Internal VDD regulator
- General Purpose I/Os (GPIOs)
- Support power saving mode
- Operating voltage range: 3V ~ 30V
- Operating temperature range: -20°C ~ +105°C
- Package: 14-pin SOP, 16-pin QFN

Applications

- USB Type-C travel adapters and chargers

3. Pin Configuration

3.1 Package



3.2 Pin Description

Pin No.		Name	Function	I/O Voltage	Type		Description
QFN16	SOP14				Input	Output	
15	1	VCC	VCC	HV	-	-	Positive power supply
16	2	VSS	VSS	-	-	-	Ground
1		GPIOC	GPIOC	HV	TTL	OD	General purpose I/O.
2	3	GATE	GATE	HV	-	PP	Blocking MOS Control
3	4	VDD	VDD	LV	-	AN	4.8V regulator
4	5	D+	D+	HV	AN	-	D+ for B.C. with USB device side
5	6	D-	D-	LV	AN	-	D- for B.C. with USB device side
6	7	CC1	CC1	HV	CC	PP	USB Type-C Configuration Channel
7	8	CC2	CC2	HV	CC	PP	USB Type-C Configuration Channel
8	9	IS+	IS+	LV	AN	-	Positive input of current sensing amplifier.
9	10	IS-	IS-	LV	AN	-	Negative input of current sensing amplifier.
10	11	VFB	VFB	LV	AN	-	Feedback of shunt regulator
11	12	IFB	IFB	HV	AN	-	Feedback of shunt regulator
12	13	GPIOB	GPIOB	HV	TTL	OD	General purpose I/O.
13		GPIOD	GPIOD	HV	TTL	OD	General purpose I/O
14	14	CATH	CATH	HV	-	AN	Cathode of shunt regulator

Legend: HV = High Voltage (max. 30V), LV = Low voltage (max. 5.5V), OD = Open Drain, PP = Push Pull, AN = analog, TTL = TTL compatible input, CC = USB PD baseband input

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter		Min.	Max.	Units
Supply voltage VCC pin		-0.3	30	V
Input voltage	D+, GATE, IFB, CC1, CC2, CATH, GPIOB, GPIOC, GPIOD	-0.3	VCC + 0.3 (max. 30V)	V
	D-, IS+, IS-, VFB	-0.3	5.5	V
Output voltage	D+, GATE, IFB, CATH, GPIOB, , GPIOC, GPIOD	-0.3	VCC + 0.3 (max. 30V)	V
	D-, IS+, IS-, VFB, VDD	-0.3	5.5	V
Operating temperature		-40	125	°C
Storage temperature		-55	150	°C

NOTE: Maximum ratings applied to the device are individual stress limit value. Stresses above those listed may cause permanent damage and reliability may be affected.

4.2 Recommended Operating Conditions

Parameter		Condition	Min.	Typ.	Max.	Units
V _{CC_OPR}	Operating voltage		3		30	V
T _{OPR}	Operating Temperature		-20		105	°C

4.3 Thermal Characteristics

16-pin QFN

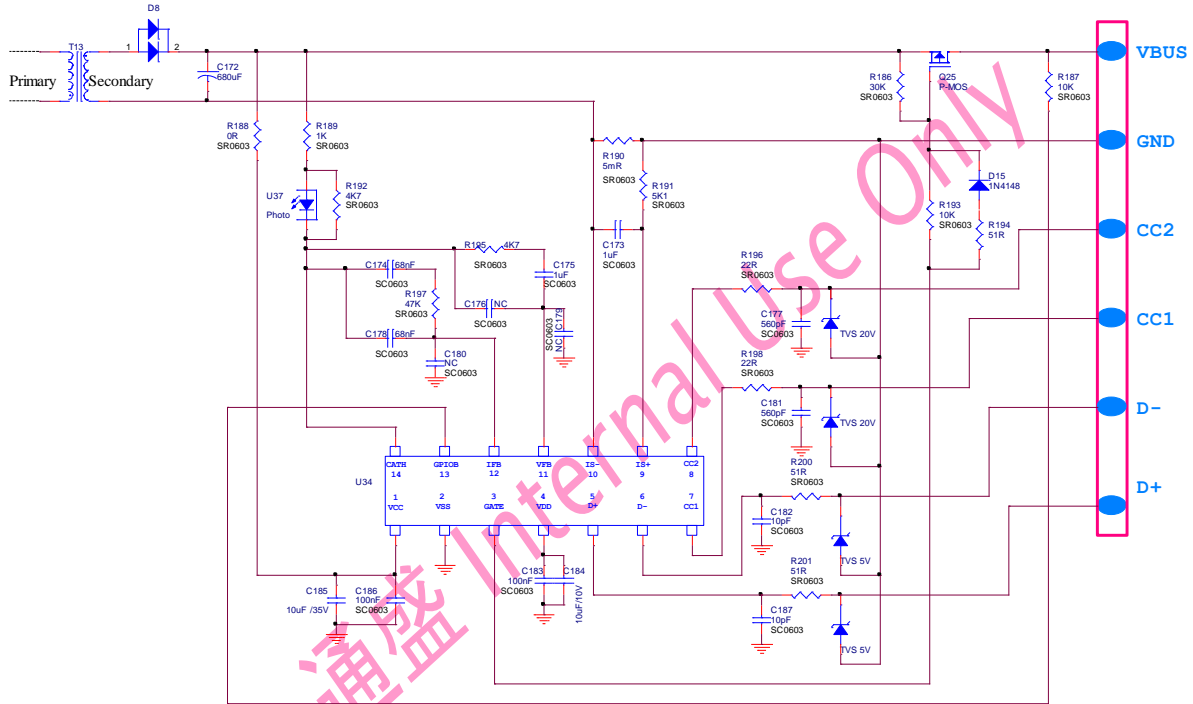
Parameter		Condition	Min.	Typ.	Max.	Units
θ_{JA}	Thermal Resistance (Junction to Air)			47		°C /W
θ_{JC}	Thermal Resistance (Junction to Case)			4.5		°C /W
T _{JMAX}	Maximum Junction Temperature			125		°C

14-pin SOP

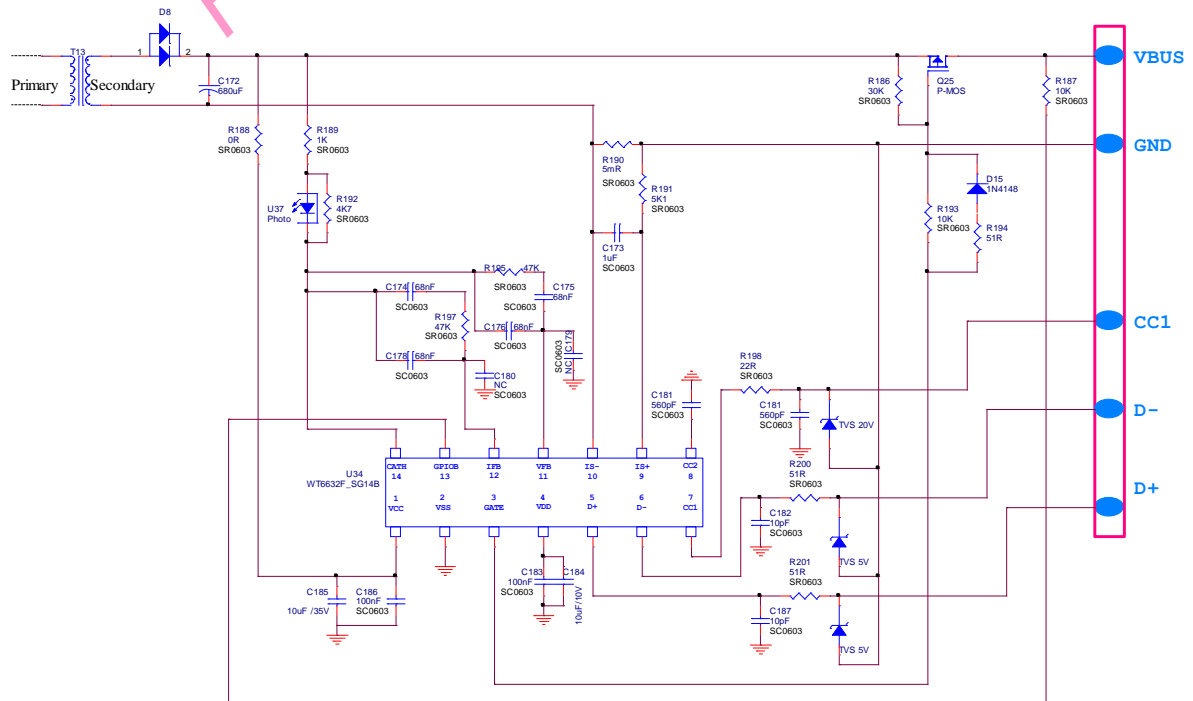
Parameter		Condition	Min.	Typ.	Max.	Units
θ_{JA}	Thermal Resistance (Junction to Air)			90		°C /W
θ_{JC}	Thermal Resistance (Junction to Case)			37		°C /W
T _{JMAX}	Maximum Junction Temperature			125		°C

5. Application Circuits

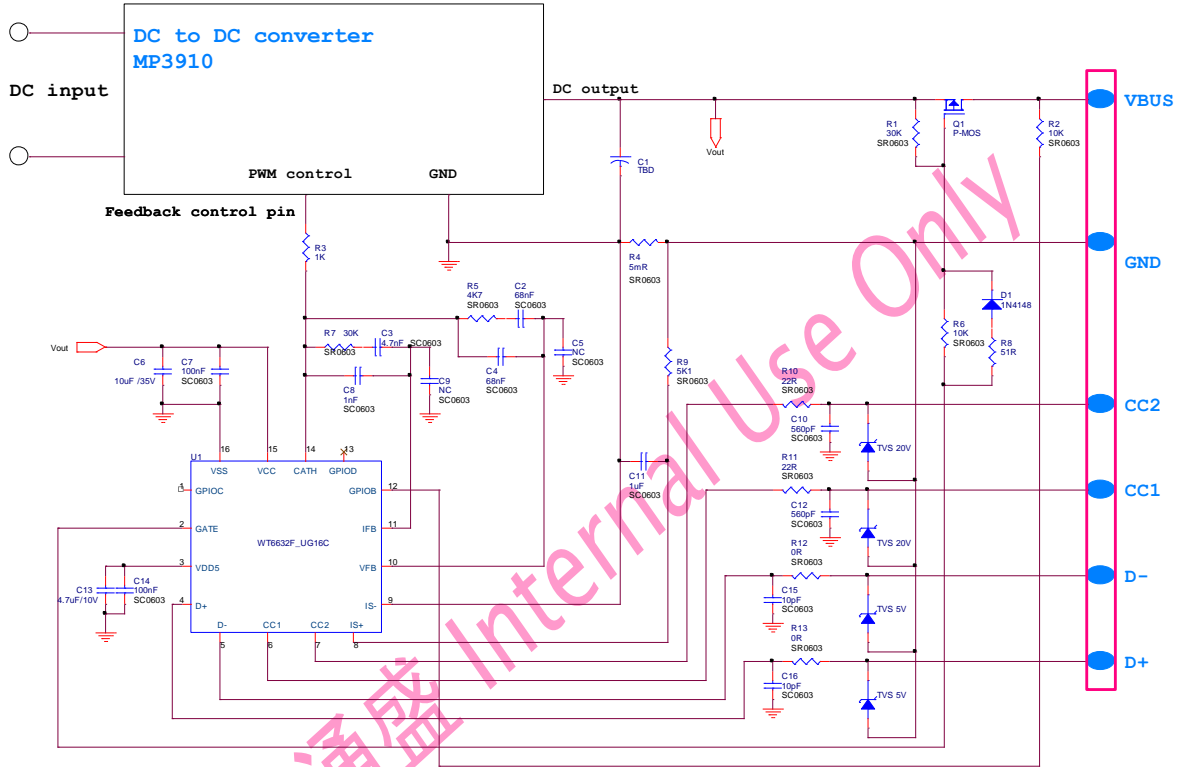
5.1 Adapter/Charger



5.2 Adapter for 65W



5.3 Car Charger



6. Ordering Information

Item	Part Number	Application	Package Outline	Package Type	Tape/Reel
18W	WT6632F-SG14BWT-S18	Adapter/Charger	150 mil	14-pin SOP	3K
30W	WT6632F-SG14BWT-S30				
45W	WT6632F-SG14BWT-S45				
65W	WT6632F-SG14BWT-S65				
30W	WT6632F-UG16CWT-C30	Car Charger	4mm x 4mm	16-pin QFN	2.5K

7. Selection Guide

Support power “18W to 65W” specification as bellow:

- 5V, 9V and 12V mode: Support USB Power Delivery Rev.2.0 and Quick Charge 3.0
- 15V and 20V mode: Only support Power Delivery Rev.2.0
- Protected Mode: (1) OCP: Auto Re-start
(2) OVP: Latch

(1) Adapter and Charger

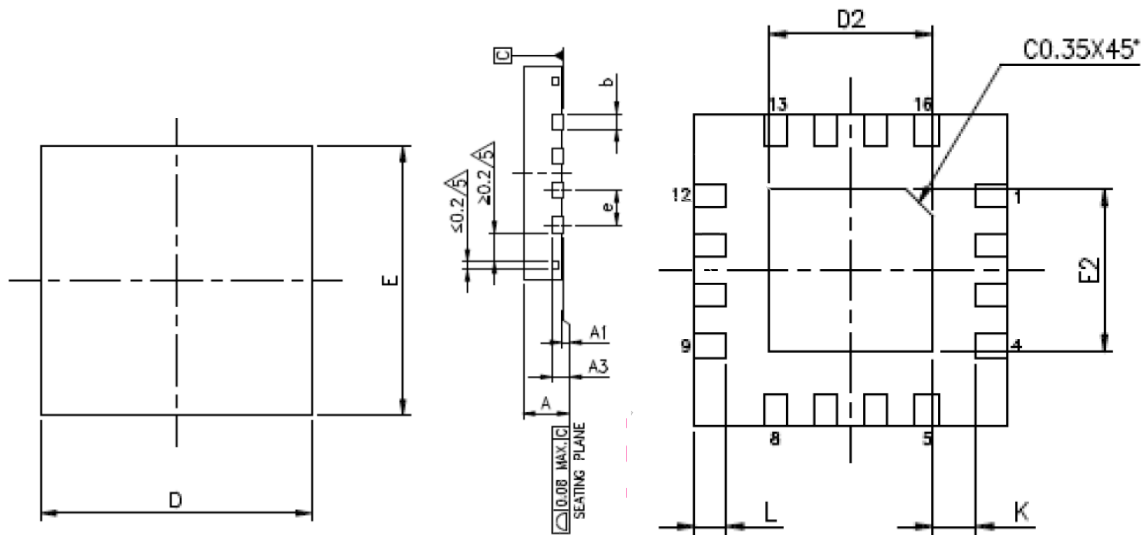
Model	5V			9V			12V			15V			20V		
	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)
18W	3	3.6	6.5	2	2.4	10.8	1.5	1.9	14.4	1.2	1.5	18	0.9	1.2	24
30W	3	3.6	6.5	3	3.6	10.8	2.5	3	14.4	2	2.4	18	1.5	2	24
45W	3	3.6	6.5	3	3.6	10.8	3	3.6	14.4	3	3.6	18	2.25	2.6	24
65W	3	3.6	6.5	3	3.6	10.8	3	3.6	14.4	3	3.6	18	3.25	3.9	24

(2) Car Charger

Model	5V			9V			12V			15V		
	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)	I (A)	OCP (A)	OVP (V)
30W	3	3.6	6.5	3	3.6	10.8	2.5	3	14.4	2	2.4	18

8. Package Dimension

8.1 16-pin QFN

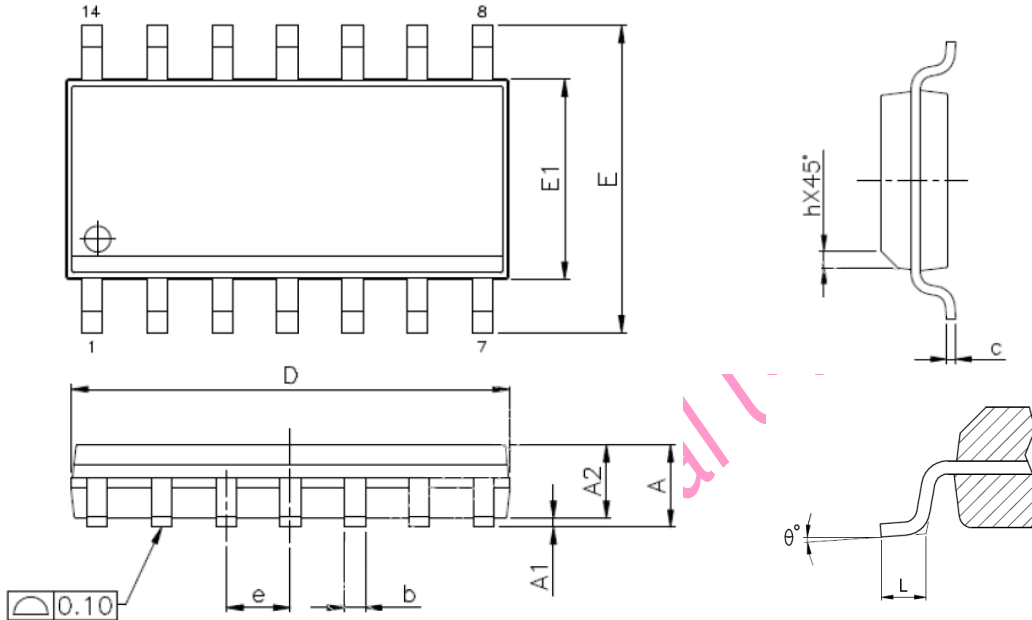


All dimensions shown in mm

SYMBOL	MIN	NOR	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3	0.20		
b	0.25	0.30	0.35
D	4.00		
E	4.00		
e	0.65		
K	0.20	-	-
L	0.30	-	0.50
D2	2.00	-	2.80
E2	2.00	-	2.80

NOTE: Dimension "b" applies to metallized terminal and is measured between 0.15mm and 0.30mm from the terminal tip. If the terminal has the optional radius on the other end of the terminal, the dimension "b" should not be measured in that radius area.

8.2 14-pin SOP



All dimensions shown in mm

SYMBOL	MIN.	MAX.
A	-	1.75
A1	0.10	0.25
A2	1.25	-
b	0.31	0.51
c	0.10	0.25
D	8.53	8.74
E	6.00 BSC	
E1	3.81	3.99
e	1.27 BSC	
L	0.40	1.27
h	0.25	0.50
θ°	0	8

NOTES:

1. Dimension "D" does not include mold flash, protrusions or gate burrs mold flash. Protrusions or gate burrs shall not exceed 0.15mm.
2. Dimension "E1" does not include inter-lead flash, or protrusions. Inter-lead flash and protrusions shall not exceed 0.25mm per side.

9. Revision History

Version	History	Date
1.0	Initial release	2016/09/30
1.01	Update General Description & Features (Section 1 & 2)	2016/10/18
1.02	Add a new part number - "WT6632F-UG16CWT-C30"	2016/12/16

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CLASS A 3.6V to 12V

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