



偉詮電子股份有限公司  
**Weltrend Semiconductor, Inc.**

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**WT6630P**  
**USB Power Delivery Controller**

**Brief Spec.**

**Rev. 0.81**

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### 1. General Description

The WT6630P is an USB Power Delivery (PD) controller designed for USB Type-C adapter or charger. It integrates USB PD baseband PHY, Type-C detection, shunt regulator, voltage and current monitor and control circuit of blocking MOSFET.

To minimize external components and can operate at single power supply from 4 to 30V.

#### Features:

- USB Type-C charge-only Downstream Facing Port (DFP)
- USB Power Delivery Rev.2.0 baseband communication
- Built-in 5V, 9V, 15V, 20V VBUS output for 30W, 45W, 60W.
- Over Voltage Protection (OVP) and Over Current Protect(OVP).
- Low side voltage output current shunt monitor
- External blocking MOSFET control
- Support power saving mode
- Operating voltage range: 4V ~ 30V
- Operating temperature range : -20 ~ +105°C
- Package : 14-pin SOP, 16-Pin QFN
- 30W, 45W, 60W specification as bellow

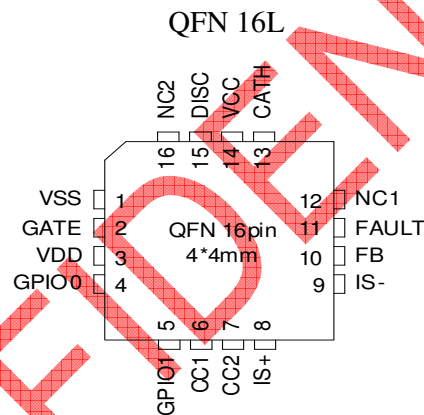
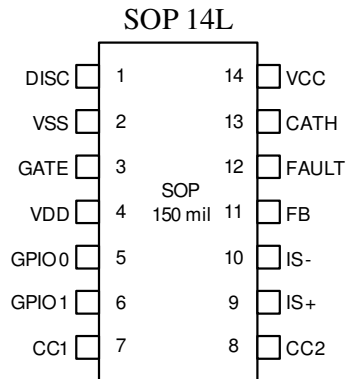
Model	5V			9V			15V			20V		
	I	OCP	OVP	I	OCP	OVP	I	OCP	OVP	I	OCP	OVP
<b>30W</b>	3A	3.8A	6.5V	2A	3.8A	10.5V	2A	3.8A	18V	1.5A	3.8A	23.5V
<b>45W</b>	3A	4A	6.5V	3A	4A	10.5V	3A	4A	18V	2.25A	4A	23.5V
<b>60W</b>	3A	4A	6.5V	3A	4A	10.5V	3A	4A	18V	3A	4A	23.5V

#### Application :

- USB Type-C AC adapters and chargers

## 2. Pin Assignment

### 2.1. Package



### 2.2. Ordering Information

Item	Part Number	Package Outline	Package Type	Tape/Reel
30W	WT6630P-UG160WT-S30	4mm x 4mm	16-pin QFN	3K
	WT6630P-SG140WT-S30	150 mil	14-pin SOP	3K
45W	WT6630P-SG140WT-S45	150 mil	14-pin SOP	3K
60W	WT6630P-SG140WT-S60	150 mil	14-pin SOP	3K



### 2.3. Pin Description

Pin No.		Name	Function	I/O Voltage	Type		Description
SOP 14	QFN 16				Input	Output	
1	15	DISC	DISC	HV	-	OD	Discharge
2	1	VSS	VSS	-			Ground
3	2	GATE	GPIO2	HV	TTL	PP	Blocking MOSFET control
4	3	VDD	VDD	LV	-	AN	1.8V regulator
5	4	GPIO0	GPIO0	HV	TTL	OD	General purpose I/O.
6	5	GPIO1	GPIO1	LV	TTL	OD	General purpose I/O.
7	6	CC1	CC1	HV	CC	PP	USB Type-C Configuration Channel
8	7	CC2	CC2	HV	CC	PP	USB Type-C Configuration Channel
9	8	IS+	IS+	LV	AN	-	Positive input of current sensing amplifier.
10	9	IS-	IS-	LV	AN	-	Negative input of current sensing amplifier.
11	10	FB	FB	LV	AN	-	Feedback of shunt regulator
12	11	FAULT	FAULT	HV	-	OD	Fault indication. Outputs low when OVP/OCP is occurred.
13	13	CATH	CATH	HV	-	AN	Cathode of shunt regulator
14	14	VCC	VCC	HV	-	-	Positive power supply

Legend: HV=High Voltage(max. 30V), LV=Low voltage(max. 5V), OD=Open Drain, PP=Push Pull, AN=analog, TTL= TTL compatible input, CC= USB PD baseband input

### 3. Electrical Characteristics

#### 3.1. Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Supply voltage VCC pin		-0.3	30	V
Input voltage	CATH, CC1, CC2	-0.3	VCC + 0.3 (max. 30V)	V
	FB, IS+, IS-	-0.3	5.5	V
Output voltage	DISC, GPIO0, GATE/GPIO2, FAULT/GPIO3	-0.3	VCC + 0.3 (max. 30V)	V
	GPIO1	-0.3	5.5	V
	VDD	-0.3	3	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.

#### 3.2. Thermal Characteristics

##### 16-Pin QFN

Parameter		Condition	Min.	Typ.	Max.	Unit
$\theta_{JA}$	Thermal Resistance (Junction to Air)			2.6		°C /W
$\theta_{JC}$	Thermal Resistance (Junction to Case)			37		°C /W
$T_{JMAX}$	Maximum Junction Temperature			125		°C

##### 14-Pin SOP

Parameter		Condition	Min.	Typ.	Max.	Unit
$\theta_{JA}$	Thermal Resistance (Junction to Air)			90		°C /W
$\theta_{JC}$	Thermal Resistance (Junction to Case)			37		°C /W
$T_{JMAX}$	Maximum Junction Temperature			125		°C

#### 3.3. Recommended Operating Conditions

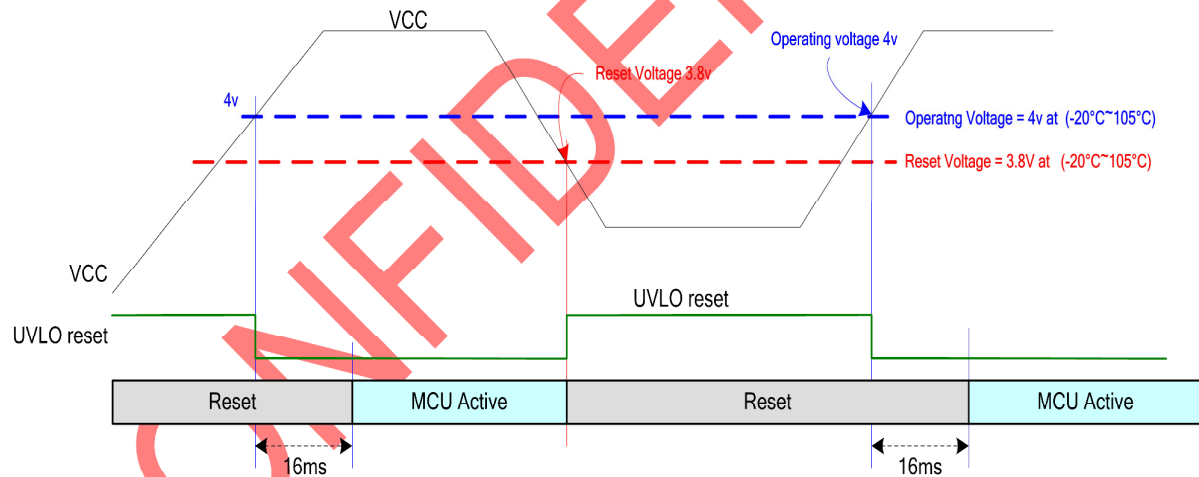
Parameter		Condition	Min.	Typ.	Max.	Unit
$V_{CC\_OPR}$	Operating voltage		4		30	V
$V_{FB}$	Feedback of shunt regulator		-0.3		4.5	V
$V_{IN}$	IS+, IS- input voltage range		-0.3		4.5	V
$T_{OPR}$	Operating Temperature		-20		105	°C

### 3.4. DC Characteristics (VCC=20V, Ta= -20 ~ +105°C, unless specified)

#### VCC and VDD

Parameter	Condition	Min.	Typ.	Max.	Unit
V <sub>CC</sub>	VCC Operating Voltage	4		30	V
I <sub>CC_OPR</sub>	VCC Current, normal operating		1.5	3	mA
I <sub>CC_SLEEP</sub>	VCC Current, sleep mode		0.8	1.0	mA
	CC1 pin floating			1.3	mA
V <sub>UVLO</sub>	VCC Under Voltage Lockout			3.95	V
	VCC rising at Ta = 25°C			3.75	V
	VCC falling at Ta = 25°C	3.2			V
	VCC rising at Ta = -20°C ~ +105°C			4	V
	VCC falling at Ta = -20°C ~ +105°C	3.15		3.8	V
V <sub>DD</sub>	VDD regulator output voltage		1.85		V

#### V<sub>UVLO</sub> Timing Diagram





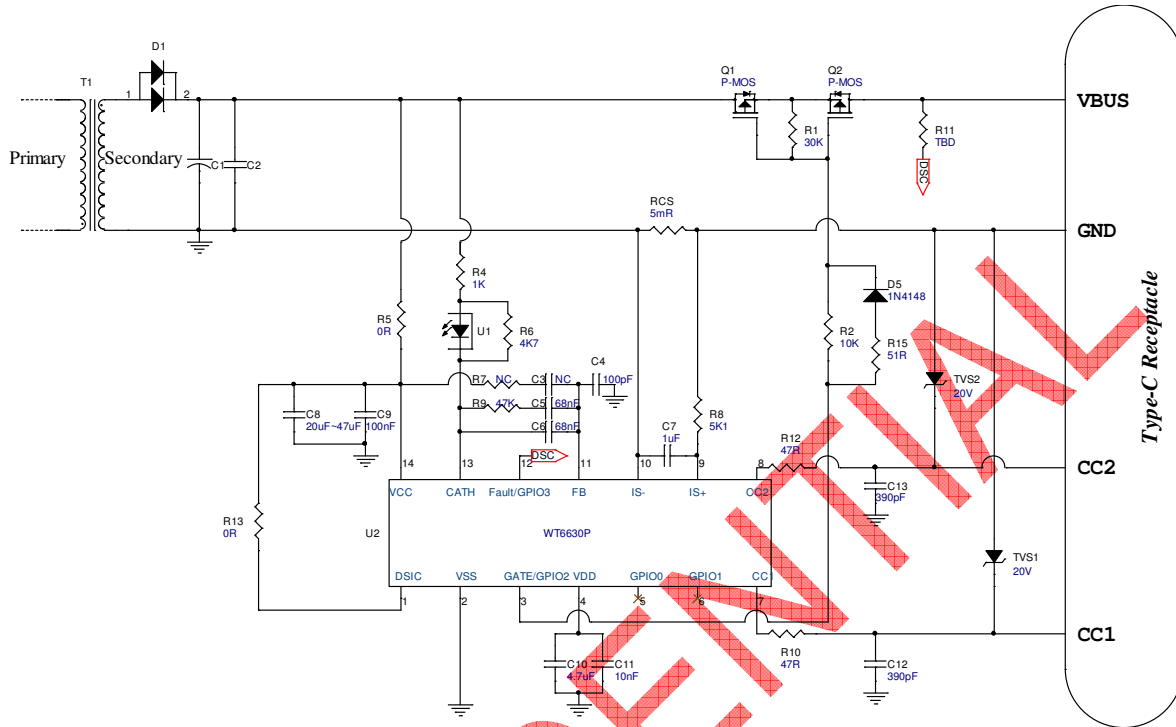
### Shunt regulator

Parameter	Condition	Min.	Typ.	Max.	Units
V <sub>REF</sub>	V <sub>CATH</sub> = V <sub>FB</sub> and I <sub>CATH</sub> = 1mA Ta = 25°C	2.49	2.5	2.51	V
	V <sub>CATH</sub> = V <sub>FB</sub> and I <sub>CATH</sub> = 1mA Ta = -20°C ~ +105°C	2.48	2.5	2.52	V
V <sub>OUT</sub>	5V output	-2		+2	%
	9V, 12V, 15V, 17V, 19.5V and 20V output	-3		+3	%

\*(1) Regulator output voltage test circuit

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### 4. Example of Application

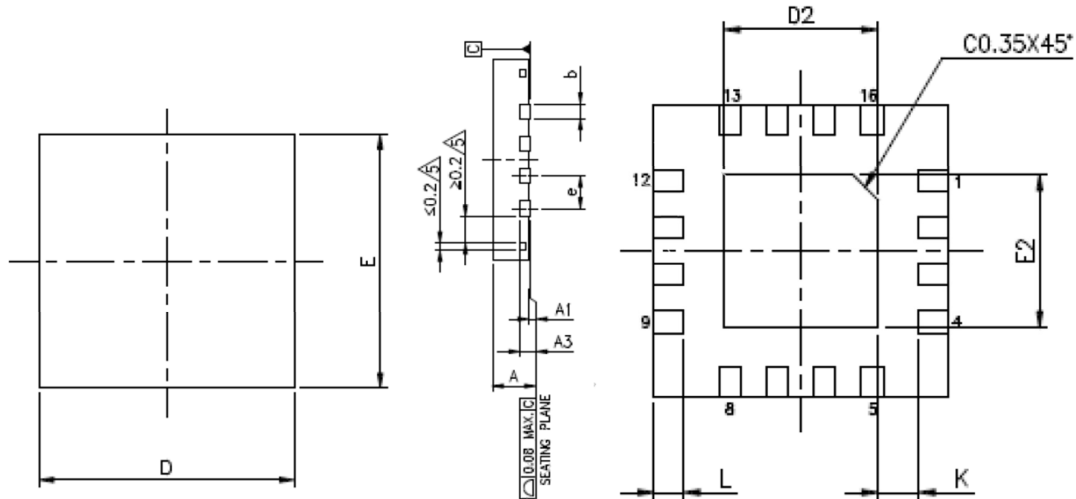


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## 5. Package Dimension

### 5.1. 16-pin QFN



(All dimensions shown in mm)

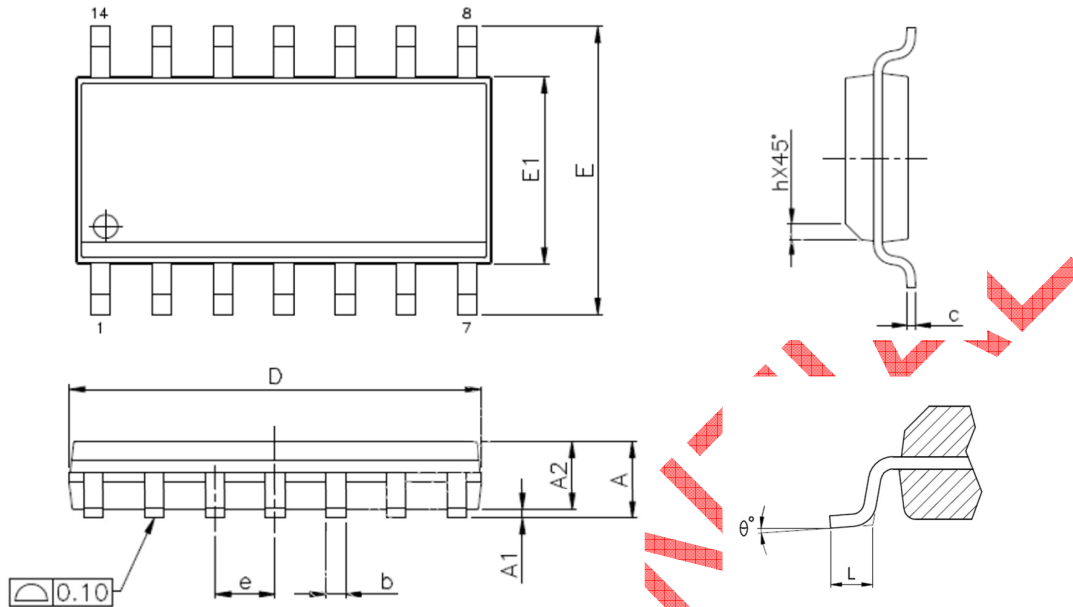
All dimensions shown in mm

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	0.35	0.40	0.45
D2	2.00	2.10	2.15
E2	2.00	2.10	2.15

**NOTES :**

- 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.

### 5.2. 14-pin SOP



(All dimensions shown in mm)

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
$\theta^\circ$	0	8

NOTES :

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