WT6635P

USB Power Delivery Controller

Product Spec.

Rev. 1.06

May 2019

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Table of Contents

1. General Description

The WT6635P is a highly integrated USB Power Delivery (PD) controller that supports USB PD 3.0 Programmable Power Supply specification. It is designed for USB Type-C power source applications such as power adapters, wall chargers, power strip, and etc.

The WT6635P minimizes external components by integrating USB PD baseband PHY, Type-C detection and an 8-bit MCU to allow small form factor and low BOM cost. Low operation voltage (3V) supports PD 3.0 Programmable Power Supply (PPS) specification. One-Time-Programmable ROM is provided for program code and user configuration data.

Without the features of Constant Voltage (CV), Constant Current (CC), voltage/current monitoring and load switch control pin, WT6635P must pair with the CV/CC controller, equipped with dynamic Over Voltage/Current Protection (OVP/OCP) & load switch control pin, by I^2C interface.

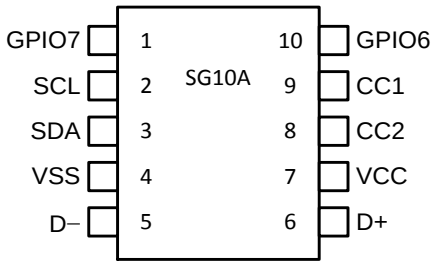
2. Features

- Supports USB Type-C Rev.1.3 and Power Delivery Rev. 3.0 with PPS
  - Programmable Type-C pull-up Rp
  - Integrated VCONN power and switch for reading E-marked cable
- Supports USB BC1.2 Dedicated Charging Port (DCP)
- Supports Qualcomm® Quick Charge™ 4 and Quick Charge 4+
- Supports SuperCharge Protocol™
- Protection coverage
  - Programmable Over Temperature Protection (OTP)
  - CC Pin Over Voltage Protection
  - D+ and D- Pins Over Voltage Protection
- 10-bit ADC for voltage and temperature measuring
- 8-bit MCU with One-Time-Programmable ROM
- Master I^2C interface
- Internal RC oscillator
- General purpose I/Os
- On-chip temperature sensor
- Built-in current source for external NTC thermistor
- Watchdog timer
- Built-in 1.8V regulator
- Supports power saving mode
- Operating voltage range: 3.0V to 4.3V
- Operating temperature range: -20°C to +105°C
- Package: SOP10, SOP8, DFN8

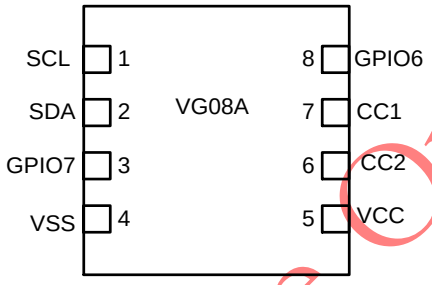
3. Pin Configuration

3.1 Package

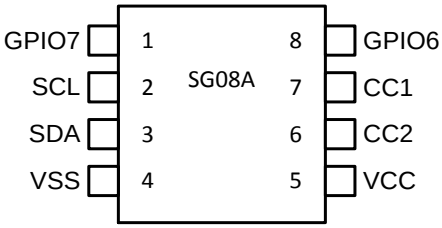
10-pin SOP



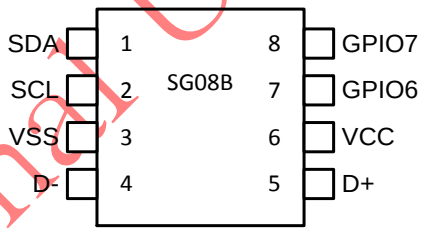
8-pin DFN



8-pin SOP



8-pin SOP



3.2 Pin Description

Pin Number				Pin Name	Function	I/O Voltage	Input Type	Output Type	Description
VG	SG								
08A	10A	08A	08B						
3	1	1	8	GPIO7	GPIO7	HV	TTL	OD	General purpose I/O
					ADC7		AN	-	ADC input
					IRQ7		TTL	-	IRQ input
1	2	2	2	GPIO2	GPIO2	HV	TTL	OD	General purpose I/O
					SCL		TTL	ODPH	I^2C SCL
					RXC		TTL	-	UART receiver path C
					IRQ2		TTL	-	IRQ input
2	3	3	1	GPIO3	GPIO3	HV	TTL	OD	General purpose I/O
					SDA		TTL	ODPH	I^2C SDA
					TXC		TTL	ODPH	UART transmitter path C
					IRQ3		TTL	-	IRQ input
4	4	4	3	VSS	VSS	-	-	-	Ground
	5		4	GPIO5	GPIO5	HV	TTL	OD	Serial purpose I/O
					D-		AN	-	USB D-

Pin Number				Pin Name	Function	I/O Voltage	Input Type	Output Type	Description
VG	SG								
08A	10A	08A	08B						
					ADC5		AN	-	ADC input
					IRQ5		TTL	-	IRQ input
	6		5	GPIO4	GPIO4	HV	TTL	OD	Serial purpose I/O
					D+		AN	-	USB D+
					ADC4		AN	-	ADC input
					IRQ4		TTL	-	IRQ input
5	7	5	6	VCC	VCC	LV	-	AN	Power
6	8	6		GPIO1	GPIO1	HV	TTL	OD	General purpose I/O
					CC2		CC	CC	USB Type-C Configuration Channel
					ADC1		AN	-	ADC input
					TRXB		TTL	OD	UART transmitter and receiver path B
					IRQ1		TTL	-	IRQ input
7	9	7		GPIO0	GPIO0	HV	TTL	OD	General purpose I/O
					CC1		CC	CC	USB Type-C Configuration Channel
					ADC0		AN	-	ADC input
					TRXA		TTL	OD	UART transmitter and receiver path A
					IRQ0		TTL	-	IRQ input
8	10	8	7	GPIO6	GPIO6	HV	TTL	OD	General purpose I/O
					RT		AN	-	Temperature sensing pin
					ADC6		AN	-	ADC input
					IRQ6		TTL	-	IRQ input

Legend: OD = Open Drain, ODPH = Open Drain+Pull High, AN = analog, TTL = TTL compatible input, CC = USB PD BMC I/O

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	Min.	Max.	Units
Supply voltage VCC pin	–0.3	7	V
Input voltage	–0.3	30V	V
Output voltage	–0.3	30V	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. 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.

4.2 Recommended Operating Conditions

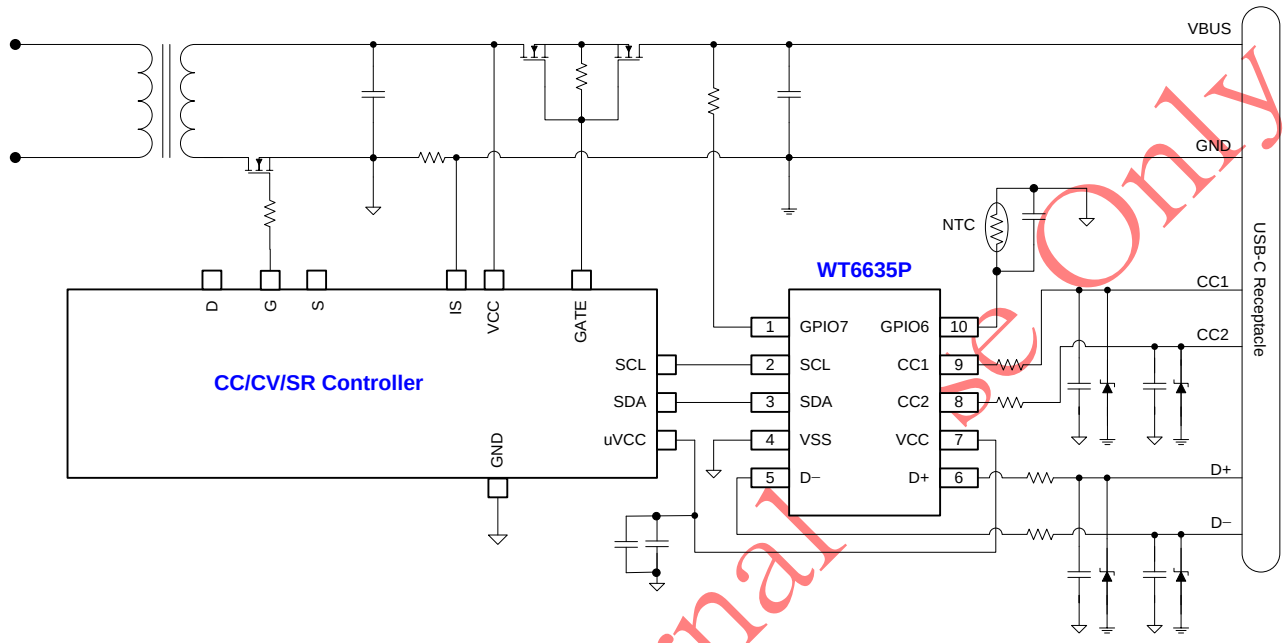
Parameter		Condition	Min.	Typ.	Max.	Units
V_{CC_OPR}	Operating voltage		3.0	3.6	4.3	V
T_{OPR}	Operating Temperature		-20		105	°C

4.3 Thermal Resistance

Package	Parameter		Min.	Typ.	Max.	Units
10-pin SOP	θ_{JA}	Thermal Resistance (Junction to Air)		88		°C /W
	θ_{JC}	Thermal Resistance (Junction to Case)		37		°C /W
	T_{JMAX}	Maximum Junction Temperature		125		°C
8-pin SOP	θ_{JA}	Thermal Resistance (Junction to Air)		150		°C /W
	θ_{JC}	Thermal Resistance (Junction to Case)		39		°C /W
	T_{JMAX}	Maximum Junction Temperature		125		°C
8-pin DFN	θ_{JA}	Thermal Resistance (Junction to Air)		43		°C /W
	θ_{JC}	Thermal Resistance (Junction to Case)		5.5		°C /W
	T_{JMAX}	Maximum Junction Temperature		125		°C

5. Application Circuit

USB-PD Power Brick



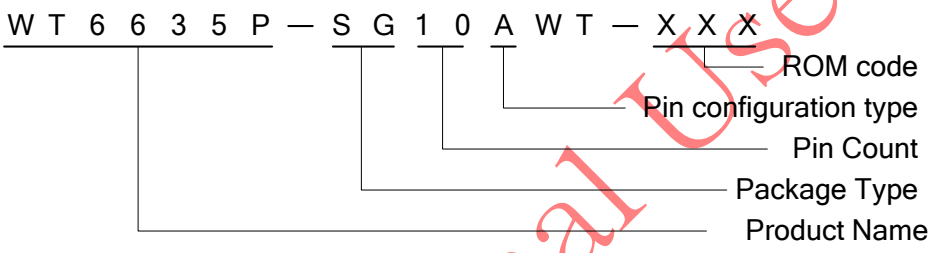
※ Note: If MI²C speed is up to 387kHz, the external pull high resistor need to add (SCL and SDA pins).

6. Ordering Information

Package Type	Package Outline	Part Number	Ordering Number	Note
10-pin SOP	150 mil	WT6635P	WT6635P-SG10AWT-XXX	-
8-pin SOP			WT6635P-SG08AWT-XXX	-
			WT6635P-SG08BWT-XXX	-
8-pin DFN	3mmx3mm		WT6635P-VG08AWT-XXX	

Note: suffix number number-XXX for difference Firmware code, please refer to Firmware control list.

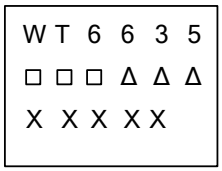
Example:



Top Marking

8-pin SOP/10-pin SOP

8-pin DFN



Δ ROM Code

□ Date Code

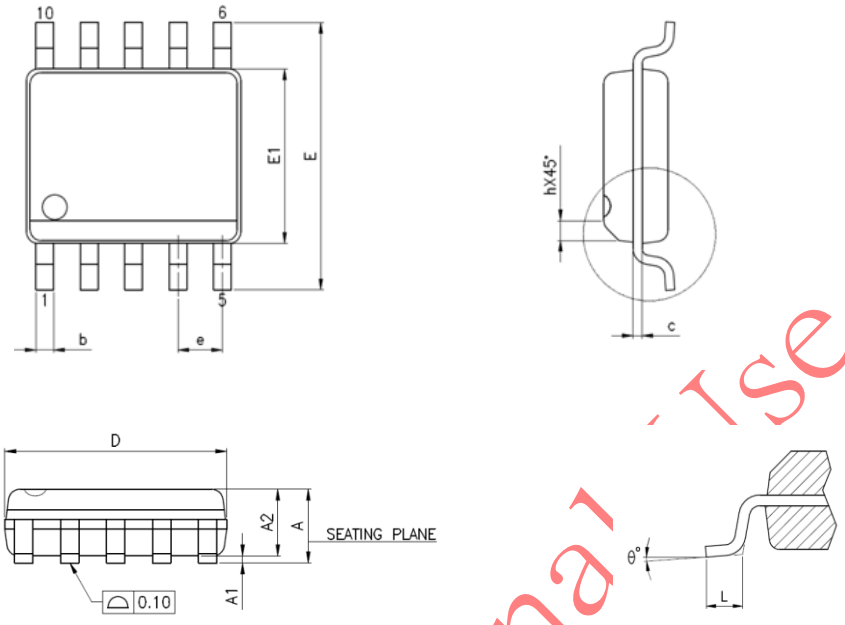
FW Version Code

& Pin configuration type

X Production Tracking code

7. Package Dimensions

10-PIN SOP



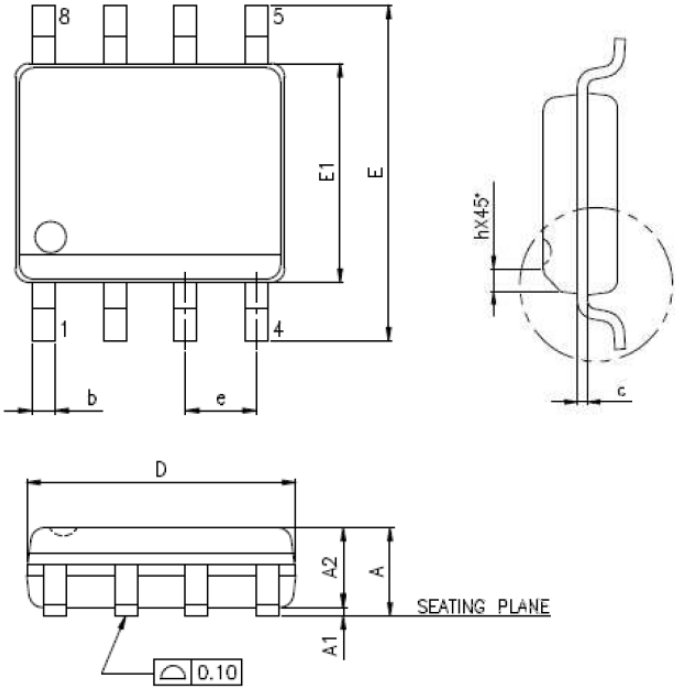
All dimensions shown in mm

SYMBOL	MIN.	MAX.
A	-	1.75
A1	0.10	0.25
A2	1.25	-
b	0.30	0.45
c	0.10	0.25
D	4.80	4.95
E	6.00 BSC	
E1	3.80	4.00
e	1.0 BSC	
L	0.40	1.27
h	0.25	0.50
θ°	0	8

Notes:

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

8-PIN SOP



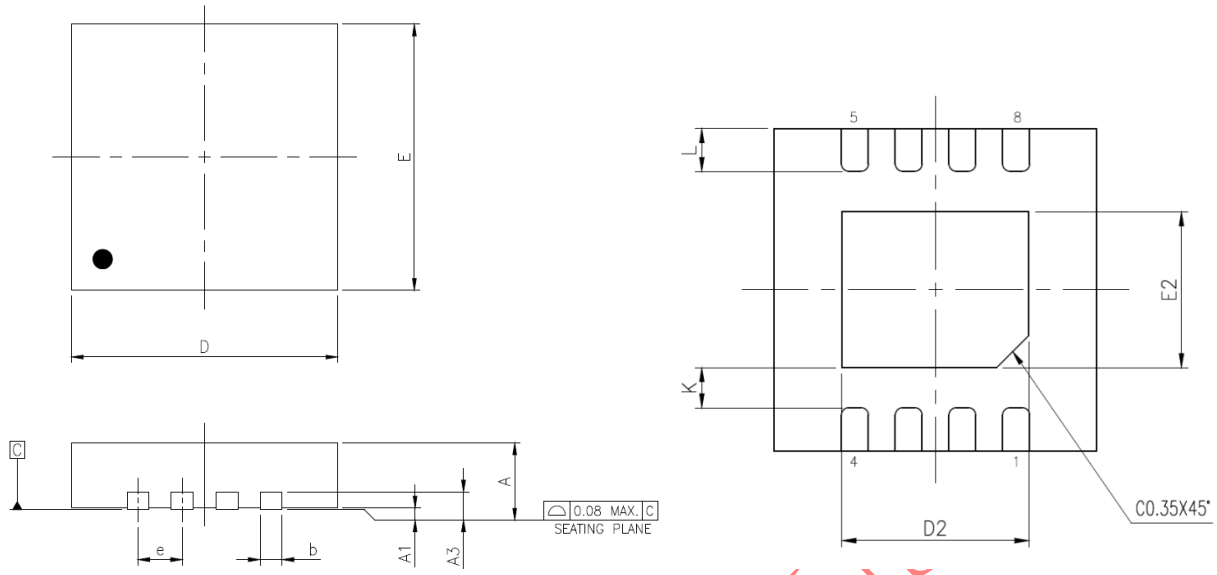
All dimensions shown in mm

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	4.80	4.95
E	6.00 BSC	
E1	3.80	4.00
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.

8-PIN DFN



All dimensions shown in mm

SYMBOL	MIN.	NOR	MAX.
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.203 REF.	
b	0.20	0.25	0.30
D		3.00 BSC	
E		3.00 BSC	
e		0.50 BSC	
K	0.20	-	-
L	0.35	0.4	0.45
D2	2.35	2.40	2.45
E2	1.65	1.70	1.75

Notes:

1. 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. Revision History

Version	History	Date
1.00	Initial issue	December 5, 2017
1.01	1. Update DC specification – power supply 2. Update application circuit 3. Add Ordering information section	December 27, 2017
1.02	Add General Description	March 5, 2018
1.03	Update Features Description	November 1, 2018
1.04	Add 8-pin DFN package	December 28, 2018
1.05	1. Update General description and Features description 2. Update 3.2. Pin description for GPIO4	April 15, 2019
1.06	Update Operating voltage range description	May 17, 2019