

## TYPE-A Controller with plug in/out auto detection

### Feature

- communication protocol
  - PDO configurable: 5V, 9V, 12V,
  - Apdo configurable: 5V prog, 9V prog,
- Support quick charge 3.0 /2.0 protocol
  - Configurable Xiaomi 27W charge Turbo
- Support Huawei FCP / SCP protocol
- Support Samsung AFC protocol
- Support USB BC1.2 DCP
- Support apple 2.4A charging specification
- built in VBUS discharge function
- Support USB type-A dual port operation mode
  - fast charging when port A works independently
  - when the USB-A port is connected to the apple charging cable but not connected to the apple mobile phone, the another USB-A port still has fast charging
  - when there are equipment access to the other chip's USB-A port/TYPER-C at the same time, link pin will indicate the signal, then the USB-A works at 5V
- Safety
  - the type-A port is controlled by the switch at the power end to avoid the leakage caused by the short circuit
- overvoltage / undervoltage protection
- Over temperature protection
- DP / DM overvoltage protection
- ESD characteristics  $\pm 4KV$
- Package: TSSOP-20

### Application

- AC-DC adapter

- USB Adapter

### DESCRIPTION

UC4600 is a multi-functional USB single port controller integrating type-A, QC3.0/2.0 fast charging protocol, Huawei FCP / SCP fast charging protocol, Samsung AFC fast charging protocol, BC1.2 DCP and Apple device 2.4A charging specification, Provide complete type-A single port charging solutions for AC-DC adapter, mobile power supply, car charger and other equipment.

UC4600 through plus the external connection function, UC4600 can be easily and flexibly applied in the charging scheme of multiple type-A ports.

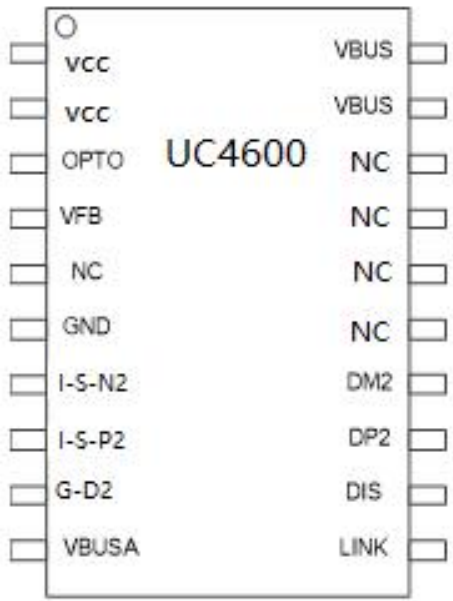
When one of the type-A ports is connected to the device, the type-A port can realize independent fast charging function. When both type-A(different chip's) or more are connected to the product, UC4600 will reduce the output voltage to 5V to supply power to the device. In particular, when the type-A port is always connected to the apple charging cable but not connected to the Apple phone, the other type-A port still has the fast charging function. When used as a charger, the charging line is often connected to the charger. UC4600 perfectly solves the problem of fast charging when two/more type-A ports are connected with charging line.

UC4600 built in a variety of protection mechanisms to ensure the safety of the equipment: including dynamic overvoltage / under voltage / overcurrent protection (the protection point can be adjusted according to the proportion of the working voltage / current requested by the equipment); start monitoring (the port voltage will be monitored before VBUS output).

UC4600 is packaged in TSSOP20.

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**Pin function**



PIN	NAME	Description
1/2	VCC	Source INPUT
3	OPTO	OPTO coupler driver
4	VFB	Voltage adjust feedback connection
5	NC	No connection
6	GND	GND
7	I-S-N2	Type-A port, current sense negative port
8	I-S-P2	Type-A port, current sense positive port
9	G-D2	Type-A port, PMOS Switch driver
10	VBUS-A	Type-A port, output VCC
11	LINK	Plus PD-LINK™ Port
12	DIS	Control the discharge MOS gate
13	DP2	Type-A Port DP
14	DM2	Type-A Port DM
15	NC	No connection
16	NC	No connection
17	NC	No connection
18	NC	No connection
19	VBUS	VBUS output
20	VBUS	VBUS output

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### Order Information

name	PDO And APDO Configuration	mark	package
UC4600	High power Output PDO : 5V/3A, 9V/3A, 12V/2.25A, Low power output PDO : 5V/2A	UC4600	TSSOP20

Mark information:

Line 1, UC4600: Chip mark

Line 2, XXXXXX: Lot Number

### Available function

	QC3.0	FCP/SCP	AFC	Single A	Plus more-link
UC4600	Y	Y	Y	Y	Y

### Specifications

#### Absolute Maximum Ratings

Parameter		Min	Max	Unit
Broken Voltage(VS to GND)	Vcc,I-S-Nx , VBUS, OPTO, DP, DM	-0.3	24	V
	The others Pin	-0.3	6	V
Operating Junction Temperature Range		-40	150	°C
Storage Temperature		-65	150	°C

(1) Absolute maximum ratings are stress limits beyond which damage to the device may happen.。

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**ESD feature**

Symbol	Parameter	Value	Unit
V <sub>ESD</sub>	HBM	±4000	V

**Recommended operating conditions**

Parameter		Min	Type	Max	Unit
VCC	Input voltage	3.6		15	V
C <sub>VBUS</sub>	Discharge limitation resistor	2.2		10	μF
C <sub>VCC</sub>	VAUX Capacitor	4.7	10		μF
R <sub>FBUP</sub>	VBUS Capacitor		100		kΩ
T <sub>A</sub>	System voltage divider resistor	-40		85	°C

**Package thermal Data**

Symbol	Parameter	Value	Unit
R <sub>θJA</sub>	Max Junction-to-Ambient Thermal Resistance <sup>(1)</sup>	100	°C/W
R <sub>θJctop</sub>	Max Junction-to-Case Thermal Resistance	36	
R <sub>θJB</sub>	Thermal resistance between junction and plate temperature	45	

**TYPE-A Controller with plug in/out auto detection**
**ELECTRICAL CHARACTERISTICS**

 (T<sub>J</sub>= 25°C, 5V≤VCC≤12V, unless otherwise specified)

Parameter	Test conditions	MIN	TYP	MAX	UNIT	
<b>VCC, VBUS</b>						
V <sub>VCC_TH</sub>	VCC UVLO Threshold	Rising edge		3.3	V	
		Falling edge		2.9		
		Hysteresis		0.4		
I <sub>SUPP</sub>	Operating current	VCC=5V, VBUS=5V		2	mA	
<b>Voltage Protection (VBUS)</b>						
V <sub>FOVP</sub>	Fast OVP Threshold, always enabled	Ref to target voltage		+20%	V	
V <sub>SOVP</sub>	Slow OVP Threshold	Ref to target voltage		+15%	V	
V <sub>SUVP</sub>	VBUS UVP Threshold	Ref to target voltage		-22%	V	
<b>OCP</b>						
V <sub>ITRIP</sub>		Ref to Power Capability(pd)		+30%	A	
		USB-A			A	
<b>OTP (internal)</b>						
T <sub>J1</sub>	Die temperature	Temperature rising edge	135	145	155	°C
		Hysteresis		20		°C
<b>HVDCP interface (DP, DM)</b>						
V <sub>DAT(REF)</sub>	Data line detection voltage		0.25	0.325	0.4	V
V <sub>SEL(REF)</sub>	Output voltage selection		1.8	2	2.2	V
T <sub>GLITCH(DP)HIGH</sub>	D+ High level disturbance filtering time		1	1.25	1.5	s
T <sub>GLITCH(DM)LOW</sub>	D- Low level disturbance filtering time			1		ms
T <sub>GLITCH(V)CHANGE</sub>	Output voltage disturbance filtering time		20	40	60	ms
T <sub>GLITCH(CONT)CHANGE</sub>	Disturbance filtering time in continuous mode		100	150	200	us
R <sub>DAT(LKG)</sub>	D+ Leakage resistance		300	500	800	KΩ
R <sub>DM(DWN)</sub>	D- DroPD-outputwn resistance		14.25	19.53	24.5	KΩ
R <sub>ON(N1)</sub>	Switch N1 on resistance			40	100	Ω
V <sub>TH(PD)</sub>	Connection voltage threshold of receiving device		0.25	0.325	0.4	V
T <sub>DPD</sub>	Connection detection and filtering time for receiving equipment		120	160	200	ms

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$\Delta I_{T(UP)}$	Step size of current source when voltage rises	$R_{IREF}=100K\Omega$		2		uA
$\Delta I_{T(DO)}$	Step size of current source when voltage is reduced	$R_{IREF}=100K\Omega$		2		uA
Apple 2.4A Charge mode						
$V_{DAT(2.7V)}$	D+/D- voltage		2.57	2.7	2.84	V
$R_{DAT(2.7V)}$	D+/D- output impedance			15		K $\Omega$
FCP charge mode						
$V_{TX-VOH}$	D- FCP TX Valid High			2.7		V
$V_{TX-VOL}$	D- FCP TX Valid Low				0.3	V
$V_{RX-VIH}$	D- FCP RX Valid High			1.2		V
$V_{RX-VIL}$	D- FCP RX Valid High			0.9		V
Trise	FCP Pulse Rise Time	10% - 90%			2.5	us
Tfall	FCP Pulse Fall Time	90% - 10%			2.5	us

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### Application informatin

#### VCC AND VBUS

Vcc is the input power of type-A ports. It is used as the power input of VBUS and the power supply pin of the chip to connect the output of ACDC or DCDC. It is recommended to connect GND to 2 ~ 10uF ceramic capacitor near VCC and VBUS pins.

#### OPTO

OPTO is used to Drive Opto coupler, with withstand voltage of more than 24V (see application diagram in Chapter 3).

#### VFB

VFB and OPTO form CV loop, which needs to be compensated. The reference at VFB is 1.24V, and the partial voltage resistance near VCC must be 100k, and the other is 33K (corresponding to VCC = 5V); the resistance accuracy affects the power supply accuracy, so it is recommended to use 1% accuracy resistance.

#### Multi-port Applications

UC4600 can realize fast charging in single port application, and it will return to 5V charging when double/more USB-A(different chip) works at the same time; moreover, it can realize whether the apple cable or mobile phone is connected to port A through special technology to avoid affecting the quick charging of another port A when there is only apple cable in port A.

#### Safety characteristics

##### Withstand voltage

In order to avoid chip damage caused by DP / DM pin and power short circuit, the withstand voltage of these ports can reach more than 24V.

##### OVP/UVP

The chip OVP/OCP/UVP threshold will be adjusted according to the voltage selected by the device to protect the device security to the maximum extent.

##### OTP

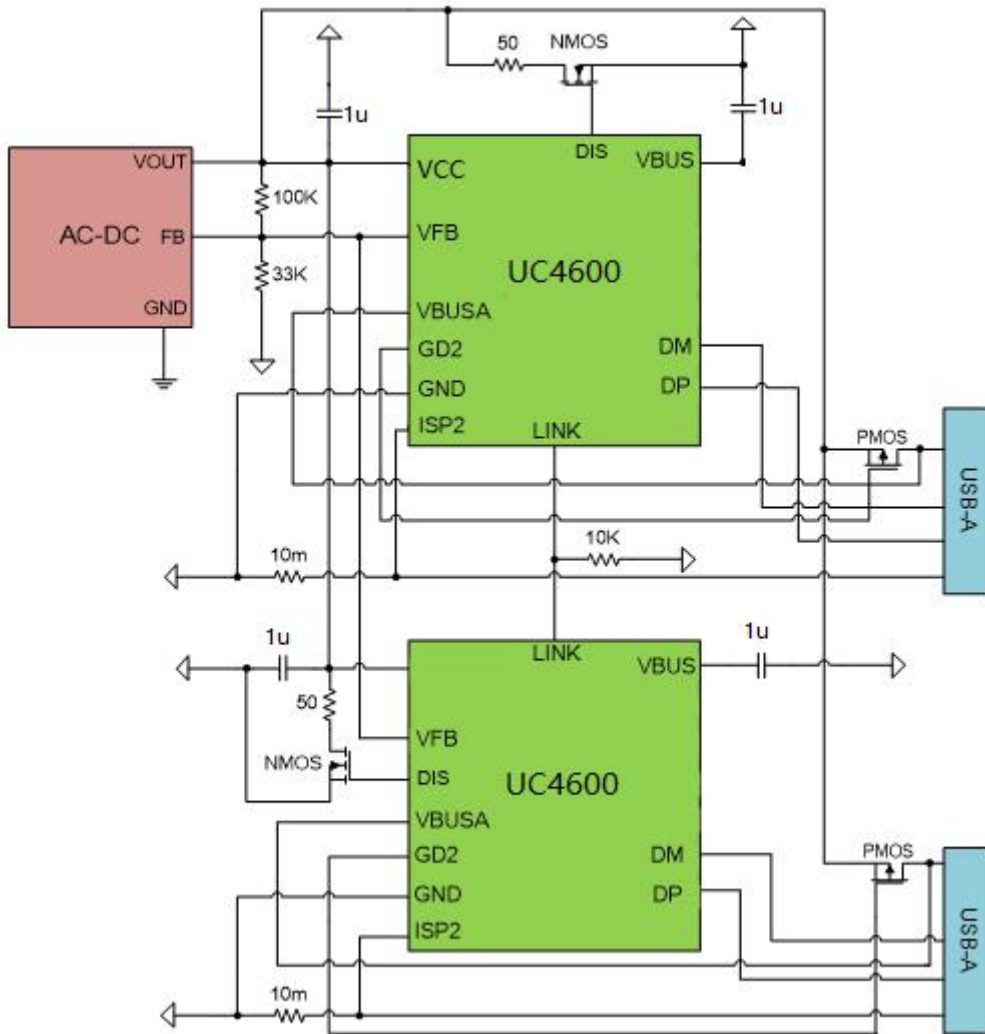
When the chip junction temperature reaches 145 °C, the output will be closed, and when it drops to 125 °C, it will be released.

##### Discharge

UC4600 has built-in energy discharge channel, which can open the discharge power energy under specific circumstances.

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**2A application**



UC4600+UC4660: 2A quick charger application



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**Package Information**

**TSSOP20**

