

Description

The ECP5701 is a Power Delivery (PD) SINK controller IC. The ECP5701 can request the maximum or specified voltage from the power supplies that complied with the Type-C PD protocol.

The ECP5701 built in pull-low resistor on CC1 and CC2 pins. When the ECP5701 connected to the TYPE-C source device, the PD communication will be triggered and started automatically. The selected voltage will be requested and all related PD protocol will be completed.

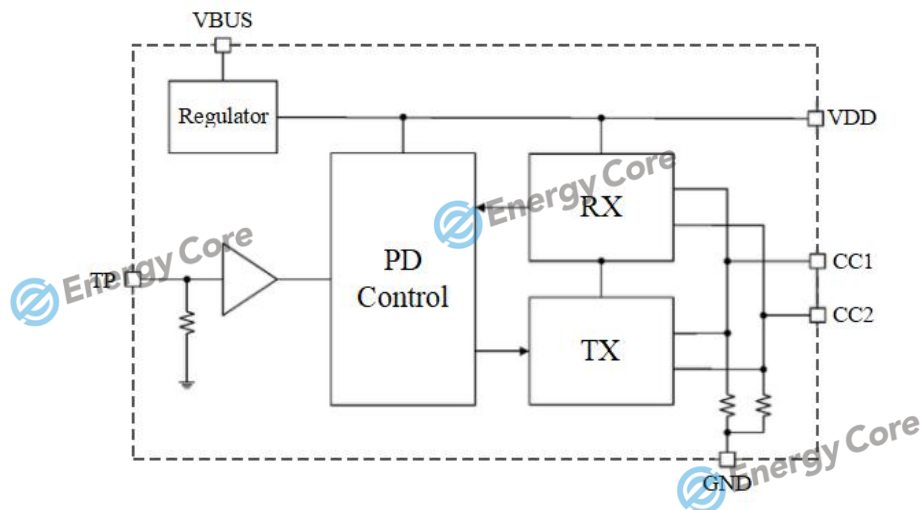
Feature

- ◆ Input voltage range : 3V~28V
- ◆ Support USB Type-C Specification Release 1.3
- ◆ Support USB PD2.0 and PD3.0 communication protocol up to seven power object
- ◆ Package Type : SOT23-6L

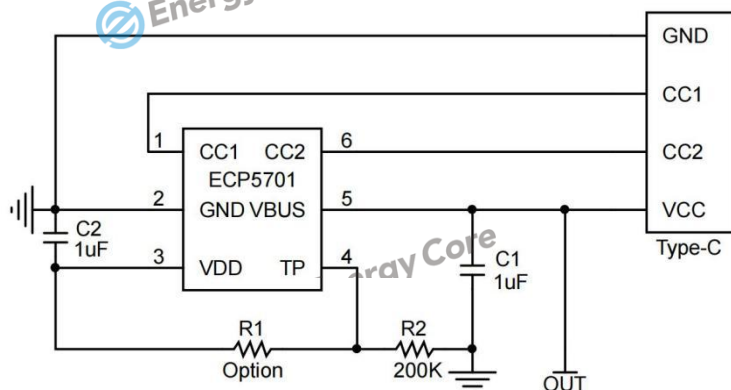
Application

- ◆ Audio
- ◆ STB
- ◆ Router
- ◆ Home Application
- ◆ Lighting

Functional Block Diagram



Typical Application



Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	VBUS		0		28	V
CC1 CC2 Voltage	VCC1 VCC2		-0.3		28	V
VDD TP Voltage	V _{VDD} V _{TP}		-0.3		3.3	V
Thermal Resistance	θ_{JA}	SOT23-6L			220	°C/W
Allowable Power Dissipation	PD	SOT23-6L TA $\leq$ +25° C			455	mW
Operation Temperature	T _{OP}		-25		+85	°C
Storage Temperature	T _{ST}	SOT23-6L	-40		+150	°C
Lead Temperature		soldering time 10sec			+260	°C

DC Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input Voltage Range	VBUS		3		20	V
VDD Regulator		VBUS = 5V		3.3		V
Operation Current		VBUS = 5V		1.28		mA
Option Voltage($\leq$ 20V)(Max)		VBUS = 5V		0		V
Option Voltage($\leq$ 15V)		VBUS = 5V		3/8* VDD		V
Option Voltage($\leq$ 12V)		VBUS = 5V		5/8* VDD		V
Option Voltage($\leq$ 9V)		VBUS = 5V		7/8* VDD		V

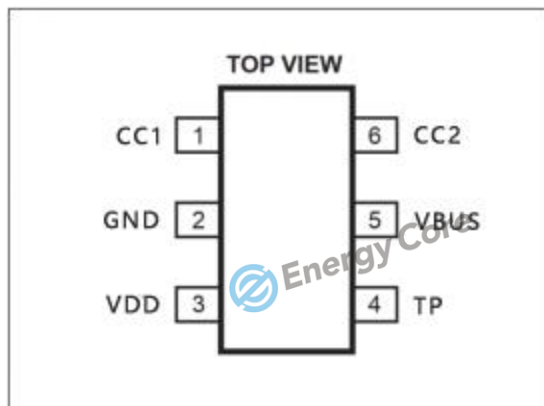
PD Electrical Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Pull-down resistance through each C_CC pin when in a disconnect state	RD_CC		4.85	5.1	5.35	kΩ
Threshold Voltage of the pull-down FET in series with RD during dead battery	VTH_DB		0.5	0.9	1.2	V
PD data bit rate	PD_BITRATE		270	300	330	mA
Unit interval (1/PD_BITRATE)	UI		3.03	3.33	3.7	V
Capacitance for a cable plug (each plug on a cable may have up to 25 pF to this value)	CCBLPLUG				25	V
Cable characteristic impedance	ZCABLE		32		65	V
Receiver capacitance. Capacitance looking into C_CCn pin when in receiver mode	CRECEIVER		70		120	V
TX Transmit Peak Voltage	VTXP		1.14	1.2	1.26	V
TX output impedance. Source output impedance at the Nyquist frequency of USB2.0 low speed (750kHz) while the source is driving the C_CCn line	ZDRIVER		33		75	Ω
Rise Time. 10% to 90% amplitude points, minimum is under an unloaded condition. Maximum set by TX mask	TRISE		300			ns
Fall Time. 90% to 10% amplitude points, minimum is under an unloaded condition. Maximum set by TX mask	TFALL		300			ns
Rx Receive Rising Input threshold	VRXTR		605	630	655	mV
Rx Receive Falling Input threshold	VRXTF		450	470	490	mV
Receiver input impedance	ZBMCRX		10			mΩ
Rx bandwidth limiting filter. Time constant of a single pole filter to limit broadband noise ingress	TRXFILTER		100			ns

Ordering Information

Part Number*	Package	Top Marking
ECP5701	SOT23-6L	PAXX

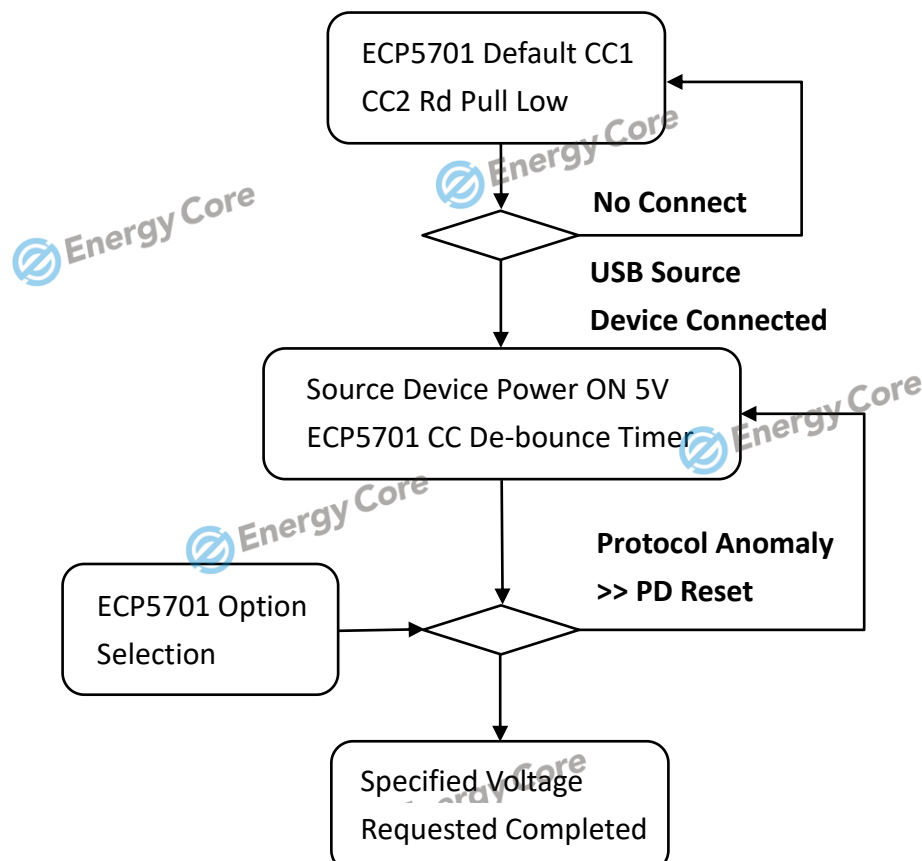
Package Reference



Pin#	Name	Description
1	CC1	PD CC1 pin
2	GND	Ground pin
3	VDD	Regulator output
4	TP	Test and option pin
5	VBUS	PD VBUS input pin
6	CC2	PD CC2 pin

Operation Algorithm

The ECP5701 will complete the PD protocol negotiation after PD source device connected. The following diagram shows the PD connection algorithm.



Option Voltage Selection

The ECP5701 will request maximum voltage of the source device. The TP option can select the other voltage object. The following table shows TP voltage and request voltage selection.

Option#	TP Voltage	PD Request	Description
OPT1	Default (0V)	20V(Max)	Request Maximum Voltage of the Source Device
OPT2	$3/8 * VDD$	15V	Request Voltage must $\leq 15V$
OPT3	$5/8 * VDD$	12V	Request Voltage must $\leq 12V$
OPT4	$7/8 * VDD$	9V	Request Voltage must $\leq 9V$

Resistor Selection for Common Output Voltages.

V_{OUT} (V)	R1 (k Ω)	R2 (k Ω)
20	NC	200
15	330	200
12	120	200
9	30	200

The option selection of ECP5701 is used to protect the connected device. The following example shows the result of requested voltage.

Source Power (W)	PD Source Supply					ECP5701 Request Voltage			
	Object 20V	Object 15V	Object 12V	Object 9V	Object 5V	Option1	Option2	Option3	Option4
60	√	√	√	√	√	20	15	12	9
45		√	√	√	√	15	15	12	9
30		√	√	√	√	15	15	12	9
30		√		√	√	15	15	9	9
15				√	√	9	9	9	9
	√					20	5	5	5
		√			√	15	15	5	5

Typical Application Circuit

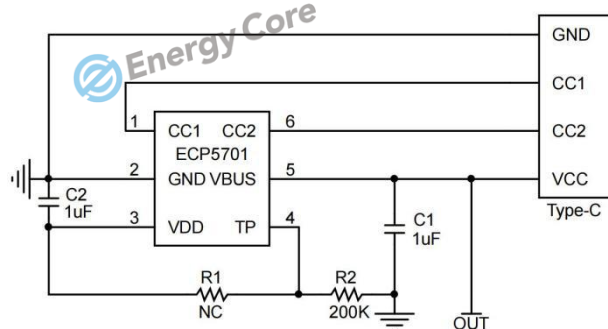


Figure 1: 20V Output Typical Application Circuit

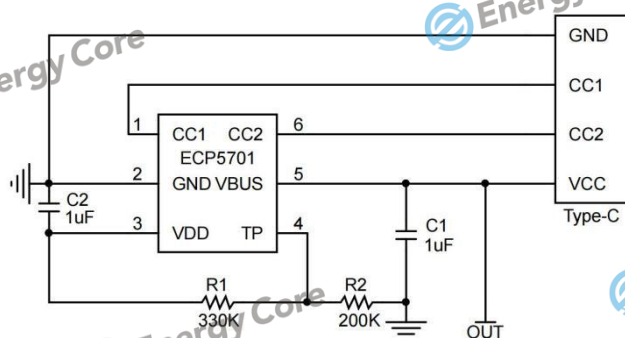


Figure 2: 15V Output Typical Application Circuit

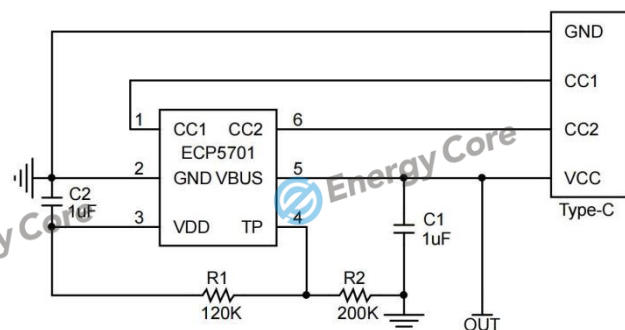


Figure 3: 12V Output Typical Application Circuit

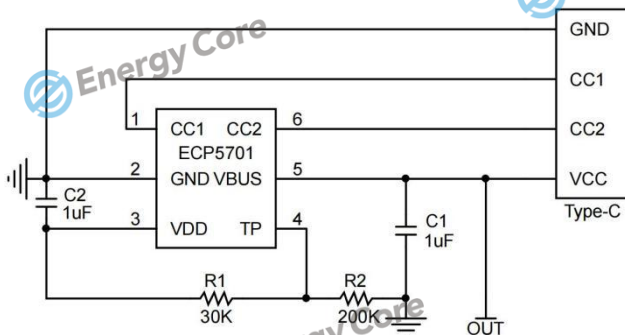
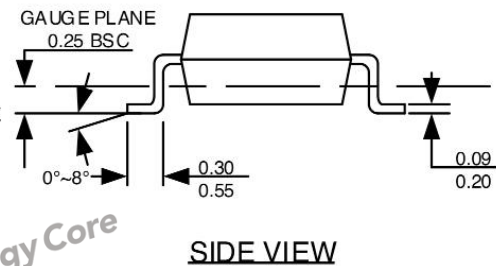
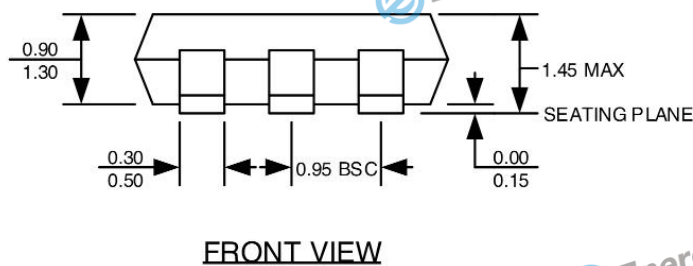
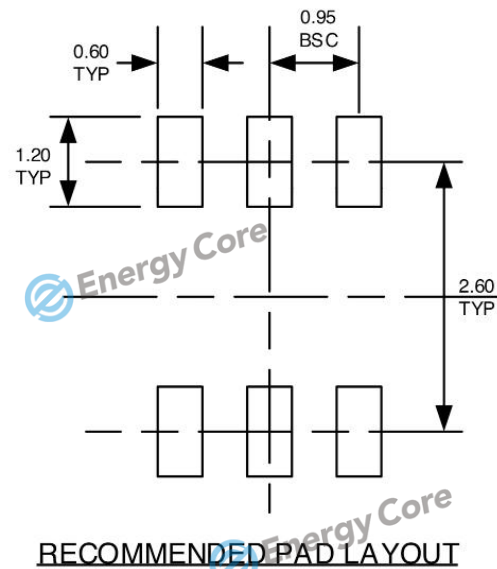
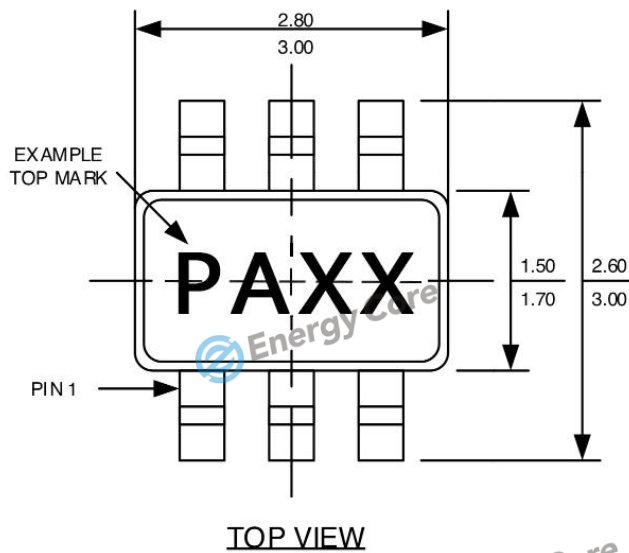


Figure 4: 9V Output Typical Application Circuit

Package Information

SOT23-6L



Note:

1. All dimensions are in millimeters.
2. Package length does not include mold flash, protrusion or gate burr.
3. Package width does not include flash or protrusion.
4. Lead coplanarity (bottom of leads after forming) shall be 0.10 millimeters max.
5. Pin 1 is lower left pin when reading top mark from left to right.