

Description

The P14C5E is an Over-Voltage-Protection (OVP) load switch with adjustable OVLO threshold voltage. The device will switch off internal MOSFET to disconnect IN to OUT to protect load when any of input voltage over the threshold. When the OVLO input set below the external OVLO select voltage, the P14C5E automatically chooses the internal fixed OVLO threshold voltage. The over voltage protection threshold voltage can be adjusted with external resistor divider and the OVLO threshold voltage range is 4.5V~16V. The Over temperature protection (OTP) function monitors chip temperature to protect the device. With internal transient voltage suppressor, the P14C5E support $\pm 350V$ surge protection. The P14C5E is available in FCQFN2020-12L. Standard products are Pb-free and Halogen-free.

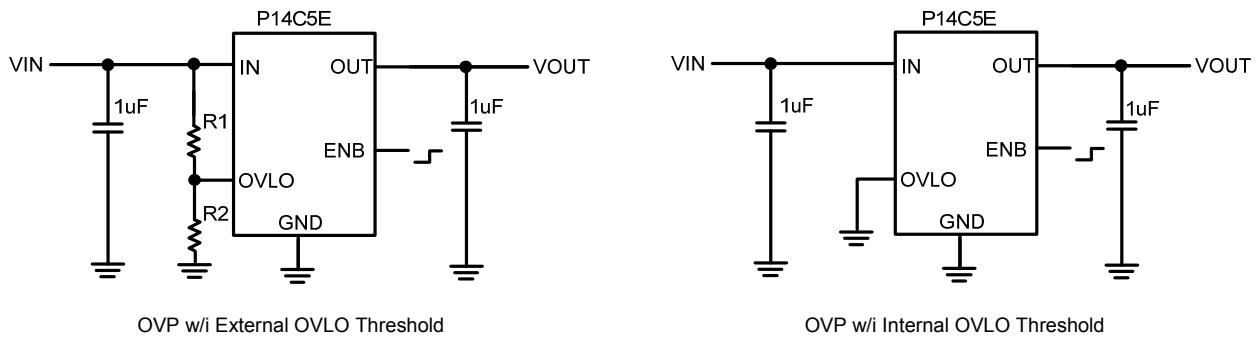


Figure 1: Typical Application

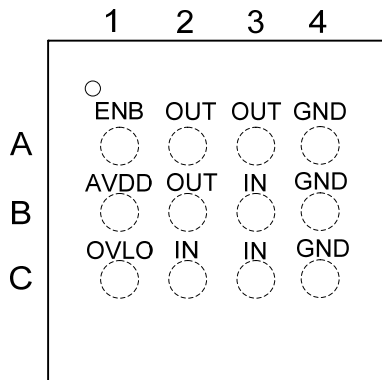


Figure 2: Pin order (Top view)

Feature

- Maximum input voltage : 25V (Integrated 25V_{RWM} TVS)
- Switch ON resistance : 35mΩ Typ.
- Ultra fast OVP response time: 50ns Typ.
- Integrated surge protection up to $\pm 350V$
- Programmed over-current protection
- Adjustable OVLO threshold voltage: 4.5V-16V, $\pm 3\%$
Fixed internal OVLO threshold voltage: 6.8V, $\pm 3\%$
- FCQFN2020-12L package

Application

- Mobile Handsets and Tablets
- Portable Media Players
- Peripherals

Pin Definitions

Pin No.	Symbol	Descriptions
A1	ENB	OUTPUT power path is enabled when ENB is logic low or floating;
A2,A3,B2	OUT	Switch Output to Load.
B3,C2,C3	IN	Switch Input and Device Power Supply.
B1	AVDD	Regulated output whenever VBUS is present. The recommended load current is less than 1mA.
C1	OVLO	External OVLO adjustment. Connect a resistor-divider to set different OVLO threshold, $V_{OVLO}=1.2x(1+R1/R2)$ as shown typical application diagram. Connect OVLO to GND when using the internal fixed threshold voltage. R2=120kohm is recommended.
A4,B4,C4	GND	Ground.

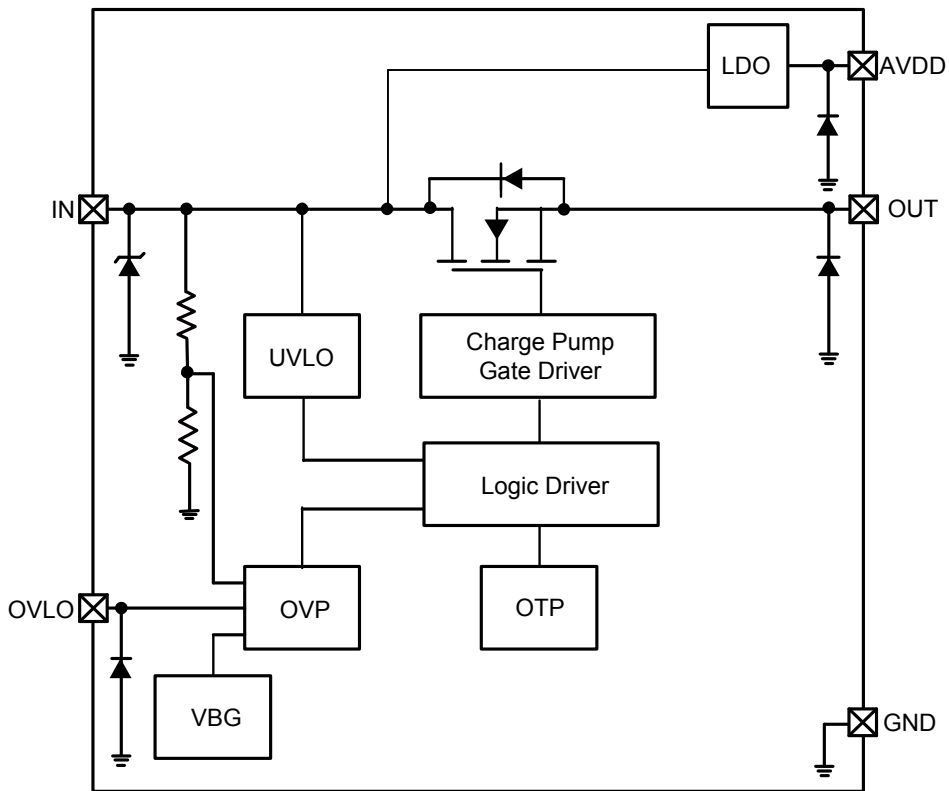


Figure 3: IC Block Diagram

Absolute maximum rating

Parameter(Note1)	Symbol	Value	Units
Input voltage (IN pin)	V_{IN}	-0.3 ~ 25	V
Output voltage (OUT pin)	V_{OUT}	-0.3 ~ 20	V
Input voltage (OVLO pin)	V_{OVLO}	-0.3 ~ 5	V
Input Maximum Reverse Peak Pulse Current (IN pin, $t_p=8/20\mu s$)	I_{PP}	140	A
Thermal resistance	$R_{\theta JA}$	TBD	°C/W
Junction temperature	T_J	150	°C
Lead temperature(10s)	T_L	260	°C
Storage temperature	T_{stg}	-55~150	°C
ESD Ratings	HBM	±2000	V
	MM	±500	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

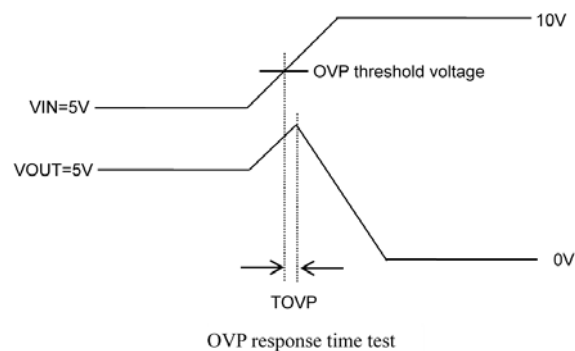
Parameter	Symbol	Value	Units
Input voltage	V_{IN}	3.5~25	V
MAX Continuous Output current	I_{OUT}	4.0	A
Ambient operating temperature	T_{opr}	-40~85	°C

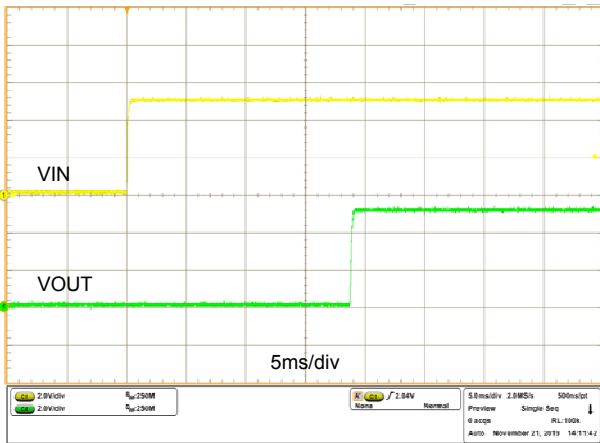
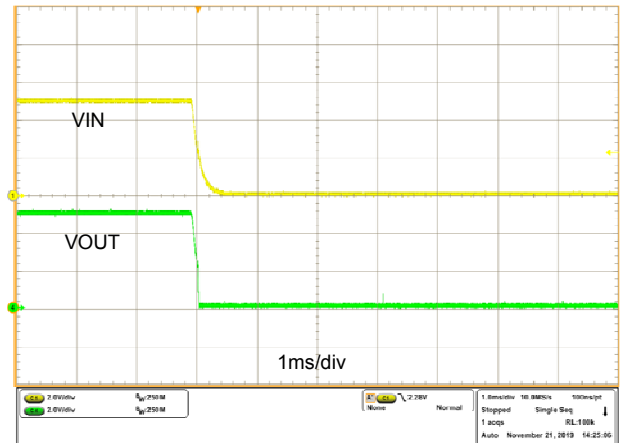
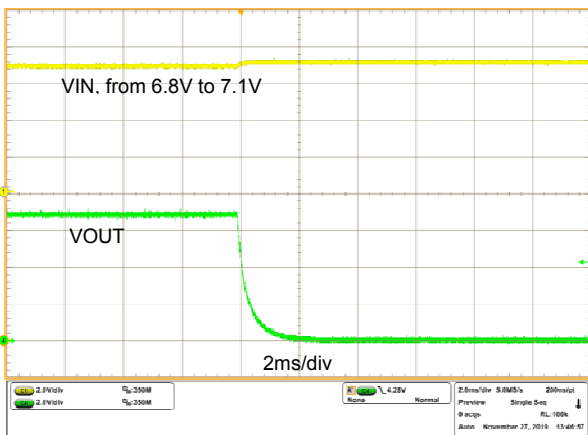
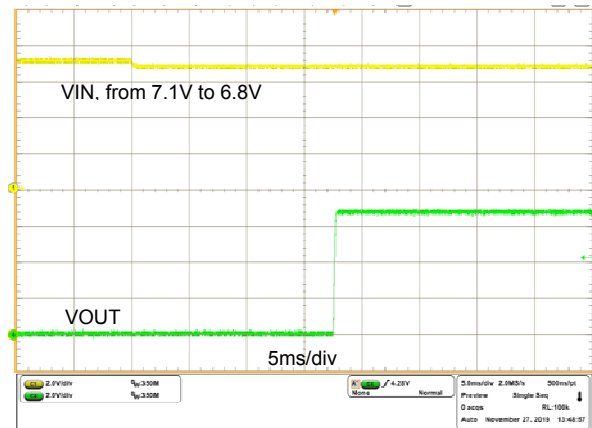
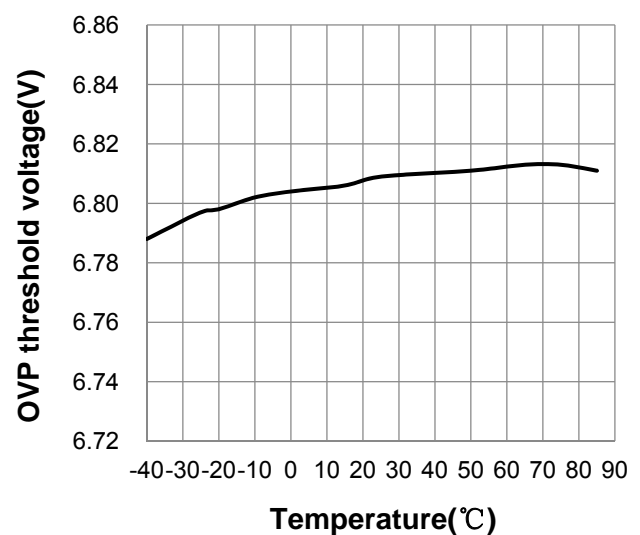
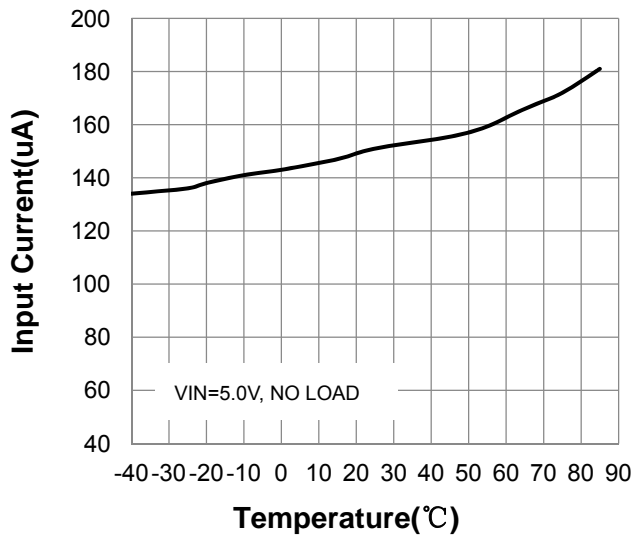
Electrical Characteristics

($T_A=25^{\circ}\text{C}$, $V_{IN}=5\text{V}$, $C_{IN}=1\mu\text{F}$, $C_{OUT}=1\mu\text{F}$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input voltage range	V_{IN}		3.5		25	V
Quiescent current	I_Q	NO Load, CTRL=GND, OVLO=GND $V_{IN}=5\text{V}$		145		μA
Over voltage quiescent current	I_{Q_OVP}	NO Load, CTRL=GND, OVLO=GND $V_{IN}=30\text{V}$		200		μA
Disable OVP quiescent current	I_{Q_DIS}	NO Load, CTRL=5V, OVLO=GND $V_{IN}=5\text{V}$		95		μA
ON resistance	R_{ON}	$V_{IN}=5\text{V}$, $I_{OUT}=1\text{A}$		35	55	$\text{m}\Omega$
OVP response time	t_{OVP}	V_{IN} rising, $C_{IN}=C_L=0\text{pF}$ (Note2)		50		ns
OVP set threshold voltage	V_{OVLO_TH}			1.2		V
Adjust OVP voltage range	VOVP_EXTSEL	V_{IN} rising	4.5		16	V
	VOVP_INTSEL		6.596	6.8	7.004	V
External OVLO select voltage	VOVLO_EXTSEL		0.6			V
Internal OVLO select voltage	VOVLO_INTSEL				0.15	V
CTRL high threshold voltage	V_{CTRL_H}	VCTRL Rising	0.6			
CTRL low threshold voltage	V_{CTRL_L}	VCTRL Falling			0.25	
UVLO threshold voltage	VUVLO	V_{IN} rising		2.34		V
UVLO hysteresis voltage	VUVLO_HYS	V_{IN} falling		25		mV
AVDD output voltage	V_{AVDD}	$V_{IN}=5\text{V}$, $I_{AVDD}=0\text{mA}$		3.8		V
		$V_{IN}=5\text{V}$, $I_{AVDD}=1\text{mA}$		3.6		V
Debounce Time	TDEB	$V_{IN}>UVLO$ to $V_{OUT}=V_{IN}*10\%$		18		ms
Turn On Time	TON	$V_{OUT}=V_{IN}*10\%$ to $V_{OUT}=V_{IN}*90\%$		200		μs
Output discharge resistance	RDCHG	$V_{IN}=5\text{V}$		400		Ω
OTP threshold temperature	TOTP	$V_{IN}=5\text{V}$		155		$^{\circ}\text{C}$
OTP hysteresis temperature	THYS	$V_{IN}=5\text{V}$		20		$^{\circ}\text{C}$

Note 2:Guaranteed by design



Typical Operating Performance

Input Power on Response

Input Power off Response

OVP Response

OVP Recovery Response


Function Descriptions

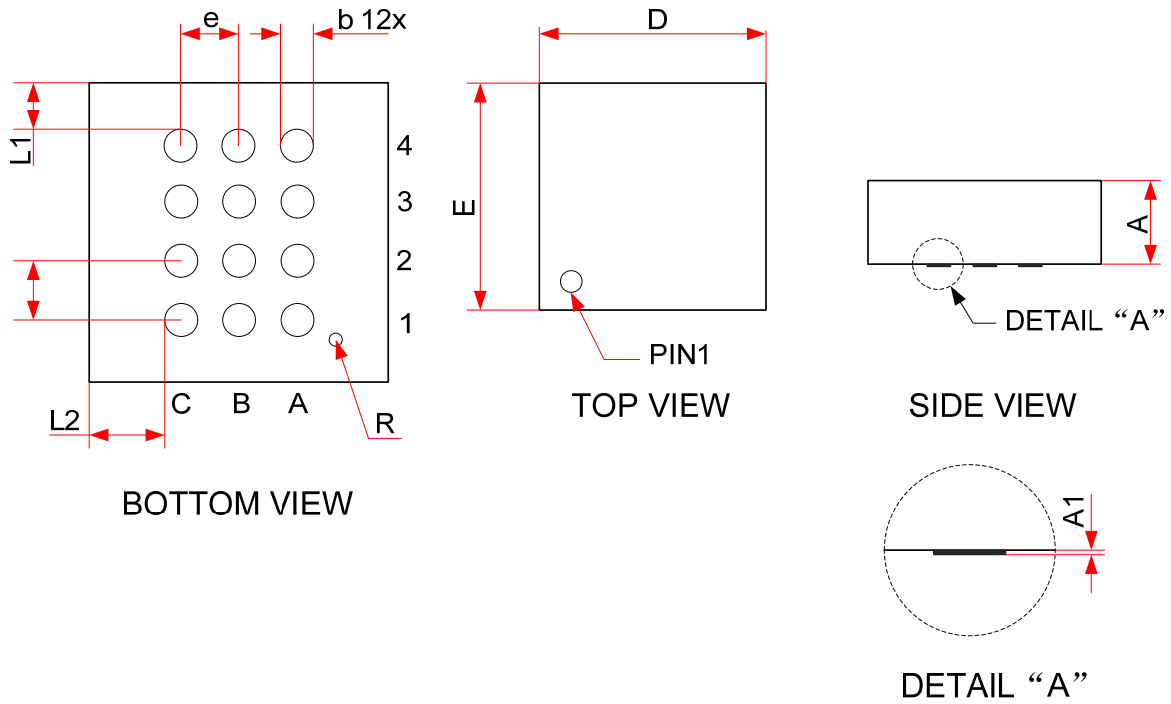
1. Under-voltage Lockout (UVLO)

The under-voltage lockout (UVLO) circuit disables the power switch until the input voltage reaches the UVLO turn on threshold. Built-in hysteresis prevents unwanted on and off cycling because of input voltage droop during turn on.

2. Over-voltage Lockout (OVLO)


When VIN exceeds 6.8V (or the set value by external resistors), the over-voltage lockout (OVLO) circuit turns off the protected power switch.

The OVP threshold is calculated by the equation: $V_{OVLO} = 1.2 \times (1 + R1/R2)$. R2=120kohm is recommended.

Product dimension (FCQFN2020-12L)


Dim	Millimeters		
	MIN	Typ.	MAX
A	0.70	0.75	0.80
A1	--	--	0.005
D	2.000	2.050	2.100
E	2.000	2.050	2.100
b	0.150	0.200	0.250
L1	0.325 REF		
L2	0.525 REF		
R	0.055 REF		
e	0.400 BSC		


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