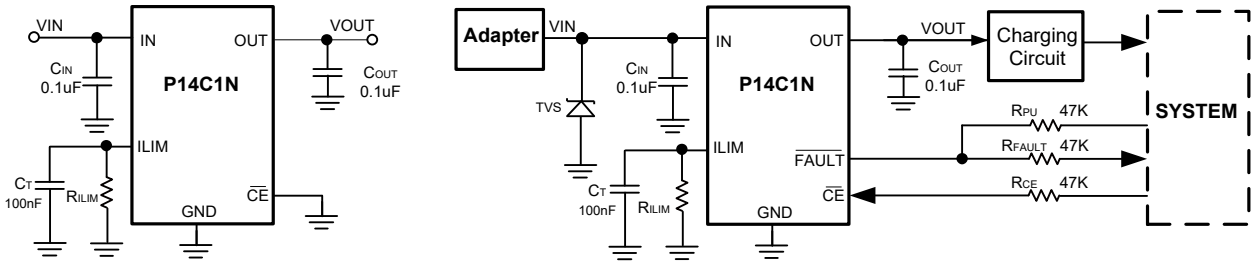
Over voltage protector

Description

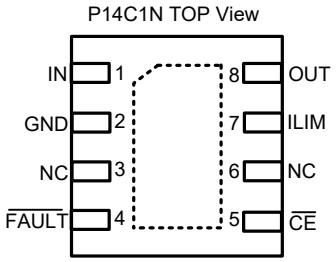
The P14C1N is an Over-Voltage-Protection (OVP) load switch with fixed OVLO threshold voltage. The OVLO threshold voltage is fixed 6.0V. The device will switch off internal MOSFET to disconnect IN to OUT to protect load when any of input voltage over the threshold. The Over temperature protection (OTP) function monitors chip temperature to protect the device. The OCP function turns off OUTPUT if the load current is over the threshold and recovers when VIN re-plug or CE reactive. The OCP current limit threshold is adjustable by an external R_{ILIM}.

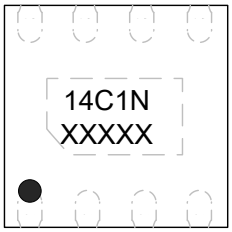
The P14C1N is available in DFN2x2-8L. Standard products are Pb-free and Halogen-free.



Typical Application 1 Typical Application 2

Figure 1: Typical Application





14C1N: P14C1N

XXXXX: Production Tracing Code

Figure 2: Pin order (Top view) and Marking (Top view)

Feature

- Maximum input voltage : 32V
- Ultra fast OVP response time: 50ns (Typ.)
- Fixed OVLO threshold voltage: 6.0V, ±3%
- Adjustable over-current protection:
  100mA-1.5A, ±10%
- Supports up to 1.2 A Load Current
- Thermal Shutdown
- Enable Function
- Fault Status Indication
- Available in Green DFN2×2-8L Package

Application

- Mobile Handsets and Tablets
- Portable Media Players
- Low-Power Handheld Devices

Pin Definitions

Pin No.	Symbol	Descriptions
1	IN	Switch Input and Device Power Supply.
2	GND	Ground Terminal. Connect to the thermal pad and to the ground rail of the circuit.
3,6	NC	No connect.
4	$\overline{FAULT}$	Open-drain Device Status Output. $\overline{FAULT}$ is pulled to GND with a 3kΩ resistant internally when the input pass FET has been turned off due to input over-voltage or overload current protection, an over-temperature condition, or because the battery voltage is outside safe limits. $\overline{FAULT}$ is high impedance during normal operation.
5	$\overline{CE}$	Active-Low Chip Enable Input. Connect $\overline{CE}$ = "HIGH" to turn the input pass FET off. Connect $\overline{CE}$ = "LOW" to turn the internal pass FET on, connecting the input to the charging circuitry. CE is internally pulled down.
7	ILIM	Current limit adjustment. Connect a resistor to GND to set over current threshold. $I_{Lim} = 600/R_{ILIM}$. (current in A, resistance in Ω) Short ILIM to GND will disable current limitation.
8	OUT	Switch output Terminal to the Charging System.

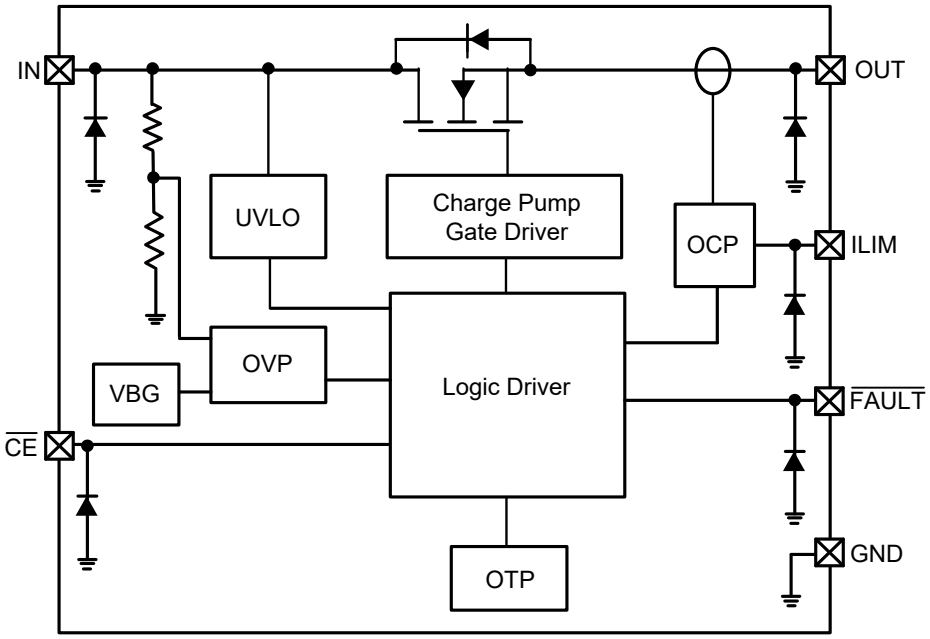


Figure 3: IC Block Diagram

Absolute maximum rating

Parameter(Note1)	Symbol	Value	Units
Input voltage (IN pin)	V_{IN}	-0.3 ~ 32	V
Output voltage (OUT pin)	V_{OUT}	-0.3 ~ 6.0	V
Junction temperature	T_J	150	℃
Lead temperature(10s)	T_L	260	℃
Storage temperature	Tstg	-55~150	℃
ESD Ratings	HBM	±2000	V
	CDM	±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

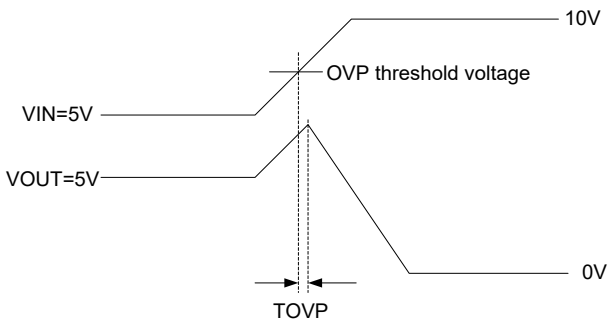
Parameter	Symbol	Value	Units
Input voltage	V_{IN}	3.5~32	V
MAX Continuous Output current	I_{OUT}	1.2	A
Ambient operating temperature	Topr	-40~85	℃

Electrical Characteristics

（T_A=25℃，V_{IN}=5V，C_{IN}=1.0uF，C_{OUT}=1.0uF，unless otherwise specified.）

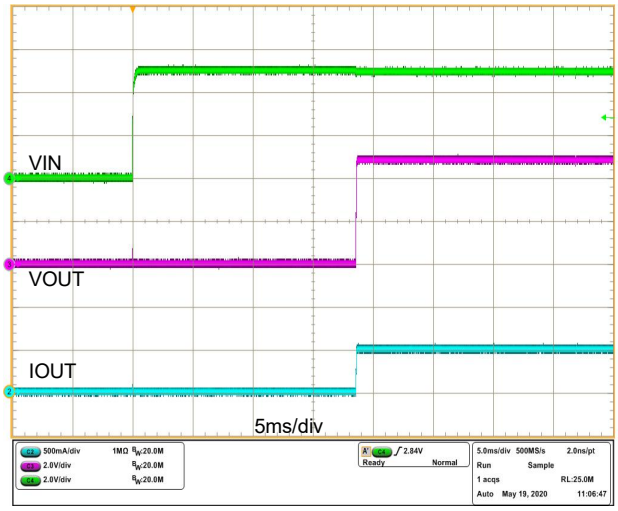
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Input voltage range	V_{IN}		3.5		32	V
Quiescent current	I_Q	NO Load, /CE=GND, V_{IN}=5V		120	200	uA
Over voltage quiescent current	I_{Q_OVP}	NO Load, /CE=GND, V_{IN}=30V		200		uA
Disable OVP quiescent current	I_{Q_DIS}	NO Load, /CE=5.5V, V_{IN}=5.5V		50	100	uA
Drop Voltage from IN to OUT	V_{DROP}	V_{IN}=5V, I_{OUT}=0.5A		110	140	mV
OVP response time	t_{OVP}	V_{IN} rising, C_{IN}=C_L=0pF (Note2)		50		ns
OVP voltage	V_{OVLO}	VIN rising	5.82	6.0	6.18	V
/CE high threshold voltage	V_{CE_H}	V_{CE} Rising	1.4			V
/CE low threshold voltage	V_{CE_L}	V_{CE} Falling			0.4	V
UVLO threshold voltage	VUVLO	VIN rising		2.35		V
UVLO hysteresis voltage	VUVLO_HYS	VIN falling		25		mV
OCP setting range	IOCP_RANG		100		1500	mA
Debounce Time	TDEB	VIN>UVLO to VOUT=VIN*10%	10	18	30	ms
Turn On Time	TON	VOUT=VIN*10% to VOUT=VIN*90%		40		us
Output discharge resistance	R_{DCHG}	VIN=5V		400		Ω
OTP threshold temperature	TOTP	VIN=5V		150		℃
OTP hysteresis temperature	THYS	VIN=5V		20		℃

Note 2: Guaranteed by design

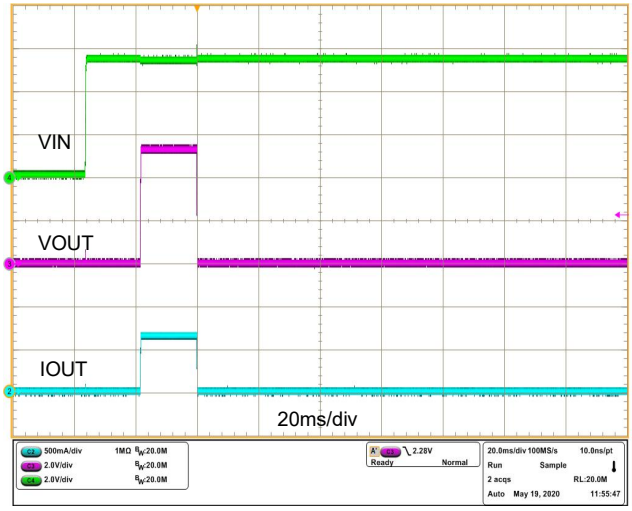


OVP response time test

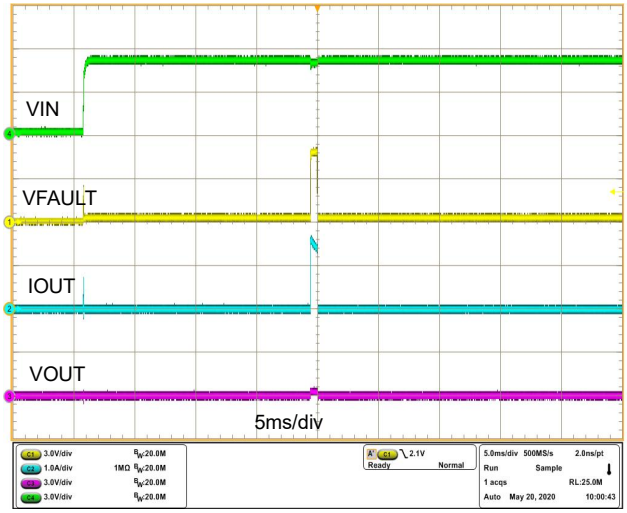
Typical Operating Performance



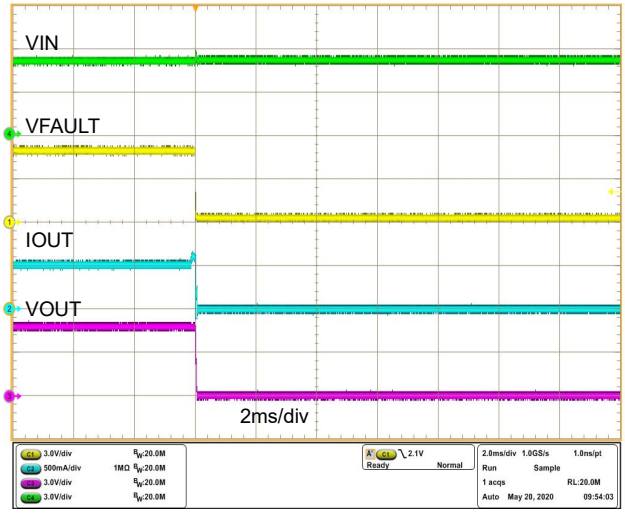
Power on Response(Rout=10Ω,R_{ILIM}=1kΩ)



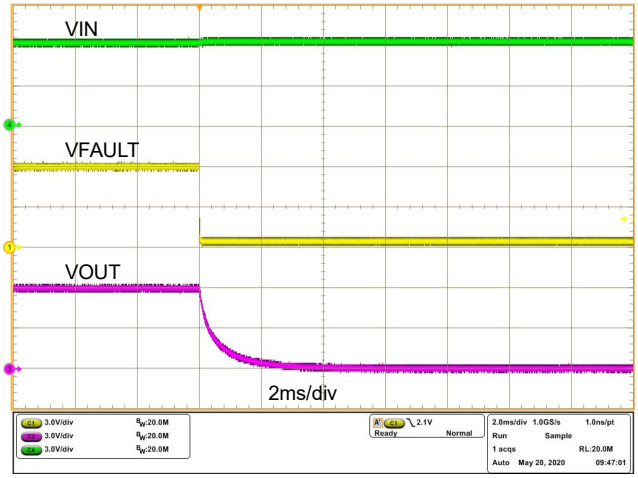
Power on OCP Response(Rout=8Ω,R_{ILIM}=1kΩ)



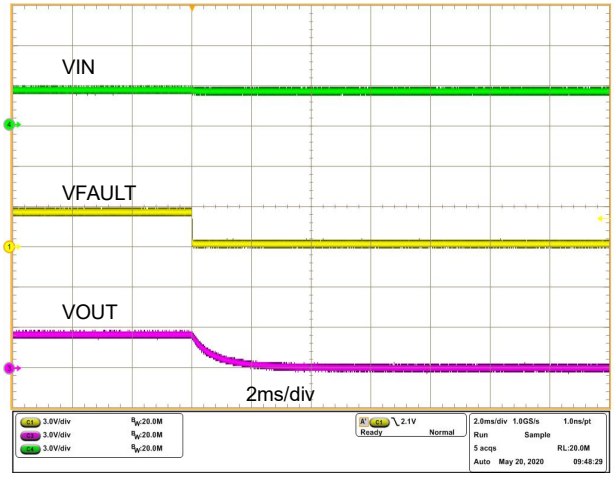
Power on Response with Output Short



OCP Response



OVP Response



UVLO 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 Current Protection (OCP)

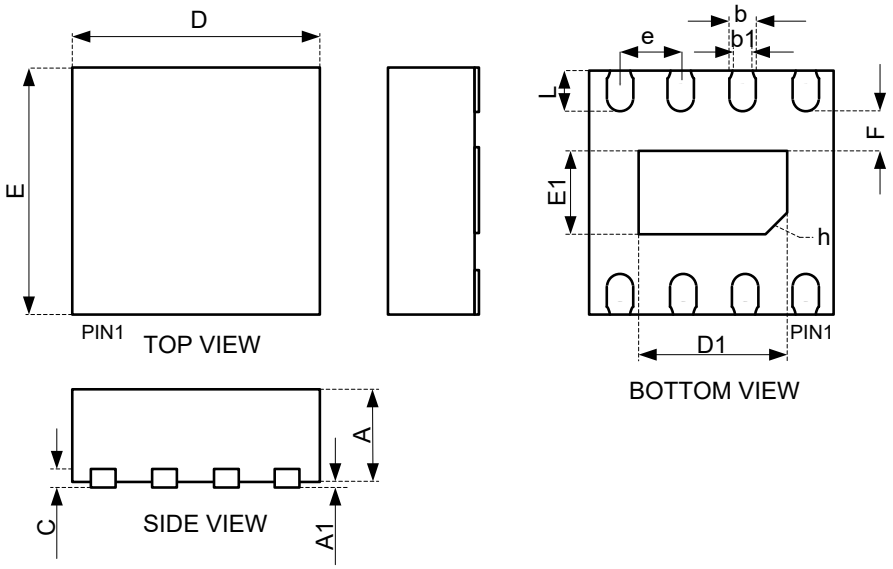
If the load current rises to the OCP threshold, the device will cut off the output voltage. It takes 18ms after power on for OCP begins to detect. After Power Good, the OCP active time is dozens to hundreds microseconds. A recommended 100-220nF capacitor(C_T) connect on ILIM pin can increase the OCP active time for longer blanking time applications.

The OCP threshold is calculated by the equation: $I_{LIM} = 600/R_{ILIM}$ (current in A, resistance in Ω).

3. Over-voltage Lockout (OVLO)

When VIN exceeds the OVP threshold voltage, the over-voltage lockout (OVLO) circuit turns off the protected power switch.

Product dimension (DFN2X2-8L)



Dim	Millimeters		
	MIN	Typ.	MAX
A	0.70	0.75	0.80
A1	0.000	0.020	0.050
b	0.200	0.250	0.300
b1	0.18REF		
C	0.180	0.200	0.220
D	1.900	2.000	2.100
E	1.900	2.000	2.100
D1	1.100	1.200	1.300
E1	0.600	0.700	0.800
e	0.475	0.500	0.525
L	0.300	0.350	0.400
F	0.280	0.300	0.320
h	0.230	0.280	0.330

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