

Description

The P1415N 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 P1415N is available in DFN2x2-8L. Standard products are Pb-free and Halogen-free.

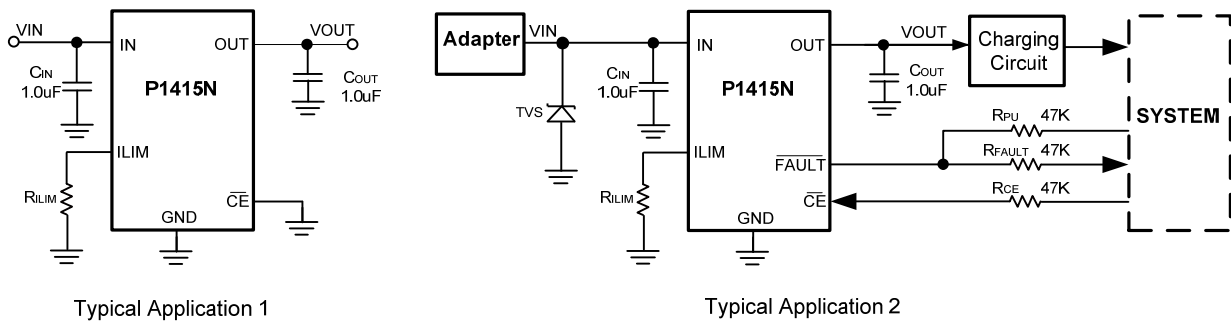


Figure 1: Typical Application

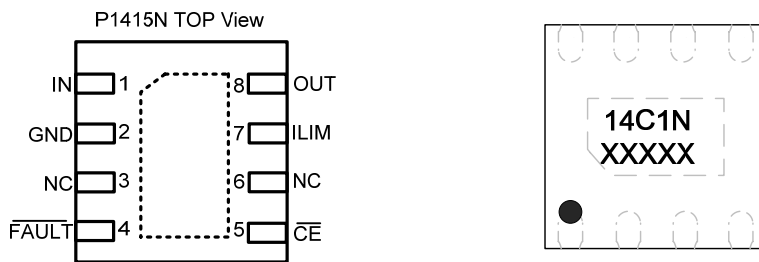


Figure 2: Pin order (Top view) and Marking (Top view)

Feature

- Maximum input voltage : 32V
- Ultra fast OVP response time: 50ns (Typ.)
- Fixed OVLO threshold voltage: 6.0V, $\pm 3\%$
- Adjustable over-current protection:
100mA-1.5A, $\pm 10\%$
- Supports up to 1.5 A Load Current
- Thermal Shutdown
- Enable Function
- Fault Status Indication
- Available in Green DFN2x2-8L Package

Application

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

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	FAULT	Open-drain Device Status Output. 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. FAULT is high impedance during normal operation.
5	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.

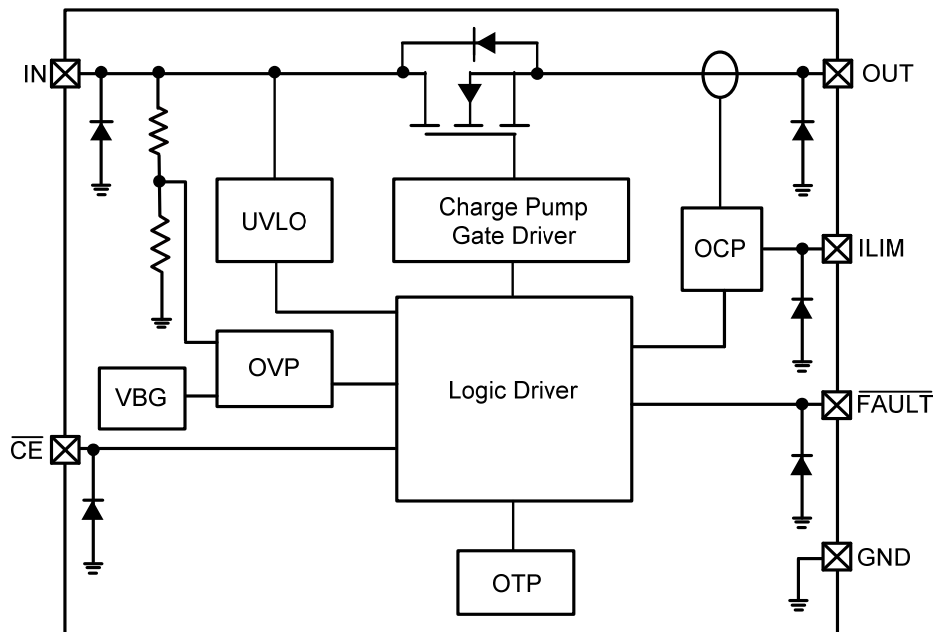


Figure 3: IC Block Diagram

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	°C
Lead temperature(10s)	T_L	260	°C
Storage temperature	Tstg	-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}	3.5~32	V
MAX Continuous Output current	I_{OUT}	1.5	A
Ambient operating temperature	Topr	0~85	°C

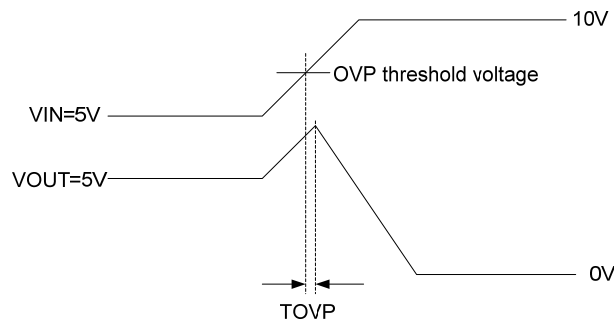
Over voltage protector

Electrical Characteristics

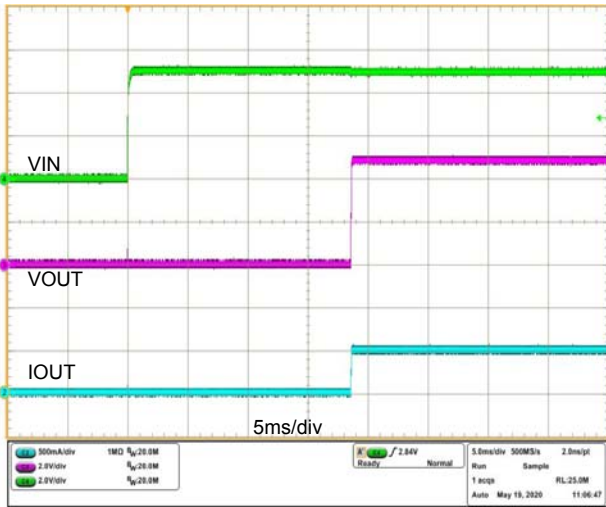
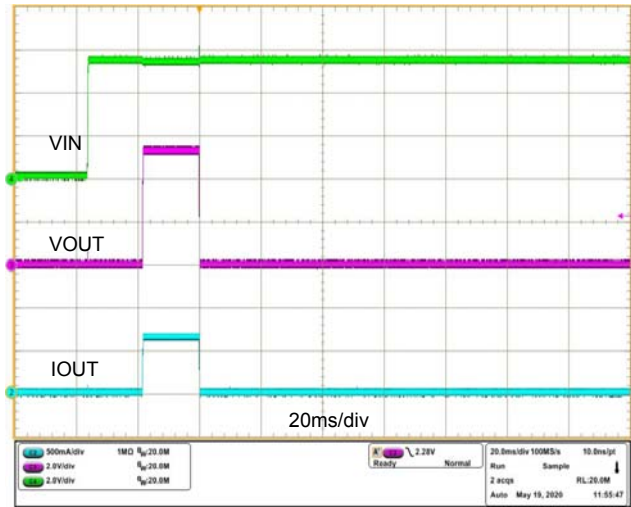
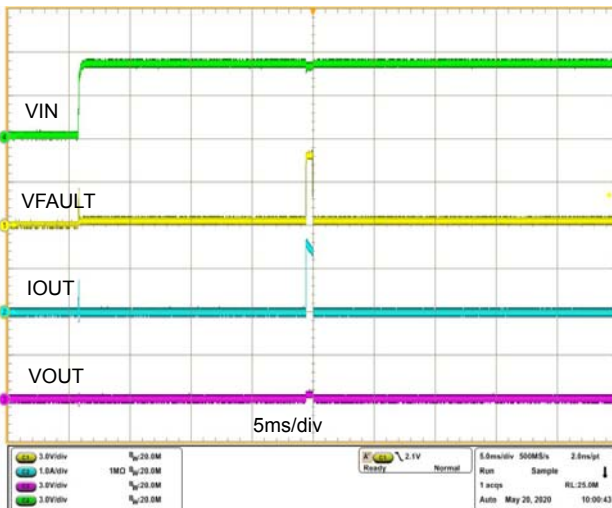
($T_A=25^{\circ}C$, $V_{IN}=5V$, $C_{IN}=1.0\mu F$, $C_{OUT}=1.0\mu F$, unless otherwise specified.)

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	μA
Over voltage quiescent current	I_{Q_OVP}	NO Load, /CE=GND, $V_{IN}=30V$		200		μA
Disable OVP quiescent current	I_{Q_DIS}	NO Load, /CE=5.5V, $V_{IN}=5.5V$		50	100	μA
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}	V_{IN} 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	V_{UVLO}	V_{IN} rising		2.35		V
UVLO hysteresis voltage	V_{UVLO_HYS}	V_{IN} falling		25		mV
OCP setting range	I_{OCP_RANG}		100		1500	mA
Debounce Time	T_{DEB}	$V_{IN}>V_{UVLO}$ to $V_{OUT}=V_{IN}*10\%$	10	18	30	ms
Turn On Time	T_{ON}	$V_{OUT}=V_{IN}*10\%$ to $V_{OUT}=V_{IN}*90\%$		40		μs
Output discharge resistance	R_{DCHG}	$V_{IN}=5V$		400		Ω
OTP threshold temperature	T_{OTP}	$V_{IN}=5V$		150		$^{\circ}C$
OTP hysteresis temperature	T_{HYS}	$V_{IN}=5V$		20		$^{\circ}C$

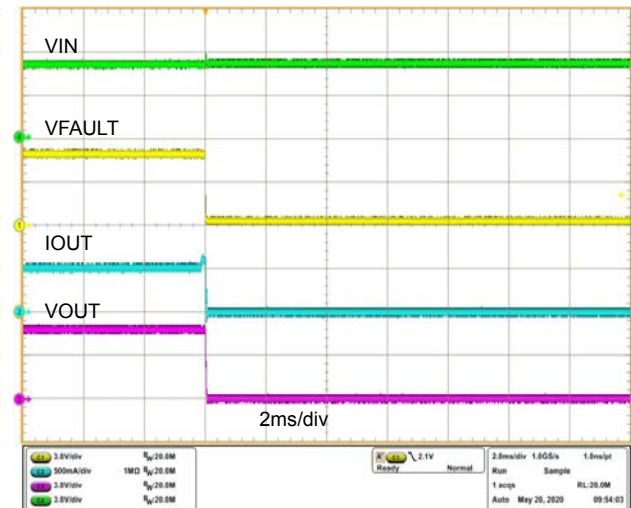
Note 2:Guaranteed by design



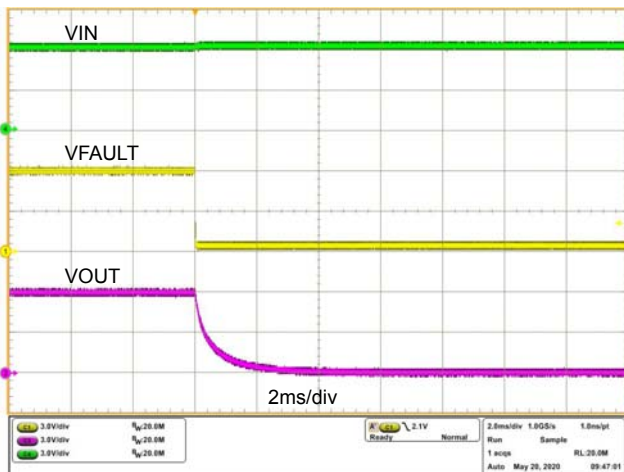
OVP response time test

Typical Operating Performance

 Power on Response($R_{out}=10\Omega, R_{ILIM}=1k\Omega$)

 Power on OCP Response($R_{out}=8\Omega, R_{ILIM}=1k\Omega$)


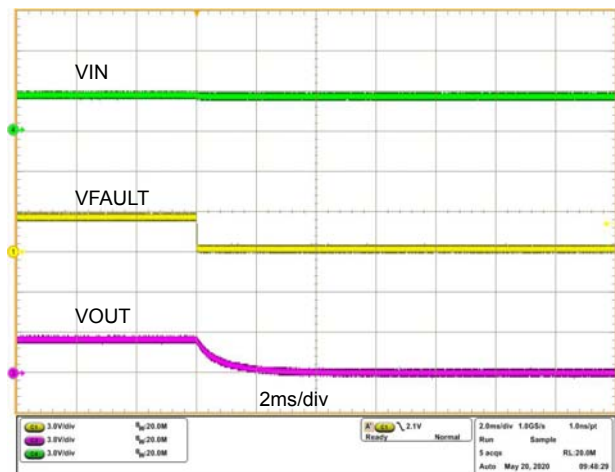
Power on Response with Output Short



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)

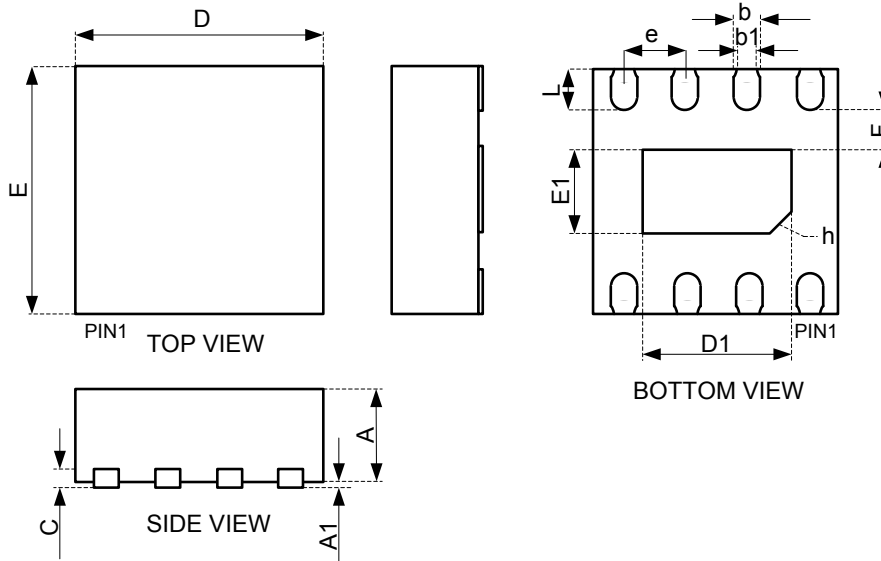
If the load current rises to the OCP threshold, the device will cut off the output voltage immediately[1].

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

Note[1]: It takes 18ms after power on for OCP begins to detect.


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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