GENERAL DESCRIPTION

The PW1515 is a front-end over voltage and over current protection device. The device monitors the input voltage and the current to make sure both parameters are in normal range. Thedevice will switch off internal MOSFET to disconnect VIN from VOUT to protect load when any ofinput voltage or output current exceeds the threshold. The Over Temperature Protection (OTP) function monitors chip temperature to protect the device. The PW1515 is SOT23-5L package. Standard products are Pb-free and Halogen-free.

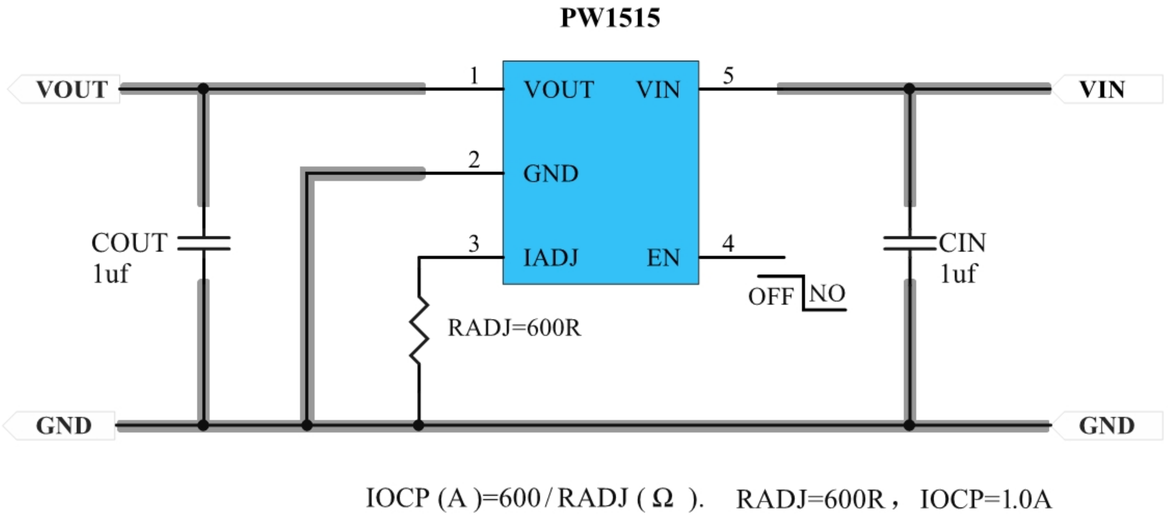
FEATURE

- Maximum Input Voltage: 32V
- Programmable OCP: 0.2A to 2A
- Constant Current Operation
- Input OVP: 6.1V
- Ultra-Low Power Path Resistor: 0.12Ω-Typical
- OVP Response Time: Less Than 1us
- Over Temperature Protection
- Soft-Start to Prevent Inrush Current
- Enable Input to Control Output
- High Immunity of False Triggering Under Transient

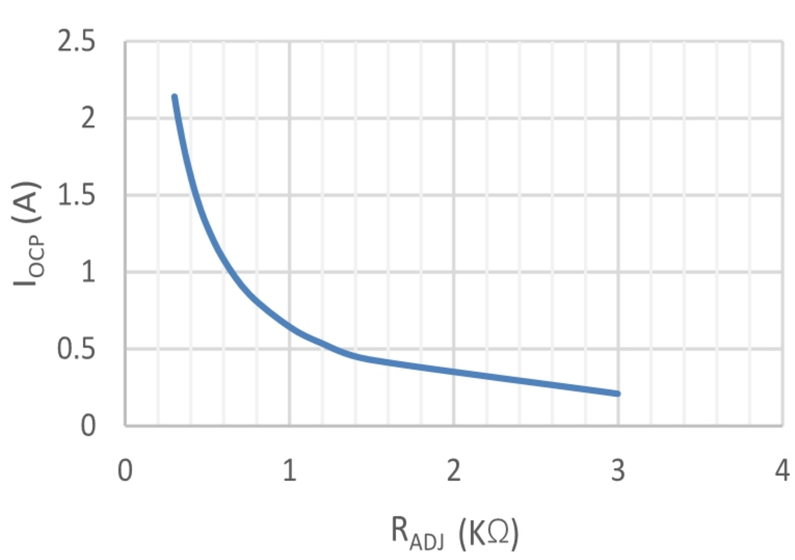
APPLICATIONS

- GPS
- MID
- Car DVR
- Digital Video

TYPICAL APPLICATION CIRCUIT

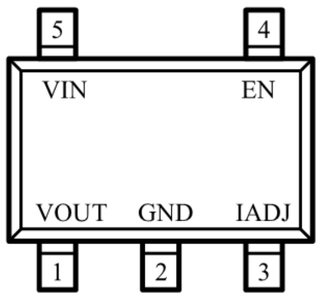


IOCP (A)=600/RADJ (Ω). RADJ=600R， IOCP=1.0A



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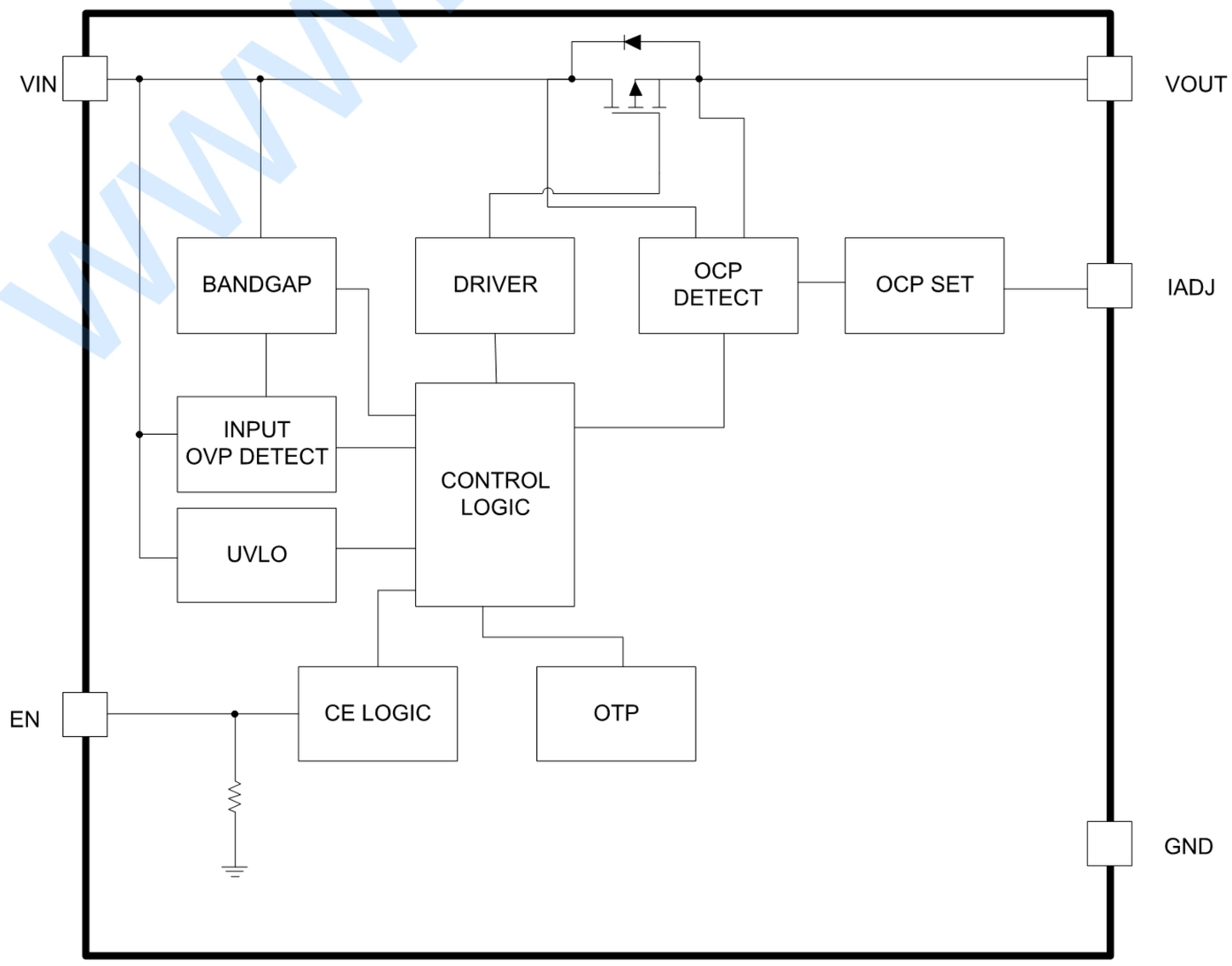
PIN ASSIGNMENT/DESCRIPTION



SOT-23-5L
(TOP VIEW)

Pin No	Pin Name	Functions
1	VOUT	Output terminal to the charging system. Bypass VOUT to GND with a ceramic capacitor (1uF MIN).
2	GND	Power ground pin
3	IADJ	Over current protection threshold setting pin. Connect res Ist or between this pin and GND to set the OCP threshold: $IOCP(A) = \frac{600}{R_{ADJ}(\Omega)}$
4	EN	Chip Enable (Active Low). Pull this pin to low or leave it floating to enable the IC and force it to high to disable the IC. This is internally pulled down and pull-down resistor is about 350kΩ.
5	VIN	Input Power. Connected to external DC supply and bypass VIN to GND with a ceramic capacitor (1μF MIN).

BLOCK DIAGRAM



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RECOMMANDED OPERATING RANGE

SYMBOL	ITEMS	VALUE	UNIT
VIN	Input Supply Voltage	3.5 to 20	V
VOUT	Output Currentt	0.2 ~ 2	A
TOPR	Operating Temperature	-40 to +85	℃

Absolute Maximum Ratings (note)

SYMBOL	ITEMS	VALUE	UNIT
VIN	Input Voltage	-0.3~32	V
VOUT	Output Voltage	-0.3~7	V
All other pins	EN, IADJ	-0.3~6	V
IOMAX	Output Load Current	3	A
PDMAX	Power Dissipation*1	0.5	W
RθJA	Thermal Resistance*2	170	℃/W
TJ	Junction Temperature	-40~150	℃
TSTG	Storage Temperature	-55 to 150	℃
TSOLDER	Package Lead Soldering Temperature (10s)	260	℃
HBM	ESD Susceptibility, Human Body Model	8	KV
MM	ESD Susceptibility, Machine Model	400	V
CDM	ESD Susceptibility, Charged Device Mode	2	KV

Note: Exceeding these limits might damage the device. Exposure to absolute maximum rating conditions may affect device reliability.

*1: Surface mounted on FR-4 Board using 1 square inch pad size, dual side, 1oz copper.

*2: Power dissipation is calculated by PD = (VIN-VOUT) x IOUT

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ELECTRICAL CHARACTERISTICS

(VIN = 5V, RADJ = 600Ω, EN floating, TA = 25℃, CIN=COUT=1μF, unless otherwise noted)

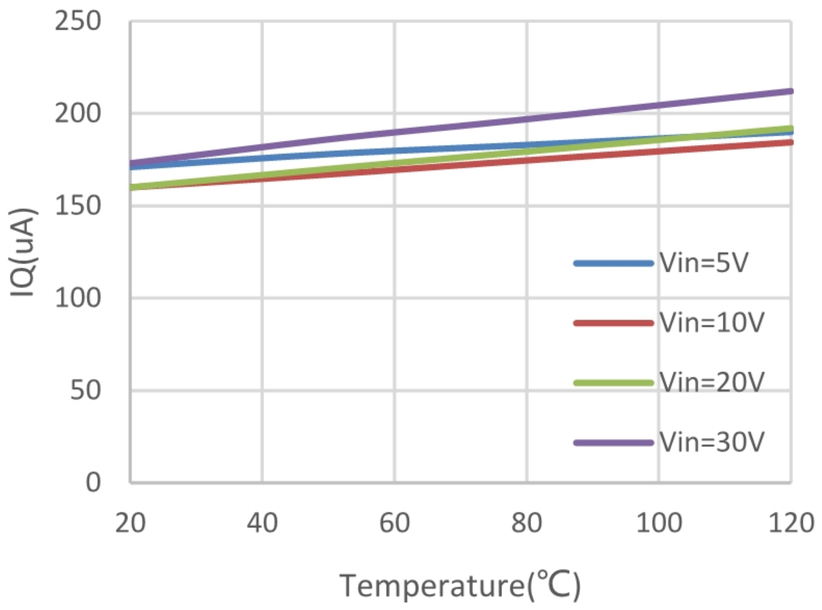
Parameter	Symbol	Test Conditions	MIN	TYP	MAX	UNIT
Normal Operation voltage	VIN		3.2		20	V
Under voltage lockout threshold	UVLO	VIN increasing from 0~3V	2.8	3.0	3.2	V
Under voltage lockout hysteresis	VHYS-UVLO	VIN decreasing from 3~0V		0.6		V
Input quiescent current	IQ	VIN=5.0V, EN =0, IOUT=0A		140	200	μA
Input shutdown current	ISHDN	EN =5V, IOUT=0A		30	60	μA
Deglitch time, Input power detected status	tDGL			64		ms
Output soft-start time	tSS	Output rising time		8		ms
OVP threshold	VOVP		5.9	6.1	6.3	V
OVP hysteresiss	VHYS-OVP			240		mV
Input OVP propagation delay	tOVP	VIN: 5.5V to 10V			1	μs
Input OVP recovery delay	tON(OVP))	VIN: 10V to 5.5V to output ON		8		ms
Over current protection	IOCP	VIN = 5V, OCP: 0.2A~3A	-10		+10	%
Over current protection blanking time	tOCP			150		μs
Over current recover delay	tON(OCP)	Hiccup delay time		64		ms
OTP threshold	TOTP			145		℃
OTP hysteresis	TOTP-HYS			10		℃
Logic high input voltage	VIH	EN rising	1.5			V
Logic low input voltage	VIL	EN falling			0.4	V
EN internal pull down resistor	REN			350		KΩ
Power MOSFET On resistance	RON	IOUT=0.5A		120		mΩ

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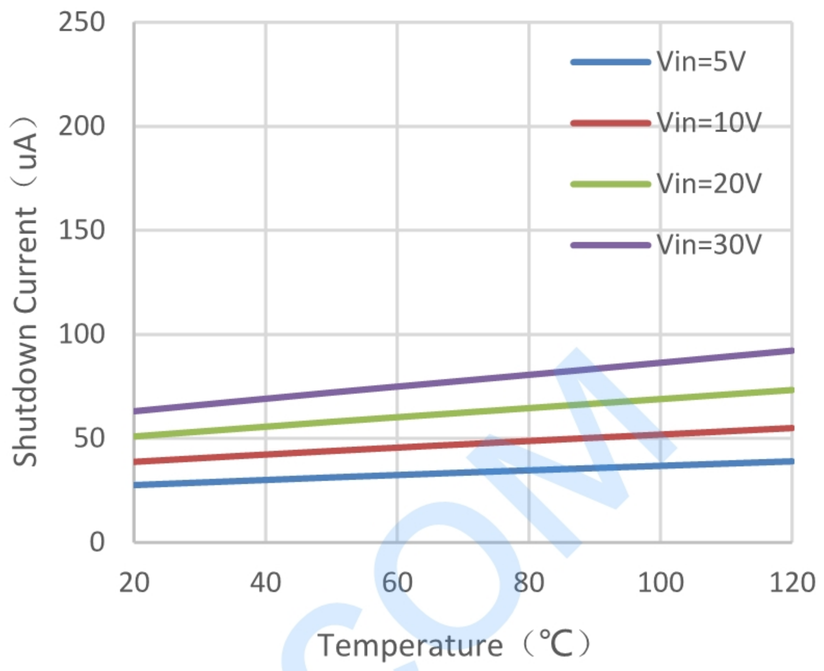
TYPICAL PERFORMANCE CHARACTERISTICS / WAVEFORM

VIN = 5V, RADJ = 1.2K, EN floating, TA = 25℃, CIN=COUT=1μF, unless otherwise noted.

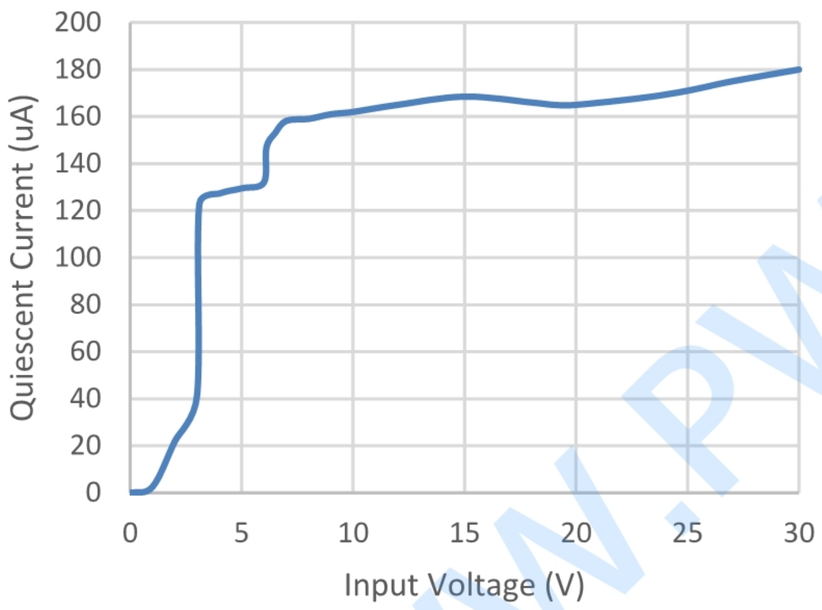
IQ vs Temperature



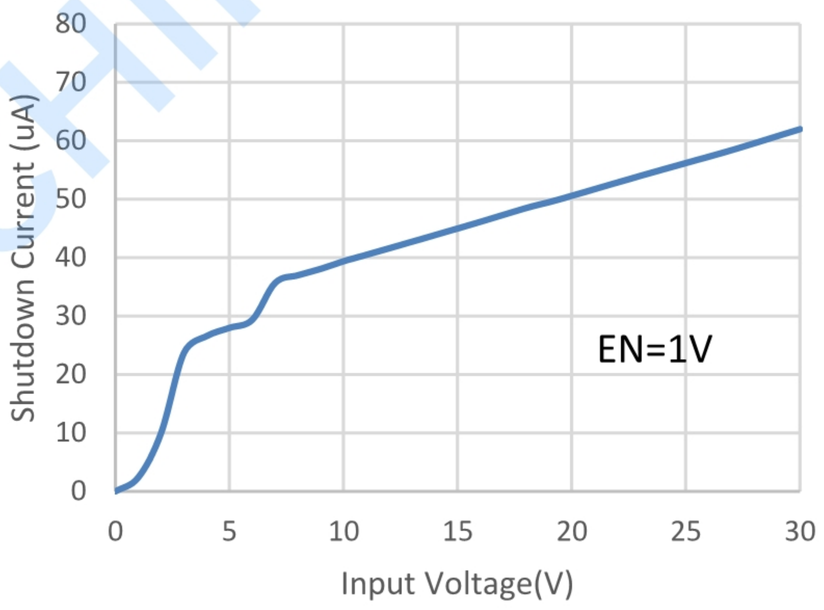
Shutdown Current vs. Temperature



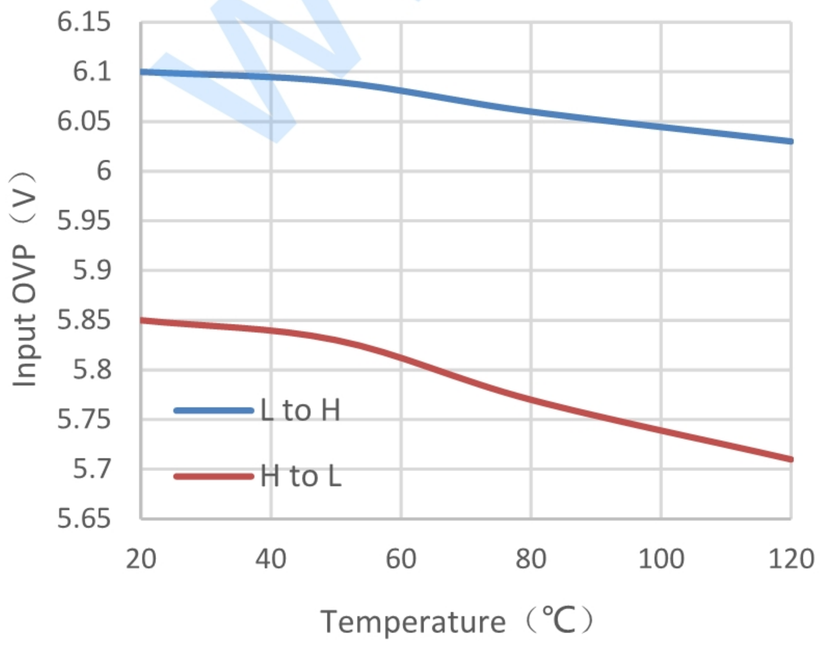
Quiescent Current vs. Input Voltage



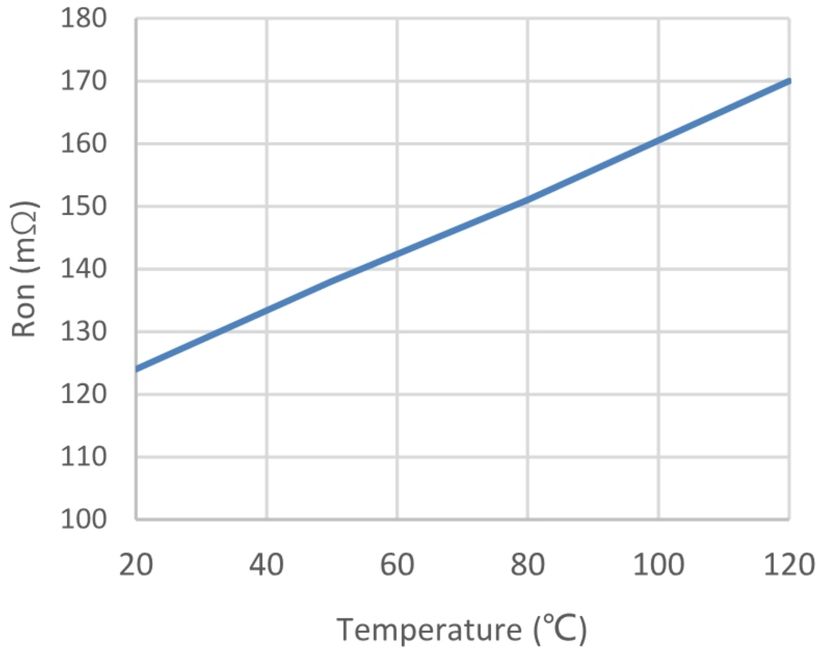
Shutdown Current vs. Input Voltage



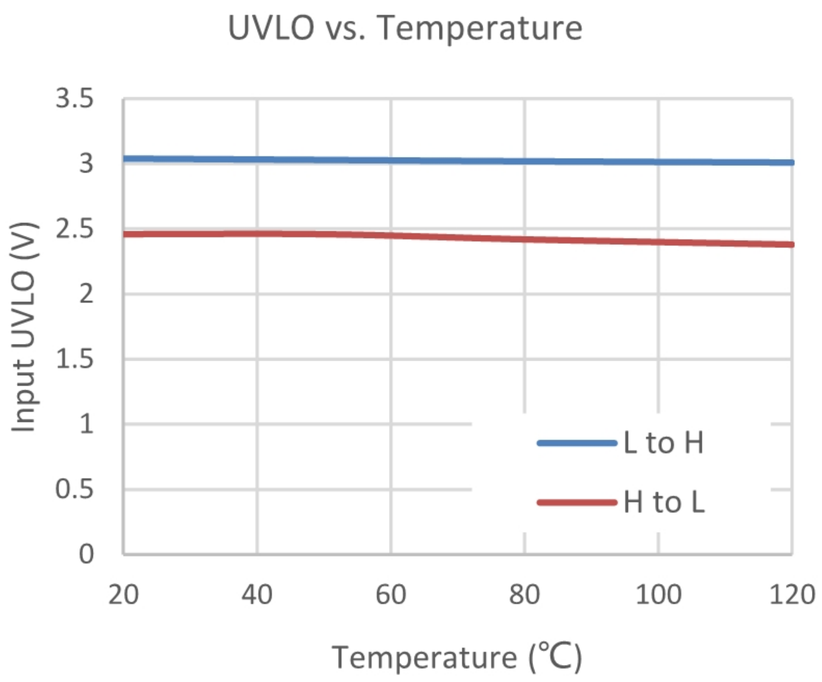
Input OVP vs. Temperature

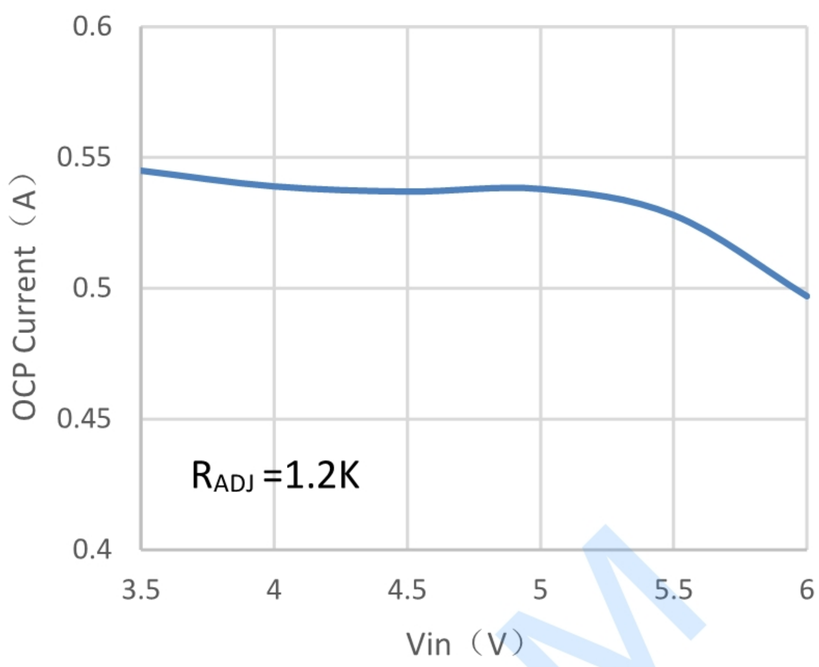


Ron vs. Temperature



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APPLICATION INFORMATION

The PW1555 continuously monitors the input voltage and output current. The device operates like a switch, so output voltage is equal to input voltage minus drop voltage on the internal MOSFET on resistance. If the input voltage exceeds VOVP, the IC turn off the internal MOSFET and disconnects the system from input power. Additionally, PW1515 monitors the output current and will disconnect the system in case of output short or excessive current. The IC also monitors its die temperature and switches the MOSFET off if it exceeds over temperature thresholds. The IC can be controlled by a processor through EN pin.

Power Up

The PW1515 has a threshold of 3.0V power on reset (UVLO) with a built-in hysteresis of 600mV. Before the input voltage reaches the UVLO threshold, the PW1515 is off. When the input voltage is over the UVLO threshold; the PW1515 will delay for 64ms and then the soft-start will be activated. The 64ms delay allows any transient at the input during a power supply hot insertion to settle down before the IC starts to operate.

During the soft-start transition, the PW1515 slowly turns on the internal MOSFET to reduce the inrush current.

Enable Control

The PW1515 offers an enable (EN) input. When the EN pin is pulled to logic high (>1.5V), the PW1515 will shut down. When the EN pin is pulled to logic low (<0.4V), the PW1515 operating is enabled. The EN pin has an internal pull-down resistor, and leaving the EN pin floating can enable the IC.

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Over Temperature Protection (OTP)

The PW1515 monitors its own internal temperature to prevent thermal failures. The chip turns off the MOSFET when the internal temperature reaches over temperature thresholds. The IC will resume after the internal temperature is cooled down below recovery threshold.

Input Over Voltage Protection

The PW1515 monitors input voltage to prevent the abnormal input voltage leading to output system failures. When the input voltage exceeds the threshold, the PW1515 turn off the internal MOSFET within 1us to prevent the high input voltage from damaging the electronics in the handheld system. The hysteresis of the input OVP threshold is 100mV. When the input voltage returns to normal operation voltage range, the PW1515 re-enables the MOSFET.

Short Circuit Protection (SCP)

If there is a short circuit in output, IC will maintain constant current and this current will flow through the ground due to the shorted output. Depending on current level and thermal performance, IC could trigger over temperature protection eventually.

Over Current Protection (OCP)

The PW1515 monitors the output current to prevent the output short or excessive charging battery current. The OCP (Over Current Protection) threshold can be set by the IADJ pin. It can be set by the resistor connected between the IADJ pin and GND. The OCP threshold can be calculated by the following equation:

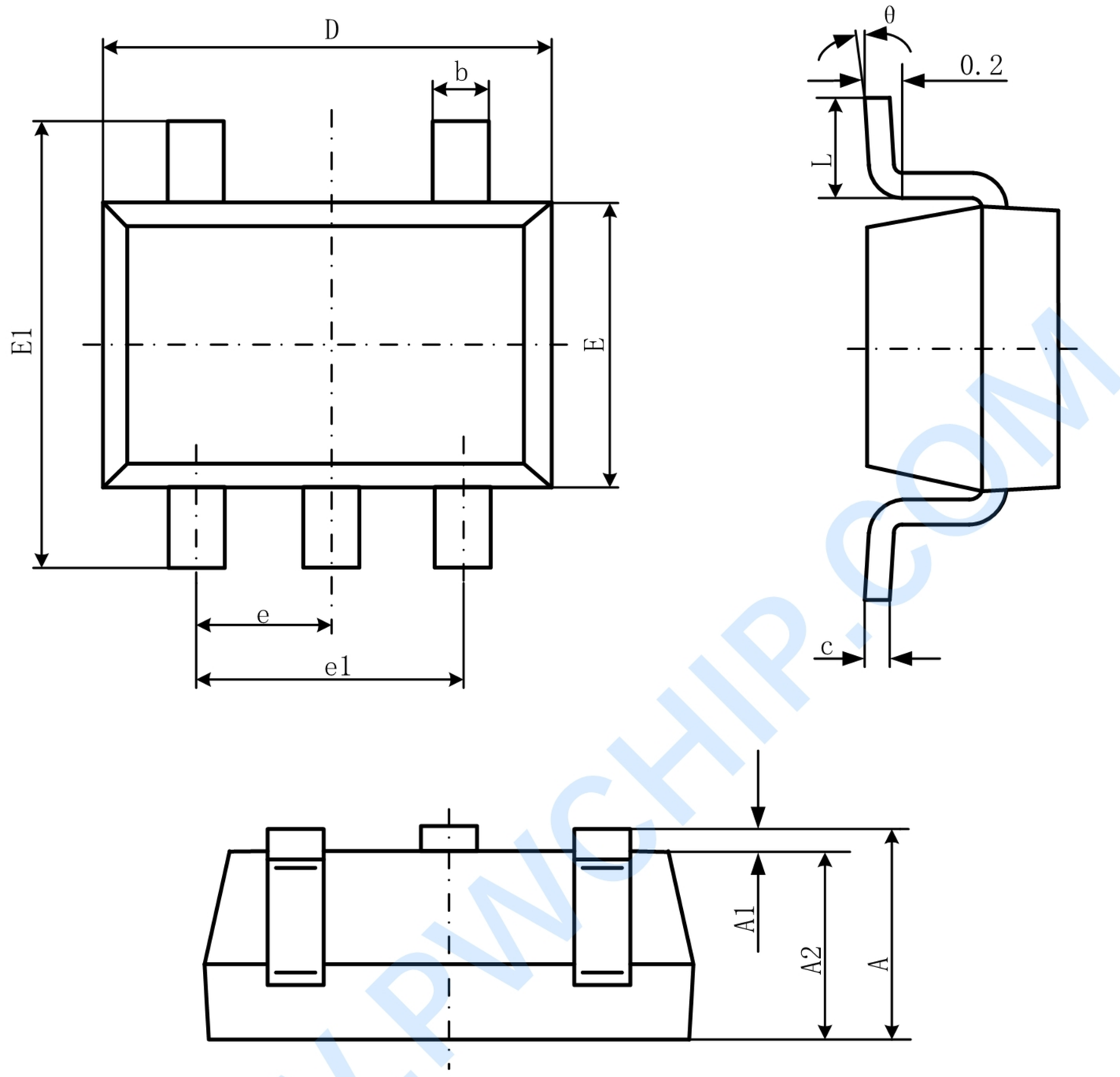
$$OCP(A) = \frac{600}{R_{ADJ}(\Omega)}$$

PW1515 has a built-in 180us delay timer to prevent any transient noise from triggering the OCP. If the output current reached OCP level, IC will maintain the constant current operation at the set IOCP level with +/- 10% output current control accuracy.

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PACKAGE DESCRIPTION

SOT23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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