

High Input Voltage LDO Linear Regulators

GENERAL DESCRIPTION

The PW6206 series is a high accuracy, high input voltage low quiescent current, high speed, and low dropout liner regulator with high ripple rejection. The input voltage is up to 40V and load current is up to 300mA at $V_{OUT} = 5V$ & $V_{IN} = 7V$. The device is manufactured with BCD process. The PW6206 offers over-current limit, soft start and over temperature protection to ensure the device working in well conditions

The PW6xxx regula tors is available in standard SOT89-3L(PW6513),and SOT23-3L (PW6206) packages. Standard products are Pb-free and Halogen-free.

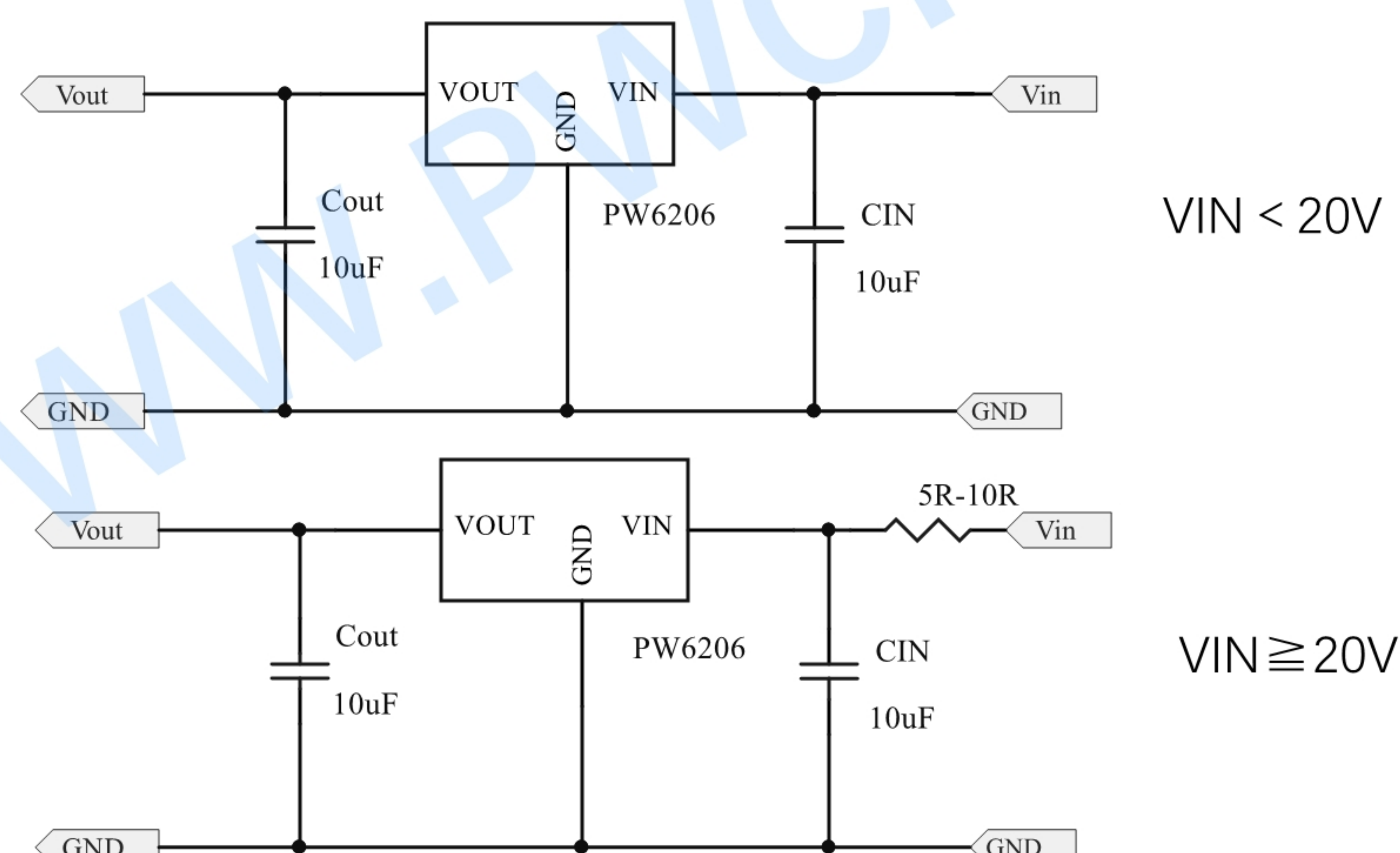
FEATURES

- Input voltage: 4.75V~40V
- Output voltage: 1.8V~5.7V
- Output accuracy: $< \pm 2\%$
- Output current: 150mA (Typ.)
- Up to 300mA @ $V_{IN} = 7V$, $V_{OUT} = 5V$, PW6513B50HV SOT89 package
- PSRR: 60dB @ 100Hz
- Dropout voltage: 600mV @ $I_{OUT} = 100mA$
- Quiescent current: 4.2 μA @ $V_{IN} = 12V$ (Typ.)
- ESD HBM: 8KV
- Recommend capacitor: 10 μF

APPLICATIONS

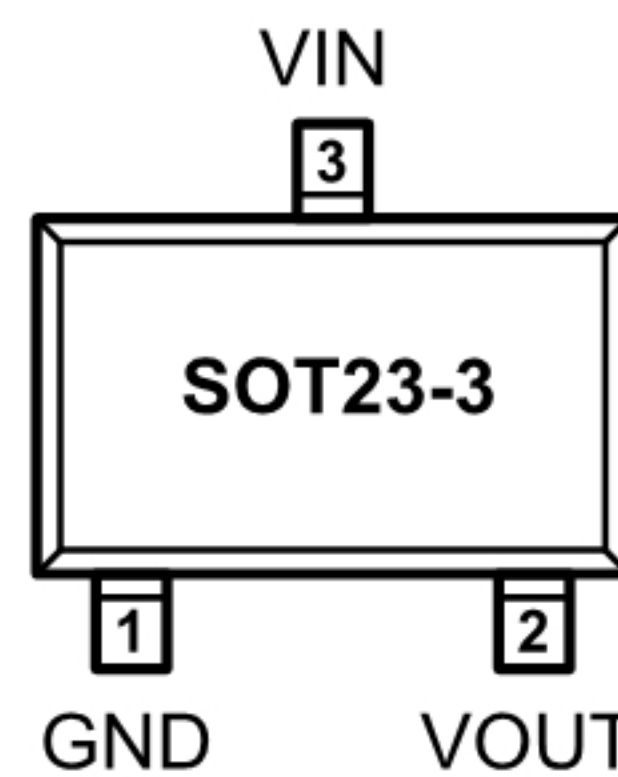
- Smart electric meter
- In-car entertainment
- Electric bicycle

TYPICAL APPLICATION CIRCUIT



PIN ASSIGNMENT/DESCRIPTION

(TOP VIEW)



Product Series	Package	Pin Number	Pin Name	Functions
PW6206AXXHV	SOT23-3	1	GND	Ground
		2	VOUT	Output
		3	VIN	Input

Products

Reel /outer anti-static packaging	Product	
 NO: 1. QR code content: WWW.PWCHIP.COM; 2. Product: PWCHIP product model name; 3. Lot No: wafer batch code/internal system production code (customers can send this code to support@pwchip.com to verify product information and confirm); 4. D/C: packaging cycle; 5. QTY: packaging quantity (box/disc); 6. Data: packaging time.	PW6206AXXHV XX: Output voltage (3.3V=33, 5.0V=50); PW6206A33HV, PW6206A50HV.	
	Brand	Package
	平芯微/PWCHIP	SOT23-3L
	Specification	Qty per reel
	Taping & Reel	3000 PCS
	Marking	
	OXXN Device code: O ; Lot number code: XXX ; Output voltage: N (3.3V=H , 5.0V=K).	

Absolute Maximum Ratings (note)

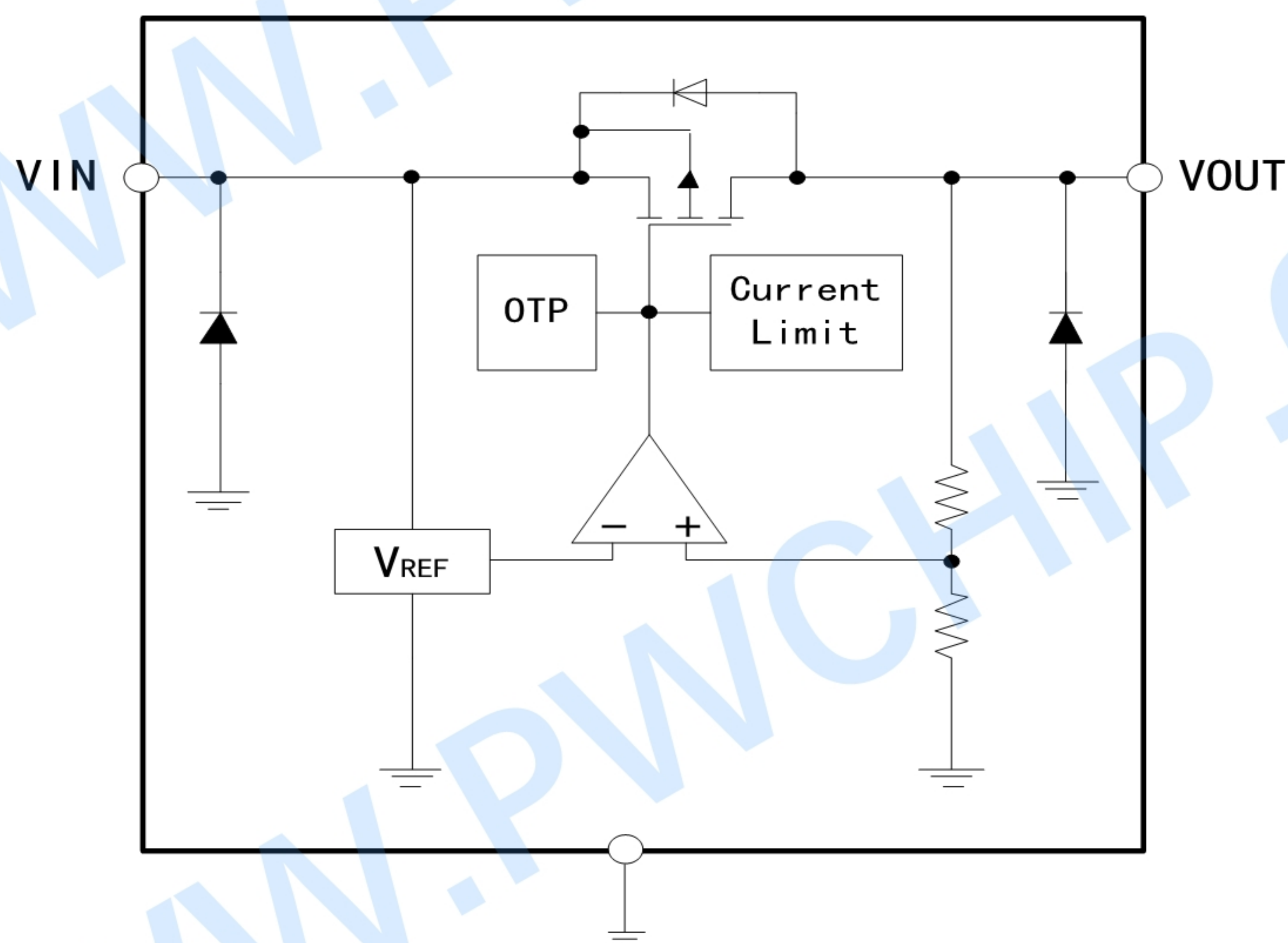
SYMBOL	ITEMS	VALUE	UNIT
VIN	Input Voltage	-0.3~45	V
VOUT	Output Voltage	-0.3~6.5	V
PD _{MAX}	Power Dissipation	OTP limited	W
T _J	Junction Temperature	-40~150	°C
T _{stg}	Storage Temperature	-55 to 150	°C
T _{solder}	Package Lead Soldering Temperature (10s)	260	°C
ESD MM	Machine Mode	200	V
ESD HBM	Human Body Mode	8000	V

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

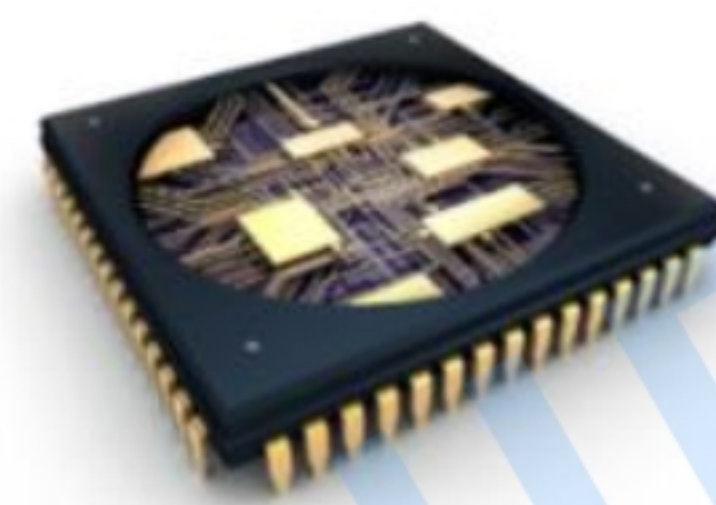
RECOMMENDED OPERATING RANGE

SYMBOL	ITEMS	VALUE	UNIT
VIN	VIN Supply Voltage	4.75 to 40	V
RθJA	Thermal Resistance on PCB	45	°C/W
TOPT	Operating Temperature	-40 to +105	°C

SIMPLIFIED BLOCK DIAGRAM



Product Center



MOSFET OVP/OCP Protection Li-ion Charger Li-ion Protector Li-ion charge-discharge LDO
Voltage Detector DC-DC Boost **DC-DC Buck** DC-DC Boost-Buck USB Fast charging LED driver

Product Title	MODE	Vin Range	Vout Range	Iout MAX	FOSC	Iq typ	Package	Link
PW2052B	Synchronous	2.3V~6V	0.6V~5V	2A	1.5MHZ	150uA	SOT23-6L	Detail
PW2335	Synchronous	4.5V~30V	ADJ	3A	500KHZ	600uA	SOP8-EP	Detail
PW2312A	Synchronous	4.5V~55V	ADJ	0.6A	1.2MHZ	250uA	SOT23-6L	Detail
PW2458	Synchronous	3.8V~36V	0.8V~35V	5A	0.1-1.1MHZ	25uA	SOP8-EP	Detail
PW2153	Asynchronous	8V~150V	5V~30V	10A	140KHZ	1mA	SOP8	Detail
PW2902	Asynchronous	8V~90V	5V~30V	2A	140KHZ	1mA	SOP8-EP	Detail
PW2906	Asynchronous	12V~90V	1.3V~20V	0.6A	150KHZ	2.5mA	SOP8-EP	Detail
PW2815	Asynchronous	4.5V~80V	ADJ	1.5A	480KHZ	0.73mA	SOP8-EP	Detail
PW5812	Asynchronous	4.5V~80V	ADJ	1.2A	480KHZ	0.33mA	SOP8-EP	Detail

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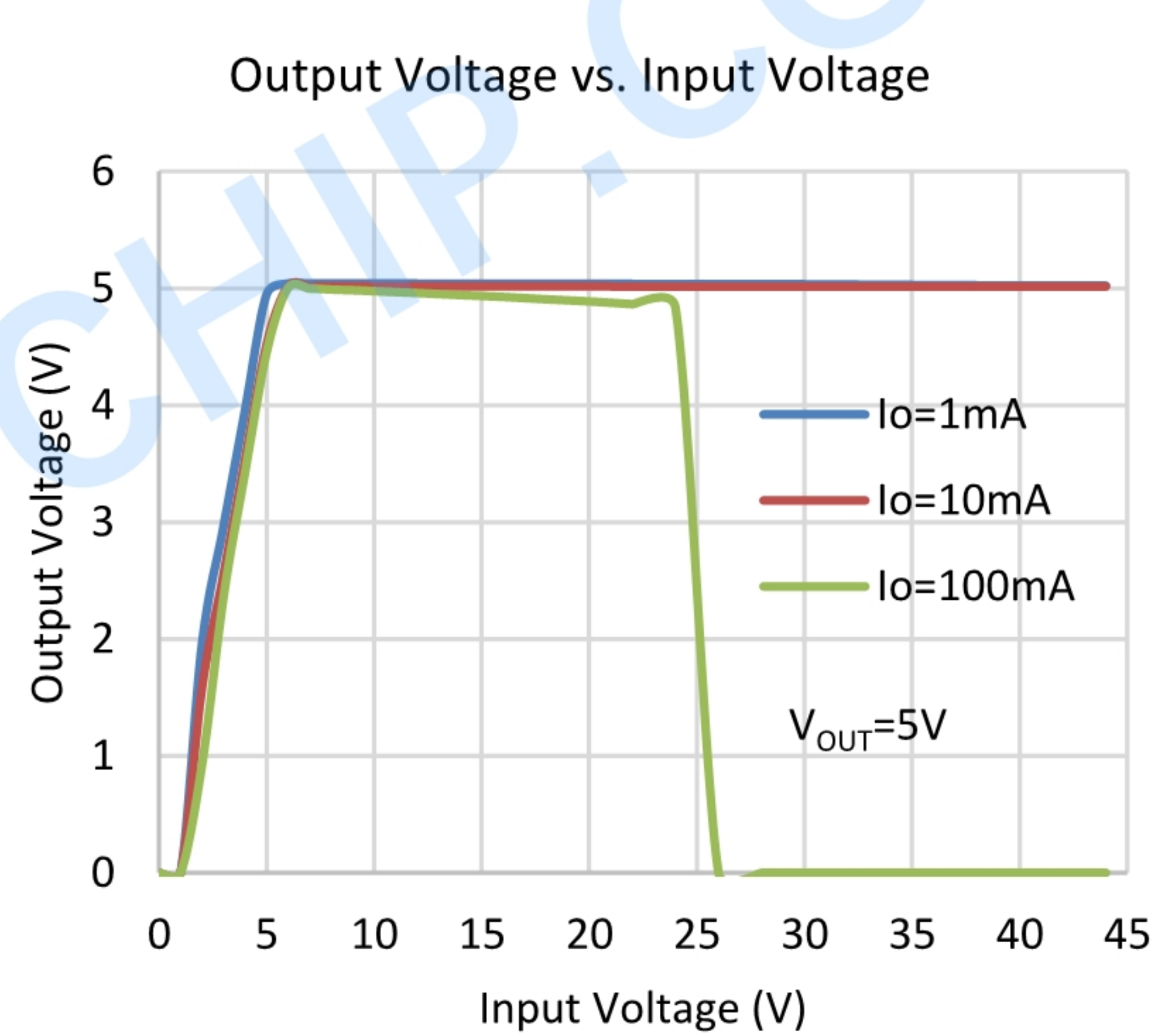
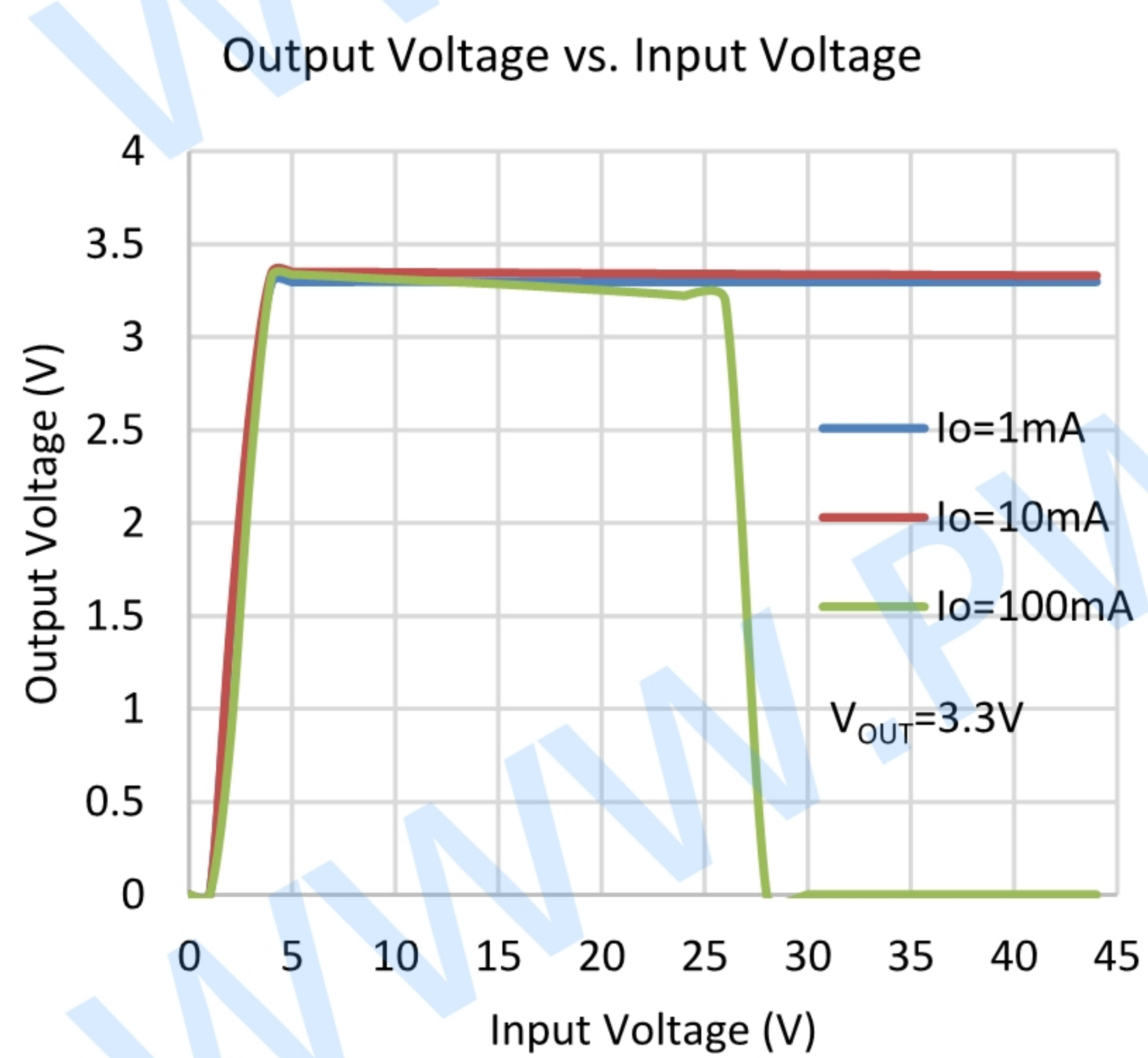
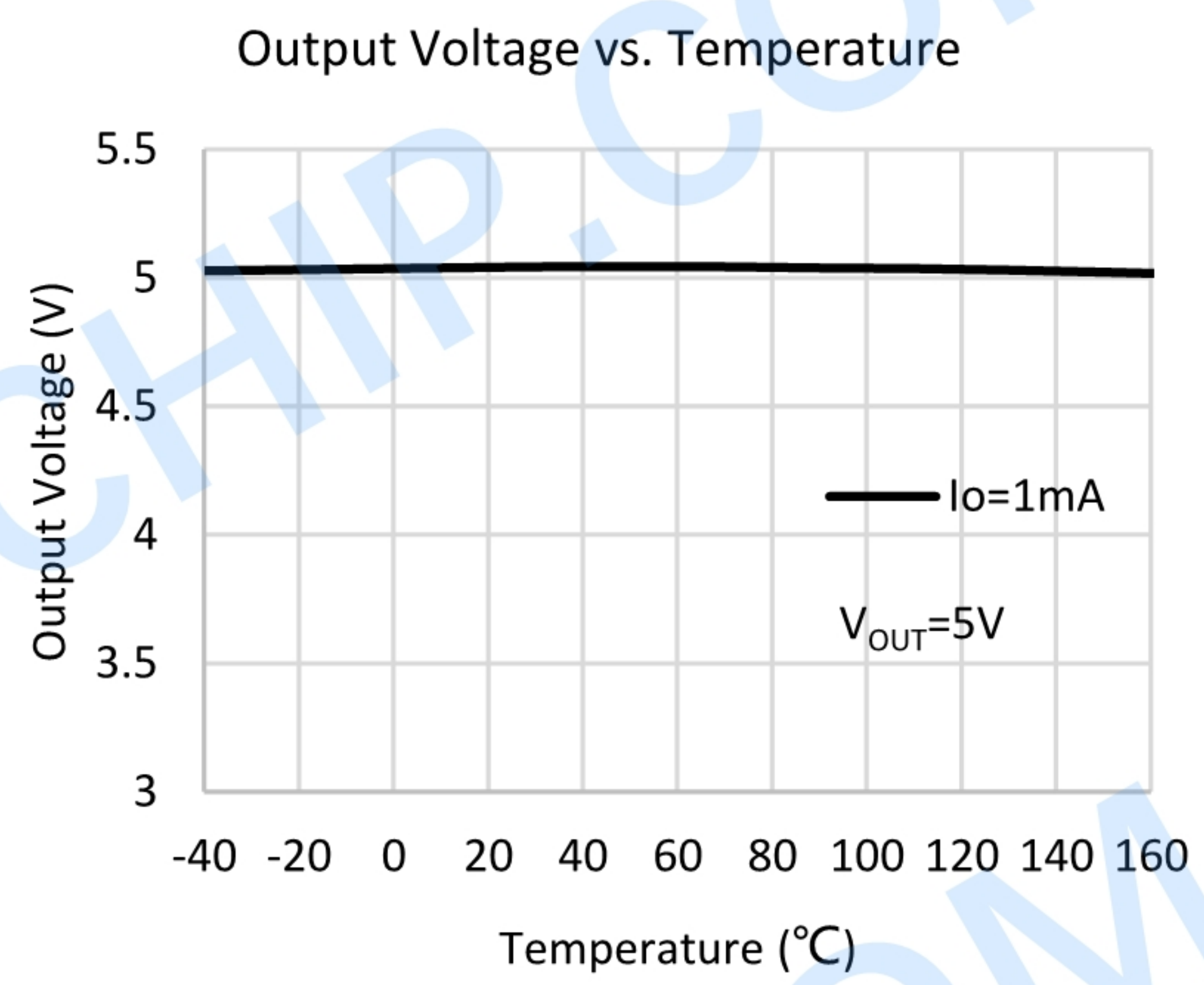
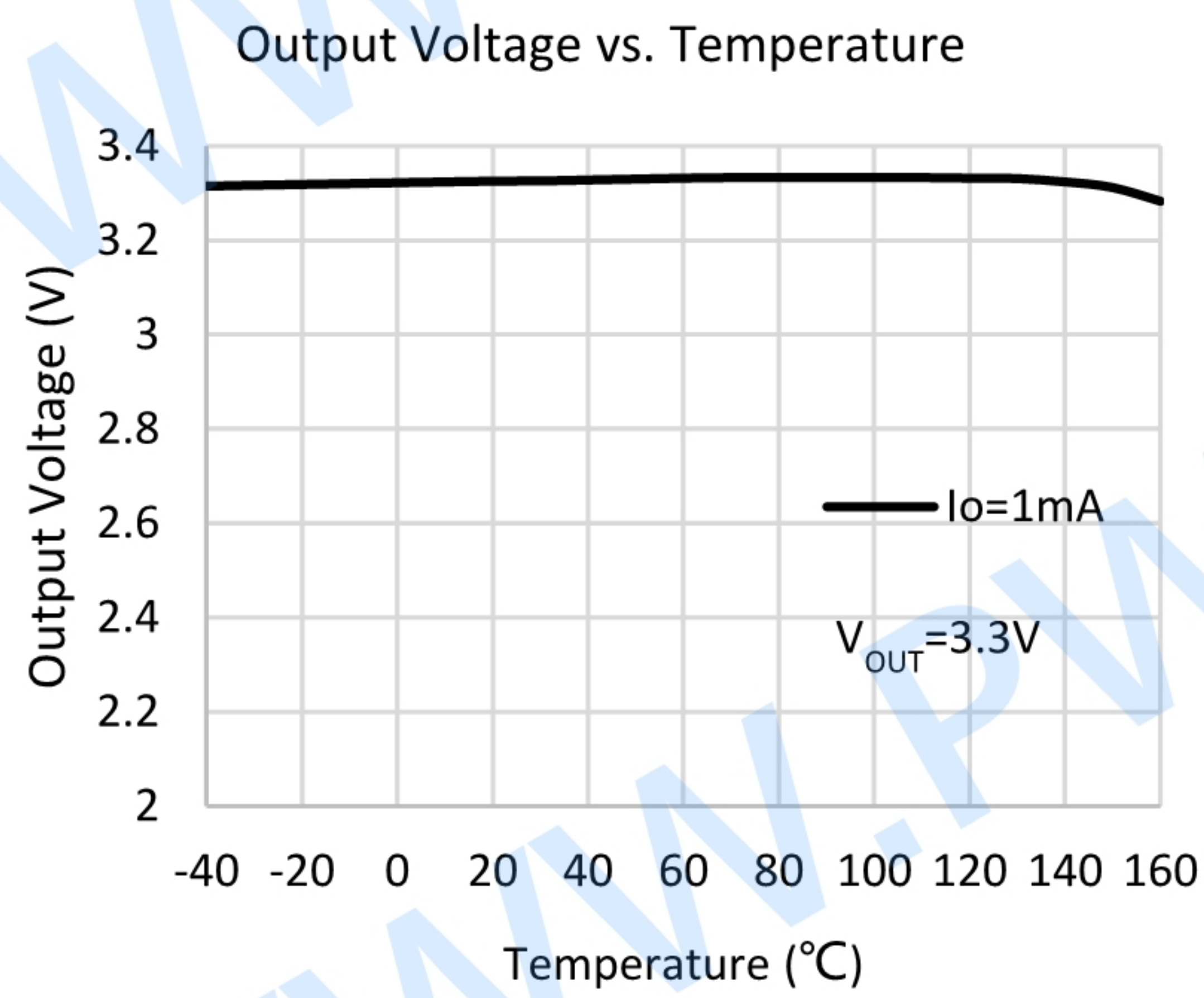
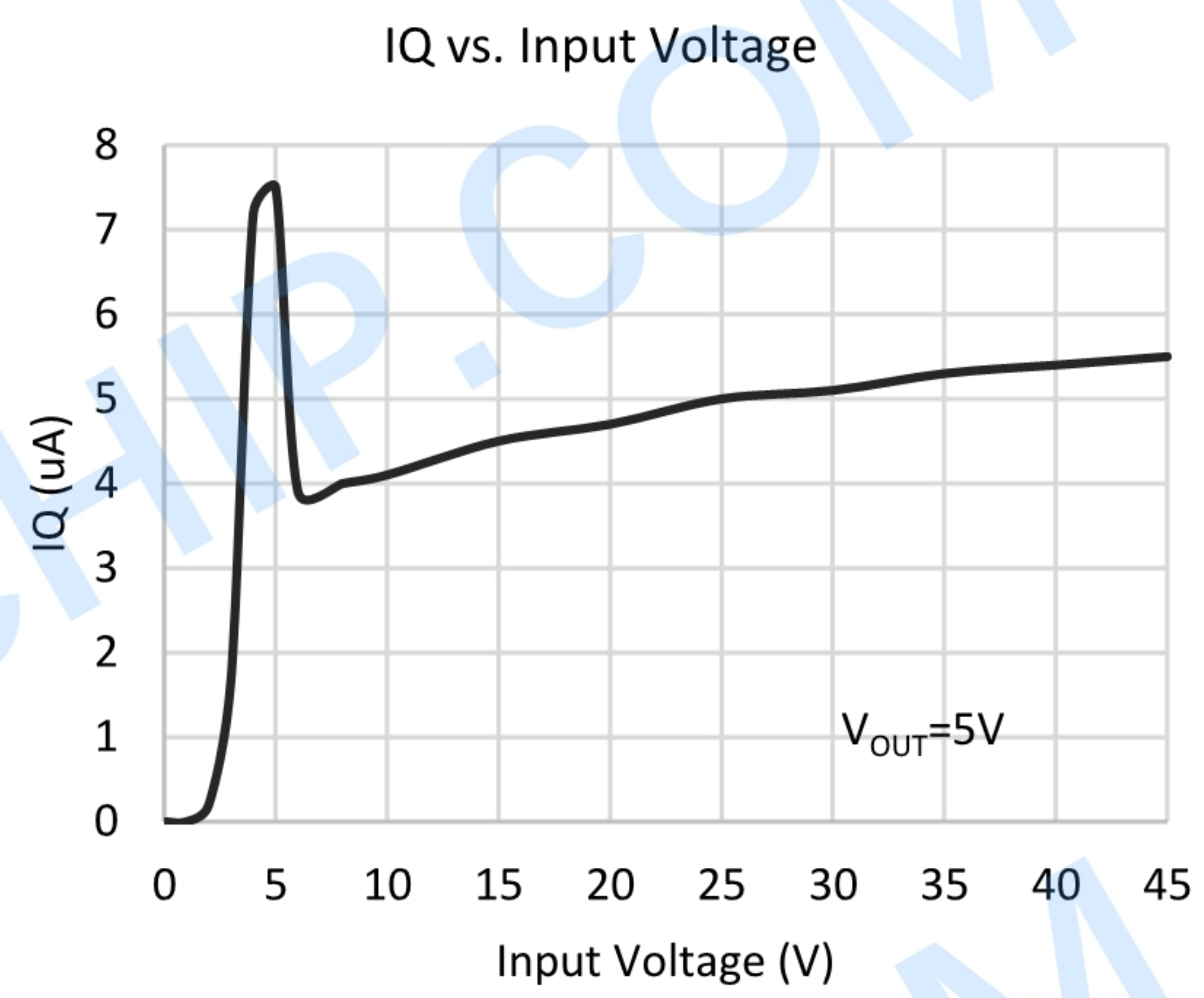
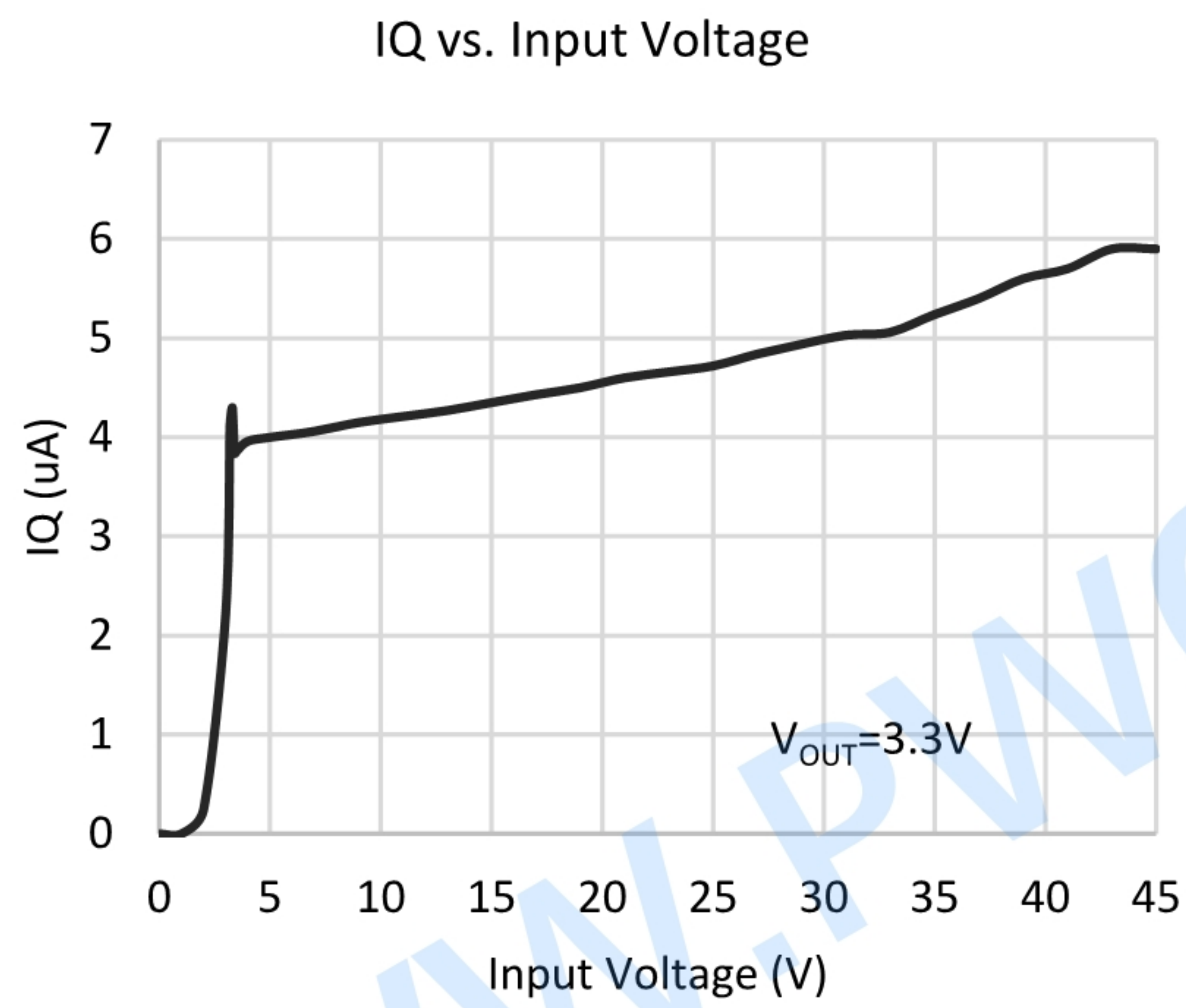
ELECTRICAL CHARACTERISTICS

The following specifications apply for $V_{IN} = 12V$, $T_A = 25^{\circ}C$, $C_{IN} = C_{OUT} = 10\mu F$, unless specified otherwise.

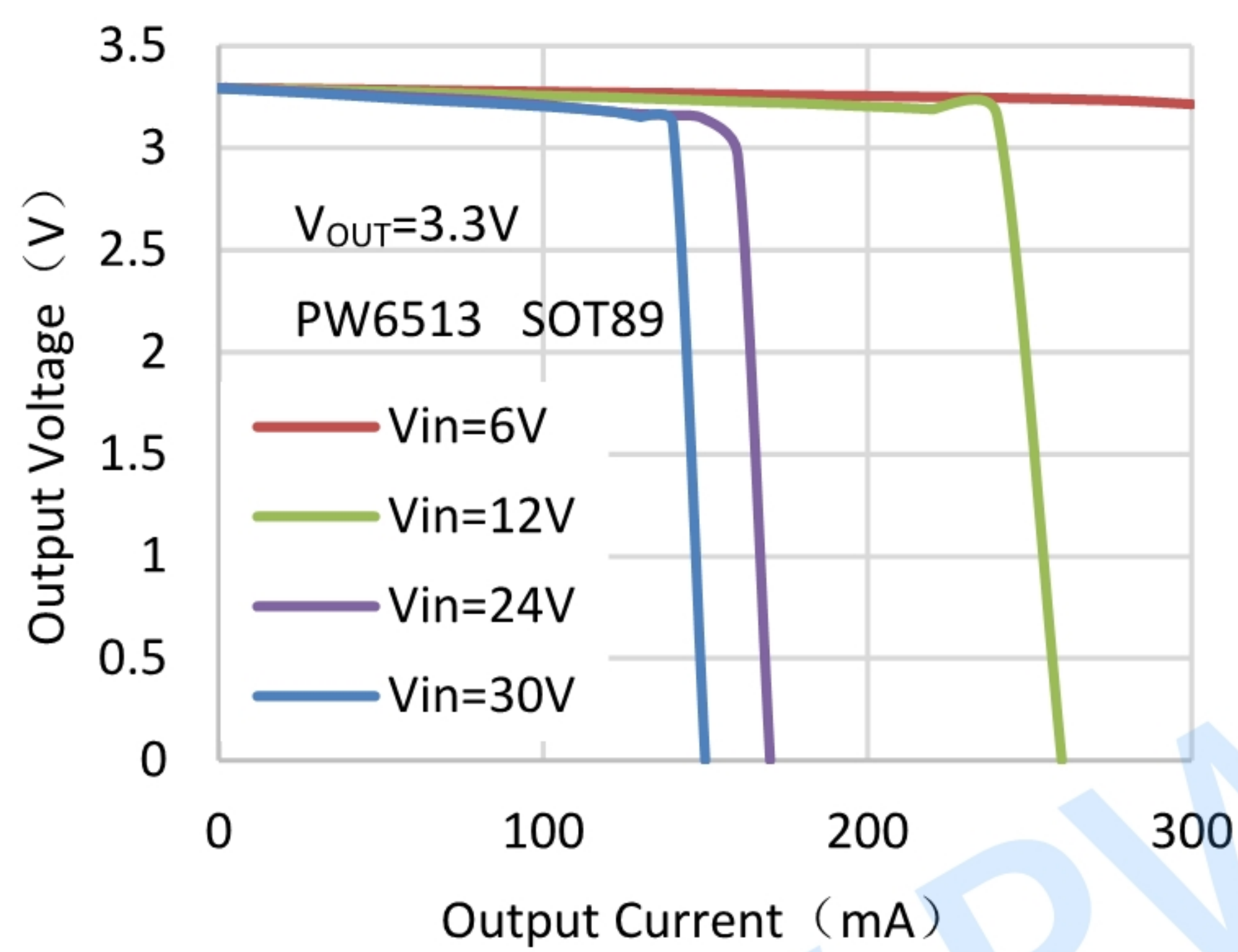
SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Range	$I_{OUT} = 10mA$	4.75		40	V
V_{OUT}	Output Range	$I_{OUT} = 10mA$	$V_{OUT} \times 0.98$	V_{OUT}	$V_{OUT} \times 1.02$	V
ΔV_{OUT}	Output Voltage	$V_{IN} = 12V, I_{OUT} = 10mA$	4.9	5	5.1	V
			3.234	3.3	3.366	
			2.94	3.0	3.06	
I_Q	Quiescent Current	$V_{IN} = 7V, I_{OUT} = 0$		4	6	μA
		$V_{IN} = 24V, I_{OUT} = 0$		4.6	6.7	
		$V_{IN} = 40V, I_{OUT} = 0$		5.4	8.2	
I_{OUT_PK}	Maximum Output Current	$V_{IN} - V_{OUT} = 4V, R_L = 1\Omega$		500	550	mA
V_{DROP}	Dropout Voltage	$I_{OUT} = 10mA$		60	90	mV
		$I_{OUT} = 100mA$		600	900	
ΔV_{LINE}	Line Regulation	$V_{IN} = 7 \sim 24V, V_{OUT} = 5V, I_{OUT} = 1mA$		0.02	0.03	%/V
		$V_{IN} = 7 \sim 45V, V_{OUT} = 5V, I_{OUT} = 1mA$		0.08	0.1	
ΔV_{LOAD}	Load Regulation	$V_{IN} = 7V, I_{OUT} = 1 \sim 100mA$		19	37	mV
I_{SHORT}	Short Current	V_{OUT} Short to GND with 1Ω (1ms pulse), $V_{IN} = 12V$		180		mA
PSRR	Power Supply Rejection Rate	$V_{IN} = 10V,$ $V_{PP} = 0.5V,$ $I_{OUT} = 1mA$	$F = 100Hz$	60		dB
			$F = 1kHz$	50		
			$F = 10kHz$	40		
e_{NO}	Output Noise Voltage	10Hz to 100kHz, $C_{OUT} = 10\mu F,$ $I_{OUT} = 10mA$		± 100		μV_{RMS}
T_{SD}	Thermal Shutdown Protection	$V_{IN} = 12V, I_{OUT} = 1mA$		165		$^{\circ}C$
$\Delta V_O / \Delta T$	Temperature Coefficient			± 0.5		mV/ $^{\circ}C$

TYPICAL PERFORMANCE CHARACTERISTICS

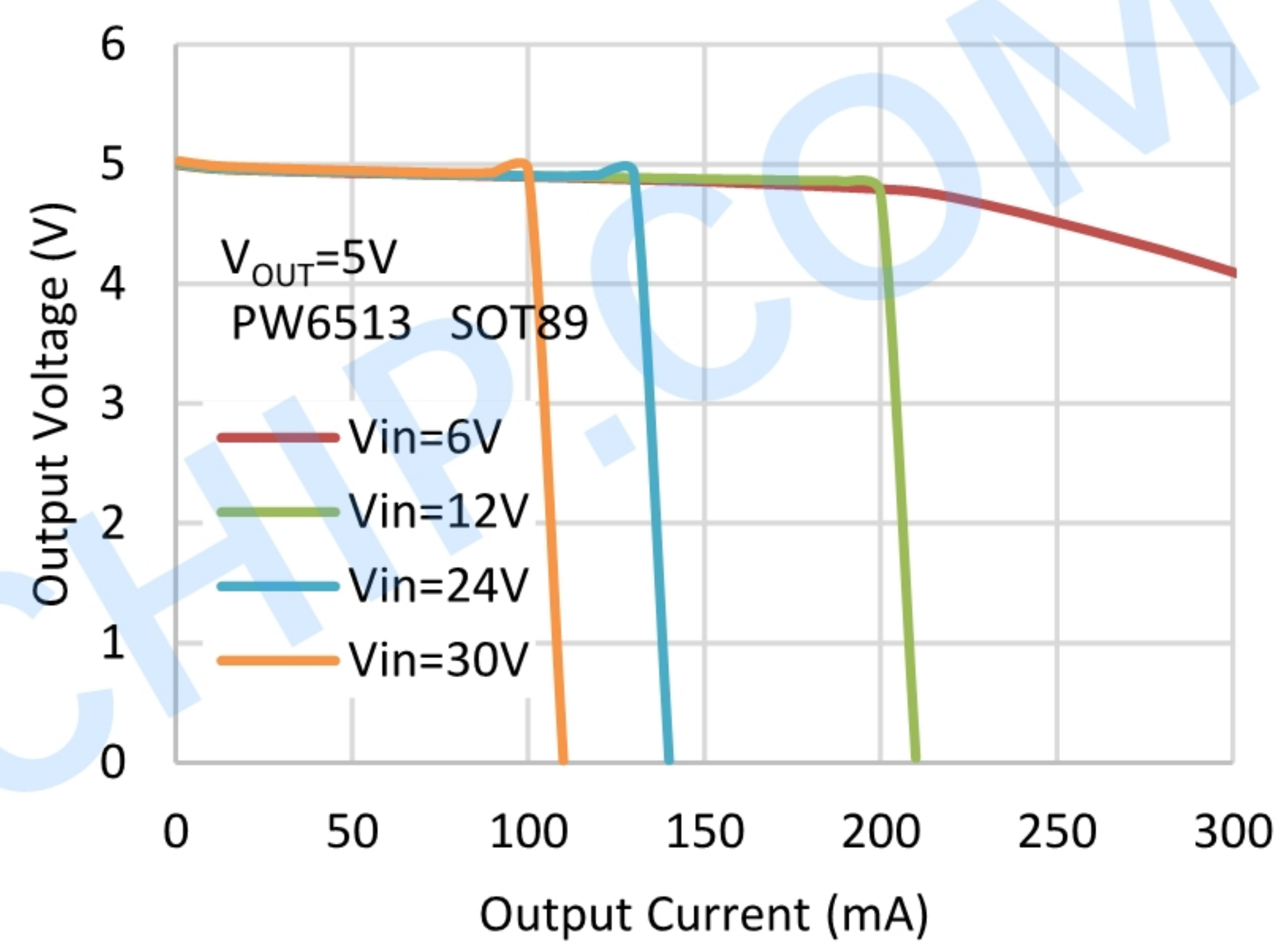
$C_{IN} = 10\mu F$, $C_{OUT} = 10\mu F$, $T_{OPT} = 25^{\circ}C$, unless specified otherwise



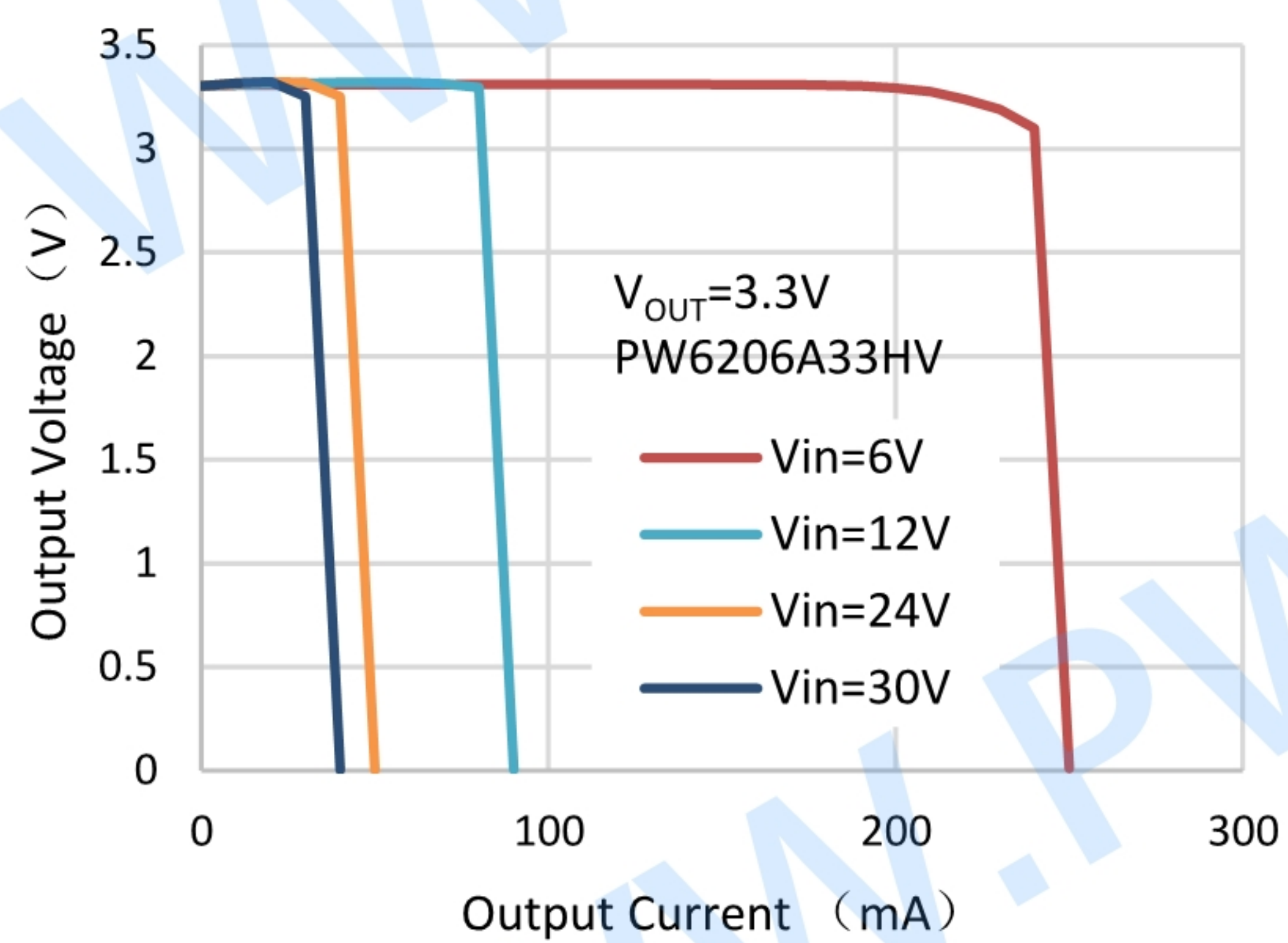
Output Voltage vs. Output Current



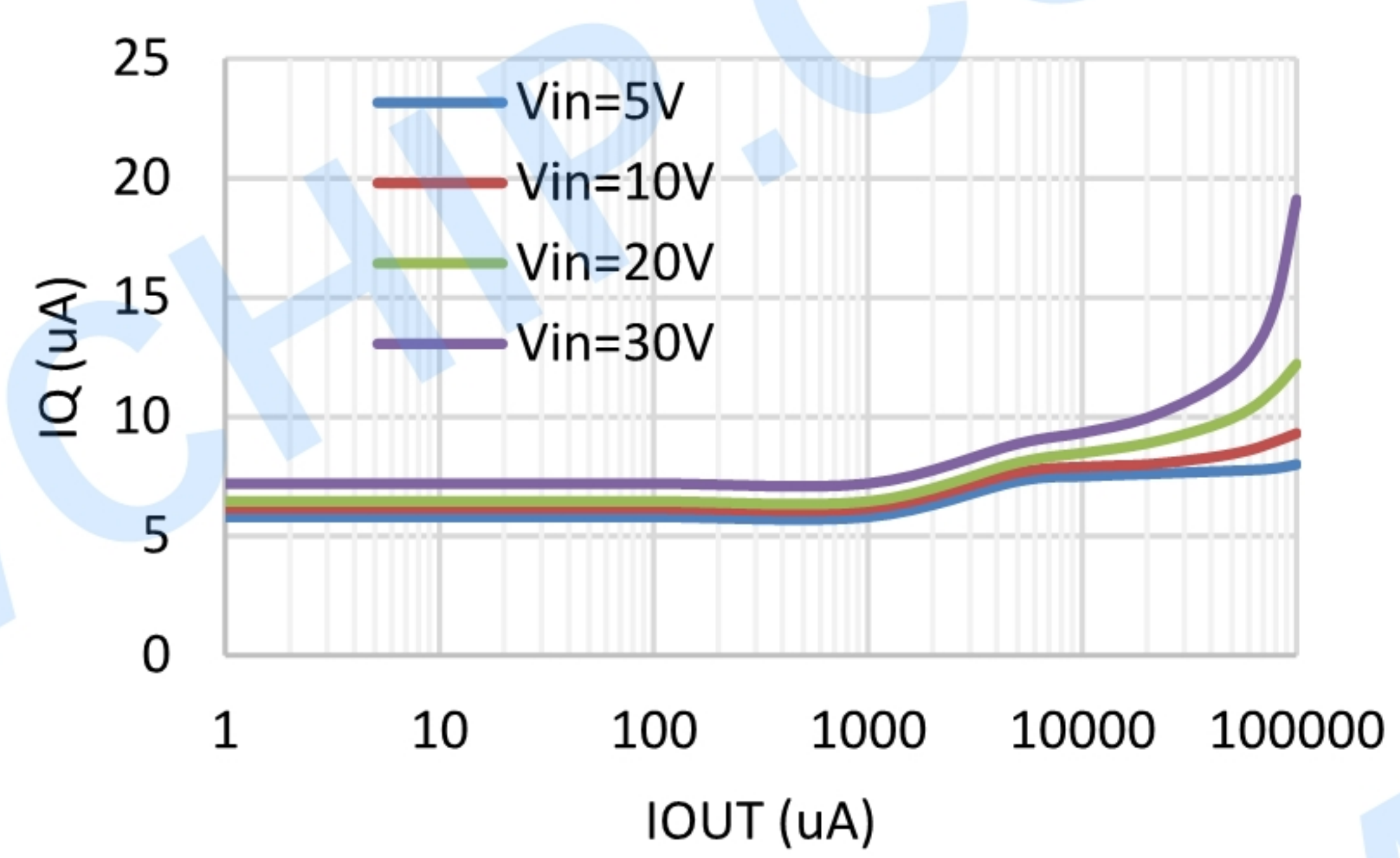
Output Voltage vs. Output Current



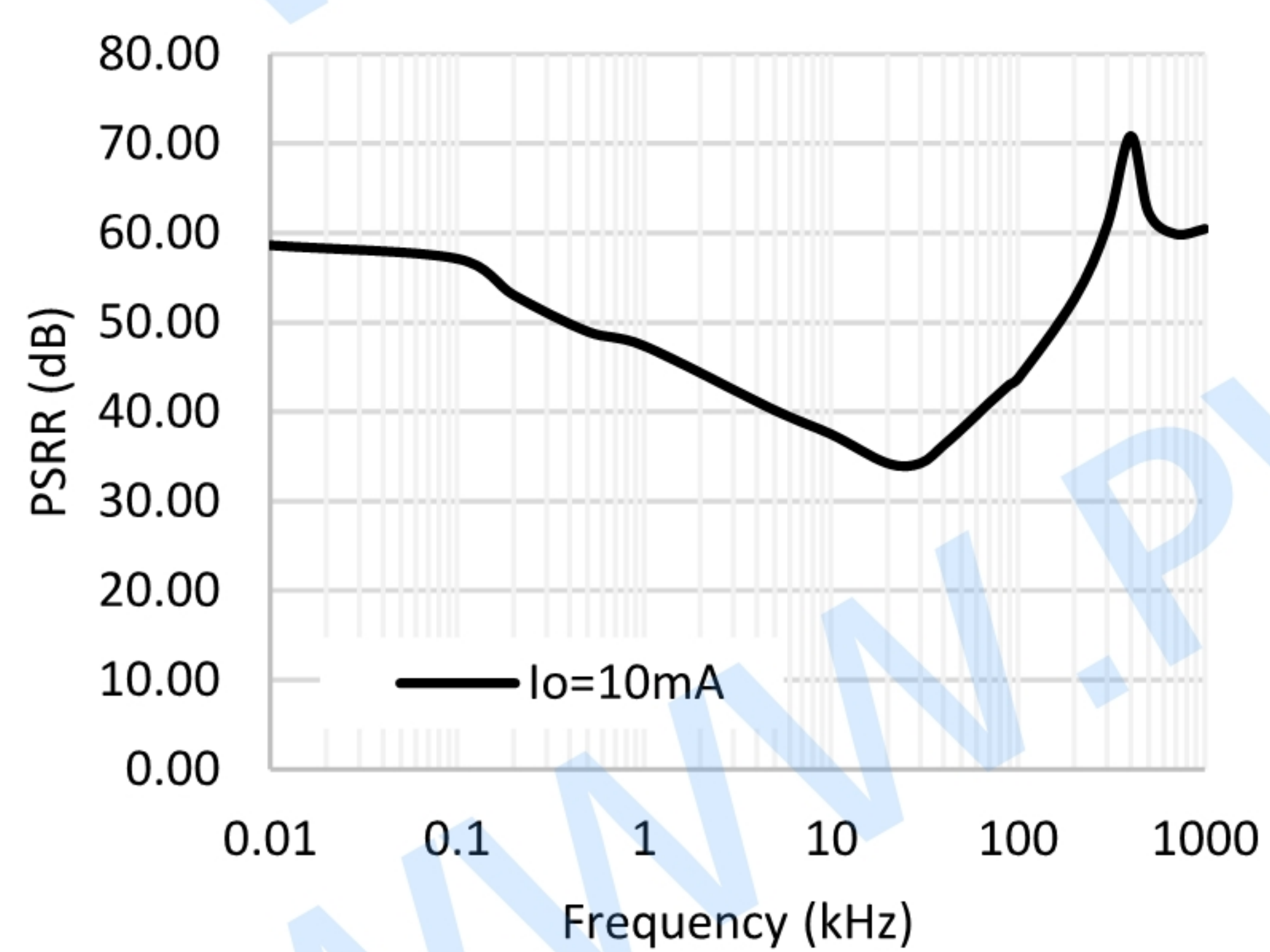
Output Voltage vs. Output Current



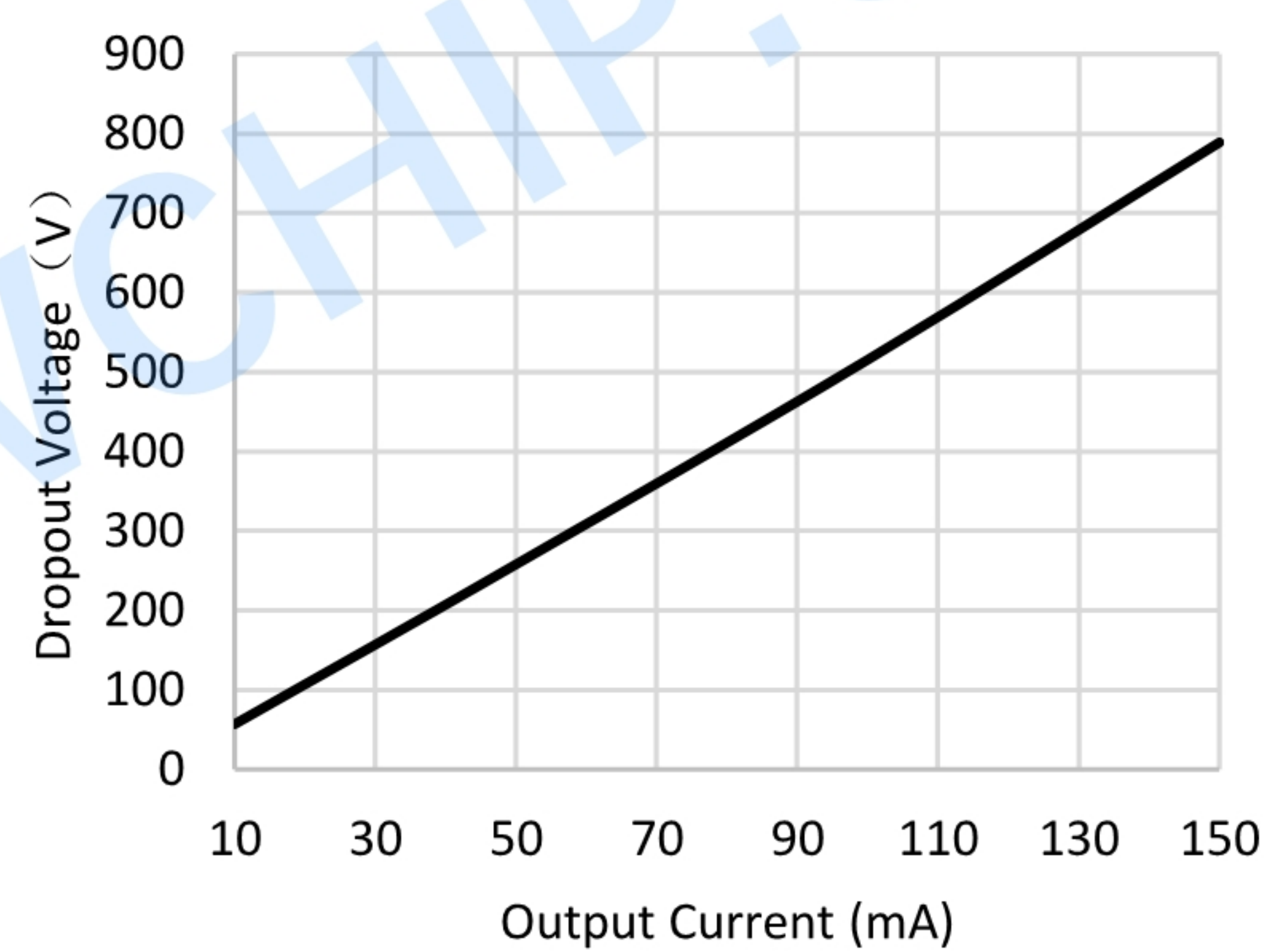
IQ vs. IOU



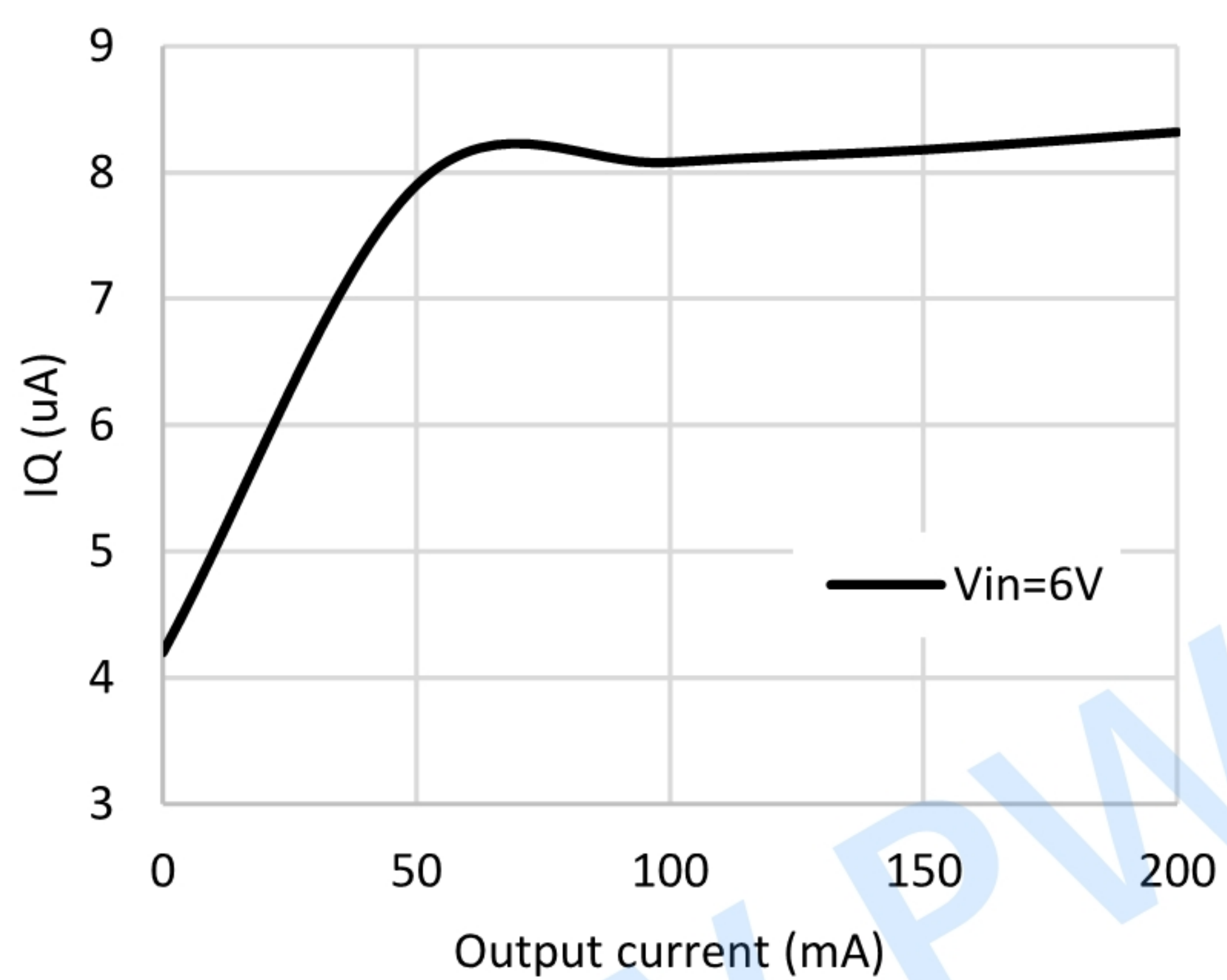
PSRR vs. Frequency



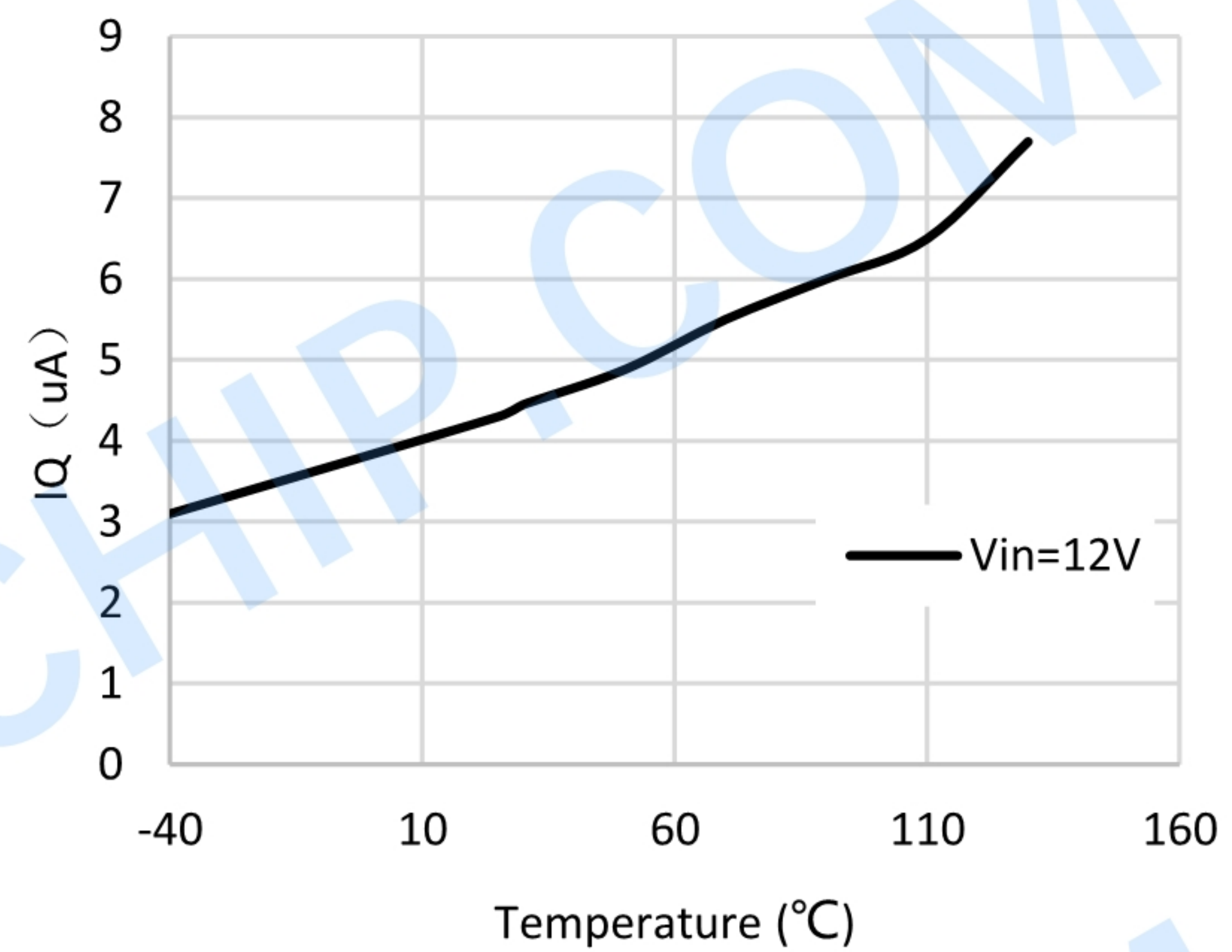
Dropout Voltage vs. Output Current



IQ vs. Output current



IQ vs. Temperature



Power ON/OFF

CH1: V_{IN} CH2: V_{OUT}

$V_{IN}=40V$ $I_{OUT}=1mA$ $V_{OUT}=5V$



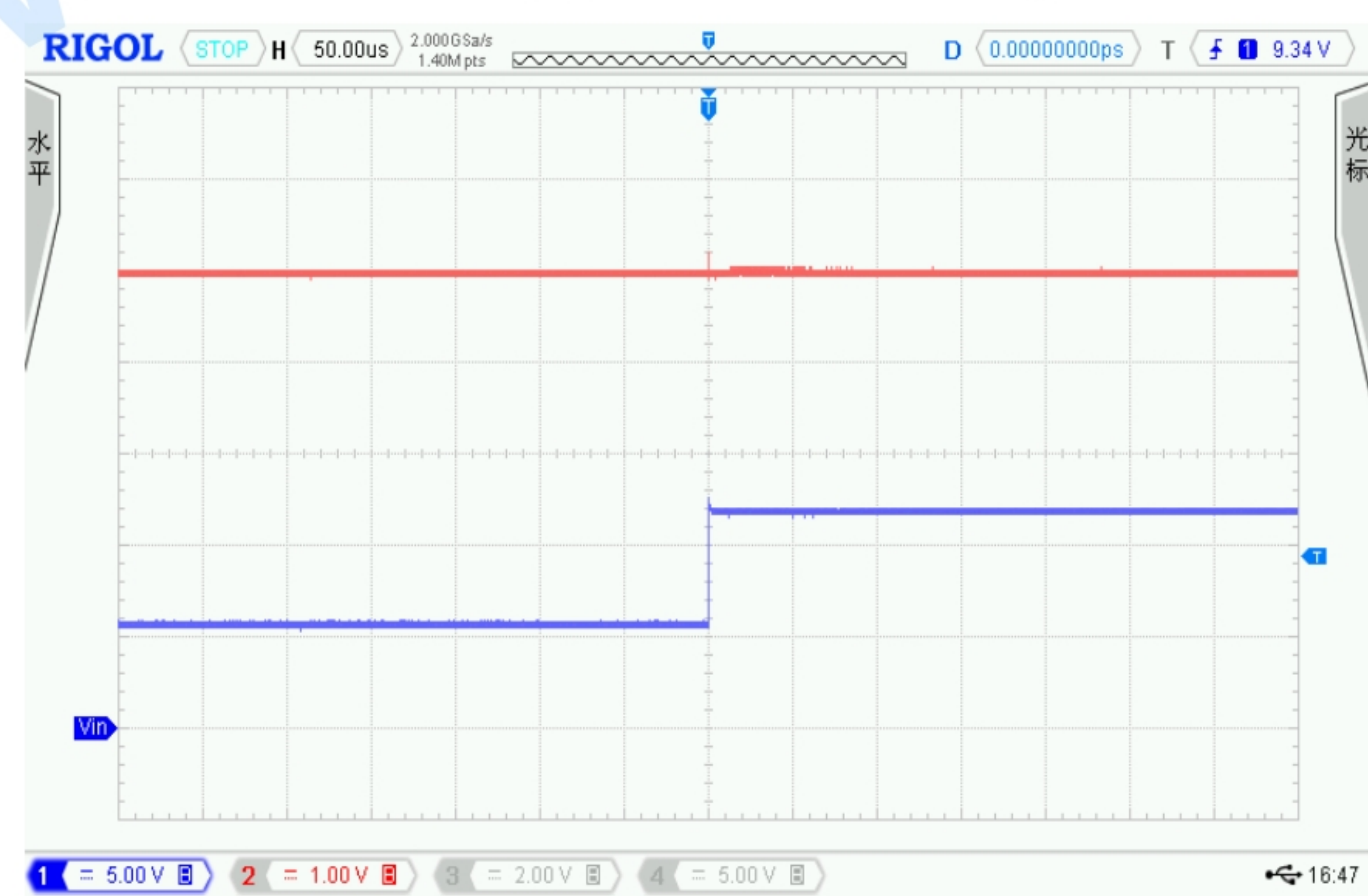
Line Transient

CH1: V_{IN} CH2: V_{OUT}

$V_{IN}=6V-12V$ $I_{OUT}=1mA$ $V_{OUT}=5V$



$V_{IN}=6V-12V$ $I_{OUT}=10mA$ $V_{OUT}=5V$



APPLICATION INFORMATION

INPUT CAPACITOR

An input capacitor of $10\mu\text{F}$ is required between the VIN and GND pin. The capacitor shall be placed as close as possible to VIN pin, and the use of electrolytic capacitors is recommended. The tolerance and temperature coefficient must be considered in order to ensure the capacitor work within the operation range over the full range of temperature and operating conditions.

OUTPUT CAPACITOR

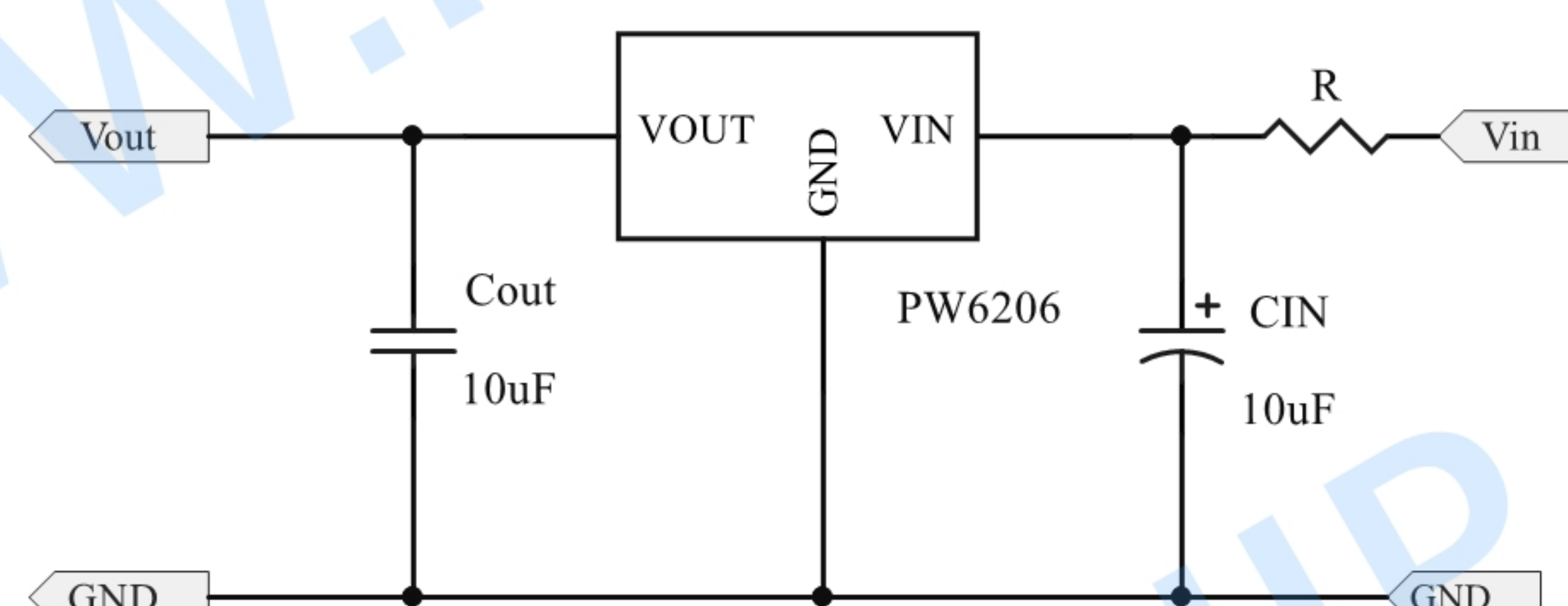
In applications, it is important to select the output capacitor for stable operation. The minimum capacitance for stable and correct operation is $1\mu\text{F}$. The capacitance tolerance should be $\pm 30\%$ or better over the operation temperature range. The recommended capacitor type is MLCC.

NO-LOAD STABILITY

The PW6206 will remain stable and in regulation with no external load. This is especially important in CMOS RAM keep-alive applications.

TYPICAL CIRCUIT

The following figure shows a typical application circuit for the PW6206 devices. The value of external components shall be chosen carefully, depending on the application. In plugging application, because the overshoot caused by the insertion and withdrawal of power on the chip may damage the chip, it is recommended that VIN be less than 30V and the input voltage spike should not exceed 45V.

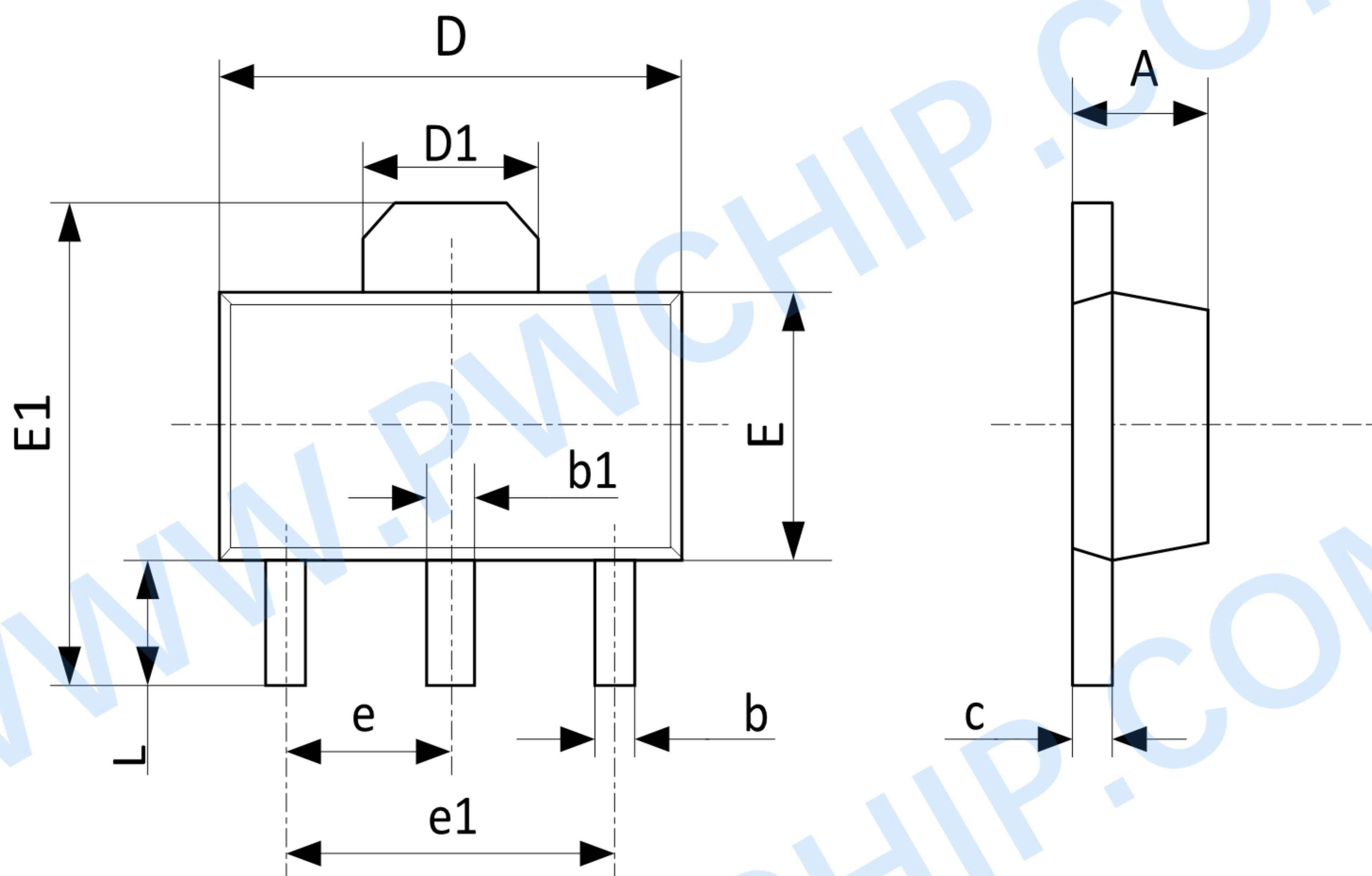


In plugging application, it is suggested that R, Cin are selected as following:

1. $C_{in}=10\mu\text{F} \sim 100\mu\text{F}$ electrolytic capacitor with maximum voltage greater than 50V, $R=0$;
2. $C_{in}=1\mu\text{F} \sim 10\mu\text{F}$ MLCC with maximum voltage $V_{\text{greater than } 50\text{V}}$ and $R=2\Omega$ in the type of 1206 - the resistor shall be carefully chosen to make sure enough margin to sustain the surge current during plugging.

PACKAGE DESCRIPTION

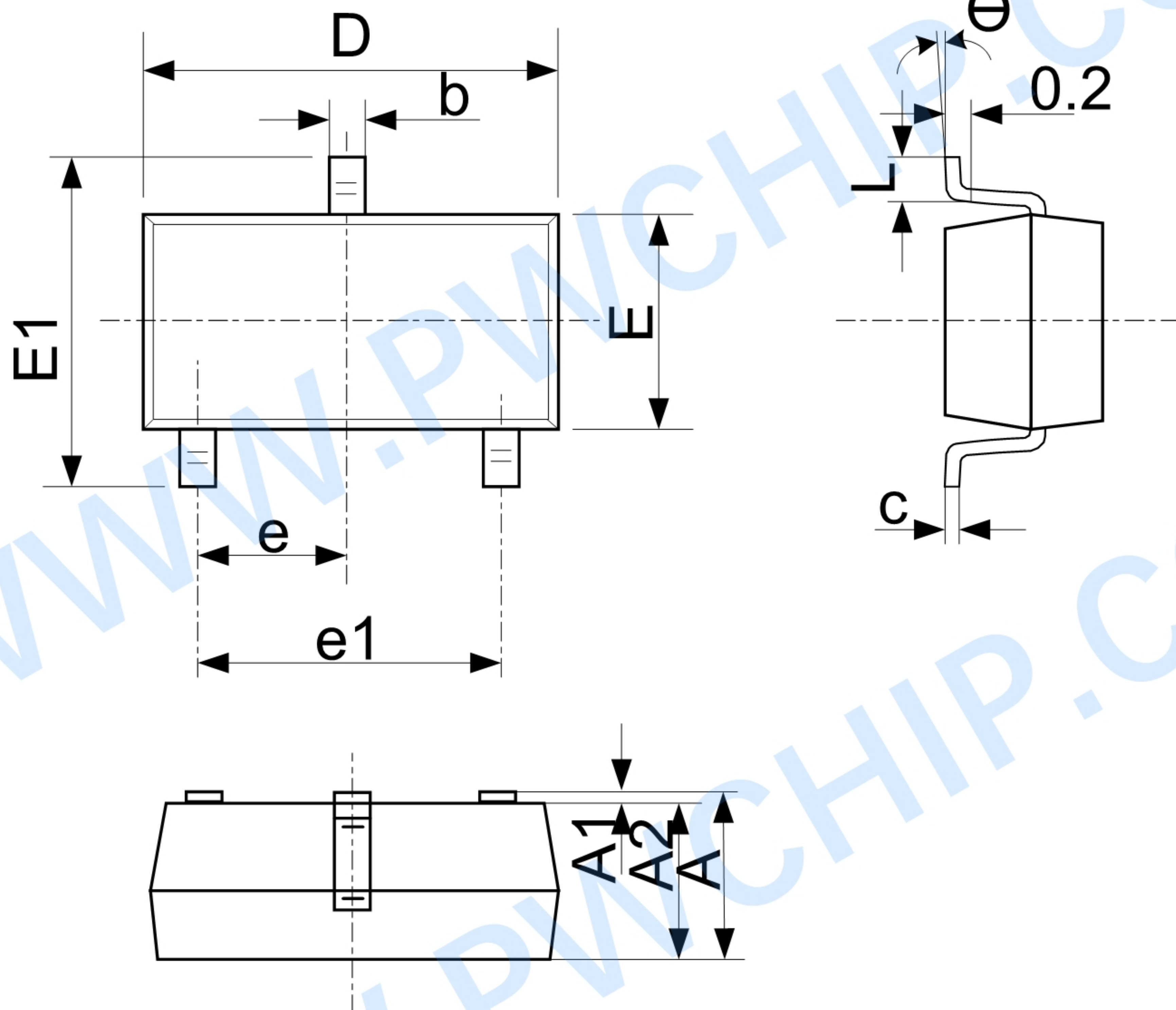
SOT89-3 (PW6513)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.45	1.65	0.057	0.065
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

PACKAGE DESCRIPTION

SOT23-3 (PW6206)



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°C	8°C	0°C	8°C

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