

GENERAL DESCRIPTION

The LW64XX series is a group of 40V high accuracy LDO. The 2.5 μ A power consumption makes it ideal for most HV power-saving systems. The maximum operating voltage can be as high as 40V. The LW64XX can deliver 150mA output current.

The other features include current limiting protection, short circuit protection and thermal shutdown protection.

Output voltage is selectable from 2.5V to 5.0V which fixed by laser trimming technologies, Step=100mV.

The LW64XX is available in SOT23-3L and SOT89-3L packages.

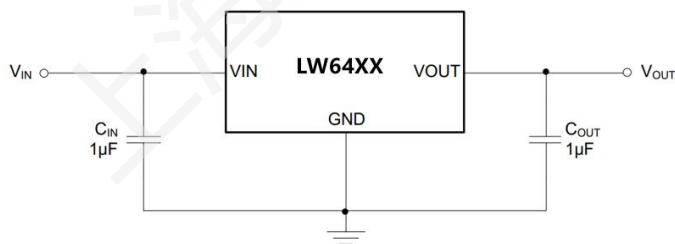
FEATURES

- Low Power Consumption: 2.5 μ A
- Operating Voltage Range: from 3.5V to 40V
- Output Voltage Range: from 2.5V to 5.0V
- Output Current: 150mA
- Output Accuracy: $\pm 1.0\%$
- High PSRR: 85dB@1KHz
- ESD Rating(HBM): ± 2 KV
- Low Temperature Coefficient
- Built-in Current Limiting, Short-Circuit and Over-Temperature Protection

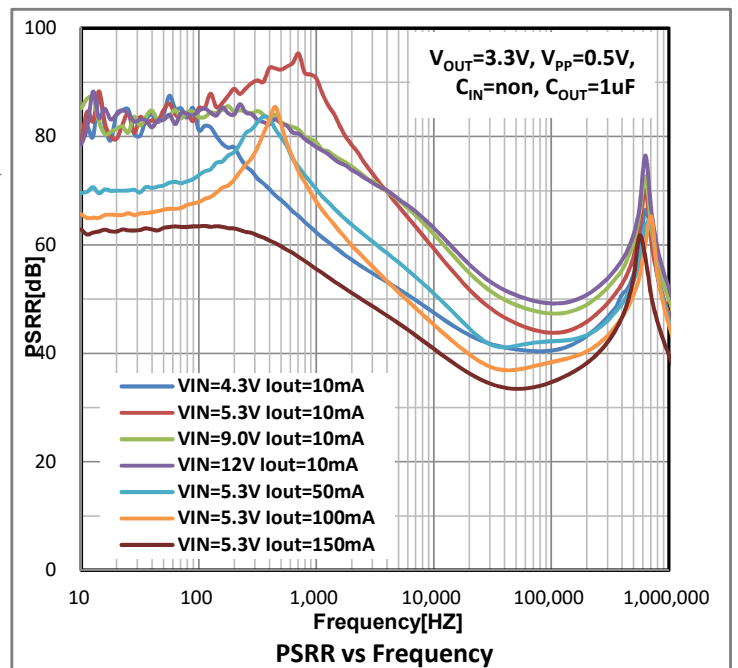
APPLICATIONS

- Battery Supplied Systems
- Telecom Systems
- Portable Audio & Video Equipment

TYPICAL APPLICATION CIRCUIT



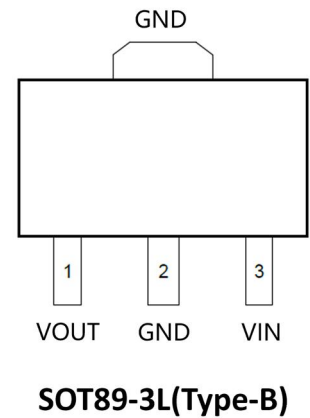
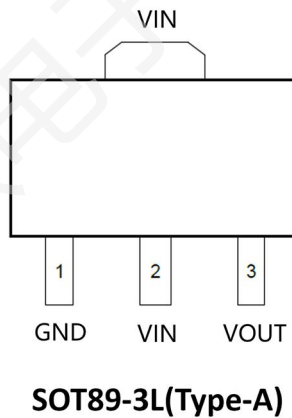
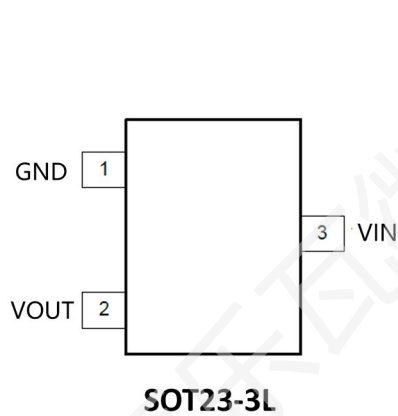
TYPICAL PERFORMANCE CHARACTERISTICS



PIN DESCRIPTION:

PIN No			SYMBOL	DESCRIPTION
SOT23-3L	SOT89-3L (Type-A)	SOT89-3L (Type-B)		
3	2、TAB	3	VIN	Input pin. Use the recommended capacitor value as listed in the Recommended Operating Conditions table. Place the input capacitor as close to the IN and GND pins of the device as possible.
1	1	2、TAB	GND	Ground pin. All ground pins must be grounded.
2	3	1	VOUT	Output pin. Use the recommended capacitor value as listed in the Recommended Operating Conditions table. Place the output capacitor as close to the OUT and GND pins of the device as possible.

PIN ASSIGNMENT

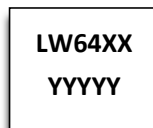


MARK INFORMATION:

SOT23-3L/SOT89-3L

XX: VOLTAGE

Y: DATE CODE



ABSOLUTE MAXIMUM RATINGS ⁽¹⁾:

Symbol	Item		Rating	Unit
V_{IN}	Supply Voltage		-0.3~44	V
V_{OUT}	V_{OUT} pin to GND Voltage		-0.3~5.0	V
$V_{(ESD)}$	ESD Susceptibility, Human-body model ⁽²⁾		+/-2000	V
$R_{\theta JA}$	Junction-to-ambient Thermal Resistance ⁽³⁾	SOT23-3L	350	°C/W
		SOT89-3L (Type-A)	125	°C/W
		SOT89-3L (Type-B)	100	°C/W
T_J	Junction Temperature Range		-40~150	°C
T_{STG}	Storage Temperature Range		-40~150	°C
T_{SOLDER}	Lead Temperature (Soldering)		260°C, 10s	

Note:

1. Absolute Maximum Ratings are threshold limit values that must not be exceeded even for an instant under any condition. Moreover, such values for any two items must not be reached simultaneously. Operation above these absolute maximum ratings may cause degradation or permanent damage to the device. These are stress ratings only and do not necessarily imply functional operation below these limits.

2. per ANSI/ESDA/JEDEC JS-001

3. Device mounted on FR-4 PCB

RECOMMENDED OPERATING RANGE:

Symbol	Item	Rating	Unit
V_{IN}	V_{IN} Supply Voltage	3.5~40	V
V_{OUT}	V_{OUT} Pin Voltage	2.5~5.0	V
I_{OUT}	Output Current	0~150	mA
T_J	Junction Temperature Range	-40~125	°C

ELECTRICAL CHARACTERISTICS:

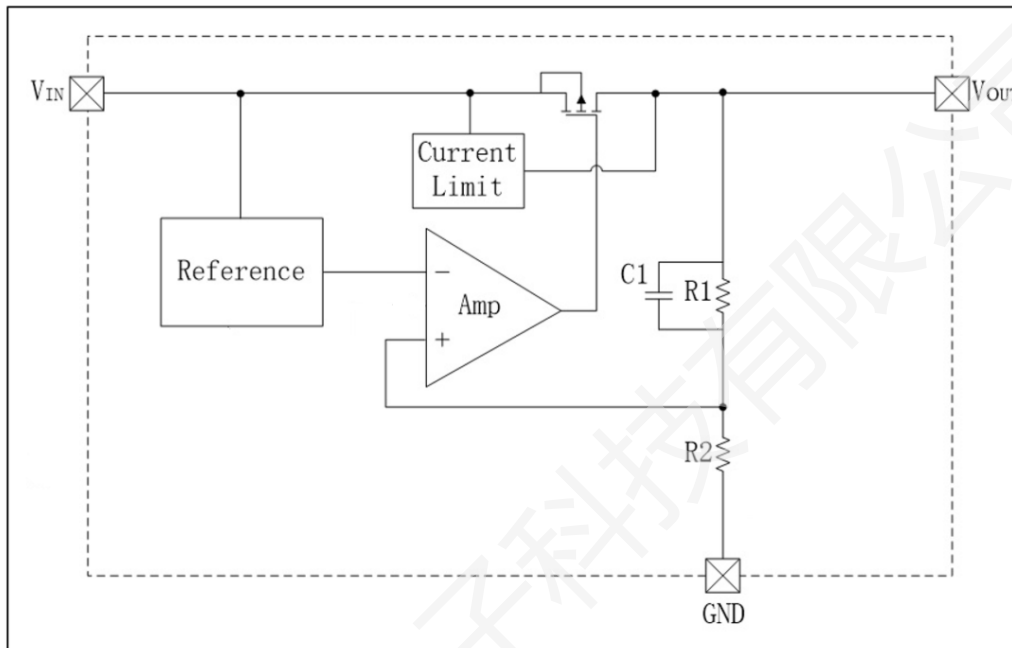
($V_{IN}=V_{OUT}+1V$ or $2V$, whichever is greater, $C_{IN}=C_{OUT}=1\mu F$, $T_A=25^{\circ}C$, unless otherwise specified, Typical values are at $T_J=25^{\circ}C$.)

Symbol	Parameter	Test Conditions	MIN	TYP	MAX	Units
V_{IN}	Input Voltage		3.5		40	V
V_{OUT}	Output Accuracy	$I_{OUT}=1mA$	-1.0		+1.0	%
I_{LIM}	Current Limit		150	230		mA
I_Q	Quiescent Current	$V_{IN}=V_{OUT}+1V$, No Load		2.5	5.0	μA
V_{DROP}	Dropout Voltage ⁽¹⁾	$I_{OUT}=50mA$, $V_{OUT}=2.5V$		326		mV
		$I_{OUT}=100mA$, $V_{OUT}=2.5V$		654		
		$I_{OUT}=150mA$, $V_{OUT}=2.5V$		986		
		$I_{OUT}=50mA$, $V_{OUT}=3.3V$		260		
		$I_{OUT}=100mA$, $V_{OUT}=3.3V$		531		
		$I_{OUT}=150mA$, $V_{OUT}=3.3V$		813		
		$I_{OUT}=50mA$, $V_{OUT}=5.0V$		243		
		$I_{OUT}=100mA$, $V_{OUT}=5.0V$		502		
		$I_{OUT}=150mA$, $V_{OUT}=5.0V$		826		
S_{LINE}	Line Regulation	$V_{IN}=V_{OUT(NOM)}+1V$ to $40V$, $I_{OUT}=1mA$		0.01	0.02	%/V
S_{LOAD}	Load Regulation	$V_{IN}=V_{OUT(NOM)}+1V$, $1mA \leq I_{OUT} \leq 150mA$		0.005	0.01	%/mA
I_{SHORT}	Short Current	$V_{OUT}=0V$		80		mA
PSRR	Power Supply Rejection Ratio	$V_{IN}=5.3V$, $V_{PP}=0.5V$ $C_{IN}=None$, $V_{OUT}=3.3V$ $I_{OUT}=10mA$	$f=217Hz$	80		dB
			$f=1KHz$	85		
			$f=10KHz$	60		
e_n	Output Voltage Noise	$f=10Hz$ to $100kHz$, $V_{IN}=4.3V$, $V_{OUT}=3.3V$	$I_{OUT}=0mA$	92		μV_{RMS}
			$I_{OUT}=10mA$	125		
T_{SD}	Overheat Protection	Temperature rising		155		$^{\circ}C$
ΔT_{SD}	TSD Hysteresis	Temperature falling		30		$^{\circ}C$

NOTES:

- The dropout voltage is defined as $V_{IN} - V_{OUT}$, when $V_{OUT}=95\%*V_{OUT(NOM)}$

SIMPLIFIED BLOCK DIAGRAM:



DETAIL OPERATION DESCRIPTION:

The LW64XX Series is a low power consumption low drop-out voltage regulator. It consists of a current limiter circuit, a driver transistor, a precision reference voltage and an error correction circuit, and is compatible with low ESR ceramic capacitors. The current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter.

Current Limiting and Short-Circuit Protection

The current limit circuitry prevents damage to the MOSFET switch and the hub downstream port but can deliver load current up to the current limit threshold of typically 150mA through the switch. When a heavy load or short circuit is applied to an enabled switch, a large transient current may flow until the current limit circuitry responds. Once this current limit threshold is exceeded the device enters constant current mode until the thermal shutdown occurs or the fault is removed.

APPLICATION INFORMATION:

- **Input Capacitor Selection**

Like any low-dropout regulator, the external capacitors used with the LW64XX Series must be carefully selected for regulator stability and performance. Using a capacitor whose value is $\geq 1\mu\text{F}$ on the LW64XX Series input and the amount of capacitance can be increased without limit. The input capacitor must be located a distance of not more than 0.5 inch from the input pin of the IC and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response.

- **Layout considerations**

To improve ac performance such as PSRR, output noise, and transient response, it is recommended that the PCB be designed with separate ground planes for VIN and VOUT, with each ground plane connected only at the GND pin of the device.

- **Output Capacitor Selection**

The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application. The LW64XX Series is designed specifically to work with low ESR ceramic output capacitor in space-saving and performance consideration. Using a ceramic capacitor whose value is at least $1\mu\text{F}$ on the LW64XX Series output ensures stability. Output capacitor of larger capacitance can reduce noise and improve load transient response, stability, and PSRR. The output capacitor should be located not more than 0.5 inch from the VOUT pin of the LW64XX Series and returned to a clean analog ground.

TYPICAL OPERATING CHARACTERISTICS:

(Tested under $T_A = 25^\circ\text{C}$, $C_{IN} = C_{OUT} = 1\mu\text{F}$, unless otherwise specified)

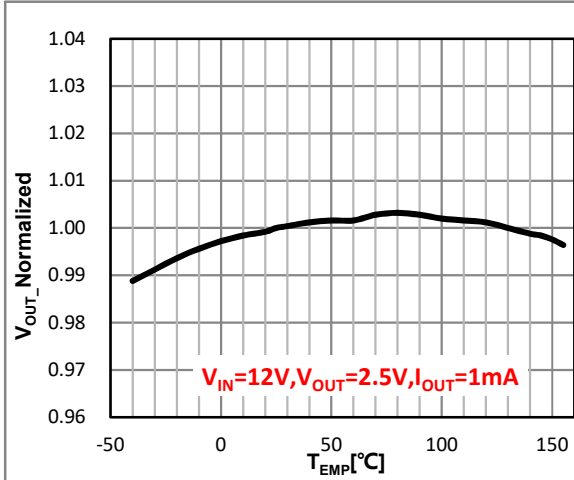


Figure 1. V_{OUT} vs Temperature

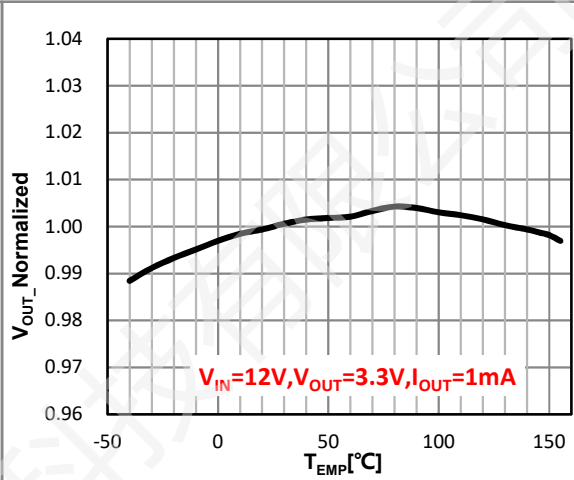


Figure 2. V_{OUT} vs Temperature

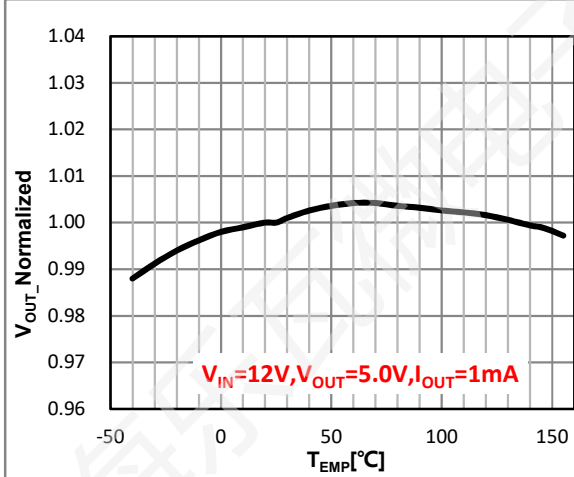


Figure 3. V_{OUT} vs Temperature

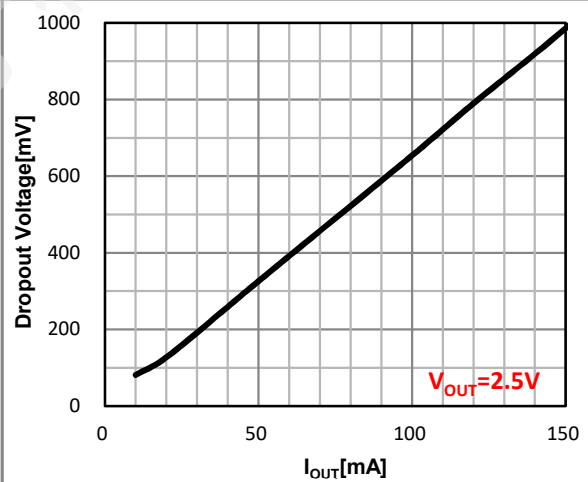


Figure 4. Dropout Voltage VS I_{OUT}

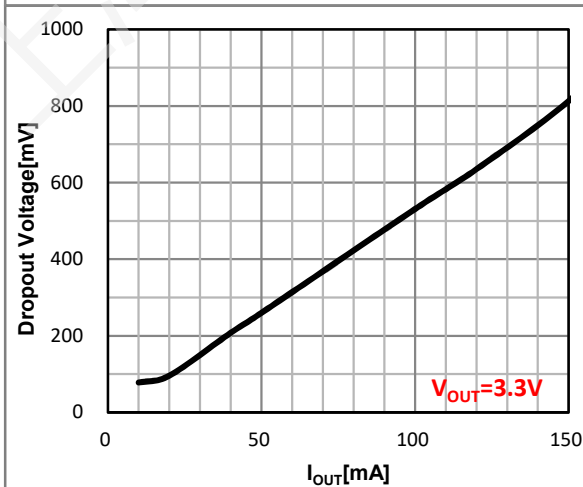


Figure 5. Dropout Voltage VS I_{OUT}

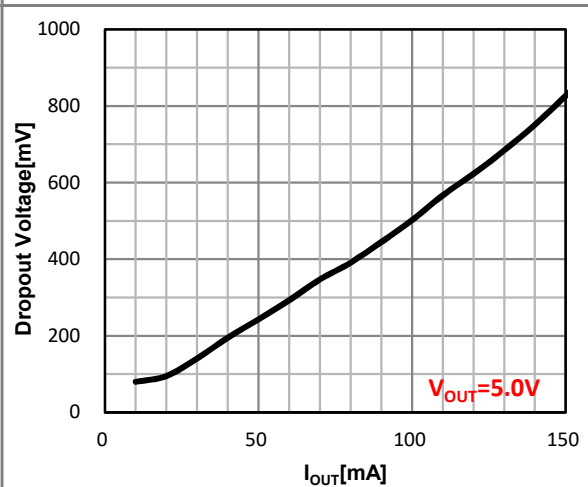


Figure 6. Dropout Voltage VS I_{OUT}

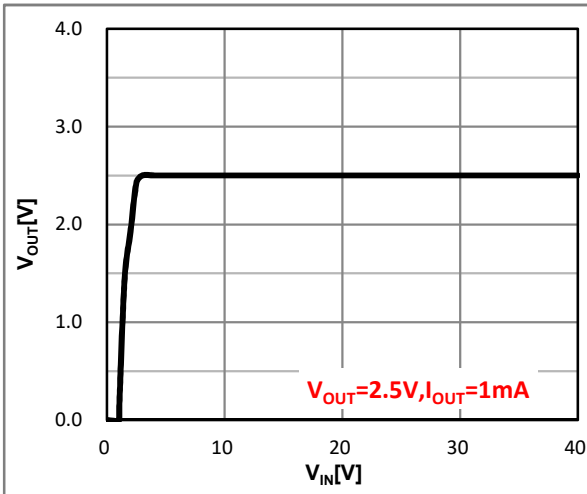


Figure 7. V_{OUT} vs V_{IN}

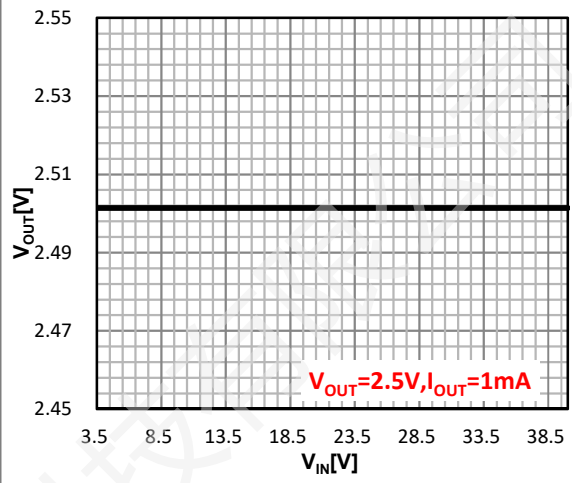


Figure 8. Line Regulation

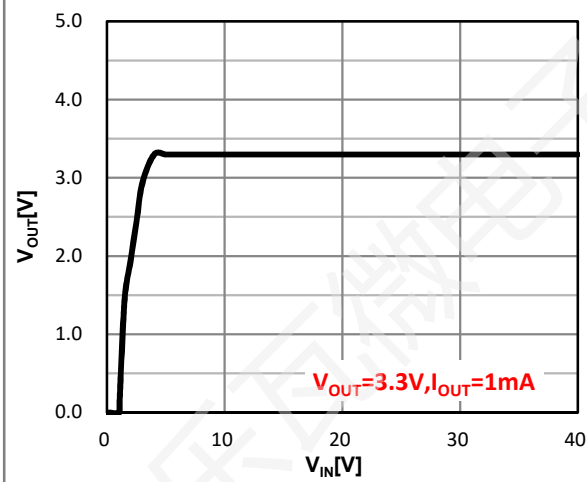


Figure 9. V_{OUT} vs V_{IN}

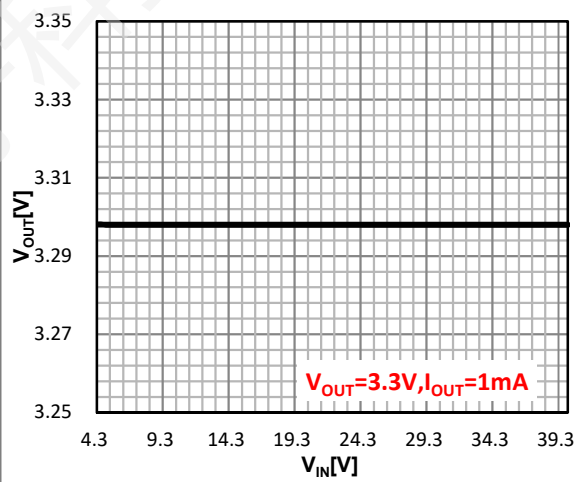


Figure 10. Line Regulation

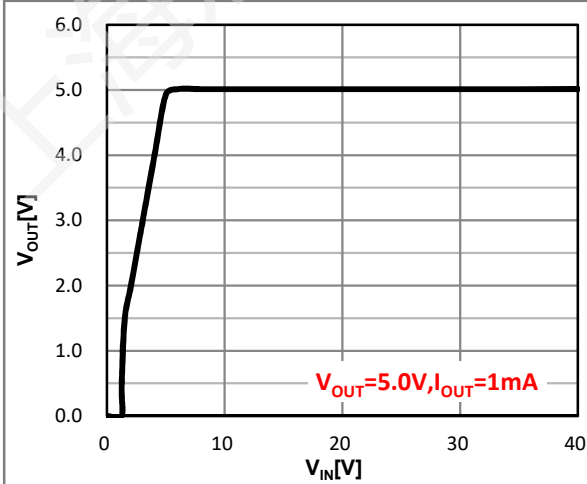


Figure 11. V_{OUT} vs V_{IN}

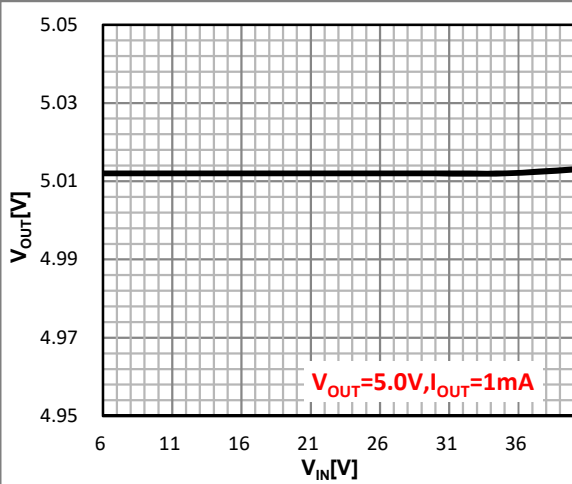


Figure 12. Line Regulation

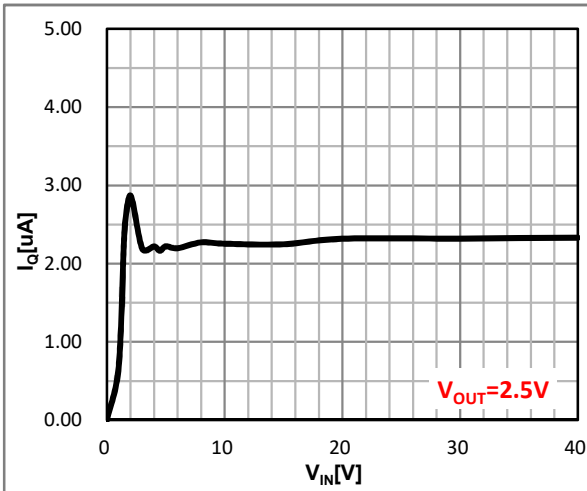


Figure 13. I_Q vs V_{IN}

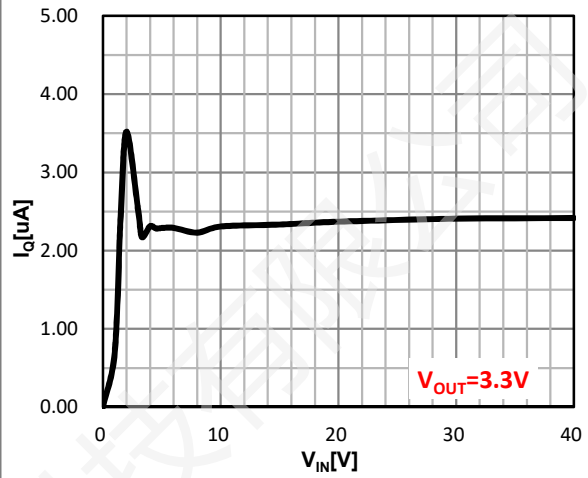


Figure 14. I_Q vs V_{IN}

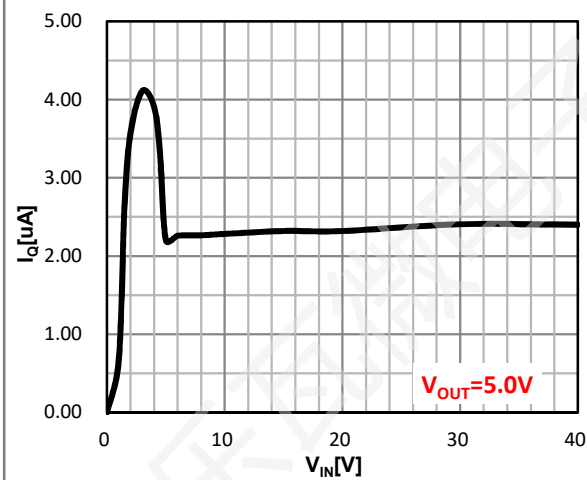


Figure 15. I_Q vs V_{IN}

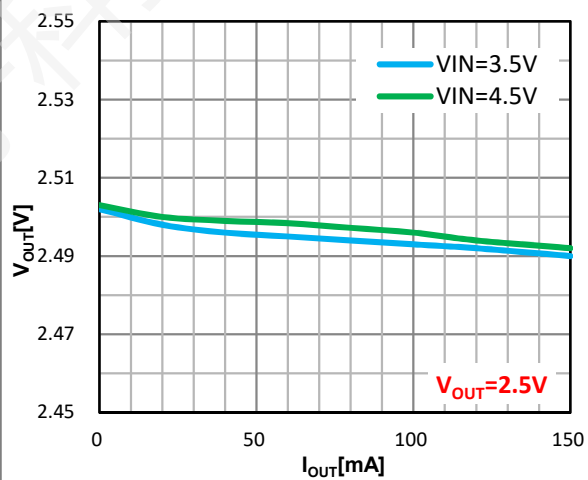


Figure 16. Load Regulation

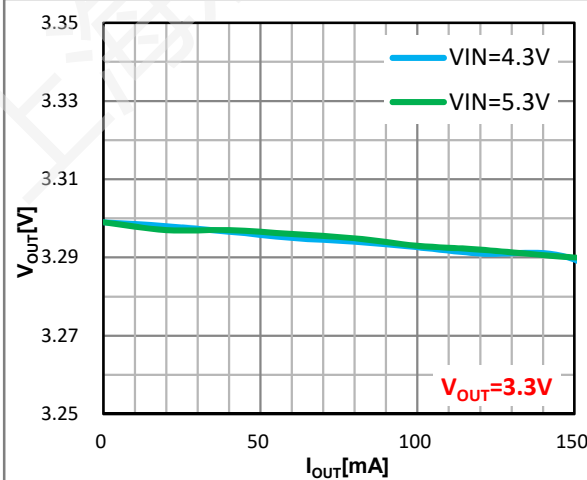


Figure 17. Load Regulation

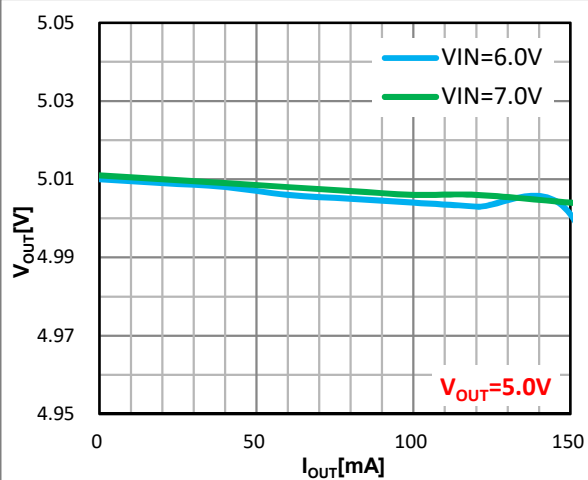
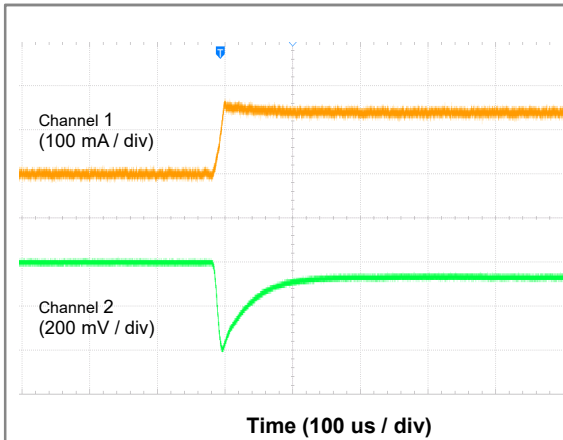
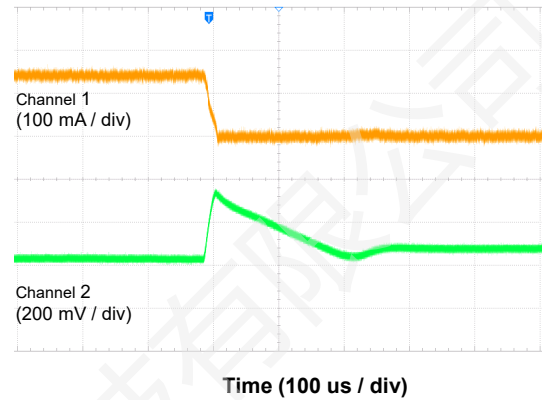


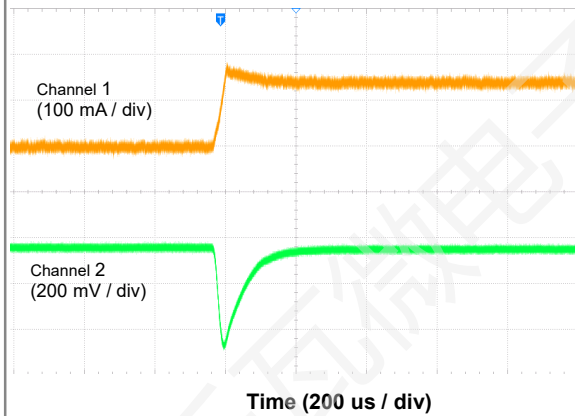
Figure 18. Load Regulation



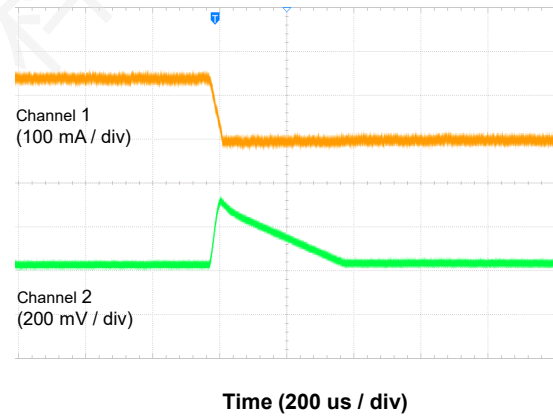
Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=3.5V$, $V_{OUT}=2.5V$
Figure 19. Load Transient (1 mA to 150 mA)



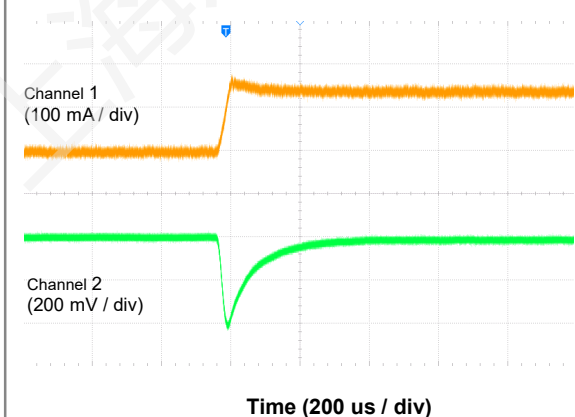
Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=3.5V$, $V_{OUT}=2.5V$
Figure 20. Load Transient (150 mA to 1 mA)



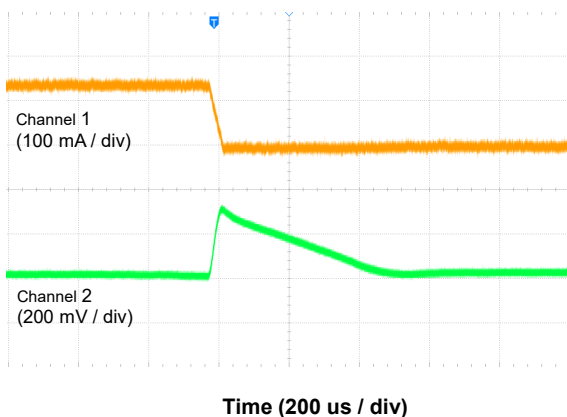
Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=4.3V$, $V_{OUT}=3.3V$
Figure 21. Load Transient (1 mA to 150 mA)



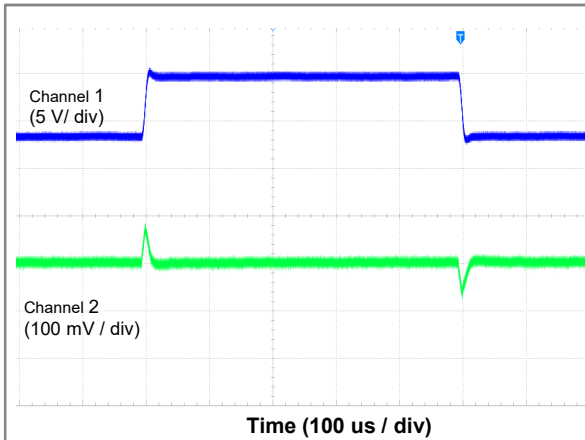
Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=4.3V$, $V_{OUT}=3.3V$
Figure 22. Load Transient (150 mA to 1 mA)



Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=6.0V$, $V_{OUT}=5.0V$
Figure 23. Load Transient (1 mA to 150 mA)

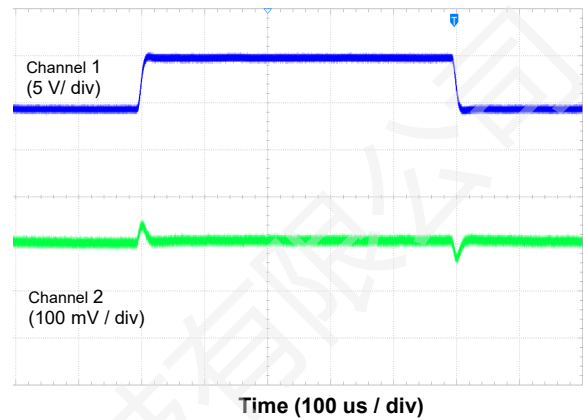


Channel 1 = I_{OUT} , channel 2 = V_{OUT} , $V_{IN}=6.0V$, $V_{OUT}=5.0V$
Figure 24. Load Transient (150 mA to 1 mA)



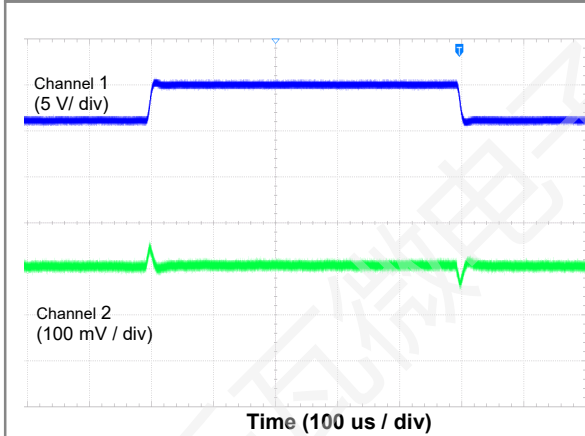
Channel 1 = V_{IN} , channel 2 = V_{OUT} , $V_{IN}=3.5V \rightarrow 10V$,
 $T_r=T_f=10\mu s$, $V_{OUT}=2.5V$, $I_{OUT}=10mA$

Figure 25. Line Transient



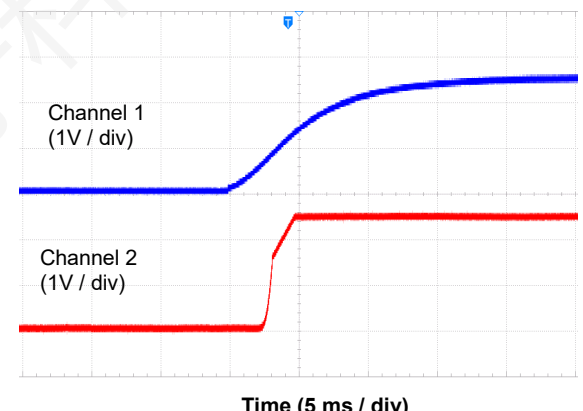
Channel 1 = V_{IN} , channel 2 = V_{OUT} , $V_{IN}=4.3V \rightarrow 10V$,
 $T_r=T_f=10\mu s$, $V_{OUT}=3.3V$, $I_{OUT}=10mA$

Figure 26. Line Transient



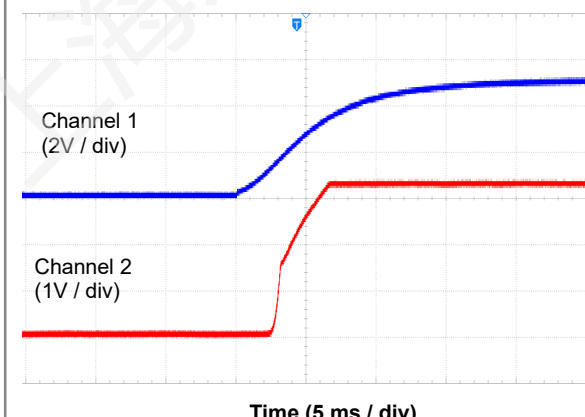
Channel 1 = V_{IN} , channel 2 = V_{OUT} , $V_{IN}=6.0V \rightarrow 10V$,
 $T_r=T_f=10\mu s$, $V_{OUT}=5.0V$, $I_{OUT}=10mA$

Figure 27. Line Transient



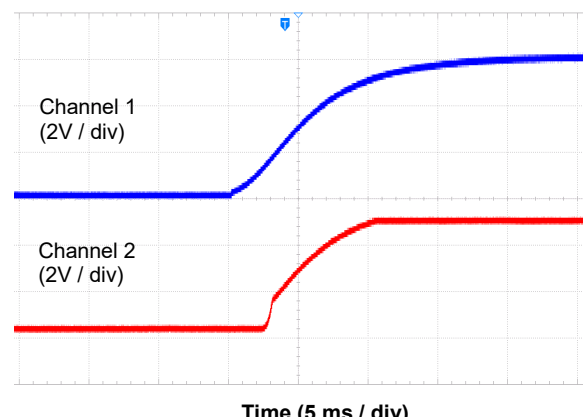
Channel 1 = V_{IN} , Channel 2 = V_{OUT} , $V_{IN}=0 \rightarrow 3.5V$, $V_{OUT}=2.5V$,
 No Load

Figure 28. Power-Up



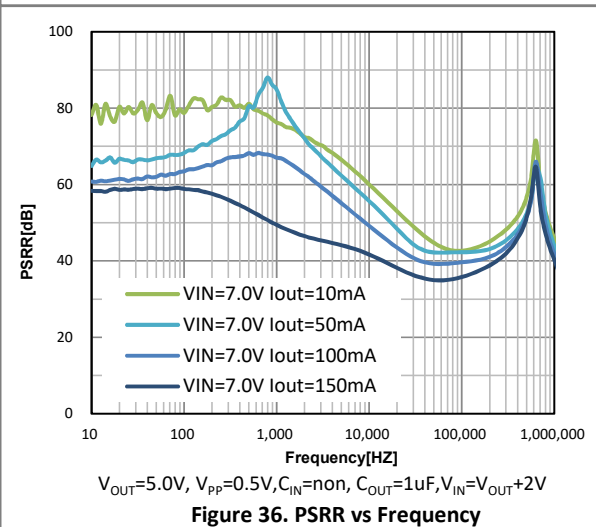
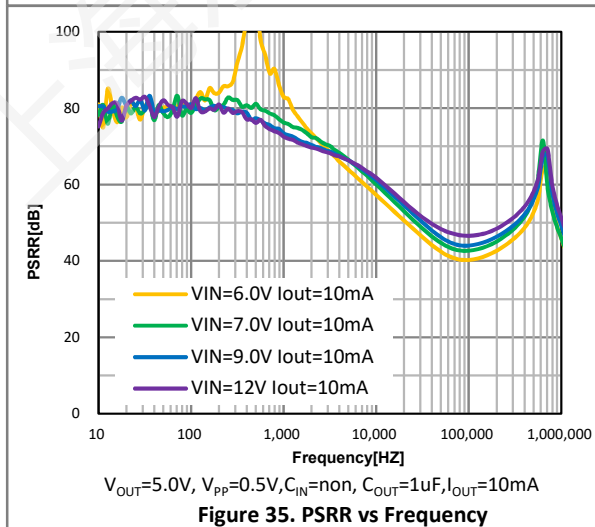
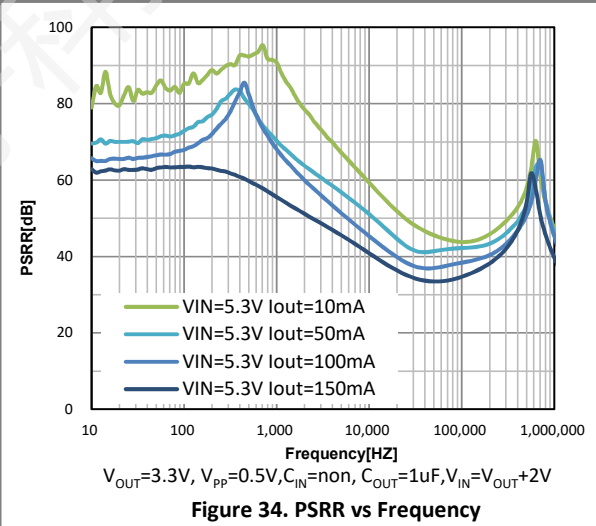
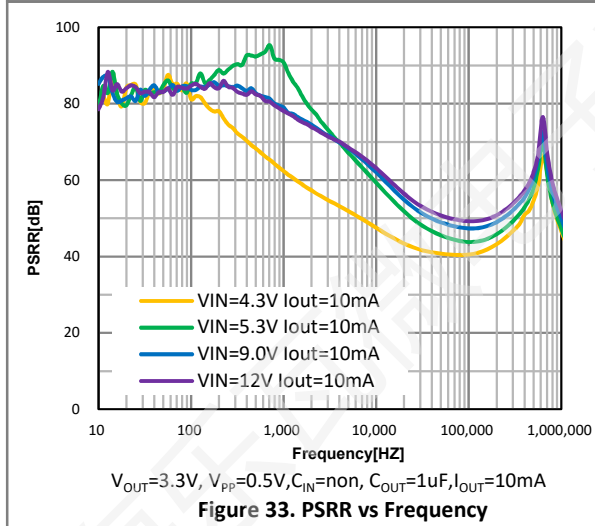
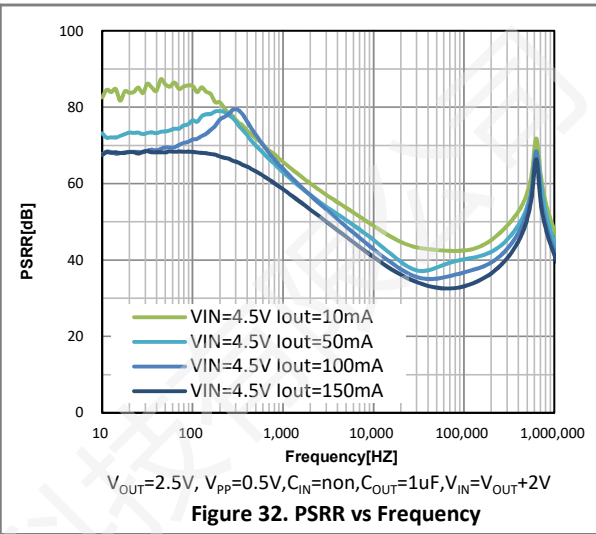
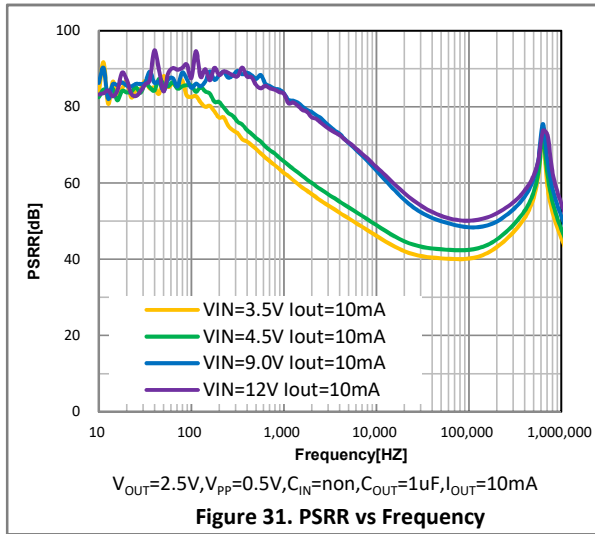
Channel 1 = V_{IN} , Channel 2 = V_{OUT} , $V_{IN}=0 \rightarrow 4.3V$, $V_{OUT}=3.3V$,
 No Load

Figure 29. Power-Up



Channel 1 = V_{IN} , Channel 2 = V_{OUT} , $V_{IN}=0 \rightarrow 6.0V$, $V_{OUT}=5.0V$,
 No Load

Figure 30. Power-Up



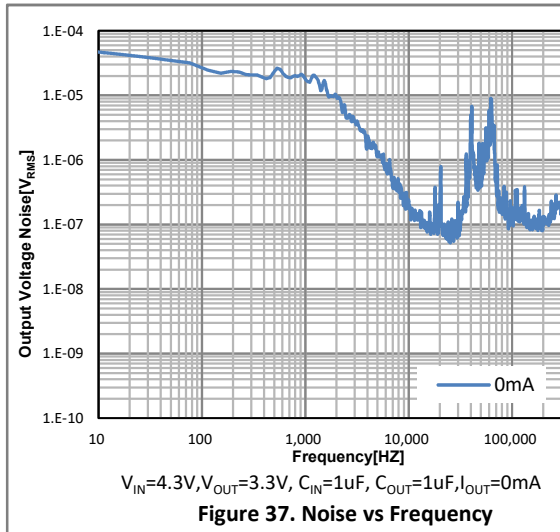


Figure 37. Noise vs Frequency

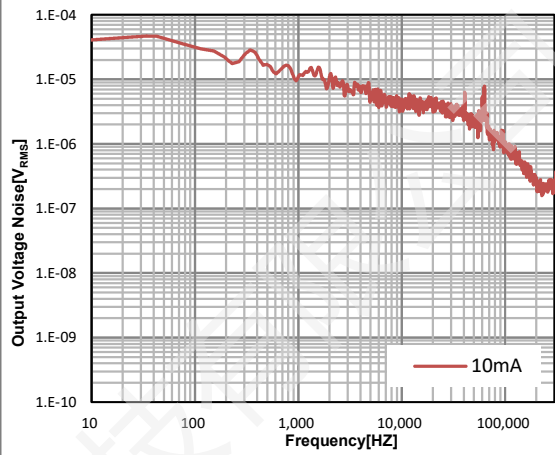


Figure 38. Noise vs Frequency

ORDER INFORMATION:

LW64①②③④⑤⑥

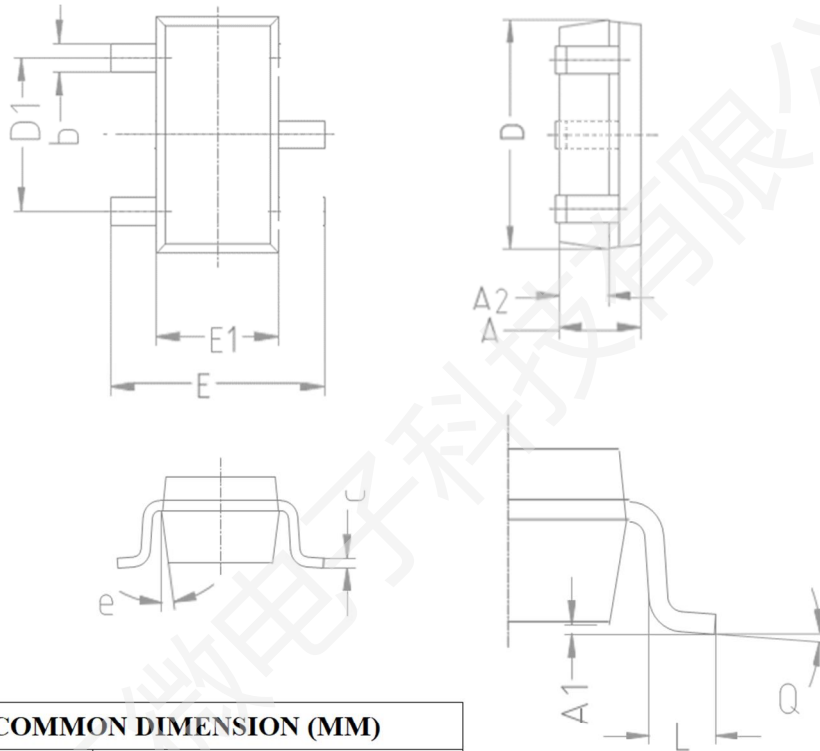
Designator	Item	Symbol	Description
①②	Output Voltage	25~50	e.g. 2.8V→①=2,②=8
③④⑤⑥	Packages	N23D	SOT23-3L
		A89C	SOT89-3L(Type-A)
		B89C	SOT89-3L(Type-B)

Part #	Output Voltage	Package	Shipping
LW6425N23D	2.5V	SOT23-3L	3000 Pcs / Tape & Reel
LW6430N23D	3.0V		
LW6433N23D	3.3V		
LW6436N23D	3.6V		
LW6440N23D	4.0V		
LW6442N23D	4.2V		
LW6450N23D	5.0V		
LW6425A89C	2.5V	SOT89-3L (Type-A)	1000 Pcs / Tape & Reel
LW6430A89C	3.0V		
LW6433A89C	3.3V		
LW6436A89C	3.6V		
LW6440A89C	4.0V		
LW6442A89C	4.2V		
LW6450A89C	5.0V		
LW6425B89C	2.5V	SOT89-3L (Type-B)	1000 Pcs / Tape & Reel
LW6430B89C	3.0V		
LW6433B89C	3.3V		
LW6436B89C	3.6V		
LW6440B89C	4.0V		
LW6442B89C	4.2V		
LW6450B89C	5.0V		

If customers have special output voltage requirements, please contact us.

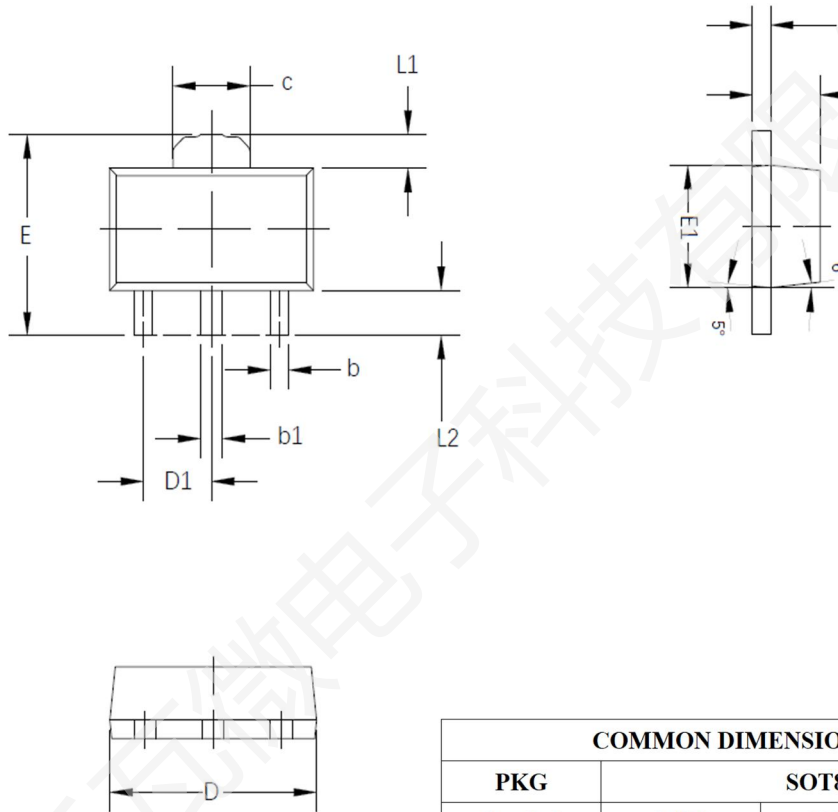
PACKAGE OUTLINE:

SOT23-3L Package



COMMON DIMENSION (MM)			
PKG	SOT23-3L		
Symbol	MIN	NOM	MAX
A	1.050	1.100	1.150
A1	0.010	0.060	0.150
A2	0.640	0.670	0.700
b	0.300	0.350	0.400
c	0.125	0.150	0.175
D	2.870	2.925	2.980
D1	1.800	1.900	2.000
E	2.650	2.825	3.000
E1	1.550	1.610	1.670
L	0.300	0.450	0.600
e	8°		
Q	0°	4°	8°

SOT89-3L Package



COMMON DIMENSION (MM)			
PKG	SOT89-3L		
Symbol	MIN	NOM	MAX
A	1.450	1.500	1.550
A1	0.350	0.400	0.450
b	0.350	0.430	0.500
b1	0.430	0.500	0.570
C	1.650	1.700	1.750
D	4.450	4.550	4.700
D1	1.470	1.500	1.550
E	4.100	4.200	4.300
E1	2.450	2.550	2.650
L1	0.630	0.700	0.770
L2	0.900	0.950	1.000

Revision History:

Revision	Date	Descriptions
Rev 0.1	Aug.2025	Initial Version
Rev 1.0	Sep.2025	Formal Version
Rev 1.1	Jan.2026	Update ETable

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