GENERAL DESCRIPTION

The LW64XX series is a group of 40V high accuracy LDO. The 2.5μA 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.

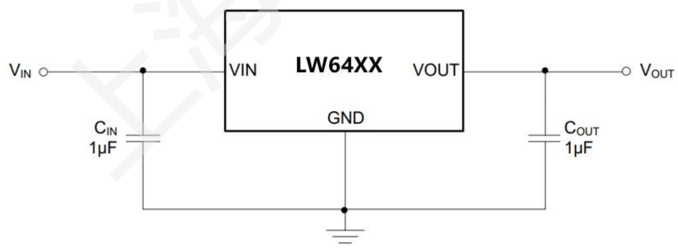
FEATURES

- Low Power Consumption: 2.5μA(Typ.)
- Operating Voltage Range: from 3.5V to 40V
- Output Voltage Range: from 2.5V to 5.0V
- Maximum Output Current: 150mA
- Output Accuracy: ±1.0%
- Low Dropout Voltage:810mV@150mA/3.3V
- High PSRR: 85dB@1KHz, 10mA
- Current Limiting Protection
- Output Short-Circuit Protection
- Over-Temperature Protection
- Stable with 1uF Output Capacitor

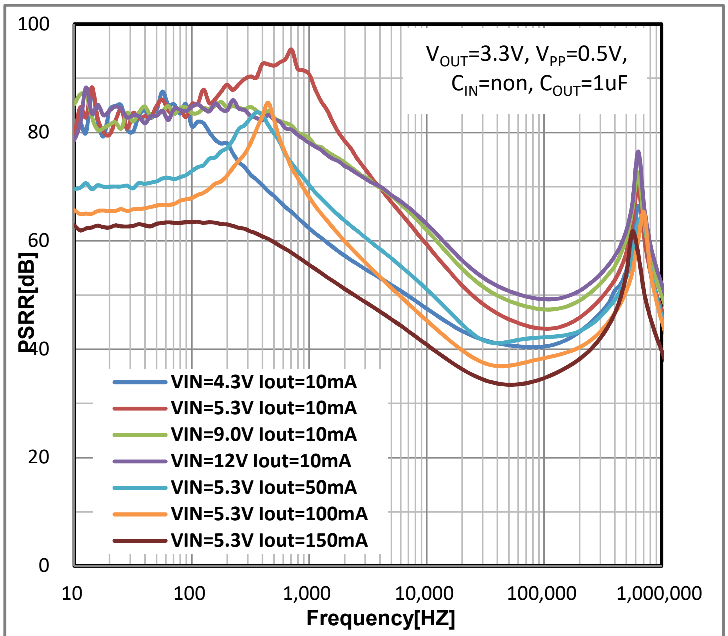
APPLICATIONS

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

TYPICAL APPLICATION CIRCUIT



TYPICAL PERFORMANCE CHARACTERISTICS

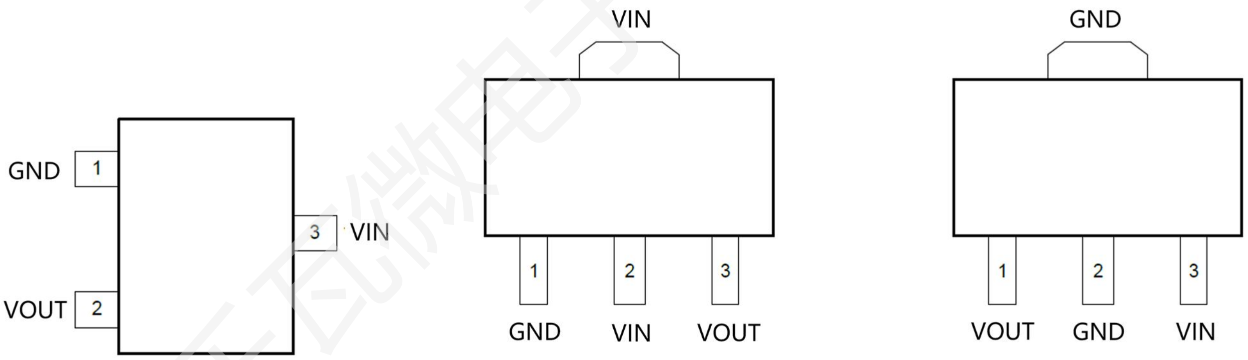


PSRR vs Frequency

PIN DESCRIPTION:

PIN No			SYMBOL	DESCRIPTTION
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



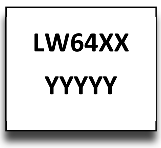
SOT23-3L SOT89-3L(Type-A) SOT89-3L(Type-B)

MARK INFORMATION:

SOT23-3L/SOT89-3L

XX: VOLTAGE

Y: DATE CODE



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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
P_D	Maximum Power Dissipation[3]	SOT23-3L	0.36	W
		SOT89-3L(Type-A)	1.0	
		SOT89-3L(Type-B)	1.25	
$R_{\theta JA}$	Junction-to-ambient Thermal Resistance[3]	SOT23-3L	350	℃/W
		SOT89-3L(Type-A)	125	℃/W
		SOT89-3L(Type-B)	100	℃/W
T_J	Junction Temperature Range		-40~150	℃
T_{STG}	Storage Temperature Range		-40~150	℃
T_{SOLDER}	Lead Temperature (Soldering)		260℃, 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

RECOMMANDED 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	℃

ELECTRICAL CHARACTERISTICS:

(V_{IN}=V_{OUT}+1V or 2V, whichever is greater, C_{IN}=C_{OUT}=1uF, unless otherwise specified, Typical values are at T_A =25℃.)

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(1)			150	230		mA
I_Q	Quiescent Current	V_{IN}=V_{OUT}+1V, No Load			2.5	5.0	μA
V_{DROP}	Dropout Voltage(1) (2)	I_{OUT}=50mA, V_{OUT}=2.5V			325		mV
		I_{OUT}=100mA, V_{OUT}=2.5V			655		
		I_{OUT}=150mA, V_{OUT}=2.5V			985		
		I_{OUT}=50mA, V_{OUT}=3.3V			260		
		I_{OUT}=100mA, V_{OUT}=3.3V			530		
		I_{OUT}=150mA, V_{OUT}=3.3V			815		
		I_{OUT}=50mA, V_{OUT}=5.0V			245		
		I_{OUT}=100mA, V_{OUT}=5.0V			500		
		I_{OUT}=150mA, V_{OUT}=5.0V			825		
ΔV_{OUT}/ (ΔV_{IN}*$V_{OUT(NOM)}$)	Line Regulation	V_{IN}= $V_{OUT(NOM)}$ +1V to 40V, I_{OUT}=1mA			0.01	0.02	%/V
ΔV_{OUT}	Load Regulation	V_{IN}= $V_{OUT(NOM)}$ +1V, 1mA≤I_{OUT}≤150mA			20	40	mV
I_{SHORT}	Short Current(1)	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		℃
ΔT_{SD}	TSD Hysteresis	Temperature falling			30		℃

NOTES:

1. Guaranteed by design
2. The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} =95%*$V_{OUT(NOM)}$

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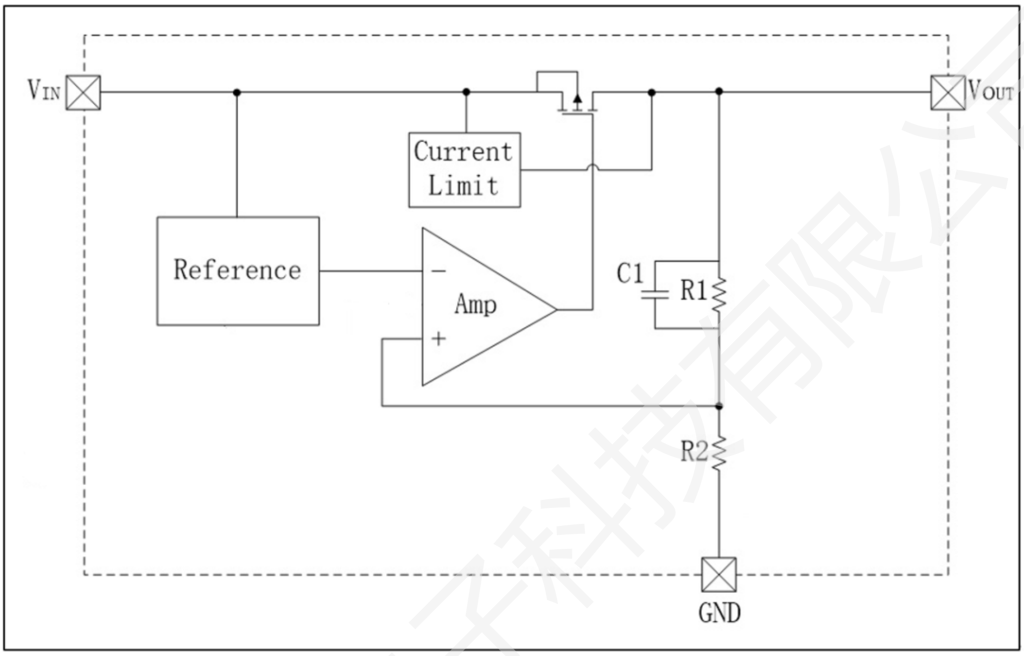
SIMPLIFIED BLOCK DIAGRAM:



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 >=1μF 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.

- **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 1μF 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.

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- **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.

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TYPICAL OPERATING CHARACTERISTICS:

（*Tested under* T_A *=25*°C, C_{IN}=C_{OUT}=1uF, unless otherwise specified）

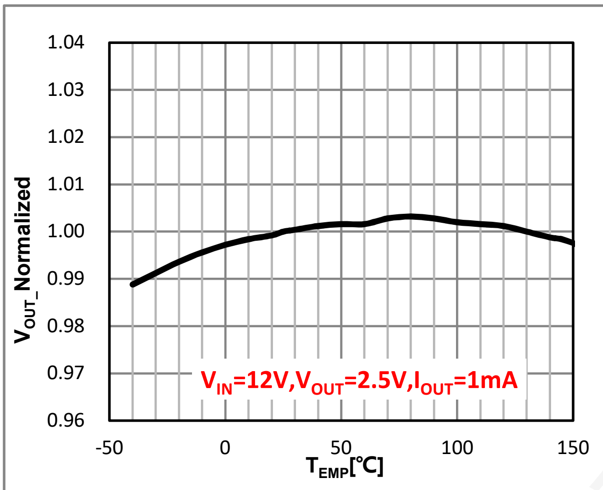

Figure 1. V_{OUT} vs Temperature

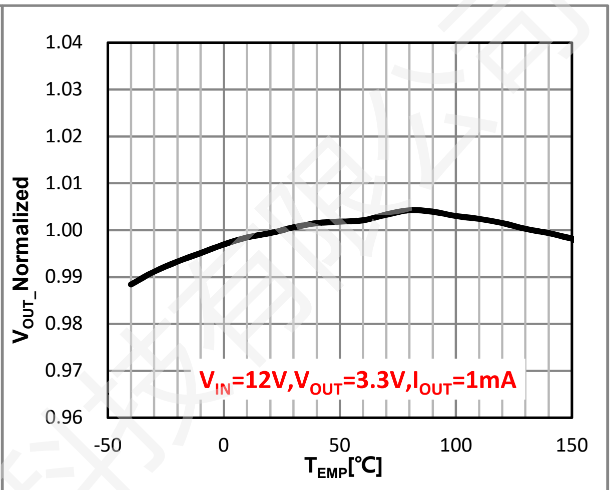

Figure 2. V_{OUT} vs Temperature

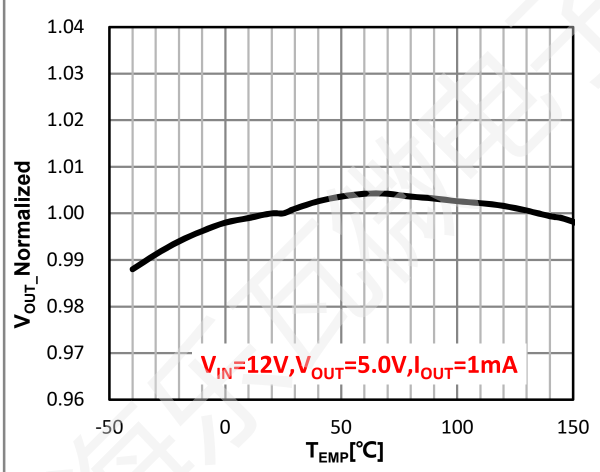

Figure 3. V_{OUT} vs Temperature

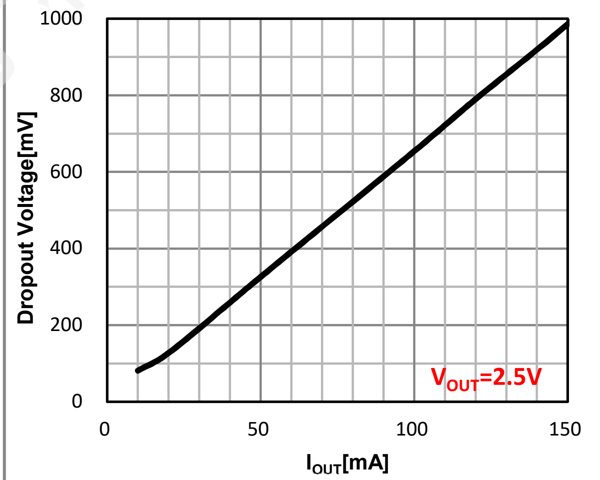

Figure 4. Dropout Voltage VS I_{OUT}

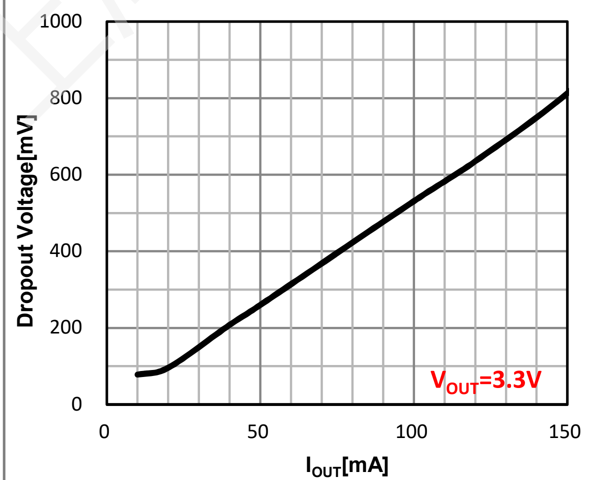

Figure 5. Dropout Voltage VS I_{OUT}

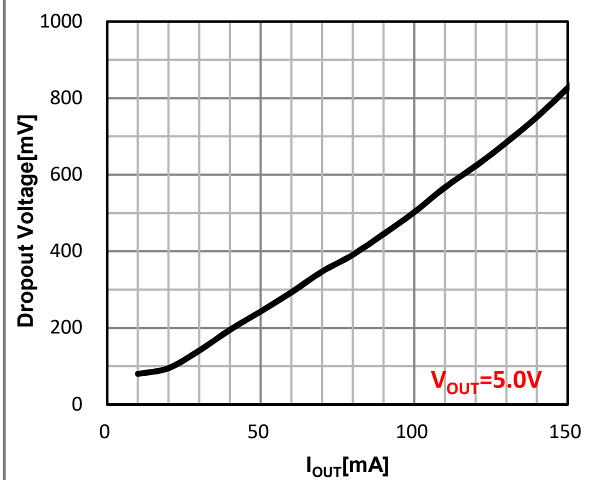

Figure 6. Dropout Voltage VS I_{OUT}

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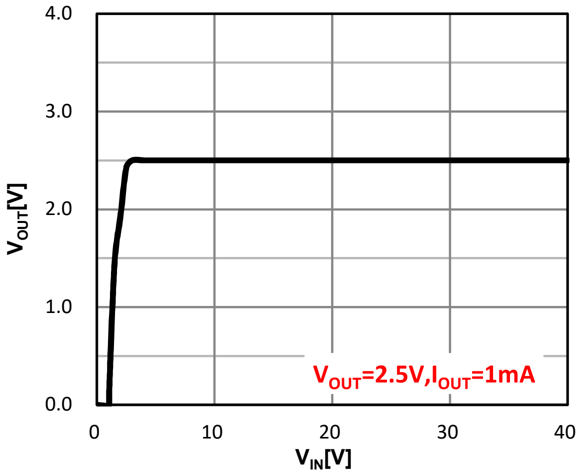

Figure 7. V_{OUT} vs V_{IN}

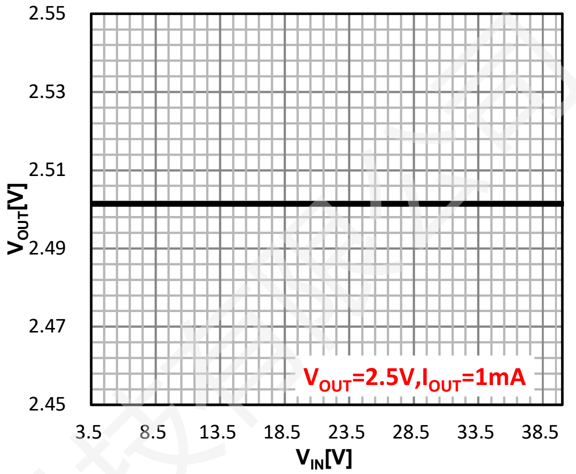

Figure 8. Line Regulation

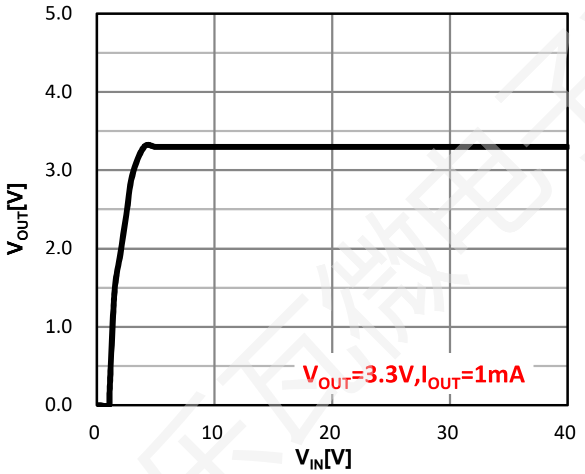

Figure 9. V_{OUT} vs V_{IN}

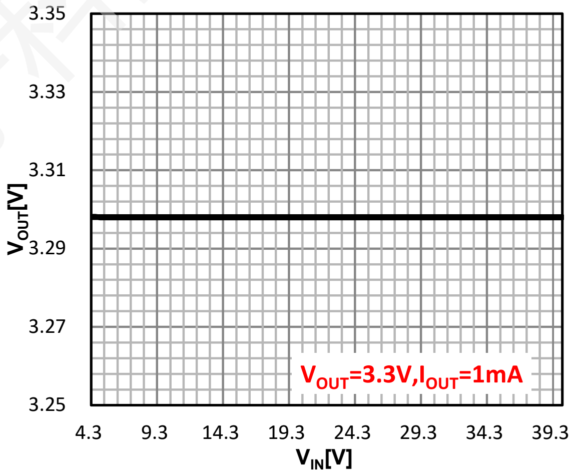

Figure 10. Line Regulation

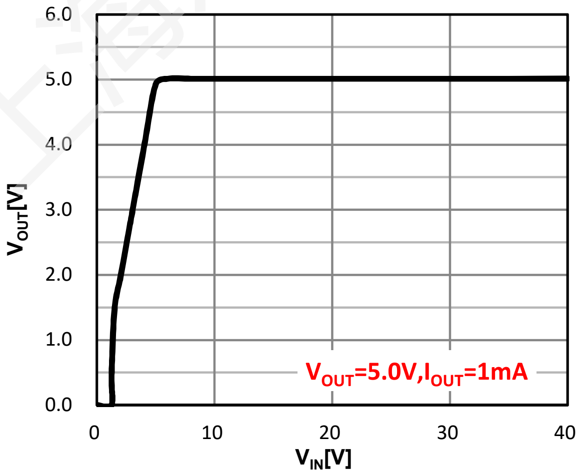

Figure 11. V_{OUT} vs V_{IN}

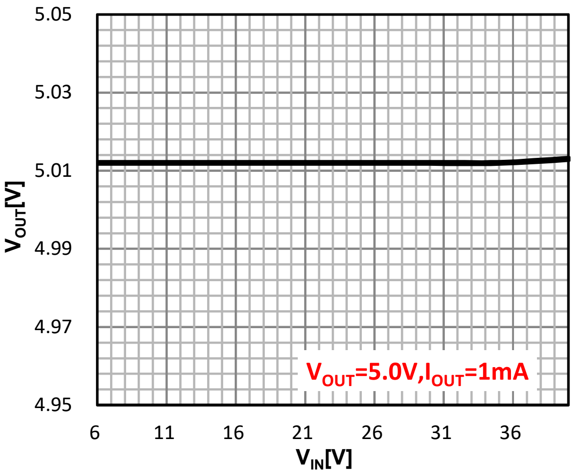

Figure 12. Line Regulation

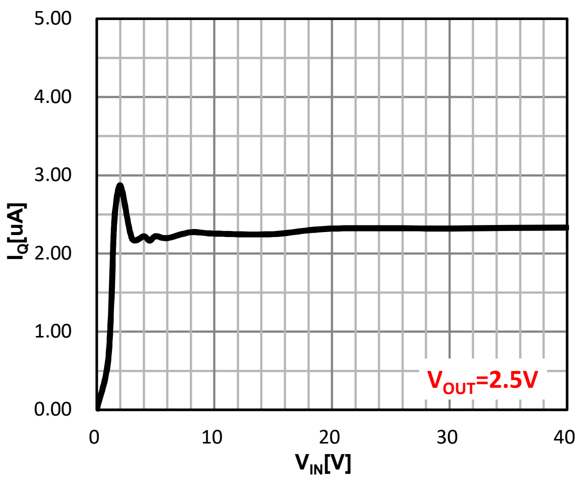

Figure 13. I_Q vs V_{IN}

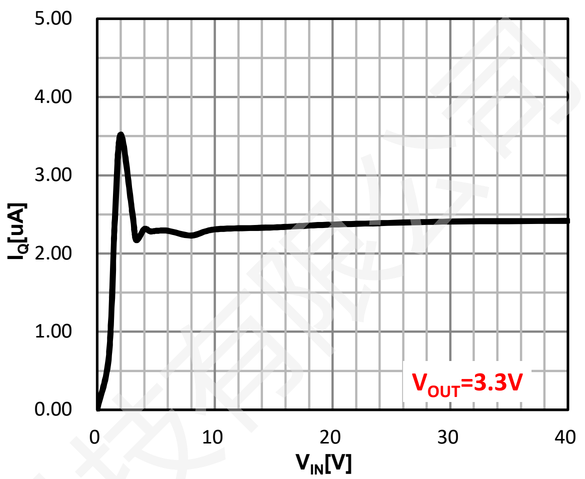

Figure 14. I_Q vs V_{IN}

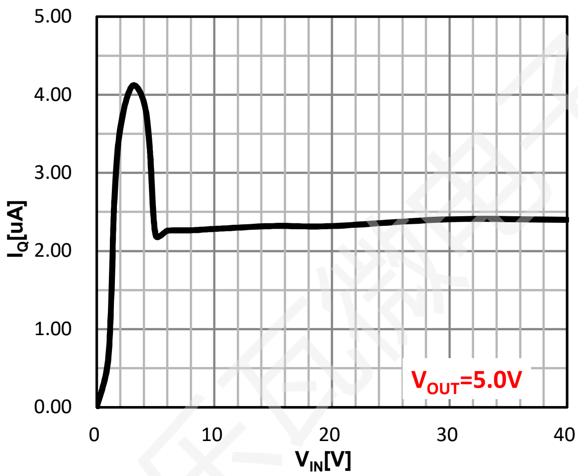

Figure 15. I_Q vs V_{IN}

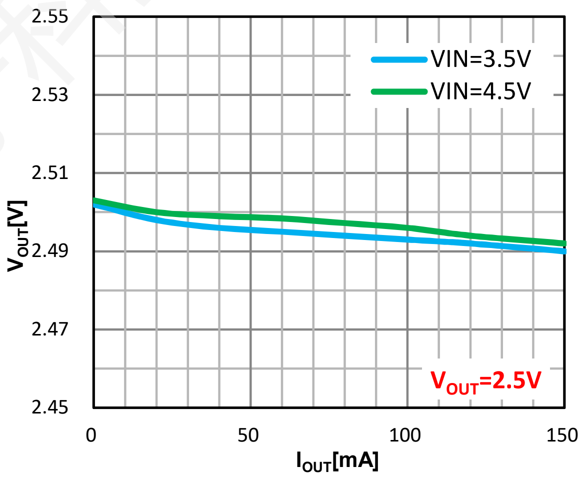

Figure 16. Load Regulation

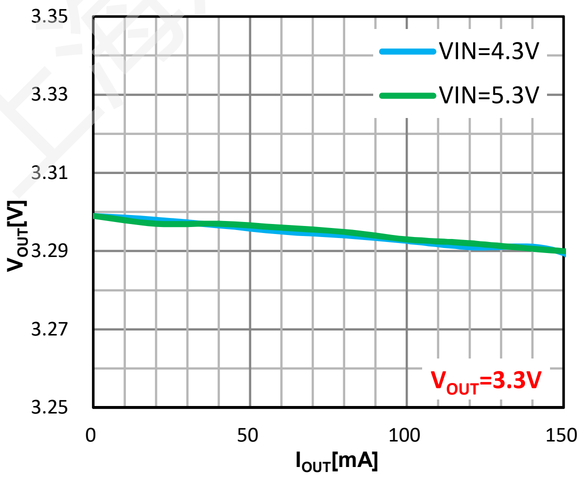

Figure 17. Load Regulation

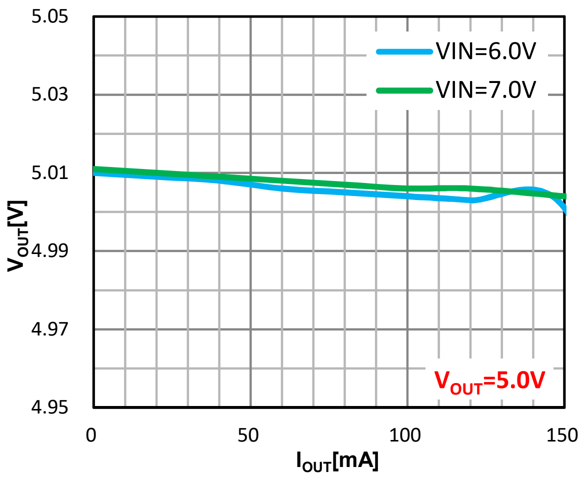

Figure 18. Load Regulation

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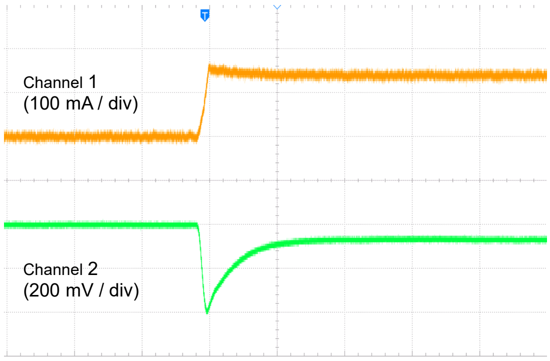
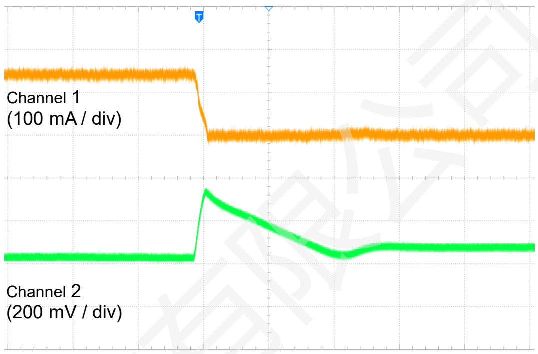


Time (100 us / div)

Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=3.5V, V_{OUT}=2.5V

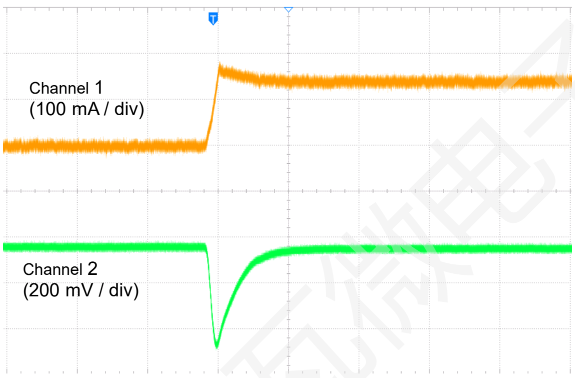
Figure 19. Load Transient (1 mA to 150 mA)



Time (100 us / div)

Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=3.5V, V_{OUT}=2.5V

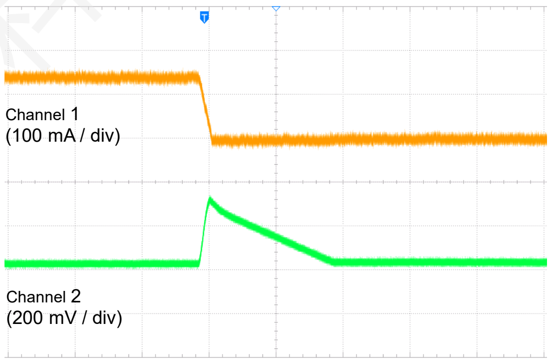
Figure 20. Load Transient (150 mA to 1 mA)



Time (200 us / div)

Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=4.3V, V_{OUT}=3.3V

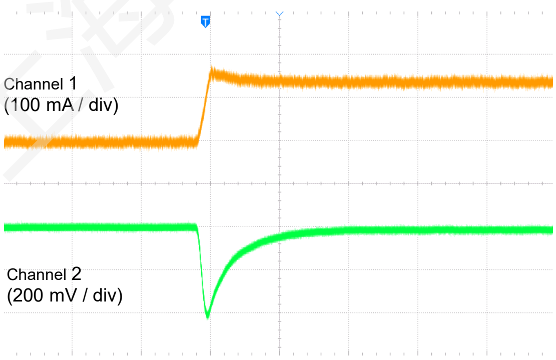
Figure 21. Load Transient (1 mA to 150 mA)



Time (200 us / div)

Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=4.3V, V_{OUT}=3.3V

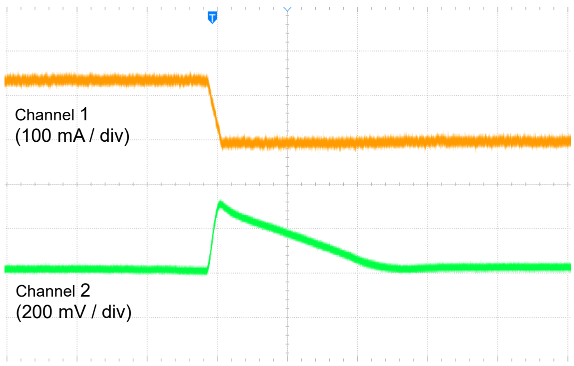
Figure 22. Load Transient (150 mA to 1 mA)



Time (200 us / div)

Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=6.0V, V_{OUT}=5.0V

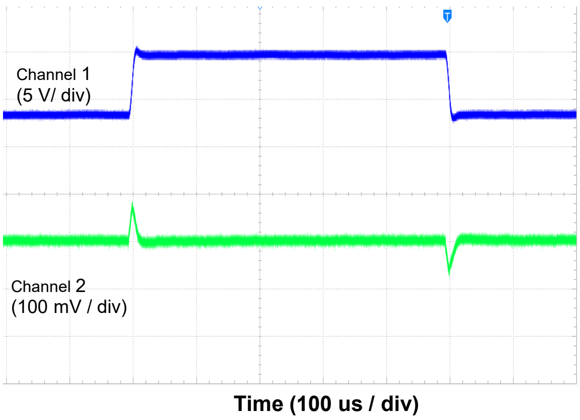
Figure 23. Load Transient (1 mA to 150 mA)



Time (200 us / div)

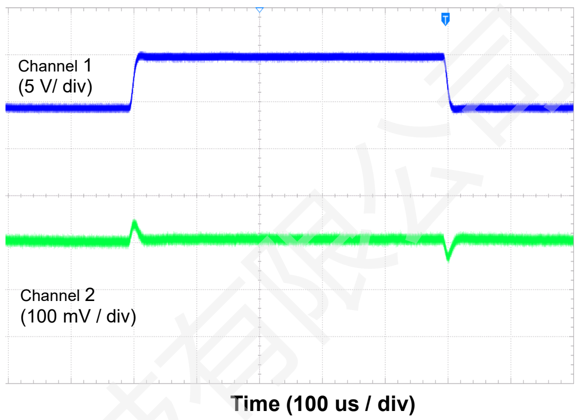
Channel 1 = I_{OUT}, channel 2 =V_{OUT}, V_{IN}=6.0V, V_{OUT}=5.0V

Figure 24. Load Transient (150 mA to 1 mA)



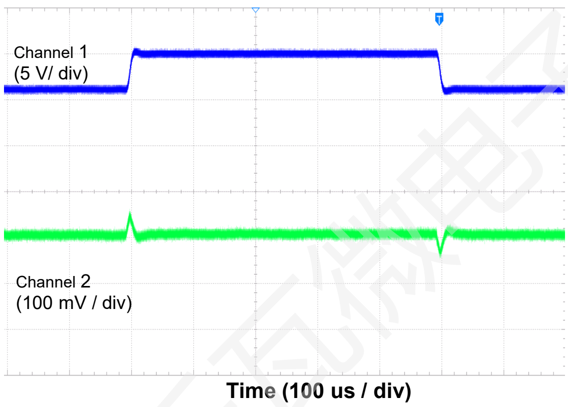
Channel 1 = V_{IN}, channel 2 = V_{OUT}, V_{IN}=3.5V→10V,
Tr=Tf=10us, V_{OUT}=2.5V, I_{OUT}=10mA

Figure 25. Line Transient



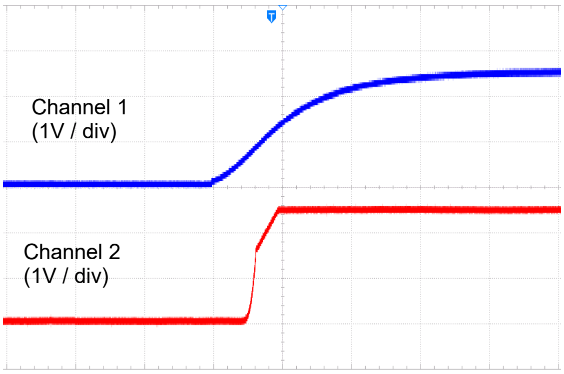
Channel 1 = V_{IN}, channel 2 = V_{OUT}, V_{IN}=4.3V→10V,
Tr=Tf=10us, V_{OUT}=3.3V, I_{OUT}=10mA

Figure 26. Line Transient



Channel 1 = V_{IN}, channel 2 = V_{OUT}, V_{IN}=6.0V→10V,
Tr=Tf=10us, V_{OUT}=5.0V, I_{OUT}=10mA

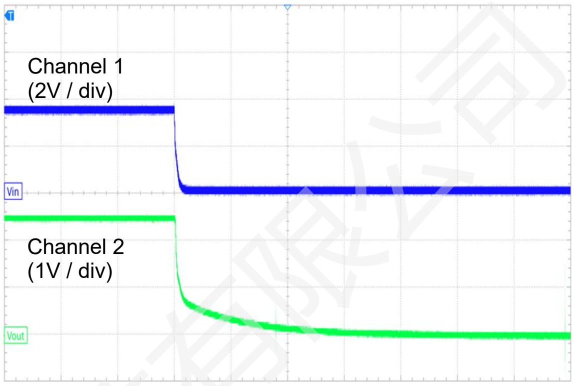
Figure 27. Line Transient



Time (5 ms / div)

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

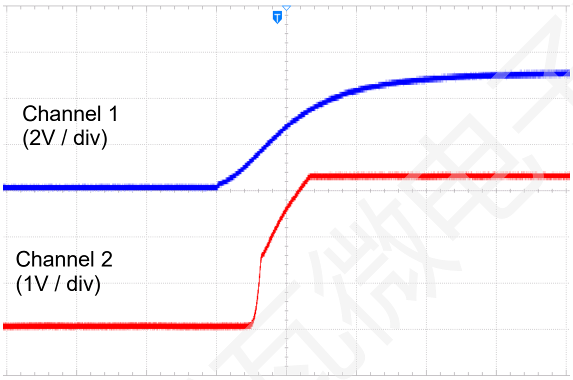
Figure 28. Power-Up



Time (2 ms / div)

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

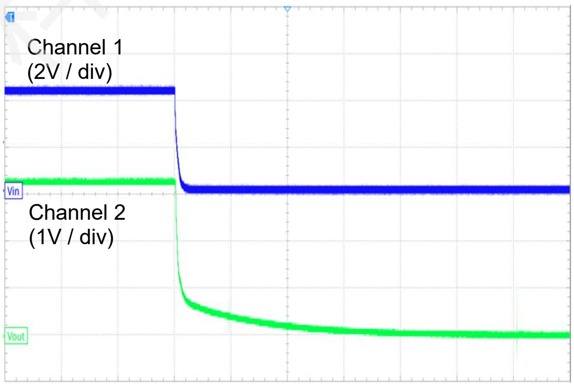
Figure 29. Shut-Down



Time (5 ms / div)

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

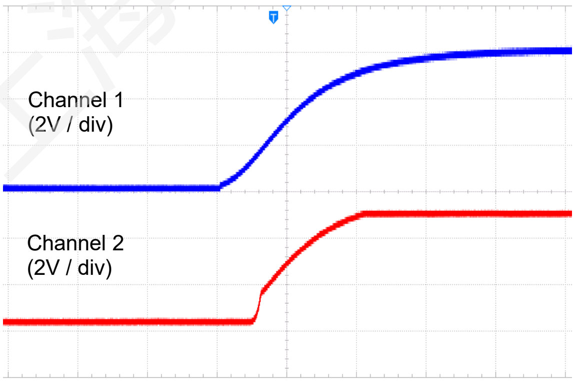
Figure 30. Power-Up



Time (2 ms / div)

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

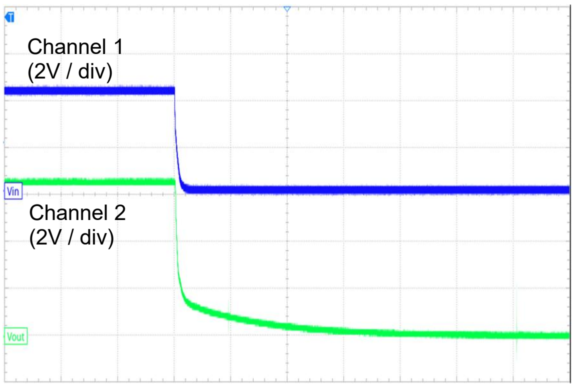
Figure 31. Shut-Down



Time (5 ms / div)

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

Figure 32. Power-Up



Time (10 ms / div)

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

Figure 33. Shut-Down

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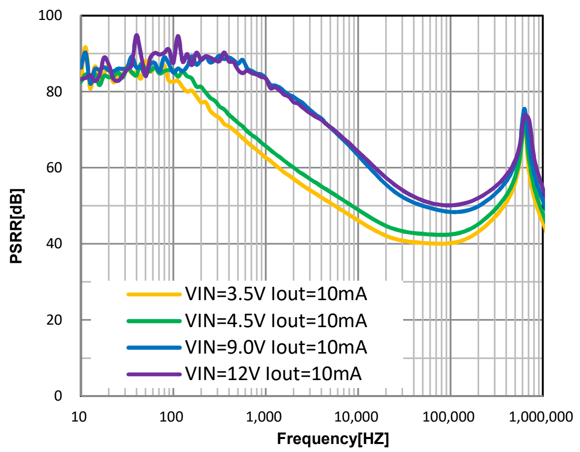
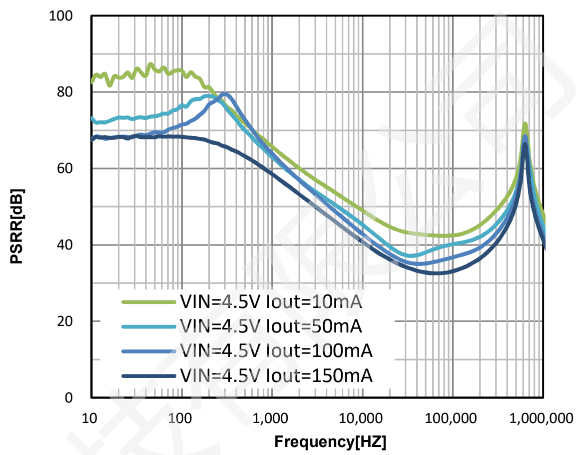


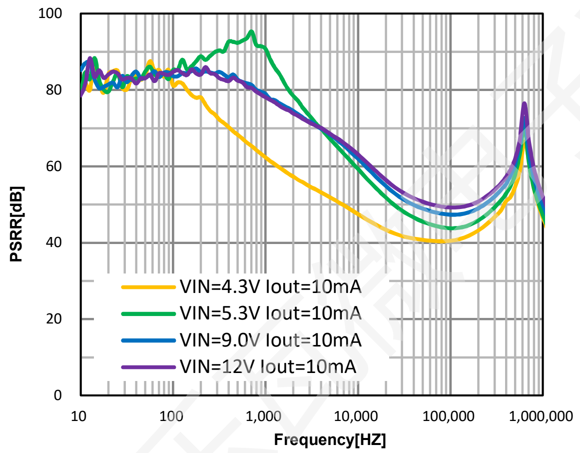
V_{OUT}=2.5V,V_{PP}=0.5V,C_{IN}=non,C_{OUT}=1uF,I_{OUT}=10mA

Figure 34. PSRR vs Frequency



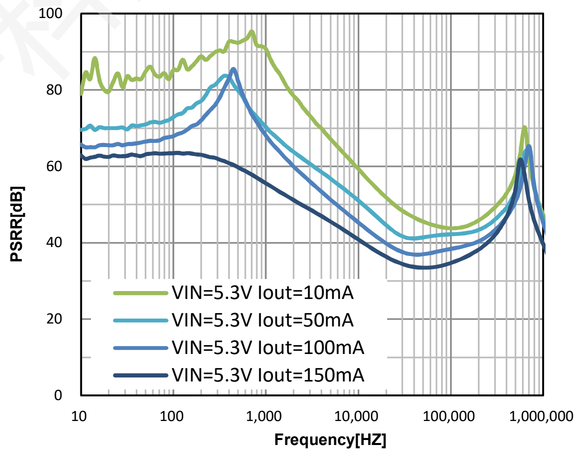
V_{OUT}=2.5V, V_{PP}=0.5V,C_{IN}=non,C_{OUT}=1uF,V_{IN}=V_{OUT}+2V

Figure 35. PSRR vs Frequency



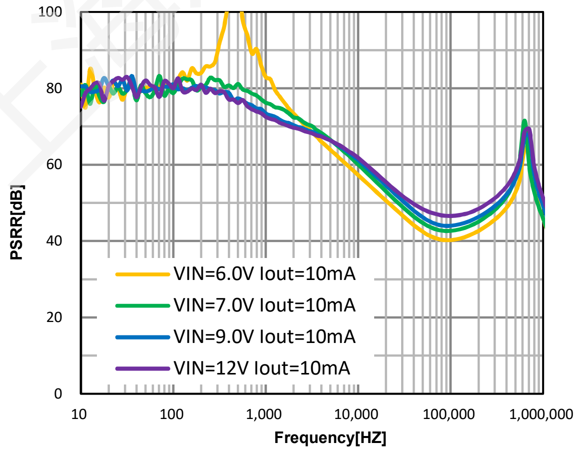
V_{OUT}=3.3V, V_{PP}=0.5V,C_{IN}=non, C_{OUT}=1uF,I_{OUT}=10mA

Figure 36. PSRR vs Frequency



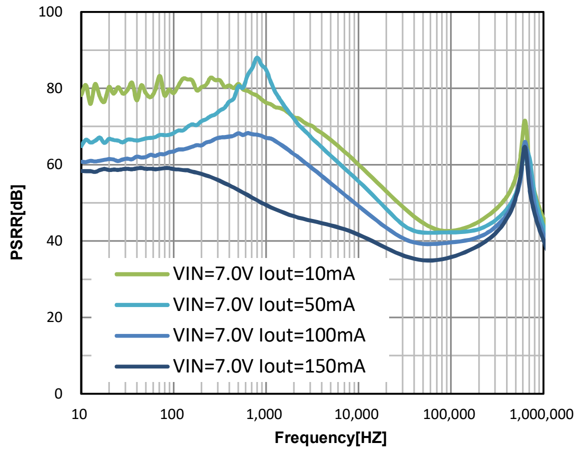
V_{OUT}=3.3V, V_{PP}=0.5V,C_{IN}=non, C_{OUT}=1uF,V_{IN}=V_{OUT}+2V

Figure 37. PSRR vs Frequency



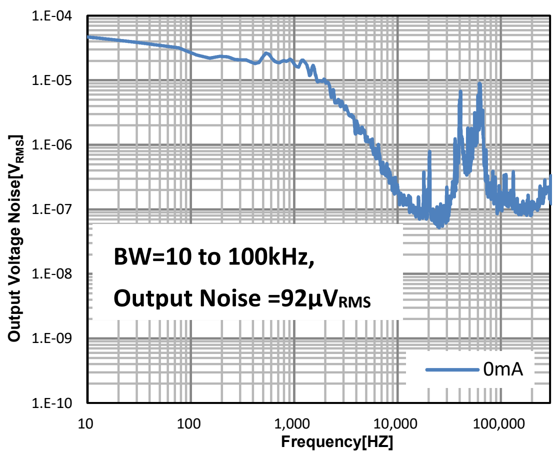
V_{OUT}=5.0V, V_{PP}=0.5V,C_{IN}=non, C_{OUT}=1uF,I_{OUT}=10mA

Figure 38. PSRR vs Frequency



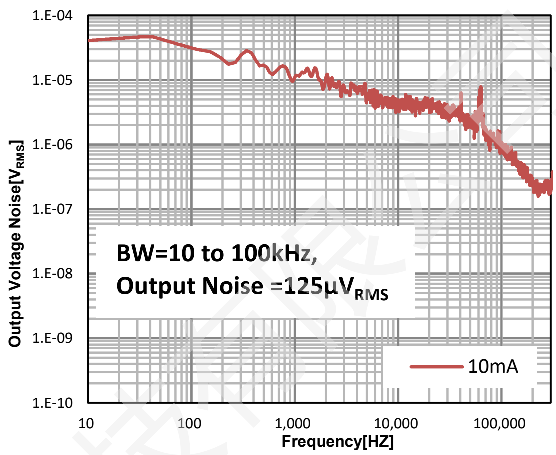
V_{OUT}=5.0V, V_{PP}=0.5V,C_{IN}=non, C_{OUT}=1uF,V_{IN}=V_{OUT}+2V

Figure 39. PSRR vs Frequency



V_{IN}=4.3V,V_{OUT}=3.3V, C_{IN}=1uF, C_{OUT}=1uF,I_{OUT}=0mA

Figure 40. Noise vs Frequency



V_{IN}=4.3V,V_{OUT}=3.3V, C_{IN}=1uF, C_{OUT}=1uF,I_{OUT}=10mA

Figure 41. Noise vs Frequency

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ORDER INFORMATION:

LW64①②③④⑤⑥

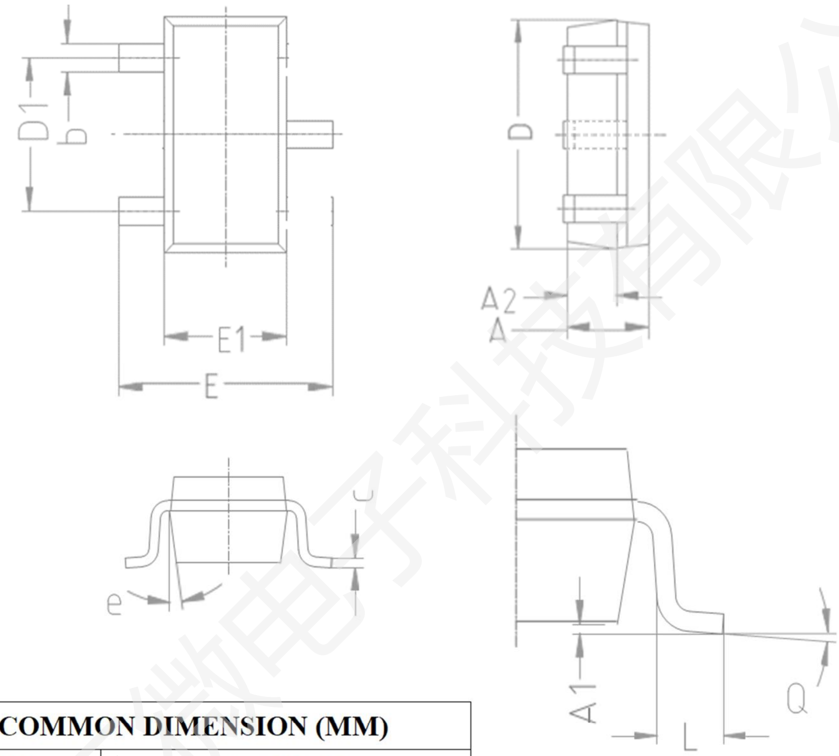
Designator	Item	Symbol	Description
①②	Output Voltage	25~50	e.g.2.8V→①=2,②=8
③④⑤⑥	Packages	N23D	SOT23-3L
		A89C	SOT89-3L(Type-A)
		B89C	SOT89-3L(Type-B)

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.

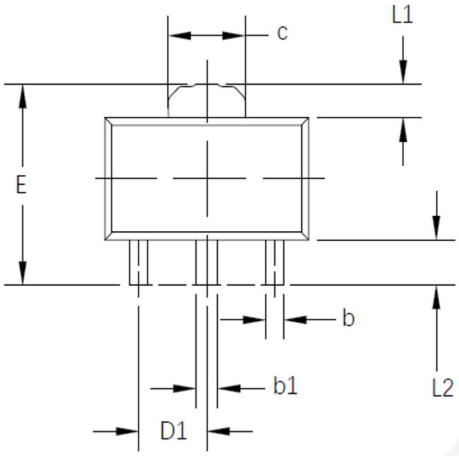
PACKAGE OUTLINE：

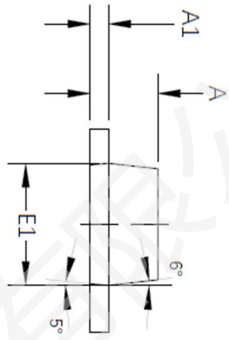
SOT23-3L Package

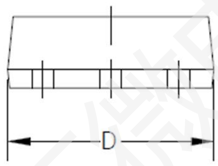


COMMON DIMENSION (MM)			
PKG	SOT23-3L		
Symbol	**MIN**	**NOM**	**MAX**
A	1.050	1.100	1.150
A1	0.010	0.060	0.150
A2	0.640	0.670	0.700
b	0.300	0.350	0.400
c	0.125	0.150	0.175
D	2.870	2.925	2.980
D1	1.800	1.900	2.000
E	2.650	2.825	3.000
E1	1.550	1.610	1.670
L	0.300	0.450	0.600
e	8°		
Q	0°	4°	8°

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

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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 Eletrical Characteristcs
Rev 1.2	Feb.2026	Update Features & Eletrical Characteristcs

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