Description

The WL9015 series are high accuracy, CMOS LDO Voltage Regulators, offering Low Power Consumption, high ripple rejection ratio and low dropout.Internally. The WL9015 includes a reference voltage source, error amplifiers, driver transistors, current limiters and phase compensators. The WL9015 's current limiters' foldback circuit also operates as a short protect for the output current limiter and the output pin.

The WL9015 series is also fully compatible with low ESR ceramic capacitors, reducing cost and improving output stability. This high level of output stability is maintained even during frequent load fluctuations, due to the excellent transient response performance and high PSRR achieved across a broad range of frequencies. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption,ideal for powering the battery equipment to a longer service life.

Features

- Low Power Consumption: 2 μA (Typ)
- Maximum Output Current: 500mA
- Low Dropout Voltage: 150mV@100mA (V_{OUT}=3.3V)
- Operating Voltage Range: 2.5V ~ 24V
- Output Voltage Accurate: ± 1%
- High PSRR: 70dB @1kHz
- Good Transient Response
- Integrated Short-Circuit Protection
- Over-Temperature Protection
- Output Current Limit
- Low Temperature Coefficient
- Stable with Ceramic Capacitor
- RoHS Compliant and Lead (Pb) Free
- -40°C to +85°C Operating Temperature Range
- Fixed Output Voltage Versions:1.8,2.5,2.8,3.0,3.3,3.6,4.0,4.2,4.4 and 5.0V
- Available in Green SOT23-3, SOT23-5, SOT89-3, SOT89-5, DFN2x2-6L Packages

Applications

- Portable, Battery Powered Equipment
- Smoke detector and sensor
- Audio/Video Equipmen
- Weighting Scales
- Home Automation
- Electronic fingerprint lock

Application Circuits

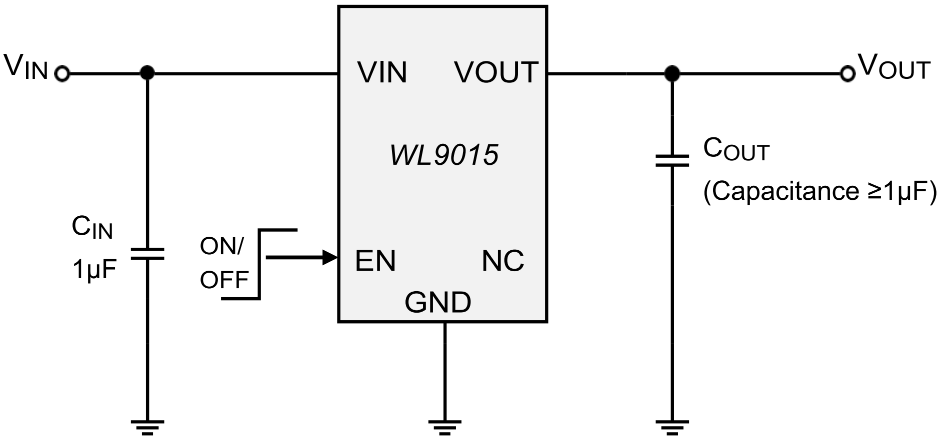
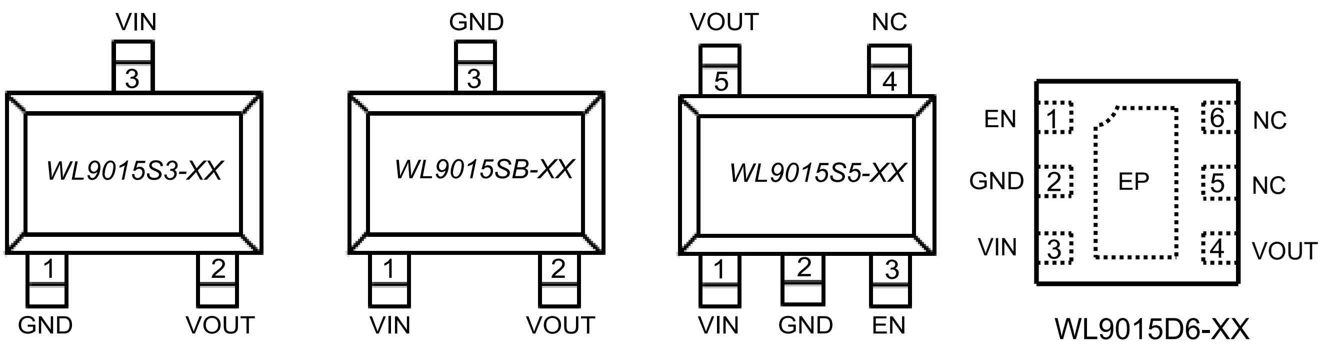


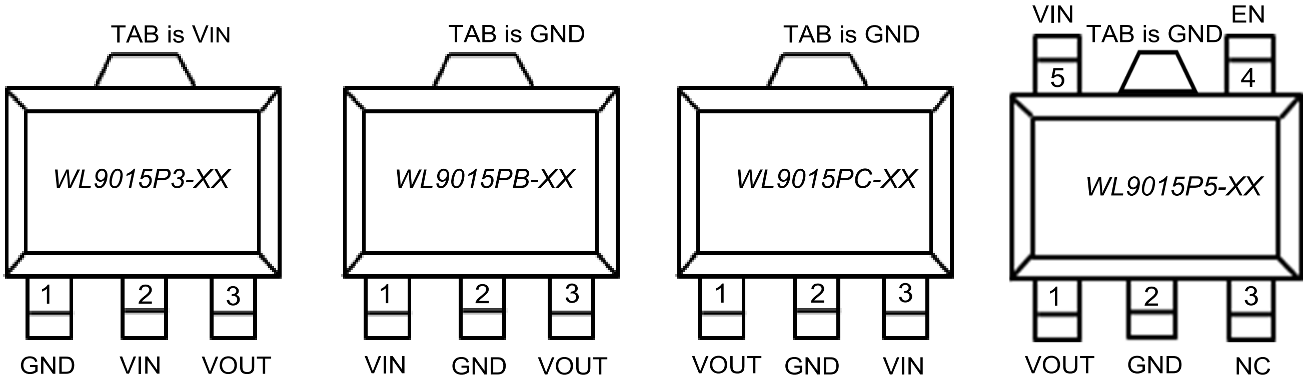
Figure 1. WL9015 Typical Application Circuit

Pin Configuration （TOP VIEW）



SOT23-3 SOT23-3(B-Type) SOT23-5

WL9015D6-XX
DFN-6L (2mm × 2mm)
0.8mm height(max),0.65mm pitch



SOT89-3 SOT89-3(B-Type) SOT89-3(C-Type) SOT89-5

Pin Description

Pin No.								Pin Name	Pin Function
SOT23-3		SOT89-3			SOT23-5	SOT89-5	DFN2X2-6		
S3	SB	P3	PB	PC	S5	P5	D6		
1	3	1	2	2	2	2	2	GND	Ground
3	1	2	1	3	1	5	3	VIN	Power Input
2	2	3	3	1	5	1	4	VOUT	Output Voltage
-----	-----	-----	-----	-----	3	4	1	EN	Enable Control Input
-----	-----	-----	-----	-----	4	3	5、6	NC	No Connect
EP / TAB	In PCB layout, prefer to use large copper area to cover this pad for better thermal dissipation								

Order Information

WL9015①②-③④

Designator	Symbol	Description
①②	S3 , S5 , D6 , P3 , P5	SOT23-3L , SOT23-5L , DFN6L , SOT89-3L , SOT89-5L
③④	Integer e.g 1.8=18	Output Voltage 1.8,2.5,2.8,3.0,3.3,3.6,4.0,4.2,4.4 and 5.0V

Part NO.	Description	Package	T/R Qty
WL9015S3-XX	WL9015 24V ,2μA IQ ,High PSRR ,500mA Low-Dropout LDO	SOT23-3L	3,000 PCS
WL9015S5-XX		SOT23-5L	3,000 PCS
WL9015D6-XX		DFN2X2-6L	5,000 PCS
WL9015P3-XX		SOT89-3L	1,000 PCS
WL9015P5-XX		SOT89-5L	1,000 PCS

Marking Information

For marking information, contact our sales representative directly

Pb-free, Green RoHS

All WPMtek parts are Pb-Free and adhere to the RoHS directive.

Absolute Maximum Ratings

Item		Symbol	Rating	Unit
Supply Input Voltage		V_{IN}	-0.3 ~ 24	V
EN to GND		V_{EN}	-0.3 ~ 24	V
Regulated Output Voltage		V_{OUT}	-0.3 ~ 6.0	V
Output Current		I_{OUT}	Internally limited	mA
Power Dissipation P_D @T_A=+25℃	SOT23-3L	P_D	450	mW
	SOT23-5L		500	
	SOT89-3L		700	
	SOT89-3L(B/C-Type)		950	
	SOT89-5L		1000	
	DFN2X2-6L		500	
Thermal Resistance (Junction to air)	SOT23-3L	θ_{JA}	275	°C /W
	SOT23-5L		250	
	SOT89-3L		180	
	SOT89-3L(B/C-Type)		130	
	SOT89-5L		125	
	DFN2X2-6L		250	
Human Body Model (HBM)		±4000		V
Charged Device Mode (CDM)		±2000		V
Machine Mode (MM)		200		V
Storage Temperature Range		T_{STG}	-65 ~ +150	°C
Operating Junction Temperature		T_J	+150	°C
Lead Temperature (Soldering 10s)		T_{LEAD}	+260	°C

Note：

1、Stresses beyond 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 conditions is not implied. Exposure to absolute-maximum-rated conditions for extended period may affect device reliability.

2、Ratings apply to ambient temperature at +25°C

3、The package thermal impedance is calculated in accordance to JESD 51-7.

Recommended Operating Conditions

Item	Min	Max	Unit
Operating Ambient Temperature	-40	+85	°C
Input Voltage	2.5	12	V
Output Voltage	1.8	5.0	V

Electronic Characteristics

Test Conditions: VIN = VOUT +1V,CIN=COUT=1uF,TA=25℃,unless otherwise specifi

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage	VIN		2.5	——	24	V
Quiescent Current	IQ	VIN=12V, ILOAD=0mA	——	2	——	μA
Shutdown Current	ISHDN	EN=0 V, VOUT =0 V		0	0.2	μA
Output Voltage	VOUT	VIN =12V, ILOAD =1mA	VOUT x 0.99	——	VOUT x 1.01	V
Output Current	IOUT	VIN = VOUT +1V	500	——	——	mA
Dropout Voltage VOUT =3.3V	VDROP	ILOAD =100mA	——	150	——	mV
		ILOAD =300mA	——	400	——	
		ILOAD =500mA	——	700	——	
Line Regulation	Δ VLINE	ILOAD =10mA VOUT +1.0V ≦ VIN ≦20V	——	0.05	——	% / V
Load Regulation	Δ VLOAD	VIN = VOUT +1V 1mA≦ ILOAD ≦100mA	——	5	20	mV
EN Threshold Voltage	VCEH	CE“High”Voltage	1.5	——	——	V
	VCEL	CE“Low”Voltage	——	——	0.4	V
EN PIN Current	IEN		——	0.1	——	μA
Current Limit	ILIMIT		——	——	750	mA
Short Current	ISHORT	VOUT = GND	——	100	——	mA
Output Noise Voltage	VON	COUT =1uF, ILOAD =10mA BW = 10Hz~100kHz	——	45	——	μVrms
Power Supply Rejection Rate	PSRR	VIN = 4.3V VOUT =3.3V ILOAD =10mA f=100Hz	——	85	——	dB
		f=1KHz	——	70	——	dB
		f=10KHz	——	50	——	dB
Thermal Shutdown Temperature	T_{SHDN}	——	——	160	——	°C
Thermal Shutdown Hysteresis	ΔT_{SHD}	——	——	20	——	°C

Note : All limits specified at room temperature (TA = 25°C) unless otherwise specified. All room temperature limits are 100% production tested. All limits at temperature extremes are ensured through correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).

Functional Block Diagram

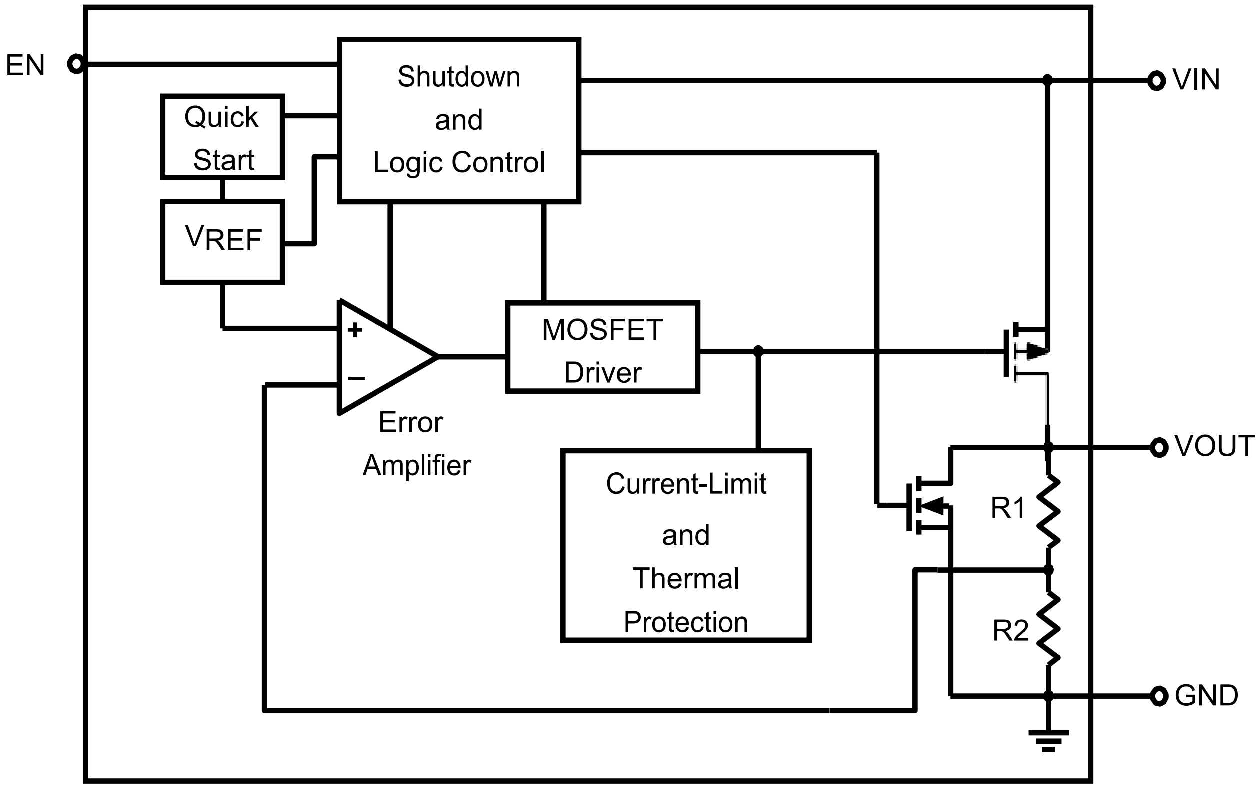


Figure 2. WL9015 Block Diagram

Application Guideline

■ Input Capacitor

A ⩾ 1μF ceramic capacitor is recommended to connect between VIN and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

■ Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is ⩾1μF, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

■ Dropout Voltage

The dropout voltage refers to the voltage difference between the VIN and VOUT pins while operating at specific output current. The dropout voltage V_{DROP} also can be expressed as the voltage drop on the pass-FET at specific output current (I_{RATED}) while the pass-FET is fully operating at ohmic region and the pass-FET can be characterized asan resistance RDS(ON). Thus the dropout voltage can bedefined as ($V_{DROP} = V_{IN} - V_{OUT} = R_{DS(ON)} \times I_{RATED}$). Fornormal operation, the suggested LDO operating range is ($V_{IN} > V_{OUT} + V_{DROP}$) for good transient response and PSRR ability. Vice versa, while operating at the ohmic region will degrade the performance severely.

■ Thermal Application

For continuous operation, do not exceed the absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated as below:

T_A=25°C, AISIS DEMO PCB

The max P_D= (Tj − T_A) / θ_{JA}.

Power dissipation (P_D) is equal to the product of the output current and the voltage drop across the output pass element, as shown in the equation below:

$P_D = (V_{IN} – V_{OUT}) \times I_{OUT}$

■ Layout Consideration

By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the WL9015 ground pin using as wide and as short of a copper trace as is practical.Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.