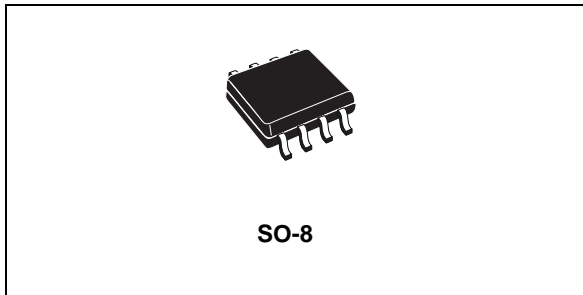


Very low drop voltage regulators with inhibit

Datasheet - production data



Description

The LK115 is a series of very low drop voltage regulators, available in SO-8 package.

The very low drop voltage (0.2 V) and very low quiescent current (0.01 μA in OFF mode, 280 μA in ON mode) make it particularly suitable for low noise, low power applications and especially in battery-powered systems.

Both active high and active low shutdown logic control are available (pin 2 and 3). This means that when the device is used as a local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption.

It only requires a 2.2 μF capacitor for stability saving space and costs.

Features

- Very low-dropout voltage (0.2 V typ.)
- Very low quiescent current (typ. 0.01 μA in OFF mode, 280 μA in ON mode)
- Output current up to 100 mA
- Two logic-controlled electronic shutdowns
- Output voltages of 3.0; 3.3; 5.0 V
- Internal current and thermal limit
- A 2.2 μF capacitor for stability
- V_{OUT} tolerance $\pm 3\%$ at 25 $^{\circ}\text{C}$
- Supply voltage rejection: 80 dB (typ.)
- Temperature range: -40 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$

Table 1. Device summary

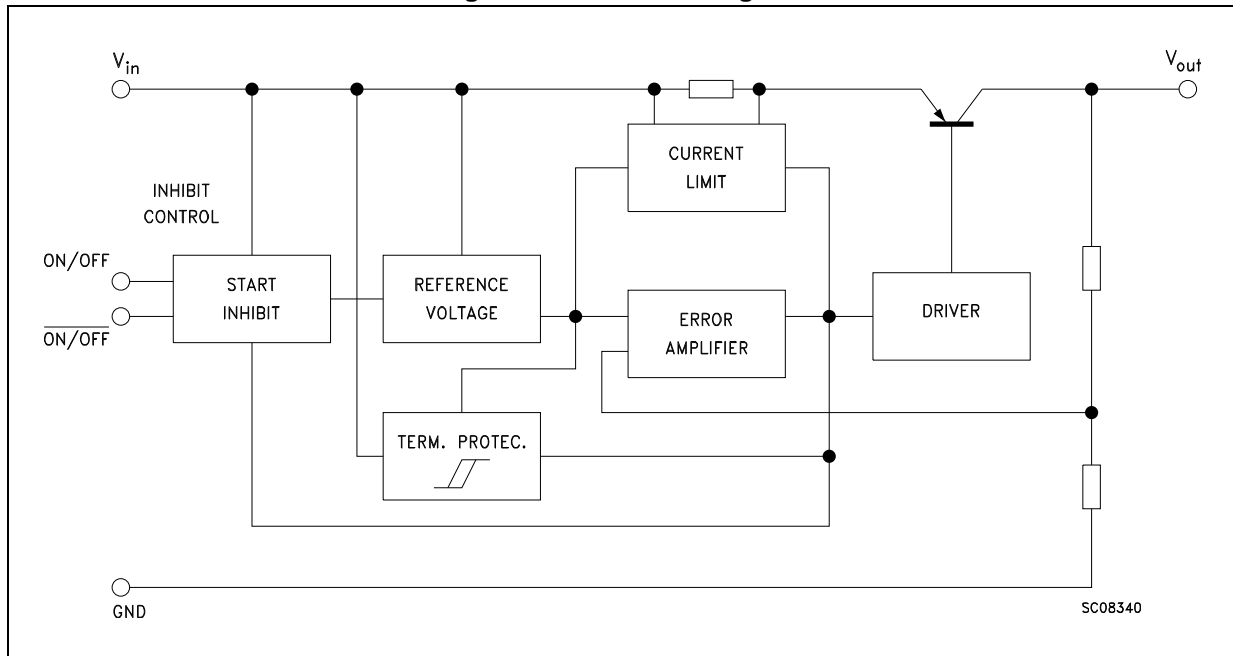
Order codes	Output voltages
LK115D33-TR	3.3 V
LK115D50-TR	5 V

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1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connection (top view)

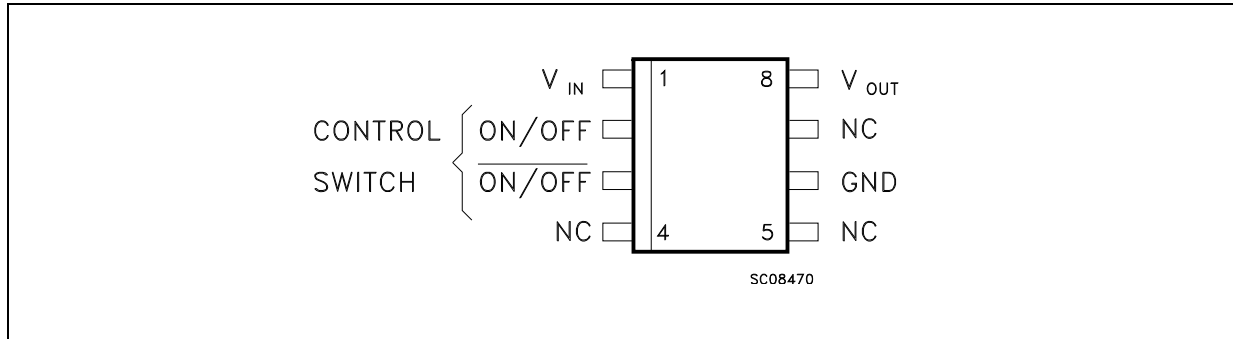


Table 2. Truth table

$\overline{\text{ON/OFF}}$ (pin 2)	$\overline{\text{ON/OFF}}$ (pin 3)	Status
H	L	ON
H	H	OFF
L	L	OFF
L	H	Not allowed

Note: Logic levels are those defined in the electrical characteristics.

3 Maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	20	V
I_O	Output current	Internally limited	
P_{TOT}	Power dissipation	Internally limited	
T_{STG}	Storage temperature range	-40 to 150	°C
T_{OP}	Operating junction temperature range	-40 to 125	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

4 Test circuits

Figure 3. Supply current (ON mode)

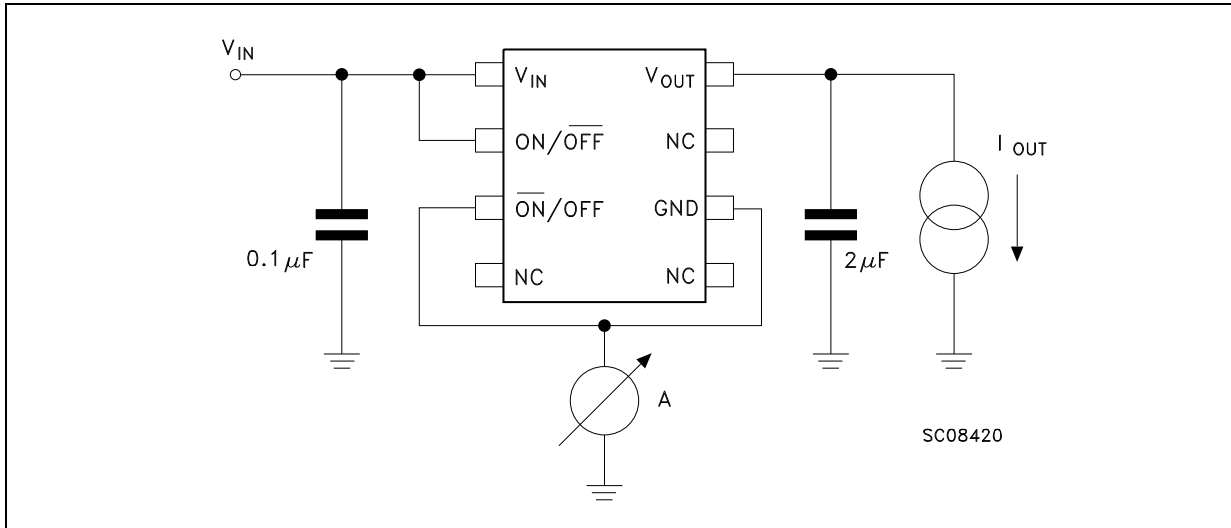
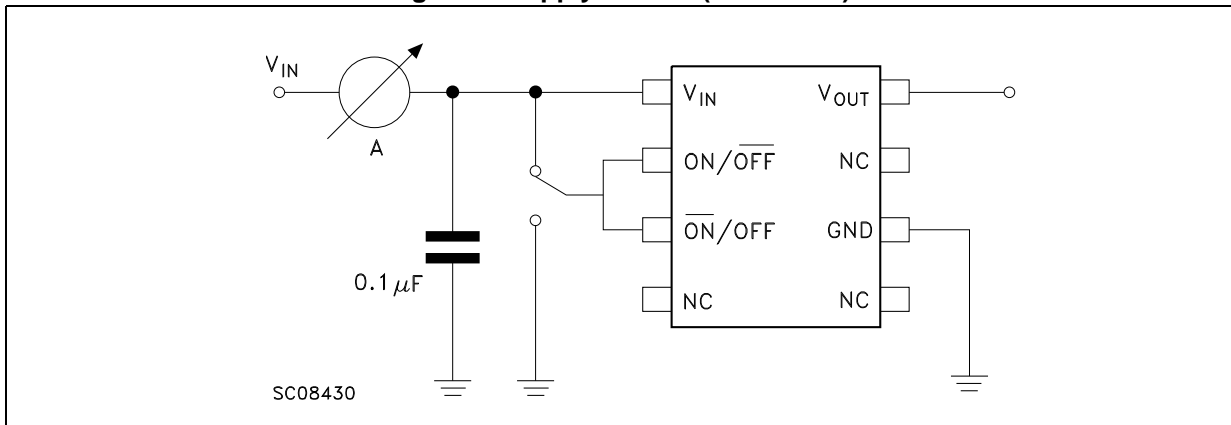


Figure 4. Supply current (OFF mode)



Note: The switch emulates two possibilities to set the regulator in OFF mode.

5 Electrical characteristics

(Refer to test circuits, $T_J = 25\text{ °C}$, $C_I = 0.1\text{ }\mu\text{F}$, $C_O = 2.2\text{ }\mu\text{F}$ unless otherwise specified)

Table 4. LK115D33 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 5.3\text{ V}$	3.2	3.3	3.4	V
		$I_O = 10\text{ mA}$, $V_I = 5.3\text{ V}$, $T_a = -40\text{ to }125\text{ °C}$	3.135		3.465	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output current limit		120	200		mA
ΔV_O	Line regulation	$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 0.5\text{ mA}$		2	10	mV
ΔV_O	Load regulation	$V_I = 4.3\text{ V}$, $I_O = 0.5\text{ to }100\text{ mA}$		4	20	mV
I_d	Quiescent current (ON mode)	$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 0$		0.28	0.5	mA
		$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 100\text{ mA}$		1.5	3	
	(OFF mode)	$V_I = 4.3\text{ to }20\text{ V}$		0.01	2	μA
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$ $V_I = 5.3\text{ V} \pm 1\text{ V}$	$f = 120\text{ Hz}$		79	dB
			$f = 1\text{ kHz}$		74	
			$f = 10\text{ kHz}$		57	
eN	Output noise voltage (RMS)	$B = 10\text{ Hz to }100\text{ kHz}$		72.6		μV
V_d	Dropout voltage	$I_O = 60\text{ mA}$		0.17		V
V_{Hlc}	ON/ $\overline{\text{OFF}}$ control (pin 2)	Pin 3 to GND, OFF	0		0.5	V
		Pin 3 to GND, ON	2.4		V_{in}	
V_{Llc}	$\overline{\text{ON}}$ /OFF control (pin 3)	Pin 2 to V_{in} , OFF	$V_{in}-0.2$		V_{in}	V
		Pin 2 to V_{in} , ON	0		$V_{in}-2.4$	
C_O	Output bypass capacitance	$\text{ESR} = 0.5\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

(Refer to test circuits, $T_J = 25\text{ }^\circ\text{C}$, $C_I = 0.1\text{ }\mu\text{F}$, $C_O = 2.2\text{ }\mu\text{F}$ unless otherwise specified)

Table 5. LK115D50 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$	4.85	5	5.15	V
		$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$, $T_a = -40\text{ to }125\text{ }^\circ\text{C}$	4.75		5.25	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output current limit		120	200		mA
ΔV_O	Line regulation	$V_I = 6\text{ to }20\text{ V}$, $I_O = 0.5\text{ mA}$		3	15	mV
ΔV_O	Load regulation	$V_I = 6\text{ V}$, $I_O = 0.5\text{ to }100\text{ mA}$		4	20	mV
I_d	Quiescent current (ON mode)	$V_I = 6\text{ to }20\text{ V}$, $I_O = 0$		0.28	0.5	mA
		$V_I = 6\text{ to }20\text{ V}$, $I_O = 100\text{ mA}$		1.5	3	
	(OFF mode)	$V_I = 6\text{ to }20\text{ V}$		0.01	2	μA
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$ $V_I = 7\text{ V} \pm 1\text{ V}$	$f = 120\text{ Hz}$		75	dB
			$f = 1\text{ kHz}$		70	
			$f = 10\text{ kHz}$		55	
eN	Output noise voltage (RMS)	$B = 10\text{ Hz to }100\text{ kHz}$		110		μV
V_d	Dropout voltage	$I_O = 60\text{ mA}$		0.17		V
V_{Hlc}	ON/ $\overline{\text{OFF}}$ control (pin 2)	Pin 3 to GND, OFF	0		0.5	V
		Pin 3 to GND, ON	2.4		V_{in}	
V_{Llc}	$\overline{\text{ON}}$ /OFF control (pin 3)	Pin 2 to V_{in} , OFF	$V_{in}-0.2$		V_{in}	V
		Pin 2 to V_{in} , ON	0		$V_{in}-2.4$	
C_O	Output bypass capacitance	$\text{ESR} = 0.5\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

6 Package mechanical data

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Figure 5. SO-8 drawings

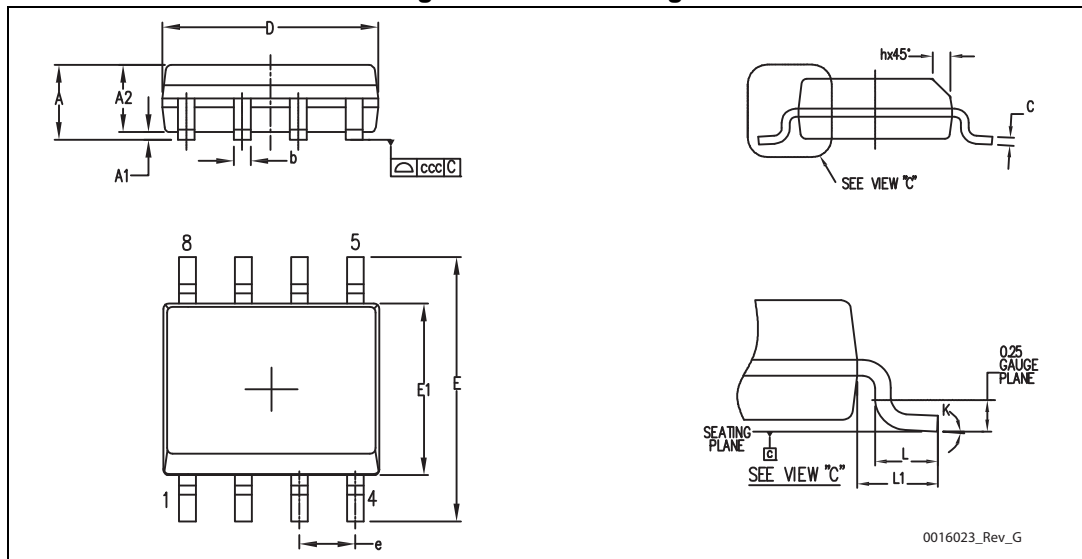


Table 6. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.28		0.48
c	0.17		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
k	0°		8°
ccc			0.10

7 Packaging mechanical data

Figure 6. SO-8 tape and reel dimensions

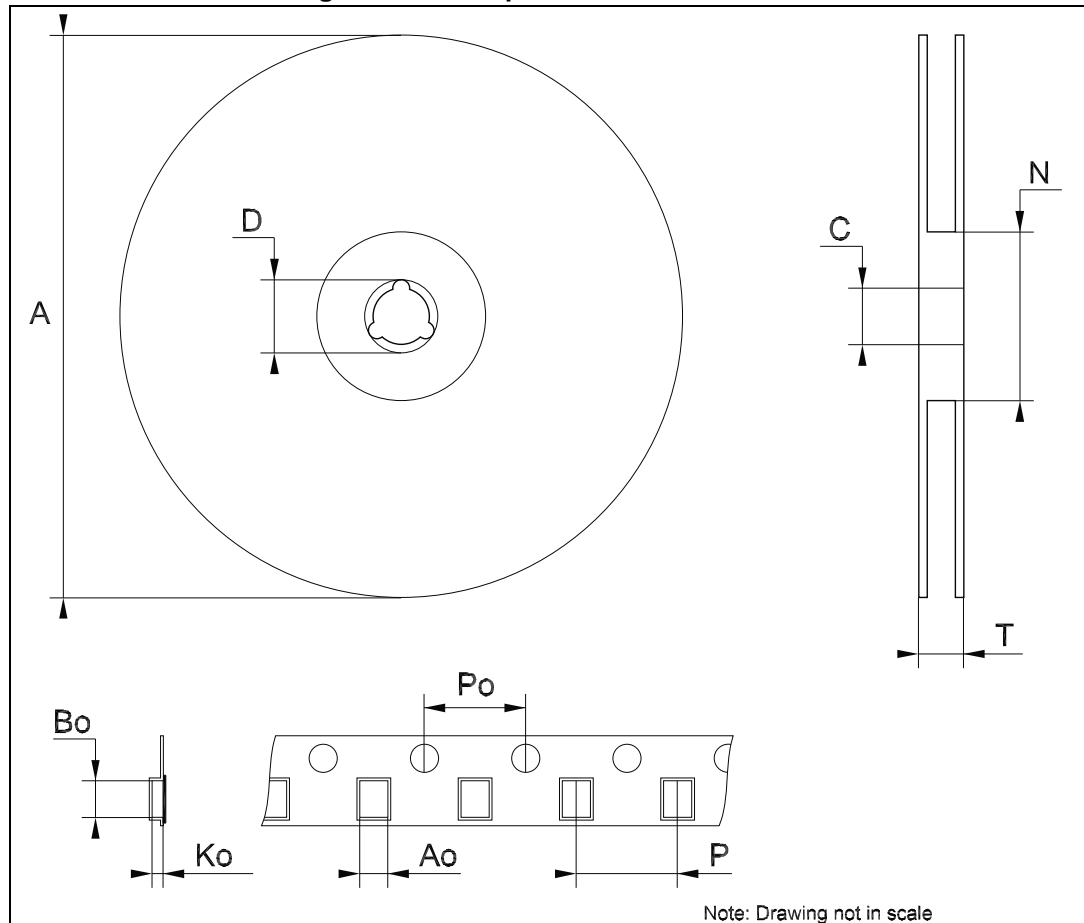


Table 7. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

8 Revision history

Table 8. Document revision history

Date	Revision	Changes
07-Jun-2006	3	Order codes updated.
07-Jul-2008	4	Added Table 1 on page 1 .
31-Jan-2014	5	Changed the LK115xx30, LK115xx33, LK115xx50 to LK115. Updated the description in cover page. Updated Section 5: Electrical characteristics , Section 6: Package mechanical data . Added Section 7: Packaging mechanical data . Minor text changes.

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