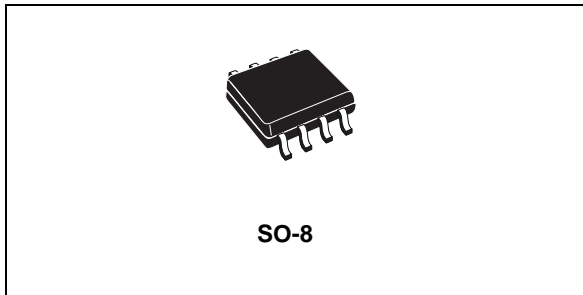


## Very low drop voltage regulators with inhibit

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  $\mu\text{A}$  in OFF mode, 280  $\mu\text{A}$  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  $\mu\text{F}$  capacitor for stability saving space and costs.

### Features

- Very low-dropout voltage (0.2 V typ.)
- Very low quiescent current (typ. 0.01  $\mu\text{A}$  in OFF mode, 280  $\mu\text{A}$  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  $\mu\text{F}$  capacitor for stability
- $V_{\text{OUT}}$  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

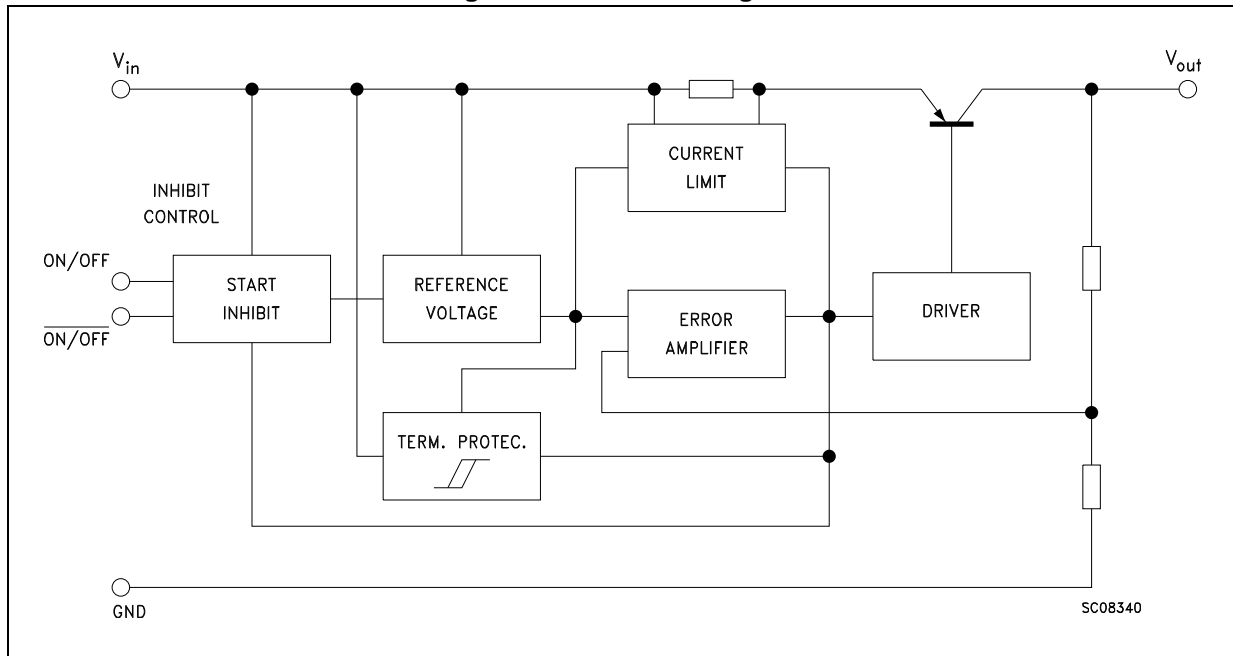
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# 1 Diagram

Figure 1. Schematic diagram



## 2 Pin configuration

Figure 2. Pin connection (top view)

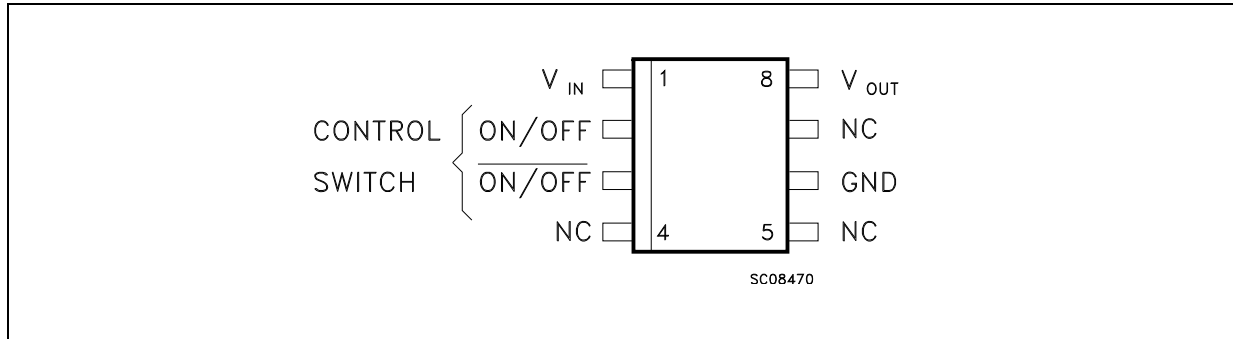


Table 2. Truth table

$\overline{\text{ON/OFF}}$ (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

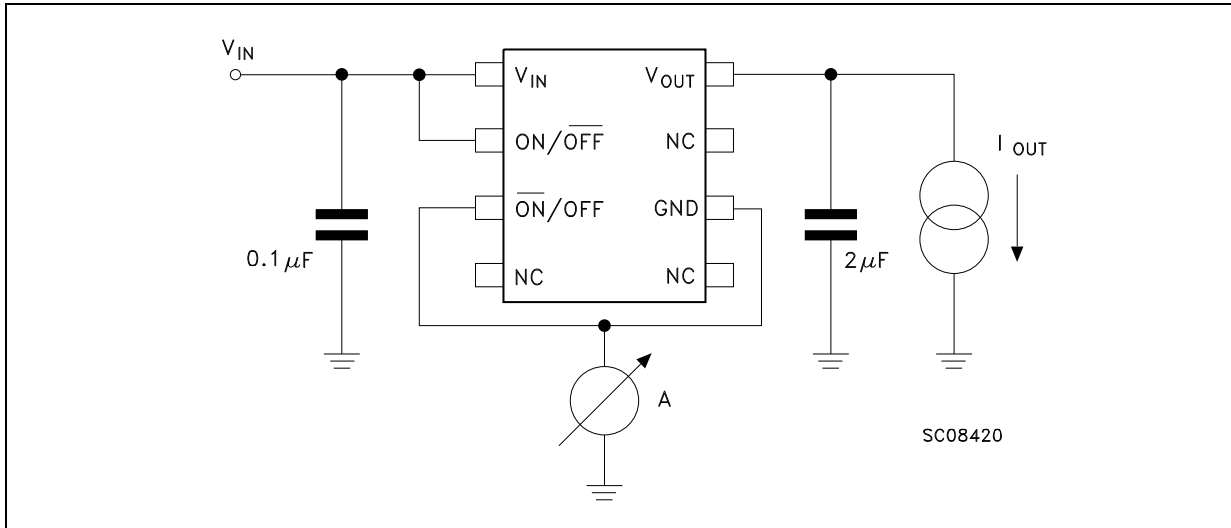
**Table 3. Absolute maximum ratings**

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

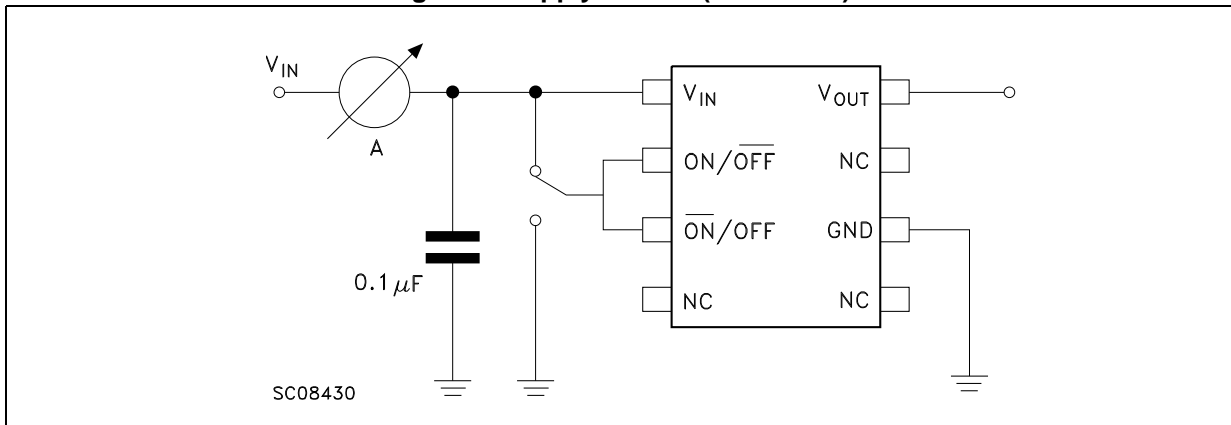
*Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.*

## 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
$\Delta V_O$	Line regulation	$V_I = 4.3\text{ to }20\text{ V}$ , $I_O = 0.5\text{ mA}$		2	10	mV
$\Delta V_O$	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	$\mu\text{A}$
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		$\mu\text{V}$
$V_d$	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		$\mu\text{F}$

(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 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
		$I_O = 10\text{ mA}$ , $V_I = 7\text{ V}$ , $T_a = -40\text{ to }125\text{ °C}$	4.75		5.25	
$V_I$	Operating input voltage	$I_O = 100\text{ mA}$			20	V
$I_{out}$	Output current limit		120	200		mA
$\Delta V_O$	Line regulation	$V_I = 6\text{ to }20\text{ V}$ , $I_O = 0.5\text{ mA}$		3	15	mV
$\Delta V_O$	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	$\mu\text{A}$
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		$\mu\text{V}$
$V_d$	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		$\mu\text{F}$



## 6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 5. SO-8 drawings

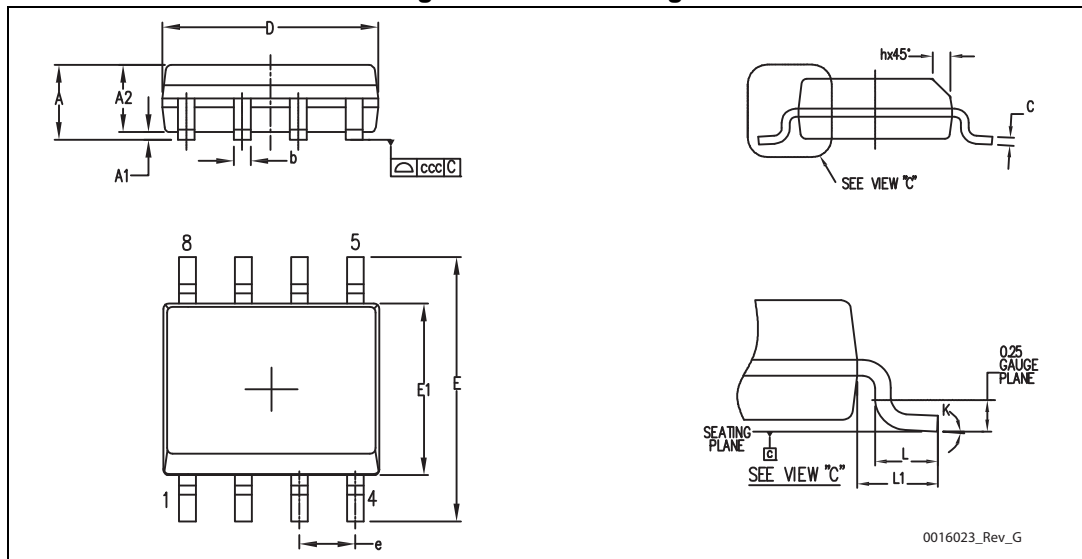


Table 6. SO-8 mechanical data

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

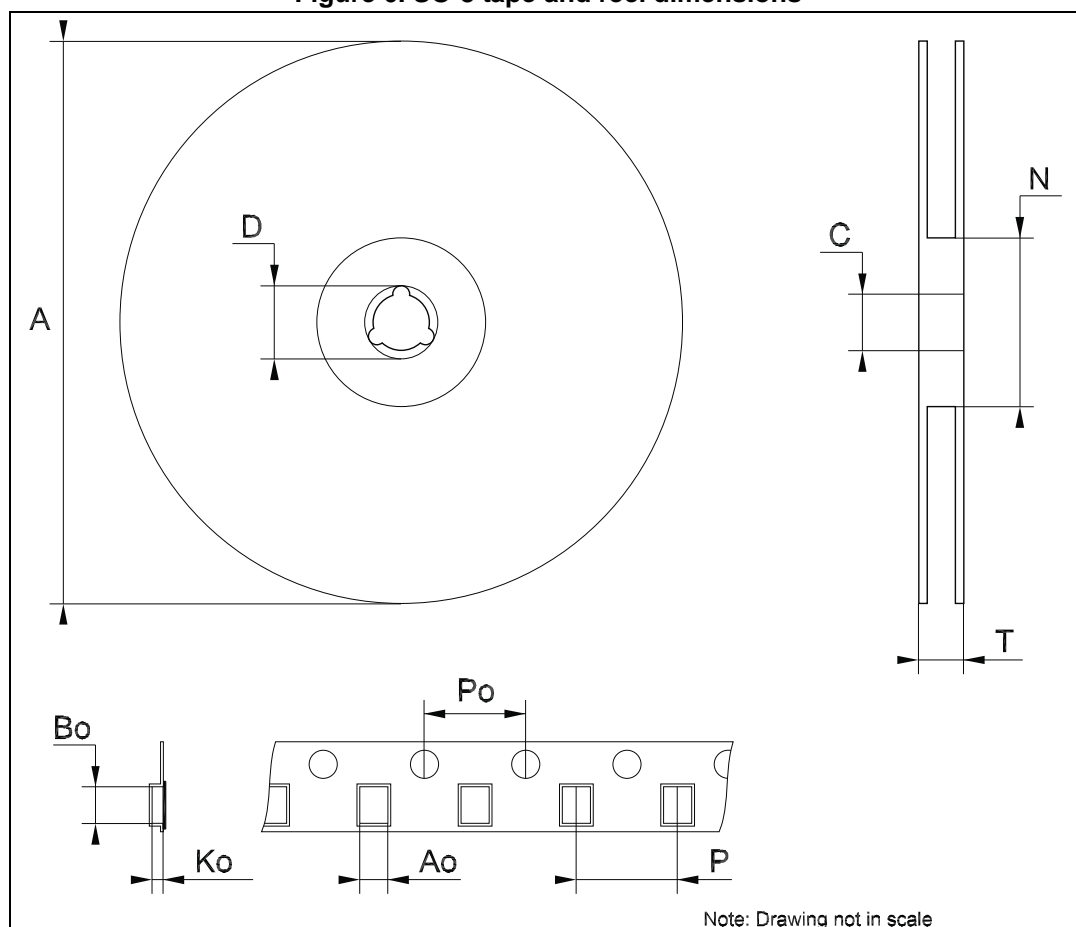


Table 7. SO-8 tape and reel mechanical data

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 <a href="#">Table 1 on page 1</a> .
31-Jan-2014	5	Changed the LK115xx30, LK115xx33, LK115xx50 to LK115. Updated the description in cover page. Updated <a href="#">Section 5: Electrical characteristics</a> , <a href="#">Section 6: Package mechanical data</a> . Added <a href="#">Section 7: Packaging mechanical data</a> . Minor text changes.

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