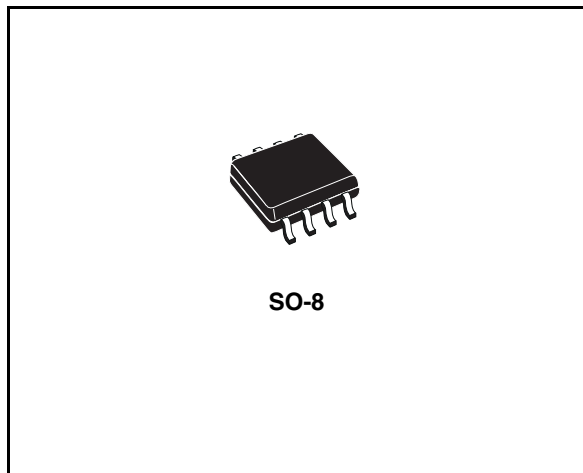


Very low drop with inhibit voltage regulators

Features

- Very low dropout voltage (0.2 V typ.)
- Very low quiescent current
(Typ. 0.01 μ A in off mode, 280 μ 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
- Only 2.2 μ F for stability
- V_{OUT} tolerance $\pm 3\%$ at 25 °C
- Supply voltage rejection: 80 dB (typ)
- Temperature range: -40 °C to 125 °C



It requires only a 2.2 μ F capacitor for stability allowing space and cost saving.

Description

The LK115XX series are very low drop regulators available in SO-8 package and in a wide range of output voltages.

The very low drop voltage (0.2 V) and the very low quiescent current (0.01 μ A in OFF MODE, 280 μ A in ON MODE) make them particularly suitable for low noise, low power applications and specially 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.

Table 1. Device summary

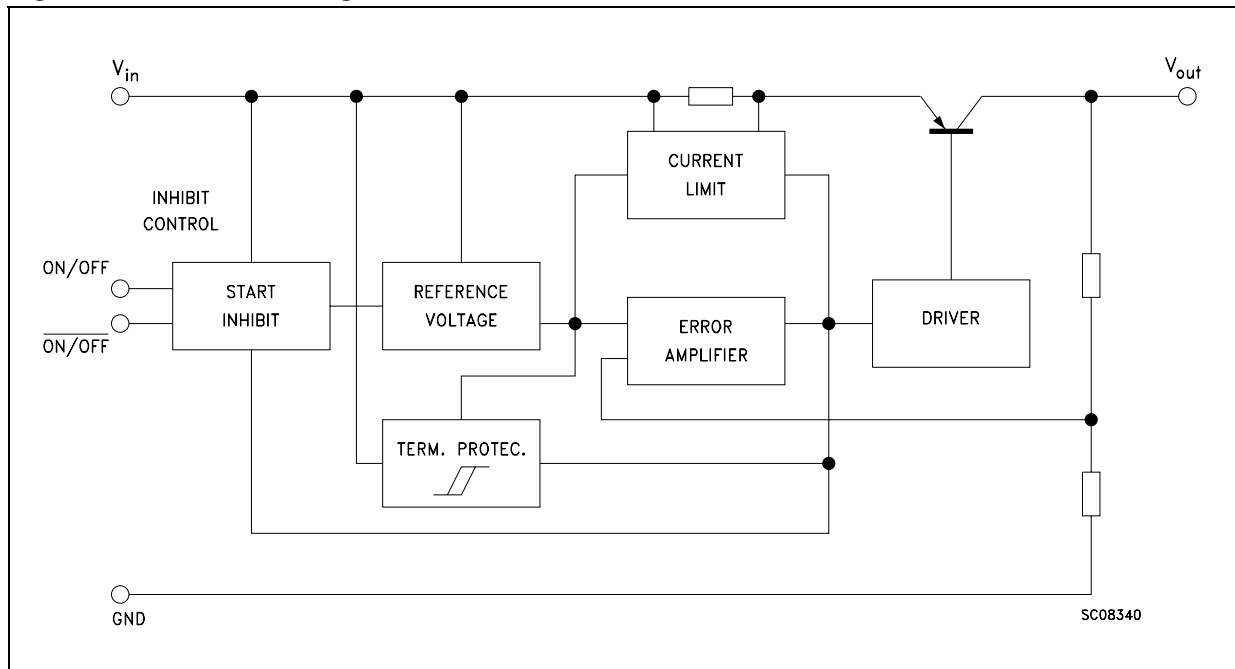
Order codes	Output voltages
LK115D30-TR	3 V
LK115D33-TR	3.3 V
LK115D50-TR	5 V

Contents

1	Diagram	3
2	Pin configuration	4
3	Maximum ratings	5
4	Test circuits	6
5	Electrical characteristics	7
6	Package mechanical data	10
7	Revision history	13

1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connection (top view)

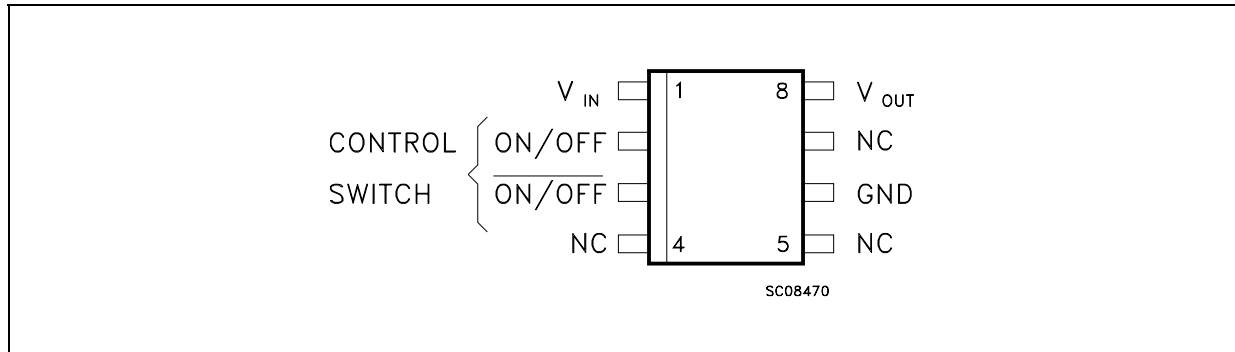


Table 2. Truth table

ON/ $\overline{\text{OFF}}$ (Pin 2)	$\overline{\text{ON}}/\text{OFF}$ (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 condition is not implied.

4 Test circuits

Figure 3. Supply current (On mode)

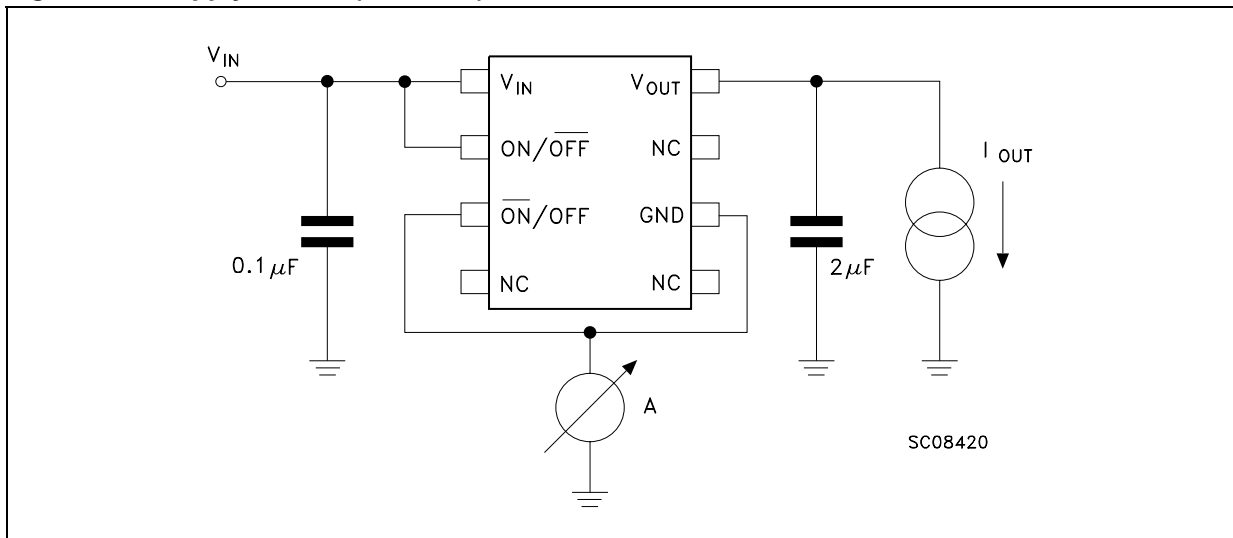
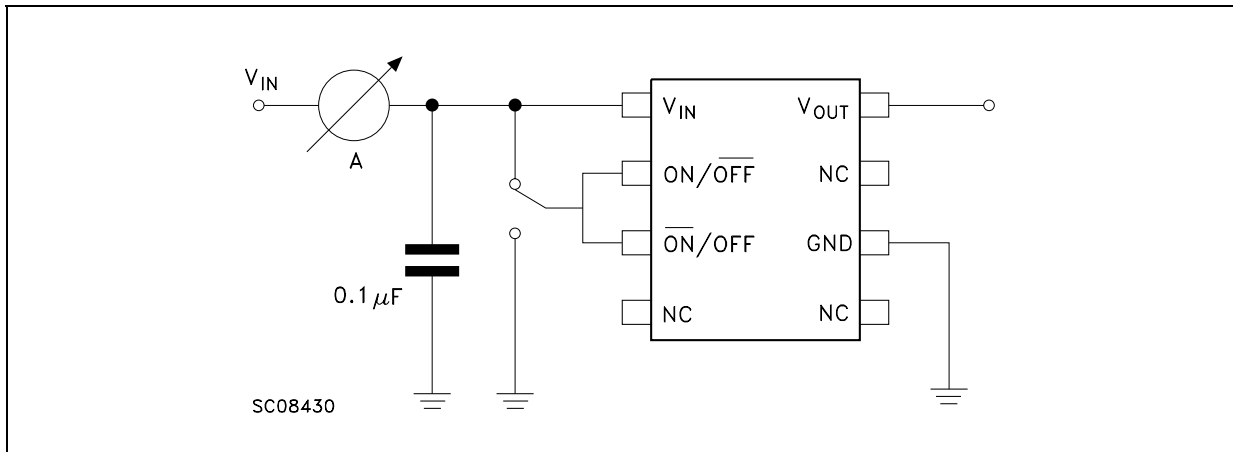


Figure 4. Supply current (Off mode)



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

5 Electrical characteristics

Table 4. Electrical characteristics for LK115D30 (refer to the 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.)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 5\text{ V}$	2.910	3	3.090	V
		$I_O = 10\text{ mA}$, $V_I = 5\text{ V}$, $T_a = -40\text{ to }125\text{ }^\circ\text{C}$	2.850		3.150	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output current limit		120	200		mA
ΔV_O	Line regulation	$V_I = 4\text{ to }20\text{ V}$, $I_O = 0.5\text{ mA}$		2	10	mV
ΔV_O	Load regulation	$V_I = 4\text{ V}$, $I_O = 0.5\text{ to }100\text{ mA}$		4	20	mV
I_d	Quiescent current (On Mode)	$V_I = 4\text{ to }20\text{ V}$, $I_O = 0$		0.28	0.5	mA
		$V_I = 4\text{ to }20\text{ V}$, $I_O = 100\text{ mA}$		1.5	3	
	(Off Mode)	$V_I = 4\text{ to }20\text{ V}$		0.01	2	μA
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$ $V_I = 5\text{ V} \pm 1\text{ V}$	$f = 120\text{ Hz}$		79	dB
			$f = 1\text{ kHz}$		74	
			$f = 10\text{ kHz}$		57	
eN	Output noise voltage (RMS)	$B = 10\text{ Hz to }100\text{ kHz}$		66		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}	$\overline{\text{ON}}$ / $\overline{\text{OFF}}$ 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

Table 5. Electrical characteristics for LK115D33 (refer to the 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.)

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
		$I_O = 10\text{ mA}$, $V_I = 5.3\text{ V}$, $T_a = -40\text{ to }125\text{ }^\circ\text{C}$	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}	$\overline{\text{ON}}$ / $\overline{\text{OFF}}$ 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	$\text{ESR} = 0.5\text{ to }10\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

Table 6. Electrical characteristics for LK115D50 (refer to the 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.)

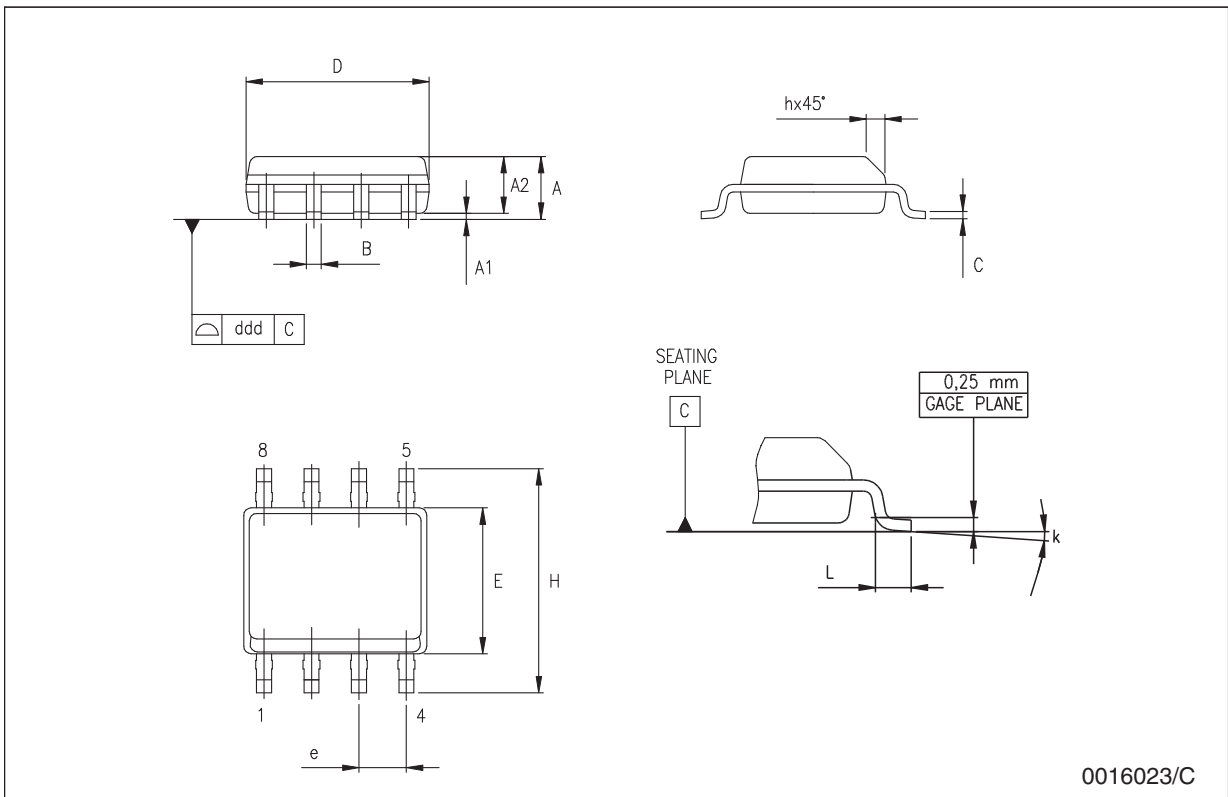
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage	$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$	4.85	5	5.15	V
		$I_O = 10\text{ mA}$, $V_I = 7\text{ V}$, $T_a = -40\text{ to }125\text{ }^\circ\text{C}$	4.75		5.25	
V_I	Operating input voltage	$I_O = 100\text{ mA}$			20	V
I_{out}	Output 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}	$\overline{\text{ON}}$ / $\overline{\text{OFF}}$ 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	$\text{ESR} = 0.5\text{ to }10\Omega$, $I_O = 0\text{ to }100\text{ mA}$	2	10		μF

6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

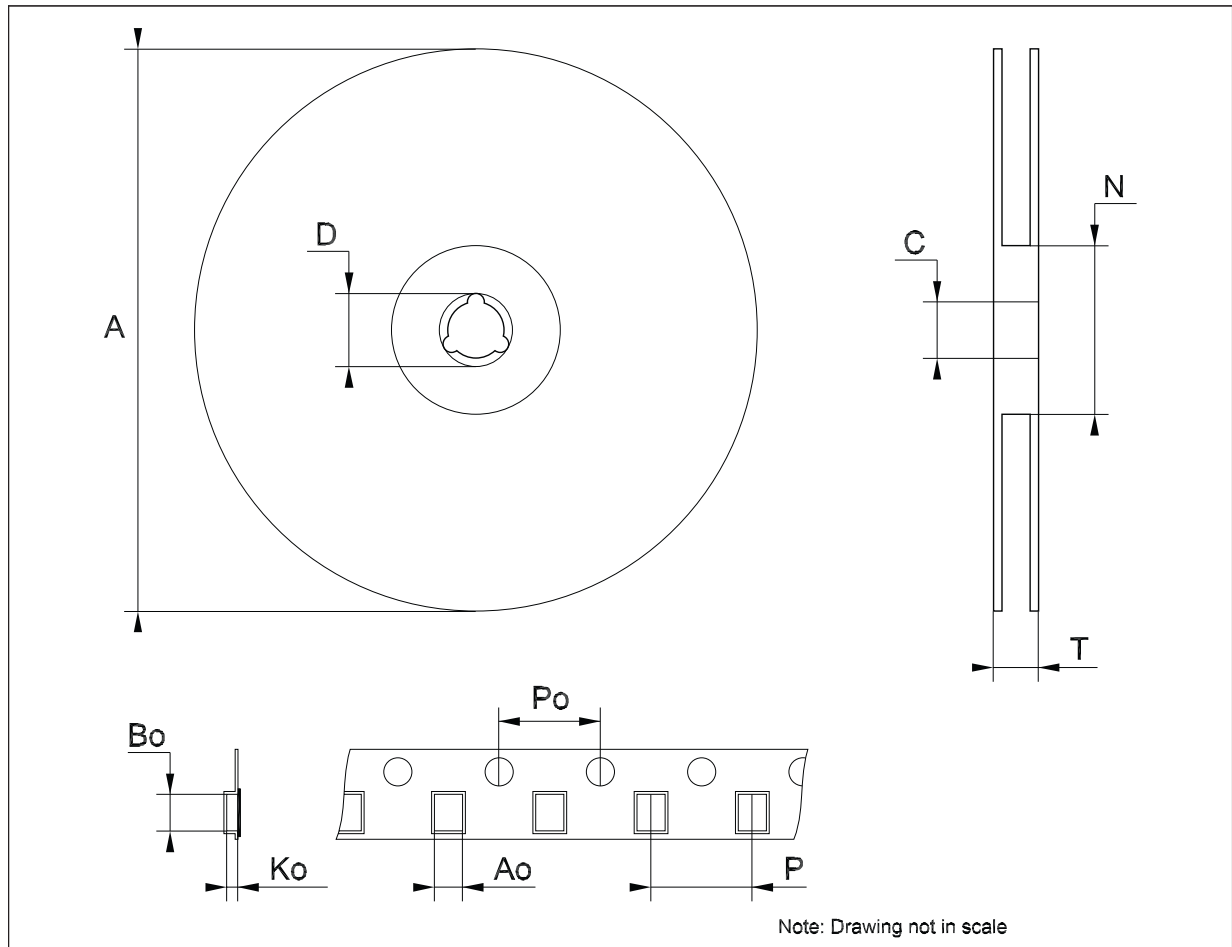
SO-8 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



Tape & reel SO-8 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



7 Revision history

Table 7. Document revision history

Date	Revision	Changes
07-Jun-2006	3	Order codes updated.
07-Jul-2008	4	Added Table 1 on page 1 .

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2008 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com