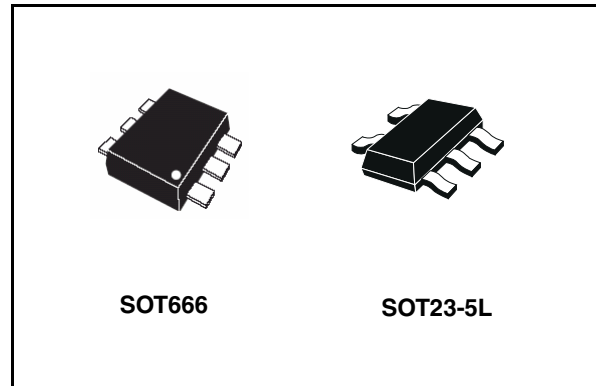


### Features

- Input voltage from 1.5 to 5.5 V
- Ultra low dropout voltage (80 mV typ. at 100 mA load)
- Very low quiescent current (18  $\mu$ A typ. at no load, 35  $\mu$ A typ. at 150 mA load, 1  $\mu$ A max in off mode)
- Very low noise without bypass capacitor (29  $\mu$ V<sub>RMS</sub> at  $V_{OUT} = 0.8$  V)
- Output voltage tolerance:  $\pm 2.0\%$  @ 25 °C
- 150 mA guaranteed output current
- Wide range of output voltages available on request: 0.8 V to 3.3 V with 100 mV step
- Logic-controlled electronic shutdown
- Compatible with ceramic capacitors  $C_O = 1$   $\mu$ F
- Internal current and thermal limit
- Available in SOT666 and SOT23-5L packages
- Temperature range: -40 °C to 125 °C



from 1.5 V to 5.5 V with a typical dropout voltage of 80 mV. It is stable with ceramic capacitor. The ultra-low drop voltage, low quiescent current and low noise features make it suitable for low power battery-powered applications. Power supply rejection is 65 dB at low frequencies and starts to roll off at 10 kHz. Enable logic control function puts the LD39015xx in shut-down mode allowing a total current consumption lower than 1  $\mu$ A. The device also includes short-circuit constant current limiting and thermal protection. Typical applications are mobile phones, personal digital assistants (PDAs), cordless phones or similar battery-powered systems.

### Description

The LD39015xx series provides 150 mA maximum current from an input voltage ranging

**Table 1. Device summary**

Part numbers	Order codes		Output voltages
	SOT666	SOT23-5L	
LD39015XX08	LD39015XG08R	LD39015M08R	0.8 V
LD39015XX10	LD39015XG10R <sup>(1)</sup>	LD39015M10R	1.0 V
LD39015XX12	LD39015XG12R	LD39015M12R	1.2 V
LD39015XX125		LD39015M125R	1.25 V
LD39015XX15	LD39015XG15R <sup>(1)</sup>	LD39015M15R	1.5 V
LD39015XX18	LD39015XG18R <sup>(1)</sup>	LD39015M18R	1.8 V
LD39015XX25	LD39015XG25R <sup>(1)</sup>	LD39015M25R	2.5 V
LD39015XX33	LD39015XG33R	LD39015M33R	3.3 V

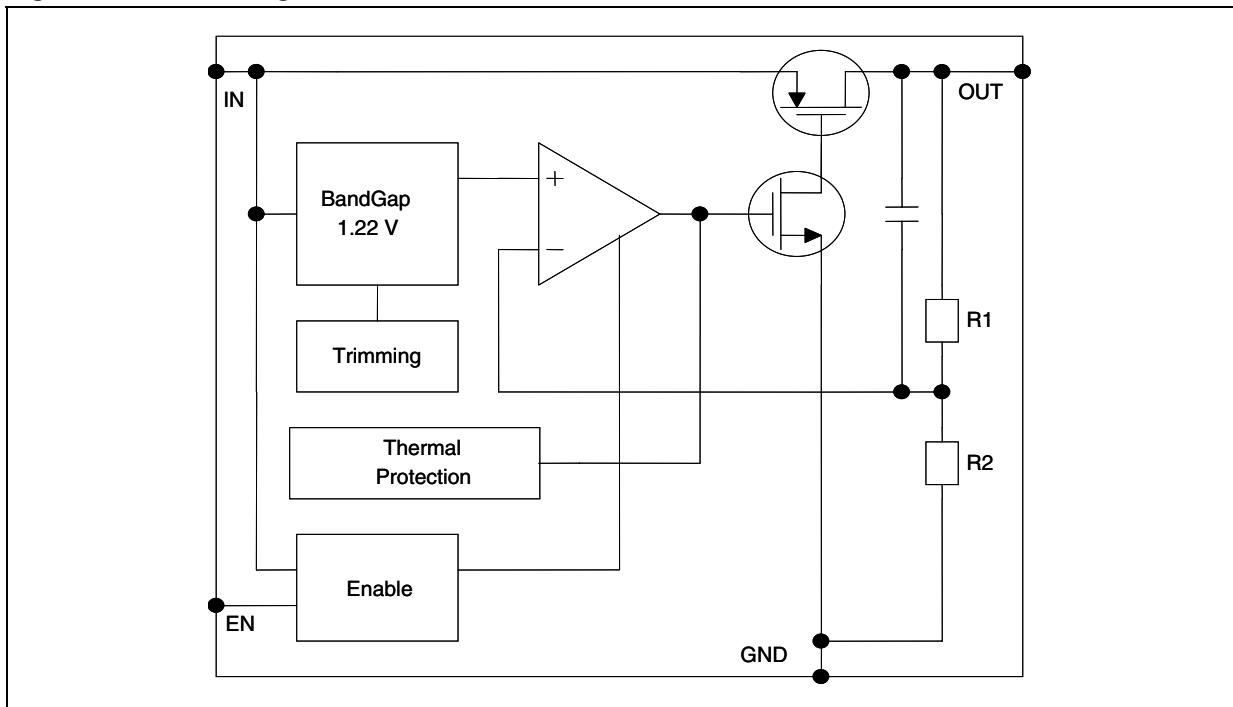
1. Available on request. Other voltages available on request from 0.8 V to 3.3 V in 100 mV step.

# Contents

1	Diagram .....	3
2	Pin configuration .....	4
3	Typical application .....	5
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# 1 Diagram

Figure 1. Block diagram



## 2 Pin configuration

Figure 2. Pin connection (top view)

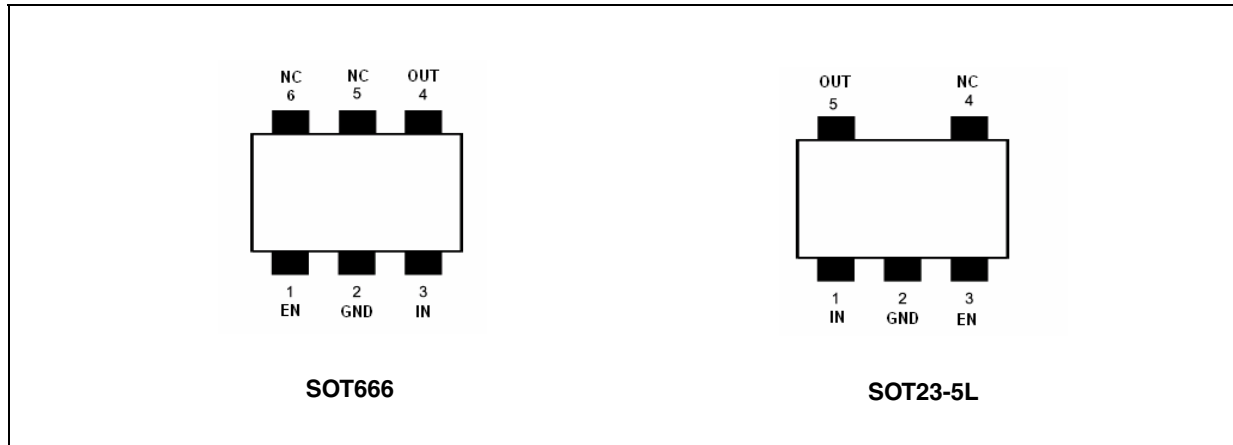
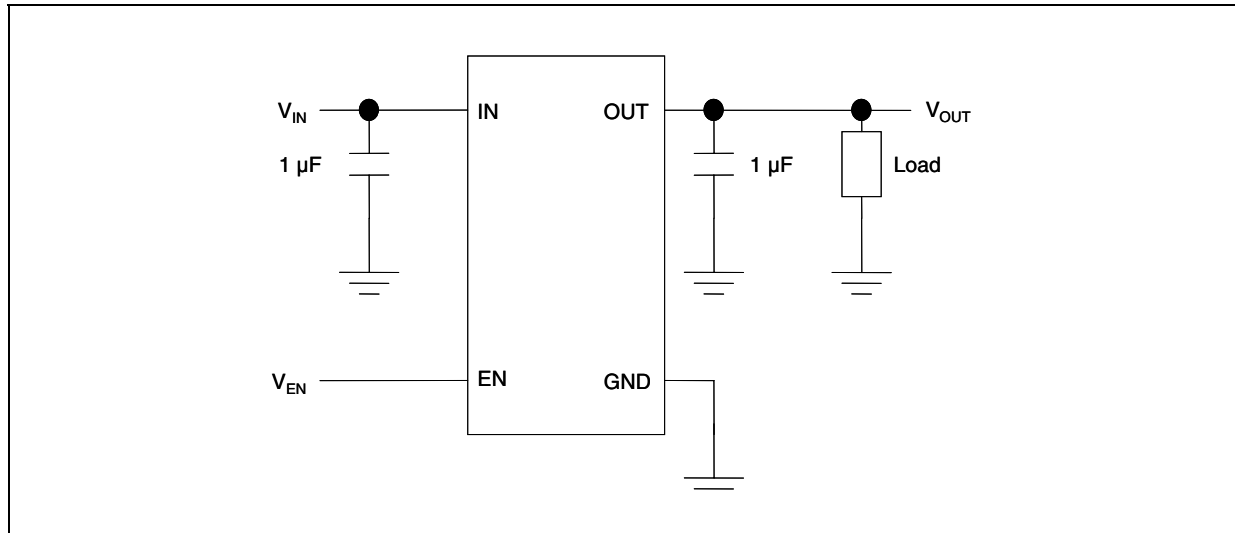


Table 2. Pin description

Pin n°		Symbol	Function
SOT666	SOT23-5L		
1	3	EN	Enable pin logic input: Low=shutdown, High=active
2	2	GND	Common ground.
3	1	IN	Input voltage of the LDO
4	5	OUT	Output voltage
5	4	NC	Not connected
6		NC	Not connected

### 3 Typical application

Figure 3. Typical application circuit



## 4 Maximum ratings

**Table 3. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{IN}$	DC input voltage	-0.3 to 7	V
$V_{OUT}$	DC output voltage	- 0.3 to $V_I + 0.3$	V
$V_{EN}$	Enable input voltage	- 0.3 to $V_I + 0.3$	V
$I_{OUT}$	Output current	Internally limited	mA
$P_D$	Power dissipation	Internally limited	mW
$T_{STG}$	Storage temperature range	-65 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. All values are referred to GND.*

**Table 4. Thermal data**

Symbol	Parameter	SOT23-5L	SOT666	Unit
$R_{thJA}$	Thermal resistance junction-ambient	255	132	°C/W
$R_{thJC}$	Thermal resistance junction-case	81	56	°C/W

## 5 Electrical characteristics

$T_J = 25\text{ }^\circ\text{C}$ ,  $V_{IN} = V_{OUT(NOM)} + 1\text{ V}$ ,  $C_{IN} = C_{OUT} = 1\text{ }\mu\text{F}$ ,  $I_{OUT} = 1\text{ mA}$ ,  $V_{EN} = V_{IN}$ , unless otherwise specified.

**Table 5. Electrical characteristics (1)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{IN}$	Operating input voltage		1.5		5.5	V
$V_{UVLO}$	Turn-on threshold			1.45	1.48	V
	Turn-off threshold		1.30	1.35		mV
$V_{OUT}$	$V_{OUT}$ accuracy	$V_{OUT} > 1.5\text{V}$ , $I_{OUT} = 1\text{mA}$ , $T_J = 25\text{ }^\circ\text{C}$	-2.0		2.0	%
		$V_{OUT} > 1.5\text{V}$ , $I_{OUT} = 1\text{mA}$ , $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$	-3.0		3.0	
		$V_{OUT} \leq 1.5\text{V}$ , $I_{OUT} = 1\text{mA}$		$\pm 10$		mV
		$V_{OUT} \leq 1.5\text{V}$ , $I_{OUT} = 1\text{mA}$ , $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$		$\pm 30$		
$\Delta V_{OUT}$	Static line regulation	$V_{OUT} + 1\text{V} \leq V_{IN} \leq 5.5\text{V}$ , $I_{OUT} = 1\text{mA}$		0.01		%/V
$\Delta V_{OUT}$	Transient line regulation (2)	$\Delta V_{IN} = +500\text{mV}$ , $I_{OUT} = 1\text{mA}$ , $T_R = T_F = 5\mu\text{s}$		10		mVpp
$\Delta V_{OUT}$	Static load regulation	$I_{OUT} = 1\text{mA}$ to $150\text{mA}$		0.002		%/mA
$\Delta V_{OUT}$	Transient load regulation (2)	$I_{OUT} = 1\text{mA}$ to $150\text{mA}$ , $T_R = T_F = 5\mu\text{s}$		40		mVpp
$V_{DROPP}$	Dropout voltage (3)	$I_{OUT} = 100\text{mA}$ , $V_{OUT} > 1.5\text{V}$ $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$		80	100	mV
$e_N$	Output noise voltage	1.1kHz to 100kHz, $I_{OUT} = 10\text{mA}$ , $V_{OUT} = 0.8\text{V}$		29		$\mu\text{V}_{RMS}$
SVR	Supply voltage rejection $V_{OUT} = 1.5\text{V}$	$V_{IN} = V_{OUTNOM} + 0.5\text{V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{V}$ , Freq. = 1kHz $I_{OUT} = 10\text{mA}$		65		dB
		$V_{IN} = V_{OUTNOM} + 0.5\text{V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{V}$ , Freq.=10kHz $I_{OUT} = 10\text{mA}$		62		
$I_Q$	Quiescent current	$I_{OUT} = 0\text{mA}$		18		$\mu\text{A}$
		$I_{OUT} = 0\text{mA}$ , $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$			50	
		$I_{OUT} = 0$ to $150\text{mA}$		38		
		$I_{OUT} = 0$ to $150\text{mA}$ $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$			70	
		$V_{IN}$ input current in OFF MODE: $V_{EN} = \text{GND}$		0.001	1	
$I_{SC}$	Short circuit current	$R_L = 0$		350		mA
$V_{EN}$	Enable input logic low	$V_{IN} = 1.5\text{V}$ to $5.5\text{V}$ , $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$			0.4	V
	Enable input logic high	$V_{IN} = 1.5\text{V}$ to $5.5\text{V}$ , $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$	0.9			V

**Table 5. Electrical characteristics (continued) <sup>(1)</sup>**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I <sub>EN</sub>	Enable pin input current	V <sub>EN</sub> = V <sub>IN</sub>		0.1	100	nA
T <sub>ON</sub>	Turn on time <sup>(4)</sup>			30		μs
T <sub>SHDN</sub>	Thermal shutdown			160		°C
	Hysteresis			20		
C <sub>OUT</sub>	Output capacitor	Capacitance (see typical performance characteristics for stability)	1		22	μF

1. For V<sub>OUT(NOM)</sub> < 1.2 V, V<sub>IN</sub> = 1.5 V
2. All transient values are guaranteed by design, not production tested
3. Dropout voltage is the input-to-output voltage difference at which the output voltage is 100 mV below its nominal value. This specification does not apply for output voltages below 1.5 V
4. Turn-on time is the time measured between the enable input just exceeding V<sub>EN</sub> High Value and the output voltage just reaching 95 % of its nominal value



## 6 Typical performance characteristics

Figure 4. Output voltage vs. temperature

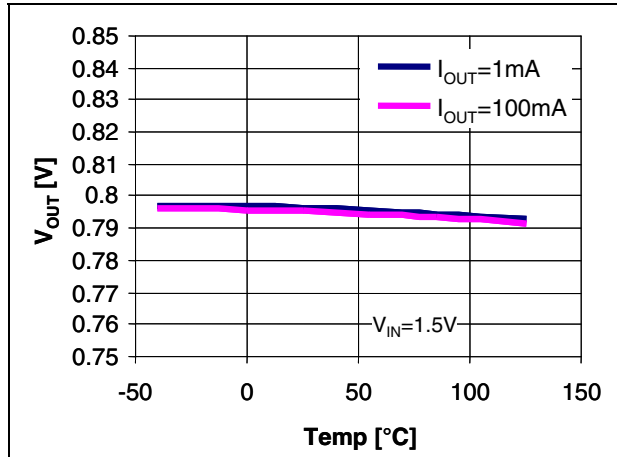


Figure 5. Output voltage vs. input voltage

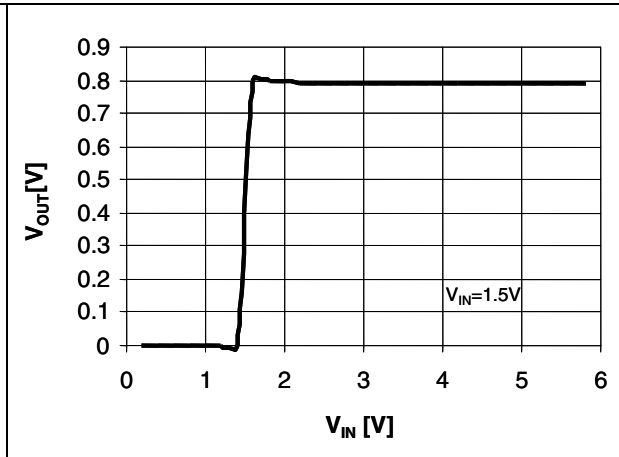


Figure 6. Dropout voltage vs. output current

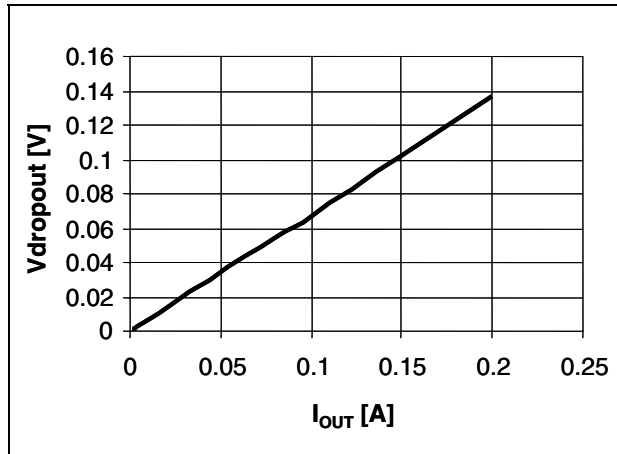


Figure 7. COUT stability region

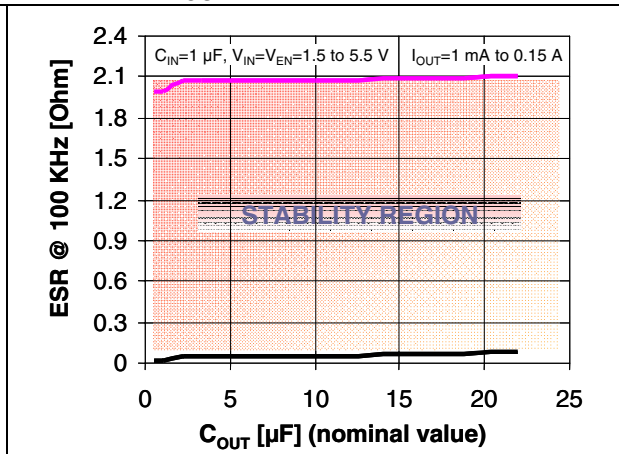


Figure 8. Supply voltage rejection vs. frequency

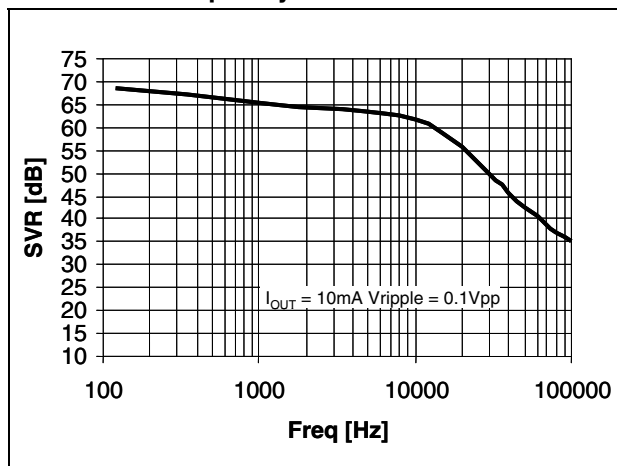


Figure 9. Output noise voltage vs. frequency

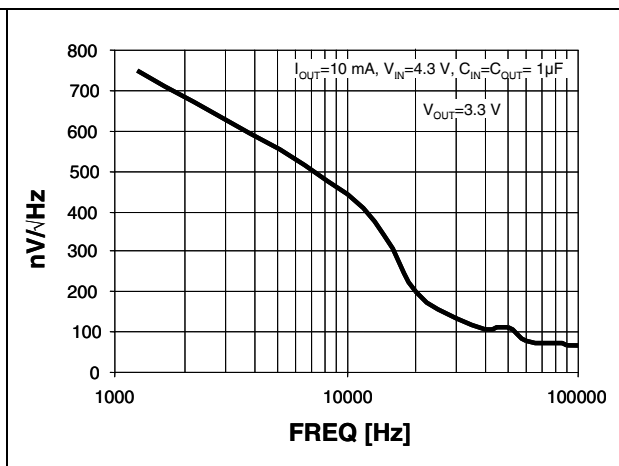


Figure 10. Quiescent current vs. input voltage Figure 11. Load transient

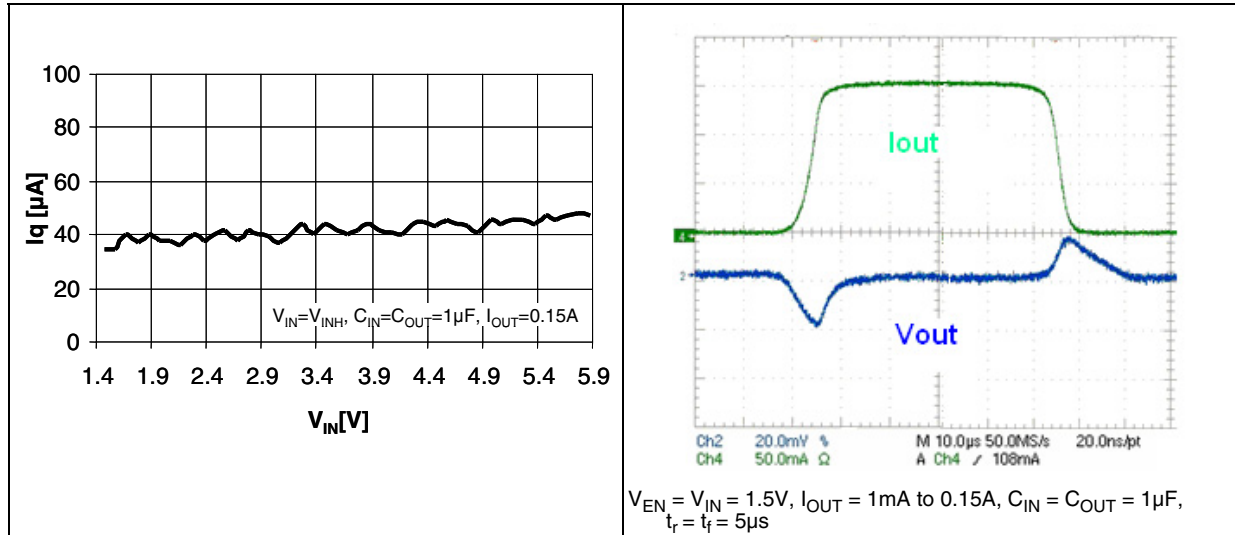


Figure 12. Line transient

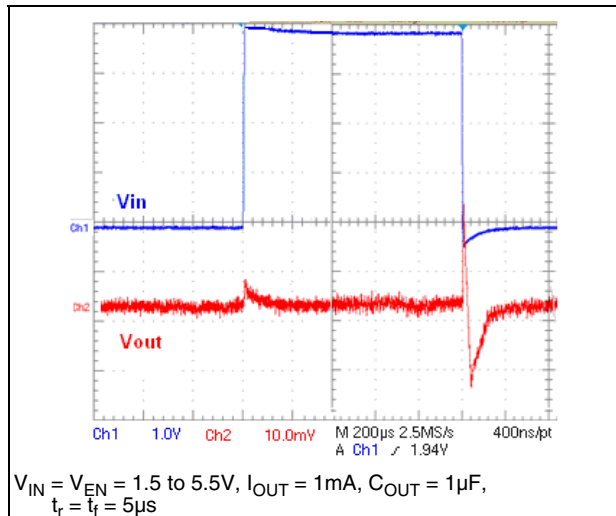
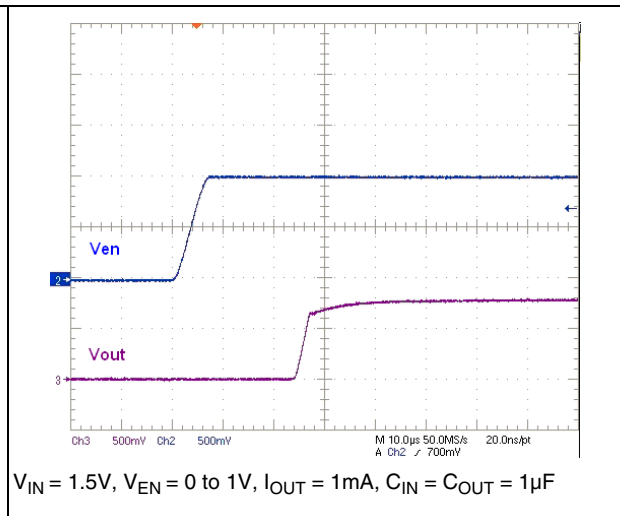


Figure 13. Enable transient

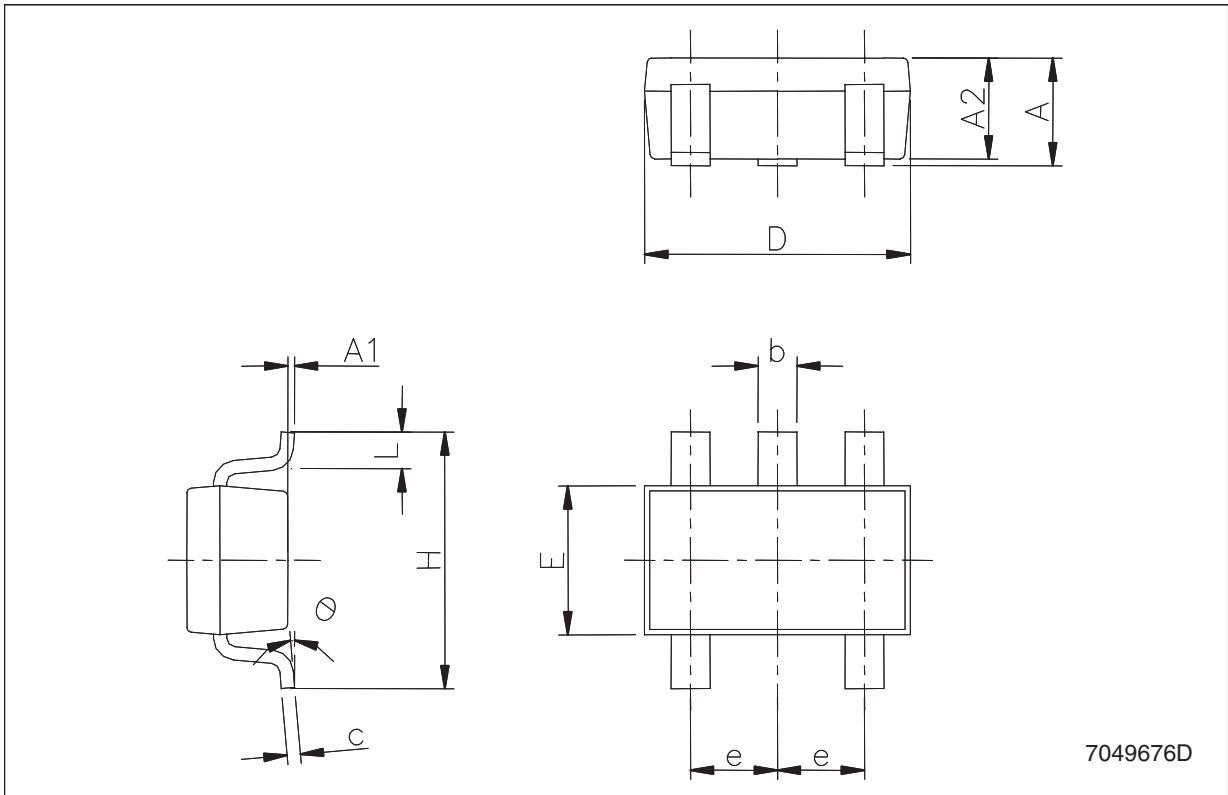


## 7 Package mechanical data

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 is an ST trademark.

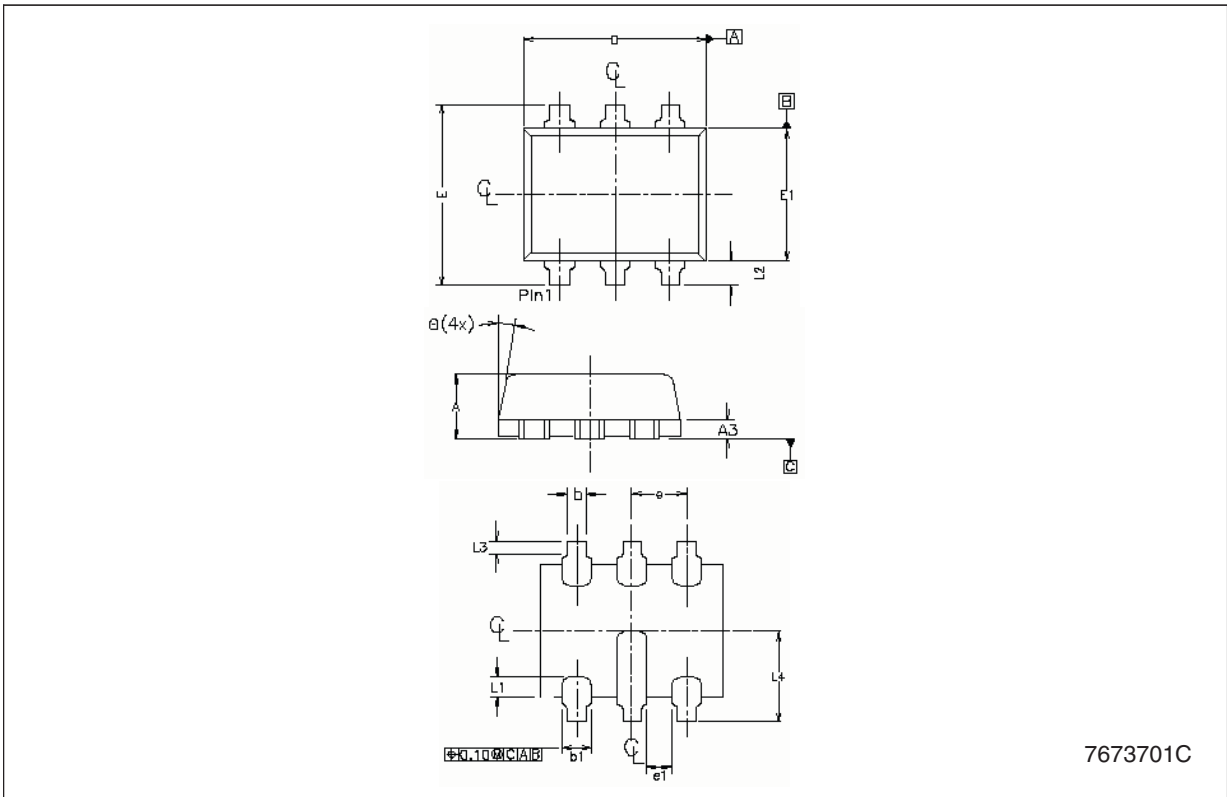
**SOT23-5L mechanical data**

Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.45	35.4		57.1
A1	0.00		0.10	0.0		3.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	1.50		1.75	59.0		68.8
e		0.95			37.4	
H	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



**SOT666 mechanical data**

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.53	0.57	0.60	0.021	0.022	0.024
A3	0.13	0.17	0.18	0.005	0.006	0.007
D	1.50	1.66	1.70	0.059	0.065	0.067
E	1.50	1.65	1.70	0.059	0.065	0.067
E1	1.10	1.20	1.30	0.043	0.047	0.051
L1	0.11	0.19	0.26	0.004	0.007	0.010
L2	0.10	0.23	0.30	0.004	0.009	0.012
L3	0.05	0.10		0.002	0.004	
b	0.17		0.25	0.17		0.25
b1		0.27	0.34		0.27	0.34
e		0.50			0.5	
e1	0.20			0.2		
$\theta$	8°	10°	12°	8°	10°	12°



**Tape & reel SOT23-xL mechanical data**

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	3.13	3.23	3.33	0.123	0.127	0.131
Bo	3.07	3.17	3.27	0.120	0.124	0.128
Ko	1.27	1.37	1.47	0.050	0.054	0.058
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	3.9	4.0	4.1	0.153	0.157	0.161



## 8 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
13-Nov-2007	1	Initial release.
11-Apr-2008	2	Modified: <a href="#">Table 5 on page 7.</a>
12-Feb-2009	3	Modified: <a href="#">Table 1 on page 1.</a>

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