



LD39015XX08 - LD39015XX10 LD39015XX12 - LD39015XX33

150 mA low quiescent current
low noise voltage regulator

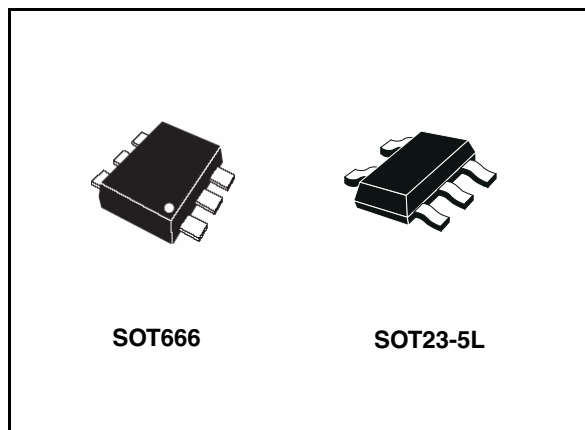
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Features

- 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 μ A typ. at no load, 35 μ A typ. at 150 mA load, 1 μ A max in off mode)
- Very low noise without bypass capacitor (29 μ V_{RMS} 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 $C_{OUT} = 1$ μ F
- Internal current and thermal limit
- Available in SOT666 and SOT23-5L packages
- Temperature range: -40 °C to 125 °C

Description

The LD39015XX series provides 150 mA maximum current from an input voltage ranging



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 μ 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.

Table 1. Device summary

Order codes		Output voltage
SOT666	SOT23-5L	
LD39015XG08R	LD39015M08R ⁽¹⁾	0.8 V
LD39015XG10R ⁽¹⁾	LD39015M10R	1.0 V
LD39015XG12R ⁽¹⁾	LD39015M12R	1.2 V
LD39015XG15R ⁽¹⁾	LD39015M15R ⁽¹⁾	1.5 V
LD39015XG18R ⁽¹⁾	LD39015M18R ⁽¹⁾	1.8 V
LD39015XG25R ⁽¹⁾	LD39015M25R ⁽¹⁾	2.5 V
LD39015XG33R	LD39015M33R ⁽¹⁾	3.3 V

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

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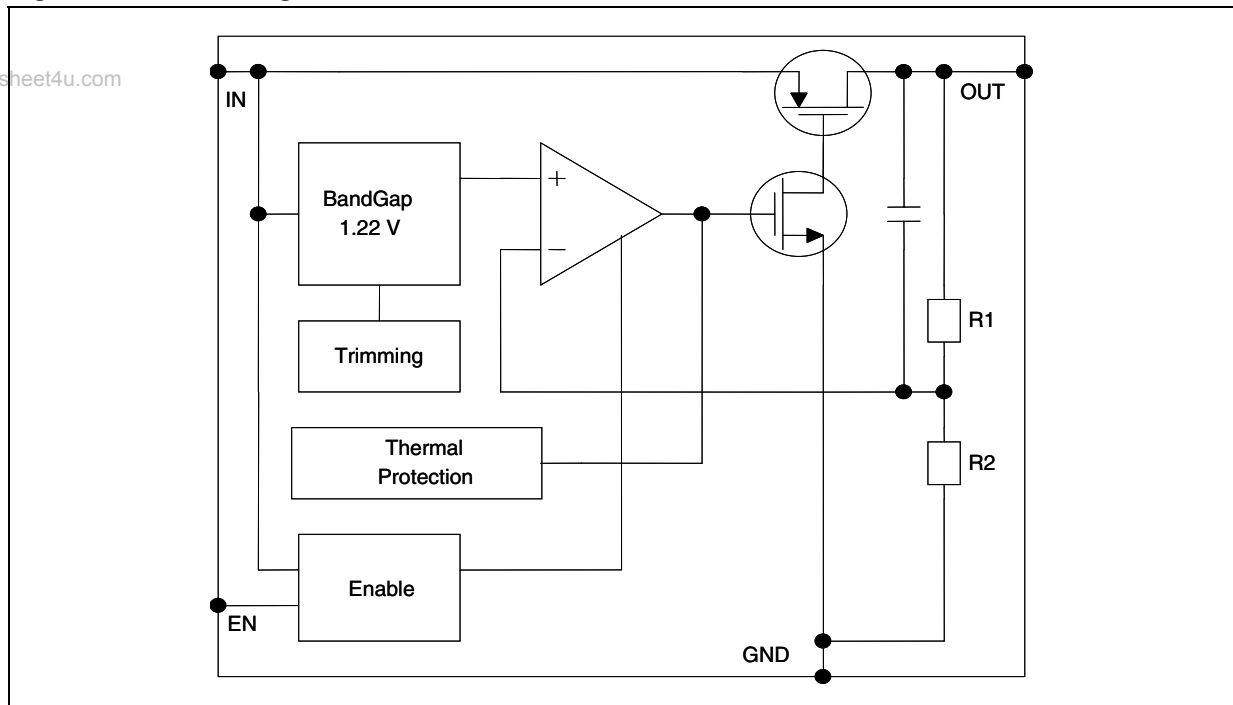
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1 Diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connection (top view)

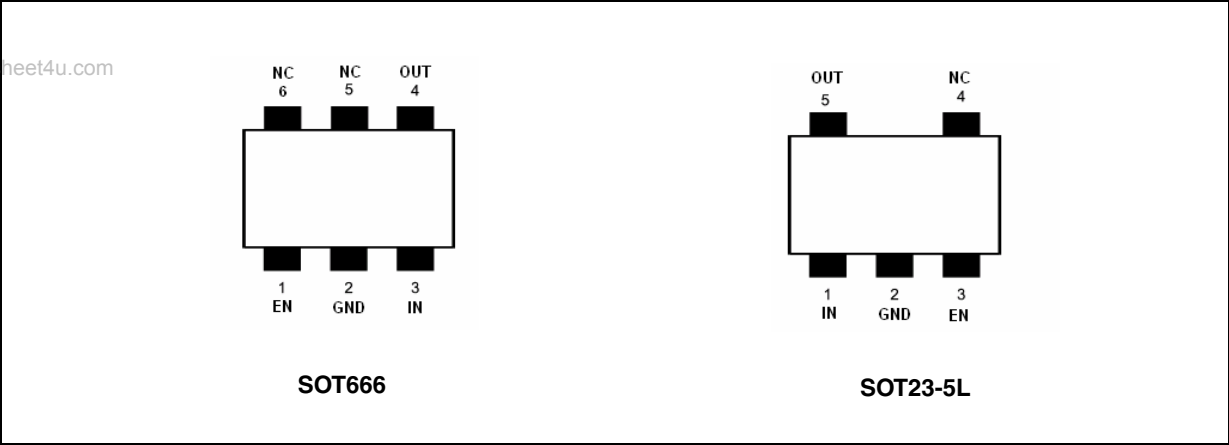
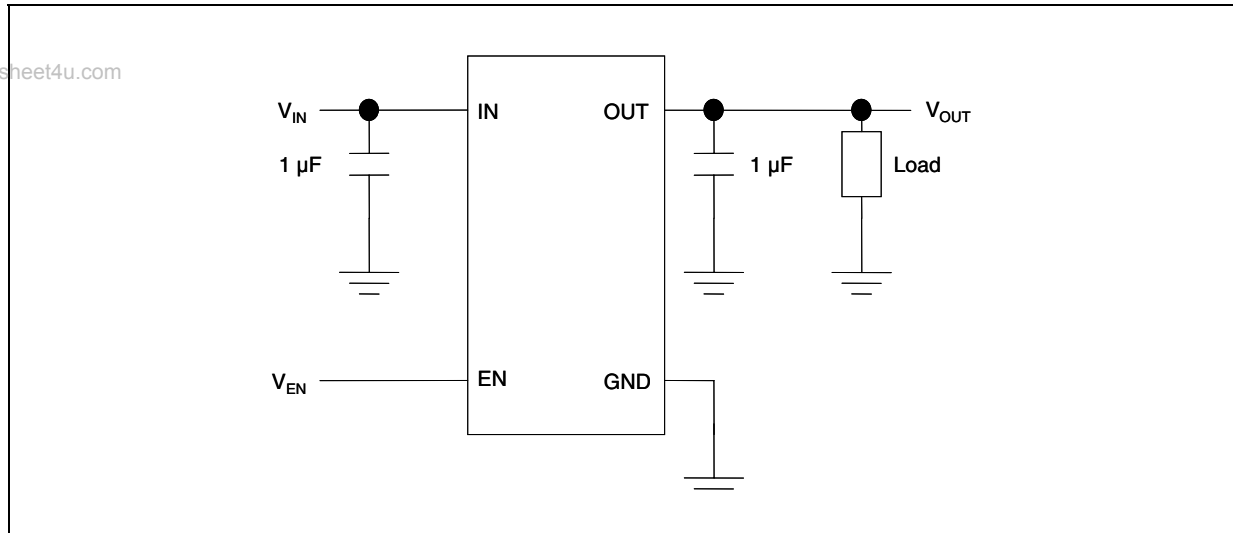


Table 2. Pin description

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

Table 5. Electrical characteristics ($T_J = 25^\circ\text{C}$, $V_{IN} = V_{OUT(NOM)} + 1\text{ V}$, $C_{IN} = C_{OUT} = 1\text{ }\mu\text{F}$, $I_{OUT} = 1\text{ mA}$, $V_{EN} = V_{IN}$, unless otherwise specified) ⁽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	$V_{OUT} > 1.5\text{V}$, $I_{OUT} = 1\text{mA}$, $T_J = 25^\circ\text{C}$	-2.0		2.0	%
		$V_{OUT} > 1.5\text{V}$, $I_{OUT} = 1\text{mA}$, $-40^\circ\text{C} < T_J < 125^\circ\text{C}$	-3.0		3.0	
		$V_{OUT} \leq 1.5\text{V}$, $I_{OUT} = 1\text{mA}$		± 10		mV
		$V_{OUT} \leq 1.5\text{V}$, $I_{OUT} = 1\text{mA}$, $-40^\circ\text{C} < T_J < 125^\circ\text{C}$		± 30		
ΔV_{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
ΔV_{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
ΔV_{OUT}	Static load regulation	$I_{OUT} = 1\text{mA}$ to 150mA		0.002		%/mA
ΔV_{OUT}	Transient load regulation ⁽²⁾	$I_{OUT} = 1\text{mA}$ to 150mA , $T_R = T_F = 5\mu\text{s}$		40		mVpp
V_{DROP}	Dropout voltage ⁽³⁾	$I_{OUT} = 100\text{mA}$, $V_{OUT} > 1.5\text{V}$ $-40^\circ\text{C} < T_J < 125^\circ\text{C}$		80	100	mV
e_N	Output noise voltage	1.1kHz to 100kHz, $I_{OUT} = 10\text{mA}$, $V_{OUT} = 0.8\text{V}$		29		μV_{RMS}
SVR	Supply voltage rejection $V_{OUT} = 1.5\text{V}$	$V_{IN} = V_{OUT(NOM)} + 0.5\text{V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{V}$, Freq. = 1kHz $I_{OUT} = 10\text{mA}$		65		dB
		$V_{IN} = V_{OUT(NOM)} + 0.5\text{V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{V}$, Freq.=10kHz $I_{OUT} = 10\text{mA}$		62		
I_Q	Quiescent current	$I_{OUT} = 0\text{mA}$		18		μA
		$I_{OUT} = 0\text{mA}$, $-40^\circ\text{C} < T_J < 125^\circ\text{C}$			50	
		$I_{OUT} = 0$ to 150mA		38		
		$I_{OUT} = 0$ to 150mA $-40^\circ\text{C} < T_J < 125^\circ\text{C}$			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 5.5V , $-40^\circ\text{C} < T_J < 125^\circ\text{C}$			0.4	V
	Enable input logic high	$V_{IN} = 1.5\text{V}$ to 5.5V , $-40^\circ\text{C} < T_J < 125^\circ\text{C}$	0.9			V
I_{EN}	Enable pin input current	$V_{EN} = V_{IN}$		0.1	100	nA

Table 5. Electrical characteristics (continued) ($T_J = 25\text{ }^{\circ}\text{C}$, $V_{IN} = V_{OUT(NOM)} + 1\text{ V}$, $C_{IN} = C_{OUT} = 1\text{ }\mu\text{F}$, $I_{OUT} = 1\text{ mA}$, $V_{EN} = V_{IN}$, unless otherwise specified) ⁽¹⁾

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
T_{ON}	Turn on time ⁽⁴⁾			30		μs
T_{SHDN}	Thermal shutdown			160		$^{\circ}\text{C}$
	Hysteresis			20		
C_{OUT}	Output capacitor	Capacitance (see typical performance characteristics for stability)	1		22	μF

1. For $V_{OUT(NOM)} < 1.2\text{ V}$, $V_{IN} = 1.5\text{ V}$
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_{EN} High Value and the output voltage just reaching 95 % of its nominal value

6 Typical performance characteristics

Figure 4. Output voltage vs temperature

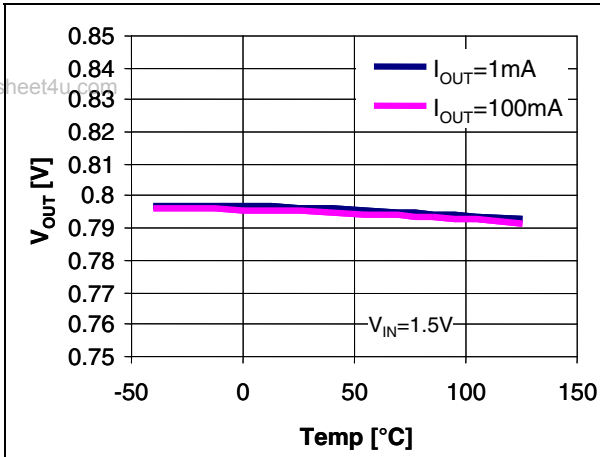


Figure 5. Output voltage vs input voltage

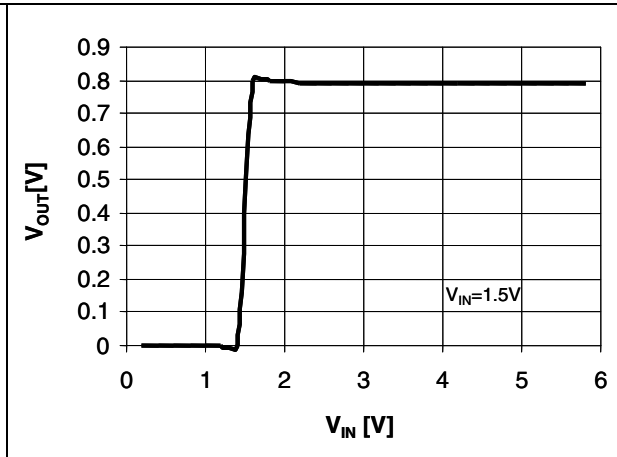


Figure 6. Dropout voltage vs output current

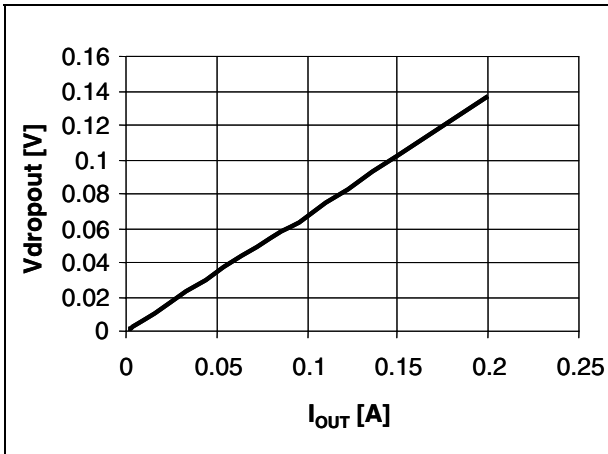
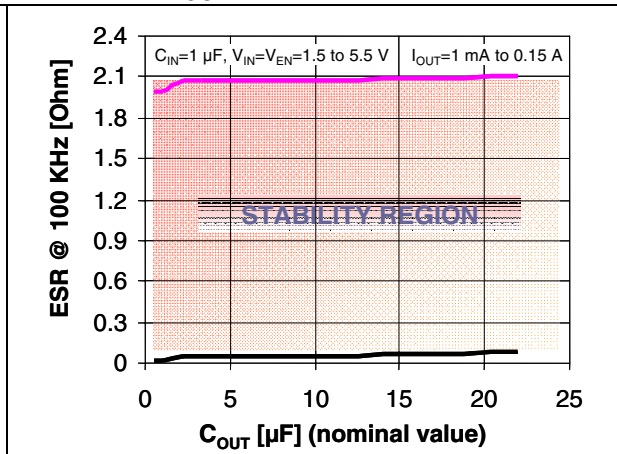
Figure 7. C_{OUT} stability region

Figure 8. Supply voltage rejection vs frequency

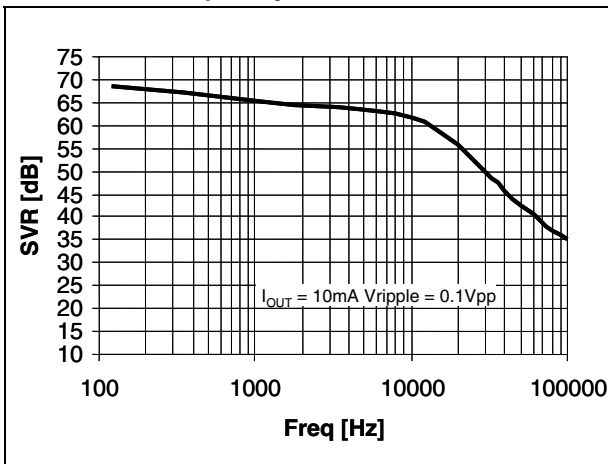


Figure 9. Output noise voltage vs frequency

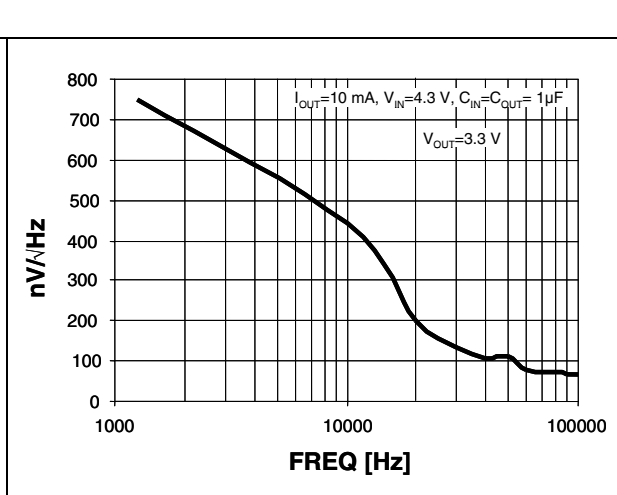


Figure 10. Quiescent current vs input voltage

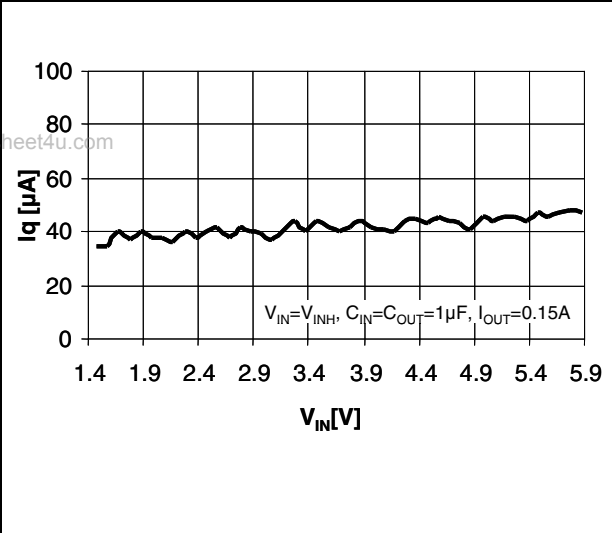


Figure 11. Load transient

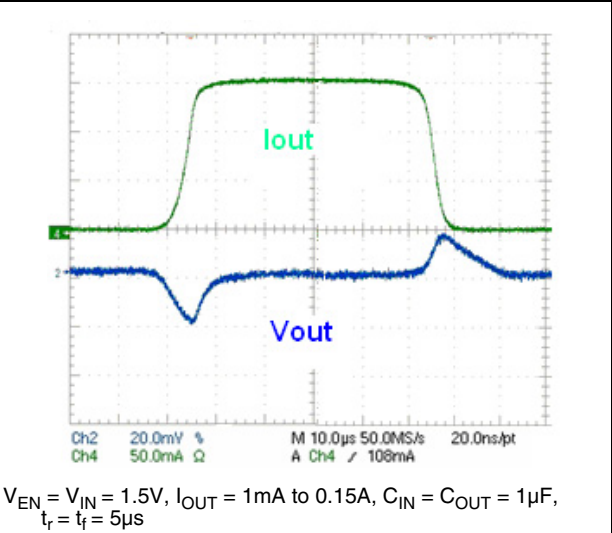


Figure 12. Line transient

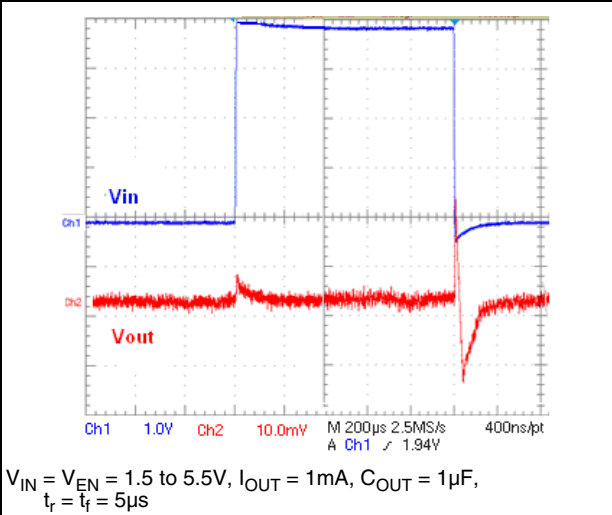
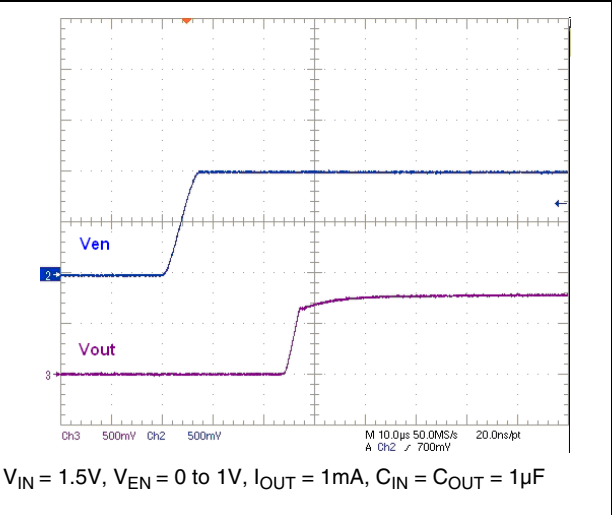


Figure 13. Enable transient



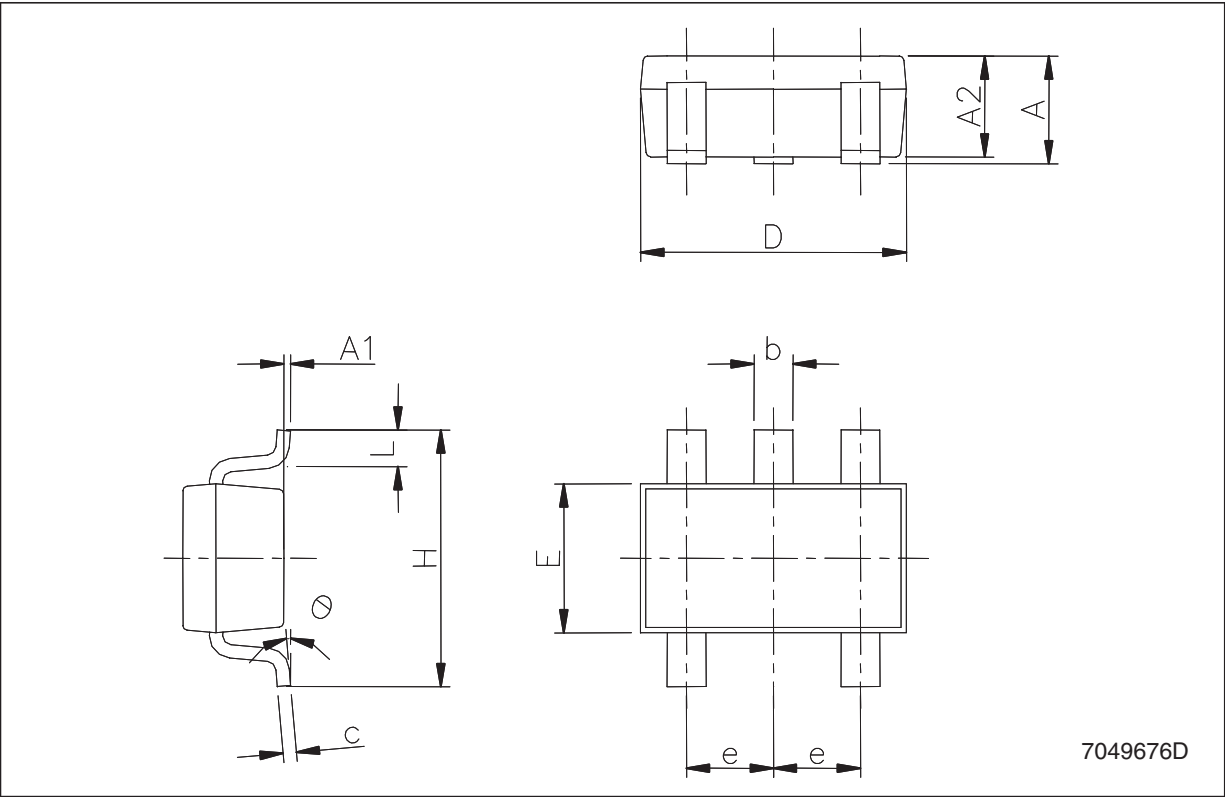
7 Package mechanical data

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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.

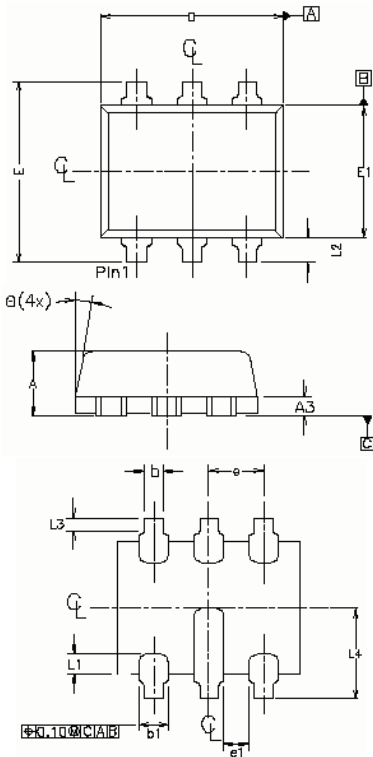
SOT23-5L mechanical data

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

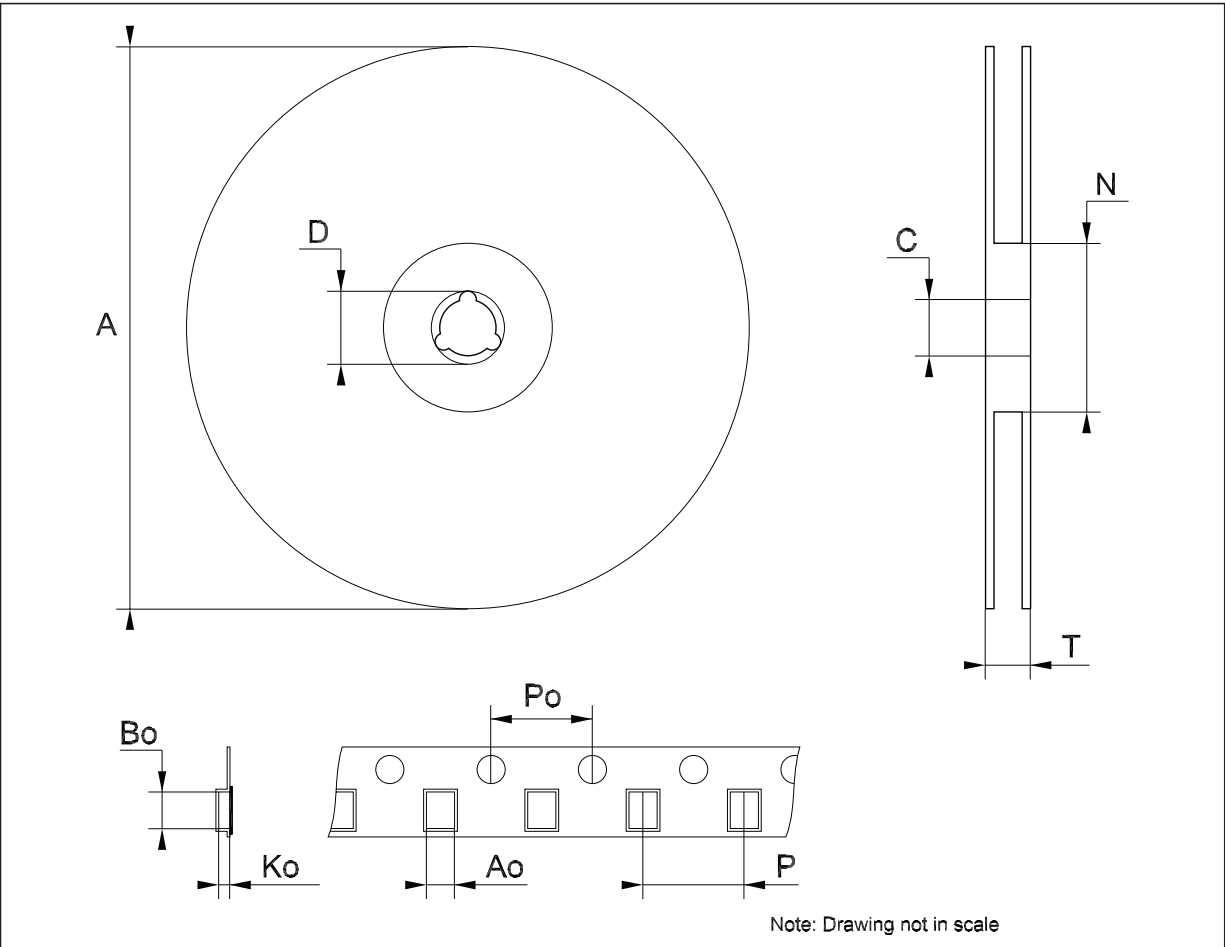
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.53	0.57	0.60	0.021	0.022	0.024
A3	0.13	0.17	0.18	0.005	0.006	0.007
D	1.50	1.66	1.70	0.059	0.065	0.067
E	1.50	1.65	1.70	0.059	0.065	0.067
E1	1.10	1.20	1.30	0.043	0.047	0.051
L1	0.11	0.19	0.26	0.004	0.007	0.010
L2	0.10	0.23	0.30	0.004	0.009	0.012
L3	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		
θ	8°	10°	12°	8°	10°	12°



7673701C

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: Table 5 on page 7 .

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