

LD39015XX08 - LD39015XX10 LD39015XX12 - LD39015XX33

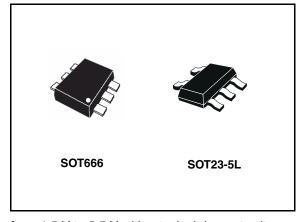
150 mA low quiescent current low noise voltage regulator

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 μA typ. at no load, 35 μA typ. at 150 mA load, 1 μA max in off mode)
- Very low noise without bypass capacitor (29 µV_{BMS} at V_{OUT} = 0.8 V)
- Output voltage tolerance: ± 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 $C_{OUT} = 1 \mu F$
- 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 μA . 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	Order codes				
SOT666	T666 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.

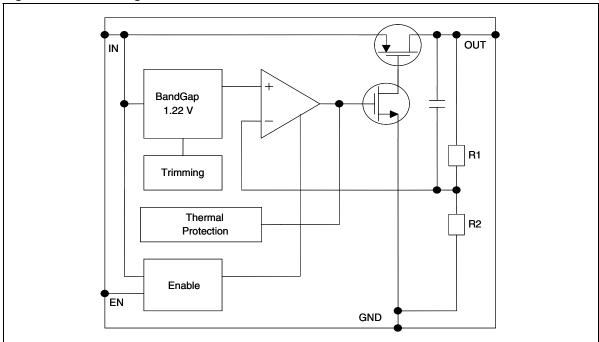
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1 Diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connection (top view)

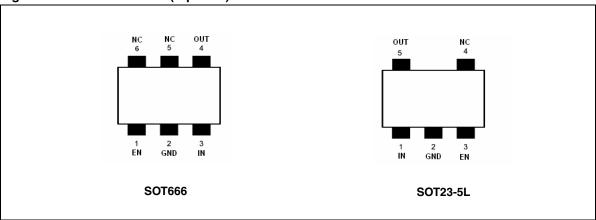
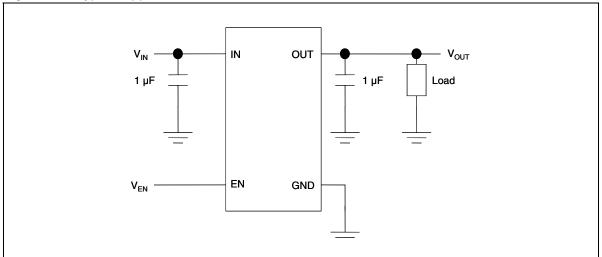


Table 2. Pin description

Pir	n n°	Symbol	Function	
SOT666	SOT666 SOT23-5L		runction	
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	٧
V _{EN}	Enable input voltage	-0.3 to V _I + 0.3	٧
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 $(T_J = 25^{\circ}C, V_{IN} = V_{OUT(NOM)} + 1V, C_{IN} = C_{OUT} = 1 \mu F, I_{OUT} = 1 mA, V_{EN} = V_{IN}$, unless otherwise specified) (1)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit	
V_{IN}	Operating input voltage		1.5		5.5	٧	
V	Turn-on threshold			1.45	1.48	٧	
V_{UVLO}	Turn-off threshold		1.30	1.35		mV	
		V _{OUT} > 1.5V, I _{OUT} = 1mA, T _J = 25°C	-2.0		2.0		
V	V conveni	V _{OUT} > 1.5V, I _{OUT} = 1mA, -40°C < T _J < 125°C	-3.0		3.0	%	
V _{OUT}	V _{OUT} accuracy	V _{OUT} ≤1.5V, I _{OUT} = 1mA		±10			
		V _{OUT} ≤1.5V, I _{OUT} = 1mA, -40°C < T _J < 125°C		±30		mV	
ΔV _{OUT}	Static line regulation	V _{OUT} +1V ≤V _{IN} ≤5.5V, I _{OUT} = 1mA		0.01		%/V	
ΔV _{OUT}	Transient line regulation (2)	$\Delta V_{IN} = +500$ mV, $I_{OUT} = 1$ mA, $T_R = T_F = 5$ µs		10		mVpp	
ΔV _{OUT}	Static load regulation	I _{OUT} = 1mA to 150mA		0.002		%/mA	
ΔV_{OUT}	Transient load regulation (2)	$I_{OUT} = 1$ mA to 150mA, $T_R = T_F = 5$ µs		40		mVpp	
V _{DROP}	Dropout voltage (3)	I _{OUT} = 100mA, V _{OUT} > 1.5V -40°C < T _J < 125°C		80	100	mV	
e _N	Output noise voltage	1.1KHz to 100KHz, I _{OUT} = 10mA, V _{OUT} = 0.8V		29		μV _{RMS}	
SVD	SVR Supply voltage rejection $V_{OUT} = 1.5V$	$V_{IN} = V_{OUTNOM} + 0.5V + /-V_{RIPPLE}$ $V_{RIPPLE} = 0.1V$, Freq. = 1KHz $I_{OUT} = 10$ mA		65		dB	
SVN		$V_{IN} = V_{OUTNOM} + 0.5V + /-V_{RIPPLE}$ $V_{RIPPLE} = 0.1V$, Freq.=10KHz $I_{OUT} = 10$ mA		62		ub l	
		I _{OUT} = 0mA		18			
		I _{OUT} = 0mA, -40°C < T _J < 125°C			50		
		I _{OUT} = 0 to 150mA		38			
ΙQ	Quiescent current	I _{OUT} = 0 to 150mA -40°C < T _J < 125°C			70	μΑ	
		V _{IN} input current in OFF MODE: V _{EN} = GND		0.001	1		
I _{SC}	Short circuit current	R _L = 0		350		mA	
V	Enable input logic low	V _{IN} = 1.5V to 5.5V, -40°C < T _J < 125°C			0.4	V	
V _{EN}	Enable input logic high	V _{IN} = 1.5V to 5.5V, -40°C < T _J < 125°C	0.9			V	
I _{EN}	Enable pin input current	V _{SHDN} = V _{IN}		0.1	100	nA	

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

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
T _{ON}	Turn on time ⁽⁴⁾			30		μs
т	Thermal shutdown			160		°C
SHDN	Hysteresis			20		C
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

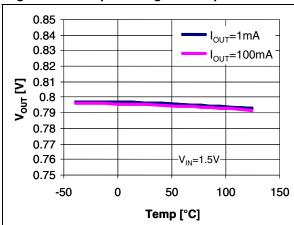


Figure 5. Output voltage vs input voltage

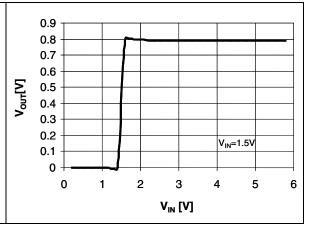


Figure 6. Dropout voltage vs output current Figure 7

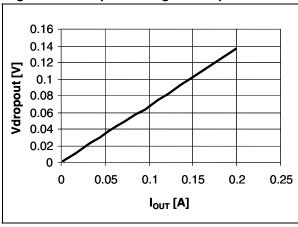


Figure 7. C_{OUT} stability region

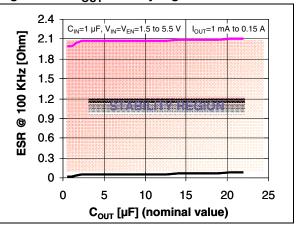
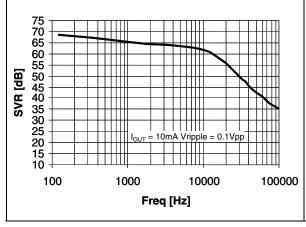
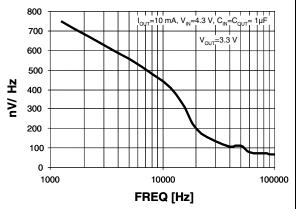


Figure 8. Supply voltage rejection vs frequency

Figure 9. Output noise voltage vs frequency







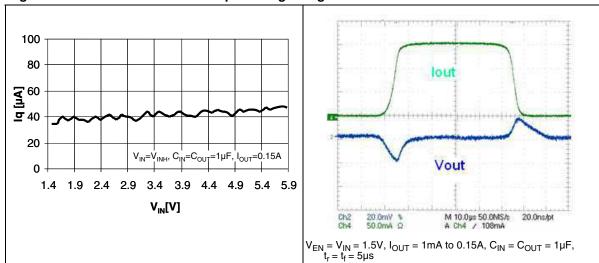


Figure 10. Quiescent current vs input voltage Figure 11. Load transient



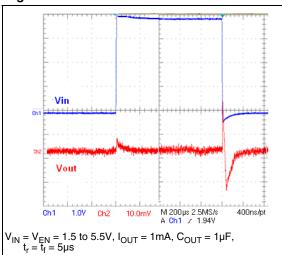
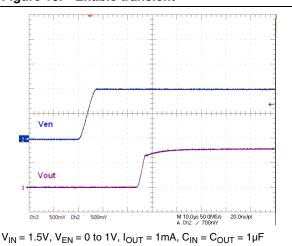


Figure 13. Enable transient



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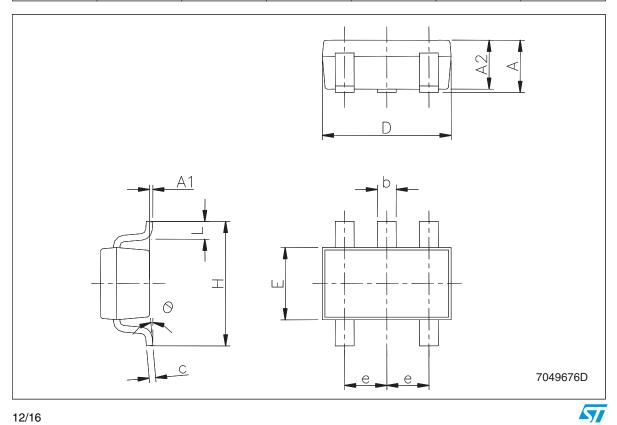
7 Package mechanical data

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.



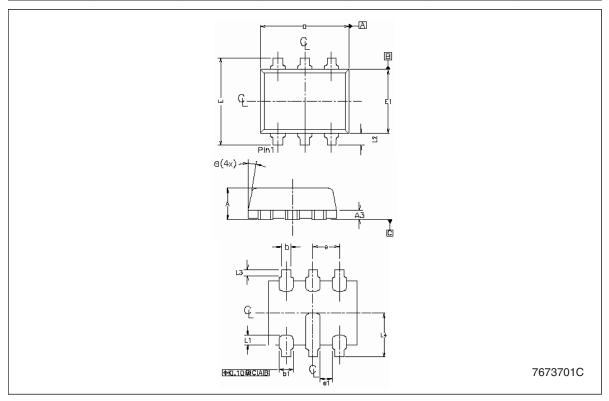
SOT23-5L mechanical data

Dim.		mm.			mils.	
Dilli.	Min.	Тур.	Max.	Min.	Тур.	Max.
А	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
С	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
Е	1.50		1.75	59.0		68.8
е		0.95			37.4	
Н	2.60		3.00	102.3		118.1
L	0.10		0.60	3.9		23.6



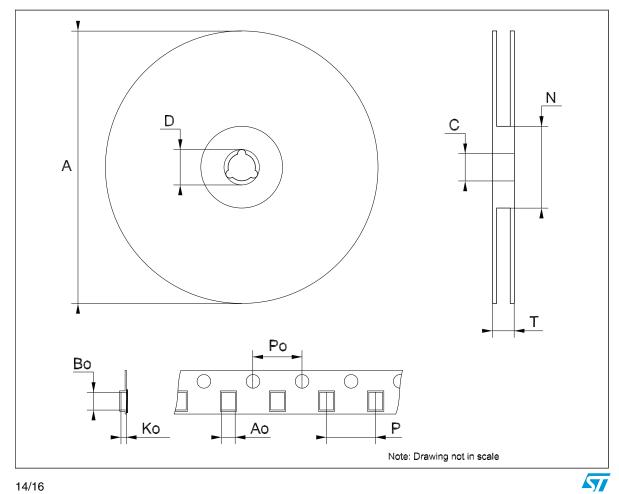
SOT666 mechanical data

Dim		mm.			inch.	
Dim.	Min.	Тур.	Max.	Min.	Тур.	Max.
А	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
е		0.50			0.5	
e1	0.20			0.2		
θ	8°	10°	12°	8°	10°	12°



Tape & reel SOT23-xL	mechanical	data
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Dim	Dim.		mm.		inch.		
DIM.	Min.	Тур.	Max.	Min.	Тур.	Max.	
А			180			7.086	
С	12.8	13.0	13.2	0.504	0.512	0.519	
D	20.2			0.795			
N	60			2.362			
Т			14.4			0.567	
Ao	3.13	3.23	3.33	0.123	0.127	0.131	
Во	3.07	3.17	3.27	0.120	0.124	0.128	
Ko	1.27	1.37	1.47	0.050	0.054	0.0.58	
Po	3.9	4.0	4.1	0.153	0.157	0.161	
Р	3.9	4.0	4.1	0.153	0.157	0.161	



8 Revision history

Table 6. Document revision history

Date	Revision	Changes
12-Oct-2007	1	Initial release.

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