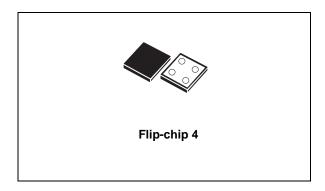


150 mA low quiescent current low noise voltage regulator

Datasheet - production data



Features

- Input voltage from 1.5 to 5.5 V
- Ultra low dropout voltage (90 mV typ. at 100 mA load)
- Very low quiescent current (20 μA typ. at no load, 35 μA typ. at 150 mA load, 1 μA max in off mode)
- Low noise (54 μV_{RMS} from 10 Hz to 100 kHz at V_{OUT} = 1.8 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 4.5 V with 100 mV step
- · Logic-controlled electronic shutdown
- Compatible with ceramic capacitor C_{OLIT} = 1 μF
- Internal current and thermal limit
- Flip-chip 4 bumps 1.1 x 1.1 mm.
- Temperature range: -40 °C to 125 °C

Description

The LD39015J provides 150 mA maximum current from an input voltage ranging from 1.5 V to 5.5 V with a typical dropout voltage of 90 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 74 dB at low frequencies and starts to roll off at 10 kHz. Enable logic control function puts the LD39015J in shut-down mode allowing a total current consumption lower than 1 µA. The device also includes a short-circuit constant current limiting and thermal protection. Typical applications are mobile phones, personal digital assistant (PDAs), cordless phone and similar battery powered systems.

Table 1. Device summary

Order code	Output voltage
LD39015J12R	1.2 V

Contents LD39015J

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_	
2	Pin configuration
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4	Maximum ratings
5	Electrical characteristics
6	Typical performance characteristics 9
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9	Revision history



LD39015J Diagram

1 Diagram

BandGap
1.22 V

Trimming

R1

Protection

R2

Figure 1. Block diagram

Pin configuration LD39015J

2 Pin configuration

Figure 2. Pin connection (top view)

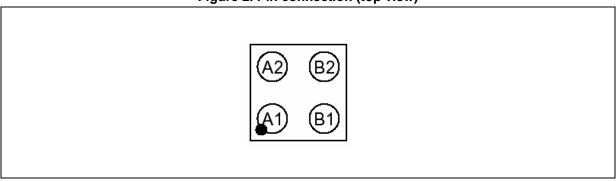


Table 2. Pin description

Pin n°	Symbol	Function
A2	EN	Enable pin logic input: Low=shutdown, High=active
A1	GND	Common ground
B2	IN	Input voltage of the LDO
B1	OUT	Output voltage

LD39015J Typical application

3 Typical application

V_{IN} IN OUT V_{OUT} 1 μF Load

V_{EN} EN GND

Figure 3. Typical application circuit

Maximum ratings LD39015J

4 Maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{IN}	DC input voltage	- 0.3 to 6	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	Symbol Parameter		Unit
R_{thJA}	Thermal resistance junction-ambient	180	°C/W

5 Electrical characteristics

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

Table 5. Electrical characteristics

$V_{OUT} = \frac{V_{OUT} > 1.5 \text{ V, } I_{OUT} = 1 \text{ mA,}}{I_J = 25 \text{ °C}} - \frac{2.0}{3.0} = \frac{2.0}{3.0}$ $V_{OUT} > 1.5 \text{ V, } I_{OUT} = 1 \text{ mA,}}{V_{OUT} > 1.5 \text{ V, } I_{OUT} = 1 \text{ mA,}} - \frac{2.0}{3.0} = \frac{3.0}{3.0} = \frac{3.0}{3.0}$ $V_{OUT} \le 1.5 \text{ V, } I_{OUT} = 1 \text{ mA,}}{V_{OUT} \le 1.5 \text{ V, } I_{OUT} = 1 \text{ mA,}} + \frac{10}{40 \text{ °C}} = \frac{100 \text{ mA}}{100000000000000000000000000000000000$	Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
$\begin{array}{c} V_{UVLO} \\ \hline \\ V_{OUT} $	V _{IN}	Operating input voltage		1.5		5.5	V
$V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ T_{J} = 25 ^{\circ} \text{C} \qquad -2.0 \qquad 2.0 \qquad \%$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad 3.0 \qquad \%$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad 3.0 \qquad \%$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad MV$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad MV$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad MV$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad MV$ $V_{OUT} = 1.5 V, \ V_{OUT} = 1 \text{mA}, \ -40 ^{\circ} \text{C} < T_{J} < 125 ^{\circ} \text{C} \qquad -3.0 \qquad 3.0 \qquad MV$ $V_{OUT} = 1.6 V, \ V_{IN} = 1.6 V, \ V_{IN} \leq 1.6 V, \ V_{IN} = 1.6 V, \ V_{IN$	V	Turn-on threshold			1.45	1.48	V
$V_{OUT} = V_{OUT} = V_{O$	VUVLO	Turn-off threshold		1.30	1.35		mV
$V_{OUT} = V_{OUT} = V_{O$				-2.0		2.0	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V _{OUT}	V _{OUT} accuracy	33.	-3.0		3.0	- %
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			V _{OUT} ≤ 1.5 V, I _{OUT} = 1 mA		±10		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					±30		mV
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ΔV _{OUT}	Static line regulation			0.01		%/V
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ΔV _{OUT}	Static load regulation	I _{OUT} = 1 mA to 150 mA		0.002		%/mA
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V _{DROP}	Dropout voltage (1)			90	130	mV
$SVR Supply \ voltage \ rejection \\ V_{OUT} = 1.5V V_{RIPPLE} = 0.1 \ V, \ freq. = 1 \ kHz \\ V_{IN} = V_{OUTNOM} + 0.5 \ V + / - V_{RIPPLE} \\ V_{RIPPLE} = 0.1 \ V, \ Freq. = 10 \ kHz \\ V_{IOUT} = 10 \ mA \\ I_{OUT} = 10 \ mA \\ I_{OUT} = 0 \ to \ 150 \ mA \\ I_{OUT} = 0 \ to \$	e _N	Output noise voltage			54		μV _{RMS}
$V_{OUT} = 1.5V \qquad V_{IN} = V_{OUTNOM} + 0.5 \text{ V +/-V}_{RIPPLE} \\ V_{RIPPLE} = 0.1 \text{ V, Freq.=10 kHz} \qquad 67 \\ I_{OUT} = 10 \text{ mA} \qquad 20 \\ I_{OUT} = 0 \text{ mA} - 40 \text{ °C < T}_{J} < 125 \text{ °C} \qquad 40 \\ I_{OUT} = 0 \text{ to 150 mA} \qquad 35 \\ I_{OUT} = 0 \text{ to 150 mA} \qquad 50 \\ I_{OUT} = 0 \text{ to 150 mA} \qquad 50 \\ V_{IN} \text{ input current in OFF MODE:} \\ V_{EN} = \text{GND} \qquad 0.003 1 \\ I_{OUT} = 0 \text{ to 150 mA} \qquad 0.003 1 \\ $	C\/D	Supply voltage rejection	$V_{RIPPLE} = 0.1 \text{ V, freq.} = 1 \text{ kHz}$		74		dD
$I_{Q} \qquad \text{Quiescent current} \qquad \begin{array}{c} I_{OUT} = 0 \text{ mA, } -40 \text{ °C} < T_{J} < 125 \text{ °C} \\ \\ I_{OUT} = 0 \text{ to } 150 \text{ mA} \\ \\ I_{OUT} = 0 \text{ to } 150 \text{ mA} \\ \\ -40 \text{ °C} < T_{J} < 125 \text{ °C} \\ \\ V_{IN} \text{ input current in OFF MODE:} \\ V_{EN} = \text{GND} \end{array} \qquad \begin{array}{c} 40 \\ 35 \\ \\ 50 \\ \\ 0.003 \\ 1 \end{array}$	SVK	V _{OUT} = 1.5V	V _{RIPPLE} = 0.1 V, Freq.=10 kHz		67	dB	
$I_{Q} \qquad \text{Quiescent current} \qquad \begin{array}{c} I_{OUT} = 0 \text{ to } 150 \text{ mA} \\ \\ I_{OUT} = 0 \text$			I _{OUT} = 0 mA		20		
$I_{Q} \qquad \text{Quiescent current} \qquad \qquad I_{OUT} = 0 \text{ to } 150 \text{ mA} \\ -40 \text{ °C} < T_{J} < 125 \text{ °C} \qquad \qquad 50 \\ \qquad V_{IN} \text{ input current in OFF MODE:} \\ \qquad V_{EN} = \text{GND} \qquad \qquad 0.003 \qquad 1 \\ \qquad \qquad \qquad \qquad \qquad 1$			I _{OUT} = 0 mA, -40 °C < T _J < 125 °C			40	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	ΙQ	Quiescent current	I _{OUT} = 0 to 150 mA		35		
V _{EN} = GND						50	μΑ
I _{SC} Short circuit current R _L = 0 200 mA					0.003	1	
	I _{SC}	Short circuit current	R _L = 0	200			mA

Electrical characteristics LD39015J

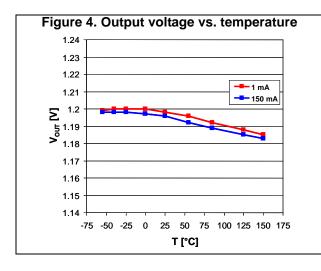
Table 5. Electrical characteristics (continued)

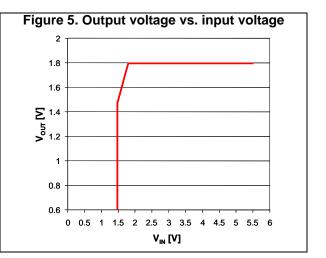
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
	Enable input logic low	V _{IN} = 1.5 V to 5.5 V, -40 °C < T _J < 125 °C			0.4	V
V _{EN}	Enable input logic high	V _{IN} = 1.5 V to 5.5 V, -40 °C < T _J < 125°C	0.9			V
I _{EN}	Enable pin input current	V _{SHDN} = V _{IN} , -40 °C < T _J < 125 °C		0.1	1	μΑ
T _{ON}	Turn on time (2)			30		μs
_	Thermal shutdown			160		°C
T _{SHDN}	Hysteresis			20		
C _{OUT}	Output capacitor	Capacitance (see typical performance characteristics for stability)	1		22	μF

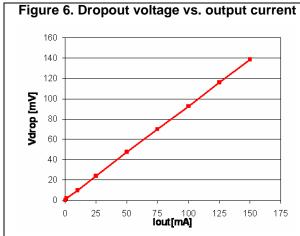
^{1.} Dropout voltage is the input-to-output voltage difference at which the output voltage is 100 mV below its nominal value. This specification does not apply for output voltages below 1.5 V.

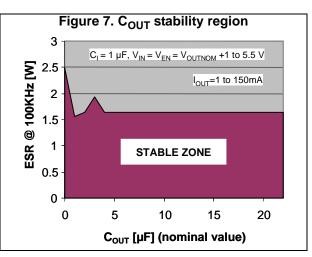
^{2.} Turn-on time is time measured between the enable input just exceeding V_{EN} High Value and the output voltage just reaching 95% of its nominal value.

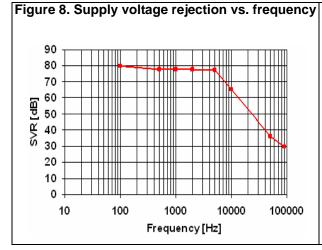
6 Typical performance characteristics

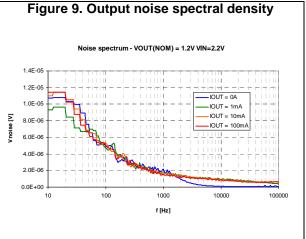






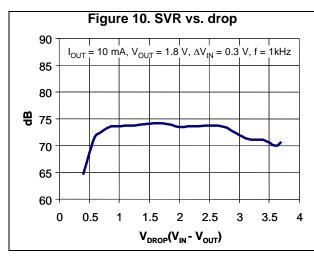


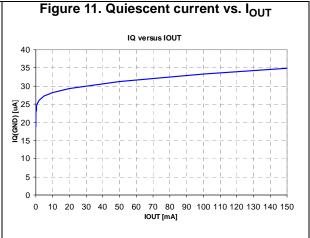


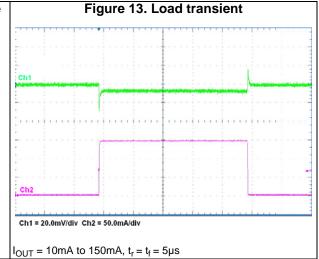


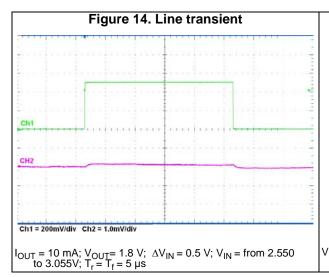
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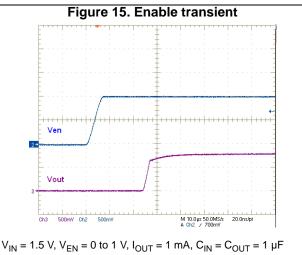
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7 Package mechanical data

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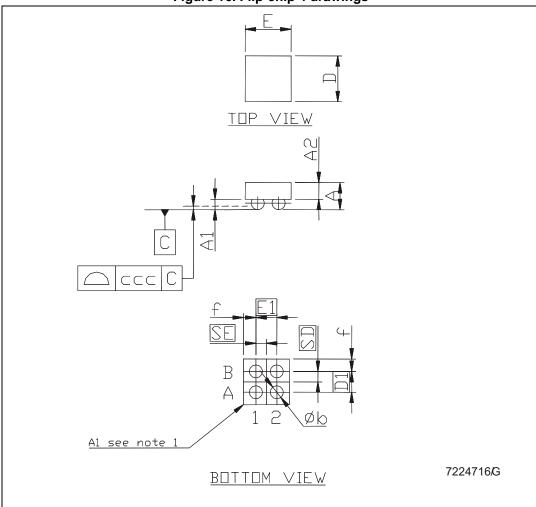


Figure 16. Flip-chip 4 drawings

0.25 0,25 S Ø0.25 Grid placement area FOOT PRINT

Figure 17. Flip-chip 4 footprint

Table 6. Flip-chip 4 mechanical data

Dim.		mm	
	Min.	Тур.	Max.
А	0.585	0.65	0.715
A1	0.21	0.25	0.29
A2		0.40	
b	0.265	0.315	0.365
D	1.02	1.07	1.12
D1		0.5	
E	1.02	1.07	1.12
E1		0.5	
SD		0.25	
SE		0.25	

8 Packaging mechanical data

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Table 7. Flip-chip 4 tape and reel mechanical data

Dim.	mm				
Dilli.	Min.	Тур.	Max.		
А			178		
С	12.8		13.2		
D	20.2				
N	59	60	61		
Т			8.4		
Ao	1.12	1.17	1.22		
Во	1.12	1.17	1.22		
Ко	0.68	0.73	0.78		
Ро	3.9	4.0	4.1		
Р	3.9	4.0	4.1		

LD39015J Revision history

9 Revision history

Table 8. Document revision history

Date	Revision	Changes
29-Jun-2009	1	First release.
05-Aug-2009 2 Updated tape and reel mechanical data.		Updated tape and reel mechanical data.
11-Sep-2012	3	Added: new order code LD39015J25R Table 1 on page 1.
08-Jan-2014	4	Part number LD39015JXX changed to LD39015J. Updated the Description in cover page, Section 7: Package mechanical data. Added Section 8: Package mechanical data. Minor text changes.
23-Aug-2017	5	Updated Table 1: Device summary on the cover page.

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