

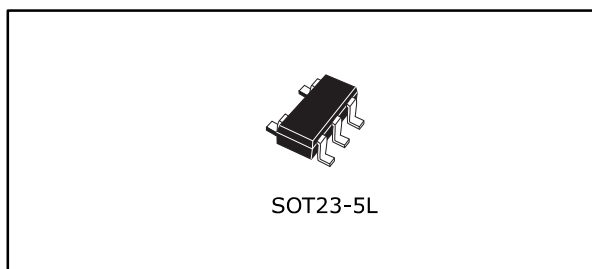


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**150 mA, ultra low quiescent current linear voltage regulator**

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Datasheet - production data

**Features**

- Input voltage from 1.5 to 5.5 V
- Very low quiescent current:
  - 1.0  $\mu\text{A}$  (typ.) at no load
  - 1.4  $\mu\text{A}$  (typ.) at 150 mA load
  - 1 nA (typ.) in OFF mode
  - 200 nA max. in OFF mode at 125 °C
- Output voltage tolerance:  $\pm 2\%$  at 25 °C
- 150 mA guaranteed output current
- Wide range of output voltages: 0.8 V to 3.3 V in 100 mV steps
- Logic-controlled electronic shutdown
- Compatible with ceramic capacitor ( $C_{\text{OUT}} = 1 \mu\text{F}$ )
- Internal current and thermal limit
- Temperature range: from -40 °C to 125 °C

**Application**

- Mobile phones
- Digital still cameras (DSC)
- Battery-powered equipment
- Portable media players

**Description**

The STLQ015 provides 150 mA of maximum current with an input voltage range from 1.5 V to 5.5 V and a typical dropout voltage of 112 mV. The key feature of this device is its quiescent current, which is just 1.4  $\mu\text{A}$  at maximum output current. The device is stable with a ceramic capacitor on the output. It offers very low quiescent current and extends battery-life of applications requiring very long standby time. The enable logic control function puts the STLQ015 in shutdown mode, reducing total current consumption to 1 nA. The device also includes short-circuit constant-current limiting and thermal protection. Typical applications are: portable and battery-powered systems, electronic sensors and microcontroller power supply.

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## 2 Pin configuration and description

Figure 2: Pin configuration (top view)

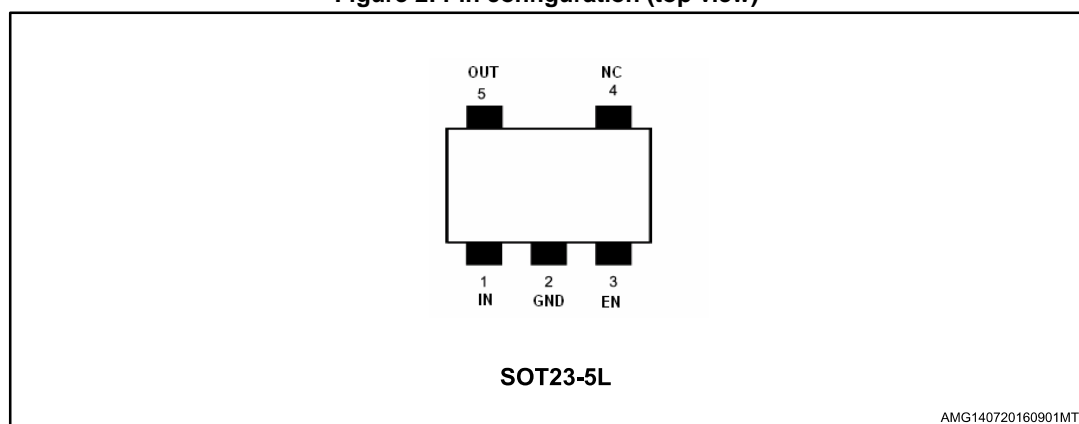
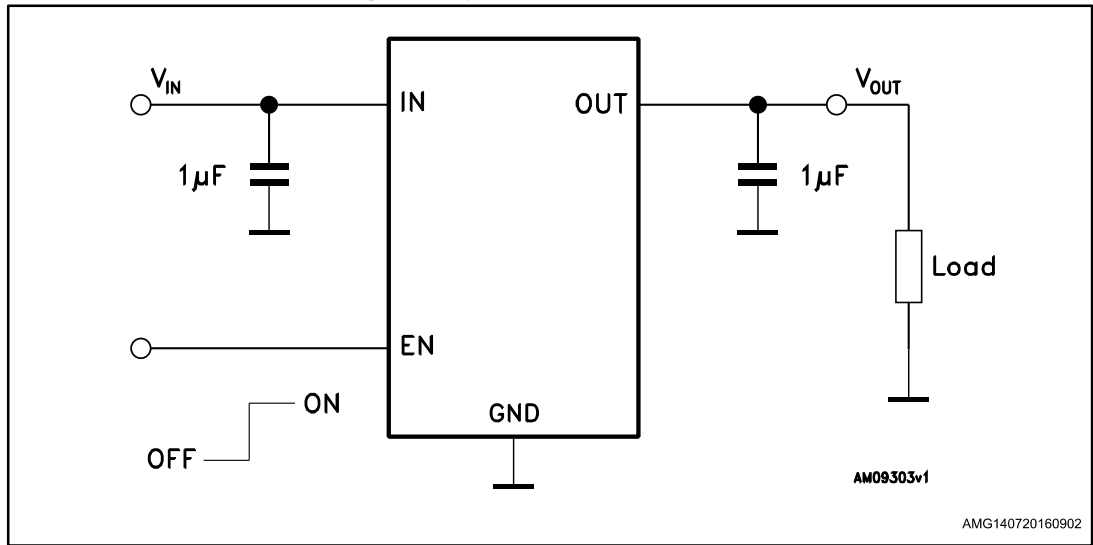


Table 1: Pin description

Pin	Symbol	Functions
3	EN	Enable input Set $V_{EN}$ = high to turn on the device Set $V_{EN}$ = low to turn off the device
2	GND	Ground
1	IN	Input voltage
5	OUT	Output voltage
4	NC	Not connected

### 3 Typical application

Figure 3: Typical application circuit



## 4 Maximum ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V <sub>IN</sub>	DC input voltage	-0.3 to 7	V
V <sub>OUT</sub>	DC output voltage	-0.3 to V <sub>IN</sub> +0.3	V
V <sub>EN</sub>	Enable input voltage	-0.3 to V <sub>IN</sub> +0.3	V
I <sub>OUT</sub>	Output current	Internally limited	mA
ESD	Human body model	±3	kV
	Machine model	±300	V
P <sub>D</sub>	Power dissipation	Internally limited	mW
T <sub>STG</sub>	Storage temperature range	-65 to 150	°C
T <sub>OP</sub>	Max. junction temperature	150	°C



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 3: Thermal data

Symbol	Parameter	Value	Unit
R <sub>thJA</sub>	Thermal resistance junction-ambient	255	°C/W
R <sub>thJC</sub>	Thermal resistance junction-case	81	°C/W

## 5 Electrical characteristics

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

Table 4: Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{IN}$	Operating input voltage	$I_{OUT} = 0$	1.5		5.5	V
		$-40\text{ °C} < T_J < 125\text{ °C}$ , $I_{OUT} = 150\text{ mA}$	1.55		5.5	
$V_{OUT}$	$V_{OUT}$ accuracy	$I_{OUT} = 1\text{ mA}$	-2		2	%
		$I_{OUT} = 1\text{ mA}$ , $V_{OUT} < 1\text{ V}$	-20		+20	mV
		$I_{OUT} = 1\text{ mA}$ , $-40\text{ °C} < T_J < 125\text{ °C}$	-3		3	%
$\Delta V_{OUT-LINE}$	Static line regulation	$V_{OUT} + 1\text{ V} \leq V_{IN} \leq 5.5\text{ V}$ , $I_{OUT} = 1\text{ mA}$		$\pm 0.01$		%/V
$\Delta V_{OUT-LOAD}$	Static load regulation	$I_{OUT} = 1\text{ mA}$ to $150\text{ mA}$		$\pm 0.002$		%/mA
$V_{DROP}$	Dropout voltage <sup>(1)</sup>	$I_{OUT} = 150\text{ mA}$		112		mV
		$I_{OUT} = 150\text{ mA}$ , $-40\text{ °C} < T_J < 125\text{ °C}$			300	
$e_n$	Output noise voltage	10 kHz to 100 kHz, $I_{OUT} = 10\text{ mA}$ , $V_{OUT} = 0.8\text{ V}$		75		$\mu\text{V}_{RMS}$
SVR	Supply voltage rejection $V_{OUT} = 0.8\text{ V}$	$V_{IN} = V_{OUTNOM} + 1\text{ V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{ V}$ , frequency = 1 kHz $I_{OUT} = 10\text{ mA}$		40		dB
		$V_{IN} = V_{OUTNOM} + 1\text{ V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{ V}$ , frequency = 10 kHz $I_{OUT} = 1\text{ mA}$		30		
		$V_{IN} = V_{OUTNOM} + 1\text{ V} \pm V_{RIPPLE}$ $V_{RIPPLE} = 0.1\text{ V}$ , frequency = 100 kHz $I_{OUT} = 1\text{ mA}$		15		
$I_q$	Quiescent current	$I_{OUT} = 0$		1.0	1.7	$\mu\text{A}$
		$I_{OUT} = 0$ to $150\text{ mA}$ , $-40\text{ °C} < T_J < 125\text{ °C}$		1.4	2.4	
$I_{OFF}$	Shutdown current <sup>(2)</sup>	$V_{IN}$ input current in OFF mode: $V_{EN} = \text{GND}$ , $-40\text{ °C} < T_J < 125\text{ °C}$		1	200	nA
$I_{SC}$	Short-circuit current	$R_L = 0$	250	350		mA
$V_{EN}$	Enable input logic low	$V_{IN} = 1.5\text{ V}$ to $5.5\text{ V}$			0.4	V
	Enable input logic high	$V_{IN} = 1.5\text{ V}$ to $5.5\text{ V}$	0.7			V

**Electrical characteristics**
**STLQ015**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{EN}$	Enable pin input current	$V_{EN} = 5.5 \text{ V}$		1	200	nA
$T_{ON}$	Turn-on time <sup>(3)</sup>	$V_{OUT} = 0.8 \text{ V}$ , $I_{OUT} = 150 \text{ mA}$		160		$\mu\text{s}$
$T_{SHDN}$	Thermal shutdown			170		$^{\circ}\text{C}$
	Hysteresis			15		
$C_{OUT}$	Output capacitor	Capacitance (see typical performance characteristics for stability)	0.47		10	$\mu\text{F}$
	ESR		0.056		6	$\Omega$

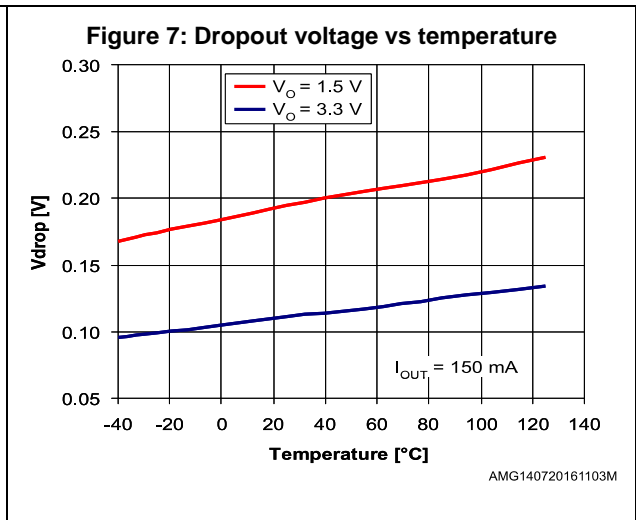
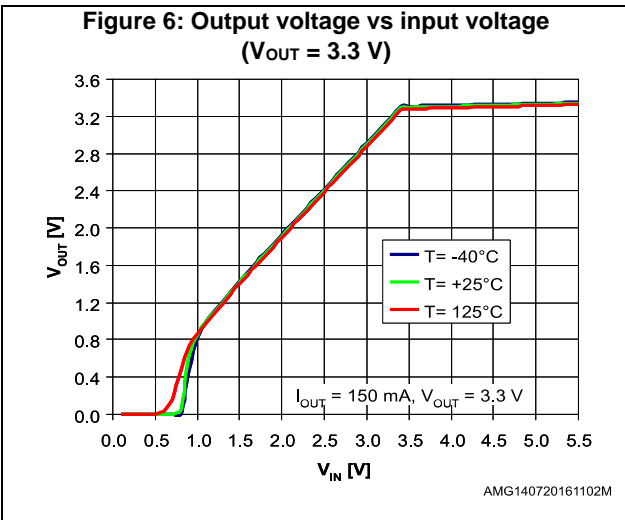
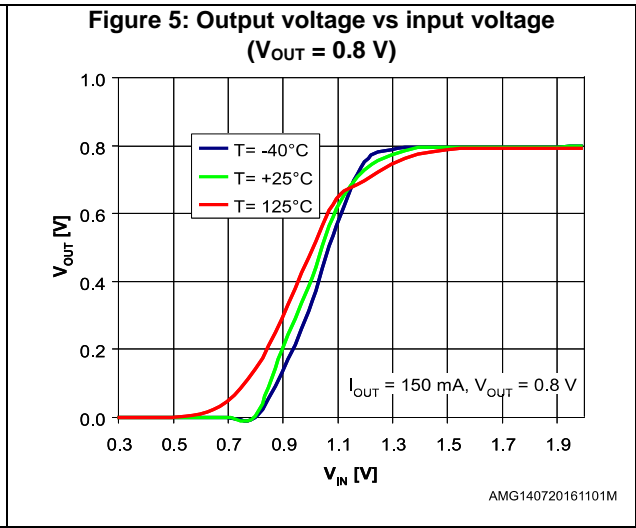
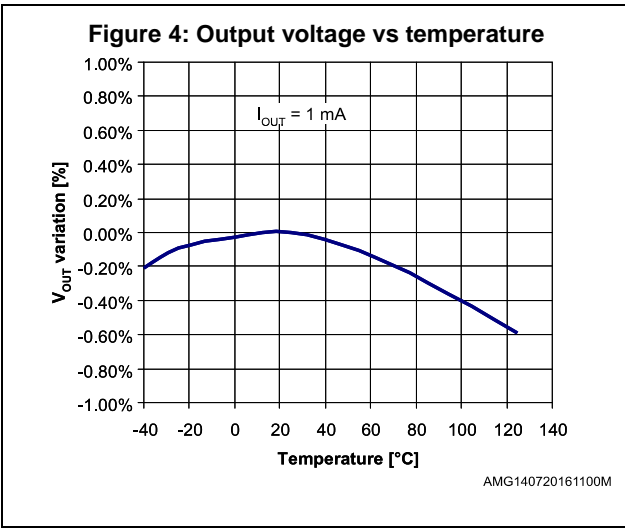
**Notes:**

<sup>(1)</sup>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 to output voltages below 1.5 V.

<sup>(2)</sup>During shutdown and at no load, P-channel leakage current flowing through the internal resistor divider causes the  $V_{OUT}$  rise.

<sup>(3)</sup>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



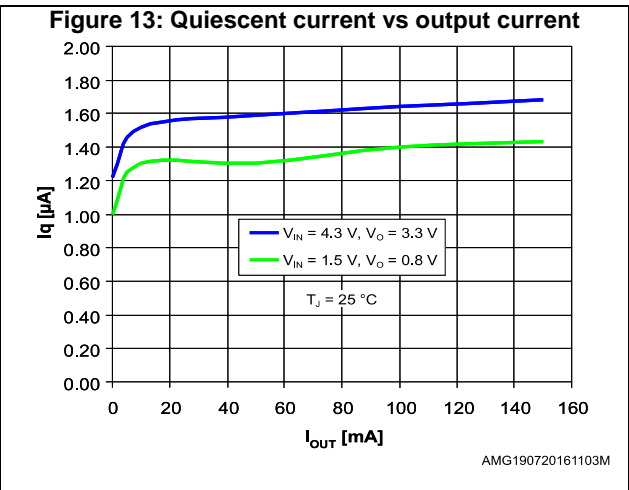
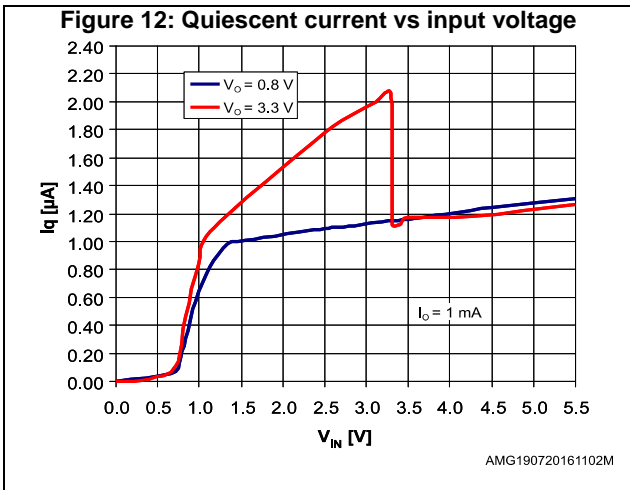
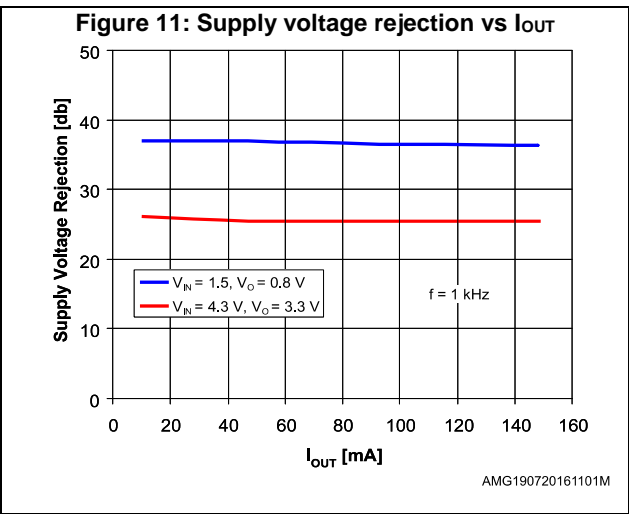
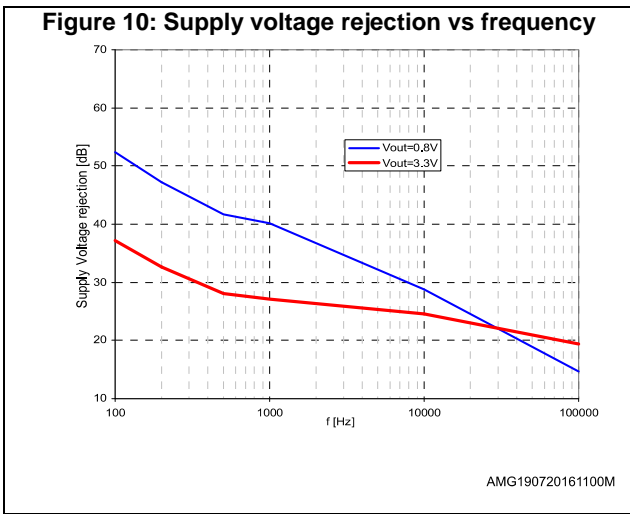
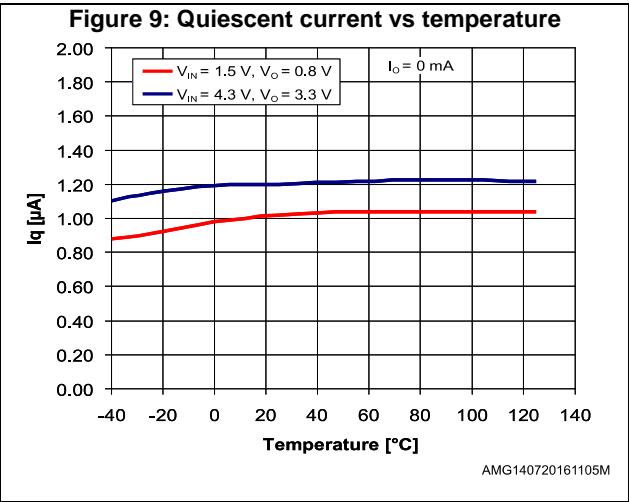
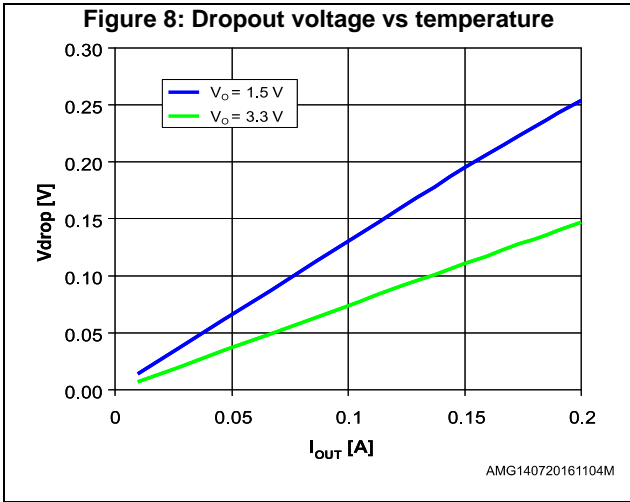
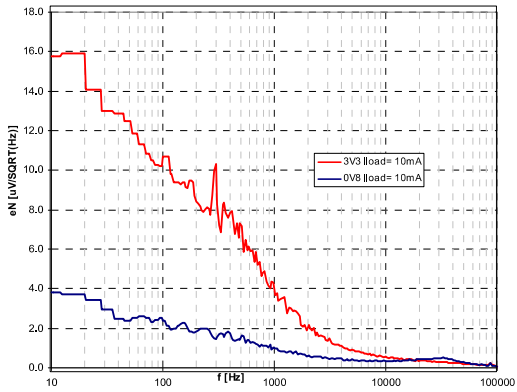
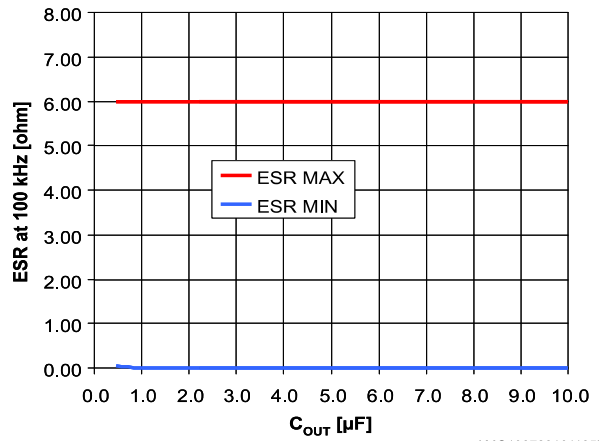


Figure 14: Output noise voltage vs frequency



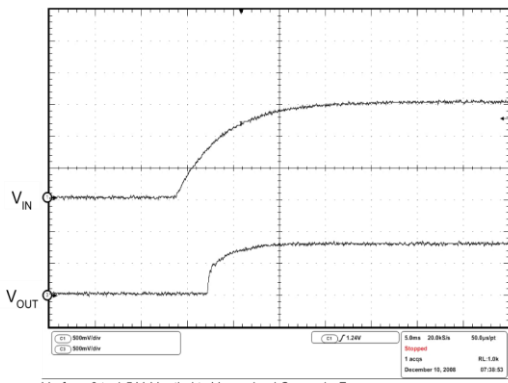
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Figure 15: C<sub>OUT</sub> stability region



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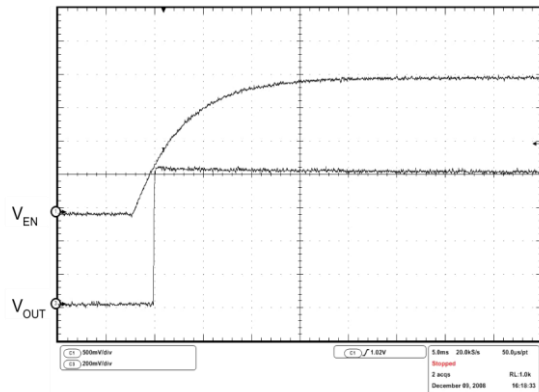
Figure 16: Start-up transient



V<sub>IN</sub> from 0 to 1.5 V, V<sub>EN</sub> tied to V<sub>IN</sub>, no load C<sub>OUT</sub> = 1 μF

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Figure 17: Enable transient



V<sub>IN</sub> = 1.5 V; V<sub>EN</sub> from 0 to 2 V, no load, T = 25 °C

AMG190720161107M

## 7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 7.1 SOT23-5L package information

Figure 18: SOT23-5L package outline

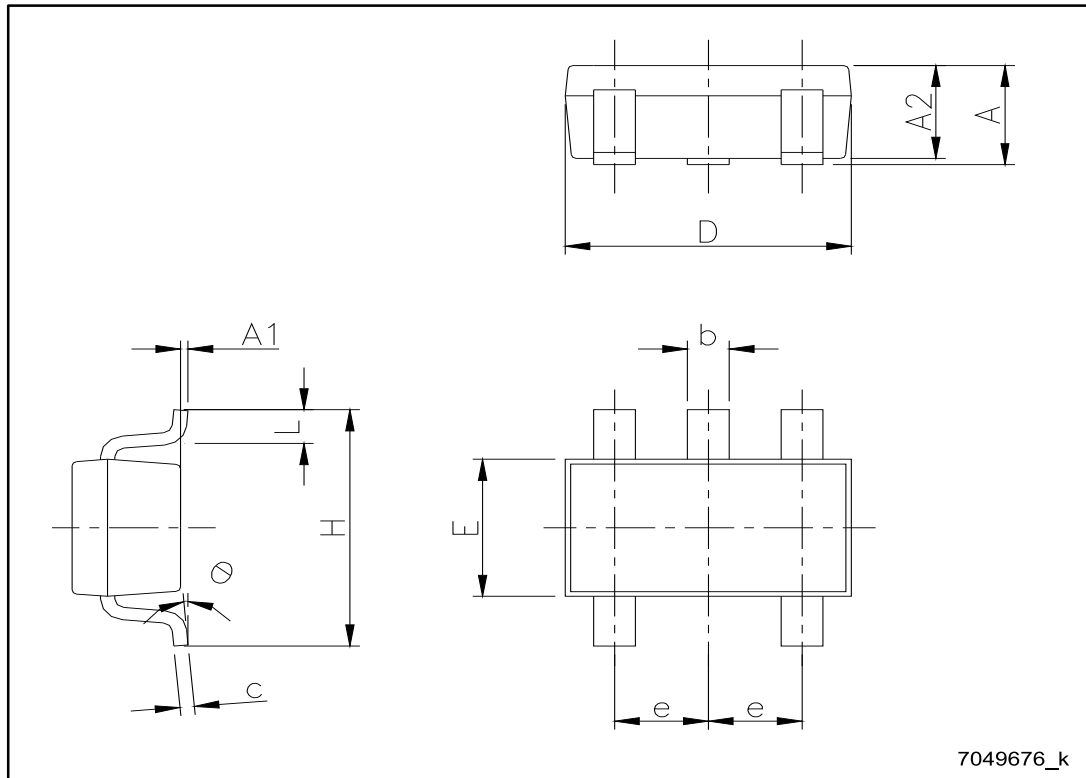
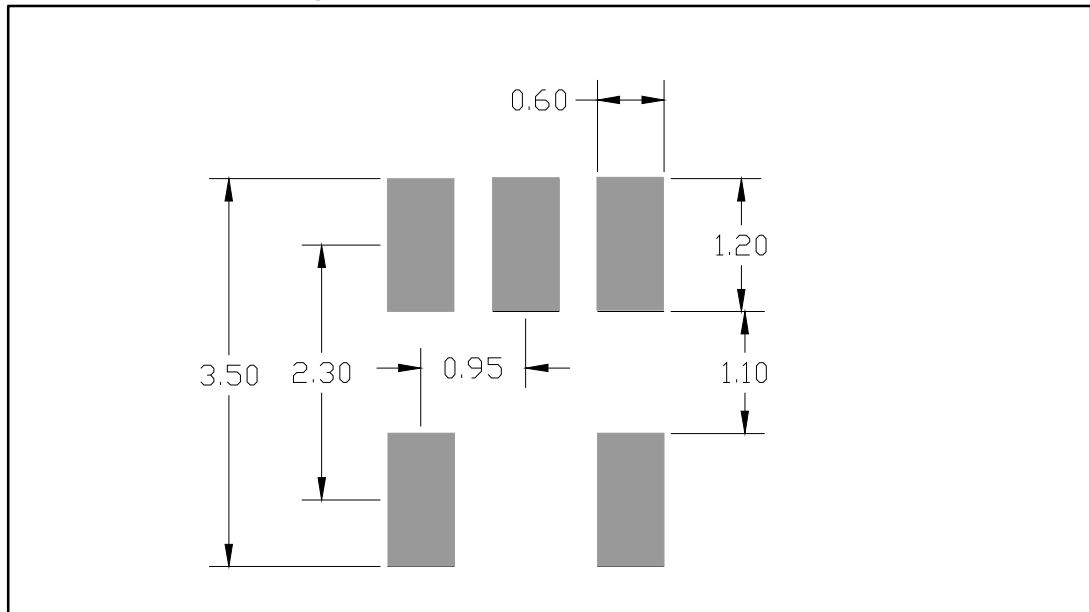


Table 5: SOT23-5L package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.90		1.45
A1	0		0.15
A2	0.90		1.30
b	0.30		0.50
c	0.09		0.20
D		2.95	
E		1.60	
e		0.95	
H		2.80	
L	0.30		0.60
$\theta$	0°		8°

Figure 19: SOT23-5L recommended footprint



Dimensions are in mm

## 7.2 SOT23-5L packing information

Figure 20: SOT23-5L tape and reel outline

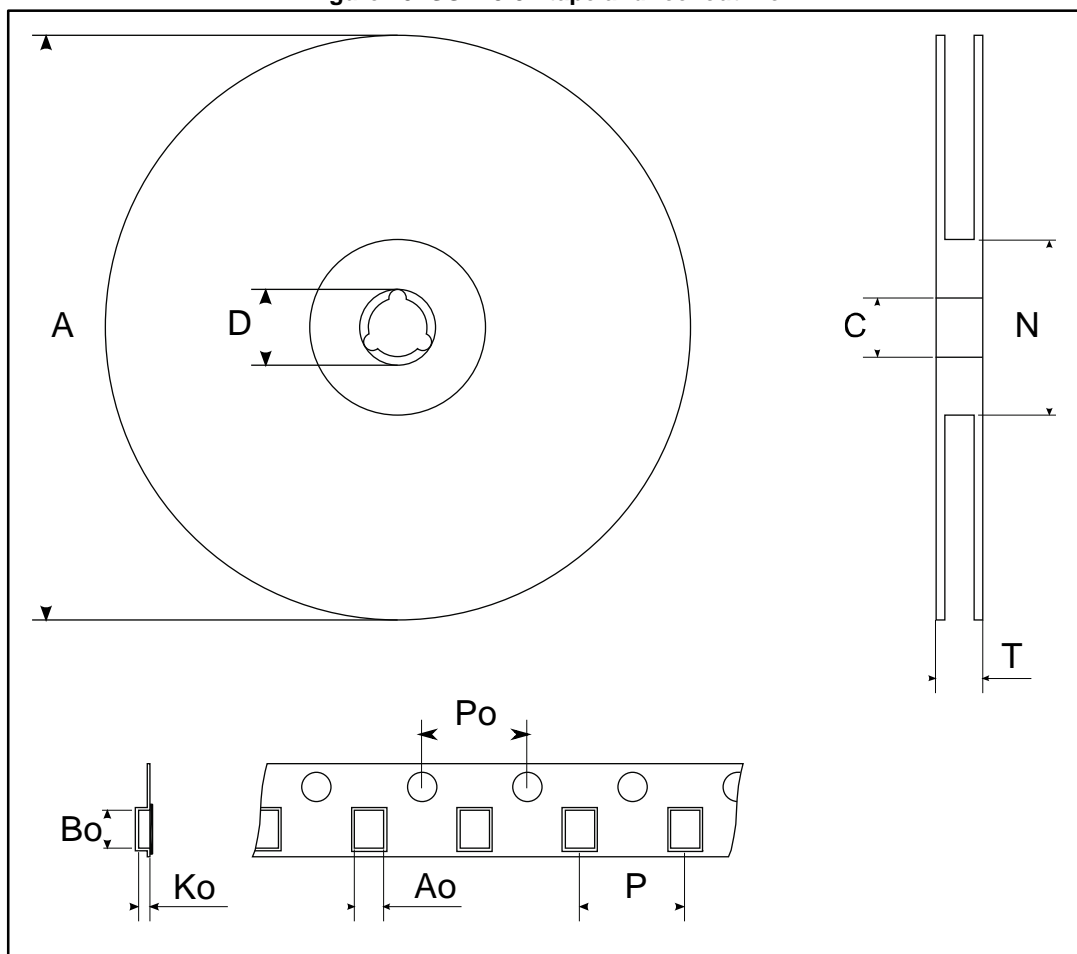


Table 6: SOT23-5L tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			180
C	12.8	13.0	13.2
D	20.2		
N	60		
T			14.4
Ao	3.13	3.23	3.33
Bo	3.07	3.17	3.27
Ko	1.27	1.37	1.47
Po	3.9	4.0	4.1
P	3.9	4.0	4.1

## 8 Ordering information

Table 7: Order code

Order code	Output voltage	Package	Marking
STLQ015M12R	1.2 V	SOT23-5L	1512
STLQ015M15R	1.5 V		1515
STLQ015M18R	1.8 V		1518
STLQ015M21R	2.1 V		1521
STLQ015M25R	2.5 V		1525
STLQ015M28R	2.8 V		1528
STLQ015M30R	3.0 V		1530
STLQ015M31R	3.1 V		1531
STLQ015M33R	3.3 V		1533

## 9 Revision history

**Table 8: Document revision history**

Date	Revision	Changes
23-Mar-2010	1	Initial release.
20-Jan-2011	2	Modified: Table 5 on page 13 and Figure 18. Added: Figure 19.
11-Sep-2012	3	Added: new order codes STLQ015XG12R, STLQ015XG15R and STLQ015XG18R to the device summary table.
17-Feb-2014	4	Changed the part number STLQ015xx to STLQ015. Changed the title in cover page. Updated Description and Table : in cover page. Changed typ. value of I <sub>Q</sub> parameter in Table 4: Electrical characteristics. Minor text changes.
03-Jul-2015	5	Added package SOT23-5L. Updated <i>Table 1.: Pin description</i> , <i>Table 3.: Thermal data</i> and <i>Figure 2.: Pin configuration (top view)</i> Updated 8: <i>Order code</i> . Updated <i>Section 7: Package information</i> . Minor text changes.
02-Sep-2016	6	Updated <a href="#">Section 8: "Ordering information"</a> . Minor text changes.

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