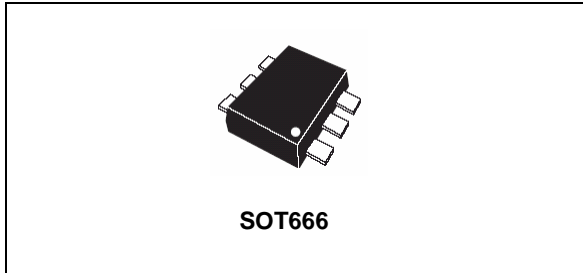


## 150 mA, ultra low quiescent current linear voltage regulator

Datasheet - production data



- Compatible with ceramic capacitor ( $C_{OUT} = 1 \mu\text{F}$ )
- Internal current and thermal limit
- Package: SOT666-6L
- Temperature range: from  $-40\text{ }^{\circ}\text{C}$  to  $125\text{ }^{\circ}\text{C}$

### 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.

### 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  $125\text{ }^{\circ}\text{C}$
- Output voltage tolerance:  $\pm 2\%$  at  $25\text{ }^{\circ}\text{C}$
- 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

**Table 1. Device summary**

Order codes	Output voltages
STLQ015XG12R	1.2 V
STLQ015XG15R	1.5 V
STLQ015XG18R	1.8 V
STLQ015XG25R	2.5 V
STLQ015XG28R	2.8 V
STLQ015XG30R	3.0 V
STLQ015XG31R	3.1 V
STLQ015XG33R	3.3 V

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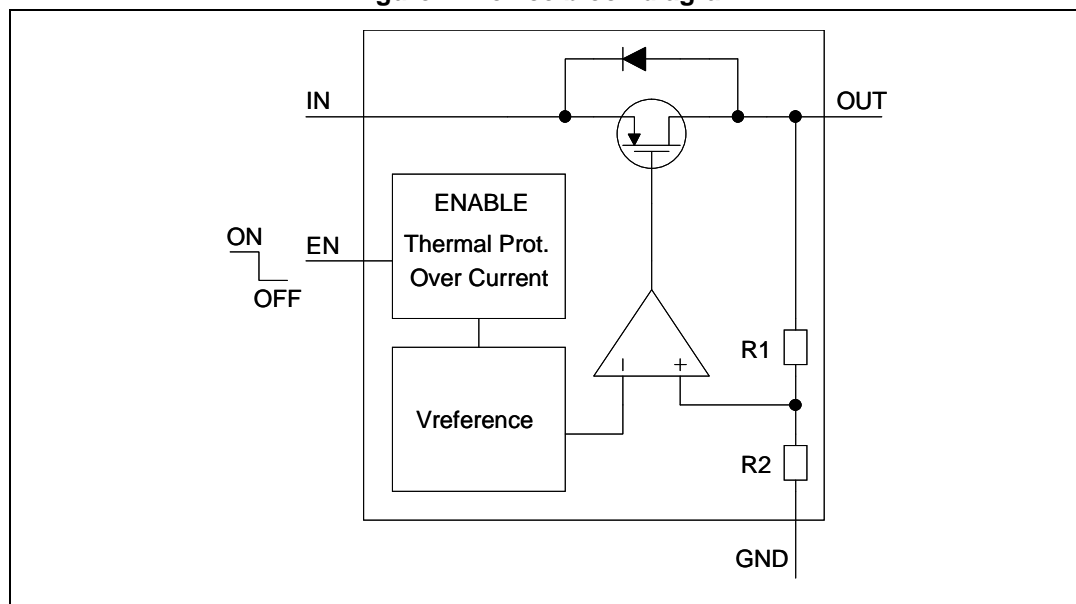
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# 1 Block diagram

Figure 1. Device block diagram



## 2 Pin configuration and description

Figure 2. Pin configuration (top view)

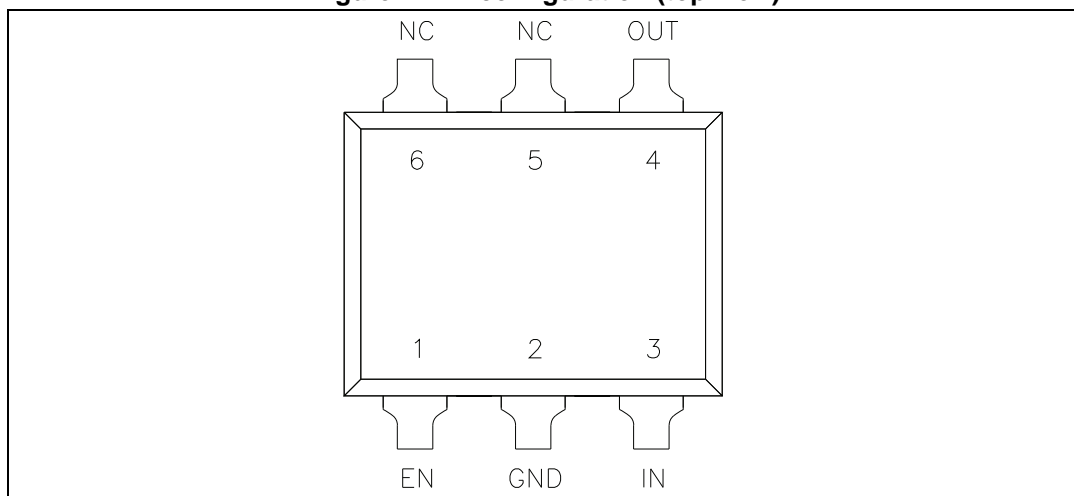
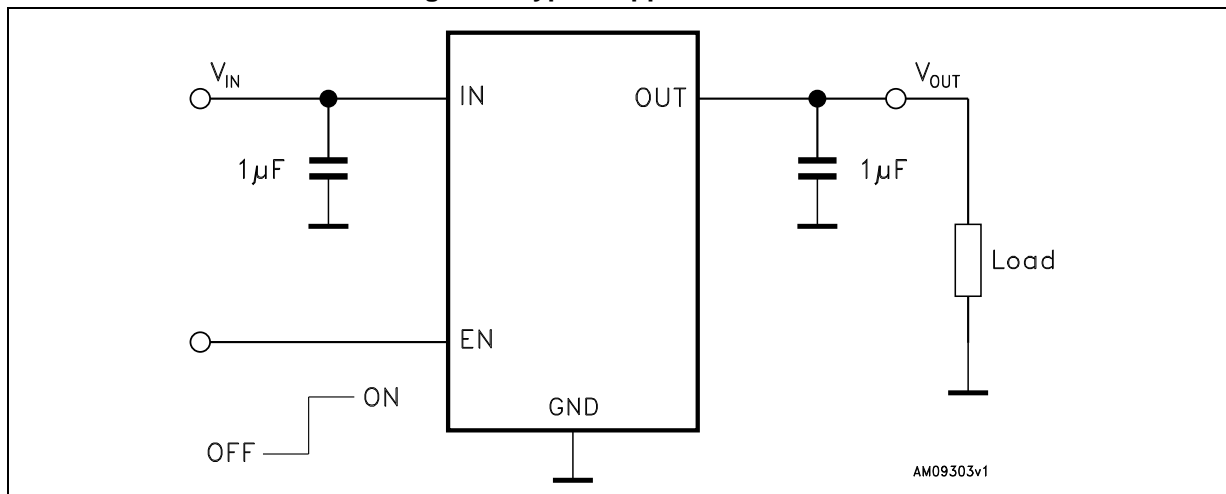


Table 2. Pin description

Pin	Symbol	Functions
1	EN	Enable input Set $V_{EN}$ = high to turn on the device Set $V_{EN}$ = low to turn off the device
2	GND	Ground
3	IN	Input voltage
4	OUT	Output voltage
5	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 $V_{IN} + 0.3$	V
$V_{EN}$	Enable input voltage	- 0.3 to $V_{IN} + 0.3$	V
$I_{OUT}$	Output current	Internally limited	mA
ESD	Human body model	$\pm 3$	kV
	Machine model	$\pm 300$	V
$P_D$	Power dissipation	Internally limited	mW
$T_{STG}$	Storage temperature range	-65 to 150	°C
$T_{OP}$	Max. junction temperature	150	°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	SOT666	Unit
$R_{thJA}$	Thermal resistance junction-ambient	132	°C/W
$R_{thJC}$	Thermal resistance junction-case	56	°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 5. 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
$I_{EN}$	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		$\mu\text{s}$



Table 5. Electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$T_{\text{SHDN}}$	Thermal shutdown			170		°C
	Hysteresis			15		
$C_{\text{OUT}}$	Output capacitor	Capacitance (see typical performance characteristics for stability)	0.47		10	μF
	ESR		0.056		6	Ω

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 to output voltages below 1.5 V.
2. During shutdown and at no load, P-channel leakage current flowing through the internal resistor divider causes the  $V_{\text{OUT}}$  rise.
3. Turn-on time is the time measured between the enable input just exceeding  $V_{\text{EN}}$  high value and the output voltage just reaching 95% of its nominal value.

## 6 Typical performance characteristics

Figure 4. Output voltage vs. temperature

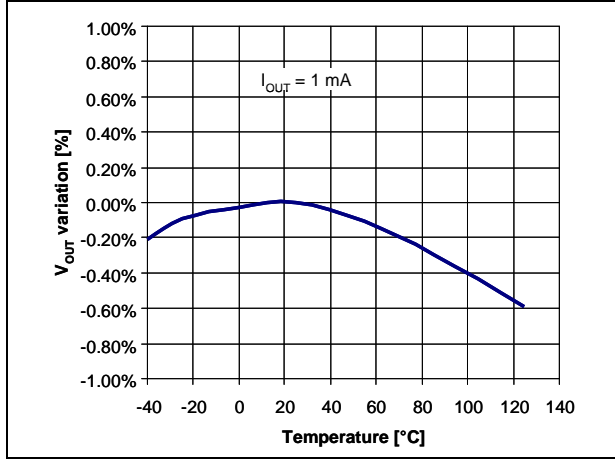


Figure 5. Output voltage vs. input voltage (V<sub>OUT</sub> = 0.8 V)

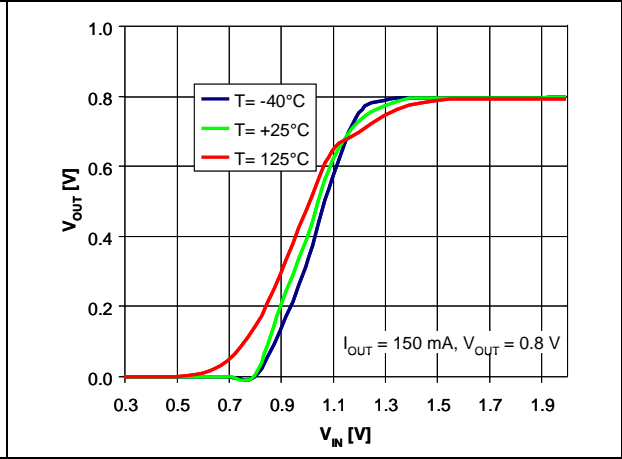


Figure 6. Output voltage vs. input voltage (V<sub>OUT</sub> = 3.3 V)

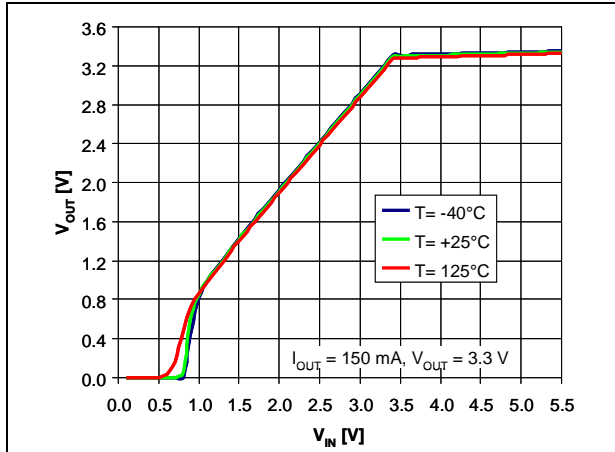


Figure 7. Dropout voltage vs. temperature

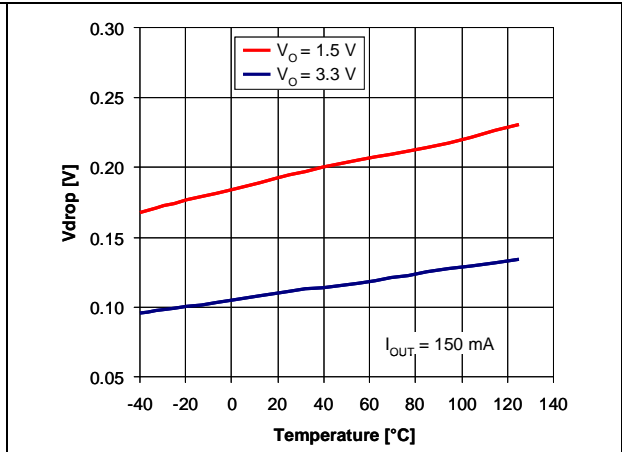


Figure 8. Dropout voltage vs. output current

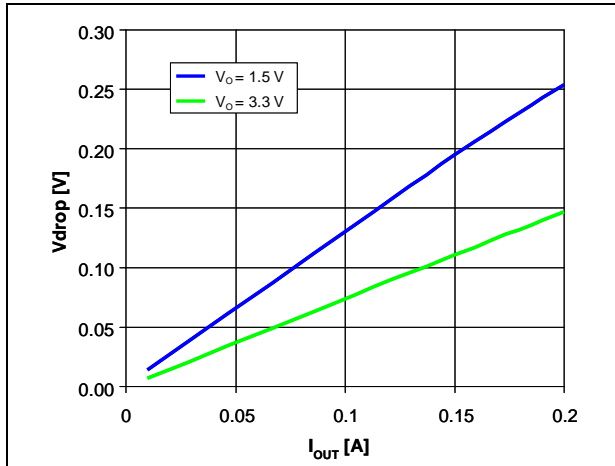


Figure 9. Quiescent current vs. temperature

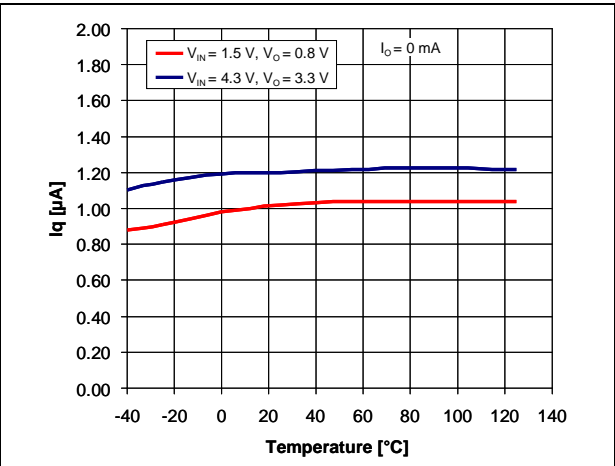


Figure 10. Supply voltage rejection vs. frequency

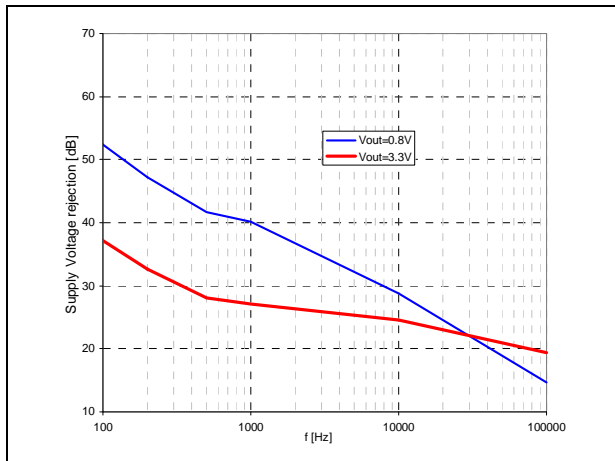


Figure 11. Supply voltage rejection vs.  $I_{OUT}$

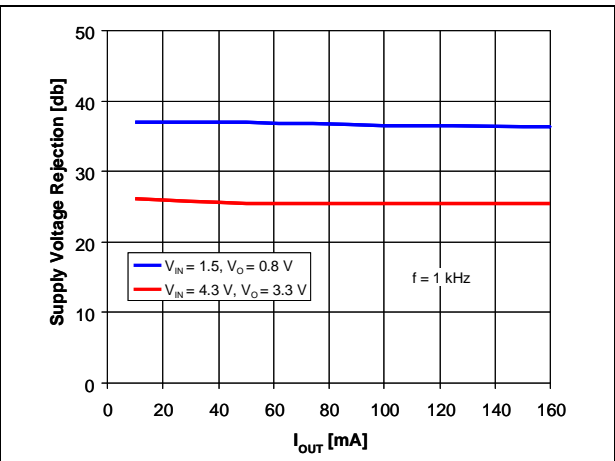


Figure 12. Quiescent current vs. input voltage

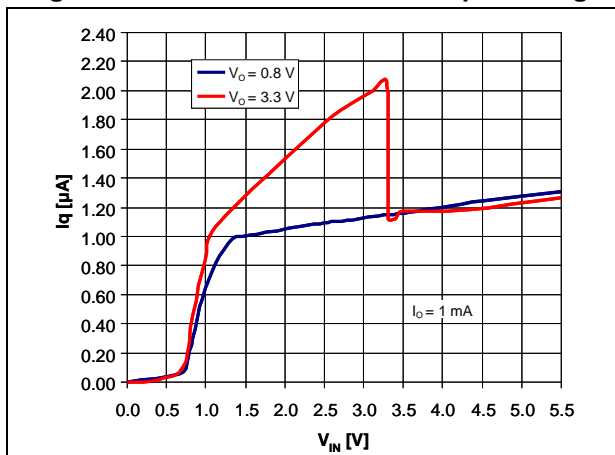


Figure 13. Quiescent current vs. output current

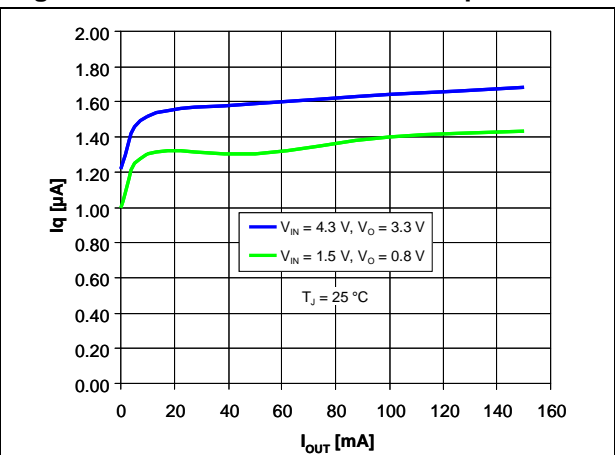


Figure 14. Output noise voltage vs. frequency

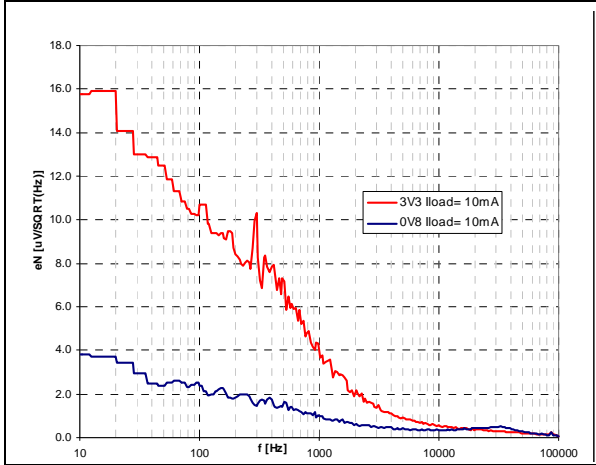


Figure 15.  $C_{\text{OUT}}$  stability region

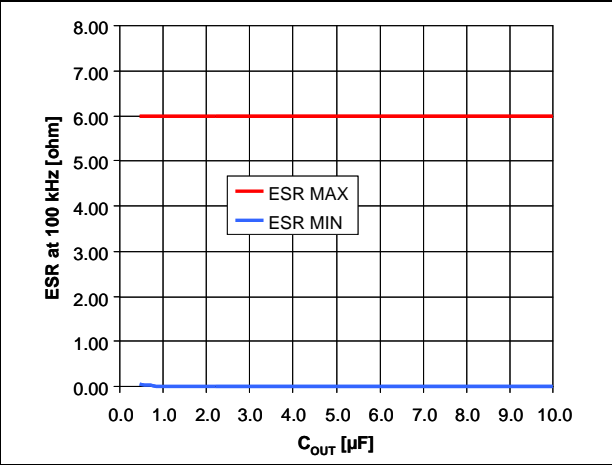
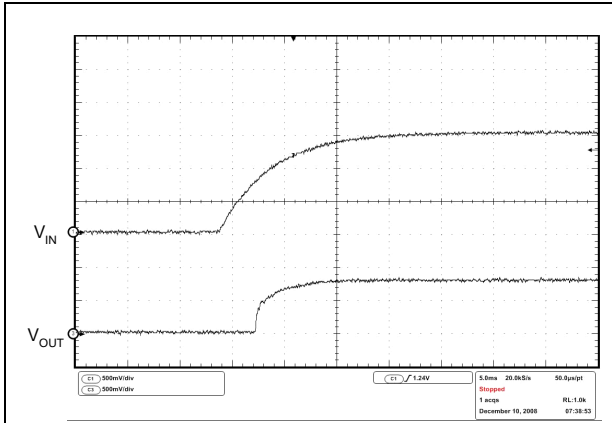
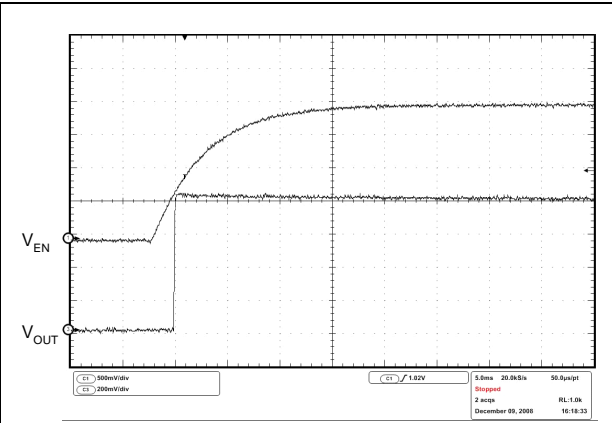


Figure 16. Start-up transient



$V_{\text{IN}}$  from 0 to 1.5 V,  $V_{\text{EN}}$  tied to  $V_{\text{IN}}$ , no load  $C_{\text{OUT}} = 1 \mu\text{F}$

Figure 17. Enable transient



$V_{\text{IN}} = 1.5 \text{ V}$ ;  $V_{\text{EN}}$  from 0 to 2 V, no load,  $T = 25 \text{ }^\circ\text{C}$

## 7 Package mechanical data

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Figure 18. SOT666 drawings

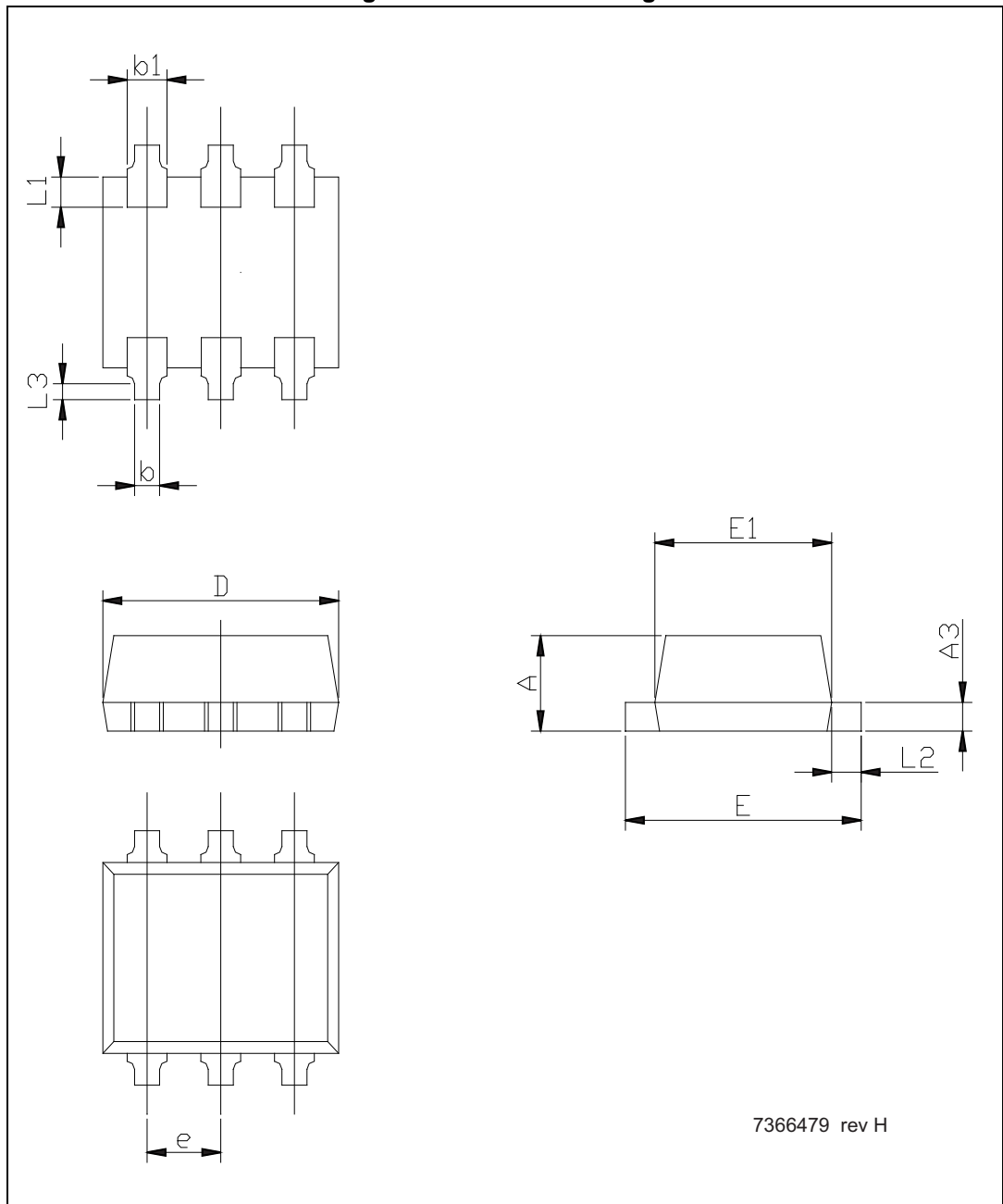
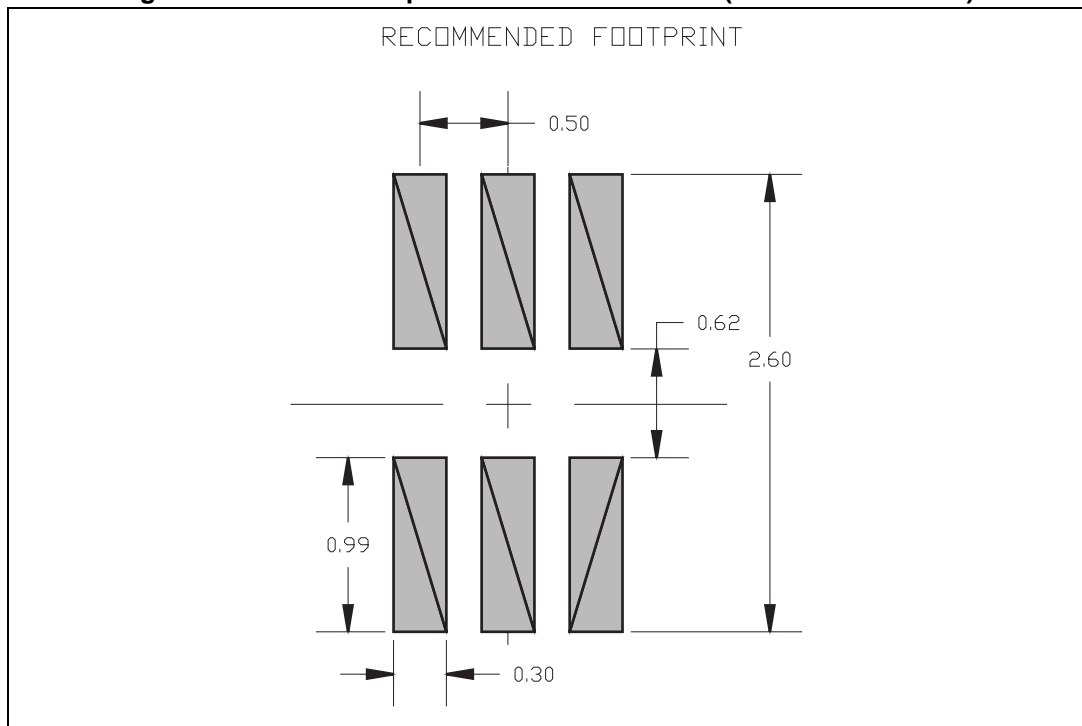


Table 6. SOT666 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.45		0.60
A3	0.08		0.18
b	0.17		0.34
b1	0.19	0.27	0.34
D	1.50		1.70
E	1.50		1.70
E1	1.10		1.30
e		0.50	
L1		0.19	
L2	0.10		0.30
L3		0.10	

Figure 19. SOT666 footprint recommended data (dimensions in mm)



## 8 Revision history

**Table 7. Document revision history**

Date	Revision	Changes
23-Mar-2010	1	Initial release.
20-Jan-2011	2	Modified: <a href="#">Table 6 on page 14</a> and <a href="#">Figure 18</a> . Added: <a href="#">Figure 19</a> .
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 <a href="#">Description</a> and <a href="#">Table 1: Device summary</a> in cover page. Changed typ. value of I <sub>Q</sub> parameter in <a href="#">Table 5: Electrical characteristics</a> . Minor text changes.

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