

# TLE42364G

Low Dropout Linear Voltage Regulator

TLE42364G

## Data Sheet

Rev. 1.0, 2010-02-08

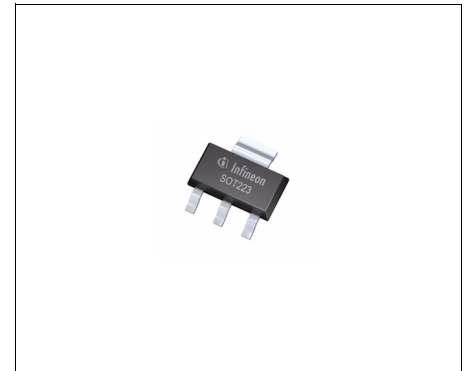
# Automotive Power



## 1 Overview

### Features

- Output voltage 5 V
- Output voltage tolerance  $\leq \pm 2\%$
- 100 mA current capability
- Very low current consumption
- Low dropout voltage
- Overtemperature shutdown
- Reverse polarity protection
- Output current limitation
- Wide temperature range
- Suitable for use in automotive electronics
- Enable
- Green Product (RoHS compliant)
- AEC Qualified



PG-SOT223-4

### Functional Description

TLE42364G is a low dropout voltage regulator for 5 V supply in a PG-SOT223-4 SMD package. The IC regulates an input voltage  $V_I$  in the range of  $5.5\text{ V} < V_I < 45\text{ V}$  to  $V_{Q,nom} = 5\text{ V}$ . The maximum output current is more than 100 mA. The IC can be switched off via the enable input, which causes the current consumption to drop below  $10\text{ }\mu\text{A}$ . The IC is protected against shortcircuit and overheat by the incorporated output current limitation and the overtemperature shutdown.

### Choosing External Components

The input capacitor  $C_I$  is necessary for compensating line influences. The output capacitor  $C_Q$  is necessary for the stability of the regulating circuit. Stability is guaranteed at values  $C_Q \geq 10\text{ }\mu\text{F}$  and an  $\text{ESR} \leq 10\text{ }\Omega$  within the whole operating temperature range.

### Circuit Description

The device includes a precise reference voltage, which is very accurate due to resistor adjustment. A control amplifier compares the divided output voltage to this reference voltage and drives the base of the PNP series transistor through a buffer. Saturation control as a function of the load current prevents any oversaturation of the power element.

Type	Package	Marking
TLE42364G	PG-SOT223-4	42364

## 2 Block Diagram

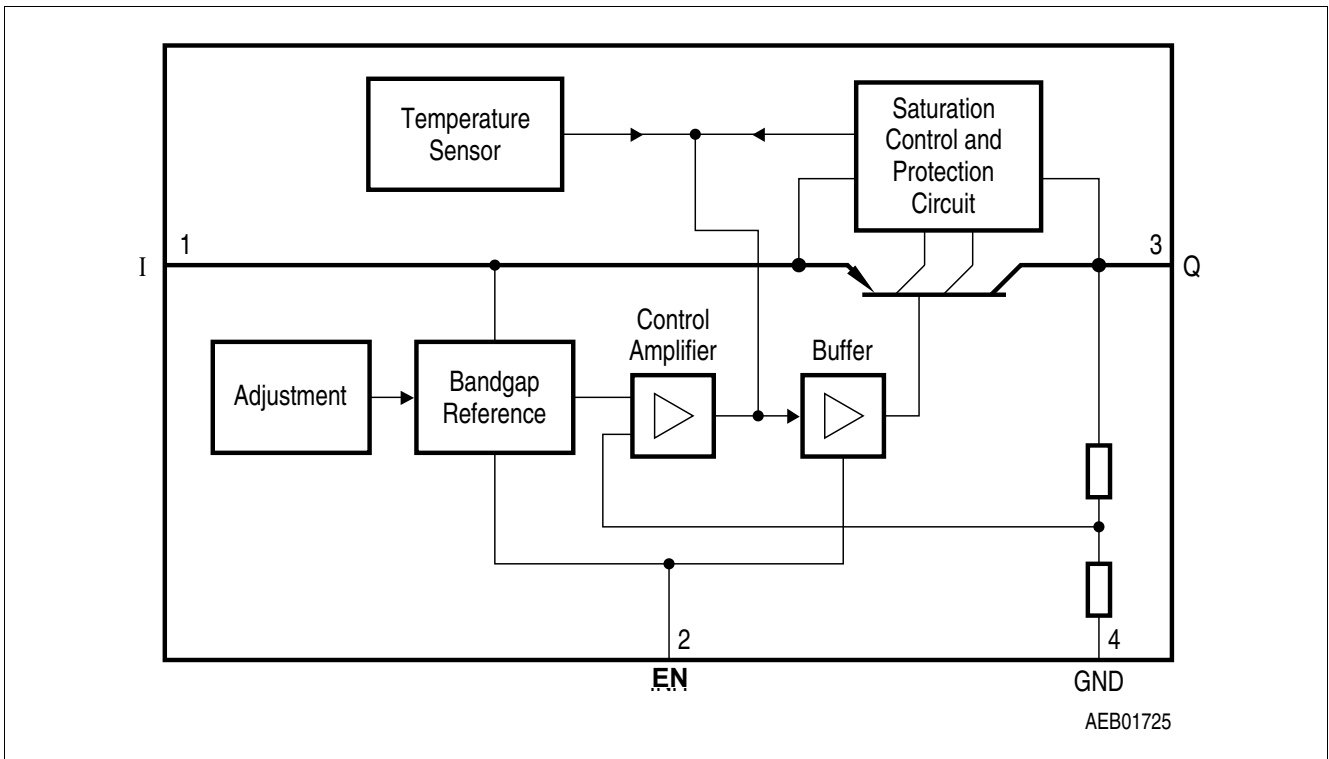


Figure 1 Block Diagram

### 3 Pin Configuration

#### 3.1 Pin Assignment

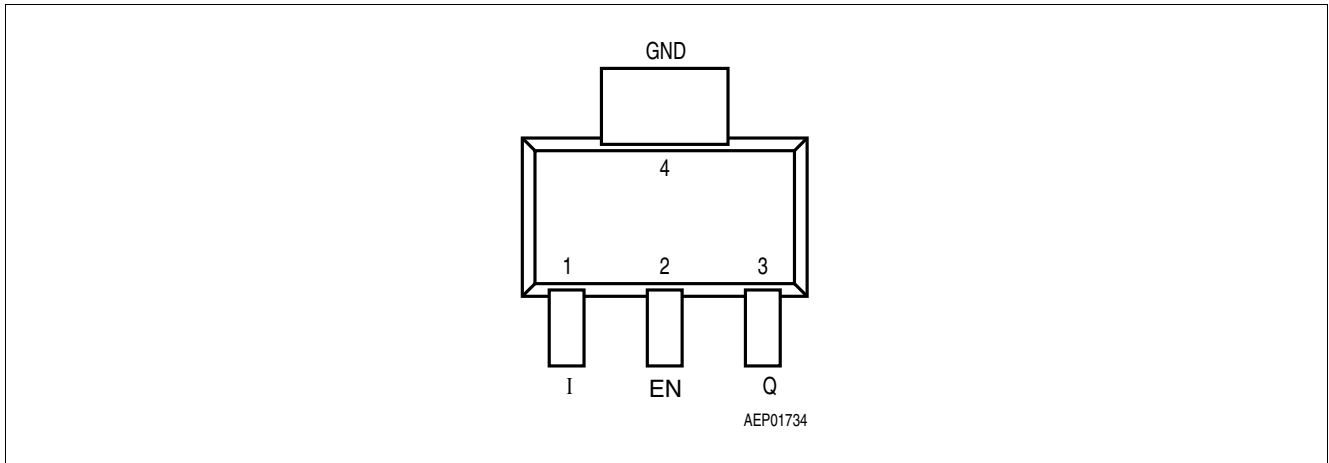


Figure 2 Pin Configuration

#### 3.2 Pin Definitions and Functions

Pin	Symbol	Function
1	I	<b>Input voltage;</b> block to ground directly at the IC with a ceramic capacitor.
2	EN	<b>Enable;</b> connect to $V_{\text{batt}}$ to enable the IC, connect to GND to disable the IC.
3	Q	<b>Output voltage;</b> block to ground with a capacitor $C_Q \geq 10 \mu\text{F}$ .
4	GND	<b>Ground</b>

## 4 General Product Characteristics

### 4.1 Absolute Maximum Ratings

#### Absolute Maximum Ratings <sup>1)</sup>

$T_j = -40\text{ °C}$  to  $+150\text{ °C}$ ; all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Pos.	Parameter	Symbol	Limit Values		Unit	Conditions
			Min.	Max.		
<b>Input, Enable</b>						
4.1.1	Voltage	$V_I, V_{EN}$	-30	45	V	–
<b>Output</b>						
4.1.2	Voltage	$V_Q$	-1	32	V	–
<b>Temperatures</b>						
4.1.3	Junction Temperature	$T_j$	-40	150	°C	–
4.1.4	Storage Temperature	$T_{stg}$	-50	150	°C	–
<b>ESD Susceptibility</b>						
4.1.5	ESD Resistivity to GND	$V_{ESD}$	-4	4	kV	HBM <sup>2)</sup>
4.1.6	ESD Resistivity to GND	$V_{ESD}$	-1.5	1.5	kV	CDM <sup>3)</sup>

1) Not subject to production test, specified by design.

2) ESD susceptibility, HBM according to EIA/JESD 22-A114B

3) ESD susceptibility, Charged Device Model "CDM" EIA/JESD22-C101 or ESDA STM5.3.1

*Note: Stresses above the ones listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

*Note: Integrated protection functions are designed to prevent IC destruction under fault conditions described in the data sheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous repetitive operation.*

### 4.2 Functional Range

**Table 1 Functional Range**

Pos.	Parameter	Symbol	Limit Values		Unit	Conditions
			Min.	Max.		
4.2.1	Input voltage	$V_I$	5.5	45	V	–
4.2.2	Junction temperature	$T_j$	-40	150	°C	–

*Note: Within the functional or operating range, the IC operates as described in the circuit description. The electrical characteristics are specified within the conditions given in the Electrical Characteristics table.*

### 4.3 Thermal Resistance

Note: This thermal data was generated in accordance with JEDEC JESD51 standards. For more information, go to [www.jedec.org](http://www.jedec.org).

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Typ.	Max.		
4.3.1	Junction to Case <sup>1)</sup>	$R_{thJC}$	–	17	–	K/W	measured to heat slug
4.3.2	Junction to Ambient <sup>1)</sup>	$R_{thJA}$	–	54	–	K/W	<sup>2)</sup>
4.3.3			–	139	–	K/W	footprint only <sup>3)</sup>
4.3.4			–	73	–	K/W	300 mm <sup>2</sup> heatsink area <sup>3)</sup>
4.3.5			–	64	–	K/W	600 mm <sup>2</sup> heatsink area <sup>3)</sup>

1) Not subject to production test, specified by design.

2) Specified  $R_{thJA}$  value is according to Jedec JESD51-2,-5,-7 at natural convection on FR4 2s2p board; The Product (Chip+Package) was simulated on a 76.2 x 114.3 x 1.5 mm<sup>3</sup> board with 2 inner copper layers (2 x 70µm Cu, 2 x 35µm Cu). Where applicable a thermal via array under the exposed pad contacted the first inner copper layer.

3) Specified  $R_{thJA}$  value is according to Jedec JESD 51-3 at natural convection on FR4 1s0p board; The Product (Chip+Package) was simulated on a 76.2 x 114.3 x 1.5 mm<sup>3</sup> board with 1 copper layer (1 x 70µm Cu).

## 5 Electrical Characteristics

### 5.1 Electrical Characteristics Voltage Regulator

**Electrical Characteristics:**

$V_I = 13.5\text{ V}$ ,  $T_j = -40\text{ °C}$  to  $+150\text{ °C}$ , all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Typ.	Max.		
5.1.1	Output voltage	$V_Q$	4.9	5.0	5.1	V	$5\text{ mA} \leq I_Q \leq 100\text{ mA}$ $6\text{ V} \leq V_I \leq 28\text{ V}$
5.1.2	Output current limitation	$I_Q$	120	150	–	mA	–
5.1.3	Current consumption $I_q = I_I - I_Q$	$I_q$	–	–	10	$\mu\text{A}$	$V_{EN} = 0\text{ V}$ ; $T_j \leq 100\text{ °C}$
5.1.4	Current consumption $I_q = I_I - I_Q$	$I_q$	–	–	400	$\mu\text{A}$	$I_Q = 1\text{ mA}$ Enable ON
5.1.5	Current consumption $I_q = I_I - I_Q$	$I_q$	–	10	15	mA	$I_Q = 100\text{ mA}$ Enable ON
5.1.6	Dropout voltage	$V_{dr}$	–	0.25	0.5	V	$I_Q = 100\text{ mA}$ <sup>1)</sup>
5.1.7	Load regulation	$\Delta V_{Q\_load}$	–	–	40	mV	$I_Q = 5\text{ to }100\text{ mA}$ $V_I = 6\text{ V}$
5.1.8	Line regulation	$\Delta V_{Q\_line}$	–	15	30	mV	$V_I = 6\text{ to }28\text{ V}$ $I_Q = 5\text{ mA}$
5.1.9	Power Supply ripple rejection	$PSRR$	–	54	–	dB	$f_r = 100\text{ Hz}$ $V_r = 0.5\text{ Vpp}$

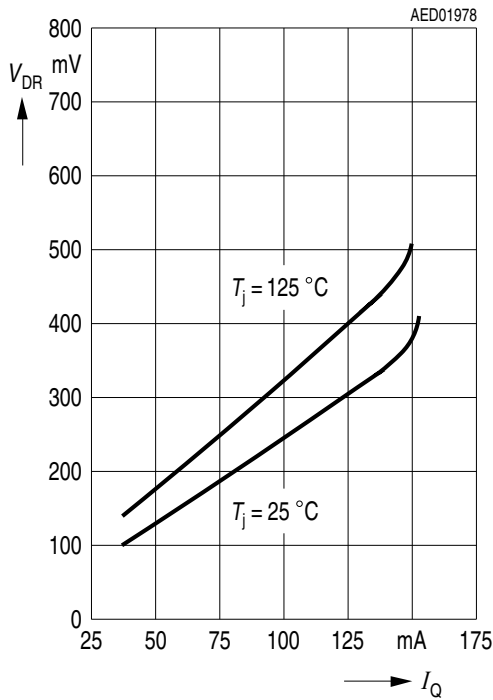
**Enable**

5.1.10	Enable on voltage	$V_{EN, on}$	3.5	–	–	V	–
5.1.11	Enable off voltage	$V_{EN, off}$	–	–	0.8	V	–
5.1.12	Enable current	$I_{EN}$	5	15	25	$\mu\text{A}$	$V_{EN} = 5\text{ V}$

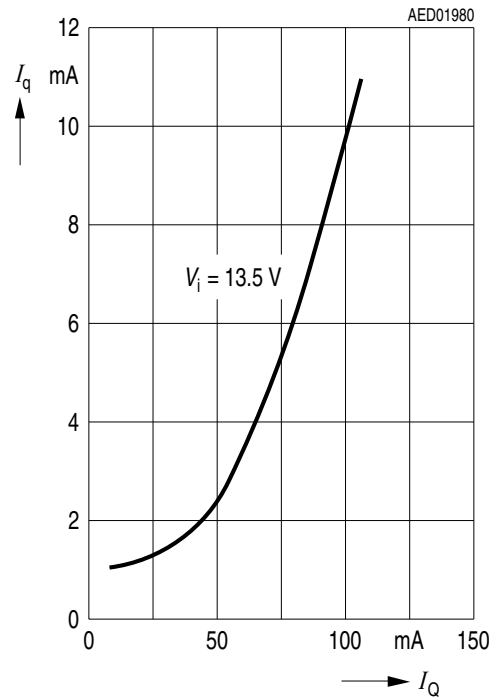
1) Dropout voltage =  $V_I - V_Q$  (measured when the output voltage  $V_Q$  has dropped 100 mV from the nominal value obtained at  $V_I = 13.5\text{ V}$ ).

## 5.2 Typical Performance Characteristics Voltage Regulator

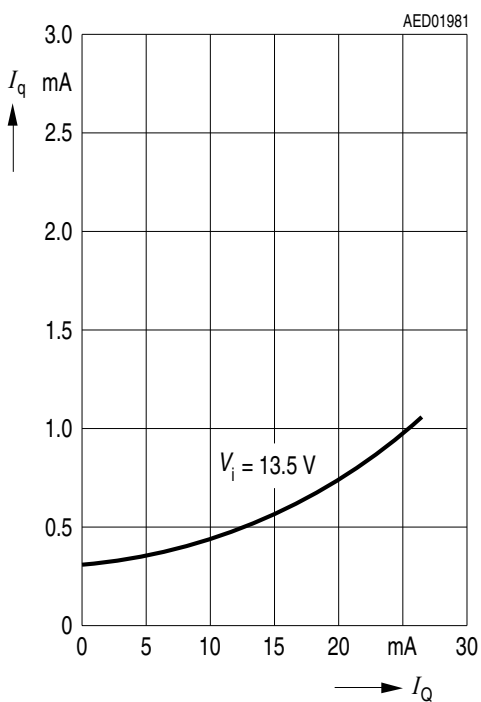
Dropout Voltage  $V_{DR}$  versus Output Current  $I_Q$



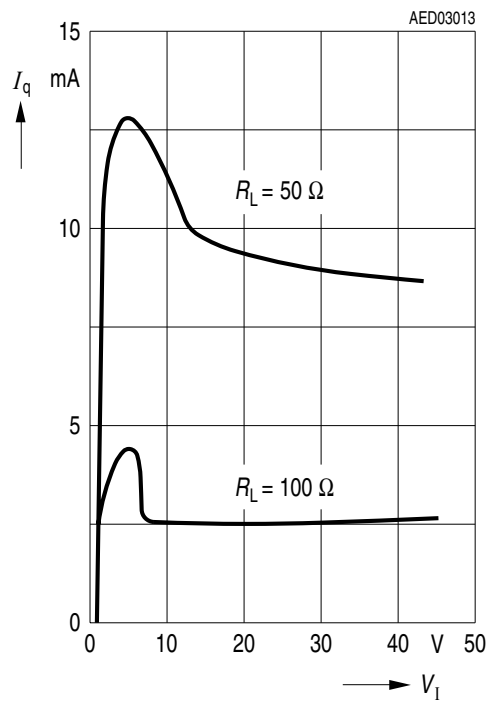
Current Consumption  $I_q$  versus Output Current  $I_Q$



Current Consumption  $I_q$  versus Output Current  $I_Q$

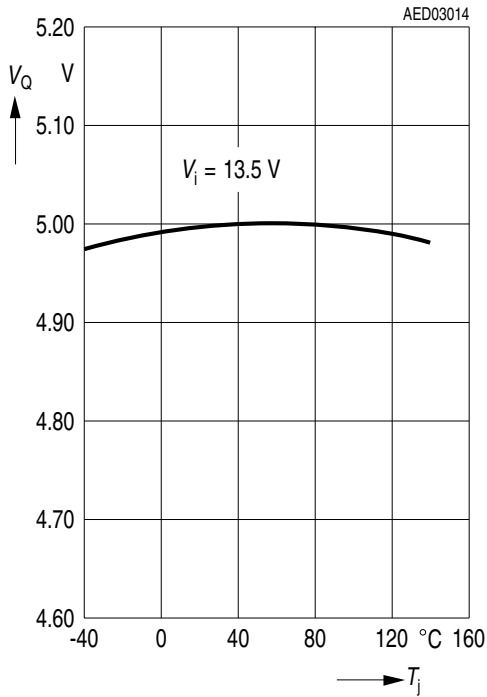


Current Consumption  $I_q$  versus Input Voltage  $V_i$

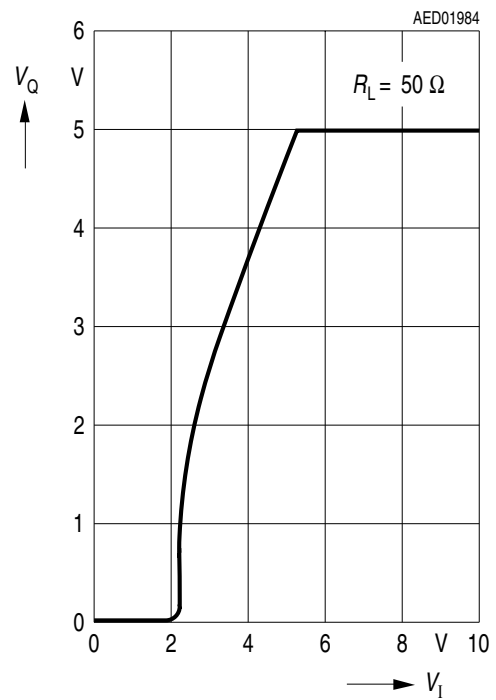




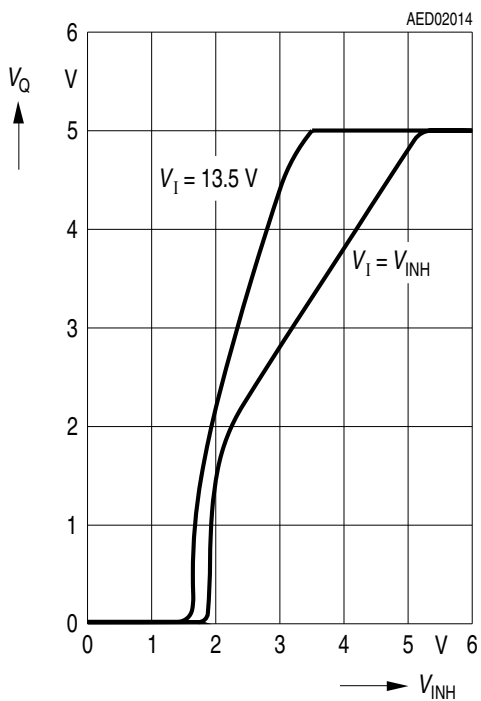
Output Voltage  $V_Q$  versus Temperature  $T_j$



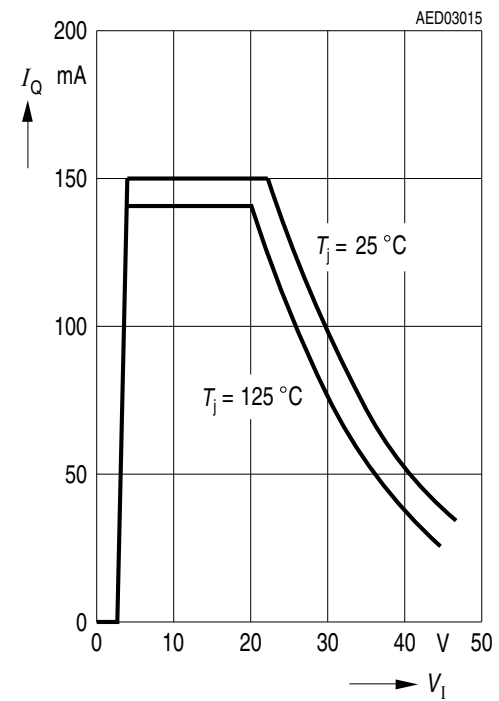
Output Voltage  $V_Q$  versus Input Voltage  $V_I$



Output Voltage  $V_Q$  versus Enable Voltage  $V_{EN}$

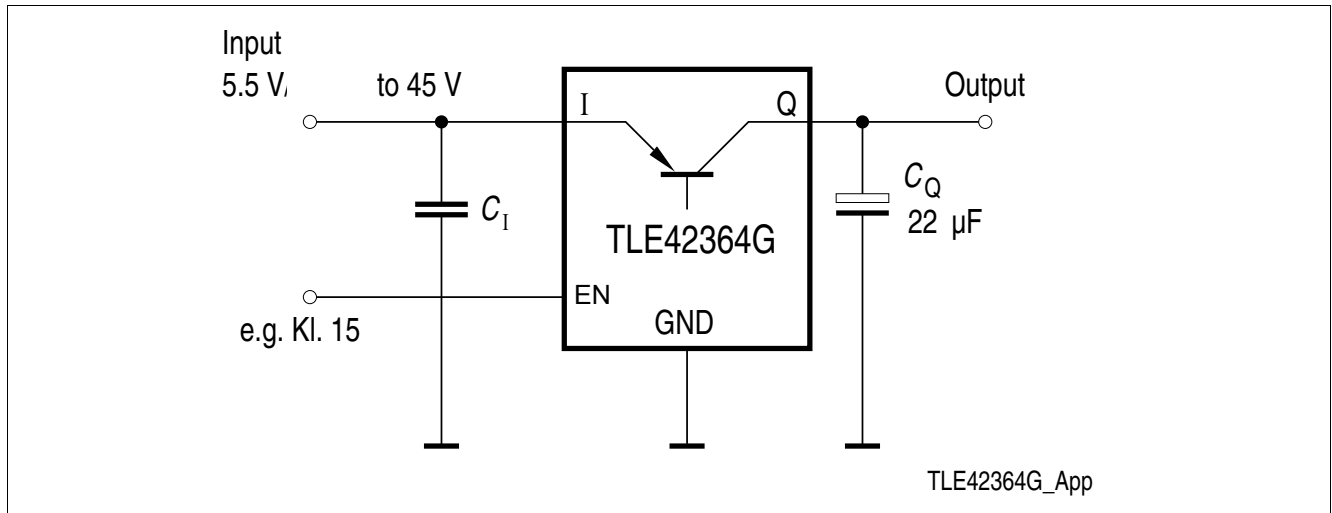


Output Current  $I_Q$  versus Input Voltage  $V_I$



## 6 Application Information

*Note: The following information is given as a hint for the implementation of the device only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.*



**Figure 3 Application Diagram**

*Note: This is a very simplified example of an application circuit. The function must be verified in the real application.*

### 6.1 Further Application Information

- For further information you may contact <http://www.infineon.com/>



## 8 Revision History

Revision	Date	Changes
1.0	2010-02-08	Initial data sheet

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