

TLE42344G

Low Dropout Linear Voltage Regulator

Data Sheet

Rev. 1.0, 2010-02-08

Automotive Power



Low Dropout Linear Voltage Regulator

TLE42344G

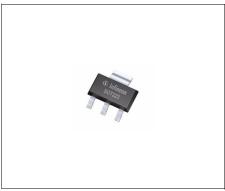




1 Overview

Features

- Output voltage tolerance ≤ ±2%
- Low dropout voltage
- · Output current up to 100 mA
- Very low current consumption
- Overtemperature shutdown
- · Output current limitation
- Suitable for use in automotive electronics
- Reverse polarity protection
- Green Product (RoHS compliant)
- AEC Qualified



PG-SOT223-4

Functional Description

TLE42344G is a 5 V low dropout fixed voltage regulator in an PG-SOT223-4 package. The IC regulates an input voltage $V_{\rm I}$ in the range 5.5 V < $V_{\rm I}$ < 45 V to $V_{\rm Qrated}$ = 5.0 V. The maximum output current is more than 100 mA. This IC is protected against shortcircuit and overheat by the integrated output current limitation and the overtemperature shutdown

Dimensioning Information on External Components

The input capacitor $C_{\rm i}$ is necessary for compensating line influences. The output capacitor $C_{\rm Q}$ is necessary for the stability of the regulating circuit. Stability is guaranteed at values $C_{\rm Q} \ge$ 10 $\mu \rm F$ and an ESR \le 10 Ω within the operating temperature range.

Circuit Description

The control amplifier compares a reference voltage, which is kept highly precise by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control, working as a function of load current, prevents any over-saturation of the power element.

Туре	Package	Marking		
TLE42344G	PG-SOT223-4	42344		

Data Sheet 2 Rev. 1.0, 2010-02-08



Block Diagram

2 Block Diagram

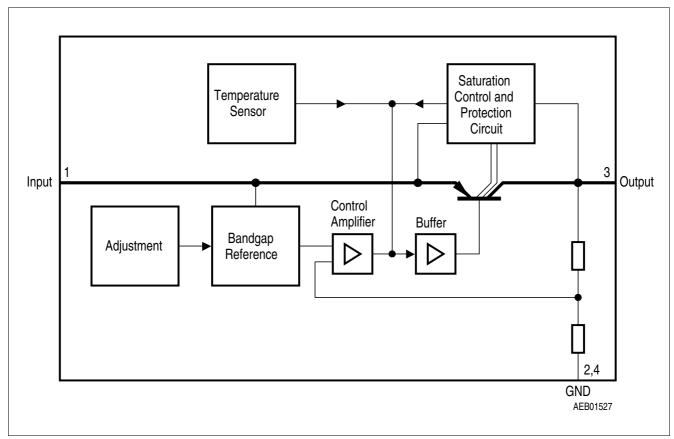


Figure 1 Block Diagram



Pin Configuration

3 Pin Configuration

3.1 Pin Assignment

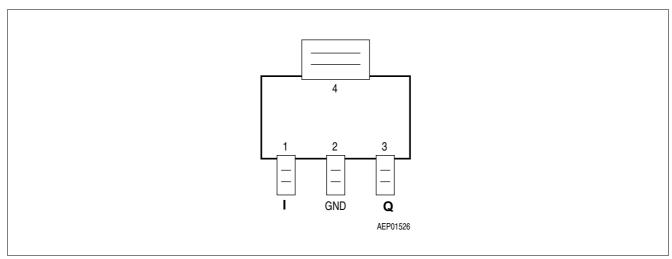


Figure 2 Pin Configuration

3.2 Pin Definitions and Functions

Pin	Symbol	Function
1	I	Input Voltage; block to ground directly on IC with ceramic capacitor
2, 4	GND	Ground
3	Q	5 V Output Voltage; block to ground with \geq 10 μ F capacitor, ESR \leq 10 Ω



General Product Characteristics

4 General Product Characteristics

4.1 Absolute Maximum Ratings

Absolute Maximum Ratings 1)

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

Pos.	Parameter	Symbol	Lim	it Values	Unit	Conditions
			Min.	Max.		
Input		-		+		
4.1.1	Input voltage	V_1	-30	45	V	_
Output	·	•	<u>'</u>		'	1
4.1.2	Output voltage	V_{Q}	-1	32	V	_
Tempe	ratures	,			<u>'</u>	
4.1.3	Junction Temperature	T_{i}	-40	150	°C	_
4.1.4	Storage Temperature	$T_{ m stg}$	-50	150	°C	_
ESD St	usceptibility	, ,	<u> </u>		'	1
4.1.5	ESD Resistivity to GND	V_{ESD}	-4	4	kV	HBM ²⁾
4.1.6	ESD Resistivity to GND	V_{ESD}	-1.5	1.5	kV	CDM ³⁾

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

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_1	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.

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



General Product Characteristics

4.3 Thermal Resistance

Note: This thermal data was generated in accordance with JEDEC JESD51 standards. For more information, go to www.jedec.org.

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Тур.	Max.		
4.3.1	Junction to Case ¹⁾	R_{thJC}	_	17	_	K/W	measured to heat slug
4.3.2	Junction to Ambient ¹⁾	R_{thJA}	_	54	_	K/W	2)
4.3.3			_	139	_	K/W	footprint only ³⁾
4.3.4			_	73	_	K/W	300 mm² heatsink area ³⁾
4.3.5			_	64	_	K/W	600 mm² heatsink area ³⁾

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 mm³ 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 \times 114.3 \times 1.5 mm³ board with 1 copper layer (1 x 70 μ m Cu).



Electrical Characteristics

5 Electrical Characteristics

5.1 Electrical Characteristics Voltage Regulator

Electrical Characteristics:

 $V_{\rm I}$ = 13.5 V, $T_{\rm j}$ = -40 °C to +150 °C, all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Тур.	Max.		
5.1.1	Output voltage	V_{Q}	4.9	5.0	5.1	V	$\begin{array}{l} \text{5 mA} \leq I_{\text{Q}} \leq \text{100 mA} \\ \text{6 V} \leq V_{\text{I}} \leq \text{28 V} \end{array}$
5.1.2	Output current limitation	I_{Q}	120	160	_	mA	_
5.1.3	Current consumption $I_q = I_l - I_Q$	I_{q}	_	_	400	μΑ	$I_{\rm Q}$ = 1 mA
5.1.4	Current consumption $I_q = I_l - I_Q$	I_{q}	_	9	15	mA	I _Q = 100 mA
5.1.5	Drop voltage	V_{dr}	_	0.25	0.5	V	$I_{\rm Q}$ = 100 mA ¹⁾
5.1.6	Load regulation	ΔV_{Q}	_	_	40	mV	$I_{\rm Q}$ = 5 to 100 mA $V_{\rm I}$ = 6 V
5.1.7	Line regulation	ΔV_{Q}	_	15	30	mV	$V_{\rm I}$ = 6 to 28 V $I_{\rm Q}$ = 5 mA
5.1.8	Power Supply ripple rejection	PSRR	_	54	-	dB	$f_{\rm r}$ = 100 Hz $V_{\rm r}$ = 0.5 Vpp

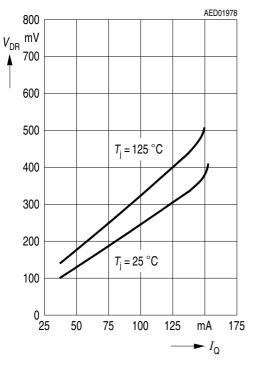
¹⁾ Drop voltage = V_1 - V_Q (measured where V_Q has dropped 100 mV from the nominal value obtained at V_1 = 13.5 V).



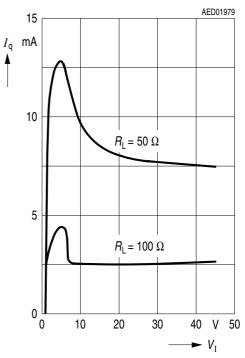
Electrical Characteristics

5.2 Typical Performance Characteristics Voltage Regulator

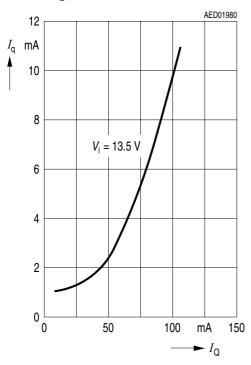
Dropout Voltage $V_{\rm DR}$ versus Output Current $I_{\rm Q}$



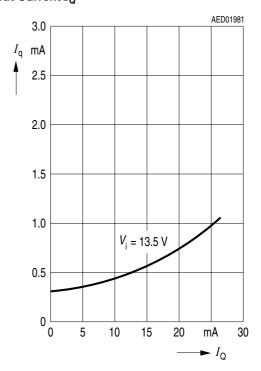
Current Consumption $I_{\rm q}$ versus Input Voltage $V_{\rm l}$



Current Consumption $I_{\rm q}$ versus Output Current $I_{\rm O}$



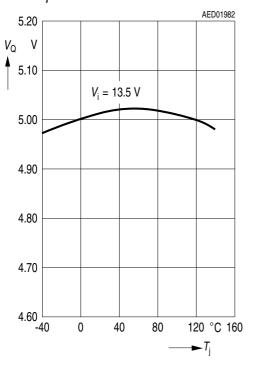
Current Consumption $I_{\rm q}$ versus Output Current $I_{\rm Q}$



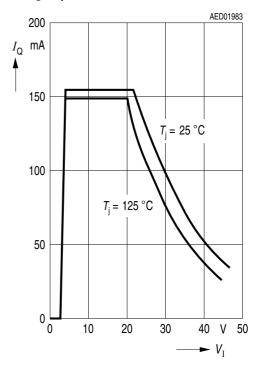


Electrical Characteristics

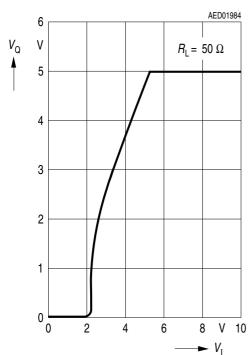
Output Voltage $V_{\rm o}$ versus Temperature $T_{\rm i}$



Output Current I_{Q} versus Input Voltage V_{I}



Output Voltage $V_{\rm Q}$ versus Input Voltage $V_{\rm I}$





Application Information

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.

(1)

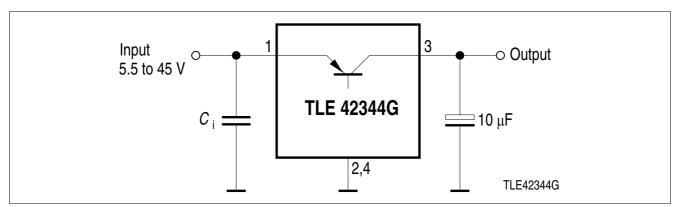


Figure 3 Application Diagram

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/



Package Outlines

7 Package Outlines

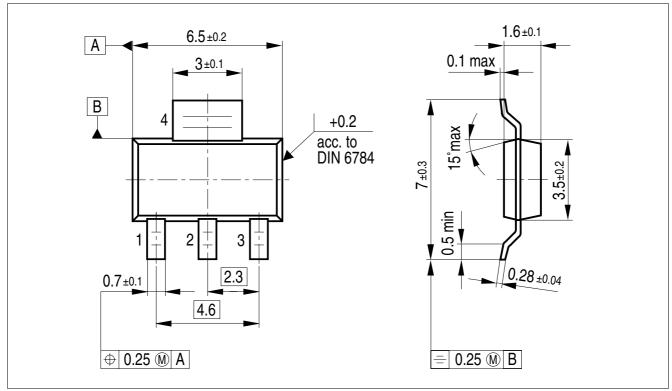


Figure 4 PG-SOT223-4 (Plastic Small Outline Transistor)

Green Product (RoHS compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).



Revision History

8 Revision History

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

Edition 2010-02-08

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