OPTIREG™ linear TLE4295GV

Low dropout voltage regulator

AEC Qualified RoHS



Features

- Three versions: 3.0 V, 3.3 V, 5.0 V
- Output voltage tolerance ≤ ± 4%
- Very low drop voltage
- Output current: 30 mA
- Power fail output
- Low quiescent current consumption
- Wide operation range: up to 45 V
- Wide temperature range: T_j = -40°C to +150°C
- Output protected against short circuit
- Overtemperature protection
- Reverse polarity proof
- Very small SMD package PG-SCT595-5
- Green Product (RoHS compliant)

Potential applications

- General automotive applications

Product validation

Qualified for automotive applications. Product validation according to AEC-Q100.

Description

The OPTIREG™ linear TLE4295GV is a monolithic integrated low-drop voltage regulator in the very small SMD package PG-SCT595-5. It is designed to supply e.g. microcontroller systems under the severe conditions of automotive applications. Therefore the device is equipped with additional protection functions against overload, short circuit and reverse polarity. At overtemperature the regulator is automatically turned off by the integrated thermal protection circuit.

Input voltages up to 40 V are regulated to $V_{Q,nom}$ = 3.0 V (V30 version) 3.3 V (V33 version) or 5.0 V (V50 version). The output is able to drive a load of more than 30 mA while it regulates the output voltage within a 4% accuracy. The power fail output (open collector) is switched to low in case of undervoltage overload or saturation of the output transistor.

Type	Package	Marking
TLE4295GV50	PG-SCT595-5	D1
TLE4295GV33	PG-SCT595-5	D2
TLE4295GV30	PG-SCT595-5	D3

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1 Block diagram

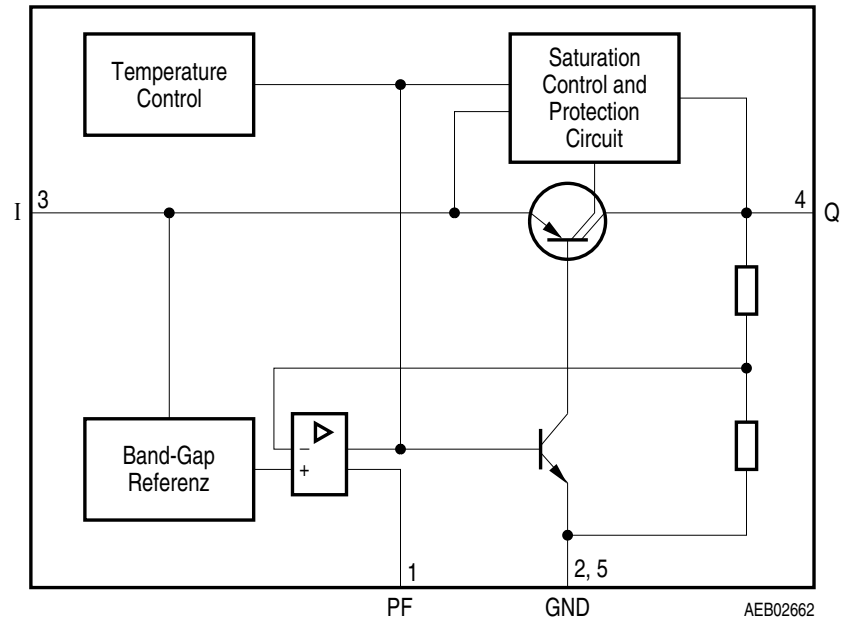


Figure 1 Block diagram

2 Pin configuration

2.1 Pin assignment

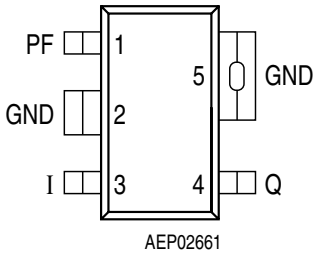


Figure 2 Pin configuration (top view)

2.2 Pin definitions and functions

Table 1 Pin definitions and functions

Pin	Symbol	Function
1	PF	**Power fail** L for undervoltage.
2	GND	**Ground** Connected to pin 5.
3	I	**Input voltage**
4	Q	**Output voltage** Must be blocked by a capacitor $C_Q \geq 2.2$ µF, ESR ≤ 5 Ω to GND (Tantalum capacitor recommended as output capacitor).
5	GND	**Ground** Connected to pin 2.

3 General product characteristics

3.1 Absolute maximum ratings

Table 2 Absolute maximum ratings

T_j = -40°C to +150°C; all voltages with respect to ground, direction of currents as shown in **Figure 3** (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Input							
Voltage	V_I	-42	–	45	V	–	P_3.1.1
Current	I_I	–	–	–	mA	1)	P_3.1.2
Output							
Voltage	V_Q	-6	–	30	V	–	P_3.1.3
Current	I_Q	–	–	1)	mA		P_3.1.4
Power fail							
Voltage	V_{PF}	-0.3	–	45	V	–	P_3.1.5
Current	I_{PF}	–500	–		µA	1)	P_3.1.6
Temperatures							
Junction temperature	T_j	-40	–	150	°C	–	P_3.1.7
Storage temperature	T_{stg}	-50	–	150	°C	–	P_3.1.8

1) Internally limited.

Notes

1. *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.*
2. *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.*

3.2 Functional range

Table 3 Functional range

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Input voltage	V_I	$V_{Q,nom}$ + 0.5 V	–	45	V	–	P_3.2.1
Output current	I_Q	–	–	–	mA	1)	P_3.2.2
Junction temperature	T_j	-40	–	150	°C	–	P_3.2.3

1) Internally limited.

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.

3.3 Thermal resistance

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

Table 4 Thermal resistance

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Junction to ambient 1)	R_{thJA}	–	–	179	K/W	Zero airflow, zero heat sink area	P_3.3.1
Junction to soldering point	R_{thJSP}	–	–	30	K/W	Measured to pin 5	P_3.3.2

1) Worst case regarding peak temperature.

4 Electrical characteristics

4.1 Electrical characteristics

Table 5 Electrical characteristics

V_I = 13.5 V; T_j = -40°C to +150°C; all voltages with respect to ground, (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Output							
Output voltage TLE4295GV30	V_Q	2.88	3.00	3.12	V	1 mA < I_Q < 30 mA V_I < 13.5 V	P_4.1.1
	V_Q	2.88	3.00	3.12	V	I_Q = 10 mA; 4 V < V_I < 40 V	P_4.1.2
Output voltage TLE4295GV33	V_Q	3.17	3.30	3.43	V	1 mA < I_Q < 30 mA V_I < 13.5 V	P_4.1.3
	V_Q	3.17	3.30	3.43	V	I_Q = 10 mA; 4.3 V < V_I < 40 V	P_4.1.4
Output voltage TLE4295GV50	V_Q	4.80	5.00	5.20	V	1 mA < I_Q < 30 mA V_I < 13.5 V	P_4.1.5
	V_Q	4.80	5.00	5.20	V	I_Q = 10 mA; 6 V < V_I < 40 V	P_4.1.6
Output current limitation	I_Q	30	–	–	mA	[1]	P_4.1.7
Drop out voltage	V_{dr}	–	0.25	0.40	V	I_Q = 20 mA[1]	P_4.1.8
Output capacitor	C_Q	2.2	–	–	µF	ESR ≤ 5 Ω at 10kHz	P_4.1.9
Current consumption							
Current consumption $I_q = I_I - I_Q$	I_q	–	2	4	mA	I_Q < 30 mA	P_4.1.10
Current consumption $I_q = I_I - I_Q$	I_q	–	120	200	µA	I_Q < 1 mA	P_4.1.11
Regulator performance							
Load regulation	$\|\Delta V_Q\|$	–	10	25	mV	1 mA < I_Q < 25 mA; T_j = 25°C;	P_4.1.12
Load regulation	$\|\Delta V_Q\|$	–	10	30	mV	1 mA < I_Q < 25 mA;	P_4.1.13
Line regulation	$\|\Delta V_Q\|$	–	5	25	mV	$\Delta V_I = V_{I,min}$ to 36 V; I_Q = 5 mA; T_j = 25°C	P_4.1.14
Line regulation	$\|\Delta V_Q\|$	–	10	30	mV	$\Delta V_I = V_{I,min}$ to 36 V; I_Q = 5 mA;	P_4.1.15
Power supply ripple rejection	PSRR	–	60	–	dB	f_r = 100 Hz; V_r = 0.5 Vpp	P_4.1.16

Table 5 Electrical characteristics (cont'd)

V_I = 13.5 V; T_j = -40°C to +150°C; all voltages with respect to ground, (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Power fail output							
Power fail threshold	V_{QPF}	–	4.86	–	V	TLE4295GV50	P_4.1.17
		–	3.20	–	V	TLE4295GV33	P_4.1.18
		–	2.91	–	V	TLE4295GV30	P_4.1.19
Power fail headroom	V_{Qnom} - V_{QPF}	50	140	300	mV	TLE4295GV50	P_4.1.20
		33	100	200	mV	TLE4295GV33	P_4.1.21
		30	90	180	mV	TLE4295GV30	P_4.1.22
Power fail low voltage	V_{PFL}	–	150	300	mV	I_{PF} = 0.1 mA	P_4.1.23
Pull-up resistor	R_{PF}	70	100	130	kΩ	2)	P_4.1.24

1) Measured when the output voltage V_Q has dropped 100 mV from the nominal value.

2) Internal connected to V_Q.

5 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.

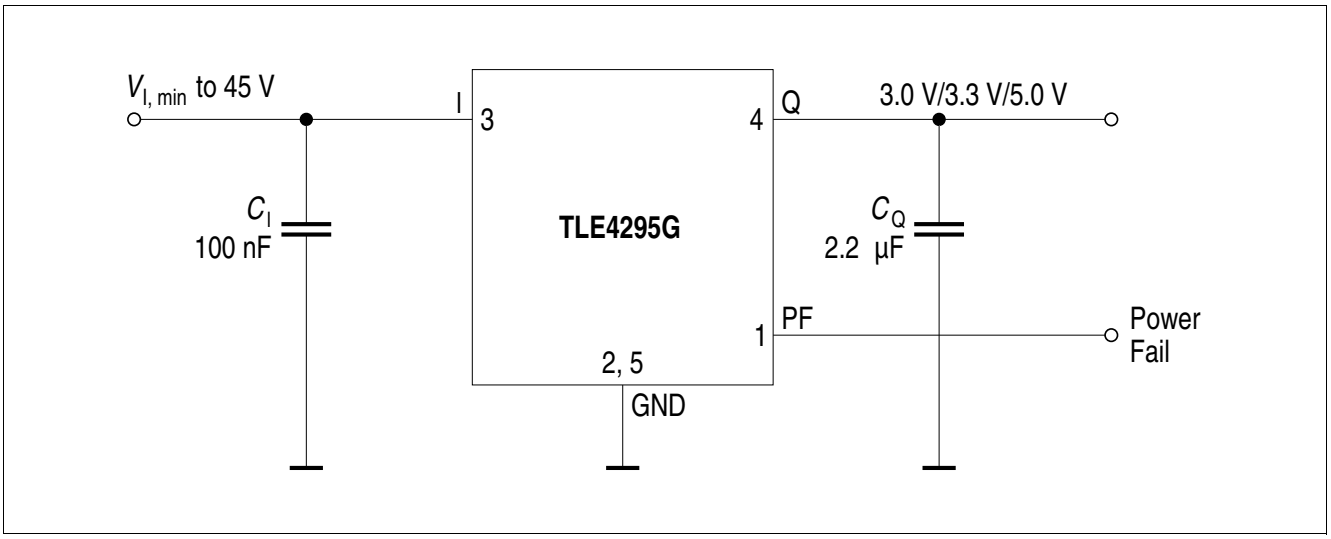


Figure 3 Application diagram

6 Package information

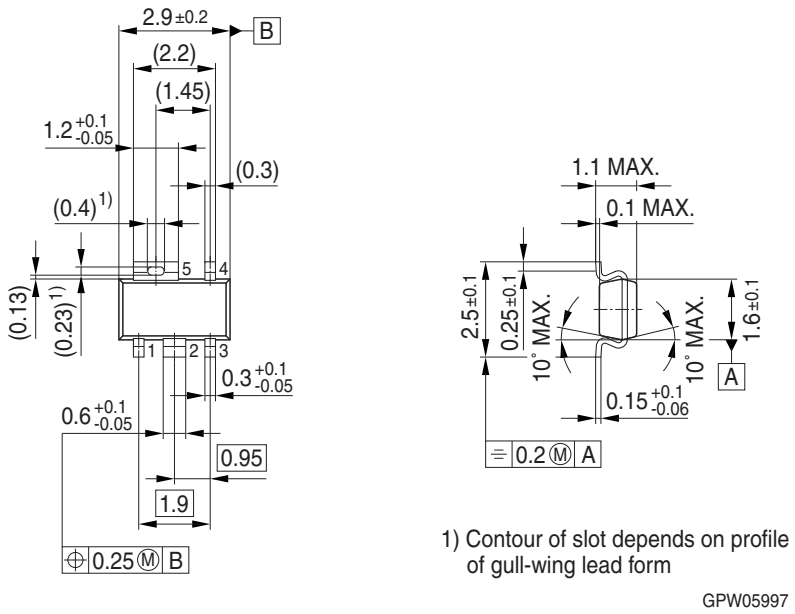


Figure 4 PG-SCT595-5[1)]

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).

Further information on packages

https://www.infineon.com/packages

1) Dimensions in mm

7 Revision history

Revision	Date	Changes
1.5	2021-04-21	Updated layout and structure Editorial changes Deleted 2.6 V version Page 7: added “Thermal resistance” added TOC
1.4	2008-04-21	Initial version of RoHS-compliant derivate of TLE4295GV. Page 1: AEC certified statement added. Marking information added. Page 1 and page 9: RoHS compliance statement and Green product feature added. Package changed to RoHS compliant version. Legal Disclaimer updated
1.3	2004-01-01	Initial release

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