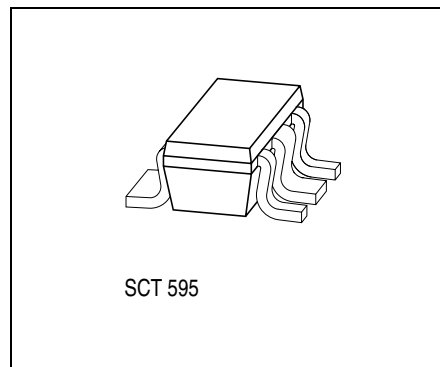


Data Sheet

Features

- Three versions: 3.0 V, 3.3 V, 5.0 V
- Output voltage tolerance $\leq \pm 4\%$
- 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: $-40\text{ }^{\circ}\text{C} \leq T_j \leq 150\text{ }^{\circ}\text{C}$
- Output protected against short circuit
- Overtemperature protection
- Reverse polarity proof
- Very small SMD-Package SCT-595



| Type | Ordering Code | Package |
|-----------------|---------------|---------------|
| ▼ TLE 4295G V30 | Q67006-A9410 | SCT-595 (SMD) |
| ▼ TLE 4295G V33 | Q67006-A9409 | SCT-595 (SMD) |
| ▼ TLE 4295G V50 | Q67006-A9395 | SCT-595 (SMD) |

▼ New type

Functional Description

The **TLE 4295 G** is a monolithic integrated low-drop voltage regulator in the very small SMD package SCT-595. It is designed to supply e.g. microprocessor systems under the severe conditions of automotive applications. Therefore the device is equipped with additional protection functions against over load, 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 $V_{Q,nom} = 3.0\text{ V}$ (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.

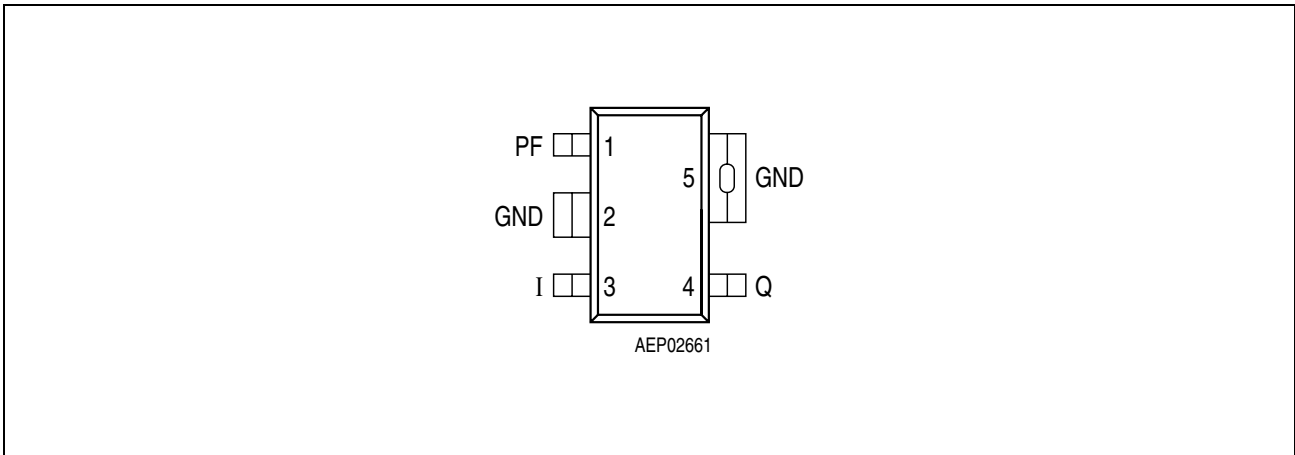


Figure 1 Pin Configuration (top view)

Pin Definitions and Functions

| Pin No. | Symbol | Function |
|---------|--------|--|
| 1 | PF | Power Fail ; L for under-voltage |
| 2 | GND | Ground ; connected to pin 5 |
| 3 | I | Input voltage |
| 4 | Q | Output voltage ; must be blocked by a capacitor $C_Q \geq 2.2 \mu\text{F}$, $\text{ESR} \leq 5 \Omega$ to GND |
| 5 | GND | Ground ; connected to pin 2 |

Absolute Maximum Ratings
 $-40\text{ °C} < T_j < 150\text{ °C}$

| Parameter | Symbol | Limit Values | | Unit | Remarks |
|-----------|--------|--------------|------|------|---------|
| | | min. | max. | | |

Input

| | | | | | |
|---------|-------|------|----|----|--------------------|
| Voltage | V_I | - 42 | 45 | V | - |
| Current | I_I | - | - | mA | internally limited |

Output

| | | | | | |
|---------|-------|-----|----|----|--------------------|
| Voltage | V_Q | - 6 | 30 | V | - |
| Current | I_Q | - | - | mA | internally limited |

Power Fail

| | | | | | |
|---------|----------|-------|----|---------------|----------------------|
| Voltage | V_{PF} | - 0.3 | 45 | V | - |
| Current | I_{PF} | - 500 | * | μA | * internally limited |

Temperatures

| | | | | | |
|----------------------|-----------|------|-----|--------------------|---|
| Junction temperature | T_j | - 40 | 150 | $^{\circ}\text{C}$ | - |
| Storage temperature | T_{stg} | - 50 | 150 | $^{\circ}\text{C}$ | - |

Thermal Resistances

| | | | | | |
|--------------------------------|---------------|---|-----|-----|-------------------------------------|
| Junction pin | $R_{thj-pin}$ | - | 30 | K/W | measured to pin 5 |
| Junction ambient ¹⁾ | R_{thja} | - | 179 | K/W | zero airflow zero heat sink area |

¹⁾ Worst case regarding peak temperature.

Note: Maximum ratings are absolute ratings; exceeding any one of these values may cause irreversible damage to the integrated circuit.

Operating Range

| Parameter | Symbol | Limit Values | | Unit | Remarks |
|----------------------|--------|---------------------|------|------|--------------------|
| | | min. | max. | | |
| Input voltage | V_I | $V_{Q,nom} + 0.5 V$ | 45 | V | – |
| Output current | I_Q | – | – | mA | internally limited |
| Junction temperature | T_j | – 40 | 150 | °C | – |

Electrical Characteristics
 $V_I = 13.5 \text{ V}; -40 \text{ }^\circ\text{C} < T_j < 150 \text{ }^\circ\text{C};$ unless otherwise specified

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|-----------|--------|--------------|------|------|------|----------------|
| | | min. | typ. | max. | | |

Output

| | | | | | | |
|-------------------------------|----------|------|------|------|---------------|--|
| Output voltage V30 version | V_Q | 2.88 | 3.0 | 3.12 | V | $1 \text{ mA} < I_Q < 30 \text{ mA}$ $V_I = 13.5 \text{ V}$ |
| Output voltage V30 version | V_Q | 2.88 | 3.0 | 3.12 | V | $I_Q = 10 \text{ mA}$ $4 \text{ V} < V_I < 40 \text{ V}$ |
| Output voltage V33 version | V_Q | 3.17 | 3.30 | 3.43 | V | $1 \text{ mA} < I_Q < 30 \text{ mA}$ $V_I = 13.5 \text{ V}$ |
| Output voltage V33 version | V_Q | 3.17 | 3.30 | 3.43 | V | $I_Q = 10 \text{ mA}$ $4.3 \text{ V} < V_I < 40 \text{ V}$ |
| Output voltage V50 version | V_Q | 4.80 | 5.00 | 5.20 | V | $1 \text{ mA} < I_Q < 30 \text{ mA}$ $V_I = 13.5 \text{ V}$ |
| Output voltage V50 version | V_Q | 4.80 | 5.00 | 5.20 | V | $I_Q = 10 \text{ mA}$ $6 \text{ V} < V_I < 40 \text{ V}$ |
| Output current limitation | I_Q | 30 | – | – | mA | ¹⁾ |
| Drop voltage | V_{dr} | – | 0.25 | 0.40 | V | $I_Q = 20 \text{ mA}$ ¹⁾ |
| Output capacitor | C_Q | 2.2 | – | – | μF | $\text{ESR} \leq 5 \Omega$ at 10 kHz |

Current Consumption

| | | | | | | |
|--|-------|---|-----|-----|---------------|-----------------------|
| Current consumption $I_q = I_l - I_Q$ | I_q | – | 2 | 4 | mA | $I_Q < 30 \text{ mA}$ |
| Current consumption $I_q = I_l - I_Q$ | I_q | – | 120 | 200 | μA | $I_Q < 1 \text{ mA}$ |

Electrical Characteristics (cont'd)
 $V_I = 13.5\text{ V}; -40\text{ }^\circ\text{C} < T_j < 150\text{ }^\circ\text{C};$ unless otherwise specified

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|-----------|--------|--------------|------|------|------|----------------|
| | | min. | typ. | max. | | |

Regulator Performance

| | | | | | | |
|-------------------------------|----------------|---|----|----|----|--|
| Load regulation | $ \Delta V_Q $ | – | 10 | 25 | mV | $1\text{ mA} < I_Q < 25\text{ mA};$ $T_j = 25\text{ }^\circ\text{C}$ |
| Load regulation | $ \Delta V_Q $ | – | 10 | 30 | mV | $1\text{ mA} < I_Q < 25\text{ mA}$ |
| Line regulation | $ \Delta V_Q $ | – | 5 | 25 | mV | $\Delta V_I = V_{Q,nom} + 0.5\text{ V}$ to 36 V; $I_Q = 5\text{ mA};$ $T_j = 25\text{ }^\circ\text{C}$ |
| Line regulation | $ \Delta V_Q $ | – | 10 | 30 | mV | $\Delta V_I = V_{Q,nom} + 0.5\text{ V}$ to 36 V; $I_Q = 5\text{ mA}$ |
| Power-Supply-Ripple-Rejection | PSRR | – | 60 | – | dB | $f_r = 100\text{ Hz};$ $V_r = 0.5 V_{SS}$ |

Power Fail Output

| | | | | | | |
|------------------------|----------------------|----|------|-----|------------|-----------------------------|
| Power fail threshold | V_{QPF} | – | 4.86 | – | V | TLE 4295GV50 |
| | | – | 3.20 | – | V | TLE 4295GV33 |
| | | – | 2.91 | – | V | TLE 4295GV30 |
| Power Fail Headroom | $V_{Qnom} - V_{QPF}$ | 50 | 140 | 300 | mV | TLE 4295GV50 |
| | | 33 | 100 | 200 | mV | TLE 4295GV33 |
| | | 30 | 90 | 180 | mV | TLE 4295GV30 |
| Power fail low voltage | V_{PFL} | – | 150 | 300 | mV | $I_{PF} = 0.1\text{ mA}$ |
| Pull up resistor | R_{PF} | 70 | 100 | 130 | k Ω | internal connected to V_Q |

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

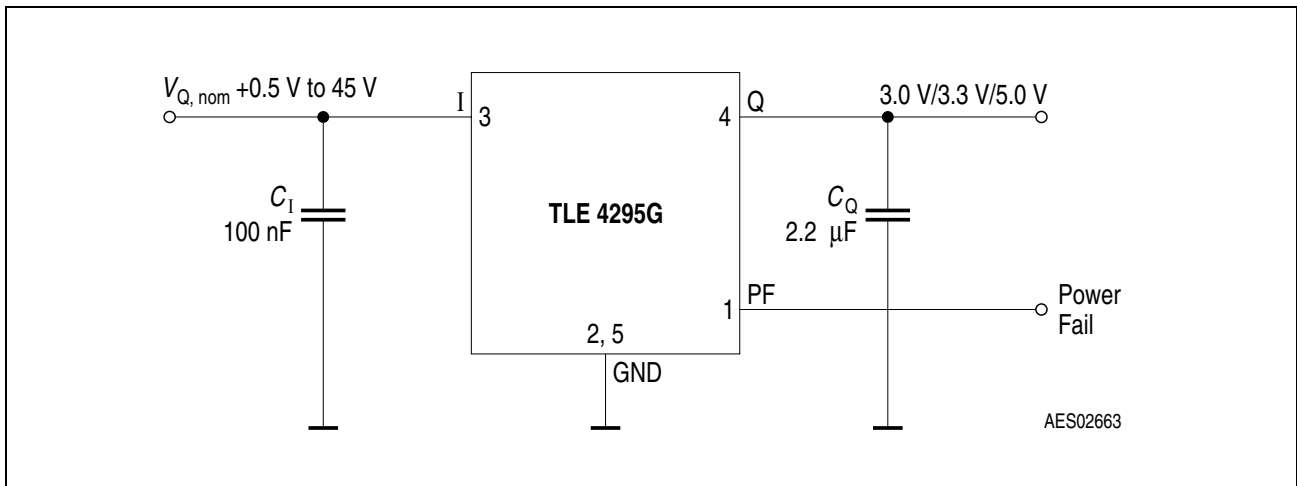


Figure 3 Application Circuit

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