# 5-V Low-Drop Fixed Voltage Regulator

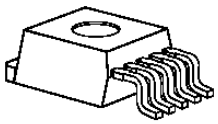
**ILE4270G**

## Functional Description

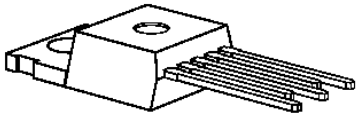
This device is a 5-V low-drop fixed-voltage regulator. The maximum input voltage is 42 V (65 V, ≤400 ms). Up to an input voltage of 26 V and for an output current up to 550 mA it regulates the output voltage within a 2 % accuracy. The short circuit protection limits the output current of more than 650 mA.

The device incorporates over voltage protection and temperature protection that disables the circuit at unpermissibly high temperatures.

**ILE4270GD2**



**ILE4270GKB**



ILE 4270GD2 P-TO263-5-1
ILE 4270GKB P-TO220-5-12

$T_A$ = -40° ÷ 125° C for all packages.

## Features

- Output voltage tolerance ≤ ± 2 %
- Low-drop voltage
- Integrated overtemperature protection
- Reverse polarity protection
- Input voltage up to 42 V
- Overvoltage protection up to 65 V (≤ 400 ms)
- Short-circuit proof
- Suitable for use in automotive electronics
- Wide temperature range
- Adjustable reset time

## Application Description

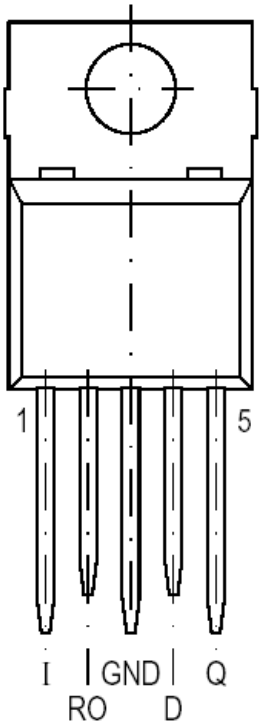
The IC regulates an input voltage in the range of 5.5 V < $V_I$ < 36 V to $V_Q$nom = 5.0 V. Up to 26 V it produces a regulated output current of more than 550 mA. Above 26 V the save-operating-area protection allows operation up to 36 V with a regulated output current of more than 300 mA. Overvoltage protection limits operation at 42 V. The overvoltage protection hysteresis restores operation if the input voltage has dropped below 36 V. A reset signal is generated for an output voltage of $V_Q$ < 4.5 V. The delay for power-on reset can be set externally with a capacitor.

## Design Notes for External Components

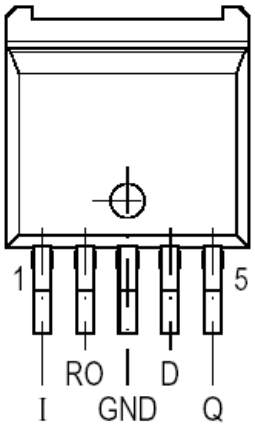
An input capacitor $C_I$ is necessary for compensation of line influences. The resonant circuit consisting of lead inductance and input capacitance can be damped by a resistor of approx. 1 Ω in series with $C_I$. An output capacitor $C_Q$ is necessary for the stability of the regulating circuit. Stability is guaranteed at values of $C_Q$ ≥ 22 µF and an ESR of < 3 Ω.

## Pin Configuration

P-TO220-5-12




P-TO263-5-1




### Pin Definitions and Functions

| Pin | Symbol | Function |
|---|---|---|
| 1 | I | **Input :** block to ground directly on the IC with ceramic capacitor |
| 2 | RO | **Reset Output :** the open collector output is connected to the 5 V output via an integrated resistor of 30 kΩ. |
| 3 | GND | **Ground :** internally connected to heatsink. |
| 4 | D | **Reset Delay :** connect a capacitor to ground for delay time adjustment. |
| 5 | Q | **5-V Output :** block to ground with 22 μF capacitor, ESR < 3 Ω. |

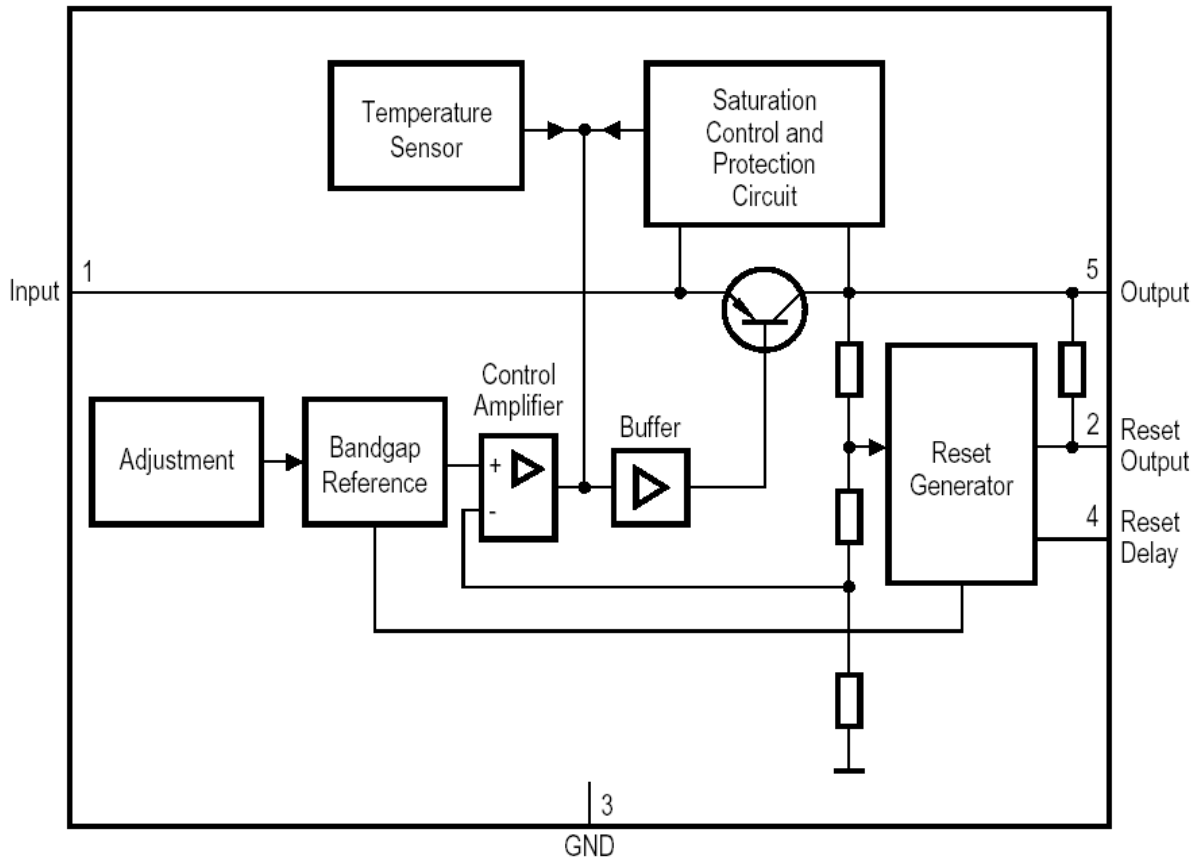
## Circuit Description

The control amplifier compares a reference voltage, which is kept highly accurate by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of a series transistor via a buffer. Saturation control as a function of the load current prevents any over-saturation of the power element. If the output voltage decreases below 4.5 V, an external capacitor $C_D$ on pin 4 (D) will be discharged by the reset generator. If the voltage on this capacitor drops below $V_{DRL}$, a reset signal is generated on pin 2 (RO), i.e. reset output is set low. If the output voltage rises above 4.5 V, $C_D$ will be charged with constant current. After the power-on-reset time the voltage on the capacitor reaches $V_{DU}$ and the reset output will be set high again. The value of the power-on-reset time can be set within a wide range depending of the capacitance of $C_D$.

The IC also incorporates a number of internal circuits for protection against:

- Overload
- Overvoltage
- Overtemperature
- Reverse polarity

### Block Diagram



## Absolute Maximum Ratings

$T_j$ = – 40 to 150 °C

| Parameter | Symbol | Limit Values | | Unit | Notes |
|---|---|---|---|---|---|
| | | min. | max. | | |
| **Input** | | | | | |
| Voltage<br>Voltage<br>Current | VI<br>VI<br>II | – 42 | 42<br>65 | V<br>V | <br>t ≤ 400 ms<br>internally limited |
| **Reset Output** | | | | | |
| Voltage<br>Current | VR<br>IR | – 0.3 | 7 | V | <br>Internally limited |
| **Reset Delay** | | | | | |
| Voltage<br>Current | VD<br>ID | – 0.3 | 7 | V | <br>Internally limited |
| **Output** | | | | | |
| Voltage<br>Current | VQ<br>IQ | – 1.0 | 16 | V | <br>Internally limited |
| **Ground** | | | | | |
| Current | IGND | – 0.5 | – | A | – |
| **Temperatures** | | | | | |
| Junction temperature<br>Storage temperature | Tj<br>Tstg | <br>– 50 | 150<br>150 | °C<br>°C | – |

Optimum reliability and life time are guaranteed if the junction temperature does not exceed 125 °C in operating mode. Operation at up to the maximum junction temperature of 150 °C is possible in principle.

* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied.
Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## Operating Range

| Parameter | Symbol | Limit Values | | Unit | Notes |
|---|---|---|---|---|---|
| | | min. | max. | | |
| Input voltage | $V_I$ | 6 | 42 | V | – |
| Junction temperature | $T_j$ | – 40 | 150 | °C | – |
| **Thermal Resistance** | | | | | |
| Junction ambient | $R_{thja}$ | – | 65 | K/W | TO263 |
| Junction case | $R_{thjc}$<br>$Z_{thjc}$ | – | 3<br>2 | K/W<br>K/W | $t$ < 1 ms<br>TO263 |

## Characteristics

$V_I$ = 13.5 V; – 40 °C ≤ $T_j$ = ≤ 125 °C (unless otherwise specified)

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Output voltage | $V_Q$ | 4.90 | 5.00 | 5.10 | V | 5 mA ≤ $I_Q$ ≤ 550 mA;<br>6 V ≤ $V_I$ ≤ 26 V |
| Output voltage | $V_Q$ | 4.90 | 5.00 | 5.10 | V | 26 V ≤ $V_I$ ≤ 36 V;<br>$I_Q$ ≤ 300 mA |
| Output current limiting | $I_Q$max | 650 | 850 | – | mA | $V_Q$ = 0 V |
| Current consumption<br>$I_q$ = $I_I$ – $I_Q$ | $I_q$ | – | 1 | 1.5 | mA | $I_Q$ = 5 mA |
| Current consumption<br>$I_q$ = $I_I$ – $I_Q$ | $I_q$ | – | 55 | 75 | mA | $I_Q$ = 550 mA |
| Current consumption<br>$I_q$ = $I_I$ – $I_Q$ | $I_q$ | – | 70 | 90 | mA | $I_Q$ = 550 mA; $V_I$ = 5 V |
| Drop voltage | $V_{dr}$ | – | 350 | 700 | mV | $I_Q$ = 550 mA1) |

1) Drop voltage = $V_I$ – $V_Q$ (measured when the output voltage has dropped 100 mV from the nominal value obtained at 13.5 V input)

## Characteristics (cont'd)

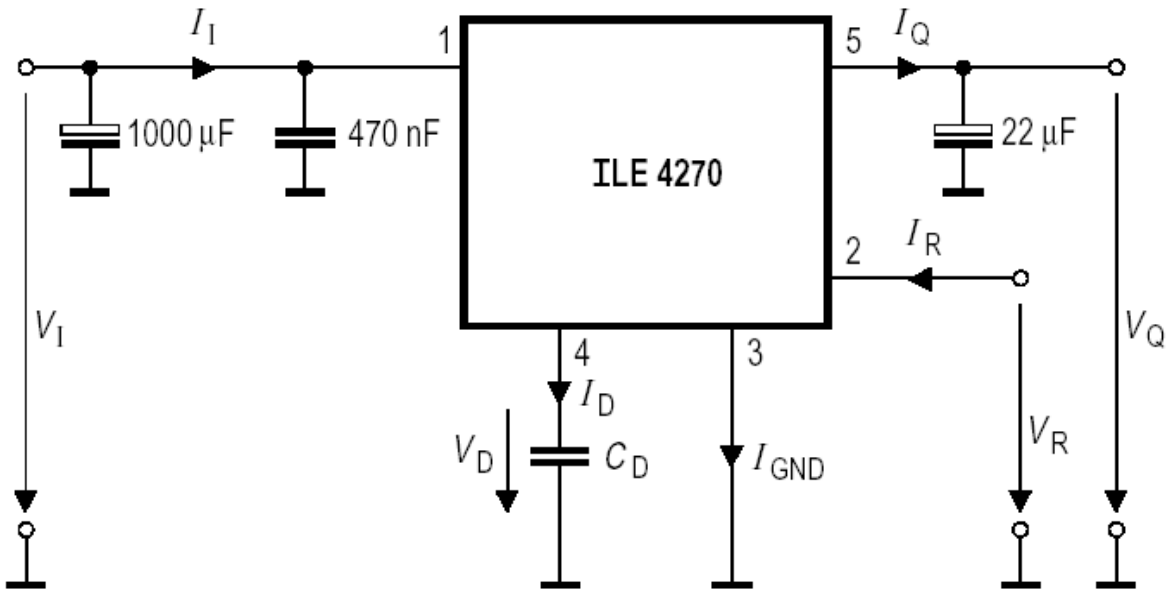
$V_I$ = 13.5 V; – 40 °C ≤ $T_j$ = ≤ 125 °C (unless otherwise specified)

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Load regulation | $\Delta V_Q$ | – | 25 | 50 | mV | $I_Q$ = 5 to 550 mA;<br>$V_I$ = 6 V |
| Supply voltage regulation | $\Delta V_Q$ | – | 12 | 25 | mV | $V_I$ = 6 to 26 V<br>$I_Q$ = 5 mA |
| Power supply Ripple rejection | *PSRR* | – | 54 | – | dB | $f_r$ = 100 Hz;<br>$V_r$ = 0.5 $V_{SS}$ |
| **Reset Generator** | | | | | | |
| Switching threshold | $V_{RT}$ | 4.5 | 4.65 | 4.8 | V | – |
| Reset High voltage | $V_{ROH}$ | 4.5 | – | – | V | – |
| Reset low voltage | $V_{ROL}$ | – | 60 | – | mV | $R_{intern}$ = 30 kΩ2);<br>1.0 V ≤ $V_Q$ ≤ 4.5 V |
| Reset low voltage | $V_{ROL}$ | – | 200 | 400 | mV | $I_R$ = 3 mA, $V_Q$ = 4.4 V |
| Reset pull-up | $R$ | 18 | 30 | 46 | kΩ | internally connected to Q |
| Lower reset timing threshold | $V_{DRL}$ | 0.2 | 0.45 | 0.8 | V | $V_Q$ < $V_{RT}$ |
| Charge current | $I_d$ | 8 | 14 | 25 | µA | $V_D$ = 1.0 V |
| Upper timing threshold | $V_{DU}$ | 1.4 | 1.8 | 2.3 | V | – |
| Delay time | $t_d$ | – | 13 | – | ms | $C_D$ = 100 nF |
| Reset reaction time | $t_{RR}$ | – | – | 3 | µs | $C_D$ = 100 nF |
| **Overvoltage Protection** | | | | | | |
| Turn-Off voltage | $V_{I, ov}$ | 42 | 44 | 46 | V | – |

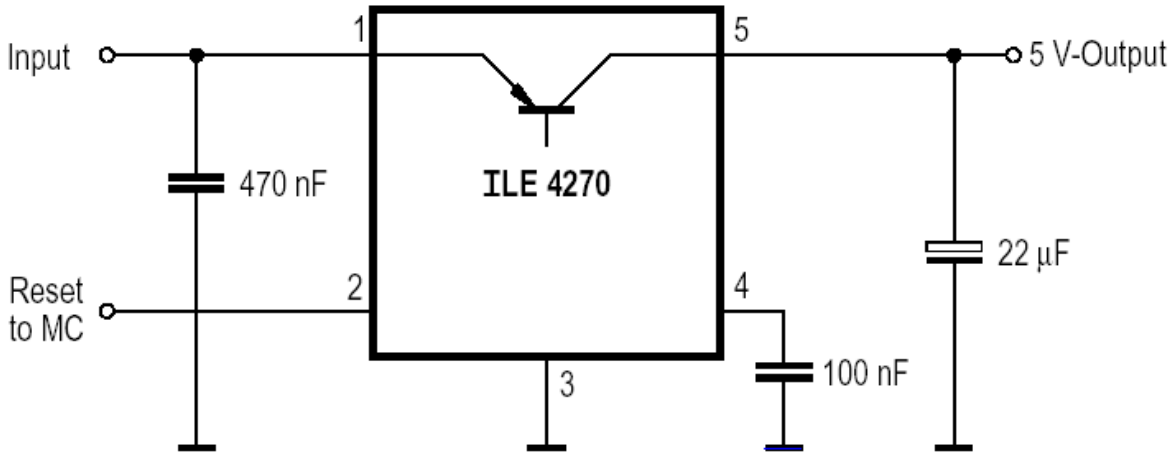
1) Drop voltage = $V_I$ – $V_Q$ (measured when the output voltage has dropped 100 mV from the nominal value

obtained at 13.5 V input)
2) Reset peak is always lower than 1.0 V.

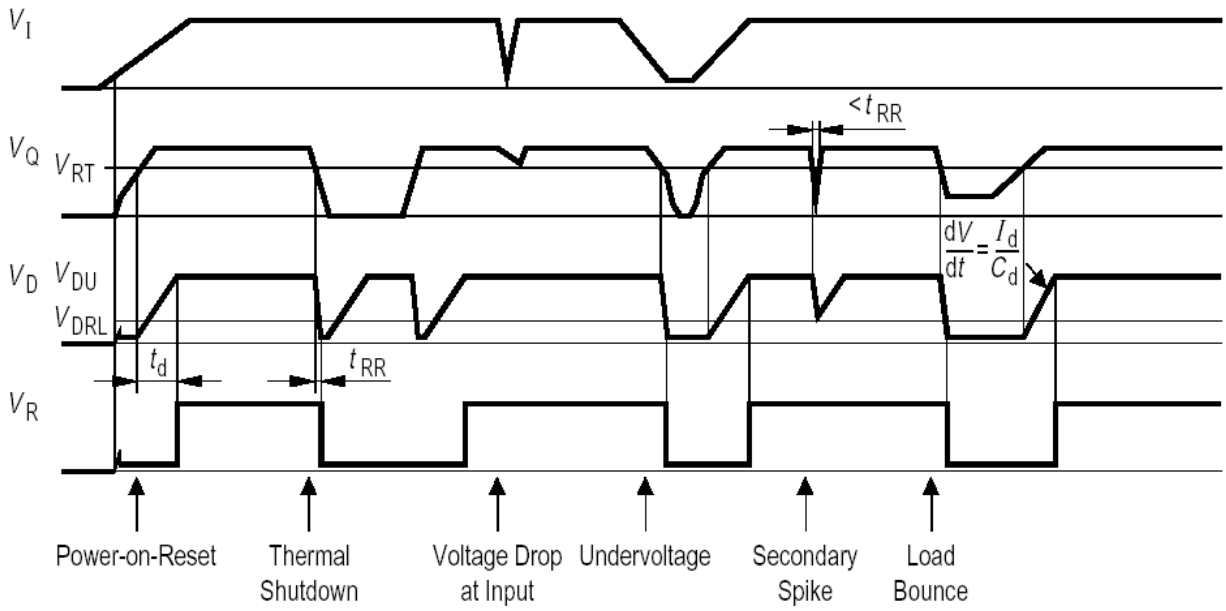
## Test Circuit




## Application Circuit

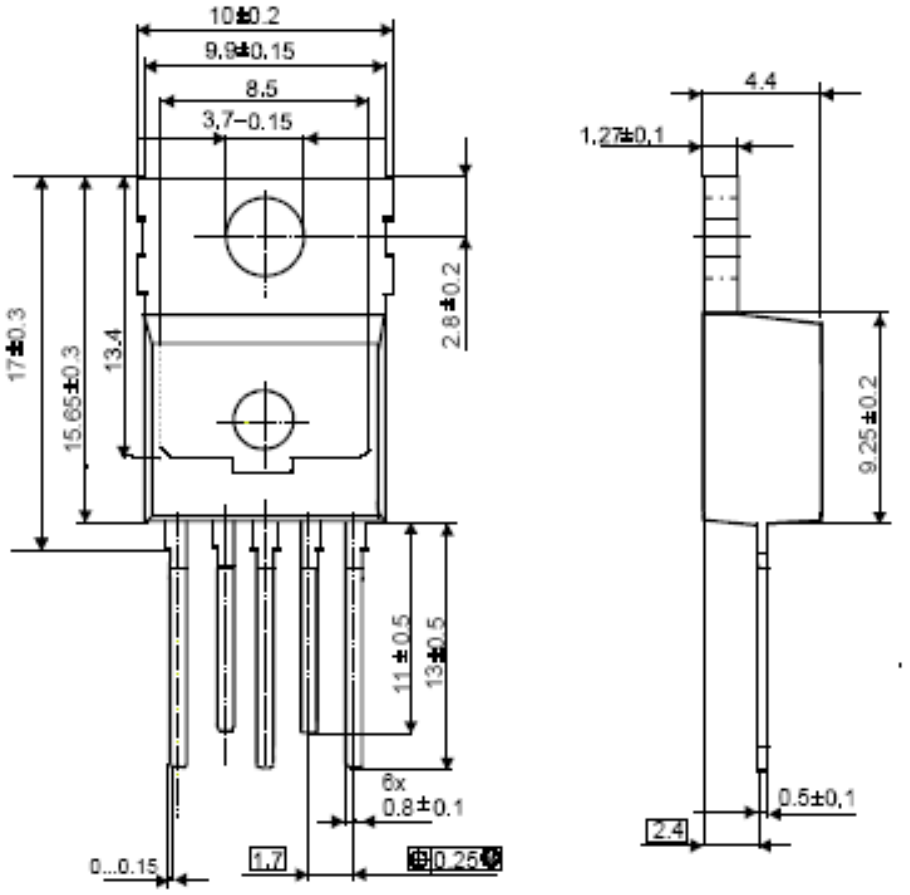


## Time Response

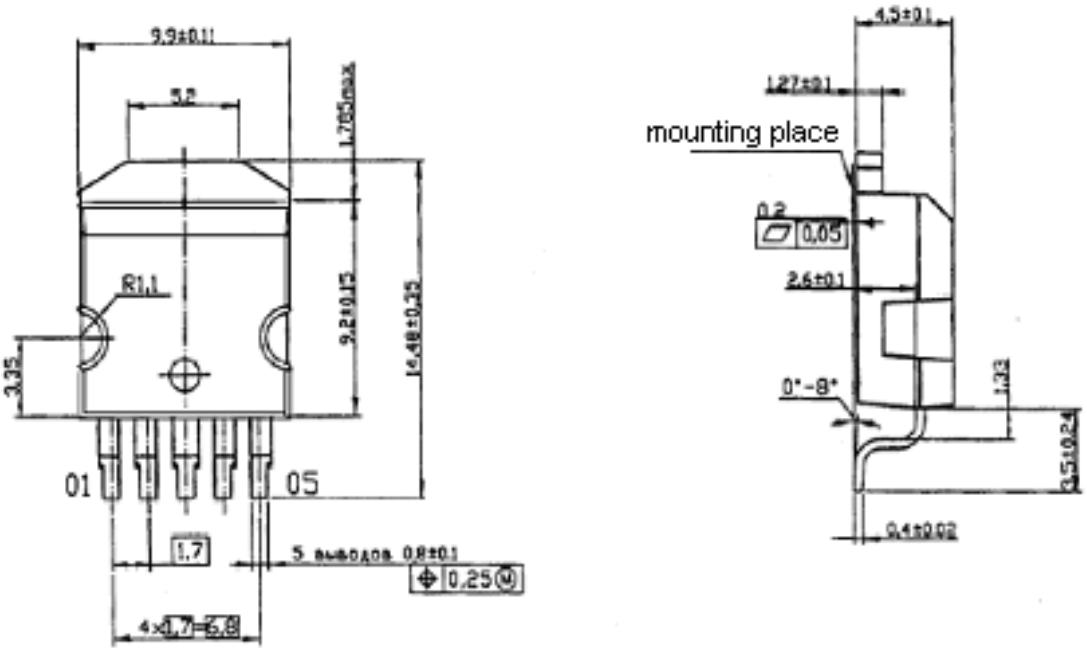


## Package Dimensions

**ILE4270GKB** **P-TO 220-5-12**




**ILE4270GD2** **P-TO 263-5-1**



Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** sales@st-electron.ru

**Адрес:** 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331