

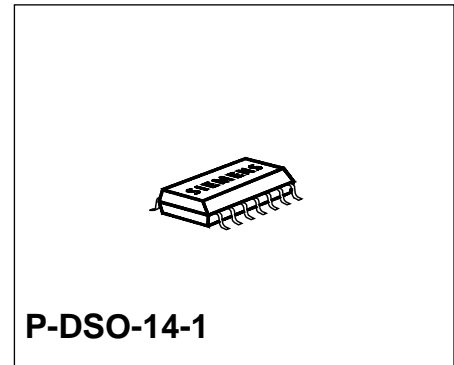
Quad PNP-Operational Amplifier

TAE 4453
TAF 4453

Bipolar IC

Features

- Supply voltage range between 3 V and 36 V
- Low current consumption, 1.6 mA typ.
- Extremely large control range
- Low output saturation voltage, almost independent of load current
- Output current up to 70 mA (100 mA max.)
- Output virtually short-circuit proof
- Wide common-mode range
- Wide temperature range (TAF 4453 G)
- Pin-compatible to LM 324
- The typical characteristics of the electric parameters correspond to those of the TAE 1453 G



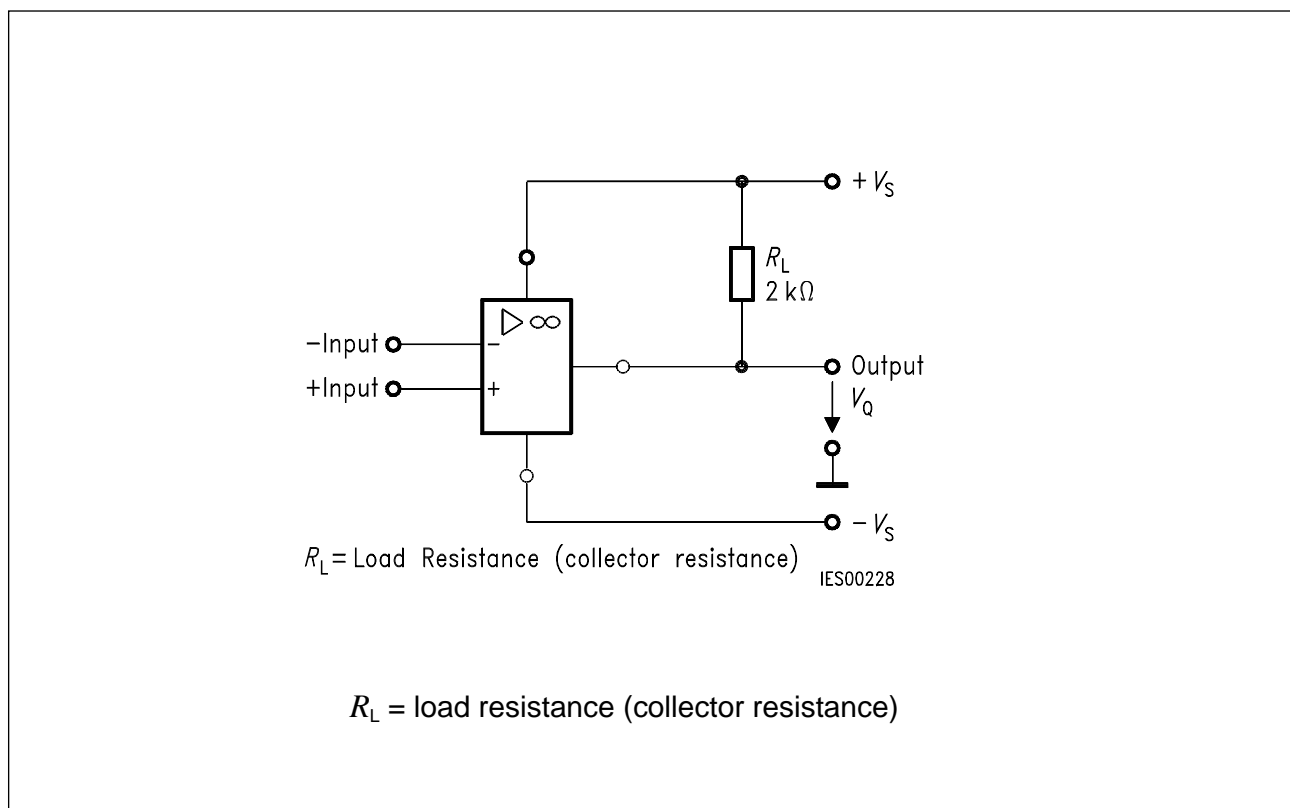
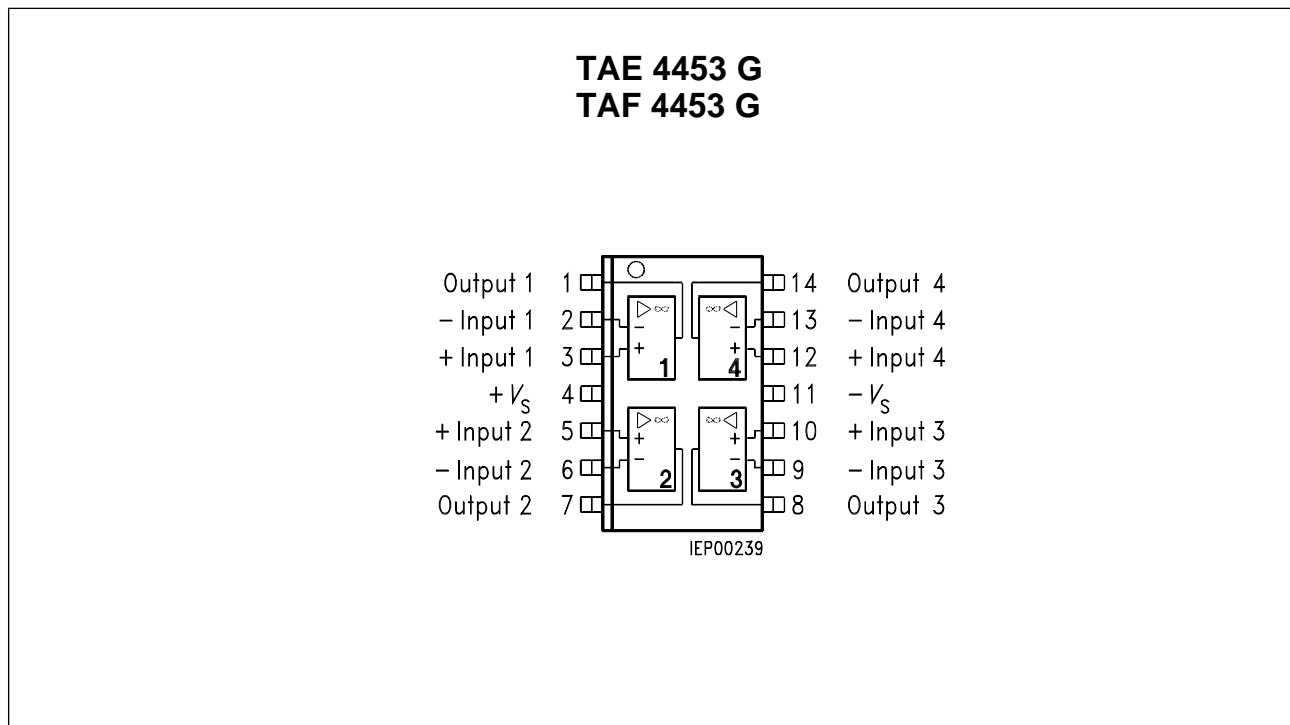
Applications

- Amplifier
- Level converter
- Driver
- Offset voltage switch
- Comparator

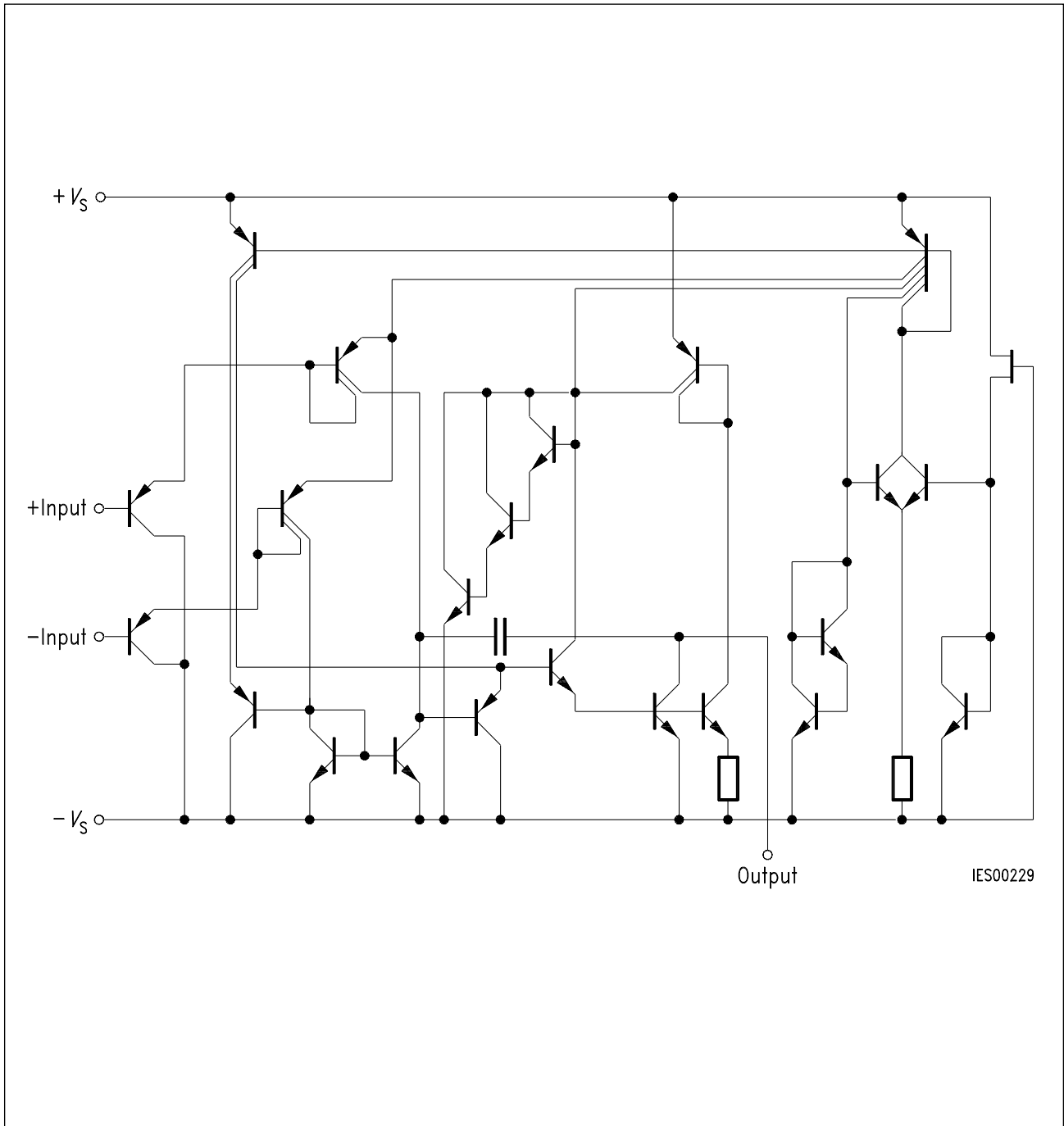
| Type | Ordering Code | Package |
|------------|---------------|------------------|
| TAE 4453 G | Q67000-A2152 | P-DSO-14-1 (SMD) |
| TAF 4453 G | Q67000-A2213 | P-DSO-14-1 (SMD) |

The TAE 4453 / TAF 4453 consists of four independent, frequency-compensated op amps, each having a PNP-input differential stage and an open collector output. The integrated regulator provides for all parameters a large degree of independence of the supply voltage.

Pin Configurations (top view)



Connection Diagram



Circuit Diagram of One Op Amp

Absolute Maximum Ratings (TAE 4453 G)

| Parameter | Symbol | Limit Values | Unit |
|-----------------------------------------------|-------------|--------------|--------------------|
| Supply voltage | V_S | ± 18 | V |
| Output current | I_Q | 100 | mA |
| Differential input voltage | V_{ID} | $\pm V_S$ | V |
| Junction temperature | T_j | 150 | $^{\circ}\text{C}$ |
| Storage temperature range | T_{stg} | - 55 to 125 | $^{\circ}\text{C}$ |
| Thermal resistance system - air TAE 4453 G | $R_{th SA}$ | 120 | K/W |

Operating Range (TAE 4453 G)

| | | | |
|---------------------|-------|---------------------------------------------------------------------------------|--------------------|
| Supply voltage | V_S | ± 2 to ± 18 (± 1.5 V with slightly increased offset voltage) | V |
| Ambient temperature | T_A | - 25 to 85 | $^{\circ}\text{C}$ |

Characteristics (TAE 4453 G)

$V_S = \pm 5$ V to ± 15 V; $R_L = 10$ k Ω , unless otherwise specified

| Parameter | Symbol | Limit Values $T_A = 25^{\circ}\text{C}$ | | | Limit Values $T_A = -25$ to 85°C | | Unit |
|------------------------------------------------|-----------|--------------------------------------------|------|--------|--------------------------------------------------------|--------|------|
| | | min. | typ. | max. | min. | max. | |
| Open-loop supply current consumption, total | I_S | | 1.6 | 3.0 | | 3.6 | mA |
| Input offset voltage, $R_G = 50 \Omega$ | V_{IO} | - 5.5 | | 5.5 | - 7 | 7 | mV |
| Input offset current | I_{IO} | - 15 | | 15 | - 25 | 25 | nA |
| Input current | I_I | | 40 | 150 | | 200 | nA |
| Control range | | | | | | | |
| $R_L = 2$ k Ω , $V_S = \pm 15$ V | V_{Qpp} | 14.9 | | - 14.7 | 14.9 | - 14.7 | V |
| $R_L = 620 \Omega$, $V_S = \pm 15$ V | V_{Qpp} | 14.9 | | - 14.5 | 14.9 | - 14.4 | V |

Characteristics (TAE 4453 G) (cont'd)

$V_S = \pm 5 \text{ V to } \pm 15 \text{ V}$; $R_L = 10 \text{ k}\Omega$, unless otherwise specified

| Parameter | Symbol | Limit Values $T_A = 25 \text{ }^\circ\text{C}$ | | | Limit Values $T_A = -25$ to $85 \text{ }^\circ\text{C}$ | | Unit |
|------------------------------------------------------------------|----------------|---------------------------------------------------|------|------------------|---------------------------------------------------------------|------------------|------------------------|
| | | min. | typ. | max. | min. | max. | |
| Input impedance, $f = 1 \text{ kHz}$ | Z_i | | 200 | | | | $\text{k}\Omega$ |
| Open-loop voltage gain $R_L = 2 \text{ k}\Omega$ | G_{V0} | 80 | 85 | | 80 | | dB |
| Output reverse current | I_{QR} | | | 10 | | 20 | μA |
| Common-mode input voltage range $R_L = 2 \text{ k}\Omega$ | V_{IC} | $-V_S$ -0.2 | | $+V_S$ -1.8 | $-V_S$ | $+V_S$ -2.0 | V |
| Common-mode rejection $R_L = 2 \text{ k}\Omega$ | k_{CMR} | 75 | 80 | | 75 | | dB |
| Supply voltage rejection $G_V = 100$ | k_{SVR} | | 25 | 100 | | 100 | $\mu\text{V/V}$ |
| Temperature coefficient of I_{IO} $R_G = 50 \text{ }\Omega$ | α_{II0} | | 0.1 | | | | nA/K |
| Temperature coefficient of V_{IO} $R_G = 50 \text{ }\Omega$ | α_{VIO} | | 6 | | | | $\mu\text{V/K}$ |
| Slew rate for non-inverting operation | SR | | 0.65 | | 0.25 | 1.0 | $\text{V}/\mu\text{s}$ |
| Slew rate for inverting operation | SR | | 1.1 | | 0.5 | 1.6 | $\text{V}/\mu\text{s}$ |

Characteristics (TAE 4453 G)

$$V_S = \pm 2 \text{ V}$$

| Parameter | Symbol | Limit Values $T_A = 25 \text{ }^\circ\text{C}$ | | | Limit Values $T_A = -25$ to $85 \text{ }^\circ\text{C}$ | | Unit |
|------------------------------------------------------|-------------------|---------------------------------------------------|------|-----------|---------------------------------------------------------------|------------|----------|
| | | min. | typ. | max. | min. | max. | |
| Input offset voltage, $R_G = 50 \text{ } \Omega$ | V_{IO} | -6 | | 6 | -7.5 | 7.5 | mV |
| Input offset current Input current | I_{IO} I_I | -15 | 40 | 15 150 | -100 | 100 200 | nA nA |
| Open-loop voltage gain; $R_L = 2 \text{ k}\Omega$ | G_{V0} | 70 | | | 70 | | dB |

Absolute Maximum Ratings (TAF 4453 G)

| Parameter | Symbol | Limit Values | Unit |
|---------------------------------------------------|--------------------|-------------------|--------------------------------------|
| Supply voltage | V_S | ± 18 | V |
| Output current | I_Q | 100 | mA |
| Differential input voltage | V_{ID} | $\pm V_S$ | V |
| Junction temperature Storage temperature range | T_j T_{stg} | 150 -55 to 125 | $^\circ\text{C}$ $^\circ\text{C}$ |
| Thermal resistance system - air TAF 4453 G | $R_{th SA}$ | 120 | K/W |

Operating Range (TAF 4453 G)

| | | | |
|---------------------|-------|---------------------------------------------------------------------------------|------------------|
| Supply voltage | V_S | ± 2 to ± 18 (± 1.5 V with slightly increased offset voltage) | V |
| Ambient temperature | T_A | -55 to 125 | $^\circ\text{C}$ |

Characteristics (TAF 4453 G)

$V_S = \pm 5 \text{ V to } \pm 15 \text{ V}$; $R_L = 10 \text{ k}\Omega$, unless otherwise specified

| Parameter | Symbol | Limit Values $T_A = 25 \text{ }^\circ\text{C}$ | | | Limit Values $T_A = -55$ to $125 \text{ }^\circ\text{C}$ | | Unit |
|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------|------|------------------|----------------------------------------------------------------|------------------|-----------------|
| | | min. | typ. | max. | min. | max. | |
| Open-loop supply current consumption, total | I_S | | 1.6 | 3.0 | | 3.6 | mA |
| Input offset voltage, $R_G = 50 \text{ }\Omega$ | V_{IO} | - 4 | | 4 | - 6 | 6 | mV |
| Input offset current Input current | I_{IO} I_I | - 10 | 40 | 10 100 | - 15 | 15 150 | nA nA |
| Control range $R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$ $R_L = 620 \text{ }\Omega$, $V_S = \pm 15 \text{ V}$ | $V_{Q\text{pp}}$ $V_{Q\text{pp}}$ | 14.9 | | - 14.7 - 14.5 | 14.8 14.8 | - 14.7 - 14.4 | V V |
| Input impedance, $f = 1 \text{ kHz}$ | Z_I | | 200 | | | | k Ω |
| Open-loop voltage gain $R_L = 2 \text{ k}\Omega$ | G_{V0} | 85 | 87 | | 80 | | dB |
| Output reverse current | I_{QR} | | | 1 | | 5 | μA |
| Common-mode input voltage range $R_L = 2 \text{ k}\Omega$ | V_{IC} | - V_S - 0.2 | | + V_S - 1.5 | - V_S + 0.2 | + V_S - 1.8 | V |
| Common-mode rejection, $R_L = 2 \text{ k}\Omega$ | k_{CMR} | 80 | 85 | | 75 | | dB |
| Supply voltage rejection, $G_V = 100$ | k_{SVR} | | 25 | 100 | | 100 | $\mu\text{V/V}$ |

Characteristics (TAF 4453 G) (cont'd)

$V_S = \pm 5 \text{ V to } \pm 15 \text{ V}$; $R_L = 10 \text{ k}\Omega$, unless otherwise specified

| Parameter | Symbol | Limit Values $T_A = 25 \text{ }^\circ\text{C}$ | | | Limit Values $T_A = -55$ to $125 \text{ }^\circ\text{C}$ | | Unit |
|------------------------------------------------------------------|----------------|---------------------------------------------------|------|------|----------------------------------------------------------------|------|------------------|
| | | min. | typ. | max. | min. | max. | |
| Temperature coefficient of I_{IO} $R_G = 50 \text{ }\Omega$ | α_{IIO} | | 0.1 | 0.8 | | 0.8 | nA/K |
| Temperature coefficient of V_{IO} $R_G = 50 \text{ }\Omega$ | α_{VIO} | | 6 | 25 | | 25 | $\mu\text{V/K}$ |
| Slew rate for non-inverting operation | SR | | 0.65 | | 0.2 | 0.65 | V/ μs |
| Slew rate for inverting operation | SR | | 1.1 | | 0.4 | 1.7 | V/ μs |

Characteristics (TAF 4453 G)

$V_S = \pm 2 \text{ V}$

| Parameter | Symbol | Limit Values $T_A = 25 \text{ }^\circ\text{C}$ | | | Limit Values $T_A = -55$ to $125 \text{ }^\circ\text{C}$ | | Unit |
|-----------------------------------------------------|----------|---------------------------------------------------|------|------|----------------------------------------------------------------|------|------|
| | | min. | typ. | max. | min. | max. | |
| Input offset voltage, $R_G = 50 \text{ }\Omega$ | V_{IO} | -4 | | 4 | -6 | 6 | mV |
| Input offset current | I_{IO} | -50 | | 50 | -75 | 75 | nA |
| Input current | I_I | | 40 | 100 | | 150 | nA |
| Open-loop voltage gain $R_L = 2 \text{ k}\Omega$ | G_{V0} | 75 | | | 70 | | dB |

Note: For typical performance curves, please refer to the data sheets of TAE 1453 and TAF 1453.