

## Quad PNP-Operational Amplifier

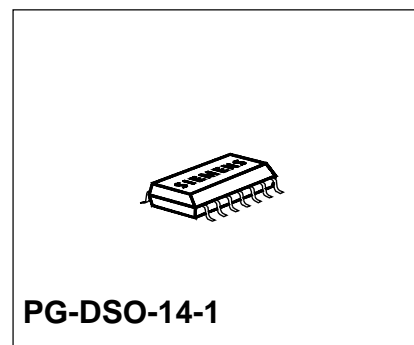
TAE 4453

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
- Pb-free lead plating; RoHS compliant



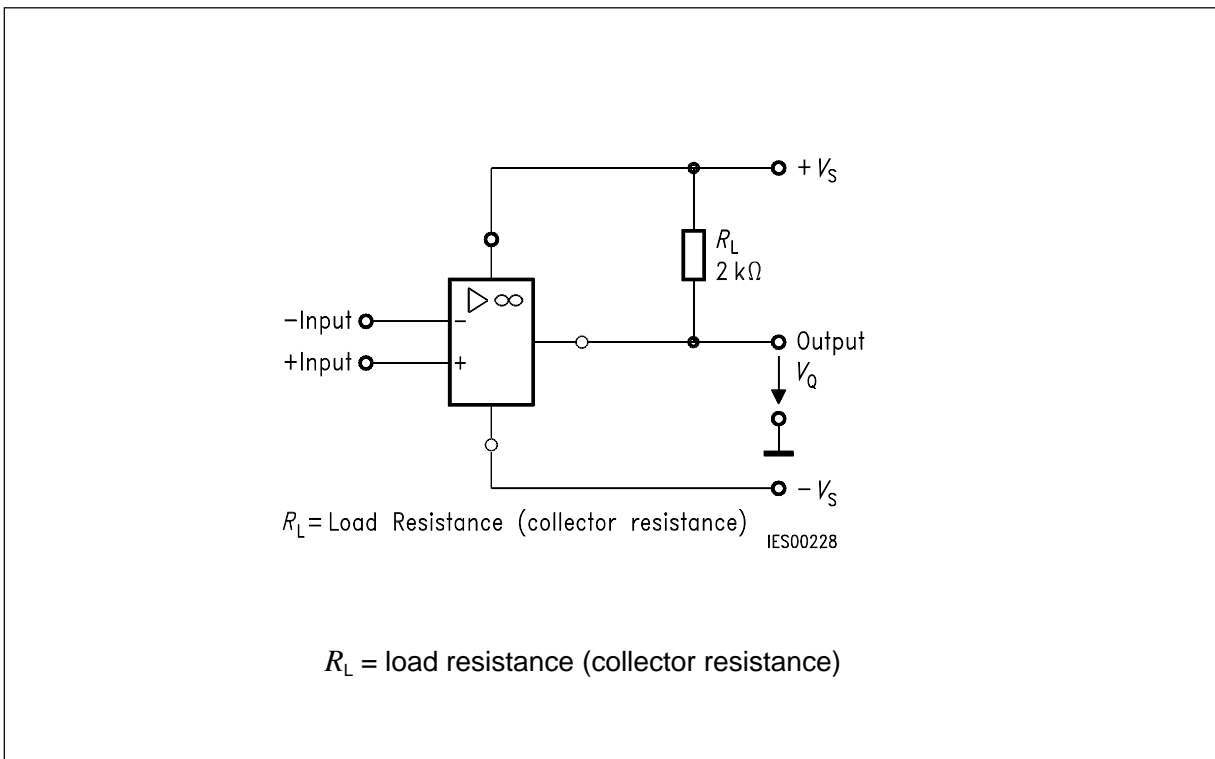
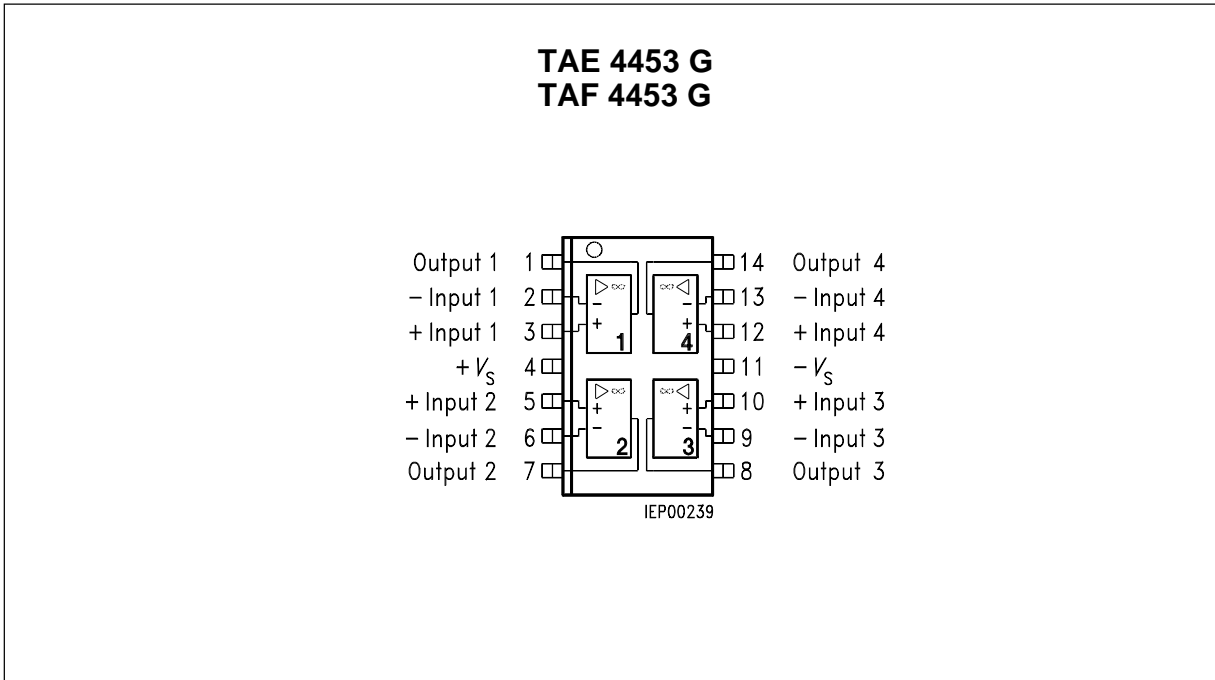
#### Applications

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

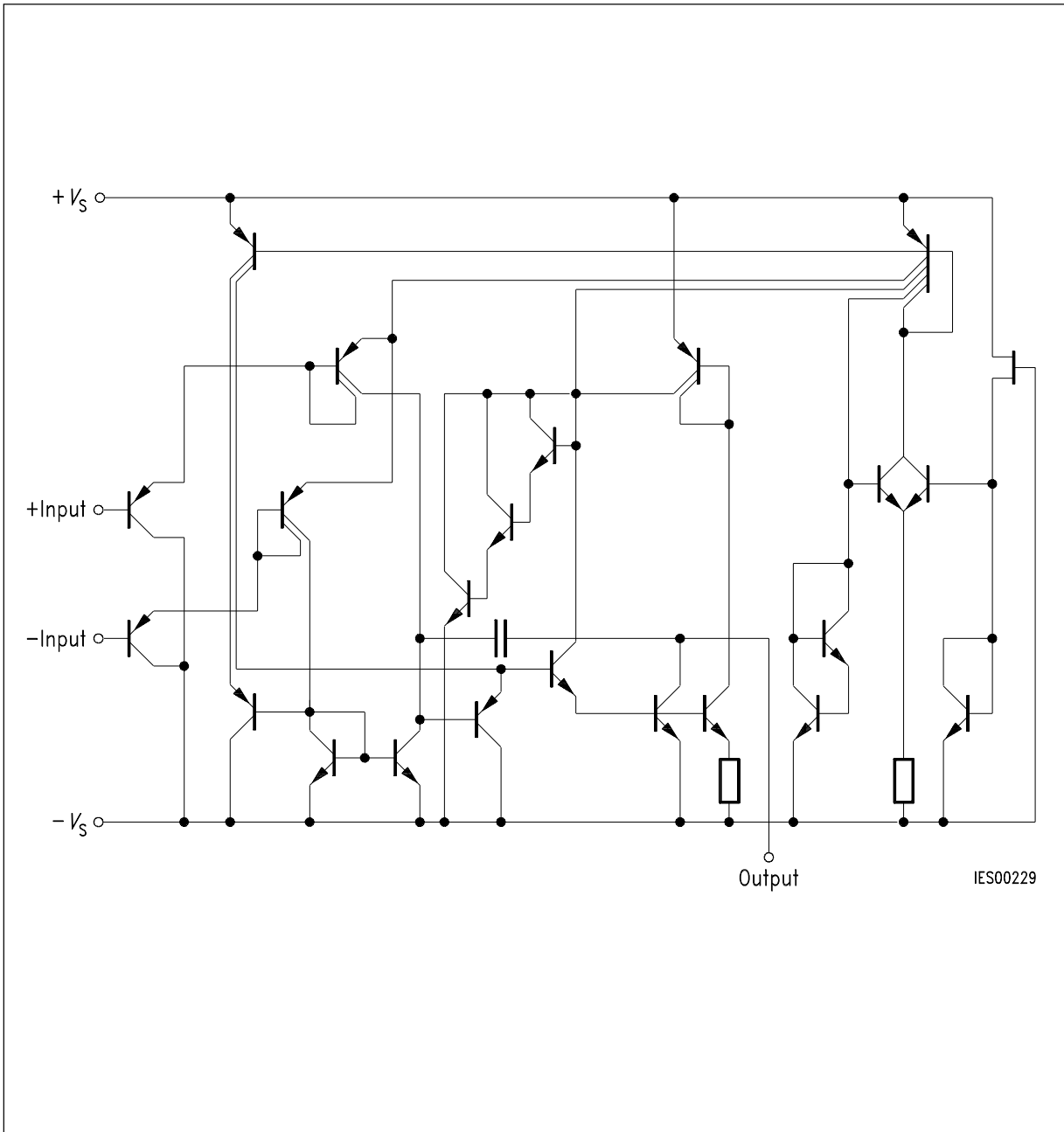
Type	Ordering Code	Package
TAE 4453 G	Q67000-A2152	PG-DSO-14-1 (SMD)
TAF 4453 G	Q67000-A2213	PG-DSO-14-1 (SMD)

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	$V_S$	$\pm 18$	V
Output current	$I_Q$	100	mA
Differential input voltage	$V_{ID}$	$\pm V_S$	V
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	- 55 to 125	°C
Thermal resistance system - air TAE 4453 G	$R_{th SA}$	120	K/W

### Operating Range (TAE 4453 G)

Supply voltage	$V_S$	$\pm 2$ to $\pm 18$ ( $\pm 1.5$ V with slightly increased offset voltage)	V
Ambient temperature	$T_A$	- 25 to 85	°C

### Characteristics (TAE 4453 G)

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

Parameter	Symbol	Limit Values $T_A = 25$ °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 $\Omega$ , $V_S = \pm 15$ V	$V_{Q pp}$	14.9		- 14.7	14.9	- 14.7	V
$R_L = 620$ $\Omega$ , $V_S = \pm 15$ V	$V_{Q pp}$	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	$\mu\text{A}$
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 $I_{IO}$ $R_G = 50 \text{ }\Omega$	$\alpha_{II0}$		0.1				nA/K
Temperature coefficient of $V_{IO}$ $R_G = 50 \text{ }\Omega$	$\alpha_{VIO}$		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	$I_{IO}$	- 15		15	- 100	100	nA
Input current	$I_I$		40	150		200	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	$V_S$	$\pm 18$	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 TAF 4453 G	$R_{th SA}$	120	K/W

## Operating Range (TAF 4453 G)

Supply voltage	$V_S$	$\pm 2$ to $\pm 18$ ( $\pm 1.5 \text{ V}$ 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	$I_{IO}$	- 10		10	- 15	15	nA
Input current	$I_I$		40	100		150	nA
Control range $R_L = 2 \text{ k}\Omega$ , $V_S = \pm 15 \text{ V}$	$V_{Qpp}$	14.9		- 14.7	14.8	- 14.7	V
$R_L = 620 \text{ }\Omega$ , $V_S = \pm 15 \text{ V}$	$V_{Qpp}$	14.9		- 14.5	14.8	- 14.4	V
Input impedance, $f = 1 \text{ kHz}$	$Z_I$		200				k $\Omega$
Open-loop voltage gain $R_L = 2 \text{ k}\Omega$	$G_{V0}$	85	87		80		dB
Output reverse current	$I_{QR}$			1		5	$\mu\text{A}$
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 $I_{IO}$ $R_G = 50 \text{ } \Omega$	$\alpha_{IIO}$		0.1	0.8		0.8	nA/K
Temperature coefficient of $V_{IO}$ $R_G = 50 \text{ } \Omega$	$\alpha_{VIO}$		6	25		25	$\mu\text{V/K}$
Slew rate for non-inverting operation	$SR$		0.65		0.2	0.65	V/ $\mu\text{s}$
Slew rate for inverting operation	$SR$		1.1		0.4	1.7	V/ $\mu\text{s}$

### 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.