

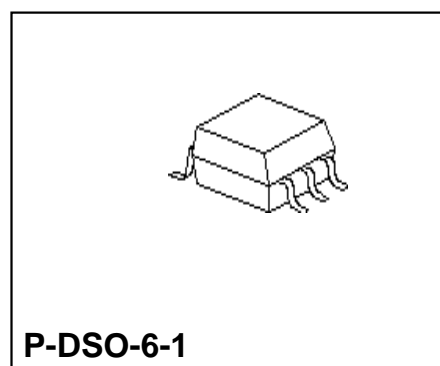
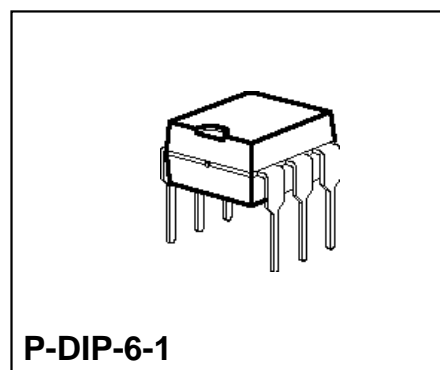
Bipolar IC

Features

- PNP input
- Supply voltage range between 3 V and 36 V
- Low current consumption, 0.25 mA typ.
- Extremely large control range
- Low output saturation voltage, almost independent of load current
- Output current up to 70 mA (100 mA max.)
- Wide common-mode range
- Wide operating temperature range (TAF 1453)
- Pin-compatible to TAA 765
- Open collector output

Applications

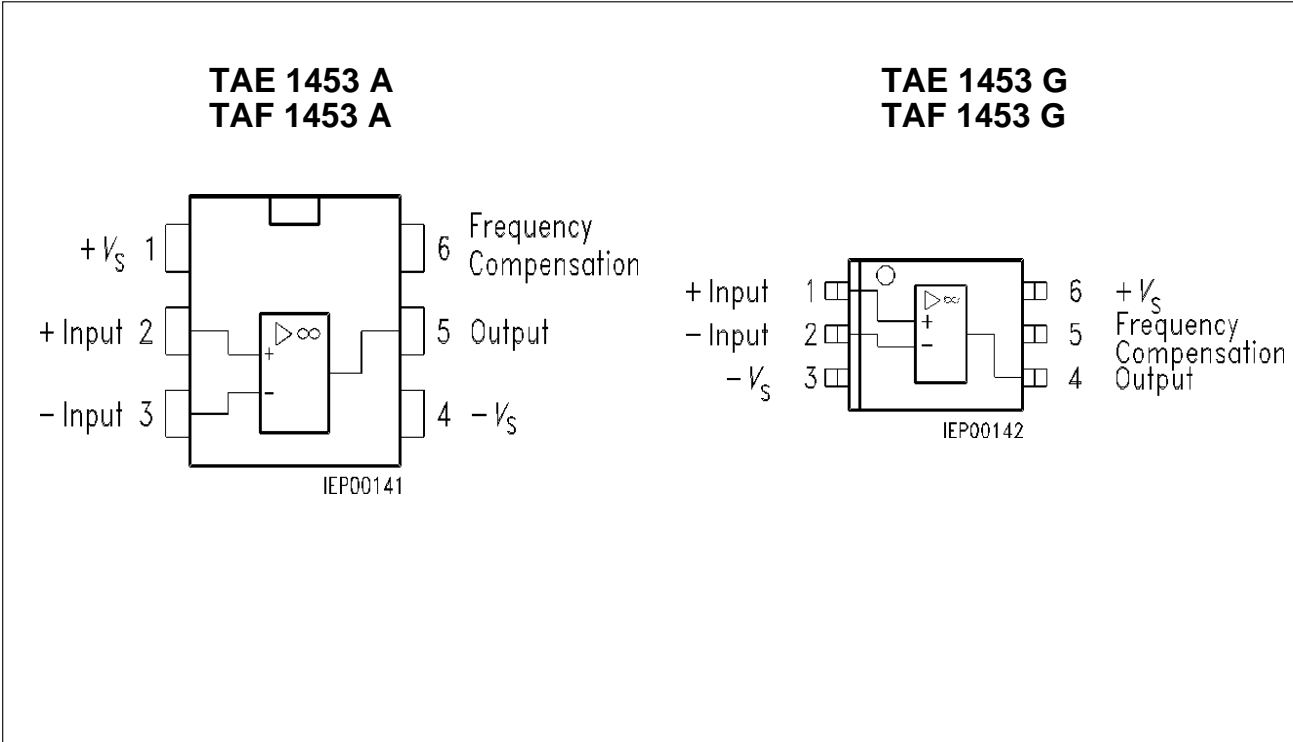
- Amplifier
- Level converter
- Driver
- Zero voltage switch
- Comparator

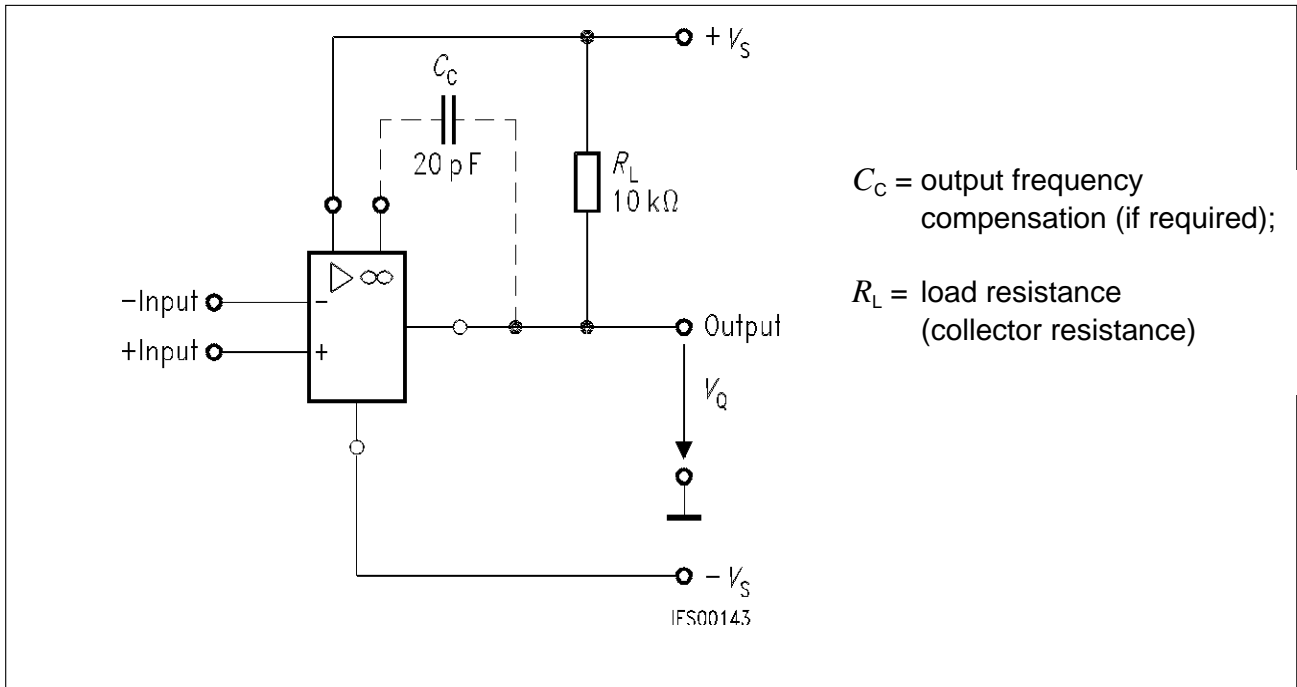


Type	Ordering Code	Package
TAE 1453 A	Q67000-A2017	P-DIP-6-1
TAE 1453 G	Q67000-A2106	P-DSO-6-1 (SMD)
TAF 1453 A	Q67000-A2269	P-DIP-6-1
TAF 1453 G	Q67000-A2209	P-DSO-6-1 (SMD)

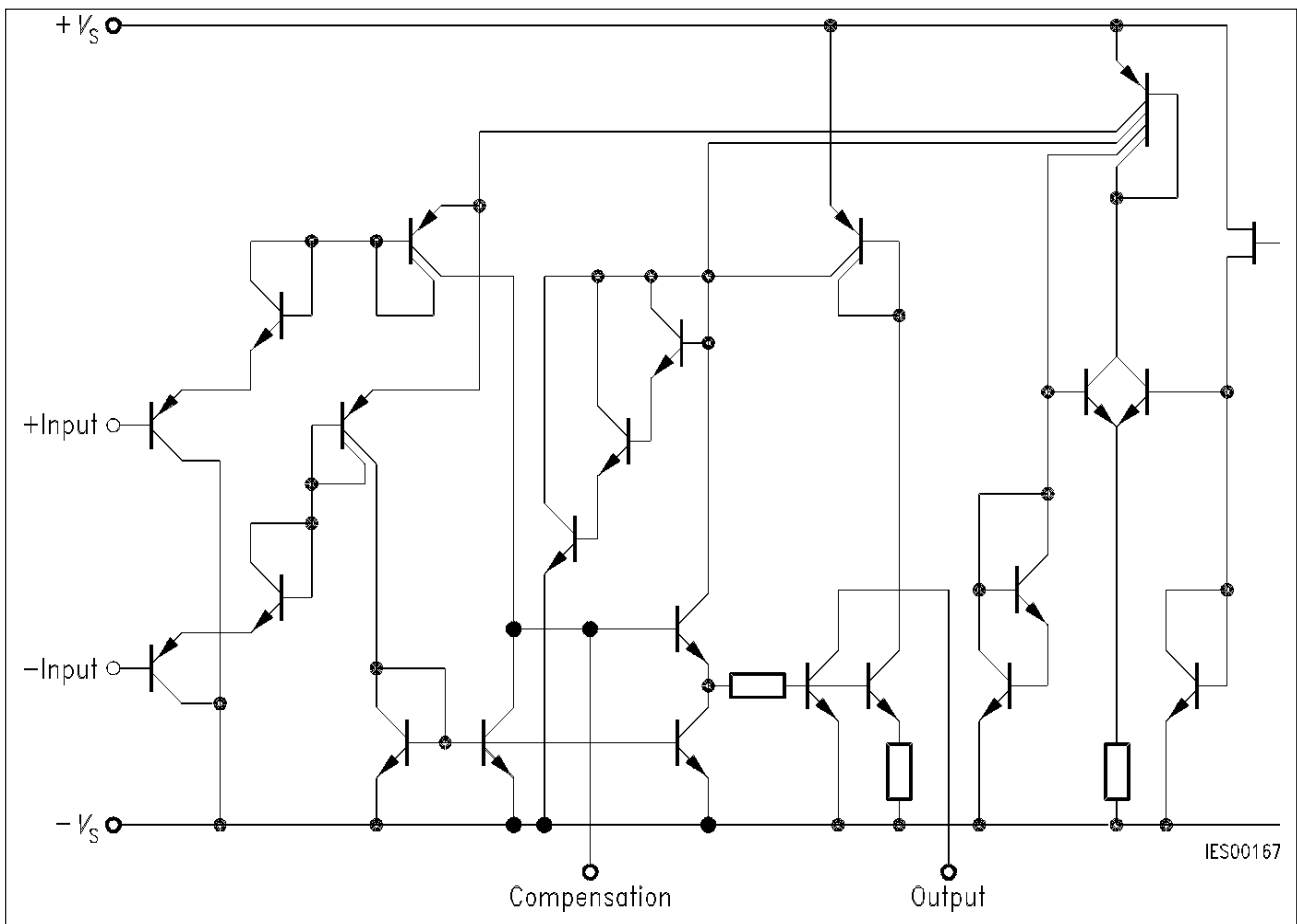
These operational amplifiers are circuits for universal applications having a PNP-input differential stage and an open collector output. Apart from one resistor, only active components are used. The integrated regulator provides for all parameters a large degree of independence from the supply voltage.

Pin Configurations
(top view)





Connection Diagram



Circuit Diagram

Absolute Maximum Ratings (TAE 1453)

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	°C
Storage temperature range	T_{stg}	- 55 to 150	°C
Thermal resistance system - air	$R_{th SA}$	135	K/W
TAE 1453 A	$R_{th SA}$	200	K/W
TAE 1453 G			

Operating Range (TAE 1453)

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

Characteristics (TAE 1453)

$V_S = \pm 5$ V to ± 15 V; $R_L = 10$ k Ω , 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 current consumption	I_S		0.25	0.4		0.45	mA
Input offset voltage, $R_G = 50$ Ω	V_{IO}	- 5.5		5.5	- 7	7	mV
Input offset current	I_{IO}	- 15		15	- 100	100	nA
Input current	I_I		40	150		200	nA

Characteristics (TAE 1453) (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.	
Control range							
$R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{pp}}$	14.9		-14.7	14.9	-14.7	V
$R_L = 620 \text{ }\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{pp}}$	14.9		-14.5	14.9	-14.4	V
$R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$, $f = 100 \text{ kHz}$	$V_{Q\text{pp}}$	10		-10			V
Input impedance, $f = 1 \text{ kHz}$	Z_i		200				$\text{k}\Omega$
Open-loop voltage gain	G_{V0}	78	85		78		dB
Output reverse current	I_{QR}			10		20	μA
Common-mode input voltage range	V_{IC}	$-V_S$ -0.2		V_S -1.8	$-V_S$	V_S -2.0	V
Common-mode rejection	k_{CMR}	75	80		75		dB
Supply voltage rejection $G_V = 100$	k_{SVR}		25	100		120	$\mu\text{V/V}$
Temperature coefficient of I_{IO} $R_G = 50 \text{ }\Omega$	α_{IIO}		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		20				V/ μs
Slew rate for inverting operation	SR		30				V/ μs

Characteristics (TAE 1453)

$V_S = \pm 2.5 \text{ V}$, $R_L = 10 \text{ k}\Omega$

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}	-75		75	-100	100	nA
Input current	I_I		40	150		200	nA
Open-loop voltage gain	G_{V0}	70			70		dB

Absolute Maximum Ratings (TAF 1453)

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	$R_{th SA}$	135	K/W
TAF 1453 A	$R_{th SA}$	200	K/W
TAF 1453 G			

Operating Range (TAF 1453)

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

Characteristics (TAF 1453)

$V_S = \pm 5 \text{ V}$ 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 current consumption (Output in H state)	I_S		0.25	0.35		0.45	mA
Input offset voltage, $R_G = 50 \text{ }\Omega$	V_{IO}	-4		4	-6	6	mV
Input offset voltage	I_{IO}	-10		10	-75	75	nA
Input current	I_I		40	100		150	nA
Control range $R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{ pp}}$	14.9		-14.7	14.9	-14.7	V
$R_L = 620 \text{ }\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{ pp}}$	14.9		-14.5	14.9	-14.4	V
$R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$, $f = 100 \text{ kHz}$	$V_{Q\text{ pp}}$	10		-10			V
Input impedance, $f = 1 \text{ kHz}$	Z_I		200				k Ω
Open-loop voltage gain	G_{V0}	80	85		75		dB
Output reverse current	I_{QR}			1		5	μA
Common-mode input voltage range	V_{IC}	$-V_S$ -0.3		V_S -1.5	$-V_S$	V_S -1.8	V
Common-mode rejection	k_{CMR}	80	85		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_{IIO}		0.1	0.8			nA/K
Temperature coefficient of V_{IO} $R_G = 50 \text{ }\Omega$	α_{VIO}		6	25			$\mu\text{V/K}$
Slew rate for non-inverting operation	SR		20				V/ μs
Slew rate for inverting operation	SR		30				V/ μs

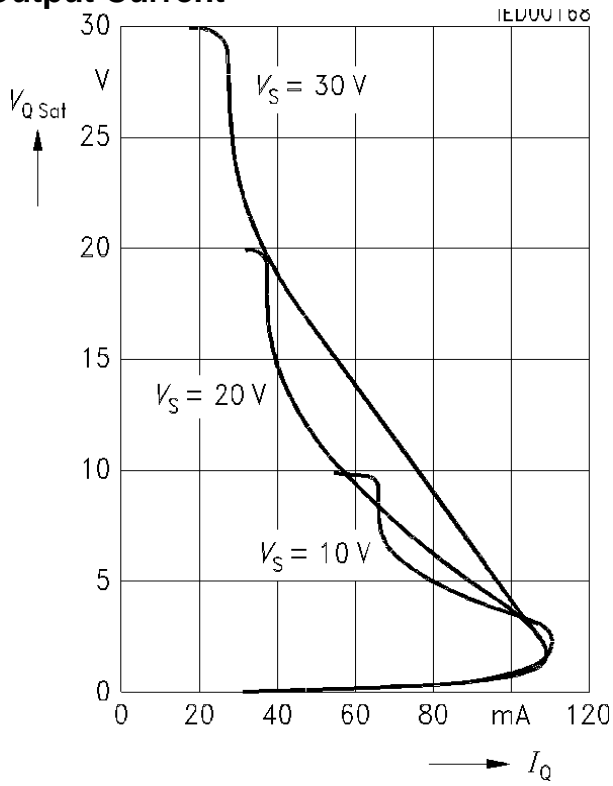
Characteristics (TAF 1453)

$V_S = \pm 2.5 \text{ V}$, $R_L = 10 \text{ k}\Omega$

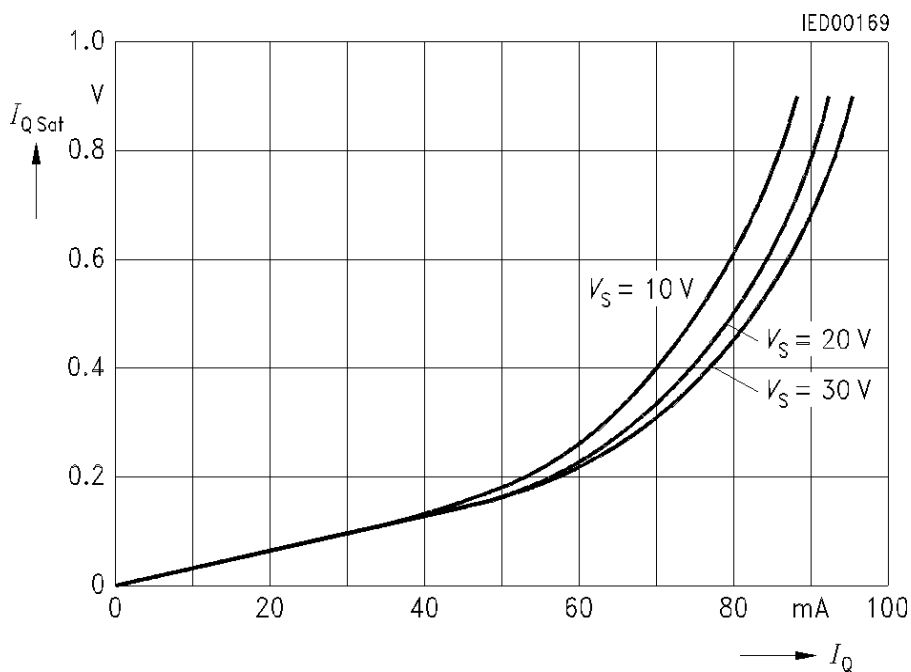
Parameter	Symbol	Limit Values $T_A = 25 \text{ }^\circ\text{C}$			Limit Values $T_A = -55$ to $125 \text{ }^\circ\text{C}$		Unit
		min.	typ.	max.	min.	max.	
Input offset voltage, $R_G = 50 \text{ }\Omega$	V_{IO}	-4		4	-6	6	mV
Input offset voltage	I_{IO}	-50		50	-75	75	nA
Input current	I_I		40	100		150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

Typical Characteristics of Electrical Parameters

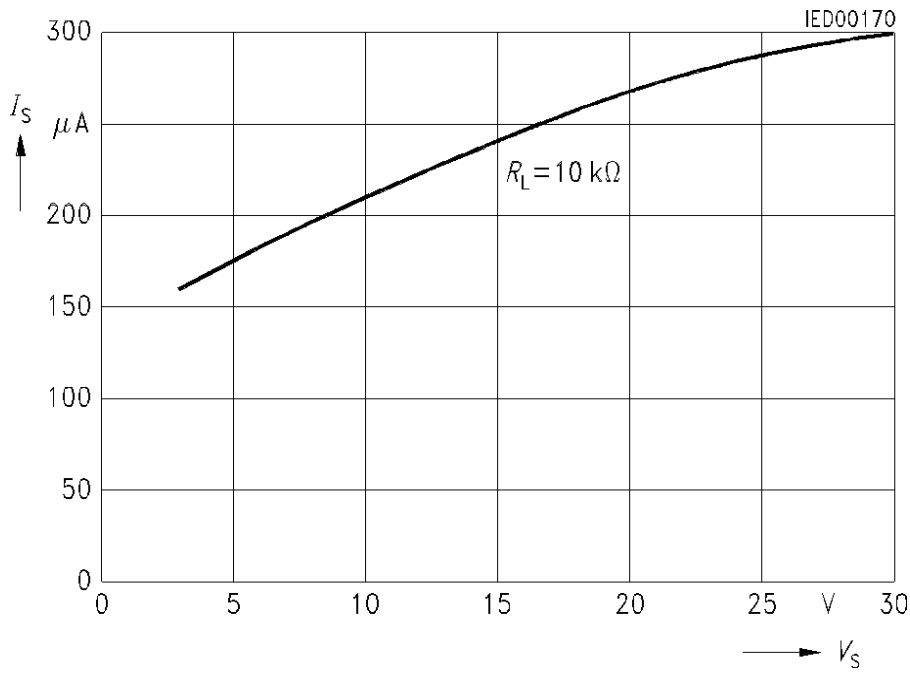
Load Characteristics Output Saturation Voltage versus Output Current



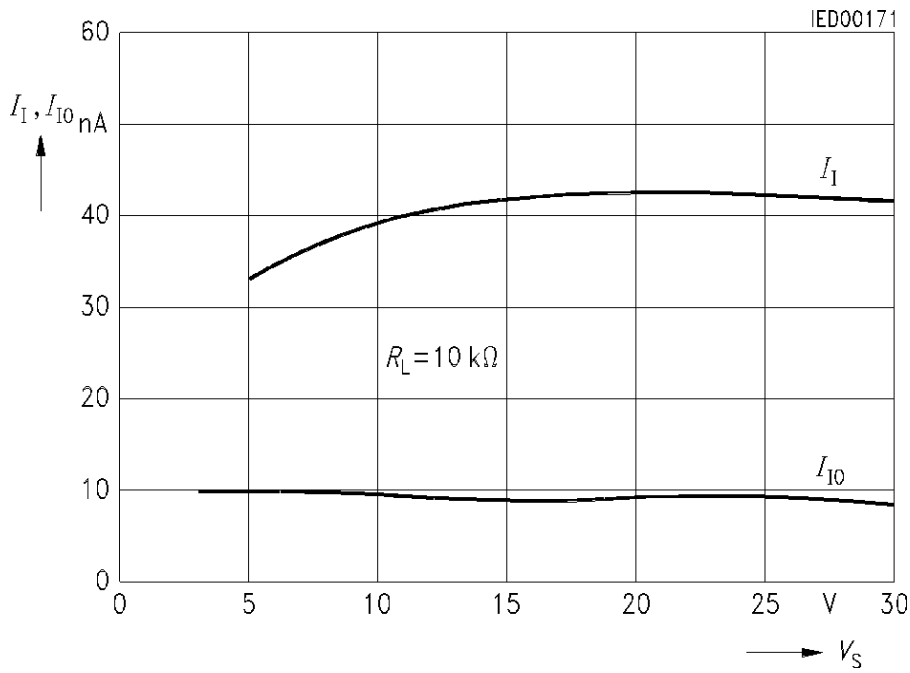
Output Saturation Voltage versus Output Current



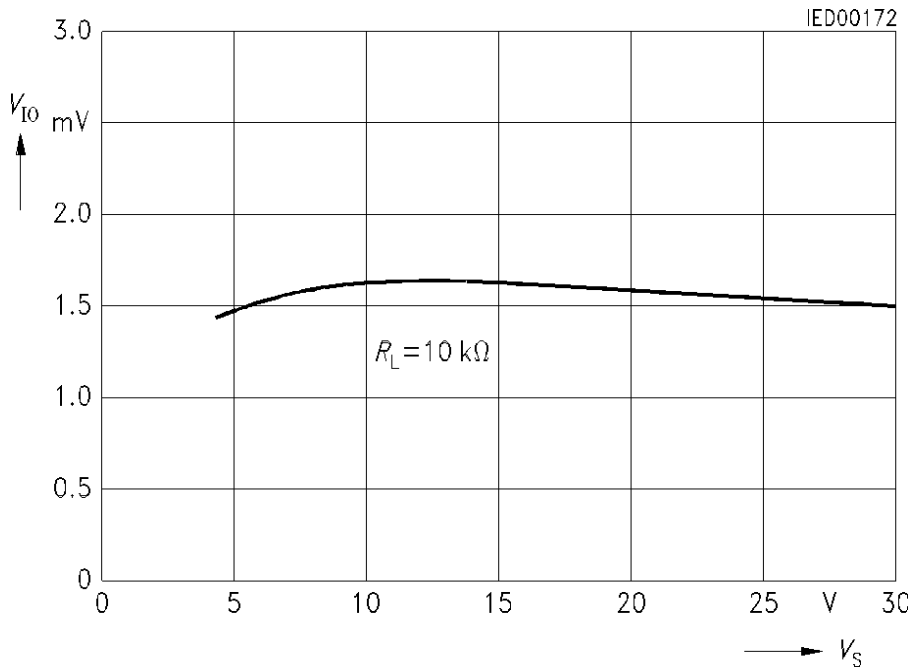
Supply Current versus Supply Voltage



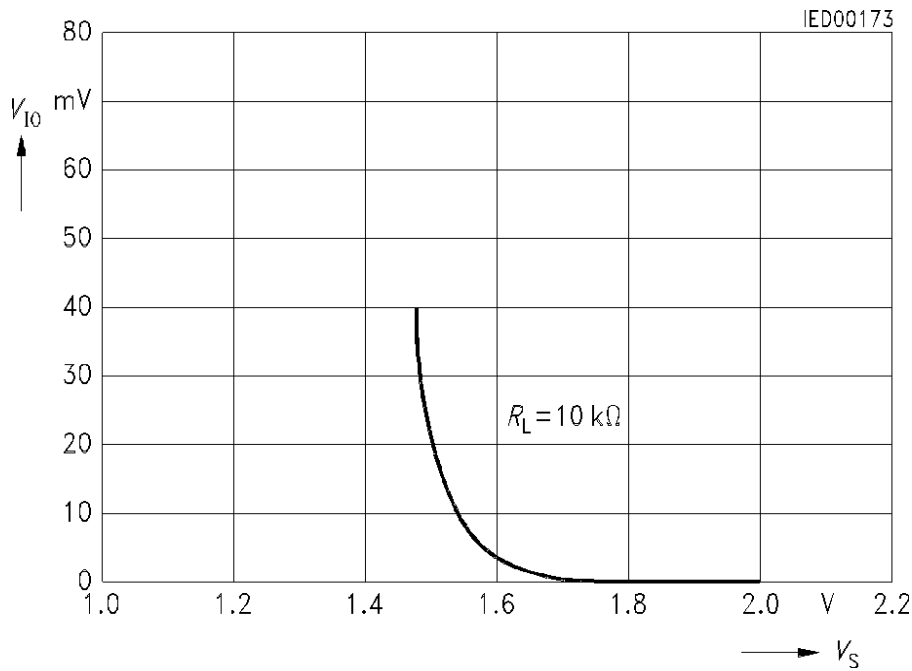
Input Current and Input Offset Current versus Supply Voltage



Input Offset Voltage versus Supply Voltage



**V_{10} Behavior at Low Operating Voltages
Input Offset Voltage versus Supply Voltage**



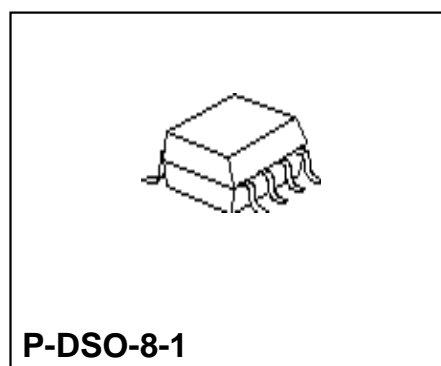
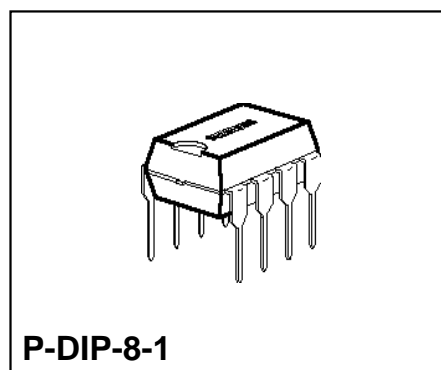
Bipolar IC

Features

- Supply voltage range between 3 V and 36 V
- Low current consumption, 0.8 mA typ.
- Extremely large control range
- Low output saturation voltage, almost independent of load current
- Output current up to 70 mA (max. 100 mA)
- Output virtually short-circuit proof
- Wide common-mode voltage range
- Wide operating temperature range (TAF 2453 A; G)
- Pin-compatible to TBB 1458 B
- The characteristic curves of the electric parameters correspond to those of type TAE 1453 A; G

Applications

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



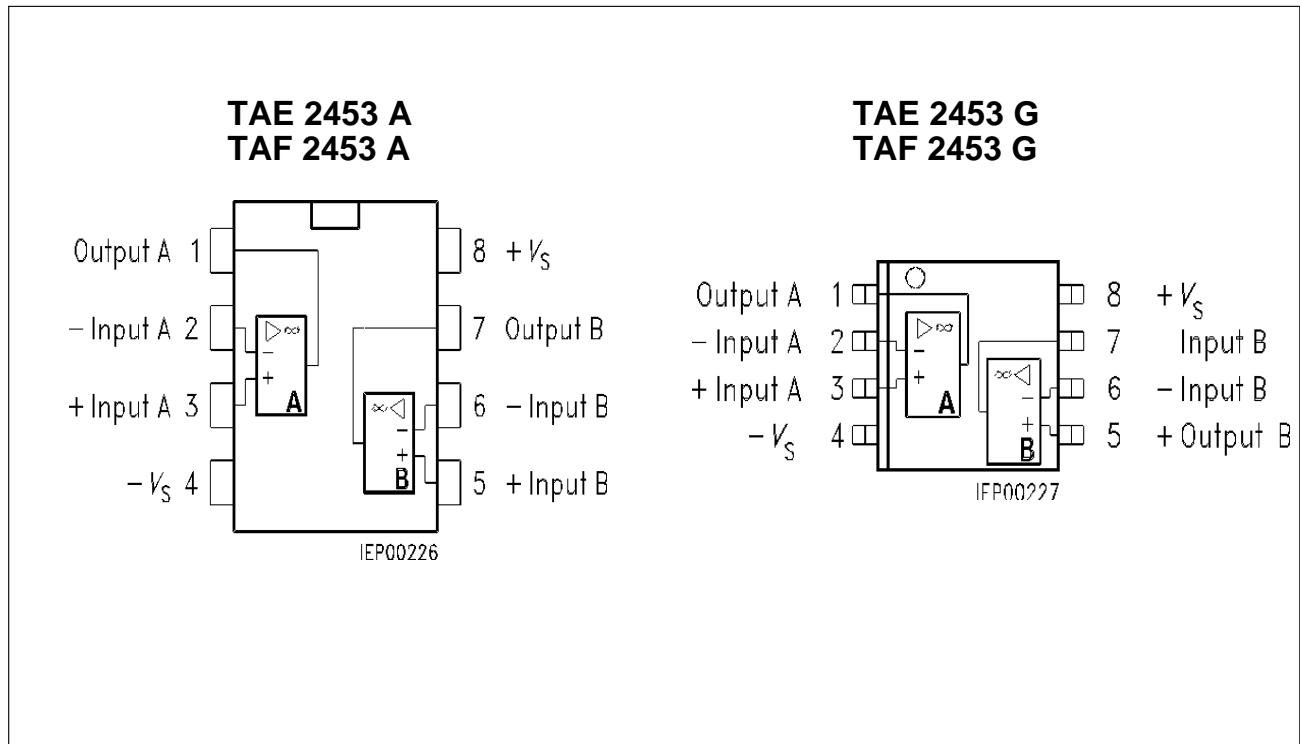
Type	Ordering Code	Package
■ TAE 2453 A	Q67000-A2107	P-DIP-8-1
TAE 2453 G	Q67000-A2108	P-DSO-8-1 (SMD)
■ TAF 2453 A	Q67000-A2210	P-DIP-8-1
TAF 2453 G	Q67000-A2211	P-DSO-8-1 (SMD)

■ Not for new design

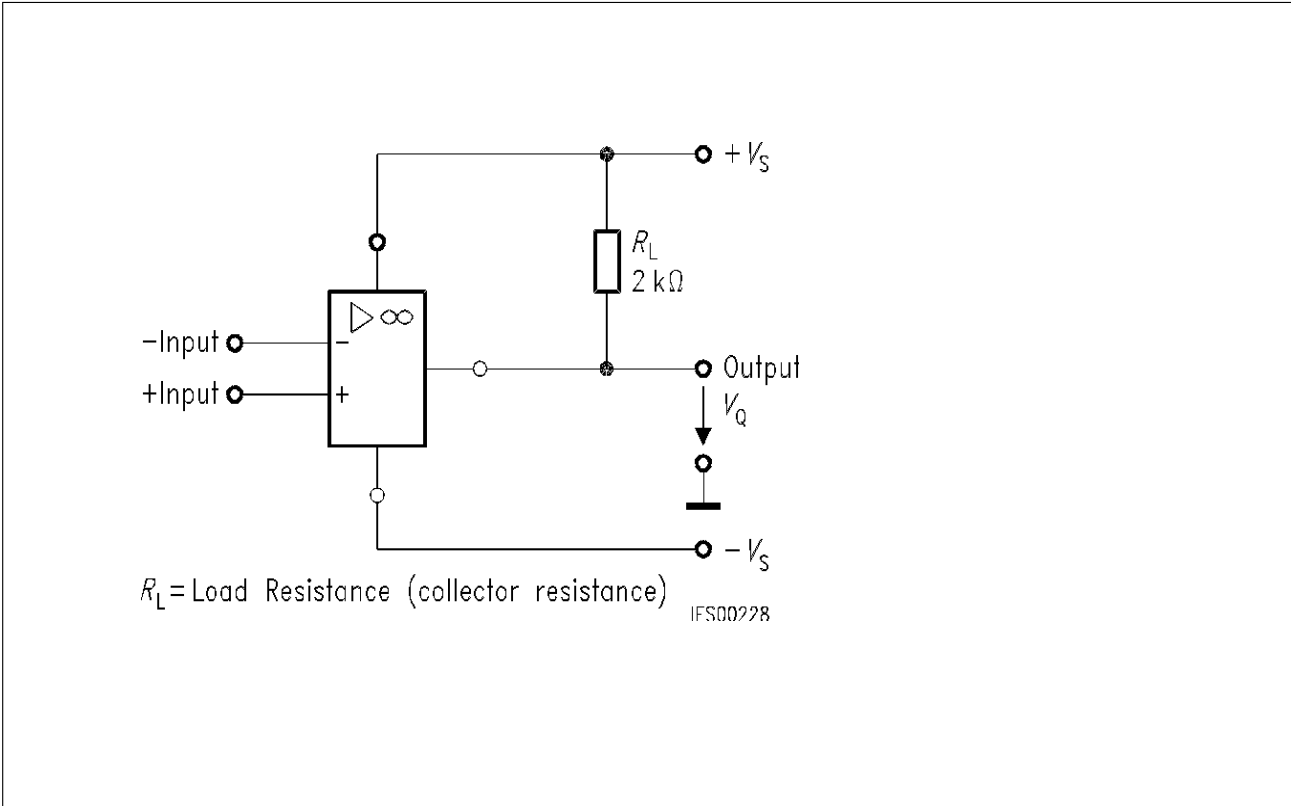
The TAF 2453 / TAE 2453 consists of two independent, frequency-compensated op amps, each having a PNP-input differential stage and an open collector output. The

integrated regulator provides for all parameters a large degree of independence from the supply voltage.

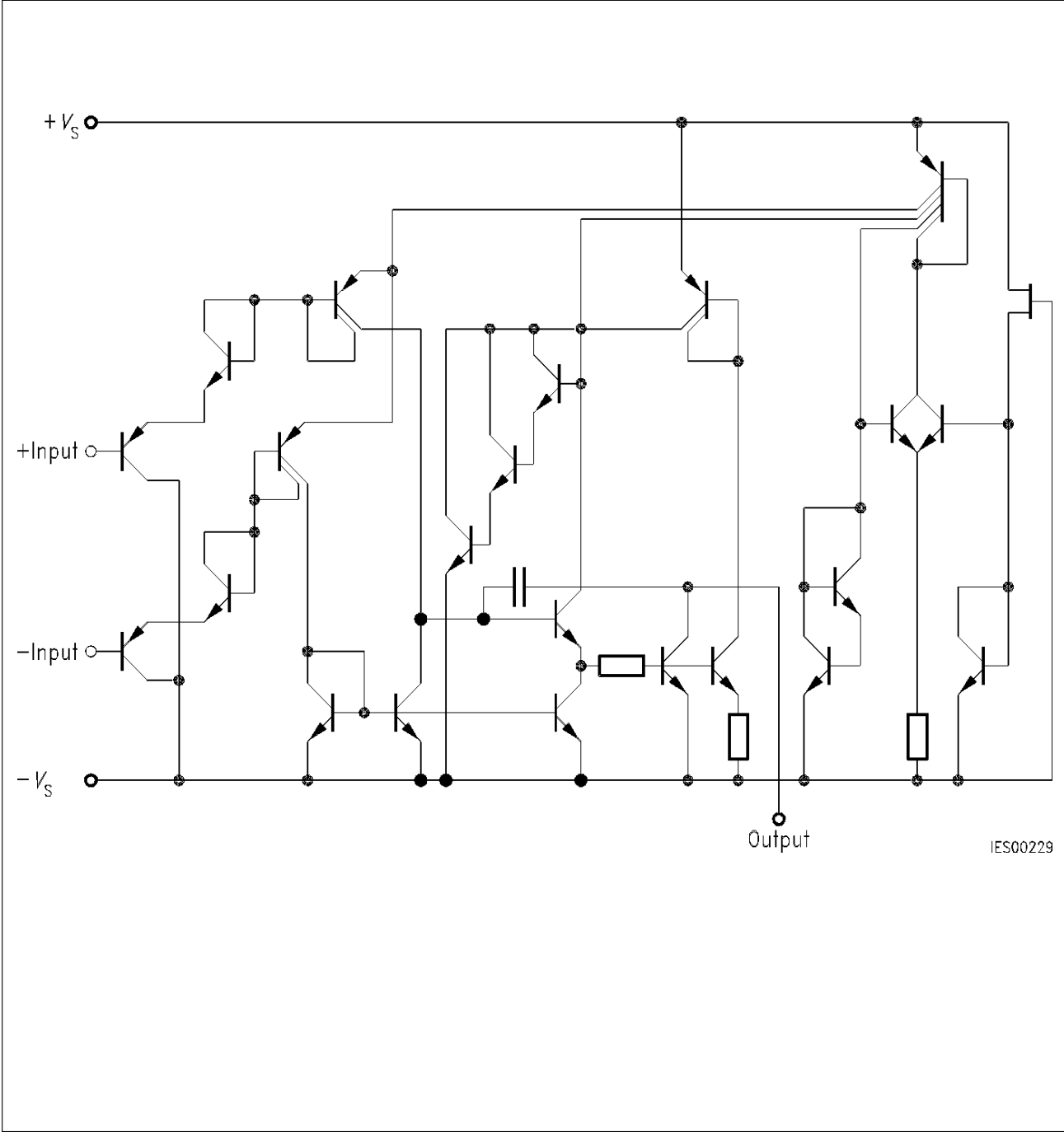
Pin Configurations (top view)



R_L = load resistance
(collector resistance)



Connection Diagram



Circuit Diagram

Absolute Maximum Ratings (TAE 2453)

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	°C
Storage temperature range	T_{stg}	- 55 to 125	°C
Thermal resistance system - air			
TAE 2453 A	$R_{th SA}$	100	K/W
TAE 2453 G	$R_{th SA}$	170	K/W

Operating Range (TAE 2453)

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

Characteristics (TAE 2453)

$V_S = \pm 5$ V to ± 15 V; $R_L = 10$ k Ω ,
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		0.8	1.5		1.8	mA
Input offset voltage $R_G = 50$ Ω	V_{IO}	- 5.5		5.5	- 7	7	mV
Input offset current	I_{IO}	- 15		15	- 100	100	nA
Input current	I_I		40	150		200	nA

Characteristics (TAE 2453) (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.	
Control range $R_L = 2\text{ k}\Omega$, $V_S = \pm 15\text{ V}$	$V_{Q\text{ pp}}$	14.9		- 14.7	14.9	- 14.7	V
$R_L = 620\text{ }\Omega$, $V_S = \pm 15\text{ V}$	$V_{Q\text{ pp}}$	14.9		- 14.5	14.9	- 14.4	V
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_{IIO}		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		1				V/ μs
Slew rate for inverting operation	SR		1				V/ μs

Characteristics (TAE 2453)

$V_S = \pm 2 \text{ V}$, $R_L = 10 \text{ k}\Omega$

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}	-75		75	-100	100	nA
Input current	I_I		40	150		200	nA
Open-loop voltage gain	G_{V0}	70			70		dB

Absolute Maximum Ratings (TAF 2453)

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 150	$^\circ\text{C}$
Thermal resistance system - air			
TAF 2453 A	$R_{th SA}$	100	K/W
TAF 2453 G	$R_{th SA}$	170	K/W

Operating Range (TAF 2453)

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

Characteristics (TAF 2453)

$V_S = \pm 5 \text{ V}$ to $\pm 15 \text{ V}$; $R_L = 2 \text{ k}\Omega$,
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		0.8	1.5		1.8	mA
Input offset voltage, $R_G = 50 \text{ }\Omega$	V_{IO}	-4		4	-6	6	mV
Input offset current	I_{IO}	-10		10	-75	75	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 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	V_{IC}	$-V_S$ -0.3		V_S -1.5	$-V_S$	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 2453) (cont'd)

$V_S = \pm 5 \text{ V to } \pm 15 \text{ V}$; $R_L = 2 \text{ k}\Omega$,
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		1				V/ μs
Slew rate for inverting operation	SR		1				V/ μs

Characteristics (TAF 2453)

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

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.

SIEMENS

Quad PNP-Operational Amplifier

TAE 4453
TAF 4453

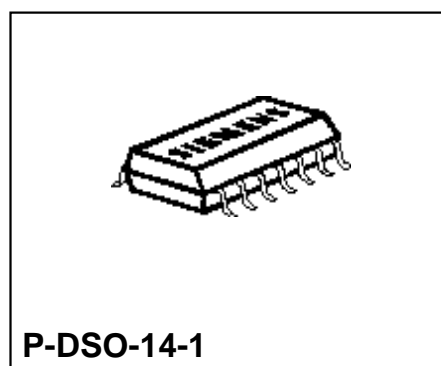
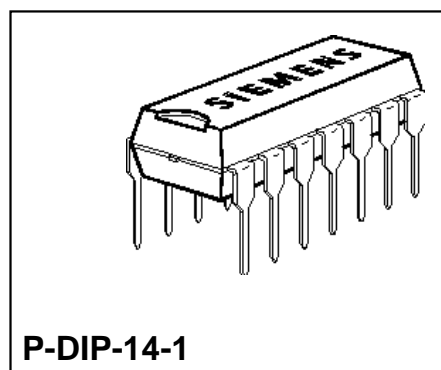
Bipolar IC

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 A; G)
- Pin-compatible to LM 324
- The typical characteristics of the electric parameters correspond to those of the TAE 1453 A; G

Applications

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



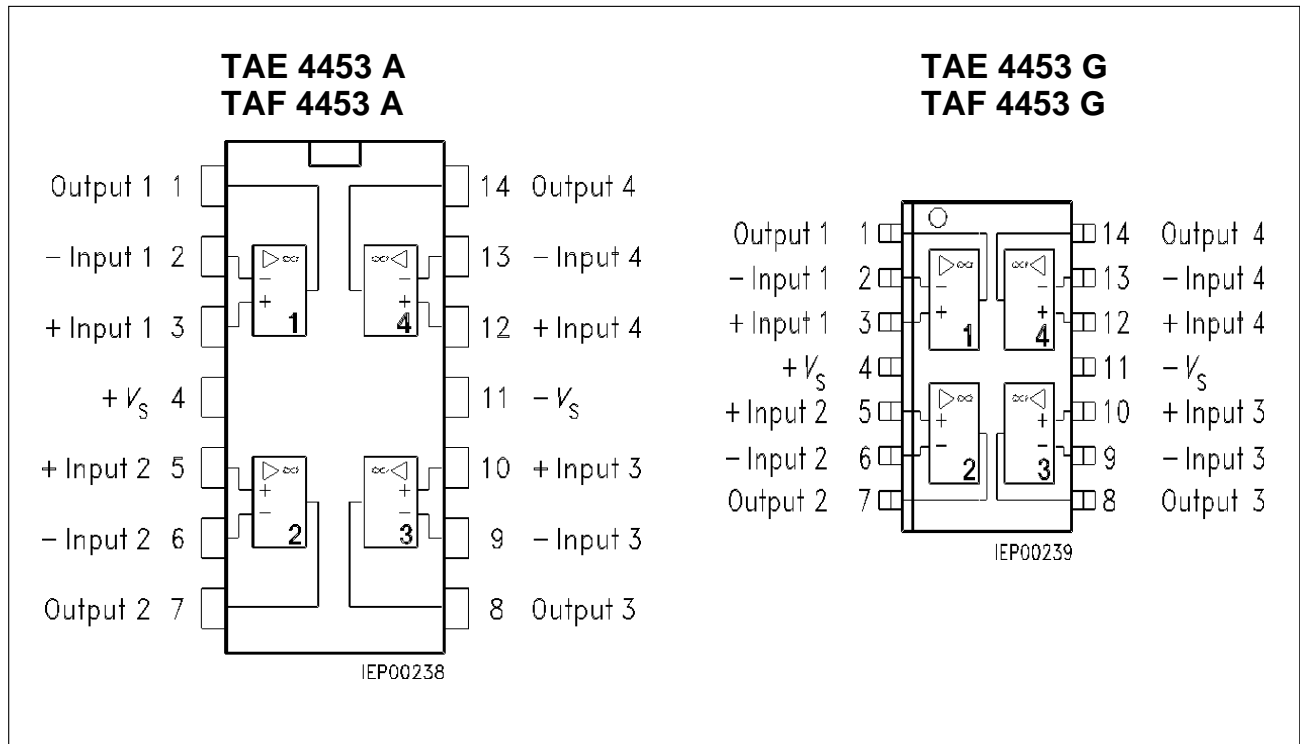
Type	Ordering Code	Package
■ TAE 4453 A	Q67000-A2109	P-DIP-14-1
TAE 4453 G	Q67000-A2152	P-DSO-14-1 (SMD)
■ TAF 4453 A	Q67000-A2212	P-DIP-14-1
TAF 4453 G	Q67000-A2213	P-DSO-14-1 (SMD)

■ Not for new design

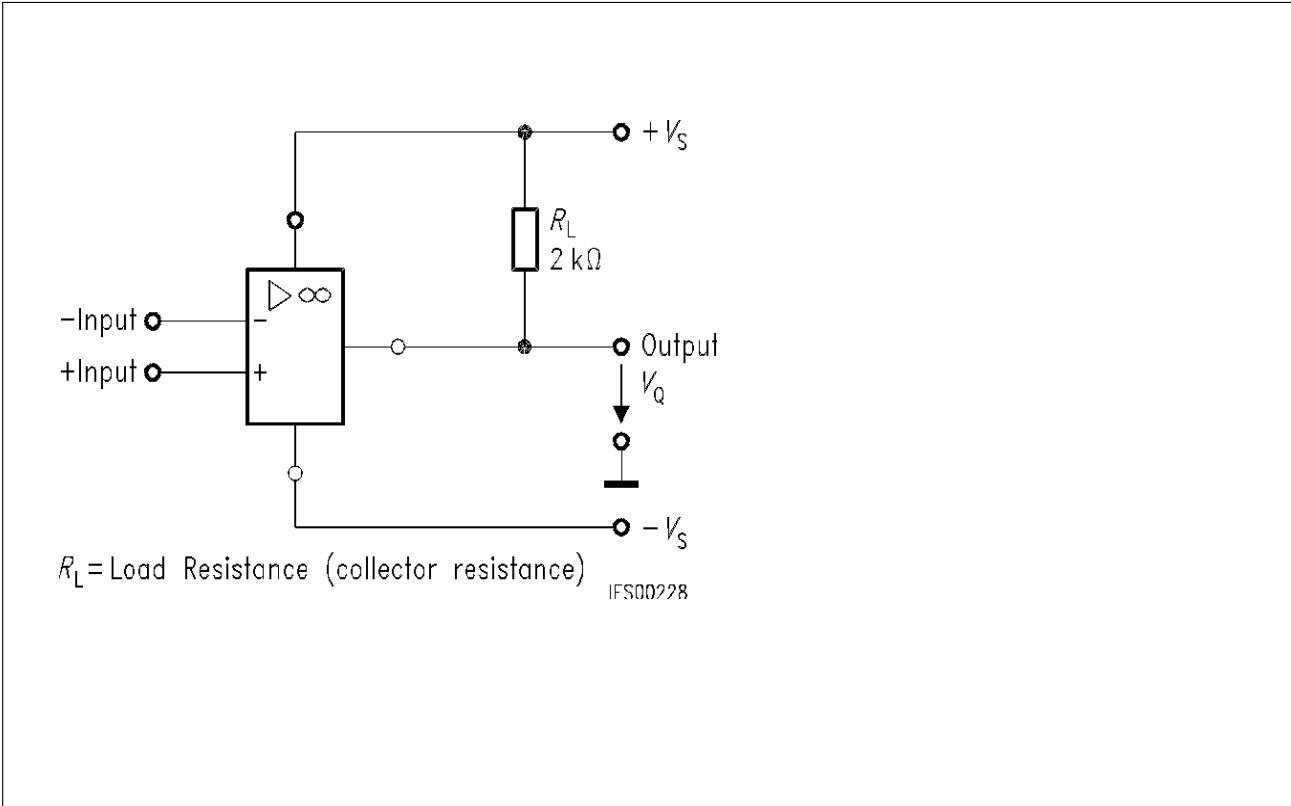
The TAE 4453 / TAF 4453 consists of four independent, frequency-compensated op amps, each having a PNP-input differential stage and an open collector output. The

integrated regulator provides for all parameters a large degree of independence of the supply voltage.

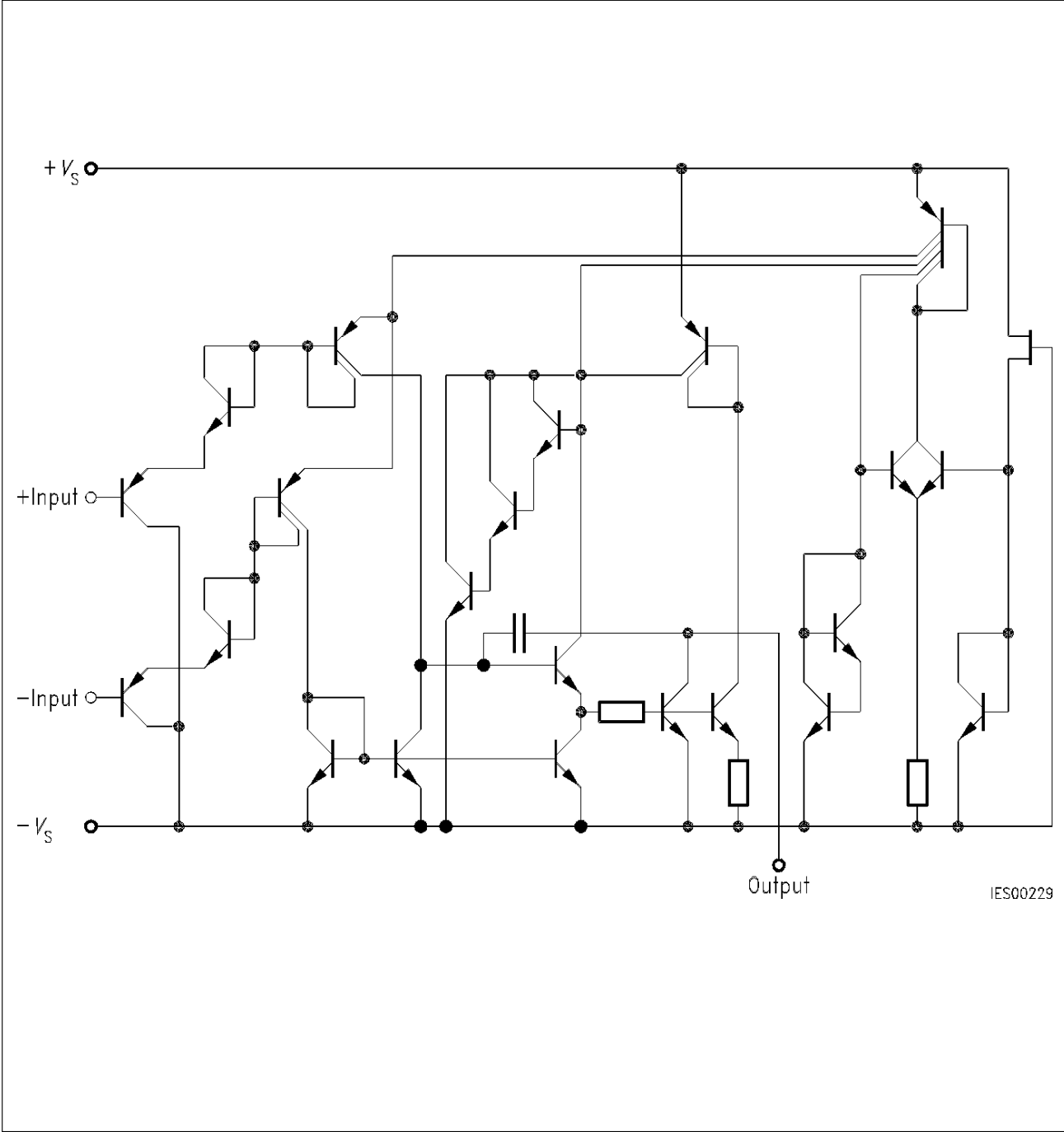
Pin Configurations
(top view)



R_L = load resistance (collector resistance)



Connection Diagram



Circuit Diagram of One Op Amp

Absolute Maximum Ratings (TAE 4453)

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	°C
Storage temperature range	T_{stg}	- 55 to 125	°C
Thermal resistance system - air	$R_{th SA}$	80	K/W
TAE 4453 A	$R_{th SA}$	120	K/W
TAE 4453 G			

Operating Range (TAE 4453)

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

Characteristics (TAE 4453)

$V_S = \pm 5$ V to ± 15 V; $R_L = 10$ k Ω , 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, $R_G = 50$ Ω	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	$V_{Q pp}$	14.9		- 14.7	14.9	- 14.7	V
$R_L = 620$ Ω , $V_S = \pm 15$ V	$V_{Q pp}$	14.9		- 14.5	14.9	- 14.4	V

Characteristics (TAE 4453) (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_{IIO}		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		1				$\text{V}/\mu\text{s}$
Slew rate for inverting operation	SR		1				$\text{V}/\mu\text{s}$

Characteristics (TAE 4453)

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

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}	-75		75	-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)

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	$R_{th SA}$	80	K/W
TAF 4453 A	$R_{th SA}$	120	K/W
TAF 4453 G			

Operating Range (TAF 4453)

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)

$V_S = \pm 5 \text{ V}$ 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 $R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{pp}}$	14.9		- 14.7	14.8	- 14.7	V
$R_L = 620 \text{ }\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{pp}}$	14.9		- 14.5	14.8	- 14.4	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 - 0.3		+ V_S - 1.5	- V_S	+ 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) (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		1				V/ μs
Slew rate for inverting operation	SR		1				V/ μs

Characteristics (TAF 4453) $V_S = \pm 2 \text{ V}$

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.