

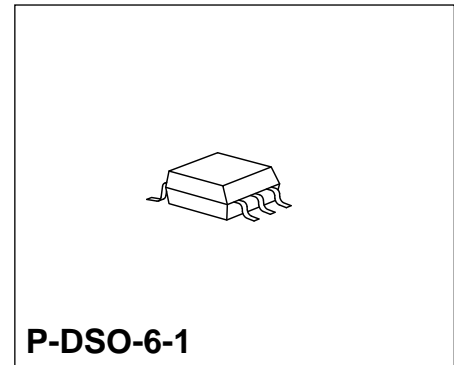
Single PNP-Operational Amplifiers

TAE 1453
TAF 1453

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)
- Open collector output



Applications

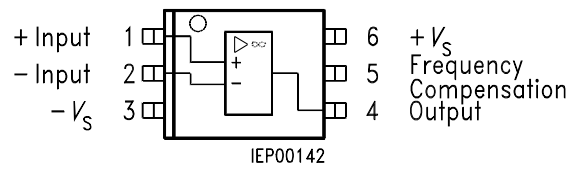
- Amplifier
- Level converter
- Driver
- Zero voltage switch
- Comparator

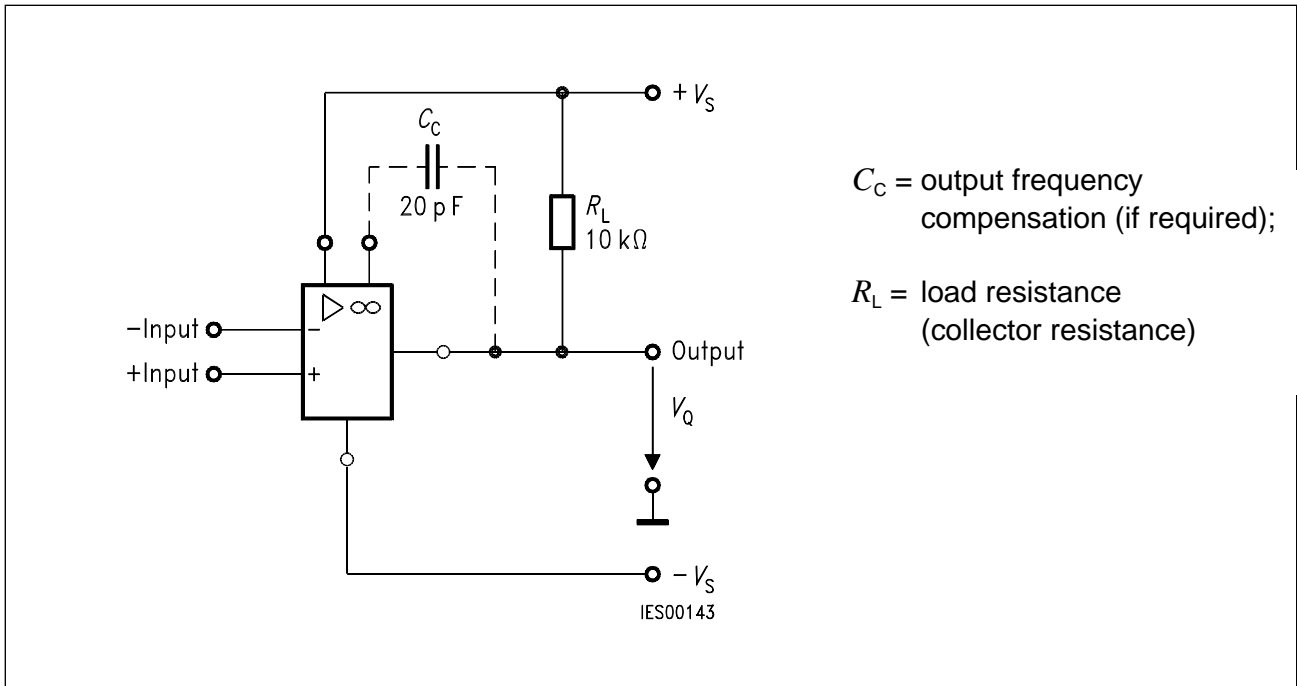
Type	Ordering Code	Package
TAE 1453 G	Q67000-A2106	P-DSO-6-1 (SMD)
TAF 1453 G	Q67000-A2209	P-DSO-6-1 (SMD)

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.

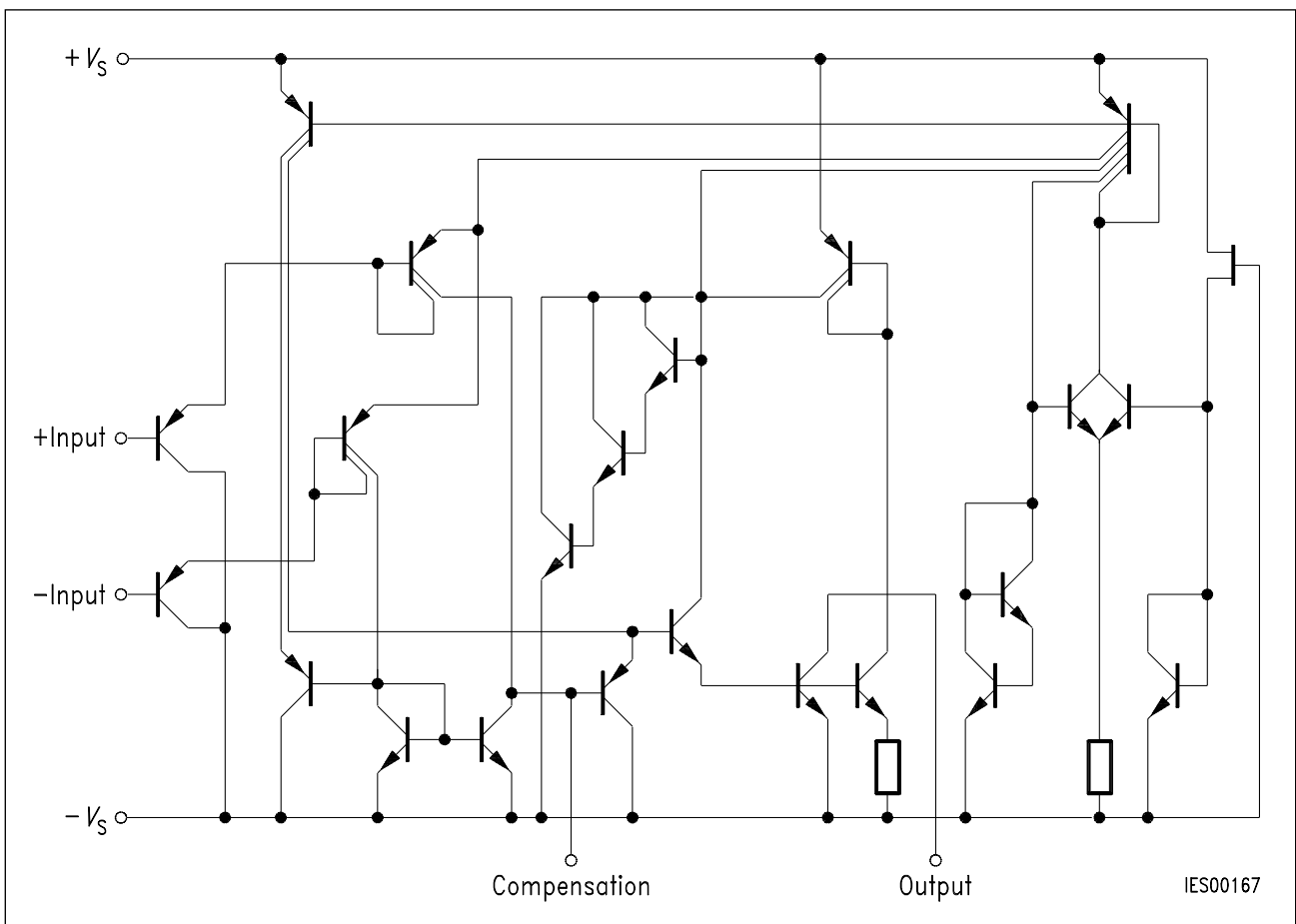
Pin Configurations (top view)

TAE 1453 G
TAF 1453 G





Connection Diagram



Circuit Diagram

Absolute Maximum Ratings (TAE 1453 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 150	$^{\circ}\text{C}$
Thermal resistance system - air TAE 1453 G	$R_{th SA}$	200	K/W

Operating Range (TAE 1453 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 1453 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 $^{\circ}\text{C}$		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 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.	
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		6		3	11	$\text{V}/\mu\text{s}^1)$
Slew rate for inverting operation	SR		6		3	10	$\text{V}/\mu\text{s}^1)$

1) $C_k = 15\text{ pF}$

Characteristics (TAE 1453 G)

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

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}	-15		15	-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 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 TAF 1453 G	$R_{th SA}$	200	K/W

Operating Range (TAF 1453 G)

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 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 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 current	I_{IO}	-10		10	-75	75	nA
Input current	I_I		40	100		150	nA
Control range							
$R_L = 2 \text{ k}\Omega$, $V_S = \pm 15 \text{ V}$	$V_{Q\text{pp}}$	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}	$-V_S$ -0.2		V_S -1.5	$-V_S$ +0.2	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			$\mu\text{V/K}$

Characteristics (TAF 1453 G)

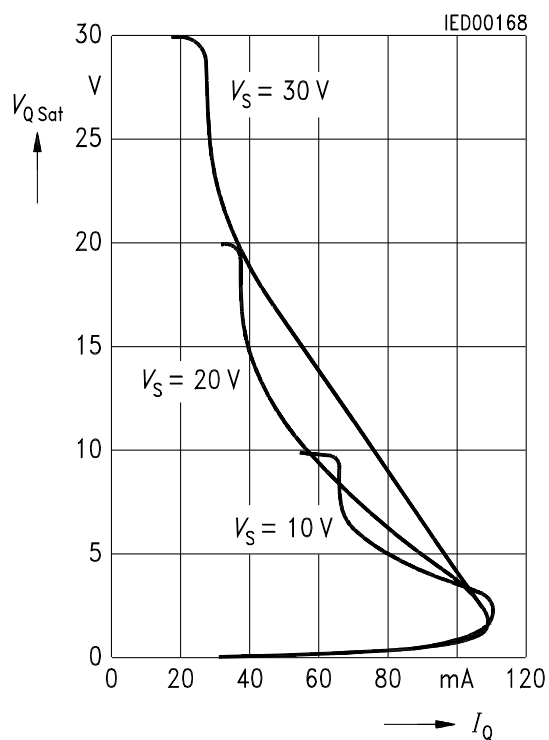
$V_S = \pm 2.5 \text{ V}$, $R_L = 10 \text{ k}\Omega$

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.	
Slew rate for non-inverting operation	SR		6		2	12	$\text{V}/\mu\text{s}^{1)}$
Slew rate for inverting operation	SR		6		2	11	$\text{V}/\mu\text{s}^{1)}$
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	G_{V0}	75			70		dB

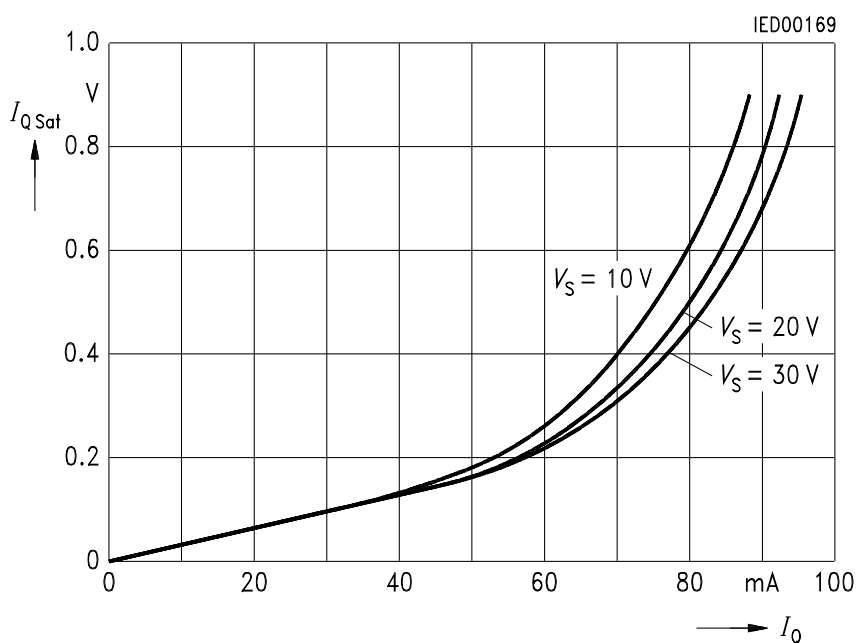
¹⁾ $C_k = 15 \text{ pF}$

Typical Characteristics of Electrical Parameters

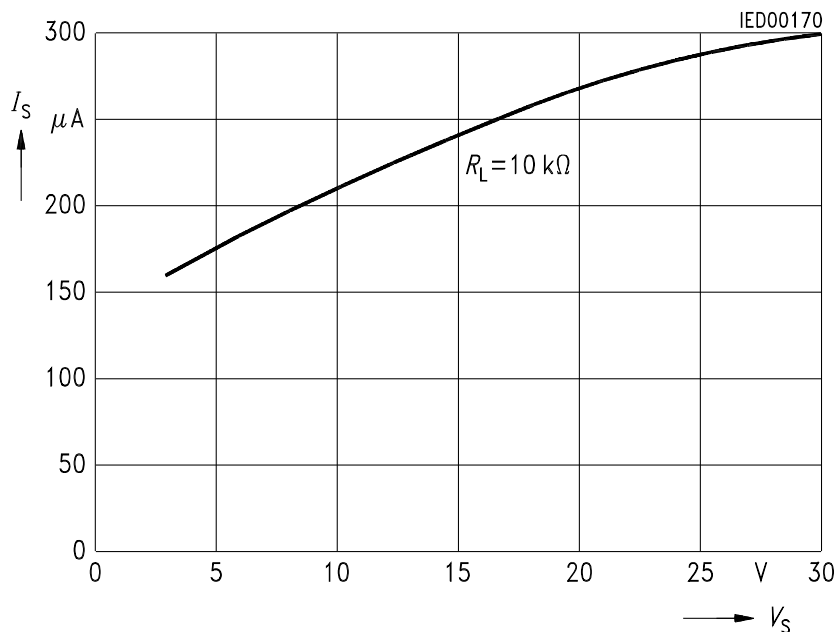
Load Characteristics Output Saturation Voltage versus Output Current



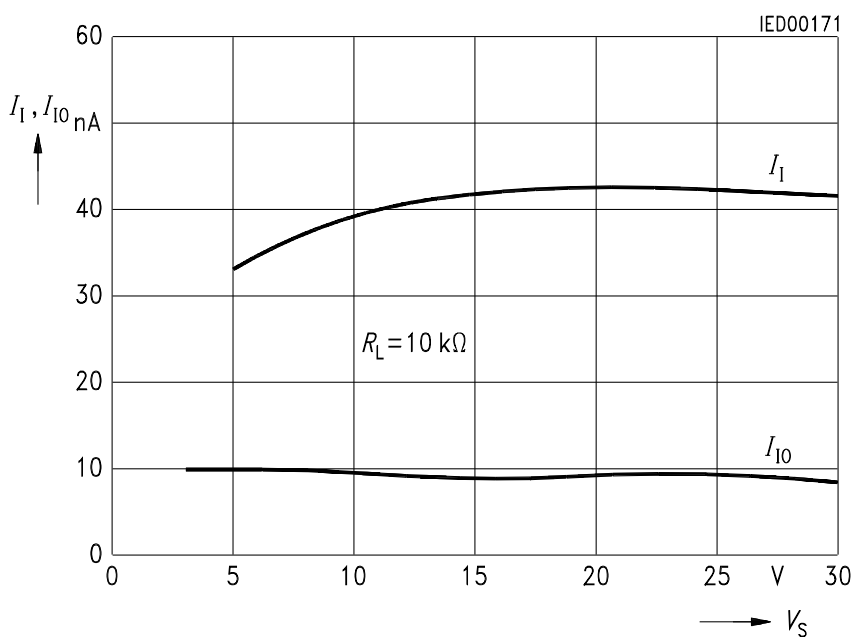
Output Saturation Voltage versus Output Current



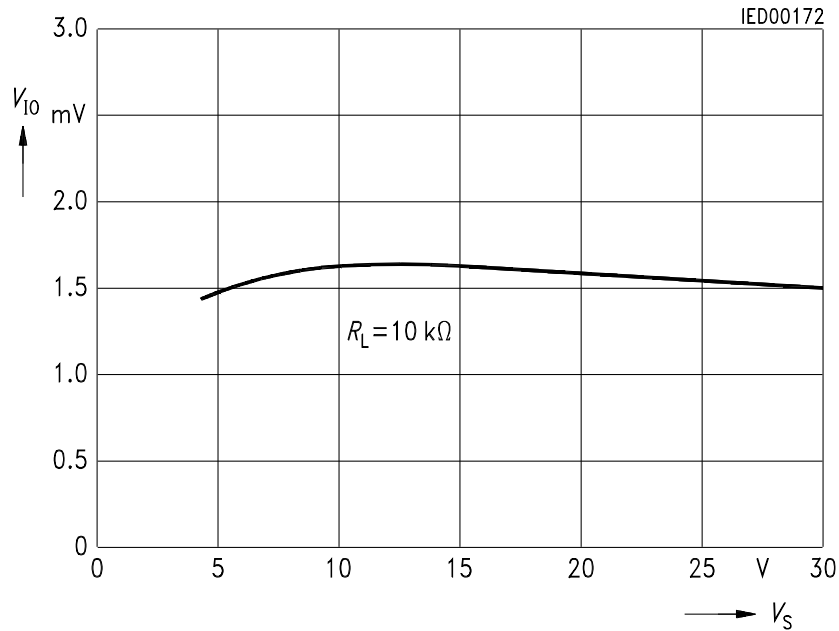
Supply Current versus Supply Voltage



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

