OPERATIONAL AMPLIFIER TCA520B,D

GENERAL DESCRIPTION

The TCA520 is a bipolar integrated operational amplifier primarily intended for low-power, low-voltage applications and as a comparator in digital systems.

Features

- wide supply voltage range
- low supply voltage operation
- low power consumption
- low input bias current
- offset compensation facility
- frequency compensation facility
- high slew rate
- large output voltage swing
- TTL compatible output

QUICK REFERENCE DATA

Supply voltage range	V_{CC}		2 to 20	V
Supply current	I_{CC}	typ.	0.8	mA
Input bias current	I_{IB}	typ.	60	nA
Output voltage range	V_Q		0.1 to V_{CC}–0.1	V
D.C. differential voltage amplification	A_{VD}	typ.	15 000	
Slew rate	S_{VOAV}	typ.	25	V/µs
Operating ambient temperature range	T_{amb}		–25 to + 85	°C

PACKAGE OUTLINES

TCA520B : 8-lead DIL; plastic (SOT-97A).
TCA520D: 8-lead mini-pack; plastic (SO-8; SOT-96A).

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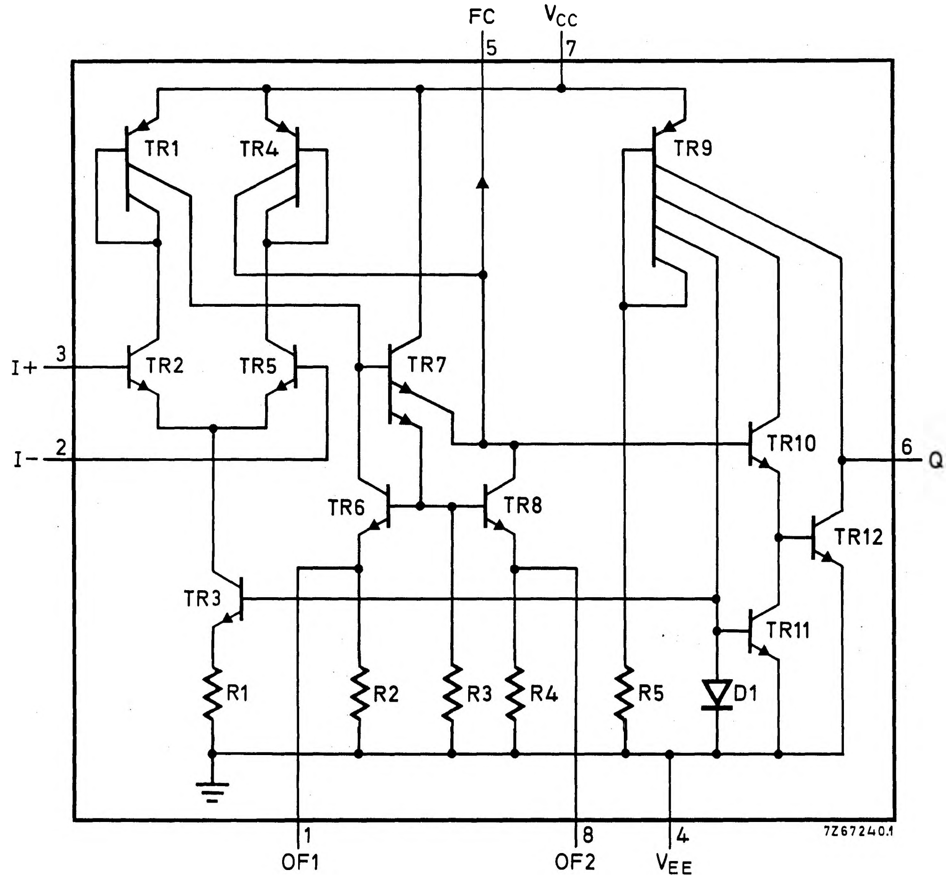

Fig. 1 Circuit diagram.

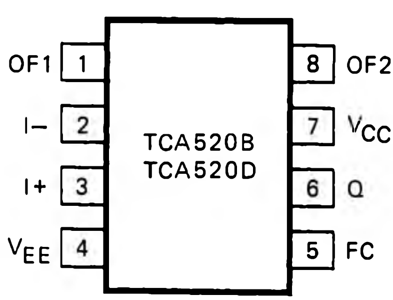

Fig. 2 Pinning diagram.

PINNING

1	OF1	offset compensation connection
2	I−	inverting input
3	I+	non-inverting input
4	V_{EE}	ground connection
5	FC	frequency compensation connection
6	Q	output
7	V_{CC}	positive supply connection
8	OF2	offset compensation connection

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage, d.c.	V_{CC}	max.	22 V
Input voltage	V_I	max.	V_{CC} V
	$-V_I$	max.	0 V
Differential input voltage	$\pm V_{ID}$	max.	7 V
Power dissipation at T_{amb} = 85 °C	P_{tot}	max.	200 mW
Storage temperature range	T_{stg}		−55 to + 125 °C
Operating ambient temperature range	T_{amb}		−25 to + 85 °C

CHARACTERISTICS

V_{CC} = 5 V; V_{EE} = 0 V; T_{amb} = 25 °C; R_L from Q to V_{CC} unless otherwise specified

parameter	symbol	min.	typ.	max.	unit
Supply V_{CC}; pin 7					
Supply current, unloaded	I_{CC}	0.5	0.8	1.2	mA
Inputs I+ and I−; pins 3 and 2					
Input voltage	V_I	0.9	–	V_{CC}−0.5	V
Input bias current	I_{IB}	–	60	250	nA
Input offset voltage	V_{IO}	–	1	6	mV
Variation with temperature	ΔV_{IO}	–	5	–	µV/K
Input offset current	I_{IO}	–	10	75	nA
Common-mode rejection ratio	k_{CMR}	70	100	–	dB
Input noise voltage at f = 1 kHz	$V_{n(rms)}$	–	15	–	nV/√Hz
Input noise current at f = 1 kHz	$I_{n(rms)}$	–	0.4	–	pA/√Hz
Output Q; pin 6					
Output voltage range at R_L = 5 kΩ	V_Q	0.1	–	V_{CC}−0.1	V
Output current					
HIGH at $V_Q = V_{CC} - 0.4$ V	$-I_{OH}$	100	200	–	µA
LOW at V_Q = 0.4 V	I_{OL}	6	12	–	mA
D.C. voltage amplification at R_L = 5 kΩ	A_{VD}	10 000	15 000	–	
A.C. voltage amplification at f = 1 kHz; C_{FC} = 100 pF	A_{vd}	–	58	–	dB
Slew rate (average rate of change of the output voltage) at R_L = 1 kΩ					
C_{FC} = 0 pF	S_{VOAV}	–	25	–	V/µs
C_{FC} = 100 pF	S_{VOAV}	–	500	–	mV/µs

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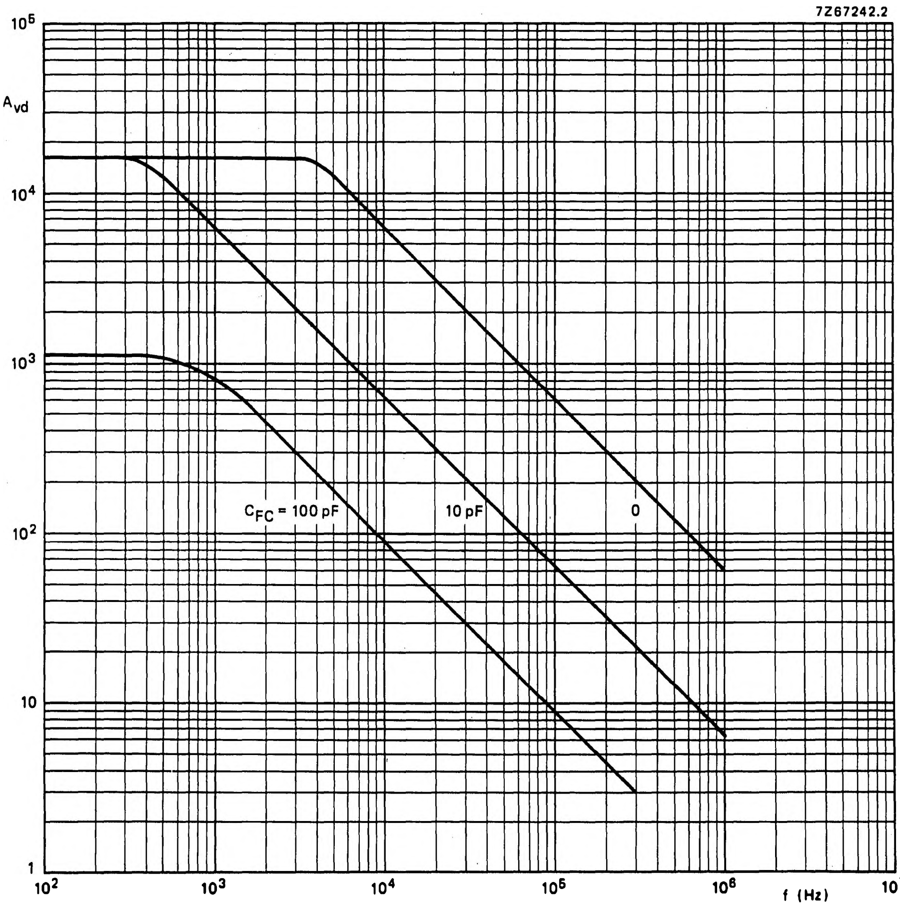

Fig. 3 Typical values of the open-loop voltage amplification as a function of frequency.

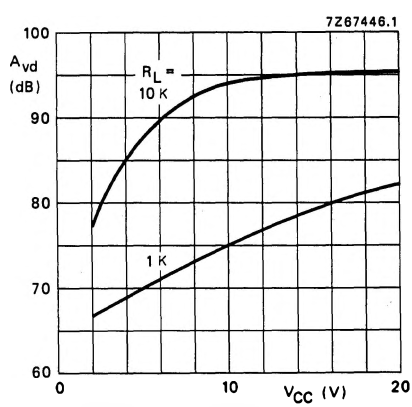

Fig. 4 Typical values of the open-loop voltage amplification as a function of supply voltage.

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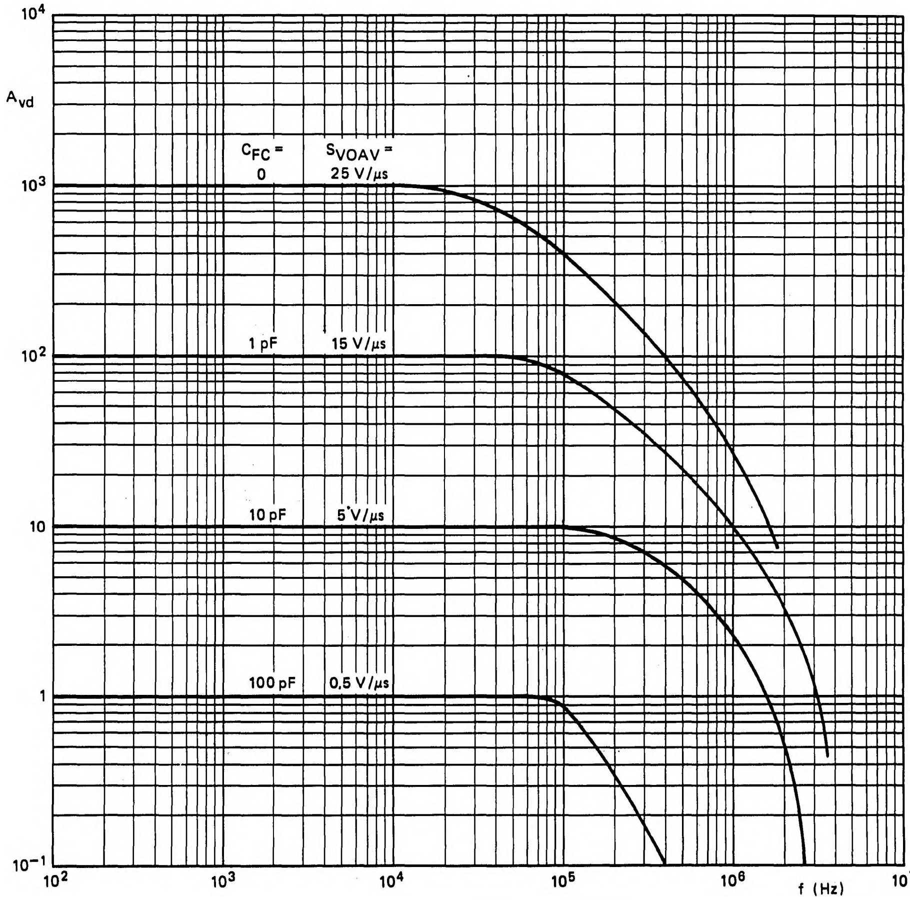

Fig. 5 Typical frequency response and slew rate for various closed-loop gains.

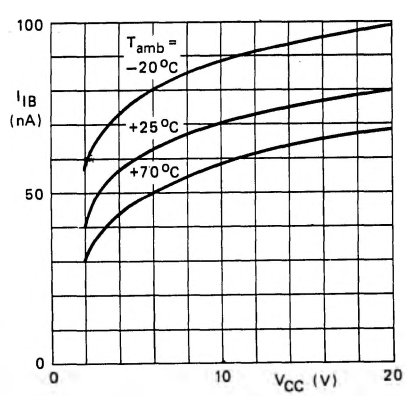

Fig. 6 Typical values of the input bias current as a function of supply voltage, with ambient temperature as a parameter.

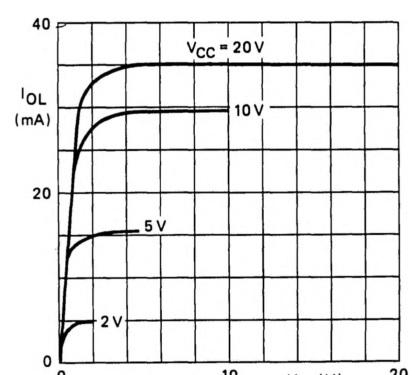

Fig. 7 Output current LOW as a function of output voltage, with supply voltage as a parameter.

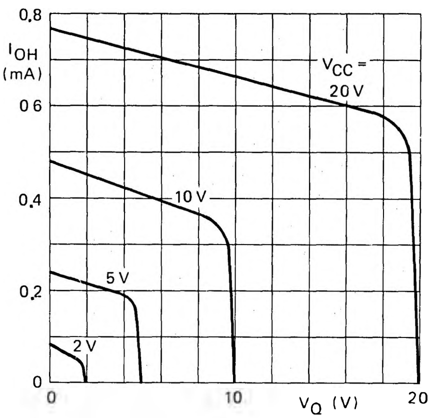

Fig. 8 Output current HIGH as a function of output voltage, with supply voltage as a parameter.

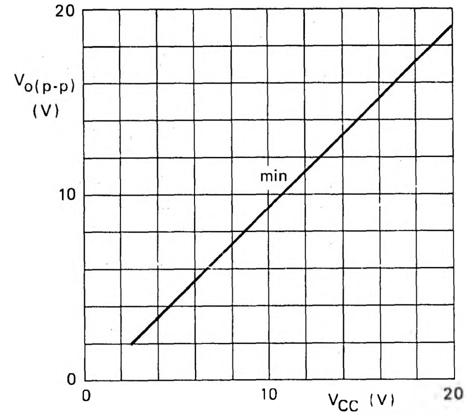

Fig. 9 Minimum values of the output voltage swing as a function of supply voltage for $R_L = 1\ k\Omega$.

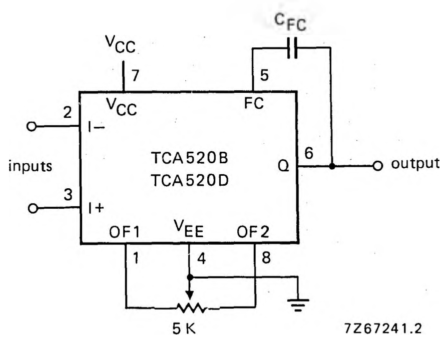

Fig. 10 Typical arrangement of the TCA520 with frequency and offset compensation.

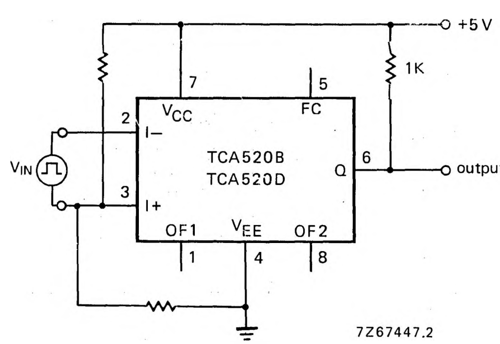

Fig. 11 Typical application of the TCA520 as a comparator.