Operational Amplifier TTL Compatible

TCA 321; A; W
TCA 322
TCA 325; A; W

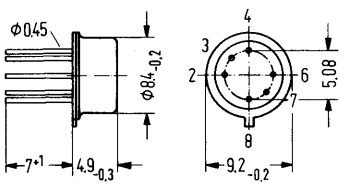
An economical operational amplifier which is well suited to be used as a Schmitt-trigger or comparator for control applications and automobile electronics. The output has been designed to control TTL-circuits directly. In addition to a high gain, low offset voltage, small temperature- and supply voltage dependence, the amplifier features:

- Wide common-mode range
- Large supply voltage range
- Wide control range
- High output current
- Low output saturation voltage
- TTL compatible

Type	Ordering codes
TCA 321	Q67000-A1006
TCA 321 A	Q67000-A1007
TCA 321 W	Q67000-A1008
TCA 322	Q67000-A1009
TCA 325	Q67000-A1010
TCA 325 A	Q67000-A562
TCA 325 W	Q67000-A1012

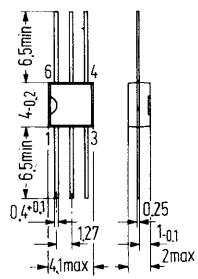
Package outlines

TCA 321, TCA 322, TCA 325



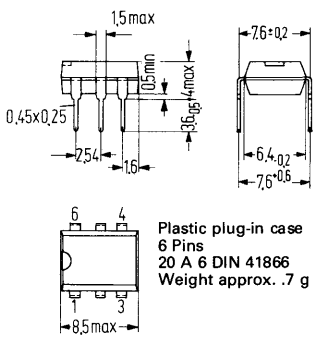
Case 5 H 6
DIN 41873
(similar T0-78)
Weight approx. 1 g

TCA 321 W, TCA 325 W



Miniature plastic case
6 Pins
Weight approx. .1 g
Colour code
TCA 321 W green/white
TCA 325 W green/yellow

TCA 321 A, TCA 325 A



Plastic plug-in case
6 Pins
20 A 6 DIN 41866
Weight approx. .7 g

Dimensions in mm

Maximum ratings

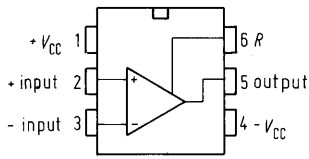
		TCA 321/A/W TCA 322 TCA 325/A/W	
Supply voltage	V_{CC}	±15	V
Output current	I_q	70	mA
Current (pin R)	I_R	10	mA
Differential input voltage	V_{ID}	$\pm V_{CC}$	
Junction temperature	T_j	150	°C
Storage temperature	T_S	−55 to +150	°C
Thermal resistance:			
System-case (TCA 321, TCA 322, TCA 325)	$R_{thScase}$	80	K/W
System-ambient air (TCA 321, 322, 325)	R_{thSamb}	190	K/W
System-ambient air (TCA 321 A, TCA 325 A)	R_{thSamb}	140	K/W
System-ambient air (TCA 321 W, TCA 325 W)	R_{thSamb}	200	K/W

Range of operation

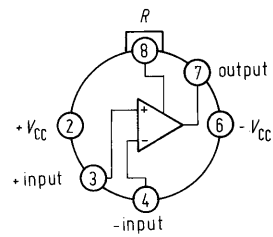
Supply voltage	V_{CC}	±2 to ±15	V
Ambient temperature in operation TCA 321/A/W	T_{amb}	0 to +70	°C
TCA 325/A/W	T_{amb}	−25 to +85	°C
TCA 322	T_{amb}	−55 to +125	°C

Pin connection

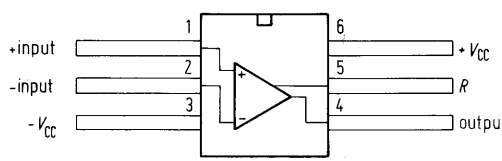
TCA 321 A
TCA 325 A



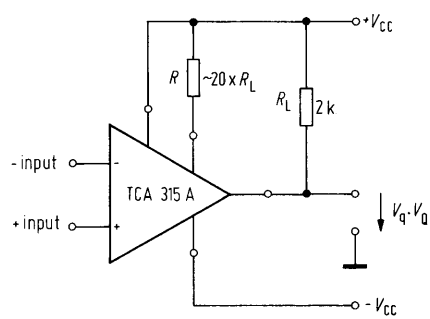
TCA 321
TCA 322
TCA 325



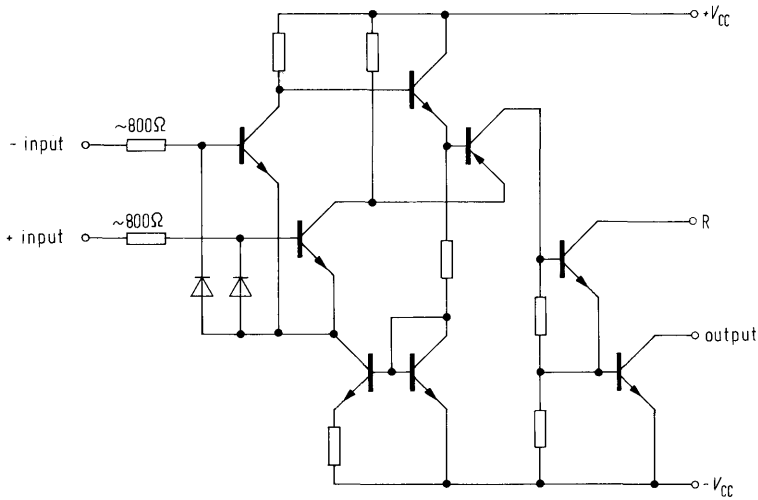
TCA 321 W
TCA 325 W



Connection diagram
R_L = load resistance



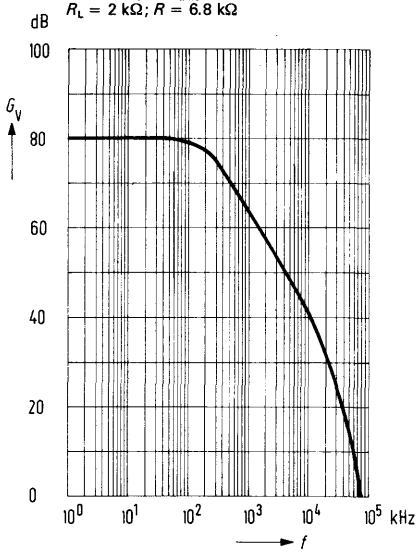
Circuit diagram



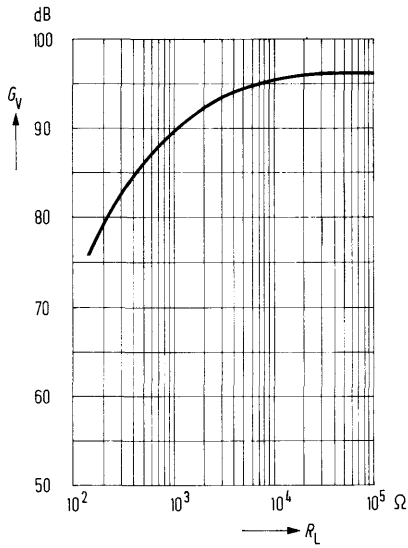
Operating characteristics (V_{CC} = ±15 V, R = 6.8 kΩ)		**TCA 321/A/W TCA 325/A/W** T_{amb} = 25 °C			**TCA 322** T_{amb} = 25 °C			T_{amb} = –55 to 125 °C		
		min	typ	max	min	typ	max	min	max	
Supply current	I_{CC}		1.5	2.5		1.5	2.5			mA
Input offset voltage (R_G = 50 Ω)	V_{io}	–7.5		7.5	–5		5	–7.5	7.5	mV
Input offset current	I_{io}	–300	±80	300	–100	±50	100	–300	300	nA
Input current	I_i		.5	1.0		.3	.7		1.0	µA
Output voltage (R_L = 2 kΩ)	V_{qpp}	14.9		–14.8	14.9		–14.8	14.8	–14.6	V
(R_L = 620 Ω)	V_{qpp}	14.9		–14.0	14.9		–14.0	14.8	–13.5	V
(R_L = 2 kΩ, f = 100 kHz)	V_{qpp}		±10			±10				V

Operating characteristics $V_{CC} = \pm 15$ V, $R = 6.8$ kΩ		**TCA 321/A/W TCA 325/A/W** $T_{amb} = 25$ °C			**TCA 322** $T_{amb} = 25$ °C			$T_{amb} = -55$ to $+125$ °C		
		min	typ	max	min	typ	max	min	max	
Input impedance ($f = 1$ kHz)	Z_i		200			200				kΩ
Open-loop voltage gain										
($R_L = 2$ kΩ, $f = 1$ kHz)	G_V	75	80		80	83		75		dB
($R_L = 10$ kΩ, $f = 1$ kHz)	G_V		85			88				dB
($R_L = 2$ kΩ, $f = 1$ MHz)	G_V		60			60				dB
Input common-mode range ($R_L = 2$ kΩ)	V_{iCM}	13		−13	13		−13			V
Common-mode rejection ration ($R_L = 2$ kΩ)	$CMRR$	60	74		65	77				dB
Sensitivity to supply voltage variations	$\frac{\Delta V_{io}}{\Delta V_{CC}}$		25	200		25	200			μV/V
Temperature-coeffizient of V_{io} ($R_G = 50$ Ω)	α_{Vio}		6			6	25			μV/K
Temperature-coefficient of I_{io} ($R_G = 50$ Ω)	α_{Iio}		.3			.3	1.5			nA/K
Rise time of V_q for non-inverting operation (test circuit 1, TAA861)	$\frac{dV_q}{d_{tr}}$		50			50				V/μs
Output saturation voltage ($I_q = 10$ mA)	V_{qsat}			200			200		400	mV
Output leakage current $V_{CC} = \pm 5$ V; $R = 6.8$ kΩ	I_{qlk}		1	10		1	10			μA
Input offset voltage ($R_G = 50$ Ω)	V_{io}	−7.5		7.5	−5		5			mV
Input offset current	I_{io}	−300	±50	300	−100		100			nA
Input current	I_i		.5	1.0		.3	.7			μA
Open-loop voltage gain ($R_L = 2$ kΩ, $f = 1$ kHz)	G_V	65			70					dB

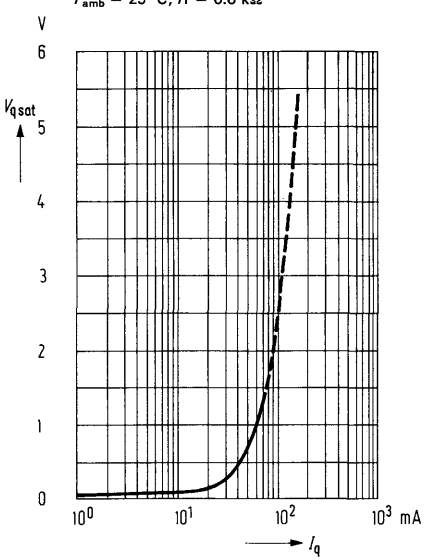
Open-loop voltage gain
$G_V = f(V_{CC})$; $T_{amb} = 25$ °C
$R_L = 2$ kΩ; $R = 6.8$ kΩ



Open-loop voltage gain $V_{CC} = \pm 15$ V
$G_V = f(V_{CC})$; $T_{amb} = 25$ °C



Saturation voltage $V_{qsat} = f(I_q)$
$T_{amb} = 25$ °C; $R = 6.8$ kΩ



For further performance curves see TAA 761