

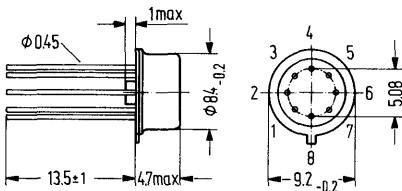
TBB 0748 and TBC 0748 are monolithic integrated operational amplifiers in packages similar to 5 G 8 DIN 41873 (TO-99). They are outstanding by their large common-mode voltage range, high differential input voltage range and permanently short-circuit proof. In addition, they feature an adjustable input offset-voltage and have the same pin configuration as the popular TBA 221 operational amplifier. Unity gain frequency compensation is achieved by means of a single 30 pF capacitor. TBB 0748 B (8 pins) in plastic plug-in package.

Type	Ordering codes
TBB 0748:	Q67000-A1041
TBB 0748 B:	Q67000-A1042
TBC 0748:	Q67000-A1073

TBB 0748 B

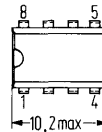
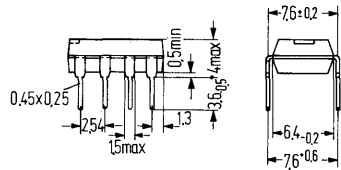
Package outlines

TBB 0748, TBC 0748



Case similar 5 G 8 DIN 41873 (TO-99)
 Weight approx. 1.2 g

Dimensions in mm



Plastic plug-in package, 8 pins
 20 A 8 DIN 41866
 Weight approx. .7 g

Maximum ratings

Supply voltage	V_{CC}	± 18	± 22	V
Input voltage ¹⁾	V_i	± 15	± 15	V
Differential input voltage	V_{iD}	± 30	± 30	V
Short circuit duration ²⁾	t_{SC}	∞	∞	
Storage temperature	T_s	-65 to +150	-65 to +150	°C
Junction temperature	T_j	150	150	°C
Thermal resistance:				
System-case (TBB 0748/TBC 0748)	$R_{thScase}$	80	80	K/W
System-ambient air (TBB 0748, TBC 0748)	R_{thSamb}	190	190	K/W
System-ambient air (TBB 0748 B)	R_{thSamb}	110		K/W

	TBB 0748 TBB 0748 B	TBC 0748	
Supply voltage	± 18	± 22	V
Input voltage ¹⁾	± 15	± 15	V
Differential input voltage	± 30	± 30	V
Short circuit duration ²⁾	∞	∞	
Storage temperature	-65 to +150	-65 to +150	°C
Junction temperature	150	150	°C
Thermal resistance:			
System-case (TBB 0748/TBC 0748)	80	80	K/W
System-ambient air (TBB 0748, TBC 0748)	190	190	K/W
System-ambient air (TBB 0748 B)	110		K/W

Range of operation

Supply voltage	V_{CC}	± 4 to ± 18	± 4 to ± 22	V
Ambient temperature in operation	T_{amb}	0 to +70	-55 to +125	°C

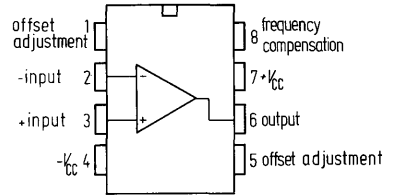
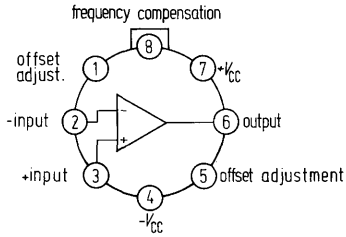
¹⁾ For supply voltage less than ± 15 V the maximum input voltage is equal to the supply voltage

²⁾ Short circuit may be ground or $\pm V_{CC}$.

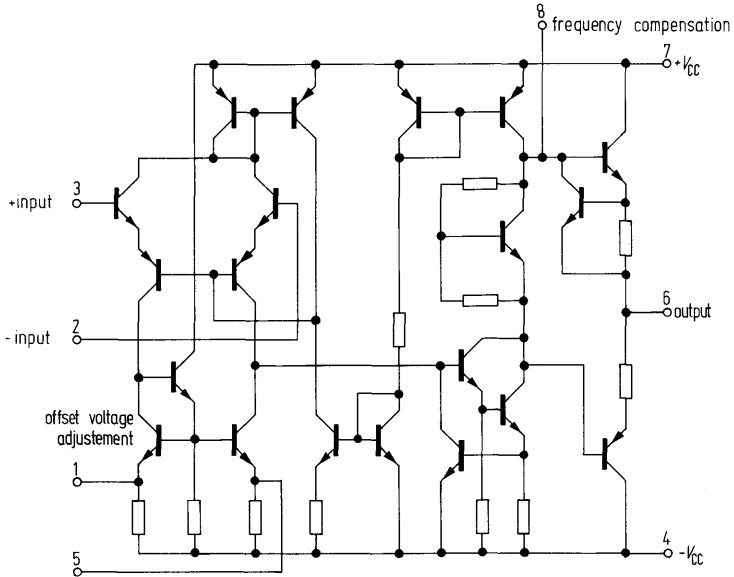
Pin connection

TBB 0748
TBC 0748

TBB 0748 B



Circuit diagram



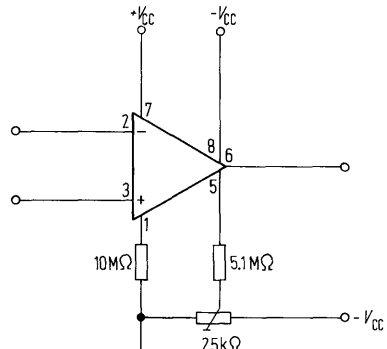
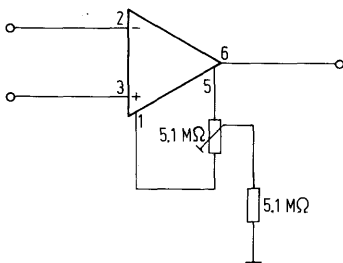
With TBB and TBC 0748 pin 4 is electrically connected to case.

Operating characteristics

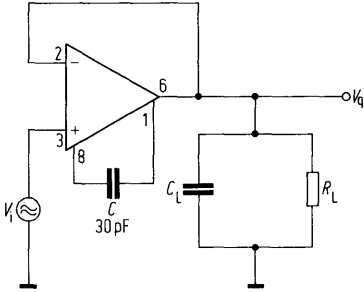
($V_{CC} = \pm 15V$, $T_{amb} = 25^\circ C$, $C = 30$ pF when not otherwise stated)

	TBB 0748/B			TBC 0748				
	min	typ	max	min	typ	max		
Input offset voltage ($R_G \leq 10$ k Ω) ($T_{amb} = 0$ to $70^\circ C$)	V_{io}	-6	6	-4	4		mV	
($T_{amb} = -55$ to $+125^\circ C$)	V_{io}	-7.5	7.5				mV	
Adjustable range of input offset voltage	ΔV_{io}	6	± 15	-6	± 15	-6	mV	
Input offset current ($T_{amb} = 0$ to $70^\circ C$)	I_{io}	-200	± 20	200	-100	± 20	100	nA
($T_{amb} = -55$ to $+125^\circ C$)	I_{io}	-300		300				nA
Input current ($T_{amb} = 0$ to $70^\circ C$)	I_i		80	500	80	500	nA	
($T_{amb} = -55$ to $+125^\circ C$)	I_i			800		350	nA	
Current supply	I_{CC}		1.7	2.8	.3	1.5	μA	
Output short circuit current	I_{qsc}		± 18		1.7	2.8	mA	
Input resistance	R_i	300	2000	300	2000		k Ω	
Input capacitance	C_i		2		2		pf	
Output resistance	R_o		75		75		Ω	
Output voltage ($R_L \geq 10$ k Ω) ($R_L \geq 2$ k Ω)	V_{qpp}	12	± 14	-12	13	± 14	-12.5	V
	V_{qpp}	10	± 13	-10	11	± 13	-11	V
Common mode input voltage range	V_{iCM}	12	± 13	-12	12	± 13	-12	V
Voltage gain ($V_{qpp} = \pm 10$ V, $R_L \geq 2$ k Ω) $T_{amb} = 0$ to $70^\circ C$	G_V	86	100	94	103			dB
($T_{amb} = -55$ to $+125^\circ C$)	G_V	83						dB
Common-mode rejection ratio ($R_G = 10$ k Ω)	$CMRR$	70	90	80	90			dB
Sensitivity to supply voltage variations ($R_G = 10$ k Ω)	$\frac{\Delta V_{io}}{\Delta V_{CC}}$		30	150	30	100		$\mu V/V$
Transient behaviour of the output voltage at $G_V = 1$ ($V_i = 20$ mV, $R_L = 2$ k Ω , $C_L < 100$ pF)								
Rise time	t_r		.3		.3			μs
Overshoot			5		5			%
Leading edge slope ($R_L \geq 2$ k Ω)	$\frac{dV_{qpp}}{dt}$		5.5		5.5			V/ μs
Temperature coefficient of V_{io}	α_{Vio}				3			$\mu V/K$
Temperature coefficient of I_{io}	α_{Iio}				.4			nA/K

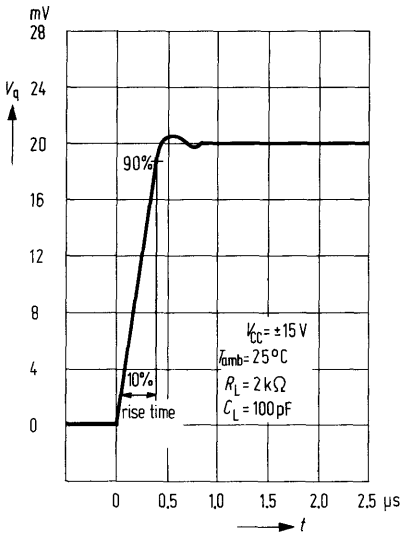
Adjustment of offset voltage.



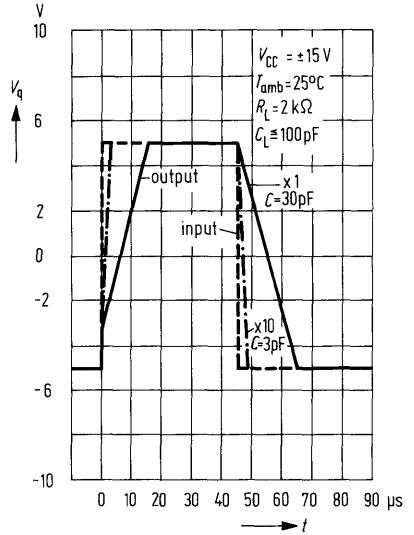
Test circuit: Transient response



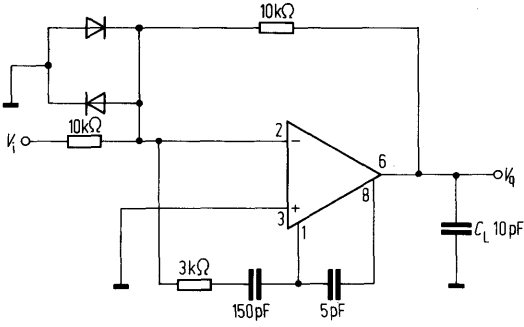
Transient response of the output voltage
 $V_q = f(t); G_V = 1$



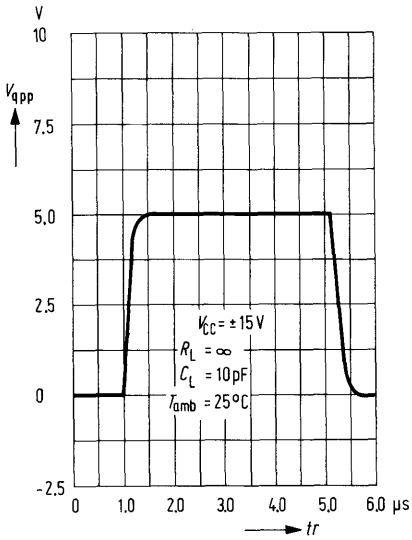
Large signal pulse response
 $V_q = f(t)$



Feed-forward compensation

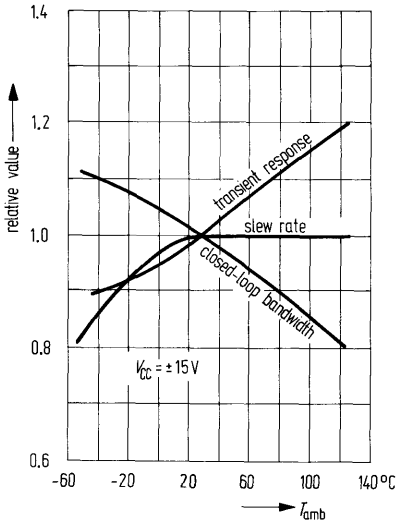


Large signal feed-forward transient response

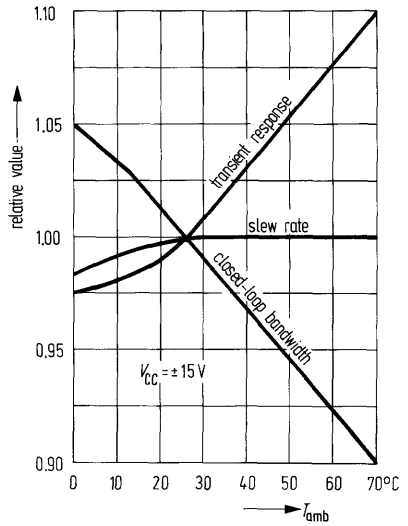


Performance curves for TBB 0748/B and TBC 0748

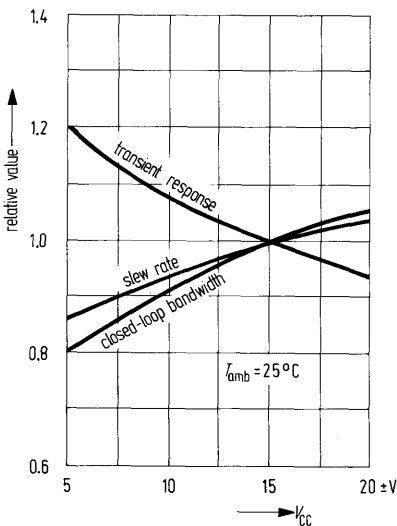
TBC 0748 Frequency characteristics as a function of ambient temperature



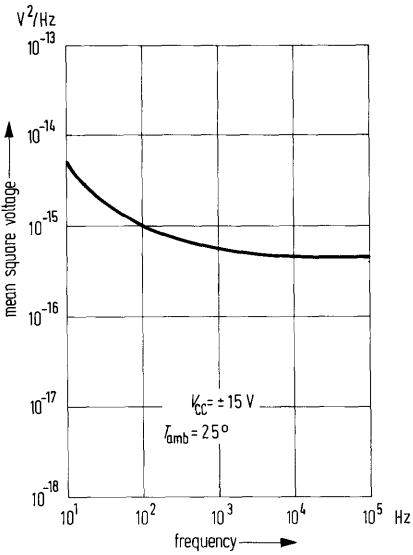
TBB 0748 B Frequency characteristics as a function of ambient temperature



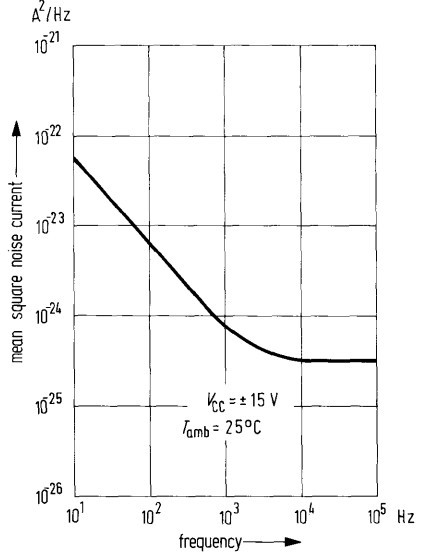
Frequency characteristics as a function of supply voltage



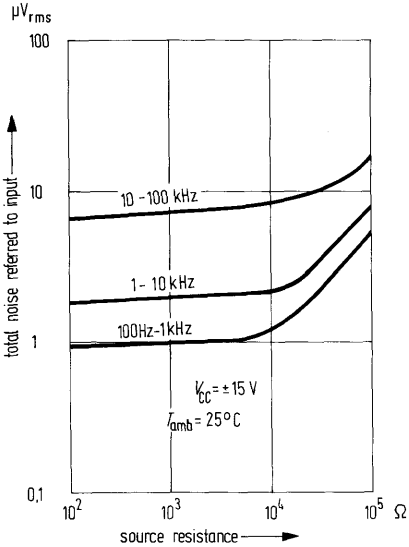
Input noise voltage as a function of frequency



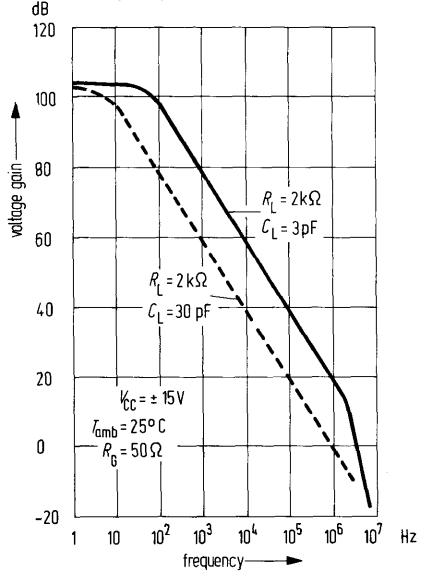
Input noise current as a function of frequency



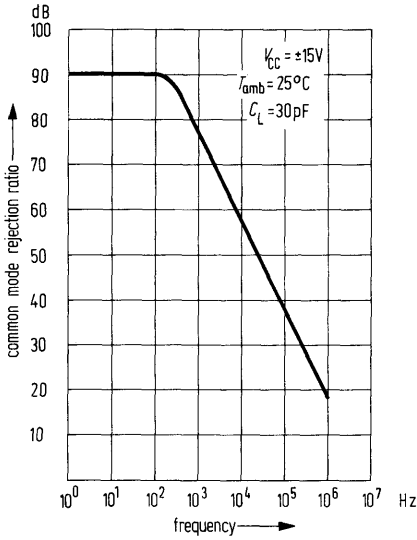
Broadband noise for various bandwidths



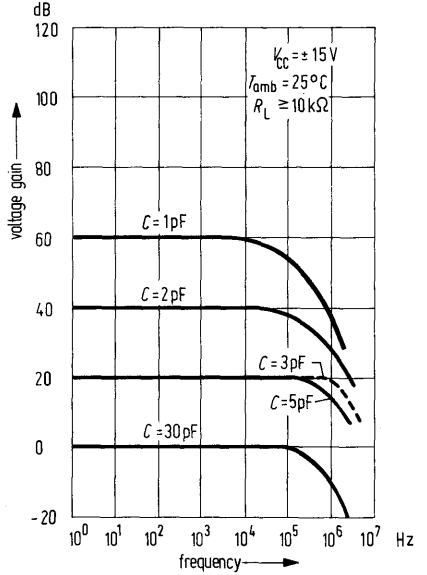
Open loop voltage gain as a function of frequency



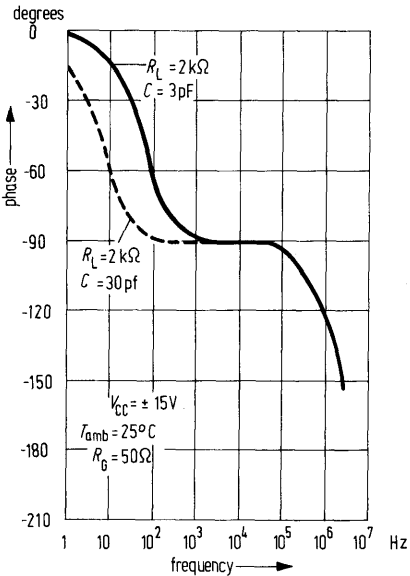
Common mode rejection ratio as a function of frequency



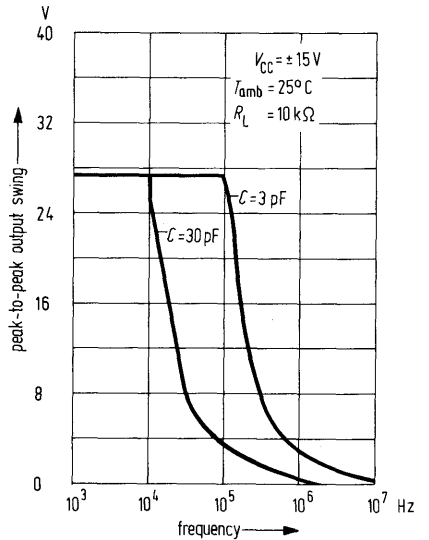
Frequency response for various closed loop gains



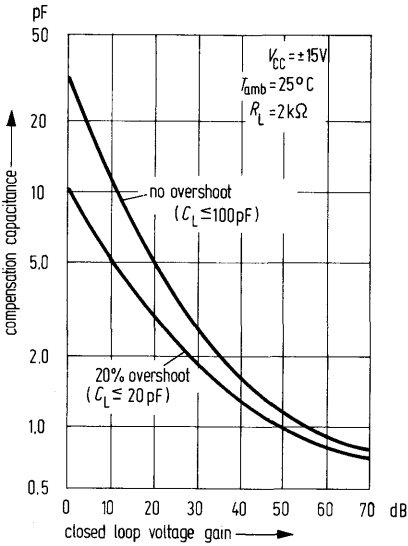
Open loop phase response as a function of frequency



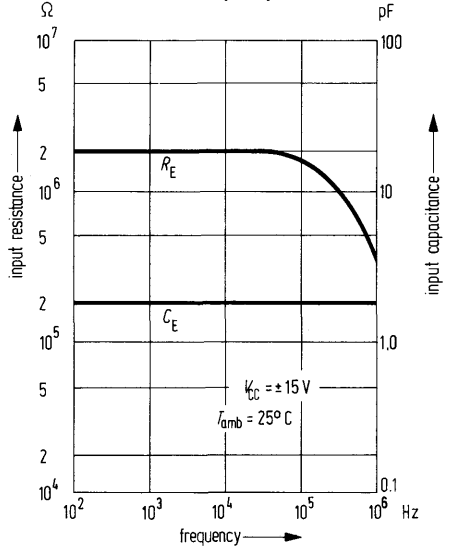
Output voltage swing as a function of frequency



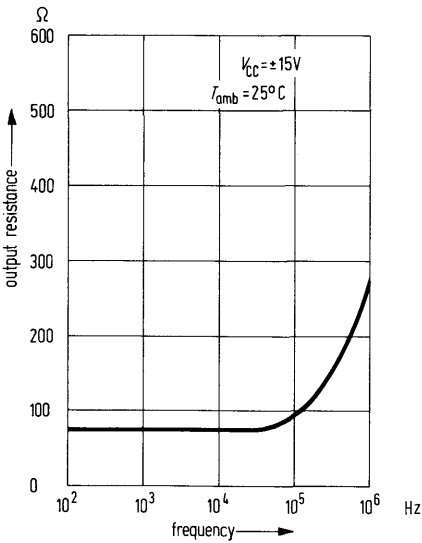
Compensation capacitance as a function of closed loop voltage gain



Input resistance and input capacitance as a function of frequency



Output resistance as a function of frequency



Further performance curves see data sheet TBA 221