RECORDING AND PLAYBACK AMPLIFIER

This integrated circuit incorporates all amplifier circuits necessary for the record/playback functions, with the exception of the audio power output amplifier. It comprises:
– a preamplifier for microphone or playback,
– a recording amplifier with automatic level control,
– a dynamic limiter with a short limiting time.
Compared to its predecessor TDA1002, this type features an improved automatic level control circuit; the control range has been enlarged from 40 to 55 dB and the spread in control characteristic has been reduced to less than 2 dB.

QUICK REFERENCE DATA

Supply voltage range	V_P		4 to 12 V
Operating ambient temperature	T_{amb}		−25 to + 125 °C
Total quiescent current (V_P = 9 V)	I_{tot}	typ.	15 mA
Preamplifier			
Input impedance (pin 1)	$\|Z_i\|$	typ.	16 kΩ
Open loop gain	G_o	typ.	70 dB
Clipping level (pin 4); V_P = 9 V; r.m.s. value	$V_{4\text{-}5(rms)}$	typ.	2 V
Equivalent noise input voltage R_S = 500 Ω; B = 300 Hz to 15 kHz	$V_{n(rms)}$	<	0,75 μV
Recording amplifier			
Input impedance (pin 8)	$\|Z_i\|$	typ.	40 kΩ
Open loop gain	G_o	typ.	80 dB
Clipping level (pin 9); V_P = 9 V; r.m.s. value	$V_{9\text{-}10(rms)}$	typ.	2 V
Automatic Level Control (A.L.C.)			
Input impedance (pin 6)			
at low signal level at pin 8	$\|Z_i\|$	typ.	250 kΩ
at high signal level pin 8	$\|Z_i\|$	typ.	25 Ω
Control voltage			
$V_{4\text{-}5}$ = 10 mV; f = 1 kHz; V_P = 9 V	$V_{9\text{-}10}$	typ.	250 mV
$V_{4\text{-}5}$ = 1000 mV; f = 1 kHz; V_P = 9 V	$V_{9\text{-}10}$	typ.	750 mV
Limiting time (Fig. 12)	t_l	typ.	10 ms
Level setting time (Fig. 12)	t_s	typ.	4 s
Recovery time (Fig. 13)	t_r	typ.	35 s

PACKAGE OUTLINE

16-lead DIL; plastic (SOT-38).

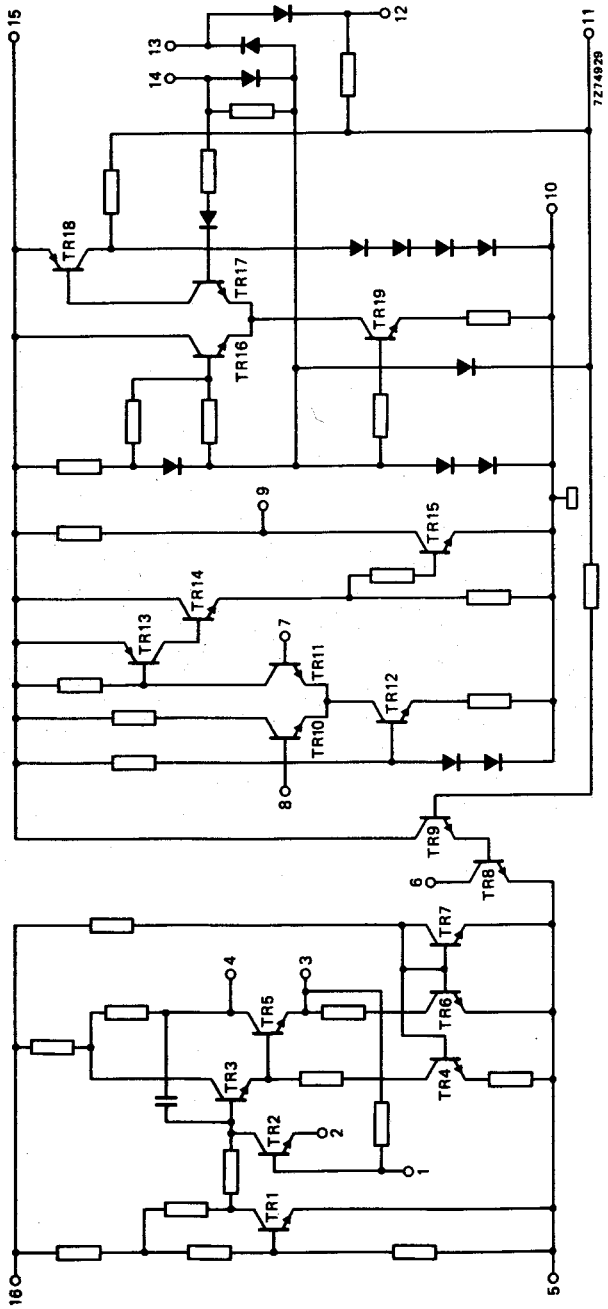


Fig. 1 Circuit diagram.

RATINGS

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

Supply voltage preamplifier	V_{16-5}	max.	12 V
Supply voltage recording amplifier	V_{15-10}	max.	12 V
Total power dissipation		see derating curve Fig. 2	
Storage temperature	T_{stg}		−65 to + 125 °C
Operating ambient temperature	T_{amb}		−25 to + 125 °C

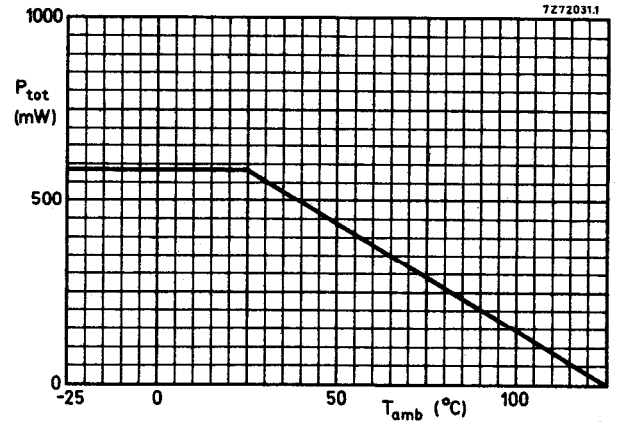


Fig. 2 Power dissipation derating curve.

D.C. CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

Supply voltage recording amplifier	V_{15-10}		4 to 12 V
Supply voltage preamplifier	V_{16-5}		4 to 12 V
Quiescent current rec. amplifier; V_P = 9 V	I_{15}	typ.	10 mA
Quiescent current preamplifier; V_P = 9 V	I_{16}	typ.	5 mA
Output voltage recording amplifier	V_{9-10}	typ.	½ V_P V
Output voltage preamplifier	V_{4-5}	typ.	½ V_P−0,35 V

A.C. CHARACTERISTICS

T_{amb} = 25 °C; V_P = 9 V unless otherwise specified.

			recording	playback
Preamplifier (note 1)				
Open loop voltage gain	G_o	typ.	70	70 dB
Closed loop voltage gain at f = 1 kHz	G_c	typ.	38	45 dB
Output voltage (clipping level); r.m.s. value	$V_{4-5(rms)}$	typ.	2	2 V
Equivalent noise input voltage; r.m.s. value (note 2)	V_n	<	0,75	0,75 μV
Input impedance (pin 1)	$\|Z_i\|$	typ.	16	16 kΩ
Total harmonic distortion				
f = 1 kHz; V_{4-5} = 150 mV	d_t	typ.	–	0,12 %
f = 1 kHz; V_{4-5} = 500 mV	d_t	<	0,2	–
Amplitude response		flat: 20 Hz to 20 kHz		see Fig. 7
Recording amplifier (Fig. 9)				
with A.L.C.; unless otherwise specified.				
Open loop gain	G_o	typ.		80 dB
Closed loop voltage gain at f = 1 kHz (note 3)	G_c	typ.		49 dB
Output voltage (clipping level); r.m.s. value	$V_{9-10(rms)}$	typ.		2 V
Input impedance pin 8	$\|Z_i\|$	typ.		40 kΩ
Input impedance pin 6				
low signal levels	$\|Z_i\|$	typ.		250 kΩ
high signal levels	$\|Z_i\|$	typ.		25 Ω
Total harmonic distortion		see Fig. 11		
Amplitude response (note 3)		see Fig. 10		
Automatic level control (see Fig. 8)				
V_{4-5} = 10 mV; f = 1 kHz	V_{9-10}	typ.		250 mV
V_{4-5} = 100 mV; f = 1 kHz	V_{9-10}	typ.		450 mV
V_{4-5} = 1000 mV; f = 1 kHz	V_{9-10}	typ.		750 mV
V_{4-5} = 2000 mV; f = 1 kHz	V_{9-10}	typ.		880 mV
Limiting time (see Fig. 12)	t_l	typ.		10 ms
Level setting time (see Fig. 12)	t_s	typ.		4 s
Recovery time (see Fig. 13)	t_r	typ.		35 s

Notes

1. For recording see Fig. 3; for playback see Fig. 5.
2. R_S = 500 Ω; bandwidth = 300 Hz to 15 kHz.
3. Pin 6 not connected to pin 8.

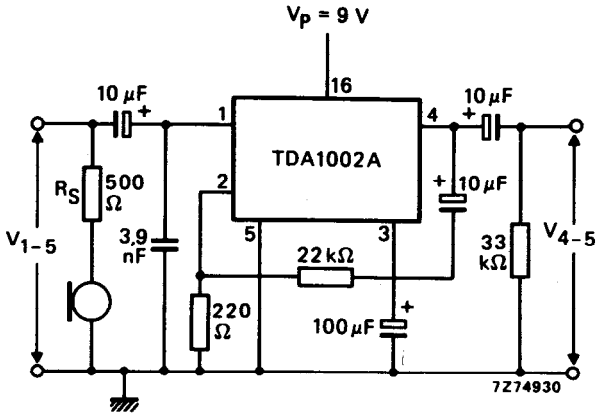


Fig. 3 Preamplifier used as microphone amplifier.

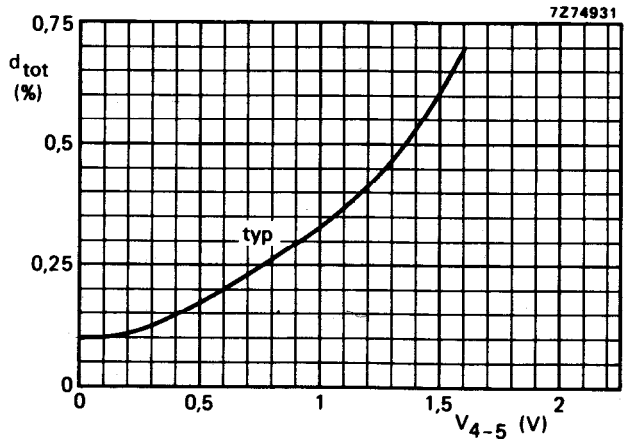


Fig. 4 Total harmonic distortion of preamplifier used for recording.

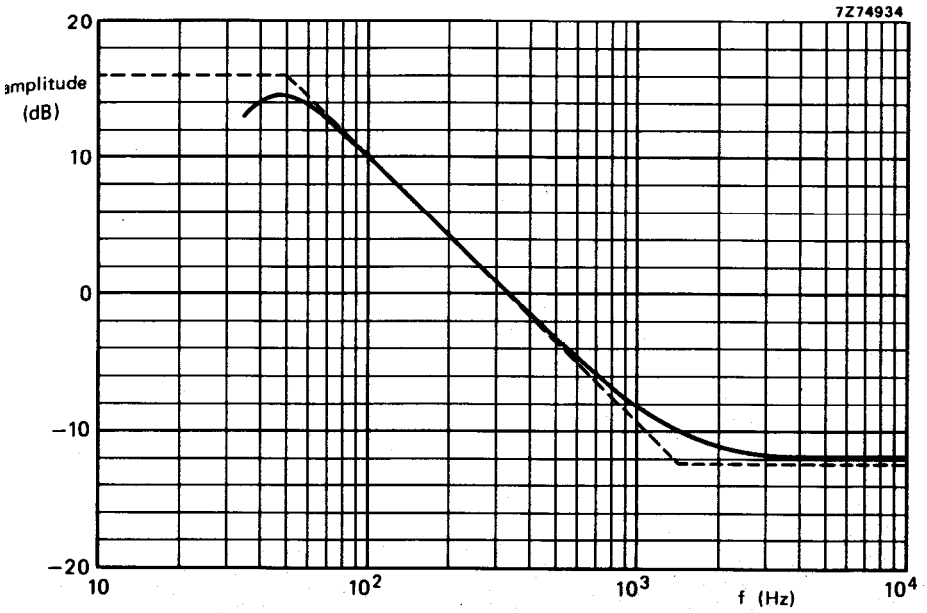


Fig. 7 Amplitude response of preamplifier used for playback; typical values.
0 dB = input voltage of 0,3 mV at f = 333 Hz. Dotted line according to DIN 45513.

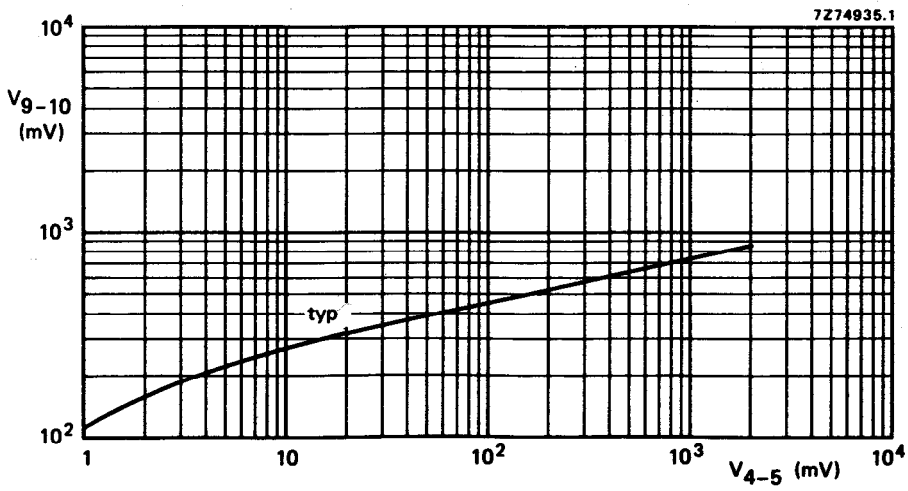


Fig. 8 Automatic level control; for circuitry see Fig. 9; f = 1 kHz.

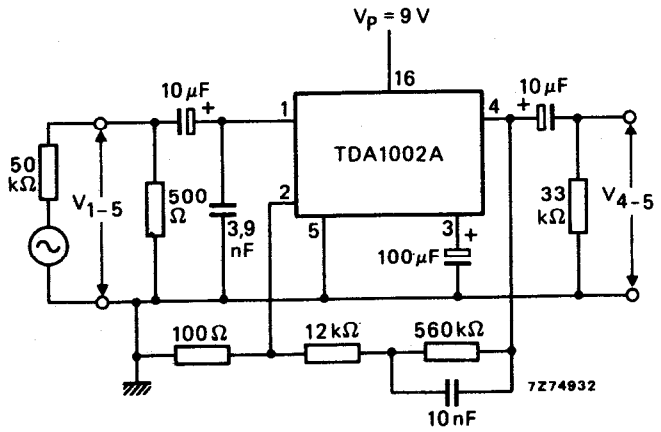


Fig. 5 Preamplifier used for playback.

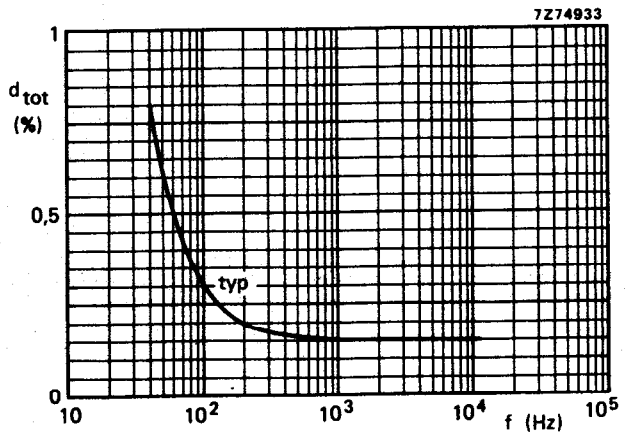


Fig. 6 Total harmonic distortion of preamplifier used for playback at V_{4-5} = 150 mV.

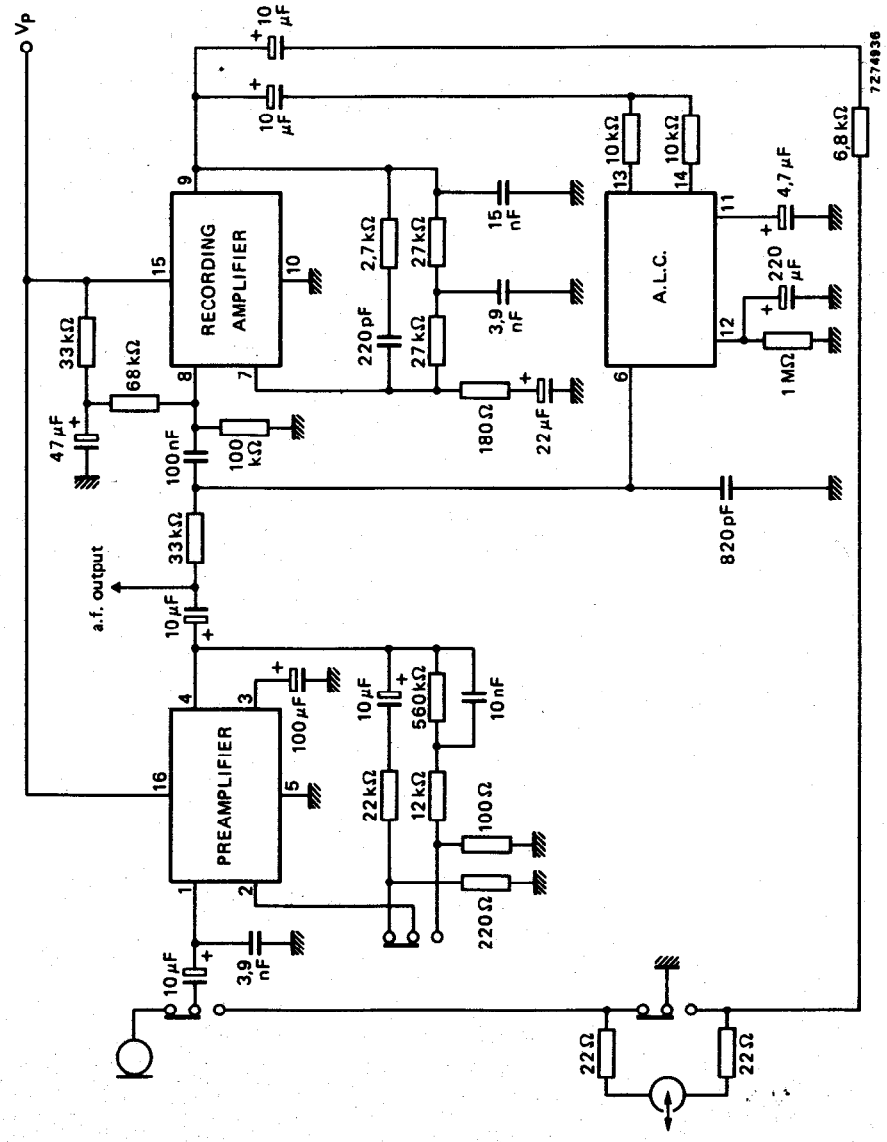


Fig. 9 Application of TDA1002A (recording position).

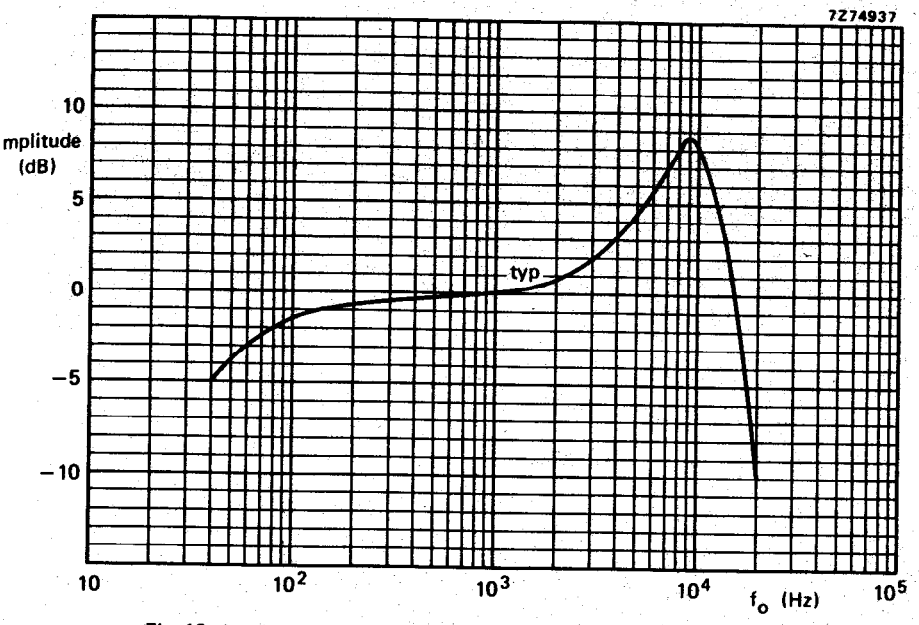


Fig. 10 Amplitude response of recording amplifier (A.L.C. not connected).

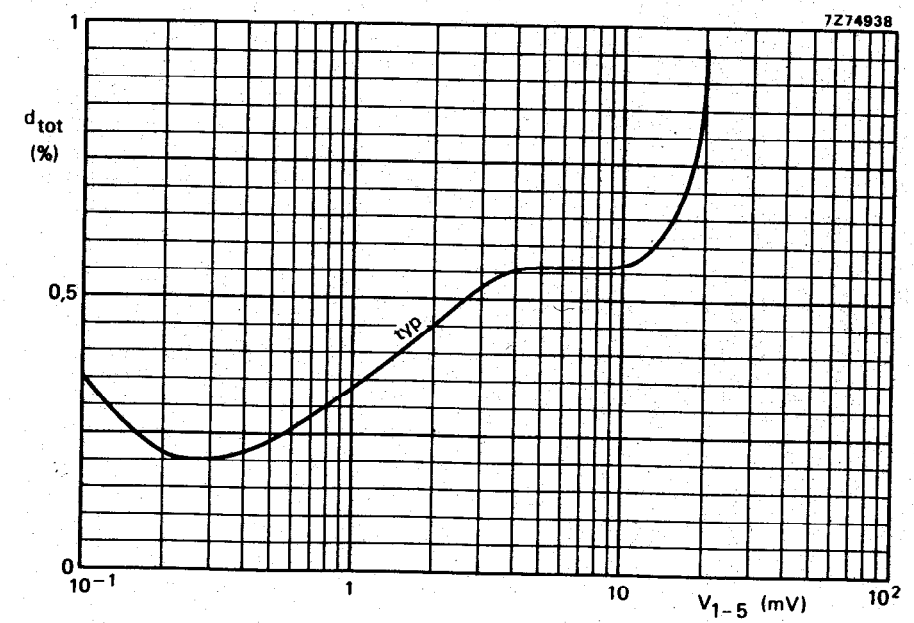
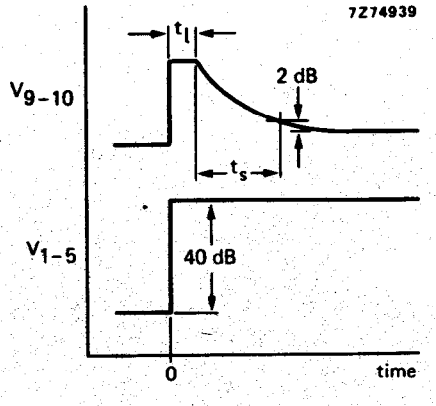


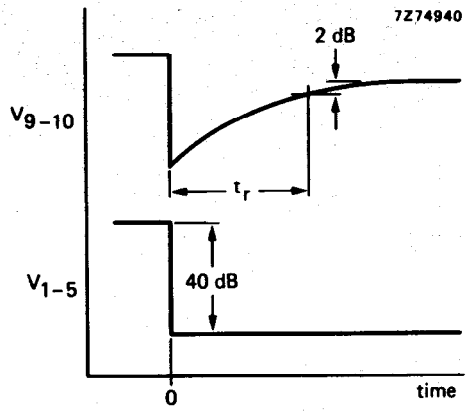
Fig. 11 Total harmonic distortion recording amplifier with A.L.C.; f = 1 kHz.

TIMING DIAGRAMS



t_l = limiting time.
t_s = level setting time.

Fig. 12 Output response at input level jumps.



t_r = recovery time.

Fig. 13 Output response at input level jumps.