

DUAL DOLBY* B—TYPE NOISE REDUCTION CIRCUIT

GENERAL DESCRIPTION

The TEA0657 is a monolithic bipolar integrated circuit providing two channels of Dolby B-type noise reduction. The circuit contains all internal electronic switching to provide playback or record functions.

In addition the TEA0657 includes preamplifiers for the playback and record modes and multiplex filter buffers for both channels.

The device will operate with power supplies in the range of 9.0 V to 15.0 V, output overload level increasing with increase in supply voltage. Current drain varies with supply voltage and noise reduction ON/OFF so it is advisable to use a regulated power supply or, a supply with a long time constant.

Features

- Dual noise reduction channels
- Full playback/record switching
- Separate playback/record inputs
- Multiplex filter buffers
- Simultaneous switching on both channels
- Dual or single supply operations
- Dolby reference level = 580 mV
- Input sensitivity = 30 mV

QUICK REFERENCE DATA

parameter	symbol	min.	typ.	max.	unit
Supply voltage range	V_{CC}	9.0	—	15.0	V
Supply current	I_{CC}	—	19	—	mA
Signal plus noise to noise ration					
record mode	$(S+N)/N$	—	72	—	dB
playback mode	$(S+N)/N$	—	90	—	dB

* Available only to licensees of Dolby Laboratories Licensing Corporation, San Francisco, CA94111, U.S.A., from whom licensing and application information must be obtained.
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PACKAGE OUTLINE

24-lead DIL; plastic (SOT101B).

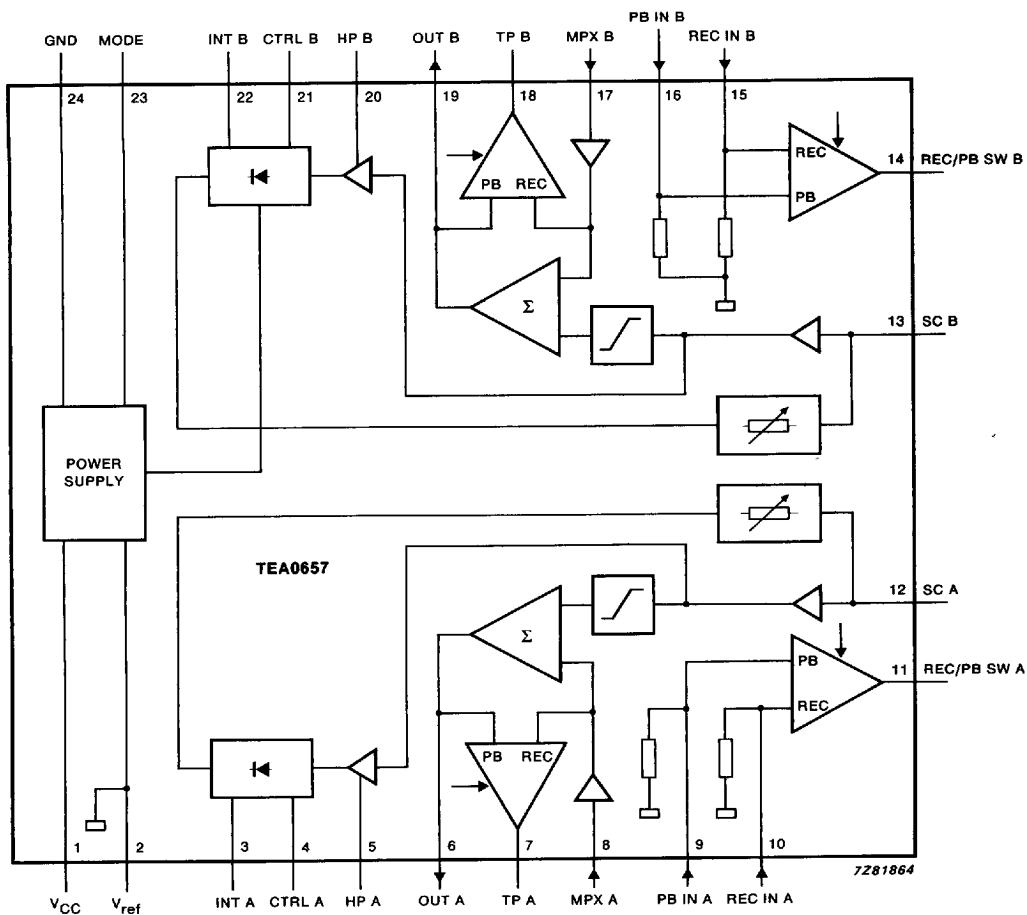


Fig. 1 Block diagram.

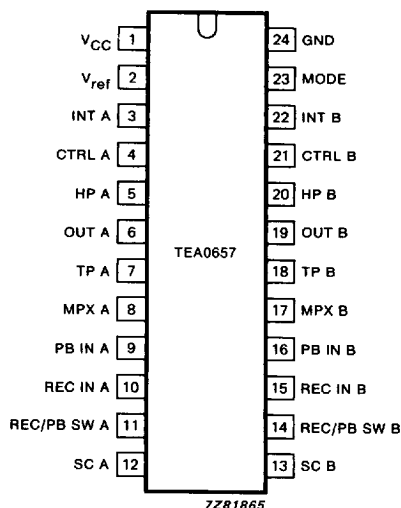


Fig. 2 Pinning diagram.

1	V _{CC}	supply voltage
2	V _{ref}	reference voltage
3	INT A	integrating filter channel A
4	CTRL A	control voltage channel A
5	HP A	high-pass filter channel A
6	OUT A	output channel A
7	TP A	test point channel A, line output channel A
8	MPX A	multiplex buffer channel A
9	PB IN A	playback input channel A
10	REC IN A	record input channel A
11	REC/PB SW A	record/playback switch channel A
12	SC A	side chain channel A
13	SC B	side chain channel B
14	REC/PB SW B	record/playback switch channel B
15	REC IN B	record input channel B
16	PB IN B	playback input channel B
17	MPX B	multiplex buffer input channel B
18	TP B	test point channel B, line output channel B
19	OUT B	output channel B
20	HP B	high-pass filter channel B
21	CTRL B	control voltage channel B
22	INT B	integrating filter channel B
23	MODE	record/playback select switch
24	GND	ground

FUNCTIONAL DESCRIPTION

Noise reduction is enabled when pin 22 is open-circuit and OFF when connected to pin 24 via a 5.1 k Ω resistor (see Fig. 3).

Pin 24 performs the functions of a logic input for noise reduction switching in both channels and provides smoothing for the control signal in one channel. It is important that no voltage is applied to this pin when in the NR ON mode as this will cause irregular noise reduction characteristics in the selected channel.

Record/playback is achieved by applying a DC voltage to pin 23. The circuit will enable the appropriate input for the selected mode.

RATINGS

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

parameter	symbol	min.	max.	unit
Supply voltage	V _{CC}	–	16.0	V
Operating ambient temperature range	T _{amb}	–40	+ 85	°C
Storage temperature range	T _{stg}	–	+ 150	°C
Input voltage (pin 1)	V _I	–0.3	V _{CC}	V
Electrostatic handling (note 1)				

Note to the ratings

Note 1, Classification A:

Human body model; C = 100 pF; R = 1.5 k Ω ; V $\geq$ 2 kV.

Charge device model; C = 200 pF; R = 0 Ω ; V $\geq$ 500 V.

CHARACTERISTICS

$V_{CC} = 12\text{ V}$; $f = 20\text{ Hz to } 20\text{ kHz}$; $T_{amb} = +25\text{ }^{\circ}\text{C}$; all levels referenced to 580 mV RMS (0 dB) at TP (pin 7 or 18); test circuit Fig. 4; Record mode; NR ON; unless otherwise specified.

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage		V_{CC}	9	12	15	V
Supply current		I_{CC}	—	19	—	mA
Voltage gain (pins 9 or 10 to 11)	$f = 1\text{ kHz}$	G_V	—	20	—	dB
Voltage gain (pins 8 to 7)	$f = 1\text{ kHz}$	G_V	—	9	—	dB
Channel matching	NR OFF		-0.5	—	+0.5	dB
Distortion 2nd and 3rd harmonic	$f = 1\text{ kHz}$, 0 dB	THD	—	0.08	0.15	%
	$f = 10\text{ kHz}$, +10 dB	THD	—	0.15	0.3	%
Signal handling; ($V_{CC} = 9\text{ V}$)	1% distortion at 1 kHz		12	—	—	dB
Signal-to-noise plus noise ratio record mode	internal CCIR ARM weighted	$(S+N)/N$	—	72	—	dB
playback mode	$f_S = 10\text{ kHz}$	$(S+N)/N$	—	90	—	dB
Supply voltage ripple rejection	$f = 1\text{ kHz}$; 250 mV	SVRR	—	40	—	dB
Frequency response, (referenced to TP)	$f = 1\text{ kHz}$; 0 dB	Δf	-1.5	—	-1.5	dB
	-20 dB	Δf	-17.3	-15.8	-14.3	dB
	$f = 5\text{ kHz}$	Δf	-23.3	-21.8	-20.3	dB
	-30 dB	Δf	-30.2	-29.7	-28.2	dB
	-40 dB					
	$f = 10\text{ kHz}$	Δf	-1.1	0.4	1.9	dB
	0 dB	Δf	-25.0	-23.5	-22.5	dB
	-30 dB					
Input resistance; (pins 9, 10, 15 and 16)		R_I	—	50	—	k Ω
Channel separation	0 dB at TP; $f = 1\text{ kHz}$	α_{cr}	—	65	—	dB
Back-to-back frequency response shift;						
as a function of T_{amb}	0 to $-70\text{ }^{\circ}\text{C}$		—	± 0.5	—	dB
as a function of V_{CC}	9 V to 15 V		—	± 0.5	—	dB

CHARACTERISTICS (continued)

parameter	conditions	symbol	min.	typ.	max.	unit
PB/REC separation	30 mV; 1 kHz; at playback input, measure V_{OUT}	$\alpha_{PB/REC}$	—	72	—	dB
Minimum load resistance on output; (pins 6 and 9)	12 dB; 1 kHz; 1% THD	R_{Lmin}	10	—	—	k Ω
Switching thresholds playback; pin 23 record; pin 28	V_{PB}	V_{PB}	$0.7 V_{CC}$	V_{CC}	—	V
		V_{REC}	—	GND	$0.4 V_{CC}$	V
NR OFF; pin 22		V_{OFF}	—	—	$0.2 V_{CC}$	V

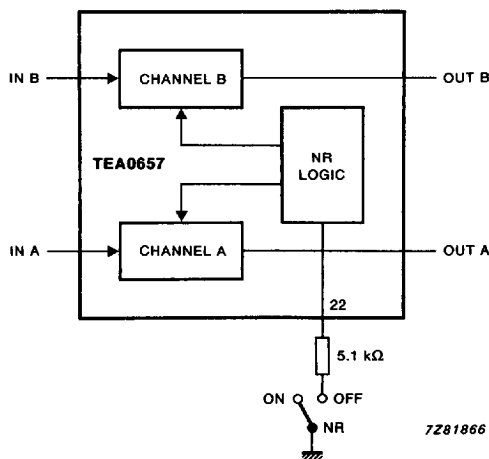
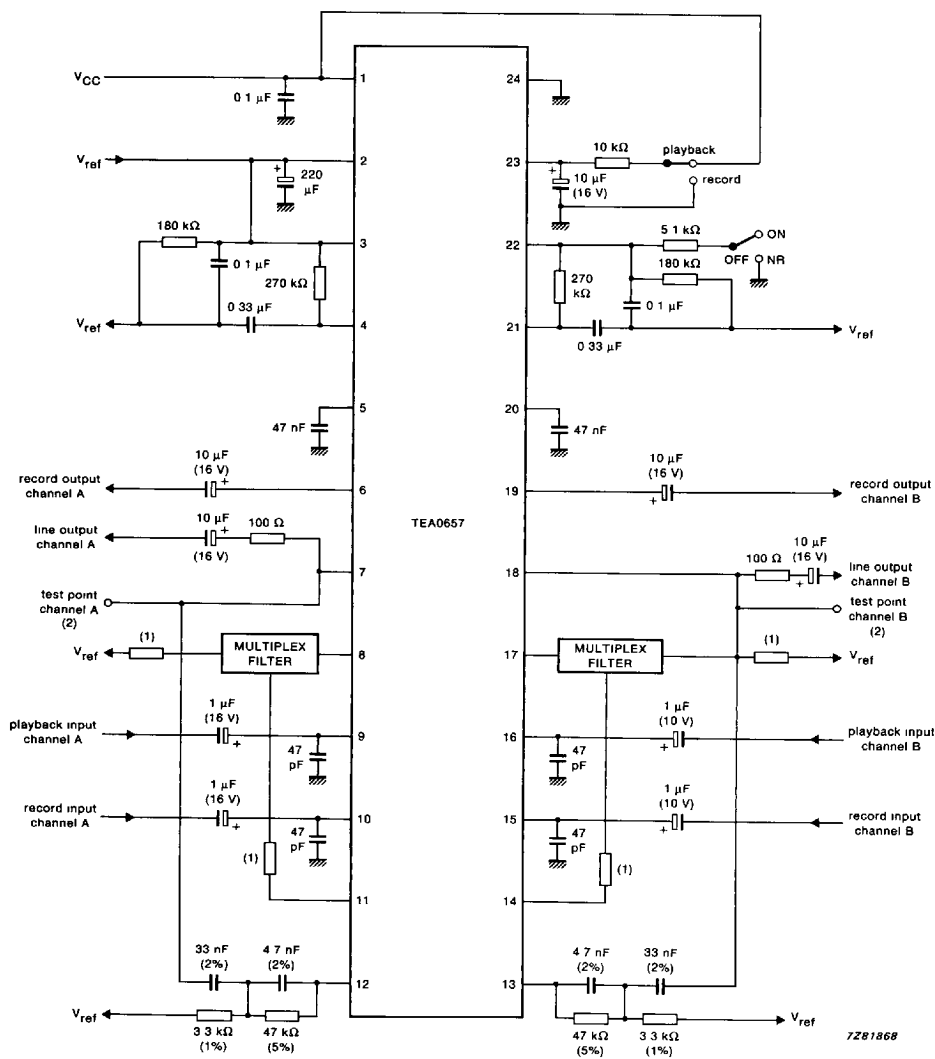


Fig. 3 External NR switch circuit for TEA0657.



All values within $\pm 10\%$ unless otherwise specified.

Notes:

- (1) Value determined by multiplexer in use.
- (2) Dolby level = 580 mV at test points.

Fig. 4 Test and application circuit.