



LM1131A/LM1131B/LM1131C Dual Dolby® B-Type Noise Reduction Processor

General Description

The LM1131 is a monolithic integrated circuit specifically designed to realize the Dolby B-Type noise reduction system.

The circuit includes two completely separate noise reduction processors and will operate in both encode and decode modes. It is ideal for stereo applications in compact equipment or for mono applications in 3-head equipment where two processors with very closely matched internal gains are required.

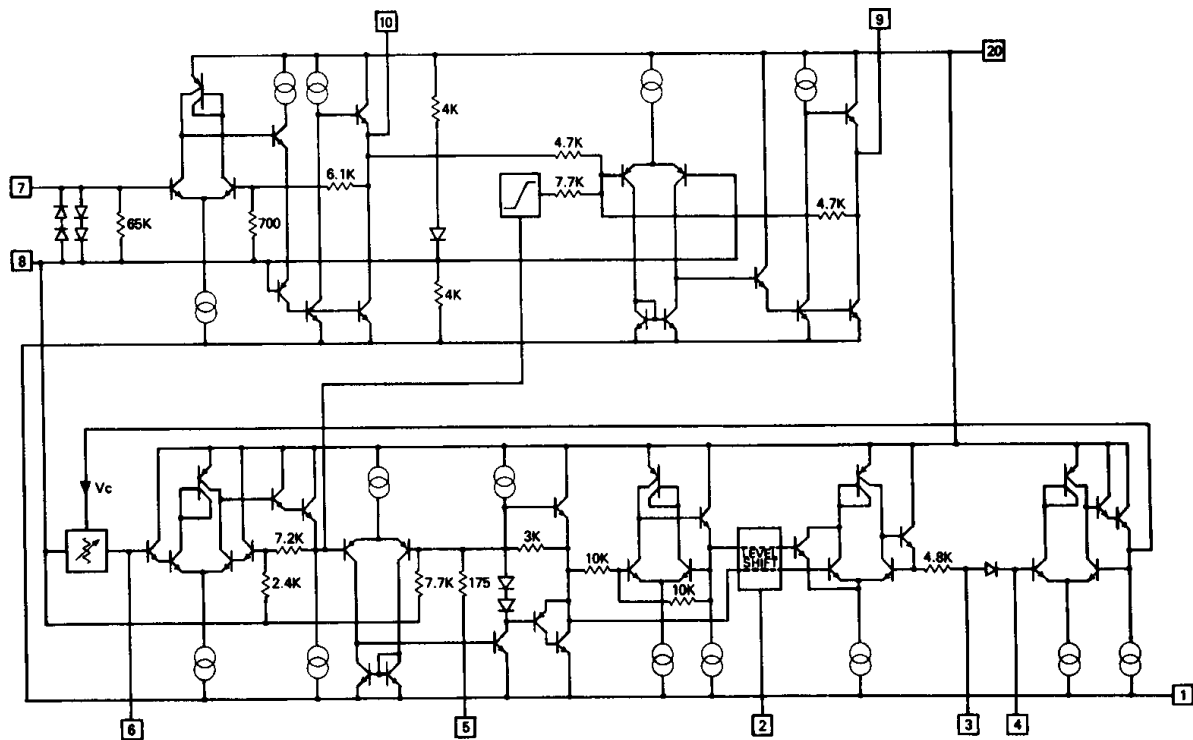
Features

- Stereo Dolby noise reduction with one IC

- Wide supply voltage range, 5V–20V
- Very high signal/noise ratio, 79 dB encode, 90 dB decode (CCIR/ARM)
- Very close gain matching for 3-head recorders
- Close matching to standard Dolby characteristics
- Very low temperature drift of Dolby characteristics
- High signal handling capability, > +20 dB ($V_S = 20V$)
- Full-wave rectifier in both channels
- Operates with both single and split supply voltages
- Excellent transient response characteristics
- Minimal input switch-on transients
- Reduced number of external components per channel
- Improved input protection

Available to licensees of Dolby Laboratories Licensing Corporation, San Francisco, from whom licensing and application information must be obtained.

Schematic Diagram (1 channel shown only)



TL/H/6858-1

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	24V
Operating Temperature Range	-20°C to +70°C
Storage Temperature Range	-65°C to +150°C

Soldering Information

Dual-In-Line Package	
Soldering (10 seconds)	260°C
Small Outline Package	
Vapor Phase (60 seconds)	215°C
Infrared (15 seconds)	220°C

See AN-450 "Surface Mounting Methods and Their Effect on Product Reliability" for other methods of soldering surface mount devices.

Electrical Characteristics

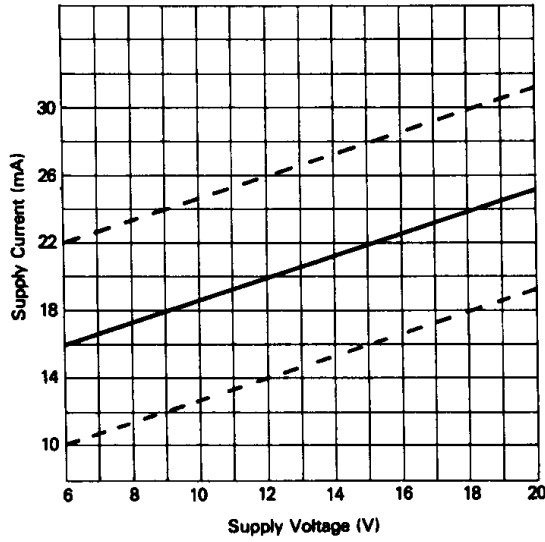
V_S = 12V, T_A = 25°C unless otherwise specified. 0 dB refers to Dolby level and is 580 mV, measured at TP1 and TP2.

Parameter	Conditions	LM1131A			LM1131B			LM1131C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Supply Voltage Range		5		20	5		20	5		20	V
Supply Current			20			20		20			mA
Voltage Gain											
(Pins 7-10 and 14-11)	1 kHz Decode	19.2	19.7	20.2	18.7	19.7	20.7	18.2	19.7	21.2	dB
(Pins 10-9 and 11-12)	1 kHz Decode	-0.5	0	0.5	-0.5	0	0.5	-1.0	0	1.0	dB
Difference in Voltage	1 kHz Noise	-0.2	0	0.2	-0.5	0	0.5	-1.0	0	1.0	dB
Gain between Channels	Reduction OFF										
Crosstalk between Channels	1 kHz, 0 dB	-60	-90		-60	-90		-60	-90		dB
Signal/Noise Ratio at Pins 9 and 12	(Note 1)										
Encode	R _S = 10 kΩ	77	79		75.5	79		74	79		dB
	R _S = 1 kΩ		82			82			82		dB
Decode	R _S = 10 kΩ		90			90			90		dB
	R _S = 1 kΩ		92			92			92		dB
Encode Characteristics	10 kHz, 0 dB	0	0.5	1.0	0.2	0.5	1.2	-0.5	0.5	1.5	dB
	1.3 kHz, -20 dB	-16.2	-15.7	-15.2	-16.7	-15.7	-14.7	-17.2	-15.7	-14.2	dB
	5 kHz, -20 dB	-17.3	-16.8	-16.3	-17.8	-16.8	-15.8	-18.3	-16.8	-15.3	dB
	3 kHz, -30 dB	-21.7	-21.2	-20.7	-22.2	-21.2	-20.2	-22.7	-21.2	-19.7	dB
	5 kHz, -30 dB	-22.3	-21.8	-23.0	-22.8	-21.8	-20.8	-23.3	-21.8	-20.3	dB
	10 kHz, -40 dB	-30.1	-29.6	-29.1	-30.3	-29.6	-28.9	-30.6	-29.6	-28.6	dB
Variation in Encode Characteristics											
Temperature	0°C-70°C		< ±0.5			< ±0.5			< ±0.5		dB
Voltage	5V-20V		< ±0.2			< ±0.2			< ±0.2		dB
Distortion	1 kHz, 0 dB		0.03	0.1		0.03	0.1		0.03	0.2	%
	10 kHz, 10 dB		0.2			0.2			0.2		%
Signal Handling	1 kHz, Dist = 0.3%										
	V _S = 5V		6.5			6.5			6.5		dB
	V _S = 7V		10.5			10.5			10.5		dB
	V _S = 12V	14.0	16.0		14.0	16.0		14.0	16.0		dB
	V _S = 20V		21.0			21.0			21.0		dB
Input Resistance	Pins 7 and 14	45	65	80	45	65	80	45	65	80	kΩ
Output Resistance	Pins 9 and 12		30	55		30	55		30	55	Ω
	Pins 10 and 11		30	55		30	55		30	55	Ω

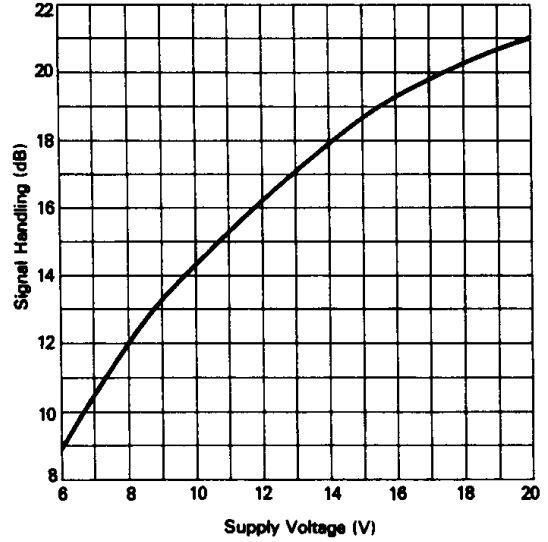
Note 1: Gaussian noise, measured over a period of 50 ms per channel, with a CCIR filter referenced to 2 kHz and an average-responding meter.

Typical Performance Characteristics

Supply Current vs Supply Voltage
(1 kHz, 0 dB; NR ON)

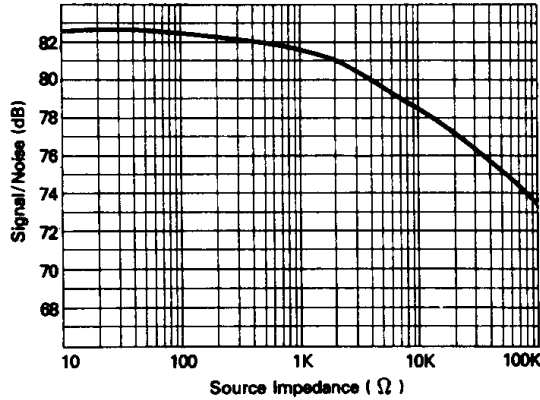


Signal Handling vs Supply Voltage

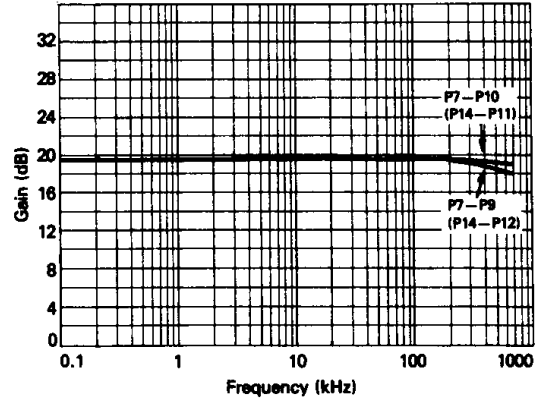


TL/H/6858-2

Signal to Noise Ratio vs Source Impedance
Encode Mode (CCIR/ARM)

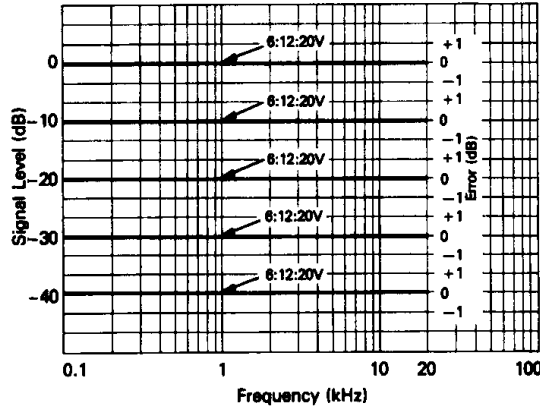


Gain vs Frequency (NR OFF)

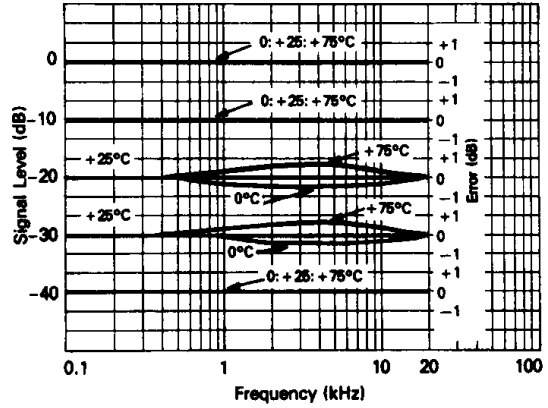


TL/H/6858-3

Back to Back Response Error vs Frequency and Supply Voltage (Standard Dolby Encoder)

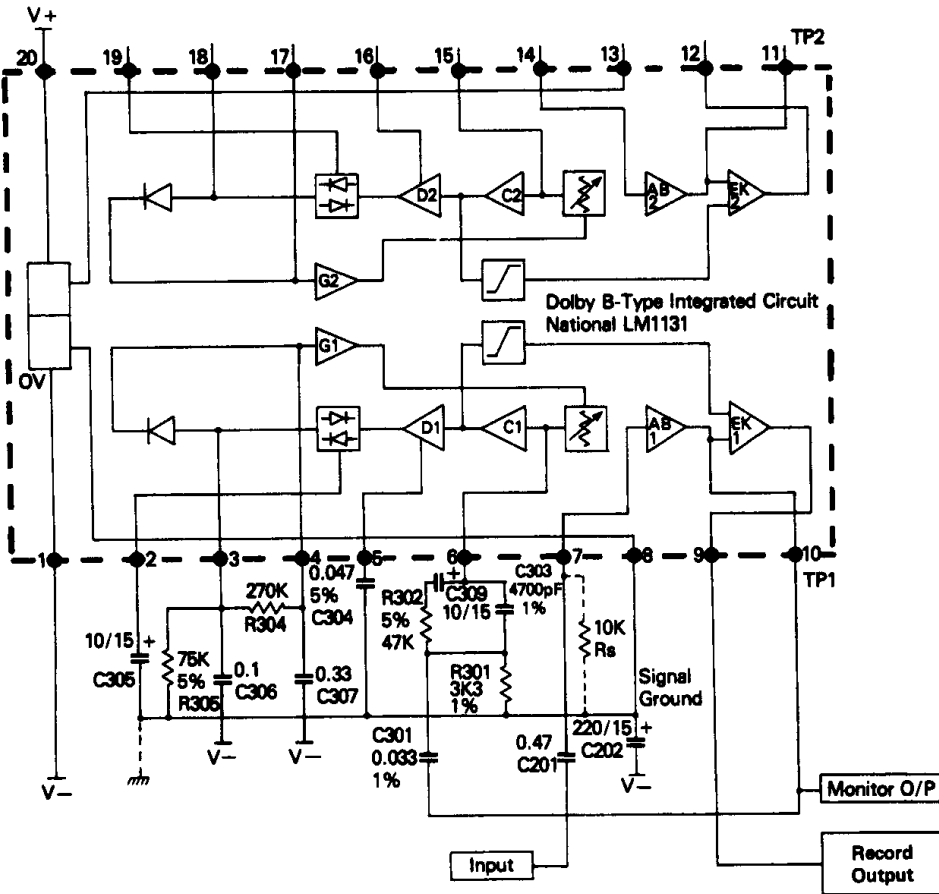


Back to Back Response Error vs Frequency and Temperature (Encode Temperature + 25°C)



TL/H/6858-4

Test Circuit Encode Mode (components shown for channel 1 only)



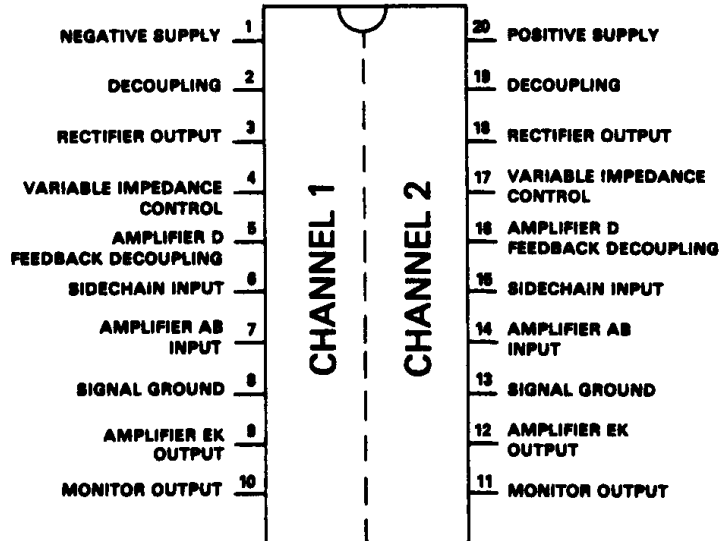
Note 1: Where not otherwise specified component tolerances are $\pm 10\%$

Note 2: For LM1131AN use 2% components for C304, R303, R305. (5% components may cause errors up to ± 0.3 dB).

TL/H/6858-6

Connection Diagram

Dual-In-Line and Small Outline Packages



Order Number LM1131AN, LM1131BN, LM1131CM or LM1131CN
See NS Package Number M20B or N20A

TL/H/6858-7