AN7354SC

Dolby* B/C-type Noise Reduction

■ Overview

The AN7354SC is an IC for 2 ch. Dolby B/C-Type noise reduction process. It requires fewer external parts and incorporates the functions of line-output muting and level detection and the delay circuit.

■ Features

- Built-in spectral skewing circuit not requiring external parts
- Line-output muting circuit built-in
- PB input delay circuit built-in
- Built-in level detection circuit for automatic level adjustment and level meter
- ON/OFF of NR, B-/C-type, REC./PB, MPX and muting function, and Hi/Lo changeover of level detection gain, directly-controllable by microcomputer

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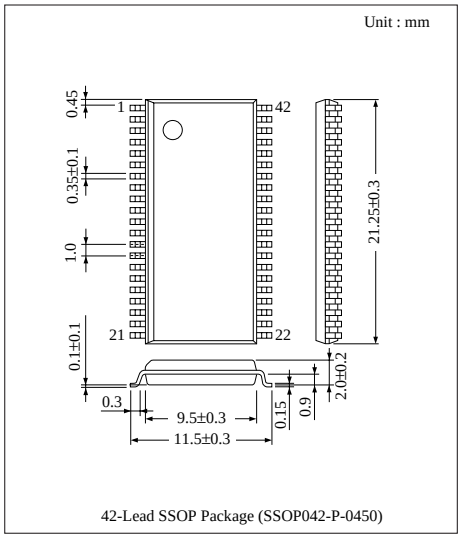
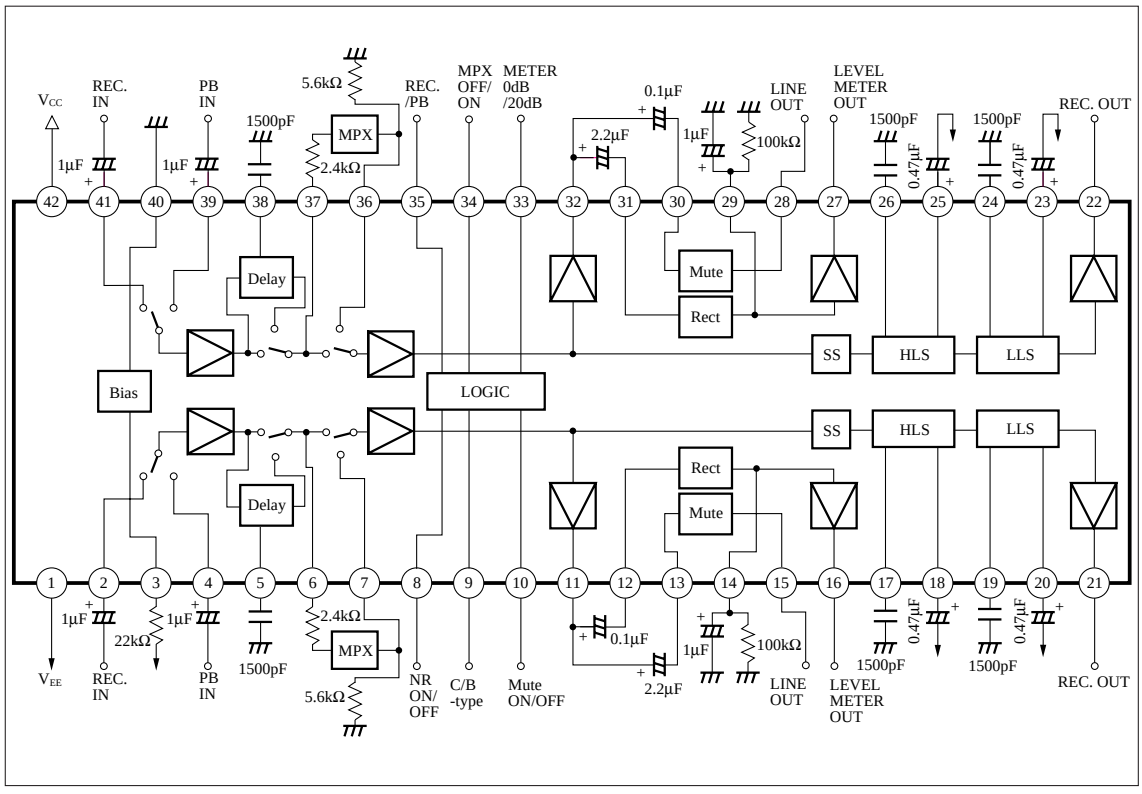


42-Lead SSOP Package (SSOP042-P-0450)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25˚C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{CC}	±6.7	V
Supply Current (Ta=75˚C)	I_{CC} (+)	+22	mA
	I_{CC} (–)	–22	
Power Dissipation (Ta=75˚C)	P_D	295	mW
Operating Ambient Temperature	T_{opr}	–20 ~ + 75	˚C
Storage Temperature	T_{stg}	–55 ~ + 125	˚C

■ Recommended Operating Range (Ta=25˚C)

Parameter	Symbol	Range
Operating Supply Voltage Range	V_{CC}	±4.5V ~ ±6.5V

■ Electrical Characteristics (V_{CC}= ± 6V, Ta=25˚C ± 2˚C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Total Circuit Current Note 1)	I_{CC}	REC., OFF, No input signals	12	16	20	mA
REC. – IN to REC. – OUT I/O Gain Note 2)	G_{rin}	REC., OFF, f = 1kHz REC. – OUT Level 388mV	17	19	21	dB
PB – IN to REC. – OUT I/O Gain Note 3)	G_{pin}	PB, OFF, f = 1kHz REC. – OUT Level 388mV	22	24	26	dB
MPX ON/OFF Gain Difference	DG_{mpx}	PB, OFF, f = 1kHz Gain difference from Gpin	– 1	0	1	dB
LINE – OUT Level	V_{lout}	PB, OFF, f = 1kHz V_{in} = 0dB	510	570	640	mVrms
B-type Encode Boost (1)	BR – 1	REC., B, f = 10kHz V_{in} = – 40dB	9.4	10.4	11.9	dB
B-type Encode Boost (2)	BR – 2	REC., B, f = 5kHz V_{in} = – 30dB	6.7	8.2	9.7	dB
B-type Encode Boost (3)	BR – 3	REC., B, f = 1kHz V_{in} = – 25dB	4.2	5.7	7.2	dB
B-type Encode Boost (4)	BR – 4	REC., B, f = 10kHz V_{in} = 0dB	– 1.1	0.4	1.9	dB
C-type Encode Boost (1)	CR – 1	REC., C, f = 1kHz V_{in} = – 60dB	18.1	19.6	21.6	dB
C-type Encode Boost (2)	CR – 2	REC., C, f = 5kHz V_{in} = – 40dB	11.5	13.5	15.5	dB
C-type Encode Boost (3)	CR – 3	REC., C, f = 300Hz V_{in} = – 30dB	8.7	10.7	12.7	dB
C-type Encode Boost (4)	CR – 4	REC., C, f = 5kHz V_{in} = – 25dB	3.5	5.5	7.5	dB
C-type Encode Boost (5)	CR – 5	REC., C, f = 15kHz V_{in} = 0dB	– 8.3	– 6.3	– 4.3	dB
Signal Handling	$V_{Omax.}$	REC., OFF, f = 1kHz V_{CC} = ±4.5V THD = 1%	12	13	—	dB
Total Harmonics Distortion – off	THDO	REC., OFF, f = 1kHz V_{in} = 0dB	—	0.02	0.15	%
Total Harmonics Distortion – C	THDC	REC., C, f = 1kHz V_{in} = 0dB	—	0.13	0.3	%
Signal to Noise Ratio	S/N	REC., C, R_g = 5.1kΩ CCIR/ARM Weighted	60.0	62.5	—	dB
Mode Switch Offset	Vofs – R	REC., OFF, → C switch, REC. – OUT potential fluctuation	–70	0	70	mV

Note 1) REC., OFF in the condition description, expresses that MODE is REC. and NR is OFF. The same for the following.
Note 2) Obtain the input voltage of REC. – IN when the output voltage of REC. – OUT becomes 388mVrms. For this input voltage, the reference level in REC. is assumed 0dB.
Note 3) Obtain the input voltage of PB. – IN when the output voltage of REC. – OUT becomes 388mVrms. For this input voltage, the reference level in PB is assumed 0dB.

■ Electrical Characteristics (Cont.) (V_{CC}= ± 6V, Ta=25˚C ± 2˚C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Channel Balance	CB	Gain difference between channels, Grin and Gpin	–1	0	1	dB
Total Harmonics Distortion Line Out	THDP	PB, OFF, f = 1kHz V_{in} = 0dB, LINE – OUT	—	0.02	0.15	%
Line Mute Attenuation	G_{mut}	PB, OFF, Mute ON f = 1kHz, V_{in} = 0dB	—	–85	–75	dB
Line Mute Offset	Vofs – M	Mute OFF → ON switching, LINE – OUT potential fluctuation	–20	0	20	mV
Level Meter Output (1) Note 4)	VDC (1)	PB, OFF, LMG Normal f = 1kHz, V_{in} = – 3dB	0.9	1.0	1.1	V
Level Meter Output (2)	VDC (2)	PB, OFF, LMG Normal f = 1kHz, V_{in} = +9dB	3.6	4.0	4.4	V
Level Meter Output (3)	VDC (3)	PB, OFF, LMG High f = 1kHz, V_{in} = –18dB	0.9	1.0	1.1	V
Level Meter Output Offset	Vofs – L	PB, OFF, LMG Normal No Input	–15	0	15	mV
Delay Output (1)	VPS (1)	V_{in} = – 0.2V S30 → C PB MPX off Piny and Pin#7 DC Potential	2	3	4	V
Delay Output (2)	VPS (2)	V_{in} = + 0.2V S30 → C PB MPX off Difference from VPS (1)	4	6	8	V
Delay Output (3)	VPS (3)	V_{in} = – 0.2V S30 → B PB MPX off Piny and Pin#7 DC Potential	– 0.1	0	0.1	V
Delay Output (4)	VPS (4)	V_{in} = + 0.2V S30 → B PB MPX off Difference from VPS (3)	– 0.2	0	0.2	V
Delay Output (5)	VPS (5)	V_{in} = – 0.2V S30 → A PB MPX off Piny and Pin#7 DC Potential	– 4	–3	–2	V
Delay Output (6)	VPS (6)	V_{in} = + 0.2V S30 → A PB MPX off Difference from VPS (5)	4	6	8	V

Note 4) LMG in the condition description is an abbreviation of Level Meter Gain.

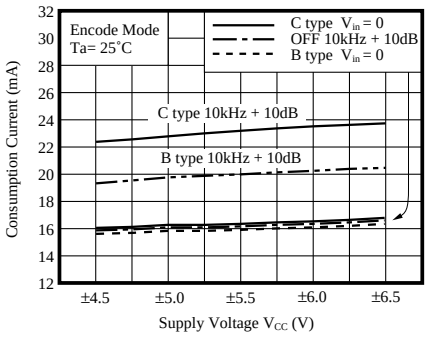
■ Electrical Characteristics (Ta=25˚C±2˚C) [Design Reference Values]

The following characteristic values are reference values for design but not guaranteed values.

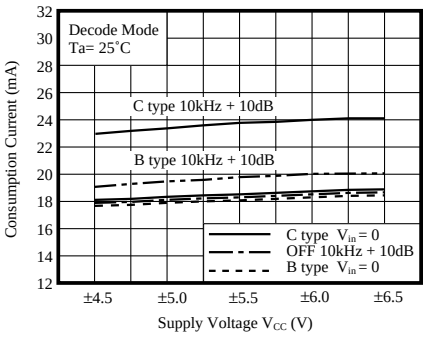
Parameter	Symbol	Condition	min.	typ.	max.	Unit
Decreased Voltage Mute (1)	$V_{mut\ (1)}$	PB, OFF, Mute OFF, f=1kHz, V_{in} = 0dB Voltage between Pins1 and 42 when mute functions	4.4	6.4	8.4	V
Crosstalk, REC.– IN to LINE– OUT	CT– RP	PB, OFF, f = 1kHz V_{in} = 0dB (At REC)	—	–80	–70	dB
Crosstalk, PB– IN to REC.– OUT	CT– PR	PB, OFF, f = 1kHz V_{in} = 0dB (At PB)	—	–80	–70	dB
Crosstalk, Cannel to Cannel	CT– CC	PB, OFF, f = 1kHz V_{in} = 0dB	—	–80	–70	dB
PB/REC. Control Voltage PB	V_CPB	Pin35 applied DC voltage when PB, MPX are OFF	+2.5	—	+6	V
PB/REC. Control Voltage REC.	V_CREC.	Pin35 applied DC voltage when PB, MPX are ON	–1.5	—	+1.5	V
MPX Control Voltage ON	V_CMon	Pin34 applied DC voltage when PB, MPX are ON	–1.5	—	+1.5	V
MPX Control Voltage OFF	V_CMoff	Pin34 applied DC voltage when PB, MPX are OFF	+2.5	—	+6	V
Meter Control Voltage Normal	V_CMnor	Pin33 applied DC voltage when Meter becomes Normal	+2.5	—	+6	V
Meter Control Voltage Hi	V_CMhi	Pin33 applied DC voltage when Meter becomes Hi	–1.5	—	+1.5	V
NR Control Voltage ON	V_CON	Pin8 applied DC voltage when NR is ON	+2.5	—	+6	V
NR Control Voltage OFF	V_COFF	Pin8 applied DC voltage when NR is OFF	–1.5	—	+1.5	V
B/C Control Voltage C	V_CC	Pin9 applied DC voltage for C-type NR	+2.5	—	+6	V
B/C Control Voltage B	V_CB	Pin9 applied DC voltage for B-type NR	–1.5	—	+1.5	V
Mute Control Voltage ON	V_CMUon	Pin10 applied DC voltage when Mute is ON	+2.5	—	+6	V
Mute Control Voltage OFF	V_CMUof	Pin10 applied DC voltage when Mute is OFF	–1.5	—	+1.5	V
REC.– IN Input Resistance	Rin – RI		56.4	64	75.6	kΩ
PB – IN Input Resistance	Rin – PI		28.05	33	37.95	kΩ

■ Characteristics Curve

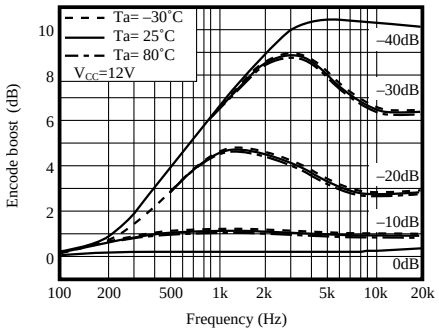
Consumption Current



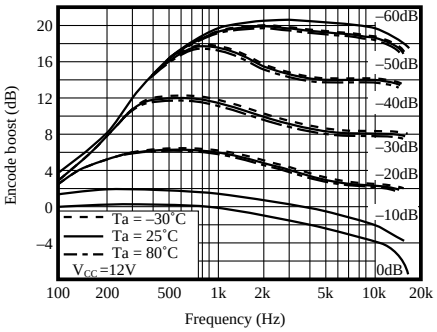
Consumption Current



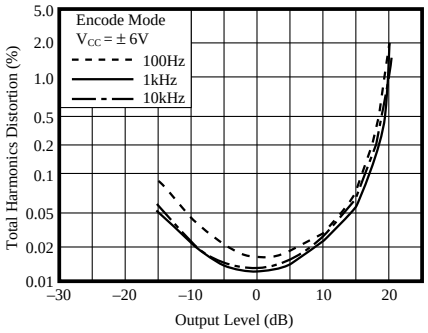
B – type Encode Characteristics



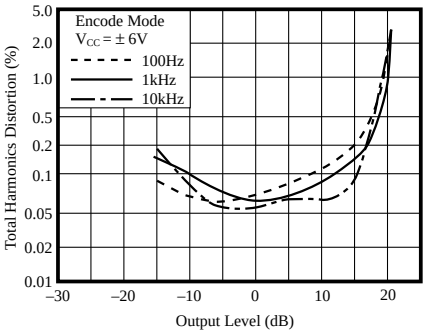
C – type Encode Characteristics



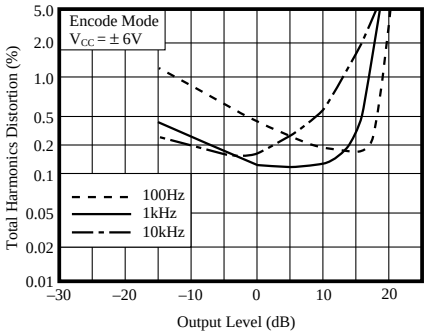
NR OFF Total Harmonics Distortion



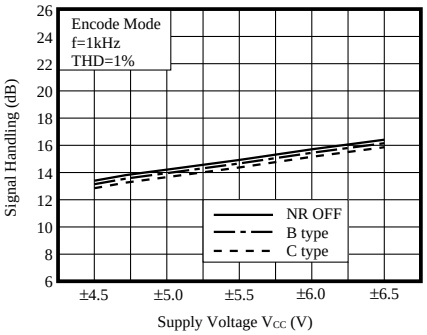
B – type Total Harmonics Distortion



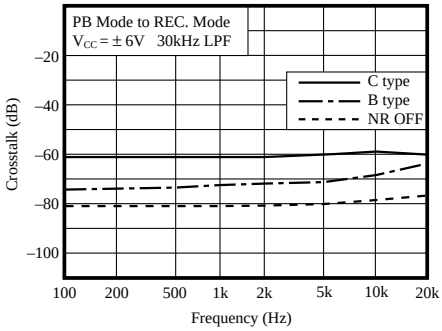
C – type Total Harmonics Distortion



Signal Handling



Crosstalk



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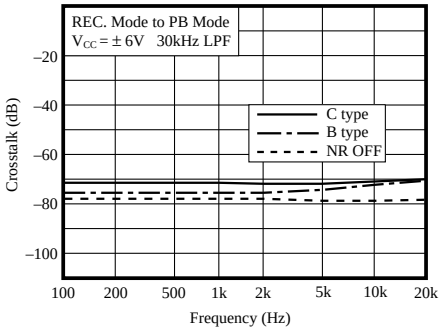
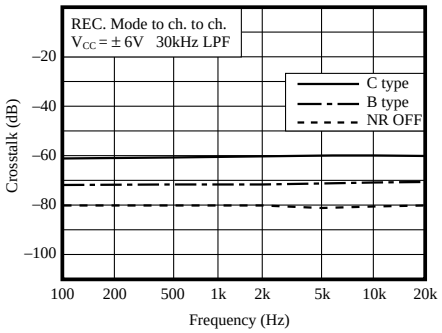
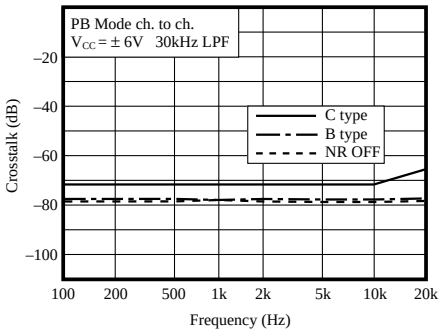


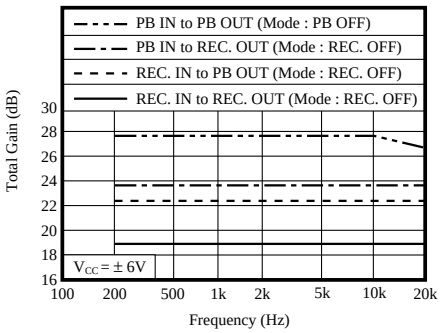
Crosstalk



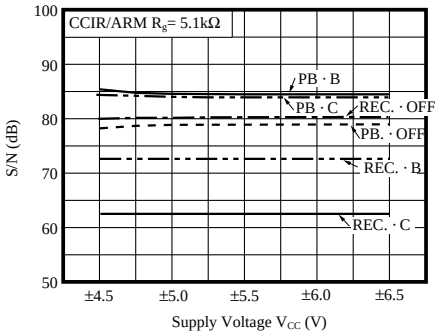
Crosstalk



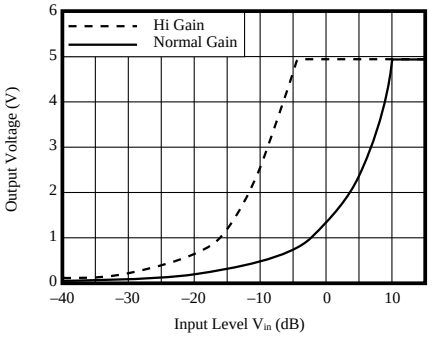
Total Gain



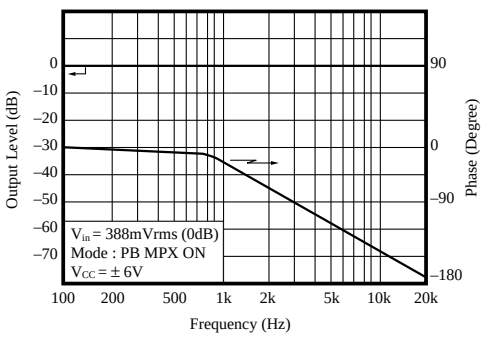
S/N



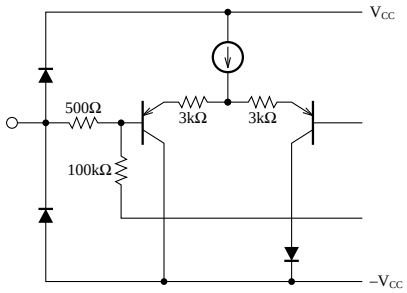
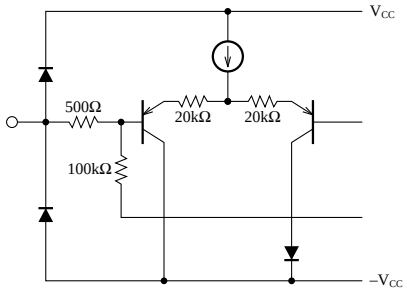
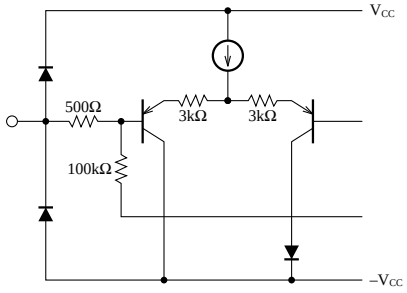
Level Meter Characteristics



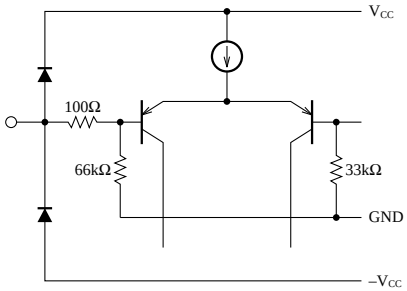
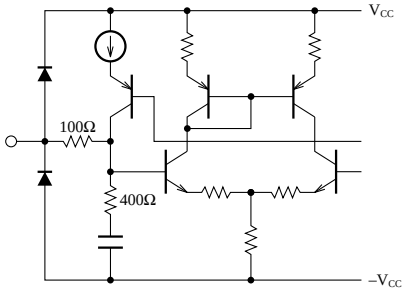
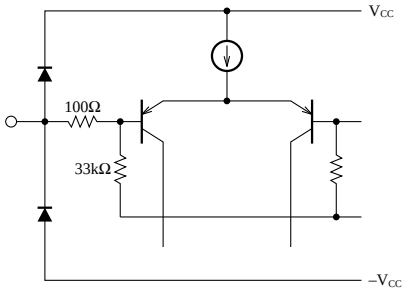
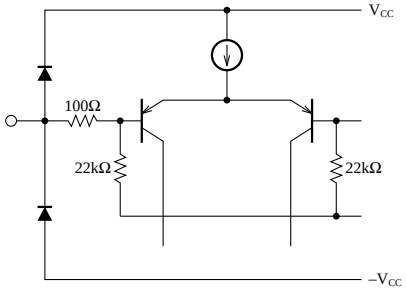
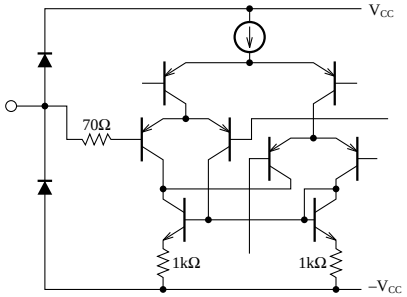
Delay Circuit Characteristics



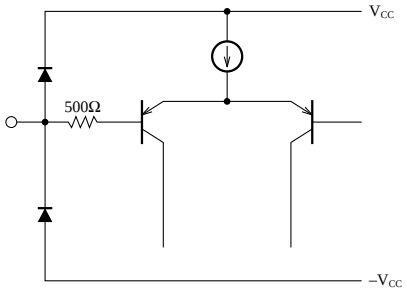
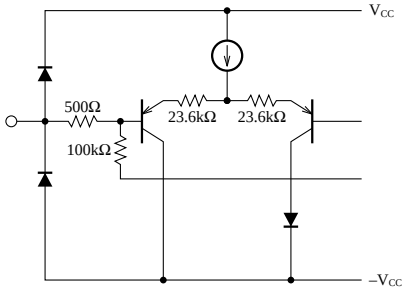
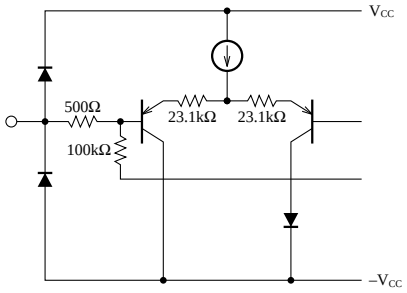
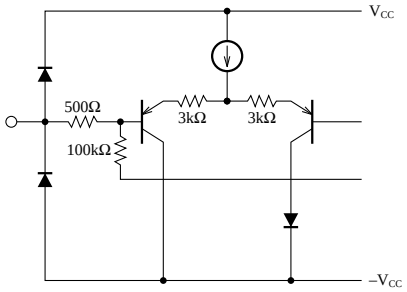
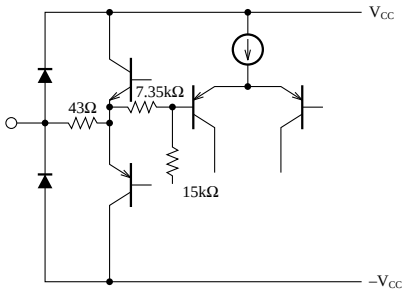
■ Pin Description

Pin No.	Pin Name	Input Impedance Pin Voltage	Pin Description	Equivalent Circuit
1	V_{EE}	–6V	Supply voltage (–)	————
42	V_{CC}	6V	Supply voltage (+)	————
40	GND	0V	Ground neutral GND	————
33	METER Nor/Hi	100kΩ 3.1V	Level meter Normal/Hi changeover switch pin	
34	MPX OFF/ON	100kΩ 3.1V	MPX OFF/ON changeover switch pin	
35	PB/REC.	100kΩ 3.1V	PB –Mode/ REC.–Mode changeover switch pin	

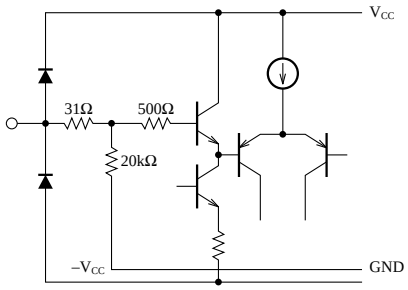
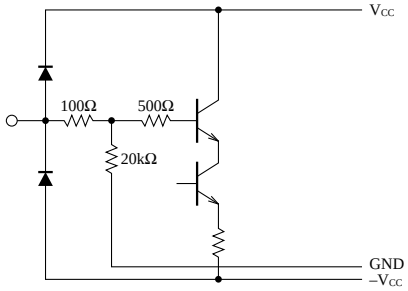
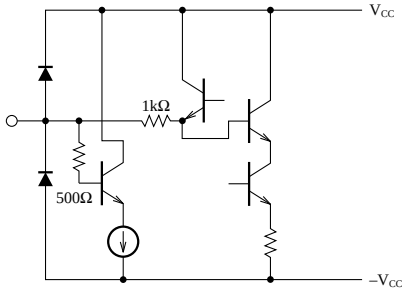
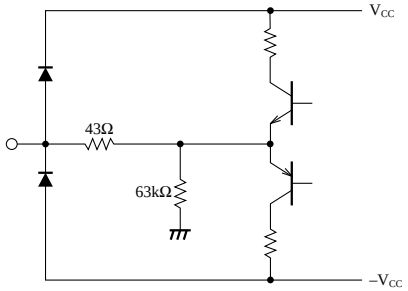
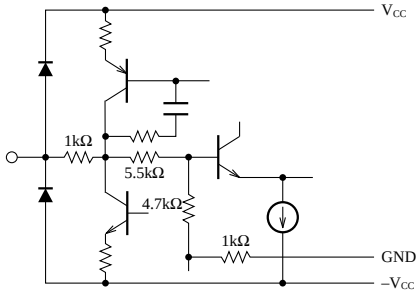
■ Pin Description (Cont.)

Pin No.	Pin Name	Input Impedance Pin Voltage	Pin Description	Equivalent Circuit
2 41	REC. IN	66kΩ neutral GND	Record input pin	
3	I_{REF}	7∞ –5V	Internal resistor error calibration pin	
4 39	PB – IN	33kΩ neutral GND	Playback input pin	
5 38	Delay	22kΩ neutral GND	Delay circuit control pin	
6 37	MPX OUT	70Ω –45mV	MPX drive amp. output pin	

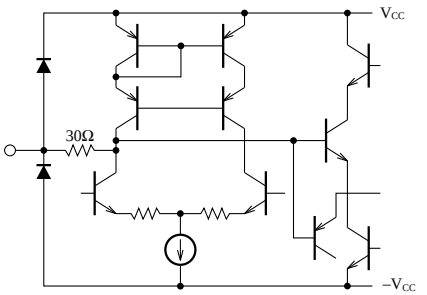
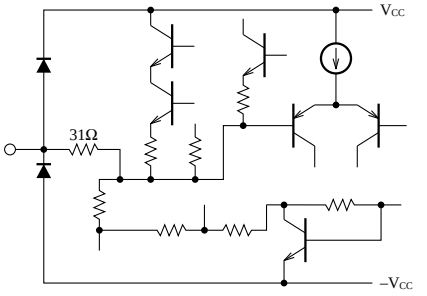
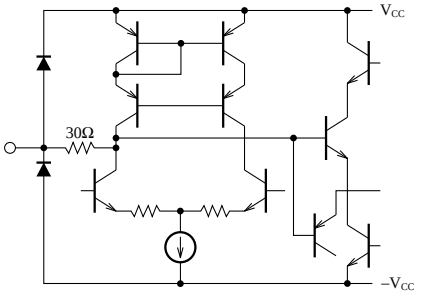
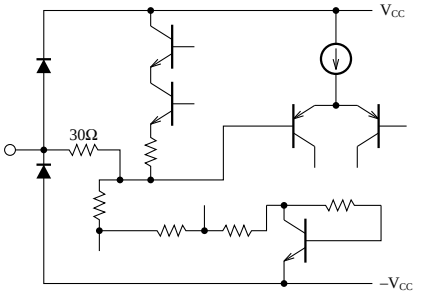
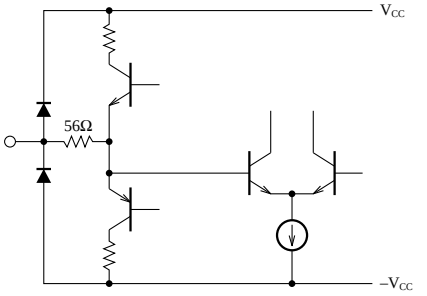
■ Pin Description (Cont.)

Pin No.	Pin Name	Input Impedance Pin Voltage	Pin Description	Equivalent Circuit
7 36	MPX IN	500Ω –30mV	MPX gain aux. amp. input pin	
8	NR ON/OFF	100kΩ3.1V	NR ON/OFF changeover switch pin	
9	C/B-type	100kΩ3.1V	C/B type changeover switch pin	
10	Mute ON/OFF	100kΩ 3.1V	Mute ON/OFF changeover switch pin	
11 32	LINE OUT	43Ω neutral GND	Playback output pin	

■ Pin Description (Cont.)

Pin No.	Pin Name	Input Impedance Pin Voltage	Pin Description	Equivalent Circuit
12 31	METER IN	20kΩ neutral GND	Level meter input pin	
13 30	MUTE – IN	20kΩ neutral GND	Mute input pin	
14 29	LEVEL	1kΩ neutral GND	Level meter control pin	
15 28	LINE MUTE OUT	63kΩ neutral GND	Playback mute output pin	
16 27	METER OUT	1kΩneutral GND	Level meter output pin	

■ Pin Description (Cont.)

Pin No.	Pin Name	Input Impedance Pin Voltage	Pin Description	Equivalent Circuit
17 26	VCR H	——— Neutral GND	HLS side chain control resistor pin	
18 25	RECT H	——— –5.45V	HLS control signal smoothing pin	
19 24	VCR L	——— Neutral GND	LLS side chain control resistor pin	
20 23	RECT–L	——— –5.45V	LLS control signal smoothing pin	
21 22	REC. OUT	56Ω neutral GND	Record output pin	

■ Precautions on Product Handling and Mounting

The AN7354SC Package is dry-sealed, because thermal stress at solder mounting may adversely affect the product reliability due to the moisture absorption in the resin.

Take into consideration the following instructions for its use :

1. After unpacking the dry sealing package, in order to reduce absorption of the resin, store the product under temperature of 30˚C or lower and RH65% or less, and perform its mounting within 5 days following the unpacking, except when only lead section is heated by such as hand soldering. In addition, after unpacking, put the remainder back into the laminate bag and seal the bag with tapes or similars. Unless the silica gel in the bag discolors (blue to pink), its quality is guaranteed within 10 days.

2. If the product is stored under the conditions more than the above, pre-bake it (for 6 hours or more under 125˚C, or for 48 hours more under 70˚C) before mounting.

3. About soldering method

(1) Solder dip method

Solder dip must be performed under as low temperature as possible not exceeding 260˚C and for as short time as possible not exceeding 5s.

(2) Reflow method

((Remarks)) 1 Peak temperature : 230˚C or lower
2 Peak time : 10s or shorter
3 Do not sharply rise the temperature from pre-heat temperature (150˚C or lower) to peak temperature (230˚C).
4 Reflow process must be performed only once.

(3) Hand soldering method

When only leads are simultaneously heated, soldering must be performed under as low temperature as possible not exceeding 300˚C and for as short time as possible not exceeding 20s.

(4) For any soldering method, do not use the chlorine flux. If the chlorine flux is used, residual chlorine may adversely affect the product reliability.

Thoroughly clean the IC after mounting. Any flux remaining after mounting results in lead corrosion, degrading the product reliability. In addition, if supersonic waves are used for cleaning, particular care must be taken, because resonance may occur depending on the size of IC and printed board.

Request for your special attention and precautions in using the technical information and semiconductors described in this material

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(5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.

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