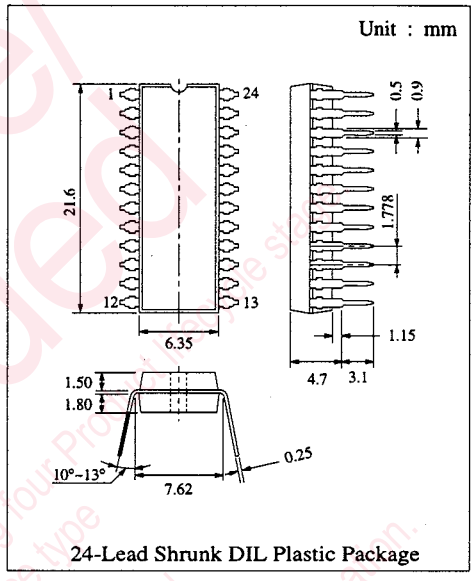
AN3383K

Head Recording Amplifier for 4-Head VCR

■ Description

The AN3383K is an integrated circuit developed as a RF signal recording/playback amplifier for 4-head VCRs. This IC, with all the functions required for RF signal recording/playback built in a 24-pin package, shares external parts at recording/playback time to realize low costs and miniaturization.

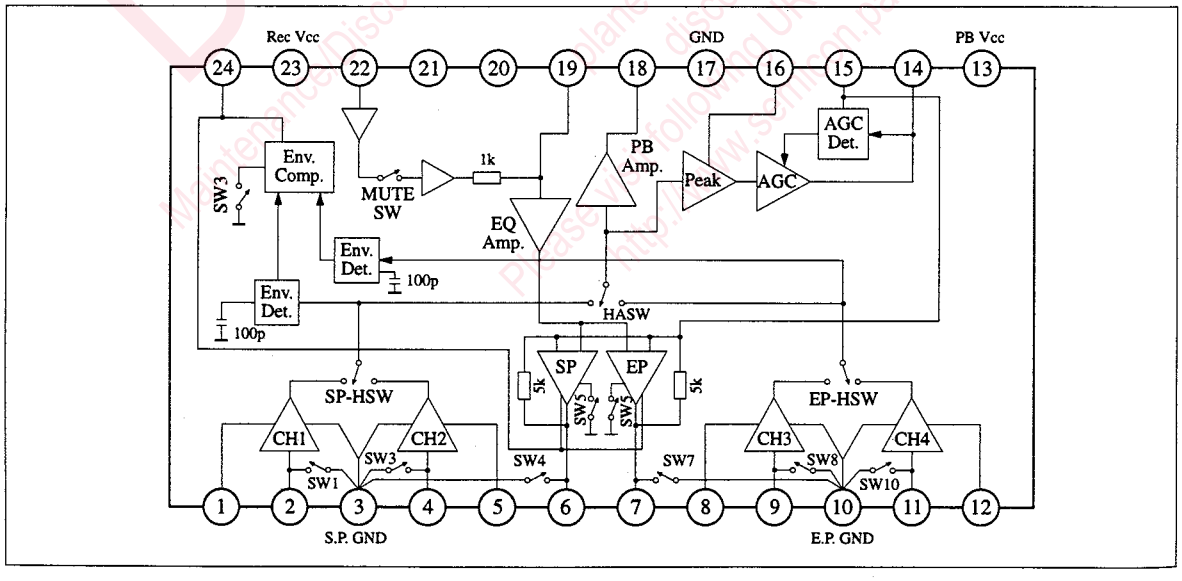


24-Lead Shrunk DIL Plastic Package

■ Features

- Operating circuit voltage: 9V (typ.) for recording, and 5V (typ.) for playback
- Low noise for the playback system; Input conversion noise voltage 1μVrms (max.)
- Built-in 4 preamplifiers and selector switches
- Built-in envelop comparator
- Built-in playback output amplifier and AGC amplifier
- Built-in constant-current output recording amplifier (2 channels)
- Built-in recording mute switch
- Built-in recording EQ amplifier
- Provided with a recording output monitor pin to facilitate adjustment and checking of the recording level

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage (REC)	REC Vcc	10	V
Supply Voltage (PB)	PB Vcc	6	V
Power Dissipation (Ta=70°C)	PD	784	mW
Operating Ambient Temperature	Topr	-20 ~ +70	°C
Storage Temperature	Tstg	-55 ~ +150	°C

■ Recommended Operating Range (Ta=25°C)

Item	Symbol	Range
Operating Supply Voltage (REC) Range	REC Vcc	8V ~9.5V
Operating Supply Voltage (PB) Range	PB Vcc	4.5V ~ 5.5V

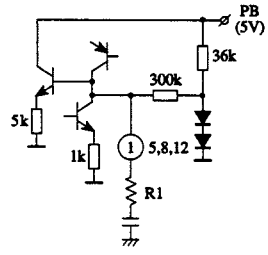
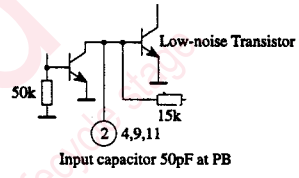
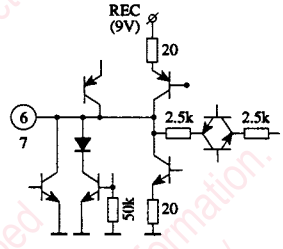
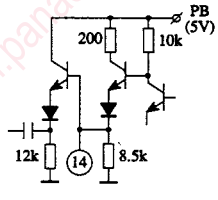
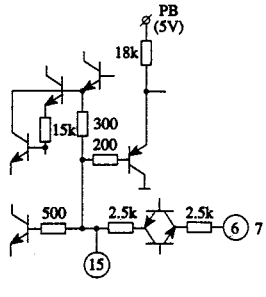
■ Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Playback static circuit current	IPCQ	PB Vcc=5V, measurement of Pin 13 inflow current	37	47	57	mA
CH1 playback voltage gain	GV1	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Low, Pin 2 input : f=4MHz, 0.3mVpp. Gain calculation after measurement of Pin 18 output level	50.5	55.5	60.5	dB
CH2 playback voltage gain	GV2	PB Vcc=5V, Pin 20 at Low, Pin 21 at Low, Pin 4 input : f=4MHz, 0.3mVpp. Gain calculation after measurement of Pin18 output level	50.5	55.5	60.5	dB
CH3 playback voltage gain	GV3	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Hi, Pin 9 input : f=4MHz, 0.3mVpp. Gain calculation after measurement of Pin 18 output level	50.5	55.5	60.5	dB
CH4 playback voltage gain	GV4	PB Vcc=5V, Pin 20 at Low, Pin 21 at Hi, Pin 11 input : f=4MHz, 0.3mVpp. Gain calculation after measurement of Pin 18 output level	50.5	55.5	60.5	dB
AGC output amplitude	VAGC	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Low, Pin 2 input : f=4MHz, 0.3mVpp. Gain calculation after measurement of Pin 14 output level	120	165	210	mVpp
AGC control sensitivity	ΔVAGC	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Low, Pin 4 input : f=4MHz, 0.15 to 0.6mVpp. Measurement of Pin 14 output change amount	0	0.7	3	dB
HEAD SW Lo holding voltage	VHSL	PB Vcc=5V, Pin 21 at Low, Pin 4 input : f=4MHz, 0.3mVpp. Pin 18 DC at which Pin 20 output level does not change	0		0.7	V
HEAD SW Hi holding voltage	VHSH	PB Vcc=5V, Pin 21 at Low, Pin 2 input : f=4MHz, 0.3mVpp. Pin 18 DC at which Pin 20 output level does not change	1.7		5	V
HEAD AMP SW Lo SP side output holding voltage	VHASL	PB Vcc=5V, Pin 20 at Hi, Pin 2 input : f=4MHz, 0.3mVpp. Pin 18 DC at which Pin 21 output level does not change	0		1.5	V
HEAD AMP SW Hi EP side output holding voltage	VHASH	PB Vcc=5V, Pin 20 at Hi, Pin 9 input : f=4MHz, 0.3mVpp. Pin 18 DC at which Pin 21 output level does not change	3.5		5	V
CH1 input conversion noise voltage	N1	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Low, Pin 2 with no input and terminated at 10Ω. Measurement through Pin 18 output 1MHz BPF			1	μVrms
CH2 input conversion noise voltage	N2	PB Vcc=5V, Pin 20 at Low, Pin 21 at Low, Pin 4 with no input and terminated at 10Ω. Measurement through Pin 18 output 1MHz BPF			1	μVrms
CH3 input conversion noise voltage	N3	PB Vcc=5V, Pin 20 at Hi, Pin 21 at Hi, Pin 9 with no input and terminated at 10Ω. Measurement through Pin 18 output 1MHz BPF			1	μVrms
CH4 input conversion noise voltage	N4	PB Vcc=5V, Pin 20 at Low, Pin 21 at Hi, Pin 11 with no input and terminated at 10Ω. Measurement through Pin 18 output 1MHz BPF			1	μVrms
Envelop comparision output amplitude	ΔVE	PB Vcc=5V, Pin 21 at Low, Pin 20 at 30Hz, 5Vpp, Pin 2, 11 input : 4MHz,0.3mVpp, Pin 4, 9 input : 4MHz, 0.6mVpp, Pin 19 at Hi	4.3			Vpp
Cue/Rev/SS CTL OFF holding voltage	VC OFF	PB Vcc=5V, Pin 21 at Low, Pin 20 at 30Hz, 5Vpp, Pin 2, 11 input : 4MHz, 0.3mVpp, Pin 4, 9 input : 4MHz, 0.6mVpp, Pin 25 DC without Pin 19 output amplitude	0		1.5	V

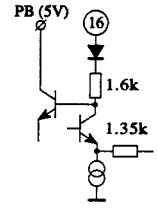
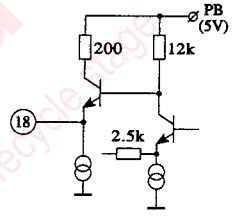
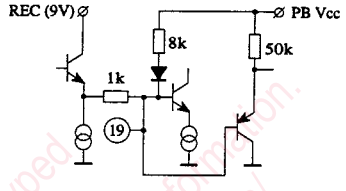
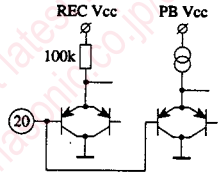
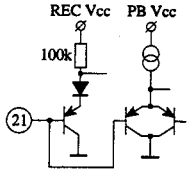
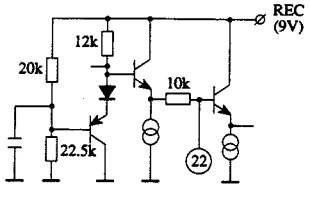
■ Electrical Characteristics (Ta=25°C) (Continue)

Item	Symbol	Condition	min.	typ.	max.	Unit
Cue/Rev/SS CTL ON holding voltage	$V_{C\,ON}$	PB Vcc=5V, Pin 21 at Low, Pin 20 at 30Hz,5Vpp, Pin 2, 11 input : 4MHz,0.3mVpp, Pin 4, 9 input : 4MHz, 0.6mVpp, Pin 24 DC with Pin 19 output amplitude	3.5		5	V
Recording static circuit current	I_{RCQ}	REC Vcc=9V, Pin 20 at Hi, Pin 21 at Low, Measurement of Pin 23 inflow current	43	53	63	mA
SP recording current gain	GI_{SP}	REC Vcc=9V, Pin20 at Hi, Pin 21 at Low, Pin 22 input : f=4MHz, 70mVpp. Gain calculation after measurement of Pin 7 output level	340	425	535	m℧
EP recording curent gain	GI_{EP}	REC Vcc=9V, Pin 20 at Hi, Pin 21 at Hi, Pin 22 input : f=4MHz, 70mVpp. Gain calculation after measurement of Pin 7 output level	340	425	535	m℧
SP/EP recording current ratio	I_{EP}/I_{SP}	REC Vcc=9V, Pin 20 at Hi, Pin 21 at Hi, Pin 22 input : f=4MHz, 70mVpp. Output level ratio between Pin 7 and Pin 6	-3	0	3	dB
Recording current frequency	$I_{SP'}/I_{SP}$	REC Vcc=9V, Pin 20 at Hi, Pin 2 at Low, Pin 22 input : f=4MHz to 8MHz, 70mVpp. Measurement of Pin 6 output change amount	-5.7	-3.7	-1.7	dB
Recording current muting ratio	MR	REC Vcc=9V, Pin 20 at Hi, Pin 2 at Low, Pin 22 input : f=4MHz, 70mVpp. Measurement of Pin 6 output change amount			-40	dB
REC OUT DET gain	GI_{RD}	REC Vcc=9V, Pin 20 at Hi, Pin 21 at Low, Pin 22 input : f=4MHz, 70mVpp. Gain calculation after measurement of Pin 6 output level	34	42.5	53.5	m℧
REC SP mode holding voltage	V_{SP}	REC Vcc=9V, Pin 20 at Hi, Pin 22 input : f=4MHz, 70mVpp. Pin 21 DC at which Pin 6 output level does not change	0		1.5	V
REC EP mode holding voltage	V_{EP}	REC Vcc=9V, Pin 20 at Hi, Pin 22 input : f=4MHz, 70mVpp. Pin 21 DC at which Pin 7 output level does not change	3.5		5	V
REC MUTE ON holding voltage	$V_{M\,ON}$	REC Vcc=9V, Pin 21 at Low, Pin 22 input : f=4MHz, 70mVpp. Pin 20 DC at which no Pin 6 output amplitude	0		1.5	V
REC MUTE OFF holding voltage	$V_{M\,OFF}$	REC Vcc=9V, Pin 20 at Low, Pin 22 input : f=4MHz, 70mVpp. Pin 20 DC at which Pin 6 output amplitude	3.5		8	V

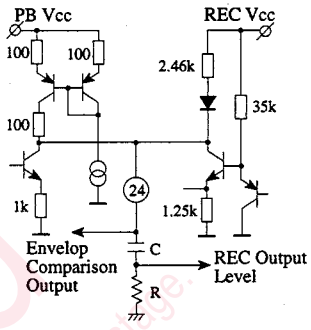
■ Pin Descriptions

Pin No.	Pin Name	Typ. DC(V)	Description	Equivalent Circuit
1 5 8 12	Damping control pin	1.65V (PB)	Controls the damping characteristic of the head amplifier via an external resistor.	
2 4 9 11	PB input pin and GND pin at REC	0.69V (PB)	At PB; EP input pin terminated in the SP mode when the Cue/Rev/SS pin is at Low. SP input pin terminated in the EP mode. All PB input terminated transistors are off when the Cue/Rev/SS pin is at High. Terminal resistor 10Ω At REC; Terminal resistor 5Ω	
6 7	REC output and GND pin at PB	4.6V (REC)	At REC; Constant current output. EP REC output terminated in the SP mode. SP REC output terminated in the EP mode, Terminal resistor 70Ω. At PB; Terminal resistor 5Ω	
3 10	GND pin	0V	Input side GND at PB. Output side GND at REC.	
13	PB Vcc pin	5V (PB)	Do not apply at REC.	
14	AGC output pin	2.45V (PB)	Output impedance 90Ω	
15	AGC detection pin and REC feedback	2.73V (PB) 4.76V (REC)		

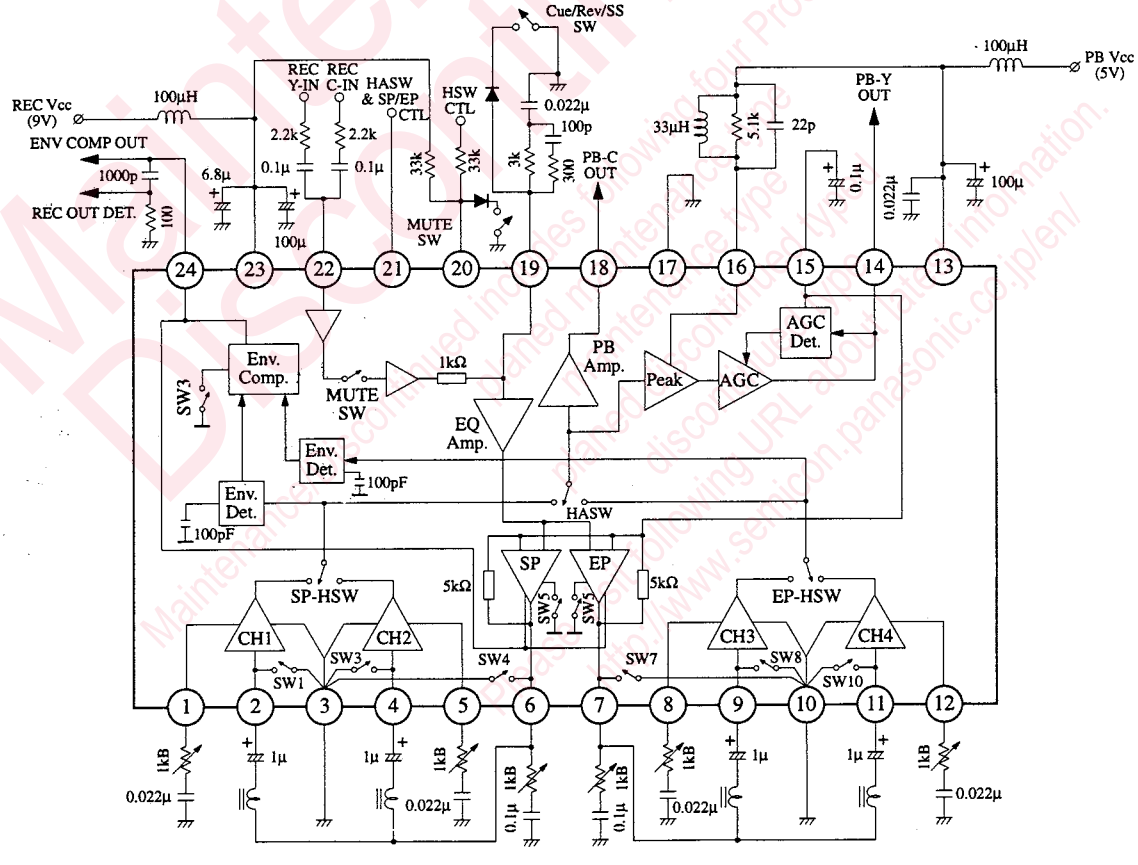
■ Pin Descriptions (Continue)

Pin No.	Pin Name	Typ. DC(V)	Description	Equivalent Circuit
16	Peaking	4.95V (PB)		
17	GND	0V	Output side GND at PB. Input side GND at REC.	
18	Playback Amp. output	2.9V (PB)	Output impedance 120Ω	
19	REC EQ and playback mode setting	4.3V (REC)	At PB : Cue/Rev/SS 0V~1.5V OFF Cue/Rev/SS 3.5V~5V ON	
20	HEAD SW CTL and REC MUTE		At PB : HSW CTL. CH1, CH3 select: 1.7V~5V CH2, CH4 select: 0V~0.7V At REC : MUTE CTL. MUTE OFF 3.5V~8V MUTE ON 0V~1.5V	
21	HASW CTL and REC SP/EP selector		At PB : HASW CTL. CH1, CH2 select: 0V~1.5V CH3, CH4 select: 3.5V~5V At REC : SP/EP change-over SP mode: 0V~1.5V EP mode: 3.5V~5V	
22	REC signal input	5.67V (REC)	Input impedance at REC : 10kΩ	

■ Pin Descriptions (Continue)

Pin No.	Pin Name	Typ. DC(V)	Description	Equivalent Circuit
23	REC Vcc	9V (REC)		
24	Envelop comparision output and REC output level detection	3.1V (REC)	At PB and when Cue/Rev/SS is ON: Serves as an envelop comparision output pin. At REC : Serves as a current output pin proportional to REC current output. External value (recommended): C = less than 1000pF R = less than 100Ω	

■ Application Circuit



■ Supplementary Explanation

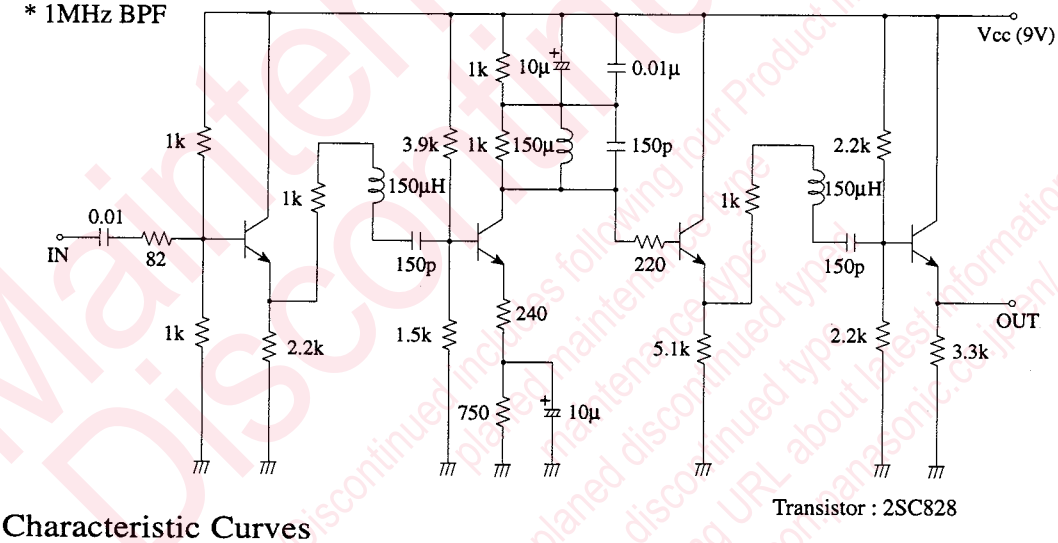
● Electrical Characteristics Design Reference Values (Ta=25°C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Recording current secondary distortion	HDI_2	REC Vcc = 9V, f = 4MHz			-35	dB
Recording current mixed modulation relative level (±fc)	C_{M1}	REC Vcc = 9V			-50	dB
Recording current mixed modulation relative level (±2fc)	C_{M2}	REC Vcc = 9V			-50	dB
Recording current constant current characteristii	I_{L1}/I_{L2}	REC Vcc = 9V	-1	0	1	dB

● Precautions for Use

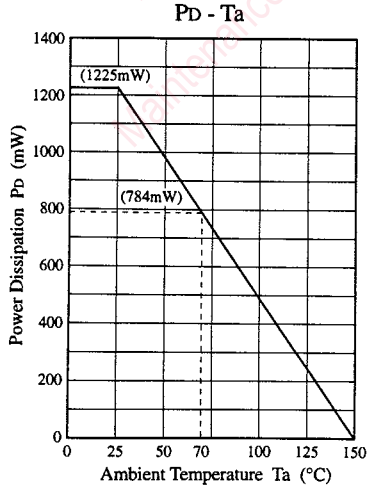
In the frequency characteristic of recording current output, there occurs a low-pass (1MHz or less) upsurge at a low temperature due to the temperature characteristic of the electrolytic capacitor impedance of the power passive component. So, it is recommended to use a tantalum capacitor (6.8µF, 35V recommended) in parallel with the electrolytic capacitor.
When a capacitor is connected between head amp. input pin (Pin 2, Pin 4, Pin 9, Pin 11) and GND, use one of value less than 68pF, because too big values may result in oscillation.

● Circuit Diagram



Transistor : 2SC828

● Characteristic Curves



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