AN6357N, AN6359N

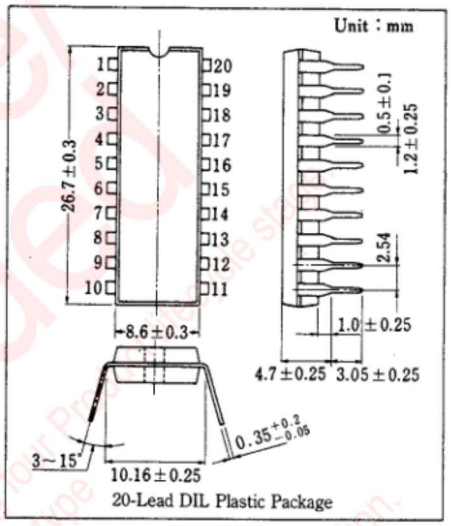
VTR Capstan Interface Circuits

■ Outline

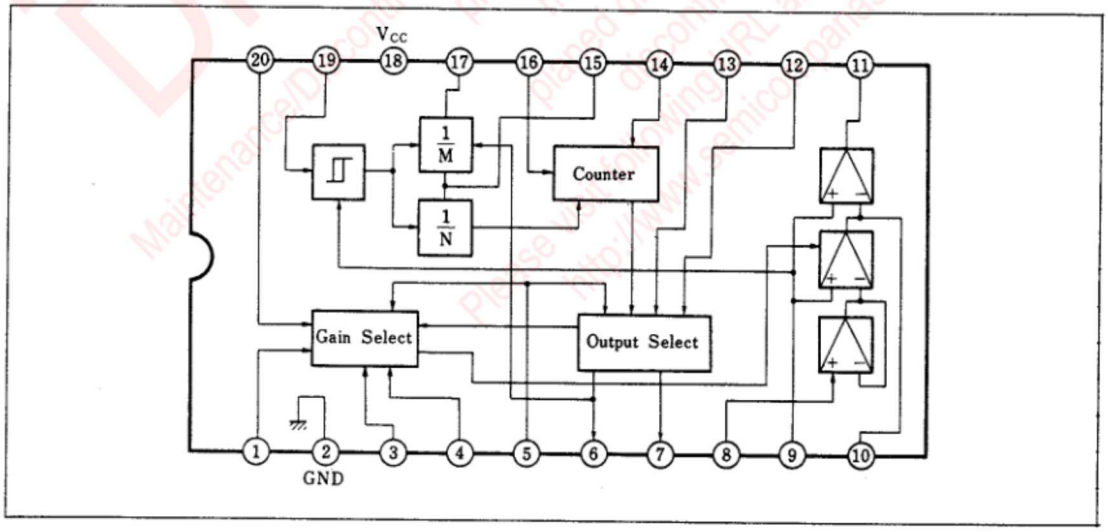
The AN6357N and AN6359N are integrated circuits designed for VTR capstan interface.

■ Features

- The functions consist of :
  - FG Amplifier
  - 2H/4H/6H automatic detector
  - FG divider
  - Gain automatic change circuit
- Supply voltage : 5V



■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Mode Select B	11	Cap. Error Output
2	GND	12	REC./P.B. Select
3	Mode Select C	13	Rec.2/4/6 Select
4	Mode Select ×½	14	Memory
5	PAL/NTSC Select	15	FG Divide Select
6	B Output	16	P.B. CTL Input
7	A Output	17	Cap. FG Output
8	Cap. Error Input	18	V_{CC}
9	Reference Input	19	Cap. FG Input
10	OP Amp. Input	20	Mode Select A

■ Absolute Maximum Ratings (Ta=25℃)

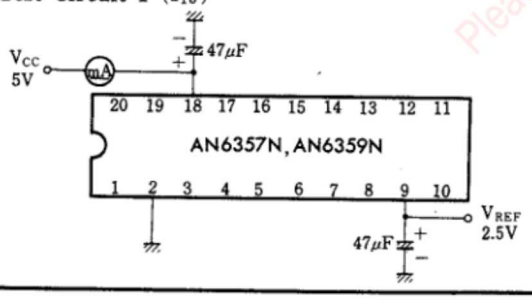
Item	Symbol	Rating	Unit
Supply voltage	V_{CC}	6.0	V
Power dissipation (Ta=70℃)	P_D	100	mW
Operating ambient temperature	T_{opr}	−20~+70	℃
Storage temperature	T_{stg}	−55~+150	℃

■ Electrical Characteristics (Ta=25℃±2℃)

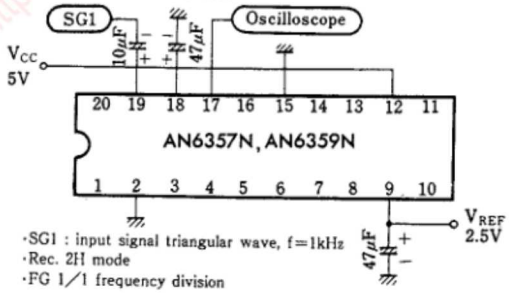
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Circuit current	I_{18}	1	V_{CC}=5V V_{REF}=2.5V	7		14	mA
FG Amp. input sensitivity	S_{19}	2	V_{CC}=5V	30			mV
FG high-level freq. dividing output	V_{OH17}	3	V_{CC}=5V	4.6			V
FG low-level freq. dividing output	V_{OL17}	3	V_{CC}=5V			0.4	V
A/B high-level output	$V_{OHA, B}$	4	V_{CC}=5V, −I=2mA	3.3			V
A/B low-level output	$V_{OLA, B}$	4	V_{CC}=5V			0.4	V
P.B. CTL input sensitivity	S_{16}	5	V_{CC}=5V	3.0			V
Mode select sensitivity Rec./P.B. PAL/MTSC.×½, C, A, B	$S_{(Mode)}$	6	V_{CC}=5V	3.0			V
OP. Amp. 3 high-level output	V_{OH11}	7	V_{CC}=5V	3.8			V
OP. Amp. 3 low-level output	V_{OL11}	7	V_{CC}=5V			1.1	V
Total offset OP. Amp. NTSC 2H	$V_{O(offset)2}$	8	V_{CC}=5V			30	mV
Total offset OP. Amp. NTSC 6H	$V_{O(offset)6}$	8	V_{CC}=5V			30	mV
OP. Amp. 2 gain	G_{V2}	9	V_{CC}=5V	−4		+2	dB

Note) Operating supply range $V_{CC(opr)}$=4.5~5.5V

Test Circuit 1 (I_{18})

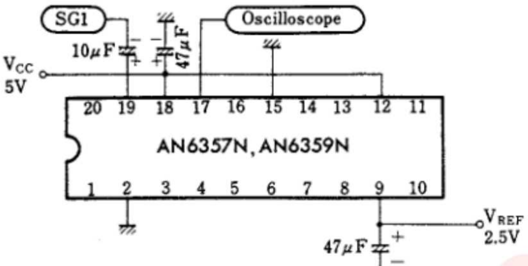


Test Circuit 2 (S_{19})



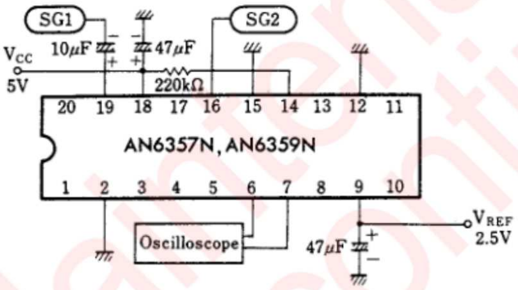
·SG1 : input signal triangular wave, f=1kHz
·Rec. 2H mode
·FG 1/1 frequency division

Test Circuit 3 (V_{OH17}, V_{OL17})



- SG1 input signal rectangular wave
- Rec. 2H mode
- FG 1/1 frequency division

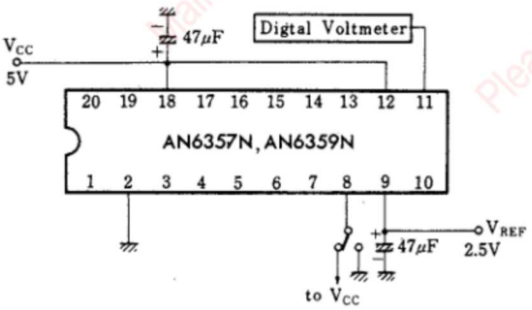
Test Circuit 5 (S_{16})



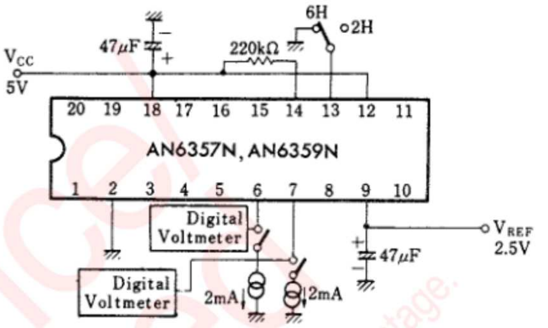
- SG1 input signal rectangular wave
  f=2.4kHz, 100mV_{P-P}
- SG2 input signal rectangular wave
  f=300Hz

※6H mode (Pins ⑥ and ⑦ at "H") when a sufficient large CTL signal is input, but forced 2H mode (Pins ⑥ and ⑦ at "L") when the CTL signal comes to below input sensitivity

Test Circuit 7 (V_{OH11}, V_{OL11})



Test Circuit 4 (V_{OHA}, V_{OHB}, V_{OLA}, V_{OLB})

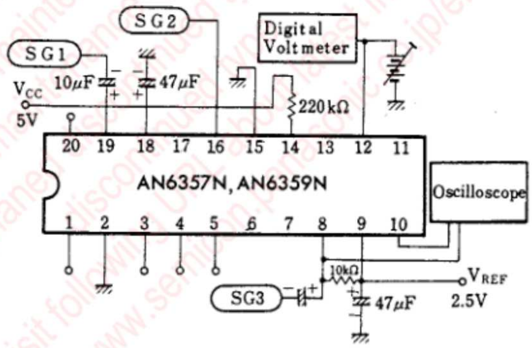


- V_{OHA}, V_{OLA}, Pin ⑦ output
- V_{OHB}, V_{OLB}, Pin ⑥ output

※Draw out a 2mA current from the Pins ⑦ and ⑥ in the Rec. 6H mode(Pin ⑬ GND), and measure high–level voltages (V_{OHA}, V_{OHB}) with a digital voltmeter.

※Menasure the low levels (V_{OLA}, V_{OLB}) of the Pins ⑦ and ⑥ in the Rec. 2H mode (Pin ⑬ Open).

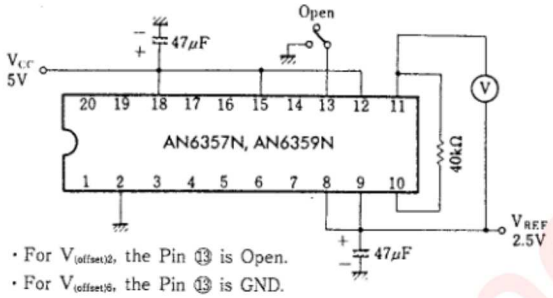
Test Circuit 6 ($S_{(Mode)}$)



- SG1 input signal rectangular wave
  f=250Hz, 100mV_{P-P}
- SG2 input signal rectangular wave
  f=30Hz, 5V_{O-P}
- SG3 input signal sine wave
  f=500Hz, 3V_{P-P}
- Use the oscilloscope in the X-Y mode.

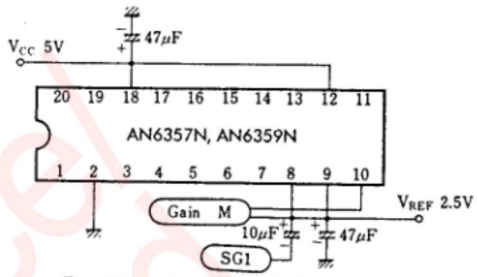
※The left figure shows a Rec./PB select sensitivity test circuit. In the same manner as the Pin ⑫, measure the voltage, at which gain is switched, as to the other Pins.

Test Circuit 8 ($V_{O(offset)2}$, $V_{O(offset)6}$)



- For $V_{(offset)2}$, the Pin ⑬ is Open.
- For $V_{(offset)6}$, the Pin ⑬ is GND.

Test Circuit 9 (G_{V2})



- For V_{OFF2}, the Pin ⑬ is Open.
- For V_{OFF6}, the Pin ⑬ is GND.
- SG1 input signal sine wave **f=500Hz, $1V_{P-P}$**

■ Function Description

1. Capstan FG Frequency Dividing Function

By setting the frequency division selector Pin ⑮, an input FG signal can be frequency-divided as shown in the table below:

Mode \ Pin ⑮		Vcc	Open	GND
NTSC	2 H	½	½	½
	4 H	½	½	½
	6 H	½	½	½
PAL	3 H	½	½	½
	6 H	½	½	½

2. Recording Mode Automatic Detecting Function

In playing back a recorded tape, this function can automatically detect the tape recording mode and play back the tape in the same mode as when recording. The top of the table below shows input FG frequencies in the regular state of each mode, and the bottom shows threshold values for automatic selection.

(1) AN6357N

Pin ⑮	NTSC			PAL	
	2 H	4 H	6 H	3 H	6 H
Vcc	2160	1080	720	1515	757.5
	1470	930		1230	
Open	1440	720	480	1010	505
	980	620		820	
GND	720	360	240	505	252.5
	490	310		410	

The detection output above is made from output in accordance with the table below:

Output	NTSC			PAL	
	2 H	4 H	6 H	3 H	6 H
A_O (Pin ⑦)	L	H	H	H	H
B_O (Pin ⑥)	L	L	H	L	H

(2) AN6359N

Pin ⑮	NTSC			PAL	
	2 H	4 H	6 H	3 H	6 H
Vcc	1080	540	360	758	379
	735	465		615	
Open	720	360	240	505	252.5
	490	310		410	
GND	360	180	120	253	126.5
	245	155		205	

NTSC 30 Hz, PAL 25 Hz for a PB CTL signal

3. Memory Function

The playback mode when the Pin ⑬ is set can be stored by setting the Pin ⑪ to Low at playback time. This can be used for special playback such as still, slow, etc.

4. Capstan Loop Gain Correcting Function

A capstan speed control loop gain correction circuit is incorporated. By externally setting PAL or NTSC, this function automatically corrects a gain in accordance with the recording or playback time mode. For special playback, 4 kinds of gains other than Normal can be set. The table below shows how to set for a special mode selection.

Mode \ Pin No.	4 (×½)	3 (C)	1 (B)	20 (A)
½ (Slow)	H	×	×	×
Normal	L	L	L	L
C (X2−X3)	L	H	L	L
B (X4−X7)	L	×	H	L
A (X8−X15)	L	×	×	H

The detection output above is made from Output in accordance with the table below:

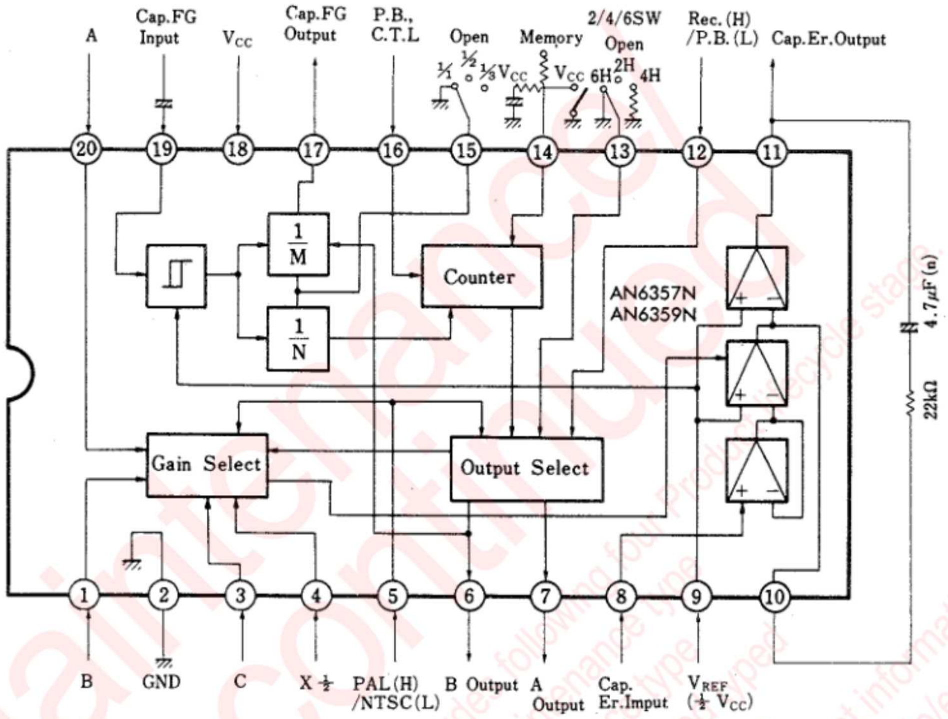
Time \ Special Mode		×½		Normal		C		B		A	
		Multiplier	dB	Multiplier	dB	Multiplier	dB	Multiplier	dB	Multiplier	dB
NTSC	2H	0.4	−7.76	1.0	0	2.45	7.78	5.3	14.5	11.0	20.8
	4H	0.2	−14.0	0.5	−6.02	1.23	1.76	2.65	8.46	5.5	14.8
	6H*1	0.072	−22.8	0.182	14.8	0.445	−7.02	0.964	−0.322	2.0	6.02
	6H*2	0.267	−11.5	0.667	−3.52	1.63	4.26	3.53	11.0	7.33	17.3
PAL	3H	0.4	−7.96	1.0	0	2.45	7.78	5.3	14.5	11.0	20.8
	6H	0.2	−14.0	0.5	−6.02	1.23	1.76	2.65	8.46	5.5	14.8

*1 Pin ⑭ as either GND or Open

*2 Pin ⑭ as Vcc

*The left table shows design specifications.

■ Application Circuit



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