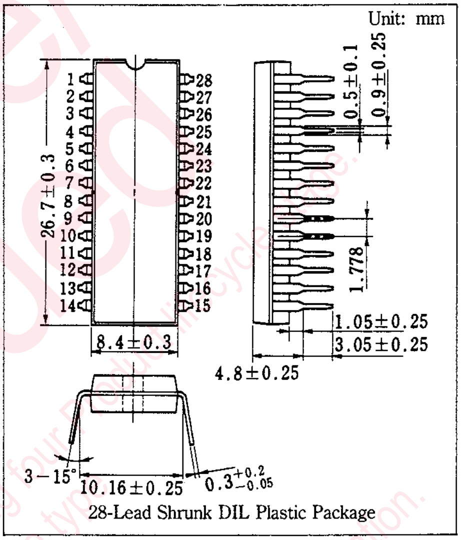
AN2800K

VHD Video Disc Player Sound Signal Demodulator Circuit

■ Outline

The AN2800K is an integrated circuit designed for sound signal demodulation of VHD-system video disk player.

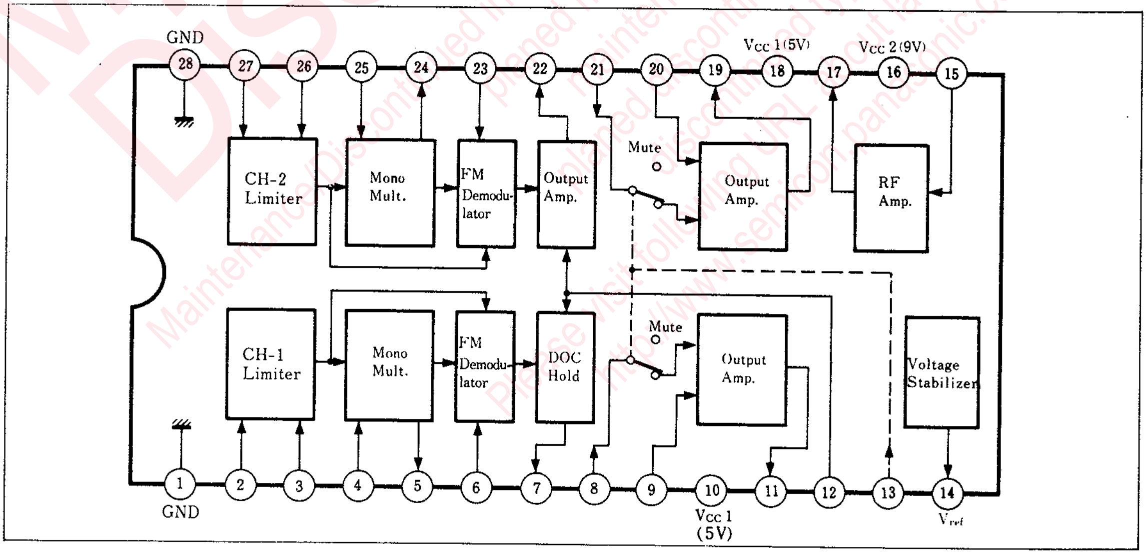


28-Lead Shrunk DIL Plastic Package

■ Features

- The functions consist of :
  - RF Amplifier
  - FM limiters, demodulators (dual channel)
  - Dropout compensators (dual channel)
  - Muting circuits (dual channel)

■ Block Diagram



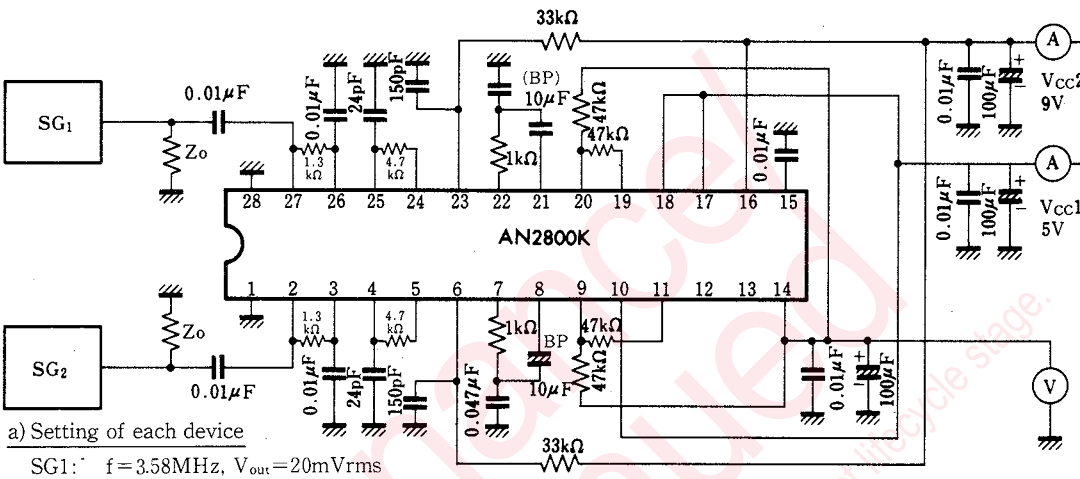
■ Absolute Maximum Ratings ($T_a=25°C$)

Item	Symbol	Rating	Unit
Supply voltage	V_{CC1}	6.0	V
	V_{CC2}	10.8	V
Supply current	I_{CC1}	20	mA
	I_{CC2}	3.3	mA
Power dissipation	P_D	160	mW
Operating ambient temperature	T_{opr}	−20～+70	°C
Storage temperature	T_{stg}	−55～+150	°C

■ Electrical Characteristics ($V_{CC1}=5V$, $V_{CC2}=9V$, $T_a=25°C$)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Circuit current 1	I_{CC1}	1	$V_{CC1}=5V$, $V_{CC2}=9V$	9	13	17	mA
Circuit current 2	I_{CC2}	1	$V_{CC1}=5V$, $V_{CC2}=9V$	1.48	2.10	2.75	mA
Terminal voltage	V_{14-1}	1	$V_{CC1}=5V$, $V_{CC2}=9V$	2.30	2.50	2.70	V
Squelch ON/OFF (CH-1) output offset voltage	$V_{(offset)}$	2	$V_{CC1}=5V$, $V_{CC2}=9V$, Pin ⑬ GND ON/OFF	−100	0	+100	mV
Squelch ON/OFF (CH-2) output offset voltage	$V_{(offset)}$	2	$V_{CC1}=5V$, $V_{CC2}=9V$, Pin ⑬ GND ON/OFF	−100	0	+100	mV
RF amp. voltage gain	G_V	3	$f_C=3.58MHz$, $V_i=20mVrms$	21.8	25.8	28.9	dB
FM demodulation min. input voltage (CH-1)	$V_{i(min.)}$	4	$f_C=3.73MHz$, $THD\leq5\%$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		1.0	2.5	mVrms
FM demodulation min. input voltage (CH-2)	$V_{i(min.)}$	4	$f_C=3.73MHz$, $THD\leq5\%$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		1.0	2.5	mVrms
FM demodulation output harmonic distortion (CH-1)	THD	5	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		0.07	0.30	%
FM demodulation output harmonic distortion (CH-2)	THD	5	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		0.07	0.30	%
FM demodulation output signal voltage (CH-1)	V_O	6	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$	150	200	250	mVrms
FM demodulation output signal voltage (CH-2)	V_O	6	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$	150	200	250	mVrms
Cross talk output signal voltage (CH-1)	CT	7	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		150	300	μVrms
Cross talk output signal voltage (CH-2)	CT	7	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		150	300	μVrms
Squelch ON output signal voltage (CH-1)	SV_O	8	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		50	140	μVrms
Squelch ON output signal voltage (CH-2)	SV_O	8	$f_c=3.73MHz$, $V_i=35mVrms$ $f_m=1kHz$, $\Delta f=\pm37.5kHz$		50	140	μVrms
Dropout pulse extension (CH-1)	t_d	9	$f_c=3.58MHz$, $V_i=20mVrms$ $f_{doc}=20kHz$ rectangular wave	4	8	16	μs
Dropout pulse extension (CH-2)	t_d	9	$f_c=3.58MHz$, $V_i=20mVrms$ $f_{doc}=20kHz$ Rectangular wave	4	8	16	μs

Test Circuit 1 (I_{CC1}, I_{CC2}, V_{14-1})



a) Setting of each device

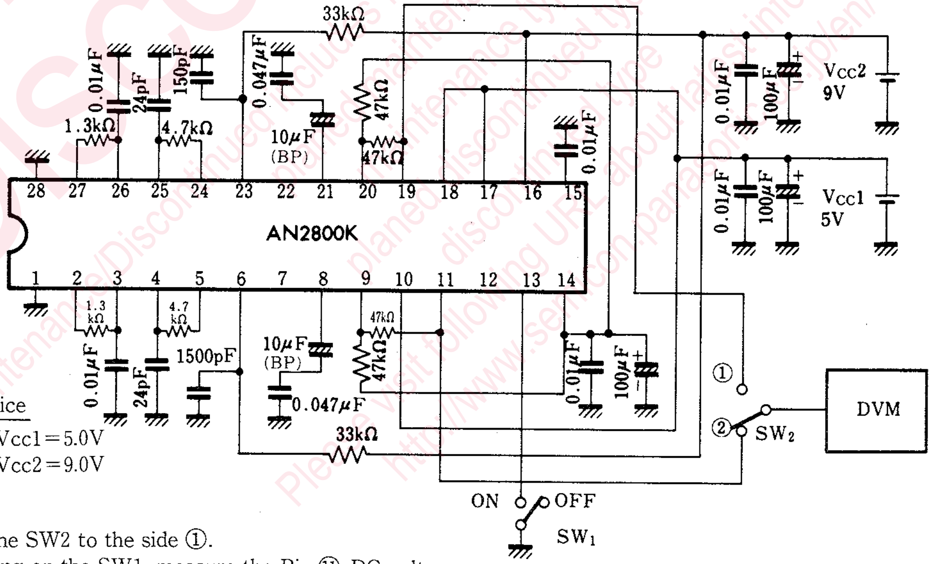
SG1: f=3.58MHz, V_{out}=20mVrms
SG2: f=3.73MHz, V_{out}=35mVrms
Adjust Zo to the output impedance(50Ω/75Ω)of each SG.

DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

I_{CC1}: Measure a value of the ammeter 1.
I_{CC2}: Measure a value of the ammeter 2.
V_{REF}: Measure a value of the voltmeter 1.

Test Circuit 2 (V_{offset})



a) Setting of each device

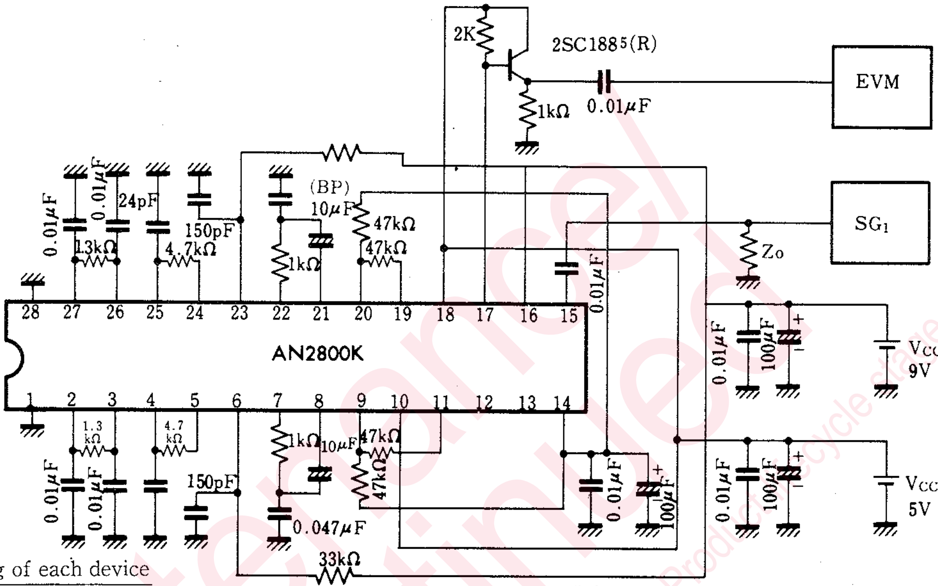
DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

Voffset: The shift the SW2 to the side ①.
When turning on the SW1, measure the Pin ⑪ DC voltage.
Next, measure the DC voltage when the SW1 is turned off.
Then, calculate a differential voltage value between both DC voltages.

Voffset: The shift the SW2 to the side ②.
When turning on the SW1, measure the Pin ⑲ DC voltage.
Next, measure the DC voltage when turning off the SW1.
Then, calculate a differential voltage value between both DC voltages.

Test Circuit 3 (G_V)



a) Setting of each device

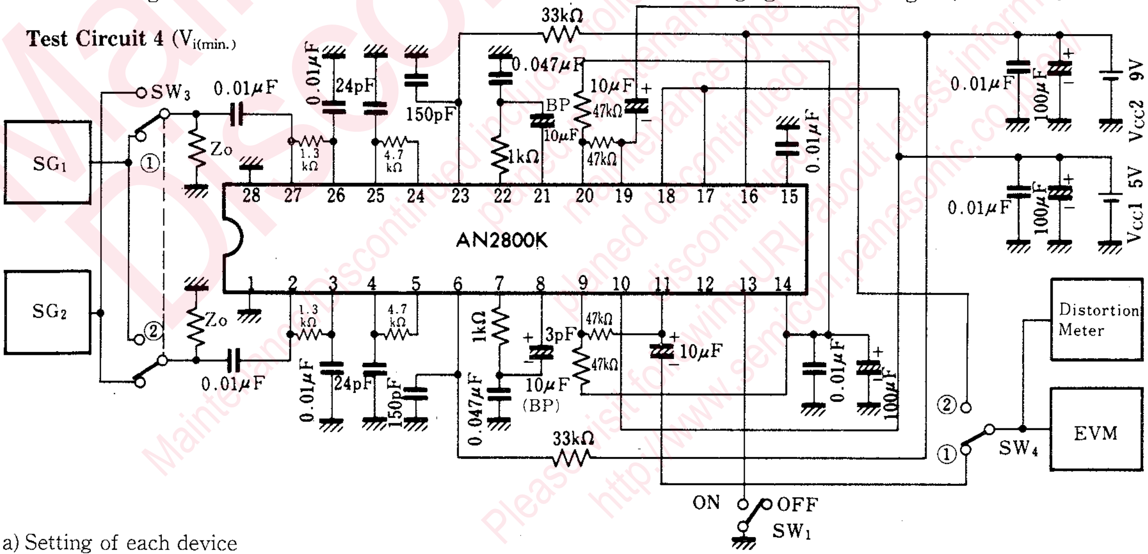
SG1: f=3.58MHz, V_{out}=20mVrms
Adjust Zo to the output impedance(50Ω/75Ω) of SG.
Electronic voltmeter (EVM) EVM: Set to a 1 Vrms full scale range.

DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

GV: Measure the value (Vo) of the electronic voltmeter
Voltage gain Gv=20 log Vo/20 mVrms

Test Circuit 4 ($V_{i(min.)}$)



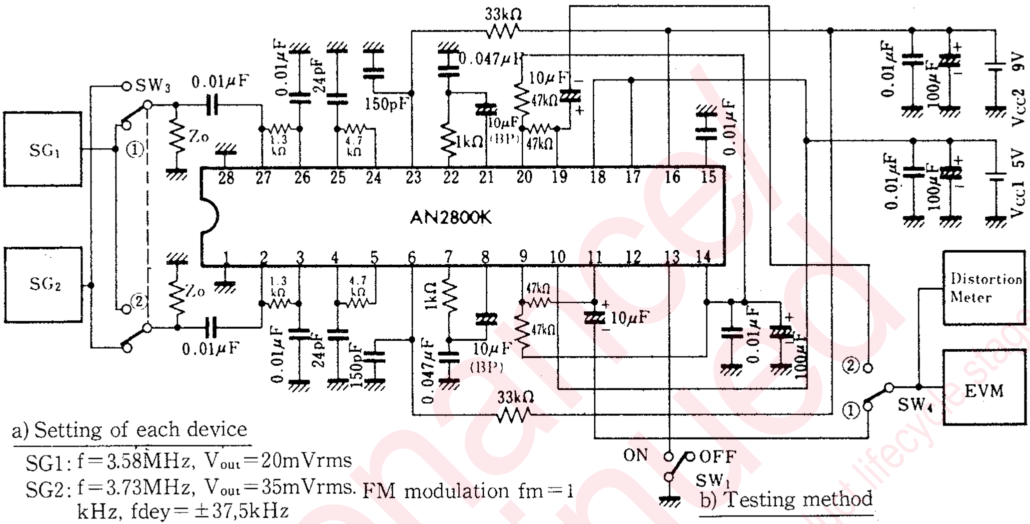
a) Setting of each device

SG1: f=3.58MHz, V_{out}=20mVrms
SG2: f=3.73MHz, V_{out}=2.5mVrms, FM modulation fm=1kHz, fdev=±37.5KHz
Adjust Zo to the output impedance (50Ω/75Ω) of each SG.
Harmonic distortion gauge: 10% range (LPF 100 kHz ON, HPF 400 Hz ON)
DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

Vi(min): Turn off the SW1, and shift the SW3 and SW4 to the side ①. Obtain a value indicated by the harmonic distortion gauge. (≦5%)
Vi(min): Turn off the SW1, and shift the SW3 and SW4 to the side ②. Obtain a value indicated by the harmonic distortion gauge. (≦5%)
Note) Input an FM signal voltage of a max. specified value and determine with a harmonic distortion factor of a demodulated output waveform.

Test Circuit 5 (THD)



a) Setting of each device

SG1: f=3.58MHz, V_{out}=20mVrms

SG2: f=3.73MHz, V_{out}=35mVrms. FM modulation fm=1 kHz, fdey=±37,5kHz
Adjust Zo to the output impedance of each SG.

Harmonic distortion gauge: 1.0% range (LPF 100 kHz ON, HPF 400 Hz ON)

DC power supply: Vcc1=5.0V

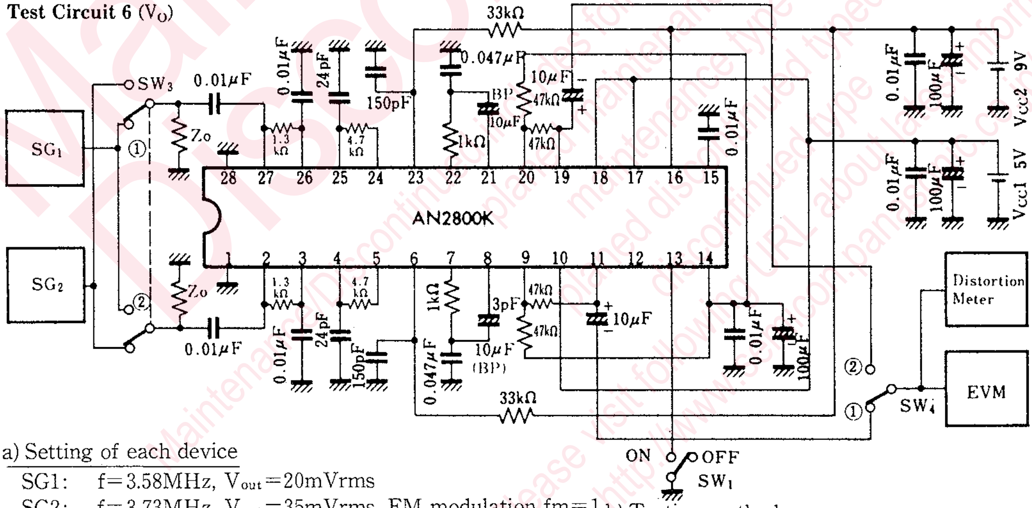
DC power supply: Vcc2=9.0V

b) Testing method

THD: Turn off the SW1, and shift the SW3 and SW4 to the side ①, and obtain a value indicated by the harmonic distortion gauge.

THD: Turn off the SW1, and shift the SW3 and SW4 to the side ②, and obtain a value indicated by the harmonic distortion gauge.

Test Circuit 6 (V_O)



a) Setting of each device

SG1: f=3.58MHz, V_{out}=20mVrms

SG2: f=3.73MHz, V_{out}=35mVrms, FM modulation fm=1 kHz fdev=±37.5kHz
Adjust Zo to the output impedance (50Ω/75Ω) of each SG.

Electronic voltmeter: 0.3 Vrms range

DC power supply: Vcc1=5.0V

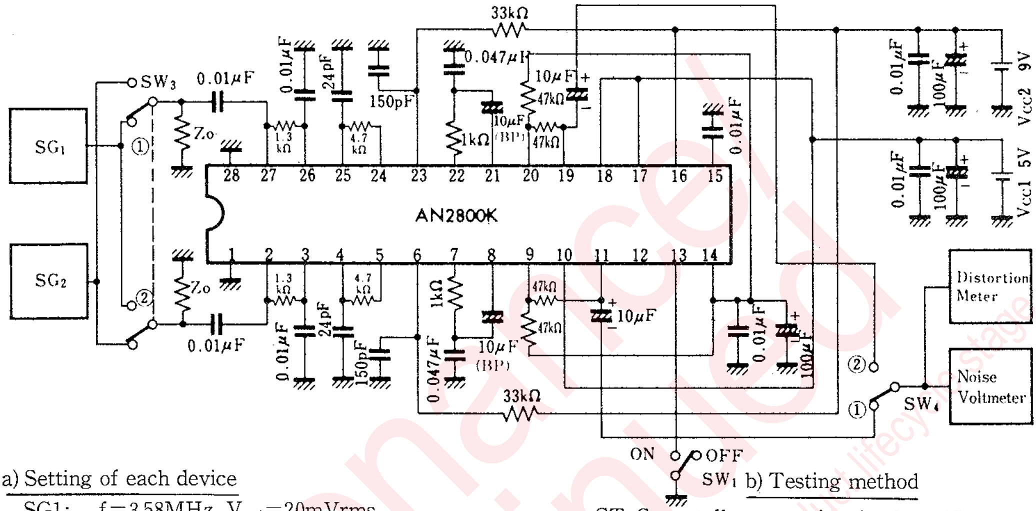
DC power supply: Vcc2=9.0V

b) Testing method

Vo: FM demodulated output signal voltage (CH-1)
Turn off the SW1, and shift the SW3 and SW4 to the side ①, and obtain a value indicated by the electronic voltmeter.

Vo: FM demodulated output signal voltage (CH-2).
Turn off the SW1, and shift the SW3 and SW4 to the side ②, and obtain a value indicated by the electronic voltmeter.

Test Circuit 7 (CT)



a) Setting of each device

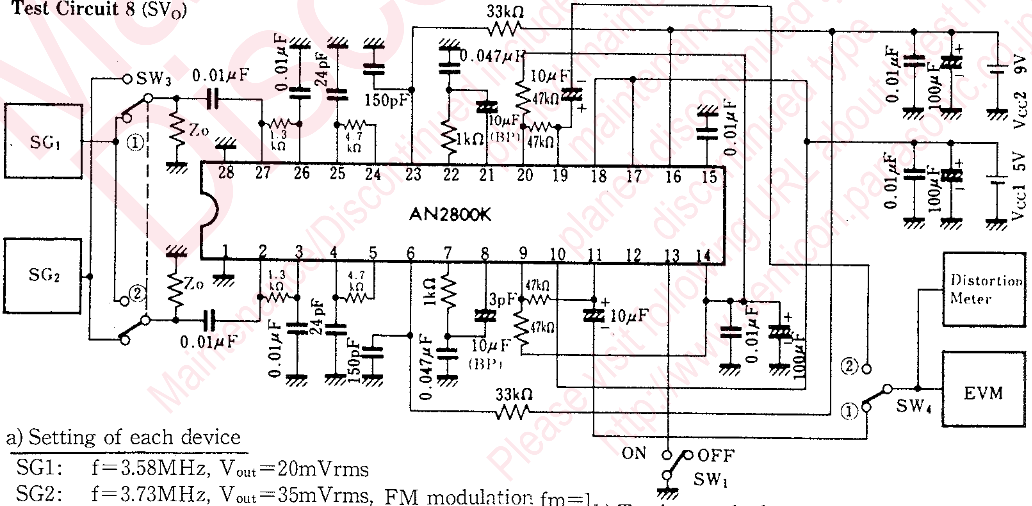
SG1: f=3.58MHz, V_{out}=20mVrms
SG2: f=3.73MHz, V_{out}=35mVrms, FM modulation fm=1 kHz, fdey=±37,5kHz
Adjust Zo to the output impedance(50Ω/75Ω) of each SG.
Noise voltmeter: 300μVrms range, IHF-A filter
DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

CT: Cross talk output signal voltage(CH-1→CH-2). Turn off the SW1, and shift the SW3 to the side ① and the SW4 to the side ②, and obtain a value indicated by the noise voltmeter.

CT: Cross talk output signal voltage(CH-2→CH-1). Turn off the SW1, and shift the SW3 to the side ② and SW4 to the side ①, and obtain a value indicated by the noise voltmeter.

Test Circuit 8 (SV_O)



a) Setting of each device

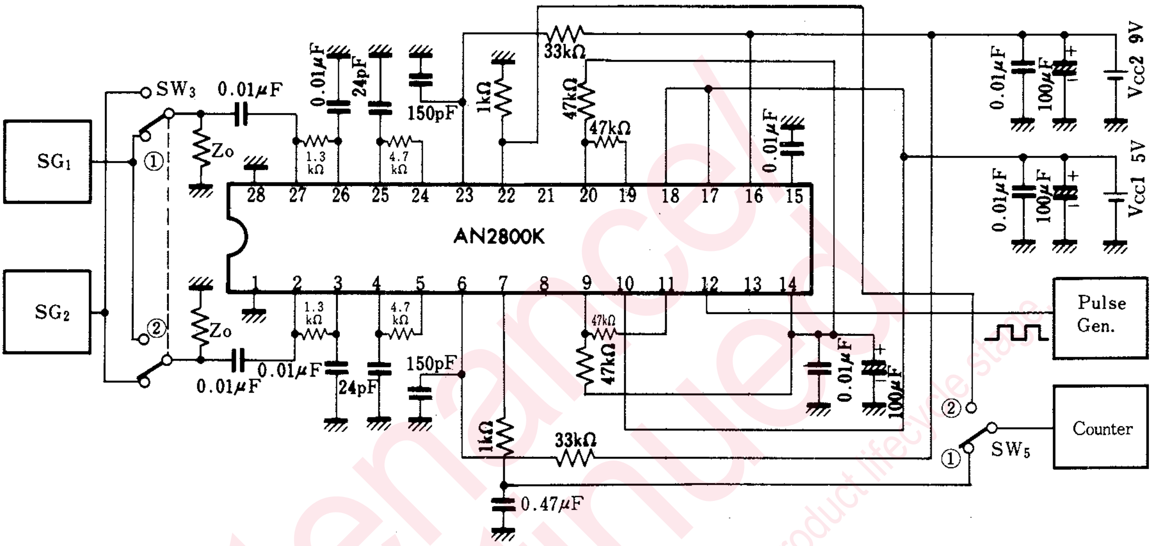
SG1: f=3.58MHz, V_{out}=20mVrms
SG2: f=3.73MHz, V_{out}=35mVrms, FM modulation fm=1 kHz, fdey=±37.5kHz,
Adjust Zo to the output impedance(50Ω/75Ω) of each SG.
Noise voltmeter: 300μVrms range, IHF-A filter ON
DC power supply: Vcc1=5.0V
DC power supply: Vcc2=9.0V

b) Testing method

SVo: Output signal voltage(CH-1) at squelch ON time. Turn on the SW1, and shift the SW3 and SW4 to the side ①. Obtain a value indicated by the noise voltmeter.

SVo: Output signal voltage (CH-2) at squelch ON time. Turn on the SW1, and shift the SW3 and SW4 to the side ②. Obtain a value indicated by the noise voltmeter.

Test Circuit 9 (t_d)



a) Setting of each device

SG1: f=3.58MHz, V_{out}=20mVrms

SG2: f=3.73MHz, V_{out}=35mVrms. FM modulation fm=1 kHz, fdey=±37,5kHz

Adjust Zo to the output impedance(50Ω/75Ω) of each SG.

Pulse generator: f=20 kHz rectangular wave (duty ratio 1 : 1)

V_H=3.75V, V_L=2.75V, DC offset voltage

Universal counter: Negative pulse width measurement mode

DC power supply : Vcc1=5.0V

DC power supply : Vcc2=9.0V

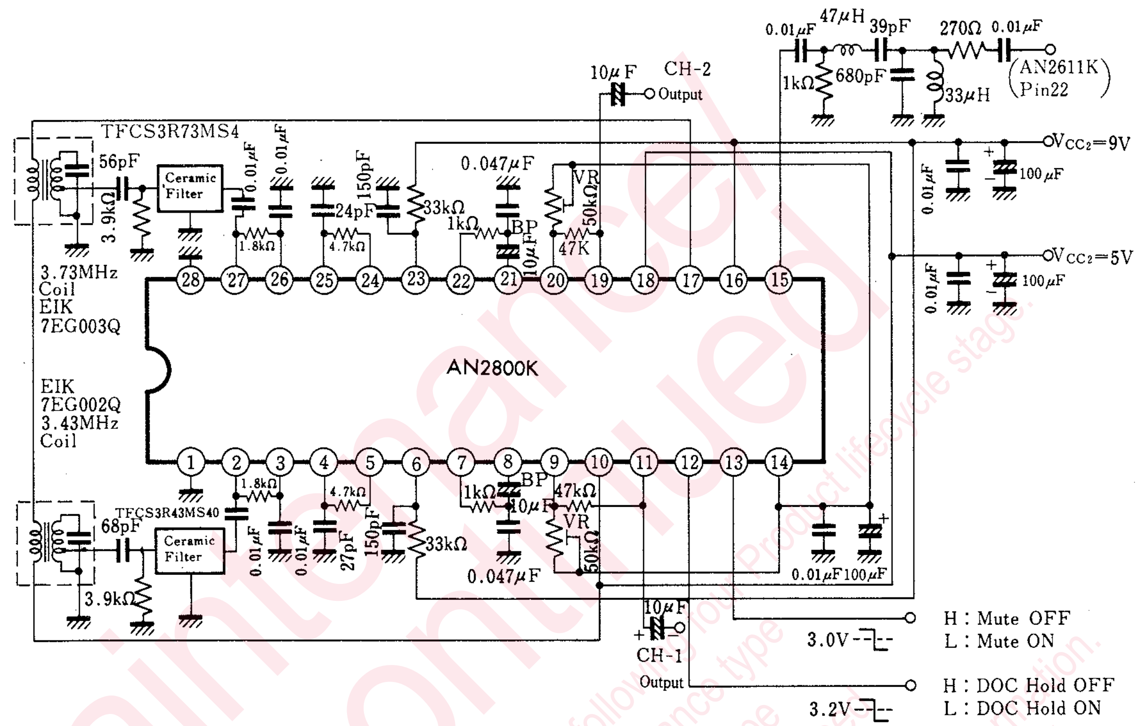
b) Testing method

td: Shift the SW3 to the side ② and SW5 to the side ①, and measure an output pulse Low section with the universal counter. (T_{VLOW})

td: Shift the SW3 to the side ① and SW5 to the side ②, and measure an output pulse Low section with the universal counter. (T_{VLOW})

Obtain a pulse extension td of T_{VLOW}-25η sec.

■ Application Circuit



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	GND	15	RF Amp. Input
2	CH-1 Limiter Input	16	V_{CC2} (typ 9V)
3	CH-1 Limiter Bias	17	RF Amp. Output
4	CH-1 Mono Multi (CR)	18	V_{CC1} (typ 5V)
5	CH-1 Mono Multi Bias	19	CH-2 Output Amp. Output
6	CH-1 FM Demodulator Output	20	CH-2 Output Amp. Input 2
7	CH-1 DOC Hold	21	CH-2 Output Amp. Input 1
8	CH-1 Output Amp. Input 1	22	CH-2 DOC Hold
9	CH-1 Output Amp. Input 2	23	CH-2 FM Demodulator Output
10	V_{CC1} (typ 5V)	24	CH-2 Mono Multi Bias
11	CH-1 Output Amp. Output	25	CH-2 Mono Multi (CR)
12	DOC Control Signal Input	26	CH-2 Limiter Bias
13	Mute Control Signal Input	27	CH-2 Limiter Input
14	Voltage Stabilizer Output	28	GND

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