

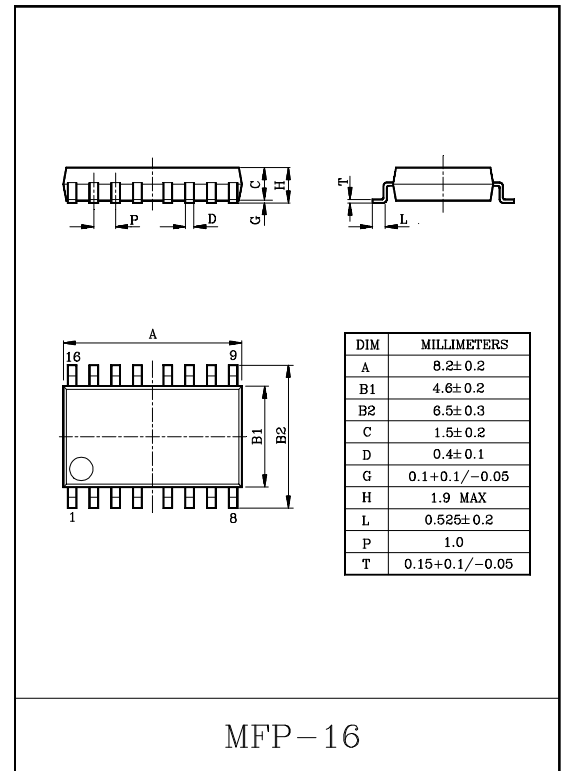
### 1.5V AM/FM TUNER

The KIA6092F is AM/FM 1 chip tuner system (FM FRONT END+AM/FM IF) IC, which is designed for low voltage operation (1.5V, 3.0V).

This is especially suitable for stereo headphone radio and radio cassette recorder equipment. This item can realize the low power dissipation and few external parts.

#### FEATURES

- AM Detector Coilless.
- FM Mixer Coilless.
- Switchover between AM/FM mode is possible with one-make switch.
- Excellent Low Supply Current.  
 $I_{CC(AM)}=1.2\text{mA(Typ.)}$  ( $V_{CC}=1.5\text{V}$ ,  $T_a=25^\circ\text{C}$ )  
 $I_{CC(FM)}=4.0\text{mA(Typ.)}$  ( $V_{CC}=1.5\text{V}$ ,  $T_a=25^\circ\text{C}$ )
- Operating Supply Voltage Range.  
 $V_{CC(opr.)}=0.95\sim 5.0\text{V}$  ( $T_a=25^\circ\text{C}$ )



#### MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	$V_{CC}$	5	V
Power Dissipation	$P_D$	350	mW
Operating Temperature	$T_{opr}$	-25~75	°C
Storage Temperature	$T_{stg}$	-55~150	°C

Note : Derated above  $T_a=25^\circ\text{C}$  in the proportion of  $2.8\text{mW}/^\circ\text{C}$  for KIA6092F.

# KIA6092F

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=1.5\text{V}$ )

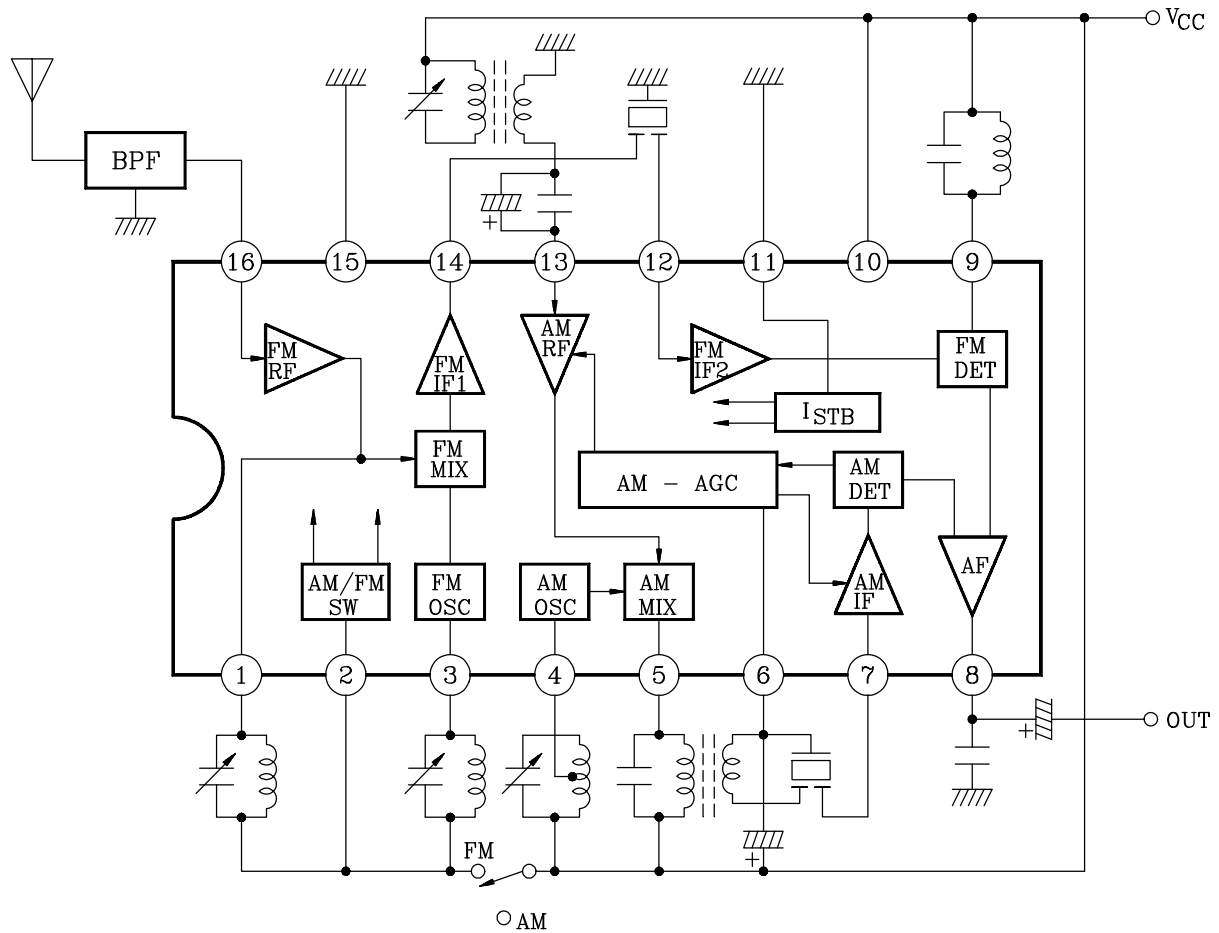
FM :  $V_{IN}=60\text{dB}\mu$ ,  $f=98\text{MHz}$ ,  $f_m=1\text{kHz}$ ,  $\Delta f=\pm 22.5\text{kHz}$

AM :  $V_{IN}=60\text{dB}\mu$ ,  $f=1\text{MHz}$ ,  $f_m=1\text{kHz}$ ,  $\text{Mod}=30\%$

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MIN.	UNIT
Supply Current		$I_{CC}(\text{FM})$	1	$V_{IN}=0$	-	4.0	5.2	mA
		$I_{CC}(\text{AM})$	1	$V_{IN}=0$	-	1.2	1.8	
FM	Input Limiting Voltage	$V_{IN(\text{lim})}$	1	-3dB limiting point	-	10	16	dB $\mu$
	Total Harmonic Distortion	THD	1		-	0.25	-	%
	Signal to Ratio	S/N	1		-	62	-	dB
	Quiescent Sensitivity	$Q_S$	1	S/N=30dB	-	12	-	dB $\mu$
	AM Rejection Ratio	AMR	1	Mod=30%	-	30	-	dB
	Oscillator Voltage	$V_{OSC}$	2	$f=60\text{MHz}$	53	90	135	mV $_{\text{rms}}$
	Oscillator Stop Supply Voltage	$V_{\text{stop}}$	1	$V_{IN}<-20\text{dB}\mu$	-	0.85	0.95	V
	Recovered Output Voltage	$V_{OD}$	1		28	45	68	mV $_{\text{rms}}$
AM	Gain	$G_V$	1	$V_{IN}=30\text{dB}\mu$	14	25	50	mV $_{\text{rms}}$
	Recovered Output Voltage	$V_{OD}$	1		25	40	60	mV $_{\text{rms}}$
	Total Harmonic Distortion	THD	1		-	1.5	-	%
	Signal to Noise Ratio	S/N	1		-	40	-	dB
	Oscillator Stop Supply Voltage	$V_{\text{stop}}$	1	$V_{IN}<-20\text{dB}\mu$	-	0.85	0.95	V
Output Resistance pin ⑧	FM	$R_O(\text{FM})$	1	$f=1\text{kHz}$	-	1.4	-	k $\Omega$
	AM	$R_O(\text{AM})$			-	8	-	

# KIA6092F

## BLOCK DIAGRAM

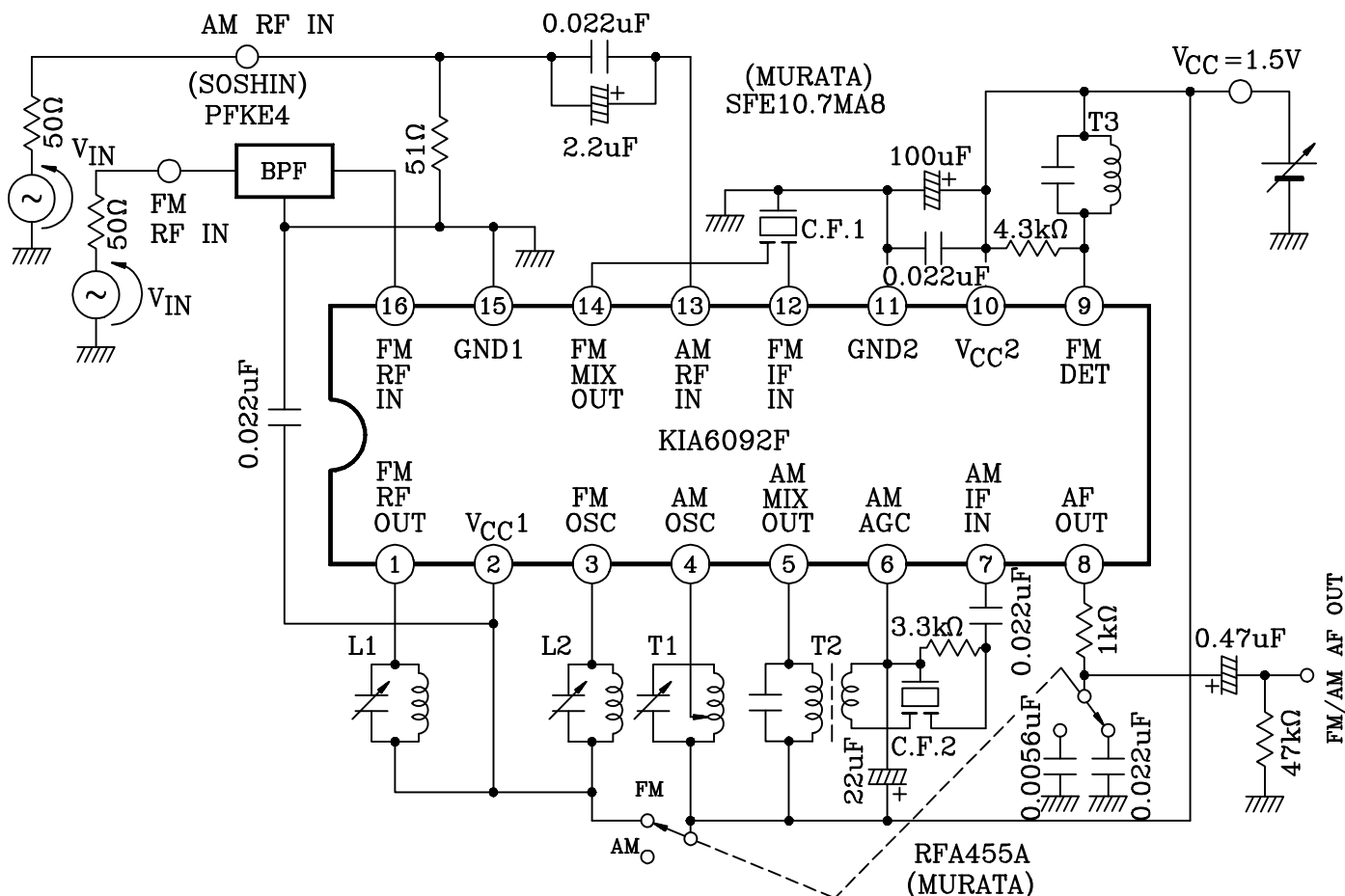


TERMINAL VOLTAGE : Terminal Voltage at No Signal With Test Circuit ( $V_{CC}=1.5V$ ,  $T_a=25^\circ C$ )

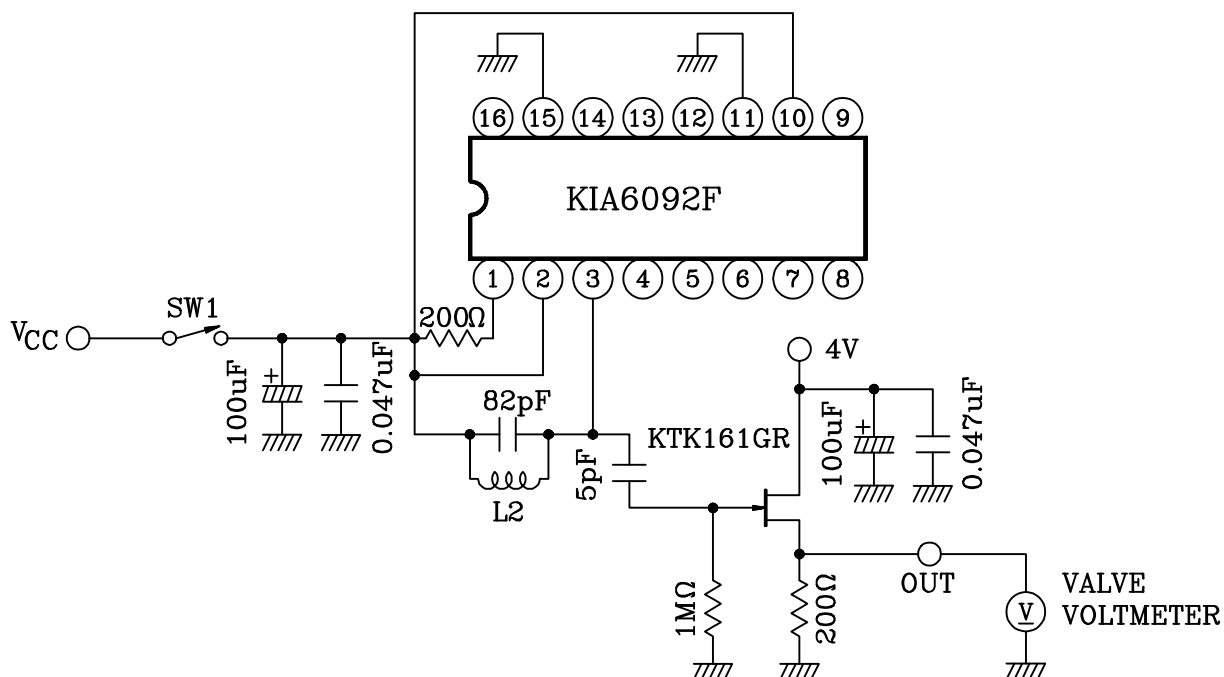
PIN NO.	ITEM	SYMBOL	TYP.		UNIT	PIN NO.	ITEM	SYMBOL	TYP.		UNIT
			AM	FM					AM	FM	
1	FM RF-OUT	$V_1$	-	1.5	V	9	FM-DET	$V_9$	1.5	1.5	V
2	$V_{CC1}$	$V_2$	-	1.5	V	10	$V_{CC2}$	$V_{10}$	1.5	1.5	V
3	FM OSC	$V_3$	-	1.5	V	11	GND2	$V_{11}$	0	0	V
4	AM OSC	$V_4$	1.5	1.5	V	12	FM IF IN	$V_{12}$	-	0.7	V
5	AM MIX-OUT	$V_5$	1.5	1.5	V	13	AM RF IN	$V_{13}$	0.7	-	V
6	AM AGC	$V_6$	0.8	-	V	14	FM MIX OUT	$V_{14}$	-	0.8	V
7	AM IF-IN	$V_7$	1.4	1.5	V	15	GND1	$V_{15}$	0	0	V
8	AF OUT	$V_8$	0.6	0.6	V	16	FM RF-IN	$V_{16}$	-	0.7	V

# KIA6092F

TEST CIRCUIT 1



TEST CIRCUIT 2



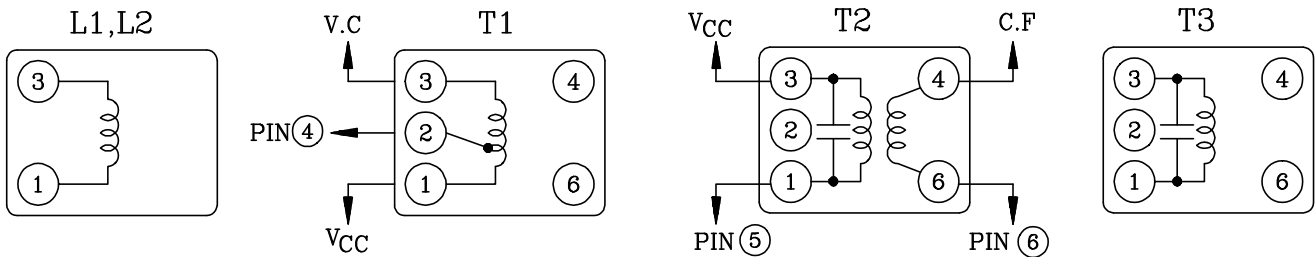
# KIA6092F

## COIL DATA (TEST CIRCUIT)

COIL STAGE	TEST FREQUENCY	L( $\mu$ H)	C <sub>o</sub> (pF)	Q <sub>o</sub>	TURN				WIRE (mm $\emptyset$ )	REFERENCE
					1-2	2-3	1-3	4-6		
L1 FM RF	100MHz			100			1 $\frac{3}{4}$		0.5UEW	Ⓢ : 0258-000-020 Ⓚ : KSFT902
L2 FM OSC	100MHz			100			2 $\frac{1}{4}$		0.5UEW	Ⓢ : 0258-000-021 Ⓚ : KSFT903
T1 AM OSC	769kHz	288		115	13	73			0.08UEW	Ⓢ : 4147-1356-038 Ⓚ : KSAD406
T2 AM IFT	455kHz		180	120			180	15	0.06UEW	Ⓢ : 2150-2162-165 Ⓚ : KSAM303
T3 FM DET	10.7MHz		82	110			13		0.12UEW	Ⓢ : 4152-4095-015 Ⓚ : KSFD513

Ⓚ : KWANGSUNG ELECTRONICS CO., LTD.  
(Tel:(02)716-0034)

Ⓢ : SUMIDA ELECTRIC CO., LTD.



## APPLICATION INFORMATION

### <FM SECTION>

- RF Amplifier (See Fig.1)

This stage is composed of the emitter-grounded and cascade connection amplifier.  
The input impedance of pin 16 is about  $260\Omega$ , which is determined by D1.

- Mixer Amplifier (See Fig.2)

The amplified RF Signal is transformed into IF signal by the mixer circuit which is composed of a differential amplifier.  
The amplified IF signal is appeared through the emitter follower circuit at pin 14. The output impedance of pin 14 is about  $300\Omega$ , due to match the impedance of the ceramic filter.

(Note)

The spurious characteristic is determined by the characteristic of the ceramic filter (10.7MHz), because the mixer coil is dispensable. It is possible to improve the spurious characteristic that the two ceramic filters of different characteristics are connected in series.

- IF Limiter Amplifier (See Fig.3)

The IF limiter amplifier is composed of six emitter-grounded amplifiers and a differential amplifier. The basis composition of the emitter-grounded amplifiers is shown as Fig.3.

- Detector Circuit

This stage is composed of the quadrature detector circuit, which has double balanced.

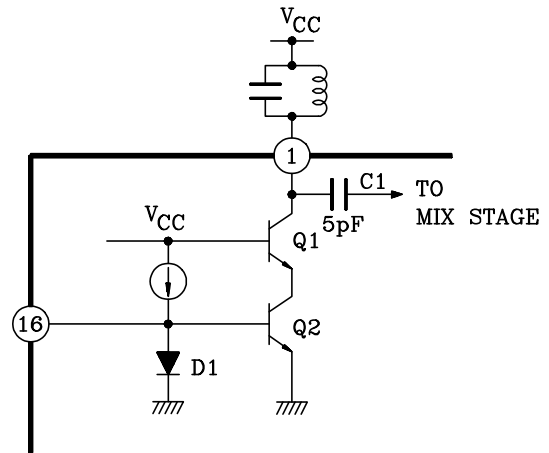


Fig. 1

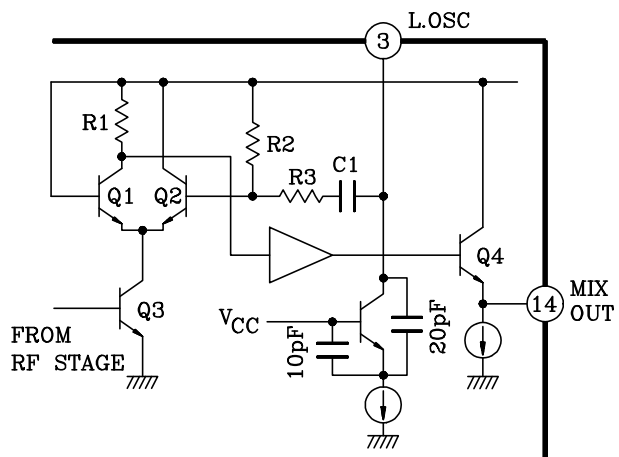


Fig. 2

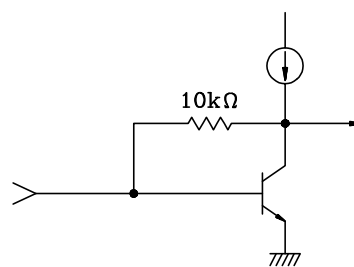


Fig. 3

## <AM SECTION>

- RF Amplifier (See Fig.4)

This stage is composed of emitter-grounded amplifier, the input impedance of which has about  $7.3k\Omega$ .

It is necessary to connect as Fig.4, because the condenser, C1 is available to the audio by-pass of the RF-AGC, the noise of low frequency.

- Mixer Circuit

The amplified RF signal is transformed into IF signal by the mixer circuit, which is composed of differential amplifier.

- IF Amplifier

This stage is composed of four emitter-grounded amplifiers and the two differential amplifiers. The input impedance is rather high, because it is changed by the amplitude of input signal (AGC level). So the input terminal of the IF amplifier must be matched with the impedance of ceramic filter.

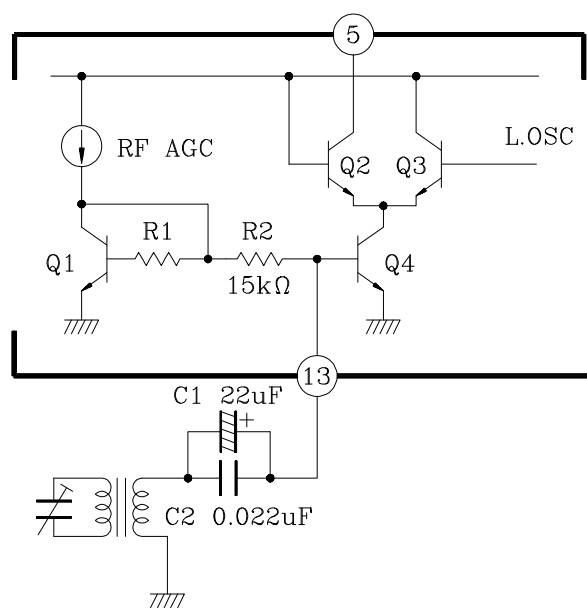


Fig. 4

## <COMMON SECTION>

- AM/FM Mode Switchover

Switchover between AM/FM mode is possible with one-make switch. In case of the opened, this IC has AM mode.

Another in case that the terminal is connected to  $V_{CC}$  directly, that has FM mode.

And the terminal of pin② is  $V_{CC}$  terminal of FM FRONT END section, too.

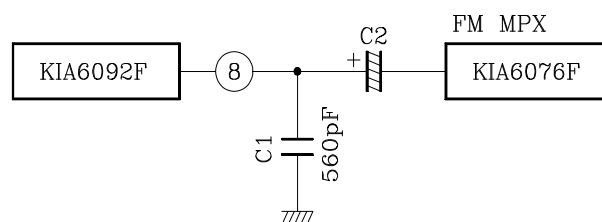


Fig. 5

- Output Circuit (See Fig. 5)

Both of the AM/FM detector signal is appeared through the pin③.

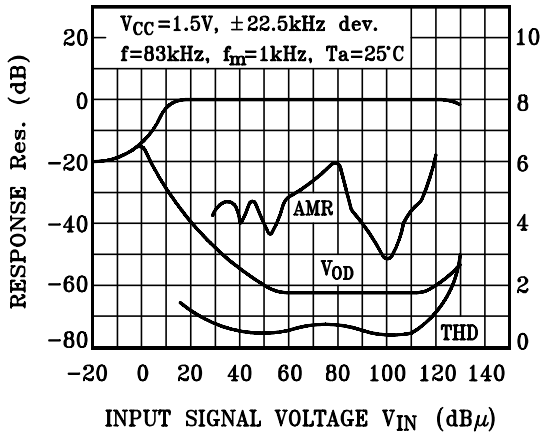
Those output are chosen by the mode switchover. At the same time, the output impedance is changed as follow at AM/FM mode, due to cut the AM carrier signal and pass the FM composite signal smoothly, with only one condenser.

$R_{out}(AM)=8k\Omega$

$R_{out}(FM)=1.4k\Omega$

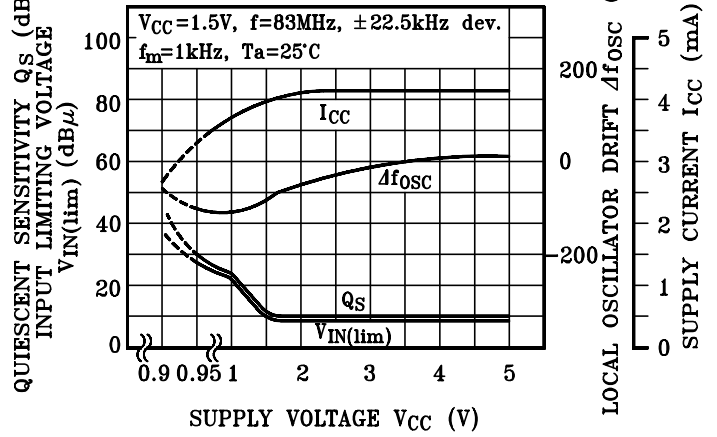
## FM (F/E+IF)

$V_{OD}$ , AMR  $V_{NO}$ , THD -  $V_{IN}$



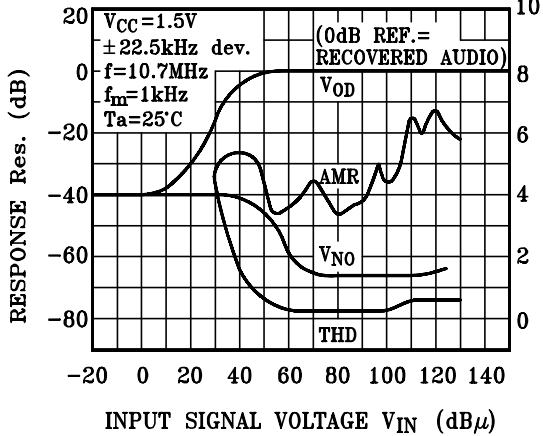
## FM(F/E+IF)

$Q_S$ ,  $V_{IN(lim)}$ ,  $\Delta f_{OSC}$ ,  $I_{CC} - V_{IN}$



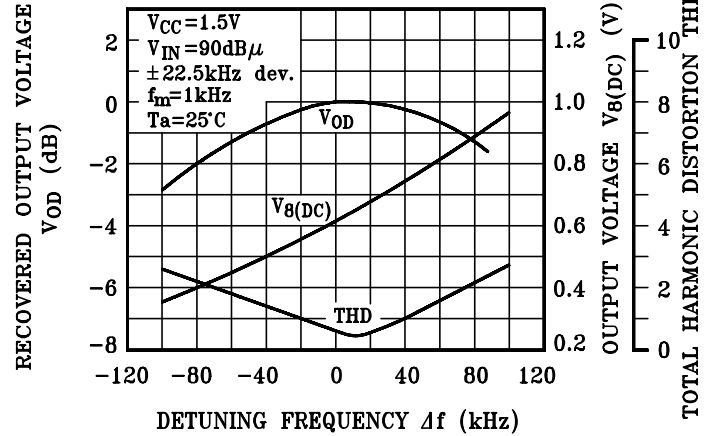
## FM (F/E+IF)

$V_{OD}$ , AMR  $V_{NO}$ , THD -  $V_{IN}$



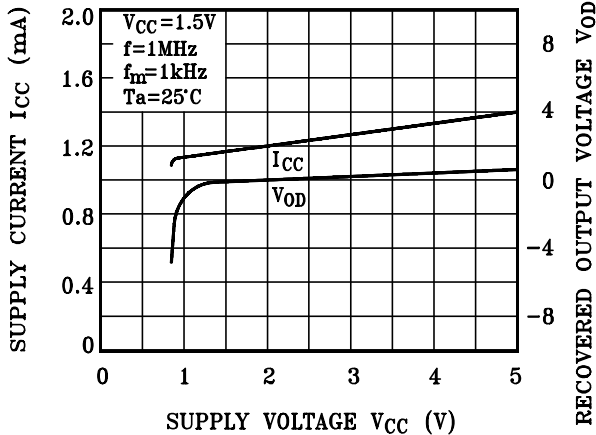
## FM(IF)

$V_{OD}$ ,  $V_{8(DC)}$ , THD -  $\Delta f$



## (AM)

$I_{CC}$ ,  $V_{OD} - V_{CC}$



## (AM)

$V_{OD}$ ,  $V_{NO}$ , THD -  $V_{IN}$

