

1.5V FM STEREO MULTIPLEX

The KIA6076F is FM PLL IC designed for low voltage operation (1.5V), which is suitable for stereo headphone radio. This can realize the low power dissipation.

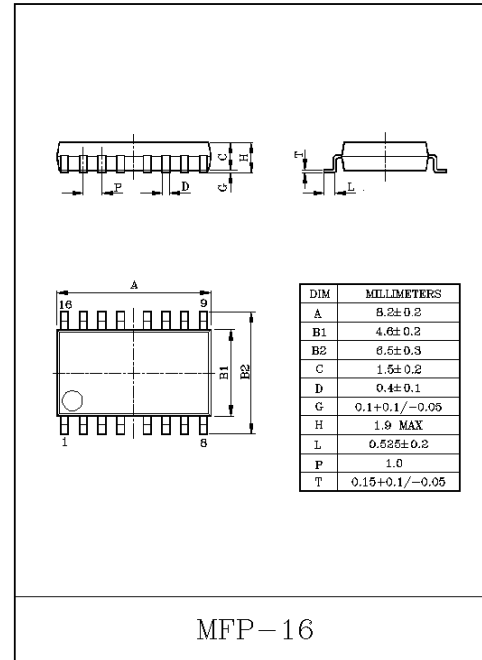
FEATURES

- LED driver for stereo indication ($V_{LED}=3\sim 6V$).
- Adopting the LC type oscillator ($f_{VCO}=456kHz$).
- Built-in compulsive monaural function (V_{CO} stop, pin ⑬).
- Free running frequency monitor terminal.
pin⑧ : $f_{FREE}=19kHz$.
- Excellent low supply current : $I_{CC}=0.8mA(Typ.)$
($V_{CC}=1.5V, T_a=25^{\circ}C$).
- Operating supply voltage range
: $V_{CC(opr.)}=0.9\sim 5V(T_a=25^{\circ}C)$.

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

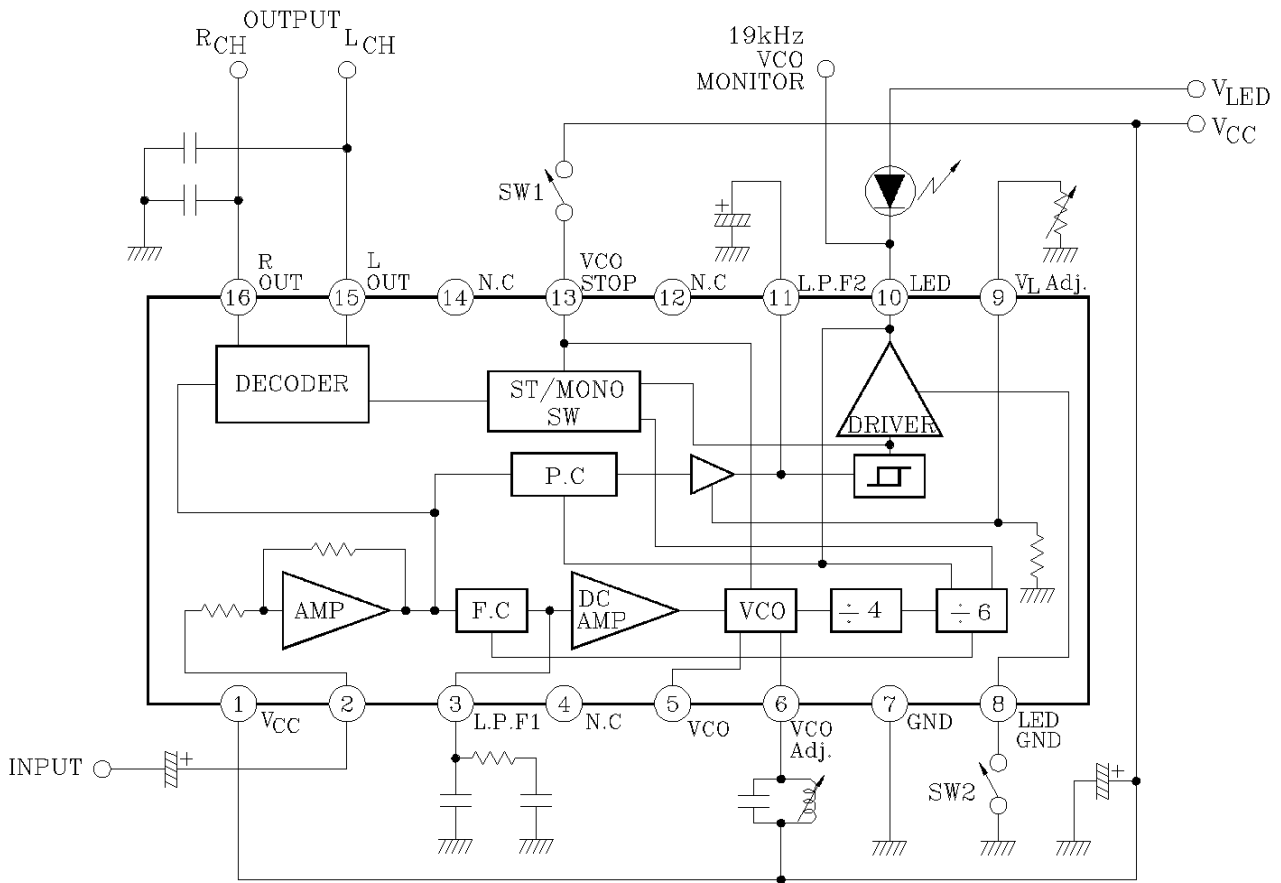
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	5	V
Lamp Current	I_{LAMP}	5	mA
Lamp Voltage	V_{LAMP}	6	V
Power Dissipation (Note)	P_D	350	mW
Operating Temperature	T_{opr}	-25~75	$^{\circ}C$
Storage Temperature	T_{sig}	-55~150	$^{\circ}C$

Note : Derated above $T_a=25^{\circ}C$ in the proportion of $2.8mW/^{\circ}C$ for KIA6076F



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BLOCK DIAGRAM



SW1 : VCO STOP SWITCH (COMPULSIVE MONAURAL)
 SW2 VCO MONITOR SWITCH

Note : pin (4), (12), (14), are no connected.

DC CHARACTERISTICS

($V_{CC}=1.5V$, $T_a=25^{\circ}C$, Terminal voltage at no signal)

PIN NO.	ITEM	SYMBOL	TYP.	UNIT	PIN NO.	ITEM	SYMBOL	TYP.	UNIT
1	V_{CC}	V_1	1.5	V	9	V_L ADJUST	V_9	0.5	V
2	INPUT	V_2	0.6	V	10	LED	V_{10}	-	V
3	L.P.F.1	V_3	0.7	V	11	L.P.F.2	V_{11}	0.7	V
4	N.C.	V_4	-	V	12	N.C.	V_{12}	-	V
5	V_{CO}	V_5	0.8	V	13	V_{CO} STOP	V_{13}	-	V
6	V_{CO}	V_6	1.5	V	14	N.C.	V_{14}	-	V
7	GND	V_7	0	V	15	Lch OUTPUT	V_{15}	0.65	V
8	LED GND	V_8	0	V	16	Rch OUTPUT	V_{16}	0.65	V

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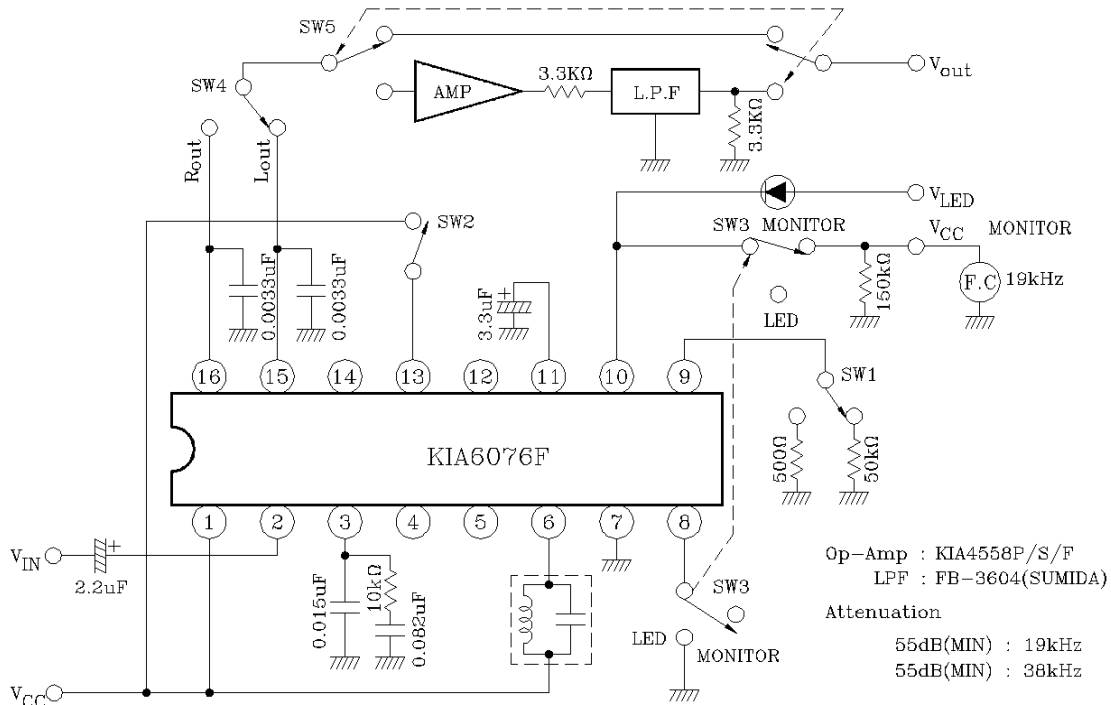
ELECTRICAL CHARACTERISTICS (AC) (Unless otherwise specified, $T_a=25^{\circ}\text{C}$, $V_{CC}=1.5\text{V}$, $f=1\text{kHz}$)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Supply Current		I_{CC}	-	at Lamp off	-	0.8	1.6	mA	
Input Resistance		R_{IN}	-		-	36	-	k Ω	
Output Resistance		R_{OUT}	-		-	15	-	k Ω	
Max. Composite Signal Input Voltage		$V_{IN(MAX.)}$ (STEREO)	-	L+R=90%, P=10% SW1→R _{LED} =50k Ω SW5→LPF ON	-	250	-	mV _{rms}	
Separation		Sep.	-	L+R=90mV _{rms} P=10mV _{rms} SW1→R _{LED} =50k Ω SW5→LPF ON	fm=100Hz	-	30	-	dB
					fm=1kHz	22	35	-	
					fm=10kHz	-	30	-	
Total Harmonic Distortion	Monaural	THD (MONAURAL)	-	$V_{IN}=100\text{mV}_{rms}$, SW1→R _{LED} =500 Ω	-	0.2	1.5	%	
	Stereo	THD (STEREO)	-	L+R=90mV _{rms} , P=10mV _{rms} fm=1kHz, SW1→R _{LED} =50k Ω SW5→LPF ON	-	0.4	-		
Voltage Gain		G_v	-	$V_{IN}=100\text{mV}_{rms}$, SW1→R _{LED} =500 Ω	-4	-2	1	dB	
Channel Balance		C.B.	-	$V_{IN}=100\text{mV}_{rms}$, SW1→R _{LED} =500 Ω	-	0	2.0	dB	
Lamp ON Sensitivity		$V_L(ON)$	-	Pilot Input	SW1→R _{LED} =50k Ω	-	-	5	mV _{rms}
Lamp OFF Sensitivity		$V_L(OFF)$	-		SW1→R _{LED} =500 Ω	7	-	-	
Stereo Lamp Hysteresis		V_H	-	to turn-off from turn-on	-	3	-	mV _{rms}	
Capture Range		C.R.	-	P=10mV _{rms}	-	±3	-	%	
Carrier Leak	19kHz	C.L.	-	P=10mV _{rms} , SW1→R _{LED} =50k Ω L+R=90mV _{rms}	-	30	-	dB	
	38kHz				-	50	-		
SCA Rejection Ratio		SCA Rej.	-	P=10mV _{rms} , L+R=80mV _{rms} SCA=10mV _{rms} , $f_{SCA}=67\text{kHz}$, SW1→R _{LED} =50k Ω	-	70	-	dB	
Signal to Noise Ratio		S/N	-	$V_{IN}=100\text{mV}_{rms}$, $R_g=620\Omega$	-	65	-	dB	

Note : Carrier Leak of 38kHz is only carrier.

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TEST CIRCUIT



Op-Amp : KIA4558P/S/F
 LPF : FB-3604(SUMIDA)
 Attenuation
 55dB(MIN) : 19kHz
 55dB(MIN) : 38kHz

SW1 : Lamp (Stereo Indicator) ON/OFF Check

Lamp ON SW1 : 50kΩ
 Lamp OFF SW1 : 500Ω

SW2 : VCO Stop Switch pin ⑬ connected to V_{CC} (Compulsive Monaural)

SW3 : VCO Monitor At Monitor Mode, pin ⑩ is connected to the resistor (150kΩ) at Test Circuit.

In case that the input has no pilot signal and pin ⑧ is connected to GND, it is possible to check the VCO frequency, too.

SW4 : Lout/Rout Switchover

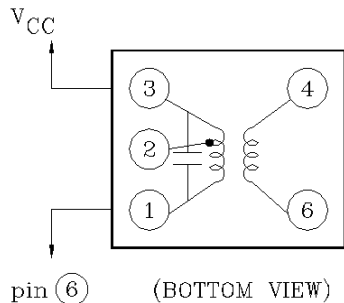
SW5 : Low Pass Filter Switchover

Note : In the test of ELECTRICAL CHARACTERISTIC

Monaural Mode (V_{IN}=100mV_{rms}) SW1 : 500Ω

Stereo Mode (L+R=90mV_{rms}, P=10mV_{rms}) SW1 : 50kΩ

COIL DATA (TEST CIRCUIT)



C ₀ (pF)	f (kHz)	Q ₀	TURNS		
			1-2	2-3	4-6
180	455	110	146	6	13

(K) : KSAD106

(S) : 44M-037-935C

WITE : 0.07mmφ UEW

Note ; (K) : KWANGSUNG ELECTRIC CO., LTD. (Tel : (02) 716-0034)

(S) : SUMIDA ELECTRIC CO., LTD.

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EXPLANATION OF INTERNAL CIRCUITS AND FUNCTIONS

(1) Input Circuit

This circuit is composed of the inverted amplifier as shown Fig.1.

In case of the large signal input, R_f (the external resistance, in series) can reduce the voltage gain.

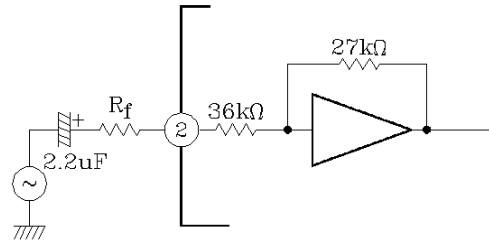


Fig. 1

(2) Lamp-ON Sensitivity and Stereo/Monaural Sensitivity

It is possible to adjust the Lamp-on sensitivity and the Stereo sensitivity by the external resistance (R_T) which is connected to the terminal pin 9.

The output current (I_o) of the synchronous detector is determined by the input pilot signal. As the value of R_T is larger, the Lamp-on sensitivity and the Stereo Sensitivity become more increasing, because the current (I_1) of Q1 is decreasing, and the current (I_2) is increasing.

However, in case that the terminal pin 9 is open, the Stereo Sensitivity is too increasing, the stereo switch remains turned-on, without pilot signal.

Therefore, the value of R_T is efficient about $10k\Omega \sim 50k\Omega$

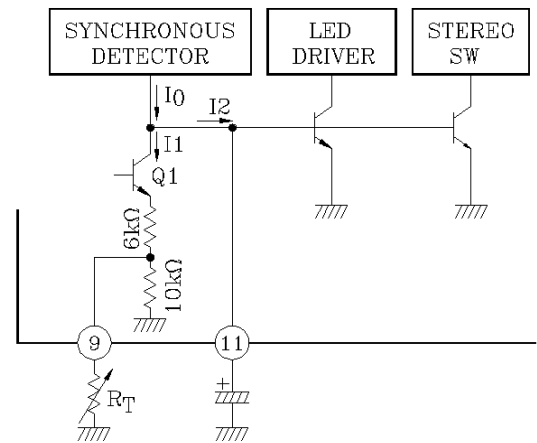


Fig. 2

(3) f_{vco} Monitor

The LED terminal pin 10 can be used as f_{vco} (19kHz) monitor terminal, in case that the terminal pin 8 is open, as Fig.3.

Under unlocked condition, in case that the terminal pin 8 is connected to GND, it can be done, too.

In case that the LED indicator is not necessary, it is better that the terminal pin 8 is open, because of the save of the supply current.

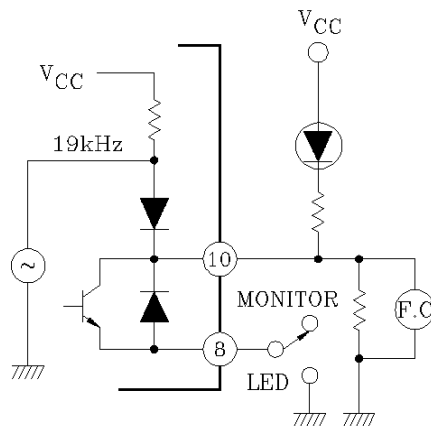


Fig. 3

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(4) Compulsive Monaural function

In Case that the terminal pin⑬ is connected to V_{CC} as Fig.4, this item becomes compulsive monaural mode, That causes the V_{CO} stopping. Connected as Fig.5, switchover between AM/FM mode is possible with one-make switch.

(5) Anti-birdy Effect

KIA6076F have beat-prevent performance, because switching wave (38kHz) hardly has a number of odd harmonic frequency of 38kHz in internal circuit.

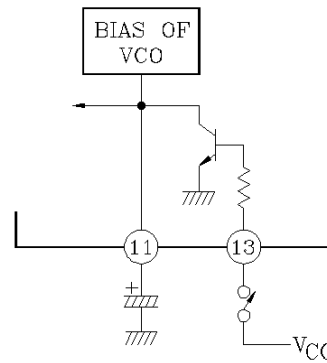


Fig. 4

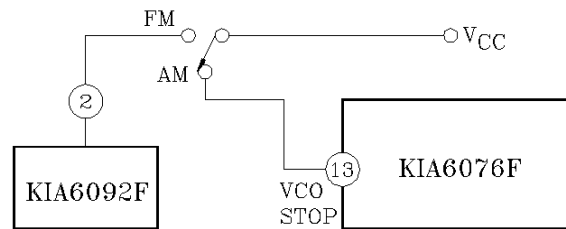
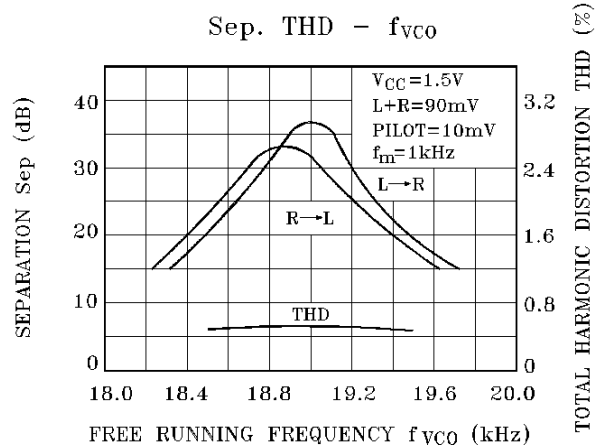
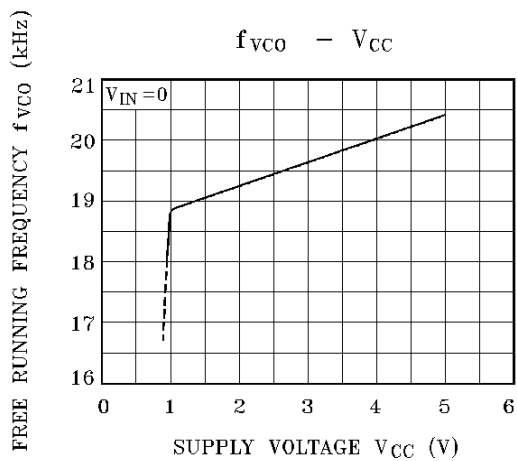
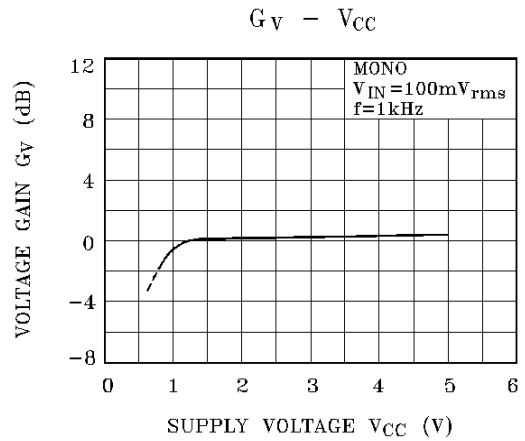
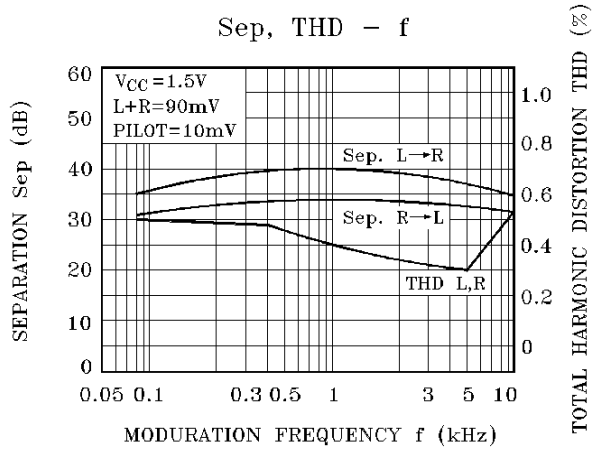
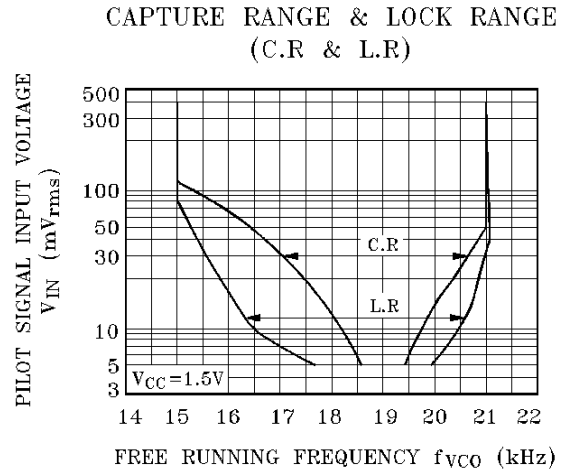
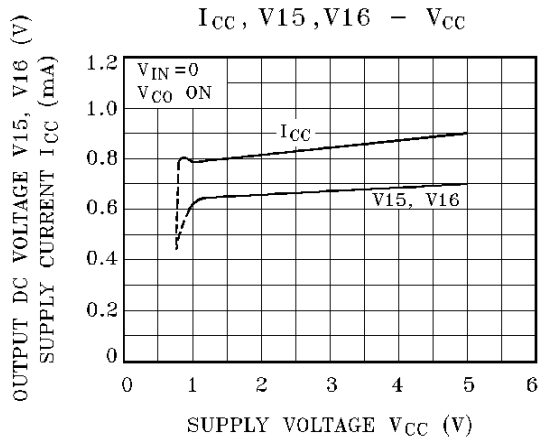


Fig. 5

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