

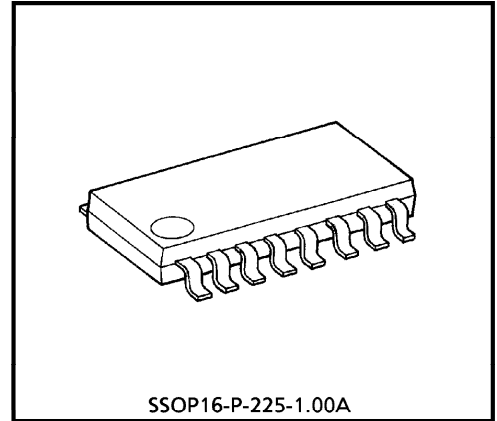
# TA7766AF

## FM PLL MPX (1.5V USE)

The TA7766AF is an FM PLL MPX IC designed for low voltage operation (1.5V), which is suitable for stereo headphone radio and radio cassette equipments. This can realize the low power dissipation.

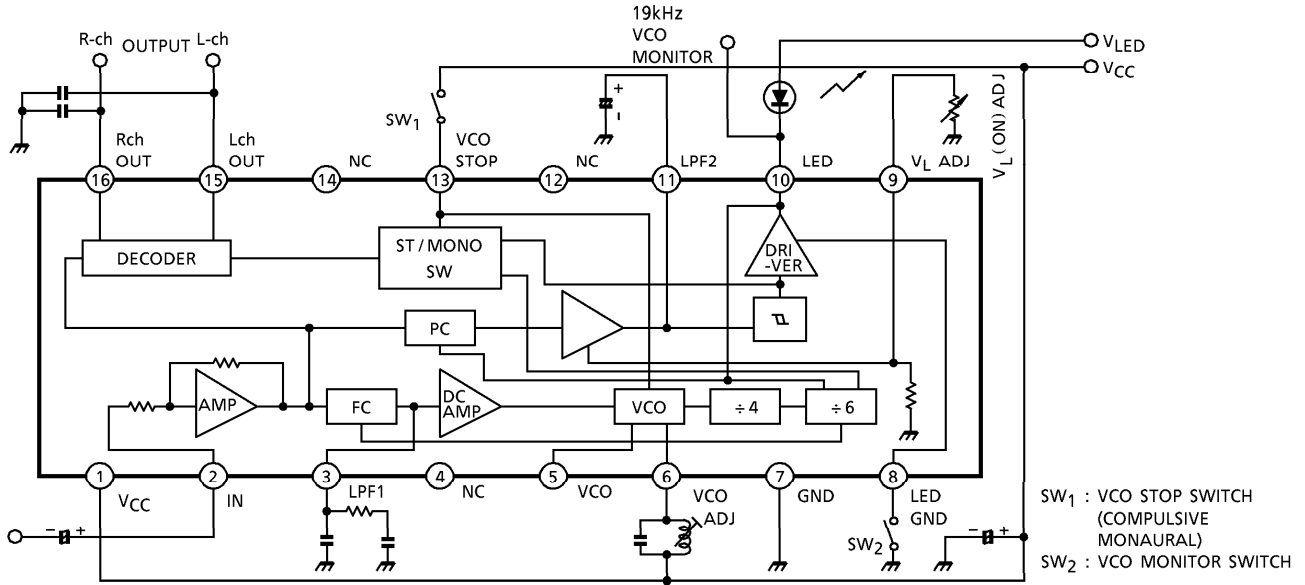
### FEATURES

- LED driver for stereo indication ( $V_{LED} = 3\sim 6V$ )
- Adopting the LC type oscillator ( $f_{VCO} = 456kHz$ )
- Adjustable for lamp-on sensitivity
- Built-in compulsive monaural function (VCO stop, pin<sup>⑬</sup>)
- Free running frequency monitor terminal  
Pin<sup>⑧</sup> :  $f_{FREE} = 19kHz$
- Excellent low supply current  
:  $I_{CC} = 0.8mA$  (Typ.) ( $V_{CC} = 1.5V$ ,  $T_a = 25^\circ C$ )
- Operating supply voltage range  
:  $V_{CC} (opr) = 0.9\sim 5V$  ( $T_a = 25^\circ C$ )
- Stereo operating supply voltage range  
:  $V_{CC} (opr) = 1\sim 5V$  ( $T_a = 25^\circ C$ )



SSOP16-P-225-1.00A  
Weight : 0.14g (Typ.)

**BLOCK DIAGRAM**



(Note) pin④, ⑫, ⑭ are no connected.

**APPLICATION NOTE**

(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.

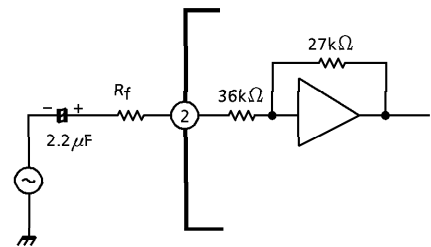


Fig.1

(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 pin⑨. 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  $Q_1$  is decreasing, and the current  $I_2$  is increasing. However, in case that the terminal pin⑨ 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 10~50k $\Omega$ .

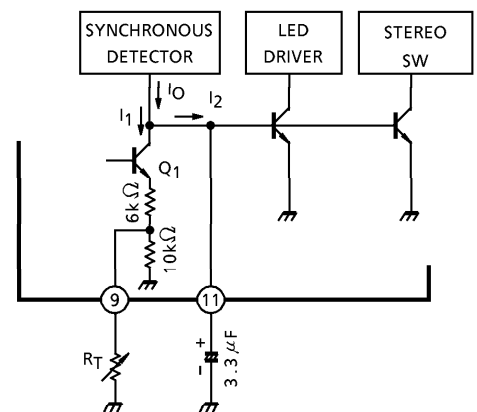


Fig.2

(3)  $f_{VCO}$  monitor

The LED terminal pin⑩ can be used as  $f_{VCO}$  (19kHz) monitor terminal, in case that the terminal pin⑧ is open, as Fig.3.

Under unlocked condition, in case that the terminal pin⑧ is connected to GND, it can be done, too.

In case that the LED indicator is not necessary, it is better that the terminal pin⑧ is open, because of the save of the supply current.

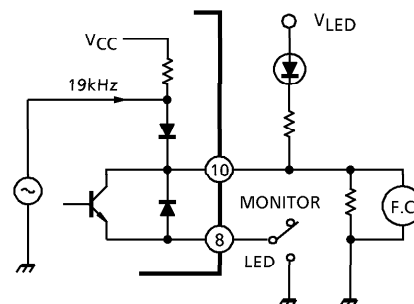


Fig.3

(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 VCO stopping. Connected as Fig.5, switchover between AM / FM mode is possible with one-make switch.

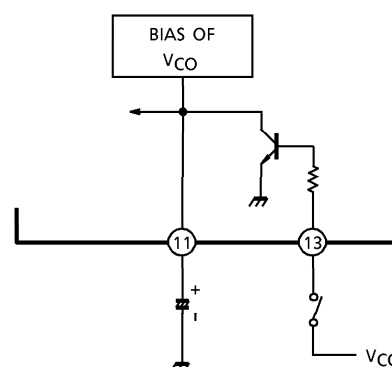


Fig.4

(5) Anti-birdy effect

TA7766AF has beat-prevent performance, because switching wave (38kHz) hardly has a number of odd harmonic frequency of 38kHz in internal circuit.

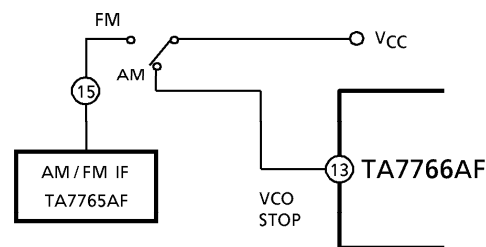


Fig.5

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

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

(Note) Derated above  $25^\circ\text{C}$  in the proportion of  $2.8\text{mW}/^\circ\text{C}$ .

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

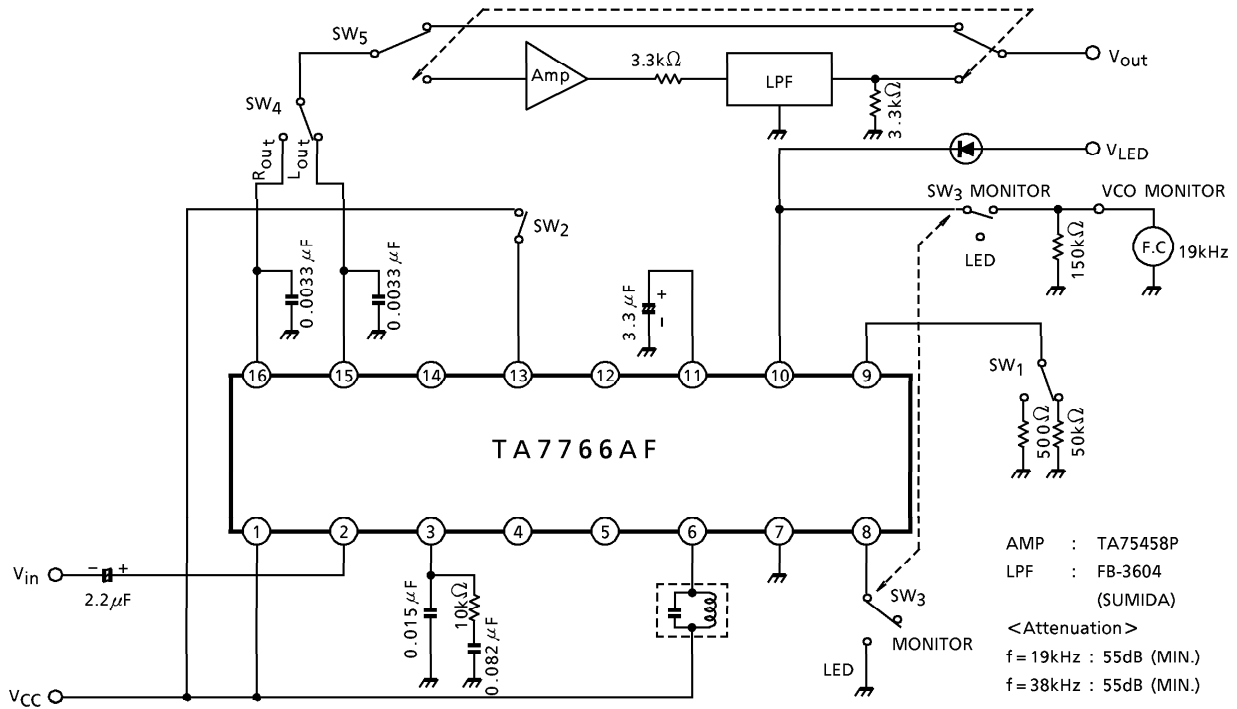
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Supply Current		$I_{CC}$	—	At lamp off	—	0.8	1.6	mA	
Input Resistance		$R_{IN}$	—		—	36	—	$k\Omega$	
Output Resistance		$R_{OUT}$	—		—	15	—	$k\Omega$	
Max. Composite Signal Input Voltage		$V_{in}(\text{MAX})$ (STEREO)	—	L + R =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

(Note) Carrier leak of 38kHz is only carrier.

**DC CHARACTERISTICS**(V<sub>CC</sub> = 1.5V, T<sub>a</sub> = 25°C, terminal voltage at no signal)

PIN No.	SYMBOL	TYP.	UNIT
PIN ① (V <sub>CC</sub> )	V <sub>1</sub>	1.5	V
PIN ② (INPUT)	V <sub>2</sub>	0.6	V
PIN ③ (LPF1)	V <sub>3</sub>	0.7	V
PIN ④ (NC)	V <sub>4</sub>	—	V
PIN ⑤ (VCO)	V <sub>5</sub>	0.8	V
PIN ⑥ (VCO ADJ)	V <sub>6</sub>	1.5	V
PIN ⑦ (GND)	V <sub>7</sub>	0	V
PIN ⑧ (LED GND)	V <sub>8</sub>	0	V
PIN ⑨ (V <sub>L</sub> ADJ)	V <sub>9</sub>	0.05	V
PIN ⑩ (LED)	V <sub>10</sub>	—	V
PIN ⑪ (LPF2)	V <sub>11</sub>	0.7	V
PIN ⑫ (NC)	V <sub>12</sub>	—	V
PIN ⑬ (VCO STOP)	V <sub>13</sub>	—	V
PIN ⑭ (NC)	V <sub>14</sub>	—	V
PIN ⑮ (L-ch OUTPUT)	V <sub>15</sub>	0.65	V
PIN ⑯ (R-ch OUTPUT)	V <sub>16</sub>	0.65	V

TEST CIRCUIT

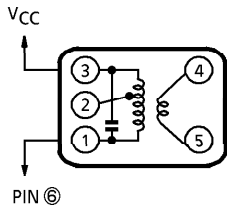


- SW<sub>1</sub> Lamp (stereo indicator) ON/OFF check  
 Lamp ON SW<sub>1</sub> : 50kΩ  
 Lamp OFF SW<sub>1</sub> : 500Ω
- SW<sub>2</sub> VCO stop switch pin<sup>⑬</sup> connected to V<sub>CC</sub> (compulsive monaural)
- SW<sub>3</sub> VCO monitor  
 At monitor mode, pin<sup>⑩</sup> is connected to the resistor (150kΩ) at test circuit.  
 In case that the input has no pilot signal and pin<sup>⑧</sup> is connected to GND, it is possible to check the VCO frequency, too.
- SW<sub>4</sub> L<sub>out</sub>/R<sub>out</sub> switchover
- SW<sub>5</sub> LPF switchover

(Note) In the test of ELECTRICAL CHARACTERISTIC

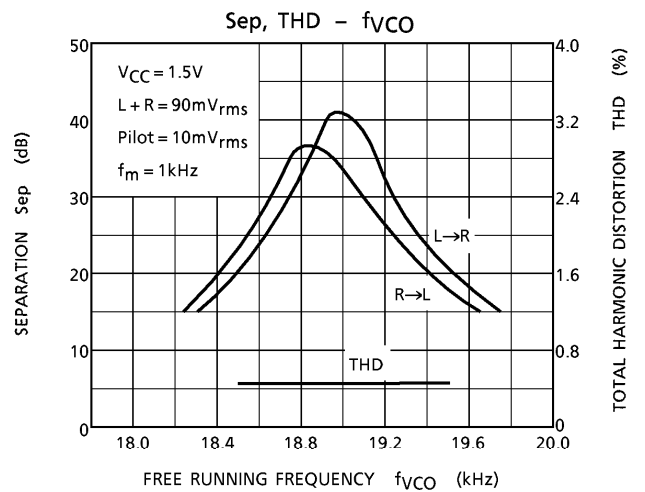
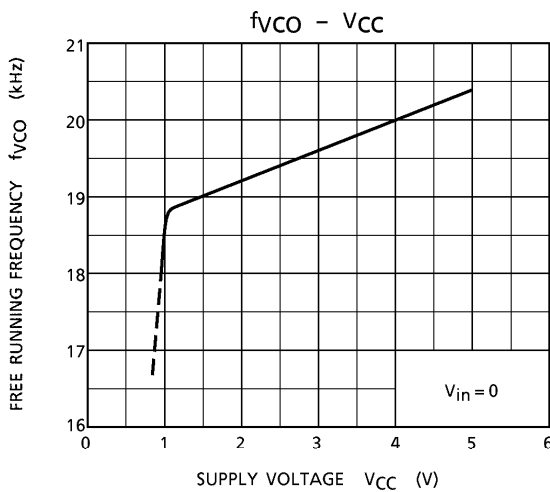
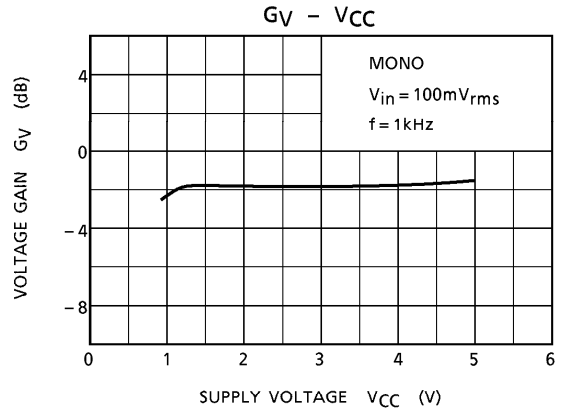
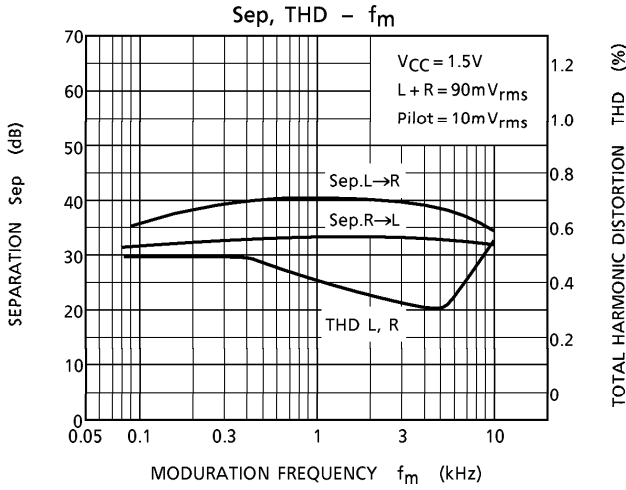
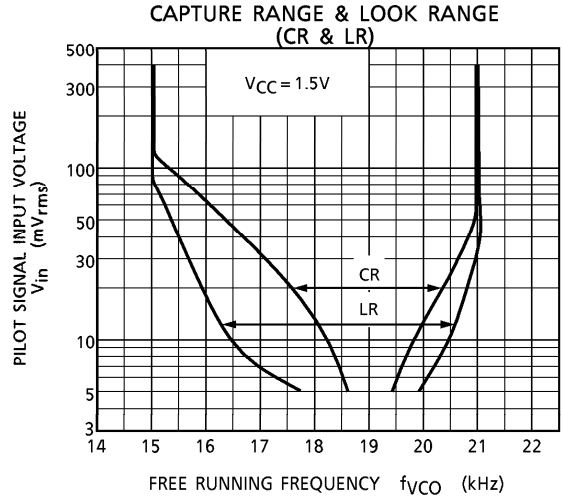
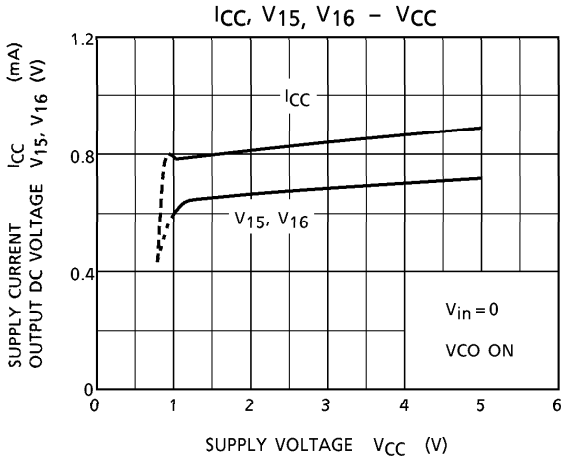
Monaural mode (V<sub>in</sub> = 100mV<sub>rms</sub>) SW<sub>1</sub> : 500Ω  
 Stereo mode (L + R = 90mV<sub>rms</sub>, P = 10mV<sub>rms</sub>) SW<sub>1</sub> : 50kΩ

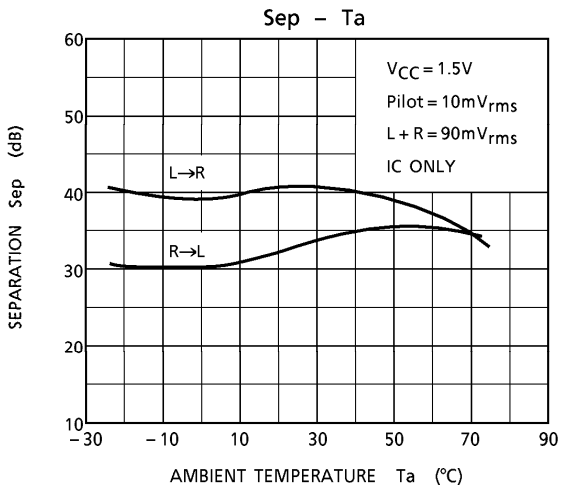
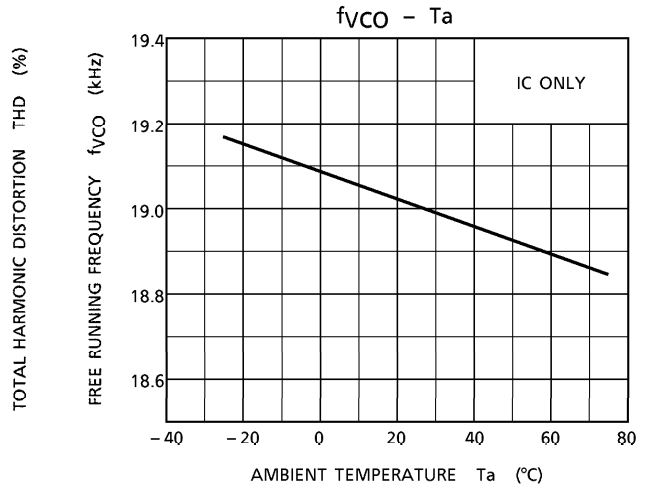
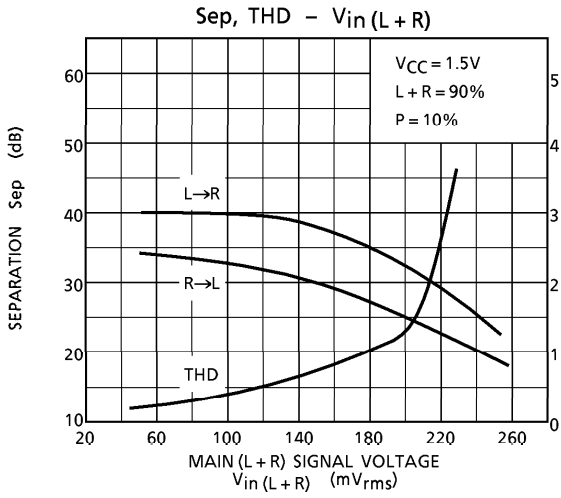
COIL DATA (Test circuit)



C <sub>O</sub> (pF)	f (kHz)	Q <sub>O</sub>	TURN		
			1-2	2-3	4-6
180	455	110	146	6	13

SUMIDA ELECTRIC Co., Ltd.  
 : 44M-037-935C  
 WITE : 0.07mmφ UEW

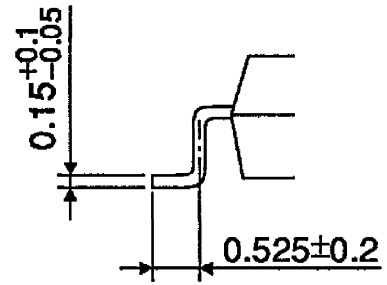
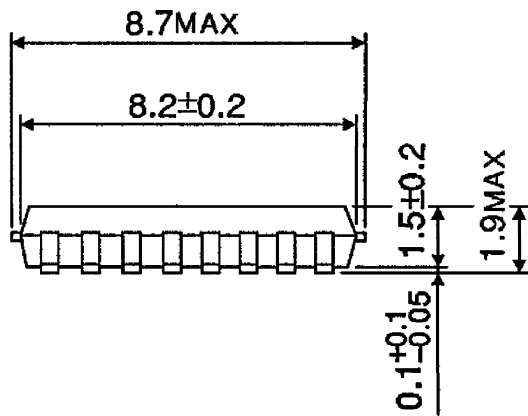
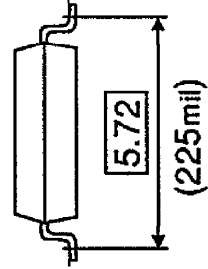
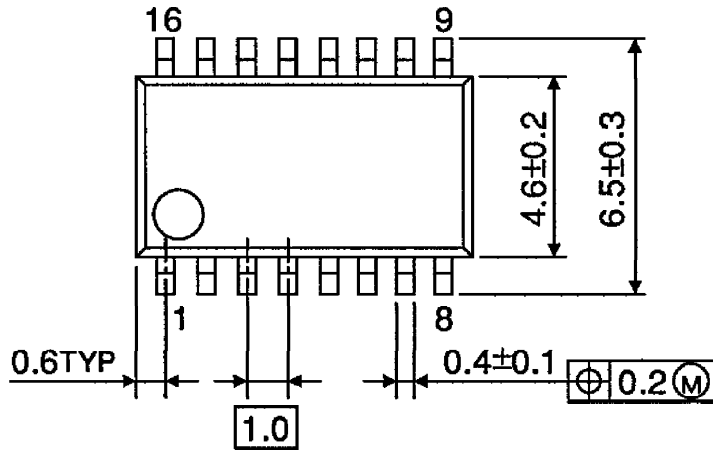






PACKAGE DIMENSIONS  
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.