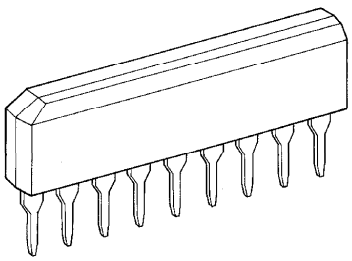
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7343AP

## FM PLL MPX

The TA7343AP is PLL FM stereo multiplex IC.
It is suitable for automotive applications and portable radio applications because of space merit by the package and wide supply voltage range.



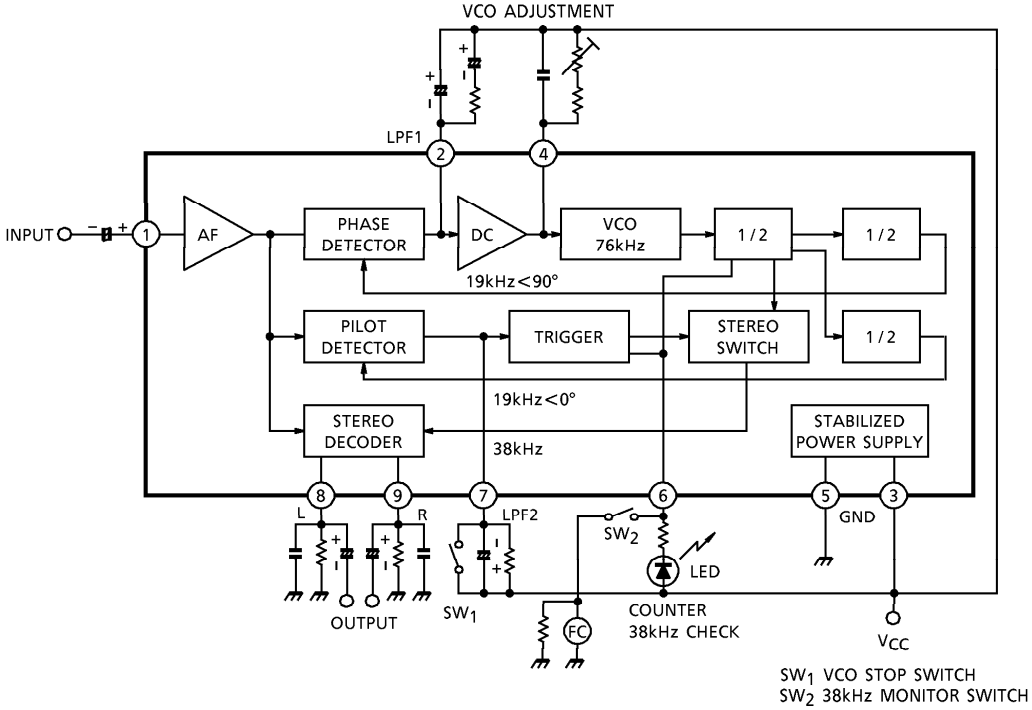
SIP9-P-2.54A

Weight : 0.92g (Typ.)

### FEATURES

- Excellent stereo LED sensitivity
  : $V_{L\,(ON)} = 9mV_{rms}$ (Typ.)
- Suitable for LED driving : $I_{LED} = 20mA$ (Max.)
- Recommendable input voltage range
  : $V_{in} = 200 \sim 700mV_{rms}$
- Operating supply voltage range : $V_{CC} = 3.5 \sim 12V$
- Excellent channel separation through entire audio frequency range : Sep = 45dB (Typ.)
- Low distortion : THD = 0.08% (Typ.) at $V_{in} = 200mV_{rms}$ (Stereo)
- Built-in compulsive monaural function. (The VCO is stopped when the pin⑦ is connected with the power supply line, and then the stereo indicator is turn off.)
- Easy adjustment (The monitored free running frequency of VCO is 38kHz at pin⑥.)

## BLOCK DIAGRAM



**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 12 | V |
| LED Voltage | $V_{LED}$ | 16 | V |
| LED Current | $I_{LED}$ | 20 | mA |
| Power Dissipation | $P_D$ (Note) | 500 | mW |
| Operating Temperature | $T_{opr}$ | − 30~75 | °C |
| Storage Temperature | $T_{stg}$ | − 55~155 | °C |

(Note) Derated above Ta = 25°C in the proportion of 4mW / °C.

**ELECTRICAL CHARACTERISTICS**

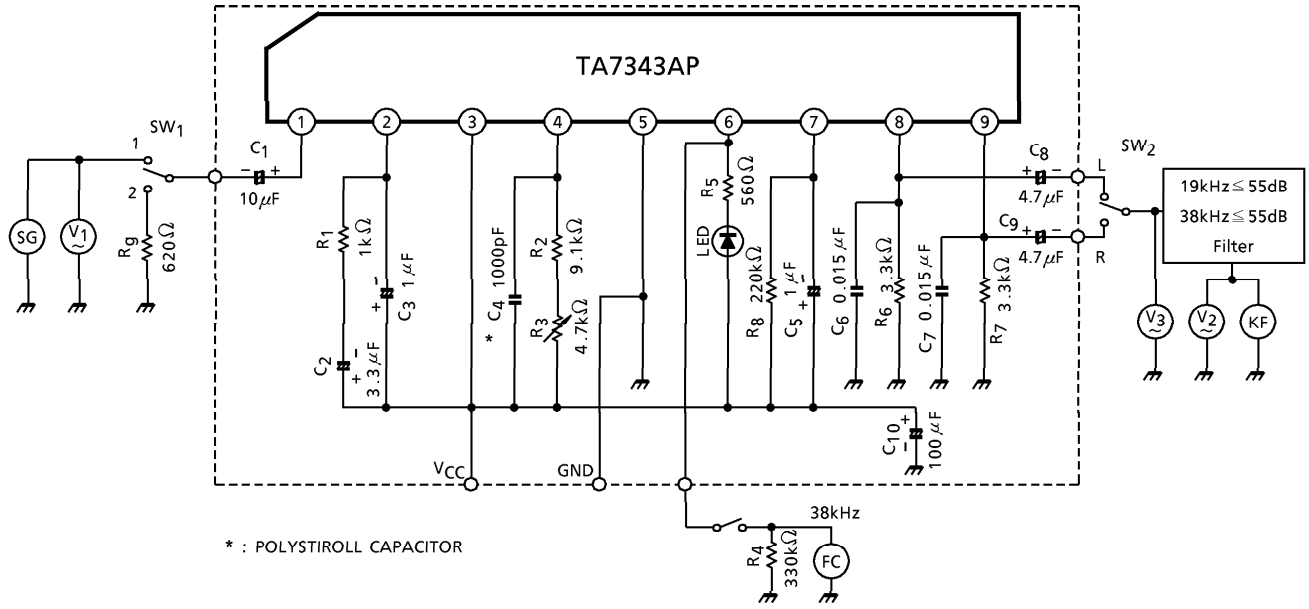
1. DC characteristics (Ta = 25°C, $V_{CC}$ = 8V, terminal voltage at no signal)

| PIN No. | CHARACTERISTIC | SYMBOL | TYP. | UNIT |
|---|---|---|---|---|
| Pin① | INPUT | V1 | 3.5 | V |
| Pin② | LPF 1 | V2 | 6.6 | V |
| Pin③ | $V_{CC}$ | V3 | 8.0 | V |
| Pin④ | VCO | V4 | 7.1 | V |
| Pin⑤ | GND | V5 | 0 | V |
| Pin⑥ | ST LED | V6 | — | V |
| Pin⑦ | LPF 2 | V7 | 7.4 | V |
| Pin⑧ | L-ch OUTPUT | V8 | 4.0 | V |
| Pin⑨ | R-ch OUTPUT | V9 | 4.0 | V |

2. AC characteristics (Unless otherwise specified, Ta = 25°C, $V_{CC}$ = 8V, f = 1kHz)

| CHARACTERISTIC | | SYMBOL | TEST CIR-CUIT | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| Supply Current | | $I_{CC}$ | — | at LED off | | — | 11 | 18 | mA |
| Input Resistance | | $R_{IN}$ | — | | | — | 33 | — | kΩ |
| Max. Composite Signal Input Voltage | | $V_{in}$ MAX (STEREO) | — | L + R = 90%, P = 10%<br>THD = 1% | | — | 900 | — | $mV_{rms}$ |
| Separation | | Sep | — | L + R = 180$mV_{rms}$<br>P = 20$mV_{rms}$ | | 36 | 45 | — | dB |
| Total Harmonic Distortion | Monaural | THD (MONAU-RAL) | — | $V_{in}$ = 200$mV_{rms}$ | | — | 0.08 | 0.3 | % |
| | Stereo | THD (STEREO) | — | L + R = 180$mV_{rms}$<br>P = 20$mV_{rms}$ | | — | 0.08 | — | |
| Voltage Gain | | $G_V$ | — | $V_{in}$ = 200$mV_{rms}$ | | −2.0 | 0 | 2.0 | dB |
| Channel Balance | | CB | — | $V_{in}$ = 200$mV_{rms}$ | | — | 0 | 1.5 | dB |
| Stereo LED Sensitivity | ON | $V_L$ (ON) | — | Pilot Input | | — | 9 | 15 | $mV_{rms}$ |
| | OFF | $V_L$ (OFF) | — | | | 2 | 6 | — | |
| Stereo LED Hysteresis | | $V_H$ | — | to turn off from LED turn on | | — | 3 | — | $mV_{rms}$ |
| Capture Range | | CR | — | P = 20$mV_{rms}$ | | — | ±3 | — | % |
| Carrier Leak | 19kHz | CL | — | P = 20$mV_{rms}$<br>L + R = 180$mV_{rms}$ | | — | 34 | — | dB |
| | 38kHz | | | | | — | 42 | — | |
| SCA Rejection Ratio | | SCA Rej | — | P = 20$mV_{rms}$<br>L + R = 160$mV_{rms}$<br>SCA = 20$mV_{rms}$<br>$f_{SCA}$ = 67kHz | | — | 70 | — | dB |
| Signal to Noise Ratio | | S / N | — | $V_{in}$ = 200$mV_{rms}$<br>f = 1kHz, $R_g$ = 620Ω | | — | 74 | — | dB |
| Output Current (Pin⑧, Pin⑨) | | $I_{OUT}$ | — | $R_L$ = 3.3kΩ | $V_{CC}$ = 3.5V | — | 0.3 | 0.6 | mA |
| | | | | | $V_{CC}$ = 8.0V | — | 1.2 | 1.8 | |
| | | | | | $V_{CC}$ = 12V | — | 1.4 | 2.1 | |

**TEST CIRCUIT**

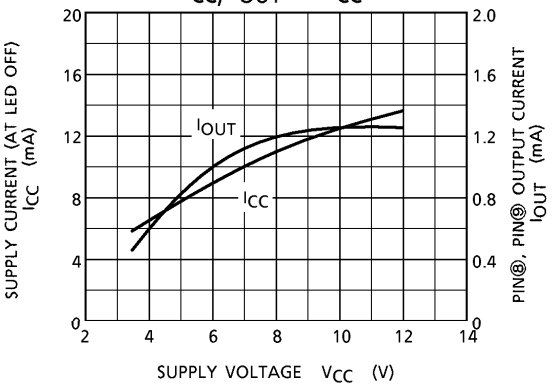



SG : STEREO SIGNAL GENERATOR
FC : FREQUENCY COUNTER
$V_1$, $V_2$, $V_3$ : AC VOLTMETER
KF : DISTORTION METER

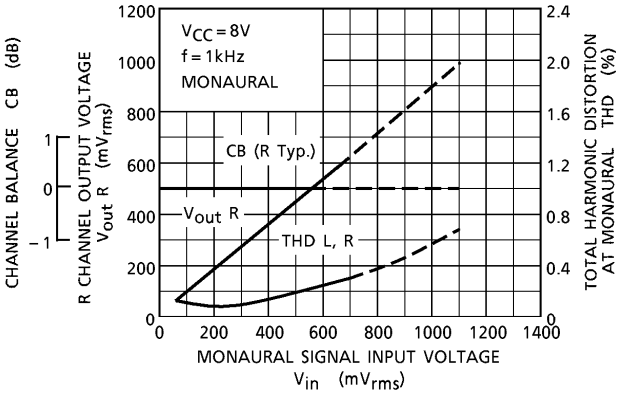
**EXTERNAL PARTS TABLE**

| PARTS No. | TYPICAL | PURPOSE | INFLUENCE | | NOTE |
|---|---|---|---|---|---|
| | | | SMALLER THAN TYP. | GREATER THAN TYP. | |
| $C_1$ | 10$\mu$F | Coupling | Separation is bad at 50~300Hz | "POP" noise is high | Input |
| $C_2$ | 3.3$\mu$F | LPF at PLL | THD is bad at 5~10kHz (stereo) | Narrow capture range | — |
| $C_3$ | 1$\mu$F | | | | |
| $R_1$ | 1k$\Omega$ | | | | |
| $C_4$ | 1000pF | VCO Free Running Frequency adjustment | $C_4$ : Small→Wide capture range and large glitter<br>$C_4$ : Large→Narrow capture range | | — |
| $R_2$ | 9.1k$\Omega$ | | | | |
| $R_3$ | 4.7k$\Omega$VR | | | | |
| $R_4$ | 330k$\Omega$ | Monitor Load | — | | — |
| $R_5$ | 560$\Omega$ | Rush Current Limiter | IC is damaged by the rush current | LED is dark | $I_{LED} \leqq 20$mA |
| LED | — | Stereo Indicator | Usable for LED | | |
| $C_6$ | 0.015$\mu$F | Load and Diemphasis | Diemphasis (50$\mu$s) | | $C_6 = 0.022\mu$F for 75$\mu$s |
| $R_6$ | 3.3k$\Omega$ | | Output voltage is small | THD is bad for low $V_{CC}$ | |
| $C_7$ | 0.015$\mu$F | Load and Diemphasis | Diemphasis (50$\mu$s) | | $C_7 = 0.022\mu$F for 75$\mu$s |
| $R_7$ | 3.3k$\Omega$ | | Output voltage is small | THD is bad for low $V_{CC}$ | |
| $C_8$ | 4.7$\mu$F | Output Coupling | Frequency response is bad | "POP" noise is large | L-ch |
| $C_9$ | 4.7$\mu$F | Output Coupling | | | R-ch |
| $R_8$ | 220k$\Omega$ | LED Sensitivity Adjustment | $V_{L\,(ON)}$ is large | $V_{L\,(ON)}$ is small | — |
| $C_5$ | 1$\mu$F | LPF at LED | THD is bad at 50~300Hz | Slow LED response | — |

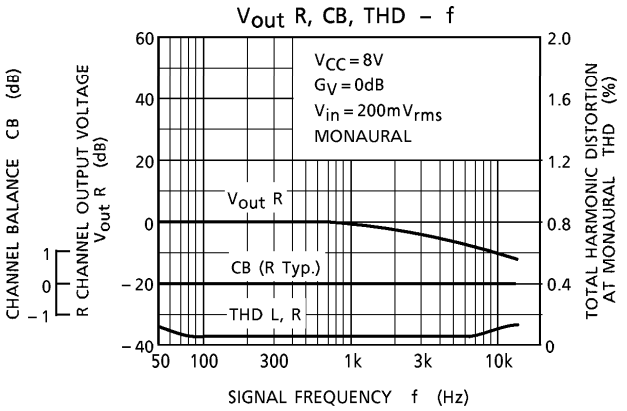
$I_{CC}$, $I_{OUT}$ – $V_{CC}$



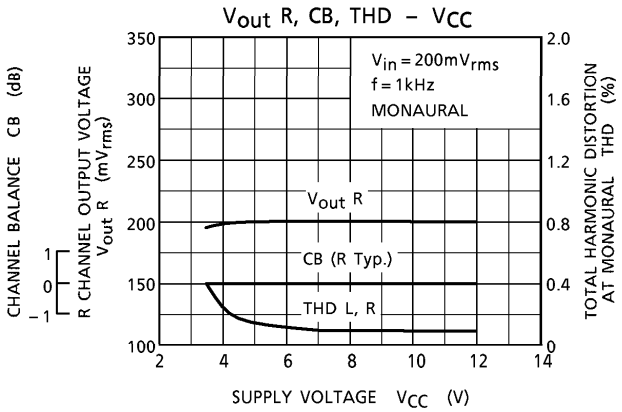

$V_{out}$ R, CB, THD – $V_{in}$



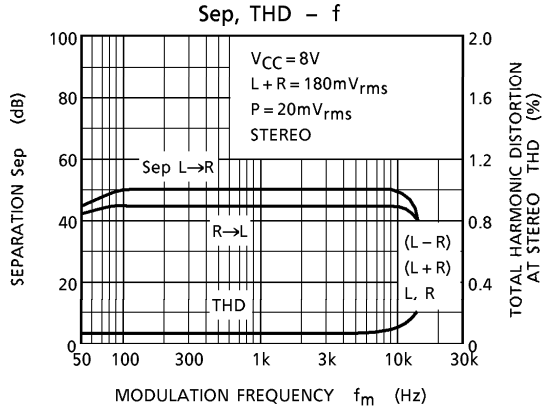

$V_{out}$ R, CB, THD – f



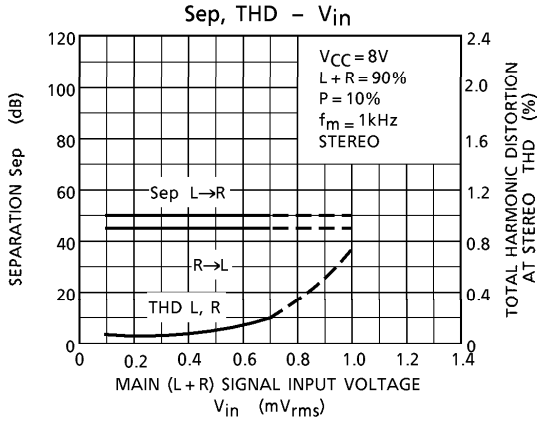

$V_{out}$ R, CB, THD – $V_{CC}$



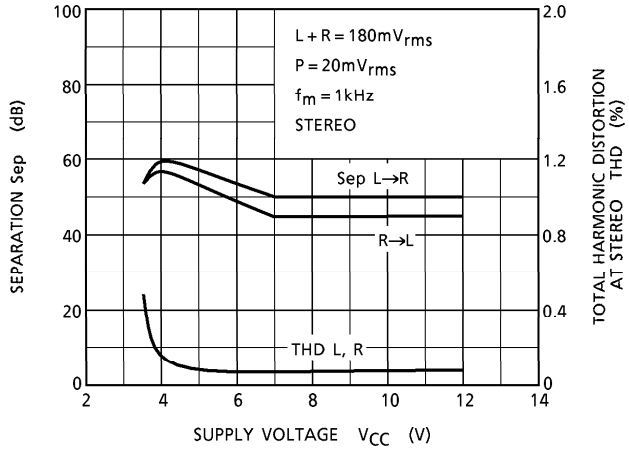

Sep, THD – f



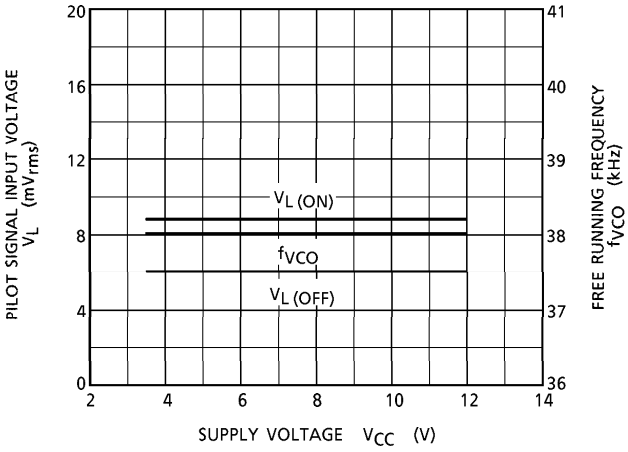

Sep, THD – $V_{in}$



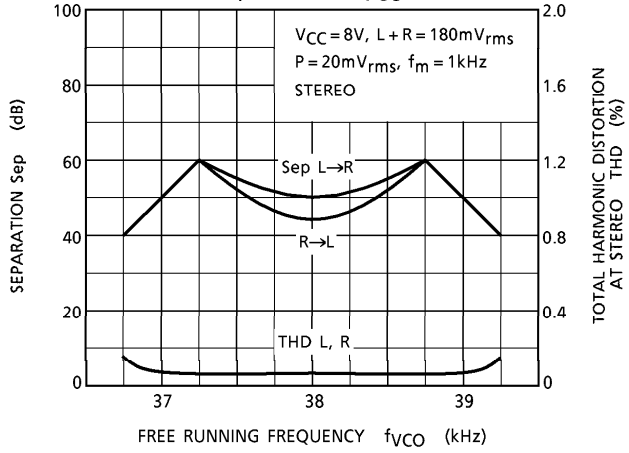
Sep, THD – $V_{CC}$



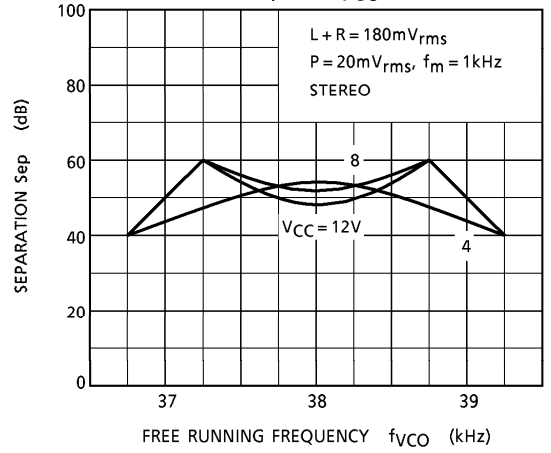

$V_L$, $f_{VCO}$ – $V_{CC}$




Sep, THD – $f_{VCO}$

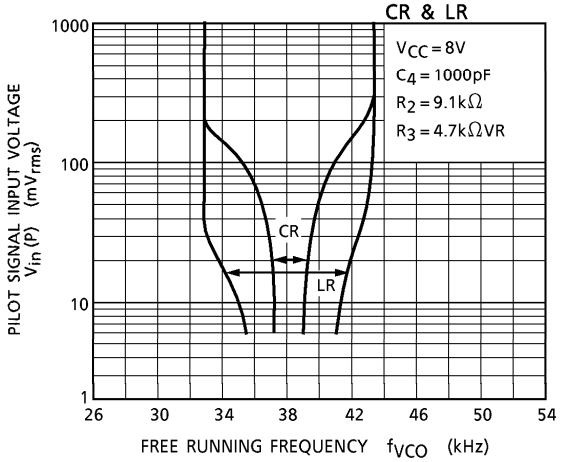



Sep, – $f_{VCO}$

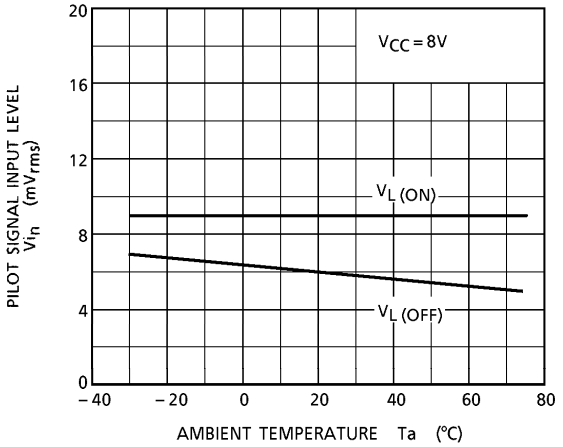



CAPTURE RANGE & LOCK RANGE

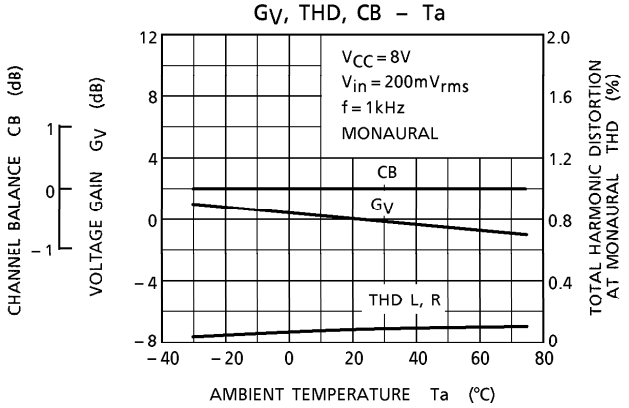
CR & LR



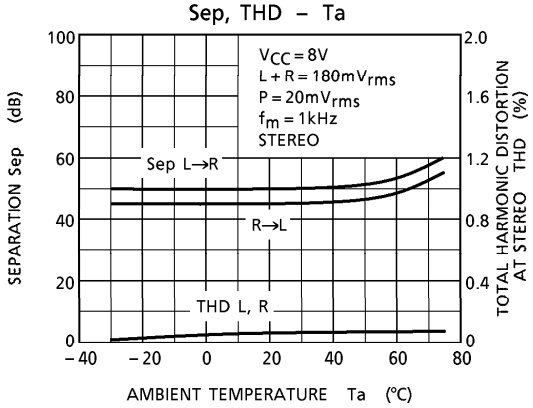

$V_L$ – Ta



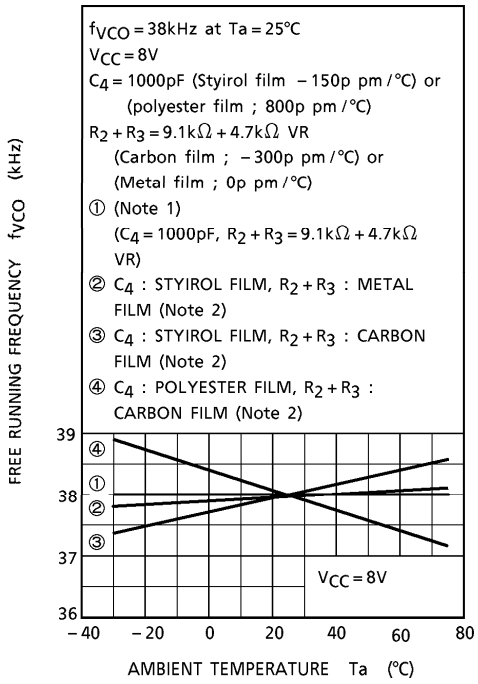
$G_V$, THD, CB – Ta




Sep, THD – Ta




$f_{VCO}$ – Ta

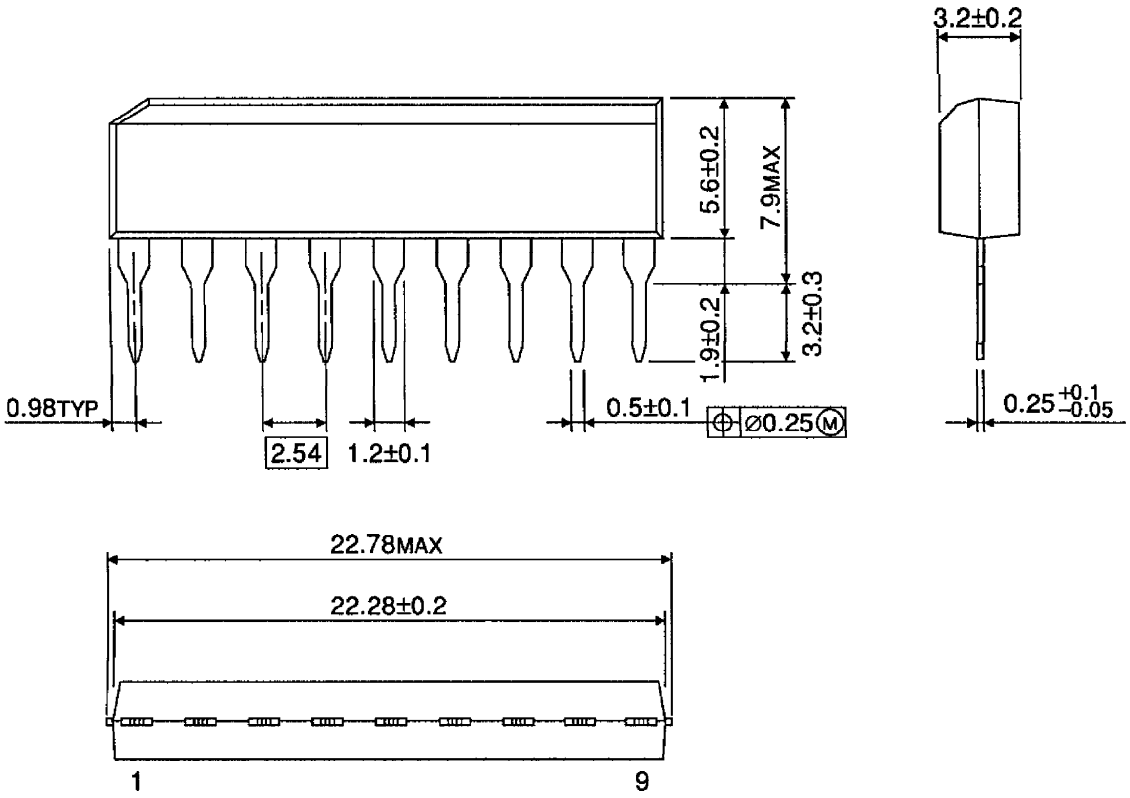



(Note 1) ① : With IC only put into a temperature test chamber
(Note 2) ②③④ : With IC, resistors and capacitors put into a temperature test chamber

**OUTLINE DRAWING**

SIP9-P-2.54A

Unit : mm




Weight : 0.92g (Typ.)