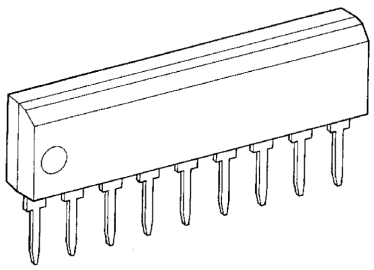
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

# TA8126S,TA8126F

DC / DC Converter For Electric Tuning (3V USE)

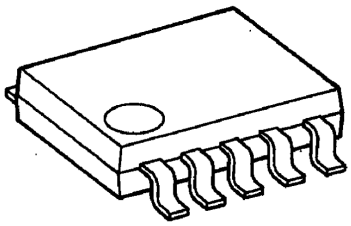
The TA8126S,TA8126F are DC /DC converter ICs, which are designed for biasing varactor diodes of tuner system. Those items are especially suitable for supplying high voltage (about 15V / 30V) for electric tuning (FM / TV / UHF / AM) system of headphone stereos, radio cassette recorders, or other equipments.

TA8126S



SIP9-P-2.54C

TA8126F



SSOP10-P-225-1.00

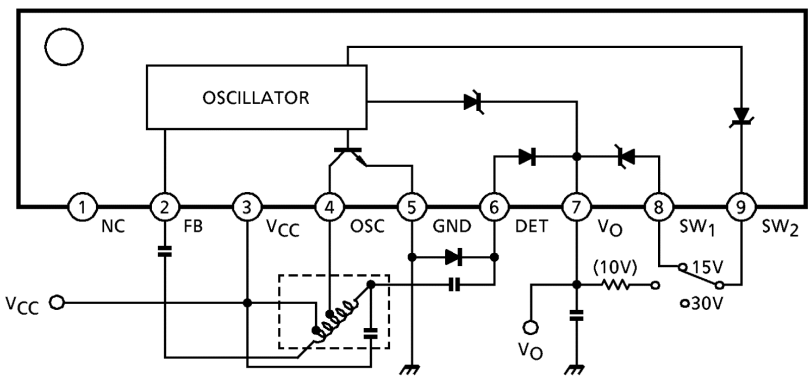
Weight
SIP9−P−2.54C: 0.72g (typ.)
SSOP10−P−225−1.00: 0.09g (typ.)

## Features

- Excellent regulatory capability of output voltage against fluctuation of supply voltage, and of ambient temperature.
- Excellent spurious radiation by oscillation of sine wave.
- Output voltage can be switched over to 15V or 30V by one−make switch, and is applicable to 10V, too.
- Few external parts.
- Low supply current (at non−load, $V_{CC}$ = 3V, Ta = 25°C)
  $I_{CCQ1}$ = 2.4mA (typ., $V_O$ = 15V mode)
  $I_{CCQ2}$ = 3.0mA (typ., $V_O$ = 30V mode)
- Operating supply voltage range (Ta = 25°C)
  $V_{CC1\ (opr)}$ = 1.8~10V, ($V_O$ = 15V mode)
  $V_{CC2\ (opr)}$ = 2.0~10V, ($V_O$ = 30V mode)

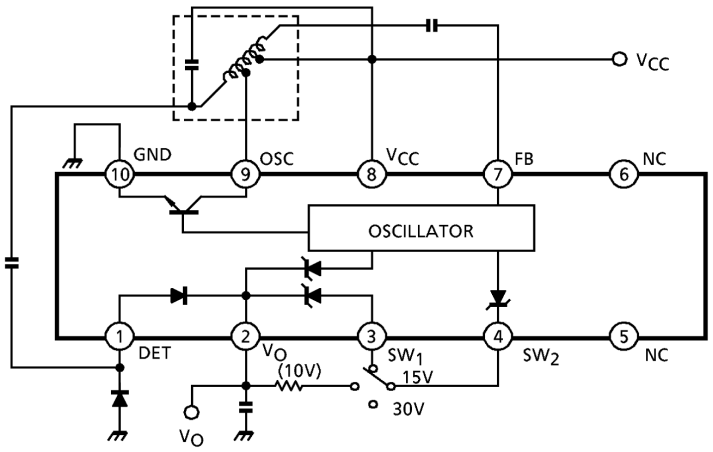
## Block Diagram

TA8126S



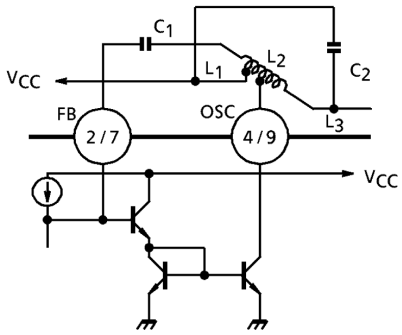
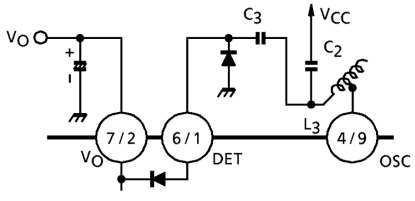
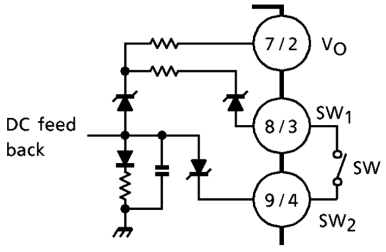
## Block Diagram

TA8126F




## Terminal Explanation

Terminal Voltage: Typical Terminal Voltage with Test Cirucuit ($V_{CC}$ = 3V, Ta = 25°C)

| Pin No. S / F | Pin Name | Contents | Equivalent | Terminal Voltage (V) |
|---|---|---|---|---|
| 1/ 6 | NC | — | — | — |
| 2 / 7 | FB | ・Hartley type oscillator $f_{OSC} = \frac{1}{2\pi\sqrt{L_3 C_2}}$ |  | 1.4 |
| 4 / 9 | OSC | ・Controlling oscillation current at the terminal of FB | | 3.0 |
| 3 / 8 | $V_{CC}$ | — | — | 3.0 |
| 5 / 10 | GND | — | — | 0 |
| 6 / 1 | DET | ・Boosted output (voltage double rectifier) $V_O$ = 15V / 30V |  | — |
| 7 / 2 | $V_O$ | | | — |
| 8 / 3 | $SW_1$ | ・Output voltage mode Switchover ON: $V_O$ = 15V OFF: $V_O$ = 30V |  | — |
| 9 / 4 | $SW_2$ | | | — |
| – / 5 | NC | — | — | — |

## Application Note

1. These ICs have the output voltage by means of boosting the oscillation voltage, derived from hartley type oscillator circuit and of voltage–double rectifier with $C_3$, $D_1$, and $D_2$.

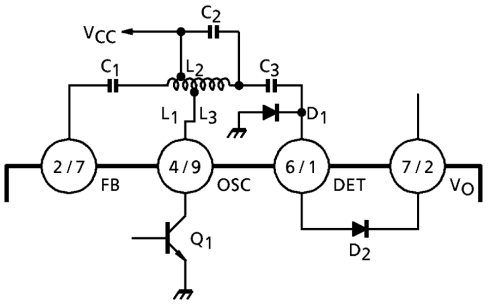



Fig.1 Oscillator and voltage-double

(1) Designing of oscillation frequency

$$f_{OSC} \fallingdotseq \frac{1}{2\pi\sqrt{L_3\, C_2}}$$

(2) Coil turns can be designed as following:

$$V_{OSC\,(p-p)} = 2\,(V_{CC\,(min)} - V_{CE1\,(sat)})$$

$$n = \frac{n_3}{n_2} \fallingdotseq \frac{V_O}{V_{OSC\,(p-p)}}$$

(Note) $V_{CC\,(min)}$ : Minimum of supply voltage designed by a equipment
$V_{CE1\,(sat)}$: Saturation voltage of $Q_1$
n : Coil turns ratio ($L_2$, $L_3$)
$V_O$ : Output voltage ($V_O \fallingdotseq 30V$)

The turn of $L_1$ is designed, so as to make the terminal of FB be about 200~300m$V_{p-p}$ through $C_1$. The turn of $L_1$ should be small, and the capacitance of $C_1$ and $Q_0$ of coil should be large, for the oscillation start at turnig power–on.

(3) Allowance is advisable for coil design of n, $Q_0$. However, spurious radiation can be reduced, in case that the output current and n of coil don't make large.

2. In case that spurious radiation due to the oscillation is large, it is recommended to provide LC filter on the power supply line as shown in Fig.2. As for this value, select the optimum one depending on the kind of set.

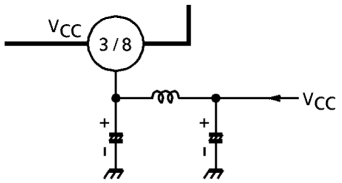



Fig.2 LC Filter

( / ) : TA8126S / F

3. Pattern diagram

The Fig.3 shows the oscillation loop. This pattern diagram should be small, because spurious radiation due to the oscillation is reduced. The Fig.4 shows the rectifier loop. This pattern diagram should be of the small, because spurious radiation due to the switching rectifier is reduced. The two loops should be isolated from other DC lines.

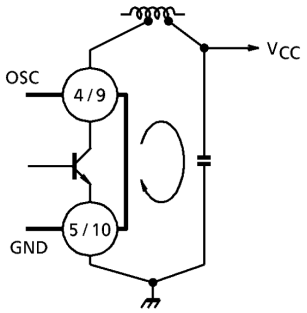



Fig.3 Oscillation loop

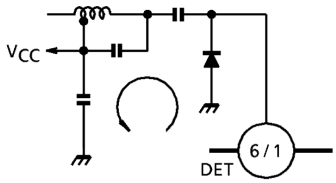



Fig.4 Rectifier loop

4. Output voltage application

The output voltage is applicable to about 10V, too, in case of connecting to external resistance "$R_X$ = 30kΩ", as Fig.5. But, in this application, the regulatory circuit doesn't operate, which is against fluctuation of supply voltage and of ambient temperature.

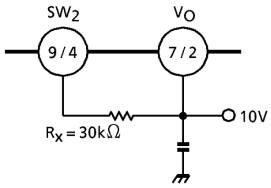



Fig.5 Output voltage application

( / ) : TA8126S / F

## Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | 12 | V |
| Output voltage | | $V_O$ | 35 | V |
| Power dissipation | TA8126S | $P_D$ (Note) | 750 | mW |
| | TA8126F | | 400 | |
| Operation temperature | | $T_{opr}$ | −25~75 | °C |
| Storage temperature | | $T_{stg}$ | −55~150 | °C |

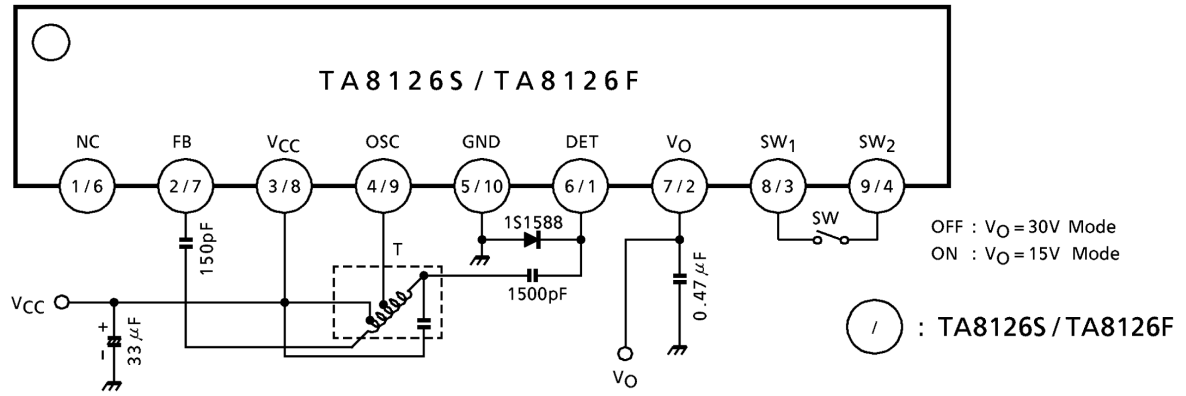
(Note) Derated above Ta = 25°C in the proportion of 6mW / °C for TA8126s, and of 3.2mW / °C for TA8126F.

## Electrical Characteristics

(unless otherwise specified: $V_{CC}$ = 3V, Ta = 25°C, $f_{OSC}$ = 3.0MHz, $I_O$ = 100μA)

| Characteristic | Symbol | Test Circuit | SW Mode | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|
| Supply current | $I_{CCQ1}$ | — | ON | $I_O$ = 0 | — | 2.4 | 5 | mA |
| | $I_{CCQ2}$ | — | OFF | $I_O$ = 0 | — | 3 | 6 | |
| Boosted output voltage 1 | $V_{O1}$ | — | ON | | 14.0 | 15.1 | 16.0 | V |
| $V_{O1}$ supply voltage fluctuation | $\Delta V_{O1}$ | — | ON | $V_{CC}$ = 10V→1.8V | −20 | 0 | 20 | mV |
| $V_{O1}$ ambient temperature coefficient | $V_{O1}$ / T | — | ON | Ta = −25~75°C | — | ±0.3 | — | mV / °C |
| $V_{O1}$ maximum output current | $I_{O1MAX}$ | — | ON | $\Delta V_{O1}$ = 30mV, with respect to standard $I_O$ = 100μA | 300 | — | — | μA |
| Boosted output voltage 2 | $V_{O2}$ | — | OFF | | 28.0 | 30.3 | 32.5 | V |
| $V_{O2}$ supply voltage fluctuation | $\Delta V_{O2a}$ | — | OFF | $V_{CC}$ = 10V→2.5V | −20 | 0 | 20 | mV |
| | $\Delta V_{O2b}$ | — | OFF | $V_{CC}$ = 4.5V→2.0V | −30 | 0 | 20 | |
| $V_{O2}$ ambient temperature coefficient | $V_{O2}$ / T | — | OFF | Ta = −25~75°C | — | ±0.3 | — | mV / °C |
| $V_{O2}$ maximum output current | $I_{O2MAX}$ | — | OFF | $\Delta V_{O2}$ = 30mV, with respect to standard $I_O$ = 100μA | 300 | — | — | μA |

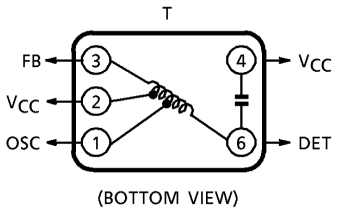
## Test Circuit




## Coil Data (test circuit)

| Test Frequency | L (μH) | $Q_0$ | $C_0$ (pF) | Turn | | | Wlire (mmϕ) | Reference |
|---|---|---|---|---|---|---|---|---|
| | 2–6 | | 4–6 | 1–2 | 2–3 | 4–6 | | |
| 3MHz | 103 | 40 | 22 | 7 | 2 | $57\frac{1}{2}$ | 0.1 UEW | (S) 4143–3099–356 |

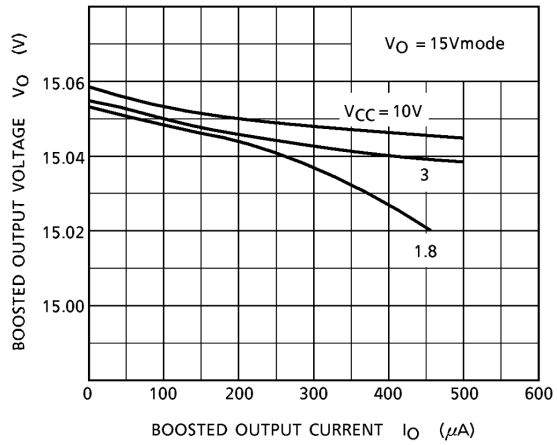
(S): SUMIDA ELECTRIC & Co., Ltd.



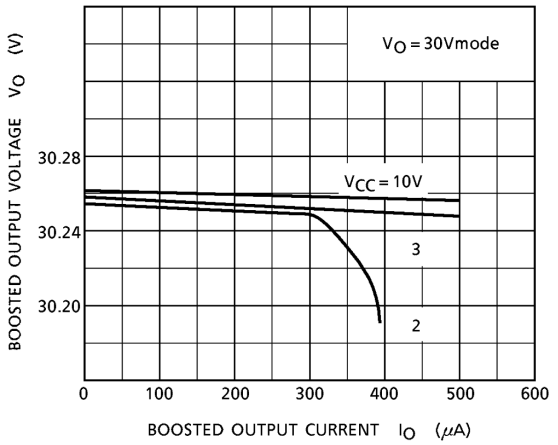
## Characteristic Curves

(unless otherwise specified, $V_{CC}$ = 3V, Ta = 25°C, $f_{OSC}$ = 3MHz, $I_O$ = 100μA)

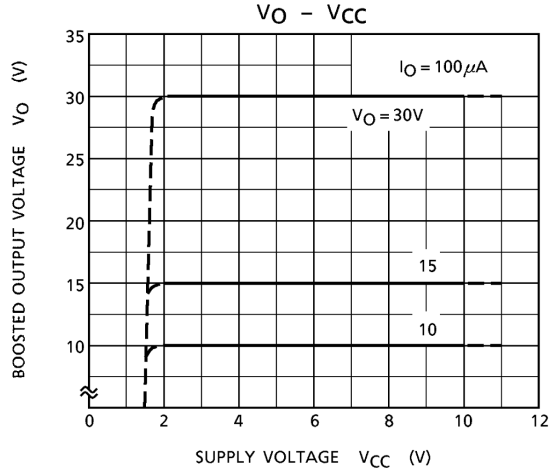
$V_O$ – $I_O$



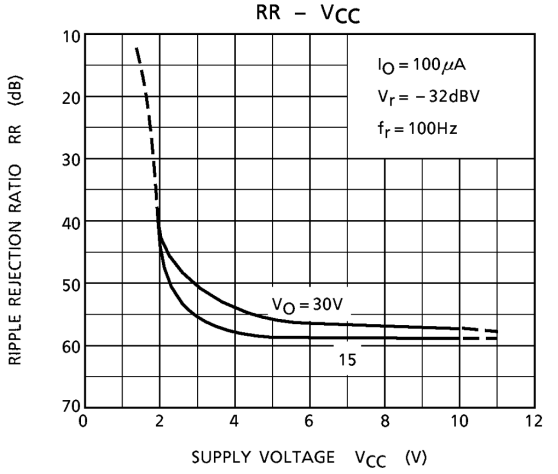

$V_O$ – $I_O$



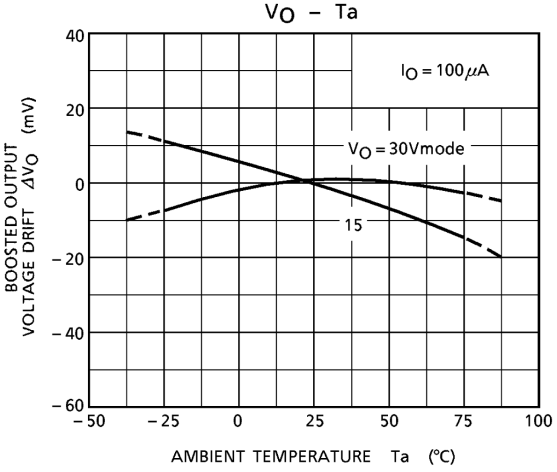

$V_O$ – $V_{CC}$



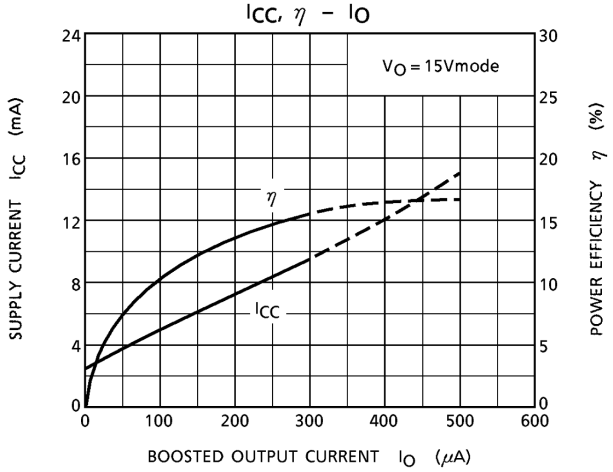

RR – $V_{CC}$

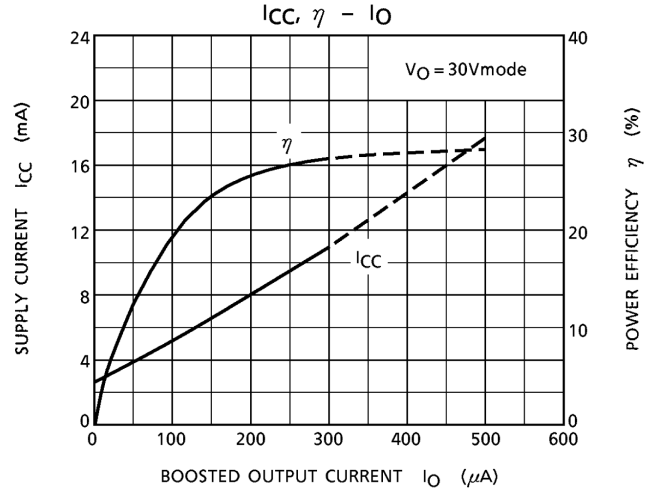


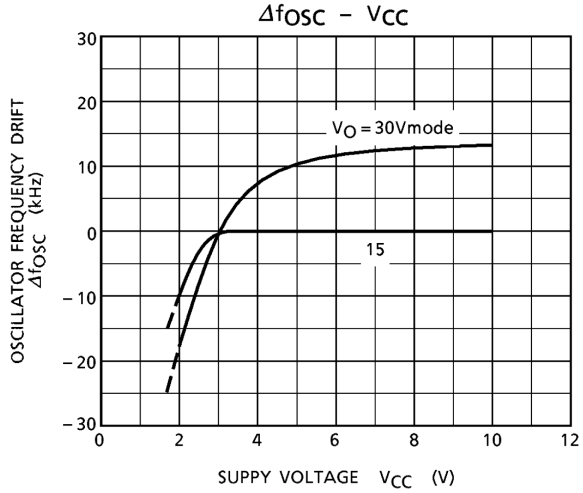

$V_O$ – Ta

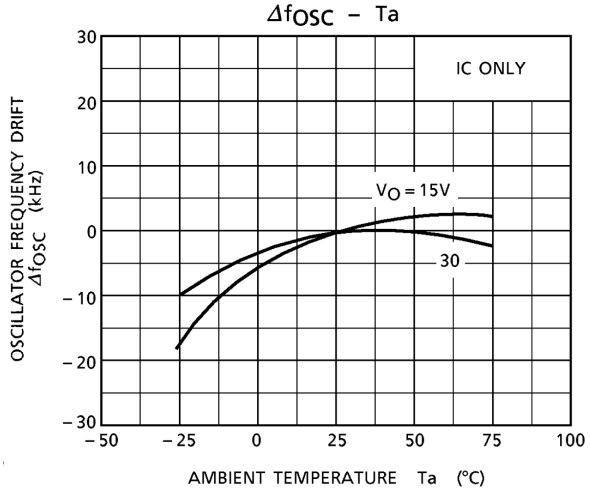



$I_{CC}$, $\eta$ – $I_O$



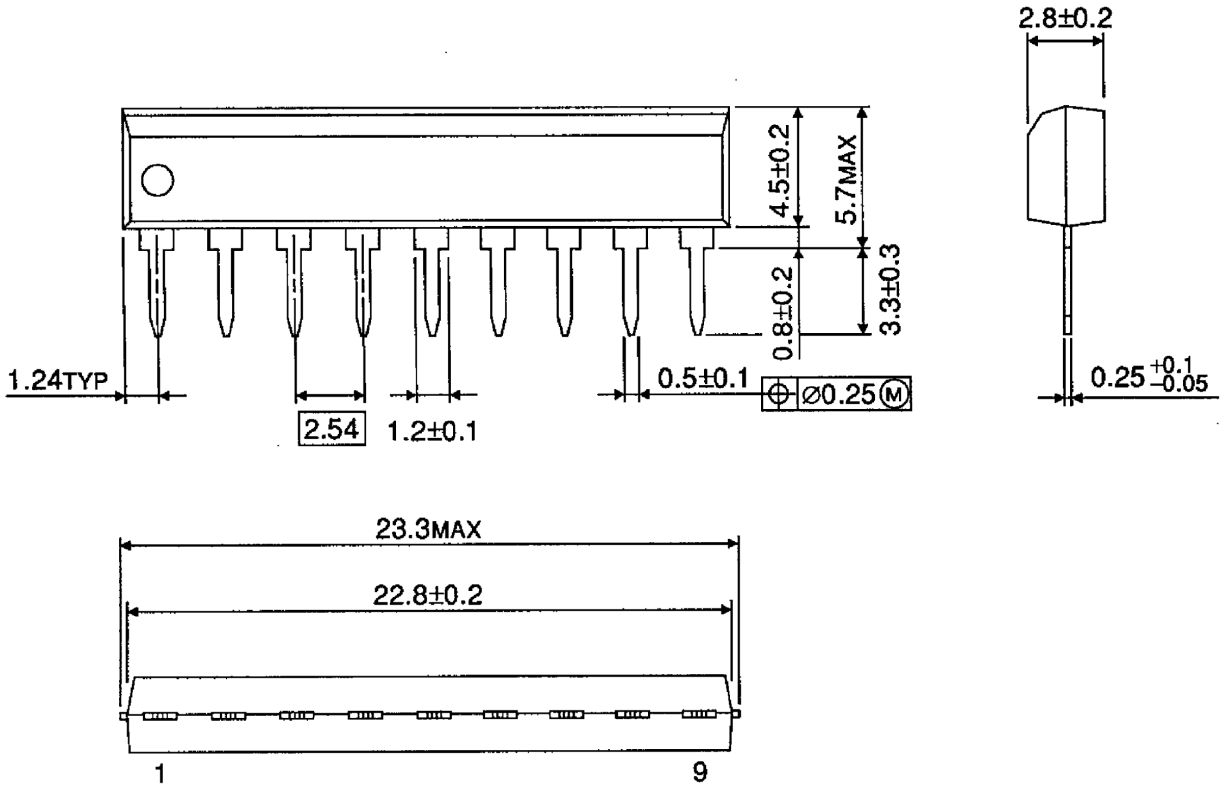

Icc, η – Io
SUPPLY CURRENT Icc (mA)
POWER EFFICIENCY η (%)
BOOSTED OUTPUT CURRENT Io (μA)
VO = 30Vmode
η
Icc
0
4
8
12
16
20
24
0
10
20
30
40
0
100
200
300
400
500
600


Δfosc – Vcc
OSCILLATOR FREQUENCY DRIFT Δfosc (kHz)
SUPPY VOLTAGE VCC (V)
VO = 30Vmode
15
30
20
10
0
– 10
– 20
– 30
0
2
4
6
8
10
12


Δfosc – Ta
OSCILLATOR FREQUENCY DRIFT Δfosc (kHz)
AMBIENT TEMPERATURE Ta (°C)
IC ONLY
VO = 15V
30
30
20
10
0
– 10
– 20
– 30
– 50
– 25
0
25
50
75
100

## Package Dimensions

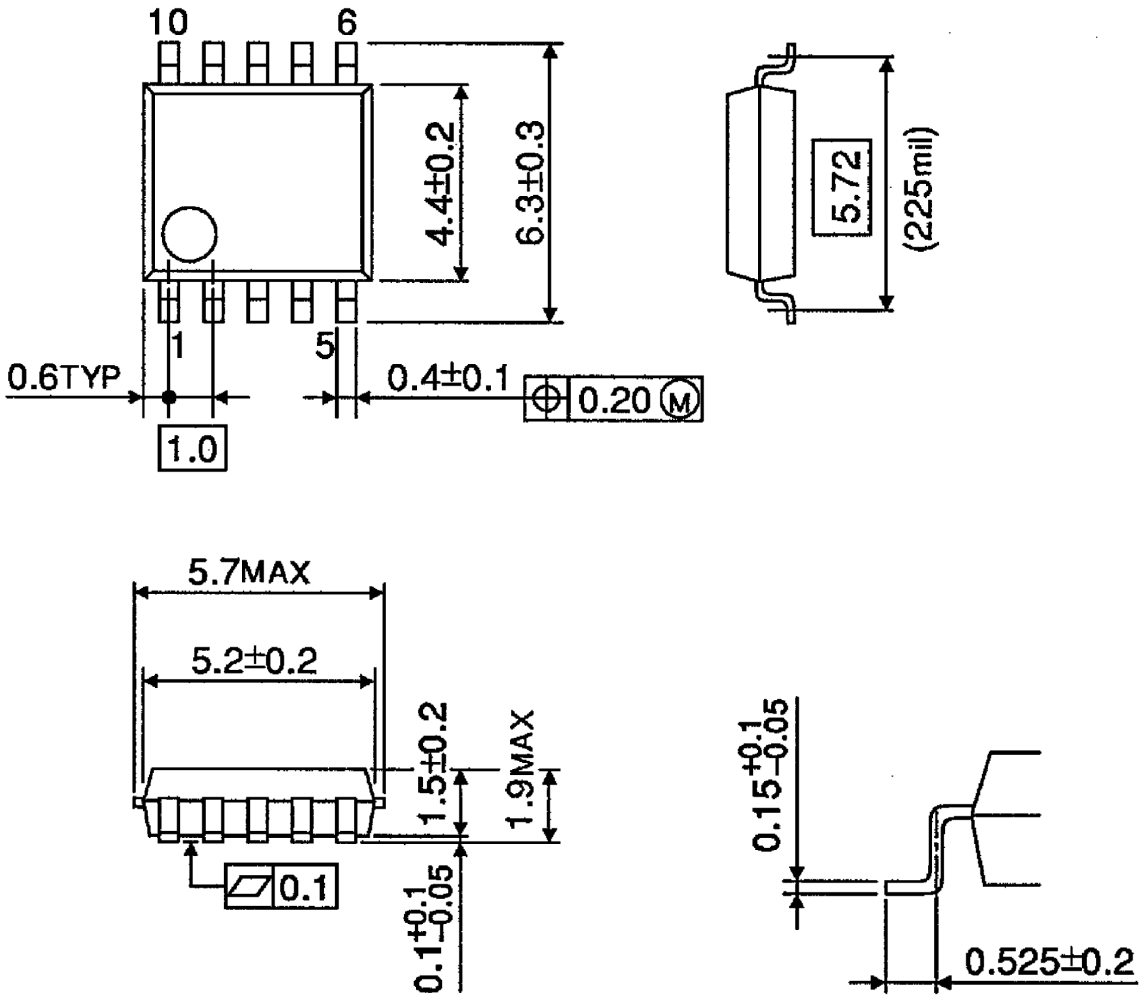
SIP9-P-2.54C Unit : mm




Weight : 0.72g (typ.)

**Package Dimensions**

SSOP10-P-225-1.00 Unit : mm




Weight : 0.09g (typ.)

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000707EBA

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