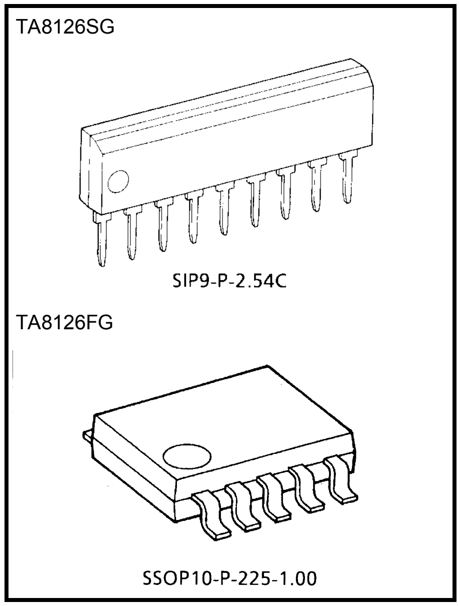
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8126SG,TA8126FG

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

The TA8126SG,TA8126FG 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.



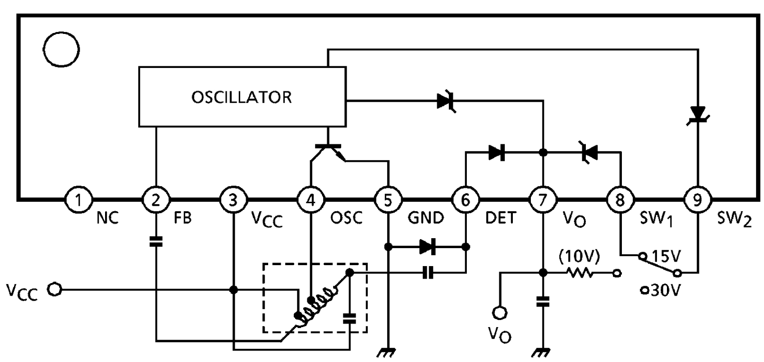
Weight
SIP9−P−2.54C: 0.72g (typ.)
SSOP10−P−225−1.00: 0.09g (typ.)

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)

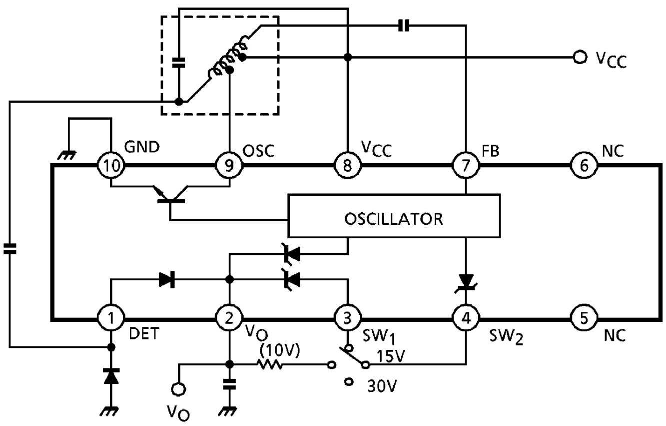
Block Diagram

TA8126SG



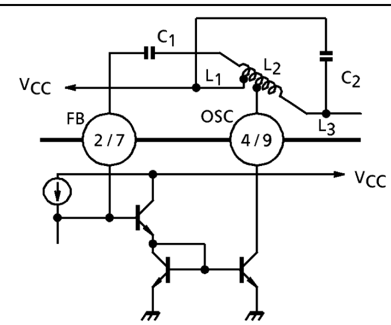
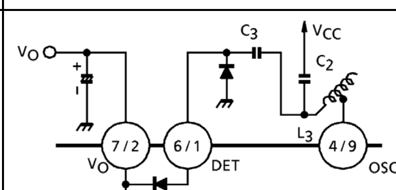
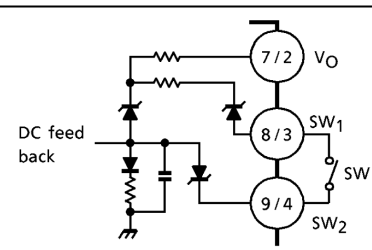
Block Diagram

TA8126FG



Terminal Explanation

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

Pin No. SG / FG	Pin Name	Contents	Equivalent	Terminal Voltage (V)
1/ 6	NC	—	—	—
2 / 7	FB	· Hartley type oscillator $f_{OSC} = \frac{1}{2\pi\sqrt{L_3\ C_2}}$ · Controlling oscillation current at the terminal of FB		1.4
4 / 9	OSC			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.

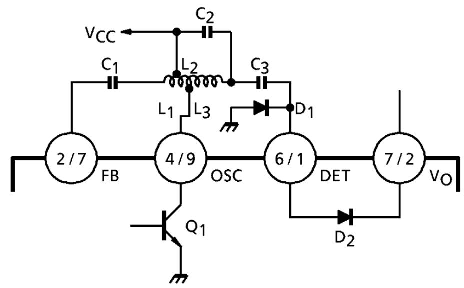


Fig.1 Oscillator and voltage-double

(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 200~300mV_{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.

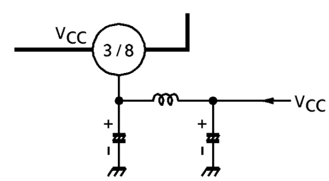
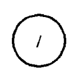


Fig.2 LC Filter



: TA8126SG/FG

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.

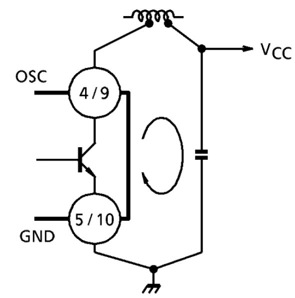


Fig.3 Oscillation loop

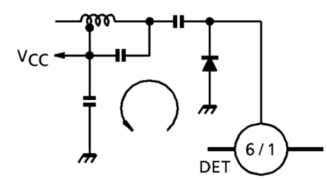


Fig.4 Rectifier loop

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.

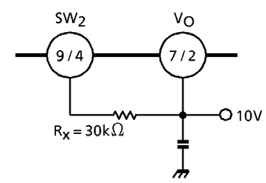


Fig.5 Output voltage application

(/) : TA8126SG/FG

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Supply voltage		V_{CC}	12	V
Output voltage		V_O	35	V
Power dissipation	TA8126SG	P_D (Note)	750	mW
	TA8126FG		400	
Operation temperature		T_{opr}	−25~75	°C
Storage temperature		T_{stg}	−55~150	°C

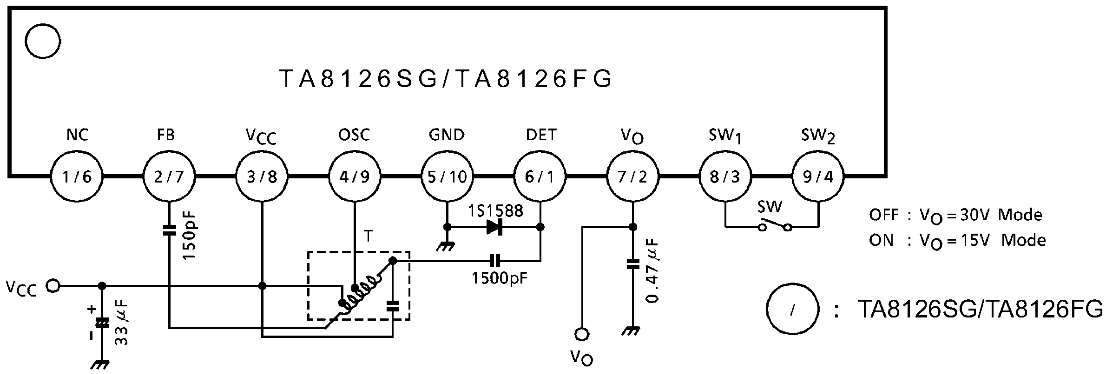
(Note) Derated above Ta = 25°C in the proportion of 6mW / °C for TA8126SG, and of 3.2mW / °C for TA8126FG.

Electrical Characteristics

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

Characteristic	Symbol	Test Cir-cuit	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	ΔV_{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	ΔV_{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	ΔV_{O2a}	—	OFF	V_{CC} = 10V→2.5V	−20	0	20	mV
	ΔV_{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	ΔV_{O2} = 30mV, with respect to standard I_O = 100μA	300	—	—	μA

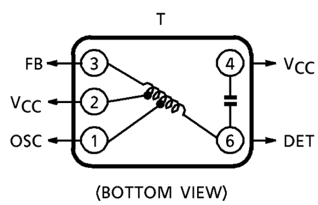
Test Circuit



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

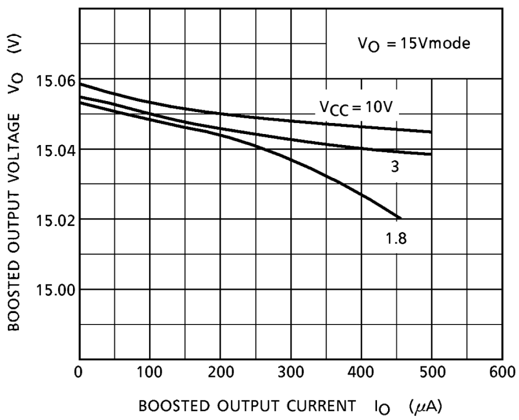
(S): SUMIDA ELECTRIC & Co., Ltd.



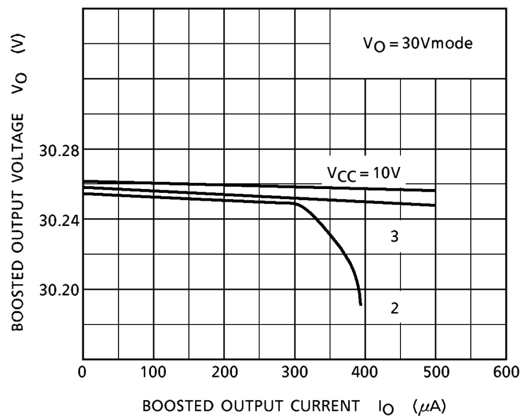
Characteristic Curves

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

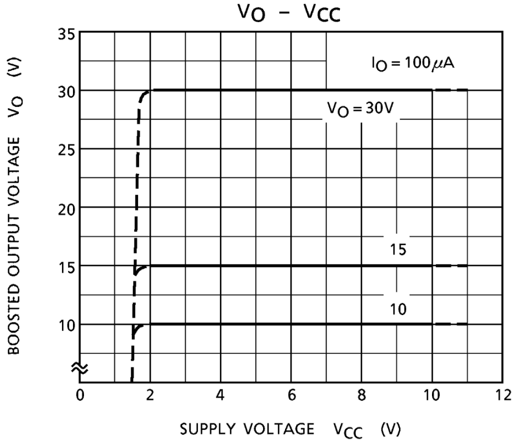
V_O – I_O



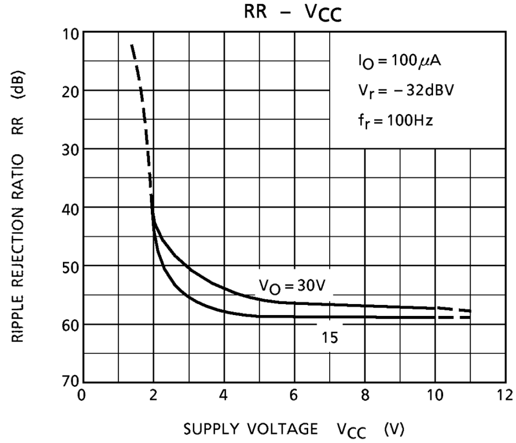
V_O – I_O



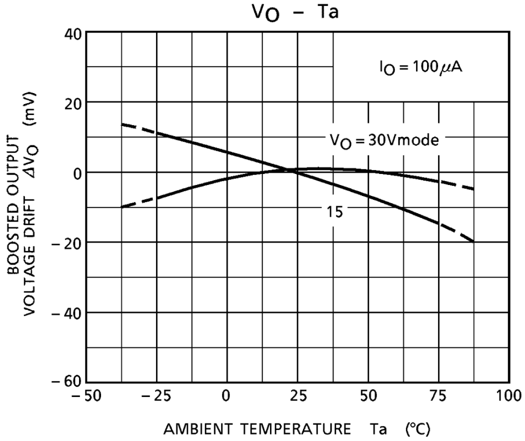
V_O – V_{CC}



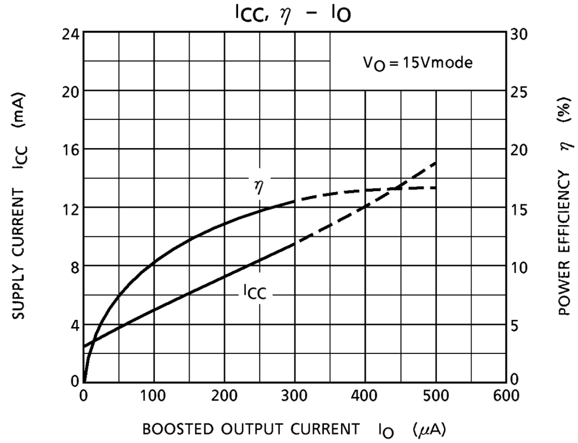
RR – V_{CC}

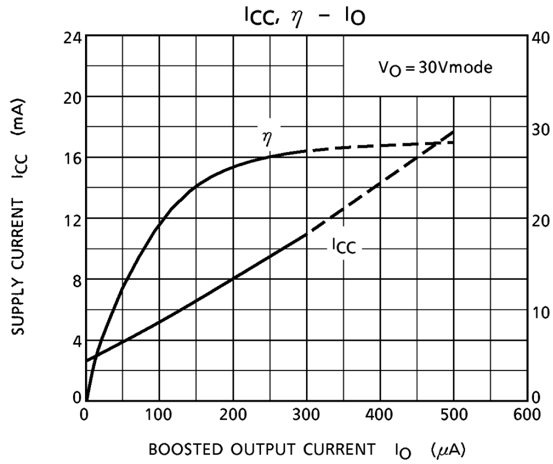


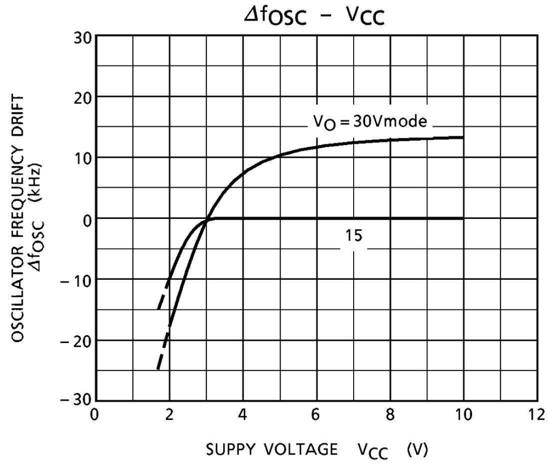
V_O – Ta

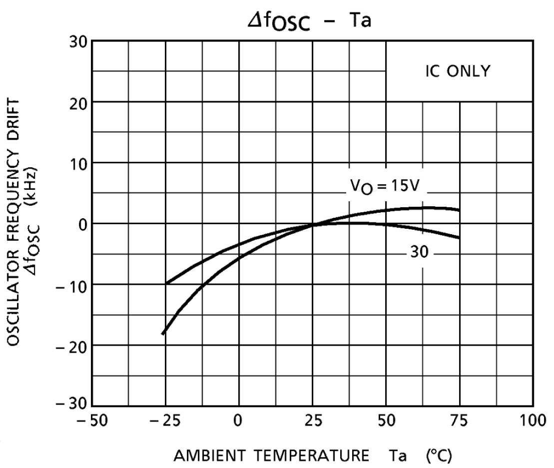


I_{CC}, η – I_O



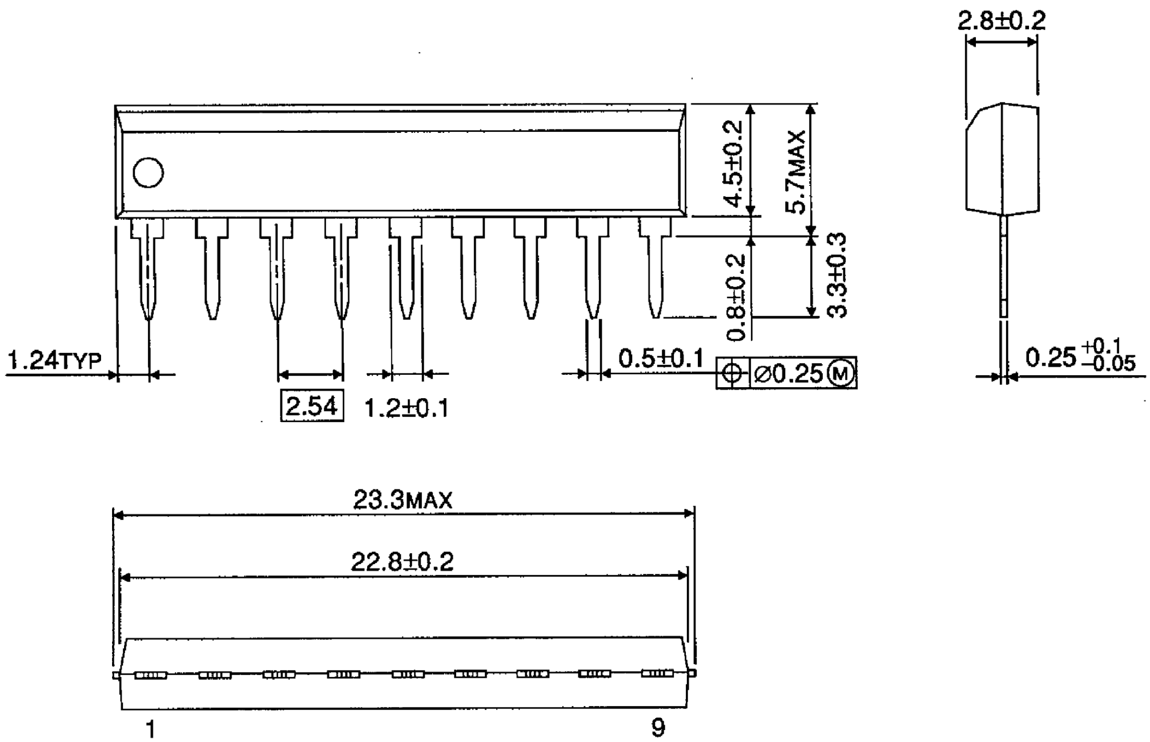

ICC, η – IO
VO = 30Vmode
η
ICC
SUPPLY CURRENT ICC (mA)
POWER EFFICIENCY η (%)
BOOSTED OUTPUT CURRENT IO (μA)
24
20
16
12
8
4
0
40
30
20
10
0
0
100
200
300
400
500
600


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


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

Package Dimensions

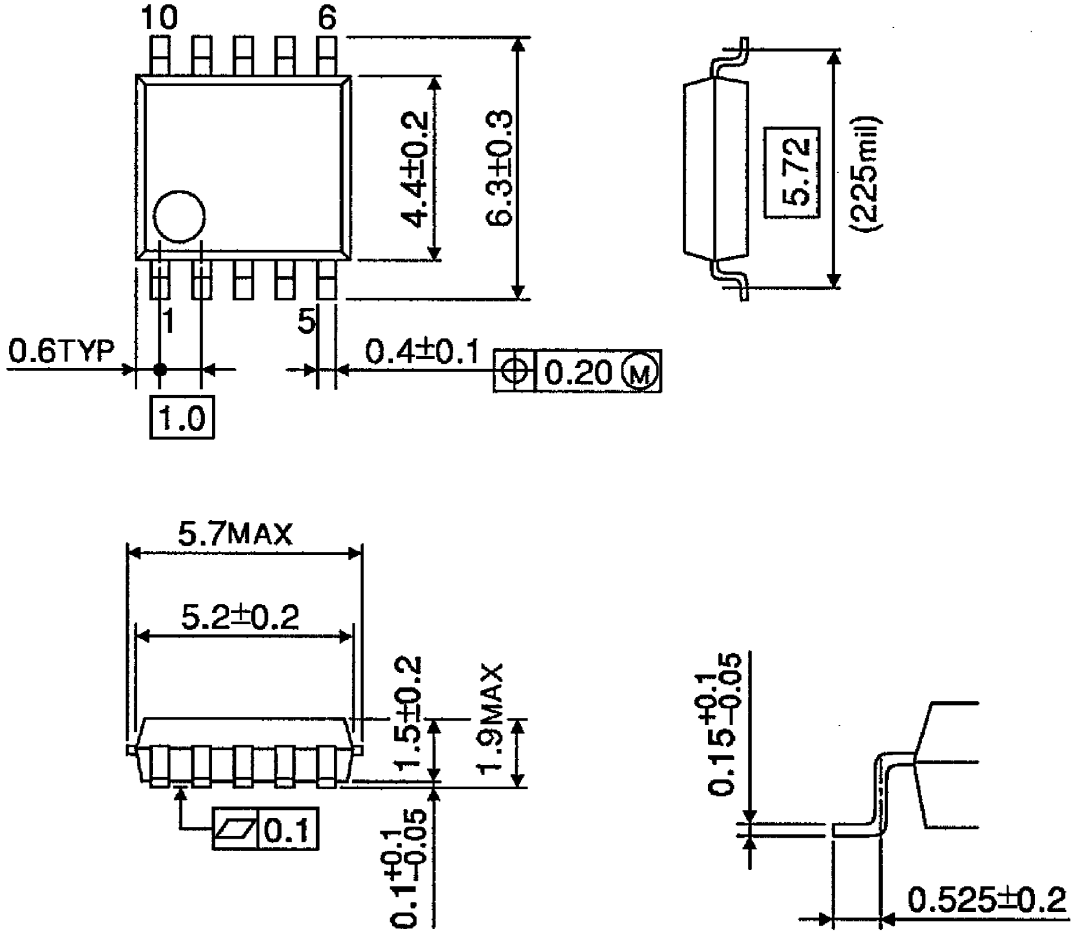
SIP9-P-2.54C Unit : mm



Weight : 0.72g (typ.)

Package Dimensions

SSOP10-P-225-1.00 Unit : mm



Weight : 0.09g (typ.)

About solderability, following conditions were confirmed

- Solderability

  (1) Use of Sn-63Pb solder Bath
  - solder bath temperature = 230°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

  (2) Use of Sn-3.0Ag-0.5Cu solder Bath
  - solder bath temperature = 245°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

RESTRICTIONS ON PRODUCT USE

030619EBA