

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

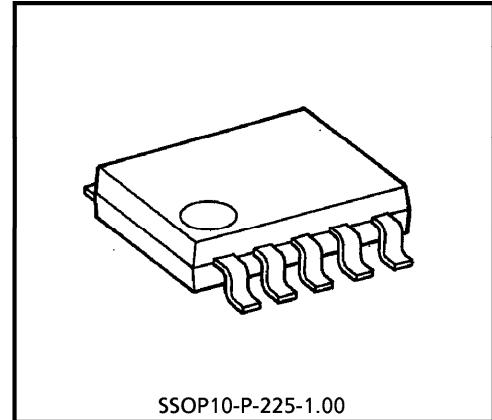
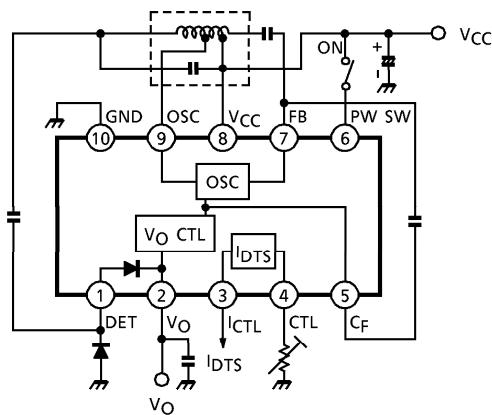
**TA8198F****DC / DC CONVERTER FOR ELECTRIC TUNING (3V USE)**

The TA8198F is a DC/DC converter IC which is developed for biasing varactor diodes of tuner system.

It is especially suitable for supplying high voltage (about 15.5V) for digital tuning (FM / TV / AM) system of headphone stereos, radio cassette recorders, or other equipments.

**FEATURES**

- Few external parts.
- Excellent spurious radiation by oscillation of sine wave.
- Built-in constant current source, it is suitable for digital tuning system. ( $I_{CTL}$  can be controlled by  $R_{CTL}$ )
- Output voltage  $V_O = 15.5V$  (Typ.)
- Excellent regulatory capability of output voltage against fluctuation of supply voltage, and of ambient temperature.
- Built-in power switch
- Low supply current (at non-load,  $V_{CC} = 3V$ ,  $T_a = 25^\circ C$ )  $I_{CCQ} = 2.4mA$  (Typ.)
- Operating supply voltage range ( $T_a = 25^\circ C$ )  $V_{CC(\text{opr})} = 1.8\sim 10V$

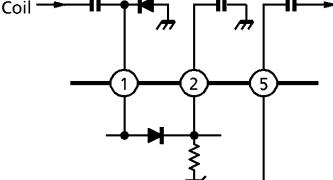
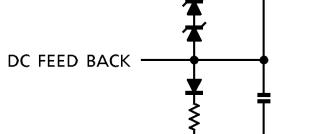
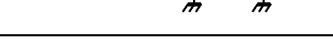
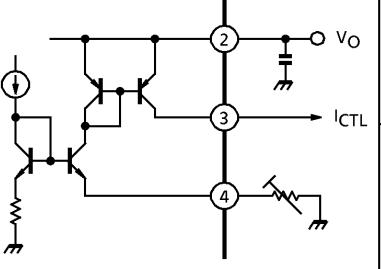
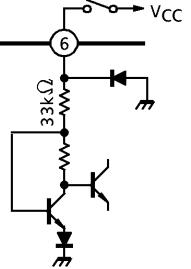
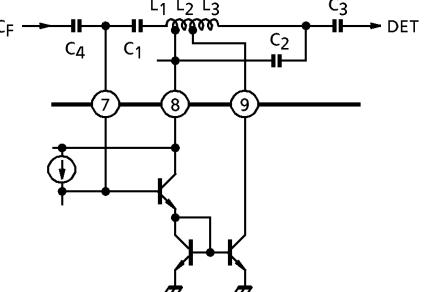
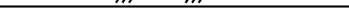
**BLOCK DIAGRAM**

Weight : 0.09g (Typ.)

※ Handle with care to prevent devices from deterioration by static electricity.

## TERMINAL EXPLANATION

Terminal voltage : Typical terminal voltage with test circuit ( $V_{CC} = 3V$ ,  $T_a = 25^\circ C$ )

TERMINAL No.	TERMINAL NAME	FUNCTION	INTERNAL CIRCUIT	TERMINAL VOLTAGE (V)
1	DET	Boosted output (Voltage double rectifier)		—
2	$V_O$			15.5
5	$C_F$			1.4
3	$I_{CTL}$	Constant current source output (for digital tuning) $V_O$ supplies this circuit with power source.		—
4	CTL	In case that this circuit isn't used, the $I_{CTL}$ terminal is connected with GND line.		—
6	PW SW	Power on / off switch ( $V_{CC}$ : Power on GND / OPEN : Power off )		—
7	FB	Hartley type oscillator $f_{OSC} = \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$ Controlling oscillation current at the terminal of FB.		1.4
8	$V_{CC}$			3.0
9	OSC			—
10	GND	—	—	0

## APPLICATION NOTE

## 1. PW SW

It is necessary to connect an external pull-down resistor with the terminal PW SW (pin 6), in case that this IC is turned on due to external noise etc.

## 2. Designing of coil

This IC has 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  $D_2$ .

## (1) Designing of oscillation frequency

$$f_{OSC} = \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$$

## (2) Coil turns can be designed as following

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

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

Note :  $V_{CC} (\min)$  : Minimum of supply voltage designed by a equipment

$V_{CE1} (\text{sat})$  : Saturation voltage of  $Q_1$

$n$  : Coil turns ratio ( $L_2$ ,  $L_3$ )

$V_O$  : Output voltage  $V_O = 15.5V$  (Typ.)

The turn of  $L_1$  is designed, so as to make the terminal of FB be about 200~300mV<sub>p-p</sub> 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 turning 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.

## 3. Pattern Diagram

The Fig.2 shows the oscillation loop. This pattern diagram should be small, because spurious radiation due to the oscillation is reduced.

The Fig.3 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.

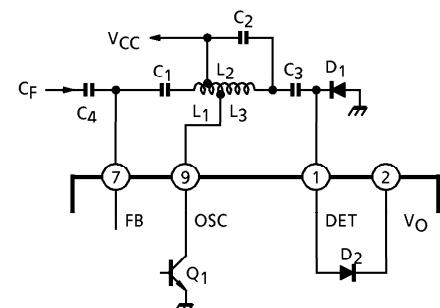


Fig.1 Oscillator and Voltage-Double

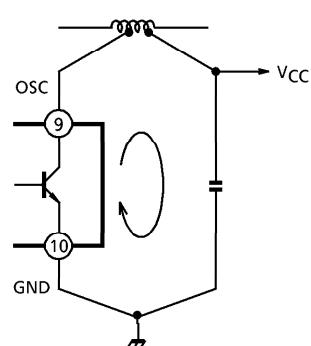


Fig.2 Oscillation Loop

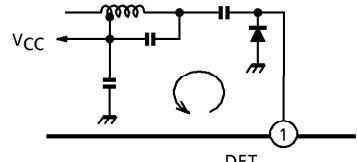
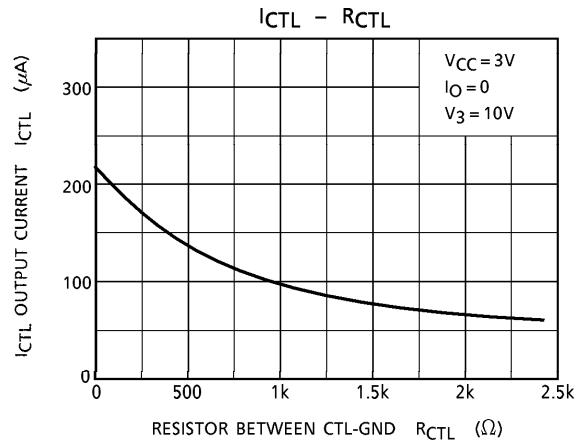


Fig.3 Rectifier Loop

4.  $I_{CTL}$ 

$I_{CTL}$  can be controlled by  $R_{CTL}$  resistor between pin 4 and GND (see Fig.4).

Fig.4  $I_{CTL}$ - $R_{CTL}$ MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	$V_{CC}$	12	V
Output Voltage	$V_O$	18	
Constant Current Source Circuit Output Current	$I_{CTL}$	2	mA
Power Dissipation	$P_D$ (Note)	400	mW
Operating Temperature	$T_{opr}$	$-25 \sim 75$	$^\circ C$
Storage Temperature	$T_{stg}$	$-55 \sim 150$	

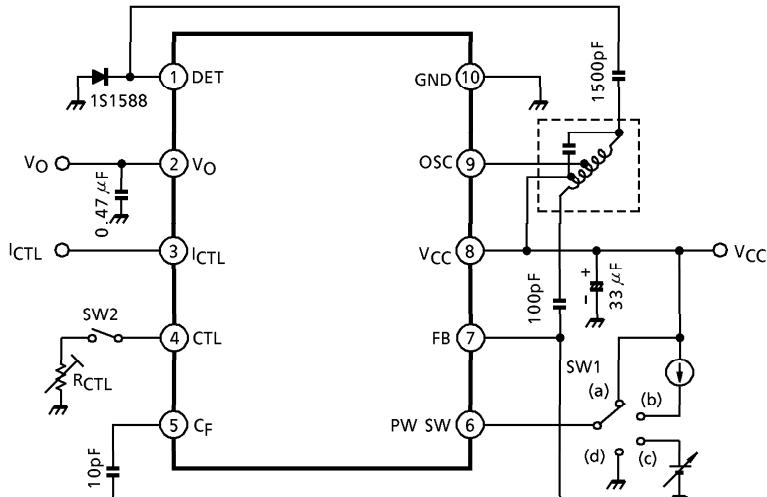
(Note) Derated above  $T_a = 25^\circ C$  in the proportion of 3.2mW.

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified :  $V_{CC} = 3V$ ,  $f_{OSC} = 3MHz$ ,  $I_O = 100\mu A$ ,  $T_a = 25^\circ C$ , SW1 : a, SW2 : OPEN)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current	$I_{CCQ1}$	—	$I_O = 0$ PW OFF, SW1 : d	—	—	5	$\mu A$
	$I_{CCQ2}$	—		—	2.4	4.0	mA
Boosted Output Voltage	$V_O$	—		14.5	15.5	16.5	V
$V_O$ Supply Voltage Fluctuation	$\Delta V_O$	—	$V_{CC} = 1.8 \sim 10V$	-20	0	+20	mV
$V_O$ Maximum Output Current	$I_O$ (MAX)	—	$\Delta V_O = 30mV$ (With respect to standard $I_O = 100\mu A$ )	300	—	—	$\mu A$
$V_O$ Ambient Temperature Coefficient	$V_O / T$	—		—	$\pm 0.3$	—	$mV / ^\circ C$
Constant Current Source Output Current	$I_{CTL}$	—	$I_O = 0$ , $V_3 = 10V$ SW2 : ON ( $R_{CTL} = 820\Omega$ )	85	110	140	$\mu A$
$I_{CTL}$ Maximum Current	$I_{CTL}$ (MAX)	—	$I_O = 0$ , $V_3 = 10V$ SW2 : ON ( $R_{CTL} = 0$ ) $\Delta V_O = 30mV$ (With respect to standard $I_{CTL} = 100\mu A$ )	—	200	—	
Power Switch On Current	$I_{ON}$	—	$V_{CC} = 1.8V$	5	—	—	$\mu A$
Power Switch Off Voltage	$V_{OFF}$	—	$V_{CC} = 1.8V$	0	—	0.7	V

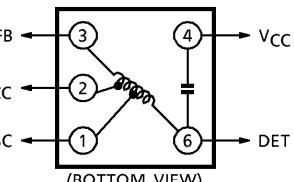
## TEST CIRCUIT



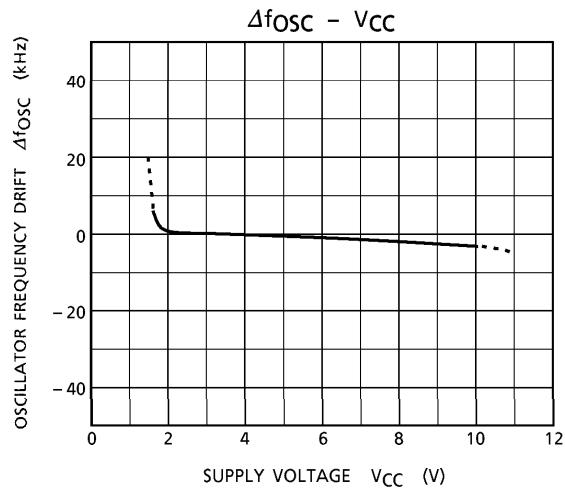
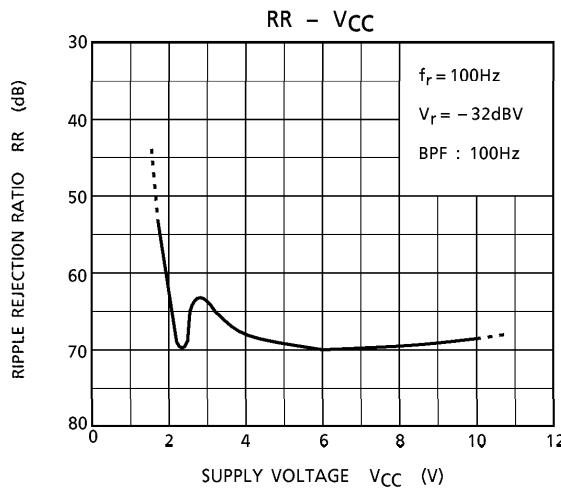
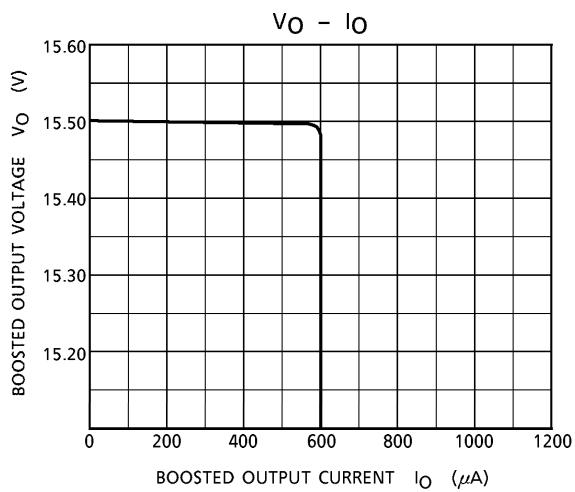
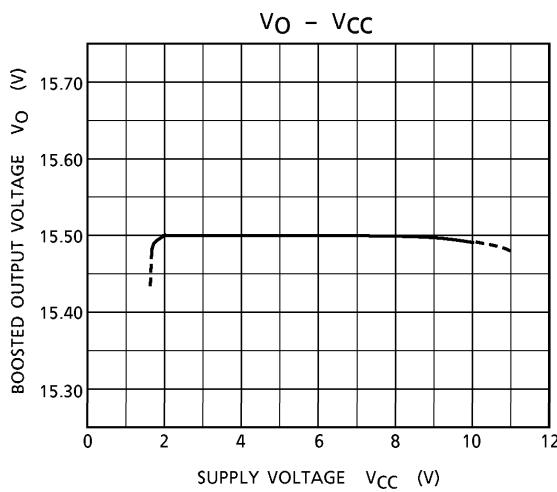
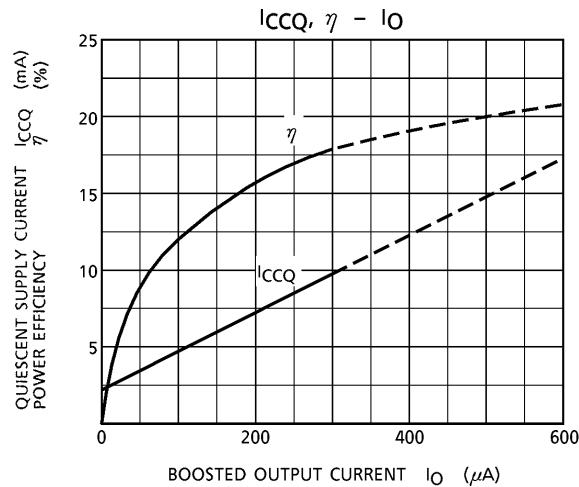
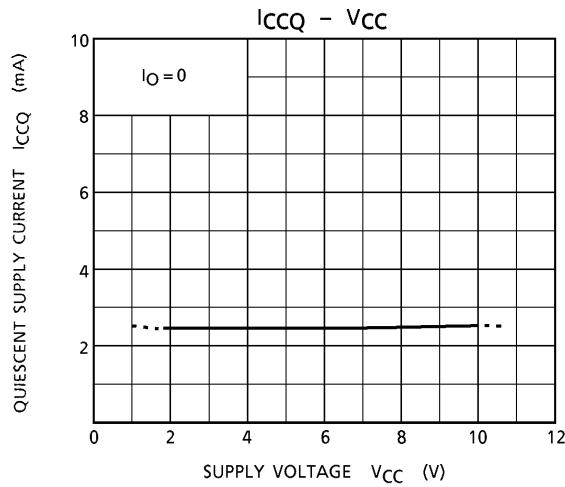
## COIL DATA (TEST CIRCUIT)

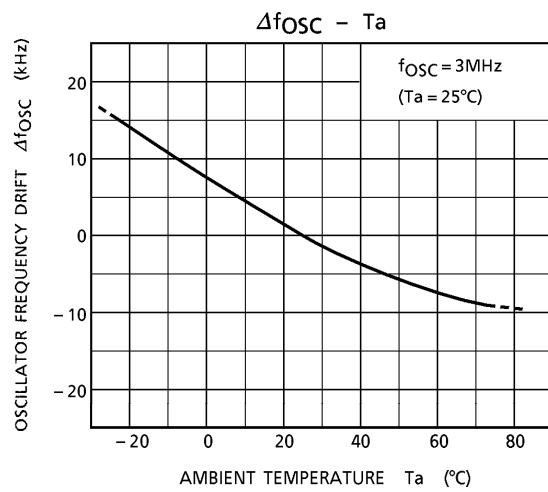
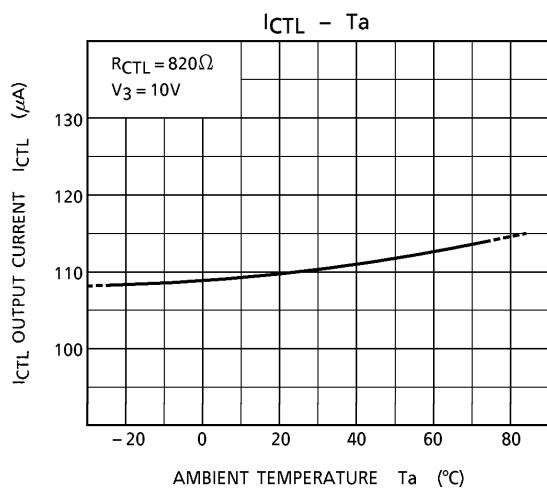
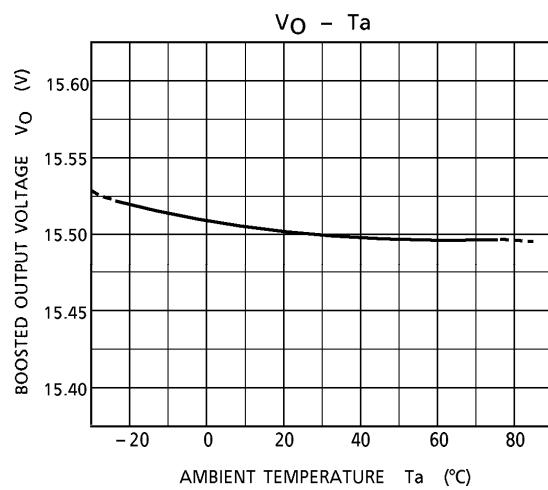
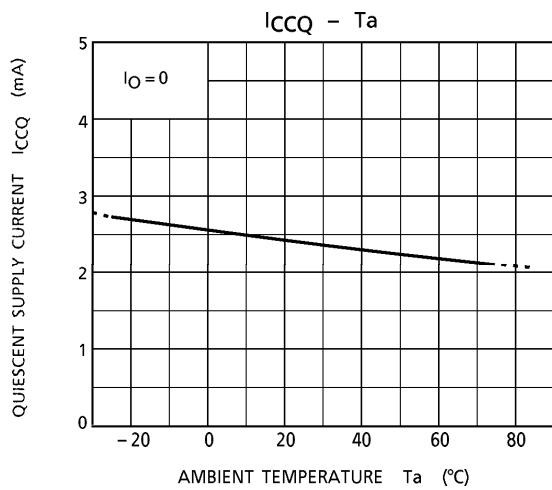
TEST FREQUENCY	L ( $\mu H$ )	Q <sub>0</sub>	C <sub>0</sub> (pF)	TURN			WIRE (mm $\phi$ )	REFERENCE
	2-6	4-6	1-2	2-3	1-6			
3MHz	103	40	22	7	2	57 1/2	0.1UEW	④4143-3099-356

④ : SUMIDA ELECTRIC &amp; Co.,Ltd.



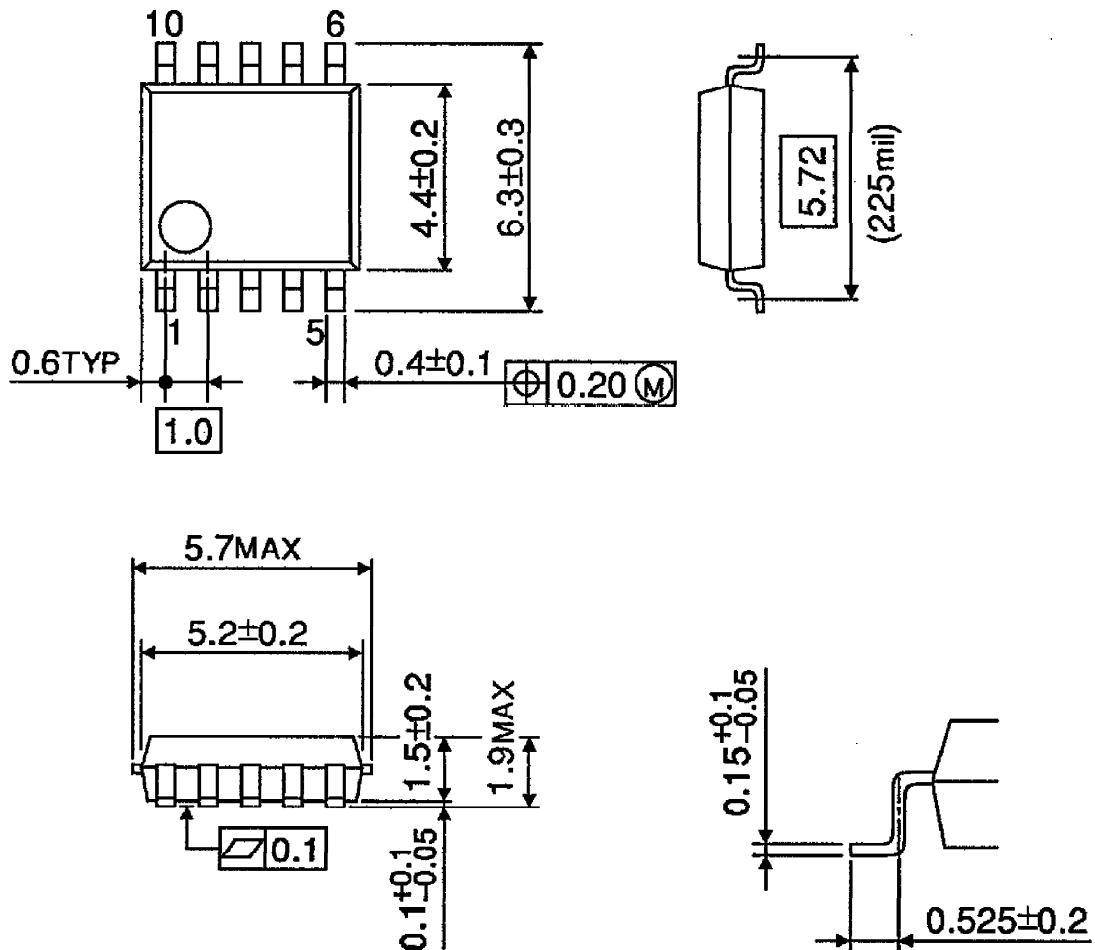
## CHARACTERISTIC CURVES

(Unless otherwise specified :  $V_{CC} = 3V$ ,  $f_{OSC} = 3MHz$ ,  $I_O = 100\mu A$ ,  $I_{CTL} = 0$ ,  $T_a = 25^\circ C$ )



**PACKAGE DIMENSIONS**  
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09g (Typ.)

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000707EBA

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