

TOSHIBA**TA8198F**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8198F

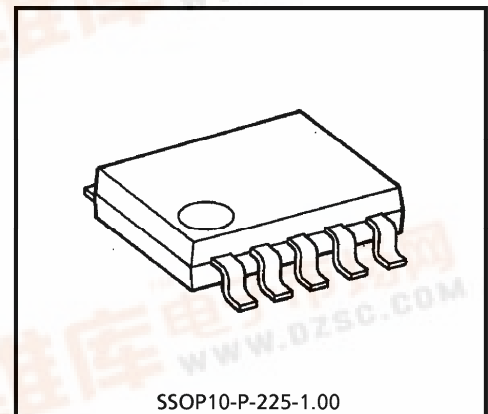
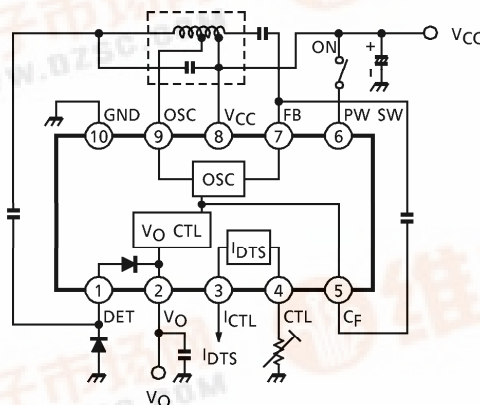
DC/DC CONVERTER FOR ELECTRIC TUNING (3V USE)

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 ($T_a = 25^\circ C$) $V_{CC(opr)} = 1.8 \sim 10V$

BLOCK DIAGRAM



Weight : 0.09g (Typ.)

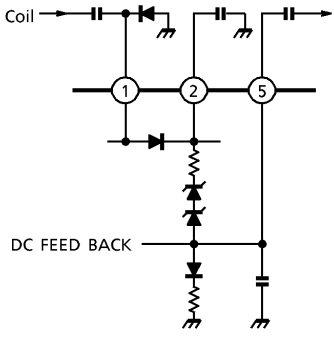
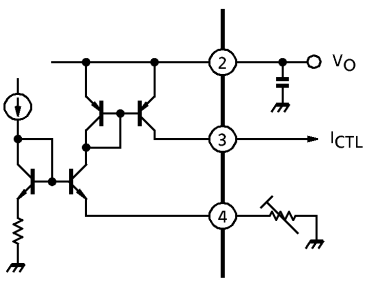
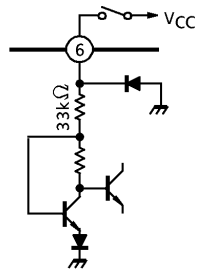
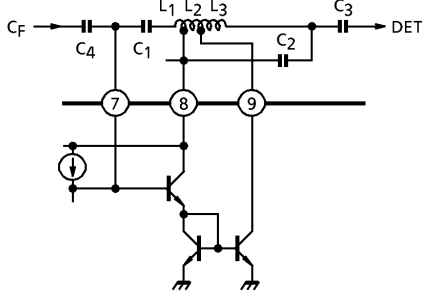
※ Handle with care to prevent devices from deterioration by static electricity.

961001EBA2

● TOSHIBA is continually working to improve the quality and the 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 observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product 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 products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

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 $f_{OSC} \doteq \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$ Controlling oscillation current at the terminal of FB.		1.4
8	V_{CC}			3.0
9	OSC			—
10	GND	—	—	0

961001EBA2'

- The products described in this document are subject to foreign exchange and foreign trade control 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.

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

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

(2) Coil turns can be designed as following

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

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

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

$V_{CE1} (sat)$: 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_{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 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.

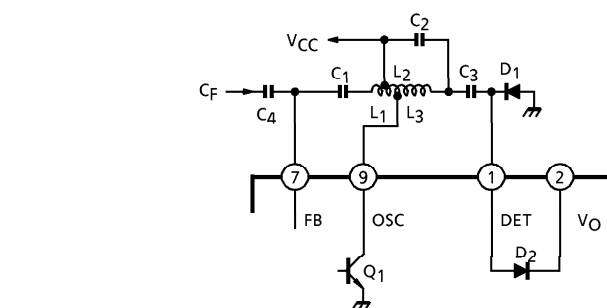


Fig.1 Oscillator and Voltage-Double

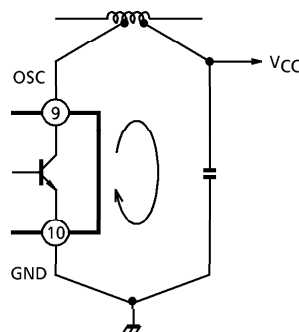


Fig.2 Oscillation Loop

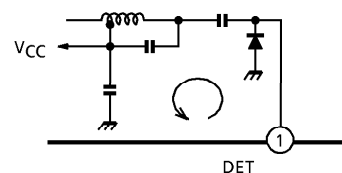
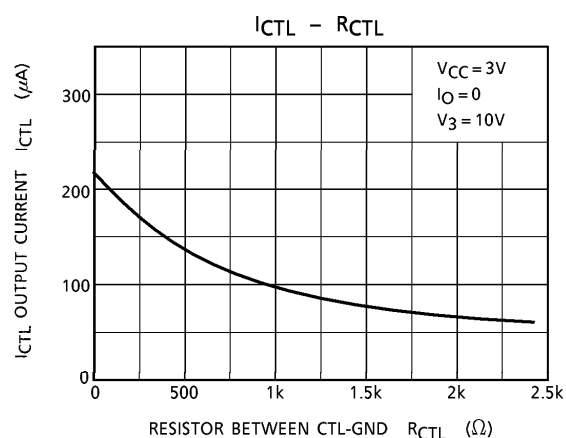


Fig.3 Rectifier Loop

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}	-25~75	$^\circ C$
Storage Temperature	T_{stg}	-55~150	

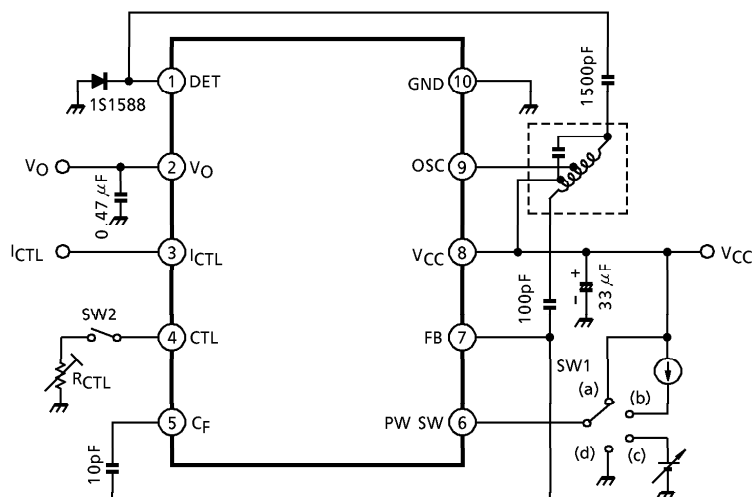
(Note) Derated above $T_a = 25^\circ C$ in the proportion of 3.2mW.

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 CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Supply Current	I_{CCQ1}	—	$I_O = 0$ PW OFF, SW1 : d	—	—	5	μA
	I_{CCQ2}	—		—	2.4	4.0	mA
Boosted Output Voltage	V_O	—		14.5	15.5	16.5	V
V_O Supply Voltage Fluctuation	ΔV_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	—	—	μA
V_O Ambient Temperature Coefficient	V_O / T	—		—	± 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	μA
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	—	—	μA
Power Switch Off Voltage	V_{OFF}	—		0	—	0.7	V

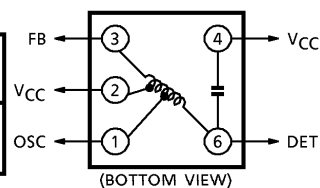
TEST CIRCUIT



COIL DATA (TEST CIRCUIT)

TEST FREQUENCY	L (μH)	Q ₀	C ₀ (pF)	TURN			WIRE (mm ϕ)	REFERENCE
	2-6		4-6	1-2	2-3	1-6		
3MHz	103	40	22	7	2	$57 \frac{1}{2}$	0.1UEW	④1413-3099-356

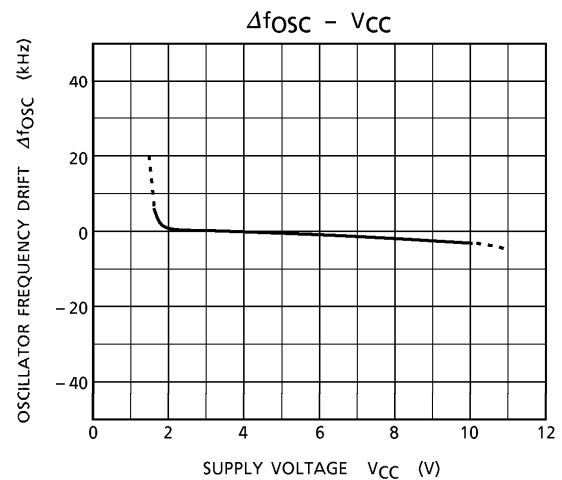
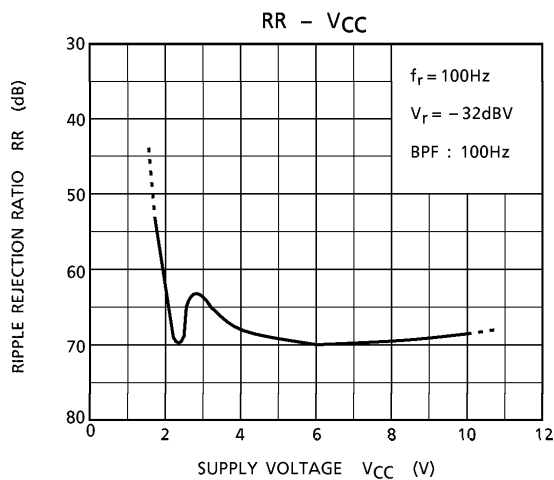
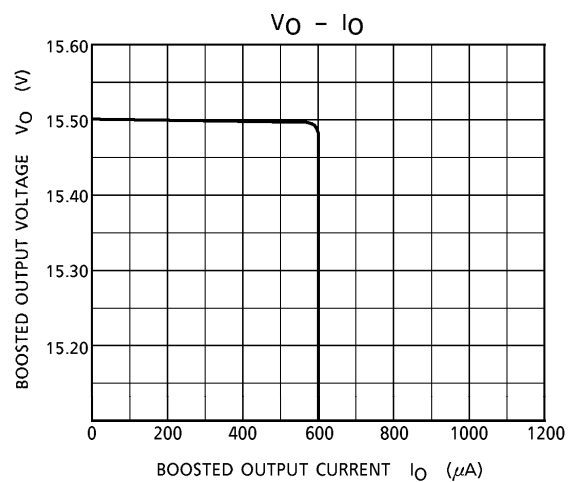
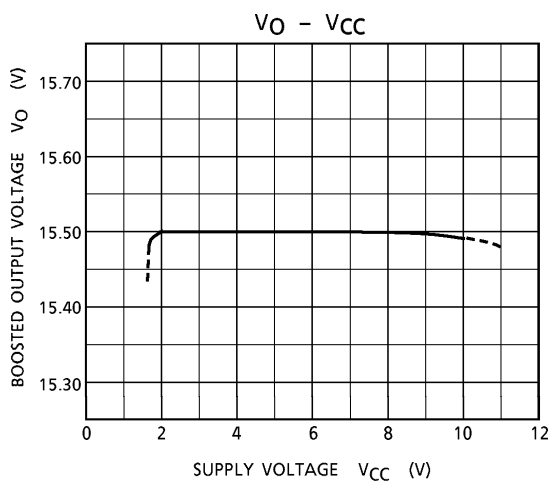
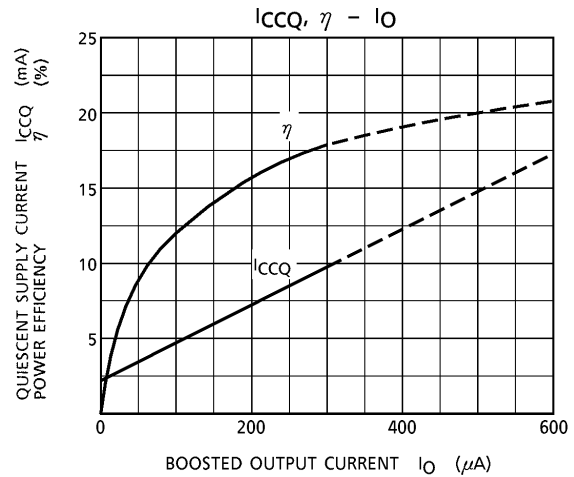
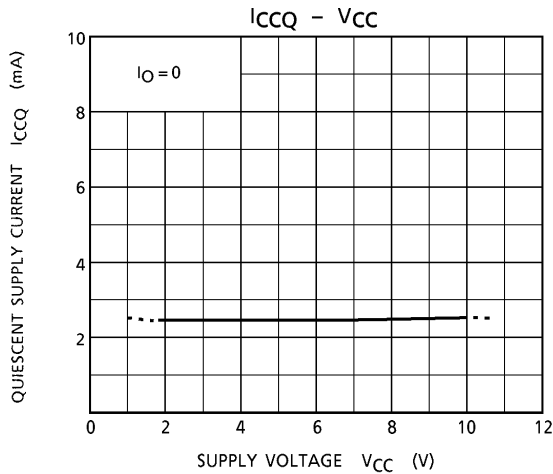
④ : SUMIDA ELECTRIC & Co.,Ltd.

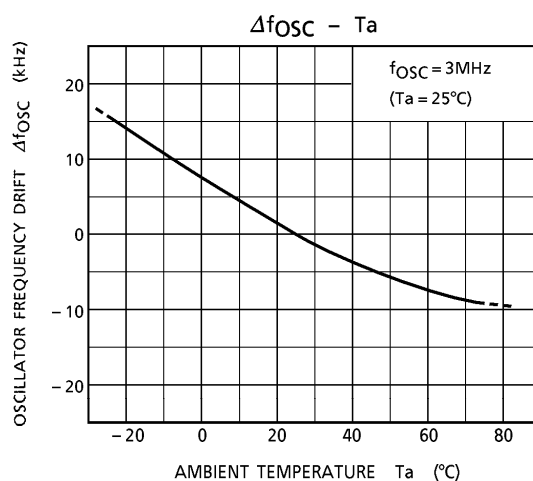
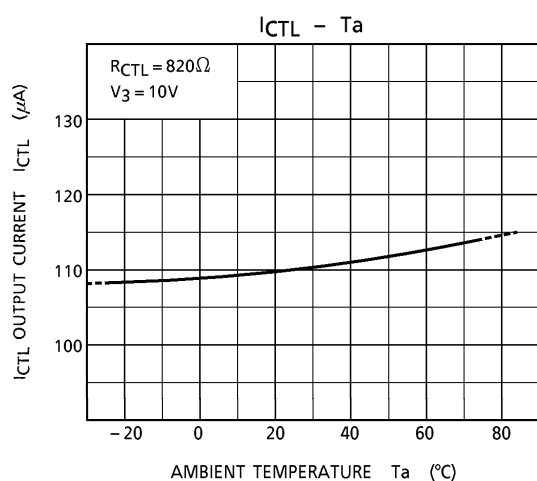
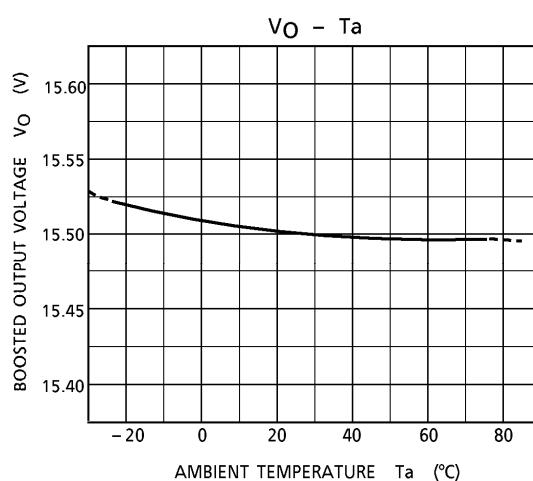
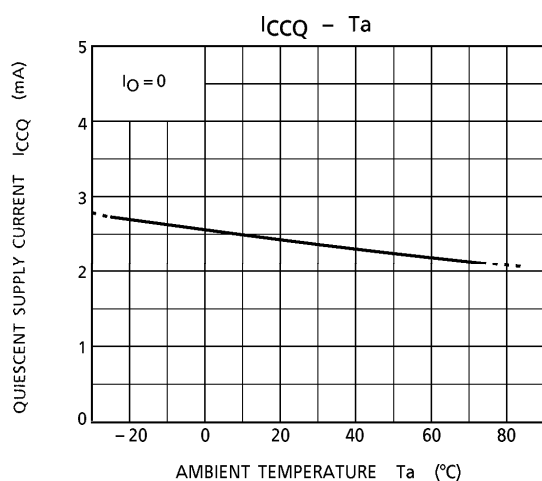


(BOTTOM VIEW)

CHARACTERISTIC CURVES

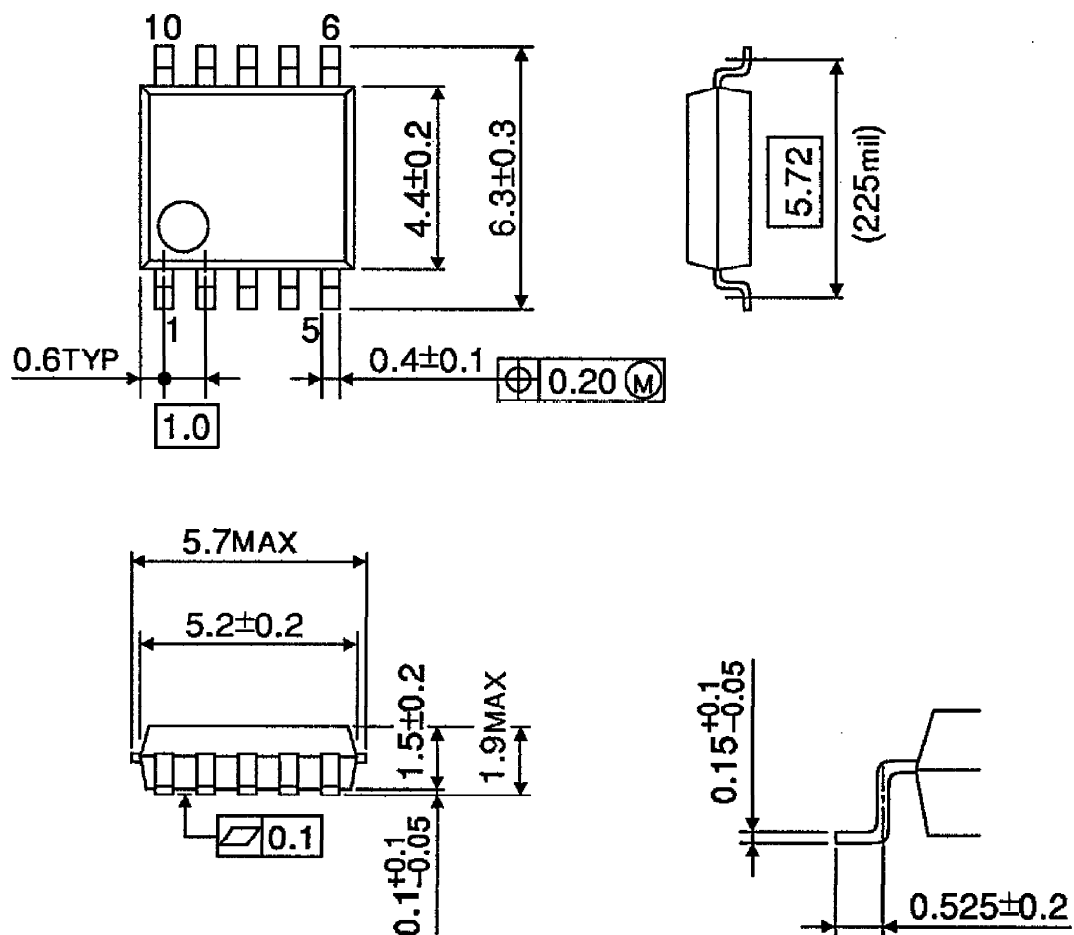
(Unless otherwise specified : $V_{CC} = 3V$, $f_{OSC} = 3MHz$, $I_O = 100\mu A$, $I_{CTL} = 0$, $T_a = 25^\circ C$)





OUTLINE DRAWING
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09g (Typ.)