

TA8198F

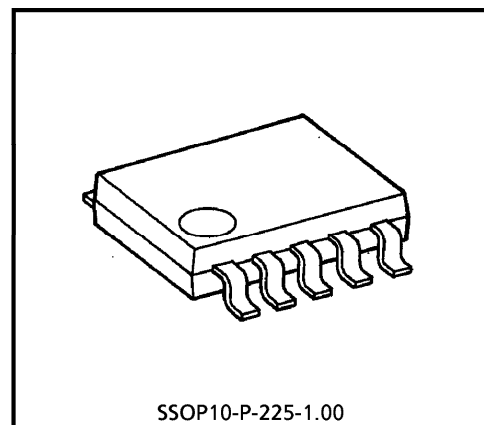
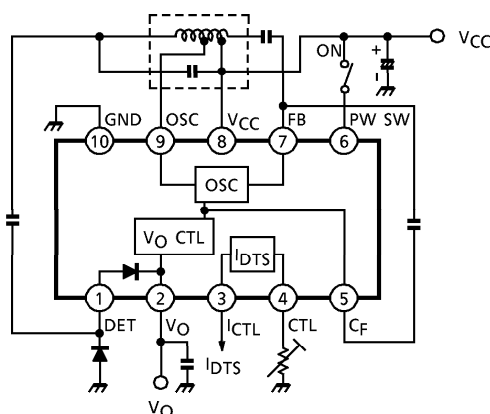
DC / DC CONVERTER FOR ELECTRIC TUNING (3V USE)

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

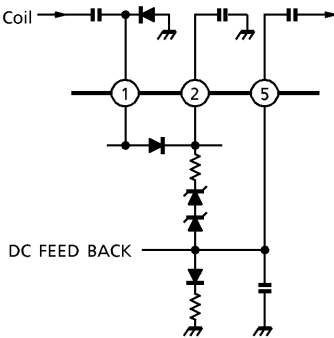
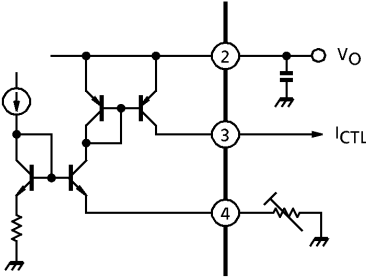
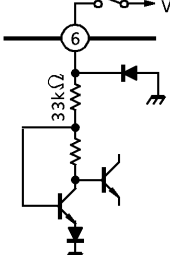
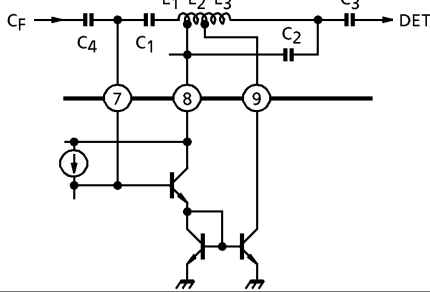


Weight : 0.09g (Typ.)

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

TERMINAL EXPLANATION

Terminal voltage : Typical terminal voltage with test circuit (V_{CC} = 3V, Ta = 25°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		1.4
8	V _{CC}	$f_{OSC} \doteq \frac{1}{2\pi\sqrt{L_3 \cdot C_2}}$		3.0
9	OSC	Controlling oscillation current at the terminal of FB.		—
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 C₃, D₁ and D₂.

(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 Q₁

n : Coil turns ratio (L₂, L₃)

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

The turn of L₁ is designed, so as to make the terminal of FB be about 200~300mV_{p-p} through C₁. The turn of L₁ should be small, and the capacitance of C₁ and Q₀ of coil should be large, for the oscillation start at turning power on.

(3) Allowance is advisable for coil design of n, Q₀. 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.

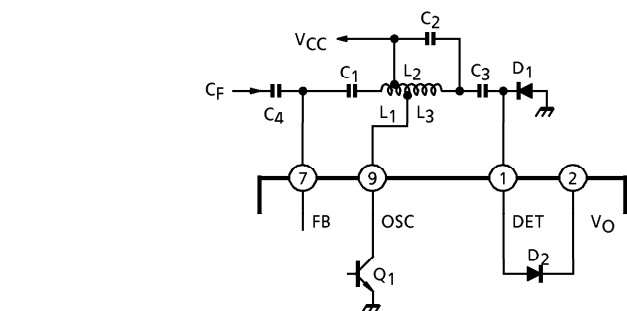


Fig.1 Oscillator and Voltage-Double

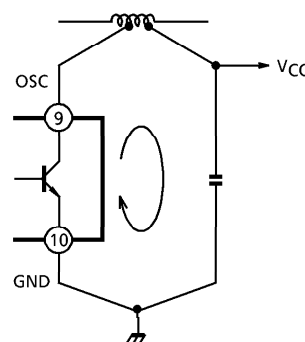


Fig.2 Oscillation Loop

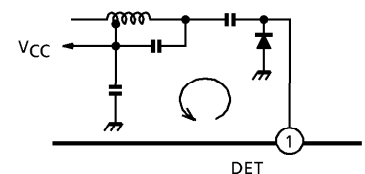


Fig.3 Rectifier Loop

4. I_{CTL}

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

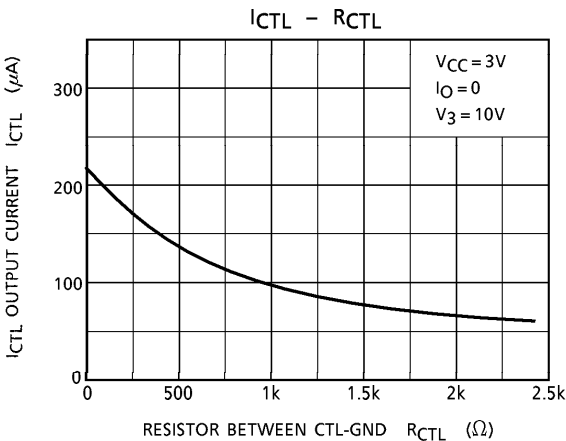


Fig.4 I_{CTL}-R_{CTL}

MAXIMUM RATINGS (Ta = 25°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	°C
Storage Temperature	T _{stg}	- 55~150	

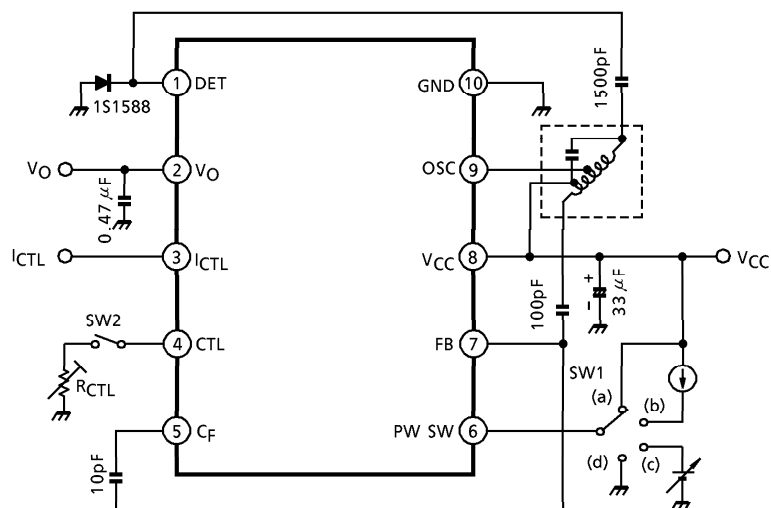
(Note) Derated above Ta = 25°C in the proportion of 3.2mW.

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 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}	—	$V_{CC} = 1.8V$	SW1 : b $V_O \geq 13V$	5	—	μA
Power Switch Off Voltage	V_{OFF}	—		SW1 : c $V_O \leq 3.5V$	0	—	0.7 V

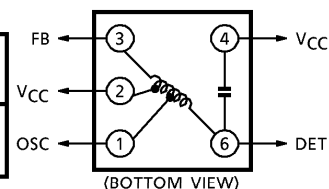
TEST CIRCUIT



COIL DATA (TEST CIRCUIT)

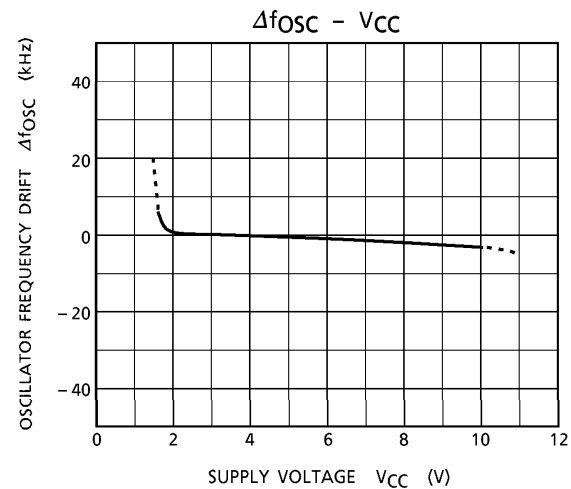
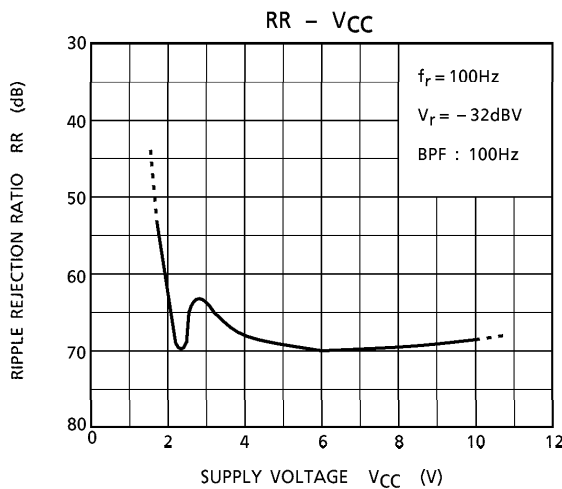
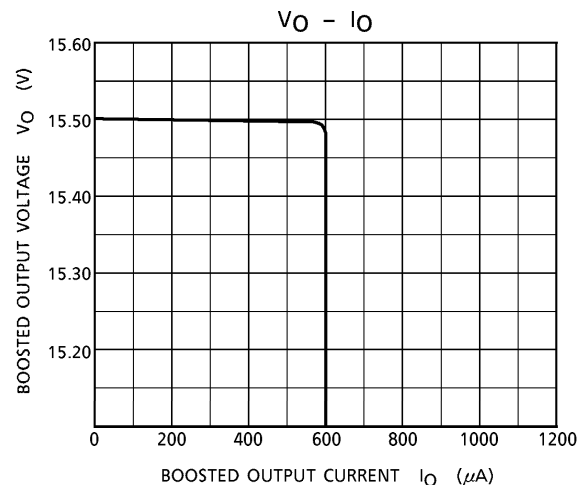
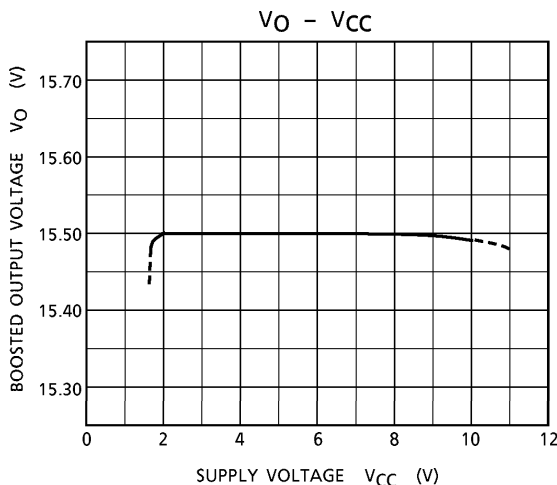
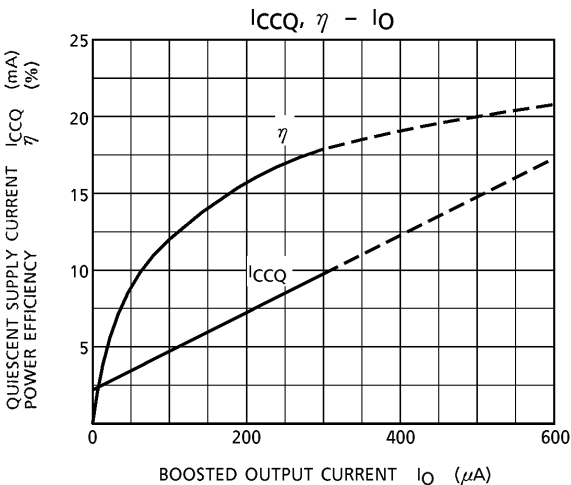
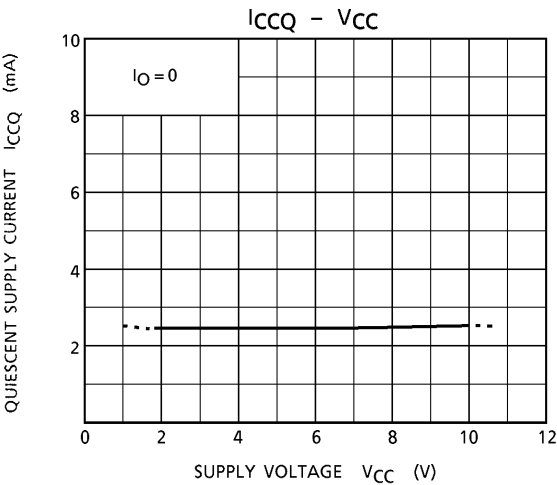
TEST FREQUENCY	L (μH)	Q ₀	C ₀ (pF)	TURN			WIRE (mm ϕ)	REFERENCE
	2-6		4-6	1-2	2-3	1-6		
3MHz	103	40	22	7	2	57 $\frac{1}{2}$	0.1UEW	⑤4143-3099-356

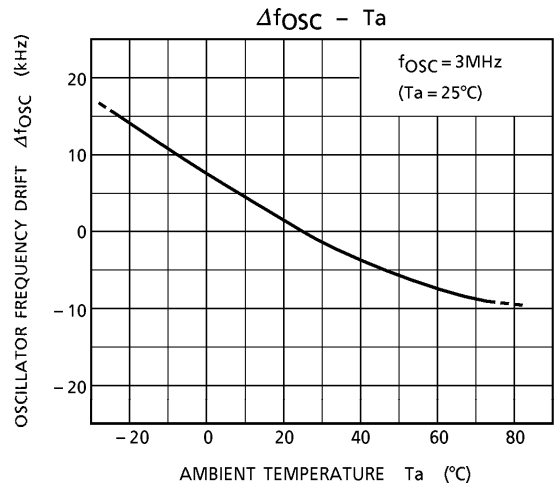
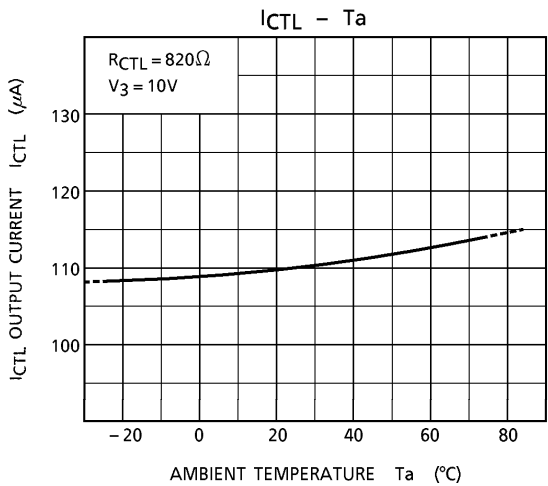
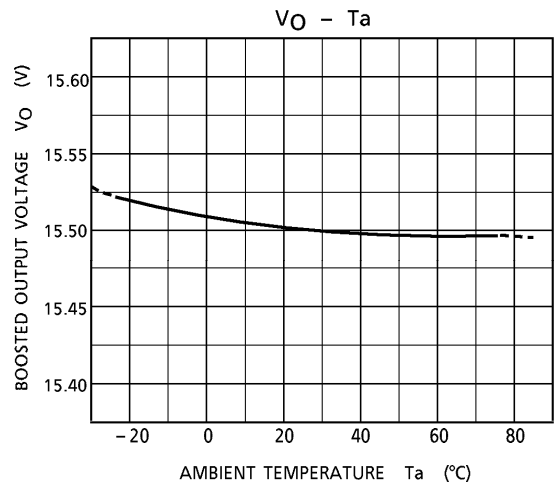
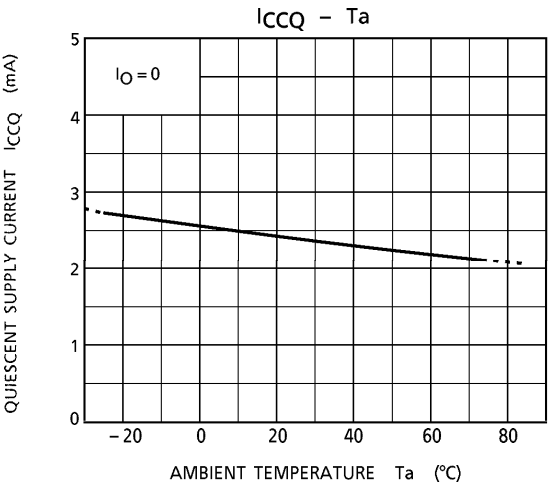
⑤ : SUMIDA ELECTRIC & Co.,Ltd.



CHARACTERISTIC CURVES

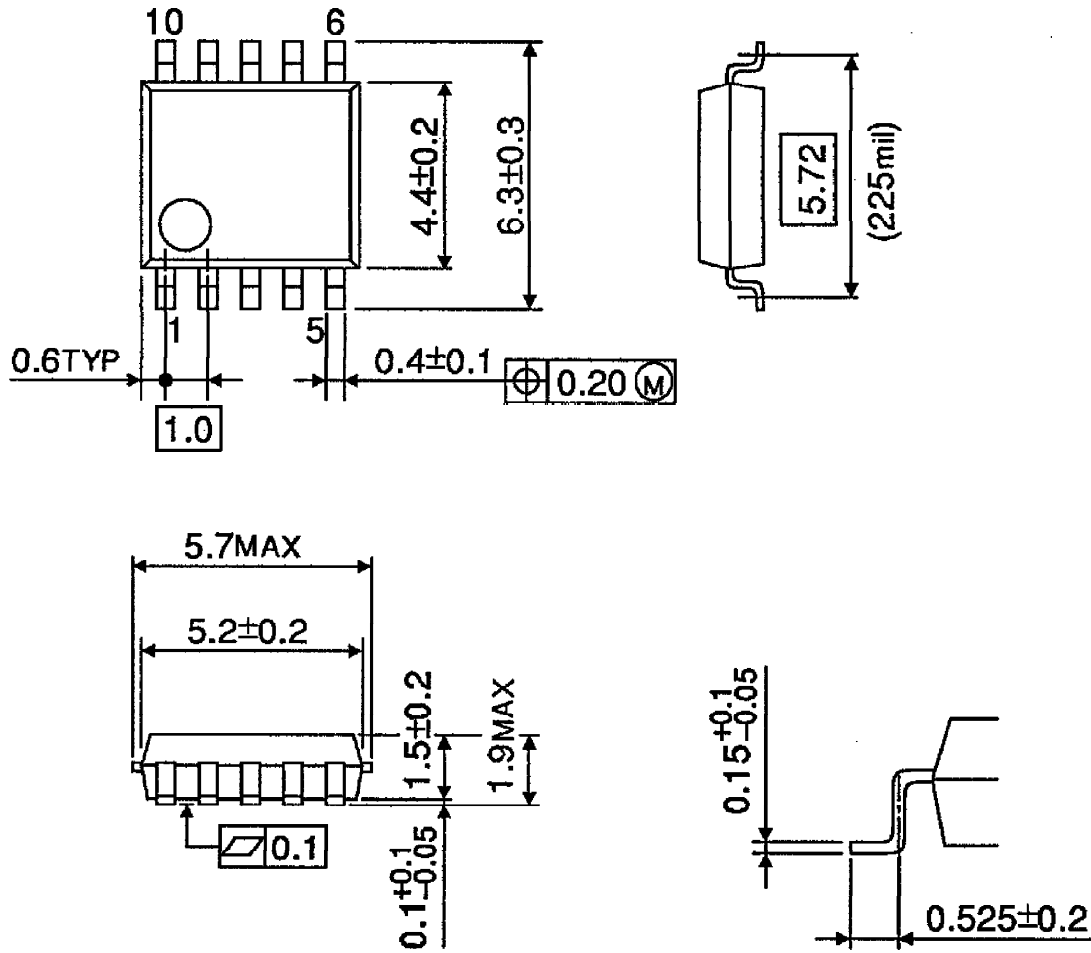
(Unless otherwise specified : $V_{CC} = 3V$, $f_{OSC} = 3MHz$, $I_O = 100\mu A$, $I_{CTL} = 0$, $T_a = 25^\circ C$)





PACKAGE DIMENSIONS
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and 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 comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products 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 TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade 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.