

TA8161F

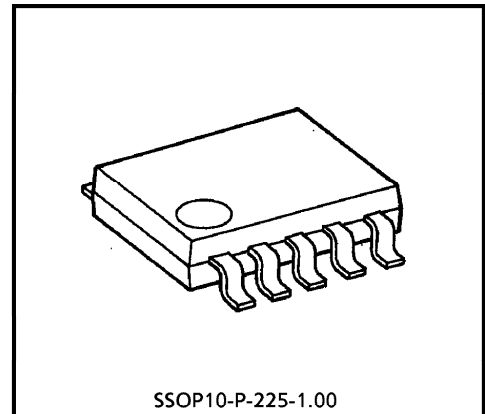
DC/DC CONVERTER SYSTEM IC FOR POWER SUPPLY

The TA8161F is a DC/DC converter system IC, which is developed for supplying a voltage (for 2.5V or 5V) for CMOS IC etc.

It is especially suitable for low voltage operation, and for power supply and back-up of speech recording / playback LSIs, with only one or two dry batteries.

FEATURES

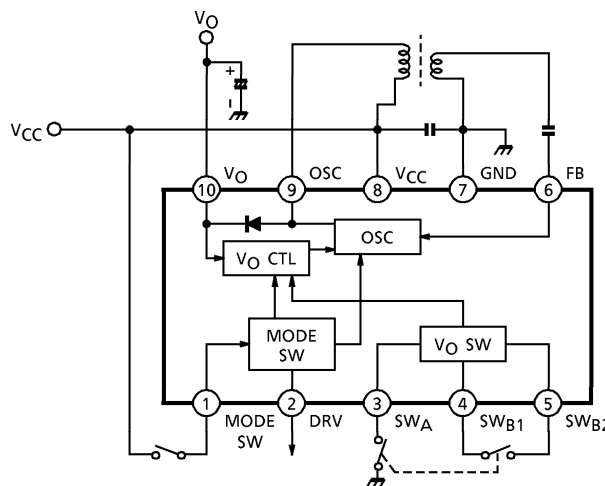
- Output voltage can be switched over to 2.5V or 5V
 (V_O = 2.5V mode (by one dry-battery)
 (V_O = 5V mode (by one or two dry-batteries)
- Built-in backup mode with a very low power dissipation
 V_{CC} = 1.2V, T_a = 25°C, I_O = 0
 (I_{CC1} = 50μA (Typ.) V_O = 5V mode
 (I_{CC2} = 30μA (Typ.) V_O = 2.5V mode
- Built-in mode switch (Back up mode / Power supply mode)
- Excellent power efficiency, by blocking oscillation
- Output current (V_{CC} = 1.2V, T_a = 25°C)
 I_{O1} = 11mA (Typ.) V_O = 5V mode
 I_{O2} = 22mA (Typ.) V_O = 2.5V mode
- Operating supply voltage range (T_a = 25°C)
 V_{CC2} (opr) = 0.9~4V (V_O = 5V mode)
 V_{CC1} (opr) = 0.9~2.2V (V_O = 2.5V mode)



SSOP10-P-225-1.00

Weight : 0.09g (Typ.)

BLOCK DIAGRAM



961001EBA2

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TERMINAL EXPLANATION

| TERMINAL | | FUNCTION | INTERNAL CIRCUIT | | | | | | | | | |
|-----------|------------------|--|------------------|------------------|------------------|---------|------|--|-----------|-------|--|--|
| No. | NAME | | | | | | | | | | | |
| 1 | MODE SW | Mode switch V_{CC} : Power supply mode GND/open : Back up mode | | | | | | | | | | |
| 2 | DRV | Current driver This terminal can be used for current driver, because it is synchronized with mode switch. In case that this circuit isn't used, this terminal should be connected with SW _{B2} (Pin⑤) terminal, as a result low voltage operation is improved. | | | | | | | | | | |
| 3 | SW _A | Change-over switch of output voltage. <table border="1" style="margin: 10px auto;"> <tr> <td></td> <td>SW_{1a}</td> <td>SW_{1b}</td> </tr> <tr> <td>5V mode</td> <td colspan="2">Open</td> </tr> <tr> <td>2.5V mode</td> <td colspan="2">Short</td> </tr> </table> To prevent parasitic oscillation, external capacitor should be connected between SW _{B1} and V _{CC} . Because the SW _{B1} terminal is high impedance. | | SW _{1a} | SW _{1b} | 5V mode | Open | | 2.5V mode | Short | | |
| | SW _{1a} | | SW _{1b} | | | | | | | | | |
| 5V mode | Open | | | | | | | | | | | |
| 2.5V mode | Short | | | | | | | | | | | |
| 4 | SW _{B1} | | | | | | | | | | | |
| 5 | SW _{B2} | | | | | | | | | | | |
| 6 | FB | Flyback converter | | | | | | | | | | |
| 9 | OSC | | | | | | | | | | | |
| 10 | V _O | | | | | | | | | | | |
| 7 | GND | — | — | | | | | | | | | |
| 8 | V _{CC} | — | — | | | | | | | | | |

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- The information contained herein is subject to change without notice.

APPLICATION NOTE

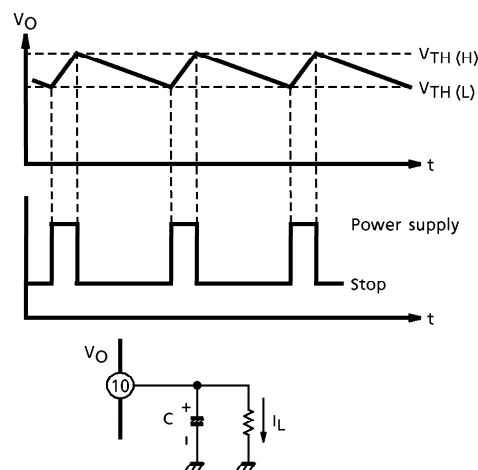
1. MODE EXPLANATION

| IC MODE | | V _O SW | | MODE SW | CURRENT DRIVER Pin② |
|-----------------------|-------------------|-------------------|------------------|-----------------|------------------------|
| | | SW _{1A} | SW _{1B} | SW ₂ | |
| V _O = 2.5V | Power Supply Mode | GND | Short | V _{CC} | ON |
| | Back Up Mode | | | Open / GND | OFF |
| V _O = 5V | Power Supply Mode | Open | Open | V _{CC} | ON |
| | Back Up Mode | | | Open / GND | OFF |

2. OPERATION OF BACK UP MODE

In case of back up mode, this IC is operated by blocking oscillation. This operation is described as follows.

- (1) When potential of output V_O reaches V_{TH(L)}, the V_O control circuit in the IC starts the converter circuit.
 - (2) When the converter is started, the capacitor C connected with V_O terminal is charged and when V_O reaches V_{TH(H)}, the converter is stopped.
 - (3) The charge of the capacitor C is consumed gradually by load current and comes close to V_{TH(L)}. This IC performs the blocking oscillation by repeating (1)~(3) above.
- The frequency of this blocking oscillation depends on load current and a capacitor connected with V_O terminal.



3. MODE SW

It is necessary to connect an external pull-down resistor with the terminal of MODE SW (pin①), in case that this IC operates in power supply mode due to external noise etc, even though this IC is back up mode.

4. CURRENT DRIVER TERMINAL

In case that current driver terminal (pin②) isn't used, this terminal should be connected with SW_{B2} terminal (pin⑤), as a result low voltage operation is improved. When this terminal is kept open, there is a probability that the MODE SW circuit doesn't operate normally.

5. RADIATION

It is necessary to connect a L/C or R/C filter, in case that output noise is large due to radiation etc. Because this IC has adopted a converter circuit of flyback system.

6. V_O and V_{CC}

Supply voltage should not be high than output voltage, because this IC is boost type DC/DC converter.

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------|-----------------------|---------|------|
| Supply Voltage | V _{CC} | 5 | V |
| Output Voltage | V _O | 8 | V |
| Output Current | I _O | 40 | mA |
| Power Dissipation | P _D (Note) | 400 | mW |
| Operating Temperature | T _{opr} | -25~75 | °C |
| Storage Temperature | T _{stg} | -55~150 | °C |

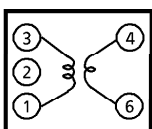
(Note) Derated above Ta = 25°C in the proportion of 3.2mW/°C.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 1.2V, Ta = 25°C, SW₂ : a, SW₃ : a)

| CHARACTERISTIC | | SYMBOL | TEST CIR-CUIT | SW ₁ | TEST CONDITION | MIN. | TYP. | MAX. | UNIT | | |
|---|---|----------------------|----------------------|---|---|--|---|------------------------|------|---------|----|
| Power Supply Mode | Quiescent Supply Current | I _{CCO1} | — | a | I _O = 0 | — | 0.5 | 1.0 | mA | | |
| | | I _{CCO2} | | b | | — | 0.3 | 0.8 | | | |
| | Boosted Output Voltage 1 | V _{O11} | | a | a | I _O = 5mA | 4.6 | 5.0 | 5.3 | V | |
| | | V _{O12} | | | | I _O = 5mA, V _{CC} = 1V | 4.6 | 5.0 | 5.3 | | |
| | V _{O1} Temperature Coefficient | ΔV _{O1} / T | | a | a | I _O = 5mA | — | -4.4 | — | mV / °C | |
| | V _{O1} Maximum Output Current | I _{O1} max1 | | I _{O1} max2 | a | V _{CC} = 1.2V | ΔV _{O1} = 0.5V, with respect to standard I _{O1} = 5mA | 8 | 11 | — | mA |
| | | | | | | | | V _{CC} = 1.5V | 10 | 17 | |
| | Boosted Output Voltage 2 | V _{O21} | | V _{O22} | b | b | I _O = 10mA | 2.2 | 2.5 | 2.8 | V |
| V _{O2} Temperature Coefficient | | | ΔV _{O2} / T | | | | | I _O = 10mA | — | -4.6 | |
| | V _{O2} Maximum Output Current | I _{O2} max | | a | a | ΔV _{O2} = 0.3V, with respect to standard I _{O2} = 10mA | 16 | | 22 | — | mA |
| Back Up Mode | Quiescent Supply Current | I _{BU1} | — | a | SW ₂ : b, I _O = 0 | — | 50 | — | μA | | |
| | | I _{BU2} | | b | | — | 30 | — | | | |
| | OSC Start Output Voltage 1 | V _{TH11} | | a | SW ₂ : b, I _O = 0 | 4.0 | 4.3 | 4.6 | V | | |
| | OSC Stop Output Voltage 1 | V _{TH12} | | b | | 4.6 | 5.0 | 5.3 | | | |
| | OSC Start Output Voltage 2 | V _{TH21} | | b | SW ₂ : b, I _O = 0 | 1.8 | 2.2 | 2.4 | V | | |
| OSC Stop Output Voltage 2 | V _{TH22} | 2.2 | 2.5 | | | 2.7 | | | | | |
| OSC Transistor Saturation Voltage | V _{DRV} | b | b | V _{CC} = 0.9V, SW ₃ : b I _{DRV} = 0.5mA | — | 50 | 150 | mV | | | |
| MODE SW | Power Supply Mode On Current | I _{mode} | — | b | V _{CC} = 0.9V, SW ₂ : c SW ₃ : b V _{O1} ≥ 2V, V _{DRV} ≤ 50mV | 10 | — | — | μA | | |
| | Back Up Mode On Voltage | V _{mode} | — | b | V _{CC} = 0.9V, SW ₂ : d SW ₃ : b V _{DRV} ≥ 0.8V | 0 | — | 0.3 | V | | |

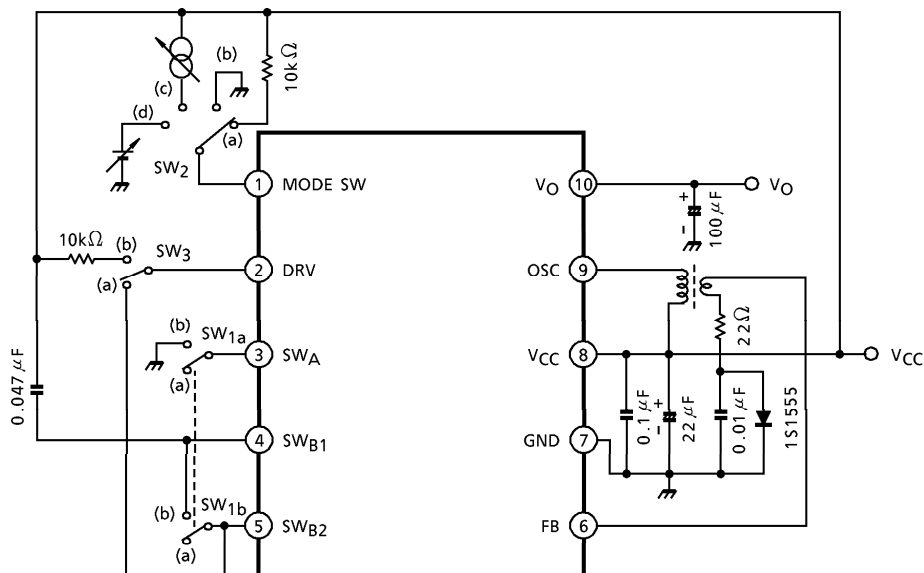
COIL DATA

| TEST FREQUENCY | L (μH) | Q _o | TURN | | WIRE (mm ϕ) | REFERENCE |
|----------------|---------------------|----------------|------|-----|-------------------|-------------------------------------|
| | 1-3 | | 1-3 | 4-6 | | |
| 796kHz | 200 | 35 | 72 | 42 | 0.10UEW | SUMIDA ELECTRIC Co., Ltd, 6300-131A |



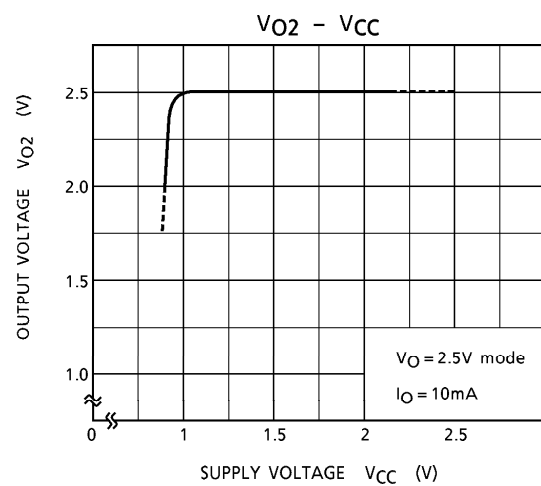
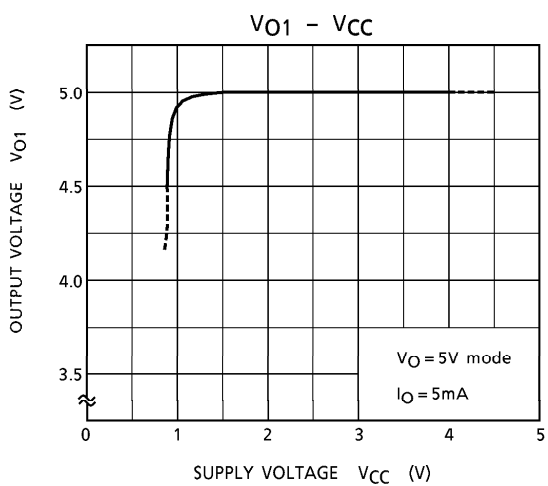
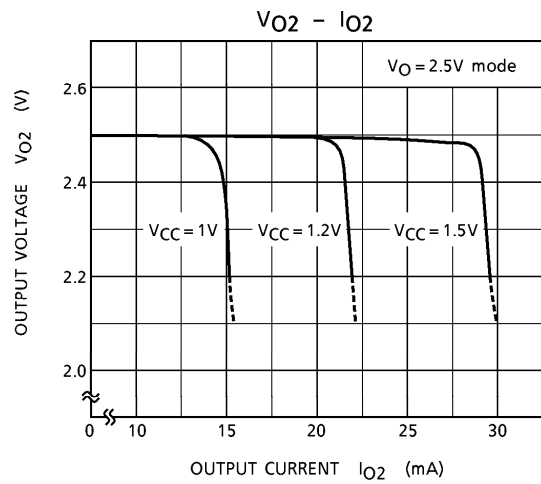
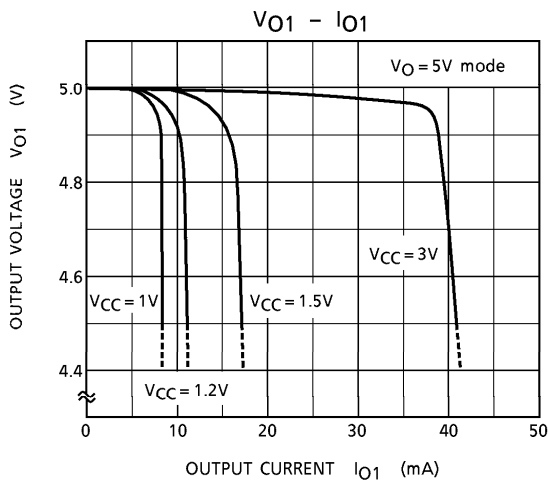
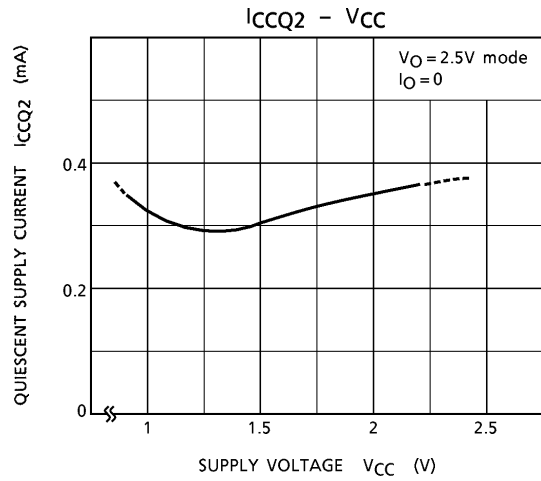
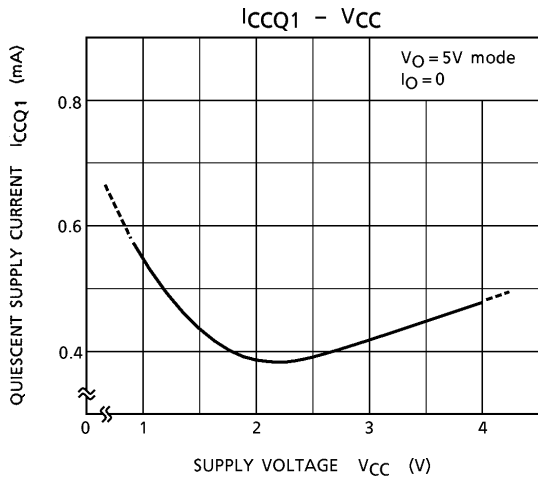
(Bottom of view)

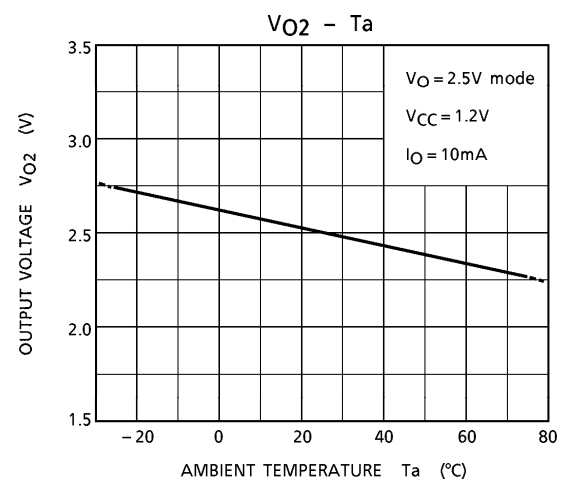
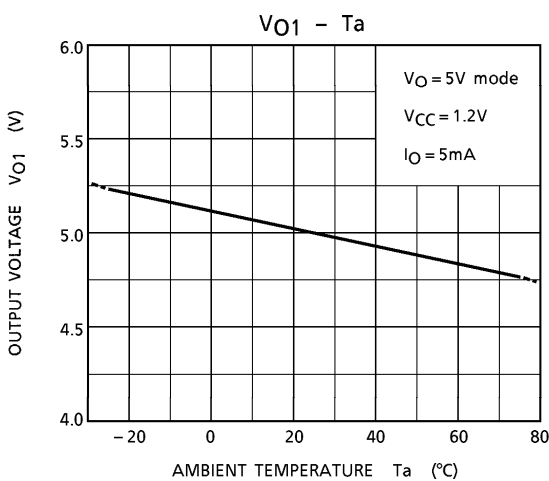
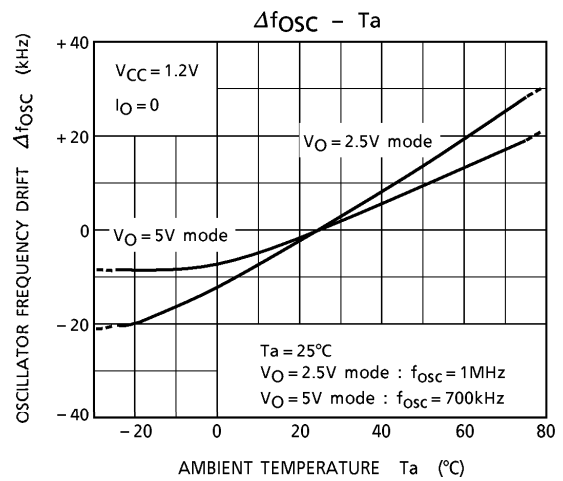
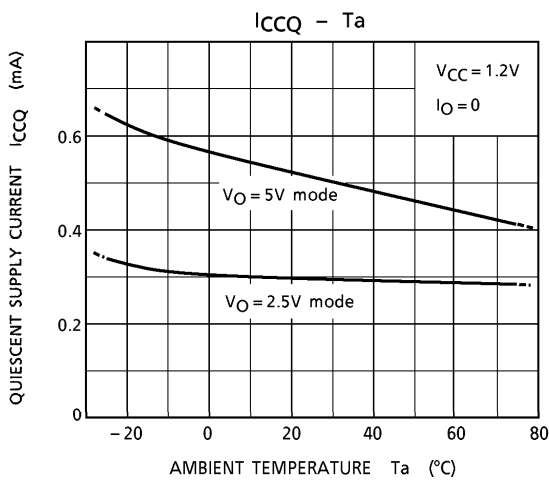
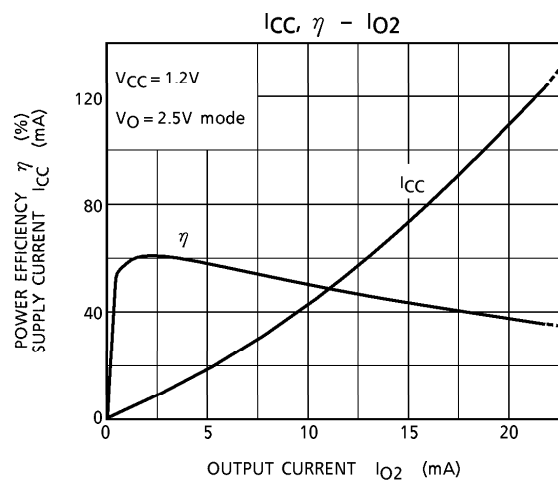
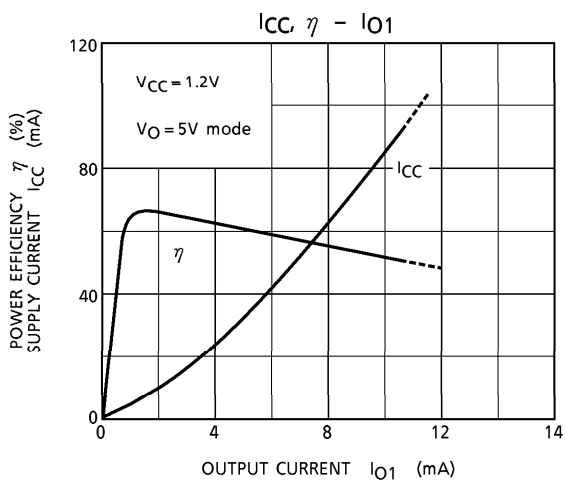
TEST CIRCUIT



CHARACTERISTIC CURVES

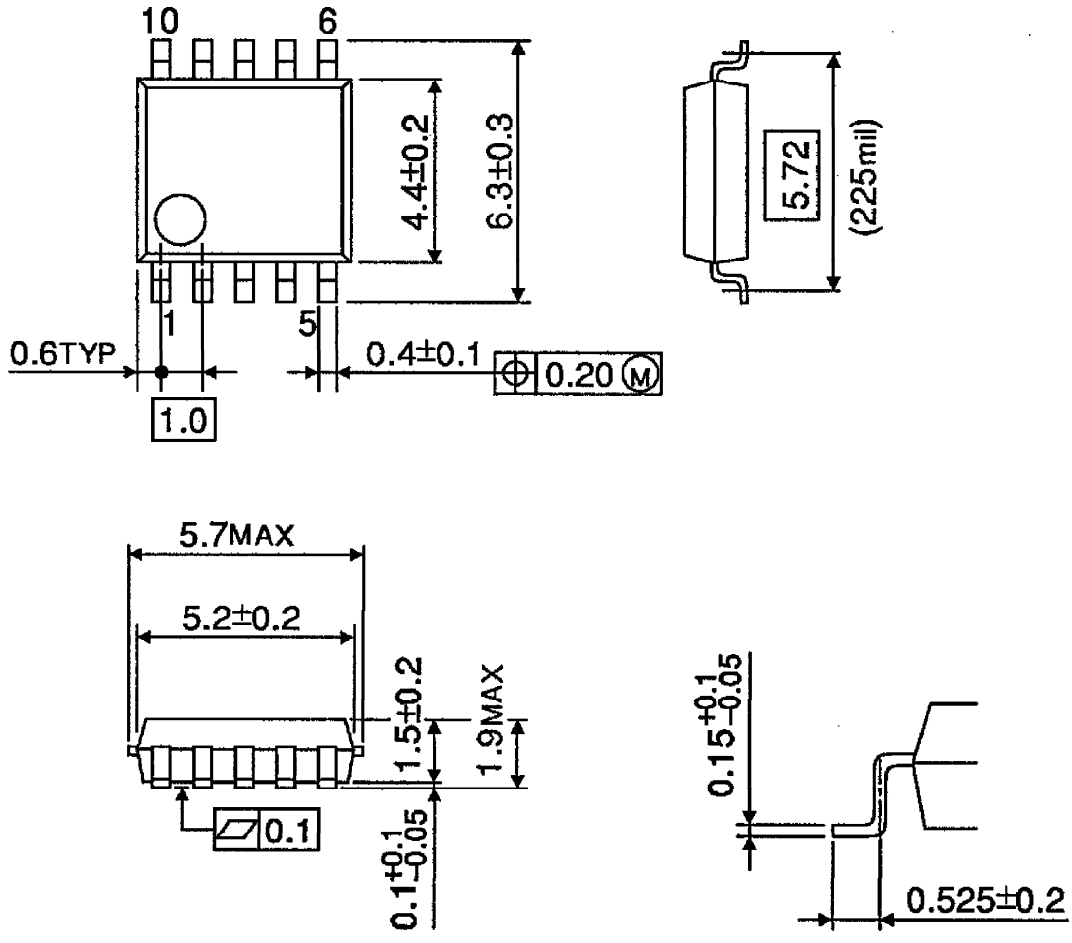
Unless otherwise specified $V_{CC} = 1.2V$, $T_a = 25^\circ C$, $I_O = 0$





OUTLINE DRAWING
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09g (Typ.)