

# TA8161F

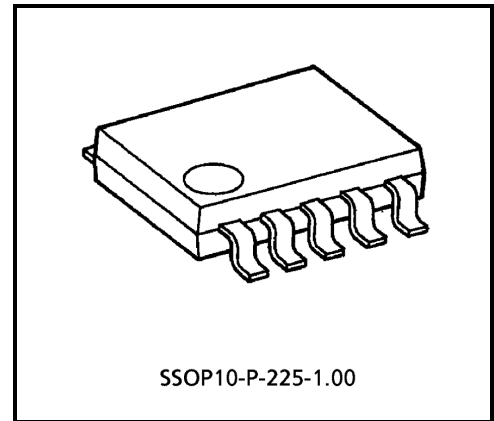
## DC / DC Converter System IC For Power Supply

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 LSI's, with only one or two dry batteries.

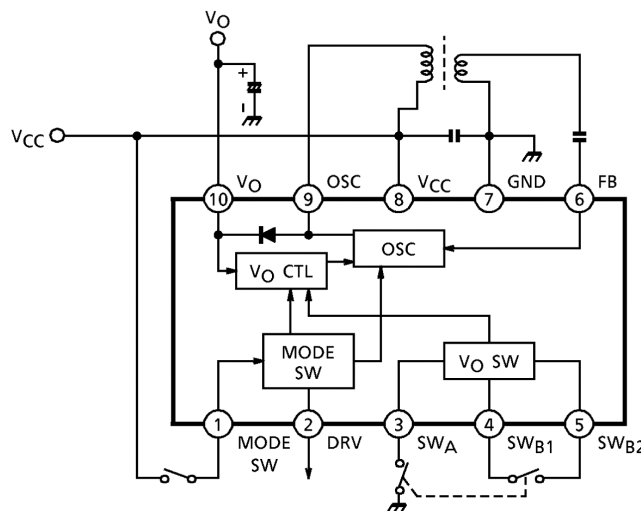
### Features

- 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  
 $V_{CC} = 1.2V, T_a = 25^\circ C, I_O = 0$   
 $I_{CC1} = 50\mu A$  (typ.).....  $V_O = 5V$  mode  
 $I_{CC2} = 30\mu A$  (typ.).....  $V_O = 2.5V$  mode
- Built-in mode switch (back up mode / power supply mode)
- Excellent power efficiency, by blocking oscillation
- Output current ( $V_{CC} = 1.2V, T_a = 25^\circ C$ )  
 $I_{O1} = 11mA$  (typ.).....  $V_O = 5V$  mode  
 $I_{O2} = 22mA$  (typ.).....  $V_O = 2.5V$  mode
- Operating supply voltage range ( $T_a = 25^\circ C$ )  
 $V_{CC2 (opr)} = 0.9\sim 4V$  ( $V_O = 5V$  mode)  
 $V_{CC1 (opr)} = 0.9\sim 2.2V$  ( $V_O = 2.5V$  mode)



Weight: 0.09g (typ.)

### Block Diagram



## Terminal Explanation

Terminal		Function	Internal Circuit									
No.	Name											
1	Mode SW	Mode switch V <sub>CC</sub> : 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 <sub>B2</sub> (pin(5)) terminal, as a result low voltage operation is improved.										
3	SW <sub>A</sub>	Change-over switch of output voltage.										
4	SW <sub>B1</sub>	<table border="1"> <tr> <td></td> <td>SW<sub>1a</sub></td> <td>SW<sub>1b</sub></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>			SW <sub>1a</sub>	SW <sub>1b</sub>	5V mode	OPEN		2.5V mode	Short	
	SW <sub>1a</sub>	SW <sub>1b</sub>										
5V mode	OPEN											
2.5V mode	Short											
5	SW <sub>B2</sub>	To prevent parasitic oscillation, external capacitor should be connected between SW <sub>B1</sub> and V <sub>CC</sub> . Because the SW <sub>B1</sub> terminal is high impedance.										
6	FB	Flyback converter										
9	OSC											
10	V <sub>O</sub>											
7	GND	—	—									
8	V <sub>CC</sub>	—	—									

## Application Note

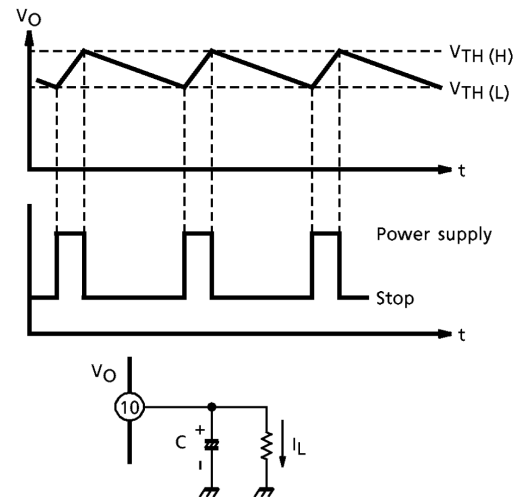
### 1. Mode explanation

IC Mode		V <sub>O</sub> SW		Mode SW	Current Driver Pin(2)
		SW <sub>1A</sub>	SW <sub>1B</sub>	SW <sub>2</sub>	
V <sub>O</sub> = 2.5V	Power supply mode	GND	Short	V <sub>CC</sub>	ON
	Back up mode			OPEN / GND	OFF
V <sub>O</sub> = 5V	Power supply mode	OPEN	OPEN	V <sub>CC</sub>	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<sub>O</sub> reaches V<sub>TH</sub> (L), the V<sub>O</sub> control circuit in the IC starts the converter circuit.
  - (2) When the converter is started, the capacitor C connected with V<sub>O</sub> terminal is charged and when V<sub>O</sub> reaches V<sub>TH</sub> (H), the converter is stopped.
  - (3) The charge of the capacitor C is consumed gradually by load current and comes close to V<sub>TH</sub> (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<sub>O</sub> terminal.



### 3. Mode SW

It is necessary to connect an external pull-down resistor with the terminal of MODE SW (pin(1)), 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 (pin(2)) isn't used, this terminal should be connected with SW<sub>B2</sub> terminal (pin(5)), 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<sub>O</sub> and V<sub>CC</sub>

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 <sub>CC</sub>	5	V
Output voltage	V <sub>O</sub>	8	V
Output current	I <sub>O</sub>	40	mA
Power dissipation	P <sub>D</sub> (Note)	400	mW
Operating temperature	T <sub>opr</sub>	-25~75	°C
Storage temperature	T <sub>stg</sub>	-55~150	°C

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

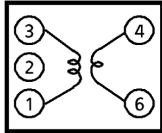
## Electrical Characteristics

(unless otherwise specified, V<sub>CC</sub> = 1.2V, Ta = 25°C, SW<sub>2</sub>: a, SW<sub>3</sub>: a)

Characteristic		Symbol	Test Cir-cuit	SW <sub>1</sub>	Test Condition	Min.	Typ.	Max.	Unit	
Power supply mode	Quiescent supply current	I <sub>CCQ1</sub>	—	a	I <sub>O</sub> = 0	—	0.5	1.0	mA	
		I <sub>CCQ2</sub>		b		—	0.3	0.8		
	Boosted output voltage 1	V <sub>O11</sub>		a	a	I <sub>O</sub> = 5mA	4.6	5.0	5.3	V
		V <sub>O12</sub>				I <sub>O</sub> = 5mA, V <sub>CC</sub> = 1V	4.6	5.0	5.3	
	V <sub>O1</sub> temperature coefficient	ΔV <sub>O1</sub> / T		a	a	I <sub>O</sub> = 5mA	—	-4.4	—	mV / °C
	V <sub>O1</sub> maximum output current	I <sub>O1 max1</sub>		a	a	V <sub>CC</sub> = 1.2V	8	11	—	mA
		I <sub>O1 max2</sub>				V <sub>CC</sub> = 1.5V				
	Boosted output voltage 2	V <sub>O21</sub>		b	b	I <sub>O</sub> = 10mA	2.2	2.5	2.8	V
		V <sub>O22</sub>				V <sub>CC</sub> = 1V, I <sub>O</sub> = 10mA	2.2	2.5	2.8	
	V <sub>O2</sub> temperature coefficient	ΔV <sub>O2</sub> / T		b	b	I <sub>O</sub> = 10mA	—	-4.6	—	mV / °C
V <sub>O2</sub> maximum output current	I <sub>O2 max</sub>	b	b	ΔV <sub>O2</sub> = 0.3V, with respect to standard I <sub>O2</sub> = 10mA	16	22	—	mA		
Back up mode	Quiescent supply current	I <sub>BU1</sub>	—	a	SW <sub>2</sub> : b, I <sub>O</sub> = 0	—	50	—	μA	
		I <sub>BU2</sub>		b		—	30	—		
	OSC start output voltage1	V <sub>TH11</sub>		a	SW <sub>2</sub> : b, I <sub>O</sub> = 0	4.0	4.3	4.6	V	
	OSC stop output voltage1	V <sub>TH12</sub>		a		4.6	5.0	5.3		
	OSC start output voltage2	V <sub>TH21</sub>		b	SW <sub>2</sub> : b, I <sub>O</sub> = 0	1.8	2.2	2.4	V	
OSC stop output voltage2	V <sub>TH22</sub>	b	2.2	2.5		2.7				
OSC transistor saturation voltage	V <sub>DRV</sub>	b	b	V <sub>CC</sub> = 0.9V, SW <sub>3</sub> : b I <sub>DRV</sub> = 0.5mA	—	50	150	mV		
Mode SW	Power supply mode on current	I <sub>mode</sub>	—	b	V <sub>CC</sub> = 0.9V, SW <sub>2</sub> : c SW <sub>3</sub> : b V <sub>O1</sub> ≥ 2V, V <sub>DRV</sub> ≤ 50mV	10	—	—	μA	
	Back up mode on voltage	V <sub>mode</sub>	—	b	V <sub>CC</sub> = 0.9V, SW <sub>2</sub> : d SW <sub>3</sub> : b V <sub>DRV</sub> ≥ 0.8V	0	—	0.3	V	

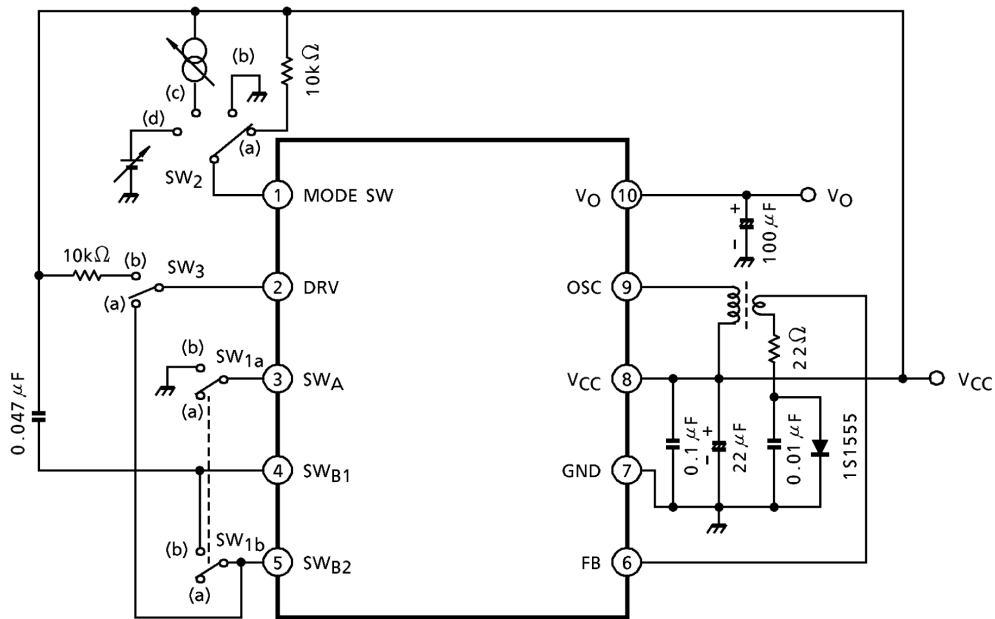
## Coil Data

Test Frequency	L ( $\mu\text{H}$ )	$Q_0$	Turn		Wire (mm $\phi$ )	Reference
	1-3		1-3	4-6		
796kHz	200	35	72	42	0.10 UEW	Sumida electric co., ltd, 6300-131A



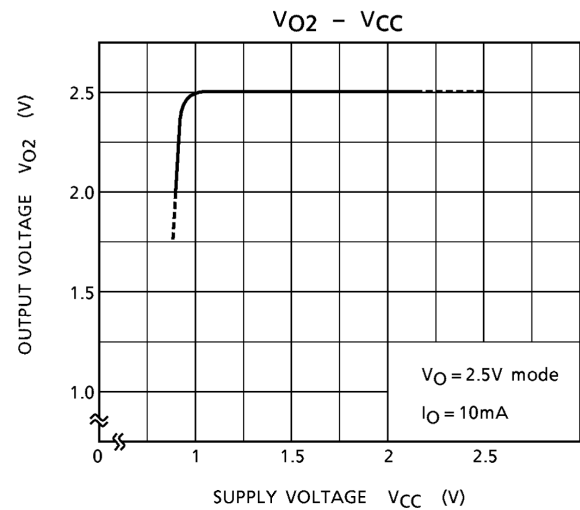
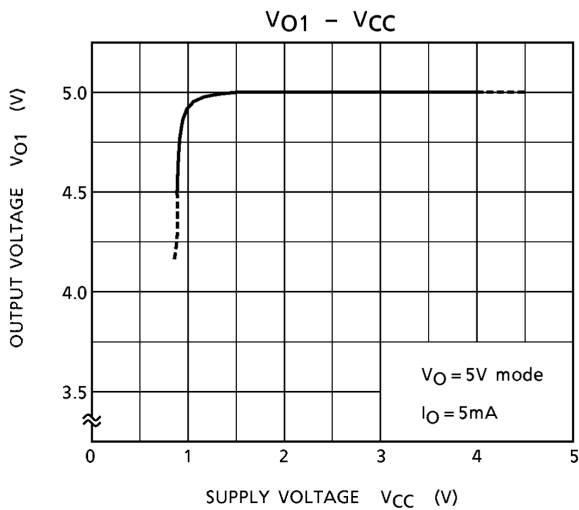
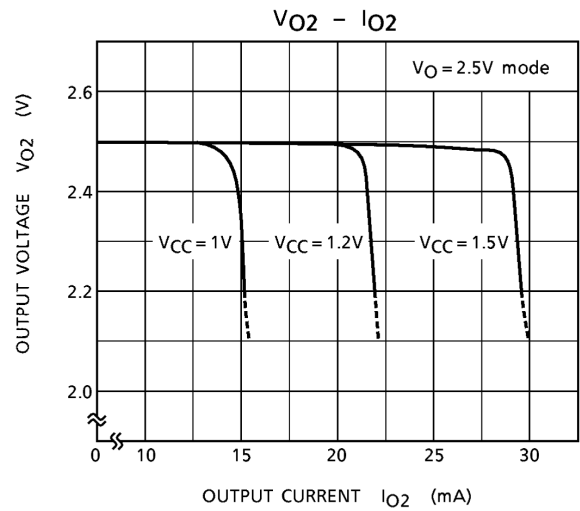
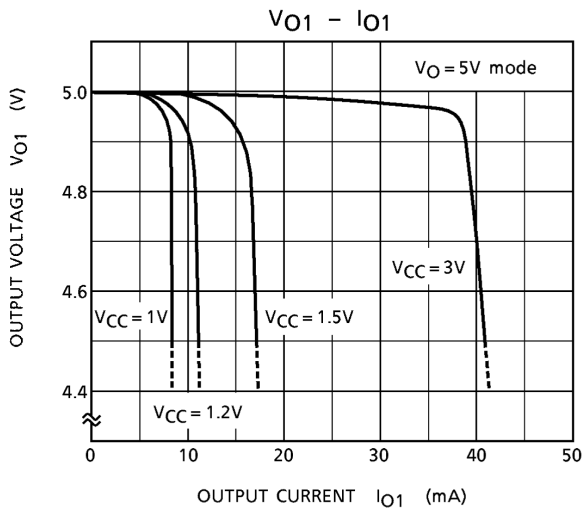
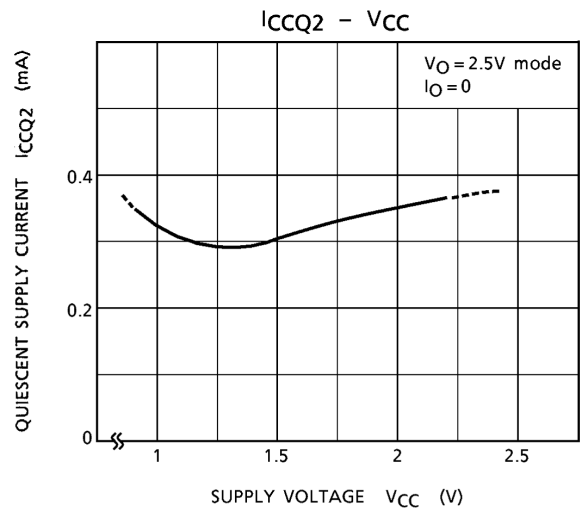
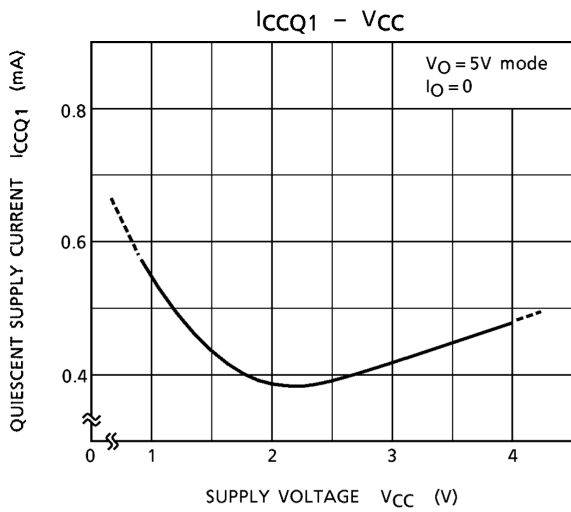
(Bottom of view)

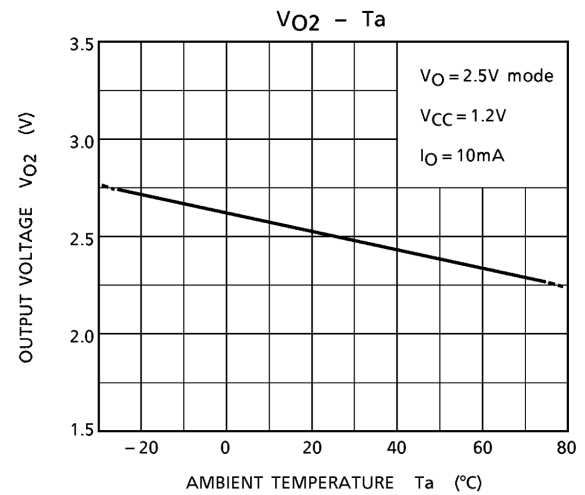
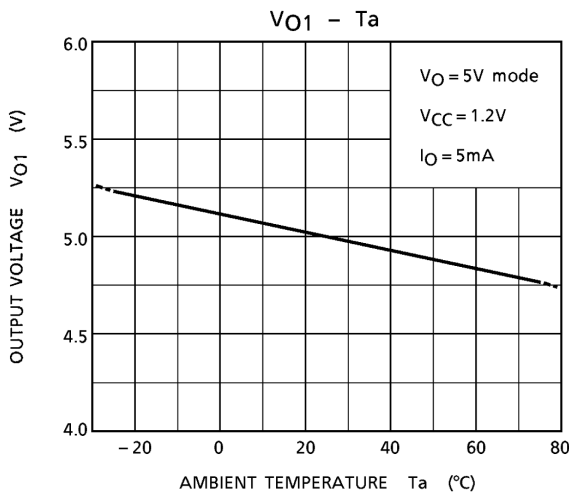
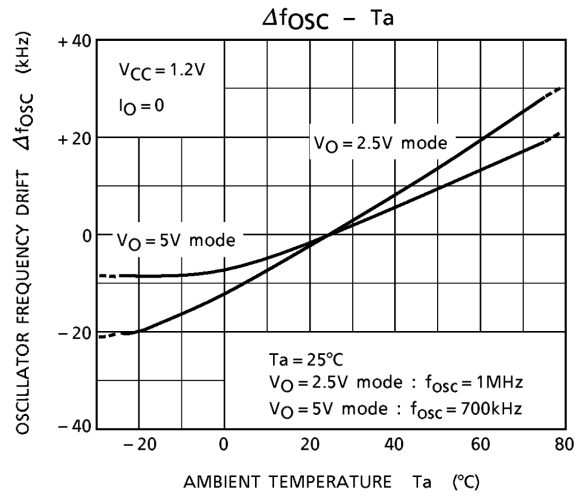
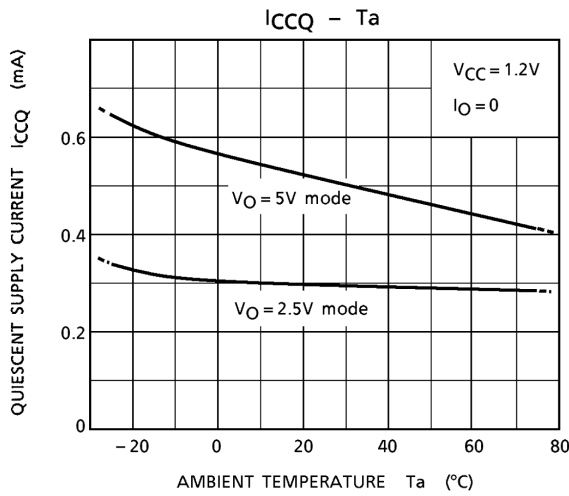
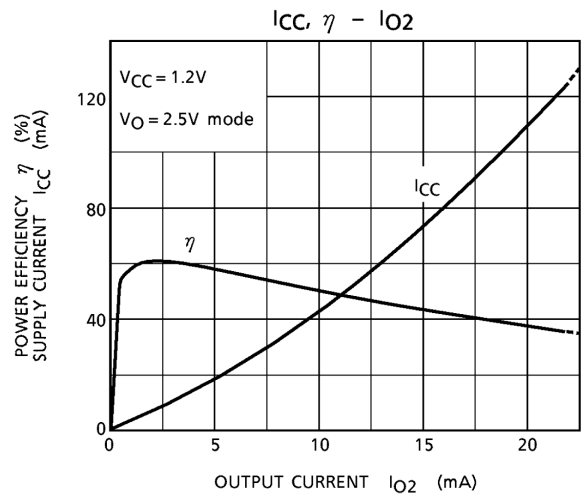
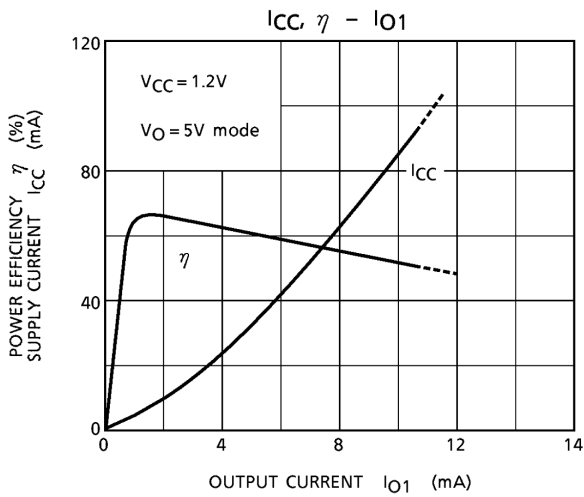
## Test Circuit



## Characteristic Curves

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

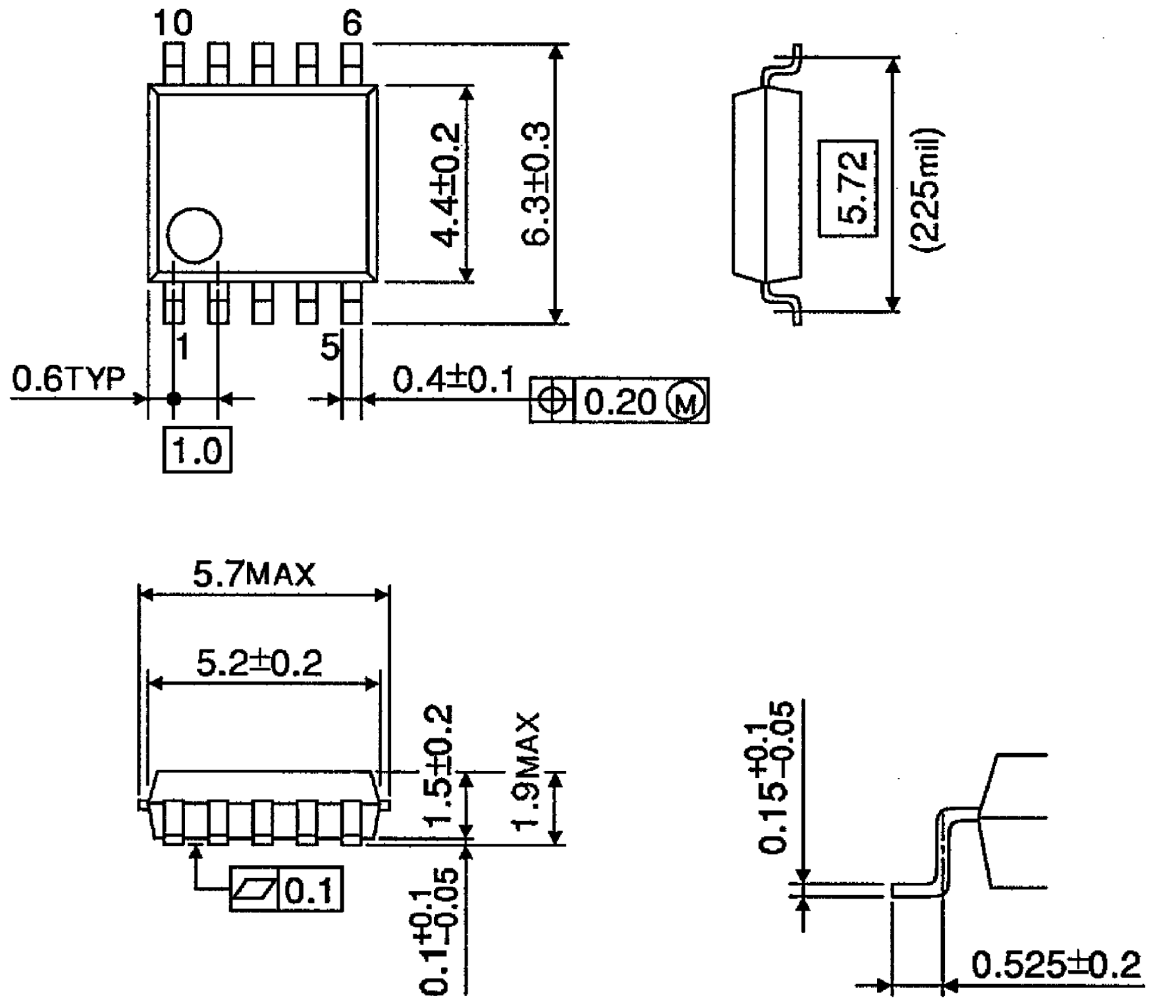




**Package Dimensions**

SSOP10-P-225-1.00

Unit : mm



Weight: 0.09g (typ.)



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