

# Step-Up DC/DC Converter (VFF) Monolithic IC MM1331

## Outline

This is a converter IC which steps up the DC input voltage to output a fixed voltage level. Utilizing technology for low-voltage operation, which is a feature of Mitsumi semiconductor processes, operation is possible beginning at 0.85V, making this device ideal for the power supply circuits of portable equipment driven by a single battery.

Under small load currents oscillation is stopped and the charge stored in an externally mounted capacitor is output in an intermittent oscillation design, to improve the efficiency of operation under light loads.

## Features

1. Low-voltage operation possible, 0.85V (no-load)
2. Internal oscillation circuit
3. Intermittent oscillation design for improved light-load efficiency
4. Numerous output voltages available (seven ranks)

## Package

SOT-25

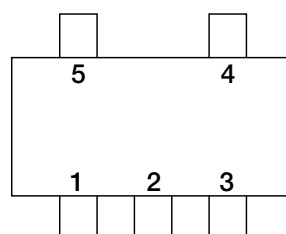
## Output Voltage Rank

Rank	A	B	C	D	E	G	H
Voltage (V)	5.0	3.2	3.5	3.0	2.5	2.2	2.7

## Applications

1. Pagers
2. Separate vibrators
3. Other portable equipment

## Pin Assignment

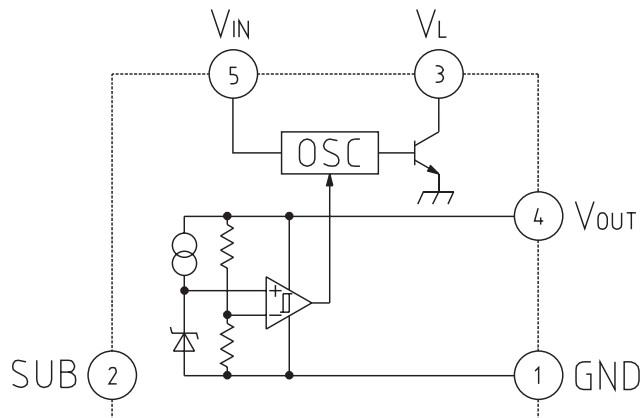


SOT-25

1	GND
2	SUB
3	V <sub>L</sub>
4	V <sub>OUT</sub>
5	V <sub>IN</sub>

\*Pin 2 is the SUB pin, and should be connected to GND.

**Block Diagram**



Note: Pin 2 is the SUB pin, and should be connected to GND.

**Absolute Maximum Ratings**

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+75	°C
Voltage applied to V <sub>IN</sub> pin		-0.3~+10	V
Voltage applied to V <sub>OUT</sub> pin		-0.3~+10	V
Voltage applied to V <sub>L</sub> pin		-0.3~+10	V
Allowable loss	P <sub>d</sub>	150	mW

**Recommended Operating Conditions**

Item	Symbol	Ratings	Units
Operating temperature	T <sub>OP</sub>	-20~+75	°C
Operating voltage	V <sub>OP</sub>	+0.85~V <sub>OUT</sub>	V

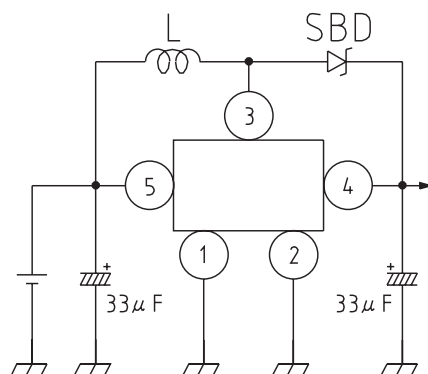
**Electrical Characteristics** (Except where noted otherwise,  $V_{IN}=1.5V$ ,  $I_o=1mA$ )

Item	Measurement conditions	Min.	Typ.	Max.	Units
Operating voltage	No-load	0.85		$V_{OUT}$	V
Output voltage rank A	$V_{IN}=1.5V$ , $I_o=1mA$	4.80	5.0	5.20	V
rank B		3.07	3.2	3.33	
rank C		3.36	3.5	3.64	
rank D		2.88	3.0	3.12	
rank E		2.40	2.5	2.60	
rank G		2.11	2.2	2.29	
rank H		2.59	2.7	2.81	
Output voltage temperature coefficient		$T_a=-20\sim 75^{\circ}C$		$\pm 100$	
Input fluctuations	$V_{IN}=1.1\rightarrow 1.7V$ , $I_o=1mA$			3	%/ $^{\circ}C$
Load fluctuations	$V_{IN}=1.5V$ , $I_o=0\rightarrow 7mA$			1	%/mA
$V_{IN}$ pin consumption current	$V_{IN}=1.5V$ , $V_{OUT}=V_{OUT\ max.}+0.05$		3	4.5	$\mu A$
$V_{OUT}$ pin consumption current	$V_{OUT}=V_{OUT\ max.}+0.05$		5	7.5	$\mu A$
$V_L$ pin leakage current	$V_L=10V$			1	$\mu A$
Output ripple voltage	$V_{IN}=1.5V$ , $I_o=1mA$		60	120	mV
Oscillation frequency	$V_{IN}=1.5V$	70	115	185	kHz

Note: Electrical characteristics assume use of the following externally mounted components.

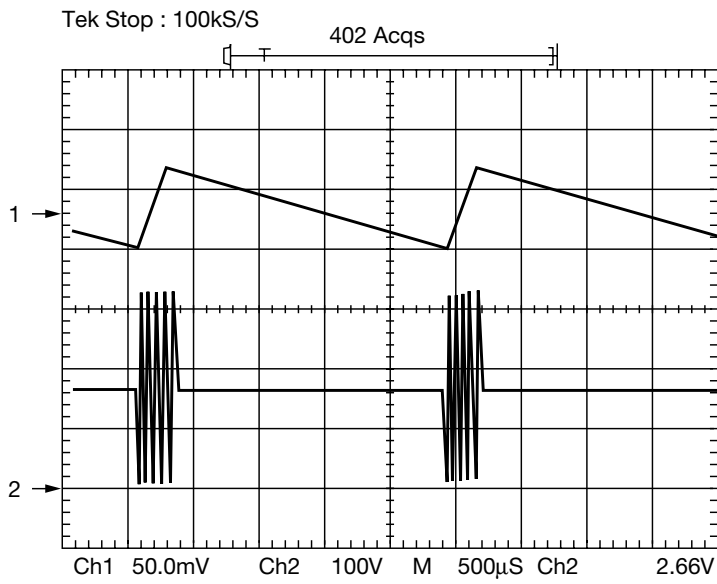
Coil	Mitsumi model C5-R	$L=120\mu H$
Capacitor	tantalum electrolytic	$C=33\mu F$
SBD	Rohm model RB451F	

**Application Circuits**



Note: Coil:  $L = 120\mu H$  (Mitsumi model C5-R)  
 Capacitor :  $C=33\mu F$  (tantalum electrolytic capacitor)  
 Schottky barrier diode (Rohm model RB451F)

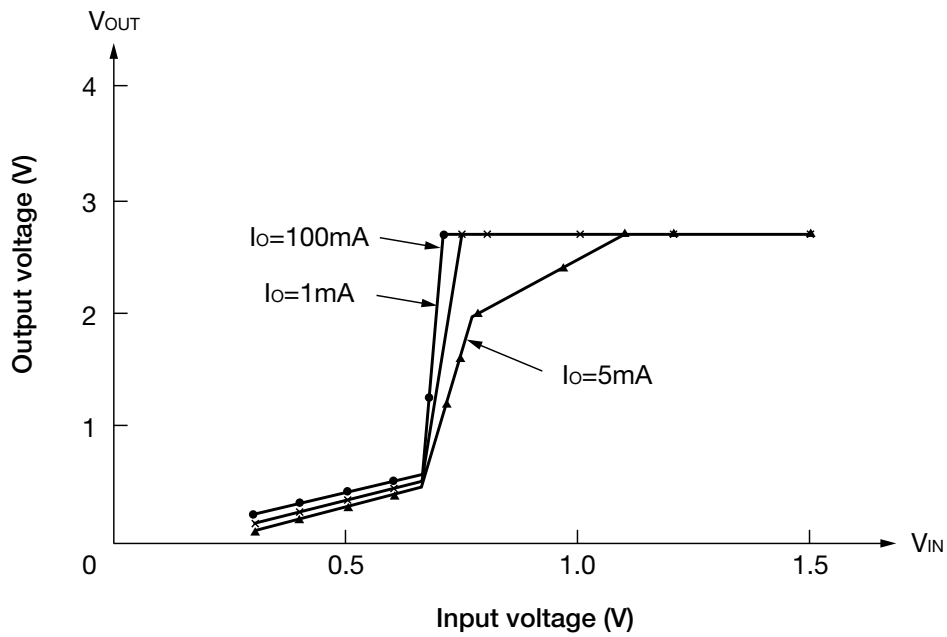
Characteristics



Conditions ;  $V_{IN}=1.5V$ ,  $I_o=1mA$   
 $L=120\mu H$  (C5-R)  
 $C_{IN}=C_{OUT}=33\mu F$  (tantalum)  
 SBD ; RB451F

$V_{OUT}$  pin waveform 50mV/div  
 500µS/div

$V_L$  pin waveform 1V/div



\*The above characteristics are representative, and are not guaranteed values.