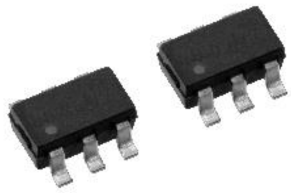
MITSUMI

Boost DC-DC converter IC

MM3333 Series



Overview

This IC is a step-up DC-DC converter with PWM / PFM automatic switching function.
A step-up DC-DC converter can be configured by using only external coils, capacitors, and diodes. The small package and low current consumption make it ideal for mobile device applications that require high efficiency. In addition, the PWM / PFM automatic switching function prevents the efficiency from decreasing due to the current consumption of the IC when the load is light.

Features

- No need external resistors
  (buit-in feedback resistors)
- Achieves high efficiency with
  low current consumption and PFM operation
- Adopt a small package

Application

- Mobile devices
- Power supply for microcomputer

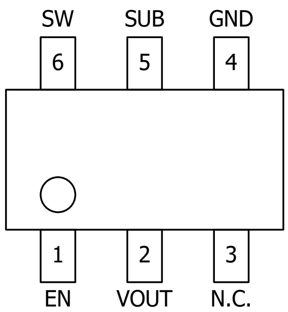
Package

- SOT-26B

Main specifications

- Input voltage range : 1.8V~Vout(Vout≦4.5V)
  2.5~4.2V(Vout=5V)
- Output voltage : 3.0/5.0V（Depends on rank)
- Switching frequency : 250kHz
- Current consumption : 74.3μA typ. (at Vout=3V)
  0.5μA max. (Shutdown)

PIN CONFIGURATION



Top view

TERMINAL EXPLANATIONS

PIN No.	SYMBOL	FUNCTION
1	EN	Enable Pin For ON/OFF. Please avoid use in the state that is floating.
2	VOUT	Output Voltage Feedback PIN / VDD PIN.
3	N.C.	No Connection.
4	GND	Ground PIN.
5	SUB	Substrate pin. Connected to IC substrate. Please connect thin pin to ground.
6	SW	Power Switch PIN.

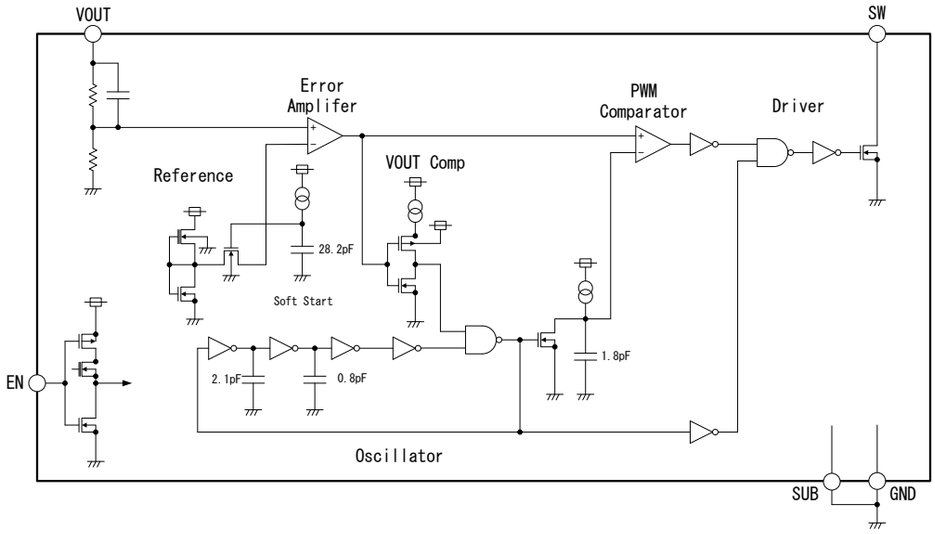
MODEL NAME

M M 3 3 3 3 J N R E

Series Name (A) (B) (C) (D)

(A) Output Voltage
J=5.0V / G=4.0V / X=3.2V / C=3.0V
(B) Package Code
(C) Direction in Emboss Cavity
(D) Emboss Tape

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

(Ta=25℃ / Ta=25℃, unless otherwise specified)

ITEM	SYMBOL	MIN.	MAX.	UNIT
VOUT pin voltage	V_{OUTM}	-0.3	6	V
EN pin voltage	V_{ENM}	-0.3	6	V
SW pin voltage	V_{SWM}	-0.3	6	V
Storage temperature	T_{STG}	-55	150	℃
Power Dissipation	Pd	-	150 *1	mW

*1 Alone

RECOMMENDED OPERATING CONDITIONS

ITEM	SYMBOL	MIN.	MAX.	UNIT
Operating Ambient temperature	Topr	-40	85	℃
Operating voltage (Vout≦4.5V/Vout=5V)	Vop	1.8/2.5	Vout-0.8	V

ELECTRICAL CHARACTERISTICS

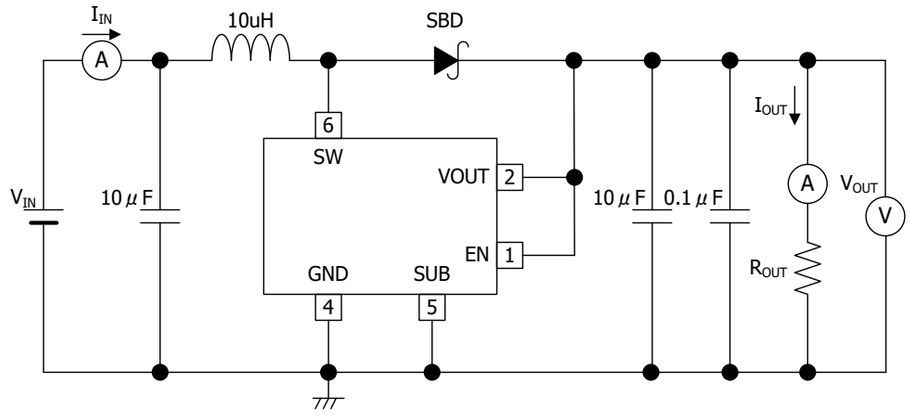
(V_{IN}=2.4V, Ta=25℃ / V_{IN}=2.4V, Ta=25℃, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output voltage (MM3333JN)	V_{OUT}	I_{OUT}=10mA	4.880	5.000	5.120	V
Starting output voltage	V_{ST1}	I_{OUT}=1mA	-	-	1.0	V
Starting oscillator voltage	V_{ST2}	No external parts, measured to voltage by applying V_{OUT}.	-	-	0.8	V
Holding output voltage		Measured by falling V_{IN}.				
Supply current 1	I_{DD1}	V_{OUT}=4.75V	-	88.0	146.6	μA
Supply current 2	I_{DD2}	V_{OUT}=5.5V	-	11.7	23.3	μA
Shutdown current	I_{DD3}	V_{EN}=0V	-	-	0.5	μA
Switching current *1	I_{SW}	V_{SW}=0.4V	293	470	-	mA
Switching transistor leakage current	I_{SWQ}	V_{SW}=V_{OUT}=5.5V	-	-	0.5	μA
Line regulation *1	ΔV_{OUT1}	V_{IN}=2.5V to 3.5V	-	30	60	mV
Load regulation *1	ΔV_{OUT2}	I_{OUT}=0.01mA to 15mA	-	30	60	mV
Output voltage temperature characteristics *1	$\Delta V_{OUT}/\Delta T$	-40℃≦T≦85℃	-	±100	-	ppm/℃
Oscillation frequency	f_{OSC}	V_{OUT}=4.75V	212.5	250	287.5	kHz
Maximum duty cycle	Max Duty	V_{OUT}=4.75V	70	78	85	%
EN pin "High" input voltage	V_{ENH}	V_{EN}=0V to 5.5V	0.9	-	-	V
EN pin "Low" input voltage	V_{ENL}	V_{EN}=5.5V to 0V	-	-	0.3	V
EN pin "High" input current	I_{ENH}	V_{EN}=5.5V	-0.1	-	0.1	μA
EN pin "Low" input current	I_{ENL}	V_{EN}=0V	-0.1	-	0.1	μA
Soft start time	T_{SS}	-	1.8	3.6	7.2	ms
Efficiency *1	EFFI	-	-	85	-	%

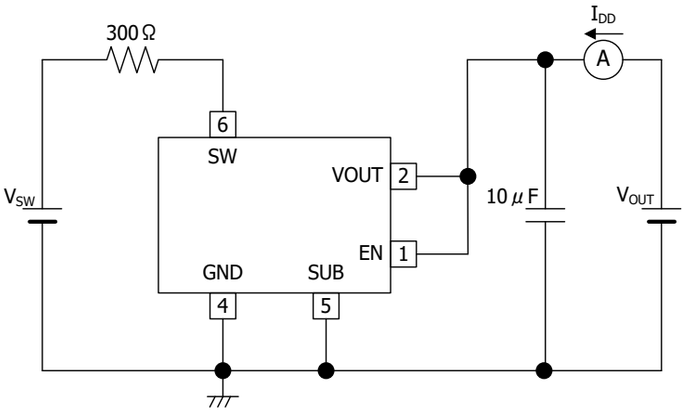
*1 The parameter is guaranteed by design.

TEST CIRCUIT

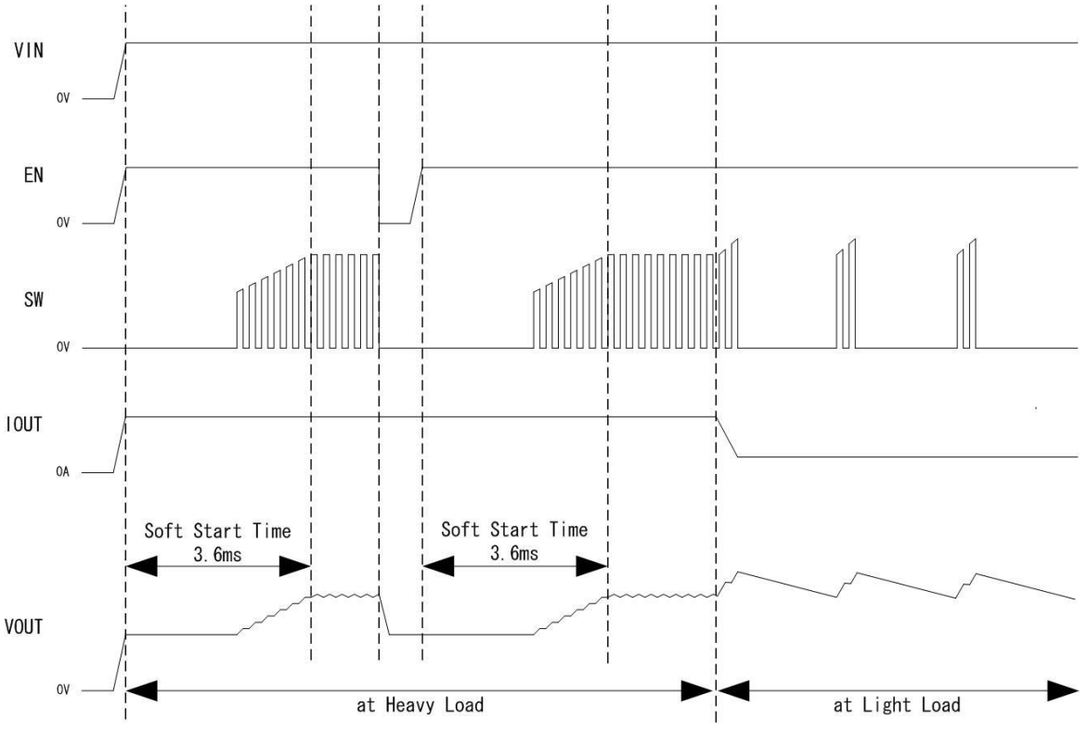
1)



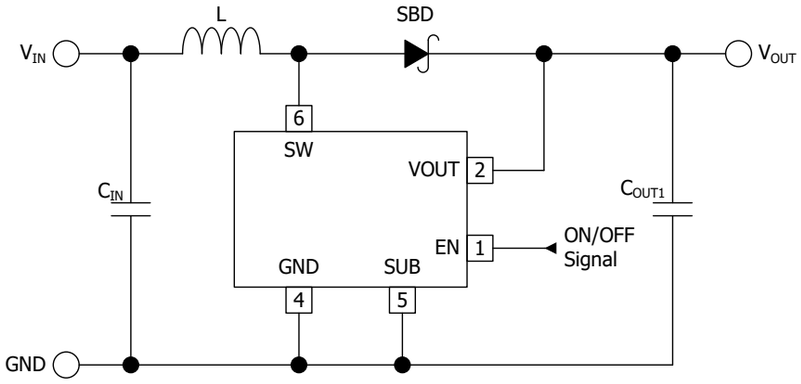
2)



TIMING CHART



TYPICAL APPLICATION CIRCUIT



- RECOMMENDED OPERATION CONDITIOS

  V_{IN} : 2.5V～4.2V
  I_{OUT} : 50mA (max.)

- RECOMMENDED PARTS

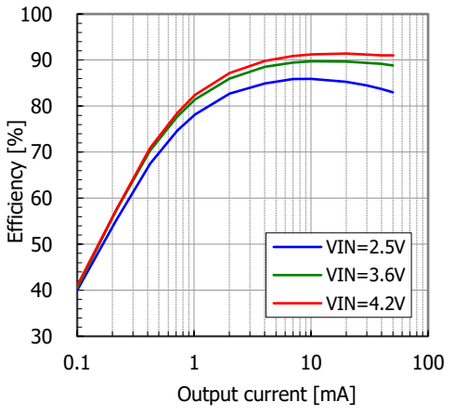
  C_{IN} : 10μF (LMK107BBJ106MALT)
  C_{OUT1} : 22μF (LMK212BBJ226MG-T)
  L : 10μH (C3-P1.5R)
  SBD : RSX101VA

- NOTICE

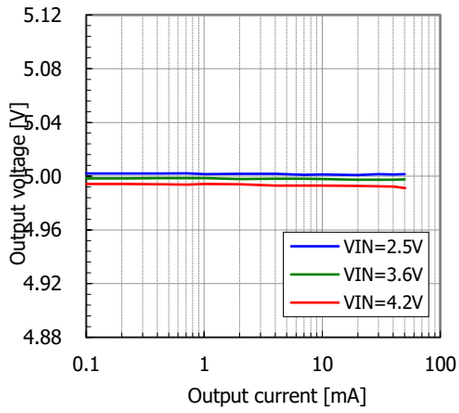
  The VOUT may be unstable when it is used except the above operation conditions.
  This circuit doesn't necessarily guarantee to operate. Please perform evaluation sufficient with actual application and determine a external parts.

TYPICAL PERFORMANCE CHARACTERISTICS

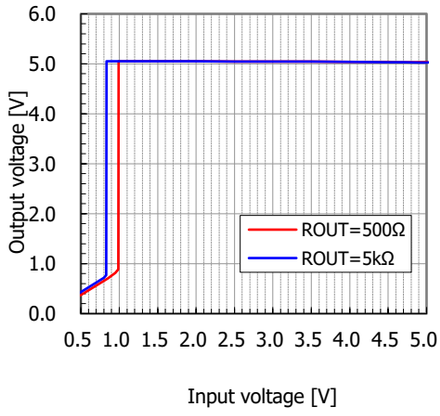
Efficiency
VIN=2.5V, 3.6V, 4.2V, Ta=25℃



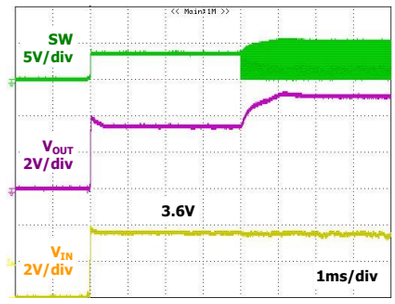
Load regulation
VIN=2.5V, 3.6V, 4.2V, Ta=25℃



Line regulation
ROUT=500Ω, 5kΩ, Ta=25℃



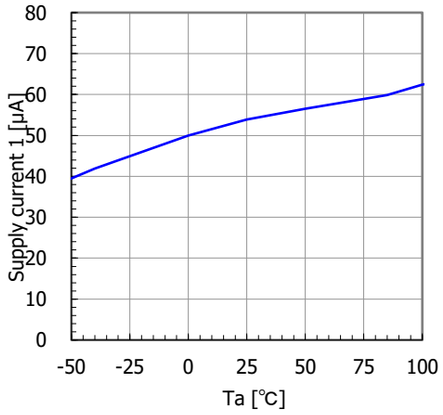
Start up
VIN=0 to 3.6V, EN=VOUT, ROUT=500Ω, Ta=25℃



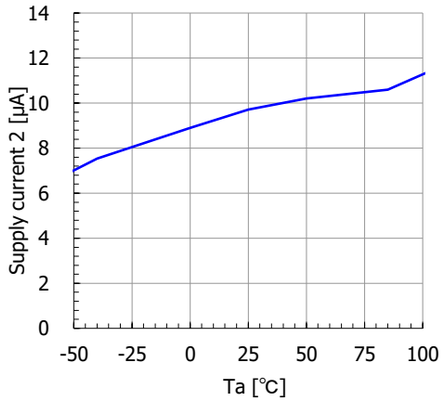
* The values indicate representative values.

MM3333XN (VOUT : 3.2V)

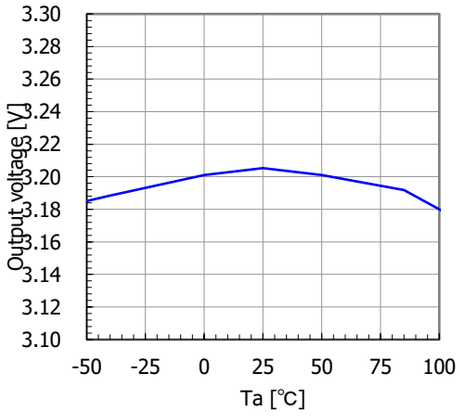
Supply current 1 - Temperature
VOUT=3.0V



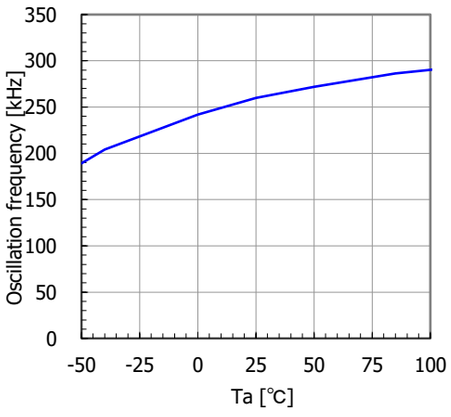
Supply current 2 - Temperature
VOUT=3.7V



Output voltage - Temperature
VIN=2.4V, IOUT=10mA



Oscillation frequency - Temperature
VOUT=3.0V

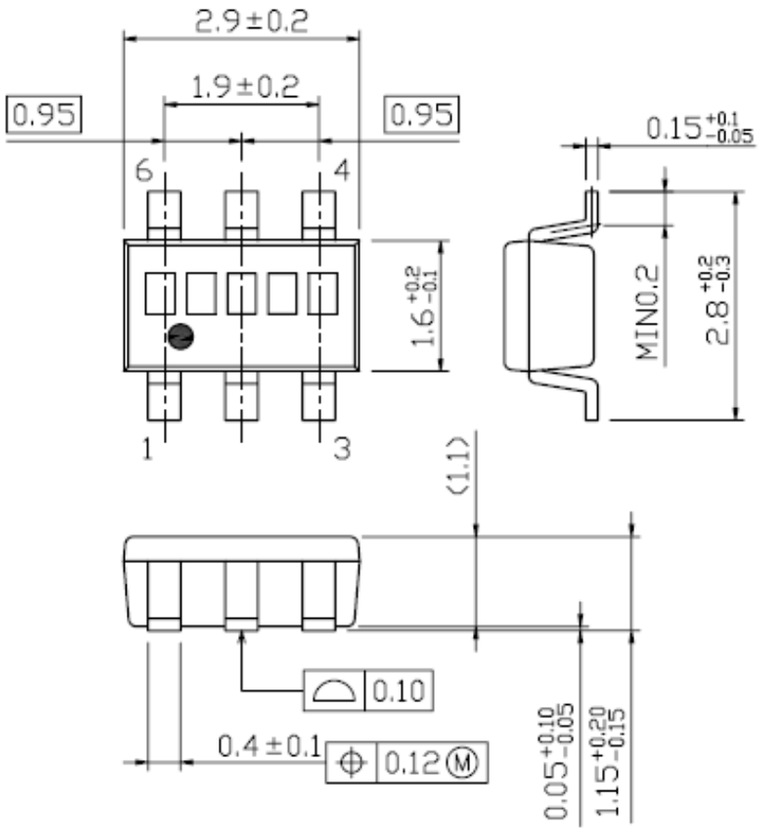


* The values indicate representative values.

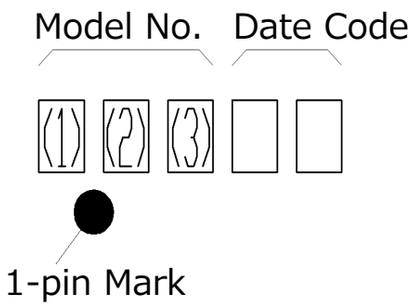
DIMENSIONS

PACKAGE : SOT-26B

UNIT	mm



MARKING CONTENTS



Model name	Model No.		
	(1)	(2)	(3)
M M 3 3 3 3 J N R E	6	1	J