

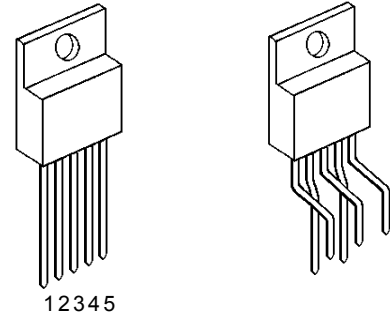
5.5A HIGH POWER DC/DC CONVERTER CONTROLLER IC

■GENERAL DESCRIPTION

The **NJM2367** is a high power DC/DC converter controller inducing basic function of DC/DC converter controller, which consists precision reference voltage, fixed frequency oscillator, high gain error amplifier, precision output switch, cycle-by-cycle current limit, under voltage lockout, and thermal shutdown circuit.

The **NJM2367** is suitable for step-down converter with few external parts, and realize low power stand-by mode.

■PACKAGE OUTLINE



NJM2367TA2050 **NJM2367TLA2050**

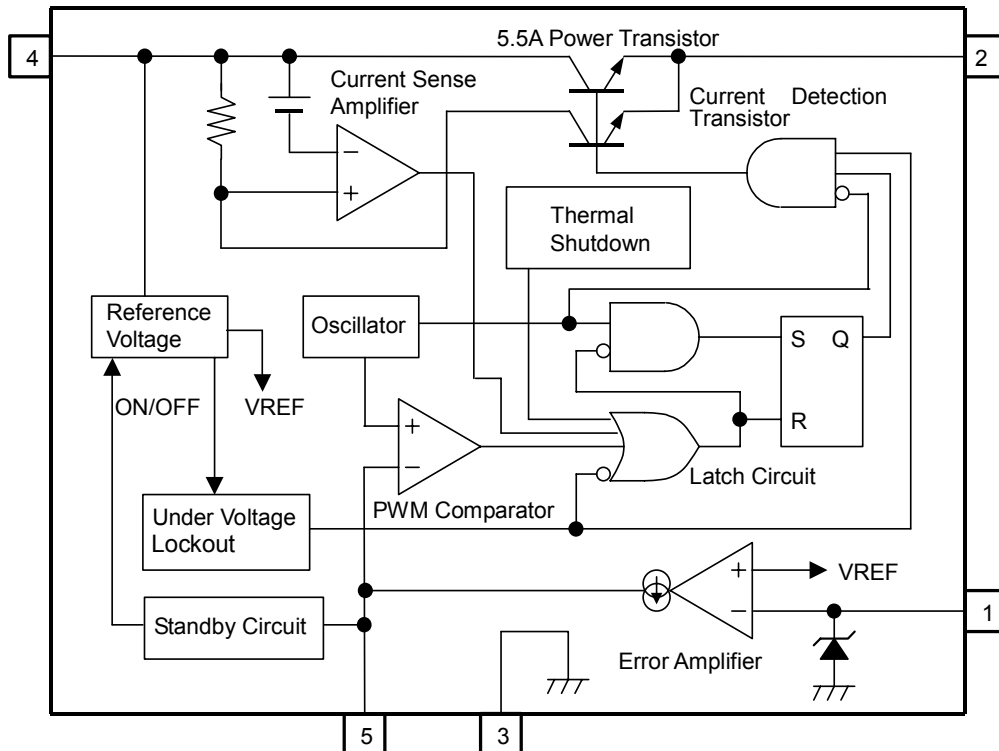
■FEATURES

- Operating Voltage (7.5V to 40V)
- PWM form Switching Power Supply Control
- Internal High Power Transistor 5.5A (min.)
- Fixed Frequency Oscillator 72kHz (typ.)
- Internal Current Sense Amplifier
- Internal Under Voltage Lockout
- Internal Thermal Shutdown Circuit
- Bipolar Technology
- Package Outline TO-220(5PIN)

PIN FUNCTION

- 1:V_{FB}
- 2:SW_{OUT}
- 3:GND
- 4:V⁺
- 5:STBY (V_{COMP})

■BLOCK DIAGRAM



NJM2367

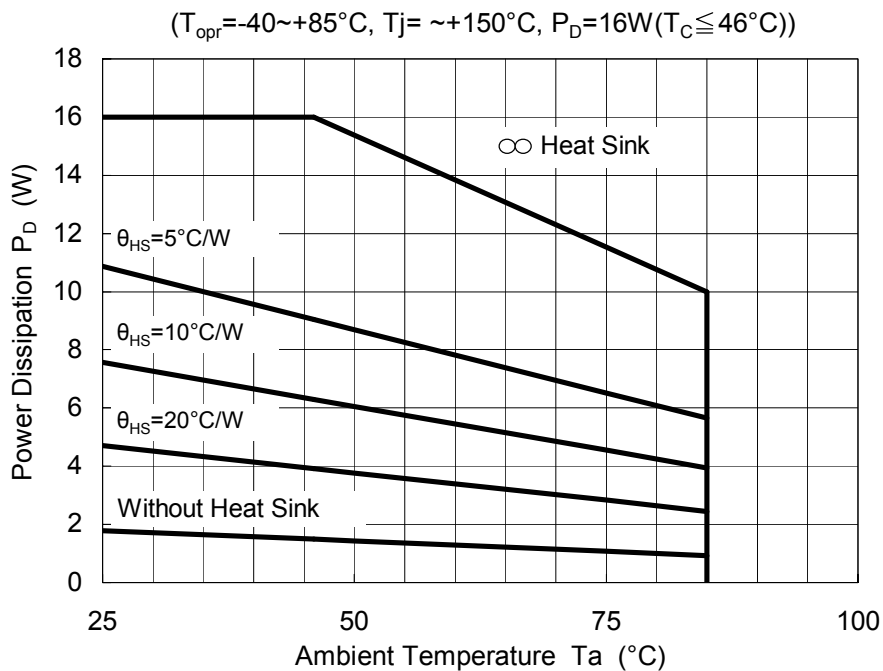
■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V ⁺	40	V
Switch Output Voltage	V _{o (SWITCH)}	-0.5 ~ +V _{in}	V
Voltage Feedback and Compensation Input Voltage Range	V _{FB} , V _{COMP}	-0.3 ~ +7.0	V
Power Dissipation	P _D	TO-220 (5PIN) 16(T _C ≤ 46°C)	W
Operating Junction Temperature	T _j	-40 ~ +150	°C
Operating Temperature Range	T _{opr}	-40 ~ +85	°C
Storage Temperature Range	T _{stg}	-50 ~ +150	°C

■THERMAL CHARACTERISTICS

Thermal Resistance	Junction-to-Ambient Temperature	θ _{ja}	70	°C/W
	Junction-to-Case	θ _{jc}	6.5	

■POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ELECTRICAL CHARACTERISTICS ($V^+=12V$, $T_a=25^\circ C$)

OSCILLATOR BLOCK

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Frequency	fosc	$V^+=7.5V$	65	72	79	kHz

ERROR AMPLIFIER BLOCK

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Voltage Feedback Input Threshold	$V_{FB(th)}$		4.9	5.0	5.1	V
Line Regulation	REG-Line	$V^+=7.5 \sim 40V$	–	0.03	0.08	%/V
Input Bias Current	I_B	$V_{FB}=V_{FB(th)}+0.15V$	–	0.15	1.0	μA
Ripple Rejection	PSRR	$V^+=10 \sim 20V$	–	80	–	dB
Output Voltage Swing	V_{OH}	$I_{source}=75\mu A, V_{FB}=4.7V$	4.2	4.9	–	V
	V_{OL}	$I_{sink}=0.4mA, V_{FB}=5.3V$	–	1.6	1.9	V

PWM COMPARATOR BLOCK

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Duty Cycle Maximum	$DC_{(MAX)}$	$V_{FB}=0V$	–	95	–	%
Duty Cycle Minimum	$DC_{(MIN)}$	$V_{FB}=5.3V$	0	0	0	%

SWITCH OUTPUT BLOCK

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage Saturation	V_{SAT}	$V^+=7.5V, I_{source}=5.5A$	–	$V^+-1.5$	$V^+-1.8$	V
OFF-State Leakage	$I_{sw(off)}$	$V^+=40V, SW_{OUT}=0V$	–	0	100	μA
Current Limit Threshold	$I_{pk(SWITCH)}$	$V^+=7.5V$	5.5	6.5	8.0	A
Switching Times						
Output Voltage Rise Time	t_r	$V^+=40V, R_{OUT}=7.7\Omega, V_{FB}=0V$	–	100	–	nS
Output Voltage Fall Time	t_f	$V^+=40V, R_{OUT}=7.7\Omega, V_{FB}=0V$	–	50	–	nS

UNDER VOLTAGE LOCKOUT BLOCK

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Startup Threshold	$V_{TH(UVLO)}$	V^+ Increasing	5.9	6.3	6.7	V
Hysteresis	$V_H(UVLO)$	V^+ Decreasing	0.6	0.8	1.0	V

TOTAL DEVICE

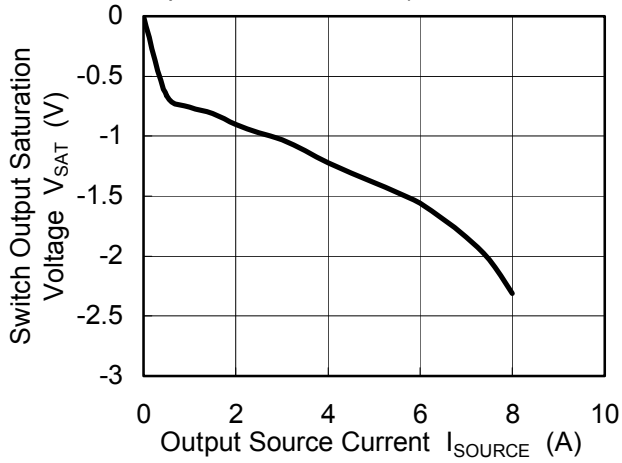
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Standby-State Power Supply Current	$I_{cc(stby)}$	$STBY \leq 0.1V$	–	36	100	μA
Operating-State Power Supply Current	I_{cc}	$V^+=40V, V_{FB}=0V$ duty cycle=MAX	–	40	53	mA

Keep the limit of maximum power dissipation not to operate thermal shutdown.

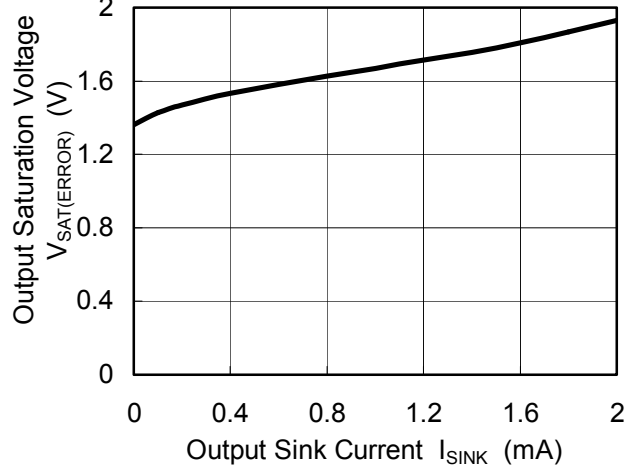
Low duty cycle pulse test is used to close its junction temperature to ambient temperature.

■ TYPICAL CHARACTERISTICS

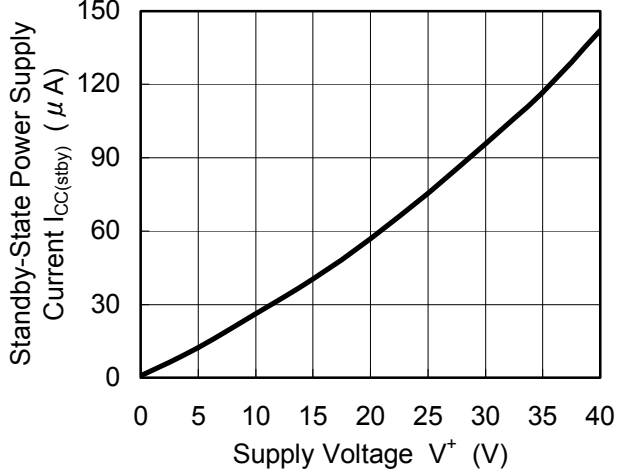
Switch Output Saturation Voltage vs. Output Source Current ($V^+ = 7.5V, T_a = 25^\circ C$)



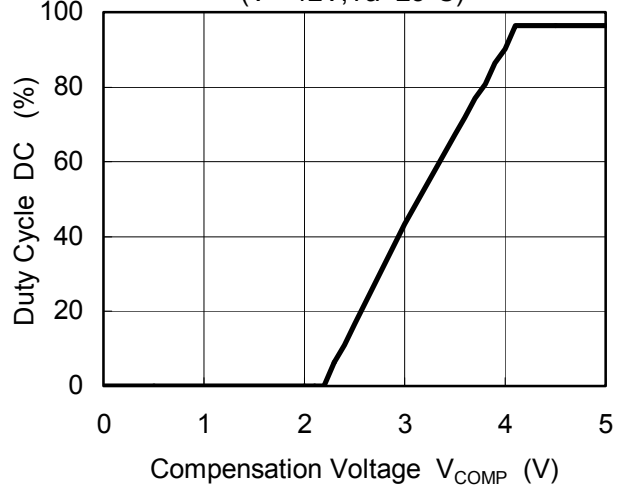
Error AMP Block Output Saturation Voltage vs. Output Sink Current ($V^+ = 12V, V_{FB} = 5.5V, T_a = 25^\circ C$)



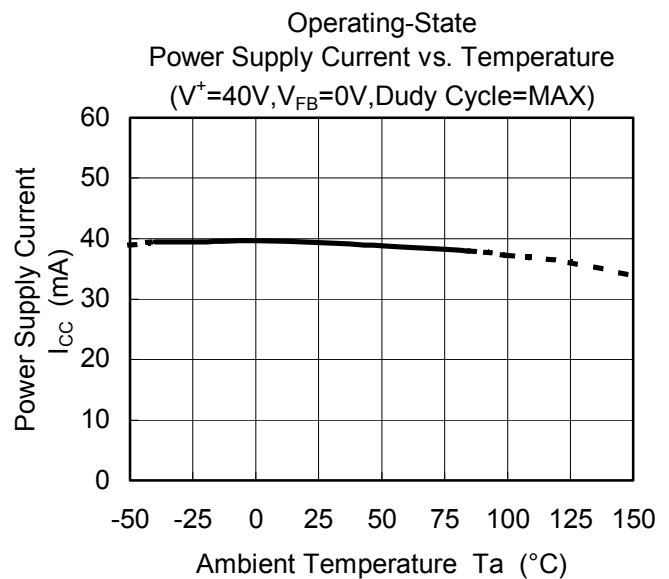
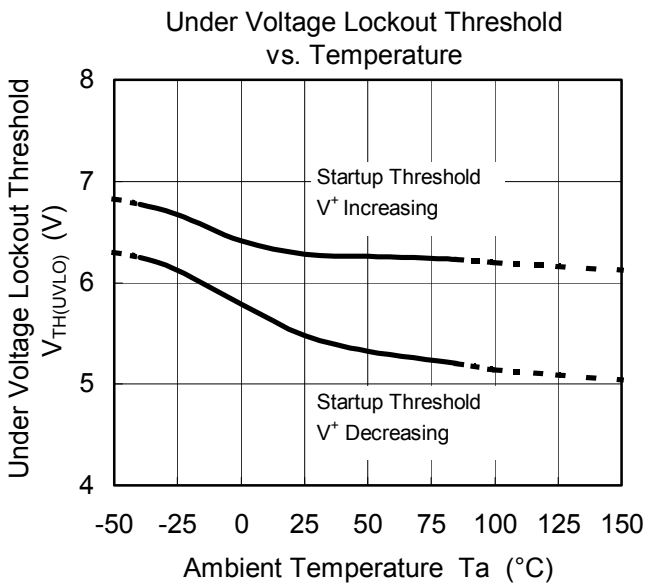
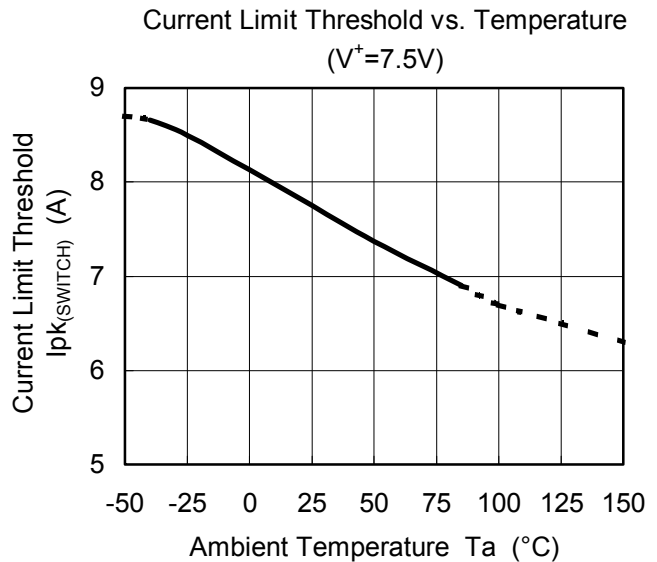
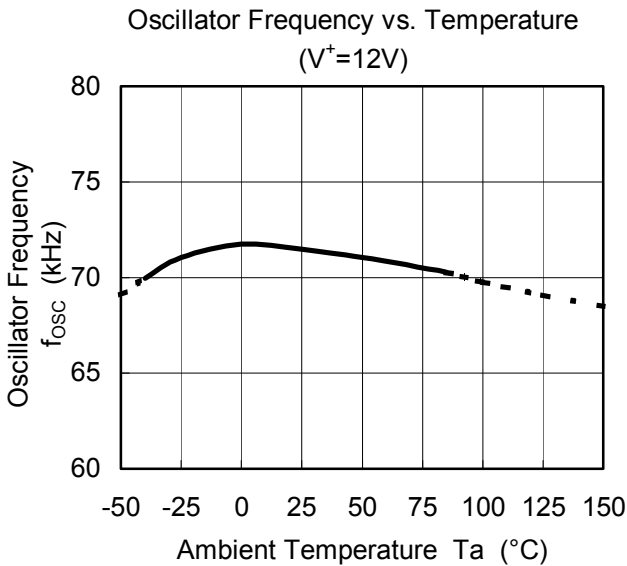
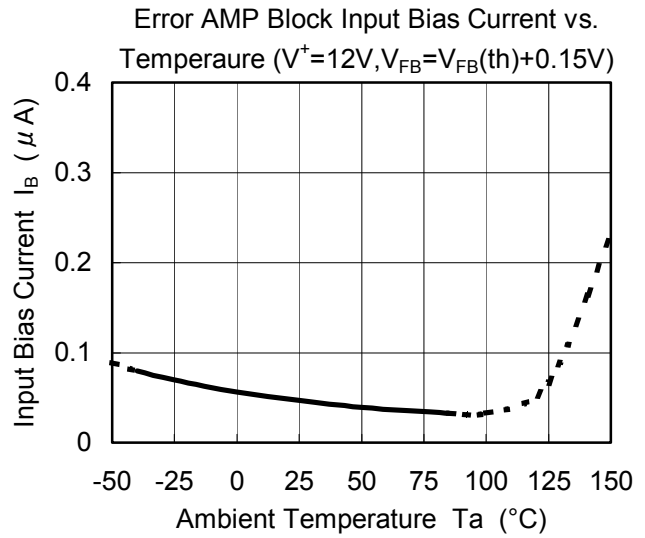
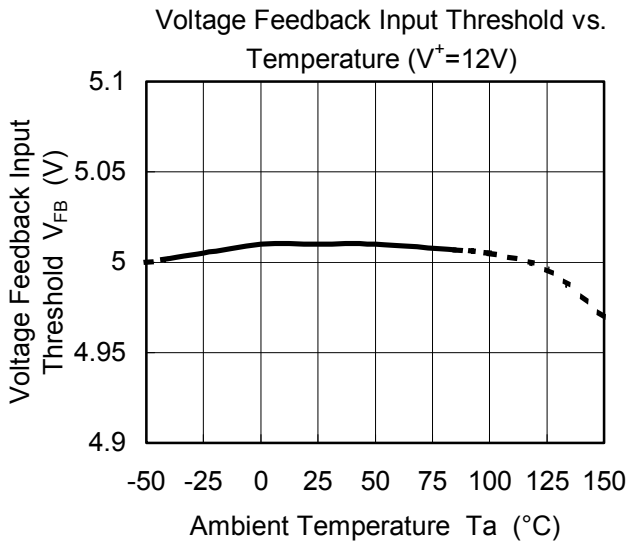
Standby-State Power Supply Current vs. Supply Voltage ($T_a = 25^\circ C$)



Duty Cycle vs. Compensation Voltage ($V^+ = 12V, T_a = 25^\circ C$)



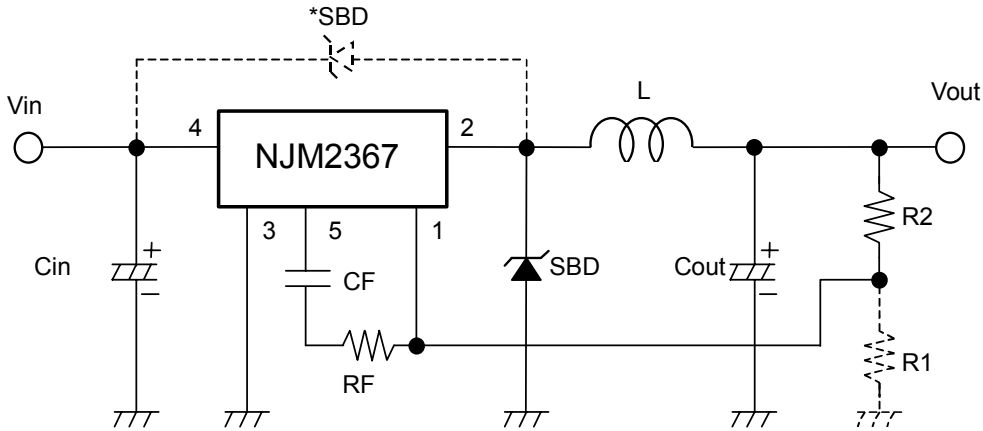
TYPICAL CHARACTERISTICS



NJM2367

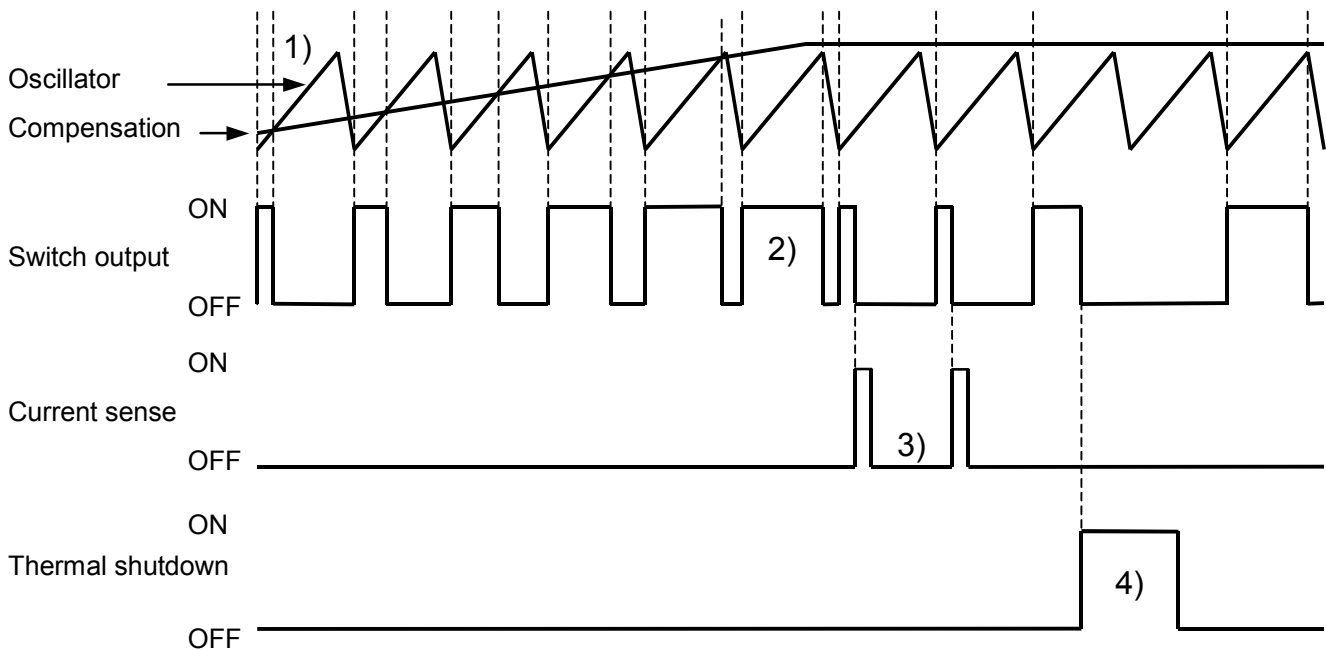
■ TYPICAL APPLICATIONS

Step-Down Converter



- 1) 5V and higher converter, the application must be connected R1 resistor according to above figure.
- 2) High current converter, the application must be placed Cin capacitor next to NJM2367, which avoid the power-line fluctuation.
- 3) The sharp fluctuation of output load cause reverse voltage for inductance and over the supply-voltage for SW_{OUT} terminal. To avoid this problem, the application must be placed SBD between terminal 2 and 4.

■ TIMING CHART



- 1) The NJM2367 generate square waves. The PWM comparator generate PWM signals to compare square waves and compensation voltage.
- 2) The switching duty is maximum 95%.
- 3) Over the 6.5A current, the output switch will be OFF to operate current limit protection. The NJM2367 sense the switching current of power transistor.
- 4) Over the 180°C (T_j), the switching will be OFF to operate thermal shutdown circuit.

MEMO

[CAUTION]
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