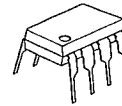


DC/DC CONVERTER CONTROL IC

■ GENERAL DESCRIPTION

The NJM2360 is a DC to DC converter control IC. Due to the internalization of a high current output switch, 1.5A switching operations are available. The NJM2360 is designed to be incorporated in step-up, step-down and inverting applications with a minimum number of external components. Output current is limited by an external resistor.

■ PACKAGE OUTLINE



NJM 2360D

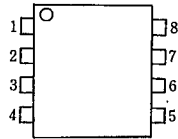


NJM2360M

■ FEATURES

- Operating Voltage (2.5V~40V)
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.5A
- Supply Voltage V^+ 2.5~40V
- Output Voltage V_{OR} 1.25~40V
- Oscillator Frequency f_{osc} 100Hz~100kHz
- Package Outline DIP8, DMP8
- Bipolar Technology

■ PIN COFIGURATION

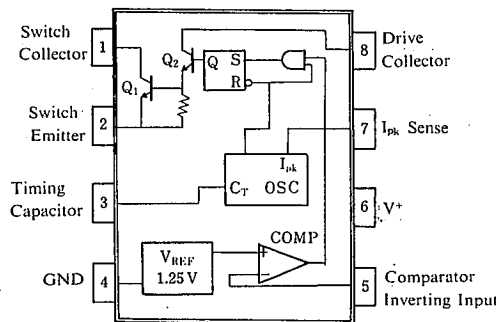


NJM2360D
NJM2360M

PIN FUNCTION

1. C_S
2. E_S
3. C_T
4. GND
5. INV_{IX}
6. V^+
7. S_1
8. C_D

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	40	V
Comparator Input Voltage Range	V _{IR}	-0.3~V ⁺	V
Power Dissipation	P _D	(DIP8) 700	mW
		(DMP8) 600 (note 1)	mW
Switch Current	I _{sw}	1.5	A
Operating Temperature Range	T _{opr}	-40~+85	°C
Storage Temperature Range	T _{stg}	-40~+125	°C

(note 1) At on PC board

■ ELECTRICAL CHARACTERISTICS

● DC Characteristics (V⁺=5V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I _{CC}	5V ≤ V ⁺ ≤ 40V, C _T = 0.001 μF S _I = V ⁺ , INV _{IN} > V _{th} , E _S = GND	—	2.4	3.5	mA

Oscillator

Charge Current	I _{chg}	5V ≤ V ⁺ ≤ 40V	20	35	50	μA
Discharge Current	I _{dischg}	5V ≤ V ⁺ ≤ 40V	150	200	250	μA
Voltage Swing	V _{osc}		—	0.5	—	V _{p-p}
Discharge to Charge Current Ratio	I _{dischg} /I _{chg}	S _I = V ⁺	—	6	—	—
Peak Current Sense Voltage	V _{IPK(sense)}	I _{chg} = I _{dischg}	250	300	350	mV

Output Switch (Note 2)

Saturation Voltage 1	V _{CE(sat)1}	Darlington Connection (C _S = C _D) I _{sw} = 1.0A	—	1.0	1.3	V
Saturation Voltage 2	V _{CE(sat)2}	I _{sw} = 1.0A, I _{C(driver)} = 50mA (Forced β ≈ 20)	—	0.5	0.7	V
DC Current Gain	h _{FE}	I _{sw} = 1.0A, V _{CE} = 5.0V	35	120	—	—
Collector Off-State Current	I _{C(off)}	V _{CE} = 40V	—	10	—	nA

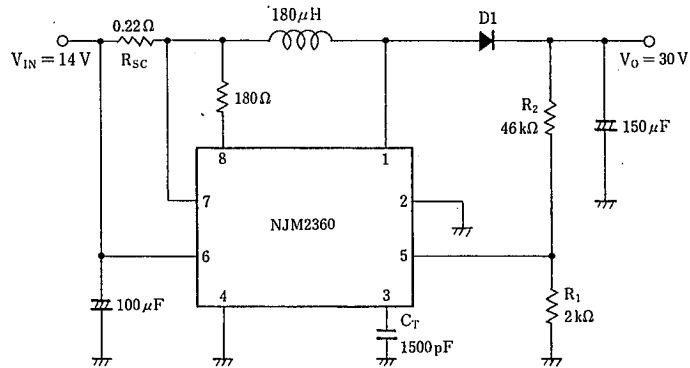
Comparator

Threshold Voltage	V _{th}		1.18	1.25	1.32	V
Input Bias Current	I _{IB}	V _{IN} = 0V	—	40	400	nA

Note 2 : Output switch tests are performed under pulsed conditions to minimize power dissipation.

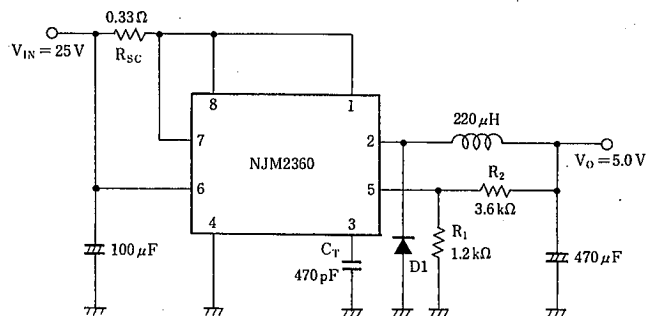
■ TYPICAL APPLICATIONS

1. Step-Up Converter.



* D1 : SBD(EK14)

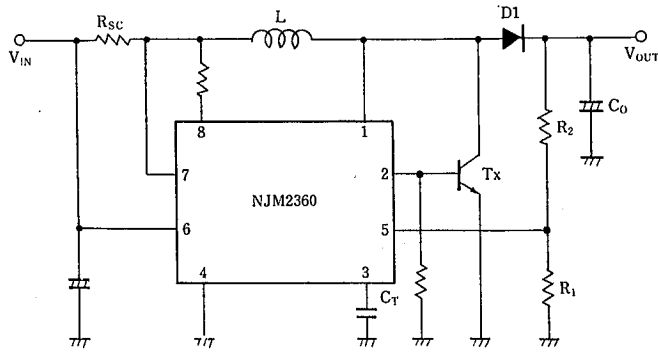
2. Step-Down Converter



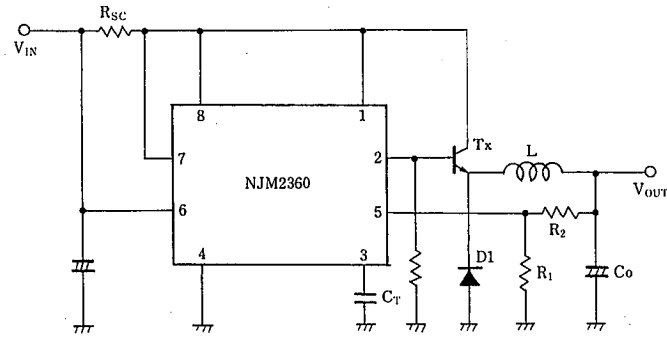
* D1 : SBD(EK14)

TYPICAL APPLICATIONS

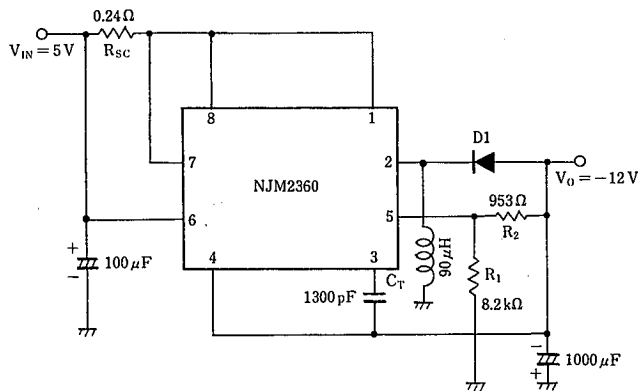
3. Step-Up Converter (High Current)



4. Step-Down Converter (High Current)



5. Inverting Converter



* D1 : SBD(EK14)

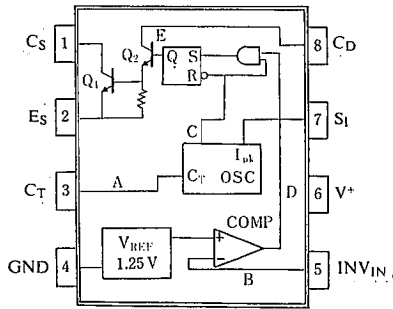


Fig.1 Block Diagram

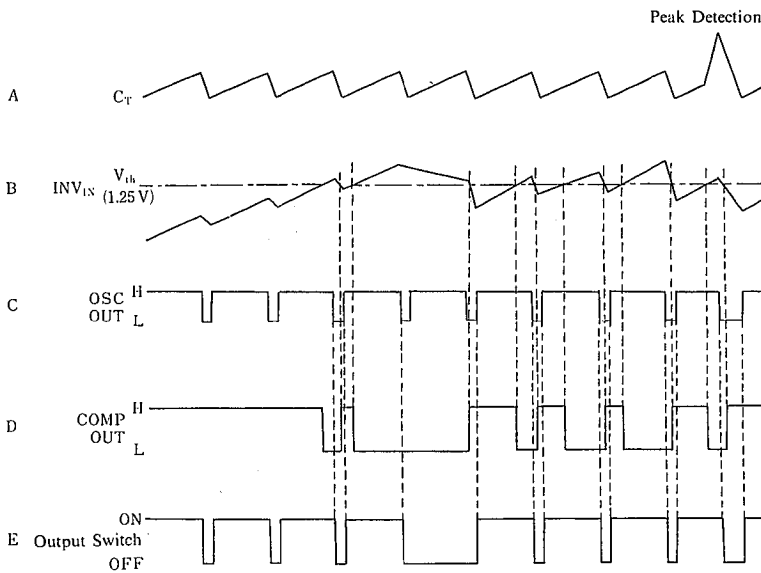
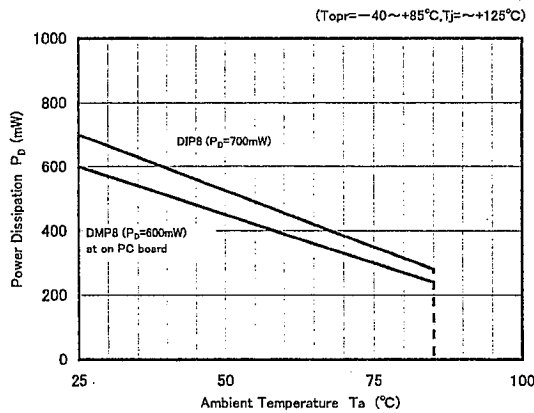


Fig. 2 Timing Chart

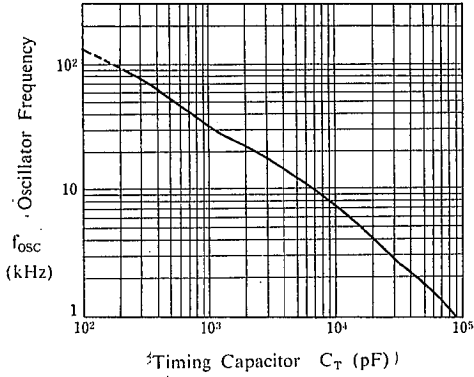
■ POWER DISSIPATION VS. TEMPERATURE



TYPICAL CHARACTERISTICS

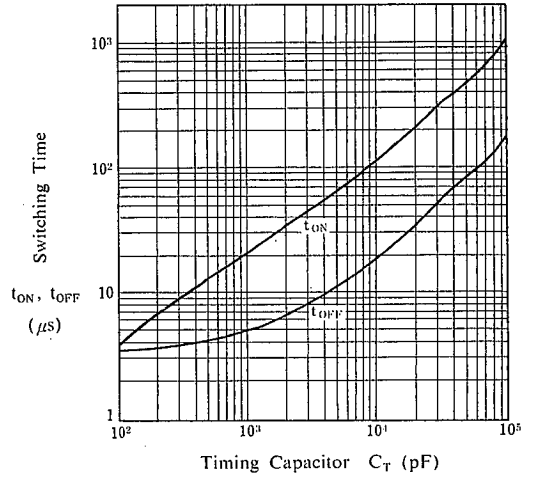
Oscillator Frequency vs. Timing Capacitor

($V_{IN} = 5V, S_1 = V^+, Pin5 = GND, T_a = 25^\circ C$)



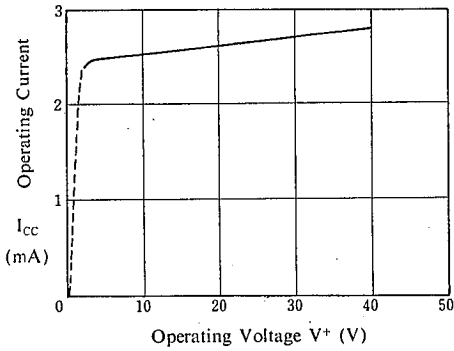
Switching Time vs. Timing Capacitor

($V_{IN} = 5V, S_1 = V^+, Pin5 = GND, T_a = 25^\circ C$)



Operating Current vs. Operating Voltage

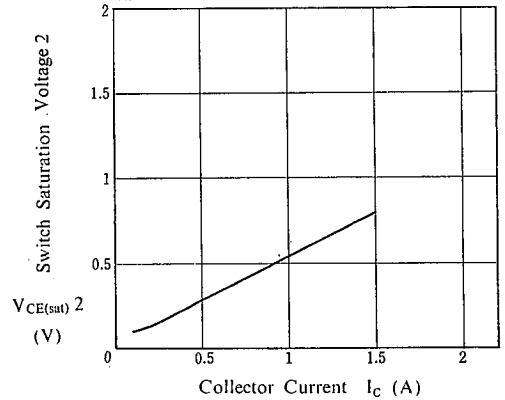
($C_T = 0.001 \mu F, S_1 = V^+, Pin2 = GND, T_a = 25^\circ C$)



Switch Saturation Voltage 2 vs. Collector Current

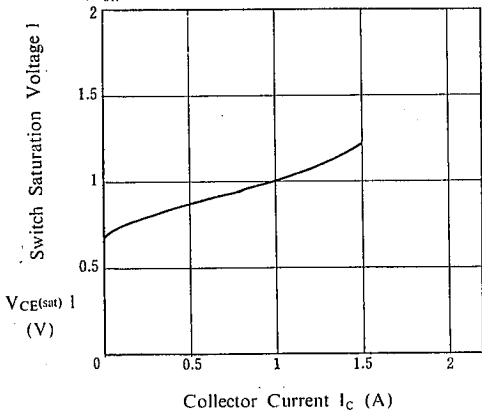
($\beta \approx 20$)

($V_{CE} = 5V, Pin7 = V^+, Pin2 \cdot 3 \cdot 5 = GND, T_a = 25^\circ C$)



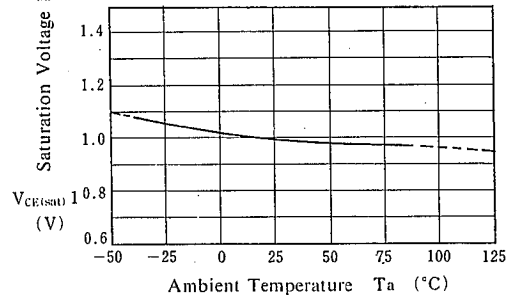
Switch Saturation Voltage 1 vs. Collector Current (Darlington)

($V_{CE} = 5V, Pin7 = V^+, Pin2 \cdot 3 \cdot 5 = GND, T_a = 25^\circ C$)



Saturation Voltage 1 vs. Temperature

($V^+ = 5V, I_{sw} = 1.0A, Darlington$)

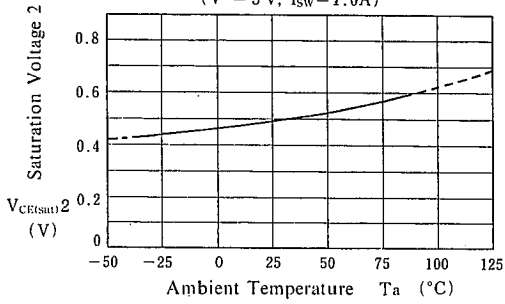


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■ TYPICAL CHARACTERISTICS

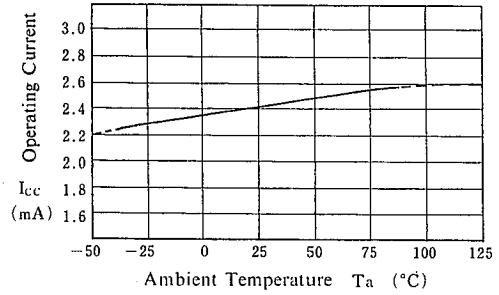
Saturation Voltage 2 vs. Temperature

($V^+ = 5\text{ V}$, $I_{SW} = 1.0\text{ A}$)



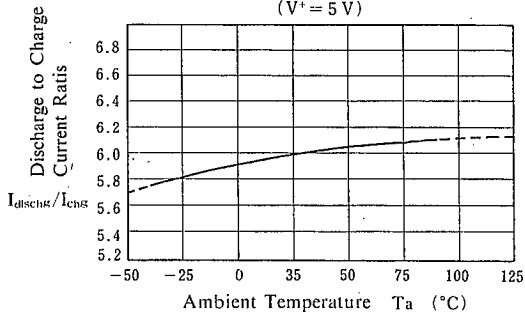
Operating Current vs. Temperature

($V^+ = 5\text{ V}$, $C_T = 0.001\mu\text{F}$)



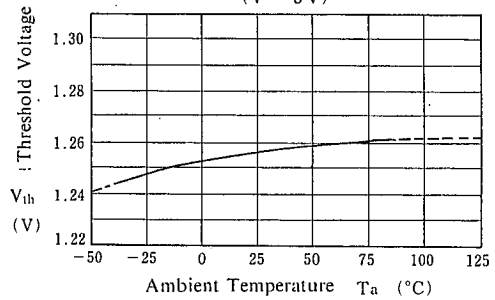
Discharge to Charge Current Ratio vs. Temperature

($V^+ = 5\text{ V}$)



Threshold Voltage vs. Temperature

($V^+ = 5\text{ V}$)

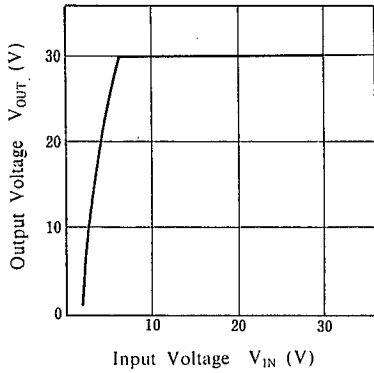


■ TYPICAL CHARACTERISTICS (Application)

1. Step-Up Converter

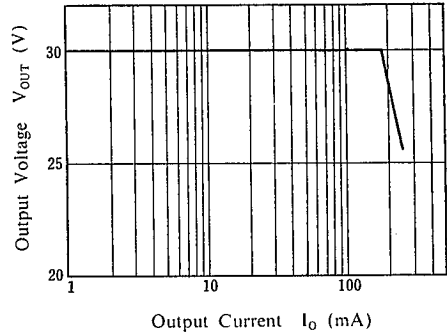
Output Voltage vs. Input Voltage

($V_O = 30\text{ V}$, $I_O = 100\text{ mA}$, $C_T = 1500\text{ pF}$,
 $L = 180\text{ }\mu\text{H}$, $T_a = 25\text{ }^\circ\text{C}$)



Output Voltage vs. Output Current

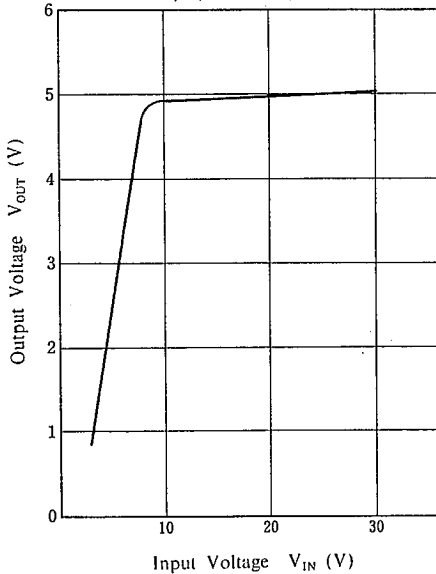
($V_{IN} = 14\text{ V}$, $V_O = 30\text{ V}$, $C_T = 1500\text{ pF}$,
 $L = 180\text{ }\mu\text{H}$, $T_a = 25\text{ }^\circ\text{C}$)



2. Step-Down Converter

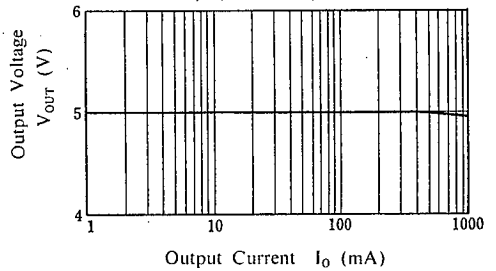
Output Voltage vs. Input Voltage

($V_O = 5\text{ V}$, $I_O = 500\text{ mA}$, $C_T = 470\text{ pF}$,
 $L = 220\text{ }\mu\text{H}$, $T_a = 25\text{ }^\circ\text{C}$)



Output Voltage vs. Output Current

($V_{IN} = 25\text{ V}$, $V_O = 5\text{ V}$, $C_T = 470\text{ pF}$,
 $L = 220\text{ }\mu\text{H}$, $T_a = 25\text{ }^\circ\text{C}$)



MEMO

[CAUTION]

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