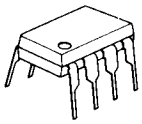
DC/DC CONVERTER CONTROL IC

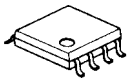
■ GENERAL DESCRIPTION

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



NJM2360D



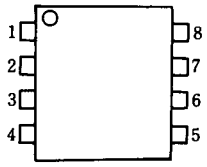
NJM2360M

■ FEATURES

- Output Switch Current 1.5A(MAX)
- Operating Voltage 2.5V* to 40V
- Internal Over Current Limit Circuit
- Supply Voltage V^+ 2.5V* to 40V
- Output Voltage V_{OR} 1.25V to 40V
- Oscillator Frequency f_{OSC} 100Hz to 100kHz
- Package Outline DIP8, DMP8

*Ta =25°C. At low temperature, the minimum voltage is 3.0V.

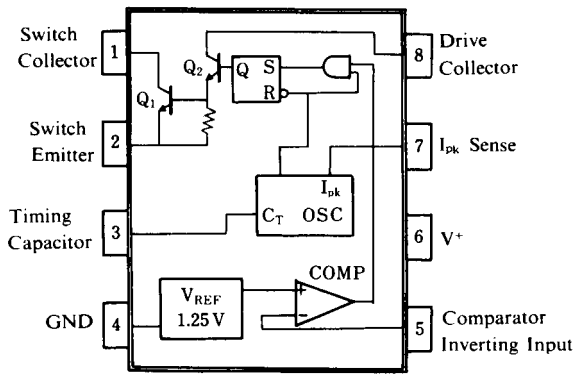
■ PIN CONFIGURATION



NJM2360D
NJM2360M

PIN FUNCTION
1. C_S
2. E_S
3. C_T
4. GND
5. INV_{IN}
6. V^+
7. S_I
8. C_D

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_a = 25ºC)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	40	V
Comparator Input Voltage Range	V_{IR}	-0.3 to V^+	V
Power Dissipation	P_D	(DIP8) 700 (DMP8) 600 (note1)	mW mW
Switch Current	I_{SW}	1.5	A
Operating Temperature Range	T_{opr}	-40 to + 85	ºC
Storage Temperature Range	T_{stg}	-40 to +125	ºC

(note 1) At on PC board

■ ELECTRICAL CHARACTERISTICS

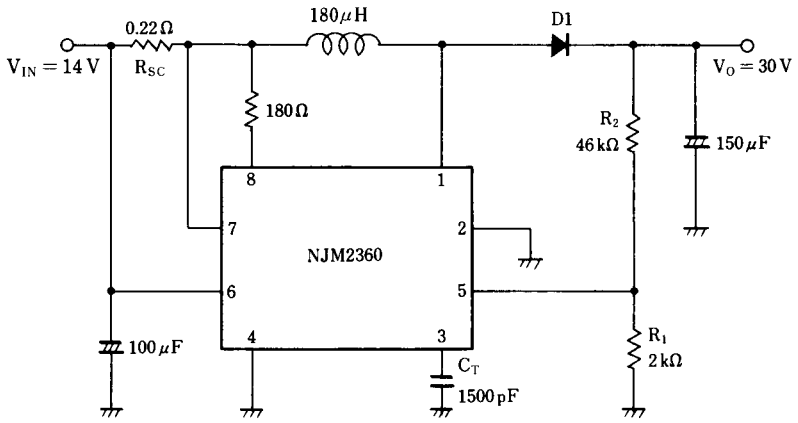
● DC Characteristics (V^+ = 5V, T_a = 25ºC)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	5V ≤ V^+ ≤ 40V, C_T = 0.001µF 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, IC(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.

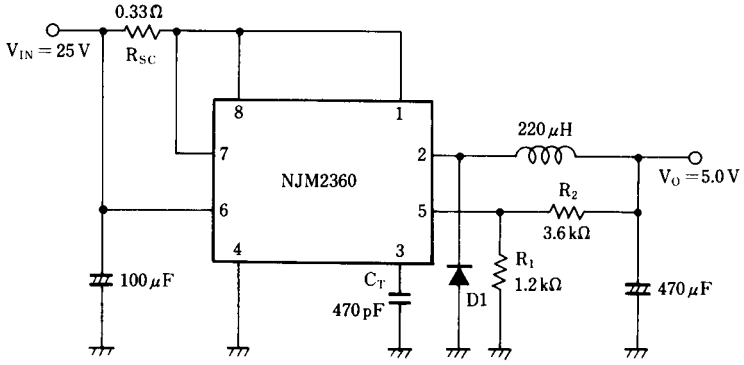
■ TYPICAL APPLICATION

1. Step-Up Converter



*D1 : SBD (EK14)

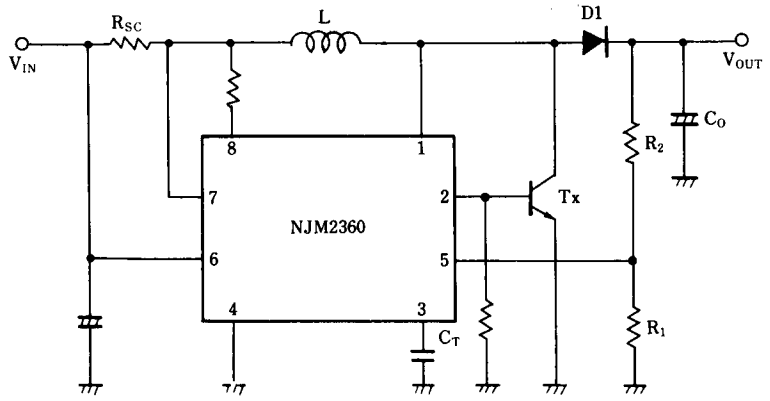
2. Step-Down Converter



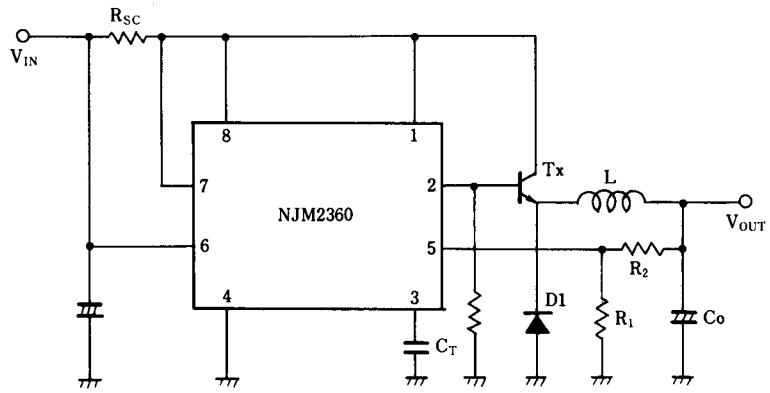
*D1 : SBD (EK14)

■ TYPICAL APPLICATIONS

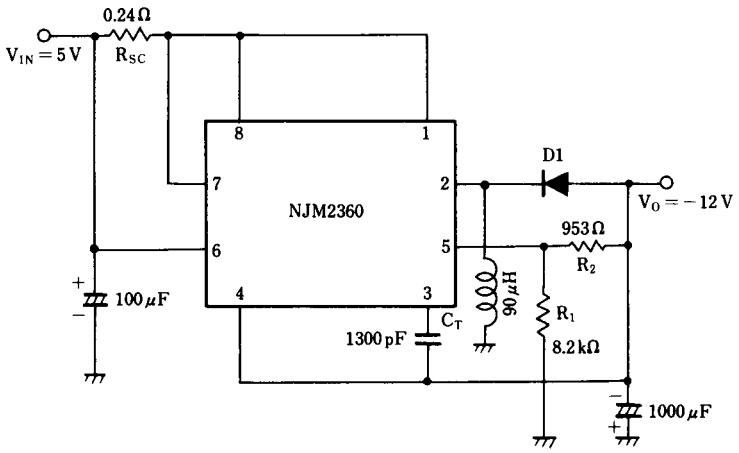
3. Step-Up Converter (High Current)



4. Step-Down Converter (High Current)



5. Inverting Converter



*D1 : SBD (EK14)

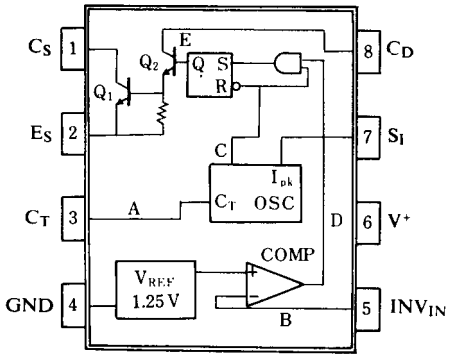


Fig. 1 Block Diagram

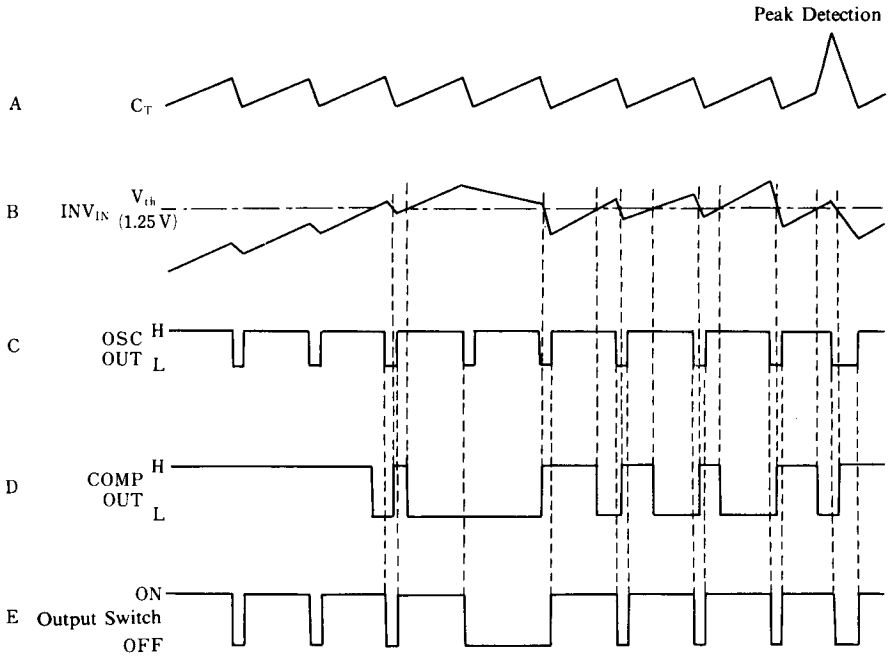
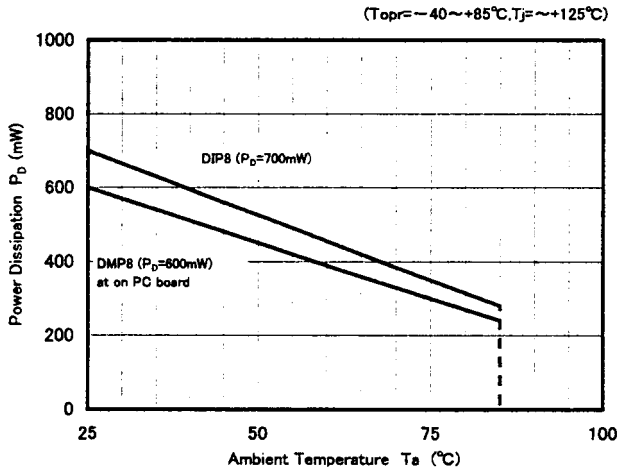


Fig. 2 Timing Chart

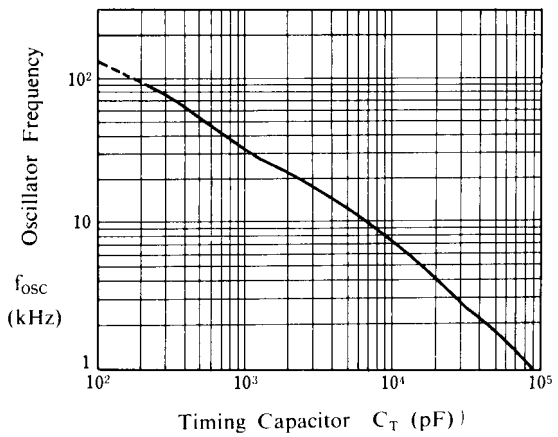
■ POWER DISSIPATION VS. TEMPERATURE



■ TYPICAL CHARACTERISTICS

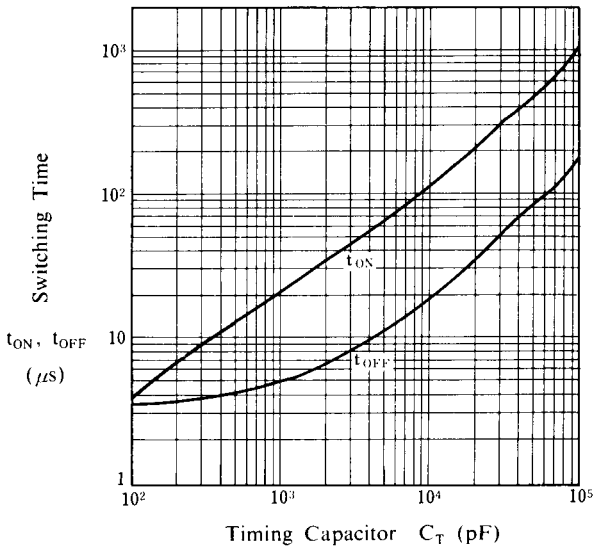
Oscillator Frequency vs. Timing Capacitor

(V_{IN} = 5 V, S_I = V+, Pin5 = GND, Ta = 25°C)



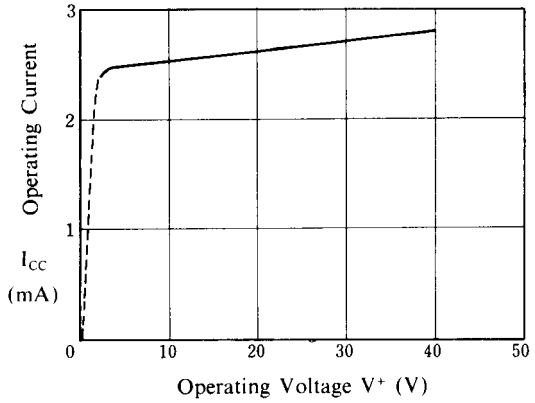
Switching Time vs. Timing Capacitor

(V_{IN} = 5 V, S_I = V+, Pin5 = GND, Ta = 25°C)



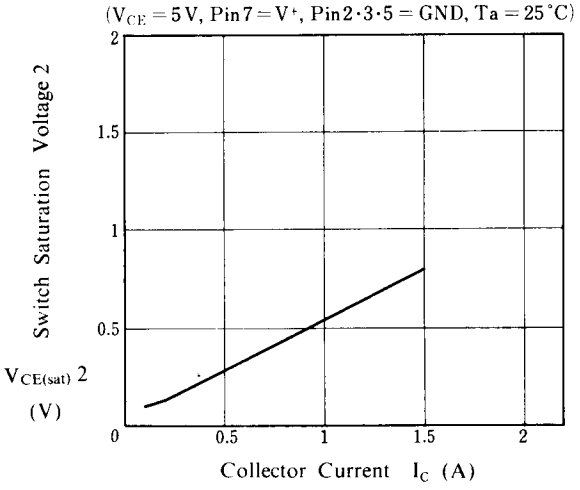
Operating Current vs. Operating Voltage

(C_T = 0.001 μF, S_I = V+, Pin2 = GND, Ta = 25°C)



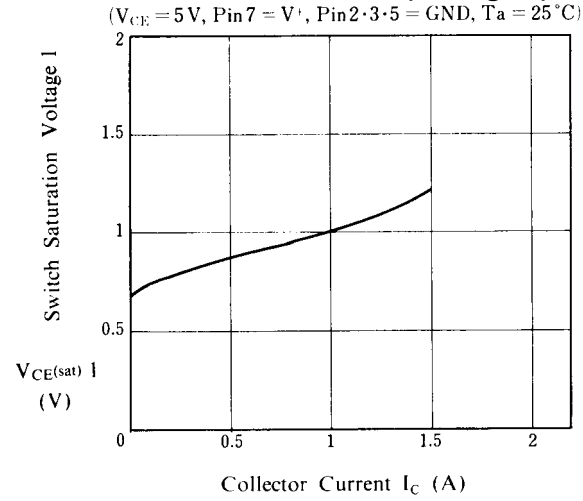
Switch Saturatin Voltage 2 vs. Collector Current (β≒20)

(V_{CE} = 5 V, Pin7 = V+, Pin2·3·5 = GND, Ta = 25°C)



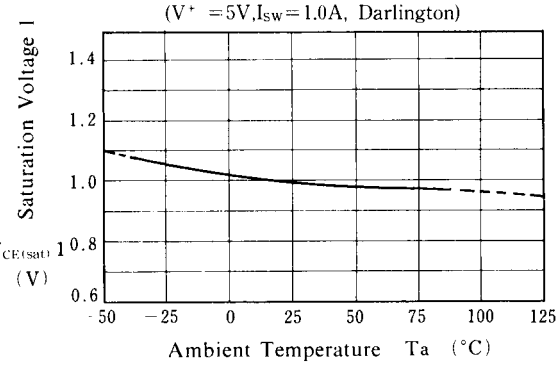
Switch Saturation Voltage 1 vs. Collector Current (Darlington)

(V_{CE} = 5 V, Pin7 = V+, Pin2·3·5 = GND, Ta = 25°C)



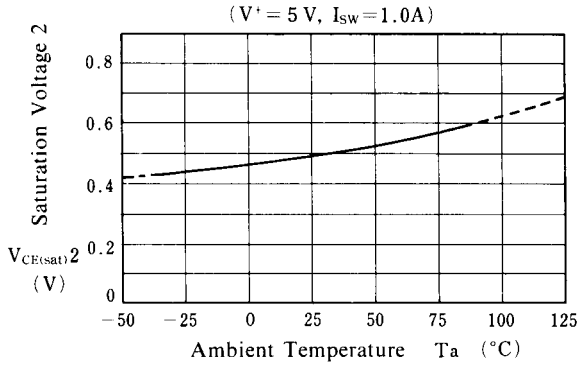
Saturation Voltage 1 vs. Temperature

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

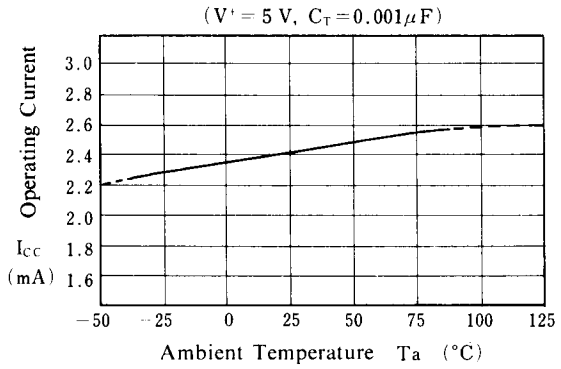


■ TYPICAL CHARACTERISTICS

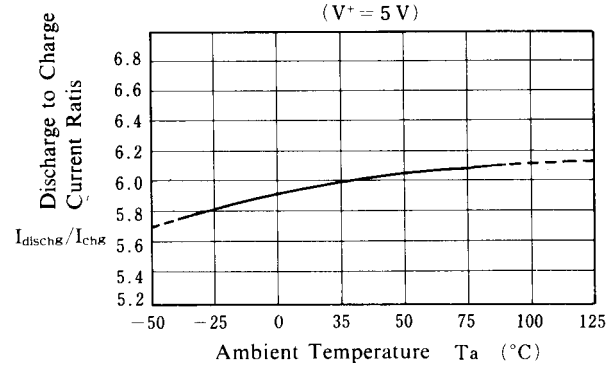
Saturation Voltage 2 vs. Temperature



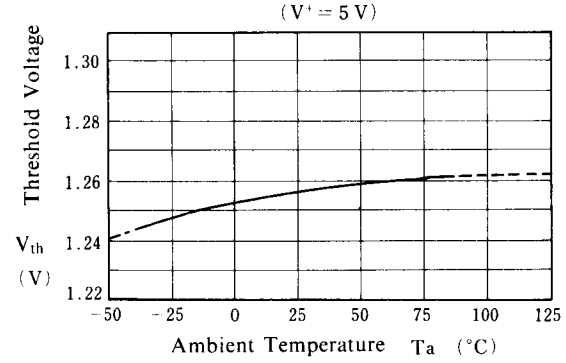
Operating Current vs. Temperature



Discharge to Charge Current Ratio vs. Temperature



Threshold Voltage vs. Temperature

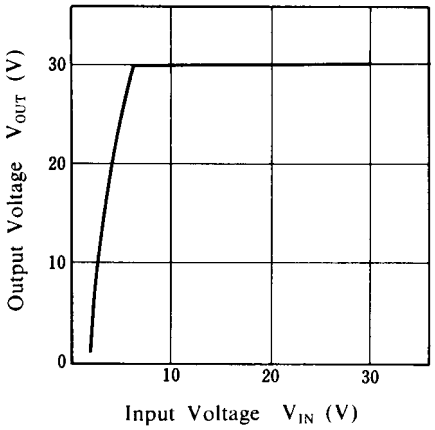


■ TYPICAL CHARACTERISTICS (Application)

1. Step-Up Converter

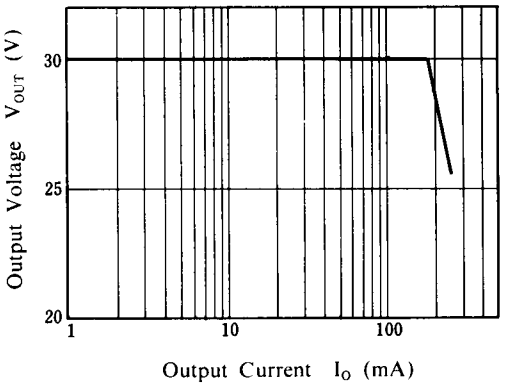
Output Voltage vs. Input Voltage

($V_O = 30\,V$, $I_O = 100\,mA$, $C_T = 1500\,pF$, $L = 180\,\mu H$, $Ta = 25\,°C$)



Output Voltage vs. Output Current

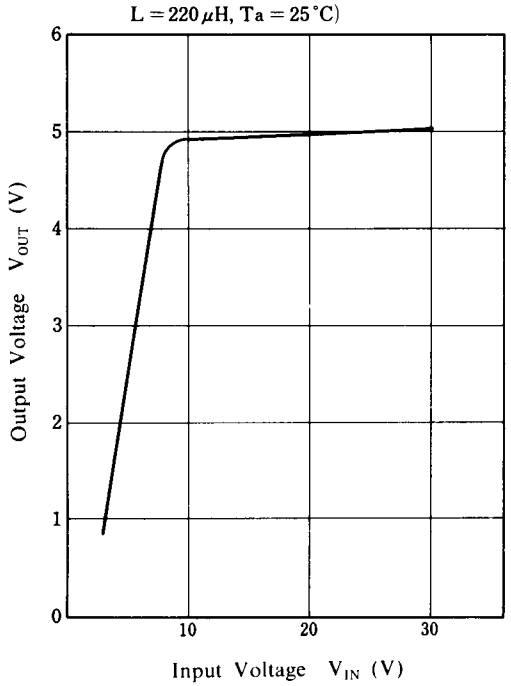
($V_{IN} = 14\,V$, $V_O = 30\,V$, $C_T = 1500\,pF$, $L = 180\,\mu H$, $Ta = 25\,°C$)



2. Step-Down Converter

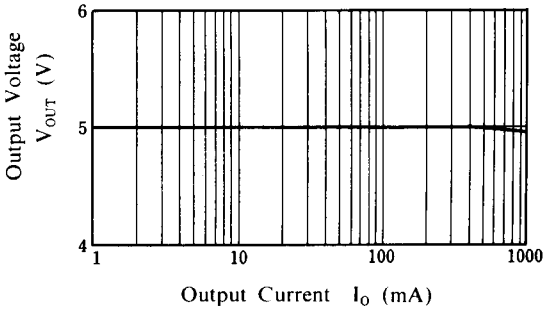
Output Voltage vs. Input Voltage

($V_O = 5\,V$, $I_O = 500\,mA$, $C_T = 470\,pF$, $L = 220\,\mu H$, $Ta = 25\,°C$)



Output Voltage vs. Output Current

($V_{IN} = 25\,V$, $V_O = 5\,V$, $C_T = 470\,pF$, $L = 220\,\mu H$, $Ta = 25\,°C$)



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