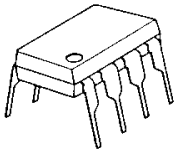
PWM DC/DC Converter IC

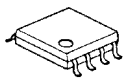
■GENERAL DESCRIPTION

The NJM2392 is a PWM DC/DC converter IC.
It features fixed frequency type PWM control for better noise handling and to avoid intermittent oscillation observed in a simplified controller.
It is suitable for Step-Up, Step-Down and Inverting applications.
In addition, it contains a pulse-by-pulse current limit circuit and can be set by an external resistance.

■PACKAGE OUTLINE



NJM2392D

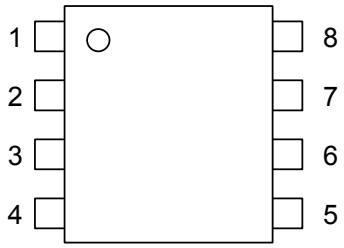


NJM2392M

■FEATURES

- Operating Voltage 3.0V to 40V
- Wide Oscillator Frequency 1kHz to 150kHz
- Internal High Power Transistor 1.5A max.
- Internal Over Current Limit Circuit
- PWM switching control
- Bipolar Technology
- Package Outline NJM2392D : DIP8
  NJM2392M : DMP8

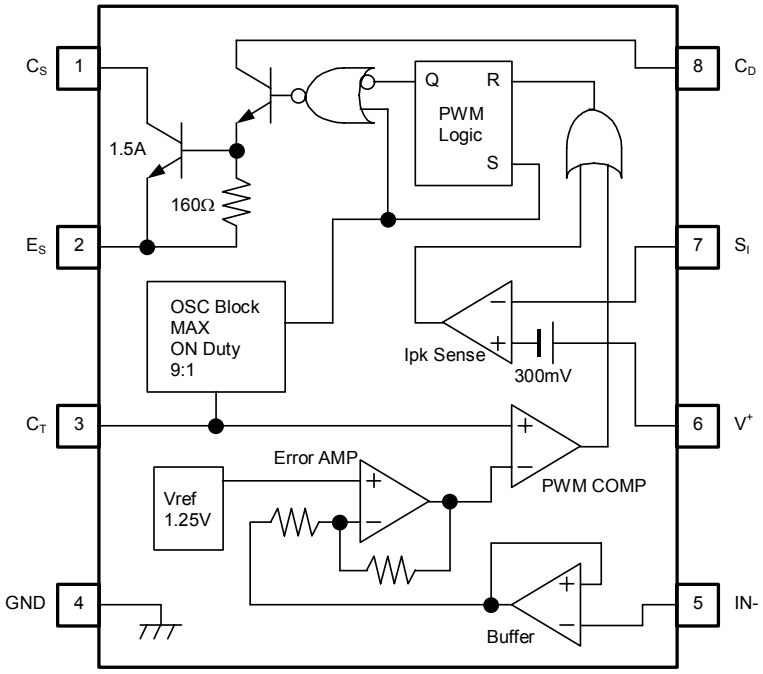
■PIN CONFIGURATION



NJM2392D
NJM2392M

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

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

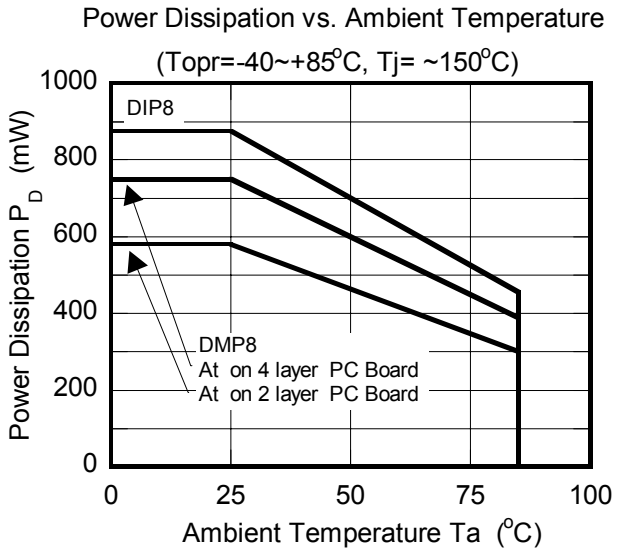
PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Maximum Supply Voltage	V^+	40	V
Comparator Input Voltage	V_{IR}	-0.3 ~ 40 (note)	V
Output Driver Voltage	V_C(driver)	40	V
Output Switch Voltage	V_{SW}	40	V
Output Driver Current	I_C(driver)	100	mA
Output Switch Current	I_{SW}	1.5	A
Power Dissipation	P_D	DIP8 875 DMP8 580 (*1) 750 (*2)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-50 ~ +150	°C

(note) When supply voltage is less than 40V, the absolute maximum input voltage is equal to the supply voltage.

(*1) At on PC board : 114.3mm × 76.2mm × 1.6mm(2 layer FR-4) : Conform to EIA/JEDEC

(*2) At on PC board :114.3mm × 76.2mm × 1.6mm(4 layer FR-4) : Conform to EIA/JEDEC

■POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ELECTRICAL CHARACTERISTICS

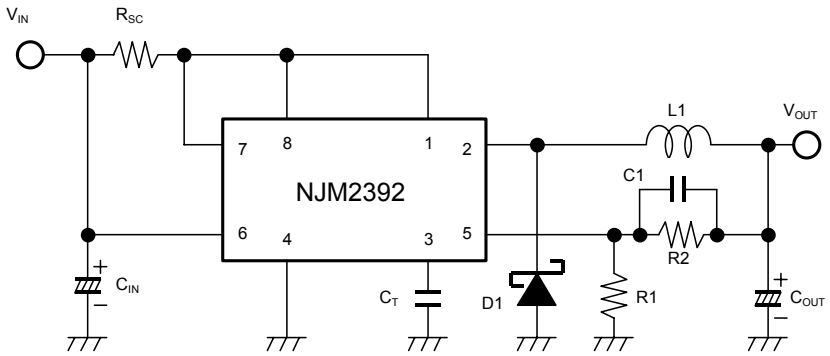
DC Characteristics (V^+=5V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
OSCILLATOR BLOCK						
Oscillation Frequency	f_{OSC}	IN-=0V, C_T=1nF	18	27	36	kHz
Charge Current	I_{chg}		11	18	27	μA
Discharge Current	I_{dis}		110	180	300	μA
Voltage Swing	V_{OSC}	C_T=1nF	–	0.5	–	V_{P-P}
Discharge to Charge Current Ratio	I_{ratio}	I_{chg}/I_{dis}	–	9	–	–
CURRENT LIMIT						
Peak Current Sense Voltage	V_{ipk}		250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage 1	V_{sat1}	Darlington Connection (C_S=C_D), I_{SW}=0.7A	–	1.0	1.3	V
Saturation Voltage 2	V_{sat2}	I_{SW}=0.7A, I_C(driver)=50mA (Forced β≈14)	–	0.5	0.7	V
Output Transistor Bias Resistance	R_{bias}		–	160	–	Ω
DC Voltage Gain	h_{FE}	I_{SW}=0.7A,V_{CE}=5.0V	35	120	–	–
Collector Off-State Current	$I_{C(Off)}$	V_{CE}=40V	–	0.01	1	μA
ERROR AMPLIFIER						
Threshold Voltage	V_{th}		1.225	1.250	1.275	V
Input Bias Current	I_{IB}	IN-=0V	–	300	900	nA
GENERAL CHARACTERISTICS						
Operating Current	I_{CC}	C_T=1nF, S_I=V^+, IN->V_{th}, E_S=GND	–	2.8	4.0	mA

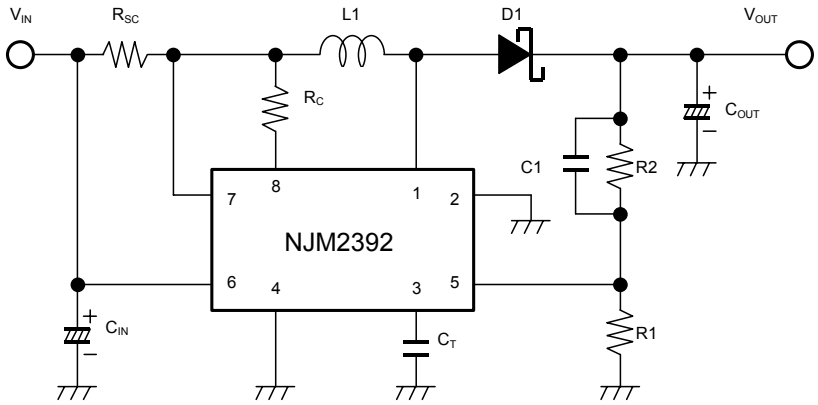
(note) Output switch tests are performed under pulsed conditions to minimize power dissipation.

■TYPICAL APPLICATIONS

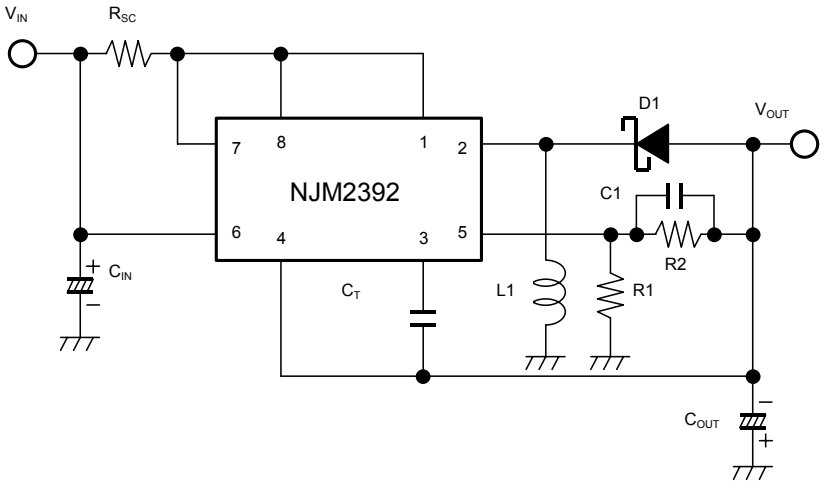
Step-Down Converter



Step-Up Converter



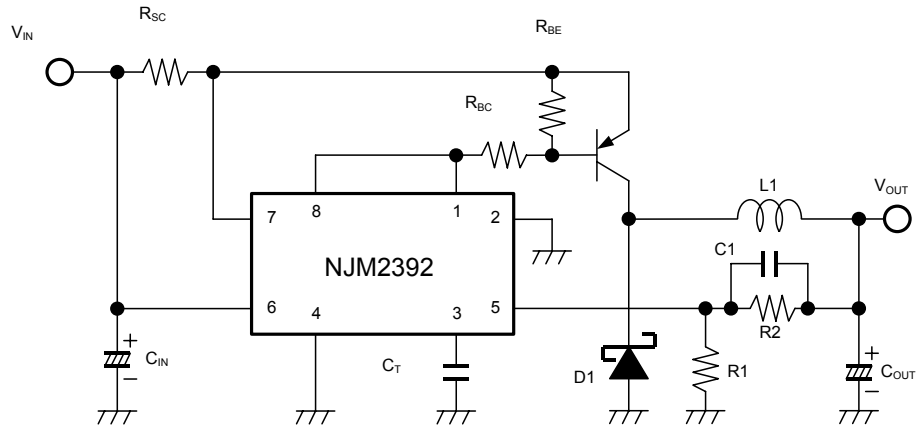
Inverting Converter



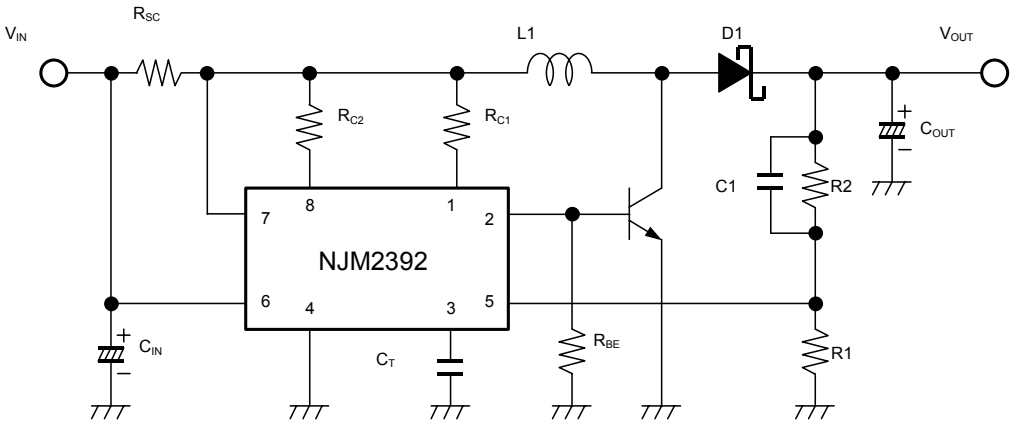
D1 use to schottky diode.

■ TYPICAL APPLICATIONS

Step-Down Converter (High Current)

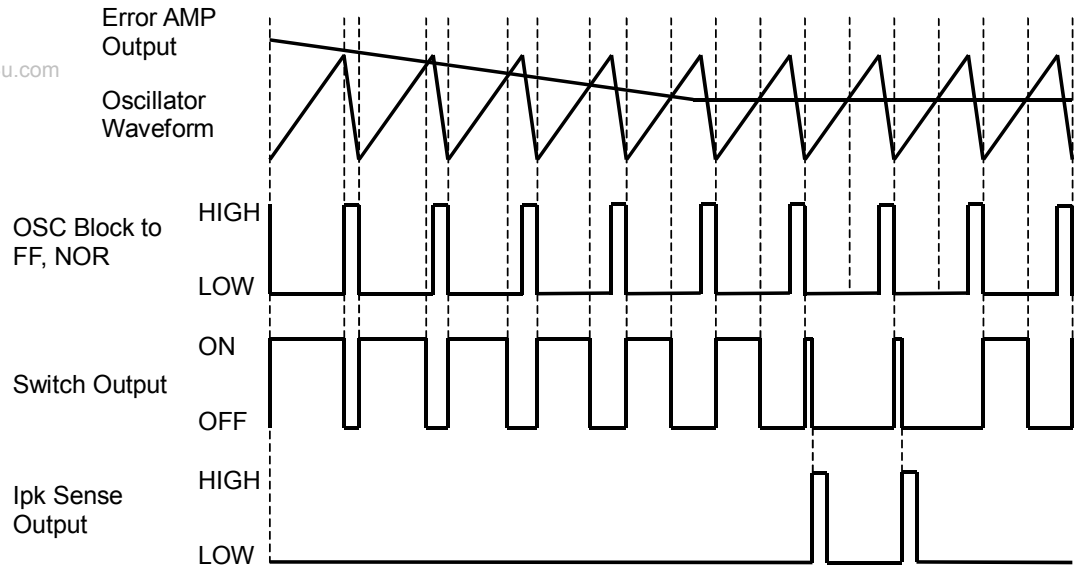


Step-Up Converter (High Current)



D1 use to schottky diode.

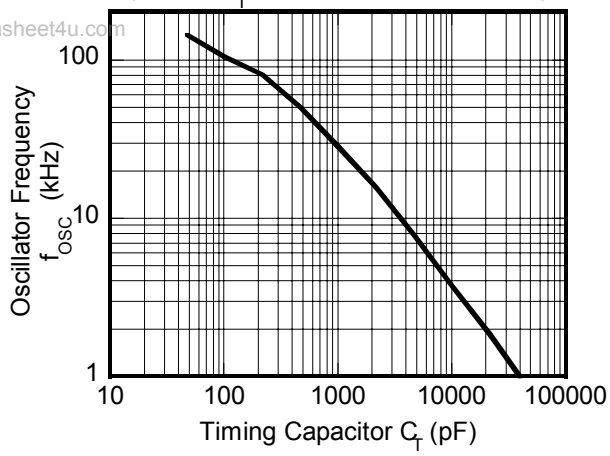
■TIMING CHART



■TYPICAL CHARACTERISTICS

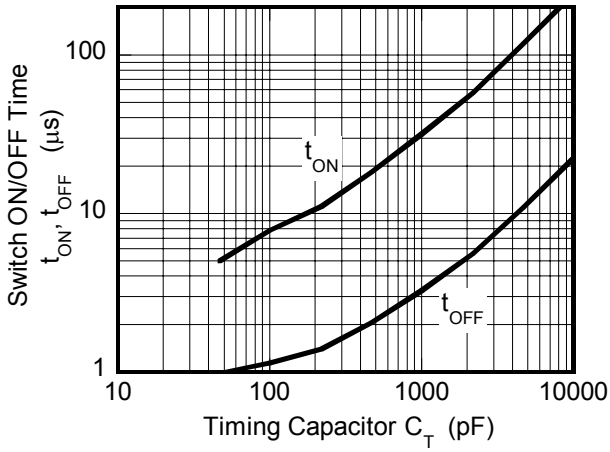
Oscillator Frequency vs. Timing Capacitor

(V^+=5V, S_I=V^+, Pin 5=GND, Ta=25°C)



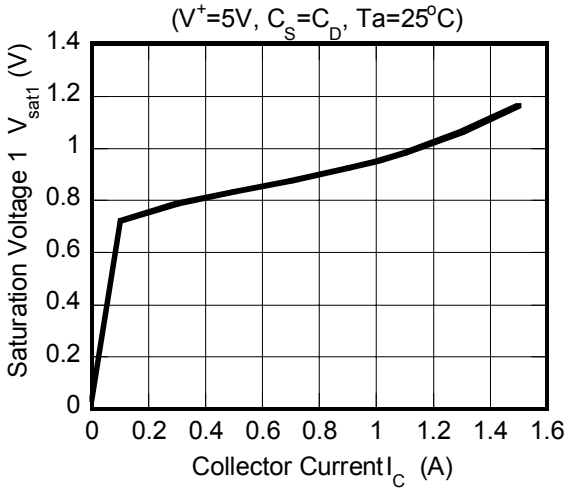
Switch ON/OFF TIme vs.Timing Capacitor

(V^+=5V, S_I=V^+, Pin 5=GND, Ta=25°C)



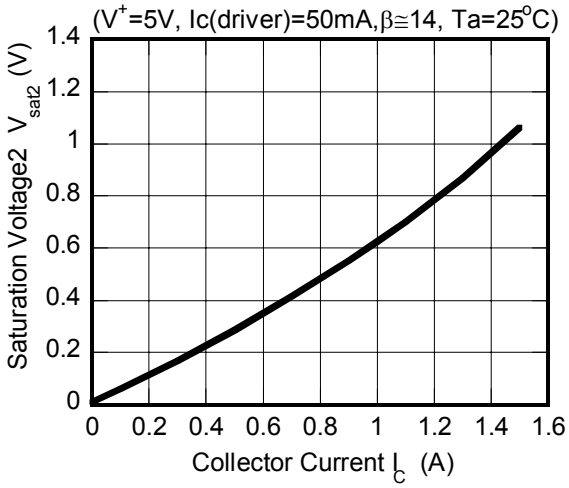
Saturation Voltage 1 vs. Collector Current

(V^+=5V, C_S=C_D, Ta=25°C)



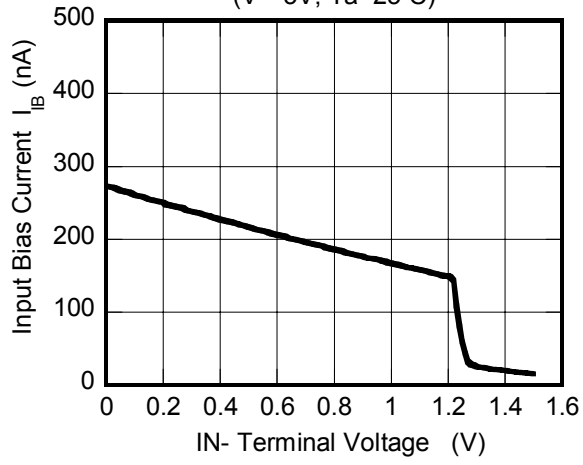
Saturation Voltage 2 vs. Collector Current

(V^+=5V, Ic(driver)=50mA,β≅14, Ta=25°C)



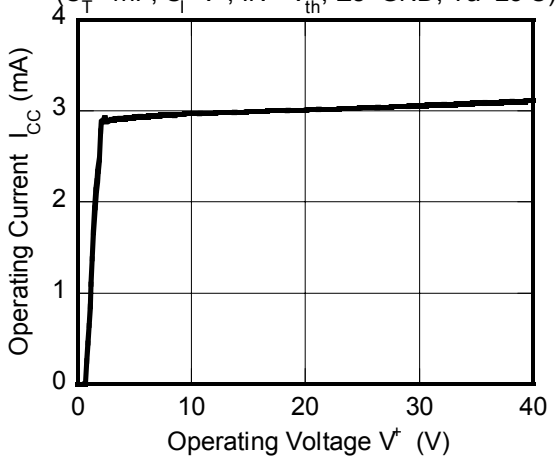
Input Bias Current vs. IN- Terminal Voltage

(V^+=5V, Ta=25°C)



Operating Current vs. Operating Voltage

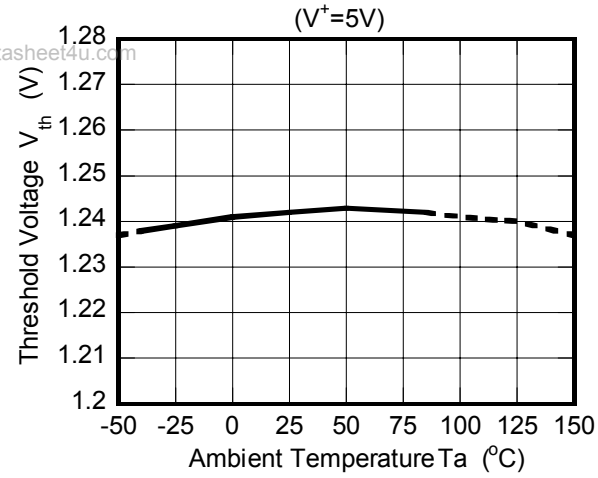
(C_T=1nF, S_I=V^+, IN->V_{th}, Es=GND, Ta=25°C)



■TYPICAL CHARACTERISTICS

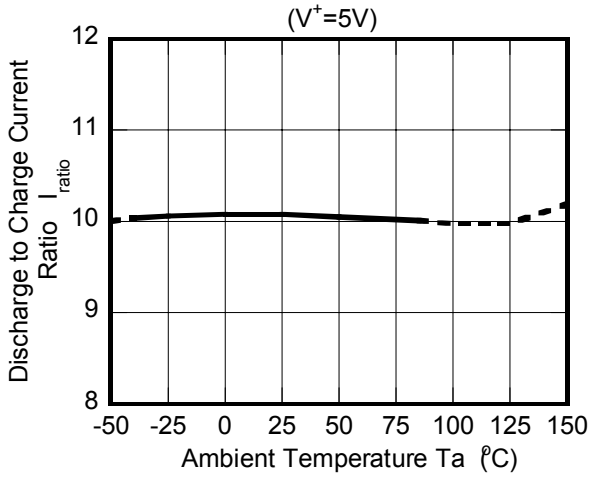
Threshold Voltage vs. Temperature

(V^+=5V)



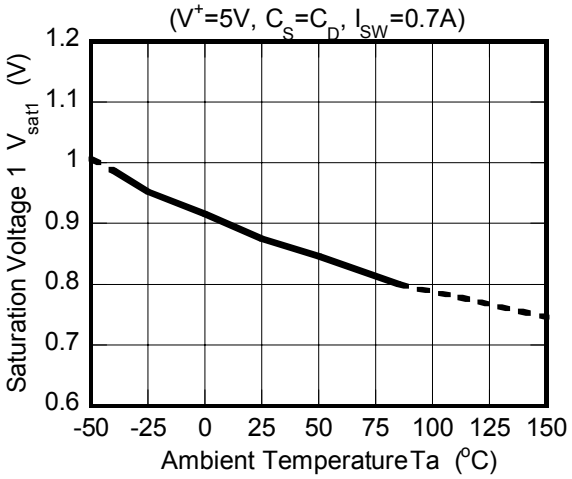
Discharge to Charge Ratio vs. Temperature

(V^+=5V)



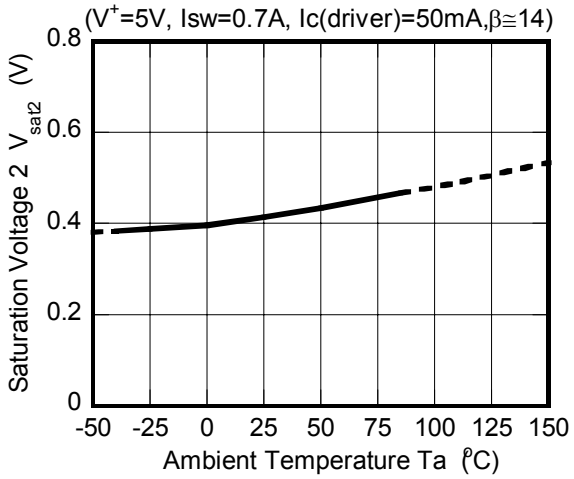
Saturation Voltage 1 vs. Temperature

(V^+=5V, C_S=C_D, I_{SW}=0.7A)



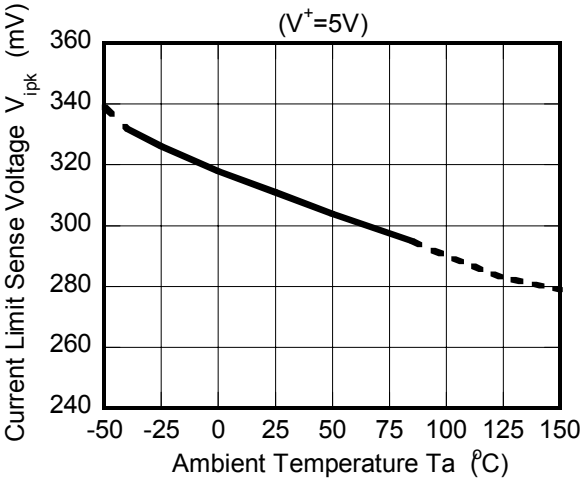
Saturation Voltage 2 vs. Temperature

(V^+=5V, Isw=0.7A, Ic(driver)=50mA,β≅14)



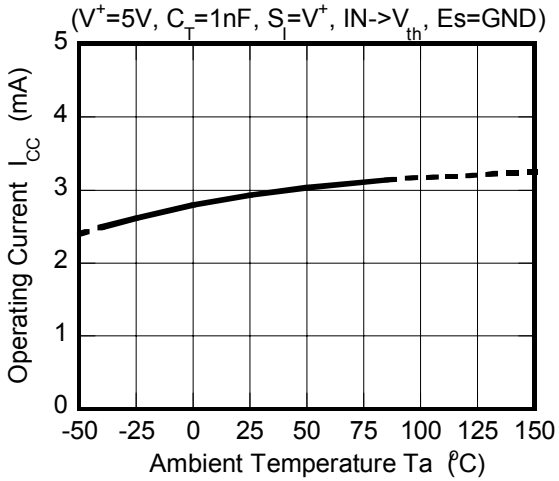
Current Limit Sense Voltage vs. Temperature

(V^+=5V)



Operating Current vs. Temperature

(V^+=5V, C_T=1nF, S_I=V^+, IN->V_{th}, Es=GND)



MEMO