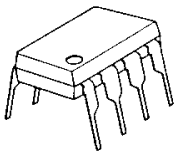
PWM DC/DC Converter IC with Standby Function

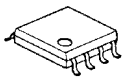
■GENERAL DESCRIPTION

The NJM2344 is a general purpose PWM DC/DC converter IC configurable for step-up, step-down and inverting applications.
An internal 1.5A power transistor, a pulse-by pulse current limit and 1% precision reference make the NJM2344 suitable for a wide range of voltage converter needs.
The NJM2344 features a standby function that can be used for both power saving and safety operation.

■PACKAGE OUTLINE



NJM2344D

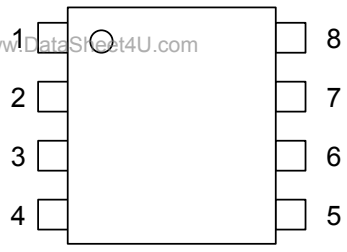


NJM2344M

■FEATURES

- Operating Voltage 3.0V to 40V
- Wide Oscillator Frequency 1kHz to 150kHz
- Precision Reference Voltage V_{th}=1.25V ± 1%
- Internal High Power Transistor 1.5A max.
- Internal Over Current Limit Circuit
- PWM switching control
- Standby Function 9μA typ.
- Bipolar Technology
- Package Outline NJM2344D : DIP8
  NJM2344M : DMP8

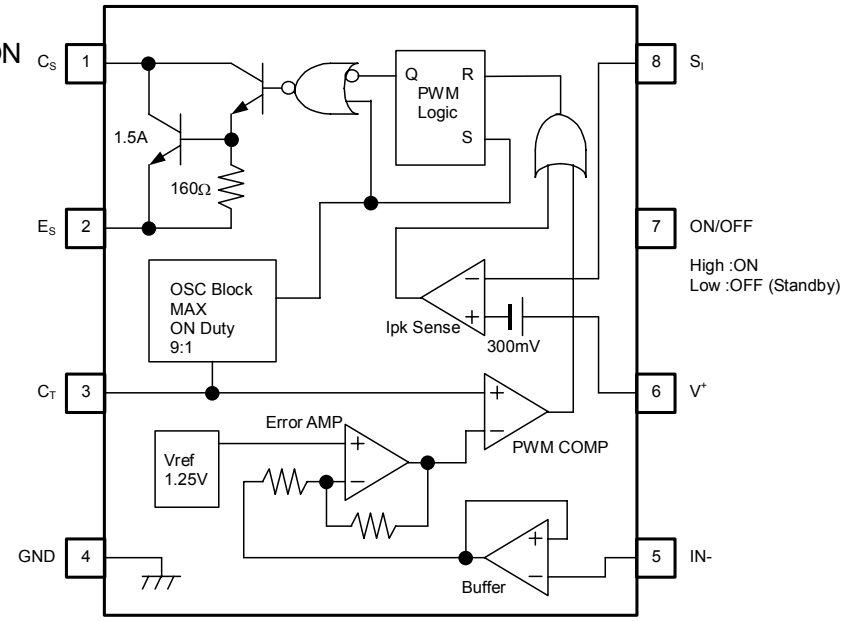
■PIN CONFIGURATION



NJM2344D
NJM2344M

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

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

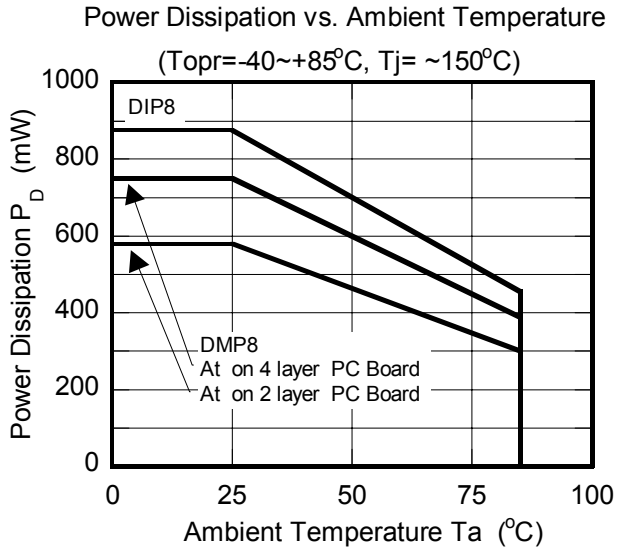
PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Maximum Supply Voltage	V^+	40	V
Comparator Input Voltage	V_{IR}	-0.3 ~ 40 (note)	V
ON/OFF Terminal Voltage	$V_{ON/OFF}$	-0.3 ~ 40 (note)	
Output Driver Voltage	V_C(driver)	40	V
Output Switch Voltage	V_{SW}	40	V
Output Driver Current	I_C(driver)	100	mA
Output Switch 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

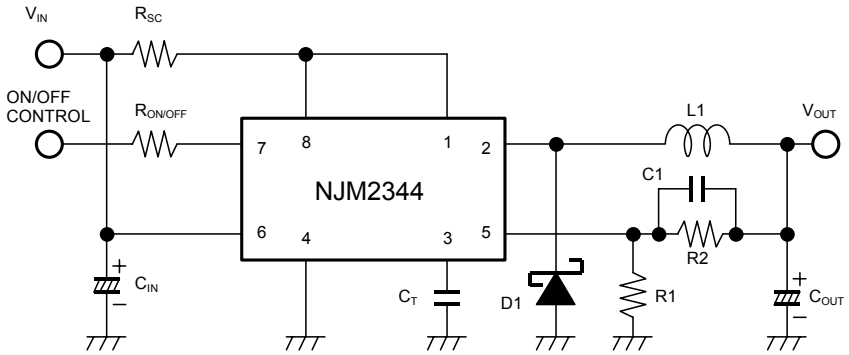
DC Characteristics (V^+= $V_{ON/OFF}$=5V, Ta=25°C)

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}	I_{chg}=I_{dis}	250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage	V_{sat}	I_{SW}=0.7A	–	1.0	1.3	V
Output Transistor Bias Resistance	R_{bias}		–	160	–	Ω
Collector Off-State Current	$I_{C(Off)}$	V_{CE}=40V	–	0.01	1	μA
ERROR AMPLIFIER						
Threshold Voltage	V_{th}		1.2375	1.250	1.2625	V
Input Bias Current	I_{IB}	IN-= V_{th}	–	100	200	nA
ON/OFF BLOCK						
ON Threshold Voltage	V_{ON}		0.8	–	–	V
OFF Threshold Voltage	V_{OFF}		–	–	0.56	V
Input Bias Current (ON/OFF Terminal)	$I_{ON/OFF}$	$V_{ON/OFF}$=5V	–	240	300	μA
GENERAL CHARACTERISTICS						
Standby Current	I_{CCSTBY}	$V_{ON/OFF}$=0V	–	9	20	μA
Operating Current	I_{CC}	C_T=1nF, S_I=V^+, IN->V_{th}, E_S=GND	–	2.8	4.0	mA

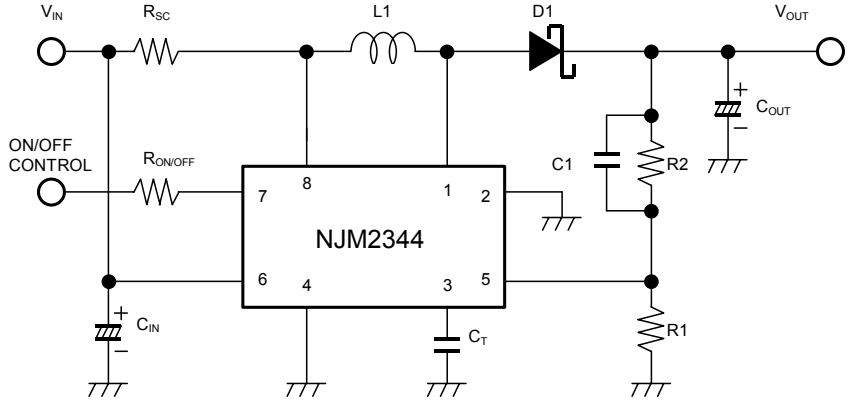
(note) Output switch tests are performed under pulsed conditions to minimize power dissipation.

■TYPICAL APPLICATIONS

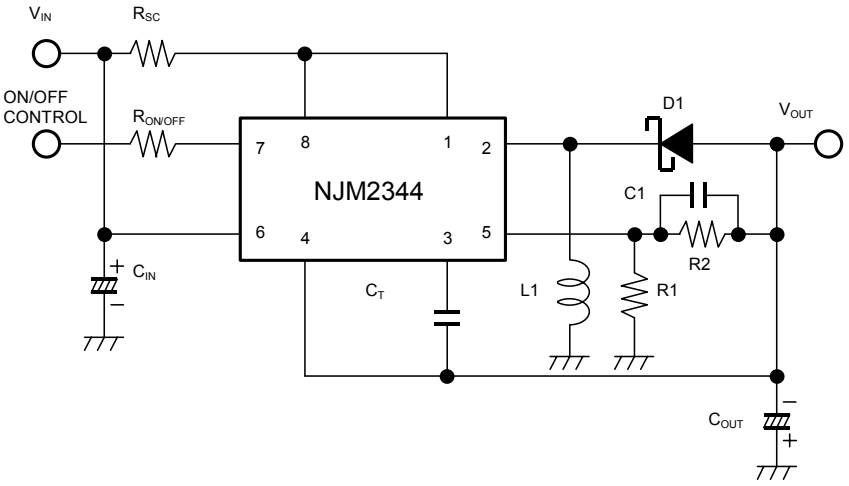
Step-Down Converter



Step-Up Converter



Inverting Converter

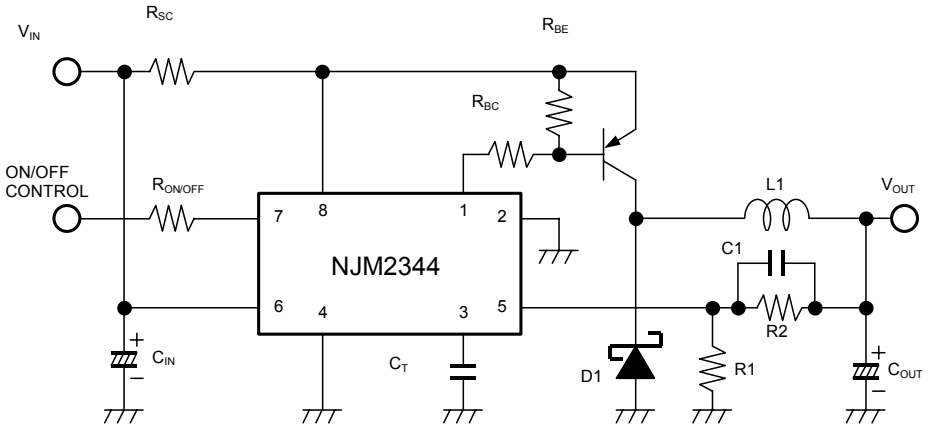


Though the $I_{ON/OFF}$ decreases by inserting "$R_{ON/OFF}$ " to between ON/OFF terminal and V_{IN} terminal, the minimum operating voltage is increased due to the resister " $R_{ON/OFF}$ ".

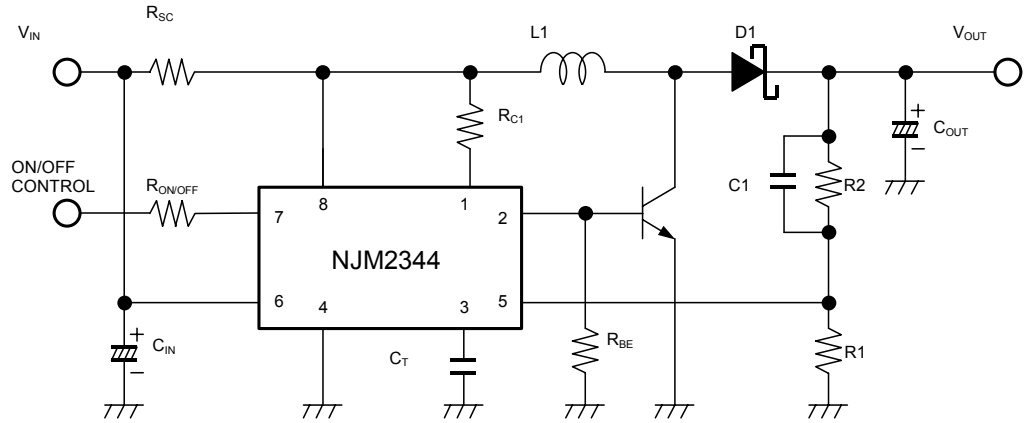
D1 use to schottky diode.

■ TYPICAL APPLICATIONS

Step-Down Converter (High Current)



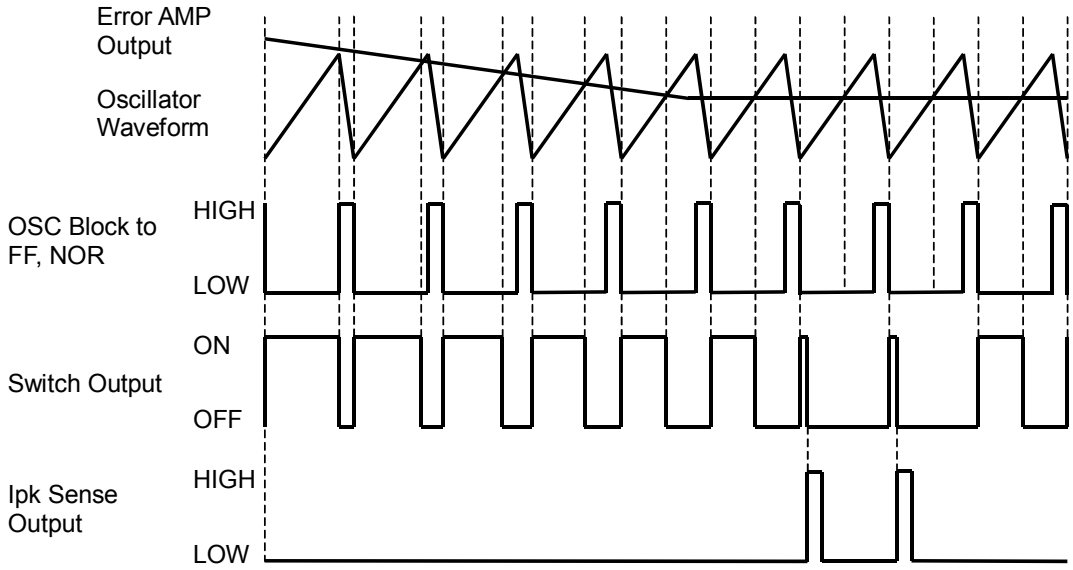
Step-Up Converter (High Current)



Though the $I_{ON/OFF}$ decreases by inserting "$R_{ON/OFF}$ " to between ON/OFF terminal and V_{IN} terminal, the minimum operating voltage is increased due to the resister " $R_{ON/OFF}$ ".

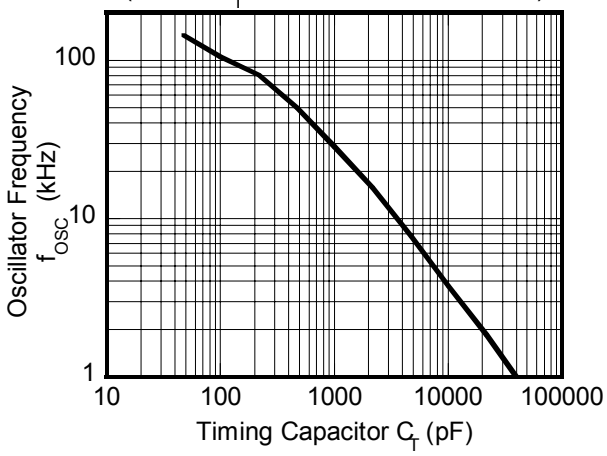
D1 use to schottky diode.

■TIMING CHART

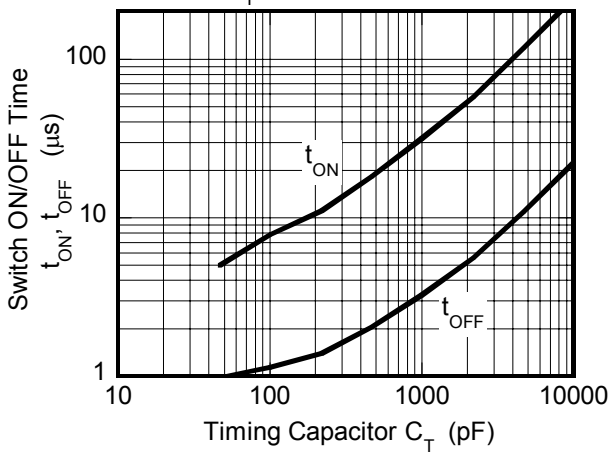


■TYPICAL CHARACTERISTICS

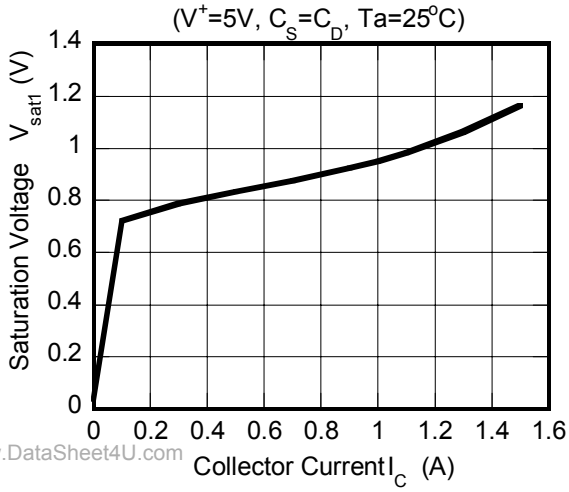
Oscillator Frequency vs. Timing Capacitor
(V^+=5V, S_I=V^+, Pin 5=GND, Ta=25°C)



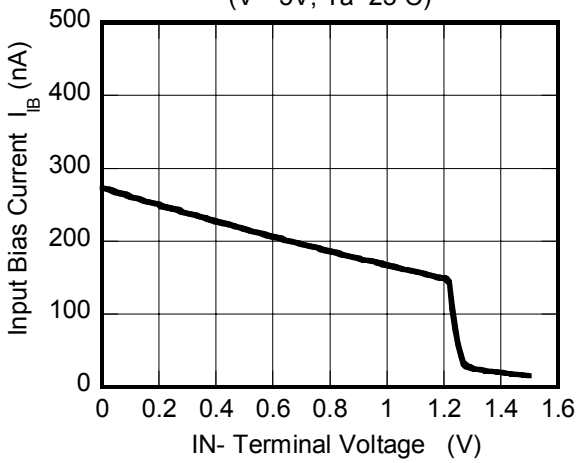
Switch ON/OFF TIme vs.Timing Capacitor
(V^+=5V, S_I=V^+, Pin 5=GND, Ta=25°C)



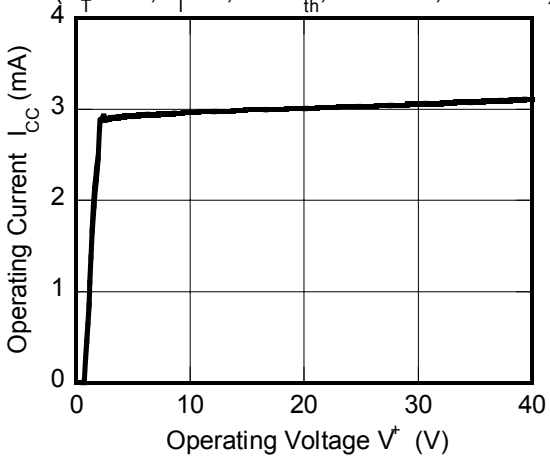
Saturation Voltage vs. Collector Current
(V^+=5V, C_S=C_D, Ta=25°C)



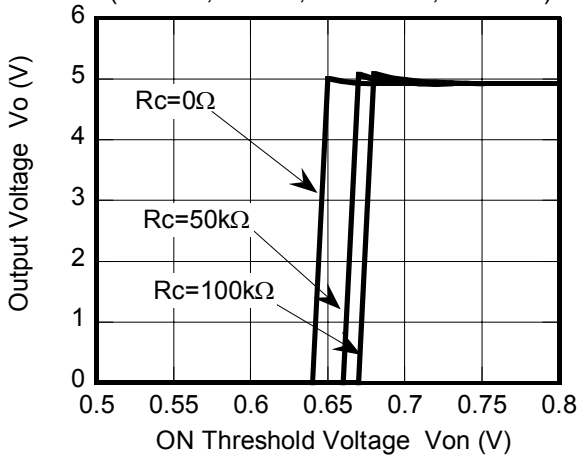
Input Bias Current vs. IN- Terminal Voltage
(V^+=5V, Ta=25°C)



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



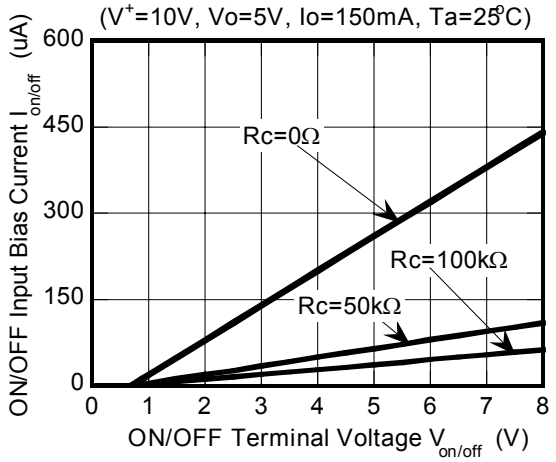
Output Voltage vs. ON Threshold Voltage
(V^+=10V, Vo=5V, Io=150mA, Ta=25°C)



■TYPICAL CHARACTERISTICS

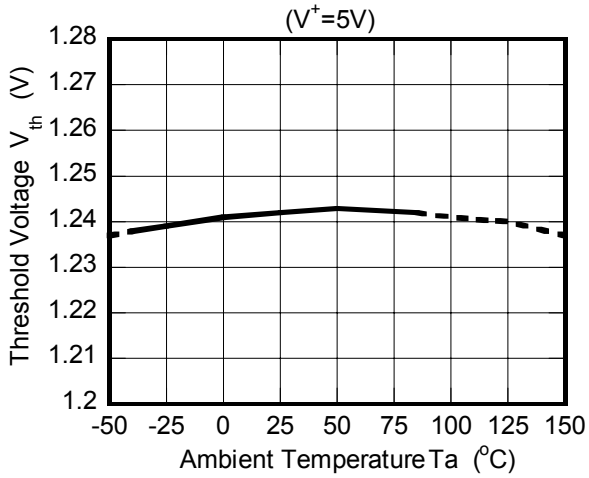
ON/OFF Input Bias Current vs. ON/OFF Terminal Voltage

(V^+=10V, Vo=5V, Io=150mA, Ta=25°C)



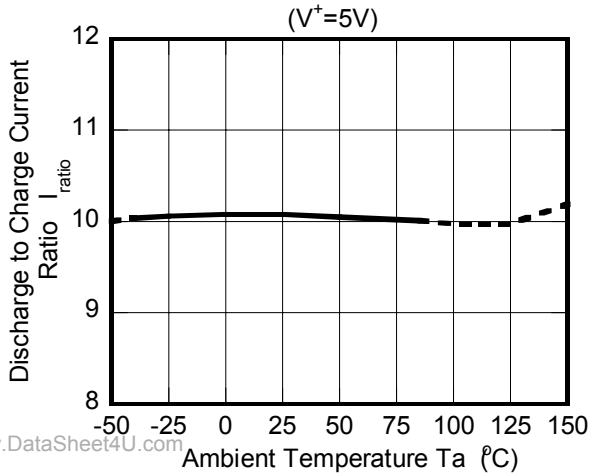
Threshold Voltage vs. Temperature

(V^+=5V)



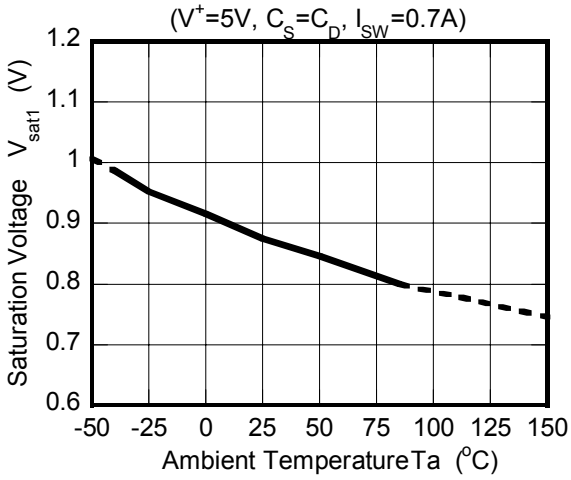
Discharge to Charge Ratio vs. Temperature

(V^+=5V)



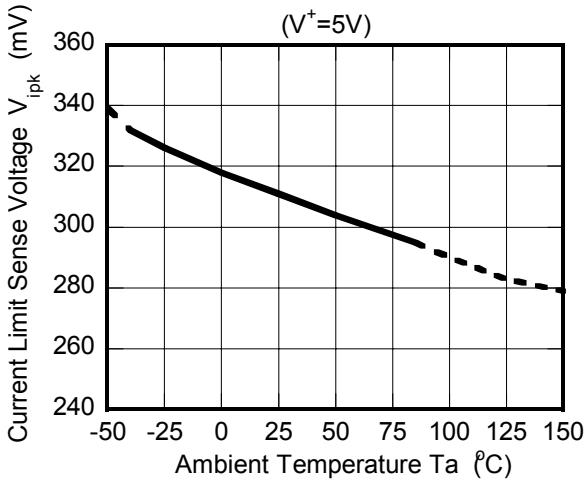
Saturation Voltage vs. Temperature

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



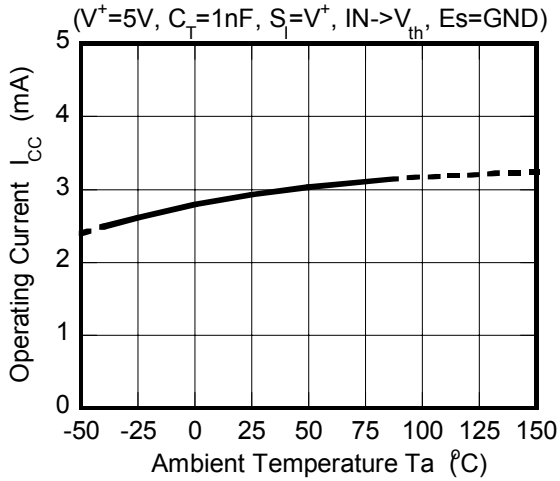
Current Limit Sense Voltage vs. Temperature

(V^+=5V)



Operating Current vs. Temperature

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



MEMO