

## PWM DC/DC Converter IC

### ■GENERAL DESCRIPTION

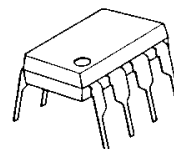
The NJM2392 is a PWM DC/DC converter IC.

It features fixed frequency type PWM control for better noise handling and to avoid intermittent oscillation observed in a simplified controller.

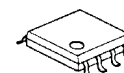
It is suitable for Step-Up, Step-Down and Inverting applications.

In addition, it contains a pulse-by-pulse current limit circuit and can be set by an external resistance.

### ■PACKAGE OUTLINE



**NJM2392D**



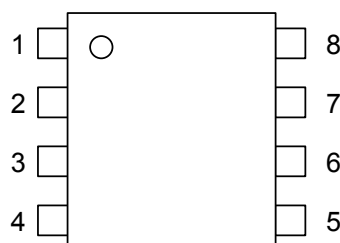
**NJM2392M**

### ■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

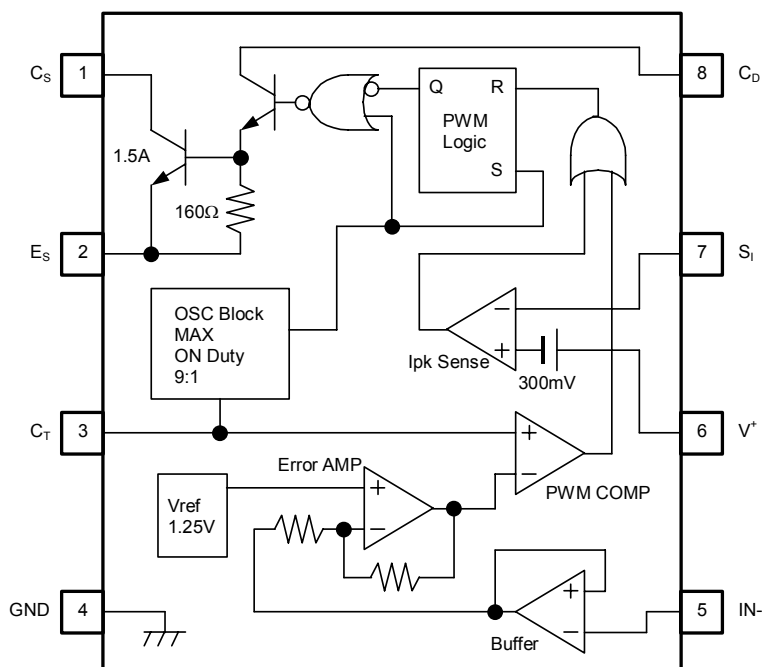


**NJM2392D**  
**NJM2392M**

### 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)

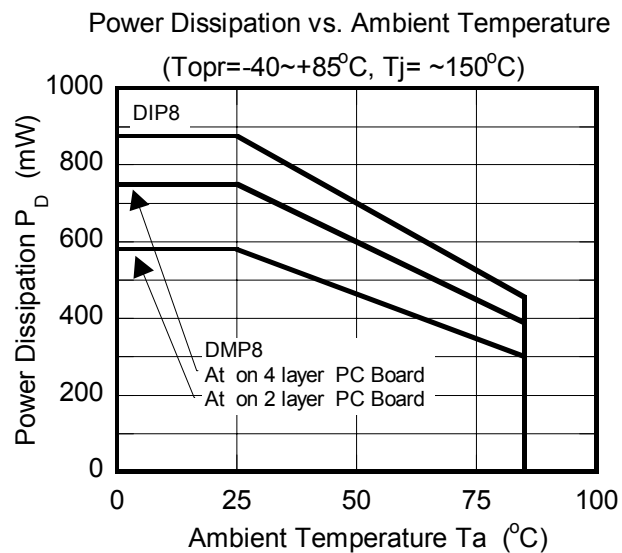
PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Maximum Supply Voltage	$V^+$	40	V
Comparator Input Voltage	$V_{IR}$	-0.3 ~ 40 (note)	V
Output Driver Voltage	$V_C(\text{driver})$	40	V
Output Switch Voltage	$V_{SW}$	40	V
Output Driver Current	$I_C(\text{driver})$	100	mA
Output Switch Current	$I_{SW}$	1.5	A
Power 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 ( $V^+=5V$ ,  $T_a=25^\circ C$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
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### OSCILLATOR BLOCK

Oscillation Frequency	$f_{OSC}$	$I_N=0V$ , $C_T=1nF$	18	27	36	kHz
Charge Current	$I_{chg}$		11	18	27	$\mu A$
Discharge Current	$I_{dis}$		110	180	300	$\mu A$
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
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### 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 $\beta \approx 14$ )	—	0.5	0.7	V
Output Transistor Bias Resistance	$R_{bias}$		—	160	—	$\Omega$
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	$\mu A$

### ERROR AMPLIFIER

Threshold Voltage	$V_{th}$		1.225	1.250	1.275	V
Input Bias Current	$I_{IB}$	$I_N=0V$	—	300	900	nA

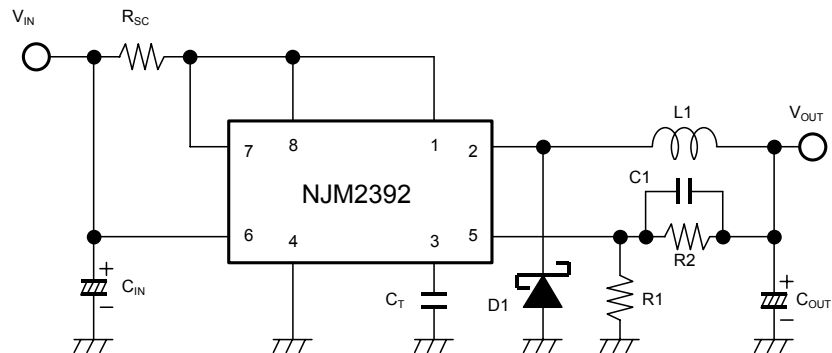
### GENERAL CHARACTERISTICS

Operating Current	$I_{CC}$	$C_T=1nF$ , $S_I=V^+$ , $I_N \rightarrow V_{th}$ , $E_S=GND$	—	2.8	4.0	mA
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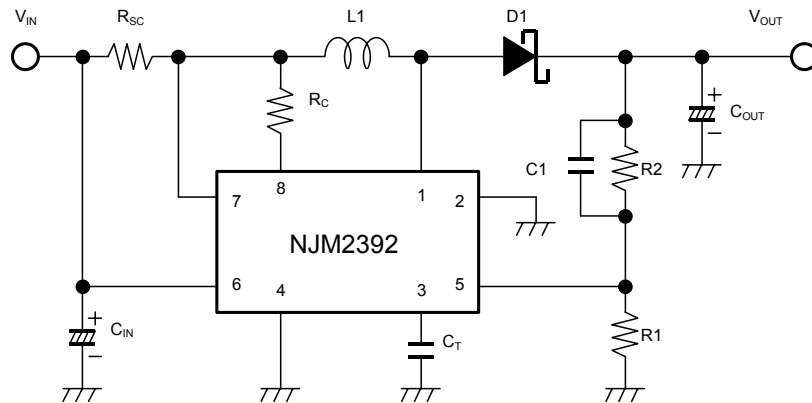
(note) Output switch tests are performed under pulsed conditions to minimize power dissipation.

## ■TYPICAL APPLICATIONS

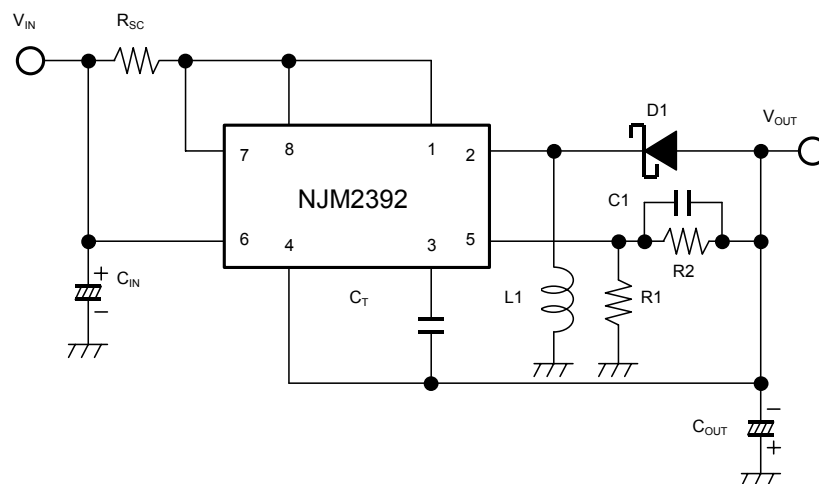
### Step-Down Converter



### Step-Up Converter



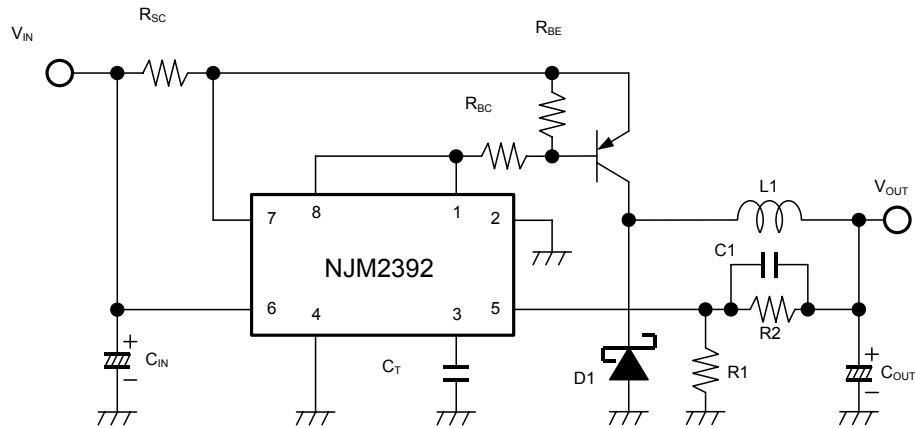
### Inverting Converter



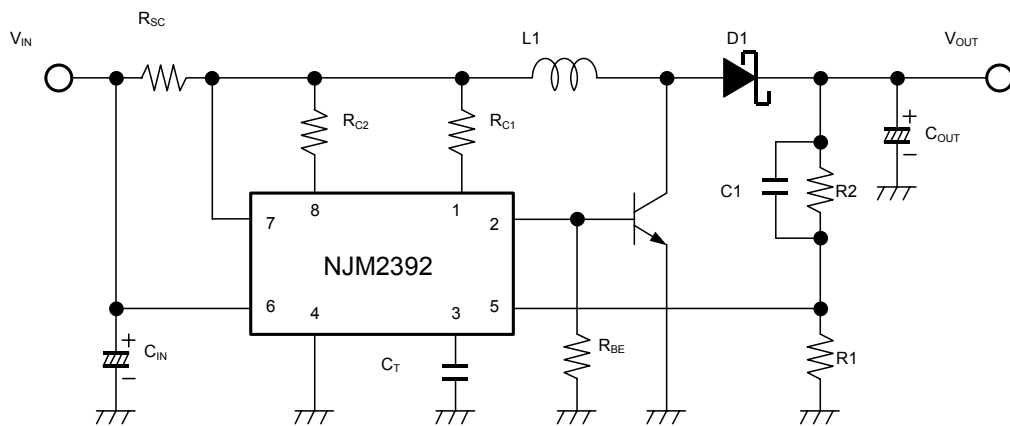
D1 use to schottky diode.

## ■ TYPICAL APPLICATIONS

### Step-Down Converter (High Current)

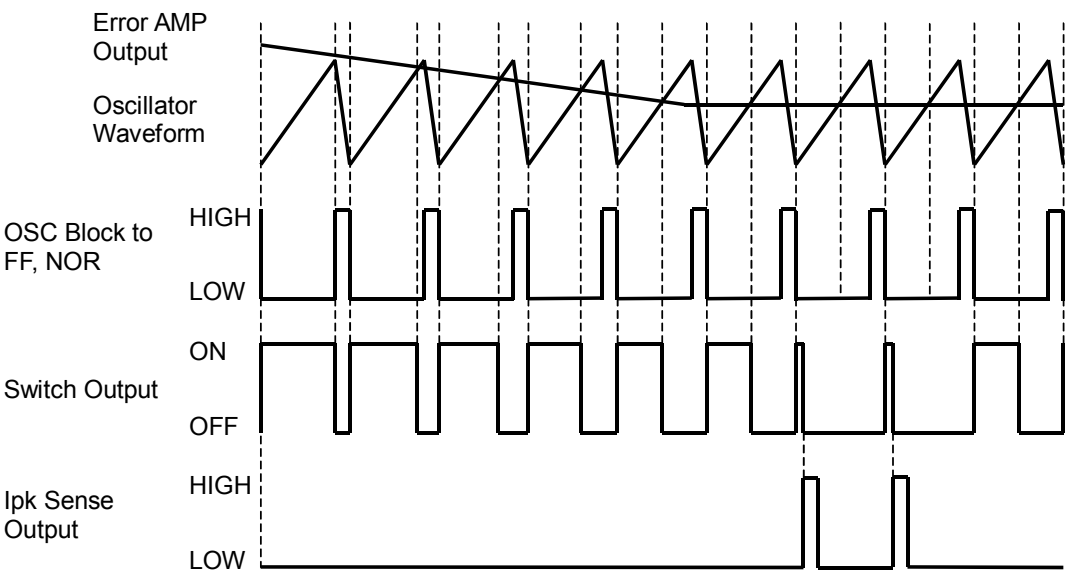


### Step-Up Converter (High Current)

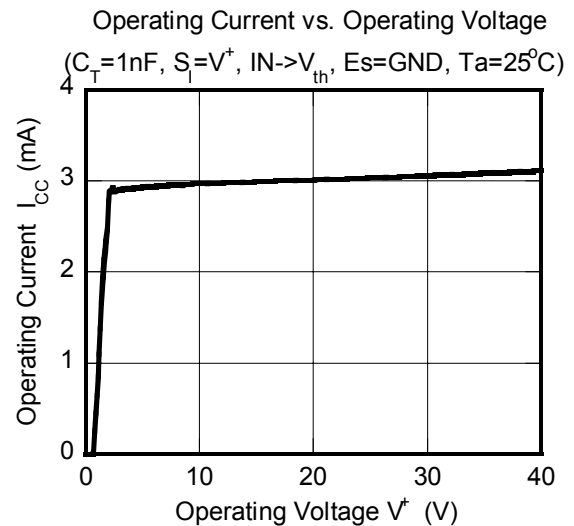
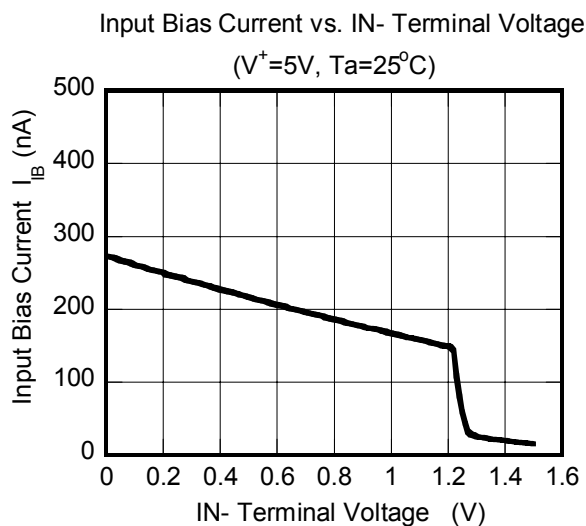
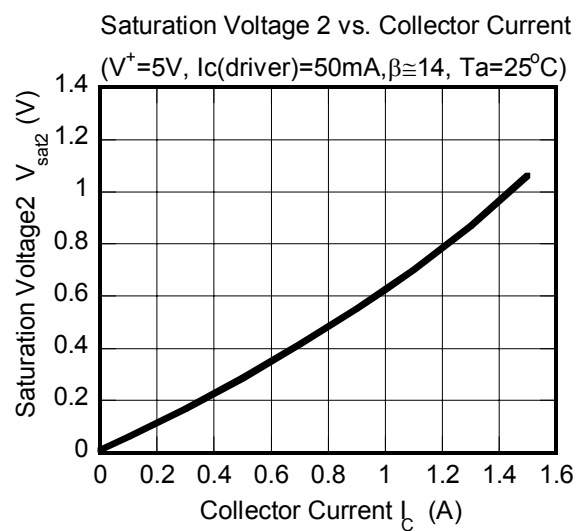
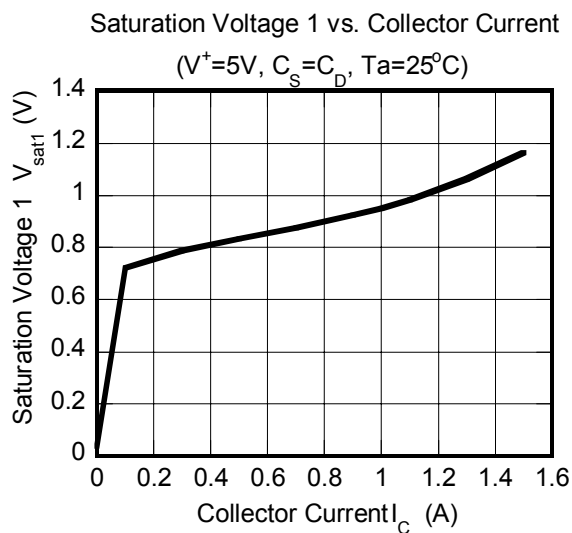
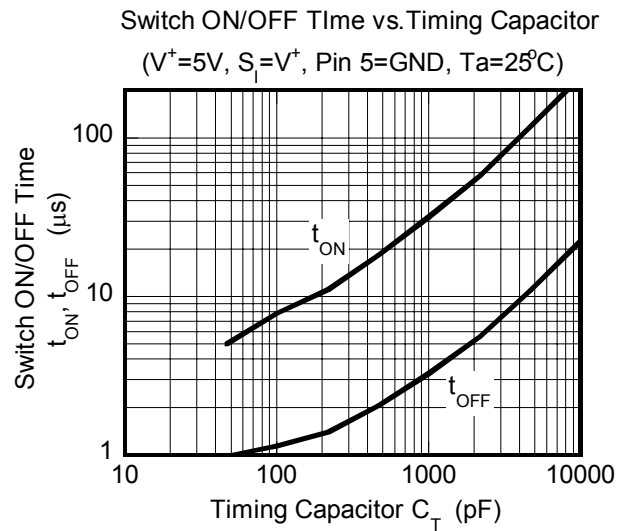
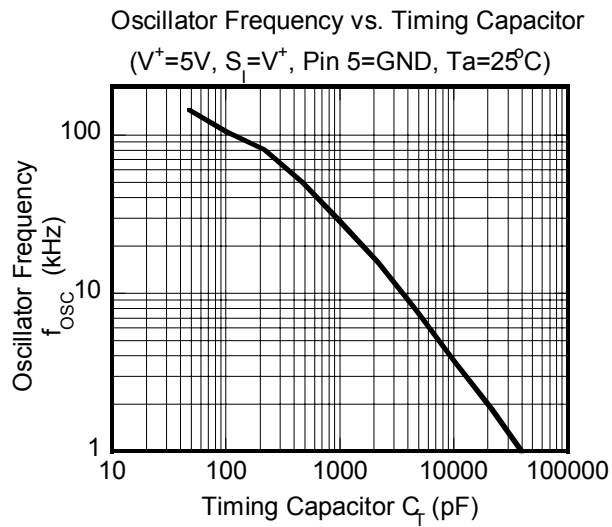


D1 use to schottky diode.

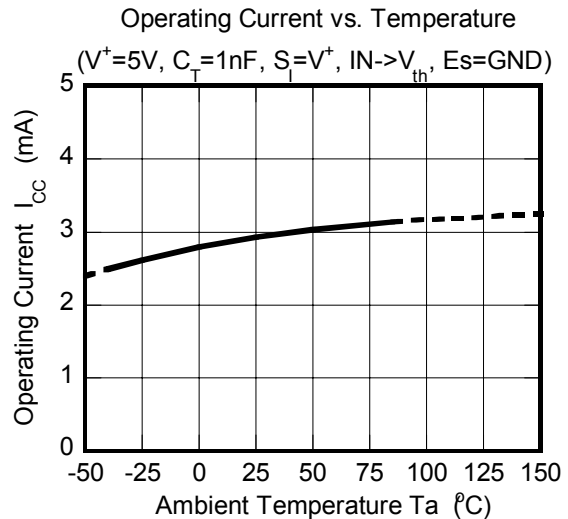
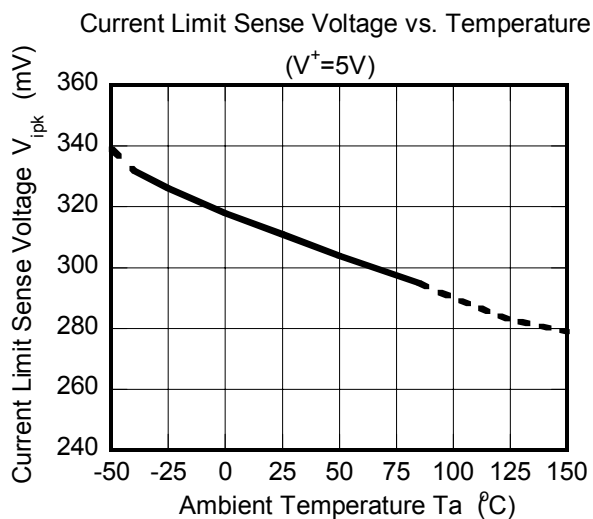
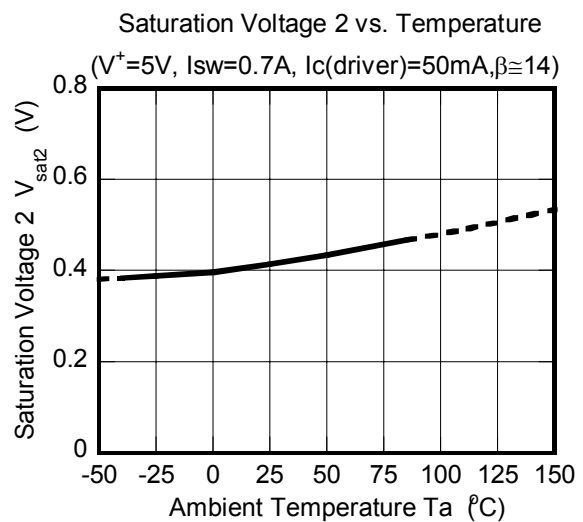
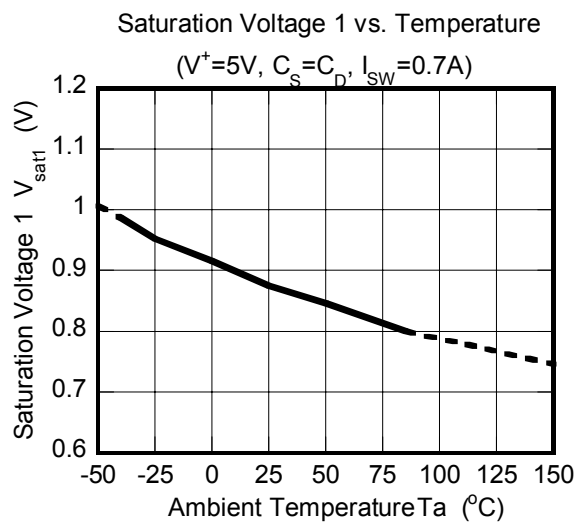
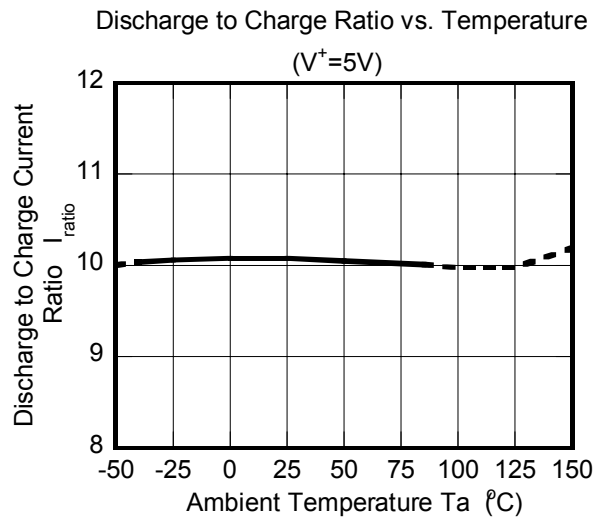
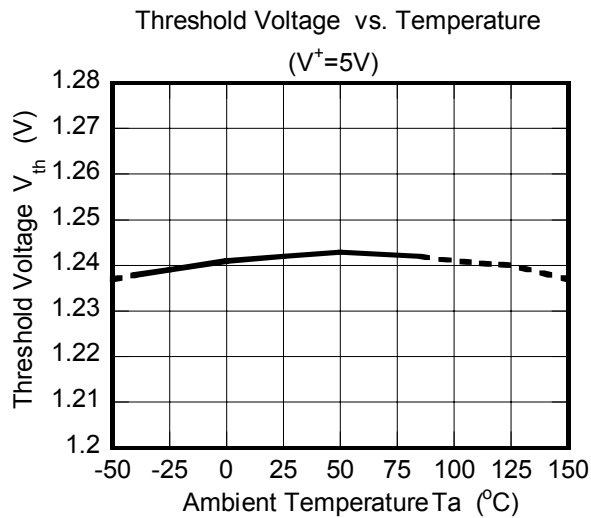
■TIMING CHART



## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS





# MEMO

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