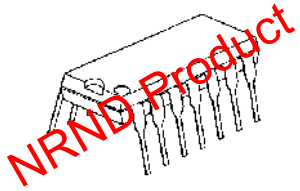
DC/DC CONVERTER CONTROL IC
WITH CURRENT SENSE AMPLIFIER

■GENERAL DESCRIPTION

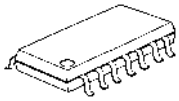
The **NJM2383** is a low voltage operation DC/DC converter control IC featuring high side current protection, soft start and standby functions.

It is suitable for power module application and on-board regulators.

■PACKAGE OUTLINE



NJM2383D

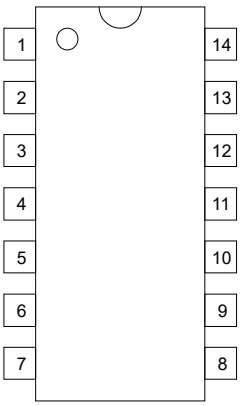


NJM2383M

■FEATURES

- PWM switching control
- Operating Voltage (3.6V to 32V)
- Wide Oscillator Range (5kHz to 350kHz)
- ON/OFF Circuit (High Active)
- Current Sensing Amplifier
- Soft-Start Function
- UVLO(Under Voltage Lockouts)
- Bipolar Technology
- Package Outline DIP14, DMP14

■PIN CONFIGURATION



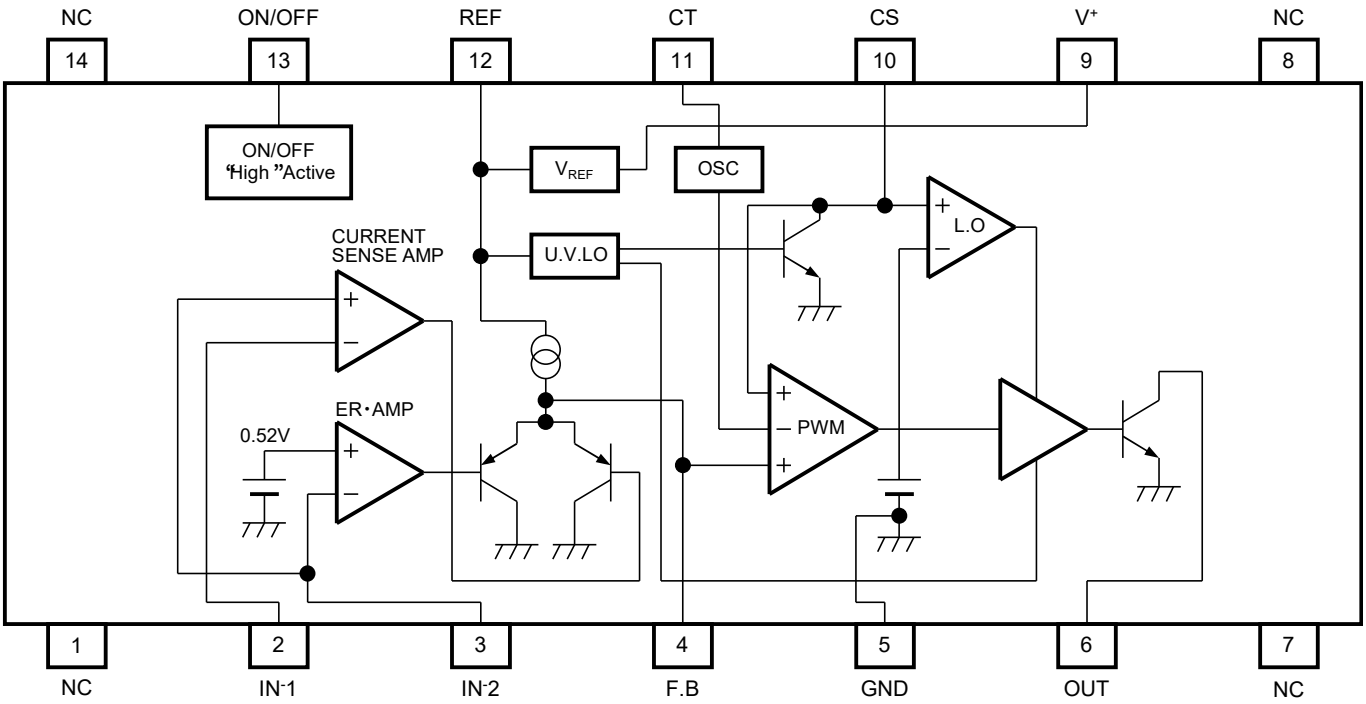
NJM2383D
NJM2383M

PIN FUNCTION

1.NC	14.NC
2.IN$^-$1	13.ON/OFF
3.IN$^-$2	12.REF
4.F.B	11.CT
5.GND	10.CS
6.OUT	9. V$^+$
7.NC	8.NC

DIP14 is the NRND product as of February,2023

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	V^+	36	V
Reference Output Current	I_{OR}	10	mA
Output Sink Current	I_{SINK}	200	mA
Differential Input Voltage	V_{ID}	2.5	V
Common Mode Input Voltage	V_{IC}	−0.3 to 2.5	V
ON/OFF Control Voltage	$V_{ON/OFF}$	−0.3 to 36 (note)	V
Power Dissipation	P_D	(DIP 14) 700 (DMP 14) 300	mW
Operating Temperature Range	T_{OPR}	−40 to 85	°C
Storage Temperature Range	T_{STG}	−50 to 150	°C

(note) When the supply voltage is less than 36V, the absolute maximum input voltage is equal to the supply voltage.

■ELECTRICAL CHARACTERISTICS (V^+=6V, R_T=33kΩ, C_T=1000pF, $V_{ON/OFF}$=3V, Ta=25°C)

REFERENCE VOLTAGE BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{REF}	I_{OR}=1mA	2.45	2.50	2.55	V
Line Regulation	L_{INE}	V^+=3.6V to 32V, I_{OR}=1mA	-	6.8	20.7	mV
Load Regulation	L_{OAD}	I_{OR}=0.1mA to 5.0mA	-	5	30	mV

OSCILLATOR BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency	f_{OSC}	R_T=33kΩ, C_T=1000pF	85	105	125	kHz
Oscillate Fluctuations1 (Line Fluctuations)	f_{dV}	V^+=3.6V to 32V	-	1	-	%
Oscillate Fluctuations2 (Temp Fluctuations)	f_{dT}	Ta=−40°C to 85°C	-	5	-	%

CURRENT SENSE AMPLIFIER BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage1	$V_{IO}1$		-	2	7	mV
Input Offset Current1	$I_{IO}1$		-	5	-	nA
Input Bias Current1	I_B1		-	20	100	nA
Open Loop Gain1	A_V1		-	90	-	dB
Gain Bandwidth Product1	G_B1		-	0.6	-	MHz
Input Common Mode Voltage Ratio1	$V_{ICM}1$		-	0 to V_{REF}−0.8	-	V
Maximum Output Voltage1 (F.B Pin)	$V_{OM-}1$	R_{NF}=100kΩ	-	-	1	V
Maximum Source Current1 (F.B Pin)	$I_{OM+}1$	V_{OM}=0.5V	40	85	200	μA

■ELECTRICAL CHARACTERISTICS (V^+=6V, R_T=33kΩ, C_T=1000pF, $V_{ON/OFF}$=3V, Ta=25°C)

ERROR AMPLIFIER BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage2	V_B2		0.51	0.52	0.53	V
Input Bias Current2	I_B2		-	5	100	nA
Open Loop Gain2	A_V2		-	90	-	dB
Gain Bandwidth Product2	G_B2		-	0.6	-	MHz
Maximum Output Voltage2 (F.B Pin)	$V_{OM-}2$	R_{NF}=100kΩ	-	-	1	V
Maximum Source Current2 (F.B Pin)	$I_{OM+}2$	V_{OM}=0.5V	40	85	200	μA

PWM COMPARATE BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Threshold Voltage (F.B Pin)	V_{TH0}	duty·cycle=0% (note)	-	1.65	1.75	V
Input Threshold Voltage (F.B Pin)	V_{TH100}	duty·cycle=100% (note)	-	2.10	-	V

SOFT START CIRCUIT BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Bias Current (CS Pin)	I_{BCS}	CS Pin=1.8V	-	250	650	nA
Input Threshold Voltage (CS Pin)	V_{THCS0}	duty·cycle=0% (note)	-	0.25	0.35	V
Input Threshold Voltage (CS Pin)	V_{THCS50}	duty·cycle=100% (note)	-	0.7	-	V

UNDER VOLTAGE LOCKOUT BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
ON Threshold Voltage	V_{THON}		-	2.70	-	V
OFF Threshold Voltage	V_{THOFF}		-	2.52	-	V
Hysteresis Voltage	V_{HYS}		60	180	-	mV

OUTPUT BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
L-Output Voltage (OUT Pin)	V_{OL}	Output Sink Current=100mA	-	0.25	0.65	V

■ELECTRICAL CHARACTERISTICS (V^+=6V, R_T=33kΩ, C_T=1000pF, $V_{ON/OFF}$=3V, Ta=25°C)

ON/OFF BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
OFF Threshold Voltage (ON/OFF Pin)	V_{OFF}		-	-	0.3	V
ON Threshold Voltage (ON/OFF Pin)	V_{ON}		1.1	-	-	V
Input Bias Current (ON/OFF Pin)	$I_{ON/OFF}$	$V_{ON/OFF}$=3V	-	100	120	μA

GENERAL CHARACTERISTICS

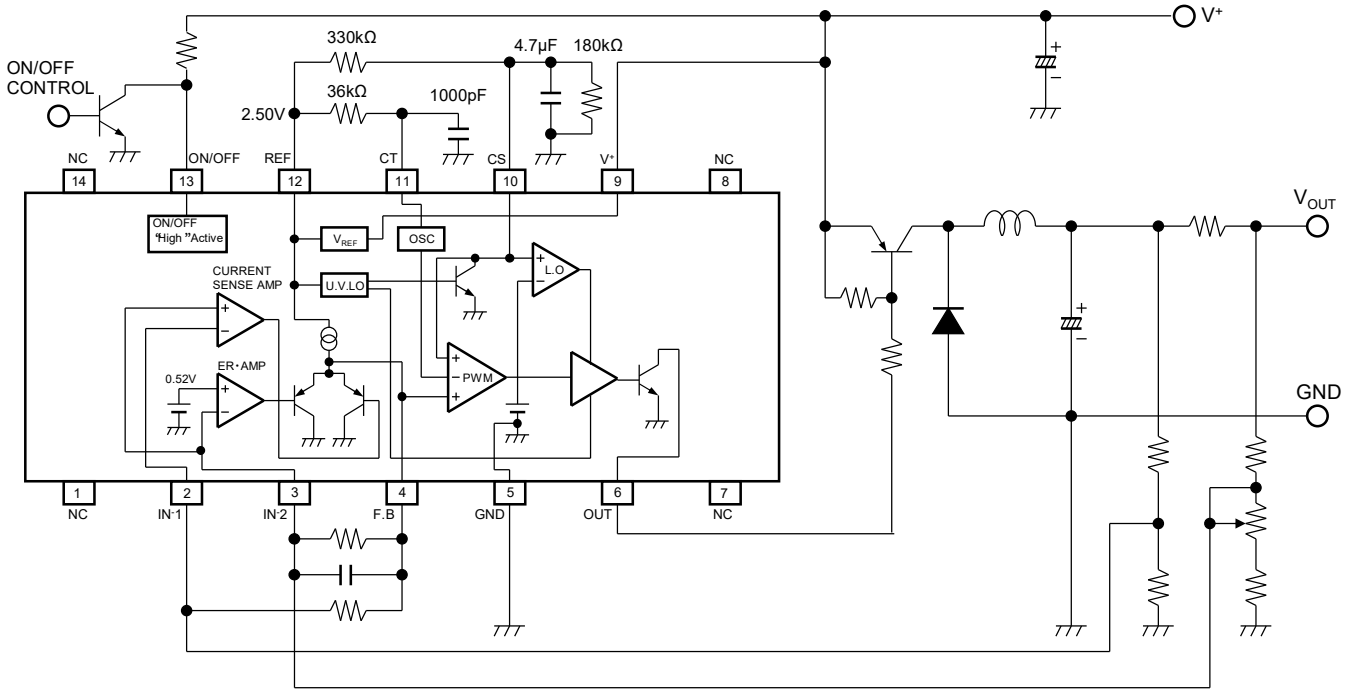
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Stand-by Current	I_{CCSTBY}	Stand-by Mode, $V_{ON/OFF}$=0V	-	12	20	μA
Latch Mode Threshold Voltage (CS Pin)	V_{THLA}		1.2	1.5	1.8	V
Quiescent Current	I_{CCLA}	Latch Mode	-	1.6	2.2	mA
Average Quiescent Current	I_{CCAV}	RL= ∞ , duty·cycle=50%	-	5.5	10	mA

(note) Duty·Cycle is defined as follows:

Duty·Cycle=0%: IC output transistor is OFF.

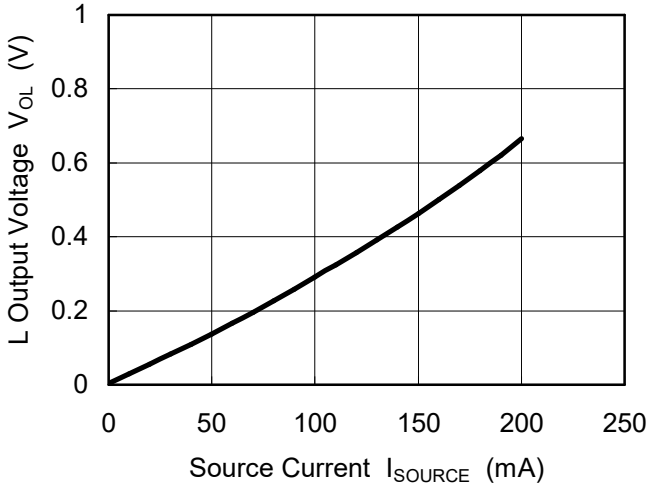
Duty·Cycle=100%: IC output transistor is ON.

■TYPICAL APPLICATIONS

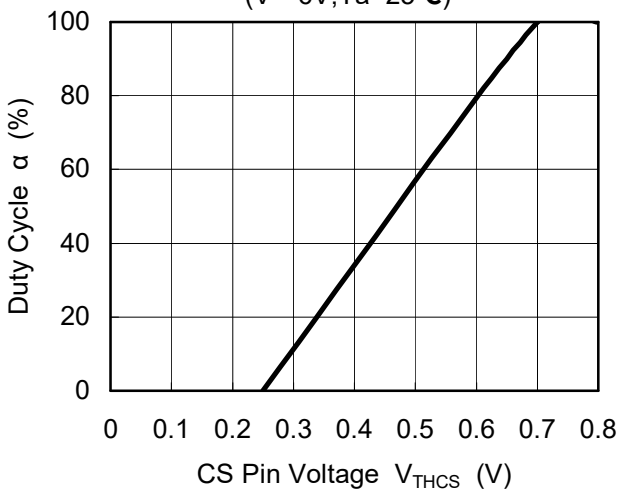


■TYPICAL CHARACTERISTICS

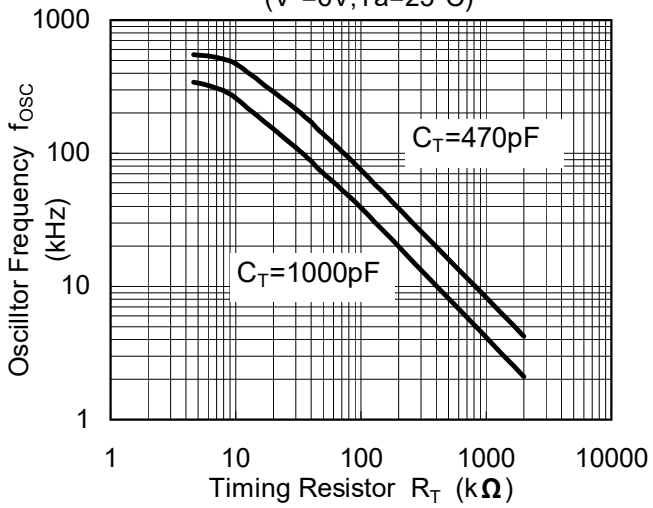
L Output Voltage vs. Source Current
(V^+=6V,R_T=33kΩ,C_T=1000pF,Ta=25℃)



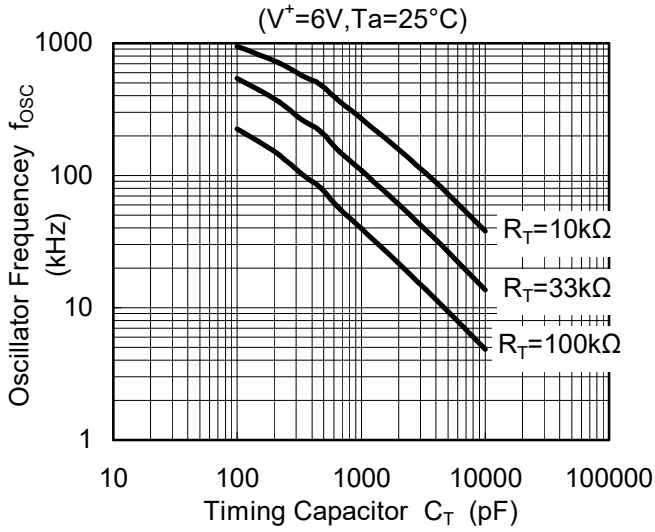
Duty Cycle vs. CS Pin Voltage
(V^+=6V,Ta=25℃)



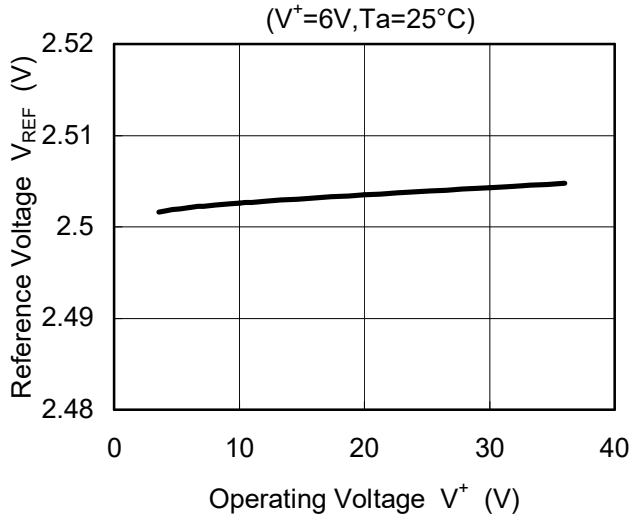
Oscillator Frequency vs. Timing Resistor
(V^+=6V,Ta=25°C)



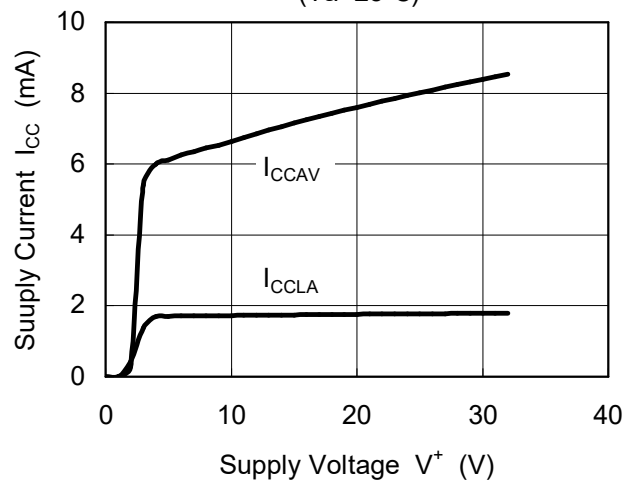
Oscillator Frequency vs. Timing Capacitor
(V^+=6V,Ta=25°C)



Reference Voltage vs. Operating Voltage
(V^+=6V,Ta=25°C)

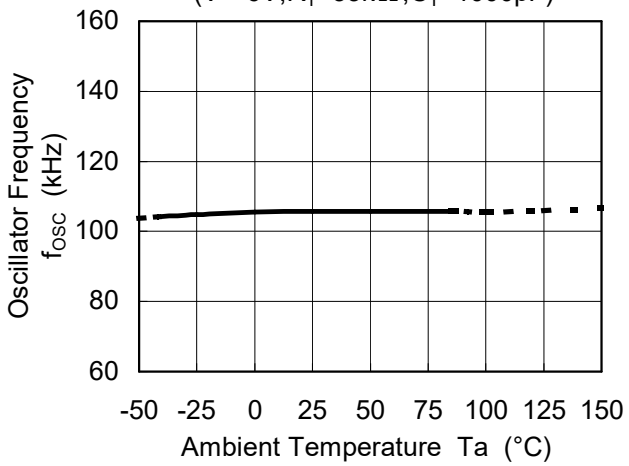


Suuply Current vs. Supply Voltage
(Ta=25℃)

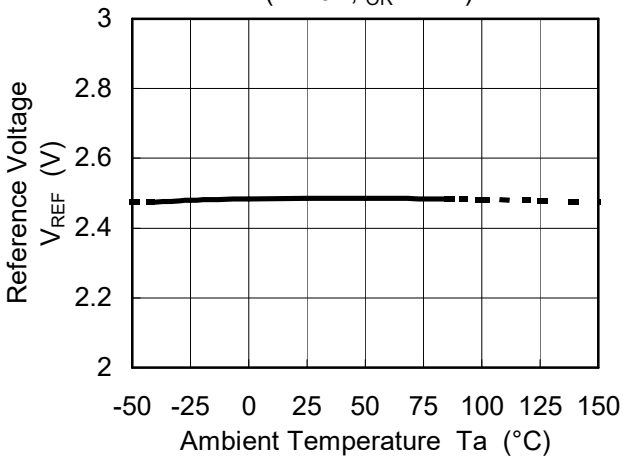


■TYPICAL CHARACTERISTICS

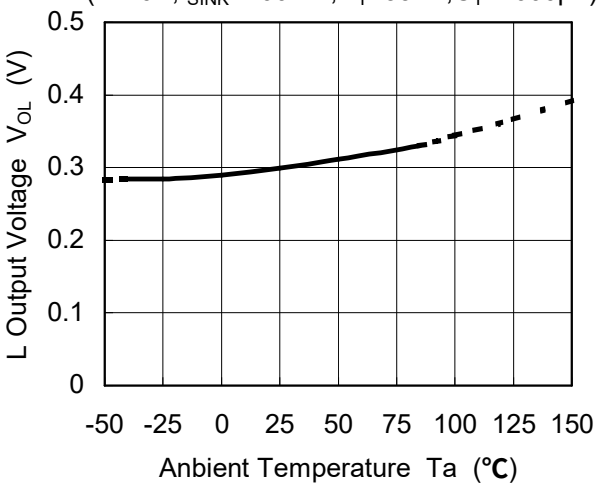
Oscillator Frequency vs. Temperature
(V^+=6V,R_T=33kΩ,C_T=1000pF)



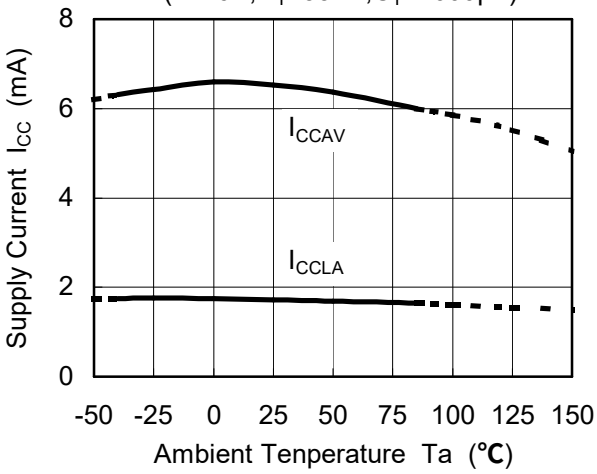
Reference Voltage vs. Temperature
(V^+=6V,I_{OR}=1mA)



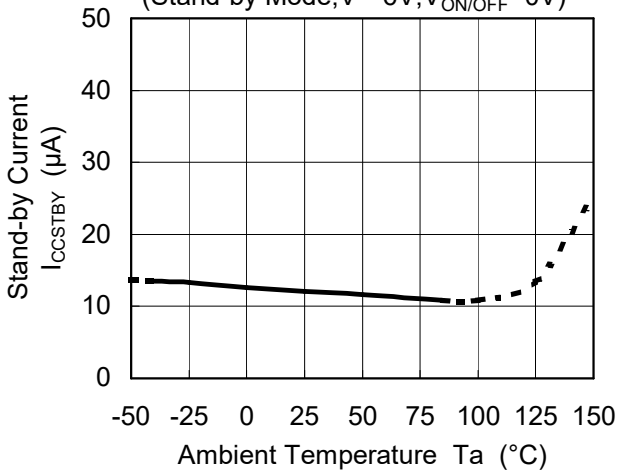
L Output Voltage vs. Tenperature
(V^+=6V,I_{SINK}=100mA,R_T=33kΩ,C_T=1000pF)



Supply Current vs. Tenperature
(V^+=6V,R_T=33kΩ,C_T=1000pF)



Stand-by Current vs. Temperature
(Stand-by Mode,V^+=6V,$V_{ON/OFF}$=0V)



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