SWITCHING REGULATOR CONTROL IC

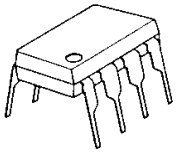
■GENERAL DESCRIPTION

The **NJM2377** is a high speed low voltage operation switching regulator control IC.

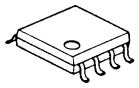
It features a totem pole driver circuit that can directly drive an external Bipolar transistor.

The **NJM2377** is suitable for potable applications, including TFT panel supply with fly-back configuration.

■PACKAGE OUTLINE



NJM2377D



NJM2377M

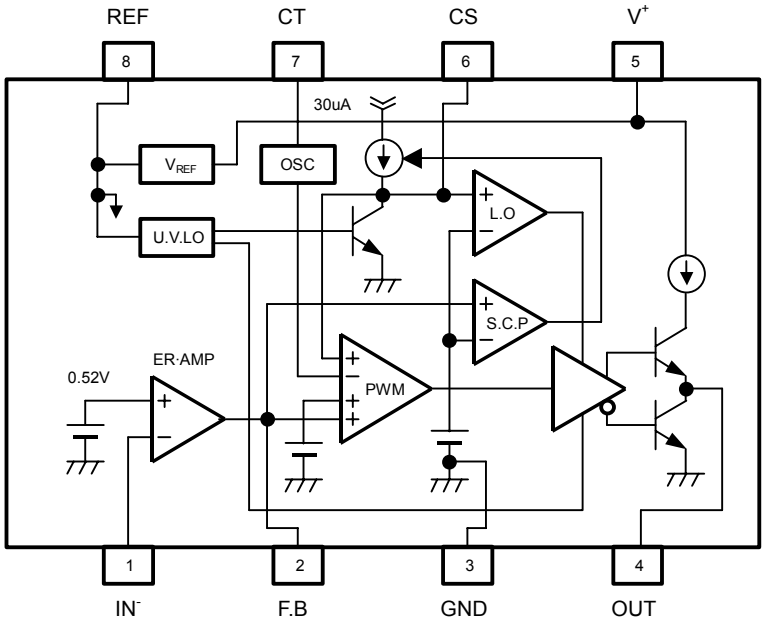
NJM2377V

NJM2377R

■FEATURES

- PWM switching control
- Operating Voltage (2.7 to 18V)
- Wide Oscillator Range (10 to 500 kHz)
- ON/OFF Maximum Duty Cycle (Ton:Toff = 9:1)
- Totem Pole Output
- Soft-Start Function
- UVLO (Under Voltage Lockout)
- Bipolar Technology
- Package Outline DIP8, DMP8, SSOP8, VSP8

■BLOCK DIAGRAM



PIN FUNCTION

1. IN^-
2. F.B
3. GND
4. OUT
5. V^+
6. CS
7. CT
8. REF

■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	V^+	18	V
Output Current	I_O	±50	mA
Power Dissipation	P_D	(DIP 8) 700 (DMP 8) 300 (SSOP 8) 250 (VSP 8) 320	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-50 ~ +125	°C

■RECOMEND OPERATING CONDITIONS (V^+=3V, Ta=25°C)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Voltage	V^+	2.7	18	V
Feed Back Resistor	R_{NF}	100	–	kΩ
Oscillator Timing Capacitor	C_T	220	22,000	pF
Oscillator Timing Resistor	R_T	5	100	kΩ
Oscillation Frequency	f_{OSC}	10	500	kHz

■ELECTRICAL CHARACTERISTICS (V^+=3V,R_T=39kΩ,C_T=470pF,Ta=25°C)

REFERENCE VOLTAGE BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{REF}	I_{OR}=1mA	1.47	1.50	1.53	V
Line Regulation	ΔV_O-V_{IN}	V^+=2.7 ~ 18V, I_{OR}=1mA	–	3.8	11.5	mV
Load Regulation	ΔV_O-I_O	I_{OR}=0.1 ~ 5.0mA	–	5	30	mV

OSCILLATOR BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency	f_{OSC}	R_T=39kΩ, C_T=470pF	80	100	120	kHz
Oscillate Fluctuations1 (Line Fluctuations)	f_{dV}	V^+=2.7 ~ 18V	–	1	–	%
Oscillate Fluctuations2 (Temp Fluctuations)	f_{dT}	Ta=-40°C ~ +85°C	–	5	–	%

ERROR AMPLIFIER BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_B		0.51	0.52	0.53	V
Input Bias Current	I_B		–	5	100	nA
Open Loop Gain	A_V		–	90	–	dB
Gain Bandwidth Product	G_B		–	1.0	–	MHz
Maximum Output Voltage (F.B Pin)	V_{OM+}	R_{NF}=100kΩ, IN^- Pin=0V	1.9	2.2	2.4	V
	V_{OM-}	R_{NF}=100kΩ, IN^- Pin=0V	–	–	200	mV
Output Source Current (F.B Pin)	I_{OM+}	V_{OM}=1V, IN^- Pin=0V	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%	–	0.45	0.65	V
Input Threshold Voltage (F.B Pin)	V_{TH80}	duty·cycle=80%	–	1.05	–	V
Maximum Duty Cycle	αM	F.B Pin=1.2V R_T=39kΩ, C_T=470pF	80	90	–	%

SOFT START CIRCUIT BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Bias Current (CS Pin)	I_{BCS}		–	250	650	nA
Input Threshold Voltage (CS Pin)	V_{THCS0}	duty·cycle=0%, F.B Pin=1.2V	–	0.25	0.35	V
Input Threshold Voltage (CS Pin)	V_{THCS80}	duty·cycle=80%, F.B Pin=1.2V	–	0.79	–	V

■ELECTRICAL CHARACTERISTICS (V^+=3V,R_T=39kΩ,C_T=470pF,Ta=25°C)

SHORT CIRCUIT PROTECTION

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Threshold Voltage (F.B Pin)	V_{THPC}		1.30	1.50	1.80	V
Charge Current (CS Pin)	I_{CHG}	CS Pin=0V, F.B Pin=2V	10	30	50	μA
Latch Mode Threshold Voltage (CS Pin)	V_{THLA}		1.20	1.50	1.80	V

UNDER VOLTAGE LOCKOUT

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
ON Threshold Voltage	V_{THON}		–	1.95	–	V
OFF Threshold Voltage	V_{THOFF}		–	1.78	–	V
Hysteresis Voltage	V_{HYS}		60	170	–	mV

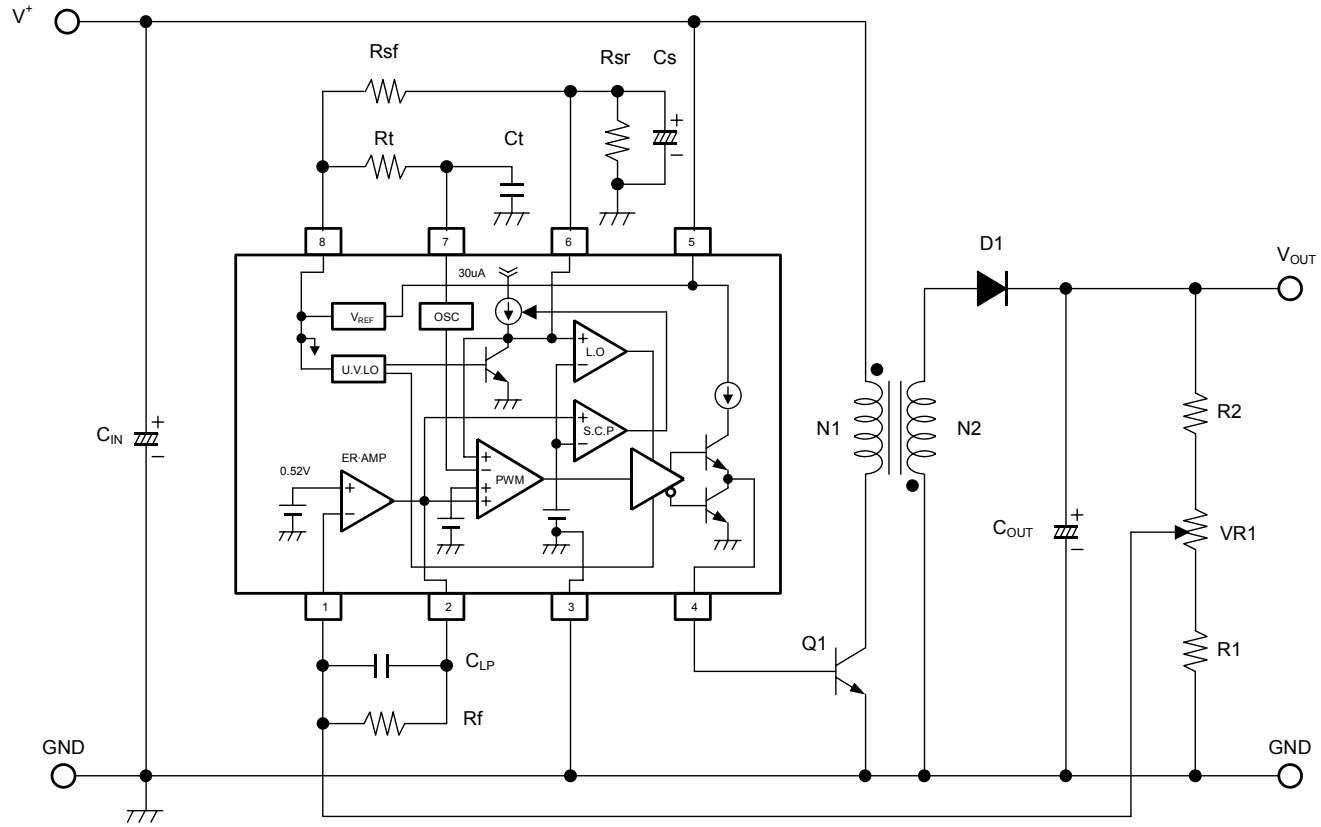
OUTPUT BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
H-Output Voltage (OUT Pin)	V_{OH}	R_L=10kΩ	1.7	2.0	–	V
L-Output Voltage (OUT Pin)	V_{OL}	Output Sink Current=20mA	–	0.25	0.65	V
Output Source Current (OUT Pin)	I_{SOURCE}	Out Pin=0V	23	35	–	mA

GENERAL CHARACTERISTICS

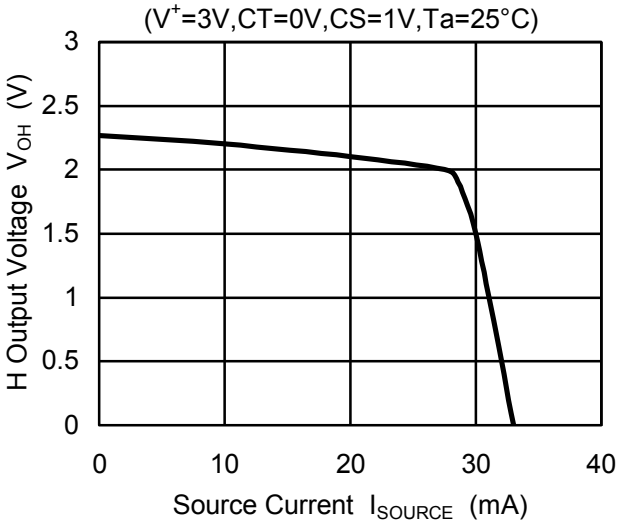
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	I_{CCLA}	Latch Mode, CS Pin=1.8V	–	1.7	2.4	mA
Average Quiescent Current	I_{CCAV}	R_L= ∞ , duty·cycle=50%	–	5.0	6.8	mA

■ TYPICAL APPLICATIONS

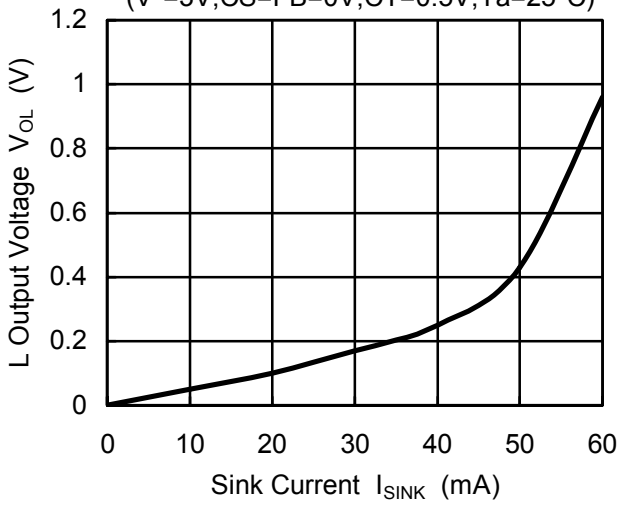


■TIPICAL CHARACTERISTICS

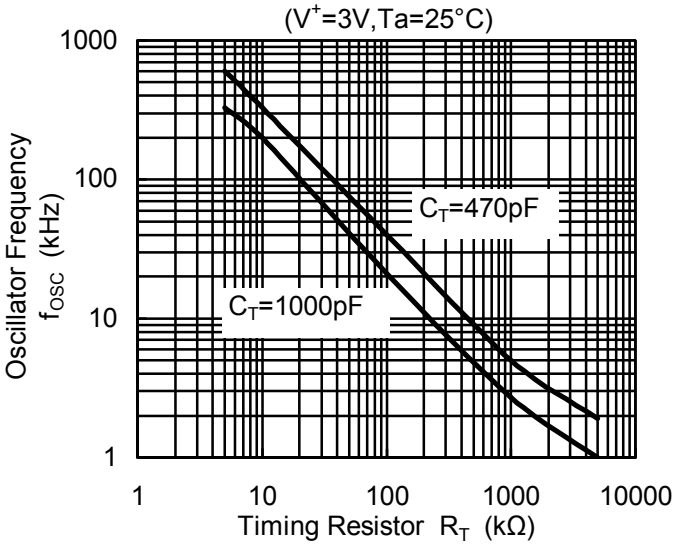
H Output Voltage(OUT Pin) vs. Source Current
(V^+=3V,CT=0V,CS=1V,Ta=25°C)



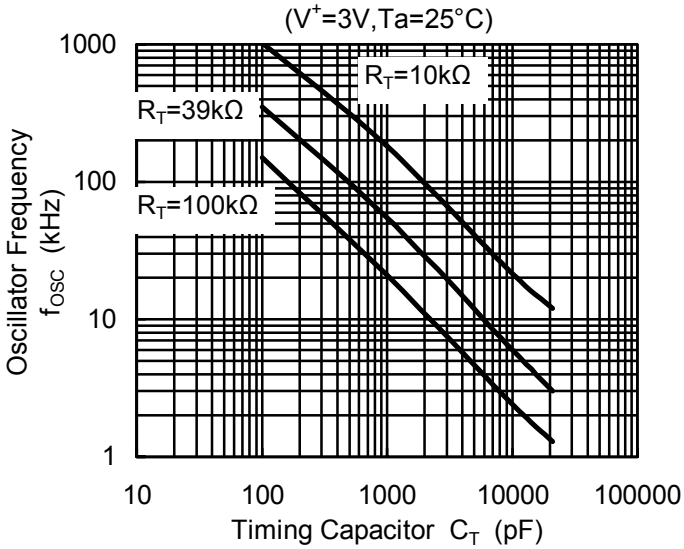
L Output Voltage(OUT Pin) vs. Sink Current
(V^+=3V,CS=FB=0V,CT=0.5V,Ta=25°C)



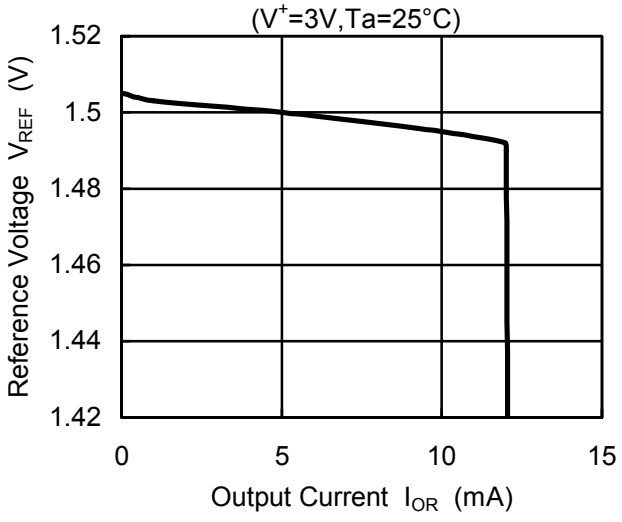
Oscillator Frequency vs. Timing Resistor
(V^+=3V,Ta=25°C)



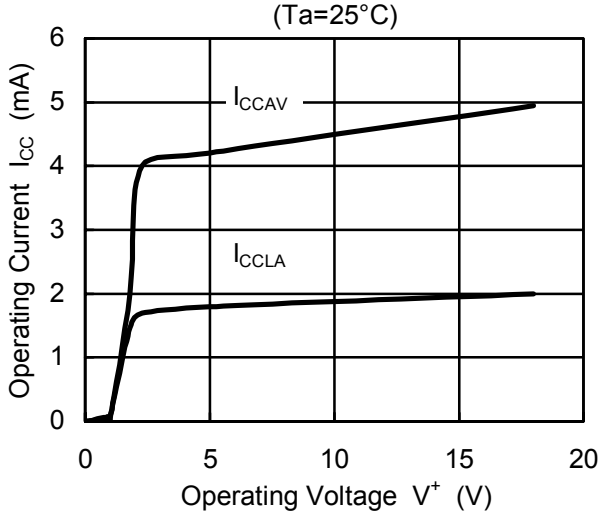
Oscillator Frequency vs. Timing Capacitor
(V^+=3V,Ta=25°C)



Reference Voltage vs. Output Current
(V^+=3V,Ta=25°C)

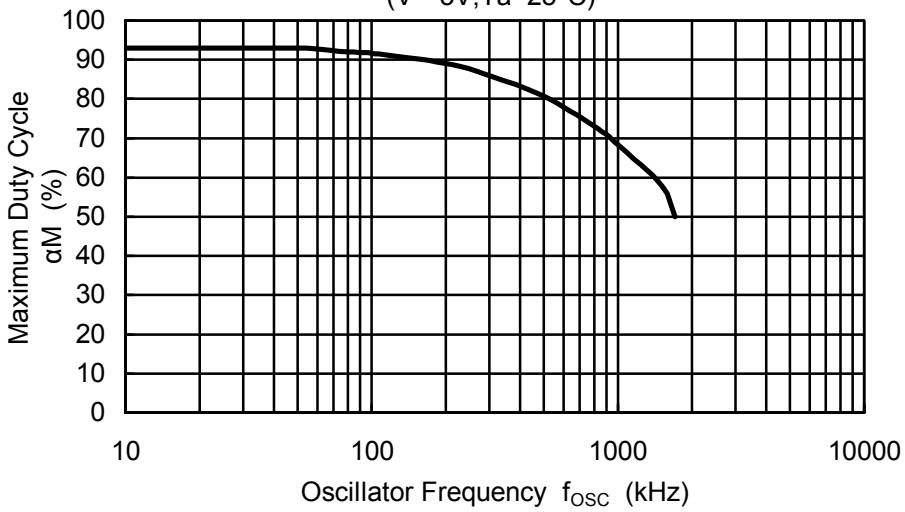


Operating Current vs. Operating Voltage
(Ta=25°C)

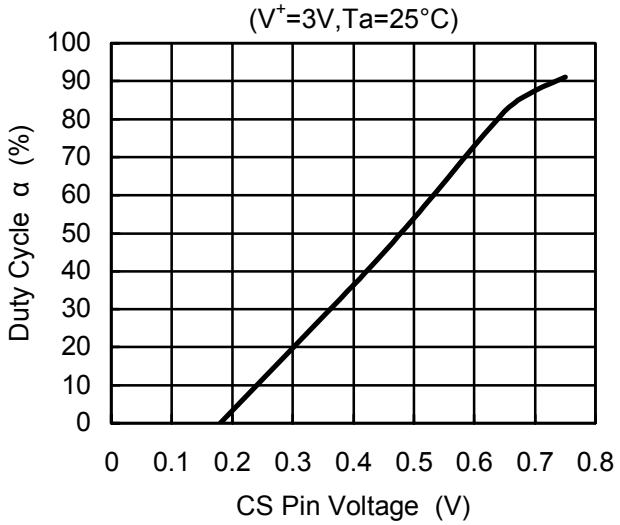


■TIPICAL CHARACTERISTICS

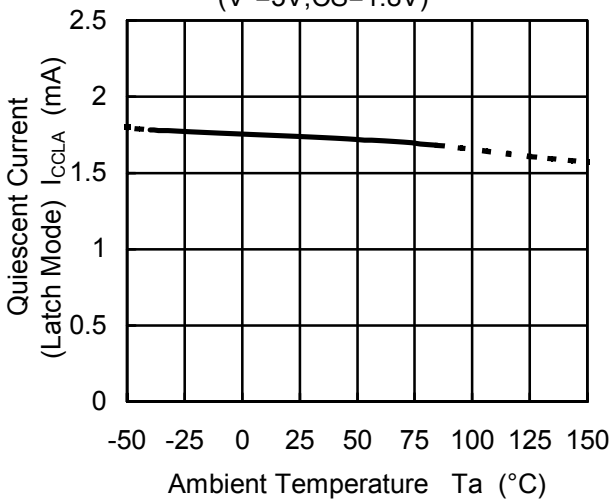
Maximum Duty Cycle vs. Oscillator Frequency
(V^+=3V,Ta=25°C)



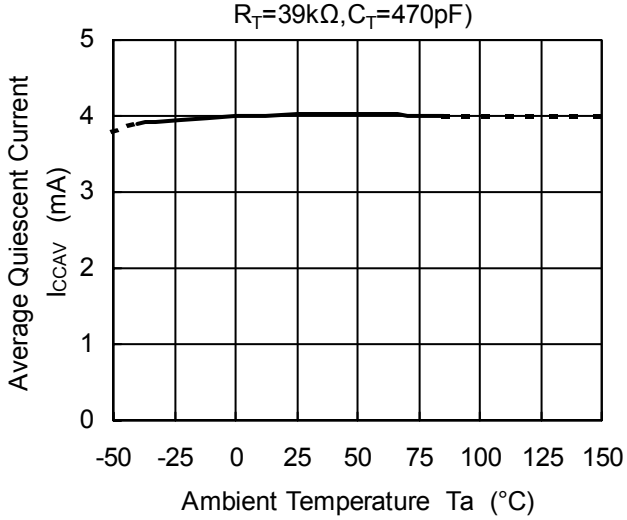
Duty Cycle vs. CS Pin Voltage
(V^+=3V,Ta=25°C)



Quiescent Current(Latch Mode) vs.Temperature
(V^+=3V,CS=1.8V)

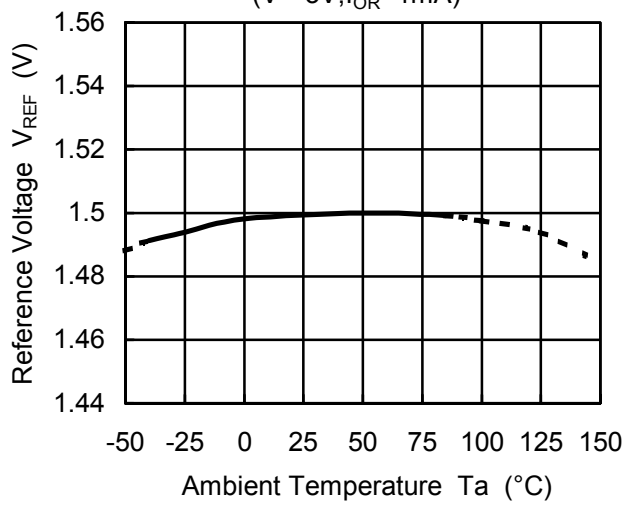


Average Quiescent Current vs. Temperature
(V^+=3V,R_L= ∞ ,duty·cycle=50%
R_T=39kΩ,C_T=470pF)

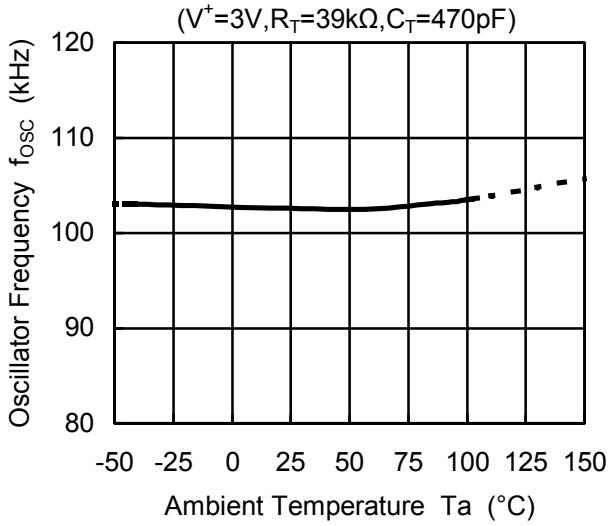


■TIPICAL CHARACTERISTICS

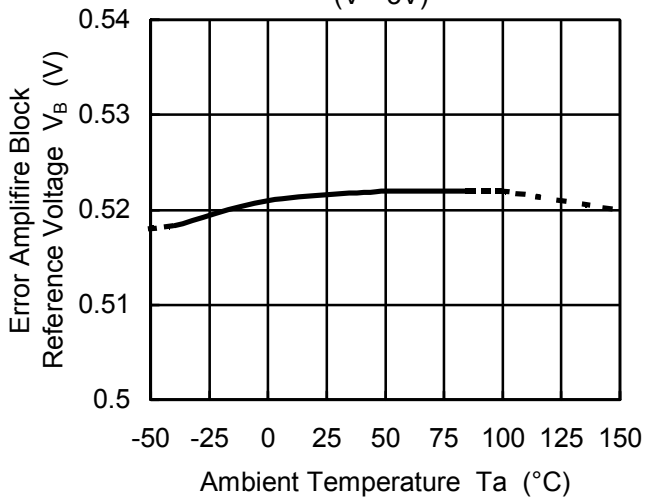
Reference Voltage Block
Reference Voltage vs. Temperature
(V^+=3V,I_{OR}=1mA)



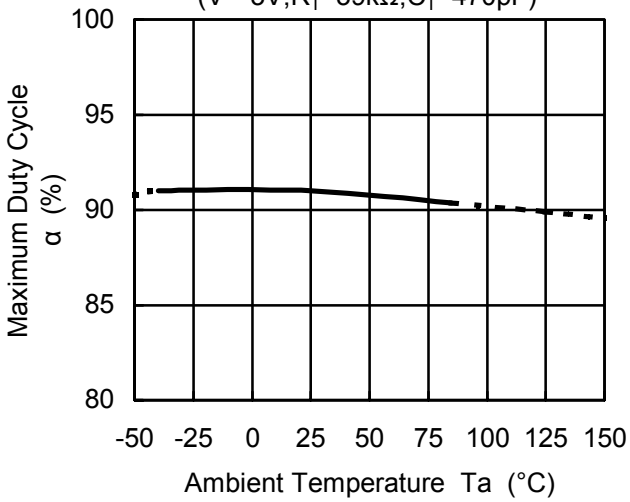
Oscillator Frequency vs. Temperature
(V^+=3V,R_T=39kΩ,C_T=470pF)



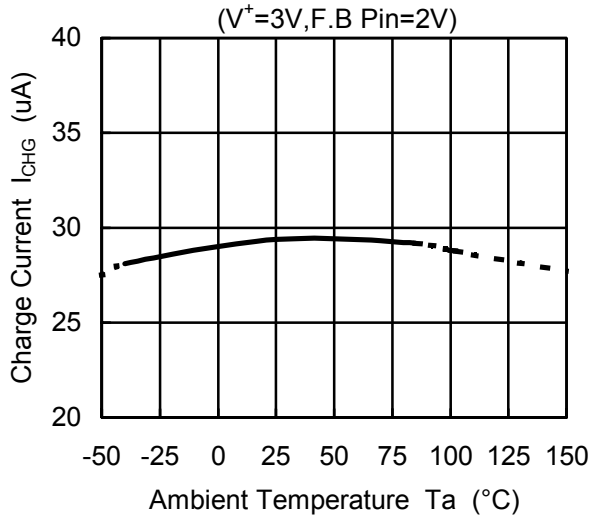
Error Amplifire Block
Reference Voltage vs. Temperaure
(V^+=3V)



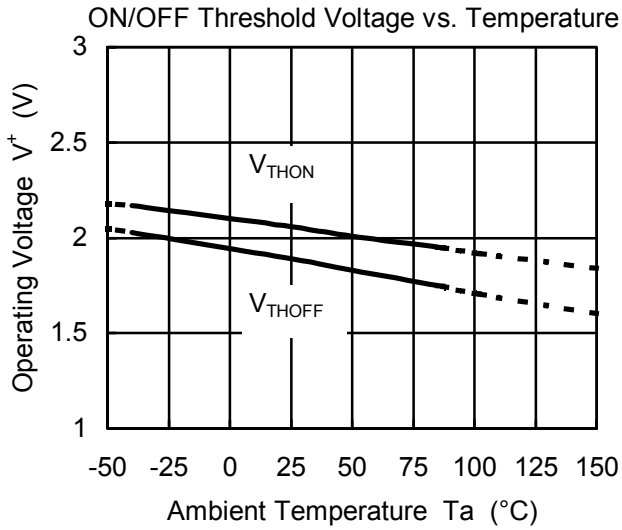
Maximum Duty Cycle vs. Temperature
(V^+=3V,R_T=39kΩ,C_T=470pF)



Charge Current (CS Pin) vs. Temperature
(V^+=3V,F.B Pin=2V)

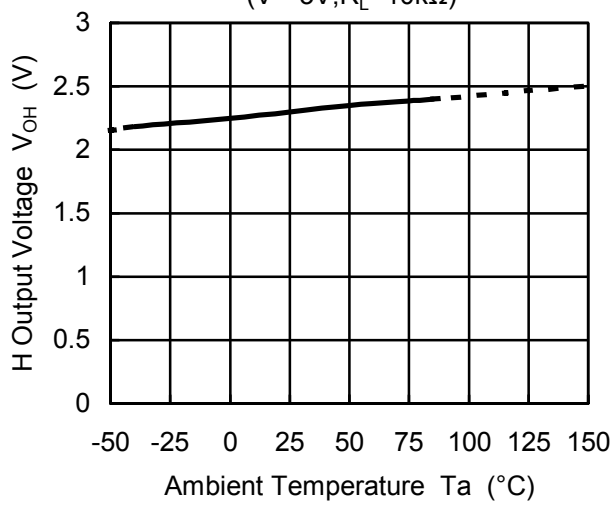


Under Voltage Lockout Block
ON/OFF Threshold Voltage vs. Temperature

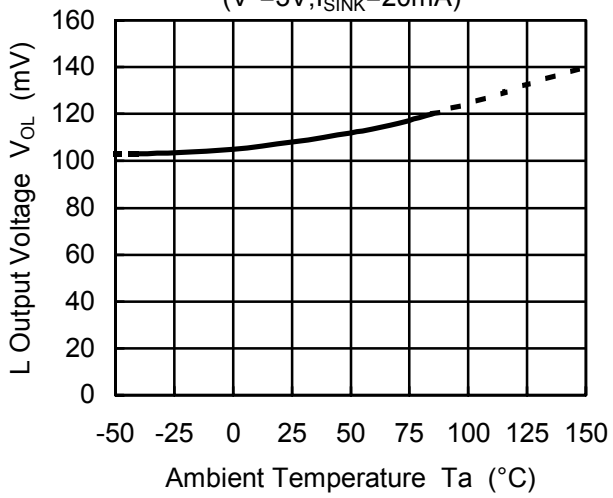


■TIPICAL CHARACTERISTICS

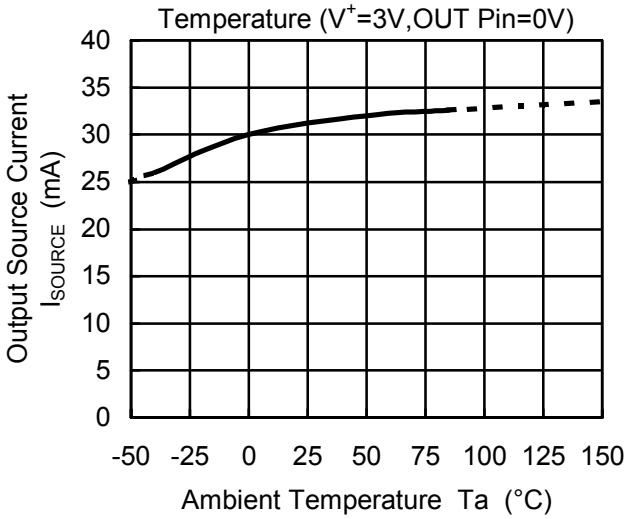
H Output Voltage (OUT Pin) vs. Temperature
(V^+=3V,R_L=10kΩ)



L Output Voltage (OUT Pin) vs. Temperature
(V^+=3V,I_{SINK}=20mA)



Output Source Current (OUT Pin) vs.
Temperature (V^+=3V,OUT Pin=0V)



Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

NJR:

NJM2377V-TE1 NJM2377M NJM2377D NJM2377R-TE2 NJM2377M-TE2 NJM2377M-TE1 NJM2377V-TE2 NJM2377R-TE1