PWM SWITCHING REGULATOR CONTROL IC FOR SLAVE TYPE

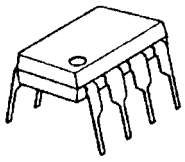
■ GENERAL DESCRIPTION

The **NJM2379** is a high speed switching regulator control IC, and directly drive an external power MOS-FET to use internal totempole output circuit.

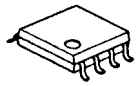
The **NJM2379** operate slave mode which synchronous external oscillation frequency, and the slave mode reduce the total noise.

The **NJM2379** is suitable for flyback type switching regulation up to 10W and several output power supply for LCD panel.

■ PACKAGE OUTLINE



NJM2379D



NJM2379M

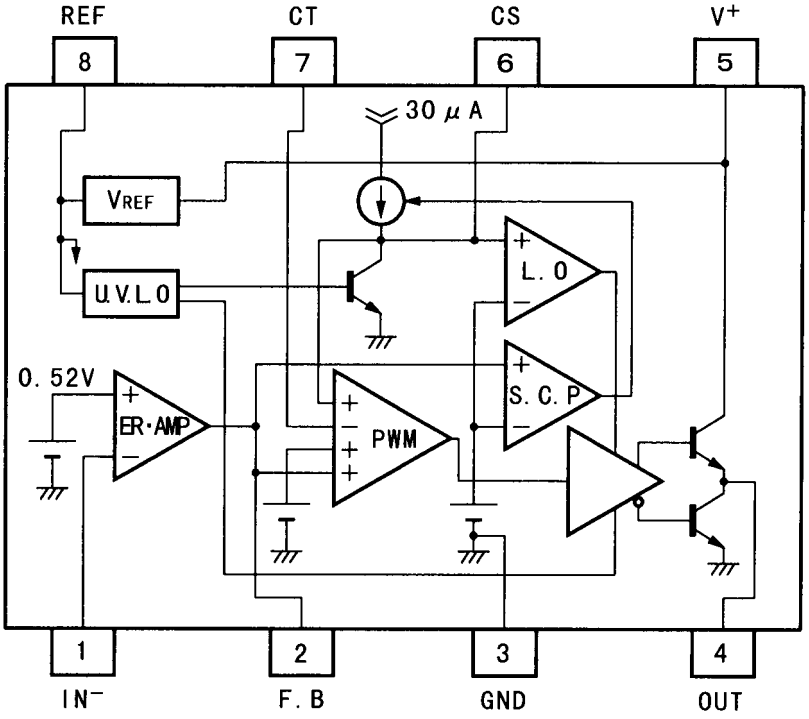
NJM2379E

NJM2379V

■ FEATURES

- Operating Voltage (3.6～32V)
- Reference Voltage (2.5V±2%)
- Input Outside Oscillator Frequency (5～350 kHz)
- Output Switch Current (±8mA min.)
- Under Voltage Lockouts Circuit
- Bipolar Technology
- Package Outline DIP8,DMP8,EMP8,SSOP8

■ BLOCK DIAGRAM



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

■ **ABSOLUTE MAXIMUM RATINGS** (T_a=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	36	V
Reference Output Current	I_{OR}	10	mA
CT Pin Voltage	V_{CT}	1.5	V
Power Dissipation	P_D	(DIP8) 700 (DMP8) 300 (EMP8) 300 (SSOP8) 250	mW
Operating Temperature Range	T_{OPR}	-40 to +85	°C
Storage Temperature Range	T_{STG}	-50 to +125	°C

■ **RECOMMENDED OPERATING CONDITIONS** (V^+=6V, T_a=25°C)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Voltage	V^+	3.6	32	V
Feed Back Resistor	R_{NF}	100	-	kΩ
Oscillate	f_{OSC}	5	350	kHz

INPUT WAVEFORM

PARAMETER	SYMBOL	RECOMMENDED	UNIT
Triangle Waveform	V_{P-P}	0.5	V
Offset Voltage	V_{OFFSET}	0.5	V

■ ELECTRICAL CHARACTERISTICS

(V^+=6V, R_T=33kΩ, C_T=1000pF, T_a=25°C OSC:Triangle Waveform, V_{P-P}=0.5V, Offset=0.5V, f_{OSC}=100kHz)

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^+=3.6 to 32V, I_{OR}=1mA	-	6.8	20.7	mV
Load Regulation	L_{OAD}	I_{OR}=0.1 to 5.0mA	-	5	30	mV

OSCILLATOR 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 Band width Product	G_B		-	0.6	-	MHz
Maximum Output Voltage	V_{OM+}	R_{NF}=100kΩ	V_{REF}-0.2	-	-	V
(F.B Pin)	V_{OM-}	R_{NF}=100kΩ	-	-	200	mV
Output Source Current	I_{OM+}	V_{OM}=1V	40	85	200	μA

PWM COMPARATOR BLOCK

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Triangle Waveform Input Minimum Voltage (CT Pin)	OSC_{LO}	CT Pin Triangle Waveform Input	0	-	0.4	V
Triangle Waveform Input Maximum Voltage (CT Pin)	OSC_{HI}	CT Pin Triangular Wave Input	0.7	-	1.3	V
Input Threshold Voltage (F.B Pin)	V_{TH0}	duty･cycle=0%	-	0.55	0.65	V
Input Threshold Voltage (F.B Pin)	V_{TH50}	duty･cycle=50%	-	0.87	-	V
Maximum Duty Cycle	αM	F.B Pin=1.2V	55	64	85	%

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%	-	0.25	0.35	V
Input Threshold Voltage (CS Pin)	V_{THCS50}	duty･cycle=50%	-	0.52	-	V

■ ELECTRICAL CHARACTERISTICS

(V^+=6V, R_T=33kΩ, C_T=1000pF, T_a=25°C OSC:Triangle Waveform, V_{P-P}=0.5V, Offset=0.5V, f_{OSC}=100kHz)

SHORT CIRCUIT PROTECTION

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Threshold Voltage (F.B Pin)	V_{THPC}		1.20	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}		-	2.70	-	V
OFF Threshold Voltage	V_{THOFF}		-	2.52	-	V
Hysteresis Voltage	V_{HYS}		60	180	-	mV

OUTPUT

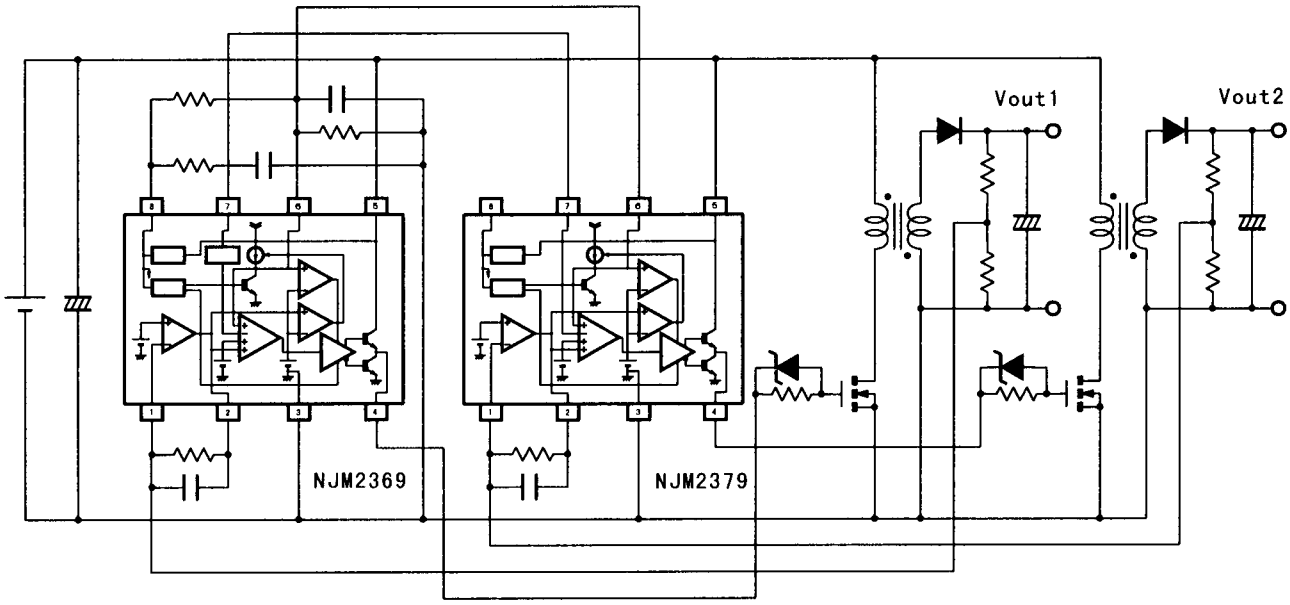
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
H-Output Voltage (OUT Pin)	V_{OH}	R_L=10kΩ	3.50	4.00	-	V
L-Output Voltage (OUT Pin)	V_{OL}	Output Sink Current=20mA	-	0.25	0.65	V
Output Source Current (OUT Pin)	I_{SOURCE}	OUT Pin=0V	-	35	-	mA

GENERAL CHARACTERISTICS

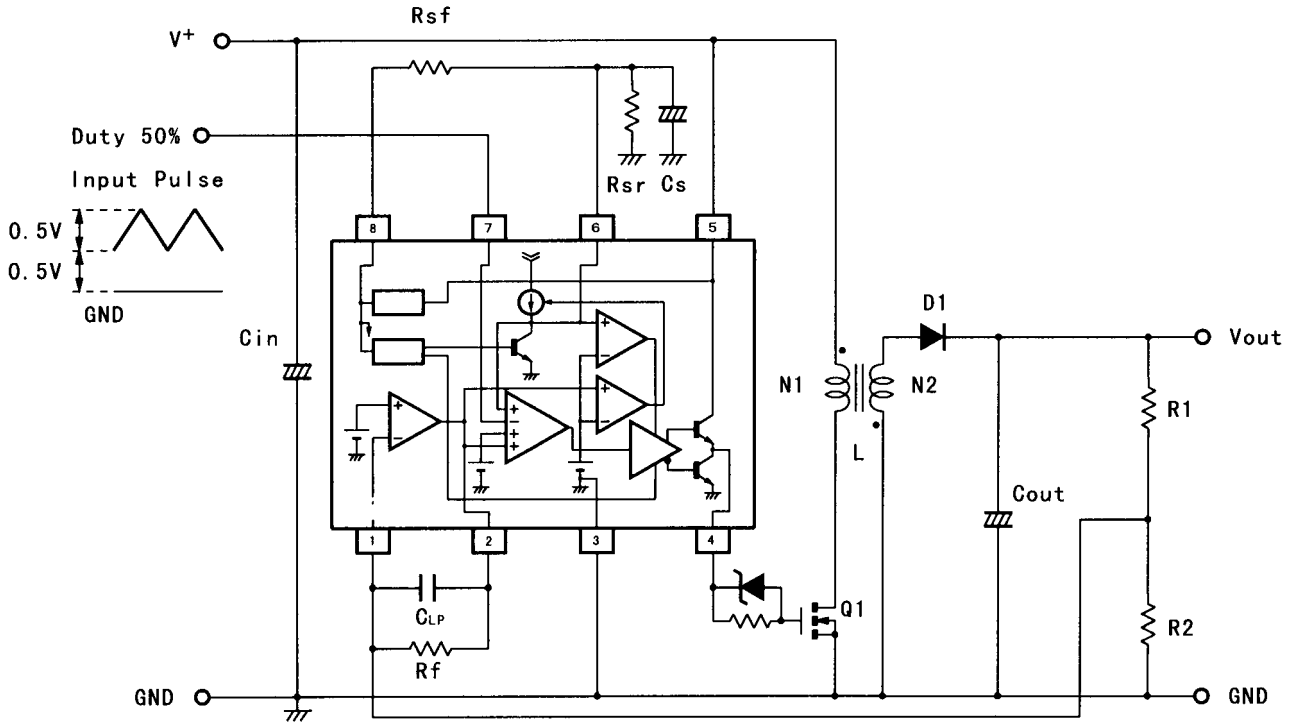
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	I_{CCLA}	Latch Mode	-	1.6	2.2	mA
Average Quiescent Current	I_{CCAV}	R_L=∞, duty·cycle=50%	-	5.2	10.0	mA

■ TYPICAL APPLICATIONS

Synchronous mode with **NJM2368**



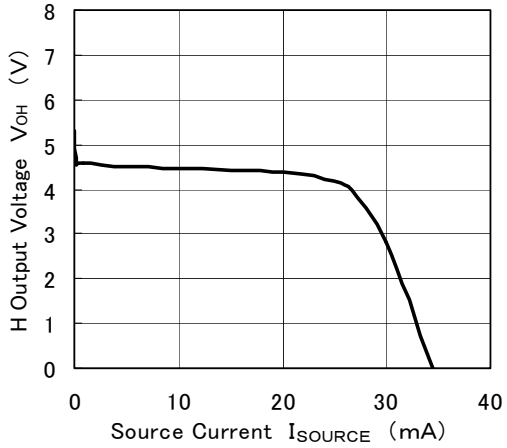
External pulse mode



■ TYPICAL CHARACTERISTICS

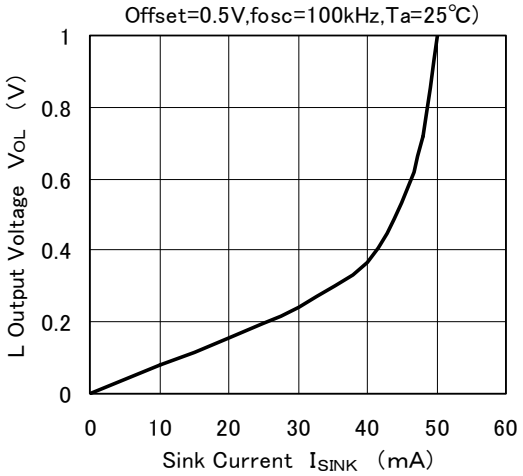
H Output Voltage(OUT Pin) vs. Source Current

(V^+=6V,OUT Pin=0V,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz,Ta=25℃)



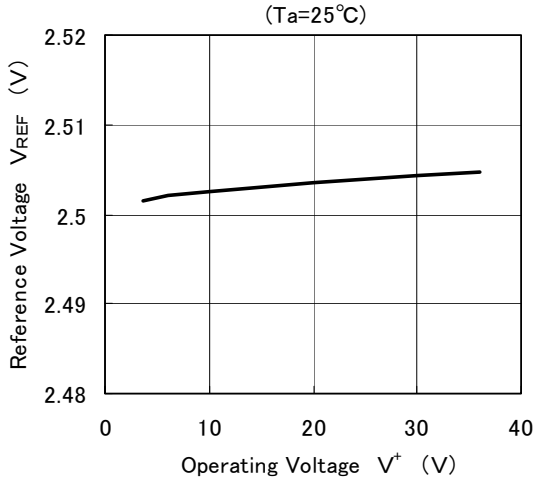
L Output Voltage(OUT Pin) vs. Sink Current

(V^+=6V,OSC:Triangle Waveform,V_{P-P}=0.5V
Offset=0.5V,fosc=100kHz,Ta=25℃)



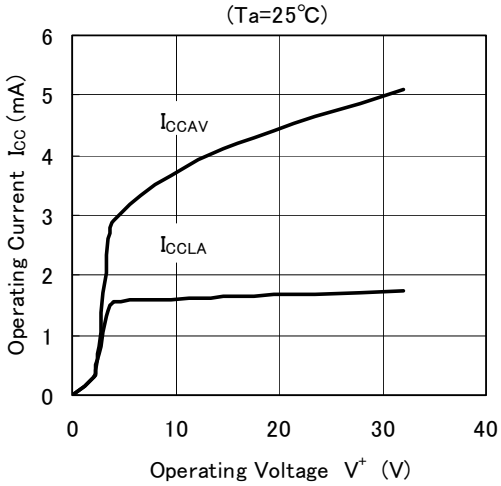
Reference Voltage vs. Operating Voltage

(Ta=25℃)



Operating Current vs. Operating Voltage

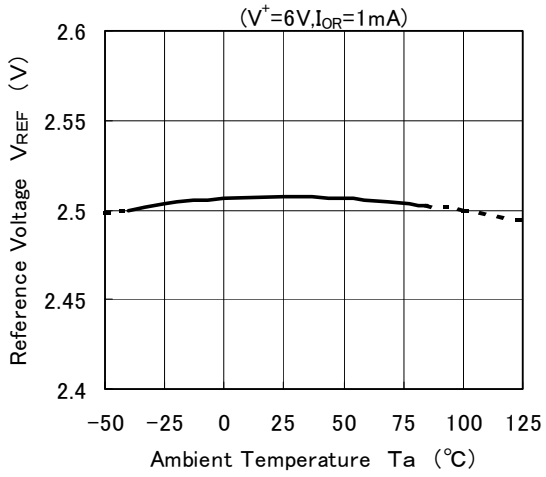
(Ta=25℃)



■ TYPICAL CHARACTERISTICS

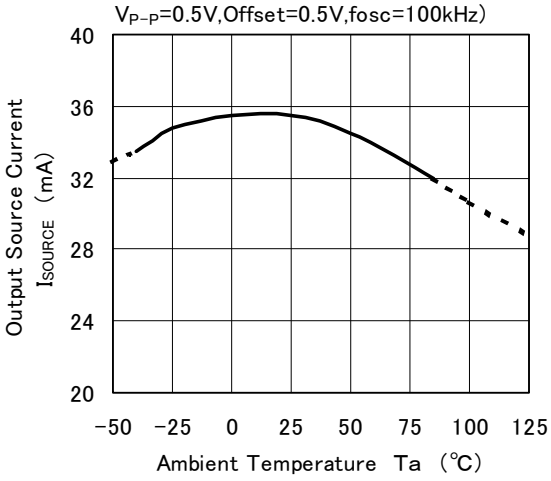
Reference Voltage vs. Temperature

(V^+=6V,I_{OR}=1mA)



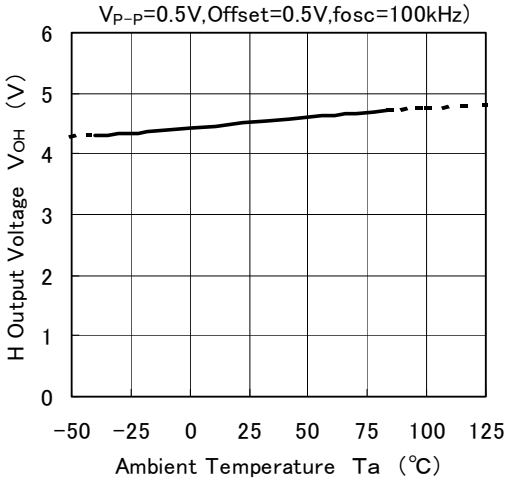
Output Source Current (OUT Pin) vs. Temperature

(V^+=6V,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz)



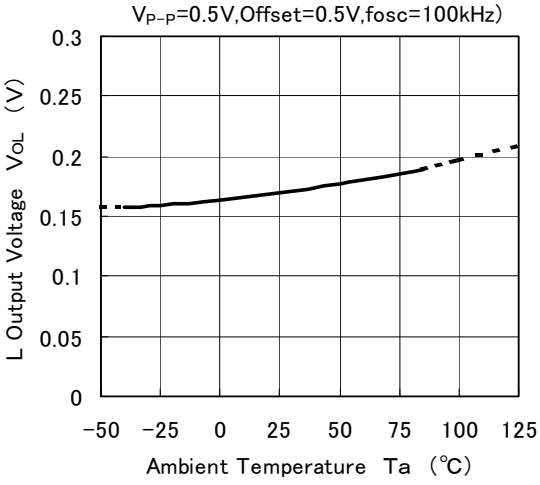
H Output Voltage (OUT Pin) vs. Temperature

(V^+=6V,R_L=10kΩ,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz)



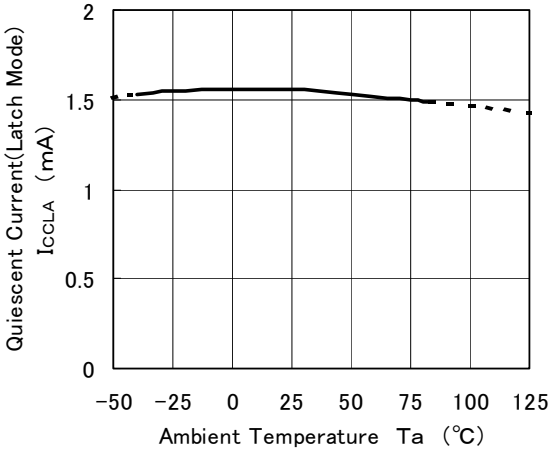
L Output Voltage (OUT Pin) vs. Temperature

(V^+=6V,I_{SINK}=20mA,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz)



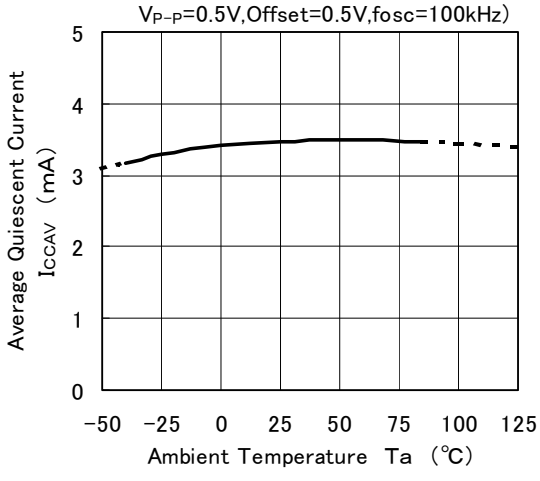
Quiescent Current(Latch Mode) vs. Temperature

(V^+=6V,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz)



Average Quiescent Current vs. Temperature

(V^+=6V,R_L=∞,OSC:Triangle Waveform
V_{P-P}=0.5V,Offset=0.5V,fosc=100kHz)



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