NCP1209

Product Preview

PWM Voltage Mode Controller

The NCP1209P series is an enhanced version of the MC44608P series. It is a high performance voltage mode controller designed for fly–back SMPS.

These 2 series are pin to pin compatible. The device is a Power MOSFET driver offering a discrete approach (controller + discrete MOSFET) for building an offline SMPS.

It features a very high efficiency stand–by management consisting in a fully controlled and adaptable Pulsed Mode operation working in conjunction with a secondary reconfiguration.

Features

- 45 kHz, 65 kHz, 77 kHz
- 7% Frequency Accuracy Over the Whole Temp Range
- Extended V_{CC} Working Range 8.6 V to 16 V
- Programmable Stand–by Burst Duty Cycle
- Stand–by Mode Selection from the Secondary Side of the SMPS
- 5 mA VHV Start–up Current Source
- Device Inhibition Through Start–up Current Source Reduction

Typical Applications

- Energy Management in Set Top Box
- Opto Feed–back Offline SMPS
- SMPS Using a Secondary Reconfiguration for the Stand–by Mode
- Ability to Adapt the MOSFET Gate Drive
- All General Purpose Fly–back SMPS

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

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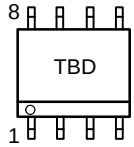
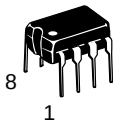
SMPS CONTROLLER WITH ENHANCED STAND–BY MANAGEMENT

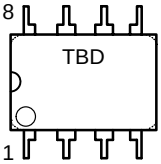
MARKING DIAGRAMS

SO–8
CASE 751
PLASTIC



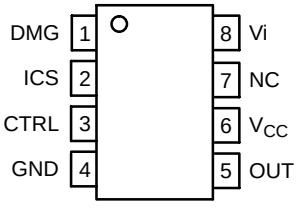


DIP–8
CASE 626
PLASTIC



xx = Specific Device Code
A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

Device	Package	Shipping
NCP1209P45	TBD	TBD
NCP1209P65	TBD	TBD
NCP1209P77	TBD	TBD

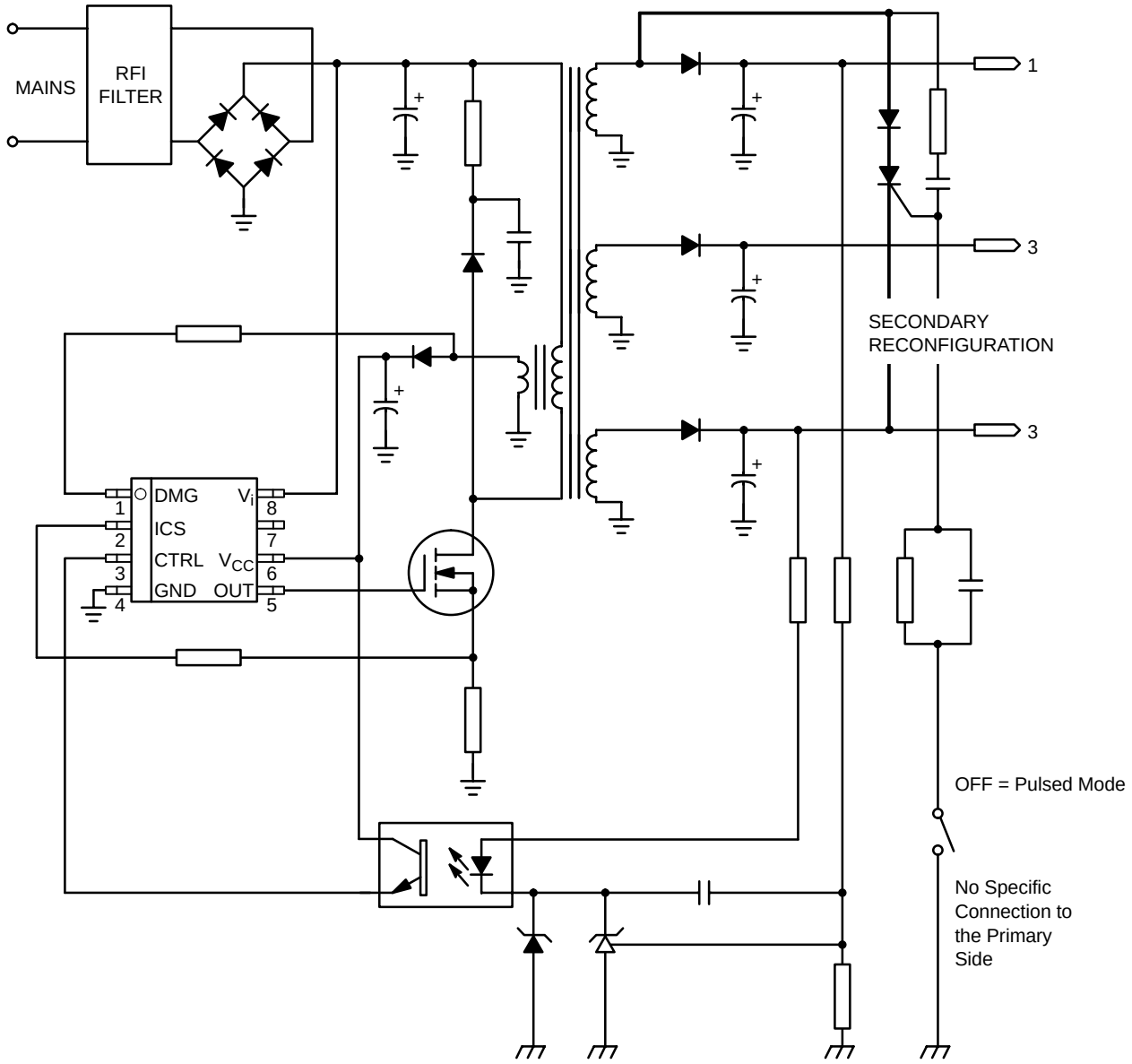


Figure 1. Typical Application Example

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
V_{CC} voltage	V_{CC}	18	V
Pin 3 sink and source current	I_{pin3}	±3	mA
VHV pin8 voltage	V_{pin8}	500	V
Total power supply current	I_{CC}	20	mA
All inputs except Vi	V_{inputs}	–1.0 to +16	V
Power dissipation and Thermal characteristics Thermal Resistance, Junction to Air PDIP Thermal Resistance, Junction to Air SOIC Maximum power dissipation at T_A = 85°C PDIP Maximum power dissipation at T_A = 85°C SOIC	 $R_{\theta JA}$ $R_{\theta JA}$ P_D P_D	 100 178 600 365	 °C/W °C/W mW mW
Operating Junction Temperature	T_J	150	°C
Operating Ambient Temperature	T_A	–25 to +85	°C

ELECTRICAL CHARACTERISTICS (V_{CC} = 10 V, T_J = 0°C up 105°C, Output Loaded with 1 nF)

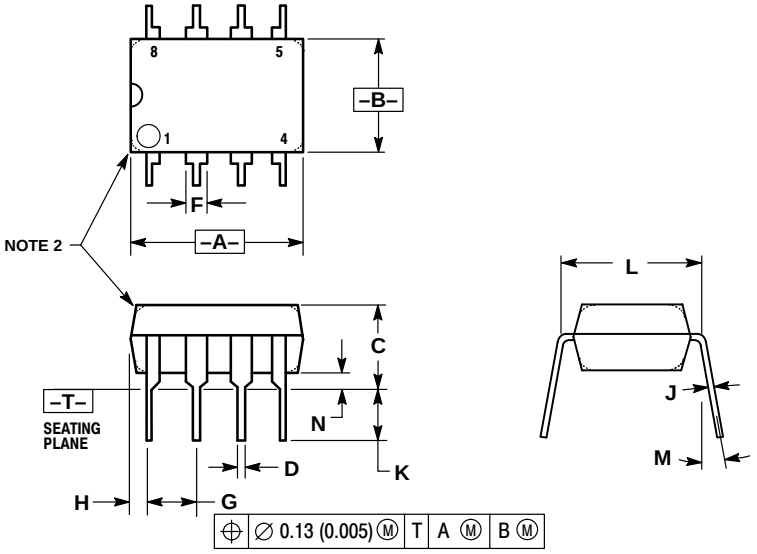
Characteristic	Symbol	Min	Typ	Max	Unit
Output Section					
Output Resistor Sink Source	 R_{OL} R_{OH}	 5 –	 8.5 15	 15 –	W
Output Voltage Rise Time (from 3 V up to 8 V)	t_r	–	50	–	ns
Output Voltage Falling Edge Slew–Rate (from 8 V down to 3 V)	t_f	–	50	–	ns
Control Input Section					
Duty Cycle @ I_{pin3} = 450 μA	$D_{450\ \mu A}$	–	–	0	%
Duty Cycle @ I_{pin3} = 225 μA	$D_{225\ \mu A}$	TBD	43	TBD	%
Control Input Clamp Voltage (Switching phase) @ I_{pin3} = –225 μA	V_{shunt}	4.65	4.9	5.15	V
Latched–off Phase Control Input (stand–by) @ I_{pin3} = 75 μA	$V_{LP-STBY}$	–	TBD	–	V
Latched–off Phase Control Input (stand–by) @ I_{pin3} = 37 μA	$V_{LP-STBY}$	–	TBD	–	V
Internal Pin3 Resistance	R_{int3}	TBD	2	TBD	kΩ
(I_{supply} – I_{CC}) / I_{pin3} (75 μA)	K3(75)	–	20	–	–
(I_{supply} – I_{CC}) / I_{pin3} (75 μA)	K3(37)	–	20	–	–
Current Sense Section					
Maximum Sense Input Threshold	V_{CS-th}	0.9	1.0	1.05	V
Input Bias Current	I_{B-cs}	–1.8	–	+1.8	mA
Current Sense Source Current during Start–up Phase	$I_{CS-stup}$	180	200	220	mA
Stand–by Current Sense Input Current	$I_{CS-stby}$	97	100	103	mA
LEB + Propagation Delay (P45)	T_{DLY}	TBD	TBD	TBD	ns
LEB + Propagation Delay (P65)	T_{DLY}	TBD	TBD	TBD	ns
LEB + Propagation Delay (P77)	T_{DLY}	TBD	350	TBD	ns
Current Sense Propagation Delay (Pin2 to OUT) (P45)	T_{prg}	TBD	TBD	TBD	ns
Current Sense Propagation Delay (Pin2 to OUT) (P65)	T_{prg}	TBD	TBD	TBD	ns
Current Sense Propagation Delay (Pin2 to OUT) (P77)	T_{prg}	TBD	175	TBD	ns
Leading Edge Blanking T_{DLY} – T_{prg} (P45)	T_{LEB}	–	TBD	–	ns
Leading Edge Blanking T_{DLY} – T_{prg} (P65)	T_{LEB}	–	TBD	–	ns
Leading Edge Blanking T_{DLY} – T_{prg} (P77)	T_{LEB}	–	TBD	–	ns
Oscillator Section					
Normal Operation Frequency (P45)	f_{osc}	41.8	45	48.1	kHz
Normal Operation Frequency (P65)	f_{osc}	60.45	65	69.55	kHz
Normal Operation Frequency (P77)	f_{osc}	71.6	77	82.4	kHz
Maximum Duty Cycle @ f = f_{osc}	d_{max}	76	80	84	%
Overvoltage Section					
OVP threshold level on V_{CC}	V_{cc-ovp}	15.9	16.4	16.9	V

ELECTRICAL CHARACTERISTICS (V_{CC} = 10 V, T_J = 0°C up 105°C, Output Loaded with 1 nF)

Characteristic	Symbol	Min	Typ	Max	Unit
Demagnetisation Detection Section					
Demag Comparator Threshold (V_{pin1} decreasing)	$V_{dmg–th}$	45	50	55	mV
Demag Comparator Hysteresis	H_{dmg}	–	30	–	mV
Propagation Delay (Input to Output, Low to High)	$T_{PHL(In/Out)}$	–	300	–	ns
Input Bias Current (V_{demag} = 50mV)	$I_{dem–Ib}$	–0.6	–	–	mA
Negative Clamp Level @ I_{demag} = 50 μA	$V_{cl–neg–dem}$	–0.9	–0.7	–0.4	V
Positive Clamp Level @ I_{demag} = 50 μA	$V_{cl–pos\ dem}$	9	10	11	V
Overtemperature Section					
Overtemp		–	150	–	°C
Normal Mode Recovery Section					
Demagnetisation Voltage for Normal Mode Recovery	Vdem NM	2.38	2.4	2.52	V
Supply Section					
Start–up Voltage	V_{stup}	11.8	12.4	13	V
Output Disabling V_{CC}	V_{uvlo1}	8.2	8.6	9	V
V_{CC} Voltage for Istart–up activation	V_{uvlo2}	5.03	5.3	5.5	V
1st level start–up HV Current Source @ V_{CC} < 1.5 V	I_{CC1}	100	200	300	mA
2nd level start–up HV Current Source @ V_{CC} > 3 V	I_{CC2L}	3.2	4.2	4.8	mA
2nd level start–up HV Current Source @ V_{CC} = 10 V	I_{CC2H}	2.2	3.2	3.8	mA
Start–up Current Source Leakage	$I_{stup\ lk}$	–	70	–	mA
I_{CC} when Switching (P45)	I_{CCS}	TBD	–	TBD	mA
I_{CC} when Switching (P65)	I_{CCS}	TBD	–	TBD	mA
I_{CC} when Switching (P77)	I_{CCS}	2.2	2.6	3	mA
I_{CC} in the Latched Off Phase	I_{CCOFF}	350	500	650	mA
Hiccup Mode Duty Cycle	D_{hiccup}	–	12.5	–	%

PACKAGE DIMENSIONS

DIP–8
CASE 626–05
ISSUE L

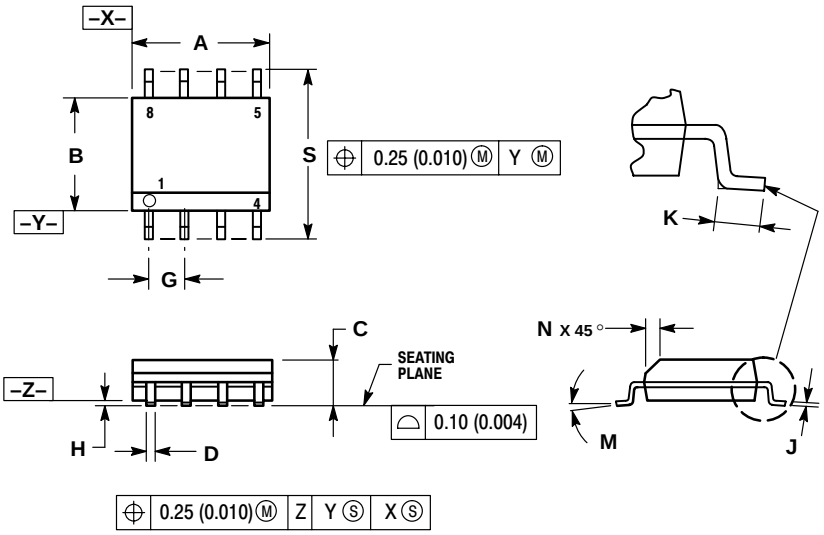


NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	---	10°	---	10°
N	0.76	1.01	0.030	0.040

PACKAGE DIMENSIONS

SO–8
CASE 751–07
ISSUE W



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

Notes

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