

NCP1225

Product Preview

Low Standby Power SMPS Controller

NCP1225 is a low standby power Switch-Mode Power Supply, SMPS controller IC specially designed for low power AC-DC adapter applications. The device operates in Discontinuous Conduction Mode (DCM) with Pulse Frequency Modulation (PFM) control scheme. PFM operation can provide high operating efficiency even at light loading conditions and the device itself takes extremely low operating current. With careful circuit design, low standby power down to 300 mW can be achieved for universal line input low power adapters. This specific feature can help the end products to comply with immediate and future international power saving regulations easily.

An innovative feedback compensation scheme is integrated in NCP1225 to eliminate the expensive optocoupler in the feedback path. By only using simple auxiliary winding feedback, the regulator still can achieve good output voltage regulation usually not possible with common SMPS controller ICs without optocoupler. For even better regulation applications, optocoupler feedback can still be used in place. Additionally, value-added features as overvoltage protection, undervoltage lockout and overcurrent protection functions are also included. This controller is an ideal solution for low power adapters and mobile phone chargers. With all valuable features, this device is available in the tiny TSOP-5 package.

Features

- Current Mode Operation
- Cycle-By-Cycle Current Limiting
- High Efficiency Pulse Frequency Modulation (PFM) Control
- Low Device Operating Current, 0.5 mA Typical
- No Optocoupler Feedback Control
- Extremely Low Standby Power
- Internal Leading Edge Blanking
- Input Undervoltage Lockout Protection
- Output Overvoltage Protection
- Optional Optocoupler Feedback
- Micro Miniature TSOP-5 Package

Typical Applications

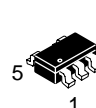
- Low Power Wall Mount Adapters
- Mobile Phone Adapter Chargers
- TV/Computer Auxiliary Power Supply



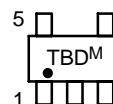
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MARKING DIAGRAM

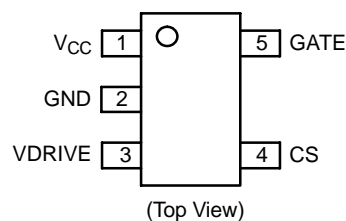


TSOP-5
SN SUFFIX
CASE 483



TBD = Device Code
M = Date Code

PIN CONNECTIONS



ORDERING INFORMATION

Device	Package	Shipping
TBD	TSOP-5	TBD

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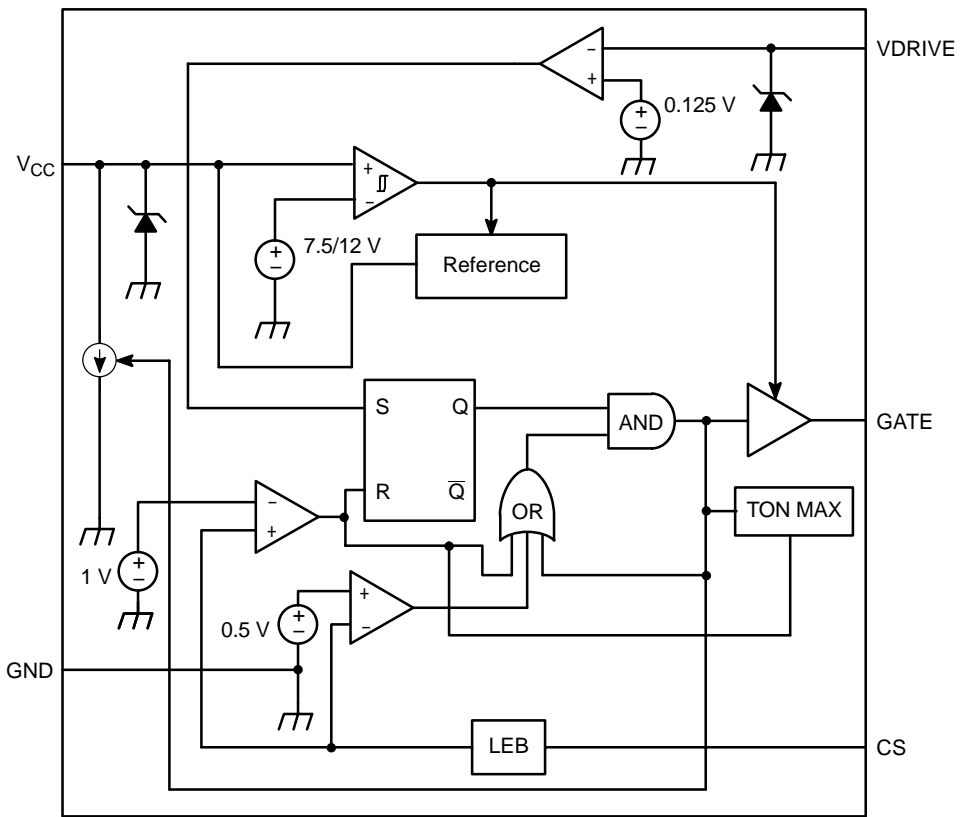


Figure 1. Simple Block Diagram

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PIN FUNCTION DESCRIPTION

Pin	Symbol	Description
1	V _{CC}	This pin is the supply of the IC. When voltage at this pin is higher than 12 V typical, the operation will be activated.
2	GND	This pin is the ground of the primary side of the system.
3	VDRIVE	This pin is also used to detect the current status of secondary winding.
4	CS	The Current Sense pin senses the voltage developed across the current sensing resistor in series with the power MOSFET. This information is used to terminate the output switch conduction cycle.
5	GATE	Controller output to the gate of the power MOSFET.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage, V _{CC}	V _{CC}	-0.3 to 16	V
Gate Output Current, Source Current (Note 1)	I _{O_SRC}	350	mA
Gate Output Current, Sink Current (Note 1)	I _{O_SINK}	450	mA
Thermal Characteristics TSOP-5 Plastic Package, Case 483 Thermal Resistance, Junction-to-Air	R _{θJA}	250	°C/W
Current Sense, CS Input Voltage	V _{CS}	-0.3 to 10	V
VDRIVE Input Voltage	V _{DRIVE}	-0.3 to 10	V
Gate Voltage	V _{GATE}	-0.3 to 16	V
Operating Junction Temperature	T _J	-25 to +150	°C
Operating Ambient Temperature	T _A	-25 to +105	°C
Storage Temperature Range	T _{stg}	-65 to 150	°C
ESD Capability, HBM Model	-	2.0	KV
ESD Capability, Machine Model	-	200	V

1. Maximum package power dissipation limits must be observed.

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ELECTRICAL CHARACTERISTICS

(For typical values $V_{CC} = 13\text{ V}$, $T_A = 25^\circ\text{C}$, and for min/max values $T_A = -25^\circ\text{C}$ to $+105^\circ\text{C}$, unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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CURRENT SENSE COMPARATOR (PIN 4)

Current Sense Reset Threshold	V_{CS_RESET}	0.95	1.0	1.05	V
Current Sense Set Threshold	V_{CS_SET}	0.475	0.5	0.525	V
Input Bias Current	I_{IB}	–	TBD	–	μA
Propagation Delay (Current Sense Input to Output)	t_{PLH}	–	200	–	ns

VDRIVE (PIN 3)

Vdrive Sense Pin Threshold	$V_{DRIVE_SET_TH}$	0.118	0.125	0.131	V
Input Bias Current	I_{VDRIVE_IB}	–	50	–	nA

GATE (PIN 5)

Output Voltage Rise Time ($C_L = 1.0\text{ nF}$, $T_A = 25^\circ\text{C}$)	t_R	–	55	–	ns
Output Voltage Fall Time ($C_L = 1.0\text{ nF}$, $T_A = 25^\circ\text{C}$)	t_F	–	40	–	ns
Output Voltage Low State ($I_{sink} = 20\text{ mA}$) ($I_{sink} = 100\text{ mA}$)	V_{OL}	– –	0.27 1.5	– –	V
High State ($I_{source} = 20\text{ mA}$) ($I_{source} = 100\text{ mA}$)	V_{OH}	– –	11.7 10	– –	V
Gate Signal Maximum ON Time	$T_{ON(MAX)}$	8.0	10	12	μs

UNDERVOLTAGE LOCKOUT (PIN 1)

Start-Up Threshold (V_{CC} Rising)	$V_{TH(ON)}$	11	12	13	V
Minimum Operation Voltage After Turn-On	$V_{CC(MIN)}$	6.5	7.5	8.5	V

OVERVOLTAGE PROTECTION (PIN 1)

Overvoltage Protect (OVP) Threshold	$V_{TH(OVP)}$	13.5	14.5	15.5	V
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TOTAL DEVICE

Power Supply Current Startup ($V_{CC} = 10\text{ V}$)	I_{START}	–	–	60	μA
Operating Current (No Switch, $T_A = 25^\circ\text{C}$)	I_{CC}	–	0.5	–	mA

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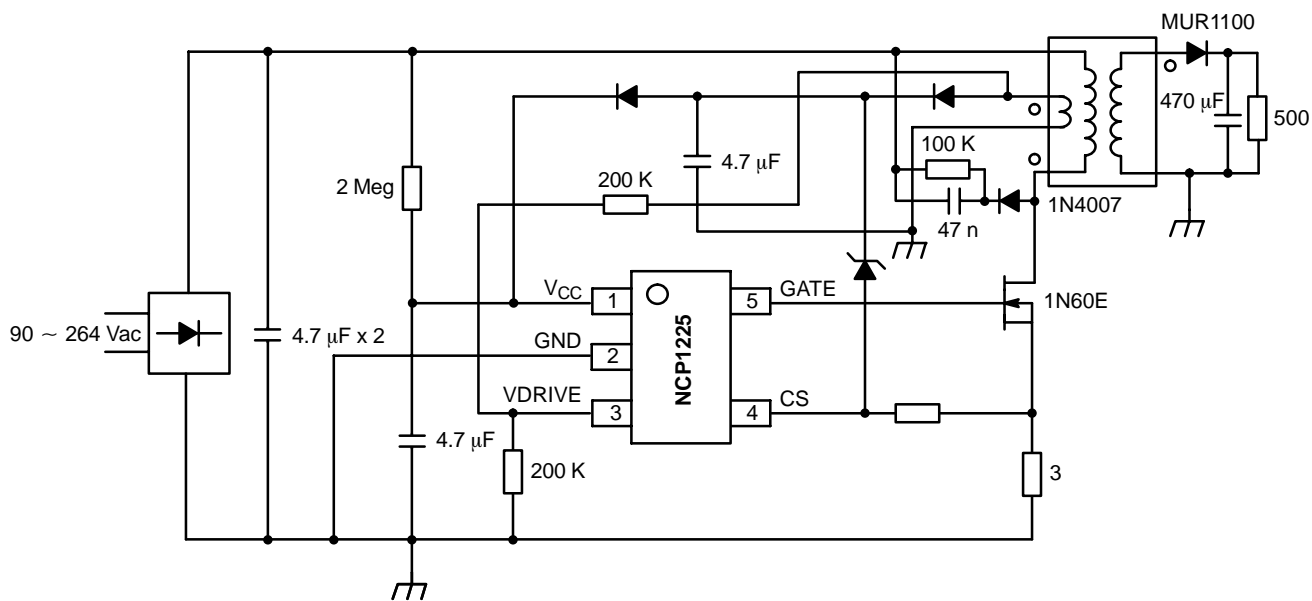
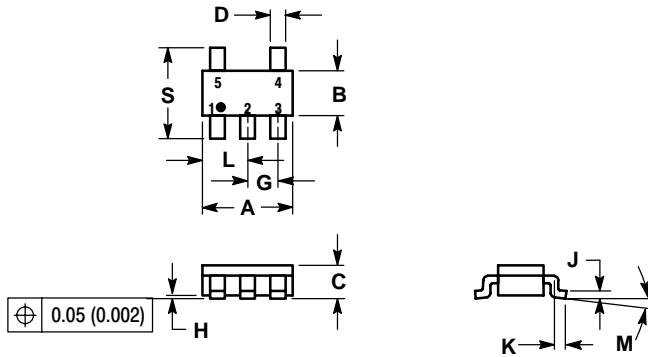


Figure 2. Typical Application Circuit Without Optocoupler

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PACKAGE DIMENSIONS

TSOP-5
SN SUFFIX
CASE 483-02
ISSUE C



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

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