

# NR887D/NR891D Full-Mold, Separate Excitation Step-down Switching Mode Regulator ICs

## Current Mode Control, Synchronous Rectifier Step-down Switching Mode

### ■Features

- DIP 8 pin package
- Input voltage range ( $V_{IN}$ ):  $V_O + 3$  to 18 V
- Synchronous rectifier mode
- High efficiency: 90%
- Introduction of current mode control method
- A ceramic capacitor can be used for output
- Built-in phase correction component
- Output current: 2 A
- Reference voltage and accuracy of  $0.8\text{ V} \pm 2\%$
- Oscillation frequency: 500 kHz
- Output ON/OFF available
- Undervoltage lockout
- Soft start function

### ■Applications

- Power supply for LCDTV and PDP
- Power supply for DVD, BD, and STB
- On-board local power supply
- Power supply for switches

### ■Electrical Characteristics

( $T_a=25^\circ\text{C}$ ,  $V_{IN}=12\text{V}$ ,  $V_O=3.3\text{V}$ , and  $I_O=1.0\text{A}$ , unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min.	typ.	max.		
Reference Voltage	$V_{REF}$	0.784	0.800	0.816	V	
Temperature Coefficient of Reference Voltage	$\Delta V_{REF}/\Delta T$		$\pm 0.05$		mV/C	$T_a=-40^\circ\text{C}$ to $+85^\circ\text{C}$
Efficiency	$\eta$		90		%	
Oscillation Frequency	$f_o$	400	500	600	kHz	
Line Regulation	$V_{LINE}$		50		mV	$V_{IN}=6.3\text{V}$ to $18\text{V}$
Load Regulation	$V_{LOAD}$		50		mV	$I_O=0.1$ to $2.0\text{A}$
Overcurrent Protection Starting Current	$I_S$	3.1		6.0	A	
Quiescent Circuit Current 1	$I_{IN}$		6		mA	$V_{EN}=10\Omega$ pull up to $V_{IN}$
Quiescent Circuit Current 2	$I_{IN(off)}$			10	$\mu\text{A}$	$I_O=0\text{A}$ , $V_{EN}=0\text{V}$
SS Pin	Outflow Current at Low Voltage	6	10	14	$\mu\text{A}$	$V_{SS}=0\text{V}$
	Open Voltage		3.0		V	
EN Pin	Inflow Current		50	100	$\mu\text{A}$	$V_{EN}=10\text{V}$
	On Threshold Voltage	0.7	1.4	2.1	V	
Maximum ON Duty	$DMAX$		90		%	
Minimum ON Time	$DMIN$		150		nsec	
Thermal Protection Start Temperature	$TSD$	151	165		$^\circ\text{C}$	
Thermal Protection Return Hysteresis	$TSD\_hys$		20		$^\circ\text{C}$	

\*: Pin 8 is the SS pin. Soft start at power on can be performed with a capacitor connected to this pin. The SS pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited.

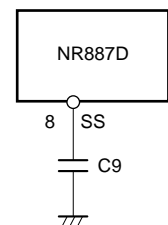
### ■Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
Input Voltage	$V_{IN}$	20	V	
Power Dissipation	$P_D$	1.50	W	When mounted on a $70 \times 60$ mm glass-epoxy board (with a $1310\text{ mm}^2$ copper area)
Junction Temperature	$T_J$	$-40$ to $+150$	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	$-40$ to $+150$	$^\circ\text{C}$	
Thermal Resistance (Junction to Lead (4 pins))	$\theta_{j-c}$	25	$^\circ\text{C}/\text{W}$	
Thermal Resistance (Junction to Ambient Air)	$\theta_{j-a}$	67	$^\circ\text{C}/\text{W}$	When mounted on a $70 \times 60$ mm glass-epoxy board (with a $1310\text{ mm}^2$ copper area)

### ■Recommended Operating Conditions

Parameter	Symbol	Ratings	Unit
Input Voltage Range	$V_{IN}$	$4.5$ or $V_O + 3^*$ to $18$	V
Output Current Range	$I_O$	$0$ to $2.0$	A
Output Voltage Range	$V_O$	$0.8$ to $14$	V
Operating Temperature Range	$T_{op}$	$-40$ to $+85$	$^\circ\text{C}$

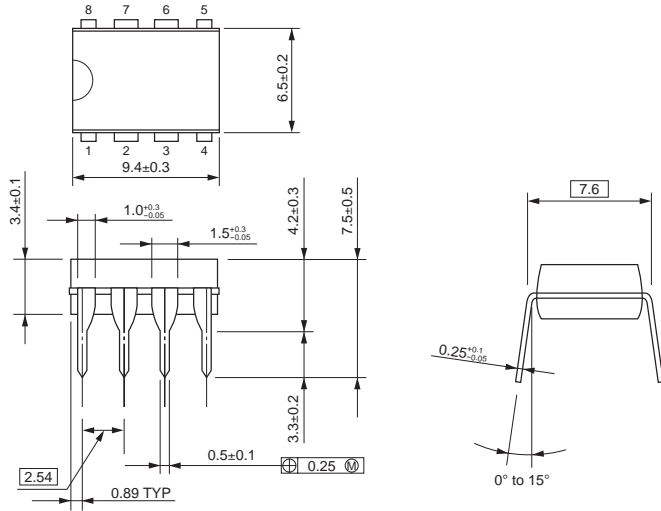
\*: The minimum value of the input voltage range is  $4.5\text{ V}$  or  $V_O + 3\text{ V}$ , whichever is higher.



Soft start

External Dimensions (DIP8)

(Unit : mm)

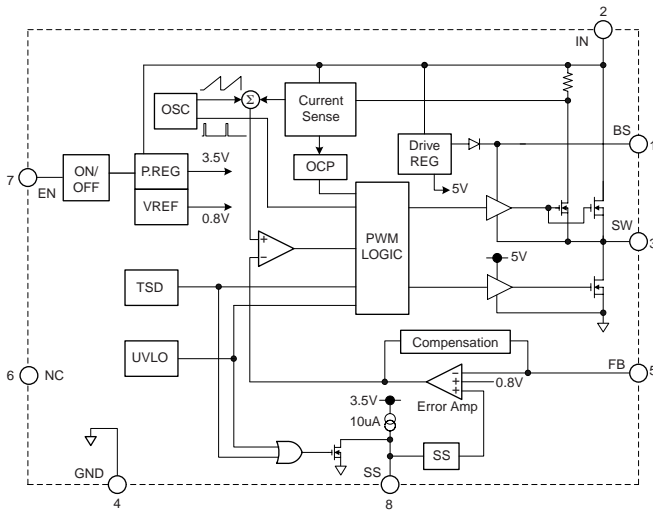


Pin Assignment

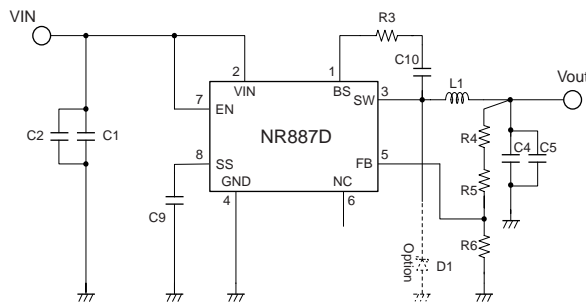
- ① BS
- ② VIN
- ③ SW
- ④ GND
- ⑤ FB
- ⑥ NC
- ⑦ EN
- ⑧ SS

Plastic Mold Package Type  
 Flammability: UL 94V-0  
 Product Mass: Approx. 0.49g

Block Diagram



Typical Connection Diagram



- C1, C2: 10 $\mu$ F/25V
- C4, C5: 22 $\mu$ F/16V
- C9: 0.1 $\mu$ F
- C10: 0.1 $\mu$ F
- L1: 10 $\mu$ H
- R3: 20 $\Omega$  to 47 $\Omega$
- R4+R5: 5k $\Omega$  (Vo=3.3V)
- R6: 1.6k $\Omega$