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 V ± 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

■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 x 60 mm glass-epoxy board (with a 1310 mm² copper area)
Junction Temperature	T_j	–40 to +150	°C	
Storage Temperature	T_{stg}	–40 to +150	°C	
Thermal Resistance (Junction to Lead (4 pins))	$\theta_{j\text{-}c}$	25	°C/W	
Thermal Resistance (Junction to Ambient Air)	$\theta_{j\text{-}a}$	67	°C/W	When mounted on a 70 x 60 mm glass-epoxy board (with a 1310 mm² 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	°C

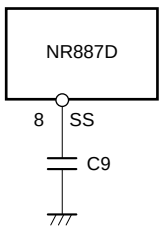
*: The minimum value of the input voltage range is 4.5 V or V_O + 3 V, whichever is higher.

■Electrical Characteristics

(Ta=25°C, V_{IN}=12V, V_O=3.3V, and Io=1.0A, 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		$\Delta V_{REF}/\Delta T$		±0.05		mV/℃	Ta=–40℃ to +85℃
Efficiency		η		90		%	
Oscillation Frequency		fo	400	500	600	kHz	
Line Regulation		V_{LINE}		50		mV	V_{IN}=6.3V to 18V
Load Regulation		V_{Load}		50		mV	I_o=0.1 to 2.0A
Overcurrent Protection Starting Current		I_s	3.1		6.0	A	
Quiescent Circuit Current 1		I_{IN}		6		mA	V_{EN}=10Ω pull up to V_{IN}
Quiescent Circuit Current 2		$I_{IN(off)}$			10	μA	I_o=0A, V_{EN}=0V
SS Pin	Outflow Current at Low Voltage	$I_{EN/SS}$	6	10	14	μA	V_{SS}=0V
	Open Voltage	V_{SSH}		3.0		V	
EN Pin	Inflow Current	I_{EN}		50	100	μA	V_{EN}=10V
	On Threshold Voltage	$V_{C/EH}$	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		℃	
Thermal Protection Return Hysteresis		TSD_hys		20		℃	

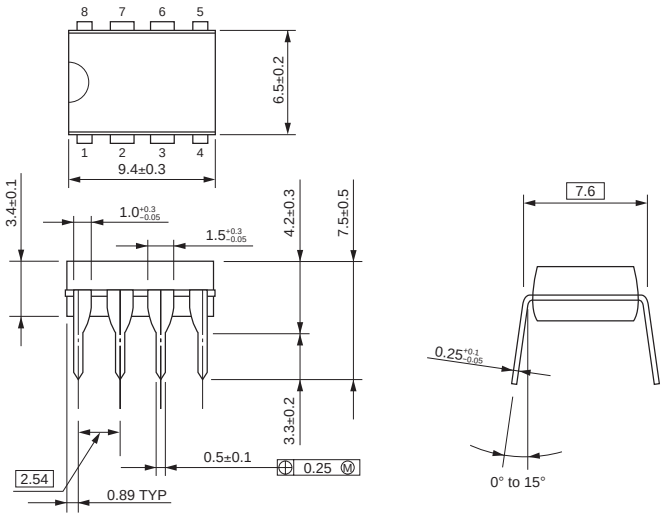
*: Pin 8 is the SS pin. Soft start at power on can be performed with a capacitor connected to this pin.
The SS pin is pulled up to the power supply in the IC, so applying the external voltage is prohibited.



Soft start

■External Dimensions (DIP8)

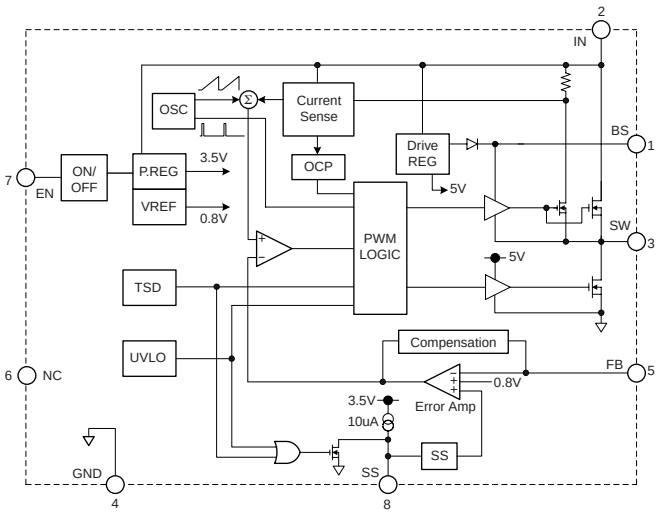
(Unit : mm)



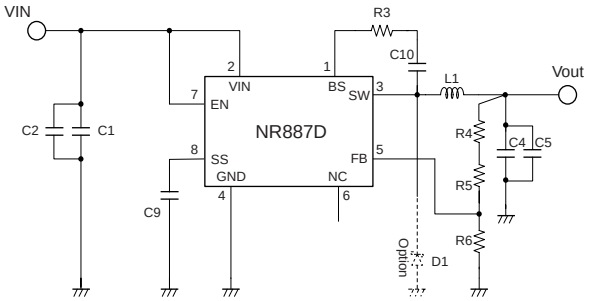
Pin Assignment
① BS
② V_{IN}
③ SW
④ GND
⑤ FB
⑥ NC
⑦ EN
⑧ SS

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

■Block Diagram



■Typical Connection Diagram



C1, C2: 10μF/25V
C4, C5: 22μF/16V
C9: 0.1μF
C10: 0.1μF
L1: 10μH
R3: 20Ω to 47Ω
R4+R5: 5kΩ (V_O=3.3V)
R6: 1.6kΩ