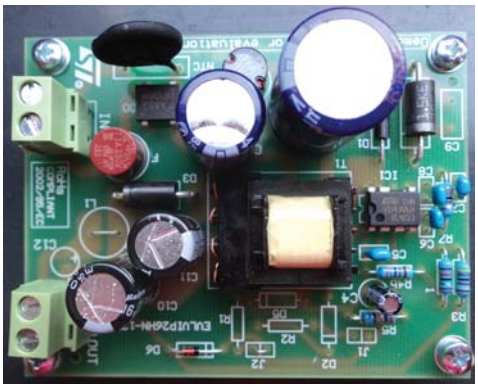
STEVAL-ISA111V1

Wide-range single-output demonstration board based on the VIPER26HN

Data brief

Features

- Universal input mains range:
  - input voltage 90 - 264 V_{AC}
  - frequency 45 - 65 Hz
- Single-output voltage: 12 V at 1 A continuous operation
- Standby mains consumption: < 30 mW at 230 V_{AC}
- Average efficiency: > 80%
- Fully protected against faults (overload, feedback disconnection and overheating)
- EMI: according to EN55022-Class-B
- RoHS compliant



STEVAL-ISA111V1

Description

The STEVAL-ISA111V1 demonstration board is a 12 V, 1 A power supply set in non-isolated flyback topology using the VIPER26HN, the new offline high voltage converter by STMicroelectronics.

The features include an 800 V avalanche rugged power section, PWM operation at 115 kHz with frequency jittering for lower EMI, current limiting with adjustable set point, onboard soft-start, a safe auto-restart after a fault condition and a low standby power. The protections include thermal shutdown with hysteresis, delayed overload protection, and open loop failure protection.

1 Adapter features

Table 1. Electrical specifications

Symbol	Parameter	Value
V_{IN}	Input voltage range	[90 V_{AC} - 265 V_{AC}]
V_{OUT}	Output voltage	12 V
I_{OUT}	Max. output current	1 A
ΔV_{OUT_LF}	Precision of output regulation	± 5%
ΔV_{OUT_HF}	High frequency output voltage ripple	50 mV
T_{AMB}	Max. ambient operating temperature	60 ^{o}C

2 Circuit description

Figure 1. Application schematic - simplified for $V_{OUT} \geq 12$ V

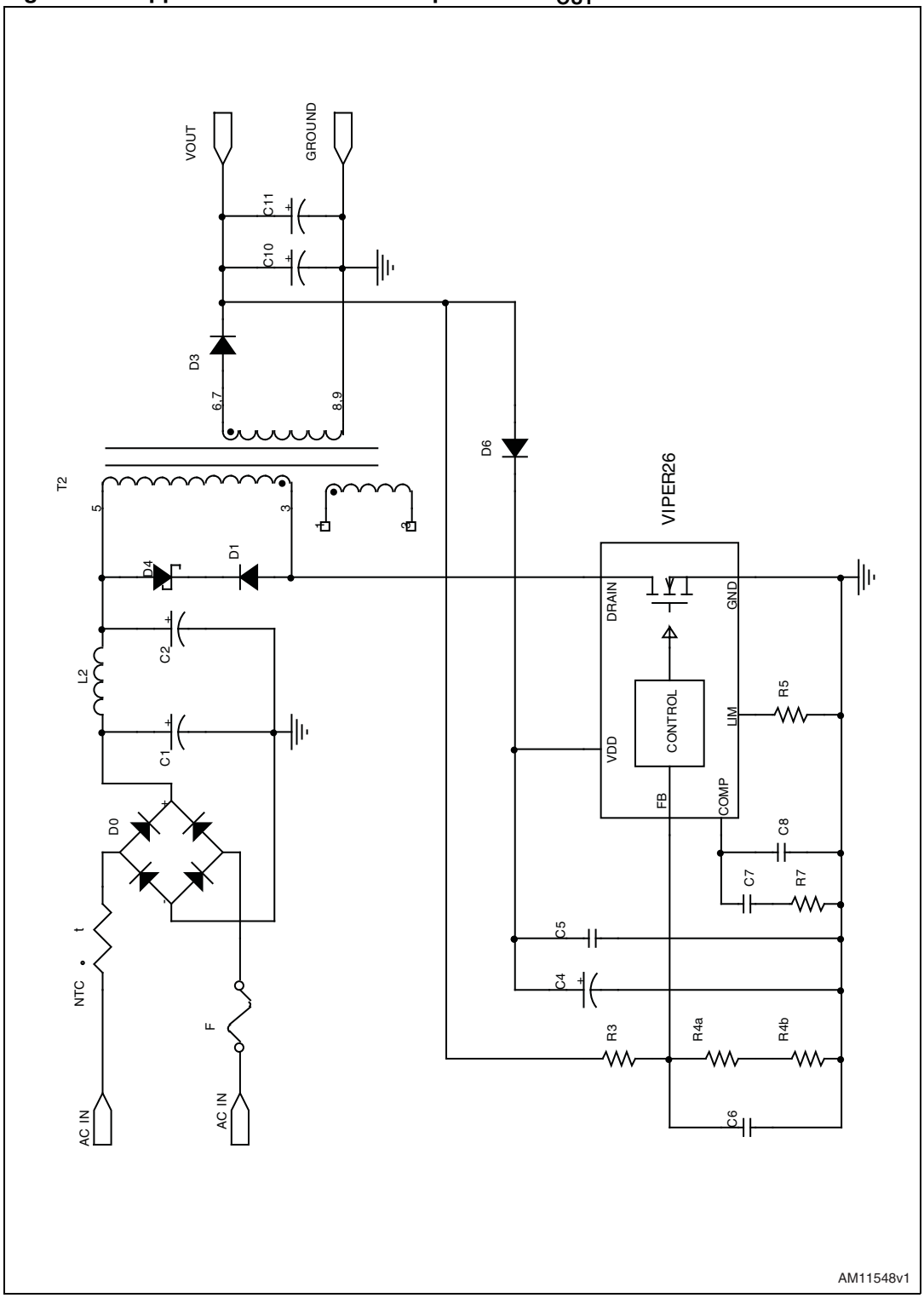


Table 2. Bill of material

Reference	Part	Description	Manufacturer
NTC	2.2 NTC	Thermistor, S236 series	Epcos
F	T2A 250 V	2 A, 250 Vac fuse, TR5 series	Wickmann
C1		10 µF, 400 V NHG series electrolytic capacitor	Panasonic
C2		22 µF, 35 V SMG series electrolytic capacitor	Panasonic
C4		2.2 µF, 63 V electrolytic capacitor	
C5, C7		100 nF, 50 V ceramic capacitor	
C6		2.2 nF, 50 V ceramic capacitor	
C8		2.2 nF, 50 V ceramic capacitor	
C10		1000 F, 16 V ultra low ESR electrolytic capacitor ZL series	Rubycon
C11		680 F, 16 V ultra low ESR electrolytic capacitor ZL series	Rubycon
D0	DF06M	1 A - 600 V diode bridge	Vishay
D1	STTH1L06	1 A - 600 V ultrafast diode	ST
D3	STPS3150	3 A - 150 V power Schottky (output diode)	ST
D4	1.5KE300A	Transil	ST
D6	1N4148	Small signal diode	Fairchild
R3		47 k 1% 1/4 W resistor	
R4a		15 k 1% 1/4 W resistor	
R4b		2.7 k 1% 1/4 W resistor	
R5		27 k 1/4 W resistor	
R7		33 k 1/4 W resistor	
L2	RFB0807-102	Input filter inductor (L = 1 mH, I_{SAT} = 0.3 A; DCRmax = 3.4 Ω)	Coilcraft
T2	1335.0089	115 Hz switch mode transformer	Magnetica
IC1	VIPER26HN	High voltage 115 kHz PWM	ST

3 Measurements

Figure 2. Line regulation

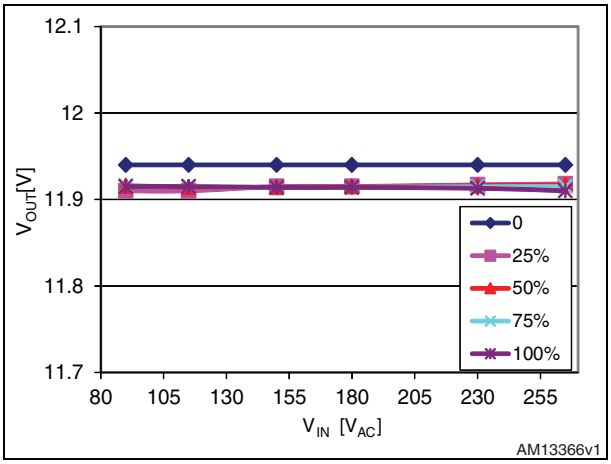


Figure 3. Load regulation

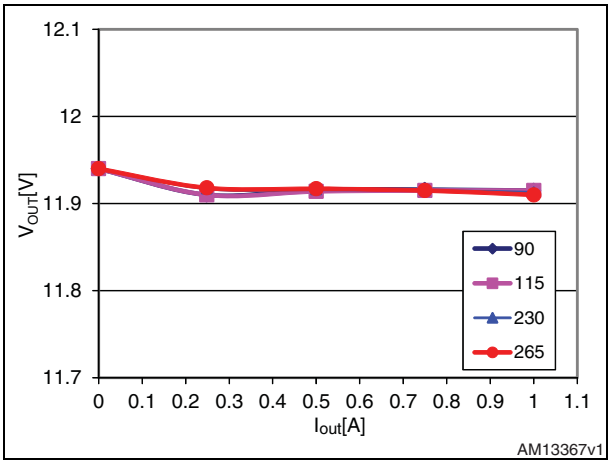


Figure 4. Efficiency vs. V_{IN}

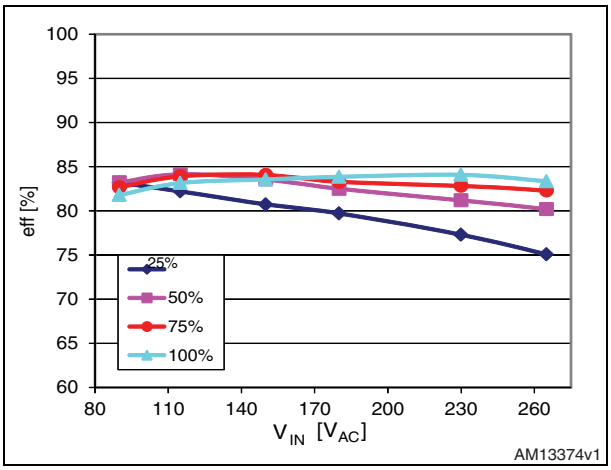


Figure 5. Efficiency vs. load

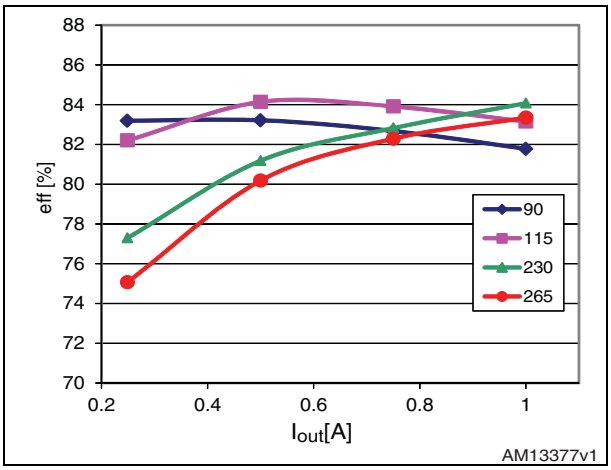


Figure 6. Active mode efficiency vs. V_{IN}

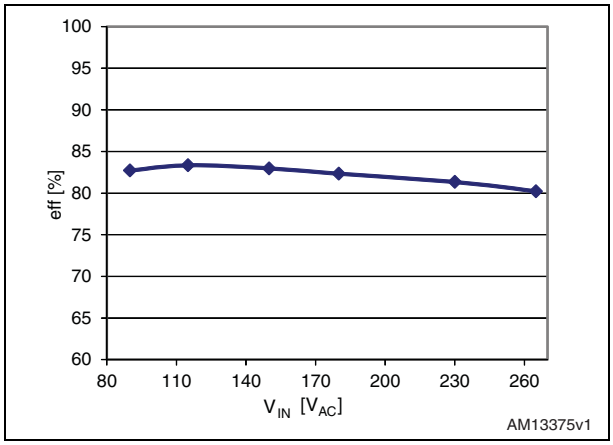


Figure 7. Input voltage averaged efficiency vs. load

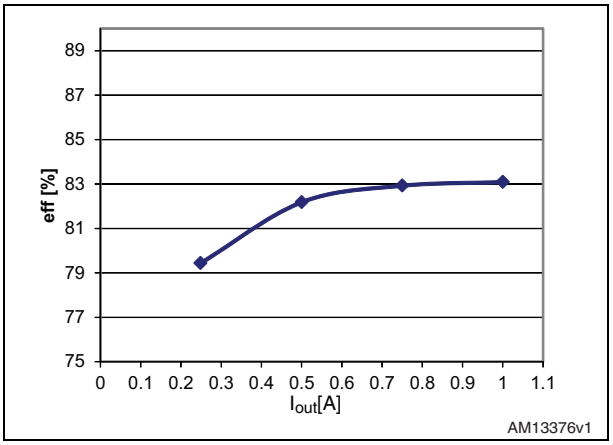


Figure 8. P_{IN} vs. V_{IN} at no load and light load

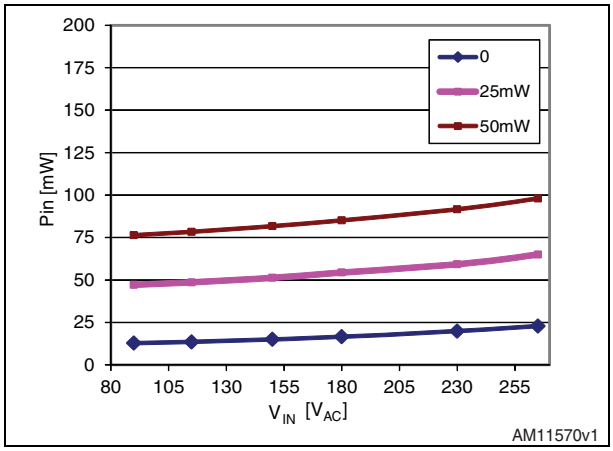
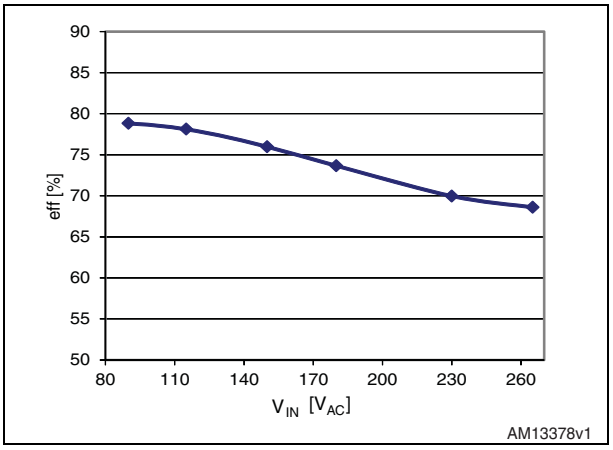
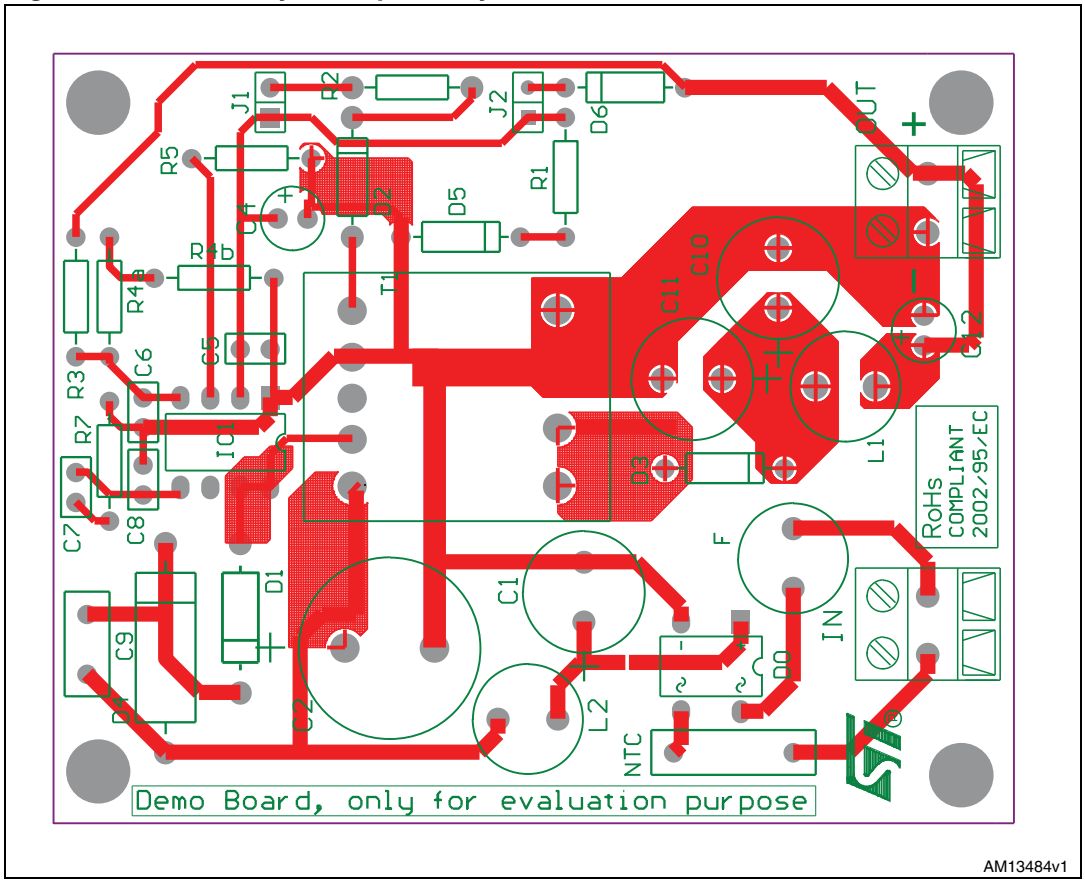


Figure 9. Efficiency vs. V_{IN} at P_{IN} = 1 W



4 Board layout

Figure 10. Bottom layer & top overlay



5 Revision history

Table 3. Document revision history

Date	Revision	Changes
10-Dec-2012	1	Initial release.

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