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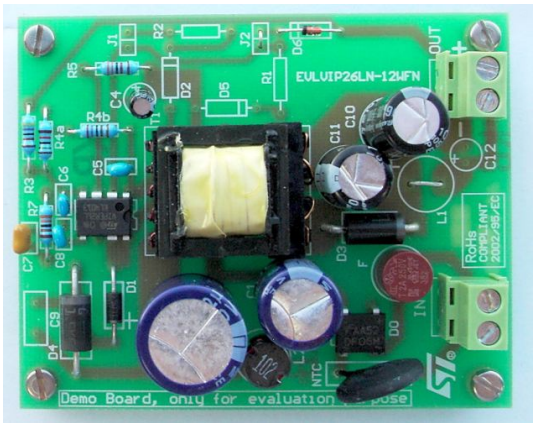
STEVAL-ISA110V1

12 V/12 W wide-range non-isolated flyback based on the VIPER26LN

Data brief

Features

- Universal input mains range:
  - input voltage 90 - 264 V_{AC}
  - frequency 45 - 65 Hz
- Single output voltage: 12 V @ 1 A continuous operation
- Standby mains consumption: < 30 mW @ 265 V_{AC}
- Average efficiency: > 85%
- Fully protected against faults (overload, feedback disconnection and overheating)
- EMI: according to EN55022-Class-B



STEVAL-ISA110V1

Description

The STEVAL-ISA110V1 demonstration board is a 12 V-1 A power supply set in non-isolated flyback topology using the VIPER26LN, a new offline high-voltage converter by STMicroelectronics.

The features of the device include an 800 V avalanche-rugged power section, PWM operation at 60 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 low standby power.

Protection features include thermal shutdown with hysteresis, delayed overload protection, and open loop failure protection.

1 Adapter features

The electrical specifications of the demonstration board are listed in *Table 1*.

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
Δ_{VOUT_LF}	Precision of output regulation	±5%
Δ_{VOUT_HF}	High frequency output voltage ripple	50 mV
T_{AMB}	Max. ambient operating temperature	60 °C

2 Schematic diagrams

Figure 1. Application schematic - complete

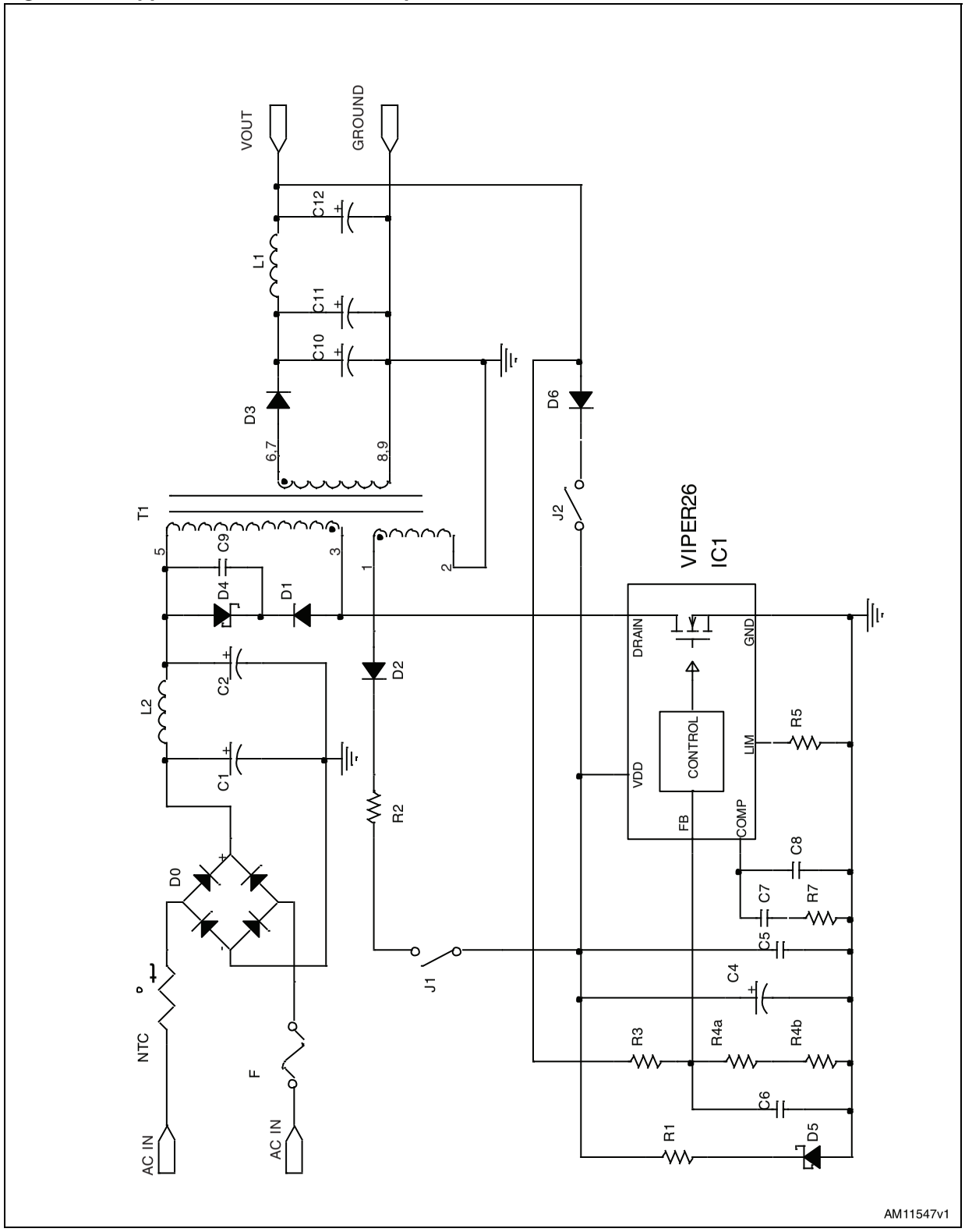
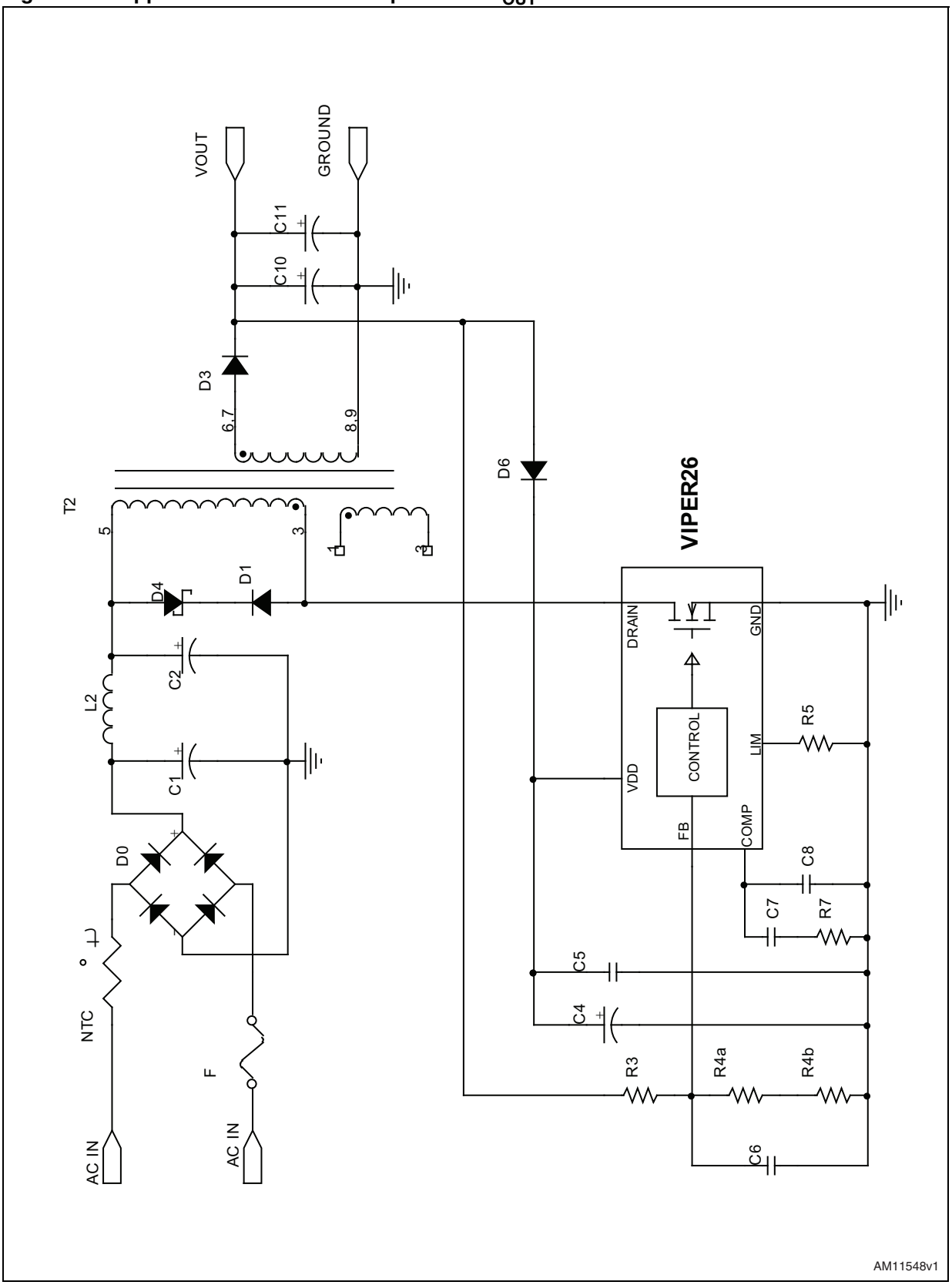


Figure 2. Application schematic - simplified for V_{OUT} ≥12 V



3 Bill of material

Table 2. Bill of material (relevant to schematic in *Figure 2*)

Reference	Part	Description	Manufacturer
NTC	2.2 Ω NTC	NTC thermistor	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		100 nF, 50 V ceramic capacitor	
C6		1 nF, 50 V ceramic capacitor	
C7		47 nF, 50 V ceramic capacitor	
C8		2.2 nF, 50 V ceramic capacitor	
C9	Not mounted		
C10		1000 µF, 16 V ultra low ESR electrolytic capacitor ZL series	Rubycon
C11		680 µF, 16 V ultra low ESR electrolytic capacitor ZL series	Rubycon
C12	Not mounted		
D0	DF06M	1 A - 600 V diode bridge	Vishay
D1	STTH1L06	1 A - 600 V ultrafast diode	ST
D2	Not mounted		
D3	STPS3150	3 A-150 V power Schottky (output diode)	ST
D4	1.5KE300A	Transil	ST
D5	Not mounted		
D6	1N4148	Small signal diode	Fairchild
R1	Not mounted		
R2	Not mounted		
R3		47 kΩ 1% 1/4 W resistor	
R4a		15 kΩ 1% 1/4 W resistor	
R4b		2.7 kΩ 1% 1/4 W resistor	
R5		33 kΩ 1/4 W resistor	
R7		3.3 kΩ 1/4 W resistor	
L1	Short-circuit		
L2	RFB0807-102	Input filter inductor (L = 1 mH, I_{SAT} = 0.3 A; DCR max. = 3.4 Ω)	Coilcraft
T1	1715.0049	60 kHz switch mode transformer	Magnetica
IC1	VIPER26LN	High-voltage 60 kHz PWM	ST
J1	Not mounted	Jumper	
J2	Short-circuit	Jumper	

4 Line/load regulation and output voltage ripple

The output voltage of the board has been measured in different line and load conditions:

Figure 3. Line regulation

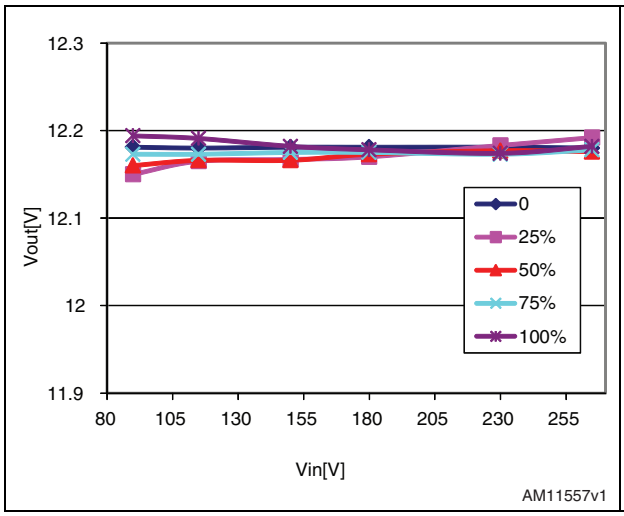


Figure 4. Load regulation

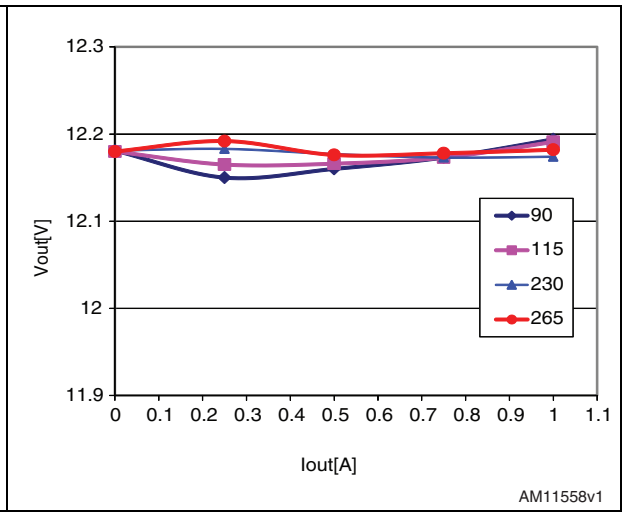


Figure 5. Efficiency vs. V_{IN}

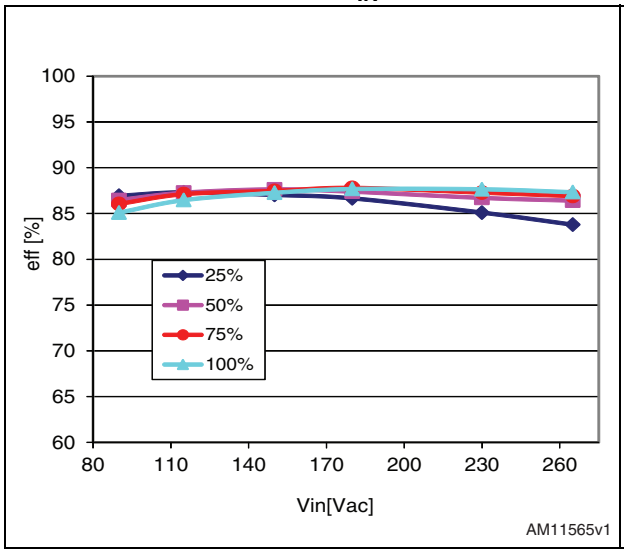


Figure 6. Efficiency vs. load

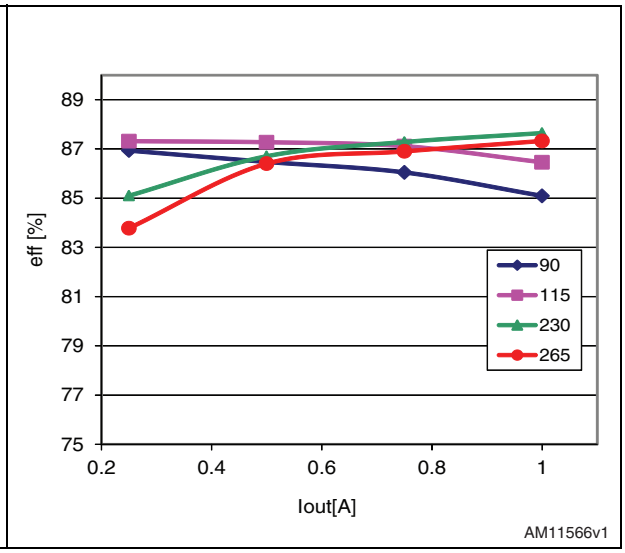


Figure 7. Active mode efficiency vs. V_{IN}

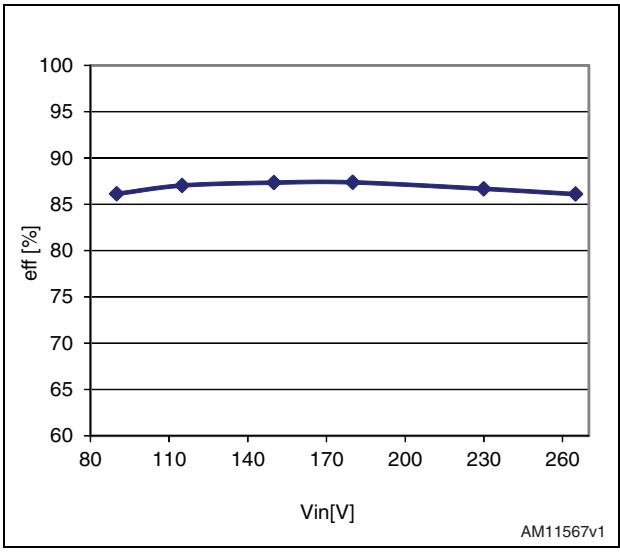


Figure 8. Input voltage averaged efficiency vs. load

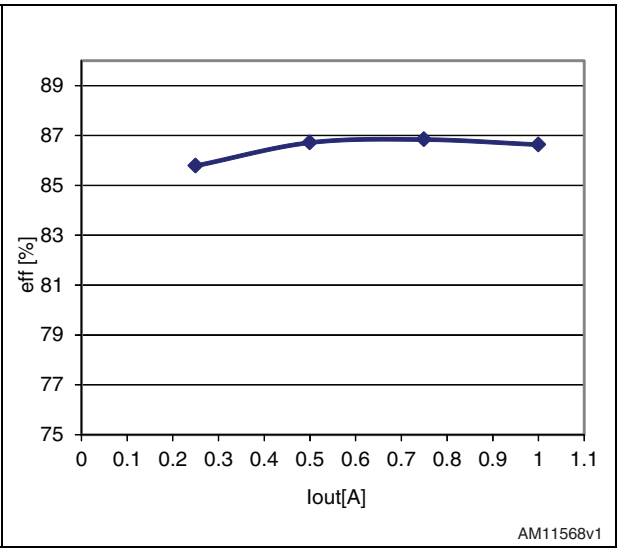


Figure 9. P_{IN} vs. V_{IN} @ no load and light load

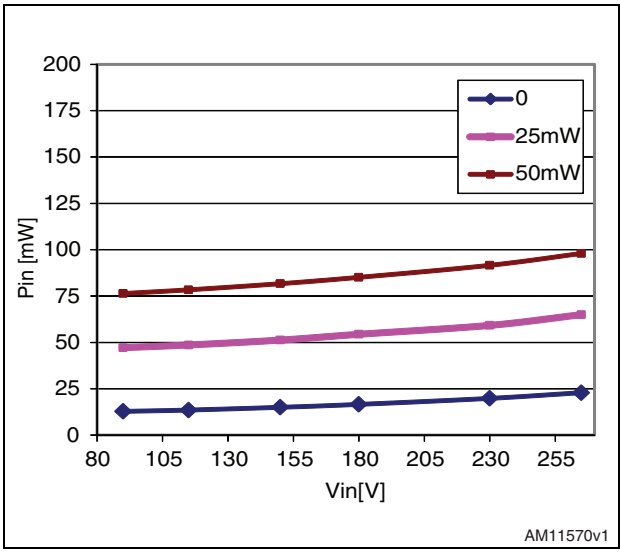
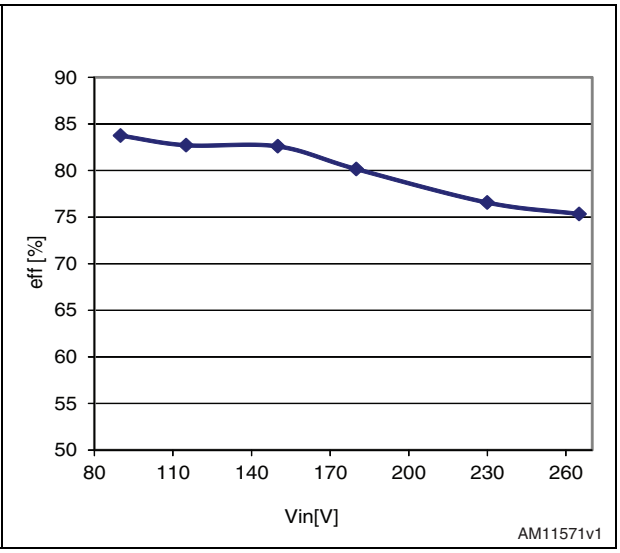
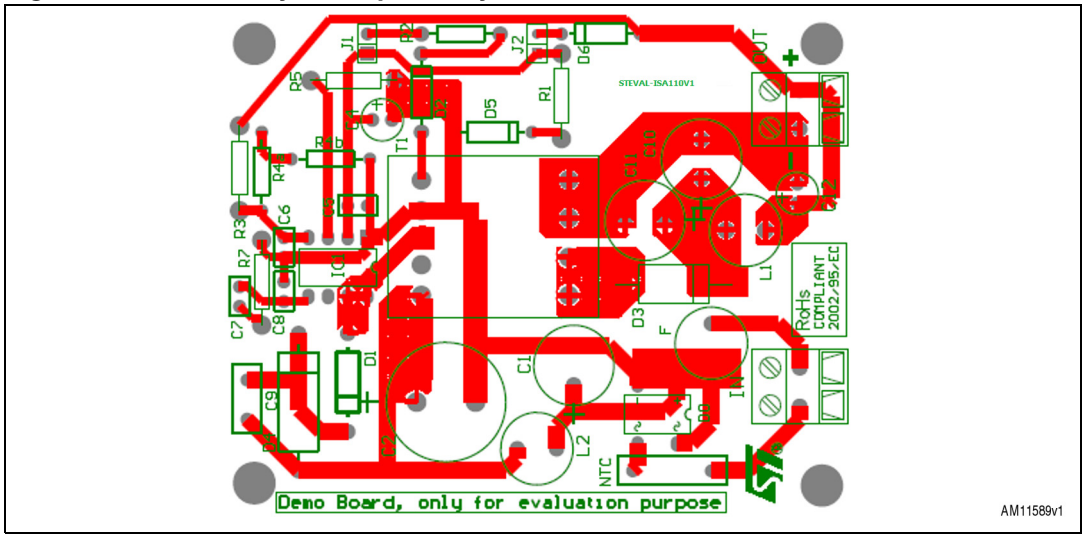


Figure 10. Efficiency @ P_{IN} = 1 W



5 Board layout

Figure 11. Bottom layer & top overlay



6 Revision history

Table 3. Document revision history

Date	Revision	Changes
11-Feb-2013	1	Initial release.

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