



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

## 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.



STEVAL-ISA110V1

# 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 <sub>AC</sub> ; 265 V <sub>AC</sub>
$V_{OUT}$	Output voltage	12 V
$I_{OUT}$	Max. output current	1 A
$\Delta V_{OUT\_LF}$	Precision of output regulation	±5%
$\Delta V_{OUT\_HF}$	High frequency output voltage ripple	50 mV
$T_{AMB}$	Max. ambient operating temperature	60 °C

## 2 Schematic diagrams

Figure 1. Application schematic - complete

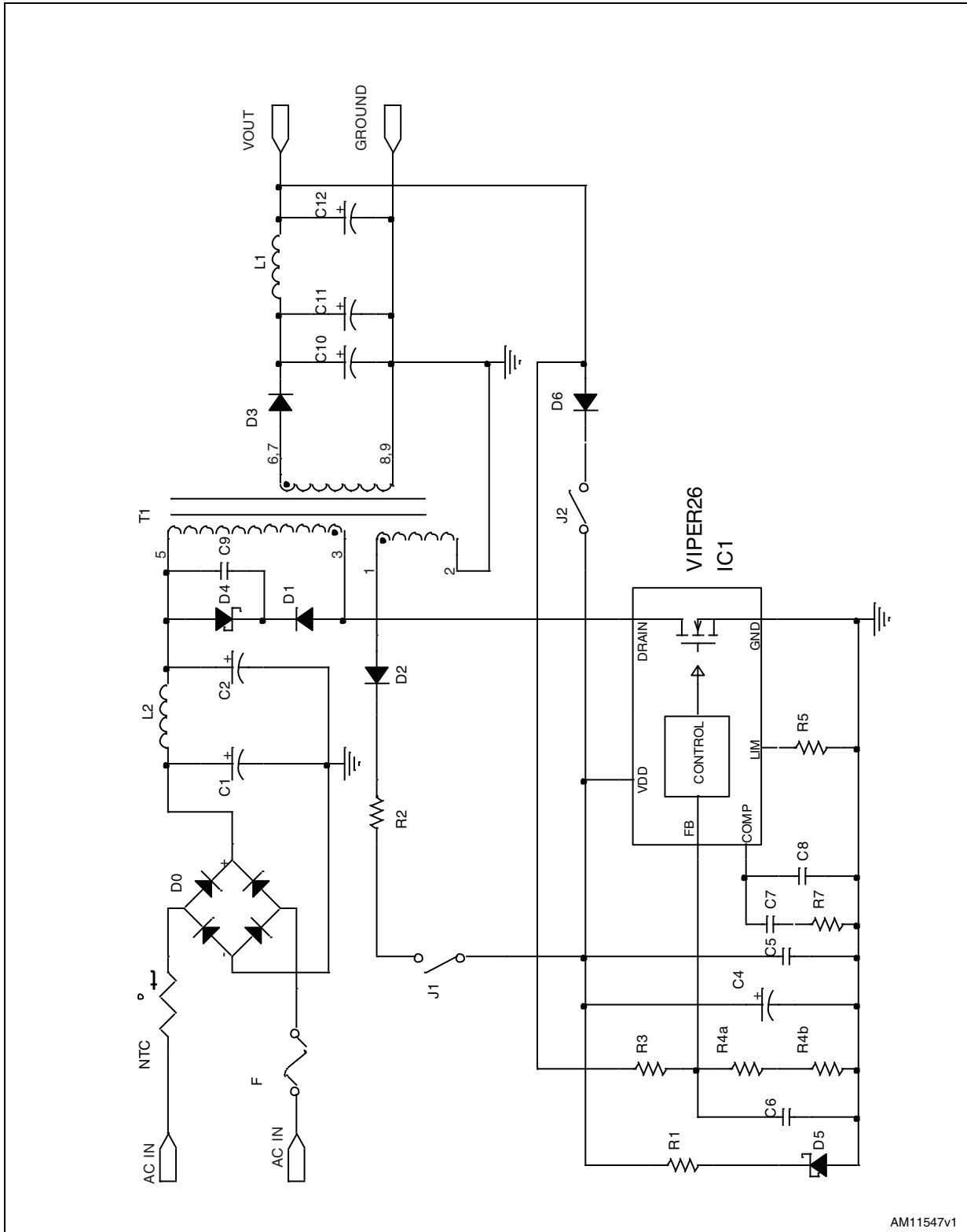
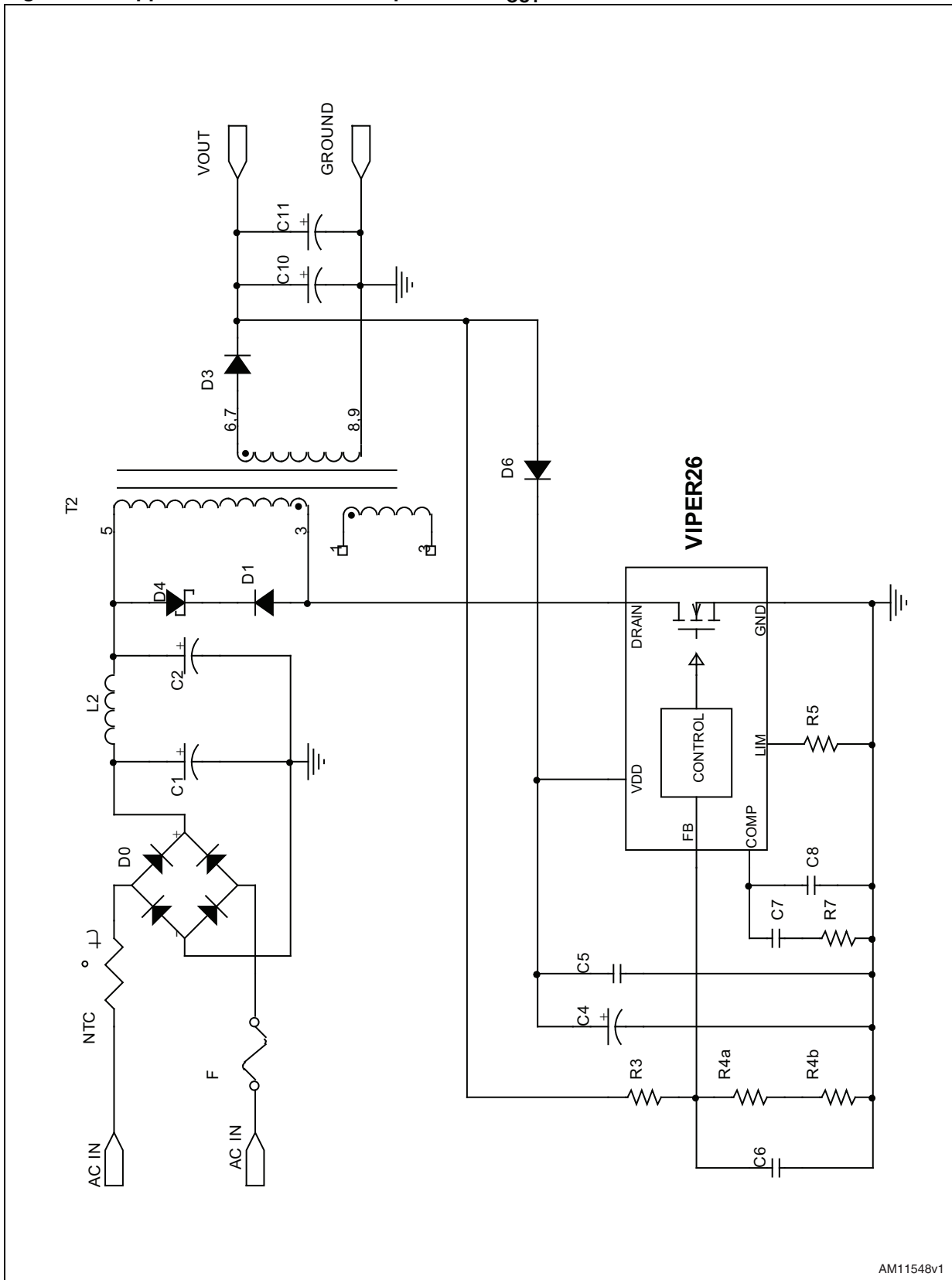


Figure 2. Application schematic - simplified for  $V_{OUT} \geq 12 V$



AM11548v1

### 3 Bill of material

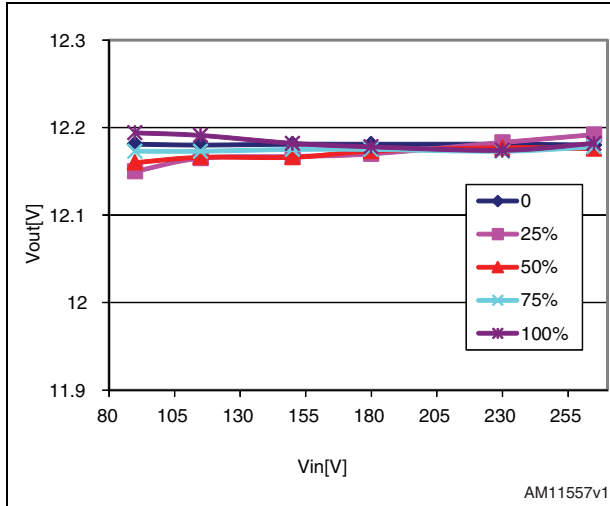
**Table 2. Bill of material (relevant to schematic in [Figure 2](#))**

Reference	Part	Description	Manufacturer
NTC	2.2 $\Omega$ NTC	NTC thermistor	EPCOS
F	T2A 250 V	2 A, 250 Vac fuse, TR5 series	Wickmann
C1		10 $\mu$ F, 400 V NHG series electrolytic capacitor	Panasonic
C2		22 $\mu$ F, 35 V SMG series electrolytic capacitor	Panasonic
C4		2.2 $\mu$ F, 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 $\mu$ F, 16 V ultra low ESR electrolytic capacitor ZL series	Rubycon
C11		680 $\mu$ F, 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 k $\Omega$ 1% 1/4 W resistor	
R4a		15 k $\Omega$ 1% 1/4 W resistor	
R4b		2.7 k $\Omega$ 1% 1/4 W resistor	
R5		33 k $\Omega$ 1/4 W resistor	
R7		3.3 k $\Omega$ 1/4 W resistor	
L1	Short-circuit		
L2	RFB0807-102	Input filter inductor (L = 1 mH, I <sub>SAT</sub> = 0.3 A; DCR max. = 3.4 $\Omega$ )	Coilcraft
T1	1715.0049	60 kHz switch mode transformer	Magnetics
IC1	VIPER26LN	High-voltage 60 kHz PWM	ST
J1	Not mounted	Jumper	
J2	Short-circuit	Jumper	

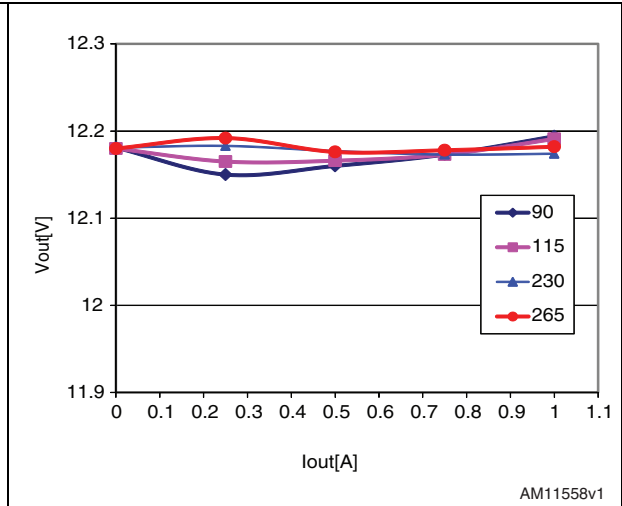
## 4 Line/load regulation and output voltage ripple

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

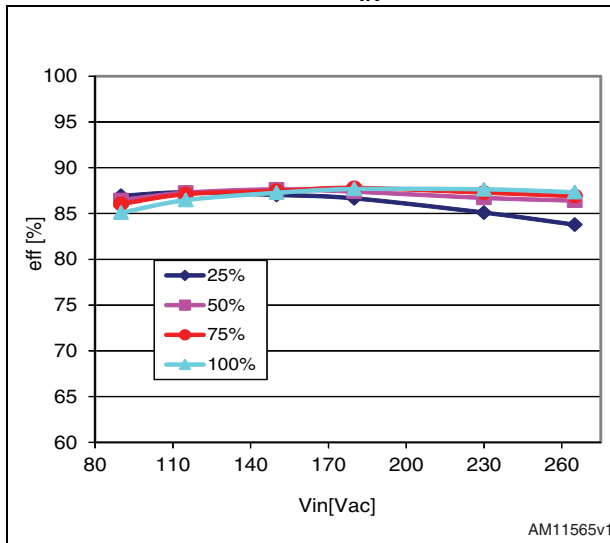
**Figure 3. Line regulation**



**Figure 4. Load regulation**



**Figure 5. Efficiency vs. VIN**



**Figure 6. Efficiency vs. load**

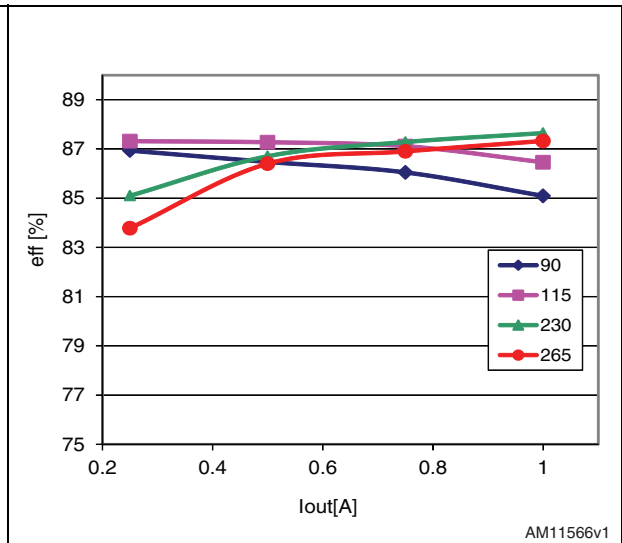


Figure 7. Active mode efficiency vs.  $V_{IN}$

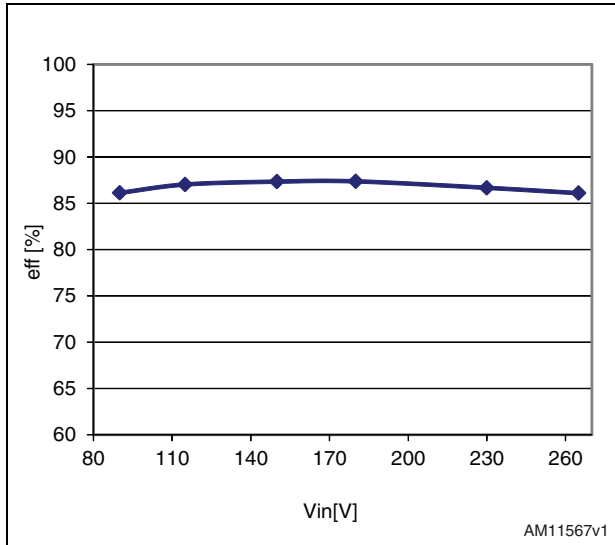


Figure 8. Input voltage averaged efficiency vs. load

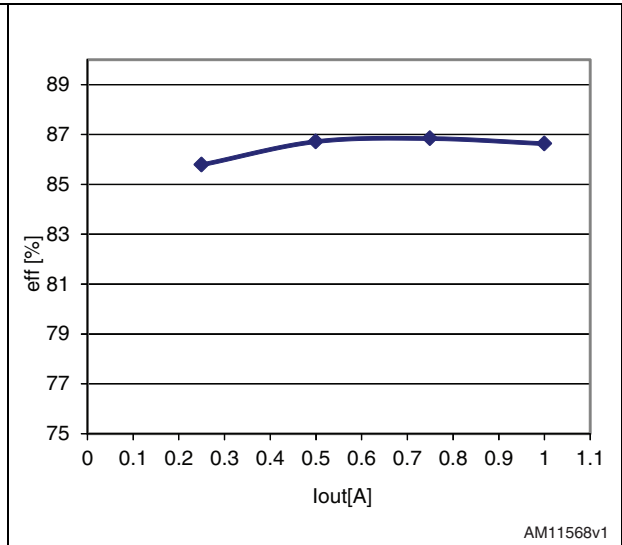
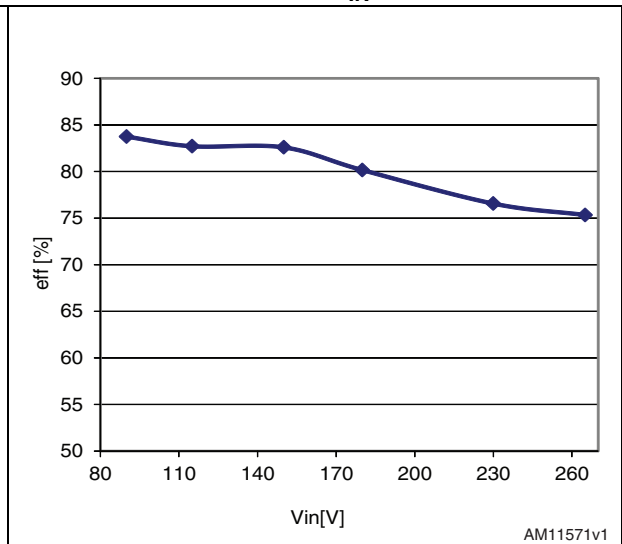
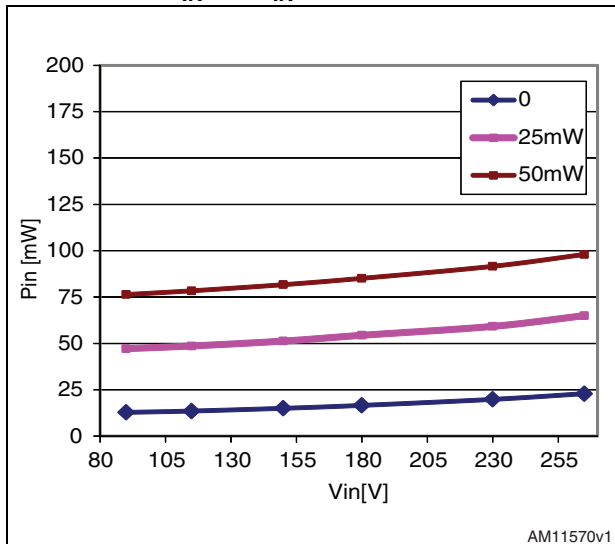
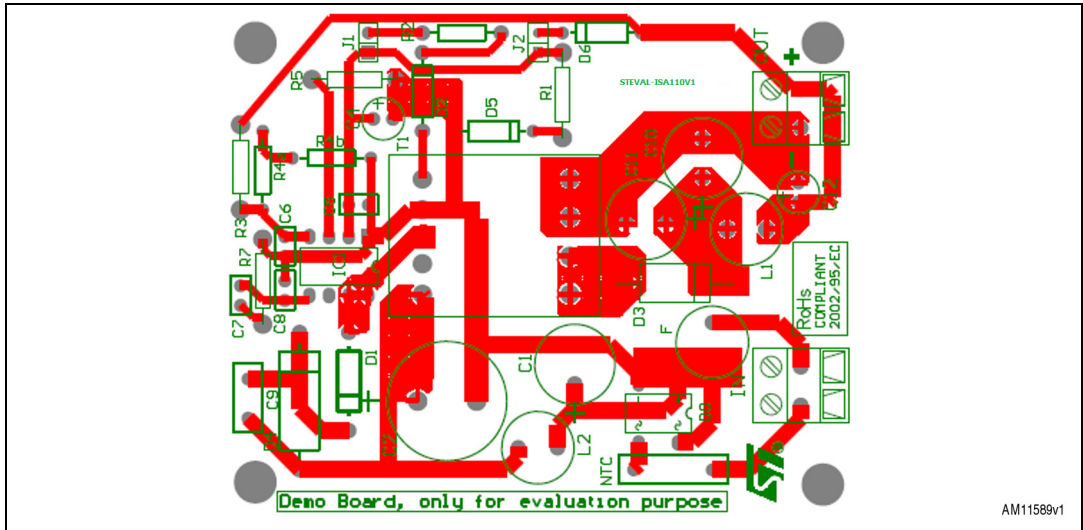


Figure 9.  $P_{IN}$  vs.  $V_{IN}$  @ no load and light load Figure 10. Efficiency @  $P_{IN} = 1\text{ W}$



# 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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