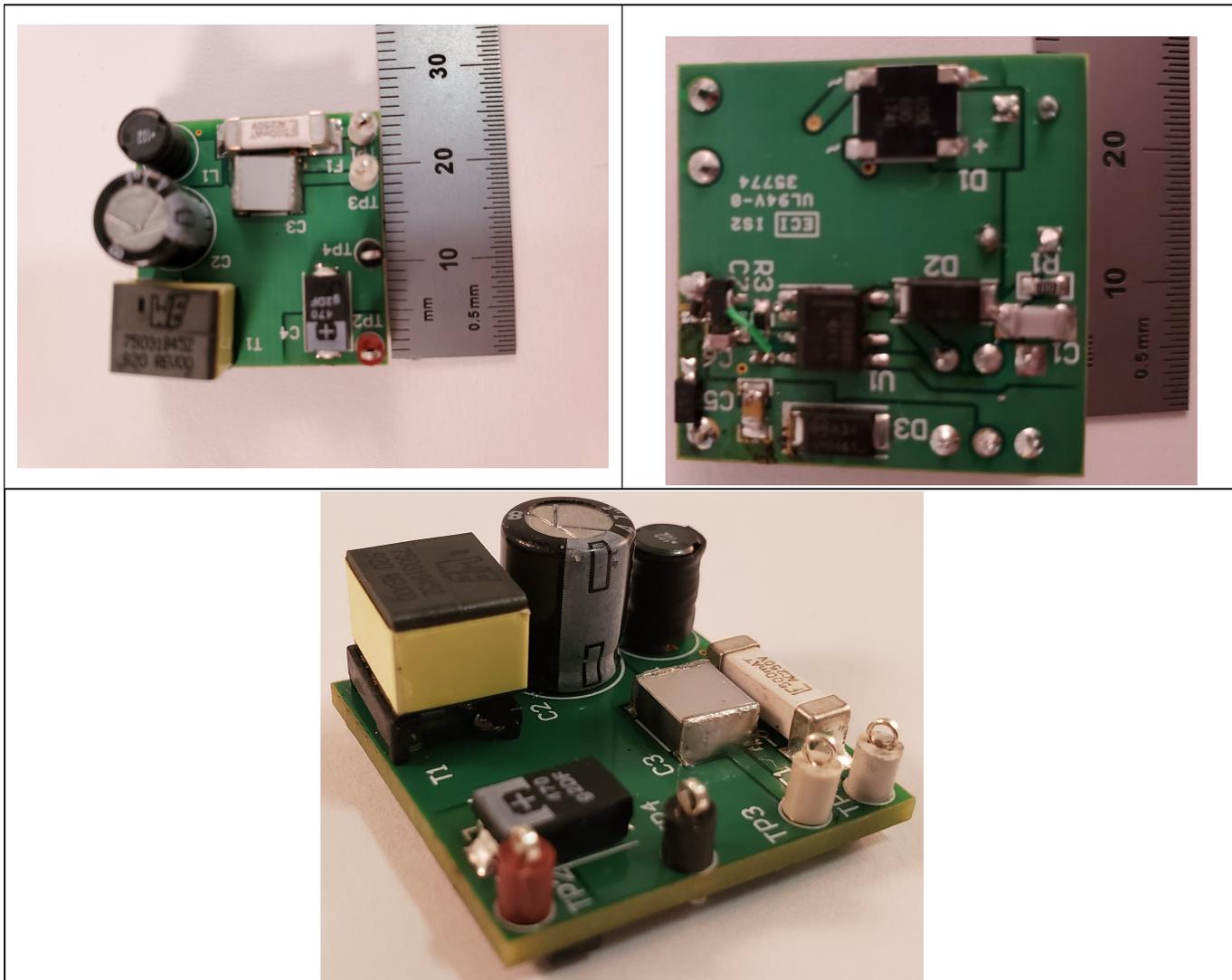


# Test Report: PMP22056 Universal AC Input, 2.75-W Non-Isolated Flyback Reference Design



## Description

PMP22056 is a non-isolated flyback topology board that takes a Universal AC input (90VAC-275VAC) and outputs 5V@550mA. It is designed for ultra-small form factor and uses a custom transformer.



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## 1 Test Prerequisites

### 1.1 Voltage and Current Requirements

**Table 1. Voltage and Current Requirements**

PARAMETER	SPECIFICATIONS
Line Input Voltage Range	90VACrms-275VACrms
Line Input Frequency	50-60Hz
Output Voltage/Current	5V/550mA

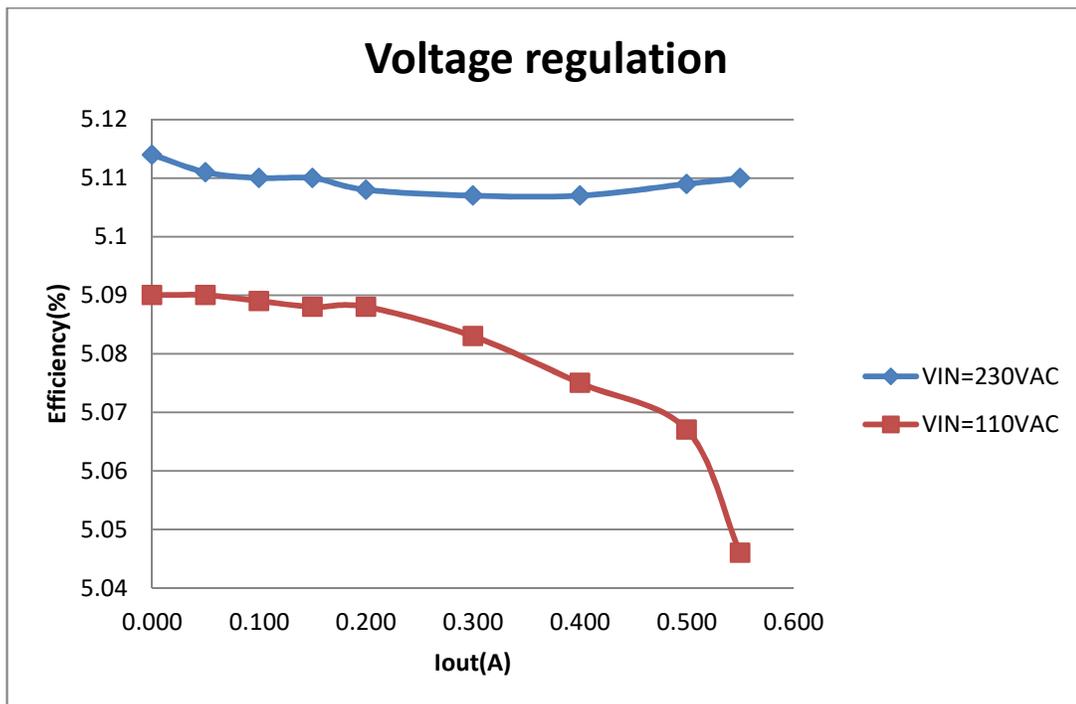
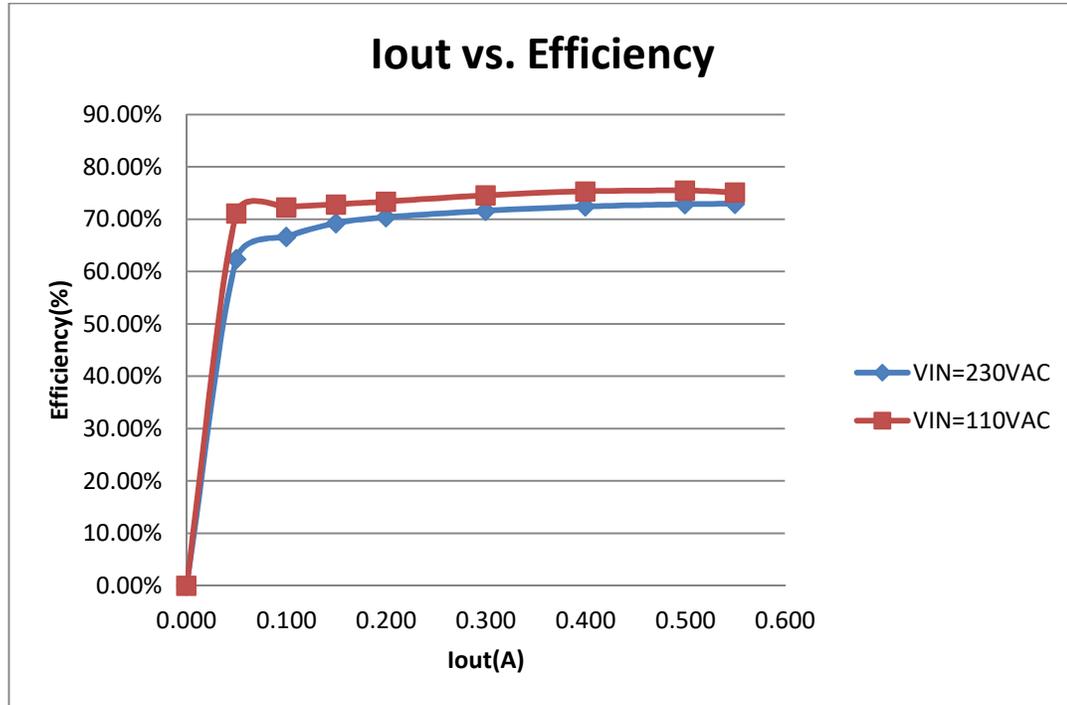
### 1.2 Required Equipment\*

- AC voltage source
- AC power meter
- Electronic load
- Multi-meters
- Oscilloscope

## 2 Testing and Results

### 2.1 Efficiency and Voltage Regulation

#### 2.1.1 5V output



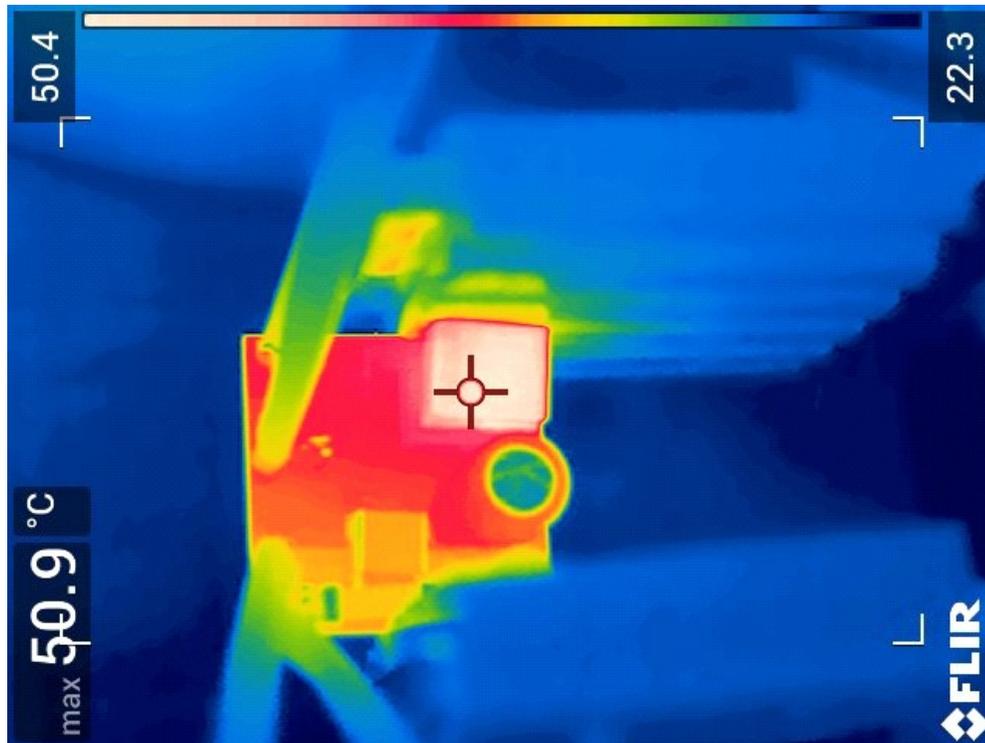
vin	lin	Pin	VOUT	iout	Pout	Eff	Ploss
110			5.090	0.000	0.000	#DIV/0!	0.000
110	0.009	0.358	5.090	0.050	0.255	71.09%	0.104
110	0.015	0.704	5.089	0.100	0.509	72.29%	0.195
110	0.020	1.048	5.088	0.150	0.763	72.82%	0.285
110	0.025	1.387	5.088	0.200	1.018	73.37%	0.369
110	0.035	2.045	5.083	0.300	1.525	74.57%	0.520
110	0.044	2.695	5.075	0.400	2.030	75.32%	0.665
110	0.053	3.357	5.067	0.500	2.534	75.47%	0.824
110	0.058	3.695	5.046	0.550	2.775	75.11%	0.920

vin	lin	Pin	Vout	iout	Pout	Eff	Ploss
230			5.114	0.000	0	#DIV/0!	0
230	0.006	0.41	5.111	0.050	0.25555	62.33%	0.15445
230	0.01	0.767	5.11	0.100	0.511	66.62%	0.256
230	0.014	1.107	5.11	0.150	0.7665	69.24%	0.3405
230	0.017	1.452	5.108	0.200	1.0216	70.36%	0.4304
230	0.024	2.14	5.107	0.300	1.5321	71.59%	0.6079
230	0.03	2.821	5.107	0.400	2.0428	72.41%	0.7782
230	0.035	3.506	5.109	0.500	2.5545	72.86%	0.9515
230	0.038	3.853	5.11	0.550	2.8105	72.94%	1.0425

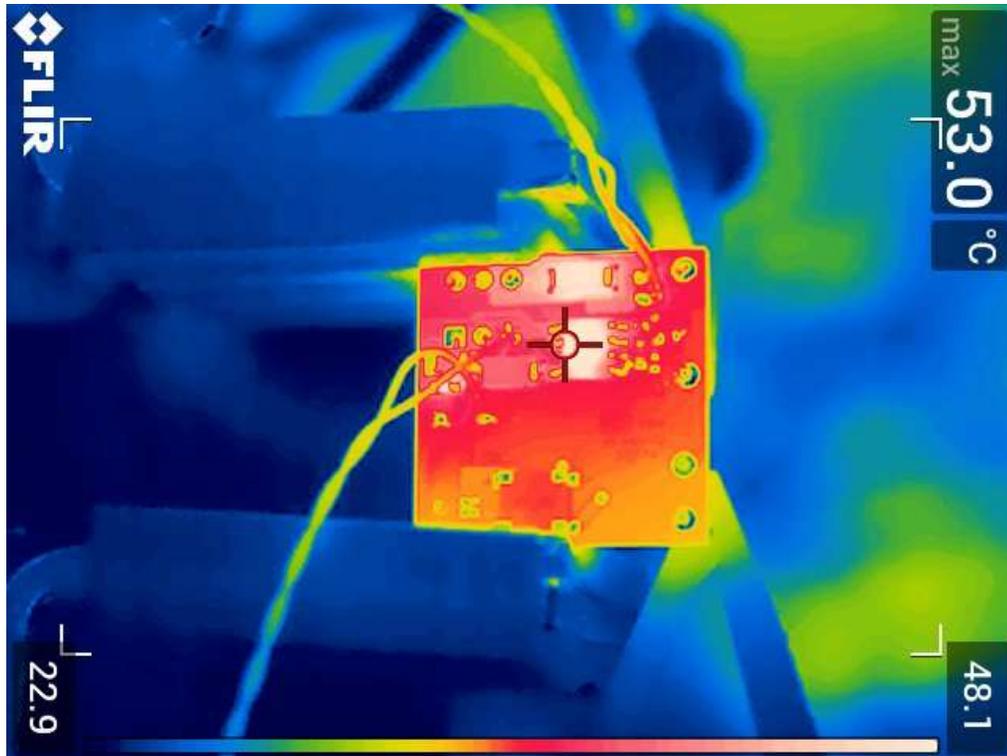
## 2.2 Thermal Images

All images were taken after a 15 minute soak and at 25C. These were taken open frame and not in any case

### 2.2.1 90VAC Input, 5V/550mA

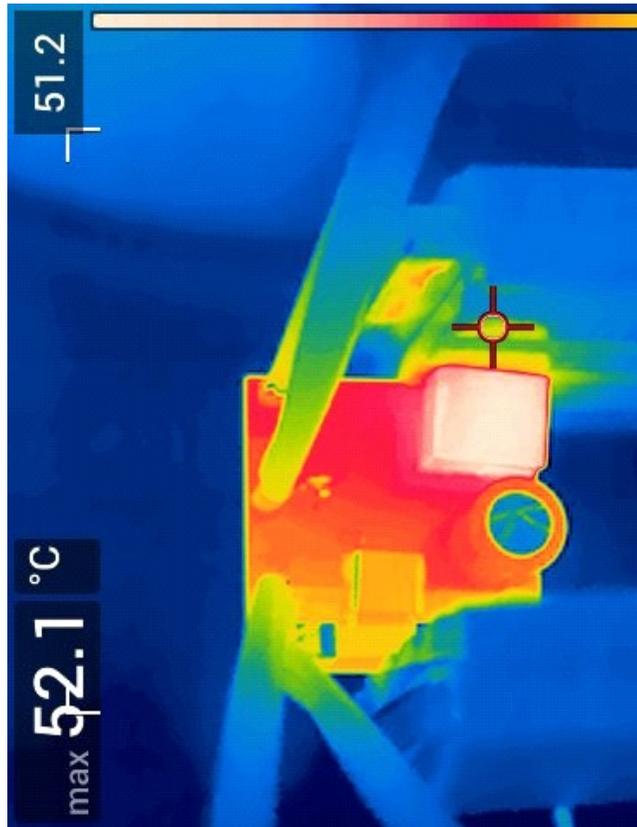


Transformer @ 50.4C (front of the board)

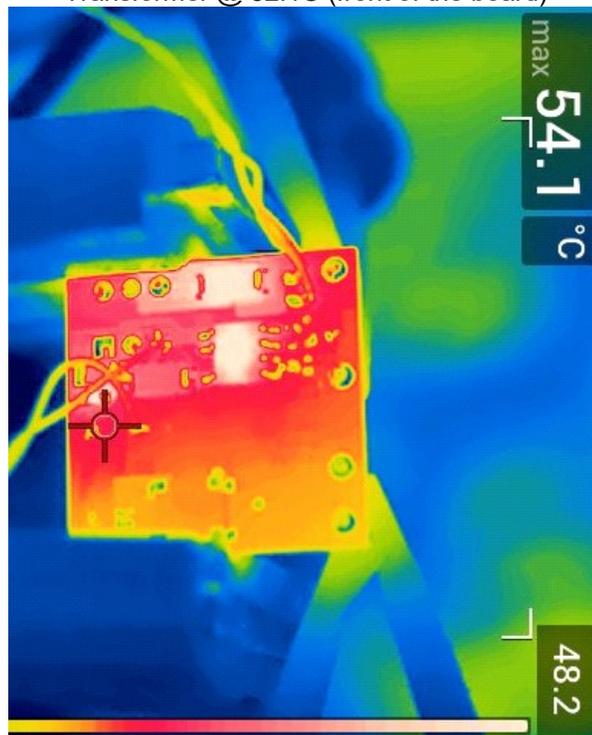


Primary FET at 53C (back of the board)

## 2.2.2 275VAC Input, 5V/550mA



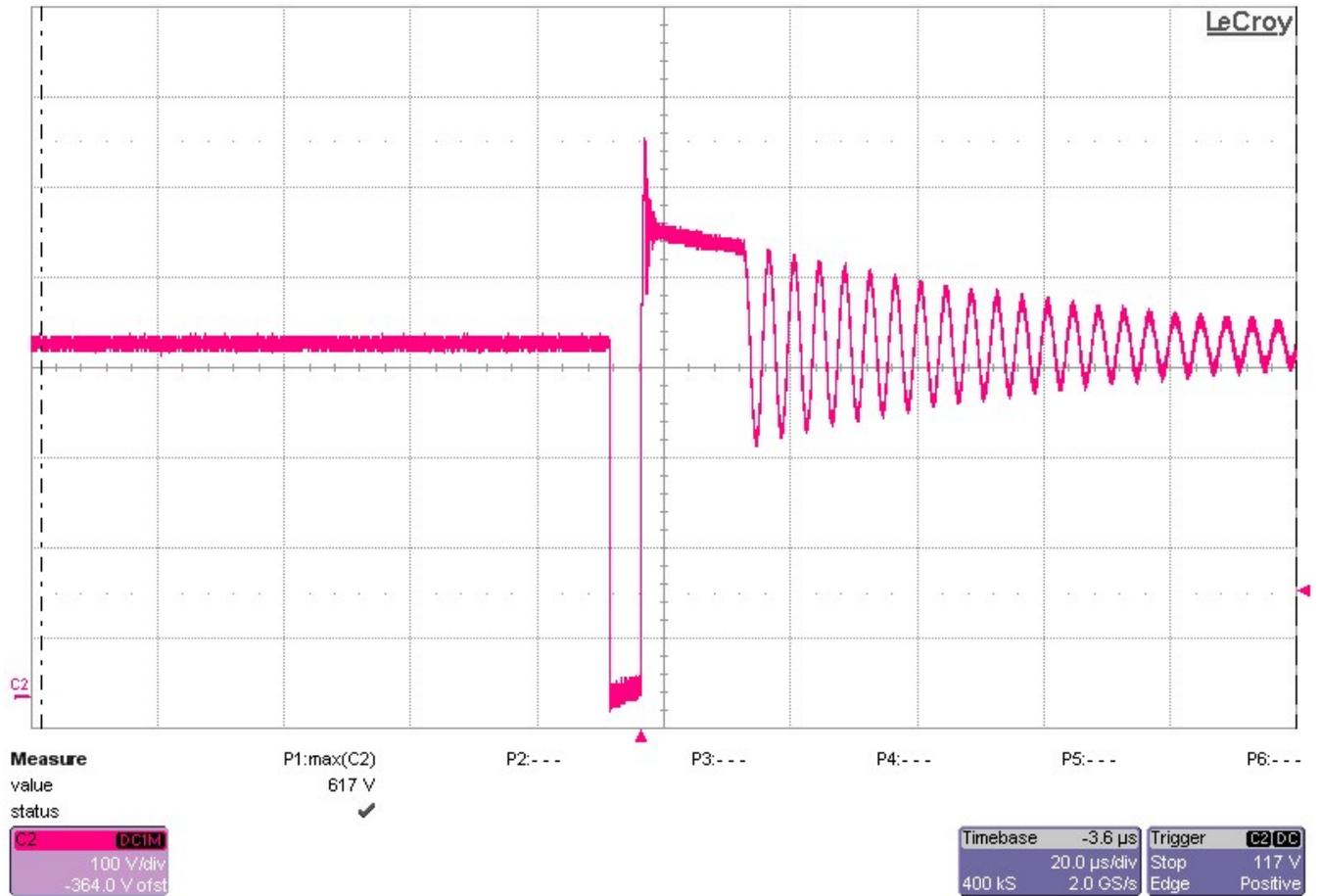
Transformer @ 52.1C (front of the board)



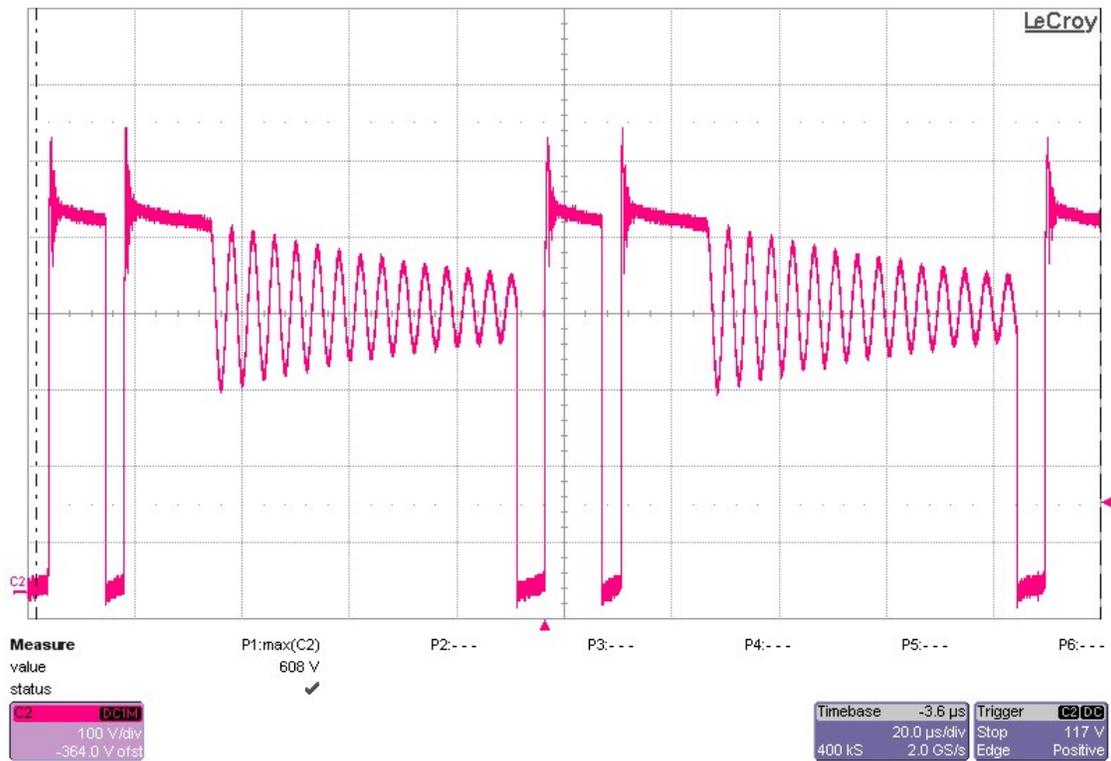
Primary FET@54.9C (back of the board)

## 2.3 Switching Waveforms

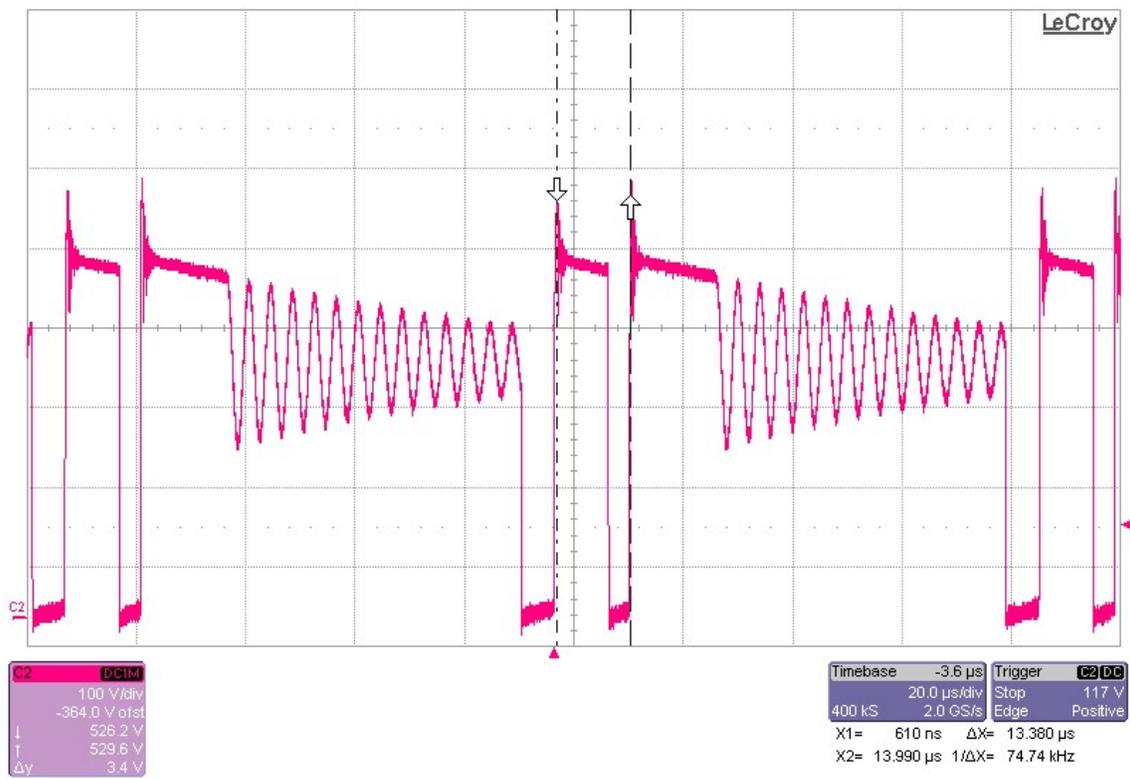
### 2.3.1 Primary Switch Node (C2-pink); 275VAC input; 5Vout; No Load



### 2.3.2 Primary Switch Node (C2-pink); 275VAC input; 5Vout; Full Load



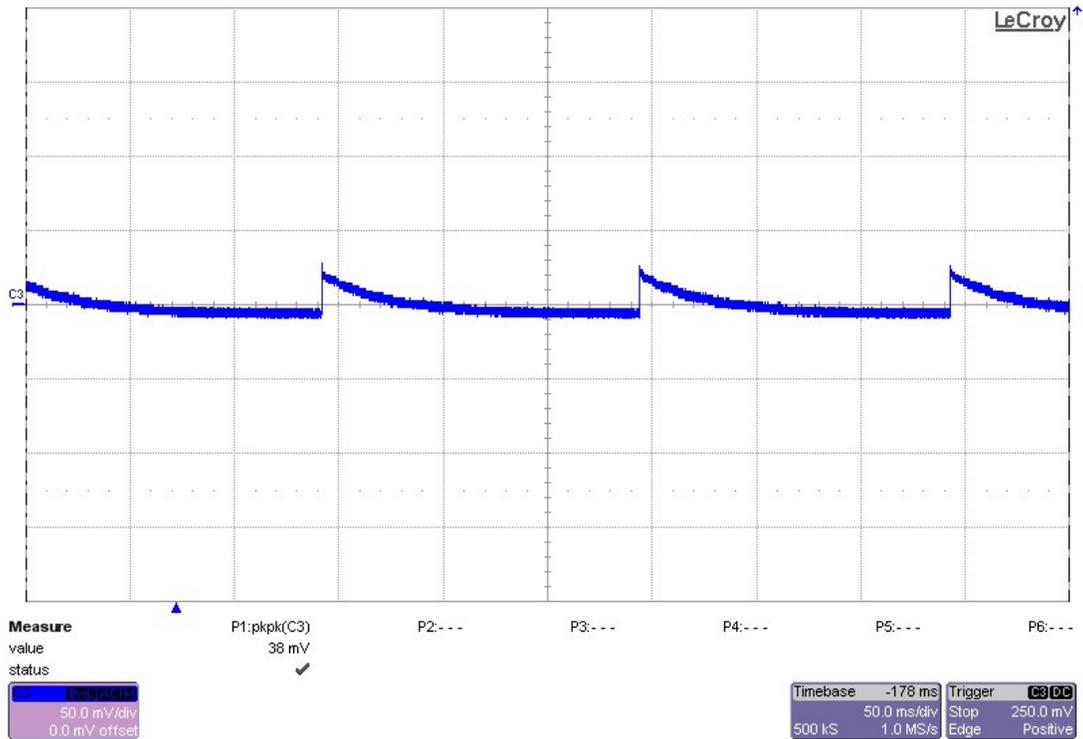
### 2.3.3 Primary Switch Node (C2-pink); 230VAC input; 5Vout; Full Load



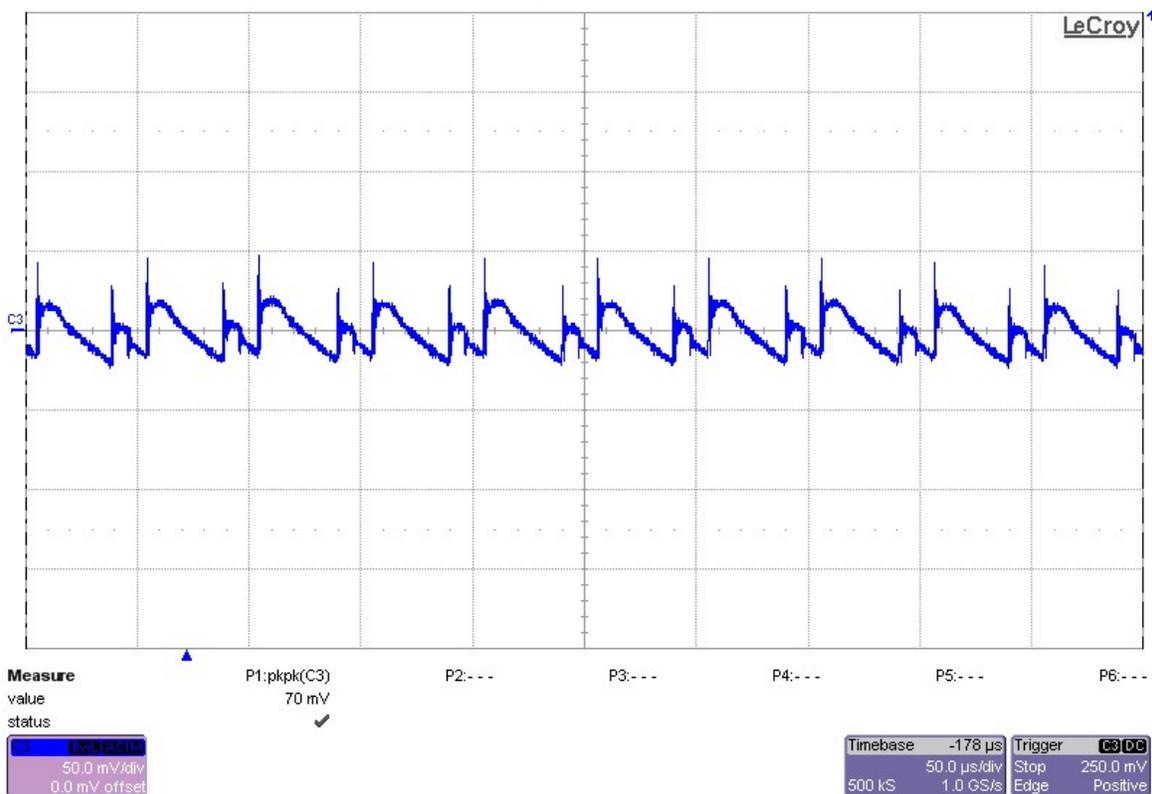
Fsw=74kHz

## 2.4 Output voltage ripple

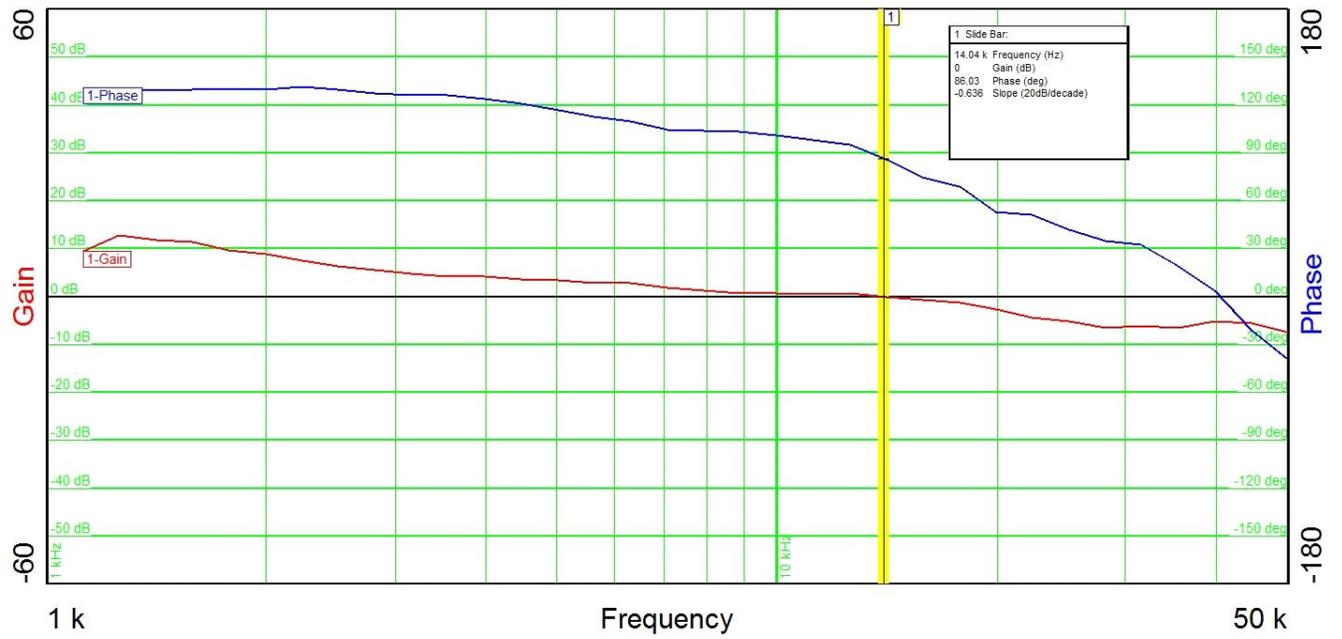
### 2.4.1 5V/0A Output, 120VAC/60Hz Input



### 2.4.2 5V/550mA Output, 120VAC/60Hz Input

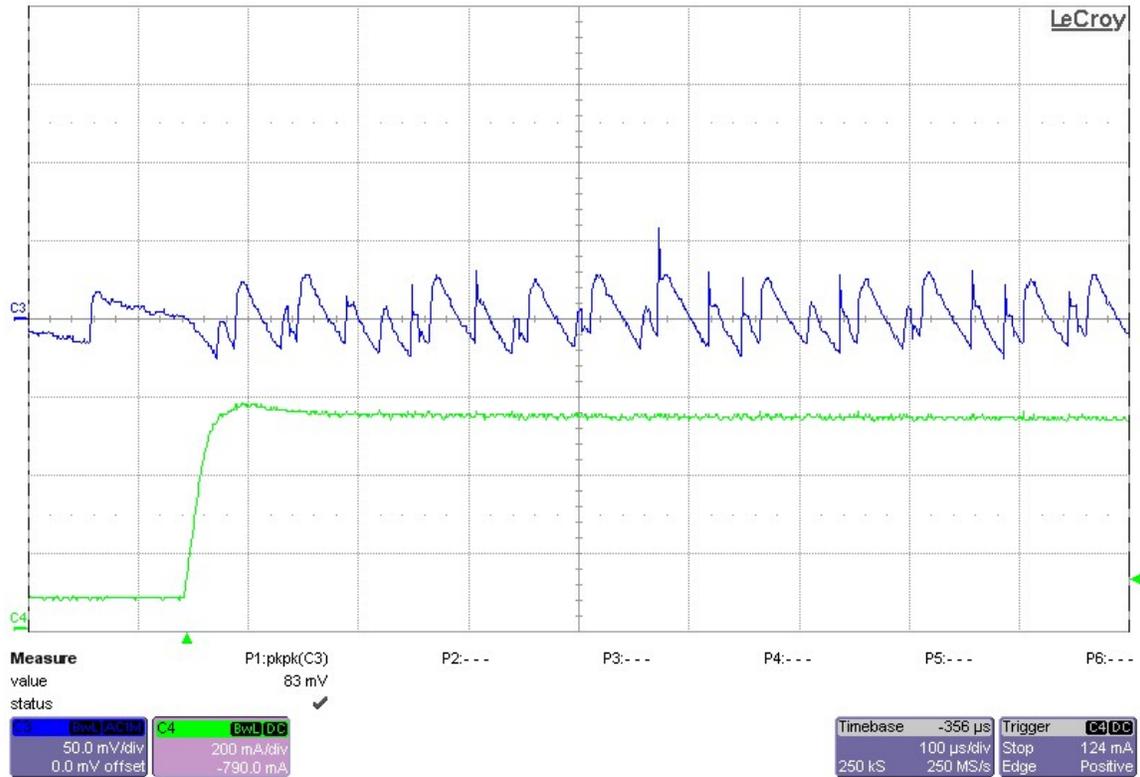


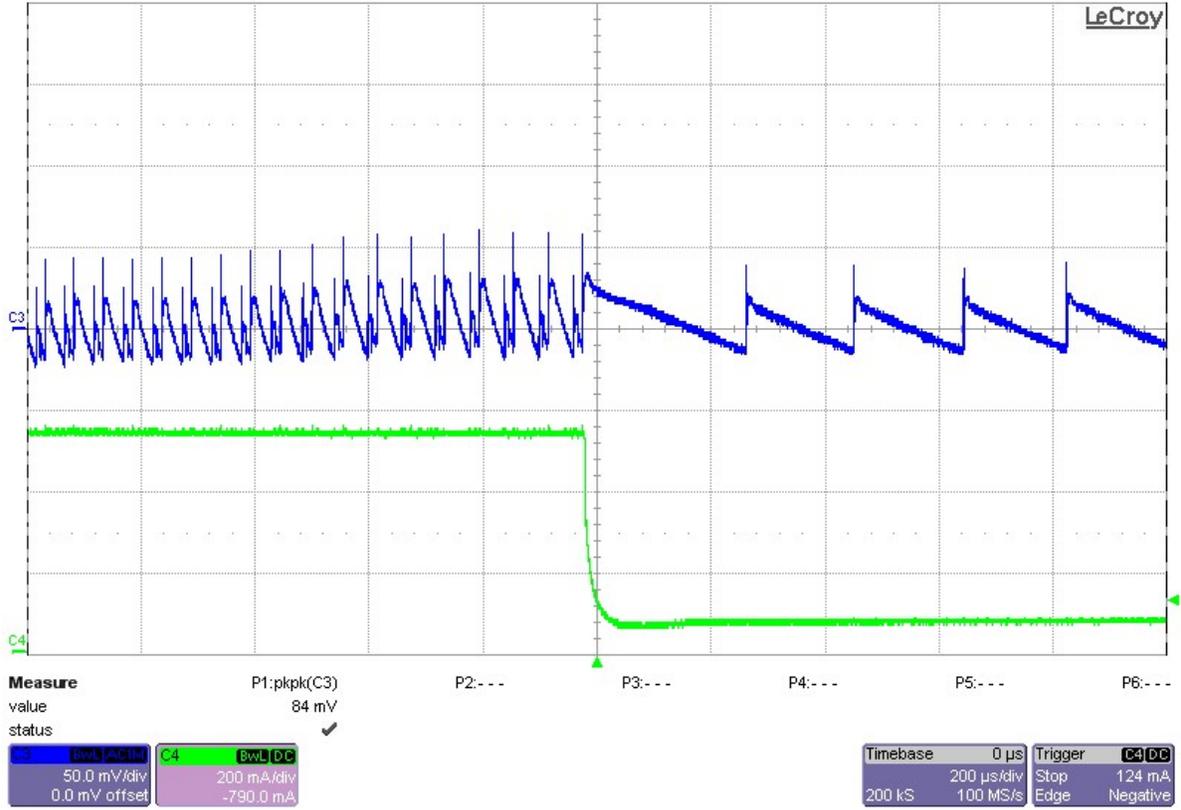
## 2.5 Bode Plot

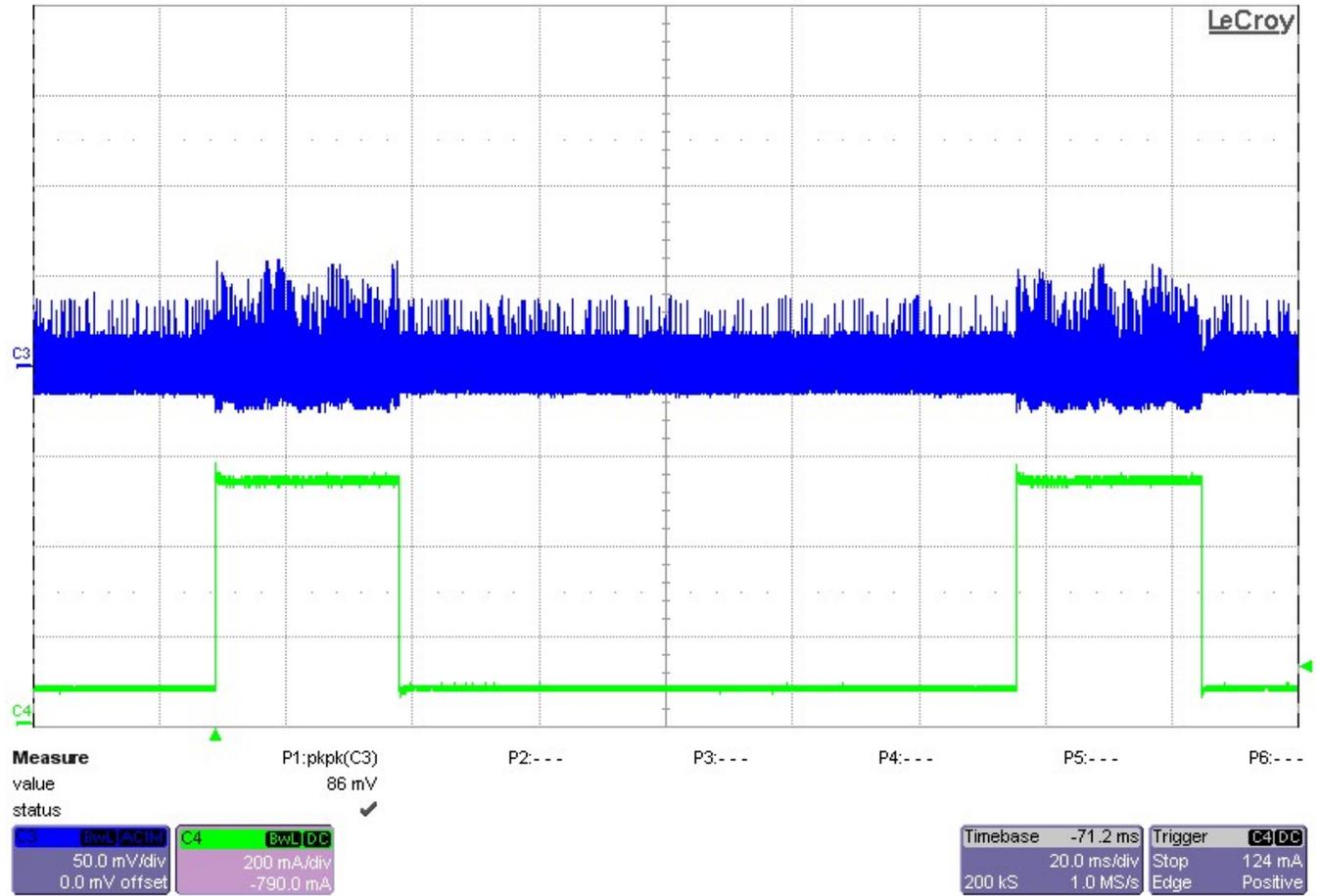


## 2.6 5V load transients

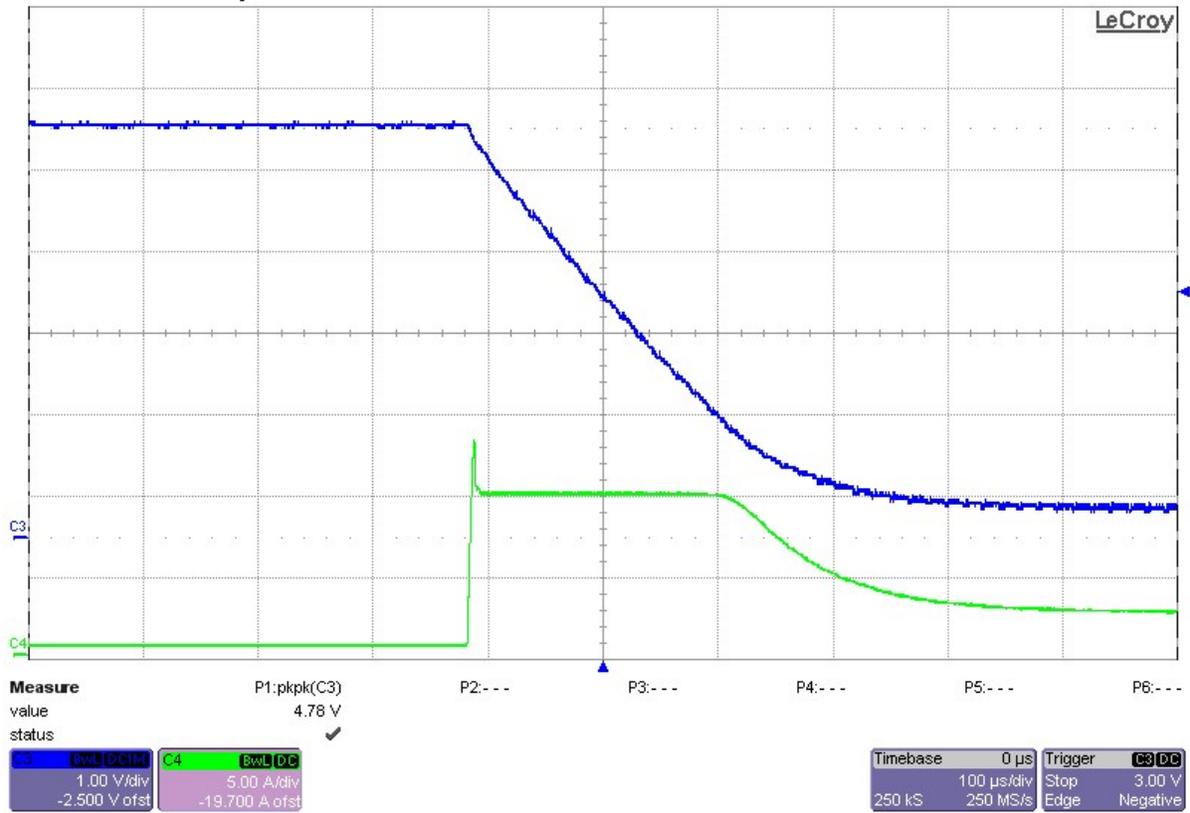
### 2.6.1 5V output, 50mA to 550mA Load step, 120VAC/60Hz Input

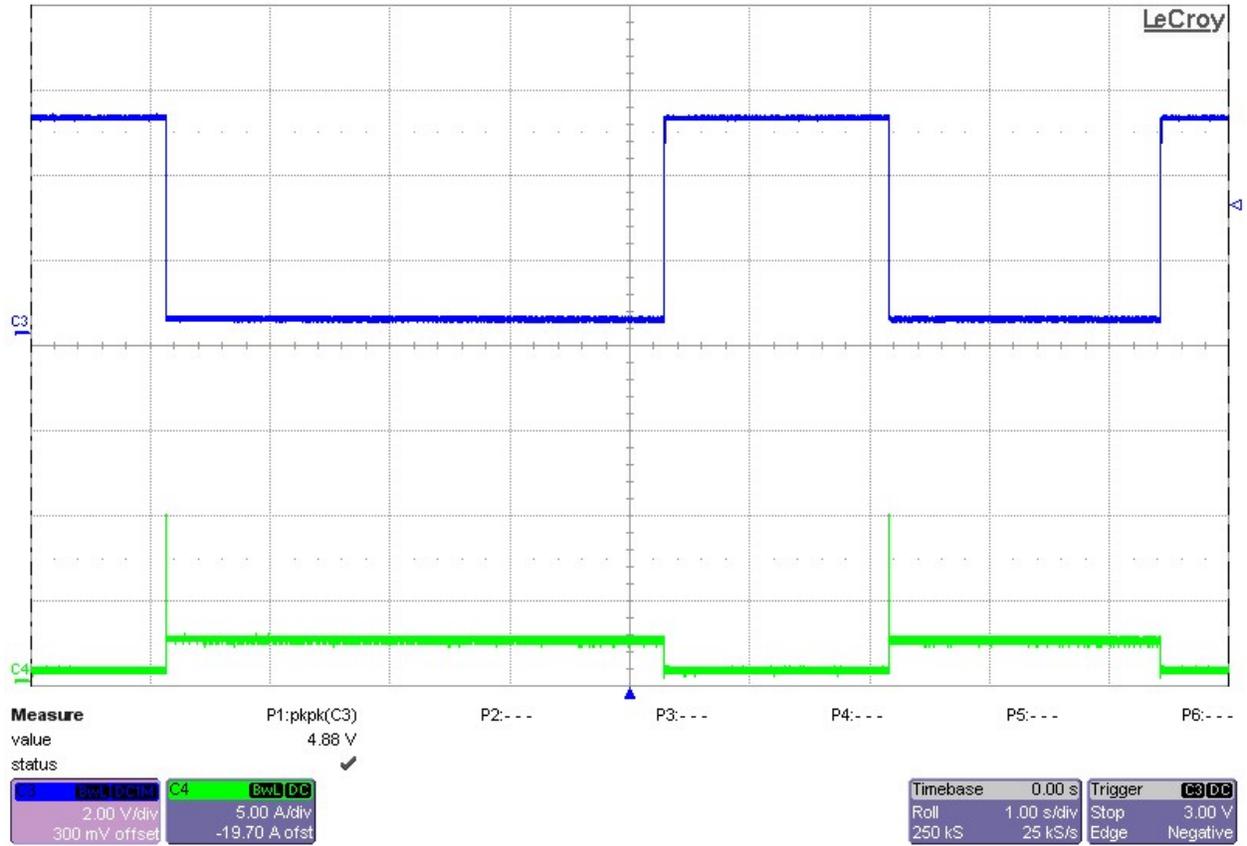




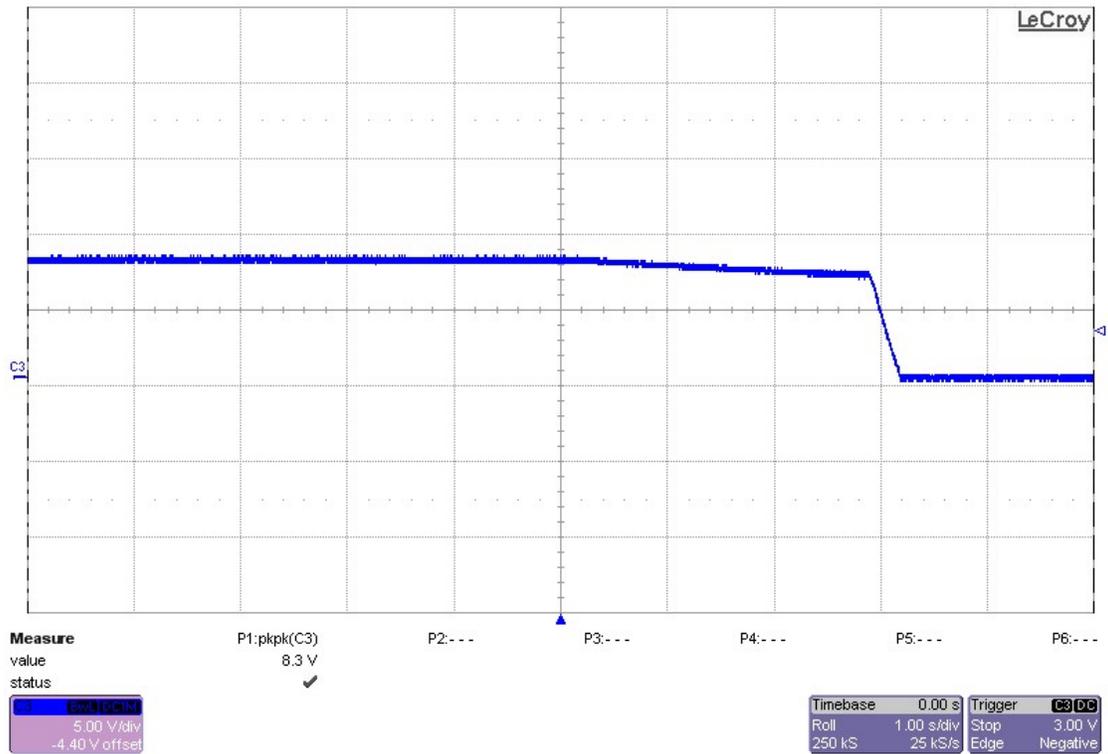


## 2.7 Short-Circuit protection

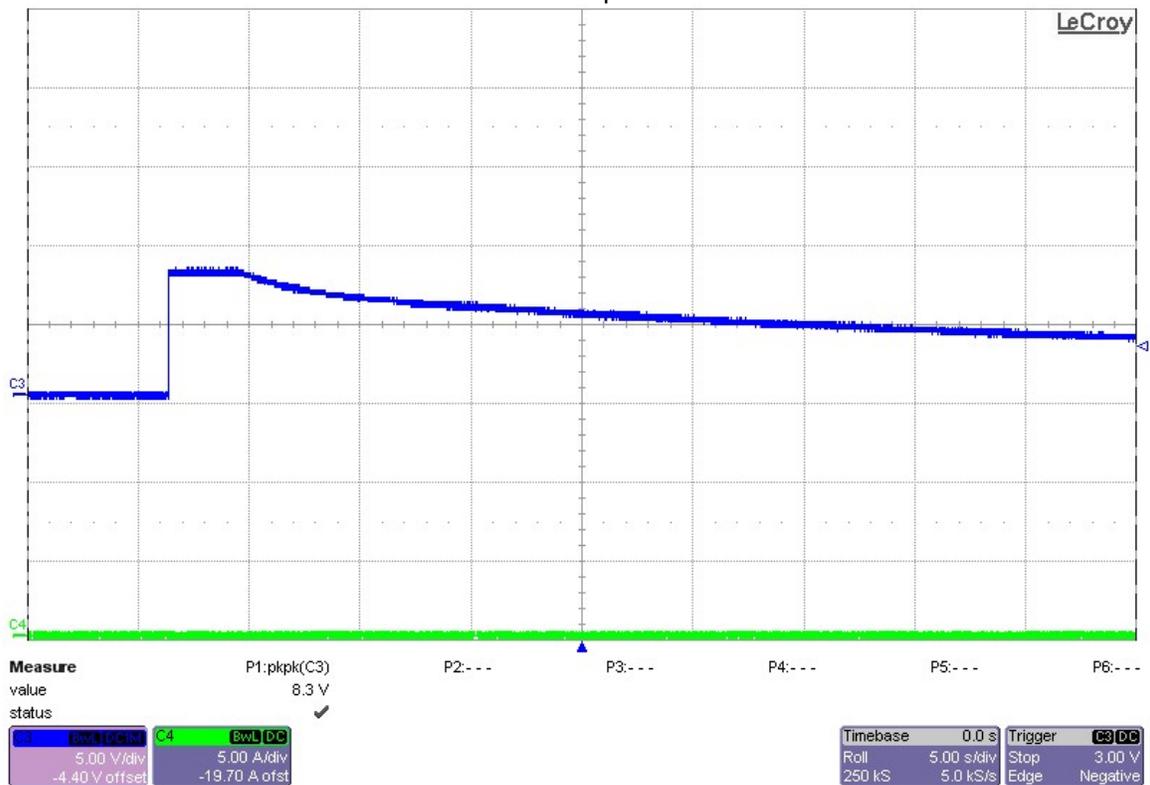




## 2.8 Over-voltage protection



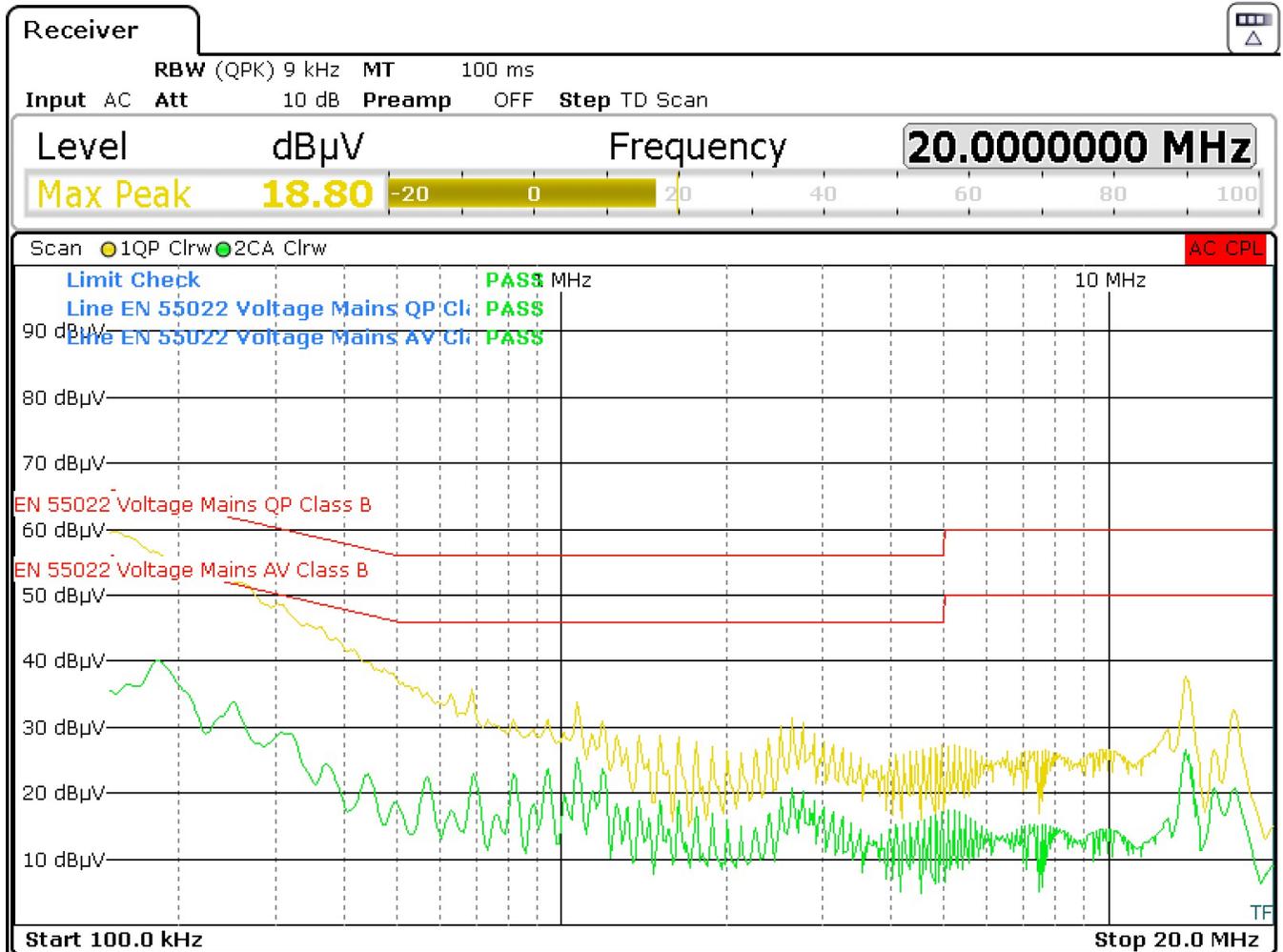
120VAC startup-no Load



120VAC startup- 5mA Load

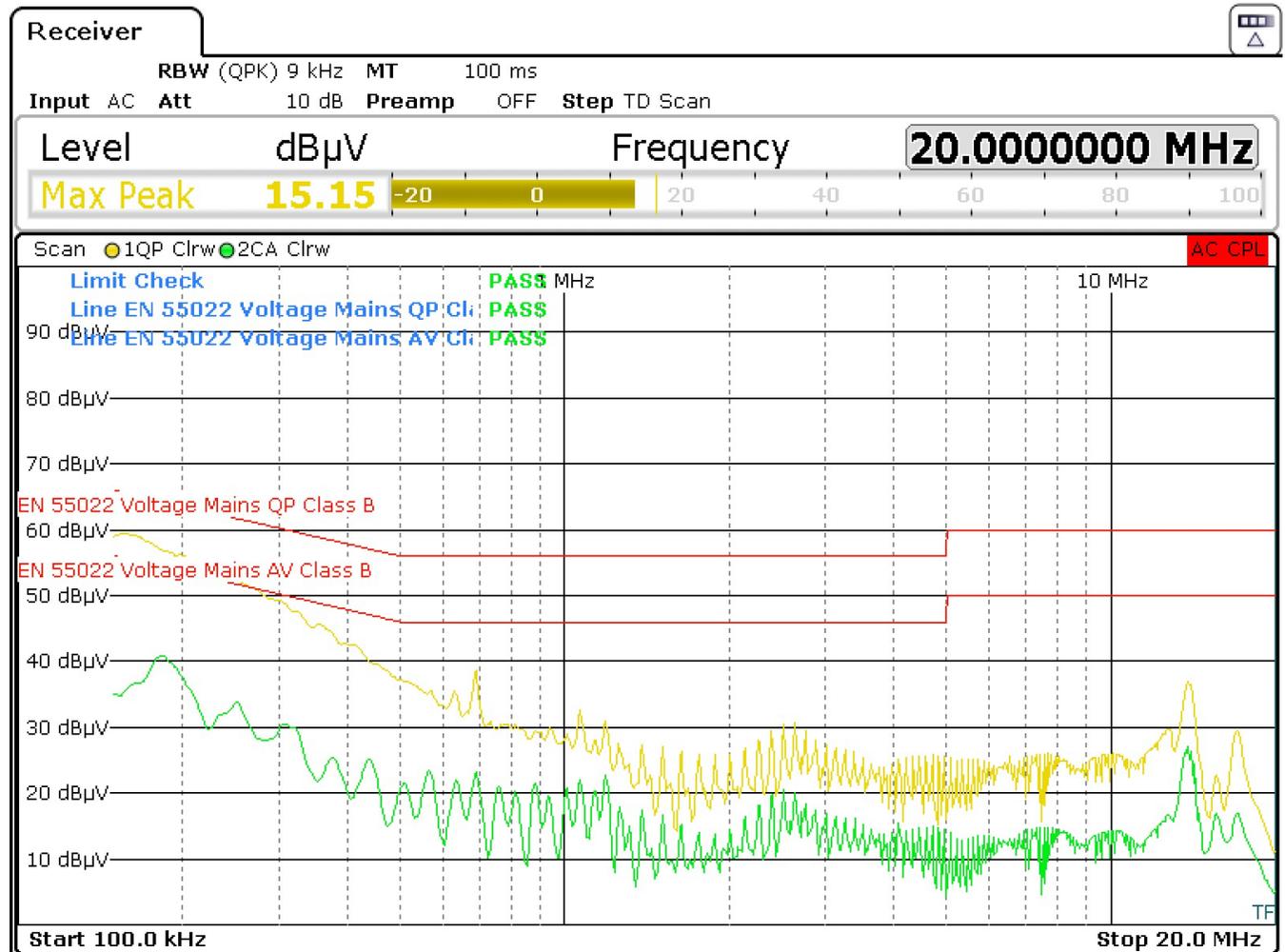
## 2.9 EMI TEST

Conducted EMI was tested on both Line and Neutral inputs at 120VAC and 230VAC input  
 120VAC LINE:



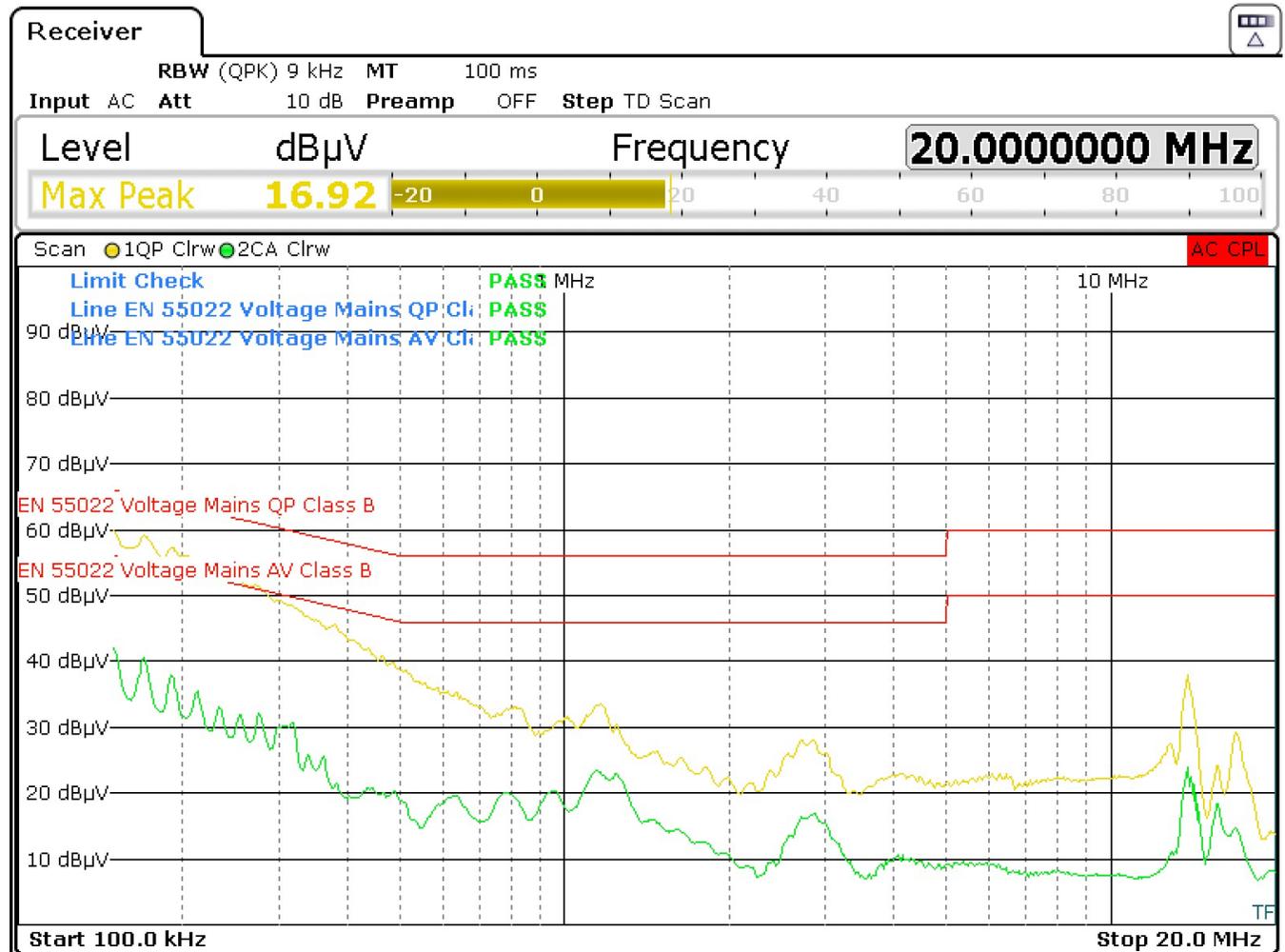
Date: 14.JUN.2019 11:56:43

120VAC NTRL:



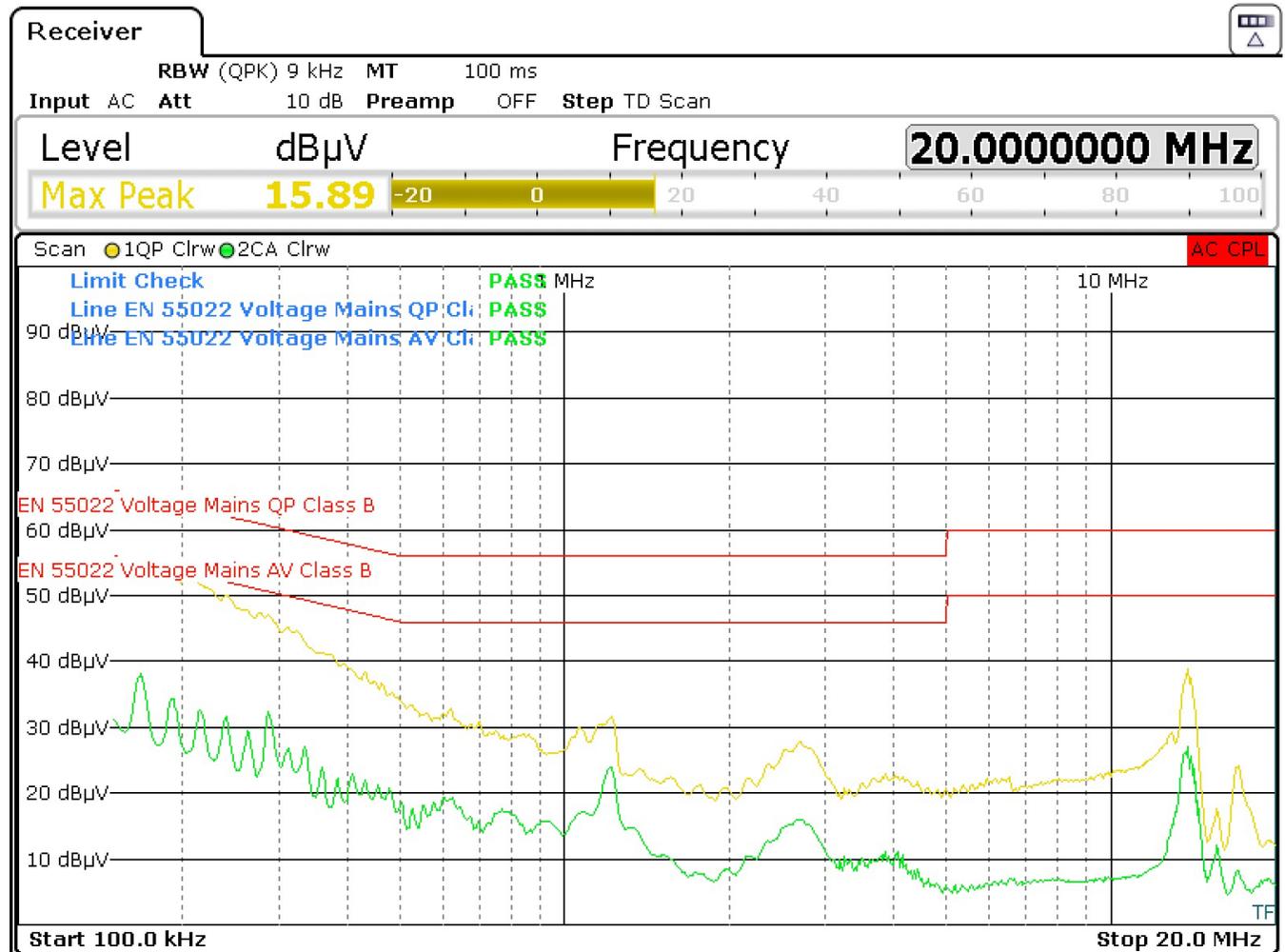
Date: 14.JUN.2019 11:55:24

230VAC LINE:



Date: 14.JUN.2019 11:51:38

230VAC NTRL:



Date: 14.JUN.2019 11:54:20

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