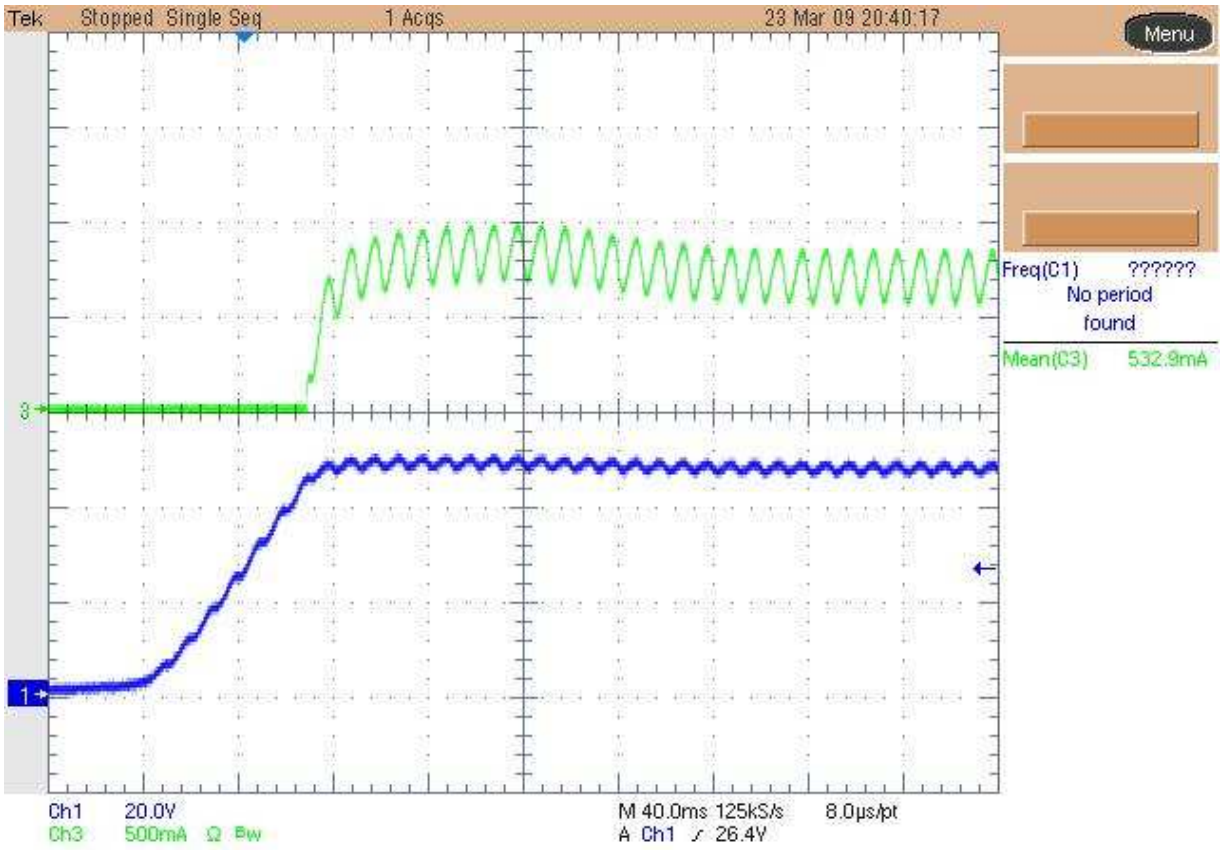
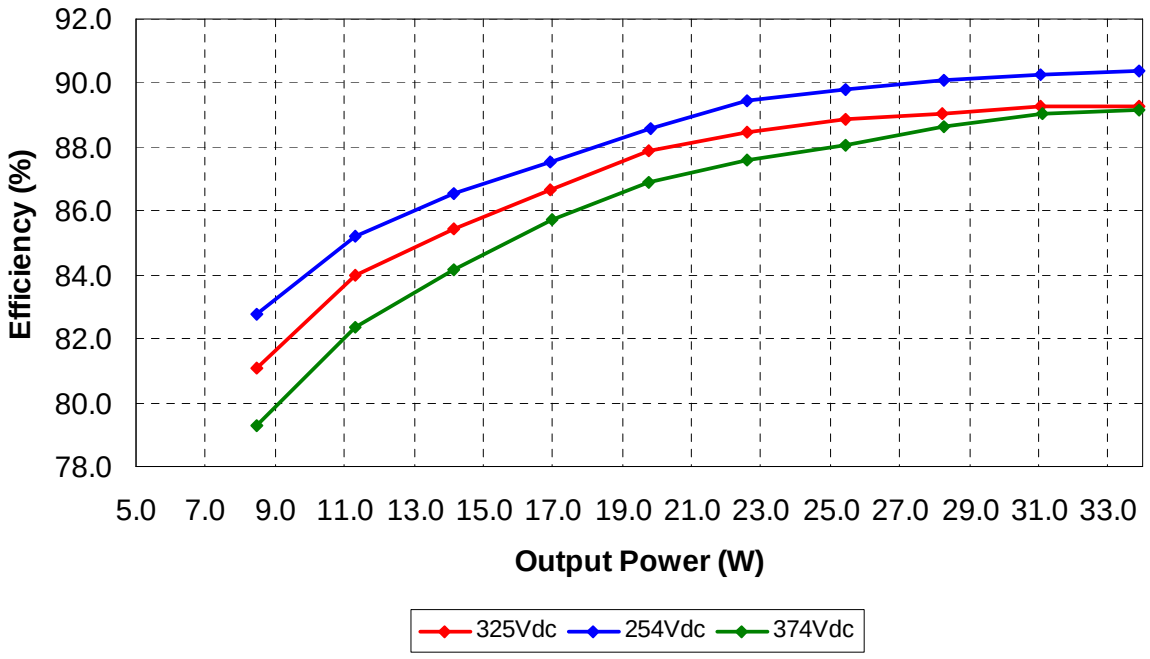
1 Startup

The output voltage and current at startup are shown in the image below. Input voltage is 230Vac. The output was fully loaded (48V, 700mA).
Channel 1 shows the output voltage (20V/div, 40ms/div).
Channel 3 shows the output current (500mA/div).



2 Efficiency

The efficiency data are shown in the tables and graph below. For simplicity and accuracy of measurements, the data was measured using a DC input.
The load was composed of 3 to 12 LEDs (700mA nominal current).



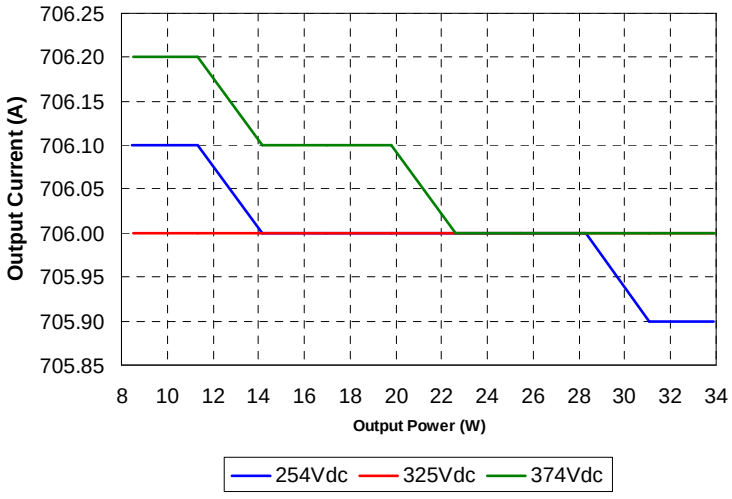
Iout (mA)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
706.1	12.00	8.47	40.3	254	10.24	1.76	82.78
706.1	16.03	11.32	52.3	254	13.28	1.97	85.20
706.0	20.05	14.16	64.4	254	16.36	2.20	86.54
706.0	24.00	16.94	76.2	254	19.35	2.41	87.54
706.0	28.05	19.80	88.0	254	22.35	2.55	88.60
706.0	32.05	22.63	99.6	254	25.30	2.67	89.44
706.0	36.02	25.43	111.5	254	28.32	2.89	89.79
706.0	40.06	28.28	123.6	254	31.39	3.11	90.09
705.9	44.03	31.08	135.6	254	34.44	3.36	90.24
705.9	48.02	33.90	147.7	254	37.52	3.62	90.35

Iout (mA)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
706.0	12.03	8.49	32.2	325	10.47	1.98	81.08
706.0	16.04	11.32	41.5	325	13.49	2.16	83.96
706.0	20.02	14.13	50.9	325	16.54	2.41	85.44
706.0	24.01	16.95	60.2	325	19.57	2.61	86.64
706.0	28.00	19.77	69.2	325	22.49	2.72	87.90
706.0	32.01	22.60	78.6	325	25.55	2.95	88.47
706.0	36.00	25.42	88.0	325	28.60	3.18	88.87
706.0	40.00	28.24	97.6	325	31.72	3.48	89.03
706.0	44.00	31.06	107.1	325	34.81	3.74	89.25
706.0	48.03	33.91	116.9	325	37.99	4.08	89.25

Iout (mA)	Vout (Vdc)	Pout (W)	Iin (mA)	Vin (Vdc)	Pin (W)	Ploss (W)	Eff (%)
706.2	12.03	8.50	28.7	374	10.72	2.22	79.26
706.2	16.04	11.33	36.8	374	13.75	2.42	82.37
706.1	20.02	14.14	44.9	374	16.79	2.66	84.18
706.1	24.02	16.96	52.9	374	19.78	2.82	85.73
706.1	28.03	19.79	60.9	374	22.78	2.98	86.90
706.0	32.02	22.61	69.0	374	25.81	3.20	87.60
706.0	36.01	25.42	77.2	374	28.87	3.45	88.05
706.0	40.04	28.27	85.3	374	31.90	3.63	88.61
706.0	44.04	31.09	93.4	374	34.93	3.84	89.01
706.0	48.04	33.92	101.7	374	38.04	4.12	89.17

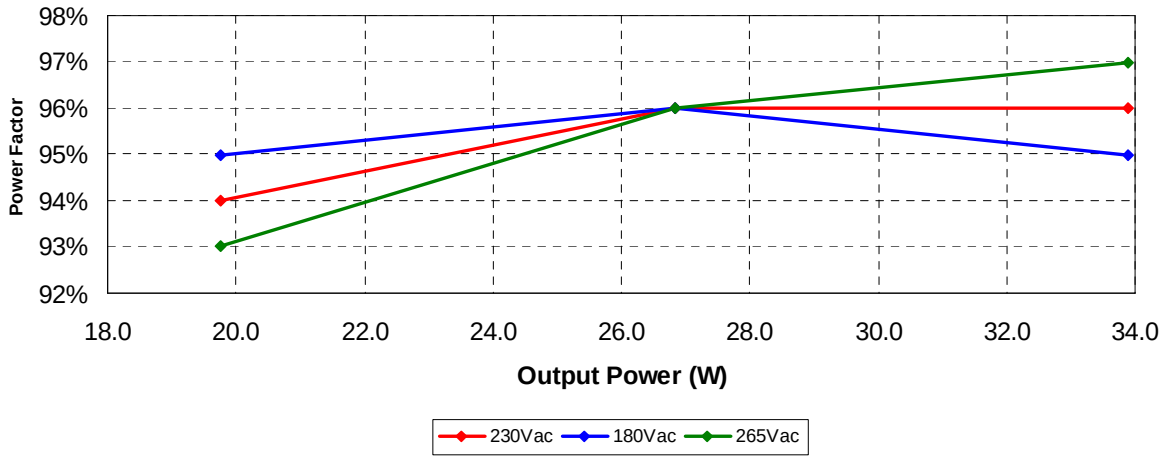
3 Output Current Regulation

The output current versus output power graph is plotted below.



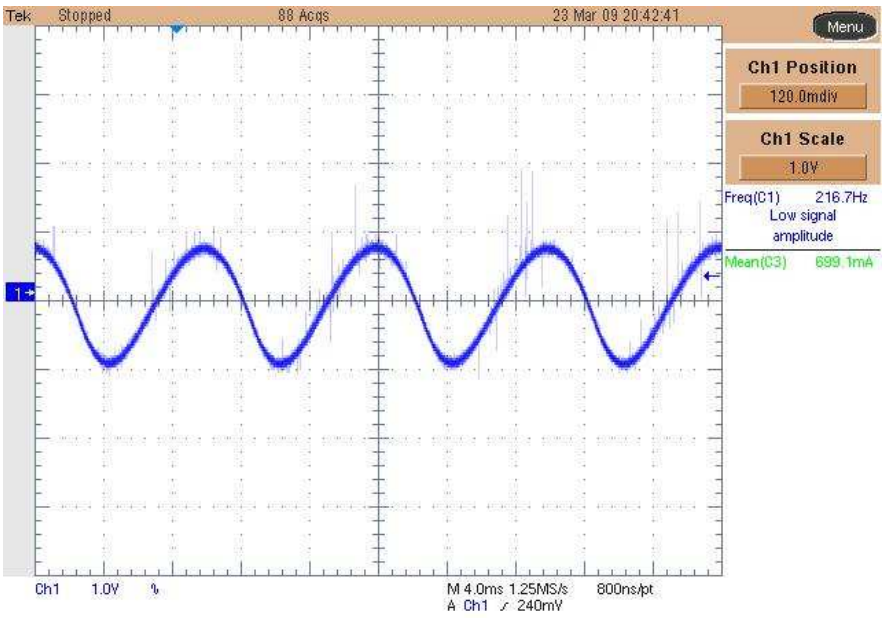
4 Power Factor

The Power Factor graph for the three input voltages is shown below:



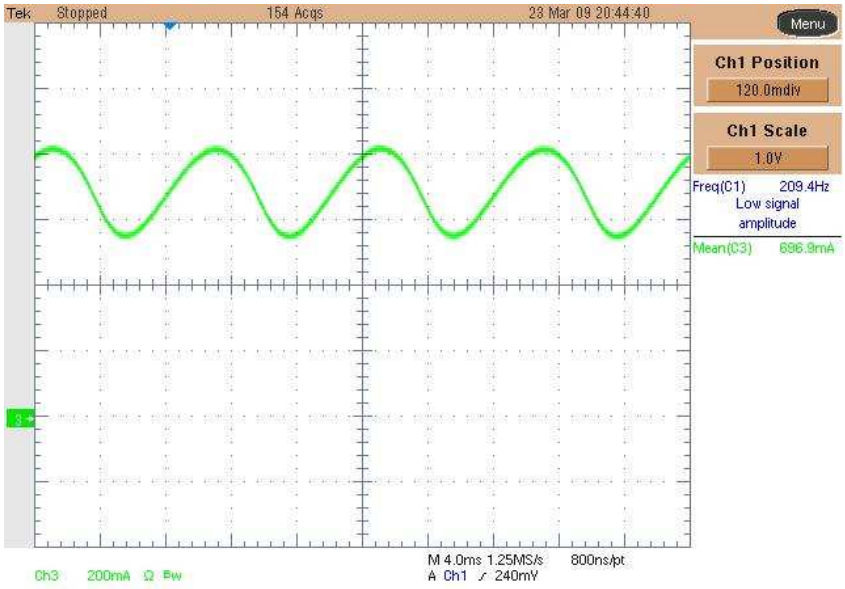
5 Output Ripple Voltage

The output ripple voltage is shown in the plot below. The input was set to 230Vac and the load was set to 700mA, 48V. Channel 1 shows the output ac voltage (1 V/div, 4ms/div).



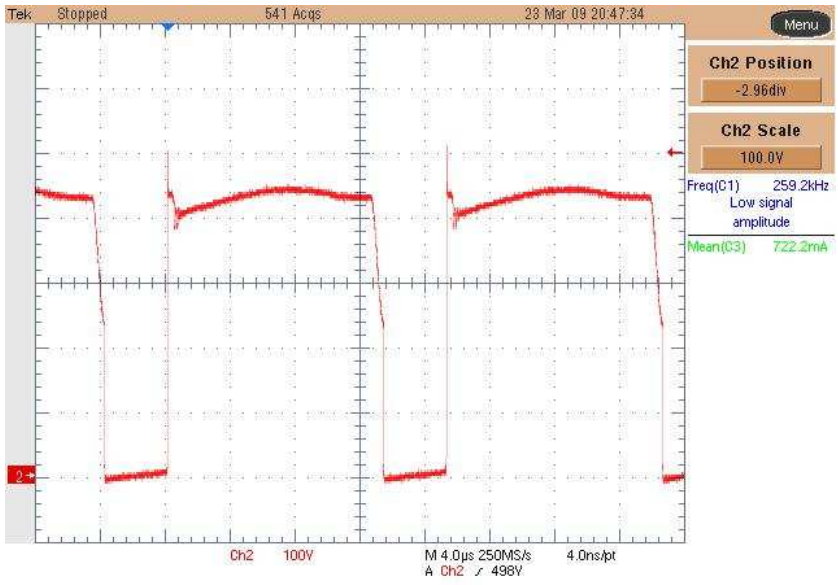
6 Output Ripple Current

The output ripple current is shown in the plot below. The input was set at 230Vac and the load was set to 700mA, 48V. Channel 3 shows the output current (200mA/div, 4ms/div).

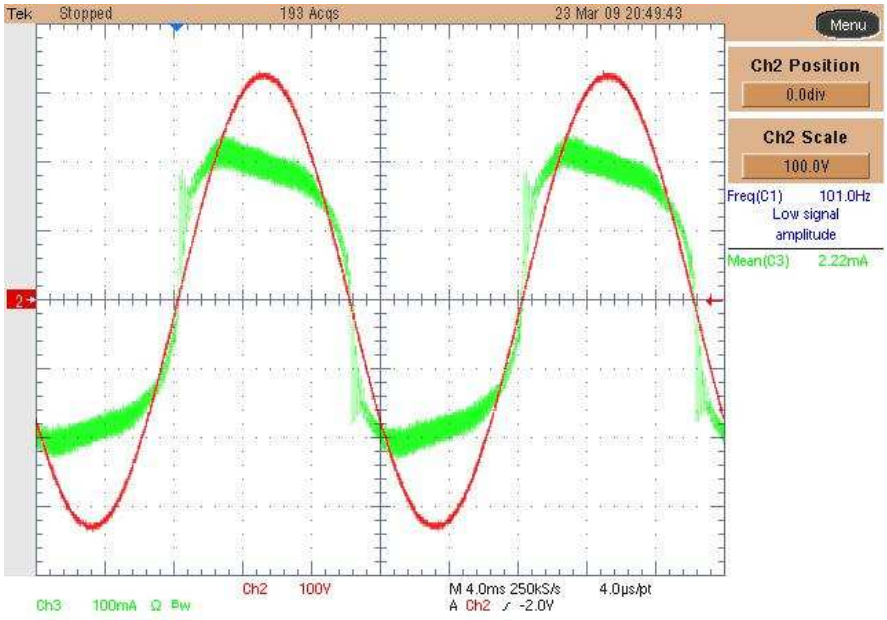


7 Switching Node Waveform

The image below shows the voltage on the drain of the switching node (Q2), with a 230Vac input, and a 700mA, 48V load. Channel 3 shows the drain voltage (100V/div, 4us/div).

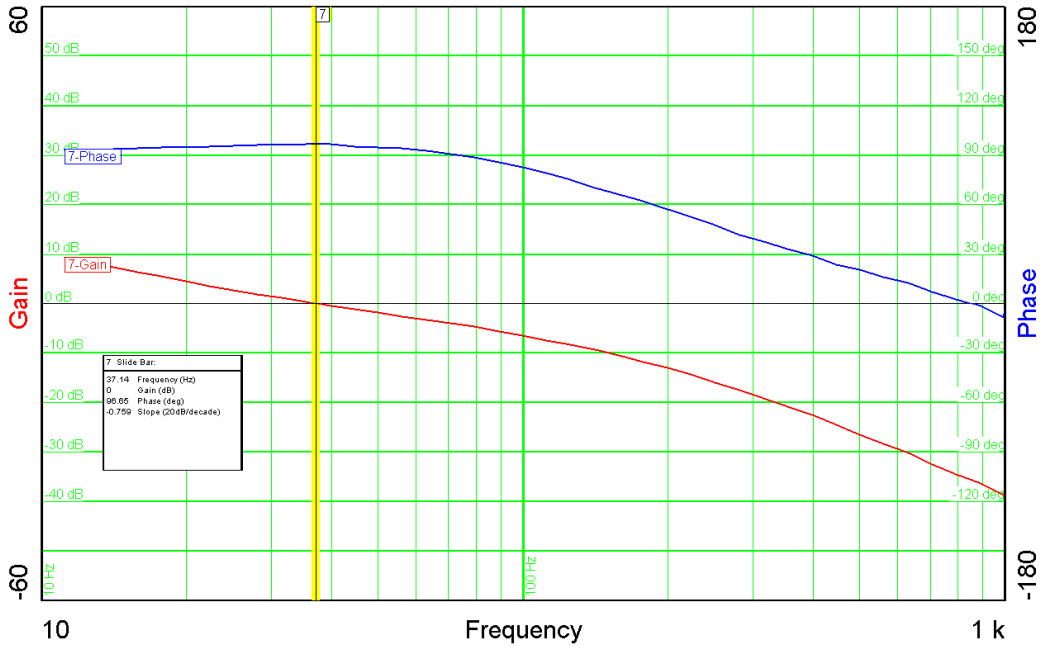


8 Input Voltage and Current Waveforms (same conditions)

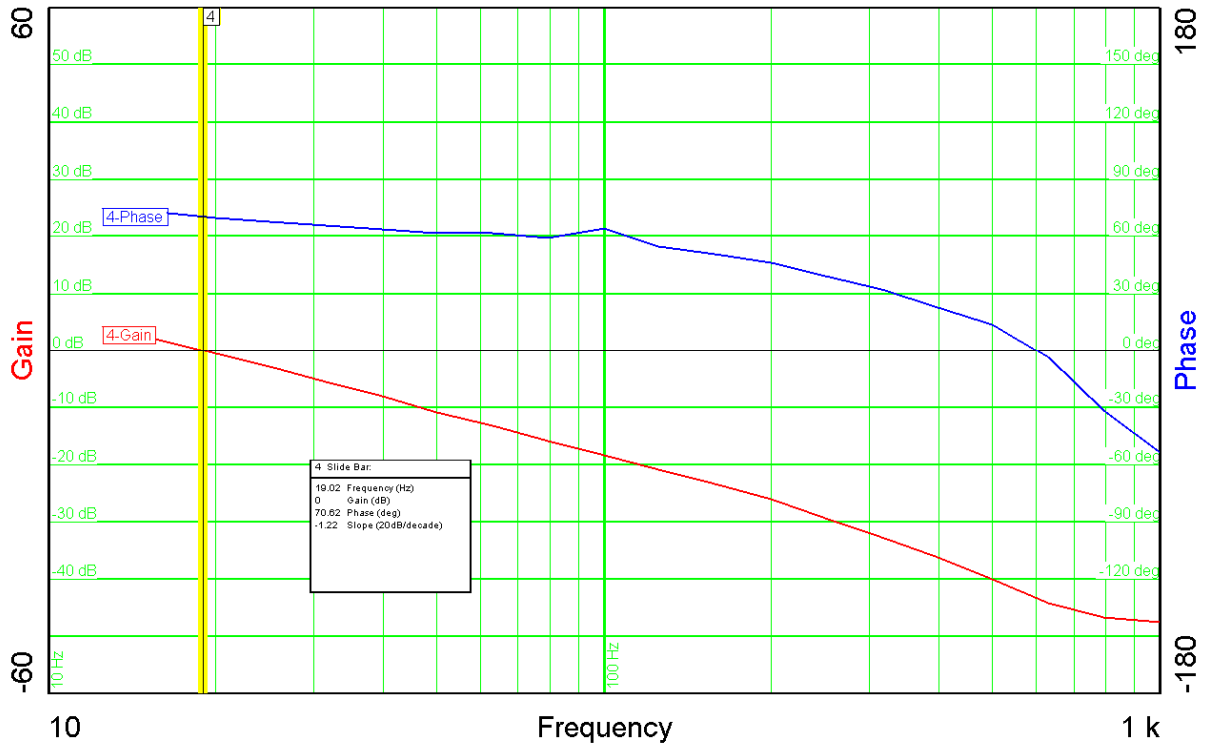


9 Loop Response

The image below shows the loop response of the converter measured with a 325Vdc input, with 3 LEDs (700mA, 12V, 8.4W). Phase margin is 96.65 deg. and crossover frequency is 37.14 Hz.

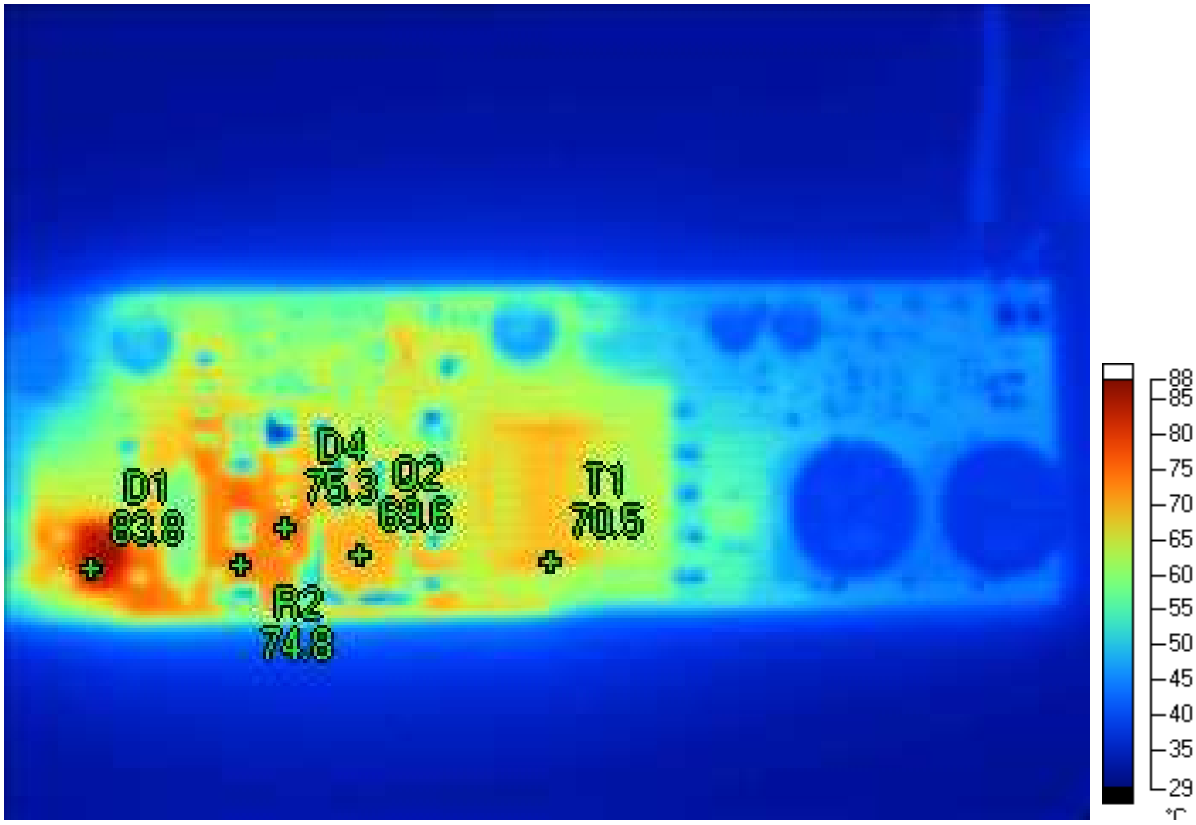


The image below shows the loop response of the converter measured with a 325Vdc input, but in this case with 12 LEDs (700mA, 48V, 33.6W). Phase margin is 70.62 deg. and crossover frequency is 19.02Hz.



10 Thermal Image

The image below shows the thermal image in still air taken at full load and 230Vac, while the ambient temperature was 25C.

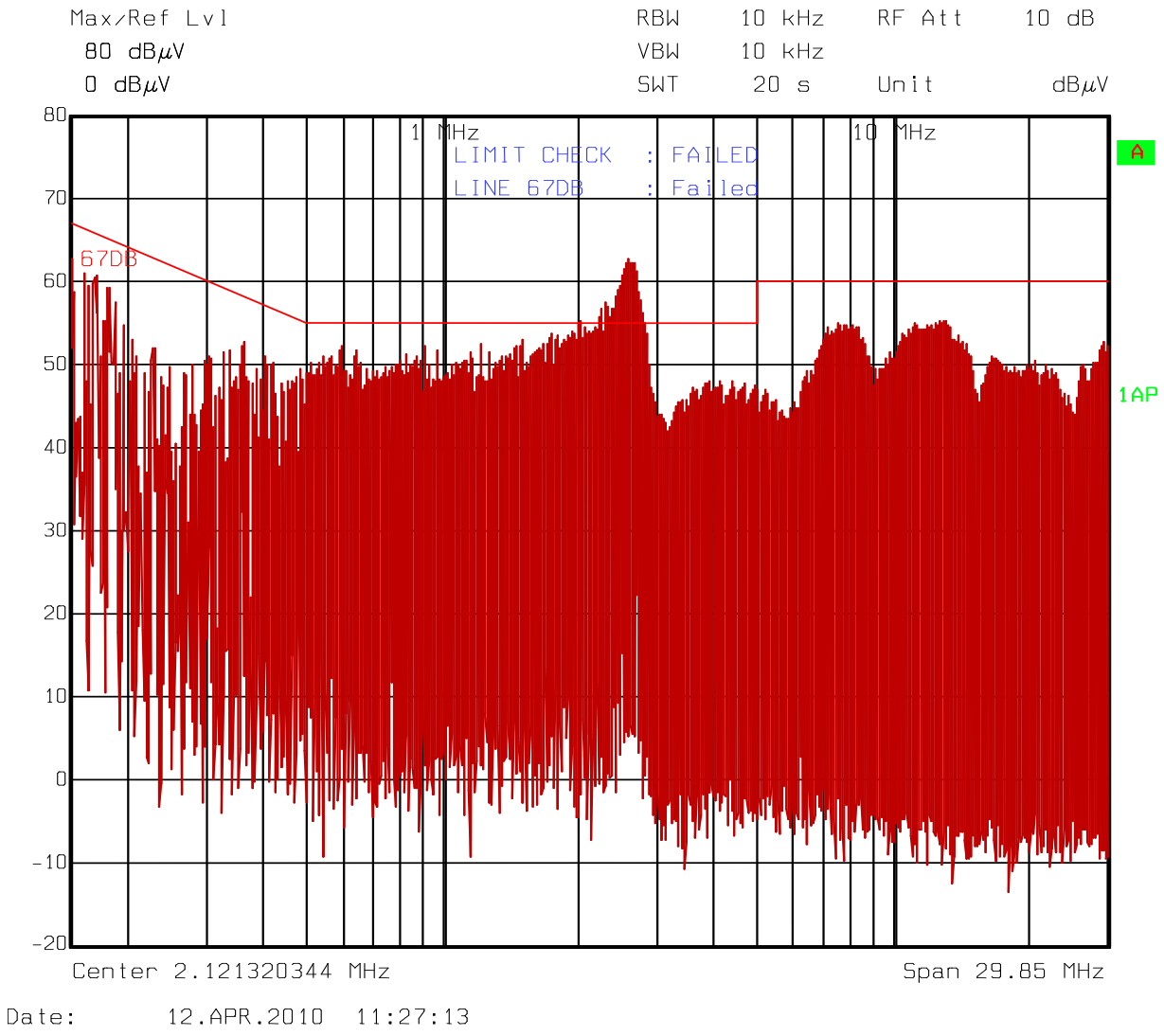


Markers

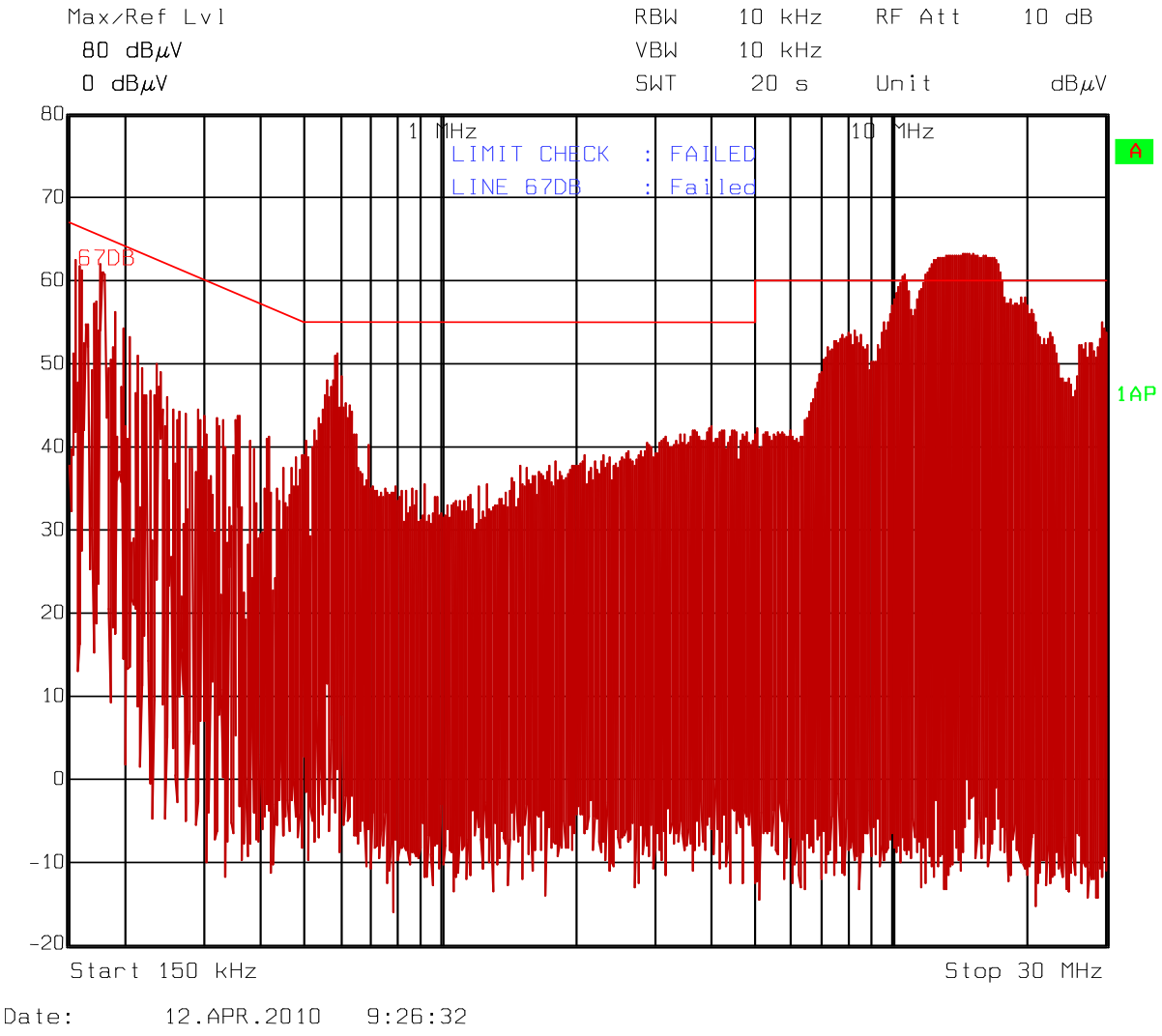
Label	Temperature	Emissivity	Background
T1	70.5 ℃	0.95	25.0 ℃
Q2	69.6 ℃	0.95	25.0 ℃
D1	83.8 ℃	0.95	25.0 ℃
D4	75.3 ℃	0.95	25.0 ℃
R2	74.8 ℃	0.95	25.0 ℃

11 Conducted EMI emission

The EMI noise was measured with a standard line impedance stabilization network (LISN). The input was set to 230Vac and the load was set to 700mA, 48V.



The image below shows the EMI noise measurement with two additional decoupling capacitors (1500pF) between the input lines and earth.
The input was set to 230Vac and the load was set to 700mA, 48V.



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