CY-SD1125
20W USB-C PD Power Adapter Solution Demo Kit
Validation Test Report
Version - 1.0

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1. Introduction

Cypress CYPAP111 part of PAG1P family is designed for a secondary controlled AC/DC flyback converter topology. In this topology, the voltage and current regulation is performed by the secondary controller. CYPAP111 is responsible for providing the start-up function, driving the primary side FET as well as responding to fault conditions

Cypress CYPAS111 part of PAG1S family is an integrated secondary-side synchronous flyback controller, synchronous rectifier (SR) controller, and charging port controller. CYPAS111 is designed to fit a secondary-controlled flyback system with a primary startup controller (CYPAP111) with secondary-side sensing and regulation. CYPAS111 is targeted towards mobile power adapters, it fits well into high-efficiency AC-DC flyback designs for USB Power Delivery, Qualcomm Quick Charge, and other standard charging protocols. CYPAS111 also supports USB Power Delivery (USB PD 3.0) Programmable Power Supply (PPS) mode.

The interface between CYPAP111 and CYPAS111 is through a Pulse Edged Transformer and its associated circuitry.

This document contains test results of PAG1P + PAG1S based 20W Power Adapter solution board. The tests were performed on this board which is equipped with Cypress CYPAP111A3-10SXQ on primary and CYPAS111A1-24LQXQ on secondary section of the converter.

Table 1-1. Test Specification

Parameter	Value
Input Voltage	90 – 265Vac
Rated Input Voltage for CY-SD1125	100 – 240Vac
Input Frequency	47 – 63Hz
Max Output Power	20W
Main Output Vo / Io	PDO-Fixed: 5V/3A; PDO-Fixed: 9V/2.2A; PDO-PPS: 3.3V – 5.9V / 3A; PDO-PPS: 3.3V – 11V / 2.2A
Efficiency	CoC Tier-2, DoE Level-6
Standby Power	CoC Tier-2, DoE Level-6
Protection	OVP, UVP, OCP, SCP, OTP

2. Test Setup

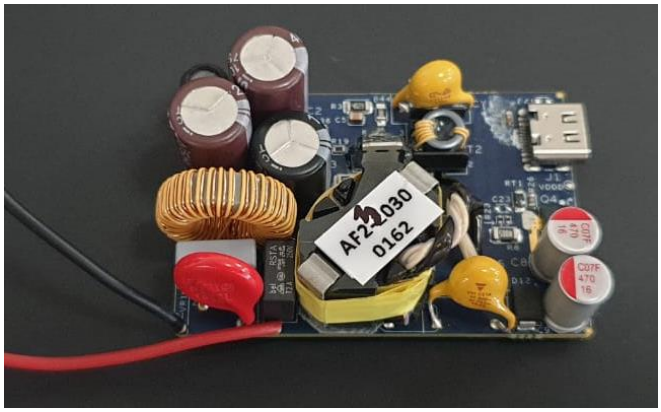
2.1 DUT (Device Under Test)

CY 20W PAG1P+PAG1S Solution Kit: (CY-SD1125)

Table 2-1. PAG1P-PAG1S Solution Kit Details

DUT contents	Description
CYPAP111A3 and CYPAS111A1	Primary and Secondary Devices
Firmware Version	#2634

Figure 2-1. PAG1P-PAG1S Solution Demo Kit

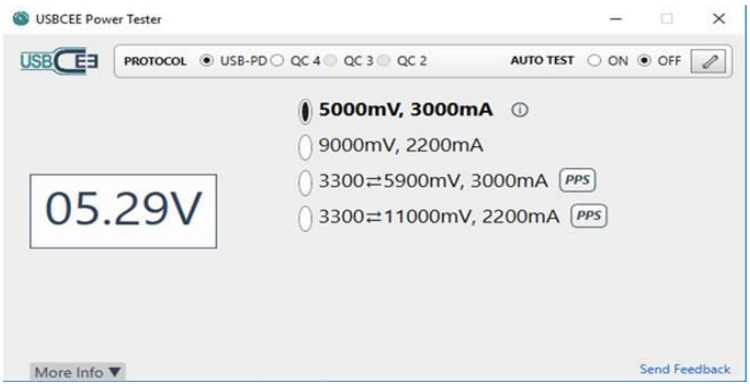


Dimensions (in mm): 55(L) x 36(W) x 21(H)

Note: All the tests mentioned in this report are carried-out under open-frame condition.

2.2 DUT Setup

Figure 2-2. Test set-up



The DUT is connected to PAT Tester (CCPROG PAT) using a USB Type-C cable. Once a successful connection is established PAT UI does a PDO discovery and displays the same on the UI. In our case, the solution kit is pre-configured with 4 PDOs:

PDO 1: 5V, 3A FIXED
PDO 2: 9V, 2.2A FIXED
PDO 3: 3.3V-5.9V, 0-3A PPS
PDO 4: 3.3V-11V, 0-2.2A PPS

One can either choose the suitable pre-configured PDO or configure a new one using Cypress EZ-PD Configuration Utility. For the Tests in the following sections, we use the pre-configured PDOs.

To know more about PAT Tester and UI, visit: USBCEE: https://www.usbcee.com/product-details/3

Type C-C cable (1meter long) used: Type C-C cable being used for all the tests mentioned in this report is 3027003-01M. Datasheet is available at: http://www.qualtekusa.com/images/Cable%20Assemblies/PDF_2/3027003-01M.pdf

2.3 Test Equipment

Table 2-3. Test Equipment List

Test setup	Description
Oscilloscope Name	Tektronix DPO 4104
Power Meter	Yokogawa WT310E
Digital Multimeter (Vo & Io)	Agilent 34411A
Programmable AC Source	Chroma 61501
Electronic Load	Chroma 63102A
Thermal Camera	Flir E75
Automation Software	LabView

3. Power Management Test Results

3.1 Efficiency 4-pt average

3.1.1 Detailed Data

Table 3-1. Efficiency* Results

Parameter	Test Condition	Criteria			Unit	Test Result	
		Min	Typ	Max		115Vac 60Hz	230Vac 50Hz
DoE Level-6 Four-point Average Efficiency (Average of 25%, 50%, 75%, 100% load)	Vo = 3.3Vdc, Io = 3A	78.63%			%	87.700	86.267
	Vo = 5Vdc, Io = 3A	81.39%			%	88.543	87.753
	Vo = 9Vdc, Io = 2.2A	85.42%			%	89.015	88.238
	Vo = 11Vdc, Io = 1.8A	85.43%			%	88.549	87.814
DoE No load consumption	No USB sink attached			100	mW	21	26
CoCv5 Tier2 Four-point Average Efficiency (Average of 25%, 50%, 75%, 100% load)	Vo = 3.3Vdc, Io = 3A	78.93%			%	87.700	86.267
	Vo = 5Vdc, Io = 3A	81.84%			%	88.543	87.753
	Vo = 9Vdc, Io = 2.2A	85.92%			%	89.015	88.238
	Vo = 11Vdc, Io = 1.8A	85.92%			%	88.549	87.814
CoCv5 Tier2 10% load Efficiency	Vo = 3.3Vdc, Io = 0.3A	69.66%			%	85.247	78.387
	Vo = 5Vdc, Io = 0.3A	72.48%			%	86.396	81.833
	Vo = 9Vdc, Io = 0.22A	75.92%			%	84.678	81.578
	Vo = 11Vdc, Io = 0.18A	75.92%			%	82.742	79.765
CoCv5 Tier2 No load consumption	No USB sink attached			75	mW	21	26

- Peak Efficiency: **89.31%** (At 115Vac-60Hz, 9V-1.6544A)

*** Vout for efficiency calculations is measured across Vbus_C at board end with 5 minutes' warmup**

*** Variation of ±1% in efficiency can be observed across units**

3.1.2 Graphs

Figure 3-1-1. Efficiency* at 115Vac 60Hz

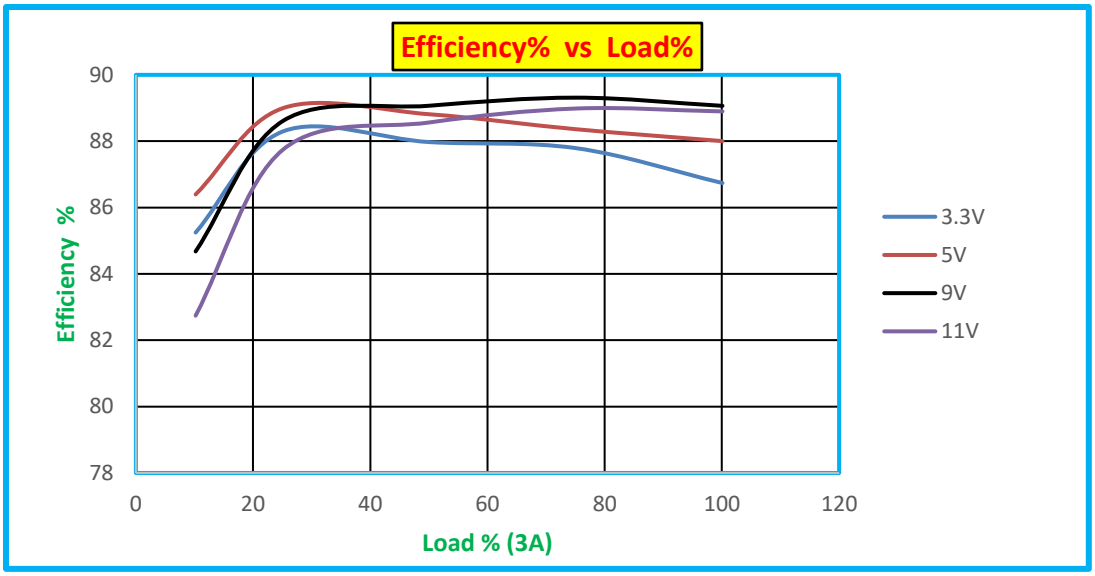
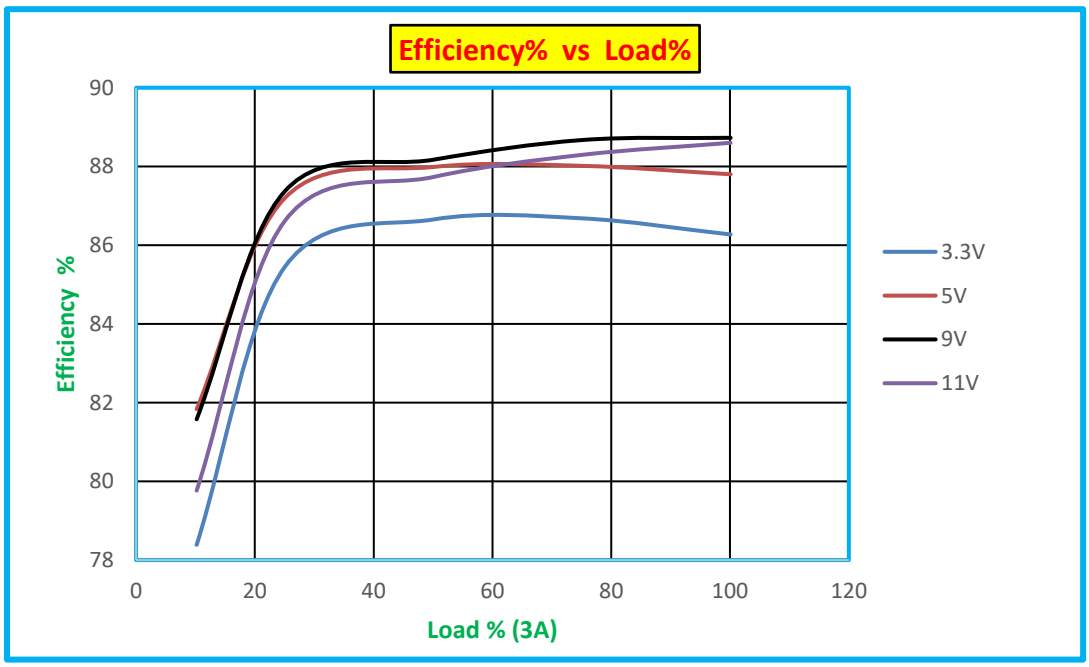


Figure 3-1-2. Efficiency* at 230Vac 50Hz



*** Vout for efficiency calculations is measured across Vbus_C at board end**

Figure 3-1-3. Efficiency* at 90Vac 47Hz

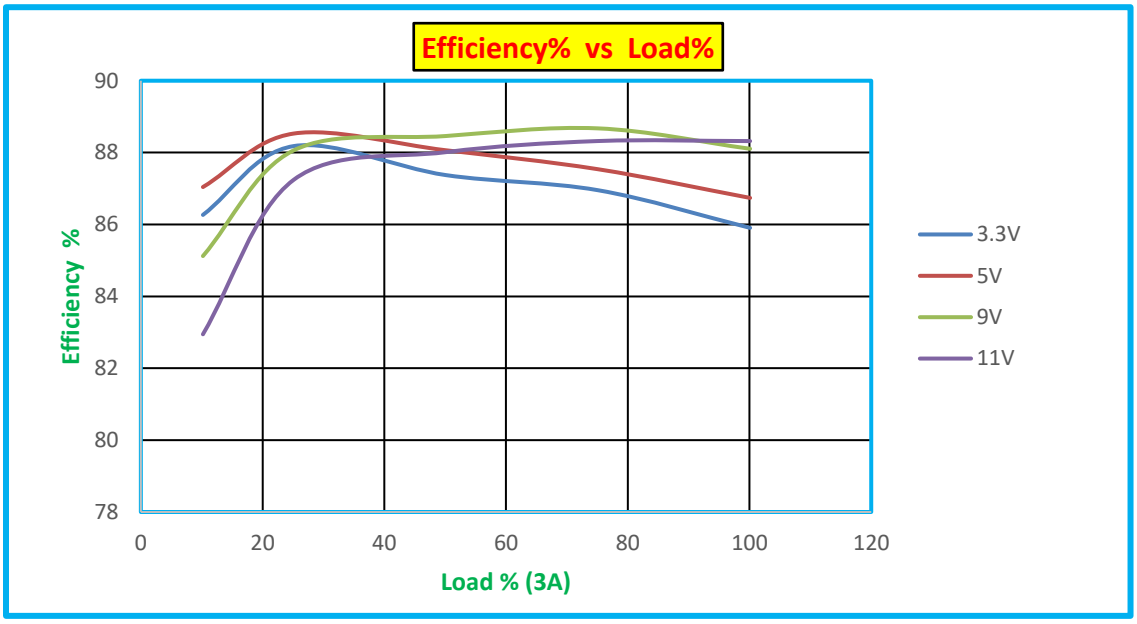
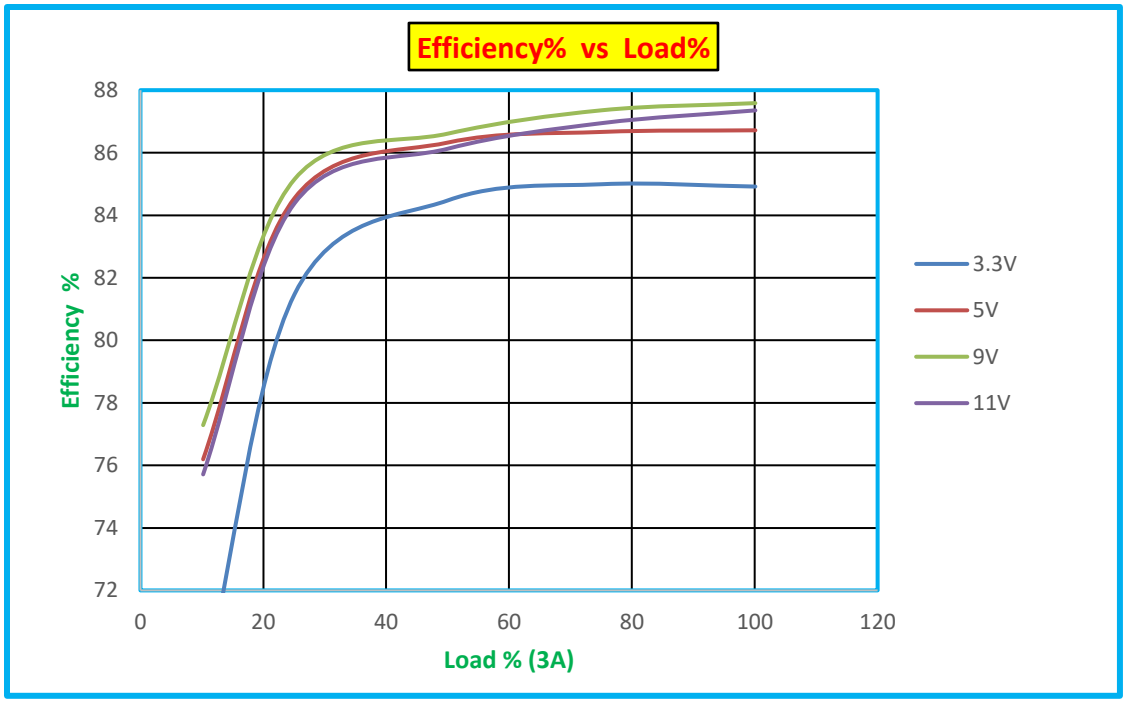


Figure 3-1-4. Efficiency* at 264Vac 63Hz



*** Vout for efficiency calculations is measured across Vbus_C at board end**

3.2 Standby Power Consumption

3.2.1 Detailed Data

Table 3-2-1. Standby Power Results*

Vin (Vac)	115Vac, 60Hz	230Vac, 50Hz
Input Power (mW)	21	26

*** There should be 15 minutes of warmup-up time before starting to measure standby power**

3.2.2 Details

Figure 3-2-2. Detailed Power Measurement Results @115Vac, 60Hz

Figure 3-2-3. Detailed Power Measurement Results @230Vac, 50Hz

3.3 Output Voltage and Current Regulation

Figure 3-3-1. CC-CV regulation curve at 115Vac 60Hz

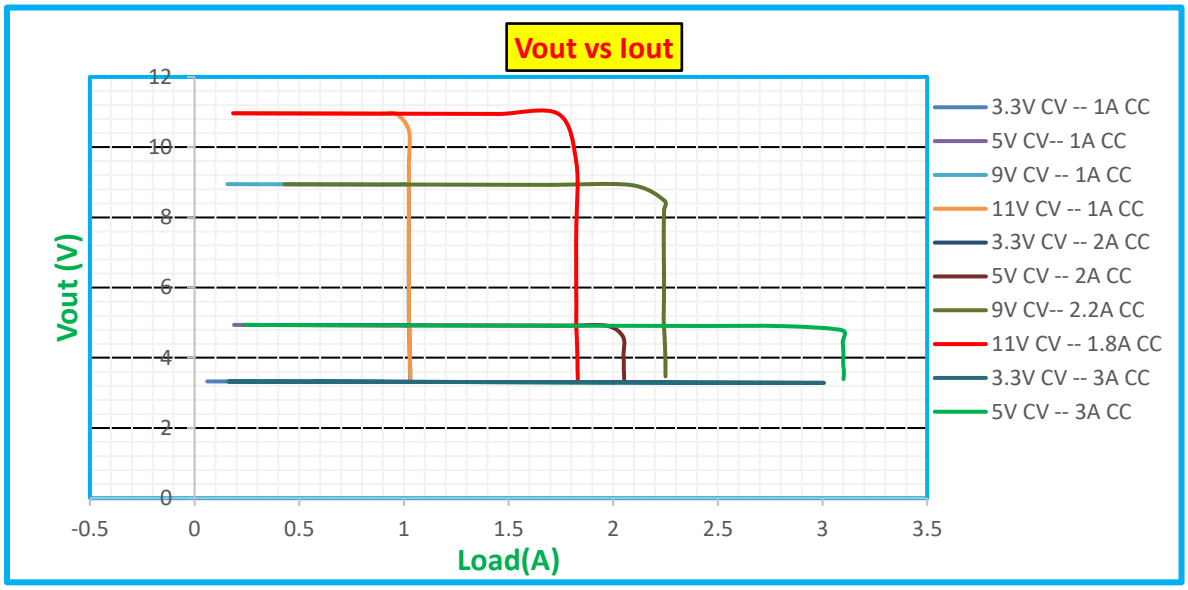
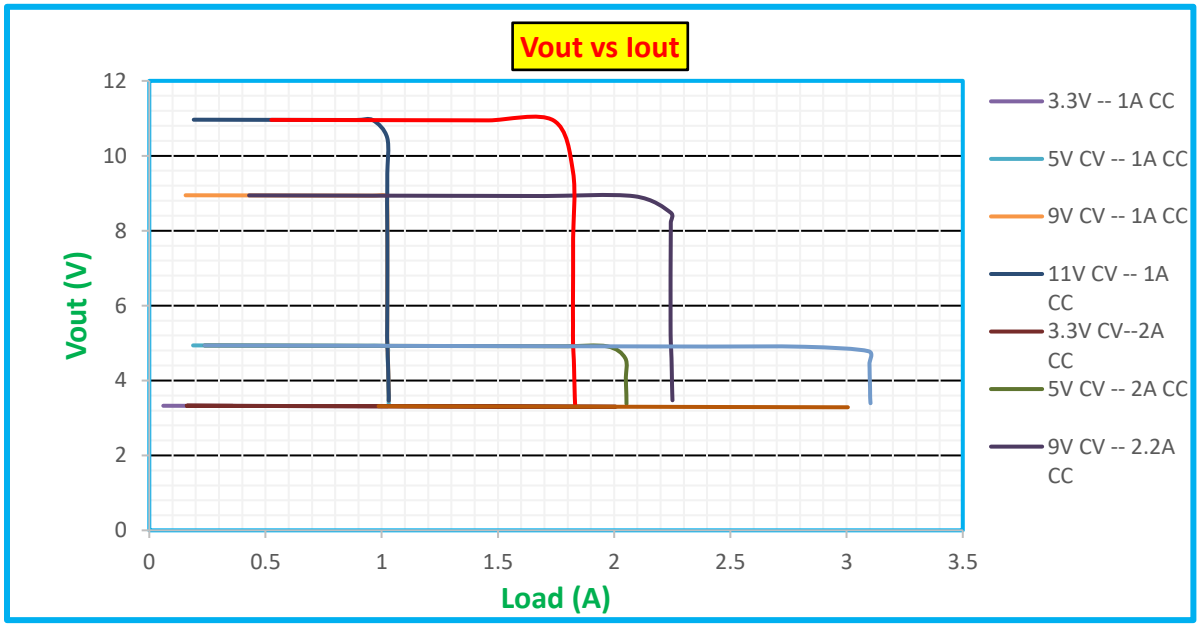


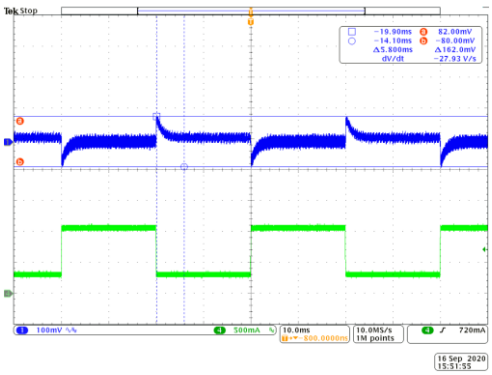
Figure 3-3-2. CC-CV regulation curve at 230Vac 50Hz



3.4 Output Dynamic Response Settling Time

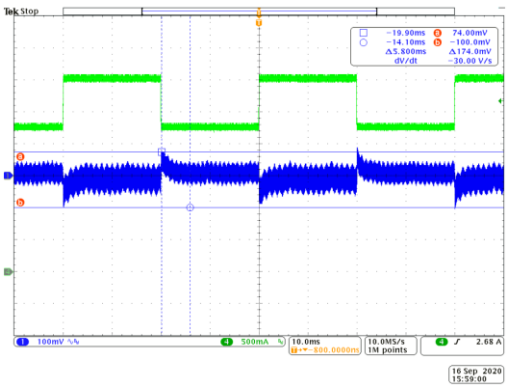
Figure 3-4-1. Settling time for 115Vac, 60Hz Load Transition 10% to 100% load (**CH1:** Vbus_c, **CH4:** Iout)

3.3V – 0.3A to 1.05A, Settling time = 5.8ms



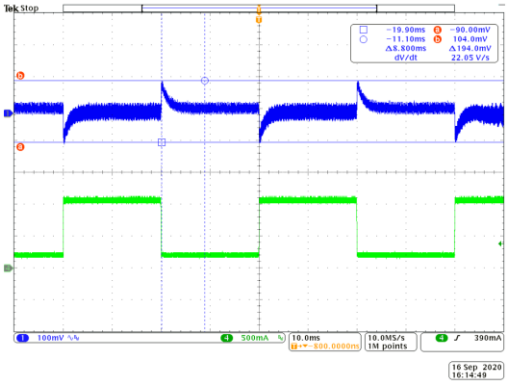
MDO4104C - 1:23:28 PM 9/16/2020

3V – 2.25A to 3A, Settling time = 5.8 ms



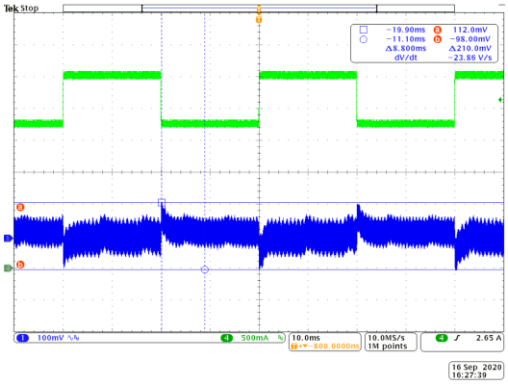
MDO4104C - 1:30:33 PM 9/16/2020

5V – 0.3A to 1.05A, Settling time = 8.8ms



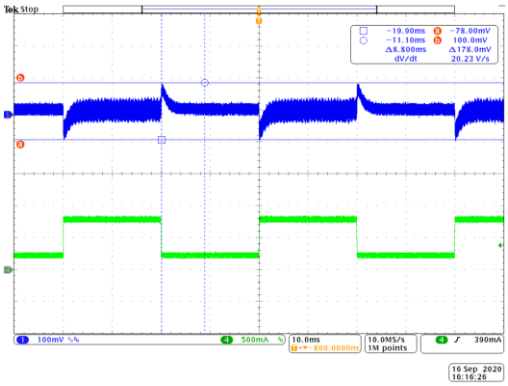
MDO4104C - 1:46:22 PM 9/16/2020

5V – 2.25A to 3A, Settling time = 8.8ms



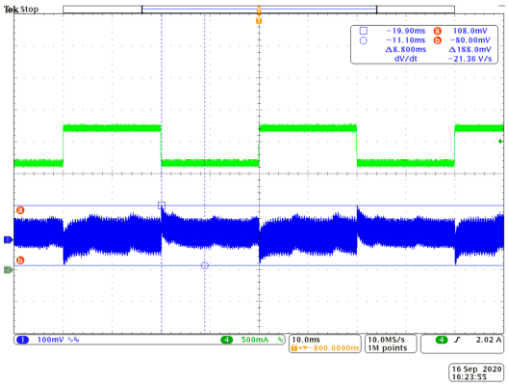
MDO4104C - 1:59:12 PM 9/16/2020

9V – 0.22A to 0.775A, Settling time = 8.8ms



MDO4104C - 1:47:59 PM 9/16/2020

9V – 1.66A to 2.2A, Settling time = 8.8ms



MDO4104C - 1:55:28 PM 9/16/2020

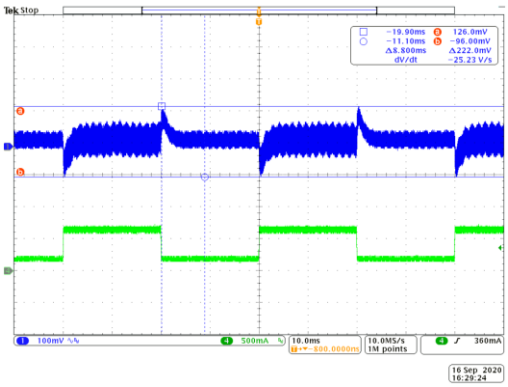
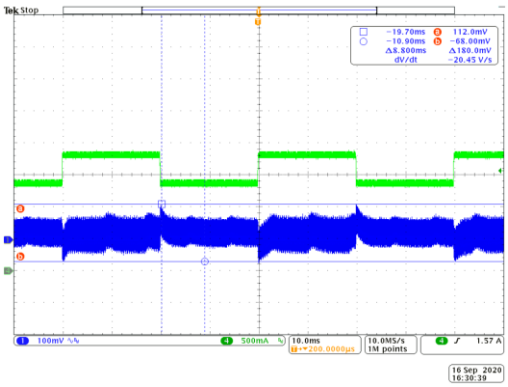
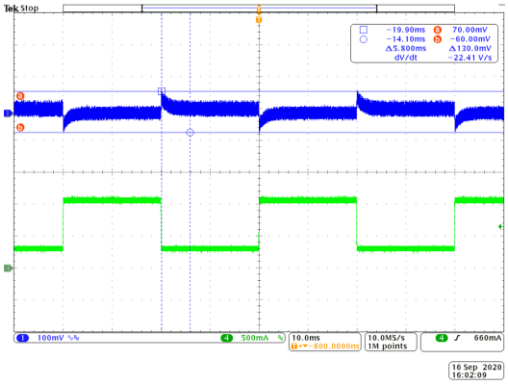
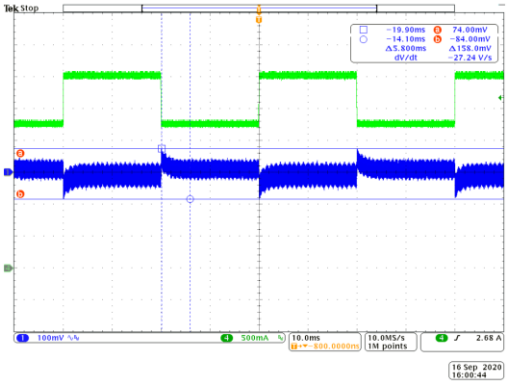
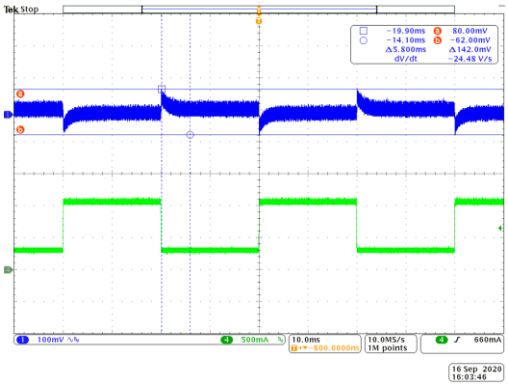
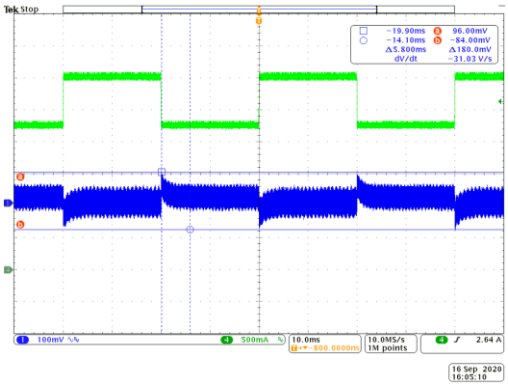
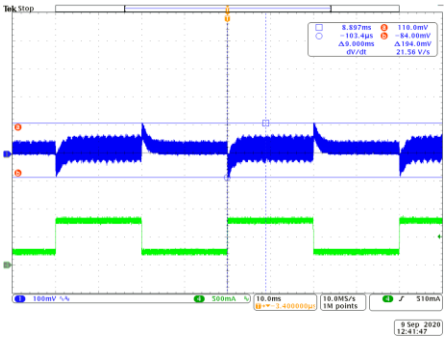
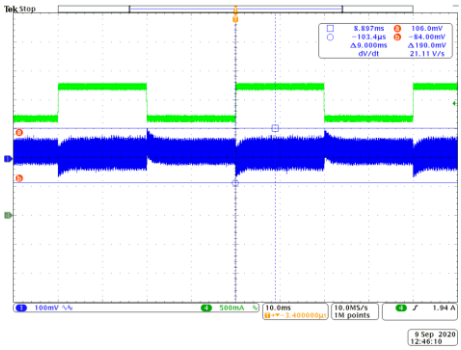
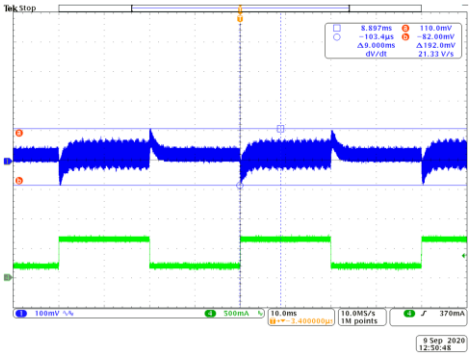
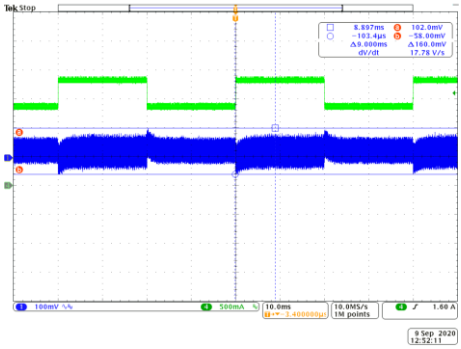
11V – 0.18A to 0.63A, Settling time = 8.8ms  MDO4104C - 2:00:57 PM 9/16/2020	**11V – 1.35A to 1.8A,** Settling time = 8.8ms  MDO4104C - 2:02:13 PM 9/16/2020

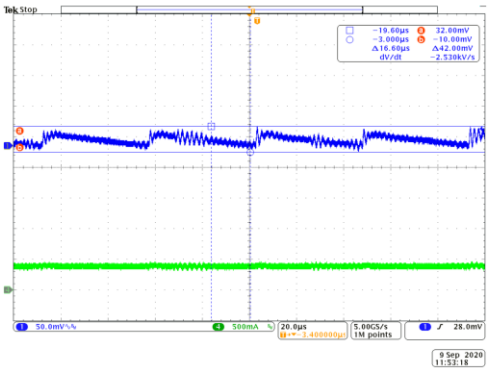
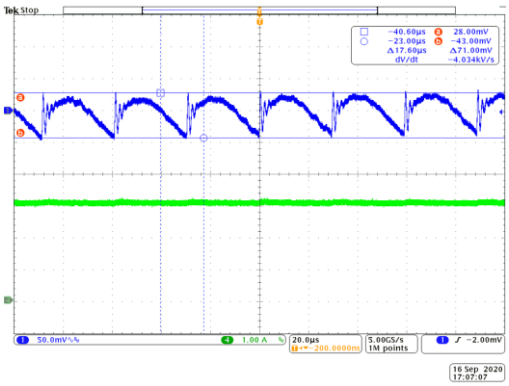
Figure 3-4-2. Settling time for 230Vac, 50Hz Load Transition 10% to 100% load (**CH1:** Vbus_c, **CH4:** Iout)

3.3V – 0.3A to 1.05A, Settling time = 5.8ms  MDO4104C - 1:33:42 PM 9/16/2020	**3V – 2.25A to 3A,** Settling time = 5.8 ms  MDO4104C - 1:32:18 PM 9/16/2020
5V – 0.3A to 1.05A, Settling time = 5.8ms  MDO4104C - 1:35:19 PM 9/16/2020	**5V – 2.25A to 3A,** Settling time = 5.8ms  MDO4104C - 1:36:44 PM 9/16/2020

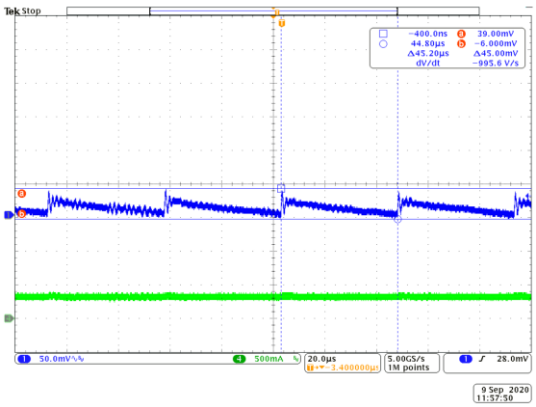
9V – 0.22A to 0.775A, Settling time = 9ms  MDO4104C - 10:14:18 AM 9/9/2020	**9V – 1.66A to 2.2A,** Settling time = 9ms  MDO4104C - 10:18:41 AM 9/9/2020
11V – 0.18A to 0.63A, Settling time = 9ms  MDO4104C - 10:23:20 AM 9/9/2020	**11V – 1.35A to 1.8A,** Settling time = 9 ms  MDO4104C - 10:24:42 AM 9/9/2020

3.5 Output Voltage Ripple Peak-Peak

Figure 3-5-1. Settling time for 115Vac, 60Hz Load Transition 10% to 100% load (**CH1:** Vbus_c; **CH4:** Iout)

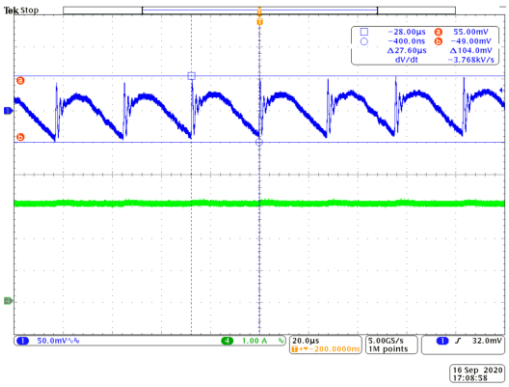
3.3V,0.3A  MDO4104C - 9:25:49 AM 9/9/2020	3.3V, 3A  MDO4104C - 2:38:40 PM 9/16/2020

5V,0.3A



MDO4104C - 9:30:22 AM 9/9/2020

5V,3A



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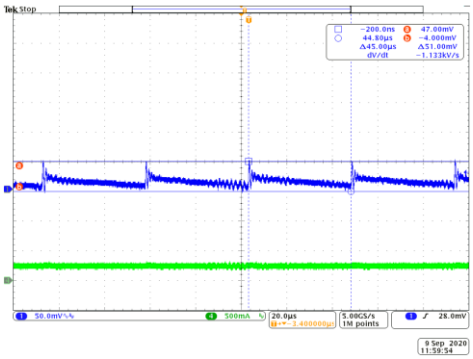
9V, 0.22A



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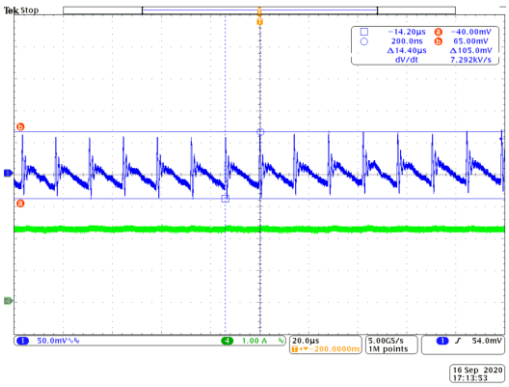
9V, 2.2A



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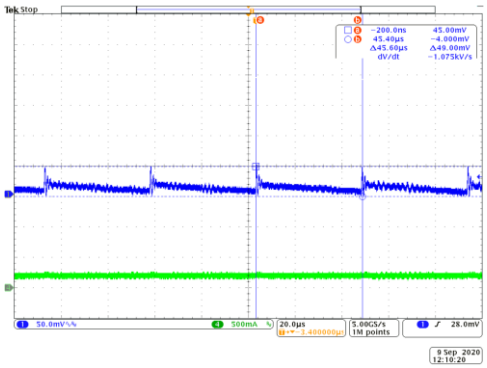
11V, 0.18A



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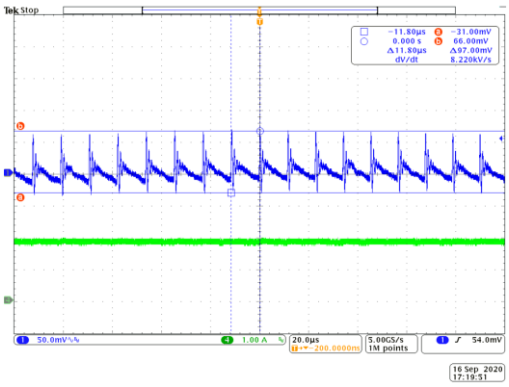
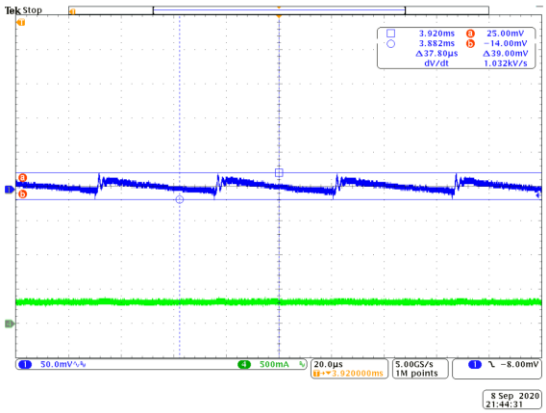
11V, 1.8A



MDO4104C - 2:51:25 PM 9/16/2020

Figure 3-5-2. Settling time for 230Vac, 50Hz Load Transition 10% to 100% load (**CH1:** Vbus_c, **CH4:** Iout)

3.3V,0.3A



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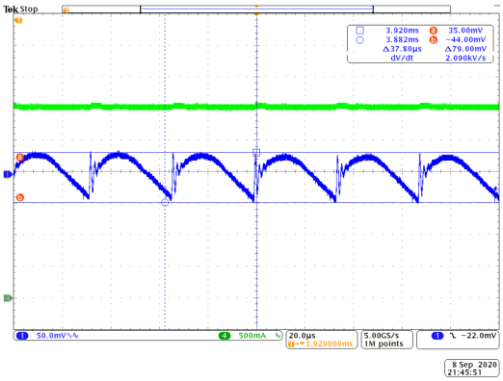
3.3V, 3A



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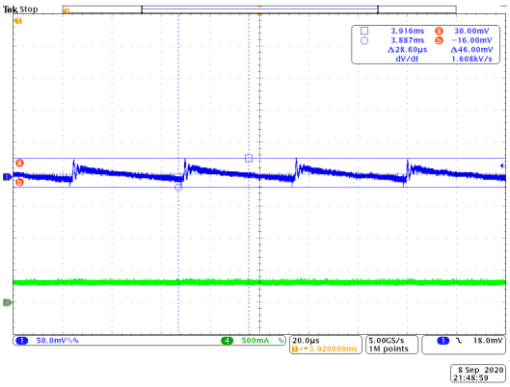
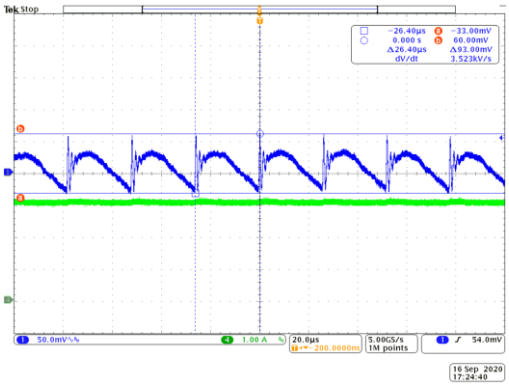
5V,0.3A



MDO4104C - 7:20:25 PM 9/8/2020

5V,3A



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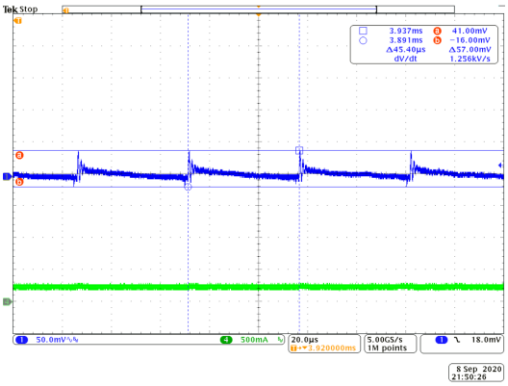
9V, 0.22A



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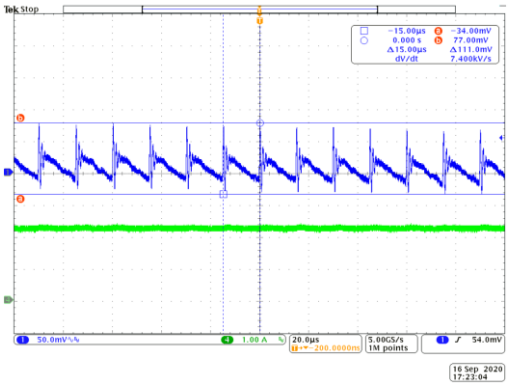
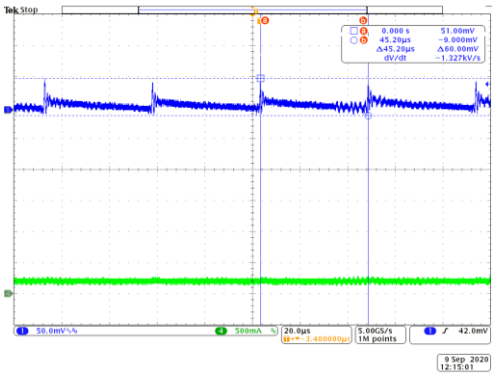
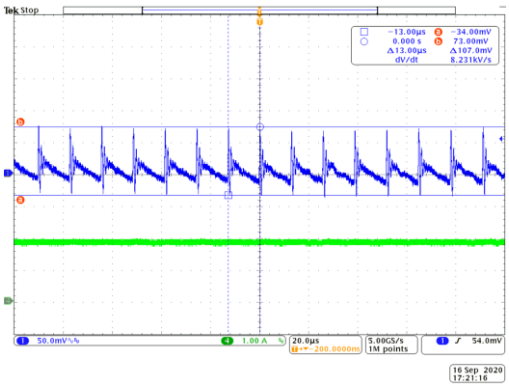
9V, 2.2A

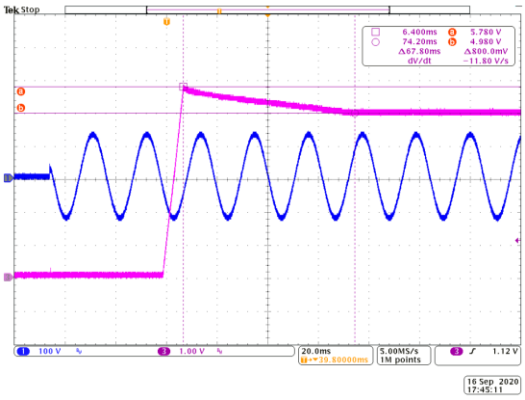


MDO4104C - 2:54:38 PM 9/16/2020

11V, 0.18A	11V, 1.8A
 MDO4104C - 9:47:32 AM 9/9/2020	 MDO4104C - 2:52:50 PM 9/16/2020

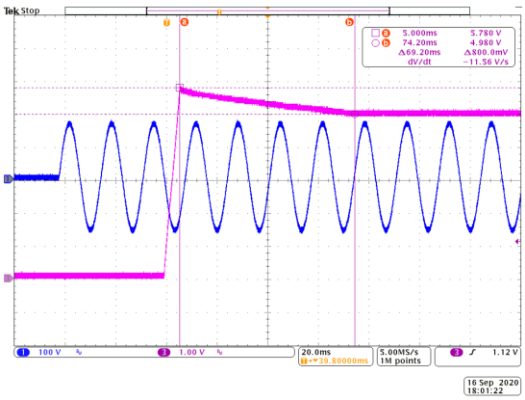
3.6 Start Up Overshoot

Figure 3-6-1. Output voltage transition for 90Vac, 47Hz; (**CH1:** Vin_ac, **CH3:** Vbus_in)



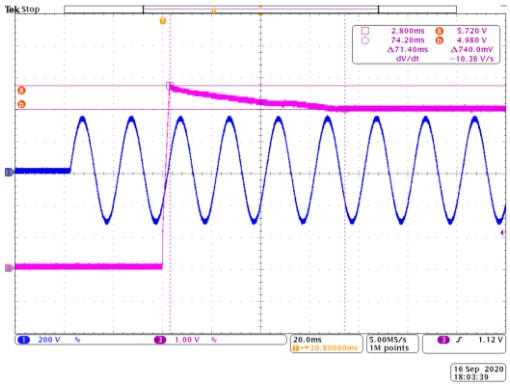
MDO4104C - 3:16:45 PM 9/16/2020

Figure 3-6-2. Output voltage transition for 115Vac, 60Hz; (**CH1:** Vin_ac, **CH3:** Vbus_in)



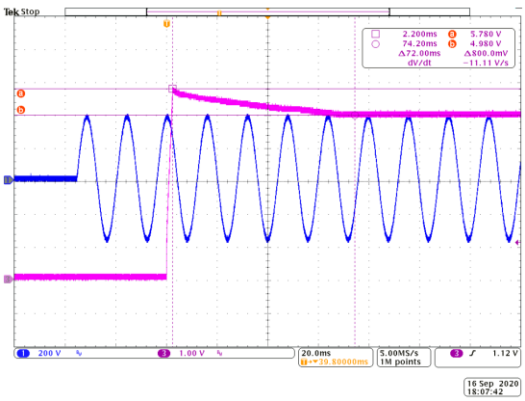
MDO4104C - 3:32:56 PM 9/16/2020

Figure 3-6-3. Output voltage transition for 230Vac, 50Hz; (**CH1:** Vin_ac, **CH3:** Vbus_in)



MDO4104C - 3:35:13 PM 9/16/2020

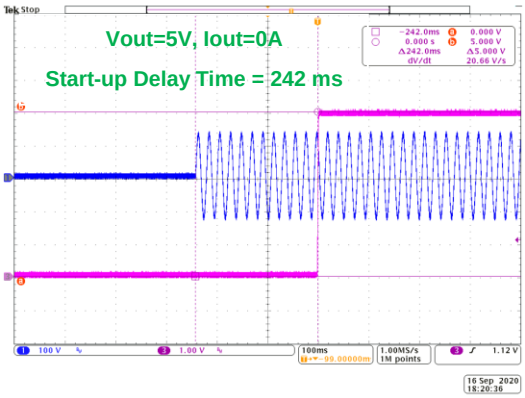
Figure 3-6-4. Output voltage transition for 264Vac, 63Hz; (**CH1:** Vin_ac, **CH3:** Vbus_in)



MDO4104C - 3:39:15 PM 9/16/2020

3.7 Start-up Turn-on Delay

Figure 3-7-1. Start-up Turn-on Delay at 90Vac, 47Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



MDO4104C - 3:52:10 PM 9/16/2020

Figure 3-7-2. Start-up Turn-on Delay at 115Vac, 60Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

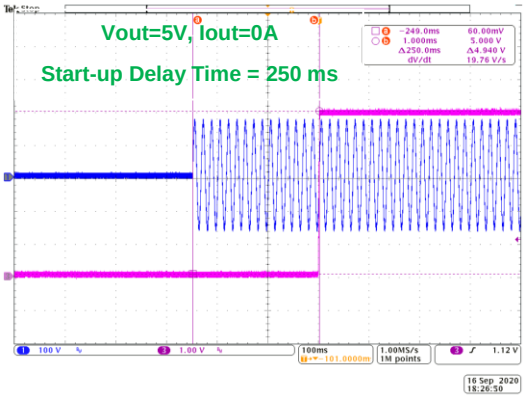


Figure 3-7-3. Start-up Turn-on Delay at 230Vac, 50Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

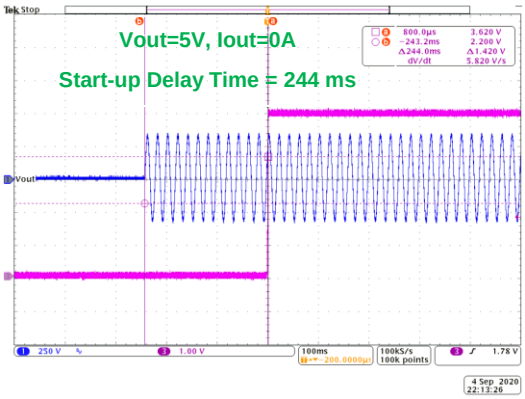
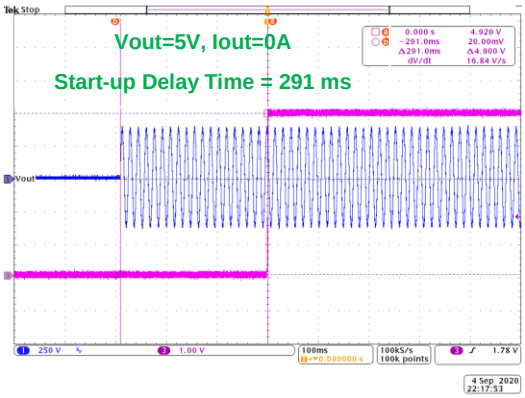
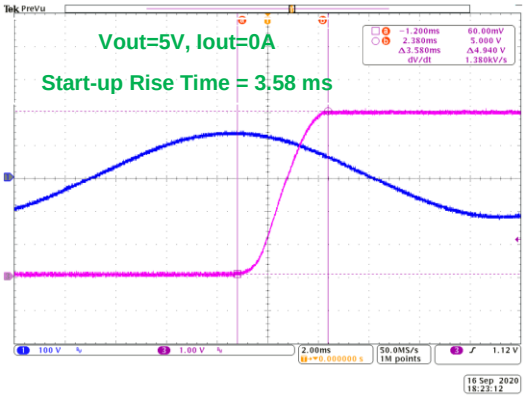


Figure 3-7-4. Start-up Turn-on Delay at 264Vac, 63Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



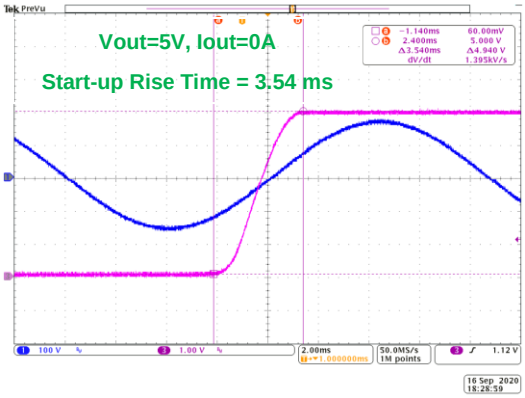
3.8 Start-up Rise Time

Figure 3-8-1. Start-up Rise time at 90 Vac, 47Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



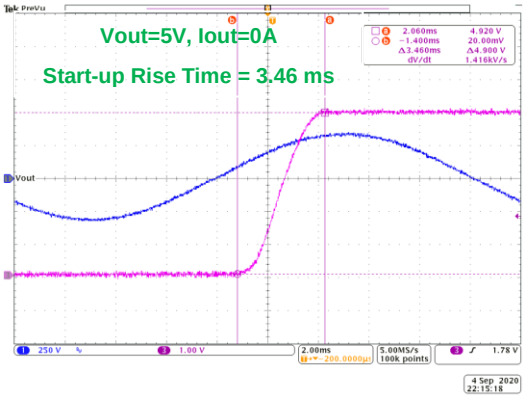
MDO4104C - 3:54:45 PM 9/16/2020

Figure 3-8-2 Start-up Rise time at 115Vac, 60Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



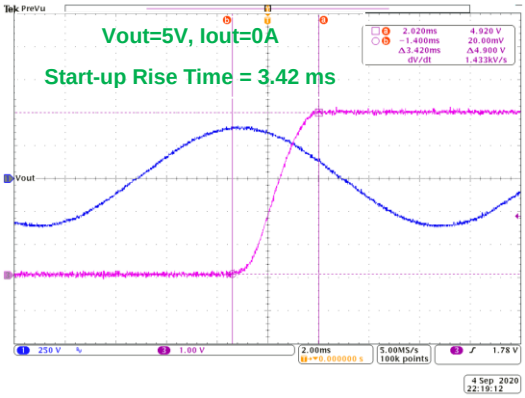
MDO4104C - 4:00:32 PM 9/16/2020

Figure 3-8-3. Start-up Rise time at 230Vac, 50Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



MDO4104C - 7:46:39 PM 9/4/2020

Figure 3-8-4 Start-up Rise time at 264Vac, 63Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



3.9 Hold-up Time

Figure 3-9-1. Hold-up time at 90Vac, 47Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

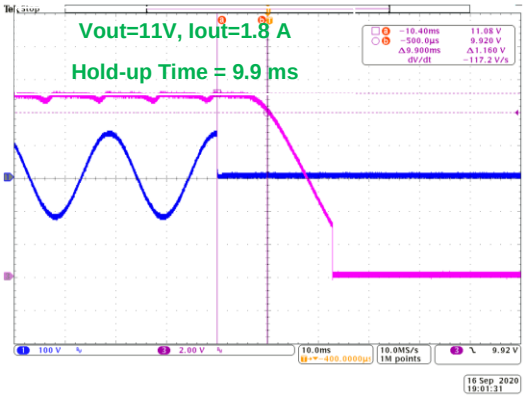


Figure 3-9-2. Hold-up time at 115Vac, 60Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

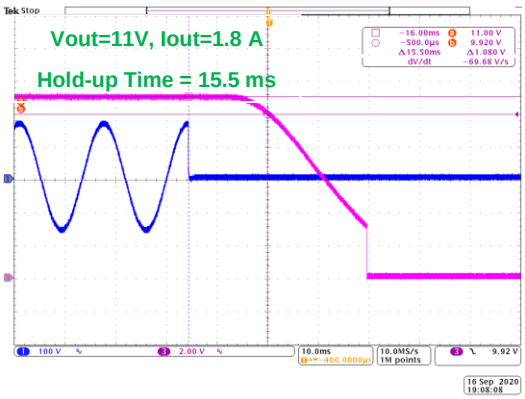


Figure 3-9-3. Hold-up time at 230Vac, 50Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

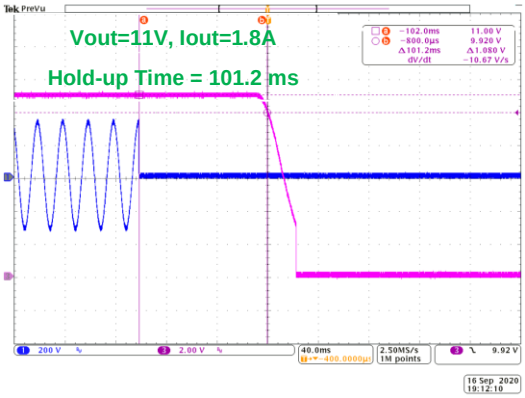
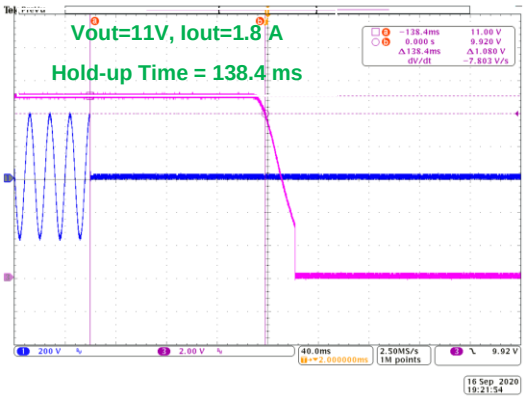


Figure 3-9-4. Hold-up time at 264Vac, 63Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



3.10 Shut-down Fall Time

Figure 3-10-1. Shut-down Fall time at 90Vac, 47Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

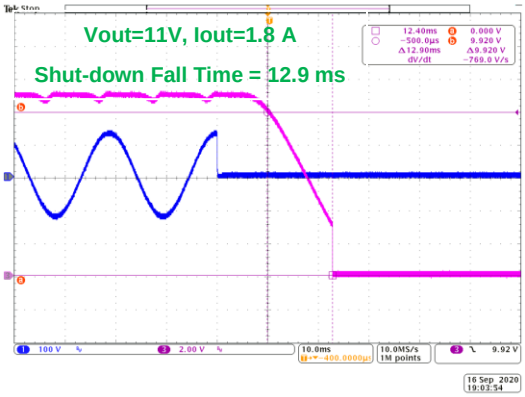


Figure 3-10-3. Shut-down Fall time at 115Vac, 60Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)

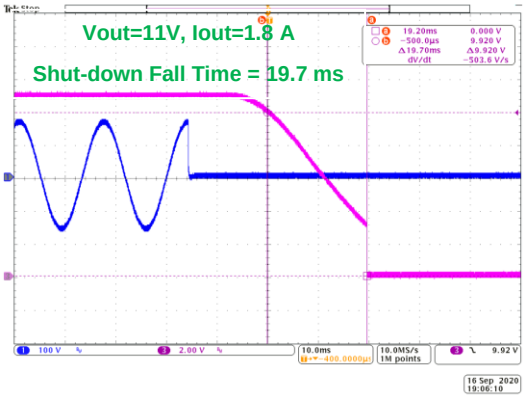


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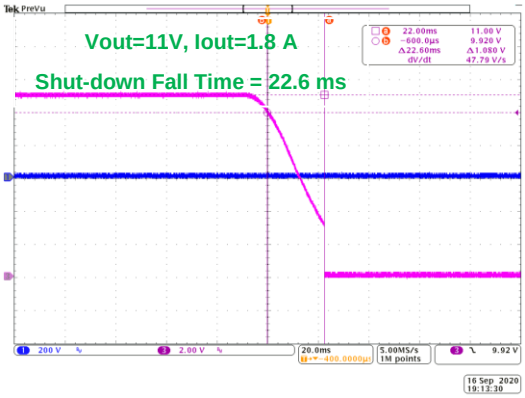
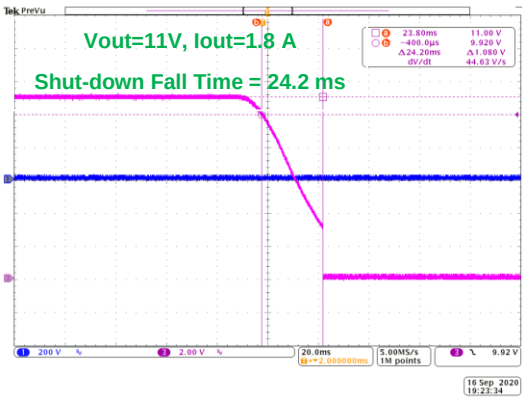
Figure 3-10-3. Shut-down Fall time at 230Vac, 50Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



MDO4104C - 4:45:03 PM 9/16/2020

Figure 3-10-4. Shut-down Fall time at 264Vac, 63Hz (**CH1:** Vin_ac, **CH3:** Vbus_c)



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3.11 Output steady state response with line transition

Figure 3-11-1. Vin changed from 90V, 47Hz to 264Vac, 47Hz (**CH1:** Vin_ac, **CH3:** Vbus_c (ac))

SS value for 90V, 47 Hz input and 11V, 1.8A output condition: 10.88V

SS value for 264V, 47 Hz input and 11V, 1.8A output condition: 10.94V

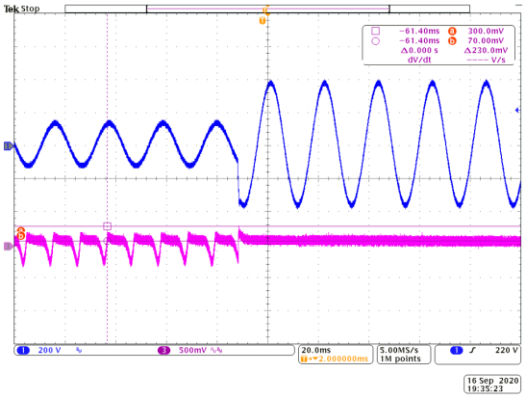

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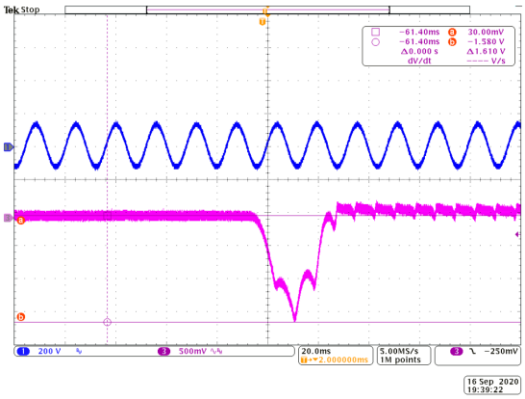
Figure 3-11-2. Vin changed from 264V, 63Hz to 90Vac, 63Hz (**CH1:** Vbus_c (ac)**, CH3:** Vin_ac)

SS value for 264V, 63 Hz input and 11V, 1.8A output condition: 10.94V

SS value for 90V, 63 Hz input and 11V, 1.8A output condition: 10.933V



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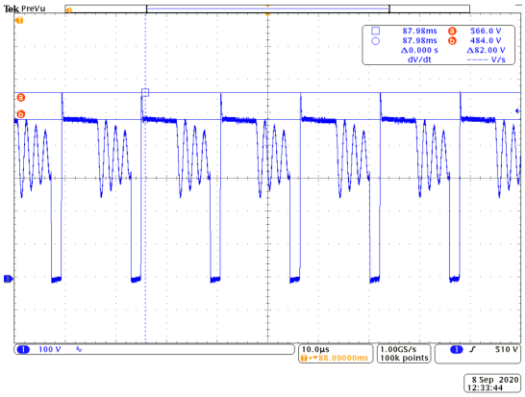
3.12 Switch Voltage Stress

Condition: Vin = 264Vac, 63Hz, Vout=11V & Iout=1.8 A

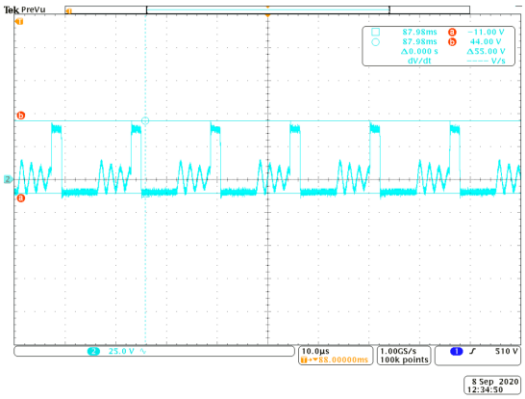
Figure 3-12-1. Voltage Stress on Primary FET (**CH1:** Vds_primary)



MDO4104C - 10:05:10 AM 9/8/2020

Vds_primary = 566 V

Figure 3-12-2. Voltage Stress on Secondary FET (**CH2:** Vds_secondary)



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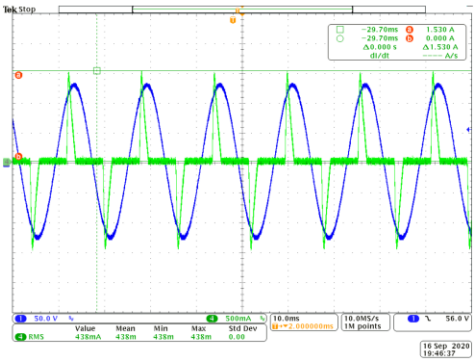
Vds_secondary = 55V

3.13 Max Input Current

Figure 3-13-1. At 90Vac, 63Hz (**CH4**: I_IN; **CH1**: V_IN(ac))



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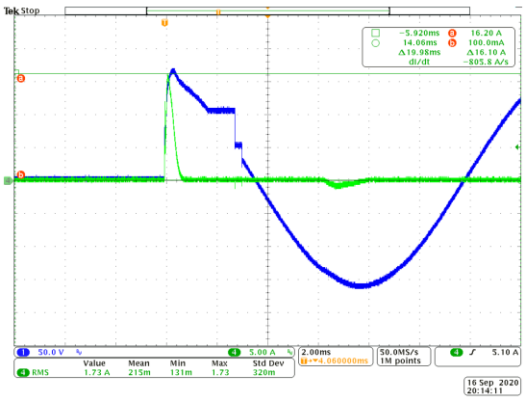
IIN(RMS) = 0.438 A

3.14 Max Input Current transient surge

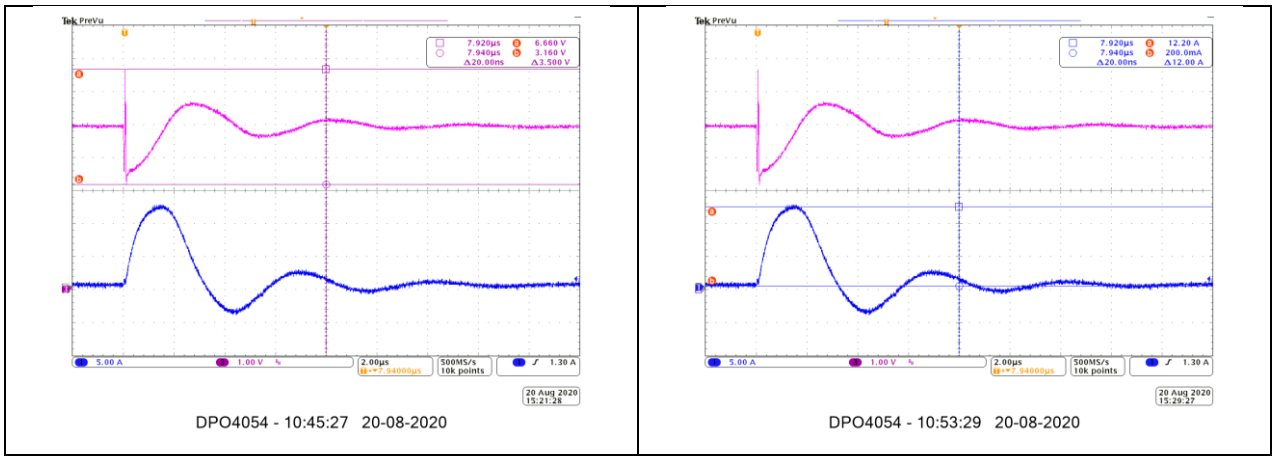
Figure 3-14-1. At 115Vac, 60Hz (**CH4**: I_IN; **CH1**: V_IN(ac))



I_IN_peak = 16.2 A

3.15 Vout dynamic response on capacitive coupling

Figure 3-15-1. At 115Vac, 60Hz, Input and 5V, 3A output (**CH1**: I_IN; **CH3**: V_out(ac))

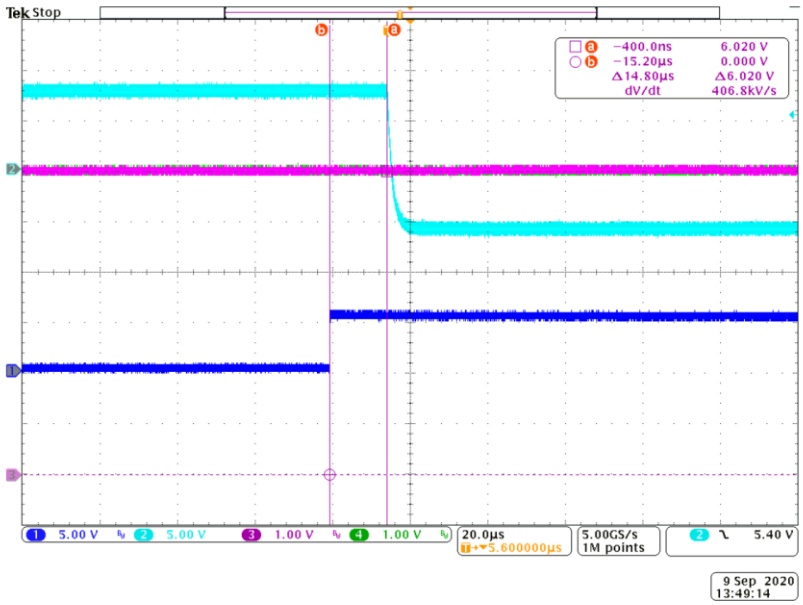


Note: Capacitive short is done on Vbus_c cap. end

3.16 Over Voltage Protection (OVP)

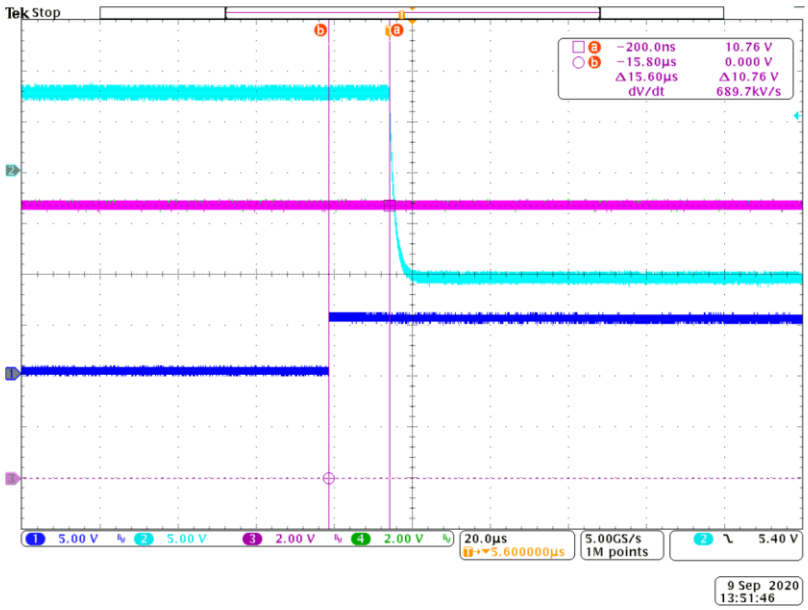
Figure 3-16-1. OVP at 115Vac, 60Hz (**CH1**: GPIO; **CH2**: NGDO[1]; **CH3**: Vbus_C; **CH4**: Vbus_in)

Vout = 5V, OVP_Voltage = 6V, Response Time = 14.8 us



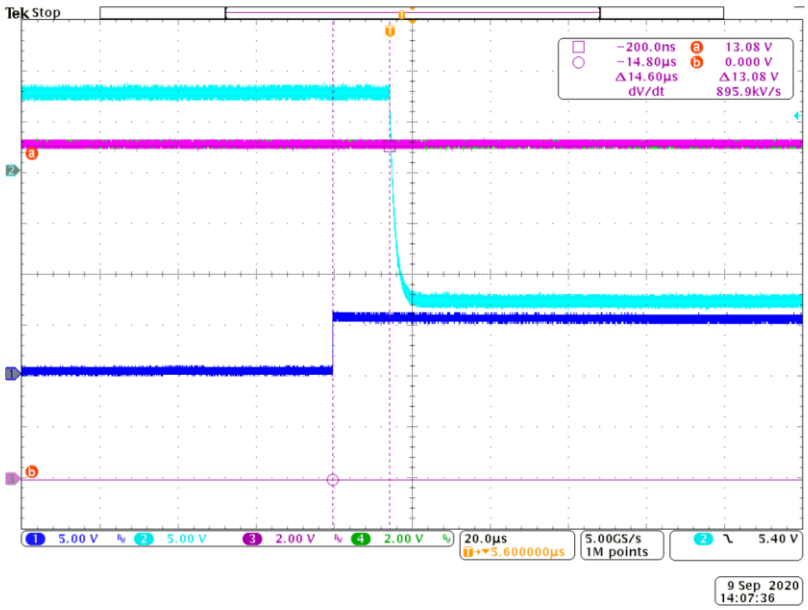
MDO4104C - 11:20:40 AM 9/9/2020

Vout = 9V, OVP_Voltage = 10.76V, Response Time = 15.6us



MDO4104C - 11:23:12 AM 9/9/2020

Vout = 11V, OVP_Voltage = 10.76V, Response Time = 14.6us

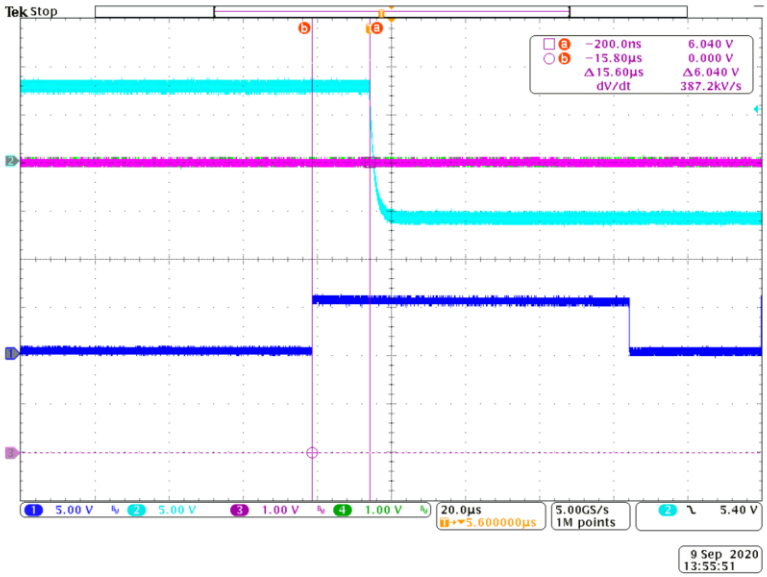


MDO4104C - 11:39:02 AM 9/9/2020

1. NGDO: NFET Gate driver output (Provider/Output MOSFET)

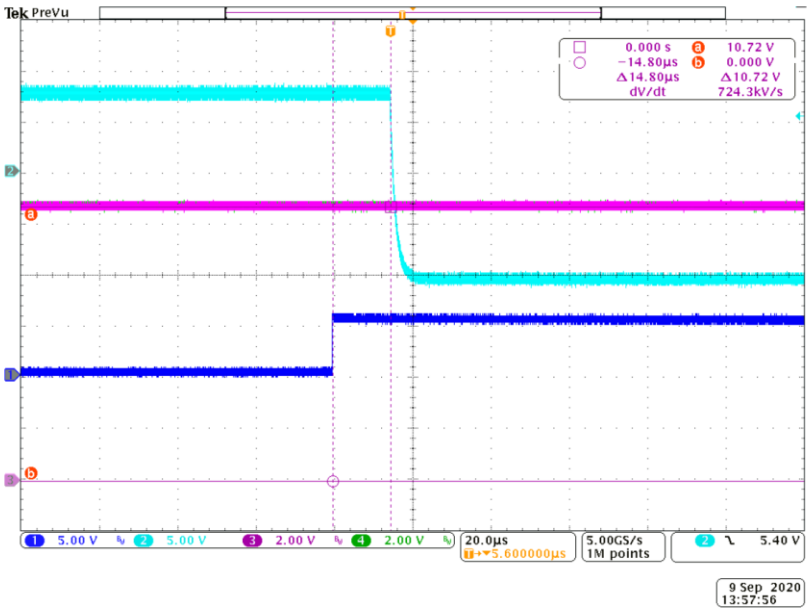
Figure 3-16-2. OVP at 230Vac, 50Hz (**CH1**: GPIO; **CH2**: NGDO[1]; **CH3**: Vbus_C; **CH4**: Vbus_in)

Vout = 5V, OVP_Voltage = 6V, Response Time = 15.6 us



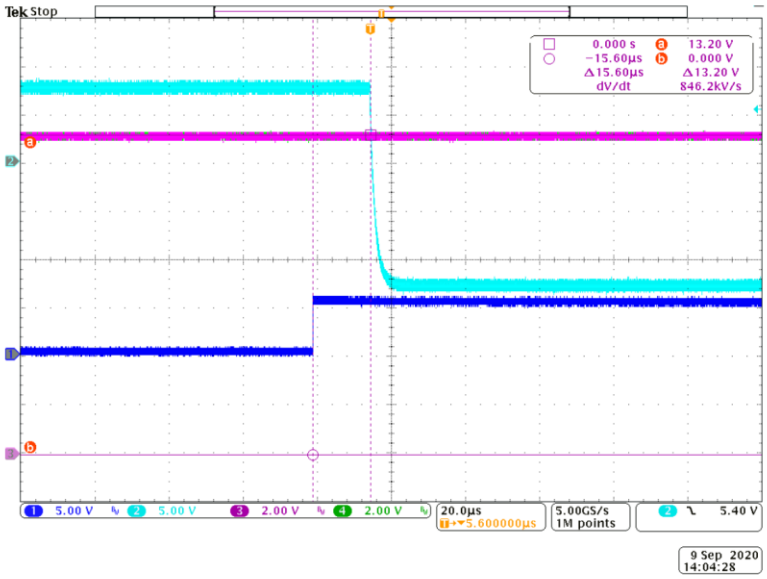
MDO4104C - 11:27:17 AM 9/9/2020

Vout = 9V, OVP_Voltage = 10.72V, Response Time = 14.8us



MDO4104C - 11:29:21 AM 9/9/2020

Vout = 11V, OVP_Voltage = 13.2V, Response Time = 15.6us

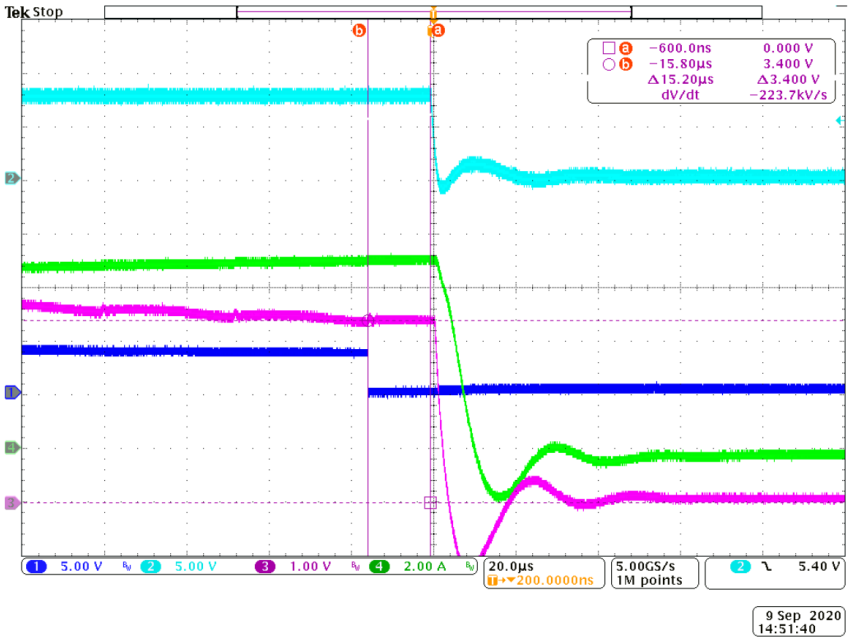


MDO4104C - 11:35:54 AM 9/9/2020

3.17 Under Voltage Protection (UVP)

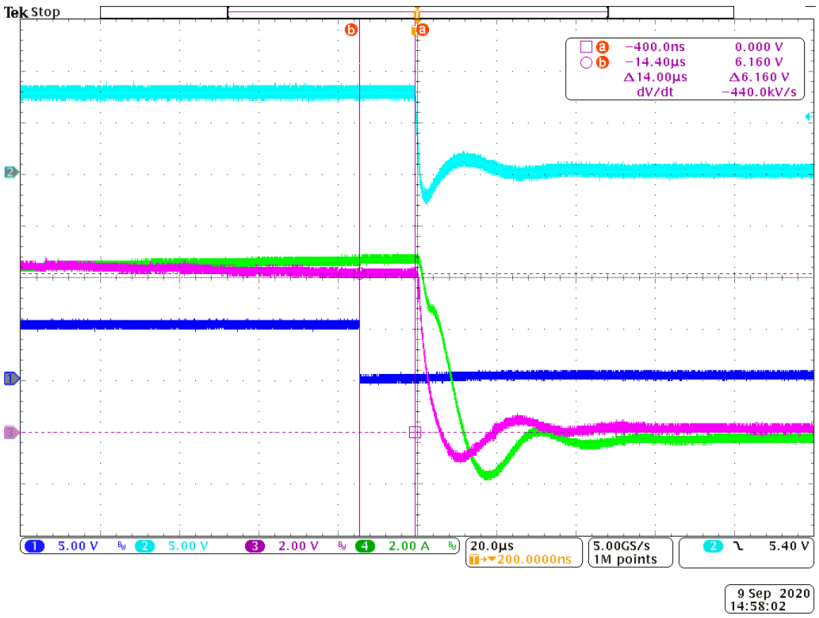
Figure 3-17-1. UVP at 115Vac, 60Hz (**CH1**: GPIO; **CH2**: NGDO[1]; **CH3**: Vbus_C; **CH4**: Iout)

Vout = Fixed 5V, UVP_Voltage = 3.4V, System Response = 15.2 us



MDO4104C - 12:23:05 PM 9/9/2020

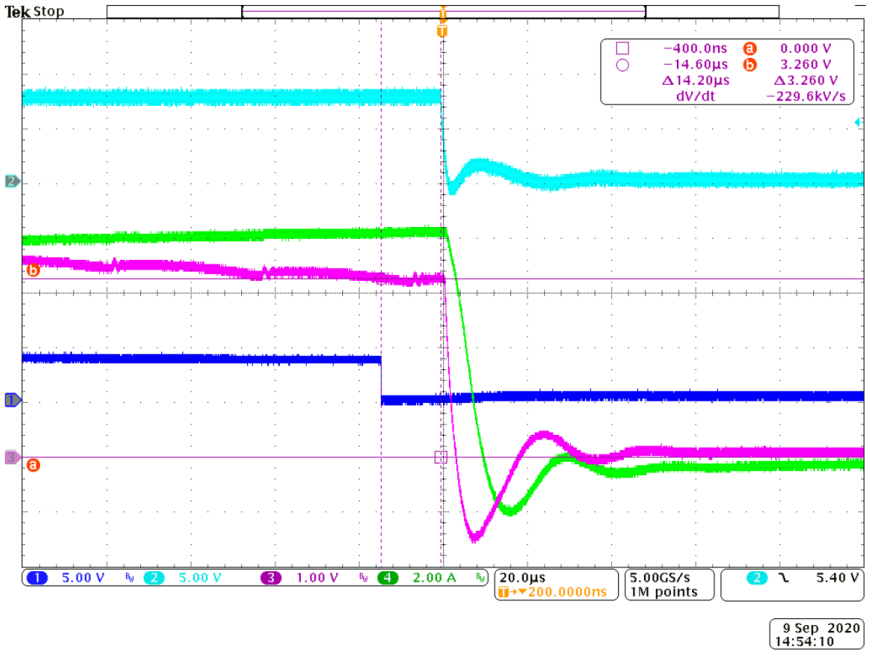
Vout = Fixed 9V, UVP_Voltage = 6.16V, Response Time = 14us



MDO4104C - 12:29:28 PM 9/9/2020

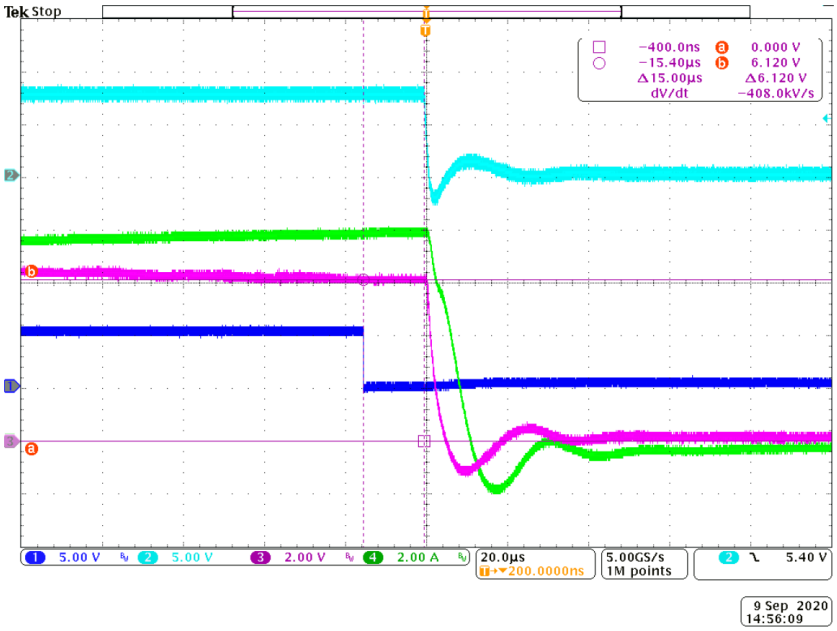
Figure 3-17-2. UVP at 230Vac, 60Hz (**CH1**: GPIO; **CH2**: NGDO[1]; **CH3**: Vbus_C; **CH4**: Iout)

Vout = Fixed 5V, UVP_Voltage = 3.26V, System Response = 14.2us



MDO4104C - 12:25:36 PM 9/9/2020

Vout = Fixed 9V, UVP_Voltage = 6.12V, Response Time = 15us

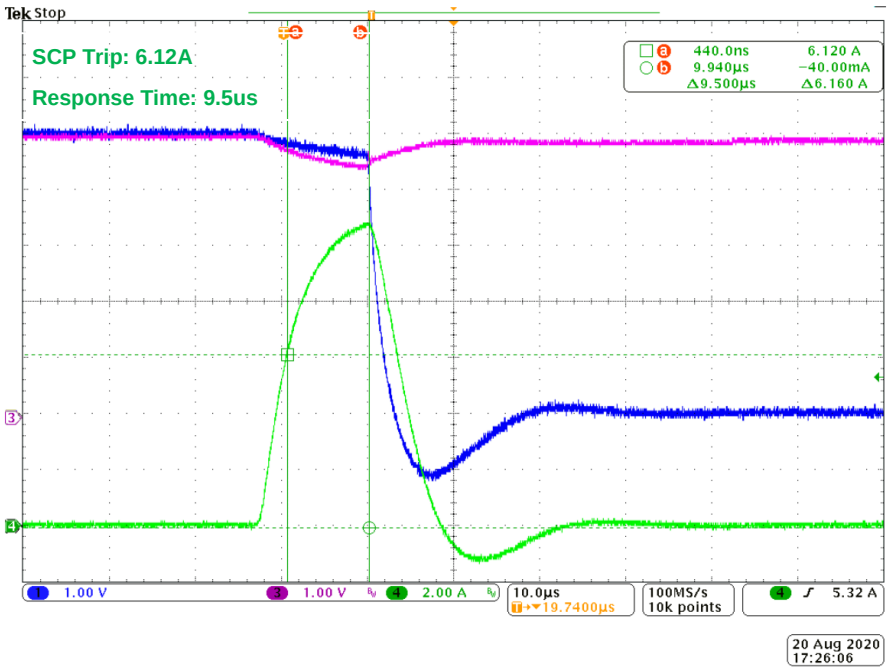


MDO4104C - 12:27:34 PM 9/9/2020

3.18 Short-Circuit Protection (SCP)

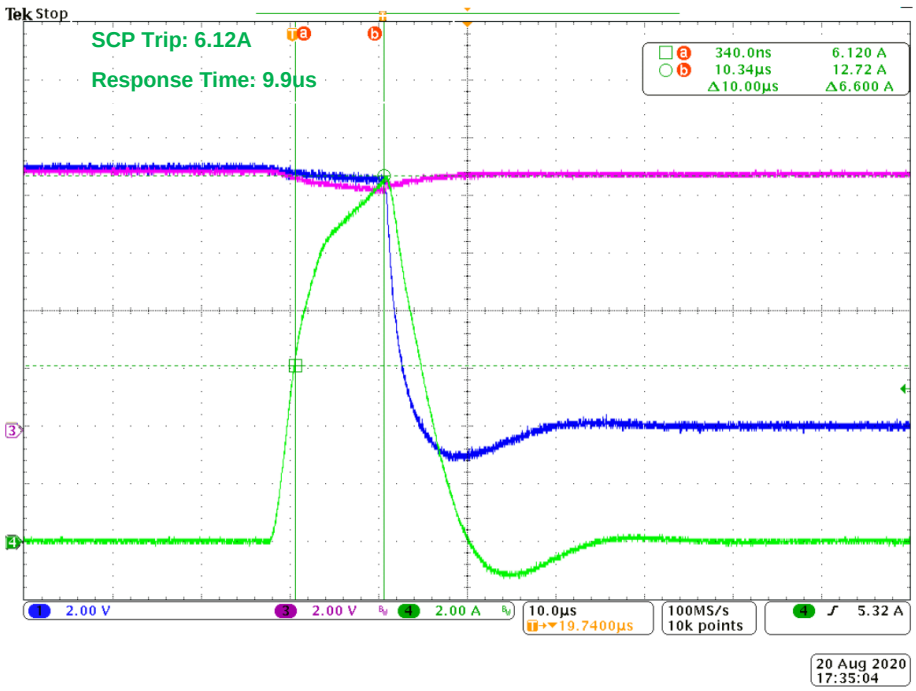
Figure 3-18-1. SCP at 115V, 60Hz (**CH1**: Vbus_c; **CH3**: Vbus_in; **CH4**: Iout)

Fixed-PDO: 5V, 3A



DPO4054 - 12:50:09 20-08-2020

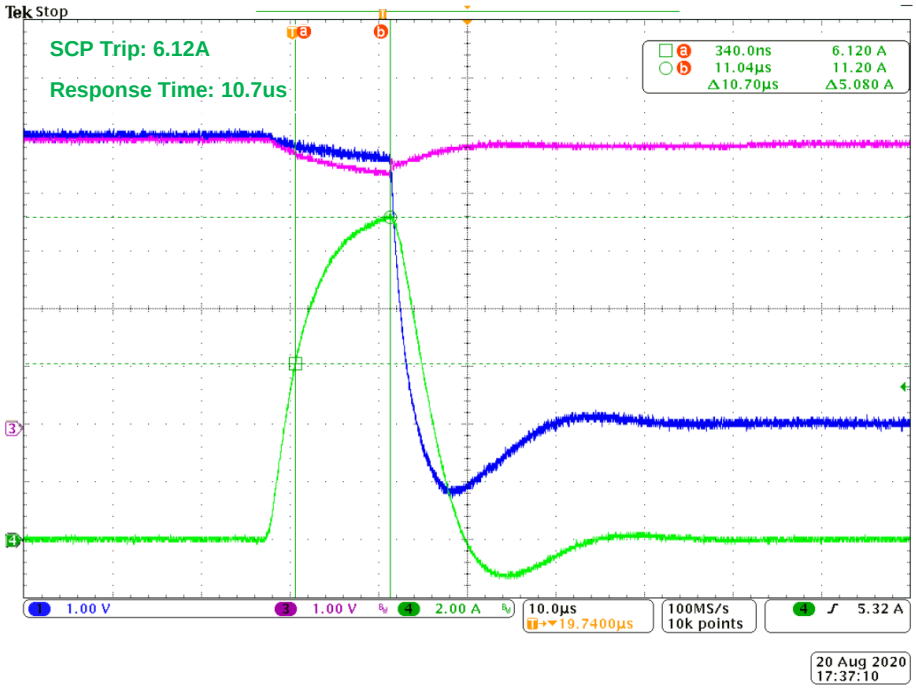
Fixed-PDO: 9V, 2.22A



DPO4054 - 12:59:05 20-08-2020

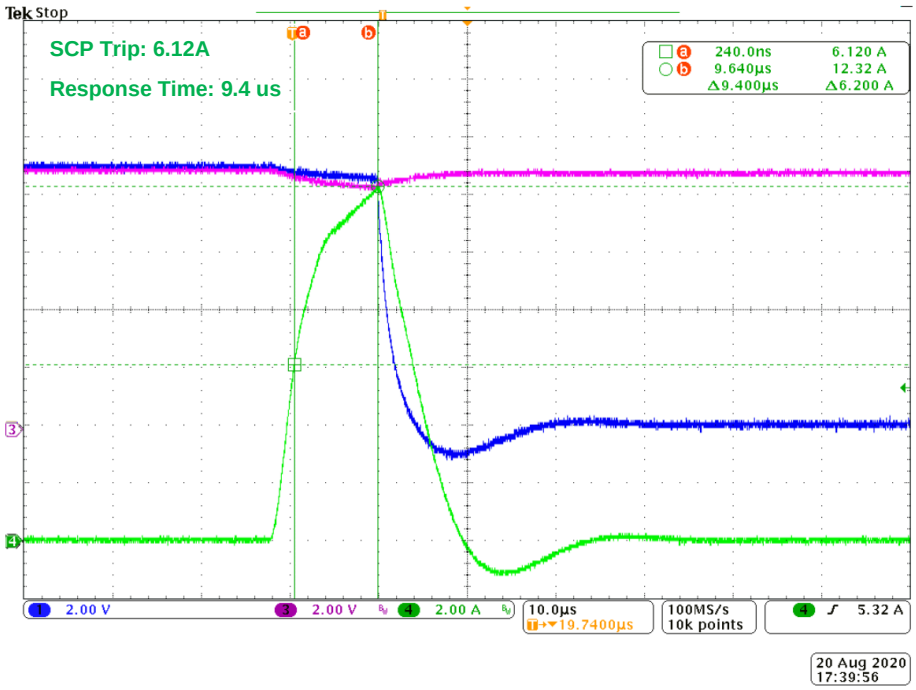
Figure 3-18-2. SCP at 230V, 50Hz (**CH1**: Vbus_c; **CH3**: Vbus_in; **CH4**: Iout)

Fixed-PDO: 5V, 3A



DPO4054 - 13:01:12 20-08-2020

Fixed-PDO: 9V, 2.22A

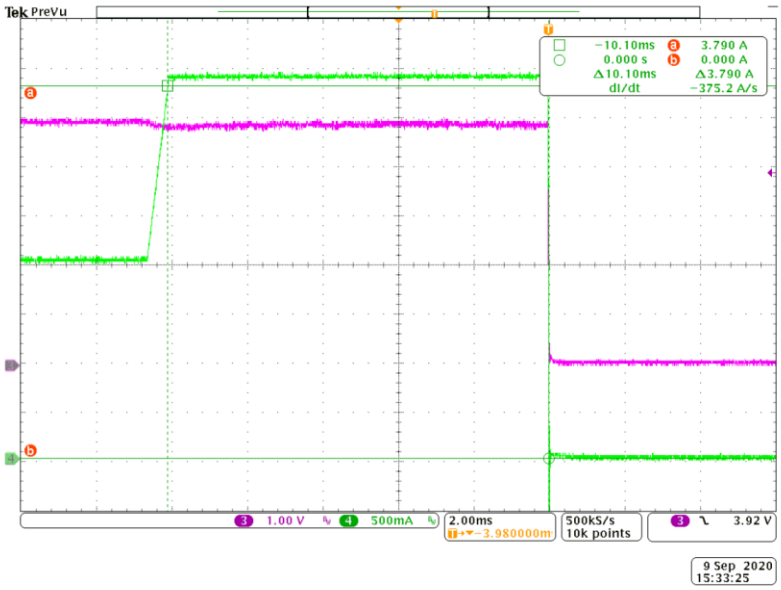


DPO4054 - 13:03:58 20-08-2020

3.19 Open-Circuit Protection (OCP)

Figure 3-19-1. OCP at 115V, 60Hz (**CH3**: Vbus_c; **CH4**: Iout)

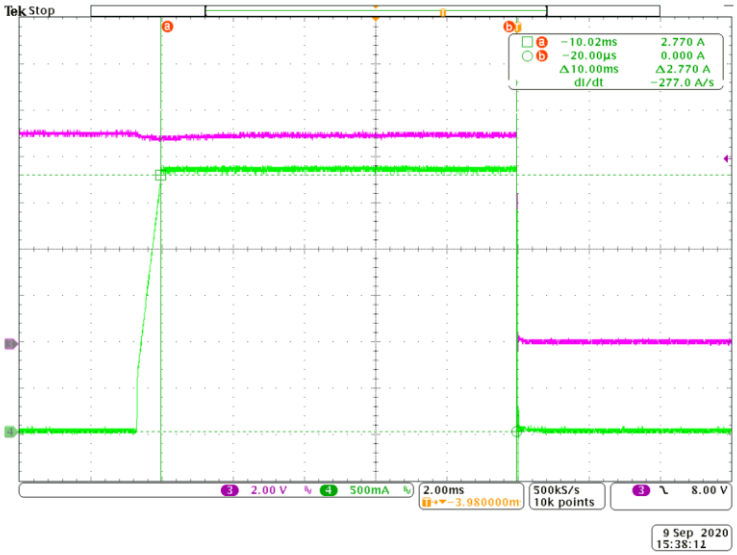
Fixed-PDO: 5V, 3A



MDO4104C - 1:04:51 PM 9/9/2020

OCP trip point = 3.79A; OCP response time = 10.1 ms;

Fixed-PDO: 9V, 2.2A

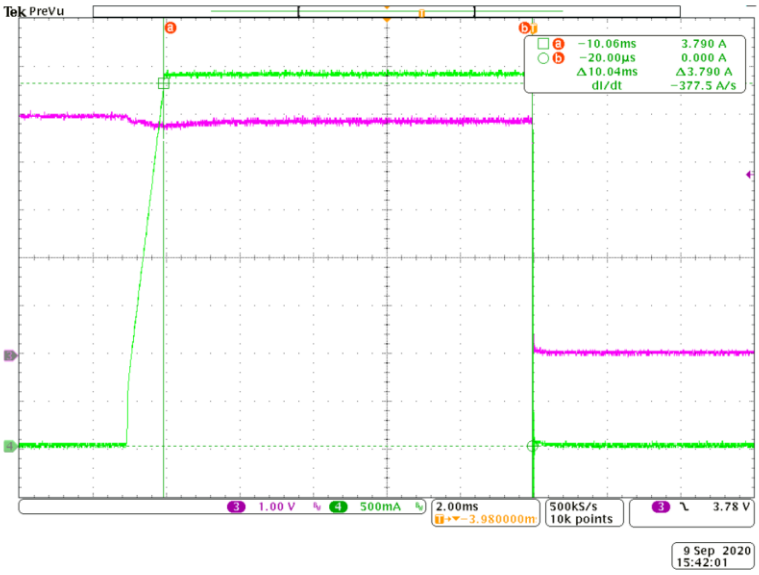


MDO4104C - 1:09:37 PM 9/9/2020

OCP trip point = 2.77A; OCP response time = 10 ms;

Figure 3-19-2. OCP at 230V, 50Hz (**CH3**: Vbus_c; **CH4**: Iout)

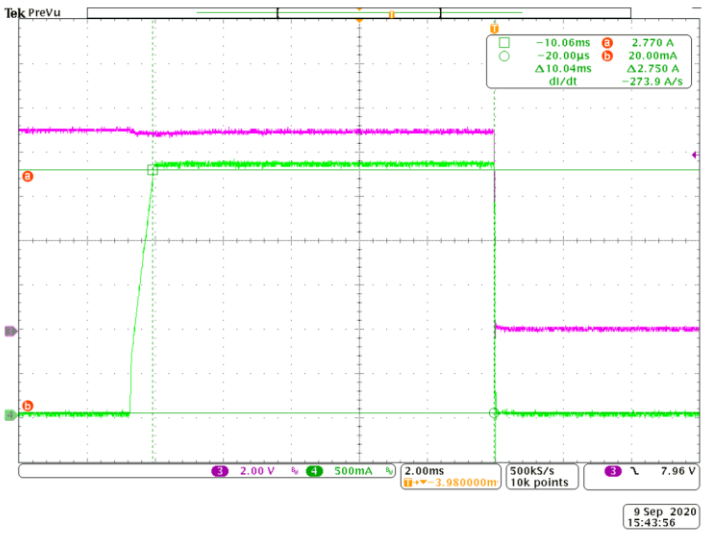
Fixed-PDO: 5V, 3A



MDO4104C - 1:13:26 PM 9/9/2020

OCP trip point = 3.79A; OCP response time = 10.04 ms;

Fixed-PDO: 9V, 2.2A



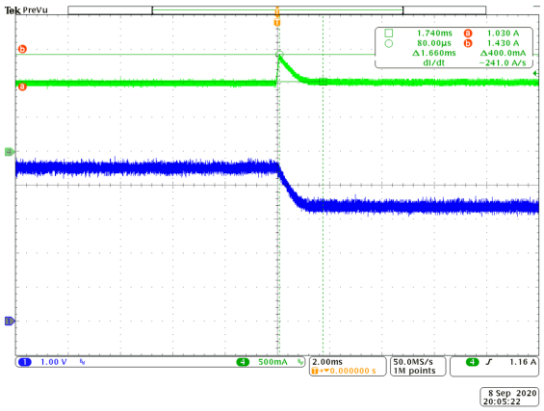
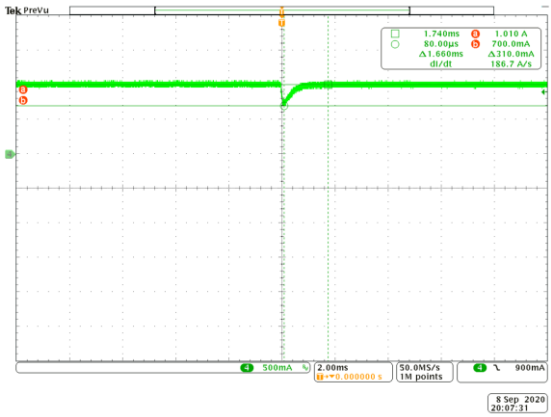
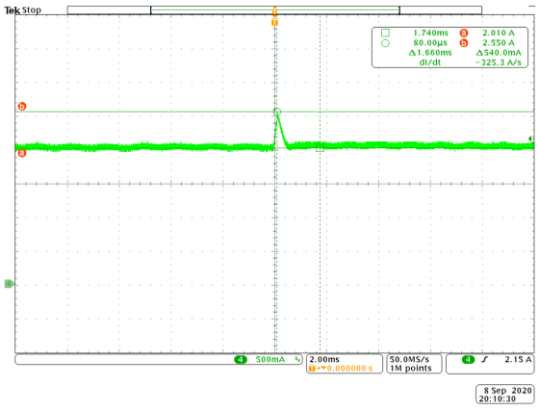
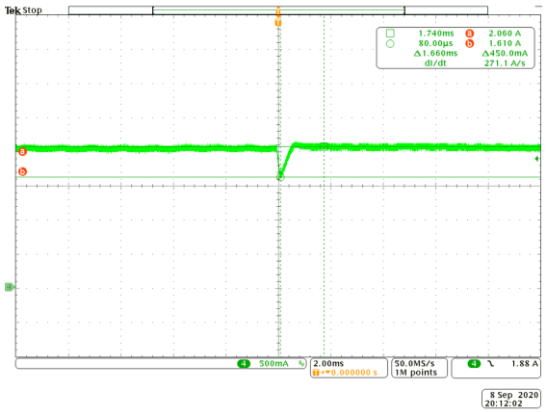
MDO4104C - 1:15:21 PM 9/9/2020

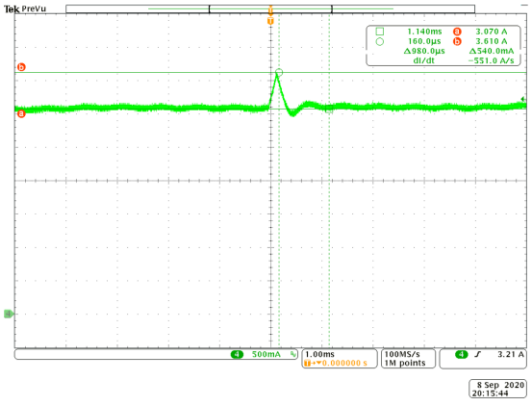
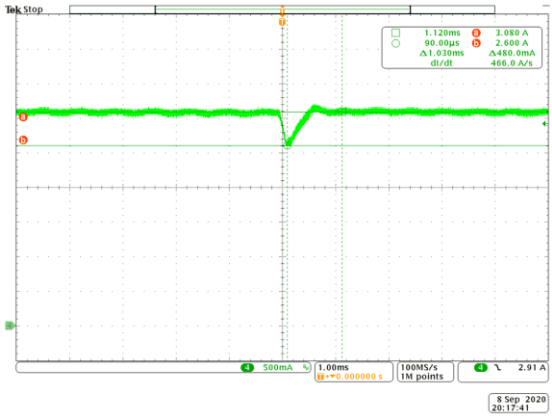
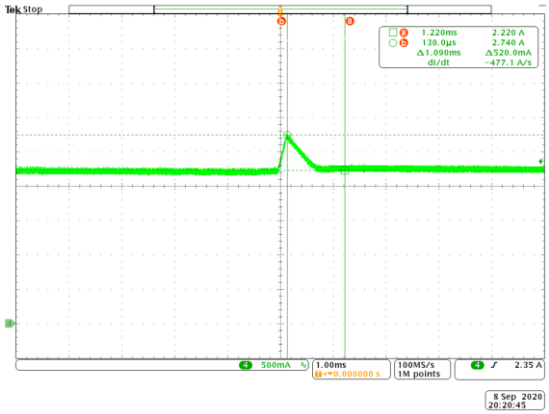
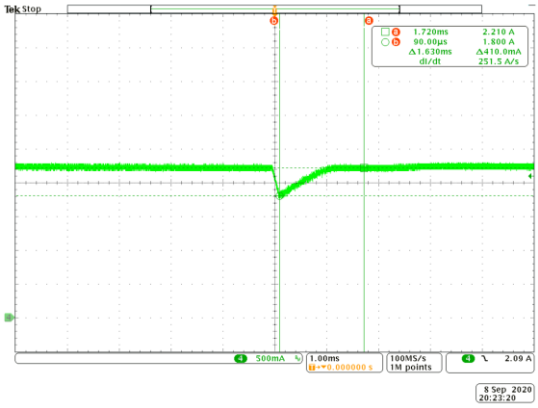
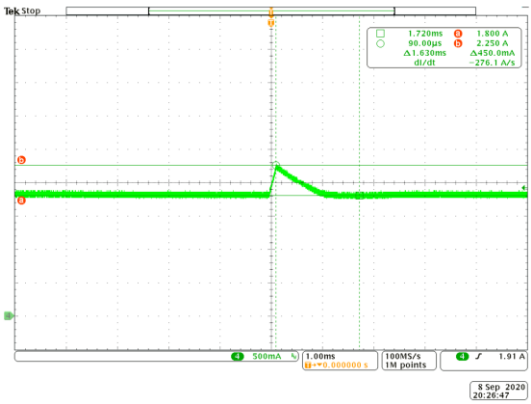
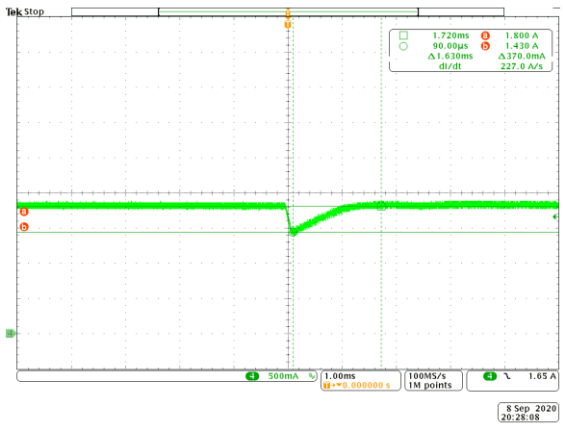
OCP trip point = 2.77A; OCP response time = 10.04 ms;

3.20 Output Current Overshoot / Undershoot and Settling time

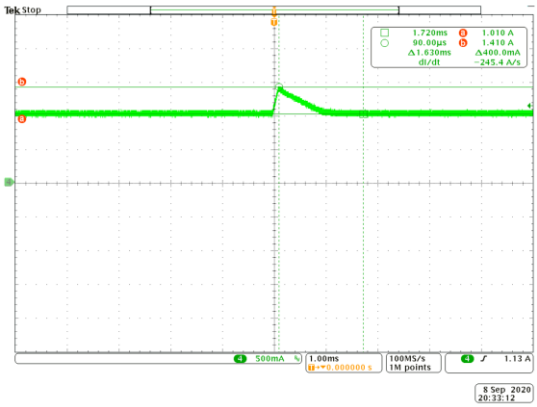
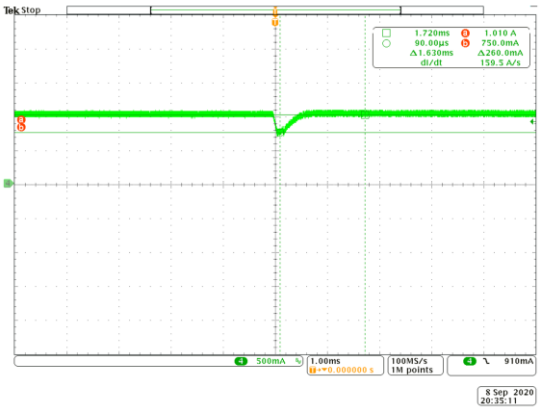
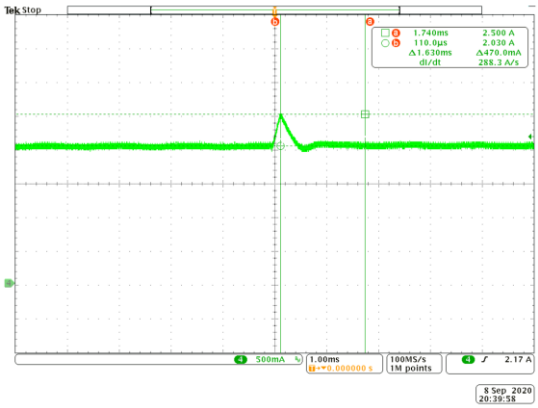
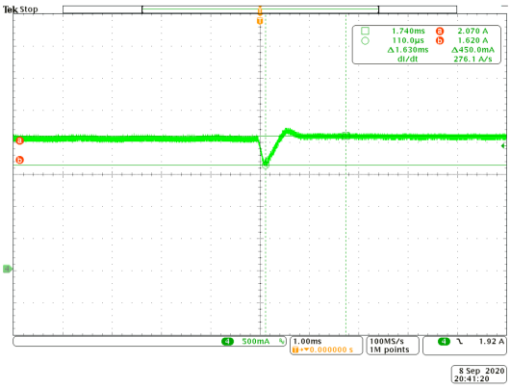
Firmware used: 2634; Rsense = 5300

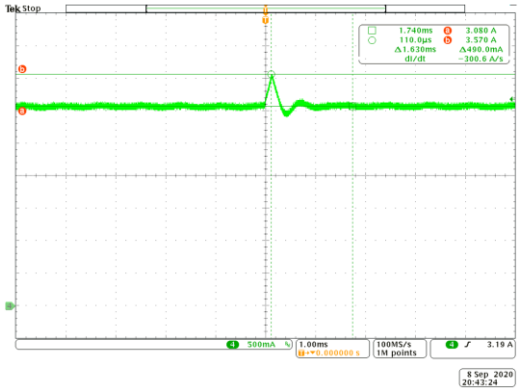
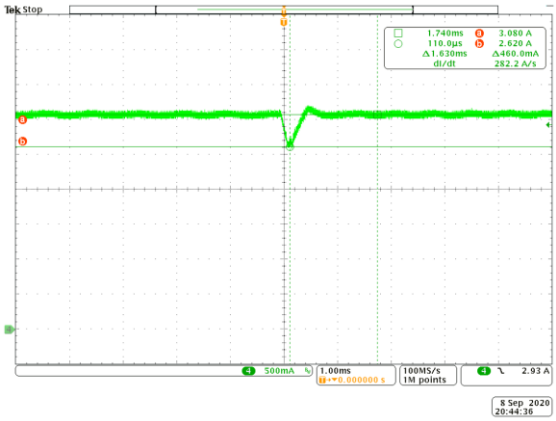
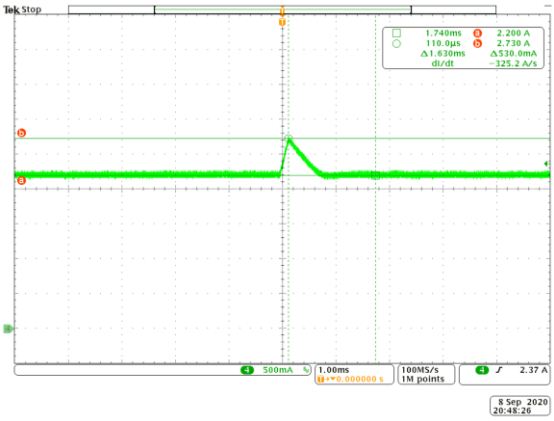
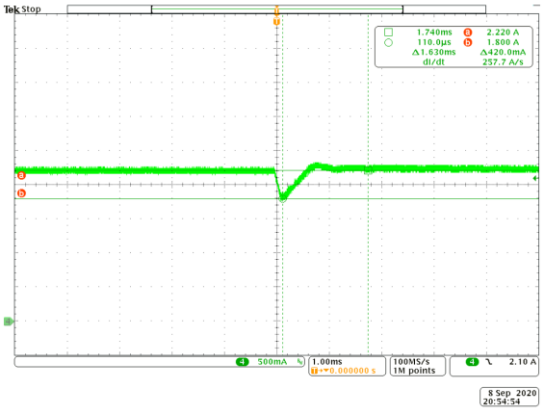
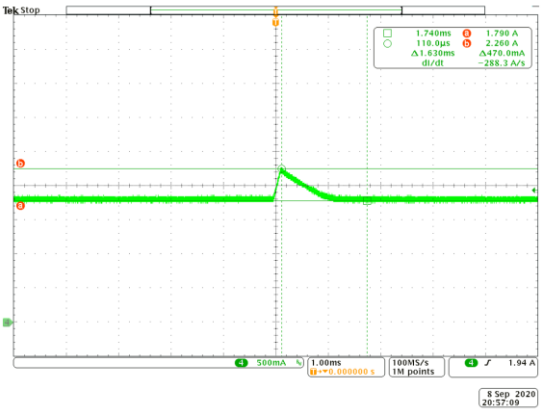
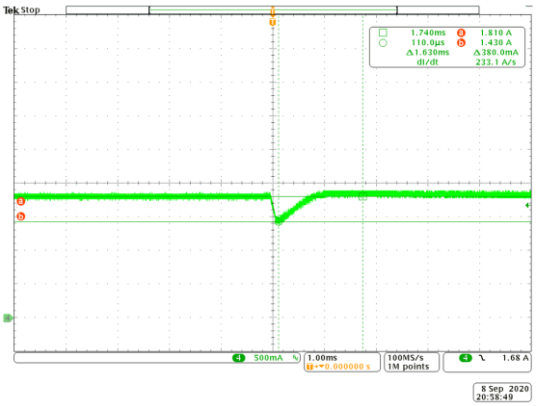
Output current dynamic response for 115Vac, 60Hz; (CH1: Vbus_c; CH4: Iout)

Vo = 5V; Io= 1.097A to 1.5A	**Vo = 5V; Io= 1.5A to 1.097A**
Io(limit) = 1A; (CR Mode: R=4.168Ω to 3.02Ω)	**Io(limit) = 1A; CR Mode*: R= 3.02Ω to 4.168Ω**
 MDO4104C - 5:36:47 PM 9/8/2020	 MDO4104C - 5:38:57 PM 9/8/2020
Vo = 5V; Io= 2.106A to 2.6A	**Vo = 5V; Io= 2.6A to 2.1A**
Io(limit) = 2A; (CR Mode: R=2.09Ω to 1.65Ω)	**Io(limit) = 2A; CR Mode*: R= 1.65Ω to 2.09Ω**
 MDO4104C - 5:41:55 PM 9/8/2020	 MDO4104C - 5:43:27 PM 9/8/2020

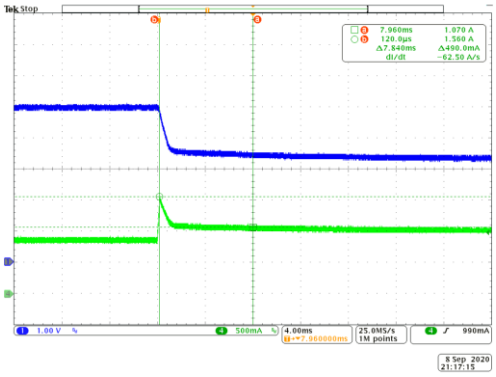
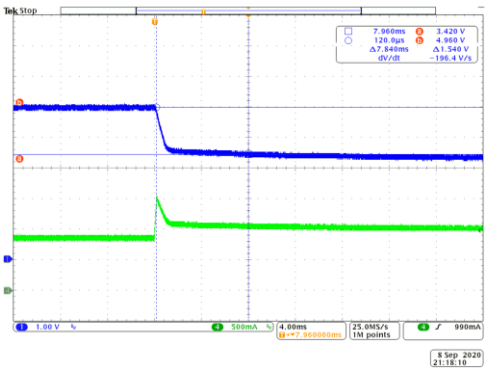
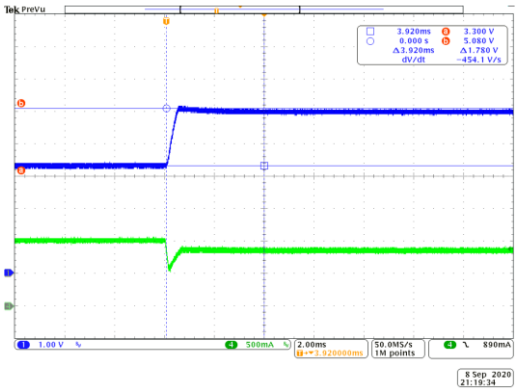
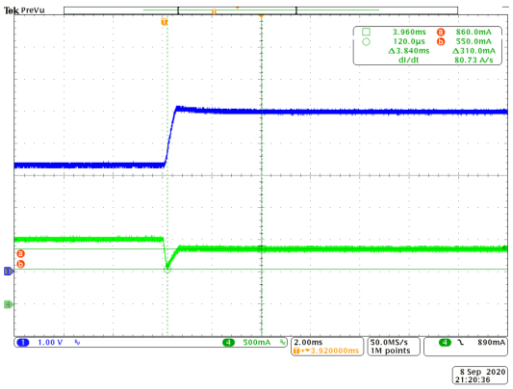
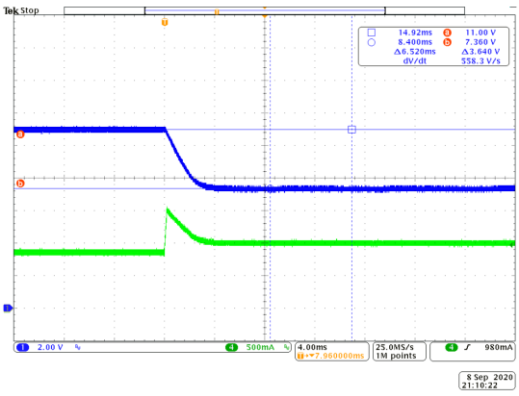
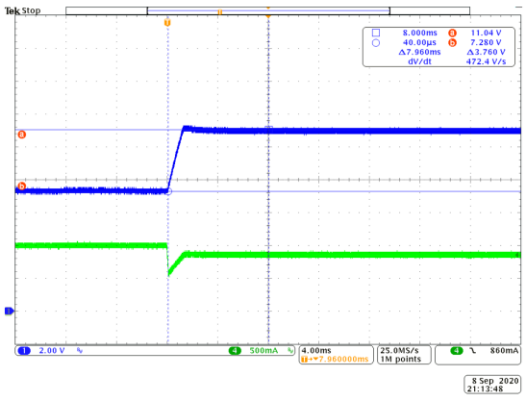
Vo = 5V; Io= 3.1A to 3.62A	**Vo = 5V; Io= 3.62A to 3.1A**
Io(limit) = 3A; (CR Mode: R=1.34Ω to 1.12Ω)	**Io(limit) = 3A; CR Mode*: R= 1.34Ω to 1.12Ω**
 MDO4104C - 5:47:09 PM 9/8/2020	 MDO4104C - 5:49:06 PM 9/8/2020
Vo = 9V; Io= 2.31A to 2.816 A	**Vo = 9V; Io= 2.816 A to 2.31A**
Io(limit) = 2.2A; (CR Mode: R= 3.62Ω to 2.91Ω)	**Io(limit) = 2.2A; CR Mode*: R= 2.91 Ω to 3.62 Ω**
 MDO4104C - 5:52:10 PM 9/8/2020	 MDO4104C - 5:54:46 PM 9/8/2020
Vo = 11V; Io= 1.92A to 2.398 A	**Vo = 11V; Io= 1.92A to 2.398A**
Io(limit) = 1.8A; (CR Mode: R= 5.45Ω to 4.285Ω)	**Io(limit) = 1.8A; CR Mode*: R= 5.45Ω to 4.285Ω**
 MDO4104C - 5:58:12 PM 9/8/2020	 MDO4104C - 5:59:33 PM 9/8/2020

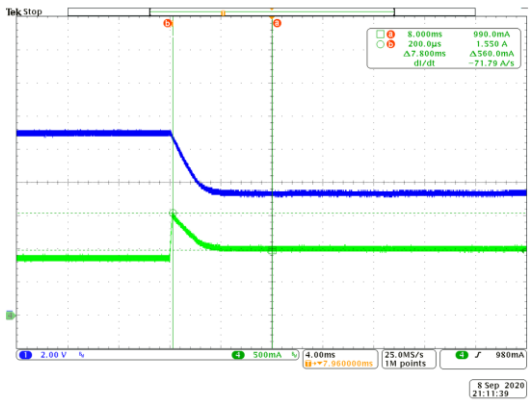
Output current dynamic response for 230Vac, 50Hz; (CH1: Vbus_c; CH4: Iout)

Vo = 5V; Io= 1.097A to 1.5A	**Vo = 5V; Io= 1.5A to 1.097A**
Io(limit) = 1A; (CR Mode: R=4.168Ω to 3.02Ω)	**Io(limit) = 1A; CR Mode*: R= 3.02Ω to 4.168Ω**
 MDO4104C - 6:04:37 PM 9/8/2020	 MDO4104C - 6:06:36 PM 9/8/2020
Vo = 5V; Io= 2.106A to 2.6A	**Vo = 5V; Io= 2.6A to 2.1A**
Io(limit) = 2A; (CR Mode: R=2.09Ω to 1.65Ω)	**Io(limit) = 2A; CR Mode*: R= 1.65Ω to 2.09Ω**
 MDO4104C - 6:11:23 PM 9/8/2020	 MDO4104C - 6:12:45 PM 9/8/2020

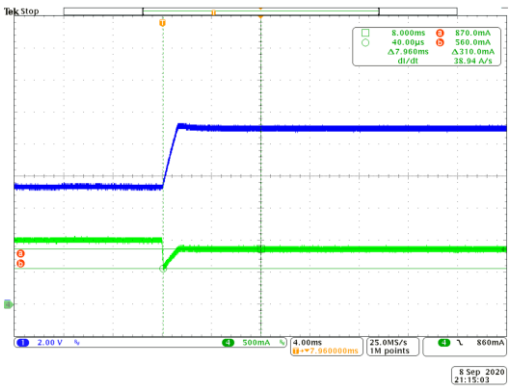
Vo = 5V; Io= 3.1A to 3.62A	**Vo = 5V; Io= 3.62A to 3.1A**
Io(limit) = 3A; (CR Mode: R=1.34Ω to 1.12Ω)	**Io(limit) = 3A; CR Mode*: R= 1.12Ω to 1.34Ω**
 MDO4104C - 6:14:50 PM 9/8/2020	 MDO4104C - 6:16:02 PM 9/8/2020
Vo = 9V; Io= 2.31A to 2.816 A	**Vo = 9V; Io= 2.816 A to 2.31A**
Io(limit) = 2.222A; (CR Mode: R= 3.62Ω to 2.91Ω)	**Io(limit) = 2.222A; CR Mode*: R= 2.91 Ω to 3.62 Ω**
 MDO4104C - 6:19:51 PM 9/8/2020	 MDO4104C - 6:26:19 PM 9/8/2020
Vo = 11V; Io= 1.92A to 2.398 A	**Vo = 11V; Io= 1.92A to 2.398A**
Io(limit) = 1.82A; (CR Mode: R= 5.45Ω to 4.285Ω)	**Io(limit) = 1.82A; CR Mode*: R= 4.285Ω to 5.45Ω**
 MDO4104C - 6:28:34 PM 9/8/2020	 MDO4104C - 6:30:14 PM 9/8/2020

CV-CC Transition Time for 115Vac, 60Hz; (CH1: Vbus_c; CH4: Iout)

Vo = 5V; Io= 0.85A to 1.498A	Vo = 5V; Io= 1.498A to 0.85A
Io(limit) = 1A; (CR Mode: R=5.5Ω to 3.02Ω)	**Io(limit) = 1A; (CR Mode*: R= 3.02Ω to 5.5Ω)**
 MDO4104C - 6:48:41 PM 9/8/2020  MDO4104C - 6:49:35 PM 9/8/2020	 MDO4104C - 6:51:00 PM 9/8/2020  MDO4104C - 6:52:02 PM 9/8/2020
Vo = 11V; Io= 0.85A to 1.5A	**Vo = 11V; Io= 1.5A to 0.85A**
Io(limit) = 1A; (CR Mode: R=12.5Ω to 6.9Ω)	**Io(limit) = 1A; (CR Mode*: R= 6.9Ω to 12.5Ω)**
 MDO4104C - 6:41:47 PM 9/8/2020	 MDO4104C - 6:45:13 PM 9/8/2020

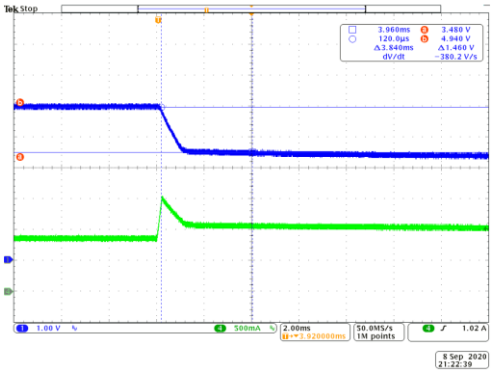
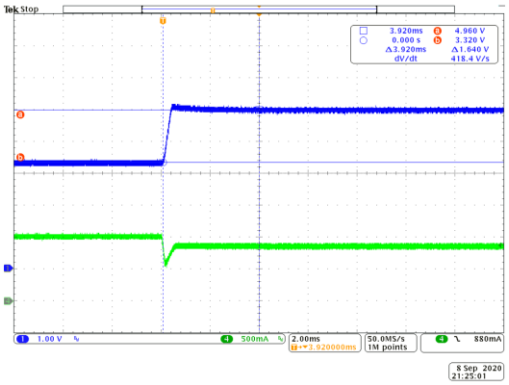
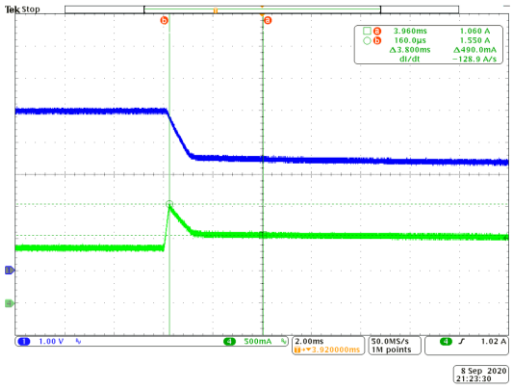
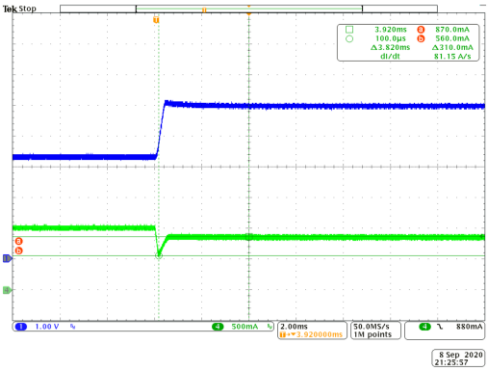


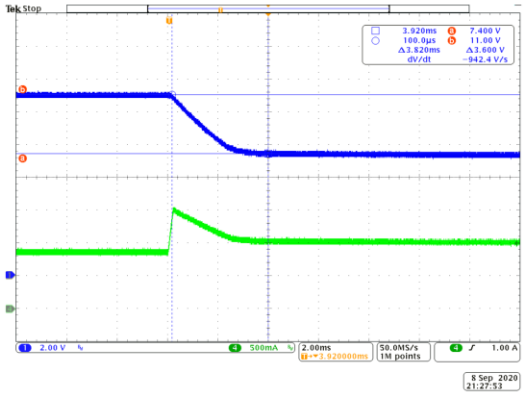
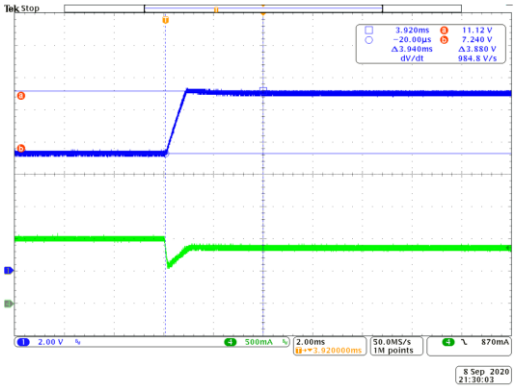
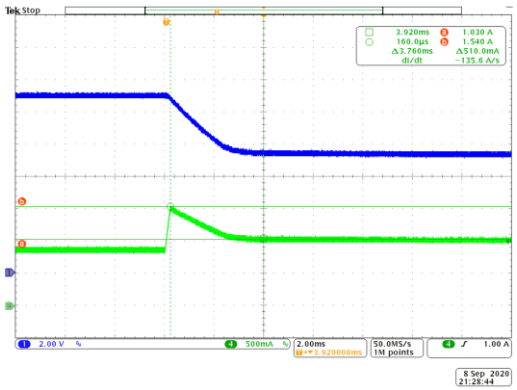
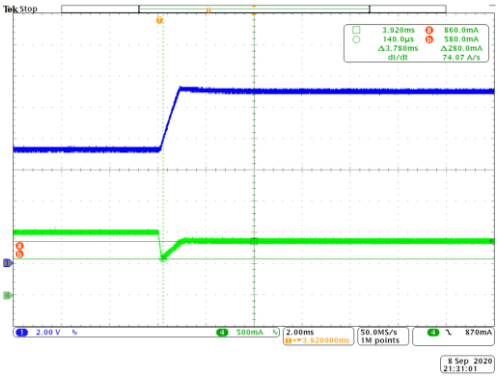
MDO4104C - 6:43:05 PM 9/8/2020



MDO4104C - 6:46:28 PM 9/8/2020

CV-CC Transition Time for 230Vac, 50Hz; (CH1: Vbus_c; CH4: Iout)

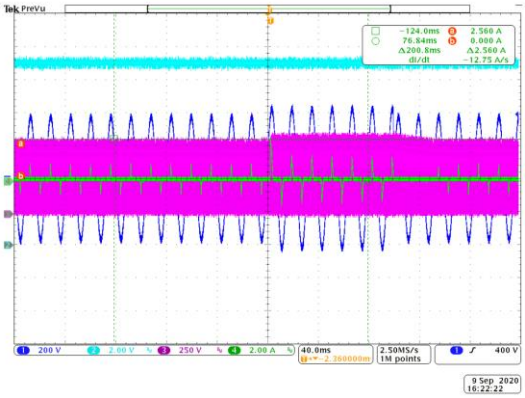
Vo = 5V; Io= 0.85A to 1.498A	**Vo = 5V; Io= 1.498A to 0.85A**
Io(limit) = 1A; (CR Mode: R=5.5Ω to 3.02Ω)	**Io(limit) = 1A; (CR Mode*: R= 3.02Ω to 5.5Ω)**
 MDO4104C - 6:54:05 PM 9/8/2020	 MDO4104C - 6:56:27 PM 9/8/2020
 MDO4104C - 6:54:55 PM 9/8/2020	 MDO4104C - 6:57:23 PM 9/8/2020

Vo = 11V; Io= 0.85A to 1.5A	Vo = 11V; Io= 1.5A to 0.85A
Io(limit) = 1A; (CR Mode: R=12.5Ω to 6.9Ω)	**Io(limit) = 1A; (CR Mode*: R= 6.9Ω to 12.5Ω)**
 MDO4104C - 6:59:18 PM 9/8/2020	 MDO4104C - 7:01:28 PM 9/8/2020
 MDO4104C - 7:00:09 PM 9/8/2020	 MDO4104C - 7:02:26 PM 9/8/2020

3.21 Max Input Current Transient Surge

Input Voltage changed from 265Vac to 300Vac for 100ms

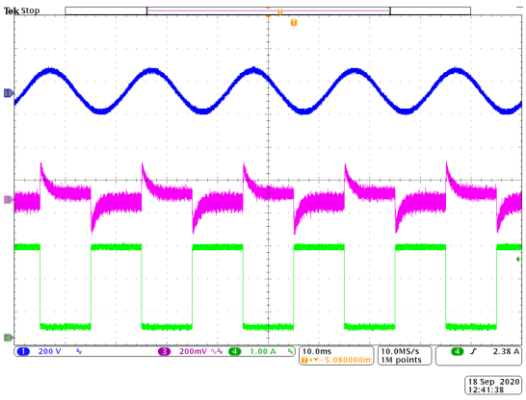
(CH1: VIN(ac); CH2: Vout; CH3: VDS(primary); CH4: Iout)



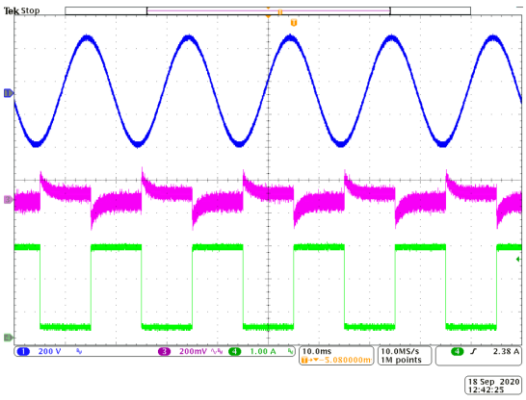
MDO4104C - 1:53:49 PM 9/9/2020

3.22 DUT Burn-in Test

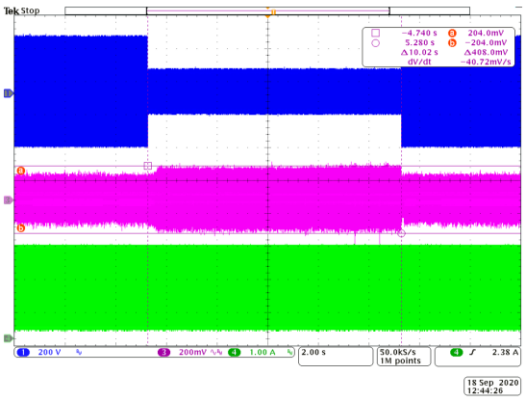
Input voltage changed from 90V,50Hz ac to 230V,50 Hz ac in interval of 10s and load is varied from 10% to 90% for 3.3Voutput and 3A load case in the interval of 10 ms for 8 hour



MDO4104C - 10:13:14 AM 9/18/2020



MDO4104C - 10:14:01 AM 9/18/2020



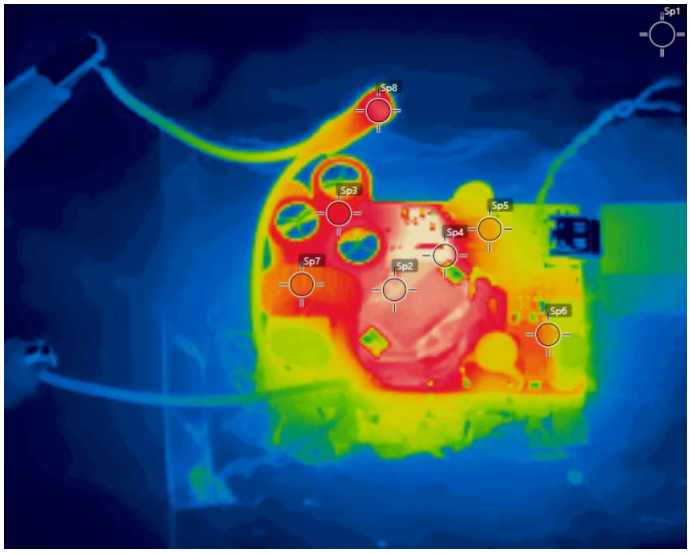
MDO4104C - 10:16:02 AM 9/18/2020

3.23 Thermal Capture:

Test Condition: Vin_ac = 90Vac-47Hz, Vout = 11V, Iout = 1.8A

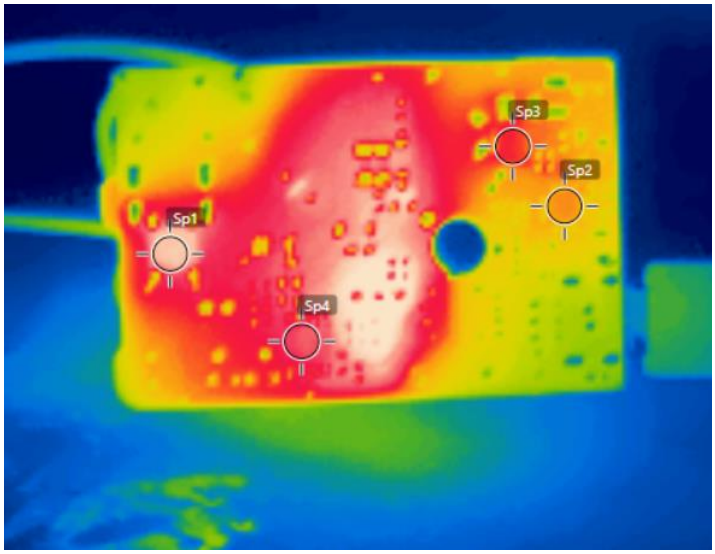
Lab Ambient Temperature: 20°c and in Open-frame for 60 mins

Figure 3-23-1. Thermal Capture – PCB (TOP)



Symbol	Description	Temperature (°C)
Sp1	Ambient	23.5
Sp2	Transformer (T1)	64.3
Sp3	Primary Caps (C1, C2, C3)	54.3
Sp4	Primary FET (Q1)	80.7
Sp5	Pulse Transformer (T2)	46.4
Sp6	Output Caps (C8, C9)	47.7
Sp7	CMC (LF1)	49.1
Sp8	NTC (RT2)	58.1

Figure 3-23-2. Thermal Capture – PCB (BOTTOM)



Symbol	Description	Temperature (°C)
Sp1	Input Bridge (BD1)	65
Sp2	CYPAS111-A1 (U1)	49.5
Sp3	Secondary FET (Q3)	53.1
Sp4	CYPAP111-A3 (U2)	58.8

3.24 Conducted Emission (CE)

Conducted Emission on AC Mains Port, Spectral Diagram, 0.15-30MHz*

Figure 3-24-1. CE at 115Vac: NEUTRAL(N)

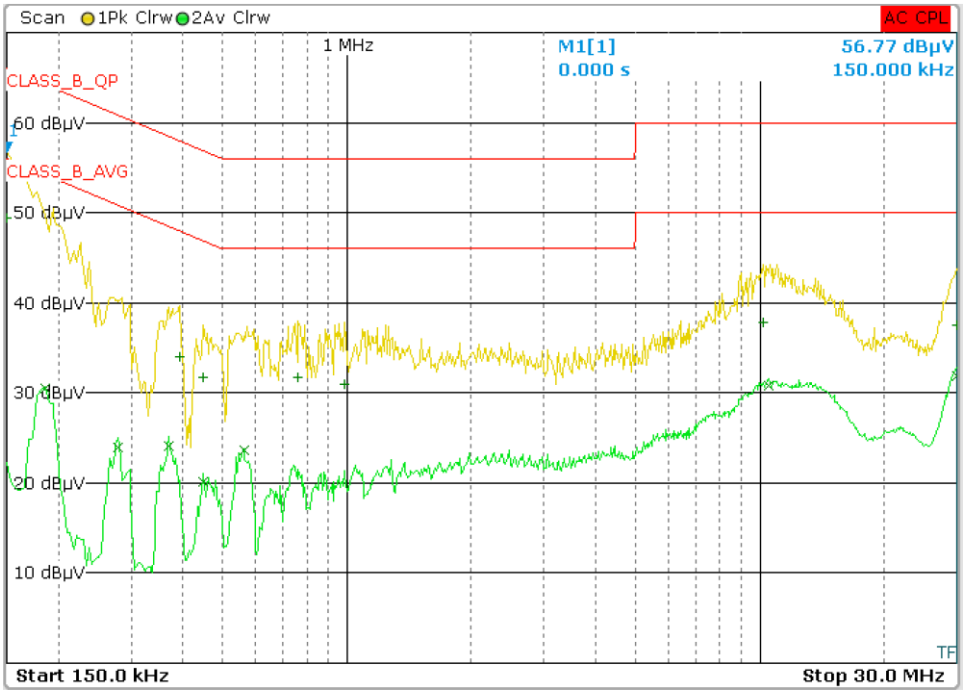


Table 3-24-1 CE at 115Vac, 150kHz-30MHz, Quasi Peak and Average Data, Neutral (N)

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	150.000000000 kHz	49.45		Quasi Peak	-16.55
2	29.938000000 MHz	31.86		Average	-18.14
2	10.478000000 MHz	30.82		Average	-19.18
1	10.182000000 MHz	37.78		Quasi Peak	-22.22
2	562.000000000 kHz	23.63		Average	-22.37
1	29.994000000 MHz	37.52		Quasi Peak	-22.48
2	186.000000000 kHz	30.52		Average	-23.69
1	394.000000000 kHz	34.05		Quasi Peak	-23.93
1	762.000000000 kHz	31.66		Quasi Peak	-24.34
2	370.000000000 kHz	24.03		Average	-24.47
1	990.000000000 kHz	30.97		Quasi Peak	-25.03
1	450.000000000 kHz	31.73		Quasi Peak	-25.15
2	450.000000000 kHz	20.12		Average	-26.76
2	278.000000000 kHz	23.95		Average	-26.93

*** All CE data has been taken from TUV Rheinland Test Report**

Figure 3-24-2. CE at 115Vac: LINE (L)

Table 3-24-2 CE at 115Vac, 150kHz-30MHz, Quasi Peak and Average Data, Line (L)

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	29.802000000 MHz	33.08		Average	-16.92
1	154.000000000 kHz	48.85		Quasi Peak	-16.93
1	1.282000000 MHz	38.80		Quasi Peak	-17.20
1	386.000000000 kHz	40.19		Quasi Peak	-17.96
2	10.078000000 MHz	30.98		Average	-19.02
1	530.000000000 kHz	35.35		Quasi Peak	-20.65
2	742.000000000 kHz	25.03		Average	-20.97
2	550.000000000 kHz	24.81		Average	-21.19
1	29.498000000 MHz	38.69		Quasi Peak	-21.31
1	270.000000000 kHz	39.65		Quasi Peak	-21.47
1	9.782000000 MHz	37.77		Quasi Peak	-22.23
2	190.000000000 kHz	29.90		Average	-24.14
2	382.000000000 kHz	23.95		Average	-24.29
2	278.000000000 kHz	26.44		Average	-24.44

Figure 3-24-3. CE at 230Vac: NEUTRAL(N)

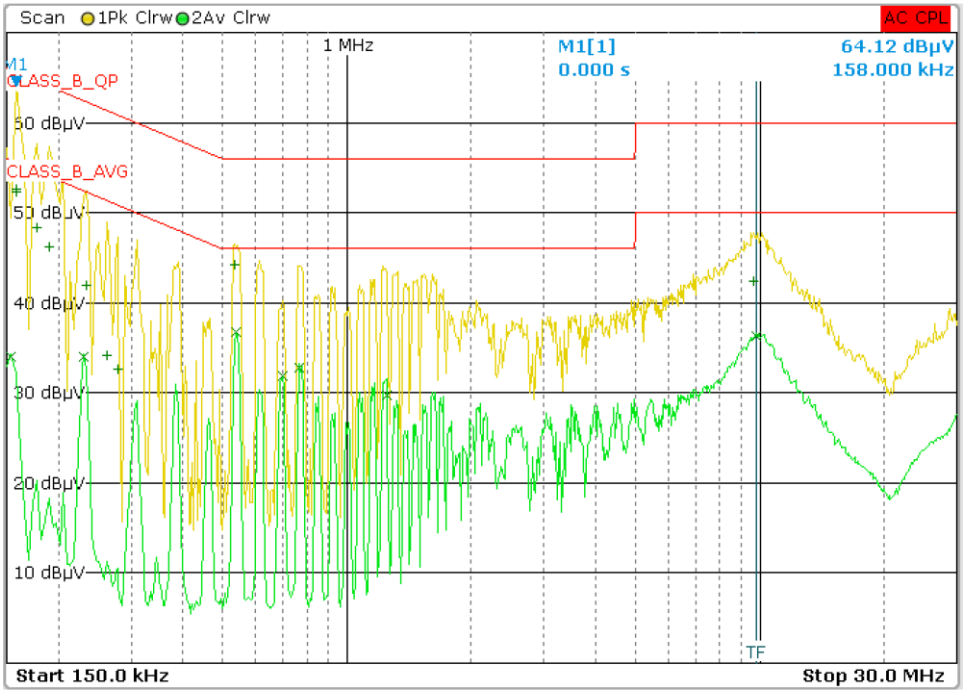


Table 3-24-3 CE at 230Vac, 150kHz-30MHz, Quasi Peak and Average Data, Neutral (N)

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	538.000000000 kHz	36.70		Average	-9.30
1	534.000000000 kHz	44.18		Quasi Peak	-11.82
1	158.000000000 kHz	52.65		Quasi Peak	-12.92
2	766.000000000 kHz	32.79		Average	-13.21
1	158.000000000 kHz	52.27		Quasi Peak	-13.30
2	9.782000000 MHz	36.28		Average	-13.72
2	698.000000000 kHz	31.94		Average	-14.06
1	178.000000000 kHz	48.37		Quasi Peak	-16.21
2	1.246000000 MHz	29.75		Average	-16.25
1	9.690000000 MHz	42.43		Quasi Peak	-17.57
1	190.000000000 kHz	46.20		Quasi Peak	-17.84
2	230.000000000 kHz	33.94		Average	-18.51
1	234.000000000 kHz	41.92		Quasi Peak	-20.39
2	154.000000000 kHz	33.98		Average	-21.80
1	262.000000000 kHz	34.15		Quasi Peak	-27.22
1	278.000000000 kHz	32.70		Quasi Peak	-28.18

Figure 3-24-4. CE at 230Vac: LINE(L)

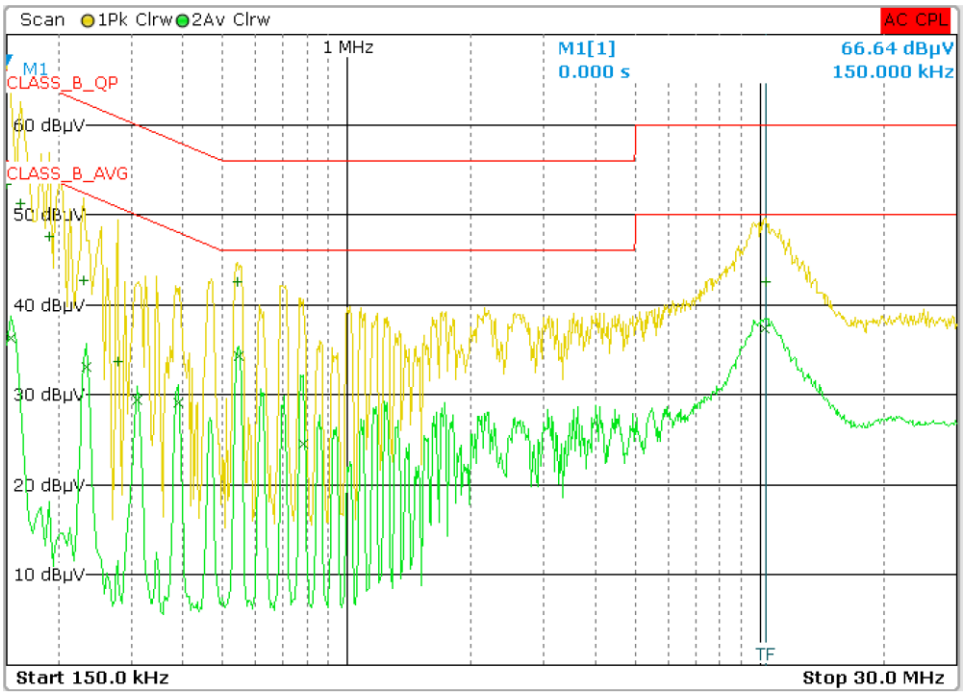


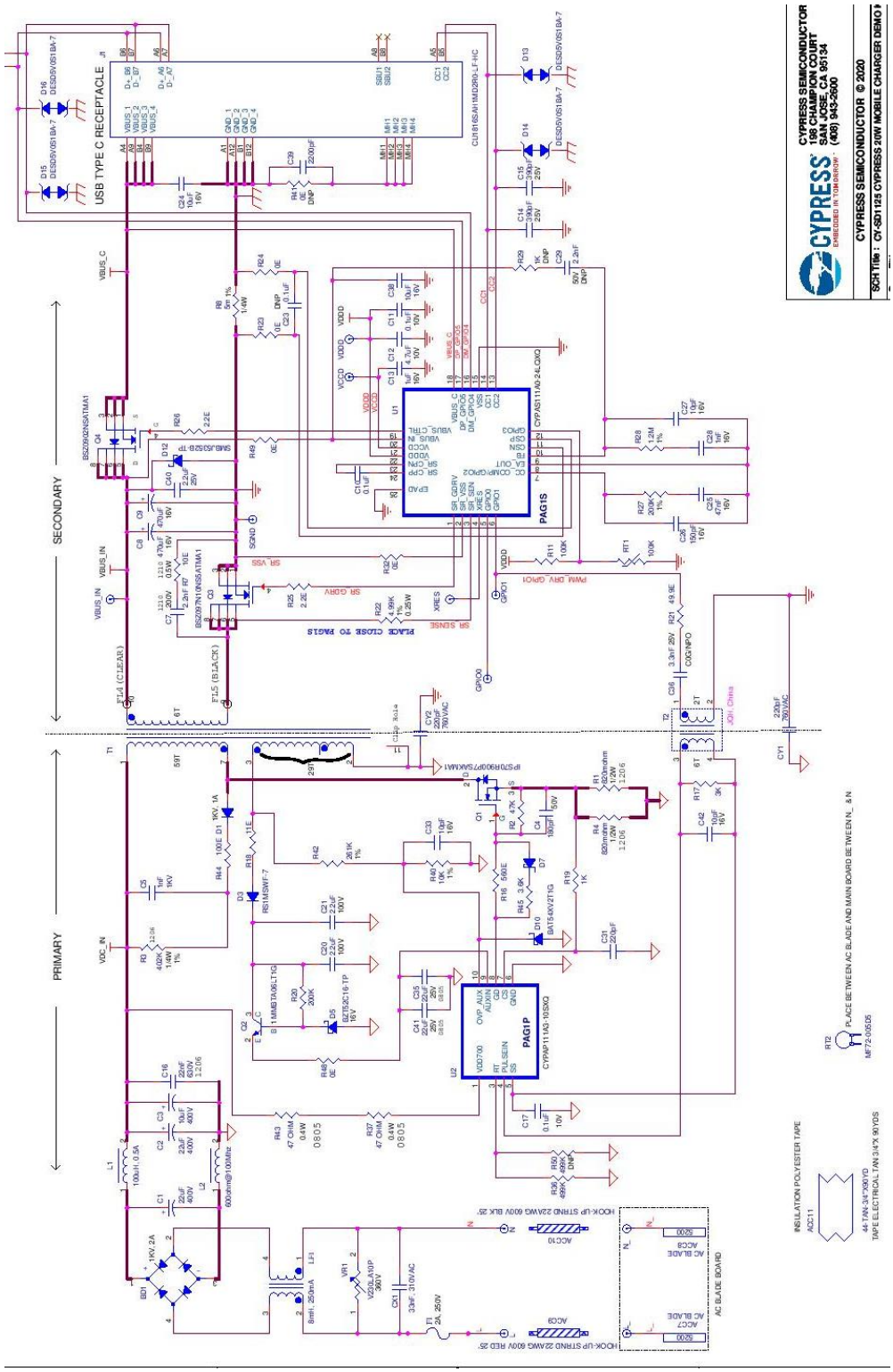
Table 3-24-4 CE at 230Vac, 150kHz-30MHz, Quasi Peak and Average Data, Line (L)

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	546.000000000 kHz	34.39		Average	-11.61
1	150.000000000 kHz	53.31		Quasi Peak	-12.69
2	10.246000000 MHz	37.30		Average	-12.70
1	542.000000000 kHz	42.60		Quasi Peak	-13.40
1	162.000000000 kHz	51.19		Quasi Peak	-14.17
1	190.000000000 kHz	47.59		Quasi Peak	-16.45
1	10.318000000 MHz	42.58		Quasi Peak	-17.42
2	390.000000000 kHz	29.17		Average	-18.89
2	234.000000000 kHz	33.11		Average	-19.20
2	154.000000000 kHz	36.27		Average	-19.51
1	230.000000000 kHz	42.73		Quasi Peak	-19.72
2	310.000000000 kHz	29.44		Average	-20.53
2	786.000000000 kHz	24.62		Average	-21.38
1	278.000000000 kHz	33.67		Quasi Peak	-27.21

4. Appendix

4.1 Schematics

Figure 4-1. Schematic



4.2 Bill of Materials

Table 4-2. Bill of Materials

Sr No	Qty	Reference	Value	Description	Manufacturer	MFG Part Number
1	1	BD1	ABS210-13	BRIDGE RECT 1PHASE 1KV 2A 4SOPA	Diodes Incorporated	ABS210-13
2	2	C10,C11	0.1uF	CAP CER 0.1UF 10V X5R 0402	Samsung Electro-Mechanics	CL05A104MP5NNNC
3	1	C17	0.1uF	CAP CER 0.1UF 10V X7R 0603	Yageo	CC0603KRX7R6BB104
4	1	C4	180pF	CCAP CER 180PF 50V C0G/NPO 0603	Yageo	CC0603JRNPO9BN181
5	1	C26	150pF	CAP CER 150PF 16V X7R 0402	Wurth Electronics Inc.	8.85012E+11
6	1	C27	10pF	CAP CER 10PF 16V C0G/NP0 0402	Wurth Electronics Inc.	8.85012E+11
7	2	C33,C42	10pF	CAP CER 10PF 16V C0G/NP0 0603	Wurth Electronics Inc.	8.85012E+11
8	1	C38	10uF	CAP CER 10UF 16V X7R 1206	Samsung Electro-Mechanics	CL31B106MOHNNNE
9	1	C40	2.2uF	CAP CER 2.2UF 25V X5R 0805	Samsung Electro-Mechanics	CL21A225KAFNNNG
10	1	C5	1nF	CAP CER 1000PF 1KV X7R 0805	KEMET	C0805C102MDRACTU
11	1	C28	1nF	CAP CER 1000PF 16V X7R 0402	KEMET	C0402C102K4RACTU
12	1	C13	1uF	CAP CER 1UF 16V X5R 0402	Samsung Electro-Mechanics	CL05A105MO5NNNC
13	1	C7	2.2nF	CAP CER 2200PF 200V NP0 1210	KEMET	C1210C222J2GAC7800
14	2	C20,C21	2.2uF	CAP CER 2.2UF 100V X5R 1206	Samsung Electro-Mechanics	CL31A225KC9LNNC
15	1	C24	10uF	CAP CER 10UF 16V X5R 0603	Murata Electronics	GRM188R61C106KAALD
16	1	C39	2200pF	CAP CER 2200PF 500V X7R 0603	KEMET	C0603C222KCRAC7867

17	1	C31	220pF	CAP CER 220PF 10V C0G/NP0 0603	KEMET	C0603C221J8GAC7867
18	1	C16	22nF	CAP CER 0.022UF 630V X7R 1206	Samsung Electro-Mechanics	CL31B223KHHNNNE
19	2	C35,C41	22uF	CAP CER 22UF 25V X5R 0805	Murata Electronics North America	GRM21BR61E226ME44K
20	1	C36	3.3nF	CAP CER 3300PF 25V NP0 0603	KEMET	C0603C332J3GAC7867
21	2	C14,C15	390pF	CAP CER 390PF 25V C0G/NP0 0402	Murata Electronics North America	GRM1555C1E391JA01D
22	1	C12	4.7uF	CAP CER 4.7UF 10V X5R 0402	Murata Electronics North America	GRM155R61A475MEAAD
23	1	C25	1nF	CAP CER 1000PF 16V X7R 0402	Samsung Electro-Mechanics	CL05B102KO5NNNC
24	1	CX1	33nF, 310VAC	CAP FILM 0.033UF 20% 630VDC RAD	Vishay BC Components	BFC233820333
25	2	CY1,CY2	220pF	CAP CER 220PF 760VAC Y5S RADIAL	Vishay BC Components	VY1221K31Y5SQ63V0
26	1	D1	CGRKM4007-HF	DIODE GEN PURP 1KV 1A SOD123F	Comchip Technology	CGRKM4007-HF
27	1	D3	RS1MSWF-7	DIODE GEN PURP 1KV 1A SOD123F	Diodes Incorporated	RS1MSWF-7
28	1	D5	BZT52C16-TP	DIODE ZENER 16V 200MW SOD123	Micro Commercial Co	BZT52C16-TP
29	1	D7	BAT54J,115	DIODE SCHOTTKY 30V 200MA SOD323F	Nexperia USA Inc.	BAT54J,115
30	1	D10	BAT54XV2T1G	DIODE SCHOTTKY 30V 200MA SOD523	ON Semiconductor	BAT54XV2T1G
31	1	D12	SMBJ5352B-TP	DIODE ZENER 15V 5W DO214AA	Micro Commercial Co	SMBJ5352B-TP
32	4	D13,D14,D15,D16	DESD5V0S1BA-7	TVS DIODE 5V 14V SOD323	Diodes Incorporated	DESD5V0S1BA-7

33	1	F1	RSTA 2 AMMO	FUSE BRD MNT 2A 250VAC/63VDC RAD	Bel Fuse Inc.	RSTA 2 AMMO
34	1	L2	600ohm@100Mhz	FERRITE BEAD 600 OHM 0805 1LN	Wurth Electronics Inc.	742792040
35	1	Q1	IPS70R900P7SAKMA1	MOSFET N-CHANNEL 700V 6A TO251	Infineon Technologies	IPS70R900P7SAKMA1
36	1	Q2	MMBTA06LT1G	TRANS NPN 80V 0.5A SOT23	ON Semiconductor	MMBTA06LT1G
37	1	Q3	BSZ097N10NS5ATMA1	MOSFET N-CH 100V 40A TSDSON-8	Infineon Technologies	BSZ097N10NS5ATMA1
38	1	Q4	BSZ0902NSATMA1	MOSFET N-CH 30V 40A TSDSON-8	Infineon Technologies	BSZ0902NSATMA1
39	2	R1,R4	820mohm	RES 0.82 OHM 1% 1/2W 1206	Vishay Dale	RCWE1206R820FKEA
40	1	R2	47K	RES SMD 47K OHM 1% 1/10W 0603	Yageo	RC0603FR-0747KL
41	1	R3	402K	RES SMD 402K OHM 1% 1/4W 1206	Yageo	RC1206FR-07402KL
42	1	R7	10E	RES 10 OHM 1% 1/2W 1210	Stackpole Electronics Inc	RMCF1210FT10R0
43	1	R8	5m	RES 0.005 OHM 1% 1W 1206	Stackpole Electronics Inc.	CSRF1206FT5L00
44	1	R11	100K	RES SMD 100K OHM 1% 1/10W 0603	Panasonic Electronic Components	ERJ-3EKF1003V
45	1	R16	560E	RES SMD 560 OHM 1% 1/10W 0603	Panasonic Electronic Components	ERJ-3EKF5600V
46	1	R45	3.6K	RES SMD 3.6K OHM 1% 1/10W 0603	Panasonic Electronic Components	ERJ-3EKF3601V
47	1	R17	3K	RES SMD 3K OHM 1% 1/10W 0603	Yageo	RC0603FR-073KL
48	1	R18	11E	RES SMD 11 OHM 1% 1/4W 0603	Panasonic Electronic Components	ERJ-PA3F11R0V
49	1	R19	1K	RES SMD 1K OHM 1% 1/10W 0603	Panasonic Electronic Components	ERJ-3EKF1001V

50	1	R20	200K	RES SMD 200K OHM 1% 1/10W 0603	Panasonic Electronic Components	ERJ-3EKF2003V
51	1	R21	49.9E	RES SMD 49.9 OHM 1% 1/10W 0603	Yageo	RC0603FR-0749R9L
52	1	R22	4.99K	RES SMD 4.99K OHM 1% 1/4W 0603	Vishay Dale	CRCW06034K99FKEAHP
53	3	R23,R24,R49	0E	RES SMD 0 OHM JUMPER 1/10W 0402	Panasonic Electronic Components	ERJ-2GE0R00X
54	2	R25,R26	2.2E	RES SMD 2.2 OHM 1% 1/10W 0603	Yageo	RC0603FR-072R2L
55	1	R27	200K	RES SMD 200K OHM 1% 1/16W 0402	Yageo	RC0402FR-07200KL
56	1	R28	1.2M	RES SMD 1.2M OHM 1% 1/16W 0402	Yageo	AC0402FR-071M2L
57	2	R32,R48	0E	RES SMD 0 OHM JUMPER 1/4W 0603	Vishay Dale	CRCW06030000Z0EAHP
58	1	R36	499K	RES SMD 499K OHM 1% 1/8W 0603	Vishay Beyschlag	MCT06030C4993FP500
59	2	R37,R43	47 OHM	RES SMD 47 OHM 5% 0.4W 0805	Rohm Semiconductor	ESR10EZPJ470
60	1	R40	10K	RES SMD 10K OHM 1% 1/10W 0603	Yageo	RC0603FR-0710KL
61	1	R42	261K	RES SMD 261K OHM 1% 1/10W 0603	Yageo	RC0603FR-07261KL
62	1	R44	100E	RES 100 OHM 1% 1/4W 0805	Stackpole Electronics Inc	RNCP0805FTD100R
63	1	RT1	100K	THERM NTC 100KOHM 4250K 0805	Murata Electronics North America	NCP21WF104J03RA
64	1	VR1	V230LA10P	VARISTOR 360V 2.5KA DISC 10MM	Littelfuse Inc.	V230LA10P
65	2	ACC7,ACC8	5200	PCB BLADE SNAP THRU POLARIZED	Heyco	5200

66	1/300"	ACC9	HOOK-UP STRND 22AWG 600V RED 25'	HOOK-UP STRND 22AWG 600V RED 25'	CNC Tech	11047-22-1-0500-004-1-TS
67	1/300"	ACC10	HOOK-UP STRND 22AWG 600V BLK 25'	HOOK-UP STRND 22AWG 600V BLK 25'	CNC Tech	11047-22-1-0500-001-1-TS
68	1	ACC11	44-TAN-3/4"X90YD	TAPE ELECTRICAL TAN 3/4"X 90YDS	3M	44-TAN-3/4"X90YD
69	1	C1	22uF	CAP ALUM 22uF 400V RADIAL DIA 10X16	AISHI	EHS2GM220G16OT
70	2	C2,C3	10uF	CAP ALUM 10uF 400V RADIAL DIA 10X12.5	AISHI	
71	2	C8,C9	470uF	CAP POLYMER 470uF 16V 6.3x11	AISHI	SPF1CM471E11O00RAXXX
72	1	J1	CU1816SAH1MD2R0-LF-HC	CU18 USB Type-C Receptacle Connector	CviLux Corporation	CU1816SAH1MD2R0-LF-HC
73	1	LF1	8mH, 250mA	8mH / D18.5 * T7.5mm*H18.5 / 250mA	Prismatic	
74	1	L1	100uH, 0.5A	100uH D8x10mm 0.5A	Prismatic	
75	1	T1	RM7	RM7 Transformer	Shenzhen Jingquanhua (JQH) Electronics Co. Ltd	BCK0RM3752B1
76	1	T2	1:03	Pulse transformer, 1:3, 4.8uH, 3KV isolation voltage	JQH, China	LCL-T6-4961A
77	1	U1	PAG1S	USB-PD Power Adapter Secondary Side Controller	CYPRESS SEMICONDUCTOR	CYPAS111A0-24LQXQ
78	1	U2	PAG1P	PRIMARY SIDE STARTUP CONTROLLER	CYPRESS SEMICONDUCTOR	CYPAP111A3-10SXQ
79	1	RT2	MF72-005D5	ICL 5 OHM 20% 1A 7MM	Cantherm	MF72-005D5

DNP:

Sr No	Qty	Reference	Value	Description	Manufacturer	MFG Part Number
1	1	C23	0.1uF	CAP CER 0.1UF 35V X7R 0603	Taiyo Yuden	GMK107B7104KAHT
2	1	C29	2.2nF	CAP CER 2200PF 50V X7R 0402	Murata Electronics North America	GCM155R71H222KA37D
3	1	R29	1K	RES 1K OHM 1% 1/16W 0402	Stackpole Electronics Inc.	RMCF0402FT1K00
4	1	R41	0E	RES SMD 0 OHM JUMPER 1/4W 0603	Vishay Dale	CRCW06030000Z0EAHP
5	1	R50	499K	RES SMD 499K OHM 1% 1/10W 0402	Panasonic Electronic Components	ERJ-2RKF4993X

4.3 PCB Layout

Figure 4-3-1. Top view

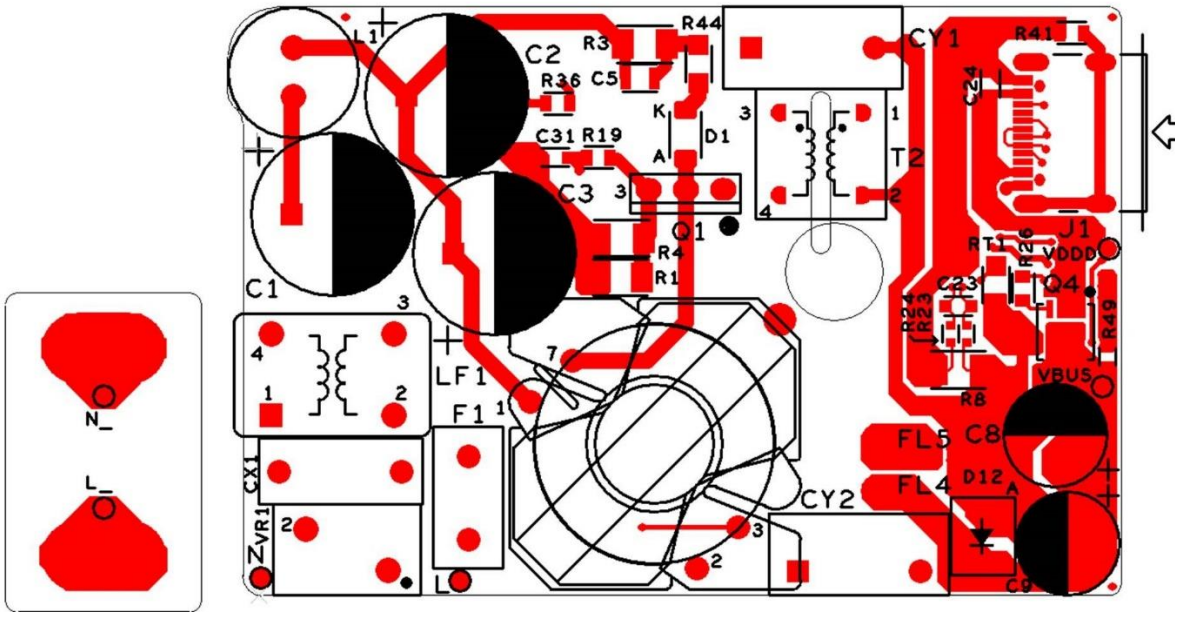
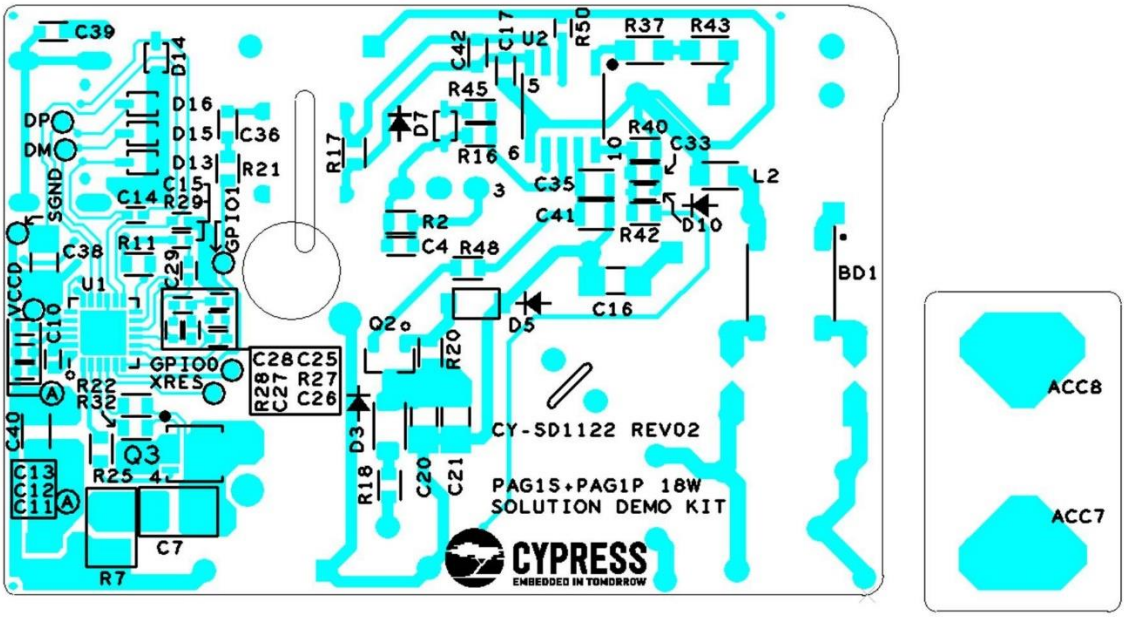


Figure 4-3-2. Bottom view

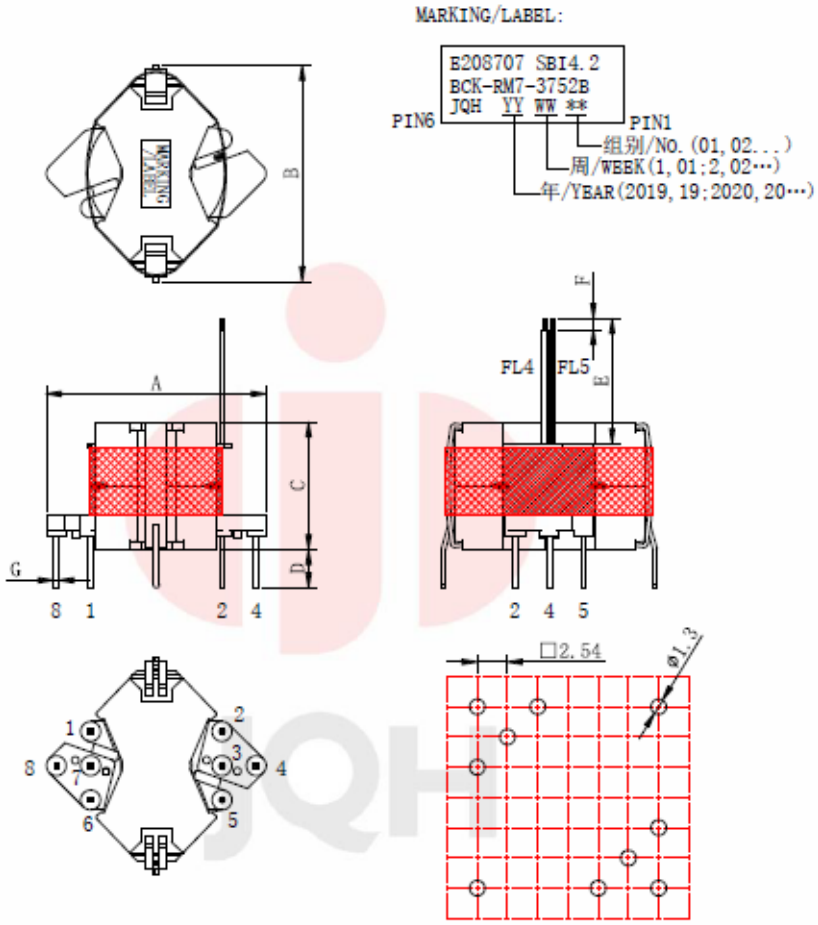


4.4 Transformer Specifications (T1)

Figure 4-4. RM7 Transformer BCK0RM3752B datasheet

顾 客 CUSTOMER	SA00169	产品名称 DESCRIPTION	RM7 TRANSFORMER	03版
部 品 号 PART NO.	18W RM7	型 号 MODEL	BCK-RM7-3752B	页修改号: 0

1. 外观图示(单位:mm)/DIMENSION(UNIT:mm)



NOTE:

1. 磁芯结合处点胶固定./Add the epoxy on the Core joint.
2. 成品沿线包方向包铜箔1.1Ts，焊接于PIN2./Copper foil 1.1Ts is wrapped in the packaging direction along the finished product and welded to PIN2.
3. 铜箔前后胶带(2Ts).Tape before and after Cu band (2Ts).
4. 产品需真空含浸。/The part must be vacuum varnished.

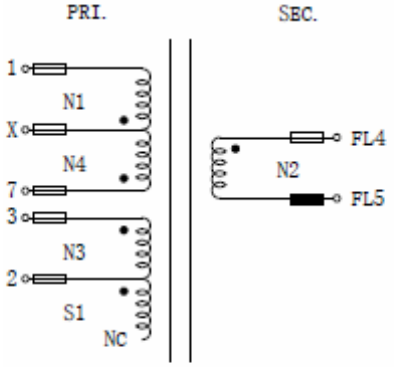
A	B	C	D	E	F	G
25.5 MAX	24.5 MAX	14.5 MAX	3.5 ±0.5	36.0 ±3.0	5.0 ±1.0	0.5*0.5 ±0.1

料 号 MATERIAL NO.	制 图 DRAWING	制 样 SAMPLE	校 核 CHECKED	QC 审 核 QC CHECKED	RD 审 核 RD CHECKED	批 准 APPROVED	日 期 DATE
BCK0RM3752B1	张 艳	陈 锦	杨相杰	朱金金	张庆庭	袁志军	2019-11-05

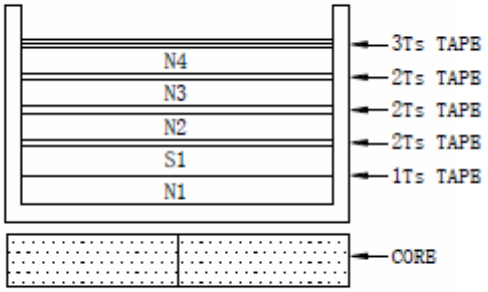
<u>Note</u>: Transformer undergoes DIP and BAKE varnishing methodology.

顾　客 CUSTOMER	SA00169	产品名称 DESCRIPTION	RM7 TRANSFORMER	03版
部　品　号 PART NO.	18W RM7	型　号 MODEL	BCK-RM7-3752B	页修改号: 0

2. 电原理图/CIRCUIT DIAGRAM



3. 解剖图/CONSTRUCTION DIAGRAM



"●": POLARITY/极性

"▭":TRANSPARENT TUBE/透明套管

"▬": BLACK TUBE/黑色套管

4. 绕组/WINDING

绕组 WINDING	漆包线 WIRE(mm)	起末端 S-F	圈数 TURNS(Ts)	胶带圈数 TAPE TURNS(Ts)	绕制方式 WINDING CONDITION
N1	Φ0.27mm*1P 2UEW-F	X-1	40	1	CLOSE/密绕
S1	Φ0.15mm*1P 2UEW-F	2-NC	37 REF	2	CLOSE/密绕
N2	Φ0.40mm*3P TEX-E	FL4-FL5	6	2	CLOSE/密绕
N3	Φ0.15mm*1P 2UEW-F	3-2	29	2	CLOSE/密绕
N4	Φ0.27mm*1P 2UEW-F	7-X	19	3	CLOSE/密绕

5. 电气特性/ELECTRICAL CHARACTERISTIC

序号 NO.	项目 ITEM	测量点 MEASURED POINT	技术要求 TECHNICAL DATA	测试条件及仪器 TESTING CONDITION & INSTRUMENT
1	电感量 INDUCTANCE	L(7-1)	805uH±5%	Agilent 4284A 60KHz/1.0V, AT 25℃
2	漏感 LEAKAGE INDUCTACE	Lk(7-1) (SHORT OTHER PINS/短路其他脚)	15uH MAX	
3	抗电强度 DIELECTRIC WITHSTAND VOLT.	初级-次级/PRI-SEC	AC 3.75KV	CS9929 5mA 3SEC 50Hz
		初级-磁芯/PRI-CORE	AC 1.0KV	
		次级-磁芯/SEC-CORE	AC 1.0KV	
4	绝缘阻抗 INSULATION RESISTANCE	绕组-绕组/COIL-COIL	100MΩ MIN	TH2681A DC500V 60S

料　号 MATERIAL NO.	制　图 DRAWING	制　样 SAMPLE	校　核 CHECKED	QC 审 核 QC CHECKED	RD 审 核 RD CHECKED	批　准 APPROVED	日　期 DATE
BCKORM3752B1	张 艳	陈 锦	杨相杰	朱金金	张庆庭	袁志军	2019-11-05

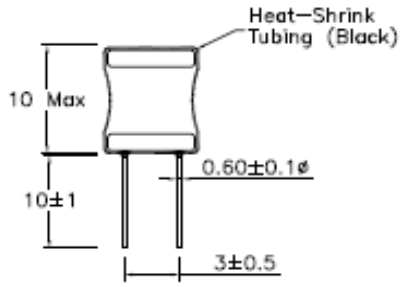
4.5 Inductor Specifications (L1)

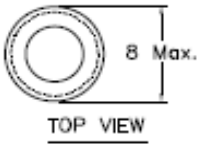
Figure 4-5. Datasheet of pi filter inductor L1

PRODUCT: CHOKE DC–100X6X8 100uH/0.3A SLEEVED–RoHS
PRODUCT CODE: 9404310401

1) Mechanical Dimensions:

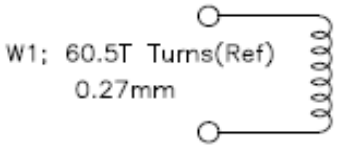
Rev1 : Core details, current ratings & Part number updated. DCR value changed to 310mΩ from 355mΩ UL File details updated.





NOTE:
*All Dimensions are in MM
*SCALE: N.T.S

2) Electrical Characteristics:



3) Electrical Characteristics:

3.1) Inductance & DC Resistance:

INDUCTANCE @0.3V/1KHz	100uH ±20%
DC RESISTANCE MAX @ 20°C.	310mΩ

3.2) Current Ratings :
a) Rated Current : 0.3A AC rms
b) Saturation current : 0.42A (inductance reduces by 10% of no load value)

3.3) Temperature Range: –20 °C to +80 °C

4) MATERIAL LIST:

SL.NO	Item	Material	Supplier of Material	UL No.	UL Material Designation
1)	Core	Ferrite Drum Core 6x8mm (Ni–Zn) TN650 Grade	THEL or equivalent	----	----
2)	Wire	Polyurethane Enamelled Copper Wire (Class B) Polyurethane Enamelled Copper Wire (Class F)	JUNG SHING WIRE CO LTD Ram Ratna Wire Ltd. Precision Wire India Ltd. or equivalent	E174837 E238786 E174288	UEW–4 RRvSHRAMIK SSFC Preci–9
3)	Sleeve	Heat Shrink Sleeve–UL any Colour	Shenzhen Woer Heat–shrinkable Material Co., Ltd	E203950	RSFR–H

PRISMATIC

PRISMATIC ENGINEERING PVT. LTD.
#308, JIGANI-BOMMSANDRA LINK ROAD, JIGANI, ANEKAL TALUK, JIGANI, BANGALORE-562 106, INDIA.
Ph : 91 80 27862273/74, Fax: 91 80 27862278e-mail: sales@prismatic.co.in, website: www.prismatic.co.in

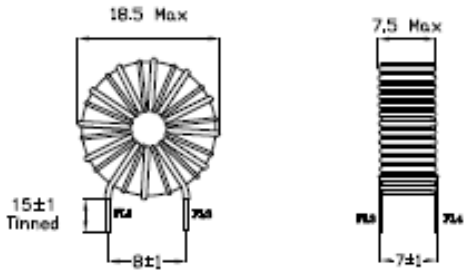
DRAWN By	APPROVED BY
DESIGN	Hod
KUMAR 15–04–2019	JOYCE 15–04–2019
	Sheet 1 of 1

4.6 Common Mode Choke Specifications (LF1)

Figure 4-6. Datasheet of Common mode choke

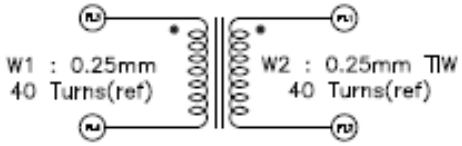
PRODUCT : CHOKE CM 8mH/250mA T16 RoHS
PRODUCT CODE : 9404320301

1) Mechanical Dimensions :



Note :
1) All Dimensions are in mm.
2) Scale : N.T.S.

2) Schematic :



3) Electrical Characteristics :

3.1) Inductance :

Parameter	W1(FL3–FL4)	W2(FL1–FL2)
Inductance @0.1V/100KHz	6mH–9mH	6mH–9mH
DC Resistance @20°C (Max)	385mΩ	385mΩ

PRELIMINARY DRAWING

3.2) Electric Strength Test (Hi–Pot Test):

W1 – W2 : 0.5KVAC/4mA/4Sec

4) Material List :

Sl.No.	Item	Material	Supplier of Material	UL no.	UL Material Designation
1)	Core	T15.9X9.07X4.7(Ferrite Core) ZW41605TC	Magnetic or Equivalent	----	----
2)	Wire	Polyurethane Enamelled Copper Wire (Class B) Polyurethane Enamelled Copper Wire (Class F)	JUNG SHING WIRE CO LTD Ram Ratna Wire Ltd. Precision Wire India Ltd. or equivalent	E174837 E238786 E174288	UEW-4 RRvSHRAMIK SSFC Precl-9
3)	TIW Wire	TIW [Class B]	FURUKAWA ELECTRIC CO LTD. Young Chang Silicone Co Ltd. or equivalent	E206440 E242198	Tex-E STW-B

PRISMATIC
PRISMATIC ENGINEERING PVT. LTD.
#308, LINK ROAD, JIGANI INDUSTRIAL AREA, BANGALORE-562 105, INDIA.
Ph : 91 80 27862273/74, Fax: 91 80 27862278e-mail: sales@prismatic.co.in, website: www.prismatic.co.in

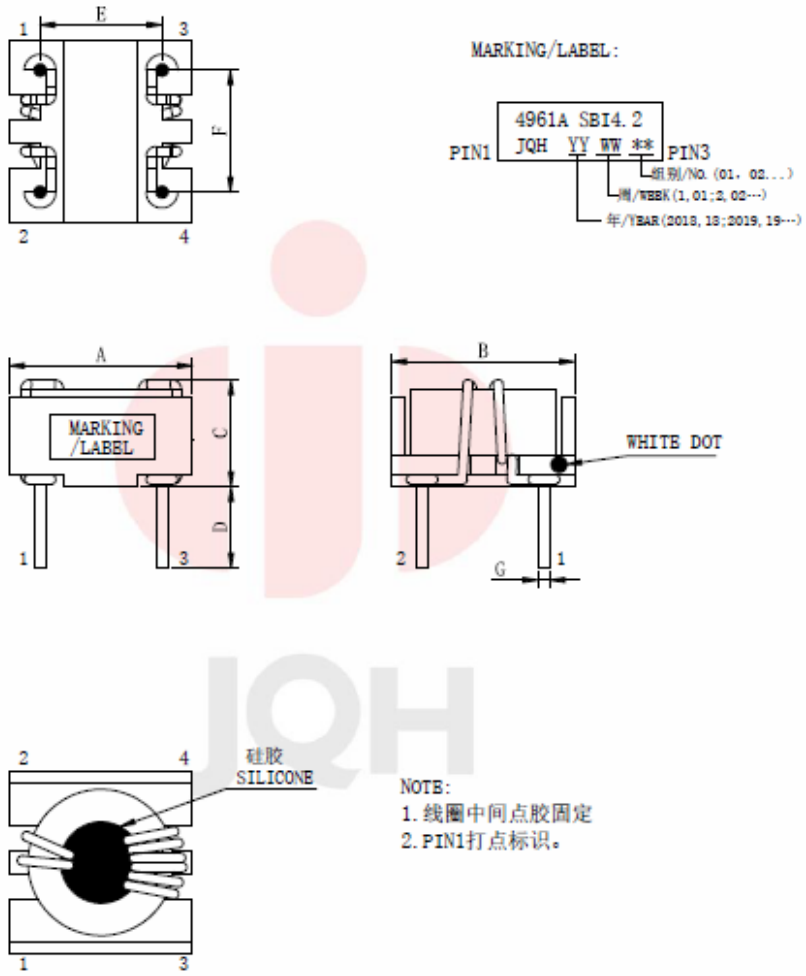
DRAWN BY	APPROVED BY
Design	HoD Design
SRIKANTH 25.09.2019	JOYCE 25.09.2019

4.7 Pulse Transformer (T2)

Figure 4-7. Datasheet of pulse transformer LCL-T6-4961A

顾 客 CUSTOMER	SA00169	产品名称 DESCRIPTION	T6 FILTER	04 版
部 品 号 PART NO.	1:3 ratio	型 号 MODEL	LCL-T6-4961A	页修改号: 0

1.外观图(单位:mm)/DIMENSION(UNIT:mm)



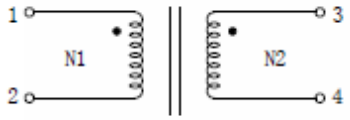
A	B	C	D	E	F	G
8.0 MAX	8.0 MAX	6.0 MAX	3.5 ±0.3	5.0 ±0.2	5.0 ±0.2	Ø0.5 ±0.1

料 号 MATERIAL NO.	制 图 DRAWING	制 样 SAMPLE	校 核 CHECKED	QC 审 核 QC CHECKED	RD 审 核 RD CHECKED	批 准 APPROVED	日 期 DATE
LCL00T4961A1	赖彩玲	张华明	杨相杰	张庆庭	朱金金	袁志军	2019-11-05

1/2

顾　客 CUSTOMER	SA00169	产品名称 DESCRIPTION	T6 FILTER	04 版
部　品　号 PART NO.	1:3 ratio	型　号 MODEL	LCL-T6-4961A	页修改号: 0

2. 电原理图/CIRCUIT DIAGRAM



" ● ": POLARITY/极性

3. 绕组/WINDING

绕组 WINDING	漆包线 WIRE(mm)	起末端 S-F	圈数 TURNS(Ts)	绕制方式 WINDING CONDITION
N1	Φ0.2mm*1P TEX-E	1-2	2	CLOSE/密绕
N2	Φ0.2mm*1P TEX-E	3-4	6	CLOSE/密绕

4. 电气特性/ELECTRICAL CHARACTERISTIC

序号 NO.	项目 ITEM	测量点 MEASURED POINT	技术要求 TECHNICAL DATA	测试条件及仪器 TESTING CONDITION & INSTRUMENT
1	电感量 INDUCTANCE	L(1-2)	4.8uH MIN	Agilent 4284A 100KHz/0.3V, AT 25℃
2	耐压 HI-POT	N1-N2	3.0KV AC	CS9929 50Hz/60Hz 4mA 4S

5. 材料清单/MATERIAL LIST

序号 NO.	材料名称 ITEM	规格 TYPE	供应商 SUPPLIERS	认证号 UL NO.
1	磁芯 CORE	TYPE:T6*4*2.15(透明涂覆) A10	ACME	N/A
2	底座 BASE	TYPE:Phenolic (PF) MATERIAL:PM-9020/PM-9630 THERMAL RATING:150℃	SUMITOMO BAKELITE CO LTD	E41429
3	三层绝缘线 TRIPLE INSULATED WIRE	REINFORCED INSULATION TYPE: TEX-E THERMAL RATING:130℃	FURUKAWA ELECTRIC CO LTD	E206440
4	硅胶 SILICONE	TYPE:3140 THERMAL RATING:200℃	DOW CORNING CORPORATION	N/A

注:1. 产品符合RoHS要求;
2. 产品绝缘温度等级为CLASS 130(B);
3. 产品使用的绝缘系统UL号为E208707。

Note:1. The products comply with RoHS requirements;
2. Insulation Temperature Class of this product is Class 130(B);
3. UL No. of the Electrical Insulation Systems used for this product is E208707.

6. 产品单重/WEIGHT

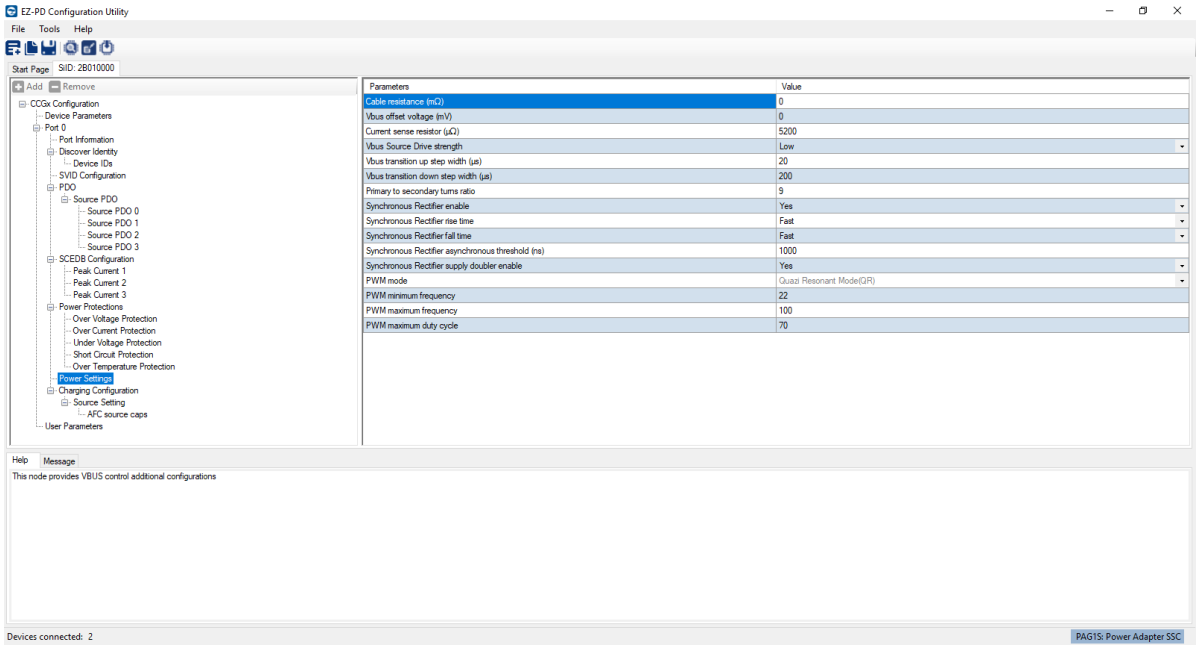
Net Weight:0.37g/PC

料　号 MATERIAL NO.	制　图 DRAWING	制　样 SAMPLE	校　核 CHECKED	QC 审 核 QC CHECKED	RD 审 核 RD CHECKED	批　准 APPROVED	日　期 DATE
LCL00T4961A1	赖彩玲	张华明	杨相杰	张庆庭	朱金金	袁志军	2019-11-05

2/2

4.8 EZ-PD Configuration Utility

Figure 4-8. Utility Screenshot



The Cypress EZ-PD PAG1S controller is a highly configurable and programmable solution. The chip can be configured using parameters stored in the internal flash memory. These parameters are to be chosen and programmed by Cypress customers according to their use cases and requirements.

The Graphical User Interface (GUI) of EZ-PD Configuration Utility allows users to intuitively select and configure the parameters for their application

Here are the default configured values with respect to Power Settings and Power Protections.

Table 4-2. Default Configuration Values

Parameters	Values
Power Settings	
Cable resistance (mΩ)	0
Vbus offset voltage (mV)	0
Current Sense resistor (µΩ)	5300
Vbus Source Drive strength	Low
Vbus transition up step width (µs)	20
Vbus transition down step width (µs)	200
Primary to secondary turns ratio	9
Synchronous Rectifier enable	Yes
Synchronous Rectifier rise time	Fast
Synchronous Rectifier fall time	Fast
Synchronous Rectifier async threshold (ns)	1000

Synchronous Rectifier doubler enable	Yes
PWM mode	Quasi Resonant Mode (QR)
PWM minimum frequency (kHz)	22
PWM maximum frequency (kHz)	100
PWM maximum duty cycle (%)	70
Power Protections	
1. Over Voltage Protection	
Enable	Yes
OVP Threshold (%)	20
Debounce period (µs)	10
Retry count	2
2. Over Current Protection	
Enable	Yes
OCP Threshold (%)	20
Debounce period (ms)	10
Retry count	2
3. Under Voltage Protection	
Enable	Yes
UVP Threshold (%)	70
Debounce period (µs)	10
Retry count	2
4. Short Circuit Protection	
Enable	Yes
Debounce period (µs)	4
Retry count	2
5. Over Temperature Protection	
Enable	Yes
Thermistor type 1	NTC
Cutoff value 1	477
Restart value 1	909
Debounce period (ms)	10
Enable Thermistor 2	Yes
Thermistor type 2	NTC
Cutoff value 2	0
Restart value 2	0

4.9 Glossary

Table 4-3. Glossary Table

Sr. No.	Acronyms	Full Names
1	CC Mode	Constant Current Mode in Electronic Load
2	CC-CV	Constant Current - Constant Voltage
3	CE	Conducted Emission
4	CH'x'	Oscilloscope Channel numbers
5	CR Mode	Constant Resistance Mode in Electronic Load
6	DUT	Device Under Test
7	FET	MOSFET (Metal Oxide Semiconductor Field Effect Transistor)
8	Io/Iout	Output Current of the DUT
9	NGDO	NFET Gate driver output – Q4
10	OCP	Over current protection
11	OVP	Over voltage protection
12	P-P	Peak to Peak
13	PPS-PDO	Programmable Power Supply - Power Delivery Output
14	SR	Synchronous Rectifier
15	UI	User Interface
16	USB PD	Universal Serial Bus Power Delivery
17	Vbus_c	Bus voltage at Type-C i.e. after Provider/NGDO FET
18	Vbus_in	Bus voltage before Provider/NGDO FET
19	Vin/Vin_ac	Input AC Voltage to the DUT
20	Vo/Vout	Output Voltage of the DUT

Revision History

Document Revision History

Document Title: CY-SD1125 20W USB-C PD Power Adapter Solution Demo Kit Validation Test Report Version - 1.0			
Revision	**Issue Date**	**Origin of Change**	**Description of Change**
**	25/09/2020	RKPA	Initial Version