### Test Procedure for the NCP1568 UHD Board



January, 2019



Figure 1 - Test Configuration

#### **Table 1: Required Equipment**

*Chroma 61604 AC	*Yokogawa WT210 Power	*Agilent 34401A
Source	Meter	Digital Multimeter x2
*Kikusui PLZ303W DC	*Tektronix TDS5034B	One NCP1568 UHD
Electronic Load	Oscilloscope	Board + PD Emulator

\*Equivalent test equipment may be substituted

#### **Test Procedure:**

- 1. Leads will need to be soldered on the board in order to properly check signals and output. Solder insulated wires onto points 1 through 5 in Figure 2 below.
- 2. Connect the output of the board to the PD emulator as shown in Figure 1.
- 3. Connect the Agilent 34401A Digital Multimeter (measuring DC I) in series with the output of the PD emulator and the Kikusui PLZ303W DC Electronic Load. Reference figure 1.
- 4. Set Kikusui PLZ303W DC Electronic Load to C.C. mode.
- 5. Set load current on Kikusui PLZ303W DC Electronic Load to 500 mA.
- 6. Connect the Agilent 34401A Digital Multimeter (measuring DC V) to the nodes as shown on Figure 1 (VOUT & SECGND in Figure 2).
- 7. Connect the AC power source and power meter as shown in Figure 1.
- 8. Set the AC power source to 115 VAC, 60 Hz and turn on power source
- 9. Using the PD Emulator, set the output to 20 V and verify that the output measures 20 +/- 0.4 V.
- 10. Slowly increase the load current to 3 A. Verify on Agilent current multimeter that current is 3 A +/- 1%.
- 11. Allow UHD board to run for approximately 10 minute then use the Input Power Meter to measure input power. Calculate the efficiency and record measurements.
- 12. Take the efficiency readings at 2.25 A (75% load), 1.5 A (50% load), 0.75A (25% load) and 0.3A (10% load). Verify that the readings are close to as in Table 2.
- 13. Set the AC power source to 230 VAC, 50 Hz and turn on power source.
- 14. Repeat steps 8-11.
- 15. Turn off the AC power source.
- 16. Using the PD Emulator, set the output to 5 V and verify that the output measures 5 +/- 0.2 V
- 17. Repeat steps 7-13.
- 18. Turn off the AC power source.
- 19. Attach Channel 1 of oscilloscope to the node "Vsw" (see Figure 2), ground at the GND point (Figure 2).
- 20. Attach Channel 2 of oscilloscope to the node "LDRV" (see Figure 2), ground at the GND point (Figure 2).
- 21. Set oscilloscope trigger to Ch2, rising edge, DC coupling, 6 V trig reference, run mode (continuous), and variable display persistence.
- 22. Set the PD Emulator to the 5 V output setting.
- 23. Set the input voltage to 115 Vac
- 24. Turn on AC source.
- 25. Turn DC load to 2.25 A, and check to see that the board is operating in CCM (see Figure 3)
- 26. Turn DC load to 0.3 A, and check to see that the board is operating in DCM (see Figure 4)

- 27. Slowly turn load up to 2.25 A (or until mode transition) and check to see a clean transition from DCM to CCM (clean transition is detailed in Figure 5)
- 28. Slowly turn load down to 0.3 A (or until mode transition) and check to see a clean transition from CCM to DCM (clean transition is detailed in Figure 5)
- 29. Change AC voltage to 230 Vac
- 30. Repeat steps 23-26
- 31. Turn off AC source.
- 32. Repeat steps 22-31 for all output voltages [9 V, 15 V, 20 V]
- 33. Since high voltage will be present on bulk capacitor, discharge should be performed from GND and VSW (Figure 2). Use a dc voltmeter to verify voltage is less than 20 VDC before continuing.
- 34. Disconnect the AC source.
- 35. Disconnect the electronic load.
- 36. Disconnect multimeters.
- 37. Disconnect oscilloscope probes.
- 38. Remove the soldered connections (Figure 2) and clean the points (clean soldering and clean flux).
- 39. End of test.

	Measured	Limit	Measurement				Calculated	
Output Power [%]	10%		25%	50%	75%	100%	4–point Avg. Efficiency Measurement	Limit
Efficiency [%] @ VIN = 115 Vrms	<mark>84.5</mark>	78.9%	87.4	91.8	92.6	92.8	<mark>91.1</mark>	88 %
Efficiency [%] @ VIN = 230 Vrms	<mark>80.7</mark>	78.9%	86.5	90.1	92.7	92.9	<mark>90.4</mark>	88 %

### Table 2. 20 V Efficiency Measurements

## Table 3. 5 V Efficiency Measurements

	Measured	Limit	Measurement				Calculated	
Output Power [%]	10%		25%	50%	75%	100%	4–point Avg. Efficiency Measurement	Limit
Efficiency [%] @ VIN = 115 Vrms	80.2	72.5%	83.8	89.2	90.0	90.3	<mark>88.3</mark>	82%
Efficiency [%] @ VIN = 230 Vrms	<mark>74.4</mark>	72.5%	79.0	86.6	88.8	<b>89.7</b>	<mark>86.0</mark>	82%

- 1. GND Top Left Solder Point
   2. VSW Top XFMR Node
   3. LDRV Left of Resistors
- 4. VOUT Left side of Daughter Card
- 5. SECGND Right side of Daughter Card



Figure 2 Solder Points

# **Transitions Information**



Figure 4 - Clean DCM Operation



Figure 5 - Transition Overlap CCM/DCM

Transitions:

- Clean transition allows for distinct DCM and CCM operation at any single load point.
- If overlap (figure 5) is seen at any given load point without settling on DCM or CCM operation within 2 seconds, this is not a clean transition.

# **Mouser Electronics**

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

onsemi: NCP1568PDUHD60WGEVB