

## FEATURES

- Wide operating voltage:
  - 40V ~ 57V
- Output power:
  - MQ7800CP : 7W
  - MQ7800DP: 13W
- Output voltage ripple: 100mV<sub>PP</sub>, (12V@1.1A)
- High Efficiency 82% (input 48V, [Load12V@1.1A](#), DP)
- Overcurrent /short circuit protection
- High reliability: designed to meet 500k hour MTBF
- Minimal space on PCB for CP:
  - 25.4mm x 14 mm x 13.8 mm or
  - 1.0 in x 0.55 in x 0.54in
- Minimal space on PCB for DP:
  - 35.6mm x 14 mm x 16.2 mm or
  - 1.40 in x 0.55 in x 0.64in
- Operating temperature: -40~+85°C
- No derating to +TBD°C, inside closed box
- UL/IEC/EN60950 compliant



## APPLICATIONS

- IP Camera
- IP Phone
- Wireless Access Point
- Video Supervisory

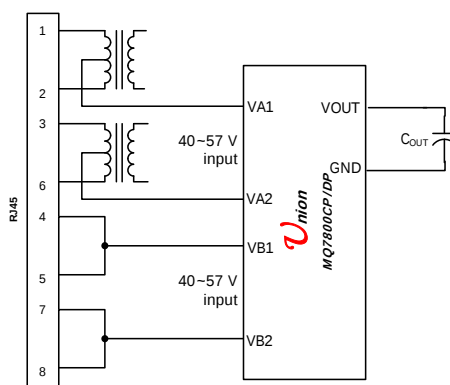
## Description

The **POE MQ7800CP/DP** series of modules are designed to extract power from a conventional twisted pair Category 5 Ethernet cable, conforming to the IEEE 802.3af/at Power-over-Ethernet (PoE) standard. IEEE 802.3af/at allows for two power options for Category 5 cables and the MQ7800CP/DP have two pairs of power inputs pins: - VA1&2 and VB1&2 to accommodate this.

The MQ7800CP/DP signature and control circuit provides the PoE compatibility signature and power classification required by the Power Sourcing Equipment (PSE) before applying up to 13W power to the port. The MQ7800CP/DP is compatible with Class 0 to Class 3 equipment.

The high efficiency DC/DC converter operates over a wide input voltage range and provides a regulated low ripple and low noise output. The DC/DC converter also has built-in overload and short-circuit output protection.

\*\*\*\*\* **Typical Application Circuit** \*\*\*\*\*



- ✘ Note: 1. COUT: for MQ7800DP050, 100uF/10V solid cap needed;
- 2. For keeping part operating normally, 0.5W minimum load is required.

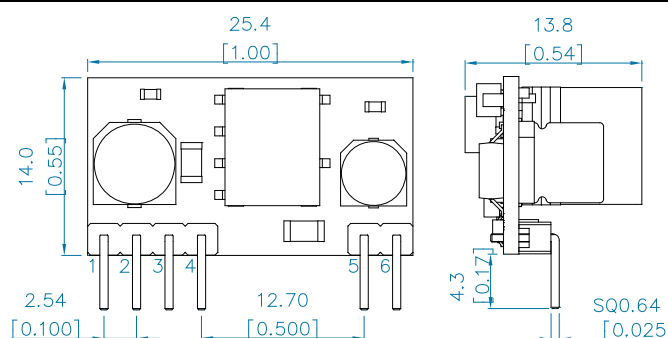
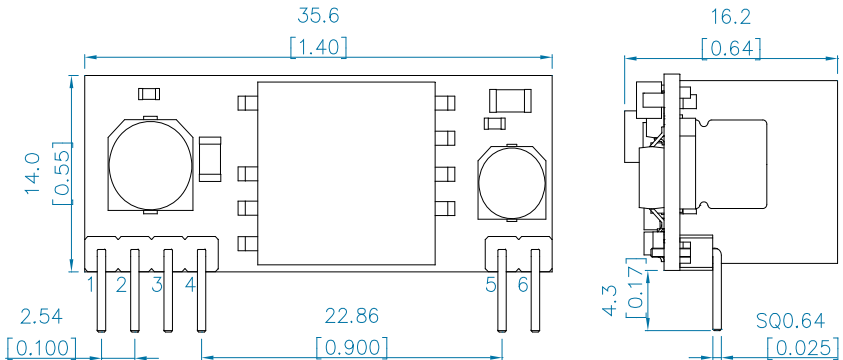
## Performance Specifications (at Ta=+25°C)

| Model        | Input V <sub>IN</sub> Range<br>(V) | Output                  |                         |            |          | Efficiency<br>(%) |
|--------------|------------------------------------|-------------------------|-------------------------|------------|----------|-------------------|
|              |                                    | I <sub>OUT</sub><br>(A) | V <sub>OUT</sub><br>(V) | Regulation |          |                   |
|              |                                    |                         |                         | Line (%)   | Load (%) |                   |
| MQ7800CPT050 | 40V-57Vdc                          | 1.4                     | 5V                      | 1          | 1        | 79                |
| MQ7800CPT120 |                                    | 0.58                    | 12V                     | 1          | 1        | 82                |
| MQ7800DPT050 |                                    | 2                       | 5V                      | 1          | 1        | 76                |
| MQ7800DPT120 |                                    | 1.1                     | 12V                     | 1          | 1        | 82                |

## Mechanical Specifications

Dimensions are in inches (millimeters)

Tolerances: x.x ±0.02in(0.5 mm), x.xx ±0.010in(0.25 mm), unless otherwise noted.

|                                                                                                         |     |             |
|---------------------------------------------------------------------------------------------------------|-----|-------------|
|  <p>“MQ7800CPT”</p>   | PIN | DESCRIPTION |
|                                                                                                         | 1   | VA1         |
|                                                                                                         | 2   | VA2         |
|                                                                                                         | 3   | VB1         |
|                                                                                                         | 4   | VB2         |
|                                                                                                         | 5   | GND         |
|  <p>“MQ7800DPT”</p> | 6   | VOUT        |
|                                                                                                         | 1   | VA1         |
|                                                                                                         | 2   | VA2         |
|                                                                                                         | 3   | VB1         |
|                                                                                                         | 4   | VB2         |
|                                                                                                         | 5   | GND         |
|                                                                                                         | 6   | VOUT        |

## Ordering Information

### MQ7800DPT120-BN

Union Microsystems  
Power Module P/N

Output power

CP: 7W

DP: 13W

product upgrade

PIN Reverse

Output Voltage Range:

120: 12 V

Through hole

For examples:

MQ7800CPT120: output voltage is preset to 12V/7W.

MQ7800DPT120 :output voltage is preset to 12V/13W.

## Absolute Maximum Ratings

Note: These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance Specifications Table is not implied.

| Parameter           | Symbol    | Min | Max | Unit |
|---------------------|-----------|-----|-----|------|
| Input Voltage       | $V_{IN}$  | -   |     | V    |
| Storage Temperature | $T_{STG}$ | -40 | 85  | °C   |

## MQ7800CPT050 Electrical Specifications: ( $T_A = +25^{\circ}\text{C}$ )

| Parameter                        | Condition                                          | Symbol                                 | Min     | Typ  | Max | Unit          |
|----------------------------------|----------------------------------------------------|----------------------------------------|---------|------|-----|---------------|
| Input Voltage Range              |                                                    | $V_{IN}$                               | 40      |      | 57  | V             |
| Output Current                   |                                                    | $I_O$                                  |         |      | 1.4 | A             |
| Output Voltage Set point         | 100% load                                          | $\Delta V_O$                           |         |      |     | %             |
| Temperature Regulation           | $T_A = T_{A,MIN}$ To $T_{A,MAX}$                   | -                                      |         |      |     | % $V_{O,SET}$ |
| Line Regulation                  | See each output's corresponding character figure   |                                        |         |      |     |               |
| Load Regulation                  |                                                    |                                        |         |      |     |               |
| Output Ripple and Noise Voltage  | $I_O = 1.4\text{A}, 0\sim 20\text{MHz}$            |                                        |         |      |     |               |
| Transient Response               |                                                    |                                        |         |      |     |               |
| Over current Protection          | 48Vin                                              | $I_O$                                  | 1.7     |      | 2.8 | A             |
| Under Voltage Lockout Trip Level | Rising $V_{IN}$ , with 10% full load               | $V_{IN}$                               | 35      | 37.6 | 40  | V             |
| Under Voltage Lockout Trip Level | Falling $V_{IN}$ , with 10% full load              | $V_{IN}$                               | 29      | 31.6 | 35  | V             |
| Start-up Time                    | 1.4A resistive load, no external output capacitors |                                        | 0       | 8    | 10  | mS            |
| Switching Frequency              |                                                    | $F_O$                                  |         | 120  |     | kHz           |
| Operating Temperature            | Natural convection                                 |                                        | -40     |      | 85  | °C            |
| Vibration                        | 3 Axes, 5 Min Each                                 | 10~55Hz, 0.35mm, 5g                    |         |      |     |               |
|                                  | 3 Axes, 6 Times Each                               | Peak Deviation 300g, Settling Time 6mS |         |      |     |               |
| MTBF                             |                                                    |                                        | 500,000 |      |     | Hour          |

## MQ7800CPT120 Electrical Specifications: ( $T_A = +25^{\circ}\text{C}$ )

| Parameter                        | Condition                                           | Symbol                                 | Min     | Typ  | Max  | Unit          |
|----------------------------------|-----------------------------------------------------|----------------------------------------|---------|------|------|---------------|
| Input Voltage Range              |                                                     | $V_{IN}$                               | 40      |      | 57   | V             |
| Output Current                   |                                                     | $I_O$                                  | 0       |      | 0.58 | A             |
| Output Voltage Set point         | 100% load                                           | $\Delta V_O$                           | -2      |      | +2   | %             |
| Temperature Regulation           | $T_A = T_{A,MIN}$ To $T_{A,MAX}$                    | -                                      |         | 0.4  |      | % $V_{O,SET}$ |
| Line Regulation                  | See each output's corresponding character figure    |                                        |         |      |      |               |
| Load Regulation                  |                                                     |                                        |         |      |      |               |
| Output Ripple and Noise Voltage  | $I_O = 1.1\text{A}, 0\sim 20\text{MHz}$             |                                        |         |      |      |               |
| Transient Response               |                                                     |                                        |         |      |      |               |
| Over current Protection          | 48Vin                                               | $I_O$                                  |         | 0.79 |      | A             |
| Under Voltage Lockout Trip Level | Rising $V_{IN}$ , with 10% full load                | $V_{IN}$                               |         | 37   |      | V             |
| Under Voltage Lockout Trip Level | Falling $V_{IN}$ , with 10% full load               | $V_{IN}$                               |         | 32   |      | V             |
| Start-up Time                    | 0.58A resistive load, no external output capacitors |                                        |         | 100  |      | mS            |
| Switching Frequency              |                                                     | $F_O$                                  |         | 120  |      | kHz           |
| Operating Temperature            | Natural convection                                  |                                        | -40     |      | 85   | °C            |
| Vibration                        | 3 Axes, 5 Min Each                                  | 10~55Hz, 0.35mm, 5g                    |         |      |      |               |
|                                  | 3 Axes, 6 Times Each                                | Peak Deviation 300g, Settling Time 6mS |         |      |      |               |
| MTBF                             |                                                     |                                        | 500,000 |      |      | Hour          |

**MQ7800DPT050 Electrical Specifications:** (TA= +25°C)

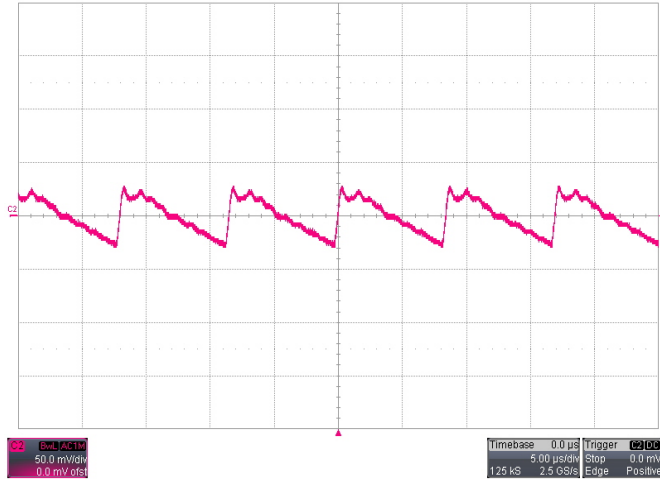
| Parameter                        | Condition                                                 | Symbol                                 | Min | Typ  | Max | Unit                |
|----------------------------------|-----------------------------------------------------------|----------------------------------------|-----|------|-----|---------------------|
| Input Voltage Range              |                                                           | V <sub>IN</sub>                        | 40  |      | 57  | V                   |
| Output Current                   |                                                           | I <sub>O</sub>                         | 0   |      | 2   | A                   |
| Output Voltage Set point         | 100% load                                                 | ΔV <sub>O</sub>                        | -2  |      | +2  | %                   |
| Temperature Regulation           | T <sub>A</sub> = T <sub>A,MIN</sub> To T <sub>A,MAX</sub> | -                                      |     | 0.4  |     | %V <sub>O,SET</sub> |
| Line Regulation                  | See each output's corresponding character figure          |                                        |     |      |     |                     |
| Load Regulation                  |                                                           |                                        |     |      |     |                     |
| Output Ripple and Noise Voltage  | I <sub>O</sub> =1.1A,0~20MHz                              |                                        |     |      |     |                     |
| Transient Response               |                                                           |                                        |     |      |     |                     |
| Over current Protection          | 48V <sub>in</sub>                                         | I <sub>O</sub>                         | 2.6 | 3.0  | 3.2 | A                   |
| Under Voltage Lockout Trip Level | Rising V <sub>IN</sub> , with 10% full load               | V <sub>IN</sub>                        |     | 37.8 |     | V                   |
| Under Voltage Lockout Trip Level | Falling V <sub>IN</sub> , with 10% full load              | V <sub>IN</sub>                        |     | 31.8 |     | V                   |
| Start-up Time                    | 2A resistive load, no external output capacitors          |                                        |     | 110  |     | mS                  |
| Switching Frequency              |                                                           | F <sub>O</sub>                         |     | 120  |     | kHz                 |
| Operating Temperature            | Natural convection                                        |                                        | -40 |      | 85  | °C                  |
| Vibration                        | 3 Axes, 5 Min Each                                        | 10~55Hz, 0.35mm, 5g                    |     |      |     |                     |
|                                  | 3 Axes, 6 Times Each                                      | Peak Deviation 300g, Settling Time 6mS |     |      |     |                     |
| MTBF                             |                                                           | 500,000                                |     |      |     | Hour                |

**MQ7800DPT120 Electrical Specifications:** (TA= +25°C)

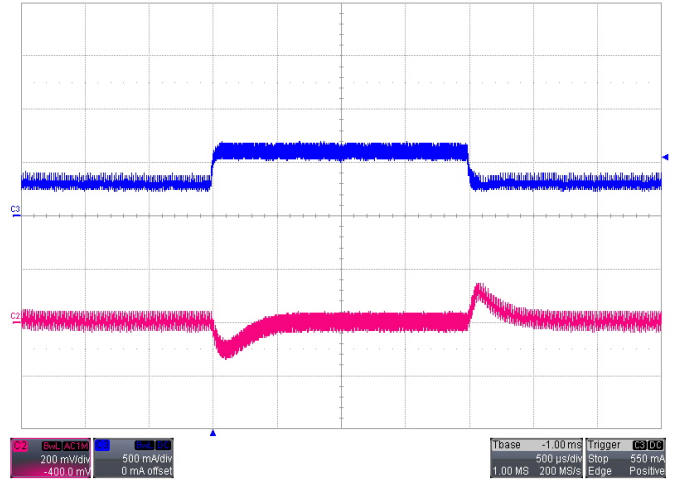
| Parameter                        | Condition                                                 | Symbol                                 | Min | Typ | Max | Unit                |
|----------------------------------|-----------------------------------------------------------|----------------------------------------|-----|-----|-----|---------------------|
| Input Voltage Range              |                                                           | V <sub>IN</sub>                        | 40  |     | 57  | V                   |
| Output Current                   |                                                           | I <sub>O</sub>                         | 0   |     | 1.1 | A                   |
| Output Voltage Set point         | 100% load                                                 | ΔV <sub>O</sub>                        | -2  |     | +2  | %                   |
| Temperature Regulation           | T <sub>A</sub> = T <sub>A,MIN</sub> To T <sub>A,MAX</sub> | -                                      |     | 0.4 |     | %V <sub>O,SET</sub> |
| Line Regulation                  | See each output's corresponding character figure          |                                        |     |     |     |                     |
| Load Regulation                  |                                                           |                                        |     |     |     |                     |
| Output Ripple and Noise Voltage  | I <sub>O</sub> =1.1A,0~20MHz                              |                                        |     |     |     |                     |
| Transient Response               |                                                           |                                        |     |     |     |                     |
| Over current Protection          | 48V <sub>in</sub>                                         |                                        |     | 1.5 |     | A                   |
| Under Voltage Lockout Trip Level | Rising V <sub>IN</sub> , with 10% full load               |                                        |     | 38  |     | V                   |
| Under Voltage Lockout Trip Level | Falling V <sub>IN</sub> , with 10% full load              |                                        |     | 33  |     | V                   |
| Start-up Time                    | 1.1A resistive load, no external output capacitors        |                                        |     | 100 |     | mS                  |
| Switching Frequency              |                                                           | F <sub>O</sub>                         |     | 120 |     | kHz                 |
| Operating Temperature            | Natural convection                                        |                                        | -40 |     | 85  | °C                  |
| Vibration                        | 3 Axes, 5 Min Each                                        | 10~55Hz, 0.35mm, 5g                    |     |     |     |                     |
|                                  | 3 Axes, 6 Times Each                                      | Peak Deviation 300g, Settling Time 6mS |     |     |     |                     |
| MTBF                             |                                                           | 500,000                                |     |     |     | Hour                |

## Typical Characteristics: MQ7800CPT120

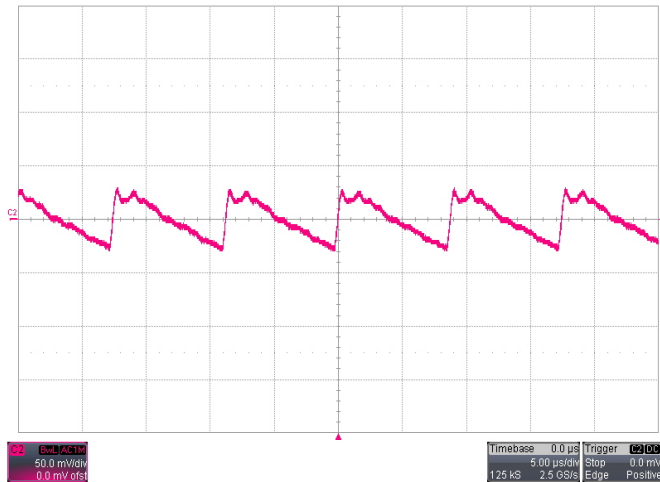
General conditions: NA



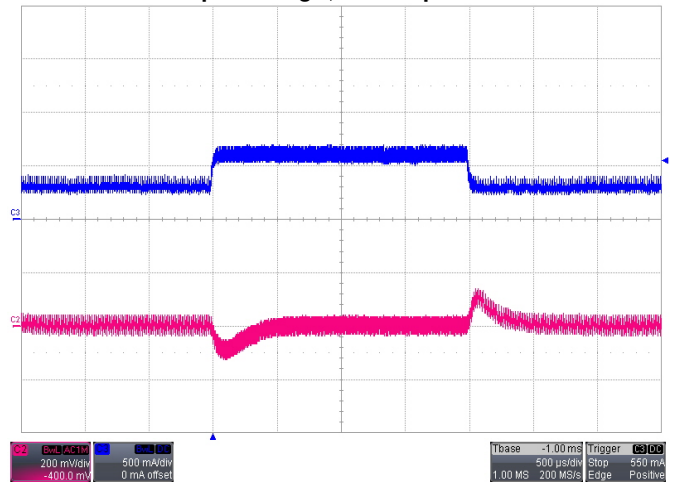
Noise  $V_{IN}=40V$ ,  $I_o=0.58A$ , 5-20MHz Bandwidth



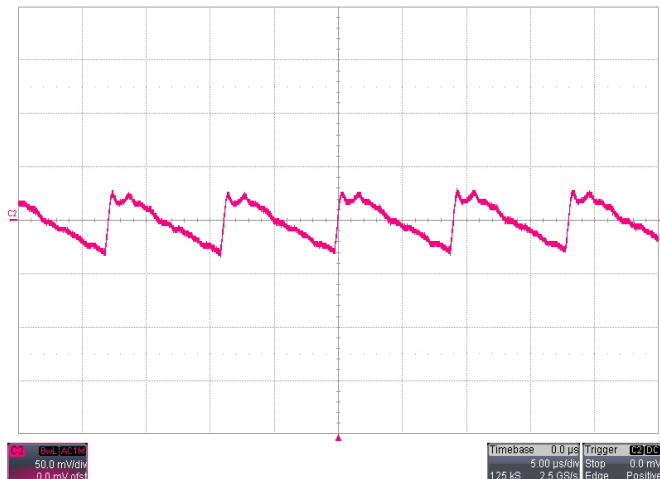
Transient Response,  $V_{in}=40V$   $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)



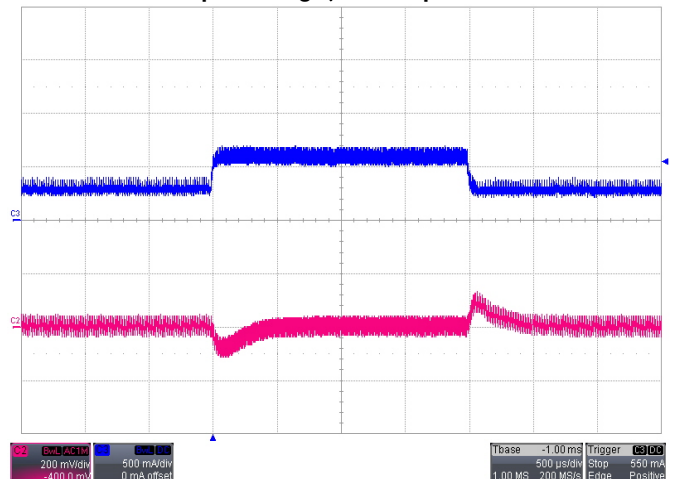
Noise  $V_{IN}=48V$ ,  $I_o=0.58A$ , 5-20MHz Bandwidth



Transient Response,  $V_{in}=48V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)

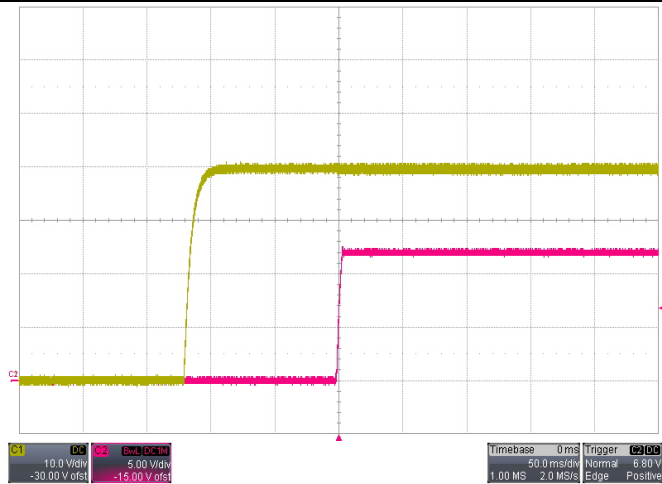


Noise  $V_{IN}=57V$ ,  $I_o=0.58A$ , 5-20MHz Bandwidth

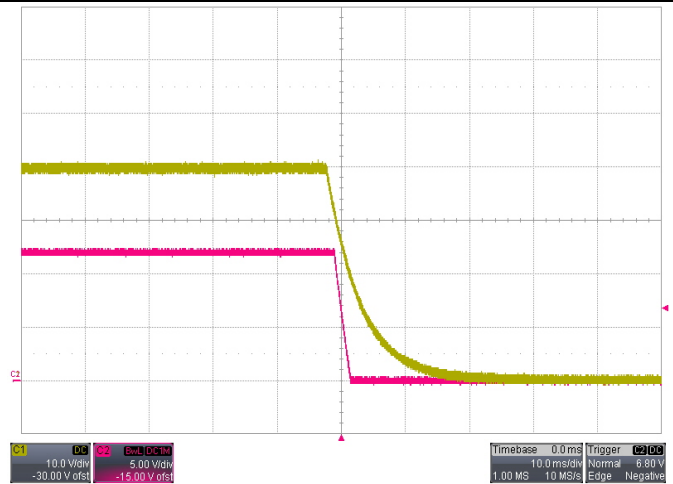


Transient Response  $V_{IN}=57V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)

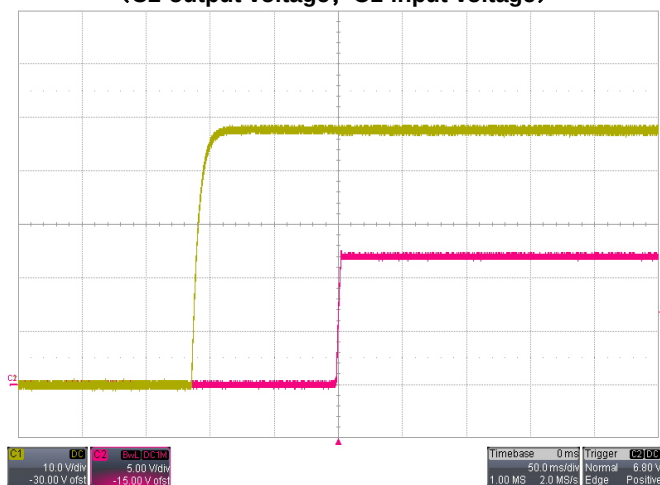
## POE input power module, MQ7800CP/DP



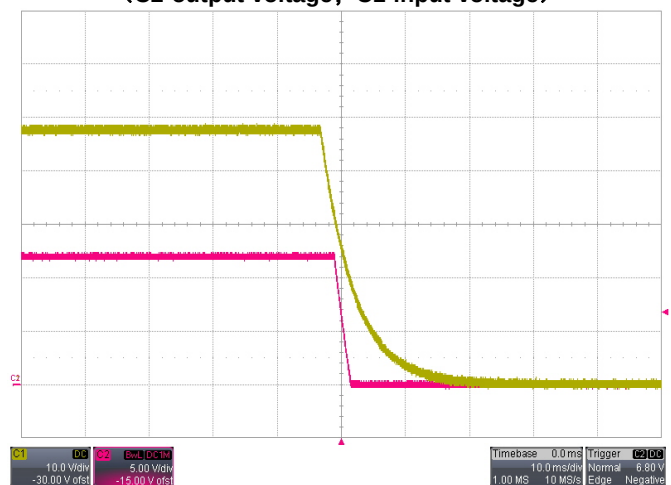
Power Up Vin=40V  
(C2-output voltage; C1-input voltage)



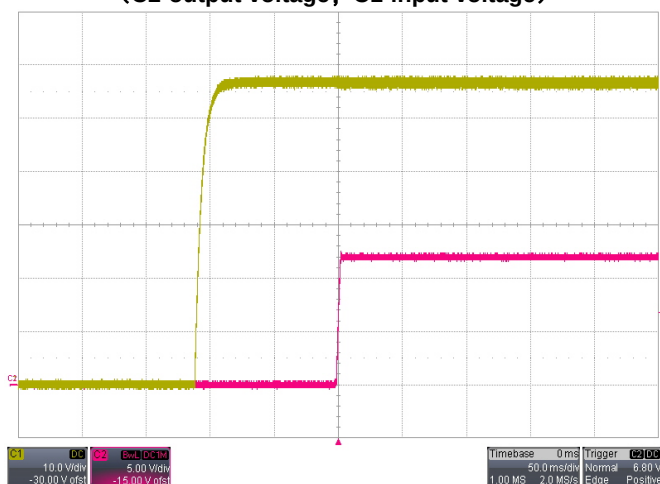
Power Down Vin=40V  
(C2-output voltage; C1-input voltage)



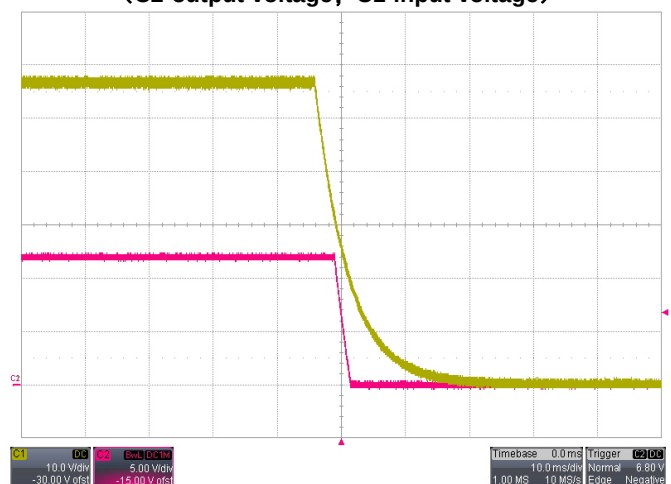
Power Up Vin=48V  
(C2-output voltage; C1-input voltage)



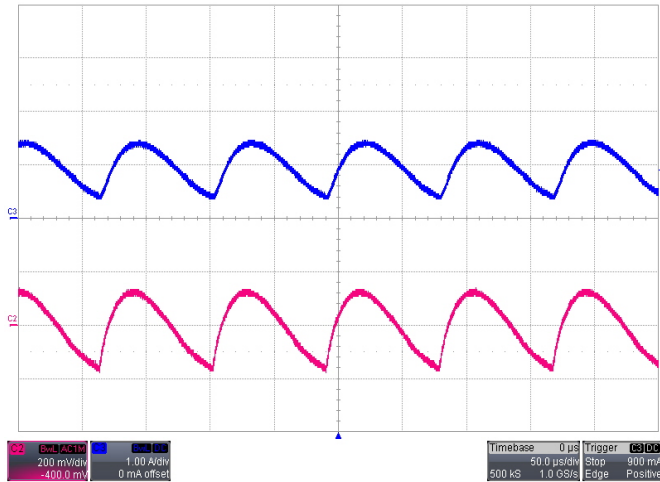
Power Down Vin=48V  
(C2-output voltage; C1-input voltage)



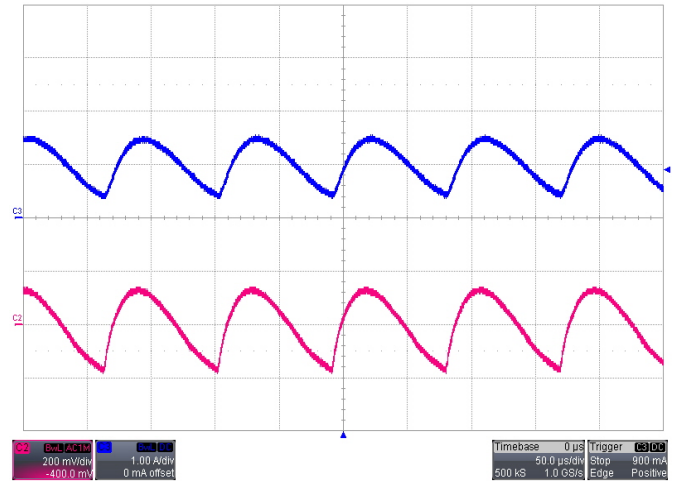
Power Up Vin=57V  
(C2-output voltage; C1-input voltage)



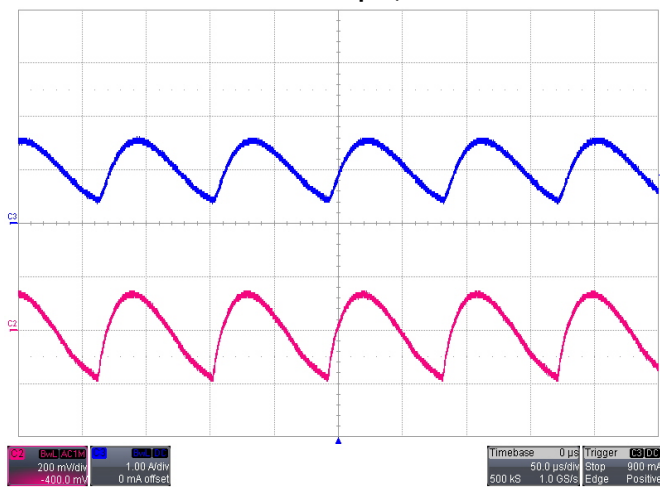
Power Down, Vin=57V  
(C2-output voltage; C1-input voltage)



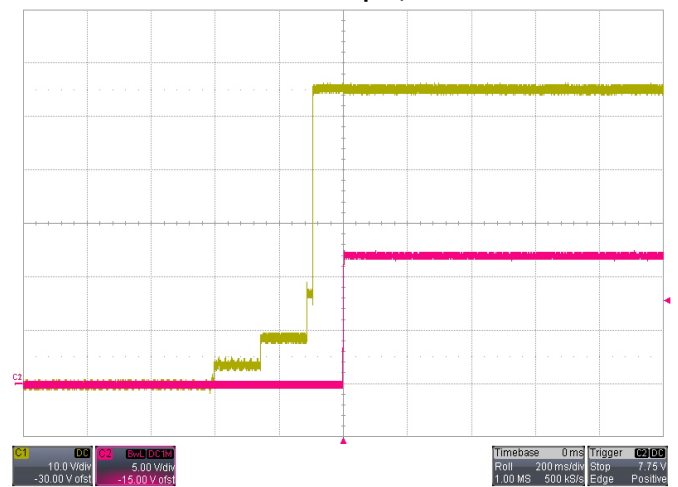
Short-Circuit Output, Vin=40V



Short-Circuit Output, Vin=48V



Short-Circuit Output Vin=57V



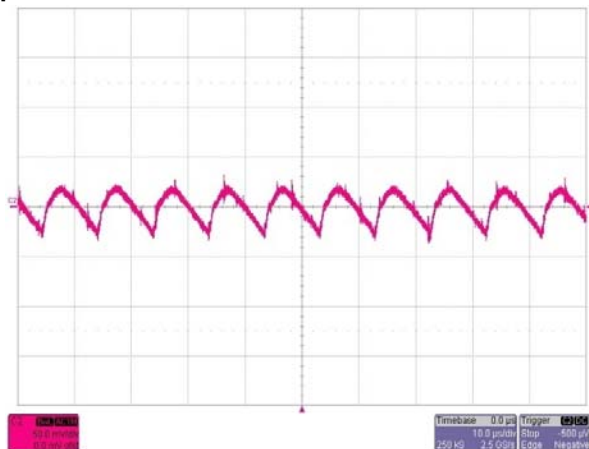
Startup from PSE (100% Load, PSE)  
C1-V<sub>IN</sub>;C2-V<sub>OUT</sub>

## Typical Characteristics: MQ7800DPT050

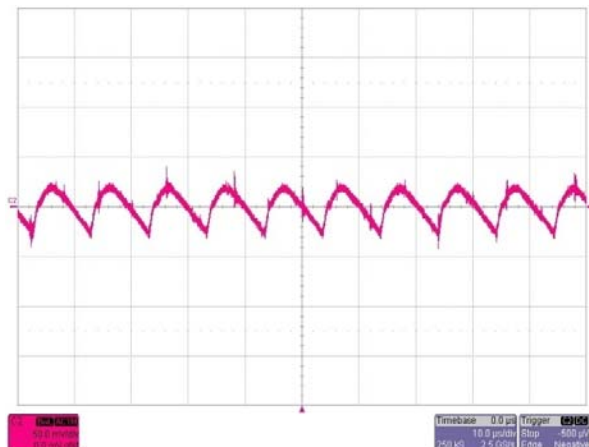
General conditions:

Input filter: N/A

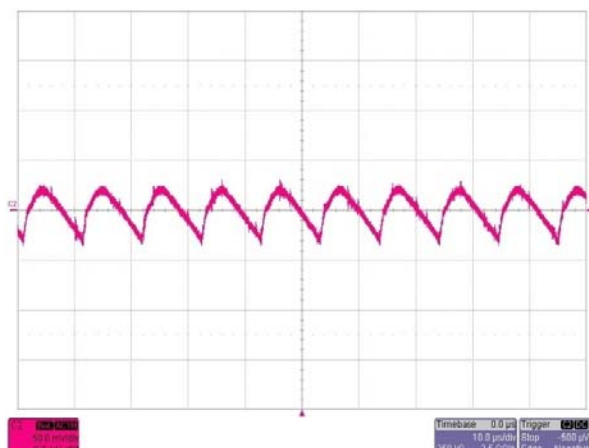
Output filter: 100uF/10V Solid CAP



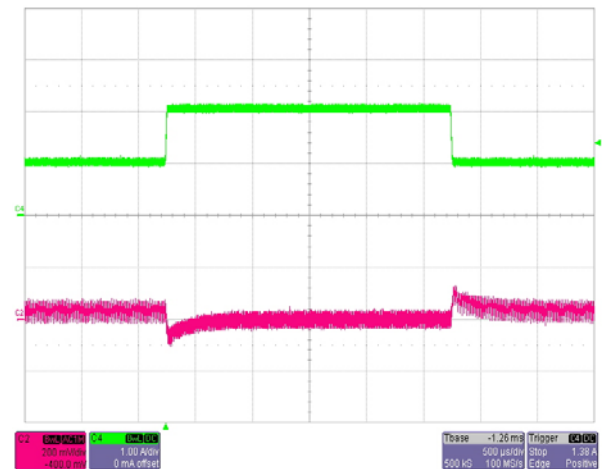
Noise  $V_{IN}=40V$ ,  $I_o=2A$ , 5~20MHz Bandwidth



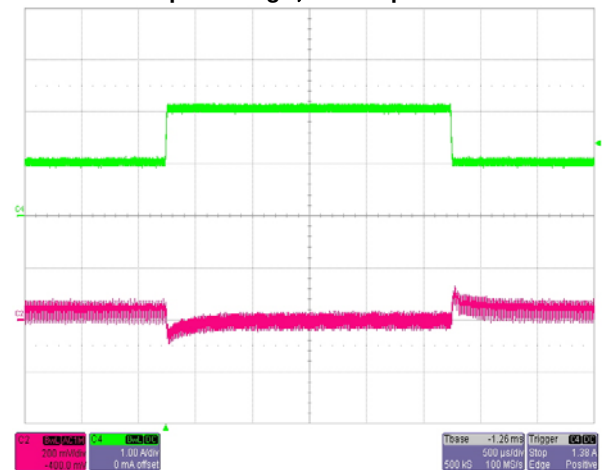
Noise  $V_{IN}=48V$ ,  $I_o=2A$ , 5~20MHz Bandwidth



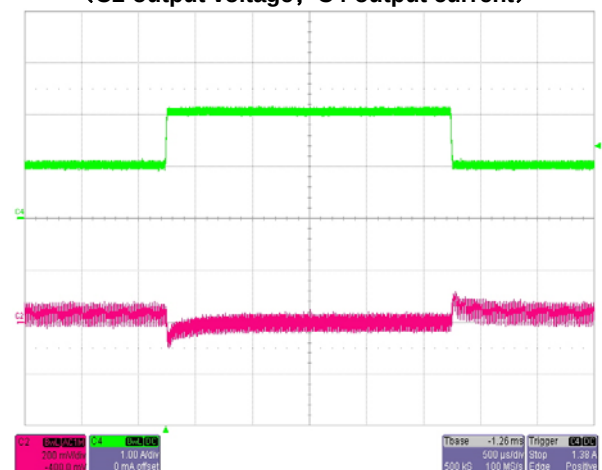
Noise  $V_{IN}=57V$ ,  $I_o=2A$ , 5~20MHz Bandwidth



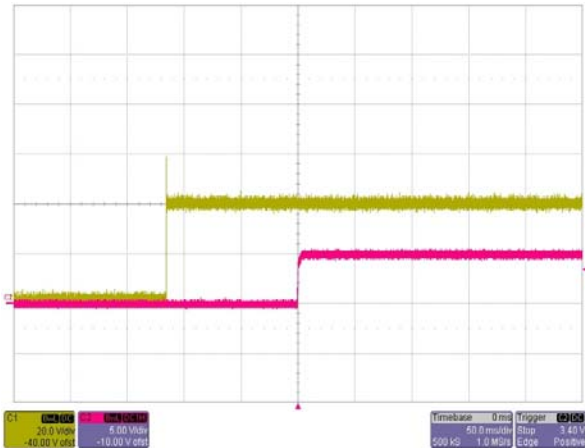
Transient Response,  $V_{IN}=40V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C4-output current)



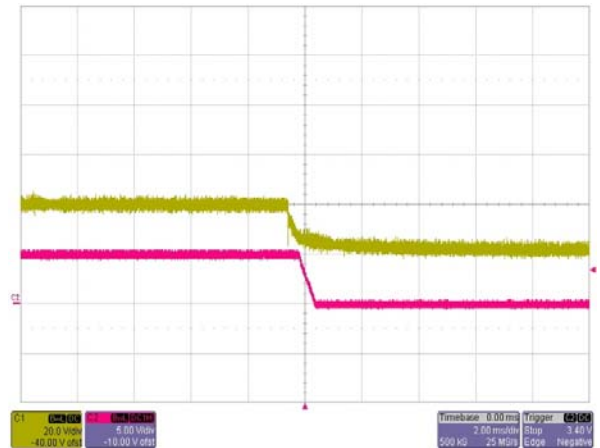
Transient Response,  $V_{IN}=48V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C4-output current)



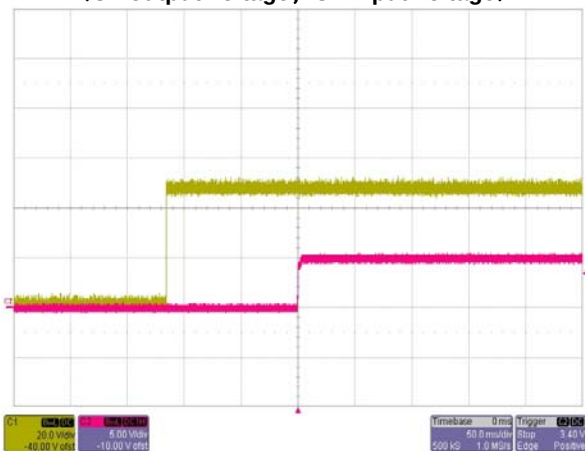
Transient Response  $V_{IN}=57V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C4-output current)



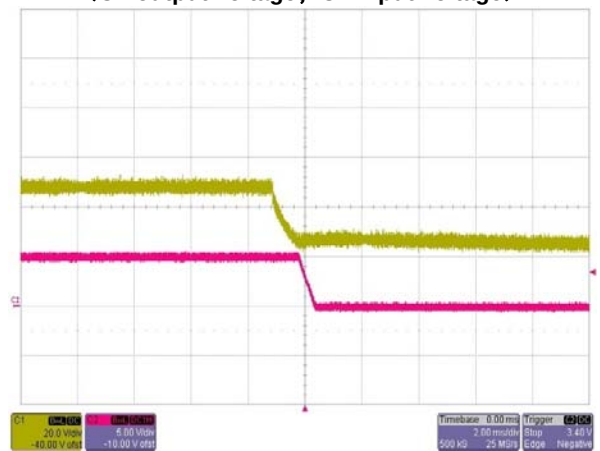
Power Up Vin=40V  
(C2-output voltage; C1-input voltage)



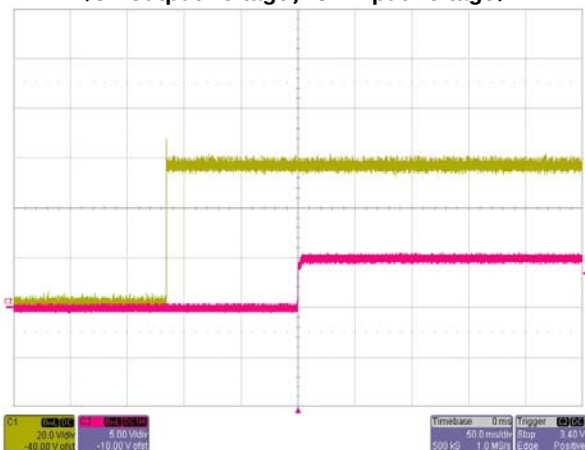
Power Down Vin=40V  
(C2-output voltage; C1-input voltage)



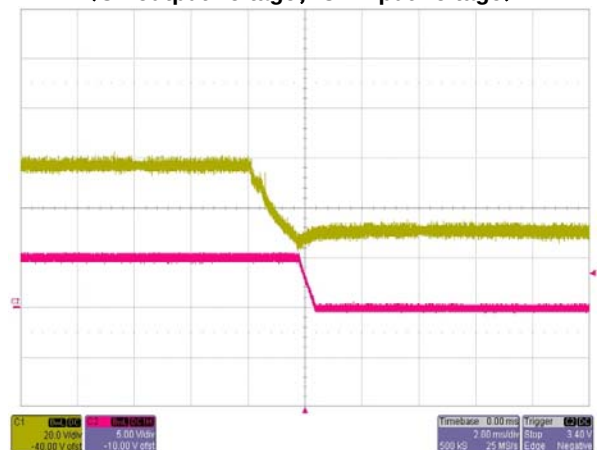
Power Up Vin=48V  
(C2-output voltage; C1-input voltage)



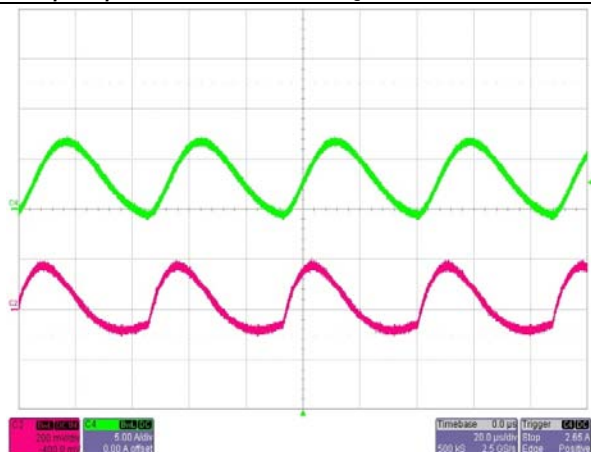
Power Down Vin=48V  
(C2-output voltage; C1-input voltage)



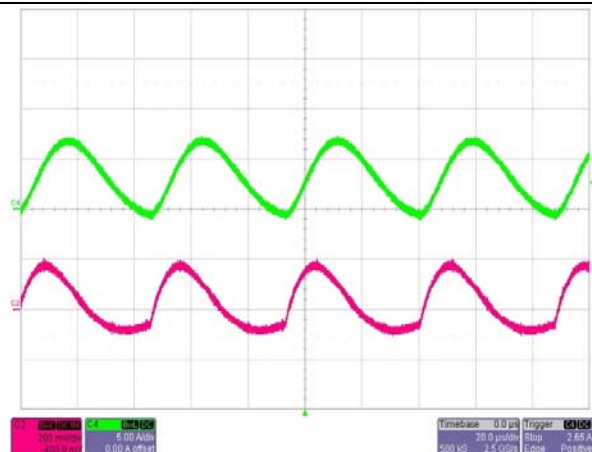
Power Up Vin=57V  
(C2-output voltage; C1-input voltage)



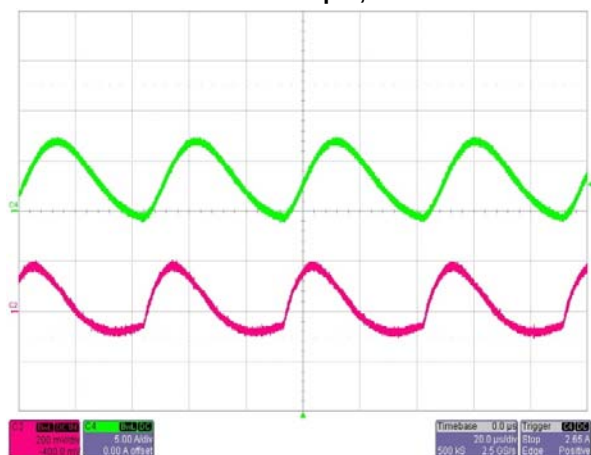
Power Down, Vin=57V  
(C2-output voltage; C1-input voltage)



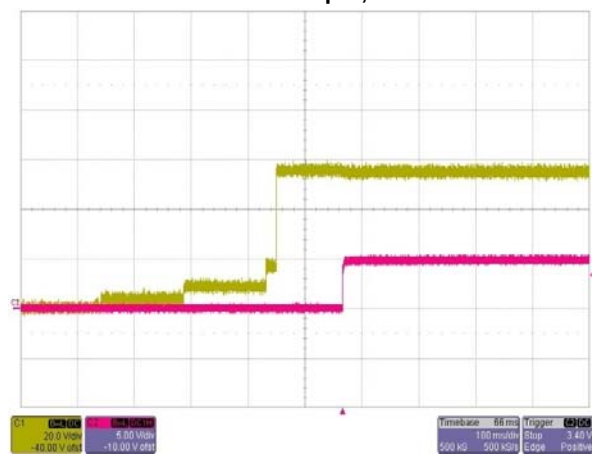
Short-Circuit Output, Vin=40V



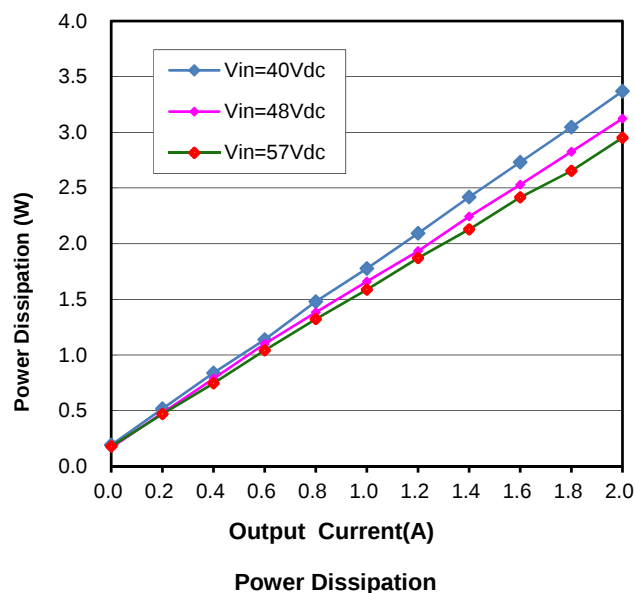
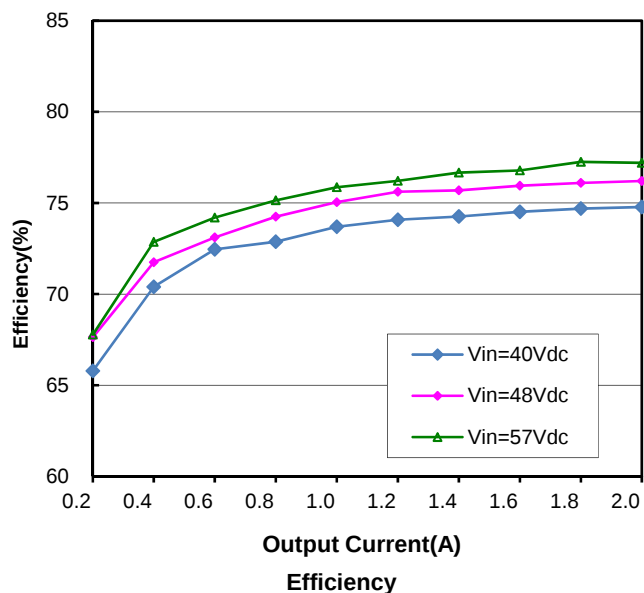
Short-Circuit Output, Vin=48V

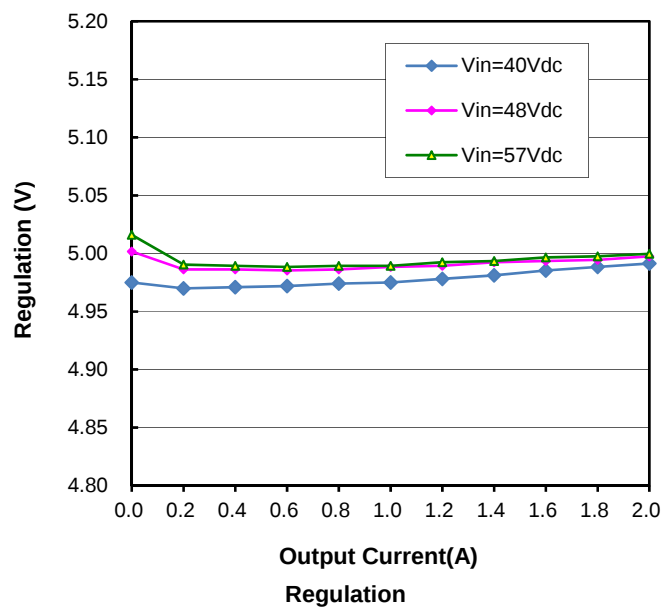


Short-Circuit Output Vin=57V



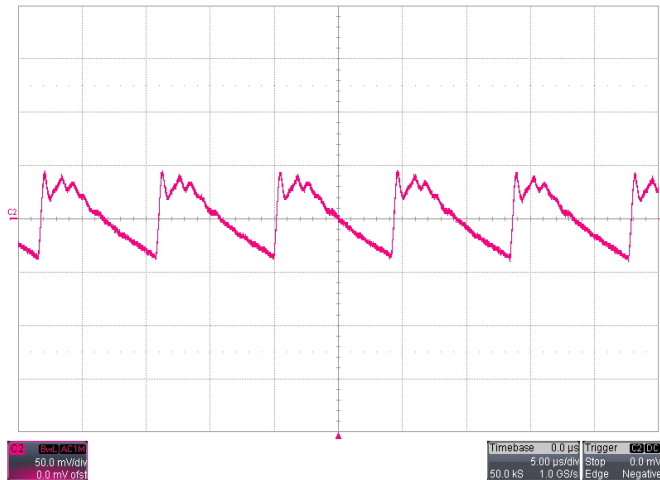
Startup from PSE (100% Load, PSE)  
C1-V<sub>IN</sub>;C2-V<sub>OUT</sub>



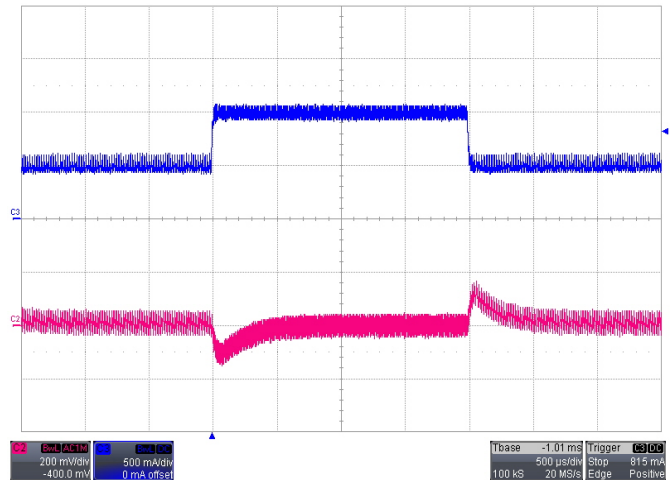


# Typical Characteristics: MQ7800DPT120

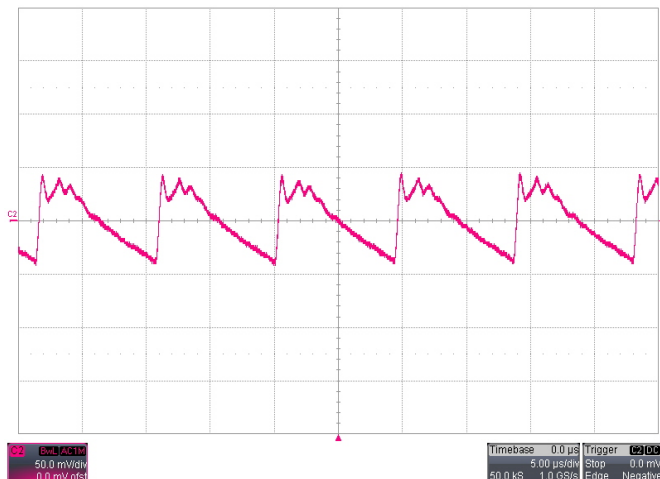
General conditions: NA



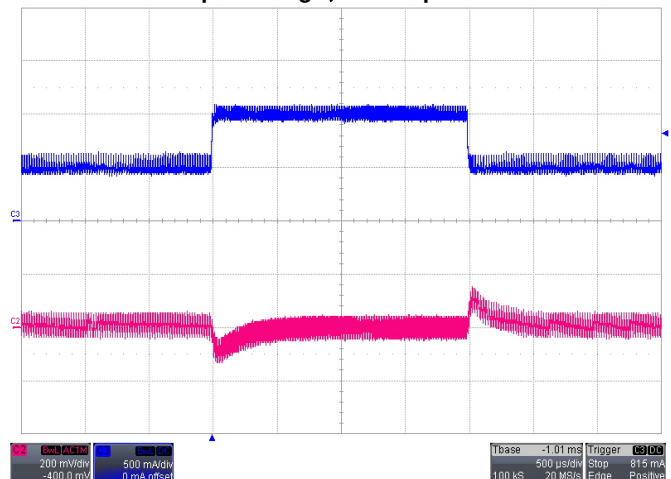
Noise  $V_{IN}=40V$ ,  $I_o=1.1A$ , 5~20MHz Bandwidth



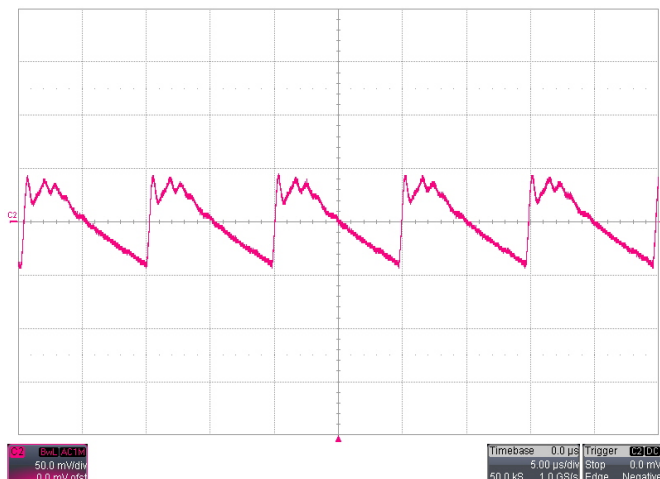
Transient Response,  $V_{in}=40V$   $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)



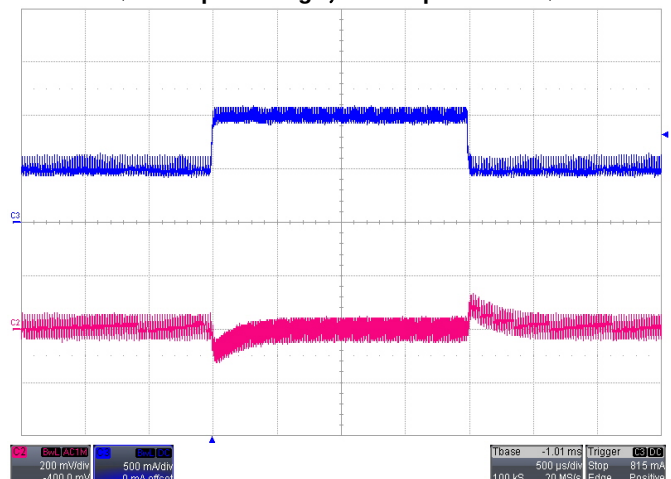
Noise  $V_{IN}=48V$ ,  $I_o=1.1A$ , 5~20MHz Bandwidth



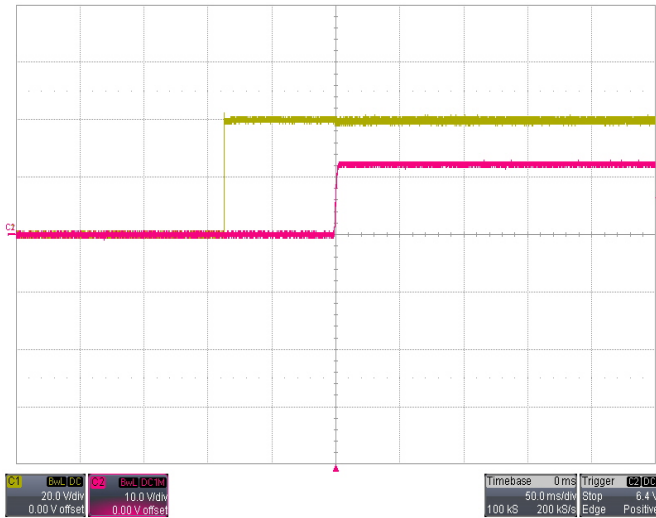
Transient Response,  $V_{in}=48V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)



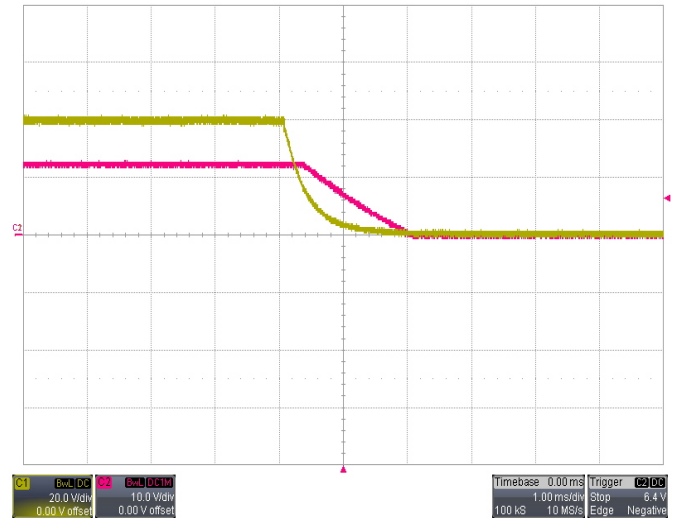
Noise  $V_{IN}=57V$ ,  $I_o=1.1A$ , 5~20MHz Bandwidth



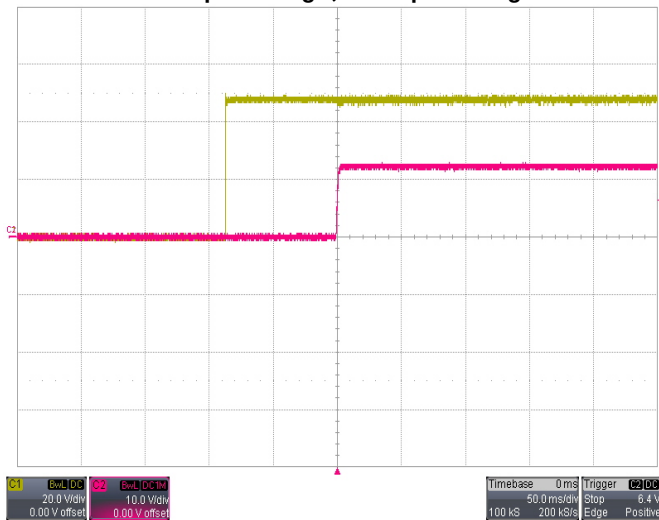
Transient Response  $V_{IN}=57V$ ,  $I_o=50\% \sim 100\% \sim 50\%$   
(C2-output voltage; C3-output current)



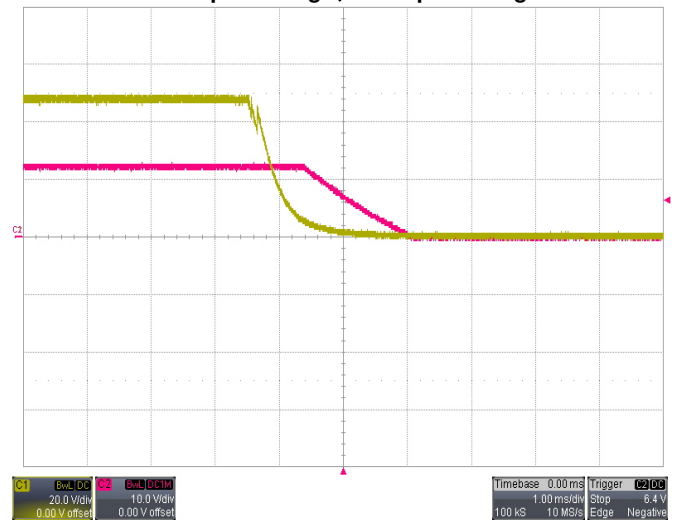
Power Up Vin=40V  
(C2-output voltage; C1-input voltage)



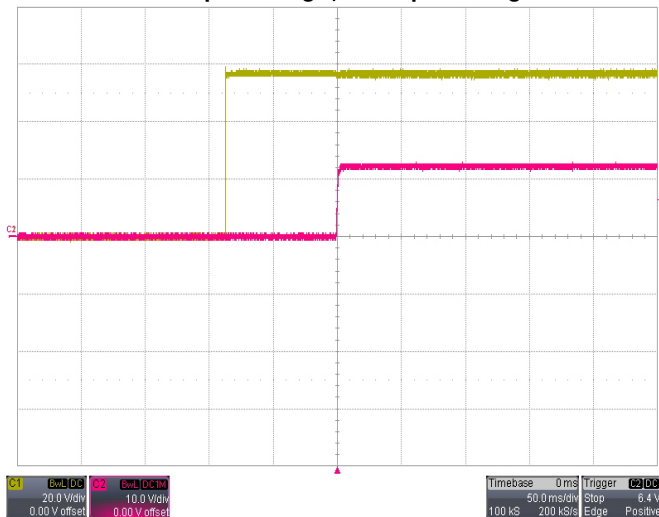
Power Down Vin=40V  
(C2-output voltage; C1-input voltage)



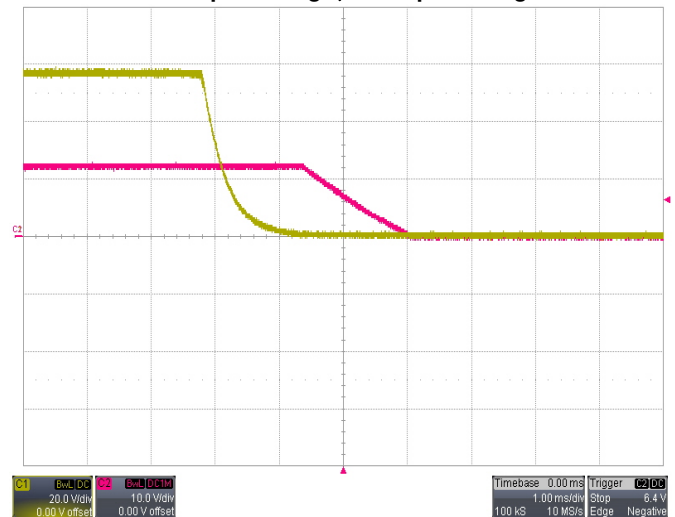
Power Up Vin=48V  
(C2-output voltage; C1-input voltage)



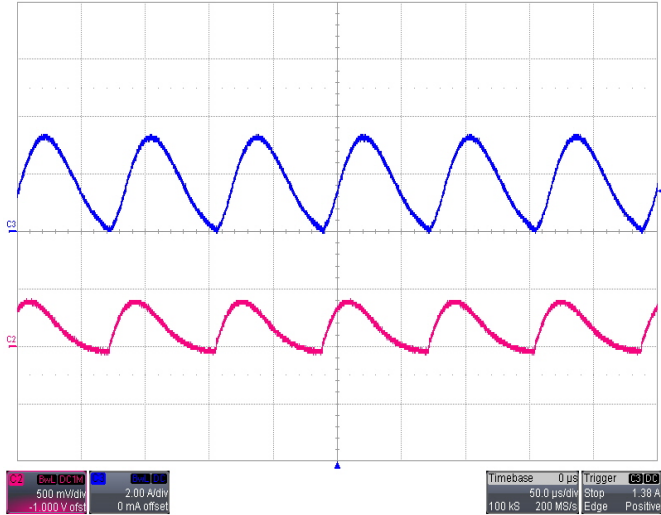
Power Down Vin=48V  
(C2-output voltage; C1-input voltage)



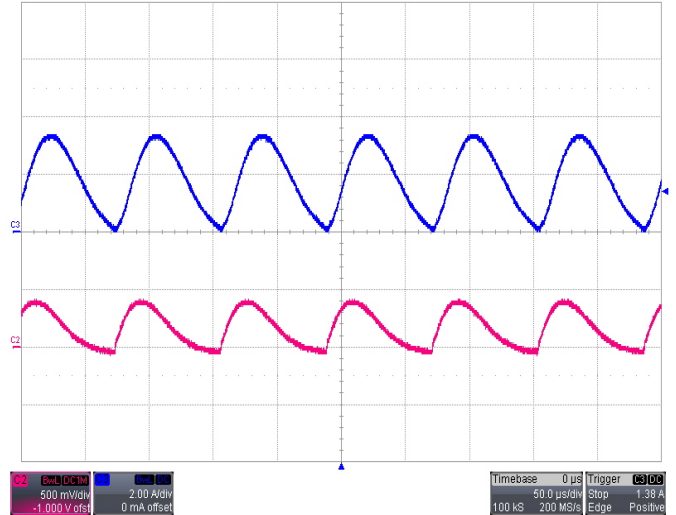
Power Up Vin=57V  
(C2-output voltage; C1-input voltage)



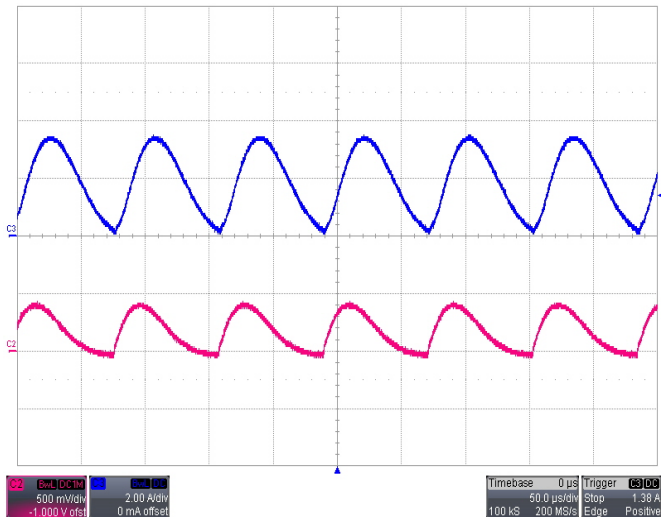
Power Down, Vin=57V  
(C2-output voltage; C1-input voltage)



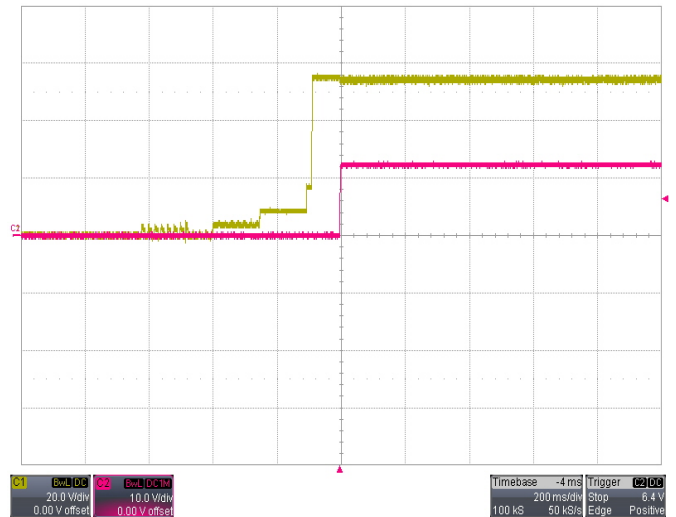
Short-Circuit Output, Vin=40V



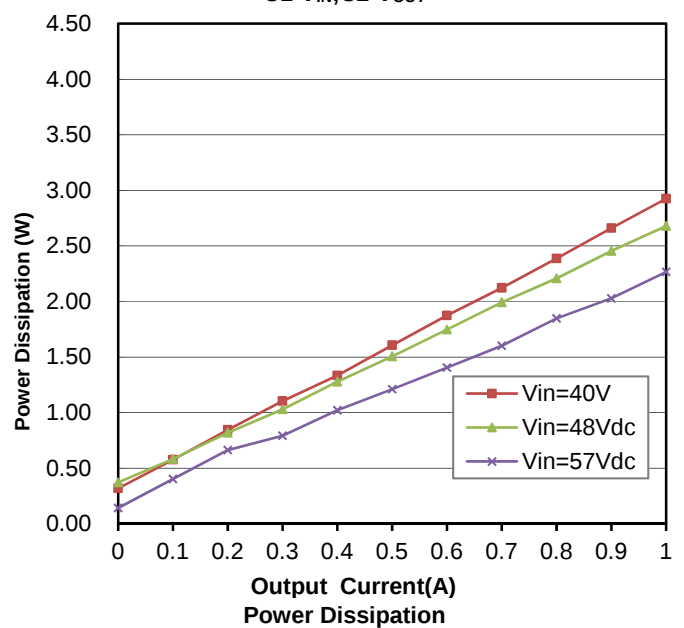
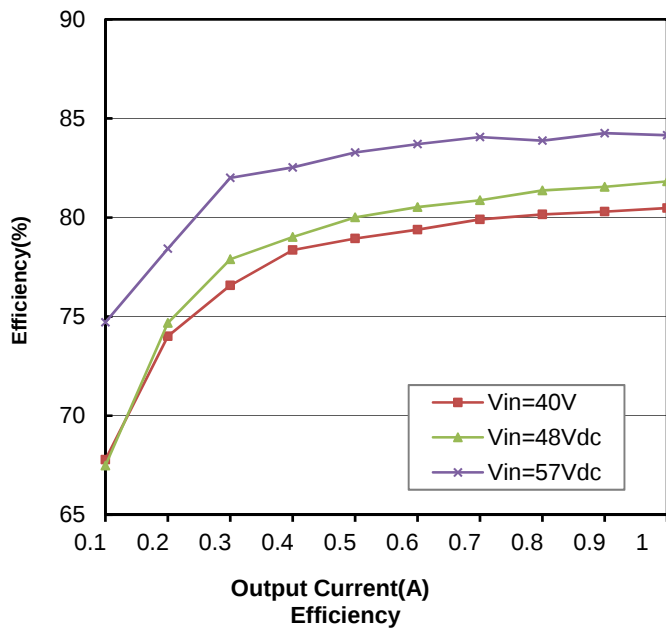
Short-Circuit Output, Vin=48V

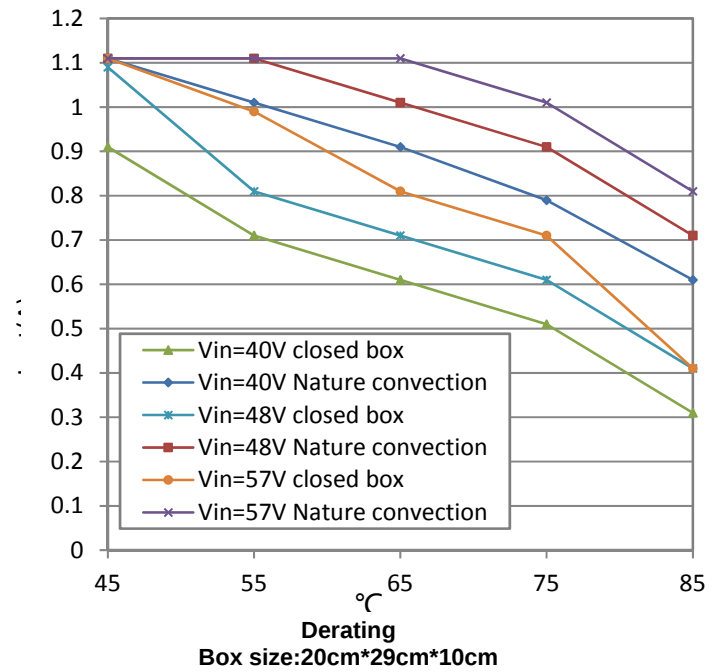
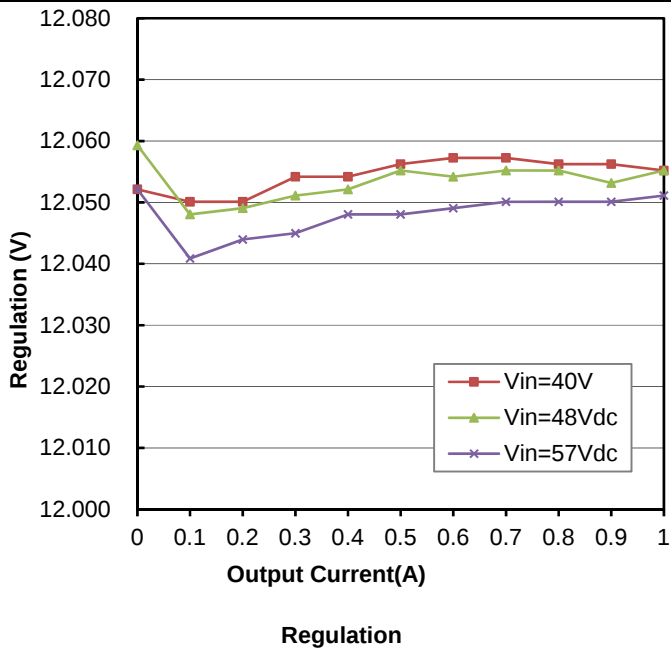


Short-Circuit Output Vin=57V



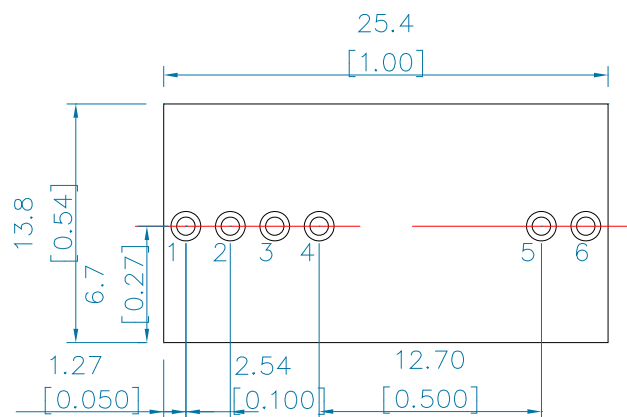
Startup from PSE (100% Load, PSE)  
C1-V<sub>IN</sub>;C2-V<sub>OUT</sub>



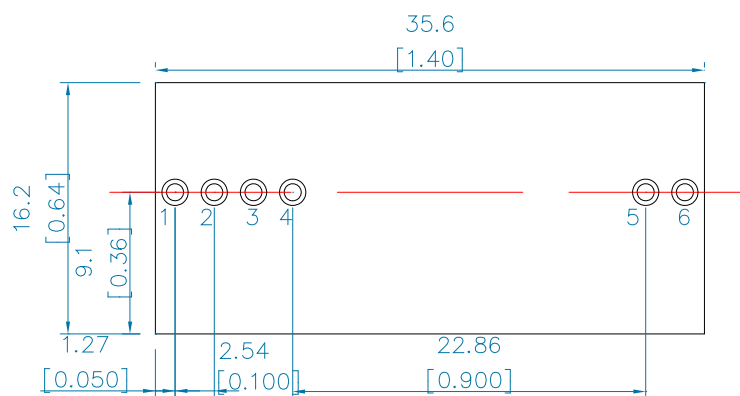


## Recommended Hole Pattern

Dimensions are in inches (millimeters)



“MQ7800CPT120”



“MQ7800DPT120”

Component-side footprint