



APPLICATIONS

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

FEATURES

- Wide operating voltage: 36V ~ 57V
- Output Current
 - ☐ 12V, 1.1A
- Output voltage ripple: 150mV_{pp}, (12V@1.1A)
- High Efficiency (input 48V, Load 12V@1.1A)
 - ☐ 85%, MQ78X00-120
 - ☐ 82%, MQ78X00-120LP
- Overcurrent /shortcircuit protection
- High reliability: designed to meet 500K hour MTBF
- Standard 38mm*38mm size with total height:
 - ☐ Standard version(MQ78X00): 15.5 mm(max);
 - ☐ Low profile version(MQ78X00LP): 10.5mm(max)
- No derating to +75°C(MQ78X00-120), inside closed box
- UL/IEC/EN60950 compliant
- RoHS Compliant available

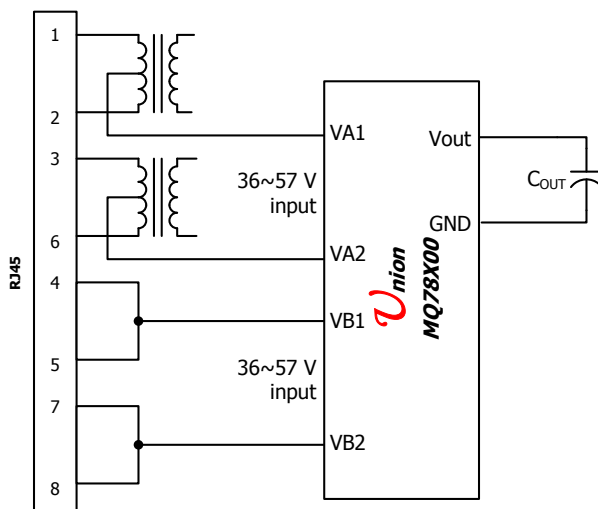
Description

The **POE MQ78X00** series of modules are designed to extract power from a conventional twisted pair Category 5 Ethernet cable, conforming to the IEEE 802.3af Power-over-Ethernet (PoE) standard. IEEE 802.3af allows for two power options for Category 5 cables and the MQ78X00 have two pairs of power inputs pins: - VA1&2 and VB1&2 to accommodate this.

The MQ78X00 signature and control circuit provides the PoE compatibility signature and power classification required by the Power Sourcing Equipment (PSE) before applying up to 15W power to the port. The MQ78X00 is preset to Class 0.

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** *****



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}	-0.3	80	V
Storage Temperature	T_{STG}	-40	125	°C

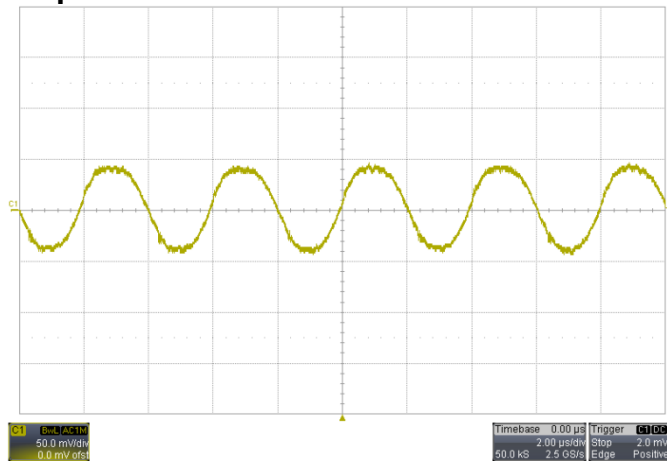
MQ78X00-120 Electrical Specifications: ($T_A=+25^{\circ}\text{C}$)

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Operating Input Voltage Range	100% Load	V_{IN}	36	48	57	V_{DC}
Input Turn-ON Threshold	100% Load, input rising	$V_{IN.ONTH}$		35.5		V_{DC}
Input Turn-OFF Threshold	10% Load, input falling	$V_{IN.OFFTH}$		31.5		V_{DC}
Maximum load	$V_{IN.MIN}$ to $V_{IN.MAX}$				1.1	A
Output Voltage Set point	100% load	ΔV_o	-2		+2	% $V_{O.SET}$
Output Ripple and Noise Voltage	$V_{IN}=48\text{V}$ $I_o=1\text{A}$, 5~20MHz			150		mVpp
Efficiency	$V_{IN}=48$, 100% Load	η	83	85		%
Switching Frequency		F_o		250		KHz
Over current trip threshold				1.3		A
Output Continuous Short-circuit Protection	$V_{IN}=V_{IN.MIN}$ To $V_{IN.MAX}$				YES	
Inrush Current	$V_{in}=55.5\text{V}$	I_{inrush}		350		mA
Operating Temperature	Natural convection		-40		85	°C
Output Power	$V_{IN}=V_{IN.MIN}$ To $V_{IN.MAX}$	P_o	0		13	W
MTBF			500,000			Hours

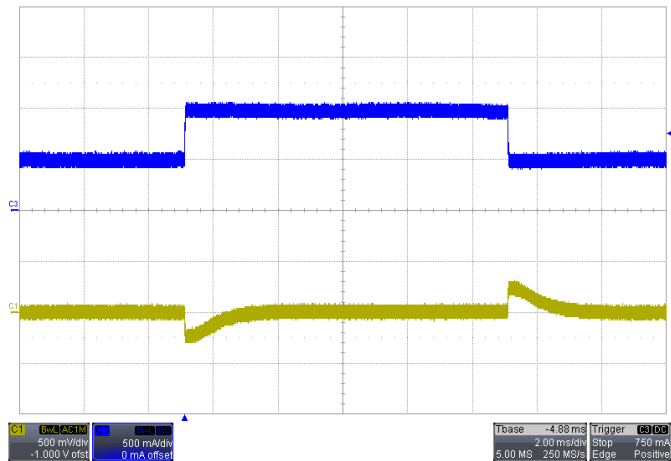
MQ78X00-120LP Electrical Specifications: ($T_A=+25^{\circ}\text{C}$)

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Operating Input Voltage Range	100% Load	V_{IN}	36	48	57	V_{DC}
Input Turn-ON Threshold	100% Load, input rising	$V_{IN.ONTH}$		35.5		V_{DC}
Input Turn-OFF Threshold	10% Load, input falling	$V_{IN.OFFTH}$		31.5		V_{DC}
Maximum load	$V_{IN.MIN}$ to $V_{IN.MAX}$				1.1	A
Output Voltage Set point	100% load	ΔV_o	-2		+2	% $V_{O.SET}$
Output Ripple and Noise Voltage	$V_{IN}=48\text{V}$ $I_o=1\text{A}$, 5~20MHz			150		mVpp
Efficiency	$V_{IN}=48$, 100% Load	η	80	82		%
Switching Frequency		F_o		250		KHz
Over current trip threshold				1.3		A
Output Continuous Short-circuit Protection	$V_{IN}=V_{IN.MIN}$ To $V_{IN.MAX}$				YES	
Inrush Current	$V_{in}=55.5\text{V}$	I_{inrush}		350		mA
Operating Temperature	Natural convection		-40		85	°C
Output Power	$V_{IN}=V_{IN.MIN}$ To $V_{IN.MAX}$	P_o	0		13	W
MTBF			500,000			Hours

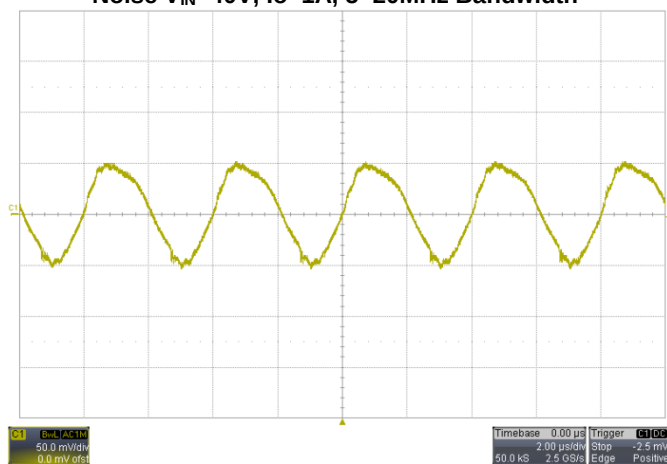
Typical Characteristics for MQ78X00-120 Output with 0.1uF+10uF CAP



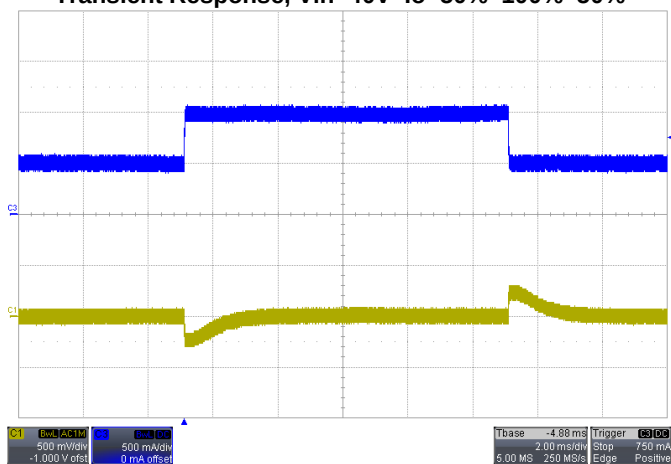
Noise $V_{IN}=40V$, $I_o=1A$, 5-20MHz Bandwidth



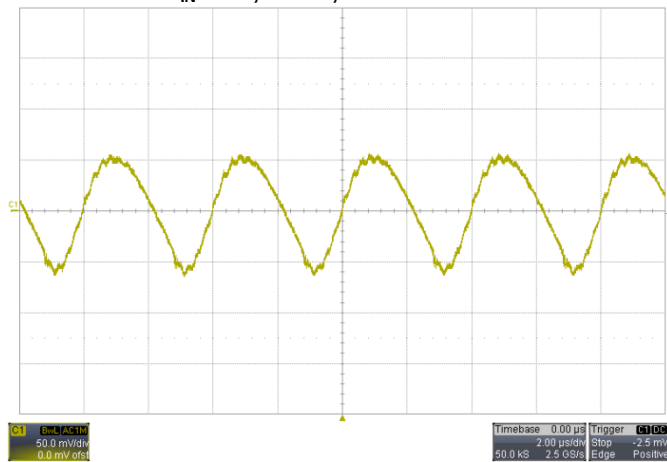
Transient Response, $V_{in}=40V$ $I_o=50\% \sim 100\% \sim 50\%$



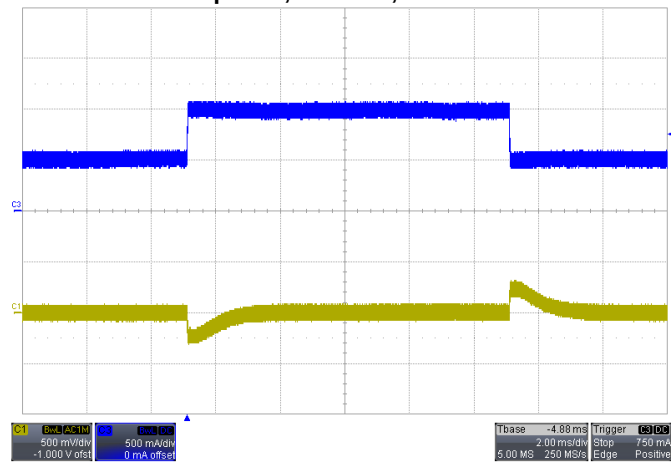
Noise $V_{IN}=48V$, $I_o=1A$, 5-20MHz Bandwidth



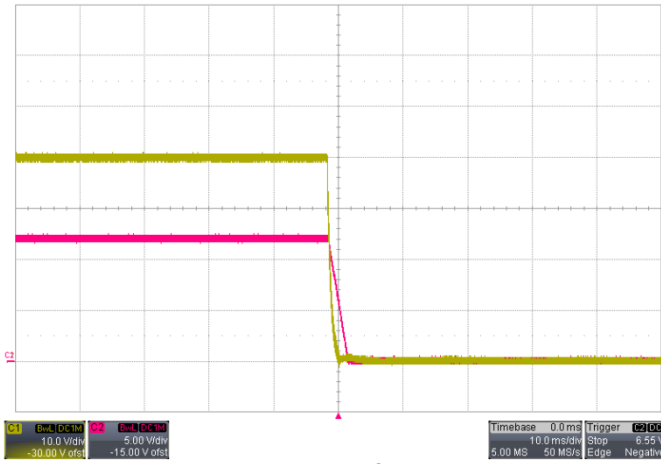
Transient Response, $V_{in}=48V$, $I_o=50\% \sim 100\% \sim 50\%$



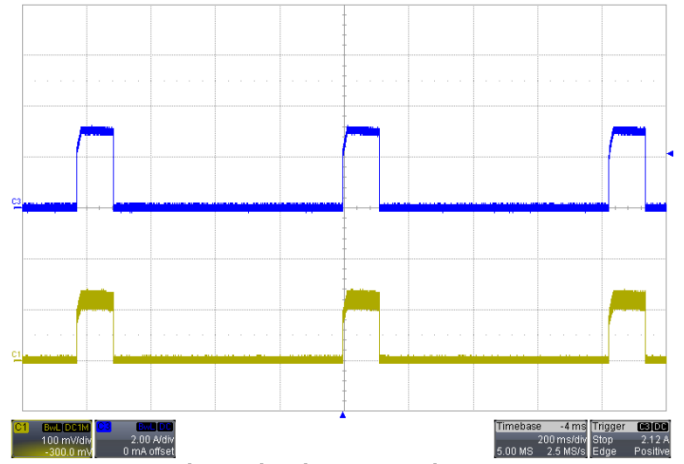
Noise $V_{IN}=57V$, $I_o=1A$, 5-20MHz Bandwidth



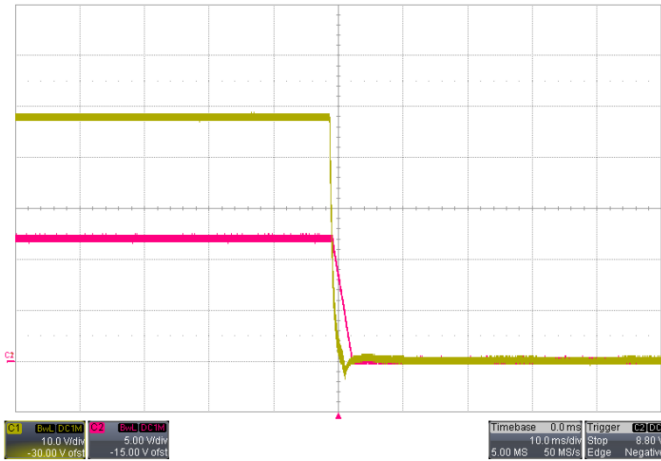
Transient Response $V_{IN}=57V$, $I_o=50\% \sim 100\% \sim 50\%$



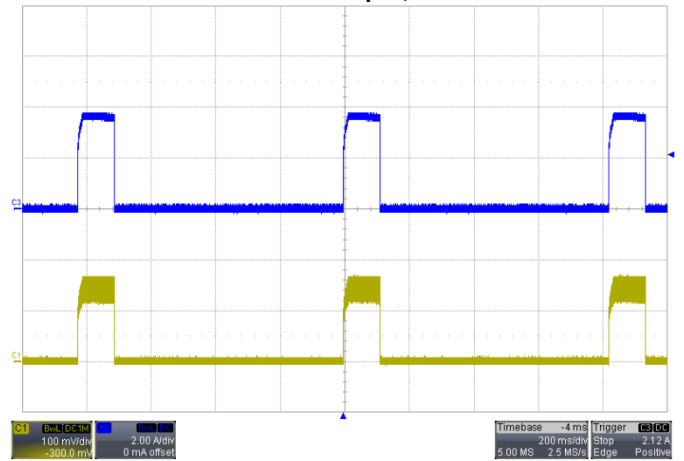
Power Down Vin=40V



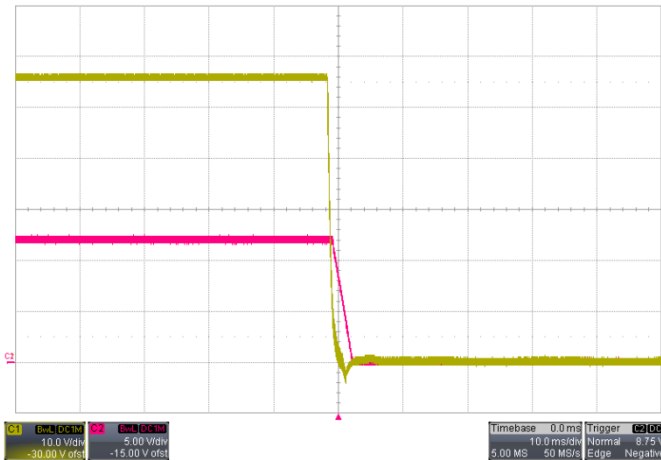
Short-Circuit Output, Vin=40V



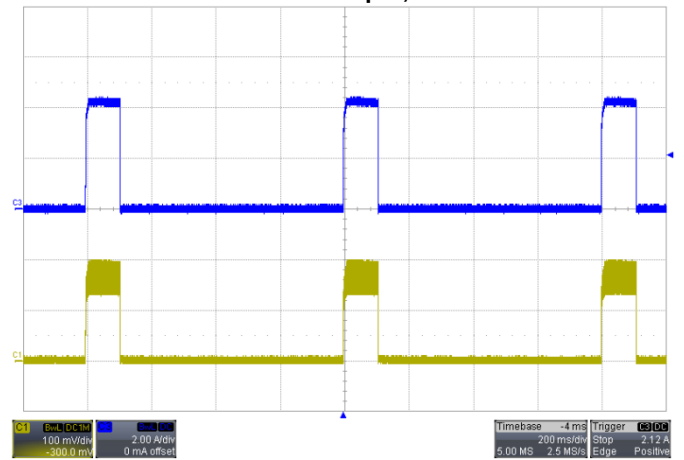
Power Down Vin=48V



Short-Circuit Output, Vin=48V

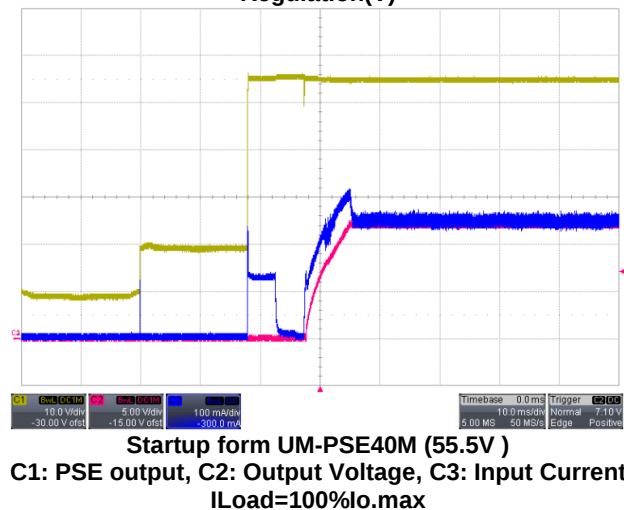
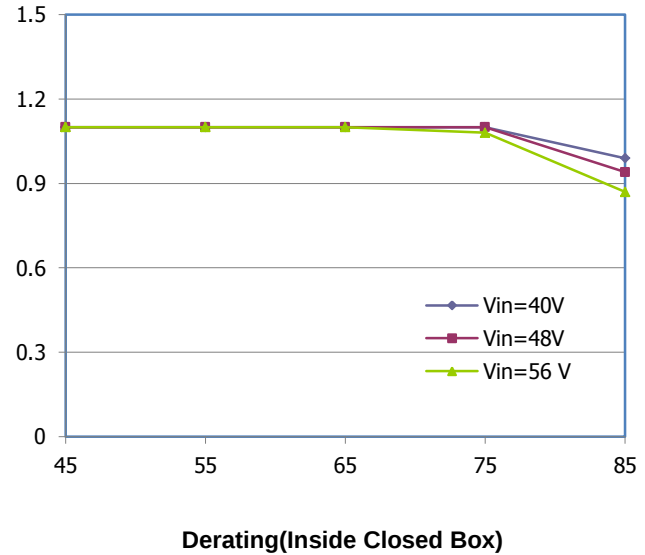
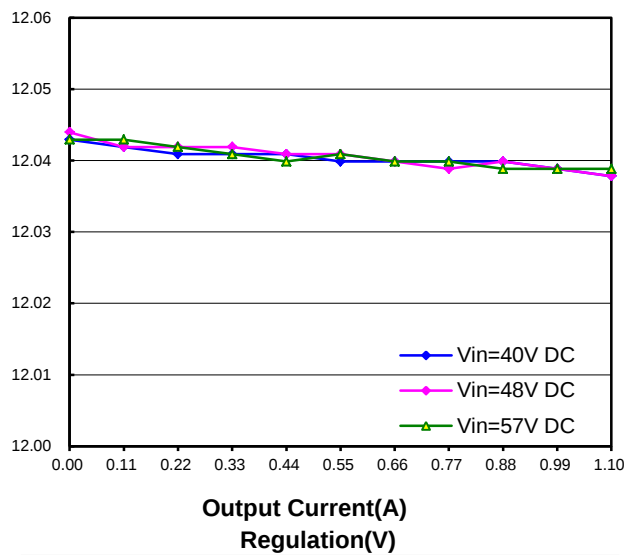
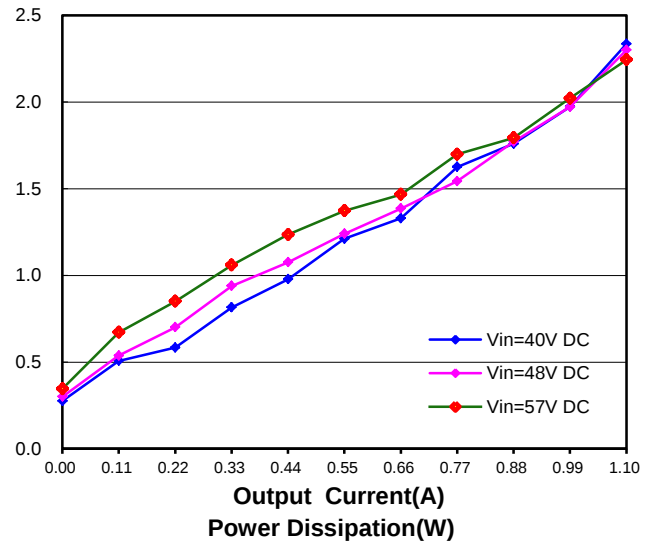
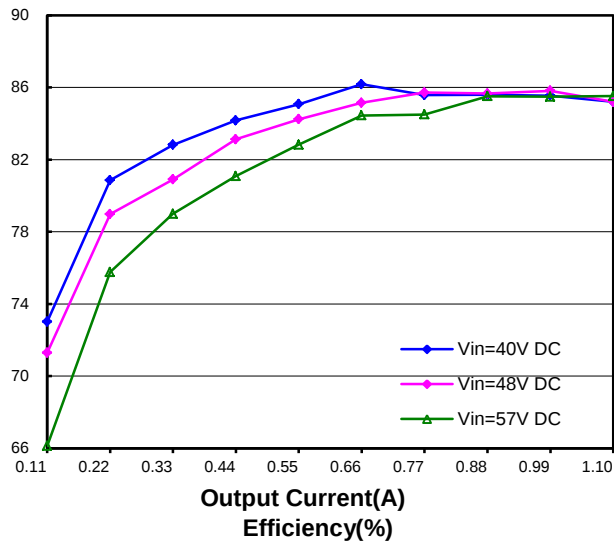


Power Down, Vin=57V

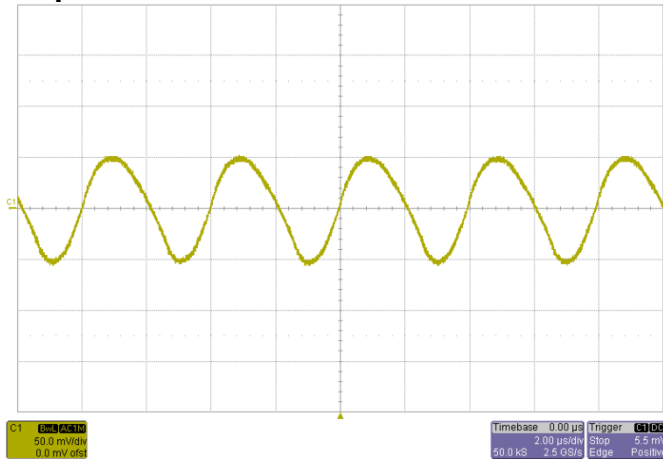


Short-Circuit Output Vin=57V

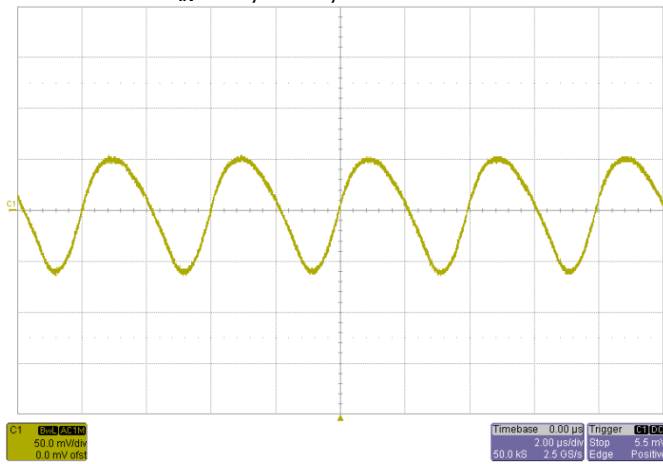
POE input power module, MQ78X00/Q78X00LP



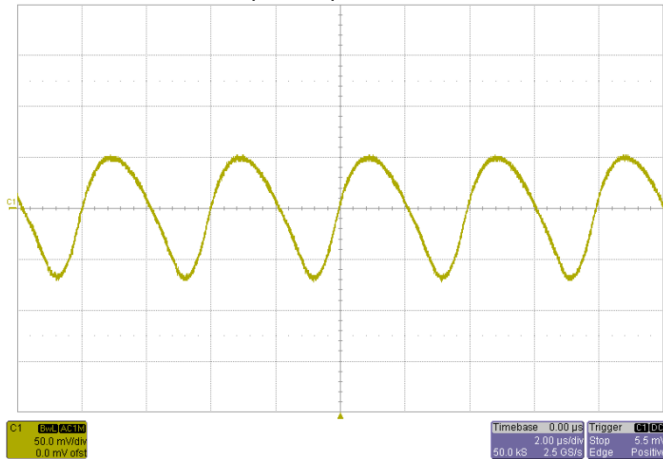
Typical Characteristics for MQ78X00-120LP Output with 0.1uF+10uF CAP



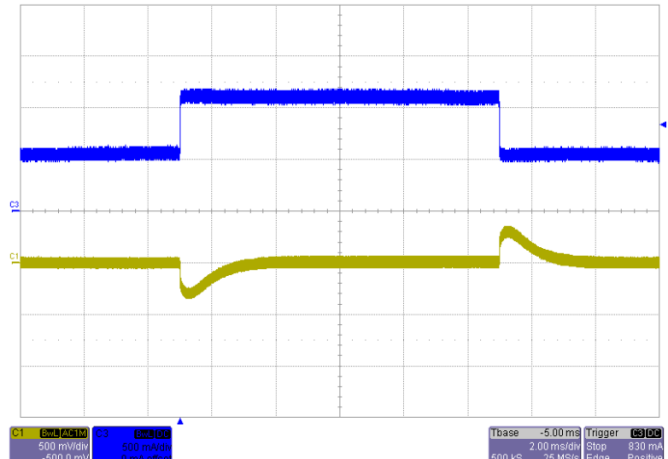
Noise $V_{IN}=40V$, $I_O=1A$, 5~20MHz Bandwidth



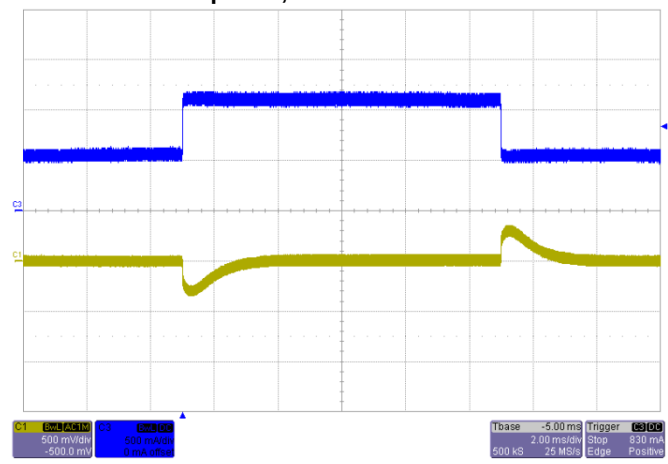
Noise $V_{IN}=48V$, $I_O=1A$, 5~20MHz Bandwidth



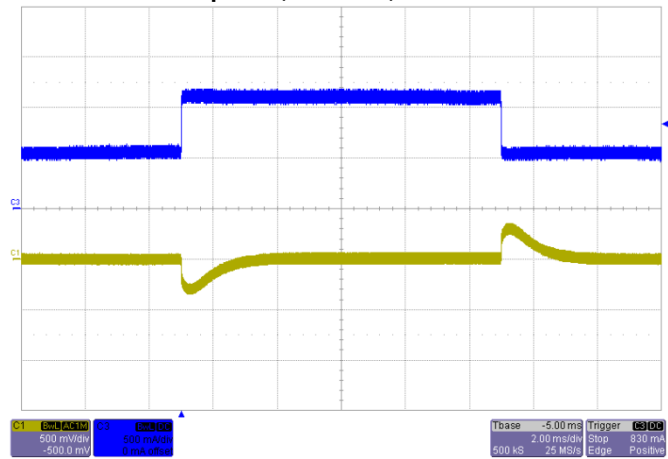
Noise $V_{IN}=57V$, $I_O=1A$, 5~20MHz Bandwidth



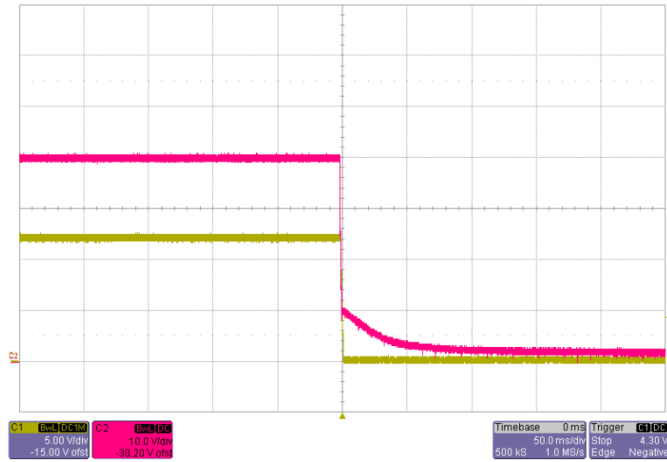
Transient Response, $V_{in}=40V$ $I_O=50\% \sim 100\% \sim 50\%$



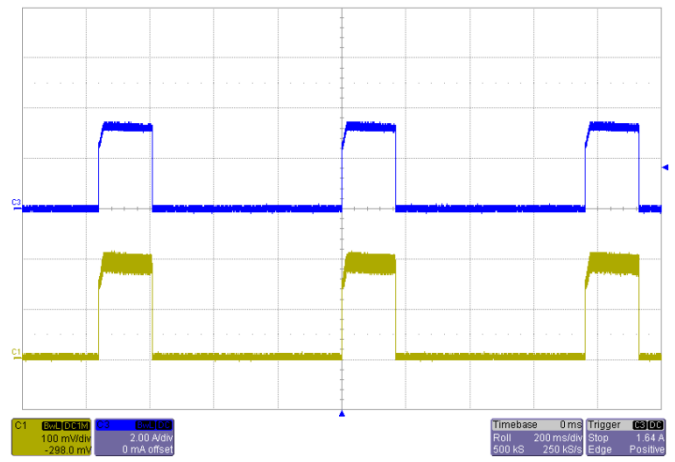
Transient Response, $V_{in}=48V$, $I_O=50\% \sim 100\% \sim 50\%$



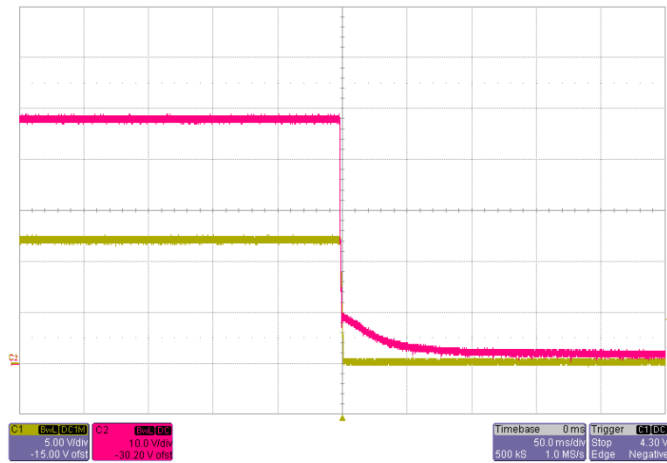
Transient Response $V_{IN}=57V$, $I_O=50\% \sim 100\% \sim 50\%$



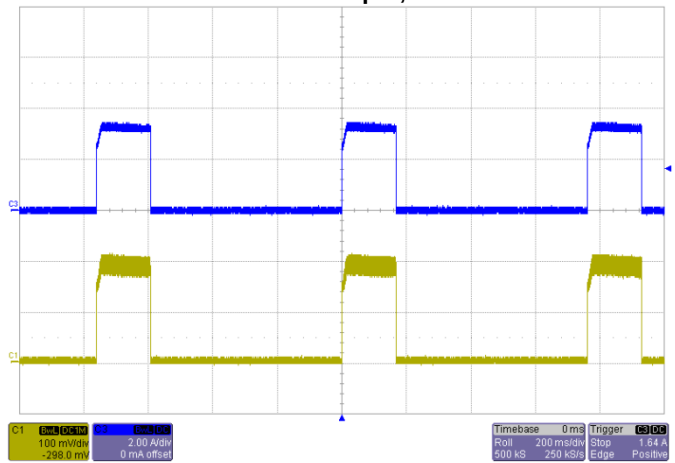
Power Down Vin=40V



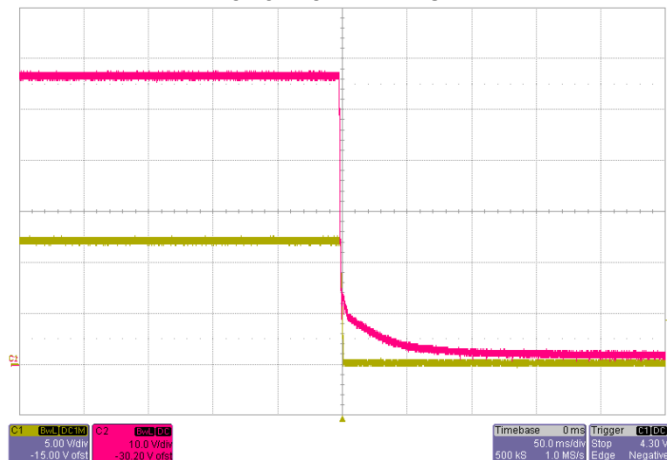
Short-Circuit Output, Vin=40V



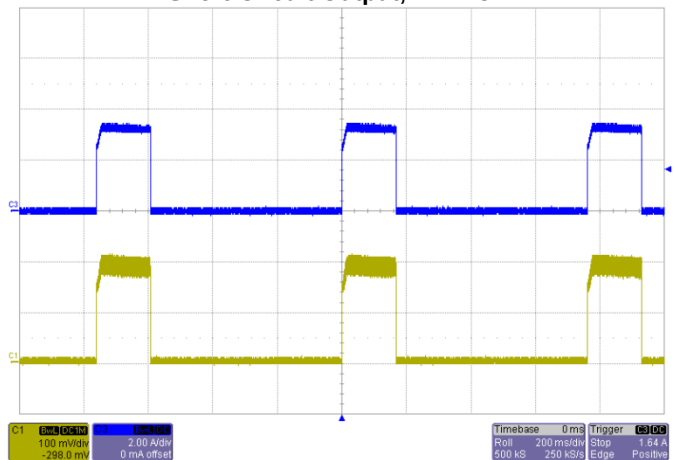
Power Down Vin=48V



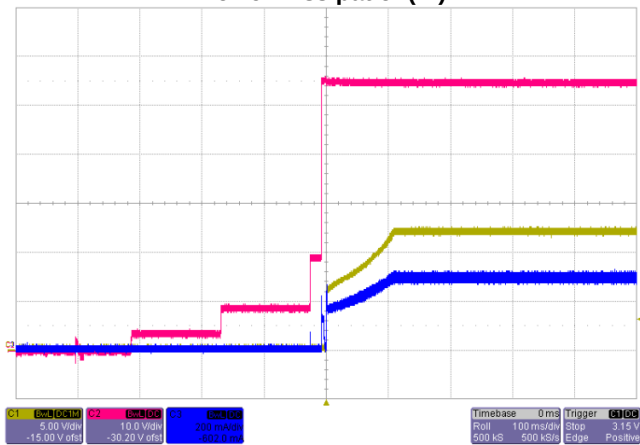
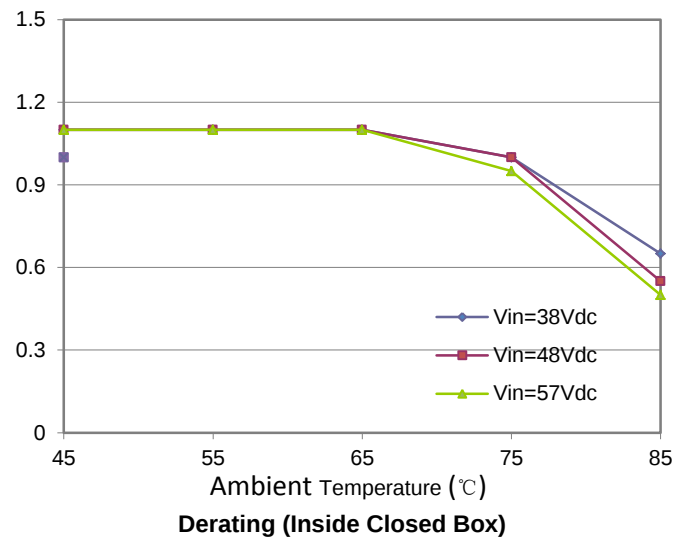
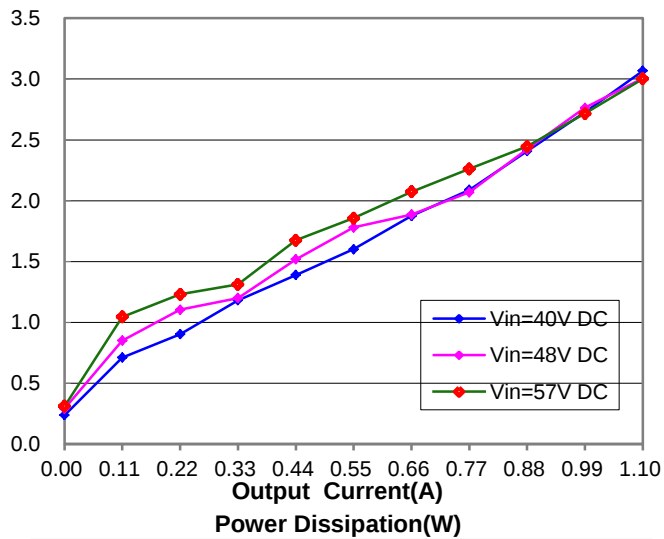
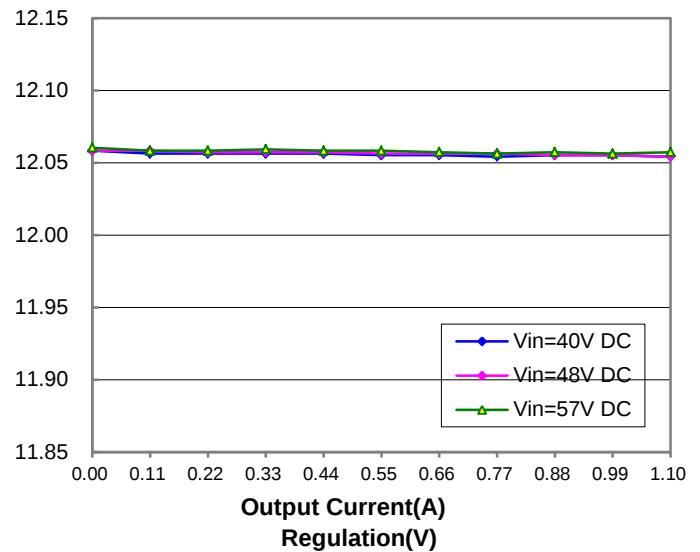
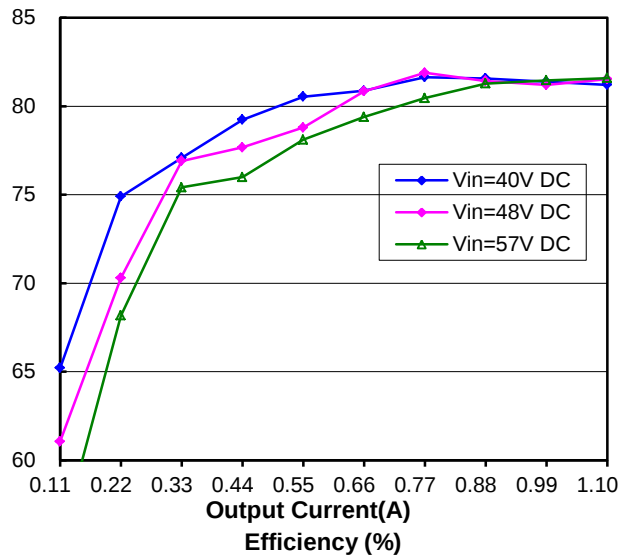
Short-Circuit Output, Vin=48V



Power Down, Vin=57V



Short-Circuit Output Vin=57V



Startup form UM-PSE40M (55.5V)

C1: PSE output, C2: Output Voltage, C3: Input Current
ILoad=100%Io.max

Application Note