MQ78X00C/D-LP, Isolated 36~57VDC input, with 12V passby input, single output, DC-DC Converter compliance with 802.3af

FEATURES

- Wide operating voltage: 36V ~ 57V
- Output Current
  - 12V, 1.1A
- Output voltage ripple: 150mV$_{PP,}$ (12V@1.1A)
- High Efficiency (input 48V, Load12V@1.1A)
  - 85%, MQ78X00-120
  - 82%, MQ78X00-120LP
- Overcurrent /short circuit protection
- External 12V passby input
- High reliability: designed to meet 500K hour MTBF
- Standard 38mm*38mm size with total height:
  - Standard version: 16.0 mm(max);
  - Low profile version: 10.8mm(max)
- No derating to +TBD℃(inside closed box)
- UL/IEC/EN60950 compliant
- RoHS Compliant available

APPLICATIONS

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

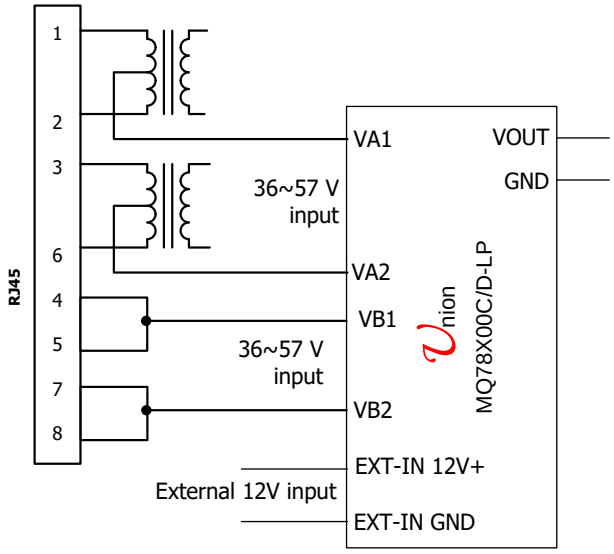
Description

The ***POE MQ78X00C/D*** 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 MQ78X00C/D have two pairs of power inputs pins: -VA1&2 and VB1&2 to accommodate this.

The MQ78X00C/D 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 MQ78X00C/D 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*** **********



Performance Specifications (at T_A=+25℃)

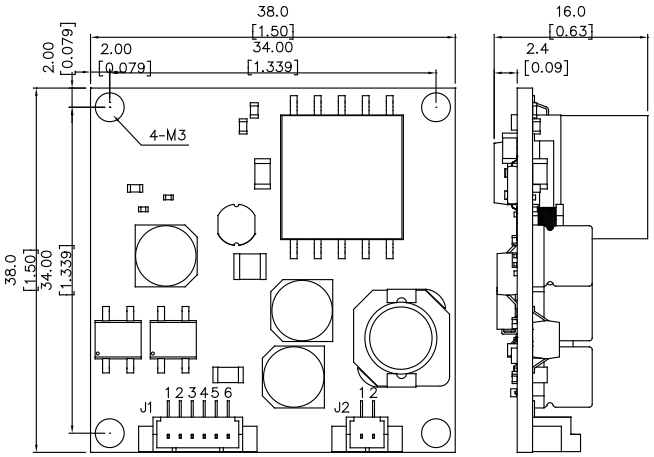
Model	Input V_{IN} Range (V)	Output				Efficiency (%)
		I_{OUT} (A)	V_{out} (V)	Regulation		
				Line (%)	Load (%)	
MQ78X00C/D-120	36~57	1.1	12	0.5	0.5	85
MQ78X00C/D-120LP				0.5	0.5	85

Mechanical Specifications

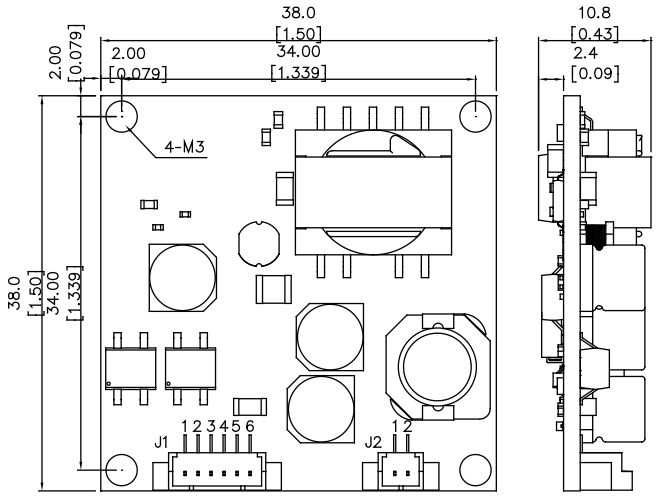
Dimensions are in millimeters

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

MQ78X00C/D



MQ78X00C/D-LP



PIN		J1						J2	
		1	J1	3	4	5	6	1	2
DESCRIPTION	MQ78X00C	VA1	VA2	VB1	VB2	GND	VOUT	Ext-IN 12V+	Ext-IN GND
	MQ78X00D							Ext-IN GND	Ext-IN 12V+

Ordering Information

MQ78X00C-120LP

Union Microsystems Part Number
X: 38mm*38mm size

LP: Low profile version

Output Voltage Range:
120: 12V

For examples:
MQ78X00C-120LP means MQ78X00CLP with 12V output voltage and 10.5mm height;
MQ78X00D-120 means MQ78X00D with 12V output voltage and 15.5mm height;

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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	℃

MQ78X00C/D-120 Electrical Specifications: *(T_A=+25℃)*

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	ΔVo	-2		+2	$\%V_{O.SET}$
Output Ripple and Noise Voltage	V_{IN} =48V Io=1A,5~20MHz			150		mVpp
Efficiency	V_{IN}=48, 100% Load	η	83	85		%
Switching Frequency		Fo		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	Vin=55.5V	I_{inrush}		350		mA
Operating Temperature	Natural convection		-40		85	℃
Output Power*	V_{IN}=$V_{IN.MIN}$ To $V_{IN.MAX}$	Po	0		13	W
MTBF		500,000				Hours

*Note: output power derating to 11W if input voltage below 40V.

MQ78X00C/D-120LP Electrical Specifications: *(T_A=+25℃)*

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	ΔVo	-2		+2	$\%V_{O.SET}$
Output Ripple and Noise Voltage	V_{IN} =48V Io=1A,5~20MHz			150		mVpp
Efficiency	V_{IN}=48, 100% Load	η	80	82		%
Switching Frequency		Fo		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	Vin=55.5V	I_{inrush}		350		mA
Operating Temperature	Natural convection		-40		85	℃
Output Power*	V_{IN}=$V_{IN.MIN}$ To $V_{IN.MAX}$	Po	0		13	W
MTBF		500,000				Hours

*Note: output power derating to 11W if input voltage below 40V.

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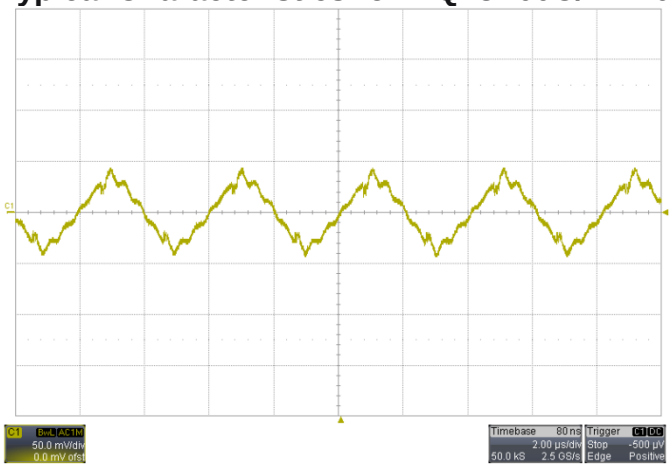
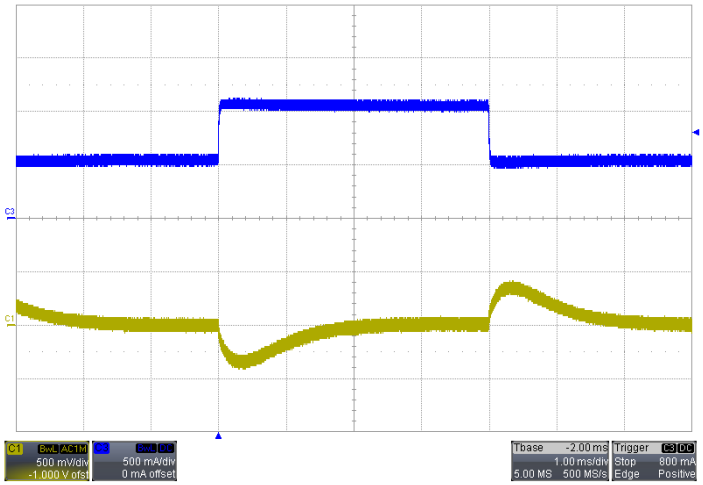
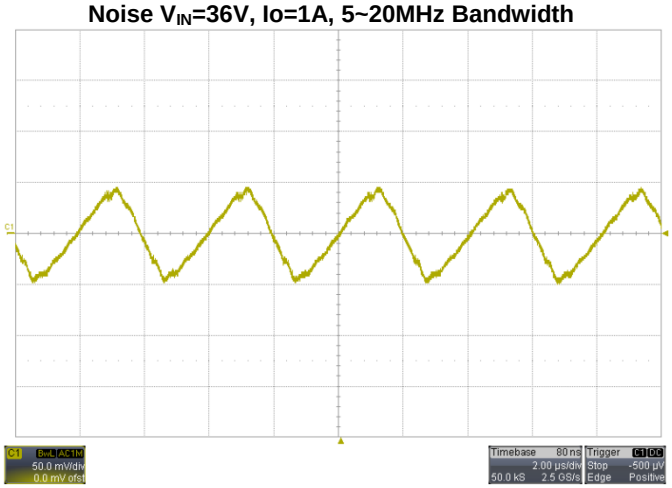
Typical Characteristics for MQ78X00C/D-120



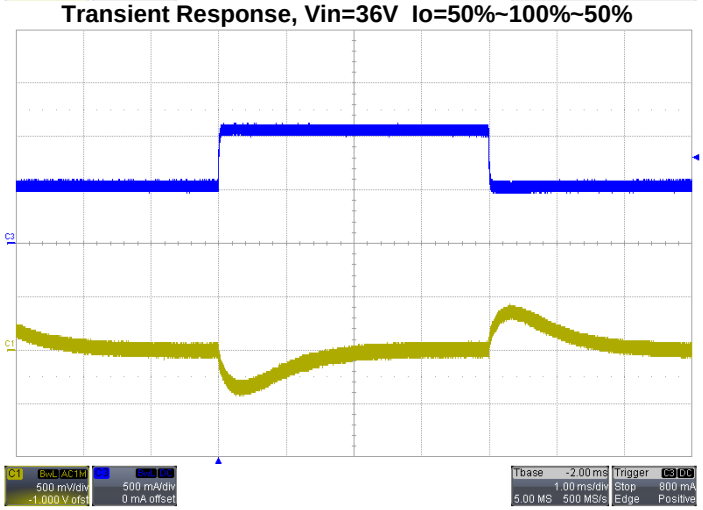
Noise V_{IN}=36V, Io=1A, 5~20MHz Bandwidth



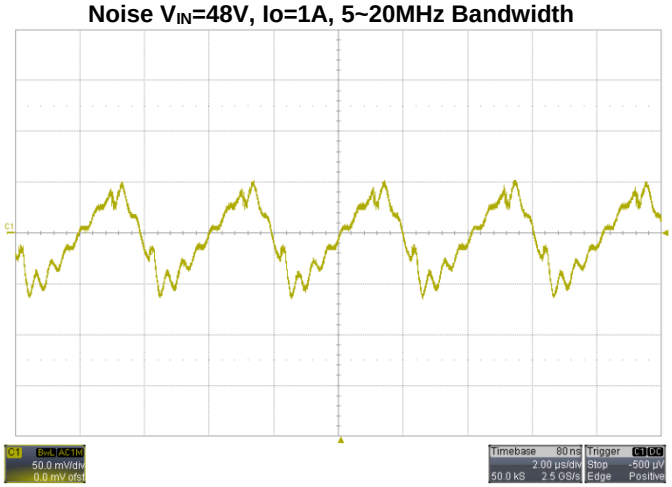
Transient Response, Vin=36V Io=50%~100%~50%



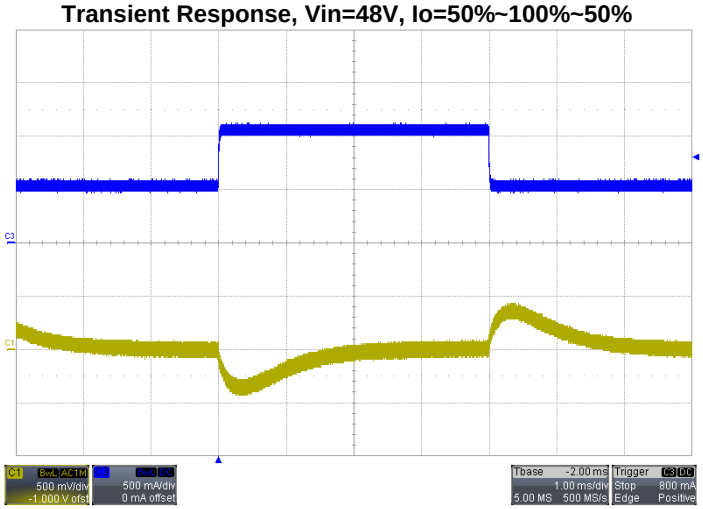
Noise V_{IN}=48V, Io=1A, 5~20MHz Bandwidth



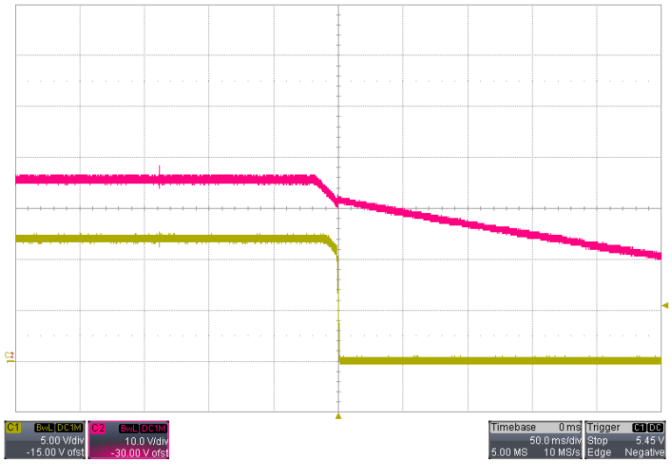
Transient Response, Vin=48V, Io=50%~100%~50%



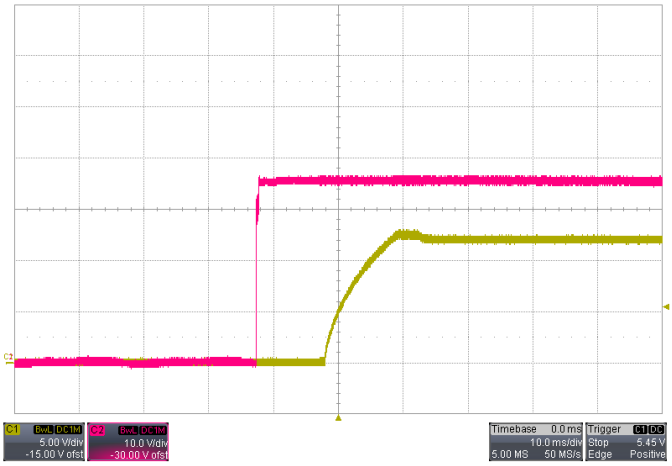
Noise V_{IN}=57V, I_O=1A, 5~20MHz Bandwidth



Transient Response V_{IN}=57V, Io=50%~100%~50%

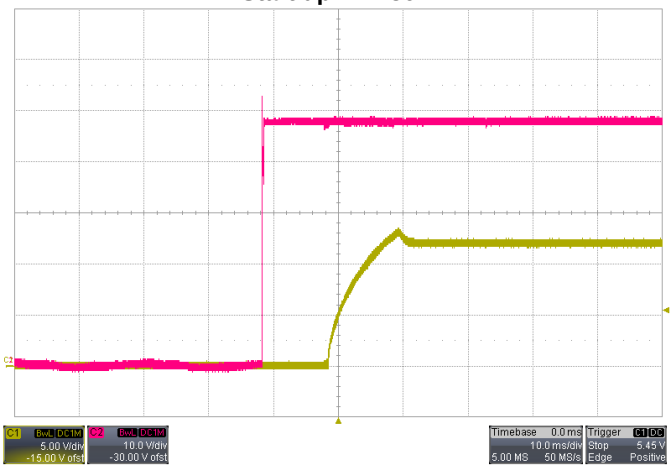


Power Down Vin=36V

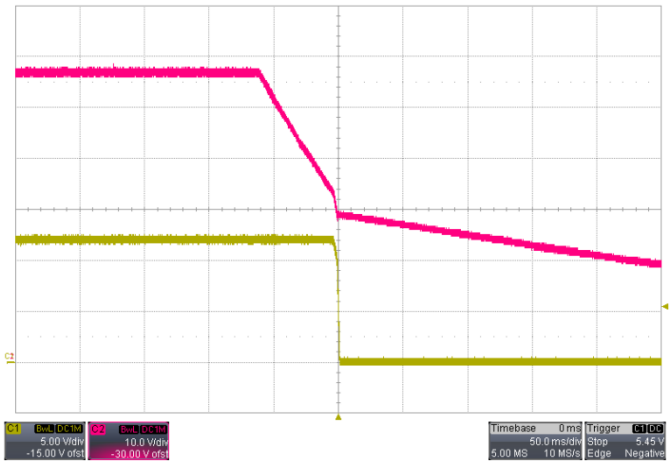


Start up Vin=36V

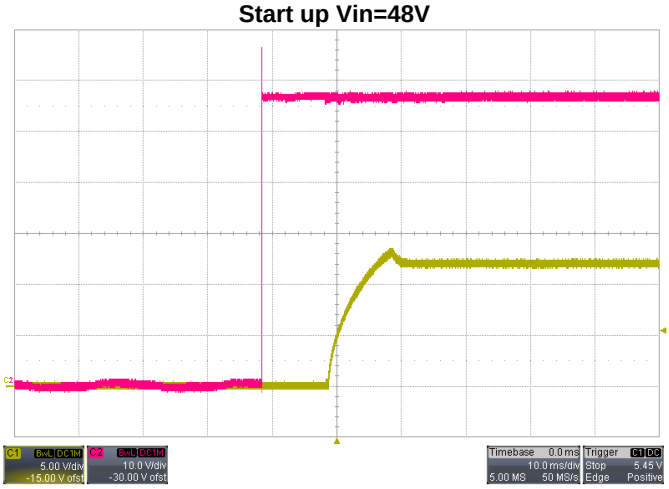
Power Down Vin=48V



Start up Vin=48V



Power Down Vin=57V



Start up Vin=57V

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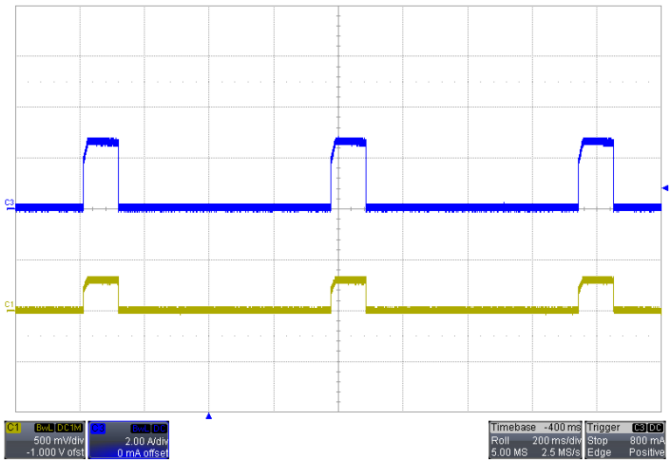
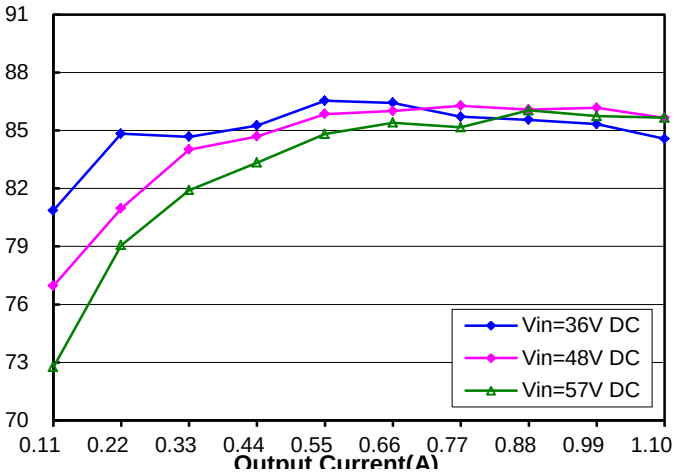
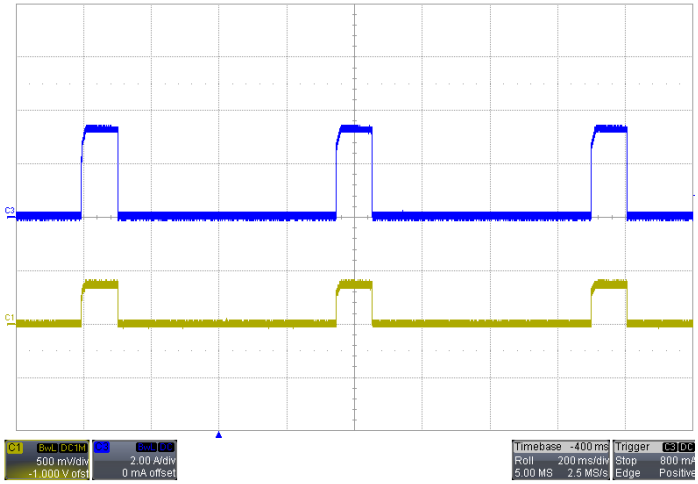


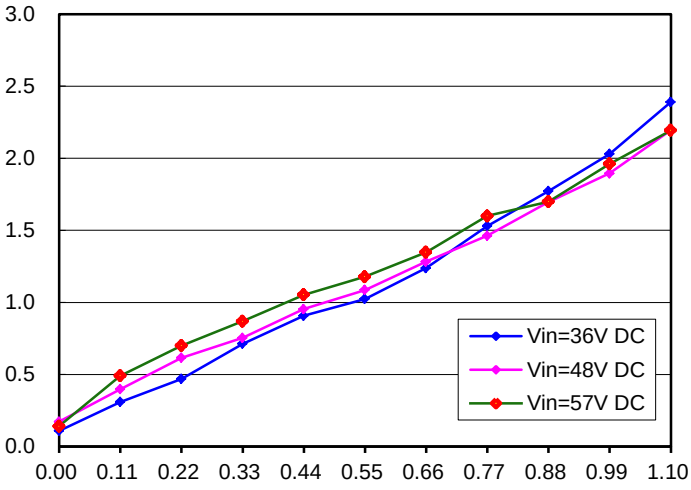
Short-Circuit Output, Vin=36V



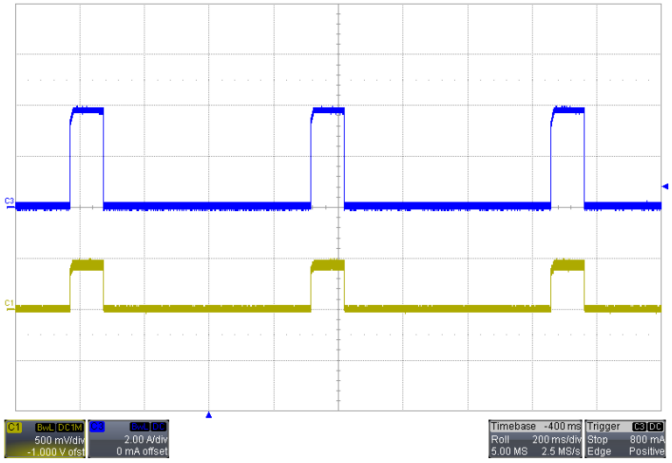
Efficiency(%)



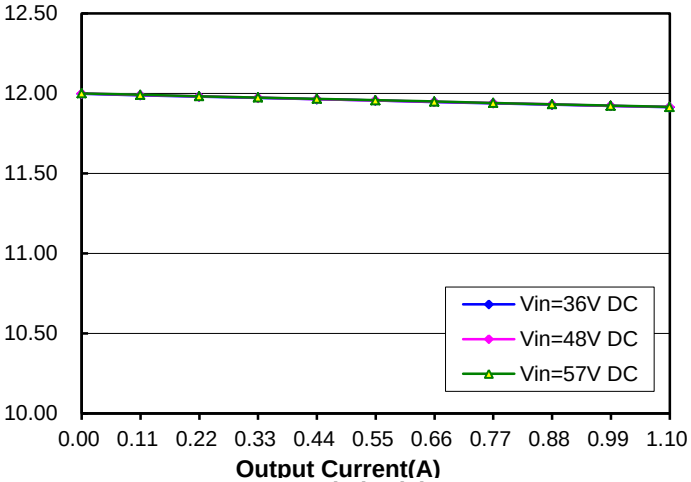
Short-Circuit Output, Vin=48V



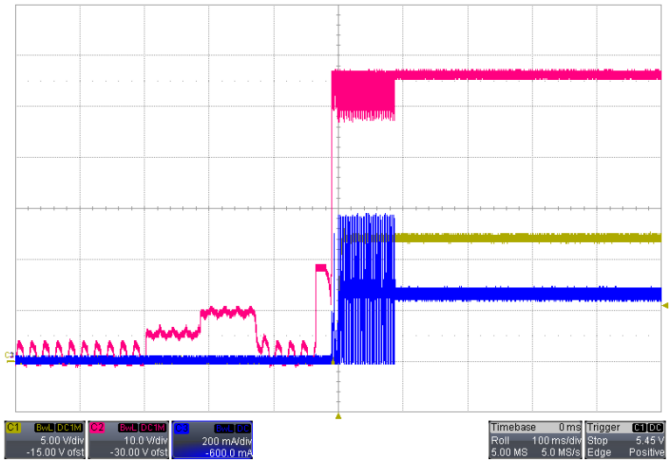
Power Dissipation(W)



Short-Circuit Output Vin=57V



Regulation(V)



Startup form UM-POE06A (56V)
C1: PSE output, C2: Output Voltage, C3: Input Current
ILoad=100%Io.max

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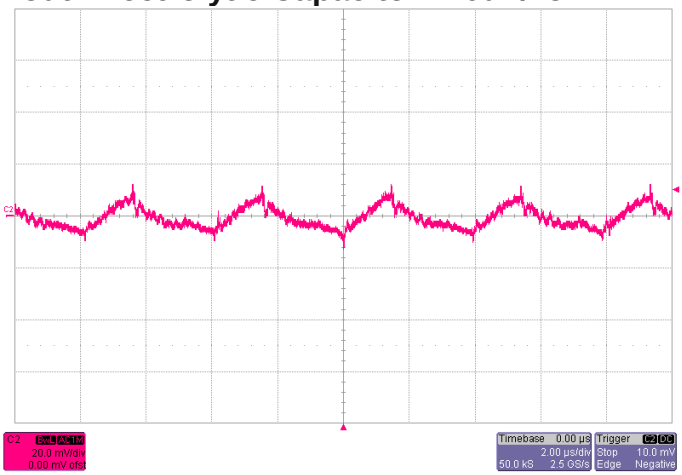
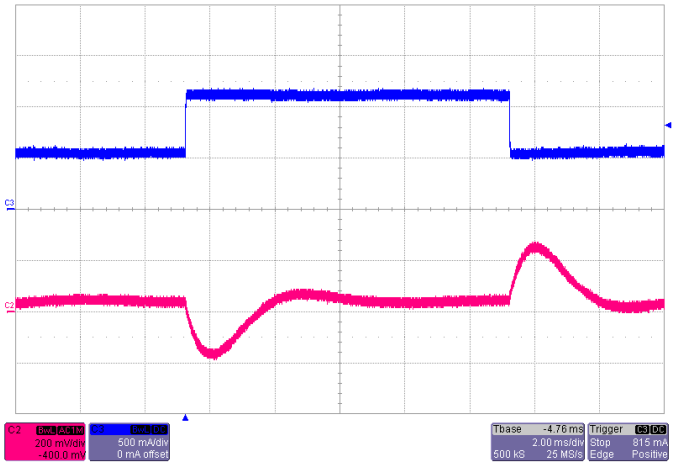
Typical Characteristics for MQ78X00C/D-120LP

General conditions:

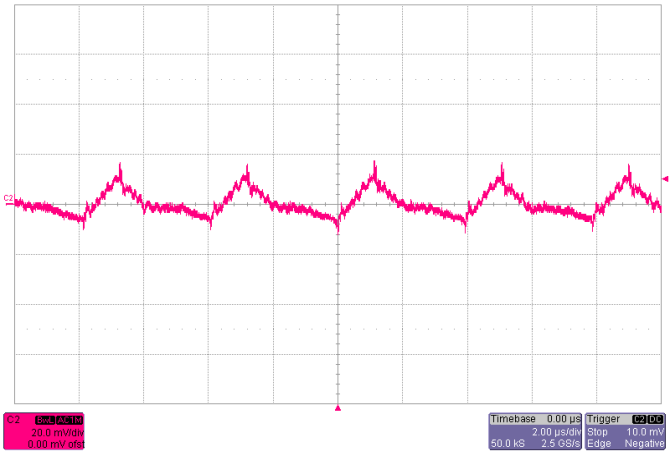
Vout=Electrolytic Capacitor 470uF/25*2



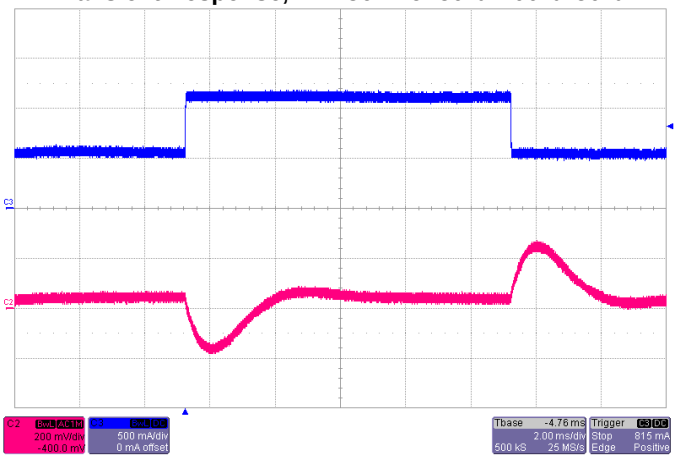
Noise V_{IN}=36V, Io=1A, 5~20MHz Bandwidth



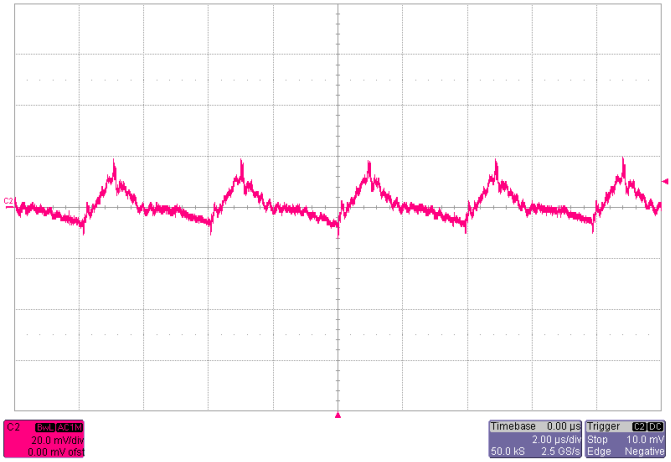
Transient Response, Vin=36V Io=50%~100%~50%



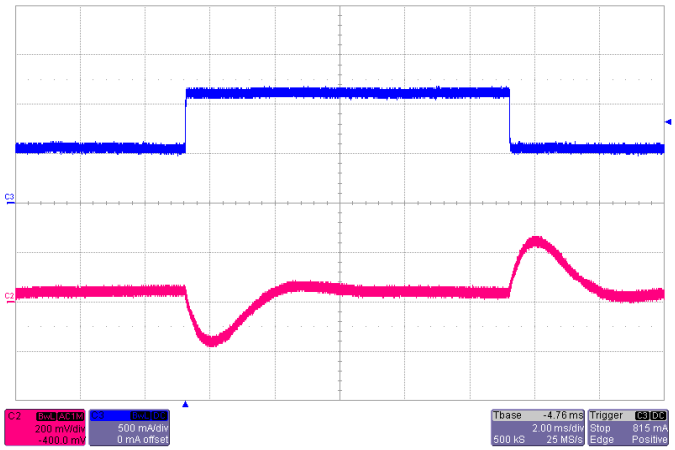
Noise V_{IN}=48V, Io=1A, 5~20MHz Bandwidth



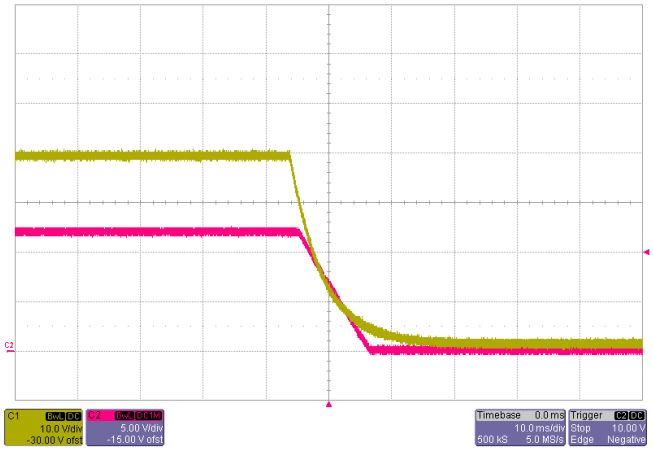
Transient Response, Vin=48V, Io=50%~100%~50%



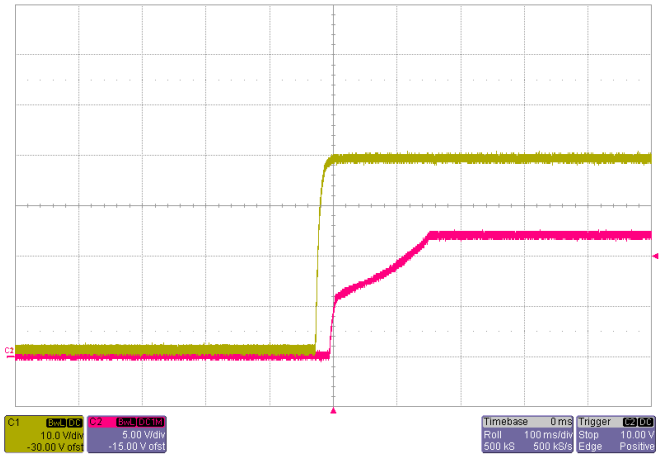
Noise V_{IN}=57V, I_O=1A, 5~20MHz Bandwidth



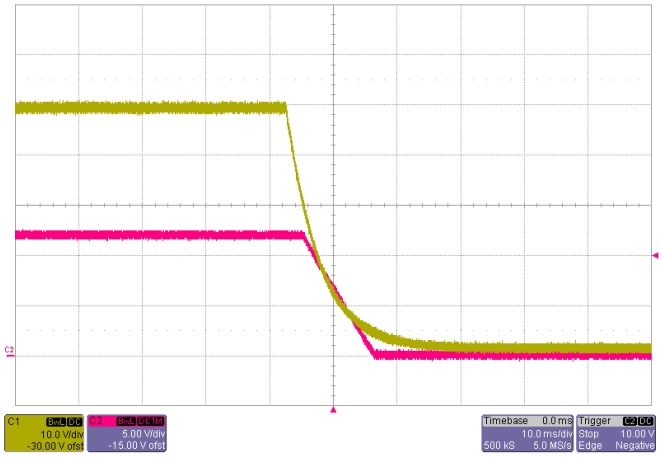
Transient Response V_{IN}=57V, Io=50%~100%~50%



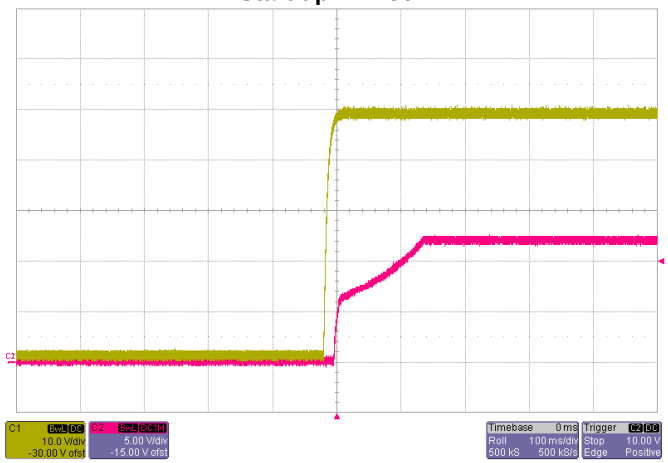
Power Down Vin=36V



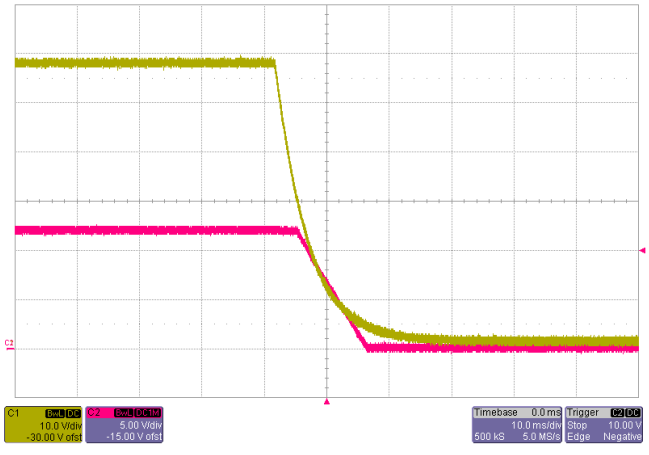
Start up Vin=36V



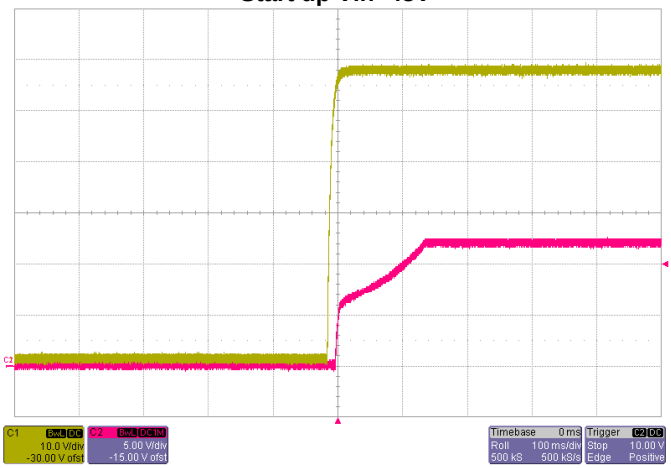
Power Down Vin=48V



Start up Vin=48V



Power Down Vin=57V



Start up Vin=57V

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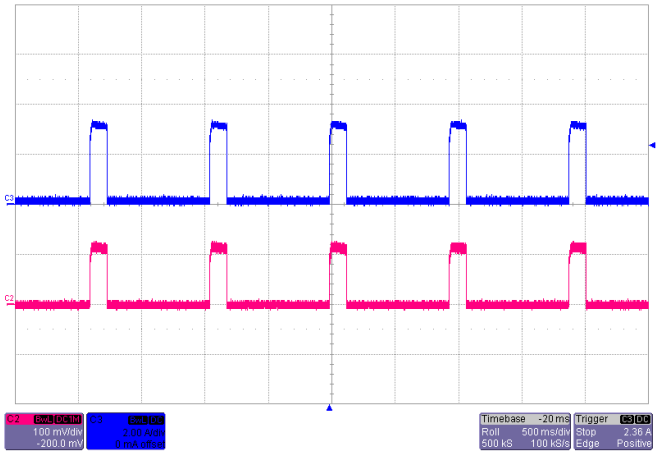
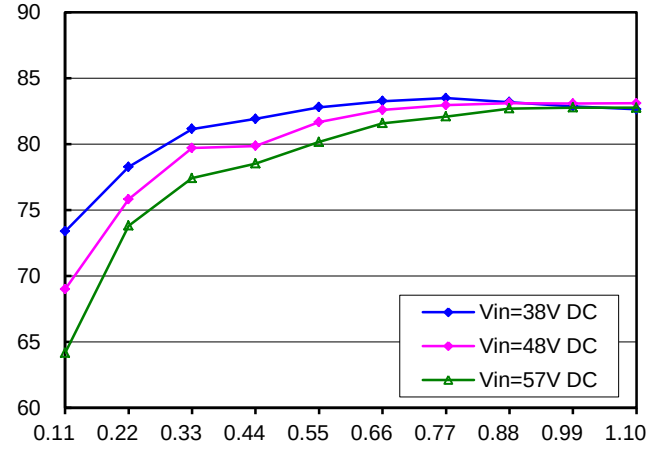
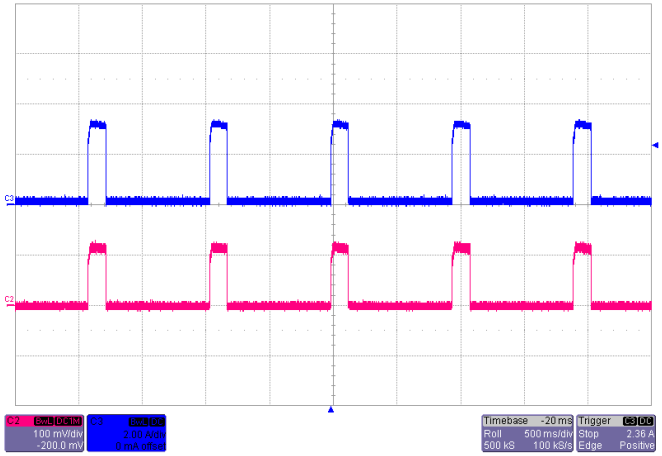


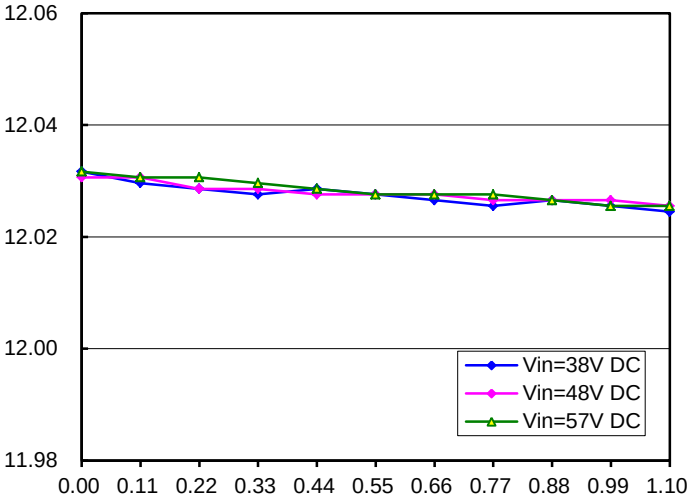
Short-Circuit Output, Vin=36V



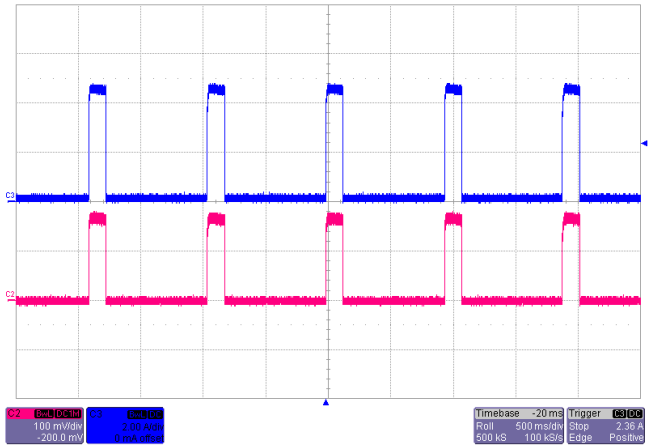
Output Current(A)
Efficiency(%)



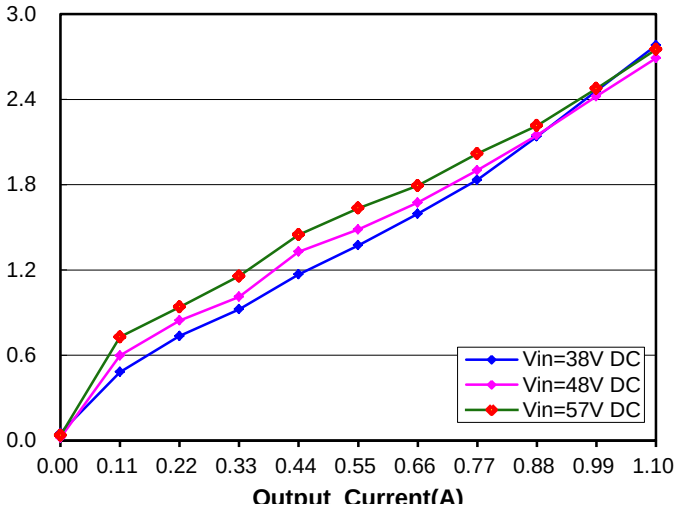
Short-Circuit Output, Vin=48V



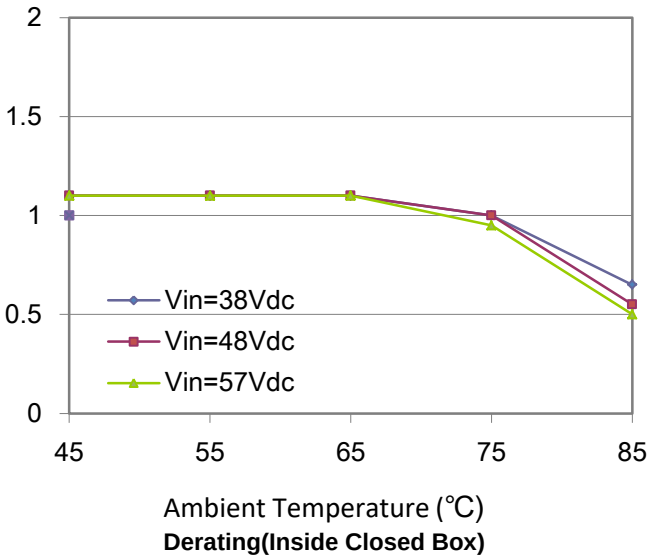
Output Current(A)
Regulation(V)



Short-Circuit Output Vin=57V



Output Current(A)
Power Dissipation(W)



Derating(Inside Closed Box)

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Application Note