QUARTER-BRICK SERIES

Dual Output Value Products

- Two independent outputs
- High full load efficiency
- Low profile through hole version
- Wide ambient temperature range, -40˚C to +85˚C
- 90% to 110% output trim
- Basic Insulation system
- Overvoltage and overtemperature protection
- Remote ON/OFF
- Approvals to EN60950-1 (VDE) and UL60950 (UL/cUL)
- 100V, 100mSec input voltage transient rated
- Up to 100% load imbalance
- Starts into pre-biased outputs
- Tracking monotonic startup
- Secondary side control, no optocouplers, fast transient load response

The Quarter-Brick series is a new high efficiency, open-frame, isolated, non-parallelable, dual-output converter product in an industry standard quarter-brick footprint and operating from a 36 to 75Vdc supply. This new series elevates the power density threshold for high-end application design requirements where high output current at low voltages are required. The converter architecture takes advantage of open-frame construction to provide low mass and a low thermal impedance for a single board design.

Additionally, a patent pending, full wave coupled inductor topology yields some of the highest full load efficiencies in the industry. The Quarter-Brick series has, as standard features, remote ON/OFF capability, adjustable output voltage trim from 90 to 110% of nominal, over-current/under-voltage protection, and full international safety approval including EN60950-1 VDE and UL60950 UL/cUL.

Patent No. 6,765,810
Other Patents Pending

[2 YEAR WARRANTY]

ARTESYN TECHNOLOGIES

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Stresses in excess of the maximum ratings can cause permanent damage to the device. Operation of the device is not implied at these or any other conditions in excess of those given in the specification. Exposure to absolute maximum ratings can adversely affect device reliability.

Absolute Maximum Ratings

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - continuous	V_{in} (cont)	-0.3		75	V DC	$V_{in}(+)$ - $V_{in}(-)$
Input voltage - peak/surge	V_{in} (peak)	-0.3		100	V DC	Transients 100mSec or less in duration
Input Voltage - remote pin	V_{rem} (peak)	-0.3		75	V DC	Peaks of any duration
Operating temperature	Top	-40		85	˚C	Measured at ambient. See Application Note 137 for details
Storage temperature	$T_{storage}$	-55		125	˚C	
Maximum Rated Output Power						
LQD30A48-3V3-1V2	P_{out} (max)			67.5	W	
LQD30A48-3V3-1V5	P_{out} (max)			72.0	W	
LQD30A48-3V3-1V8	P_{out} (max)			76.5	W	
LQD30A48-3V3-2V5	P_{out} (max)			87.0	W	
LQD25A48-5V0-3V3	P_{out} (max)			99.5	W	

All specifications are typical at nominal input Vin = 48V, with full rated resistive load on both outputs at 25˚C ambient unless otherwise stated.

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - operating	V_{in} (oper)	36	48	75	V DC	
Input current - no load	I_{in}		50	80	mADC	V_{in} (min) - V_{in} (max), enabled
Input current - Quiescent	I_{in} (off)		3	6	mADC	Converter disabled
Inrush current (i^2t)	Inrush		0.05		A^2s	See Application Note 137 for
Inrush current ratio	I_t/I_m		22			inrush test circuit
Input ripple rejection			50		dB	Frequency <1 kHz
Input fuse				10	A	Slow blow/antisurge HRC recommended 200V Rating See Application Note 137

Turn On/Off

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - turn on	V_{in} (on)		35.5	36	V DC	
Input voltage - turn off	V_{in} (off)	33	33.5	35	V DC	
Turn on delay - enabled, then power applied	T_{delay} (power)		14	20	msec	With the Remote ON/OFF signal asserted, time from when V_{in} > V_{in} (oper) until Vout is within total regulation band
Turn on delay - power applied, then enabled	T_{delay} (enable)		14	20	msec	With V_{in} = V_{in} (nom), then Remote ON/OFF asserted, time until Vo within total error band
Rise time	T_{rise}		4	6	msec	From 10% to 90%, full resistive load, no external capacitance

Signal Electrical Interface

Characteristic - Signal Name	Symbol	Min	Typ	Max	Units	Notes and Conditions
At remote ON/OFF (control) pin						**See Notes 1 and 2**
Open collector or equivalent compatible						See Application Note 137 for remote ON/OFF details
Control pin open circuit voltage	V_{ih}		2.8	3.5	V	I_{ih} = 0µA; open circuit voltage
High level input voltage	V_{ih}	2.4			V	Converter guaranteed ON when control pin is greater than V_{ih} (min)
High level input current	I_{ih}			10	µA	Current flowing into control pin when pin is pulled high (max. at V_{ih} = 75V)
Acceptable high level leakage current	I_{ih} (leakage)			-10	µA	Acceptable leakage current from signal pin into the open collector driver (neg = from converter)
Low level input voltage	V_{il}			0.4	V	Converter guaranteed OFF when control pin is < V_{il} (max)
Low level input current	I_{il} (max)		-0.4	-0.5	mA	V_{il} = 0.0 V, maximum source current from converter with short circuit

Common Protection/Control

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overtemperature shutdown threshold	Tots	120	125	130	˚C	Hotspot temperature non-latching shutdown protection. See Application Note 137

Reliability and Service Life

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Mean time between failure	MTBF		2,883,816		Hours	Telcordia Tech. SR-332 Tamb = 25ºC, Tcase = 20ºC rise airflow = 400LFM, V_{in} = V_{in} (nom), $I_{out\ 1,2}$ = 50% $I_{out\ 1,2}$ (max)

Isolation

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input to output test voltage				2250	V DC	Test duration 1s
Input to output capacitance			1200		pF	
Input to output resistance		10			MΩ	Measured with 500 V DC
Input to output insulation system			Basic			

Other Specifications

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Switching frequency	F_{sw}		480		kHz	All models
Weight			34		g	

Environmental Requirements

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Thermal performance		-40		120	˚C	Hotspot temperature
Altitude				3000	m	Derate total max. output current by 20%
				9843	ft	Derate total max. output current by 20%
				10000	m	Derate total max. output current by 50%
				32808	ft	Derate total max. output current by 50%

Type	Parameter	Reference	Test Level
Air temperature		IEC 60068-2-1 Ab/Ad: Cold	-40˚C, 16h
		IEC 680068-2-2 Bb/Bd: Dry heat	+70˚C, 16h
		IEC 68-2-14 Nb: Rate of change	-5˚C/+45˚C, 0.5°C/min 2 cycles, 3h ea
Relative humidity		IEC60068-2-56 Cb: damp heat, steady state	+35°C, 93% RH, 4 days 50%, of samples powered at 10% load and 50% unpowered
Vibration		IEC60068-2-6 Fc: sinusoidal	3 axes, 5 sweeps per axis, unpowered on test card. Freq. range and displacement 5-9Hz, 1.2mm. Freq. range and acceleration 9-200Hz, 10m/s^2
Shock and Bump		IEC 60068-2-29 Eb: bump	100 bumps each of 6 directions, mounted on test card and powered on. Shock spectrum half-sine, duration 11ms, acceleratoin: 50m/sec^2

EMC Electromagnetic Compatibility

Phenomenon	Port	Standard	Test level	Notes and conditions
Immunity:				
ESD	Enclosure	EN61000-4-2	6kV contact 8kV air	Level 3, (output within specification) Level 3, (output within specification)
Radiated field	Enclosure	EN61000-4-3	10V/m	Level 3, (output within specification) X and Y axes
Conducted	DC power	EN61000-4-6	10V	Level 3, (output within specification)
Input transients	DC power	100V, 100mS		With recommended Class B external filter, no load, 10J (output remains within ±9%)

Standards Compliance List

Characteristic	
EN60950-1 UL/cUL 60950	 3rd edition

Safety Agency Approvals

Standard	Category
UL/cUL60950 File Number	E135734
VDE Certificate No.	10401-3336-0197

Material Ratings

Characteristic	Notes and Conditions
Flammability rating	UL94V-0
Material type	FR4 PCB

Model Numbers

Model Number	Input Voltage	Output Voltage	Overvoltage Protection	Output Current (Max.)	Typical Efficiency
LQD30A48-3V3-1V2	36-75 VDC	3.3V/1.2V	4V/1.5V	15A/15A	90.0%
LQD30A48-3V3-1V5	36-75 VDC	3.3V/1.5V	4V/1.8V	15A/15A	90.5%
LQD30A48-3V3-1V8	36-75 VDC	3.3V/1.8V	4V/2.0V	15A/15A	90.5%
LQD30A48-3V3-2V5	36-75 VDC	3.3V/2.5V	4V/3.0V	15A/15A	91.0%
LQD25A48-5V0-3V3	36-75 VDC	5.0V/3.3V	6V/4.0V	10A/15A	91.0%

LQD30A48-3V3-1V2 Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		1.6		A DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max.)}$; $V_o = V_{o\ (nom)}$ 100% load on each output
Input current - maximum	$I_{in\ (max.)}$			2.40	A DC	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max.)}$; $V_o = V_{o\ (nom)}$, 100% load on each output
Input capacitor ripple current	$I_{in\ (ripple)}$		30 60		mA RMS mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external Filter. See Application Note 137 for details
Reflected ripple current	$I_{in\ (ref)}$		2 5		mA RMS mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external Filter. See Application Note 137 for details
Input capacitance - internal filter	C_{input}		3		µF	Internal to converter
Input capacitance - external bypass	C_{bypass}	33			µF	Recommended customer added capacitance, <0.7 Ohm ESR

LQD30A48-3V3-1V2 Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	$V_{o\ (nom)}$ 1.2V $V_{o\ (nom)}$ 3.3V	1.18 3.25	1.20 3.30	1.22 3.35	V DC V DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	V_o 1.2V V_o 3.3V	1.16 3.20		1.24 3.40	V DC V DC	For all line, static load and temperature until end of life
Line regulation	V_o 1.2V V_o 3.3V			0.8 0.5	% %	$I_{out} = I_{out\ (nom)}$; $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation	V_o 1.2V V_o 3.3V			0.8 0.5	% %	$V_{in} = V_{in\ (nom)}$; $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation			0.005	0.01	±%/°C	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$
Output current continuous	I_{out} 1.2V I_{out} 3.3V	0 0		15 15	A DC A DC	
Output current - short circuit	I_{sc} 1.2V I_{sc} 3.3V		8 8		A rms A rms	Continuous, unit auto recovers from short, V_o < 100mV. See Application Note 137
Load transient response - peak deviation	$V_{dynamic}$ 1.2V $V_{dynamic}$ 3.3V		40 40	75 75	mV mV	Peak deviation for 50% to 75% step load, di/dt = 100mA/µsec
Load transient response - recovery	$T_{recovery}$		20	50	µsec	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext} 1.2V C_{ext} 3.3V	0 0		3,300 3,300	µF µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	Vp-p Vrms		30 10	50 15	mV p-p mV rms	Measurement bandwidth 20MHz. See Application Note 137 for measurement set-up details.

LQD30A48-3V3-1V2 Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage trip voltage	V_{ov} 1.2V V_{ov} 3.3V			1.56 4.29	V DC V DC	Non-latching. See Application Note 137 for details
Overcurrent limit inception	I_{oc}	15.5	17.6	20.0	A DC	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 67.5W
		90			%	Trim down (% of $V_{o\ nom}$) See Application Note 137 for details of trim equations and trim curves

LQD30A48-3V3-1V2 Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η		91.0		%	I_{out} 3.3V = 50% Iout (max), I_{out} 1.2V = 100% Iout (max), V_{in} = V_{in} (nom)
Efficiency	η		90.5		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.2V = 50% I_{out} (max), V_{in} = V_{in} (nom)
Efficiency	η	88.0	90.0		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.2V = 100% I_{out} (max), V_{in} = V_{in} (nom)

LQD30A48-3V3-1V5 Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		1.7		A DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max.)}$; $V_o = V_o$ (nom) 100% load on each output
Input current - maximum	$I_{in\ (max.)}$			2.50	A DC	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max.)}$; $V_o = V_o$ (nom), 100% load on each output
Input capacitor ripple current	$I_{in\ (ripple)}$		30 60		mA RMS mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external Filter. See Application Note 137 for details
Reflected ripple current	$I_{in\ (ref)}$		2 5		mA RMS mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external Filter. See Application Note 137 for details
Input capacitance - internal filter	C_{input}		3		µF	Internal to converter
Input capacitance - external bypass	C_{bypass}	33			µF	Recommended customer added capacitance, <0.7 Ohm ESR

LQD30A48-3V3-1V5 Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	$V_{o\ (nom)}$ 1.5V $V_{o\ (nom)}$ 3.3V	1.48 3.25	1.50 3.30	1.53 3.35	V DC V DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	V_o 1.5V V_o 3.3V	1.44 3.20		1.55 3.40	V DC V DC	For all line, static load and temperature until end of life
Line regulation	V_o 1.5V V_o 3.3V			0.8 0.5	% %	$I_{out} = I_{out\ (nom)}$; $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation	V_o 1.5V V_o 3.3V			0.8 0.5	% %	$V_{in} = V_{in\ (nom)}$; $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation			0.005	0.01	±%/°C	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$
Output current continuous	I_{out} 1.5V I_{out} 3.3V	0 0		15 15	A DC A DC	
Output current - short circuit	I_{sc} 1.5V I_{sc} 3.3V		8 8		A rms A rms	Continuous, unit auto recovers from short, V_o < 100mV. See Application Note 137
Load transient response - peak deviation	$V_{dynamic}$ 1.5V $V_{dynamic}$ 3.3V		40 40	75 75	mV mV	Peak deviation for 50% to 75% step load, di/dt = 100mA/µsec
Load transient response - recovery	$T_{recovery}$		20	50	µsec	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext} 1.5V C_{ext} 3.3V	0 0		3,300 3,300	µF µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	Vp-p Vrms		30 10	50 15	mV p-p mV rms	Measurement bandwidth 20MHz. See Application Note 137 for measurement set-up details.

LQD30A48-3V3-1V5 Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage trip voltage	V_{ov} 1.5V V_{ov} 3.3V	1.65 3.63		1.88 4.29	V DC V DC	Non-latching. See Application Note 137 for details
Overcurrent limit inception	I_{oc}	15.5	17.6	20.0	A DC	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 72W
		90			%	Trim down (% of $V_{o\ nom}$) See Application Note 137 for details of trim equations and trim curves

LQD30A48-3V3-1V5 Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η		91.0		%	I_{out} 3.3V = 50% Iout (max), I_{out} 1.5V = 100% Iout (max), V_{in} = V_{in} (nom)
Efficiency	η		91.0		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.5V = 50% I_{out} (max), V_{in} = V_{in} (nom)
Efficiency	η	88.0	90.5		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.5V = 100% I_{out} (max), V_{in} = V_{in} (nom)

LQD30A48-3V3-1V8 Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		1.8		ADC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input current - maximum	$I_{in\ (max.)}$			2.70	ADC	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input capacitor ripple current	$I_{in\ (ripple)}$		30 60		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Reflected ripple current	$I_{in\ (ref)}$		3 5		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Input capacitance - internal filter	C_{input}		3		µF	Internal to converter
Input capacitance - external bypass	C_{bypass}	33			µF	Recommended customer added capacitance, <0.7Ω ESR

LQD30A48-3V3-1V8 Model

Electrical Characteristics – O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom) 1.8V Vo (nom) 3.3V	1.77 3.25	1.80 3.30	1.83 3.35	V DC V DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	Vo 1.8V Vo 3.3V	1.75 3.20		1.85 3.40	V DC V DC	For all line, static load and temperature until end of life
Line regulation	Vo 1.8V Vo 3.3V			0.5 0.3	% %	$I_{out} = I_{out\ (nom)}$; $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation	Vo 1.8V Vo 3.3V			0.5 0.5	% %	$V_{in} = V_{in\ (nom)}$; $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation			0.005	0.02	±%/°C	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$
Output current continuous	Iout 1.8V Iout 3.3V	0 0		15 15	A DC A DC	
Output current - short circuit	I_{sc} 1.8V I_{sc} 3.3V		8 8		A rms A rms	Continuous, unit auto recovers from short, V_o < 100mV See Application Note 137
Load transient response - peak deviation	$V_{dynamic}$ 1.8V $V_{dynamic}$ 3.3V		40 40	75 75	mV mV	Peak deviation for 50% to 75% step load, di/dt = 100mA/µsec
Load transient response - recovery	$T_{recovery}$		20	50	µsec	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext} 1.8V C_{ext} 3.3V	0 0		3,300 3,300	µF µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	Vp-p Vrms		30 10	50 15	mV p-p mV rms	Measurement bandwidth 20MHz. See Application Note 137 for measurement set-up details.

LQD30A48-3V3-1V8 Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage trip voltage	V_{ov} 1.8V Vov 3.3V	1.98 3.63		2.34 4.29	V DC V DC	Non-latching. See Application Note 137 for details
Overcurrent limit inception	I_{oc}	15.5	17.6	20.0	A DC	V_o = 90% of $V_{o\ (nom)}$
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 76.5W
		90				Trim down (% of $V_{o\ nom}$) See Application Note 137 for details of trim equations and trim curves

LQD30A48-3V3-1V8 Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η		90.5		%	I_{out} 3.3V = 50% Iout (max), I_{out} 1.8V = 100% Iout (max), $V_{in} = V_{in\ (nom)}$
Efficiency	η		90.5		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.8V = 50% I_{out} (max), $V_{in} = V_{in\ (nom)}$
Efficiency	η	88.5	90.5		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 1.8V = 100% I_{out} (max), $V_{in} = V_{in\ (nom)}$

LQD30A48-3V3-2V5 Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		2.04		ADC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input current - maximum	$I_{in\ (max.)}$			3.00	ADC	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input capacitor ripple current	$I_{in\ (ripple)}$		30 60		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Reflected ripple current	$I_{in\ (ref)}$		3 5		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Input capacitance - internal filter	C_{input}		3		µF	Internal to converter
Input capacitance - external bypass	C_{bypass}	33			µF	Recommended customer added capacitance, <0.7Ω ESR

LQD30A48-3V3-2V5 Model

Electrical Characteristics – O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom) 2.5V Vo (nom) 3.3V	2.46 3.25	2.50 3.30	2.54 3.35	V DC V DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	Vo 2.5V Vo 3.3V	2.42 3.20		2.58 3.40	V DC V DC	For all line, static load and temperature until end of life
Line regulation	Vo 2.5V Vo 3.3V			0.3 0.3	% %	$I_{out} = I_{out\ (nom)}$; $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation	Vo 2.5V Vo 3.3V			0.5 0.5	% %	$V_{in} = V_{in\ (nom)}$; $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation			0.005	0.02	±%/°C	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$
Output current continuous	Iout 2.5V Iout 3.3V	0 0		15 15	A DC A DC	
Output current - short circuit	I_{sc} 2.5V I_{sc} 3.3V		8 8		A rms A rms	Continuous, unit auto recovers from short, V_o < 100mV See Application Note 137
Load transient response - peak deviation	$V_{dynamic}$ 2.5V $V_{dynamic}$ 3.3V		40 40	75 75	mV mV	Peak deviation for 50% to 75% step load, di/dt = 100mA/µsec
Load transient response - recovery	$T_{recovery}$		20	50	µsec	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext} 2.5V C_{ext} 3.3V	0 0		3,300 3,300	µF µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	Vp-p Vrms		30 10	50 15	mV p-p mV rms	Measurement bandwidth 20MHz. See Application Note 137 for measurement set-up details.

LQD30A48-3V3-2V5 Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage trip voltage	V_{ov} 2.5V Vov 3.3V	2.75 3.63		3.25 4.29	V DC V DC	Non-latching. See Application Note 137 for details
Overcurrent limit inception	I_{oc}	15.5	17.6	20.0	A DC	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of V_o nom) Limit O/P to 87W
		90				Trim down (% of V_o nom) See Application Note 137 for details of trim equations and trim curves

LQD30A48-3V3-2V5 Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η		91.5		%	I_{out} 3.3V = 50% Iout (max), I_{out} 2.5V = 100% Iout (max), V_{in} = V_{in} (nom)
Efficiency	η		91.5		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 2.5V = 50% I_{out} (max), V_{in} = V_{in} (nom)
Efficiency	η	89.0	91.0		%	I_{out} 3.3V = 100% I_{out} (max), I_{out} 2.5V = 100% I_{out} (max), V_{in} = V_{in} (nom)

LQD25A48-5V0-3V3 Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		2.35		ADC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input current - maximum	$I_{in\ (max.)}$			3.40	ADC	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max.)}$; 100% load on each output
Input capacitor ripple current	$I_{in\ (ripple)}$		30 60		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Reflected ripple current	$I_{in\ (ref)}$		3 5		mA rms mA pk-pk	$I_{out} = I_{out\ (max.)}$, measured with external filter. See Application Note 137 for details
Input capacitance - internal filter	C_{input}		3		µF	Internal to converter
Input capacitance - external bypass	C_{bypass}	33			µF	Recommended customer added capacitance, <0.7Ω ESR

LQD25A48-5V0-3V3 Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom) 5.0V Vo (nom) 3.3V	4.92 3.25	5.00 3.30	5.08 3.35	V DC V DC	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	Vo 5.0V Vo 3.3V	4.85 3.20	5.00	5.15 3.40	V DC V DC	For all line, static load and temperature until end of life
Line regulation	Vo 5.0V Vo 3.3V			0.3 0.3	% %	$I_{out} = I_{out\ (nom)}$; $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation	Vo 5.0V Vo 3.3V			0.5 0.5	% %	$V_{in} = V_{in\ (nom)}$; $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation			0.005	0.02	±%/°C	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$
Output current continuous	Iout 5.0V Iout 3.3V	0 0		10 15	A DC A DC	
Output current - short circuit	I_{sc} 5.0V I_{sc} 3.3V		4 6		A rms A rms	Continuous, unit auto recovers from short, V_o < 100mV See Application Note 137
Load transient response - peak deviation	$V_{dynamic}$ 5.0V $V_{dynamic}$ 3.3V		120 40	200 75	mV mV	Peak deviation for 50% to 75% step load, di/dt = 100mA/µsec
Load transient response - recovery	$T_{recovery}$		20	50	µsec	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext} 5.0V C_{ext} 3.3V	0 0		3,300 3,300	µF µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	Vp-p Vrms		30 10	50 15	mV p-p mV rms	Measurement bandwidth 20MHz. See Application Note 137 for measurement set-up details.

LQD25A48-5V0-3V3 Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage trip voltage	V_{ov} 5.0V Vov 3.3V	5.50 3.63		6.50 4.29	V DC V DC	Non-latching. See Application Note 137 for details
Overcurrent limit inception	I_{oc} 5.0V I_{oc} 3.3V	10.5 15.5	11.7 17.6	13.0 20.0	A DC A DC	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 99.5W
		90				Trim down (% of $V_{o\ nom}$) See Application Note 137 for details of trim equations and trim curves

LQD25A48-5V0-3V3 Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η		91.0		%	I_{out} 5.0V = 50% Iout (max), I_{out} 3.3V = 100% Iout (max), V_{in} = V_{in} (nom)
Efficiency	η		91.0		%	I_{out} 5.0V = 100% I_{out} (max), I_{out} 3.3V = 50% I_{out} (max), V_{in} = V_{in} (nom)
Efficiency	η	88.5	91.0		%	I_{out} 5.0V = 100% I_{out} (max), I_{out} 3.3V = 100% I_{out} (max), V_{in} = V_{in} (nom)

LQD30A48-3V3-1V2 Model

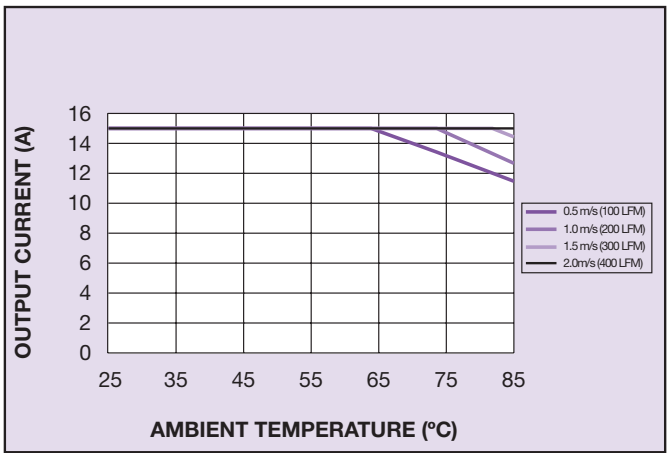


Figure 1.1: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 4 Iout1 = Iout2, Vin = 48V

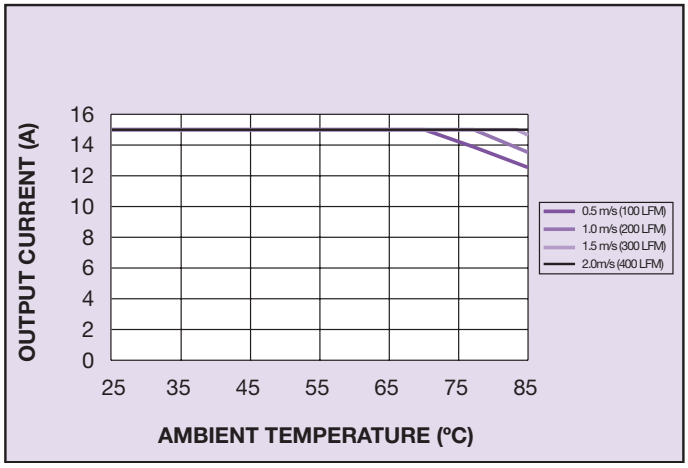


Figure 1.2: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 1 Iout1 = Iout2, Vin = 48V

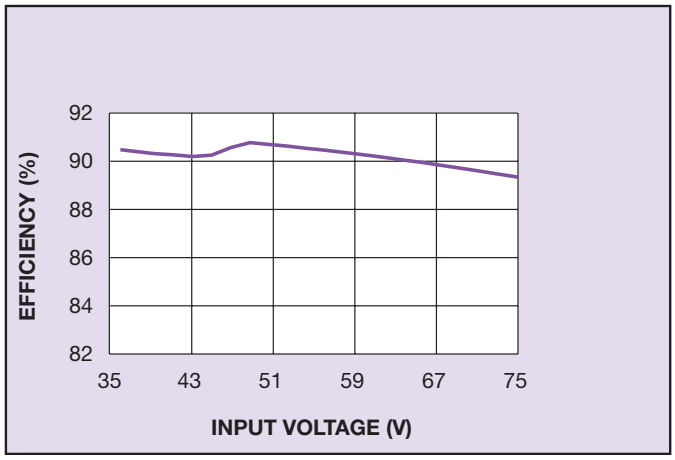


Figure 2: Efficiency vs. Line

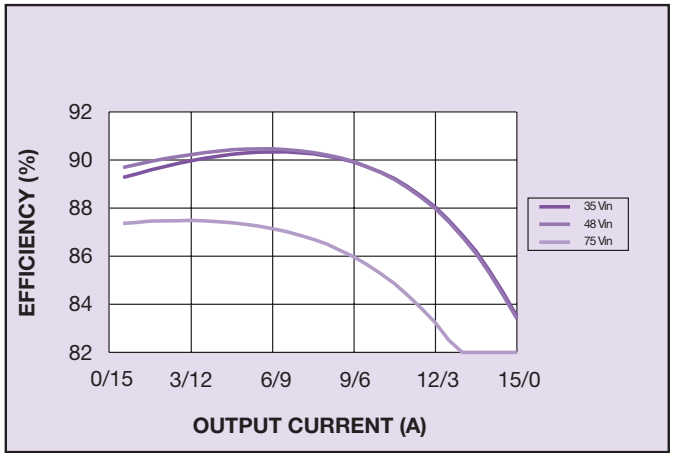


Figure 3: Efficiency vs. Crossload Vout1/Vout2

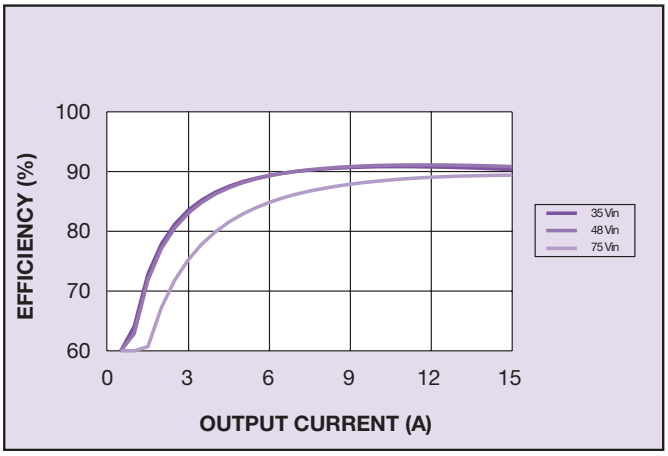


Figure 4: Efficiency vs. Load Iout1 = Iout2

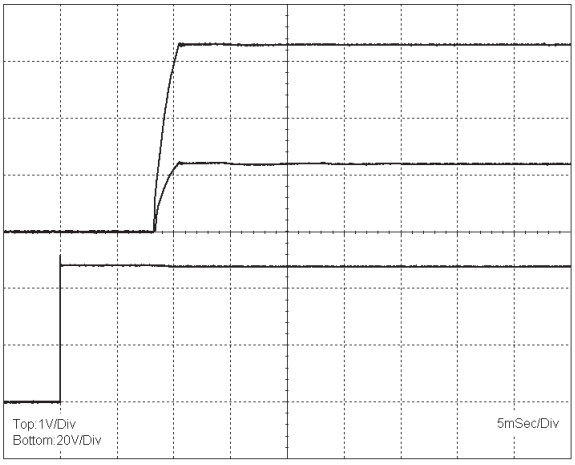


Figure 5: Typical Start-up Top (Vout1 and Vout2), Bottom (Vin)

LQD30A48-3V3-1V2 Model

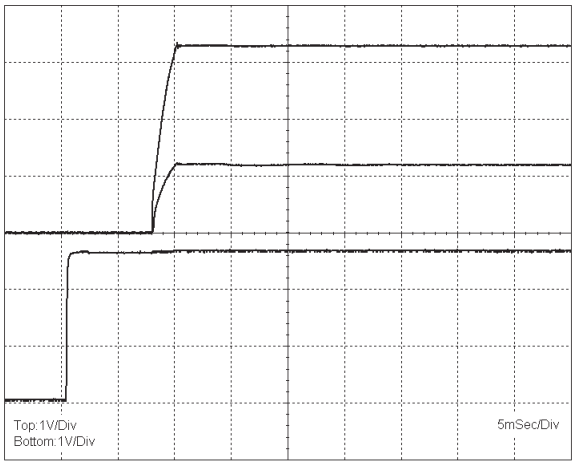


Figure 6: Bottom (Remote ON/OFF), Top (Vout1 and Vout2)

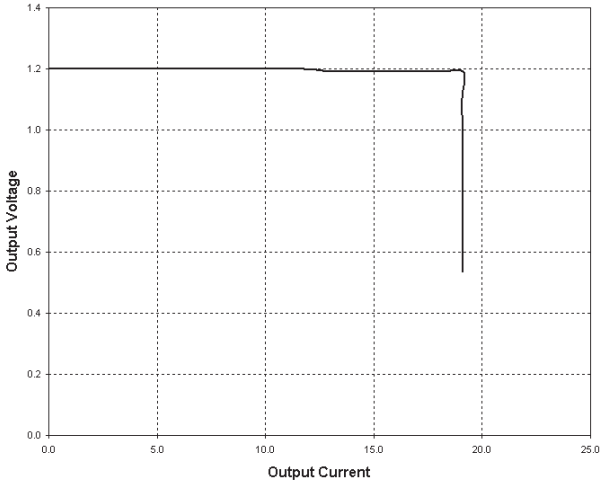


Figure 7: Current Limit characteristic (Vout1)

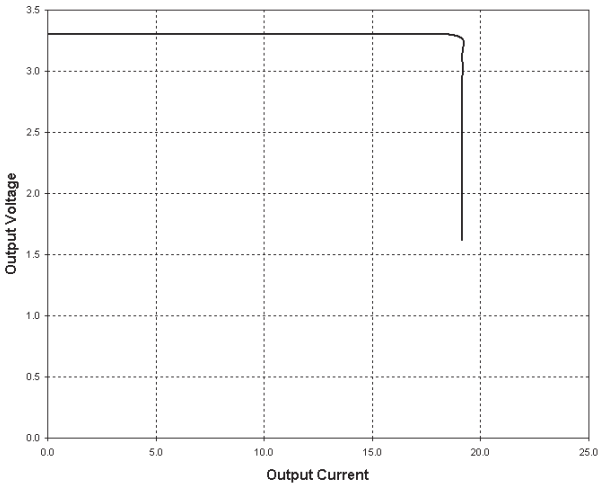


Figure 8: Current Limit characteristic (Vout2)

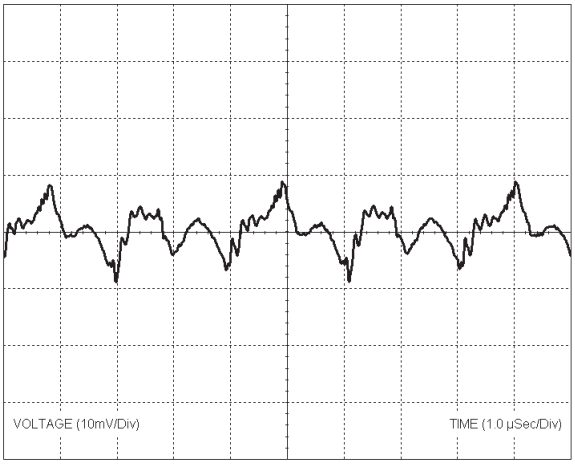


Figure 9: Output Ripple (Vout1)

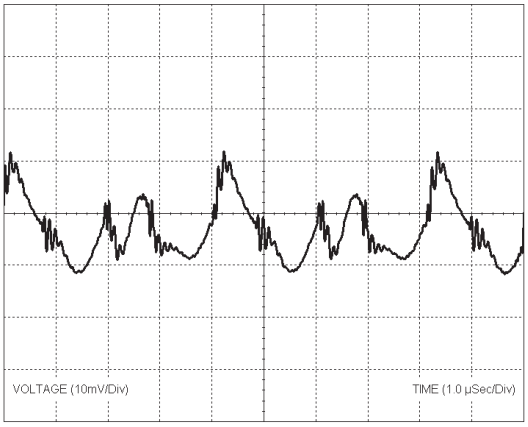


Figure 10: Output Ripple (Vout2)

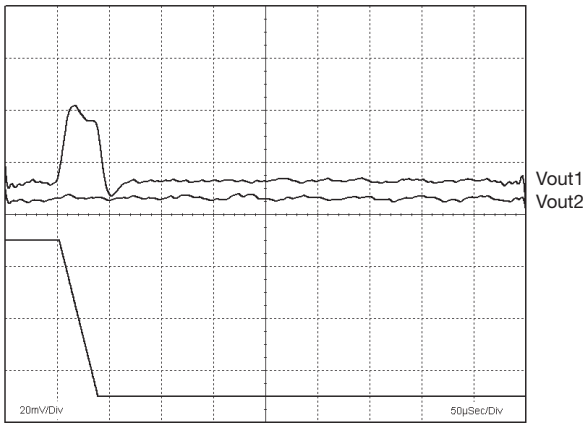


Figure 11: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout1)

LQD30A48-3V3-1V2 Model

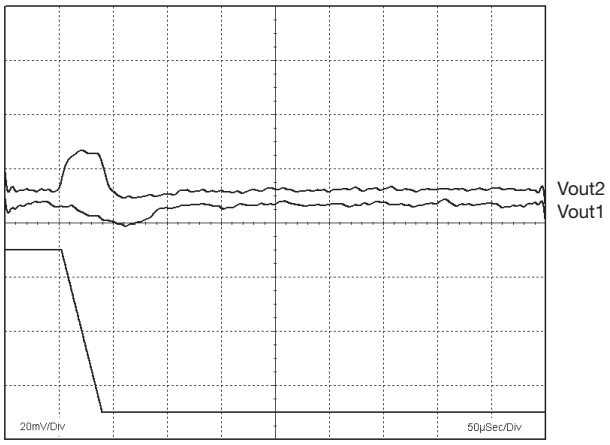


Figure 12: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout2)

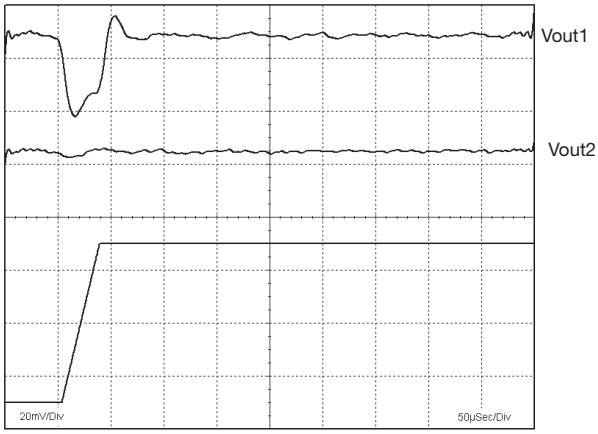


Figure 13: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout1)

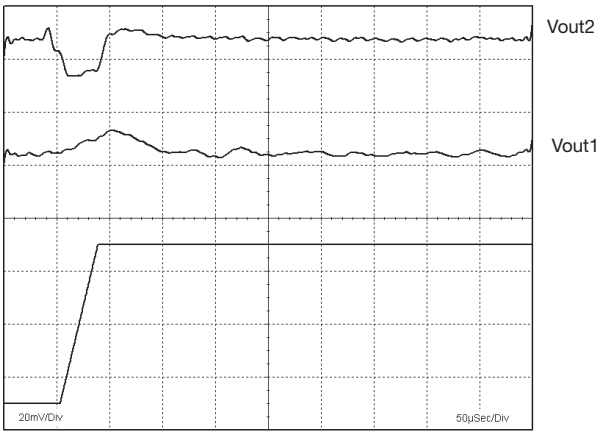


Figure 14: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout2)

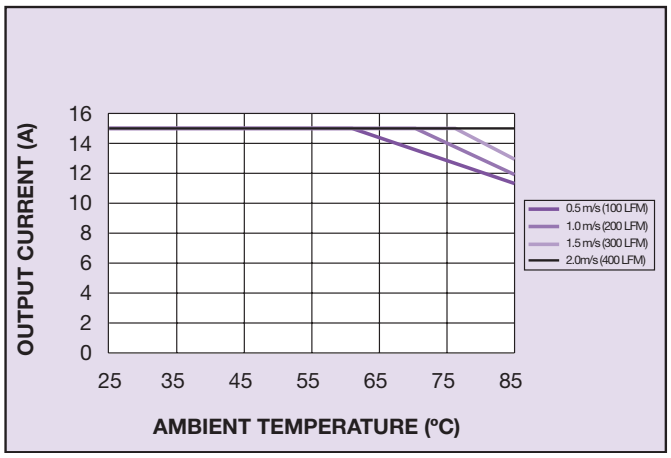


Figure 15.1: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 4 Iout1 = Iout2, Vin = 48V

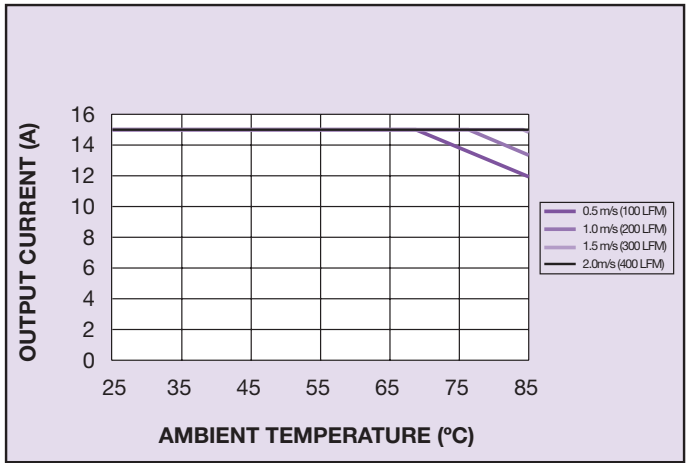


Figure 15.2: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 1 Iout1 = Iout2, Vin = 48V

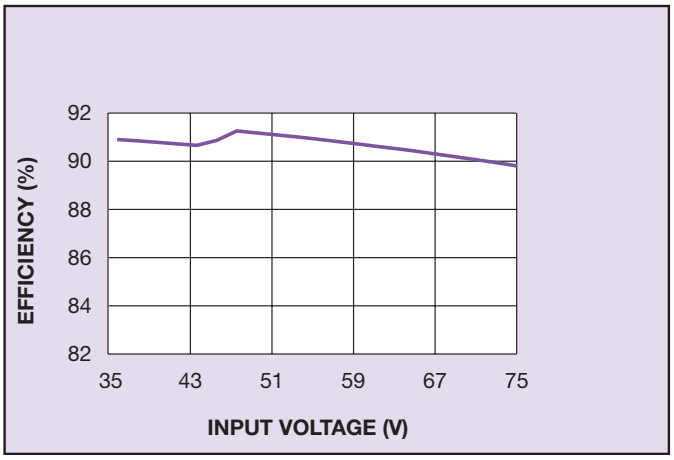


Figure 16: Efficiency vs. Line

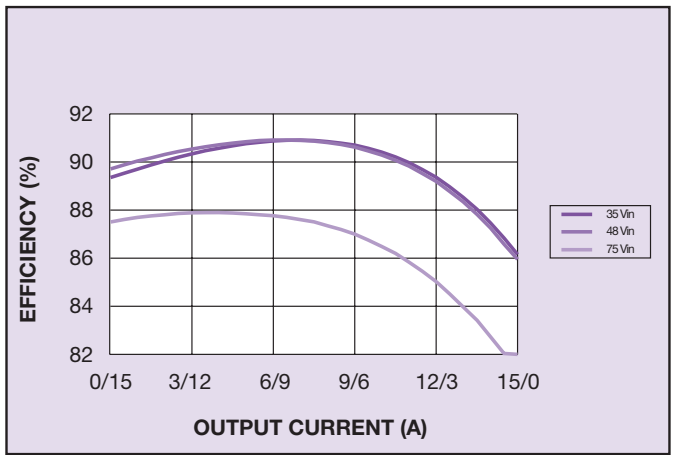


Figure 17: Efficiency vs. Crossload Vout1/Vout2

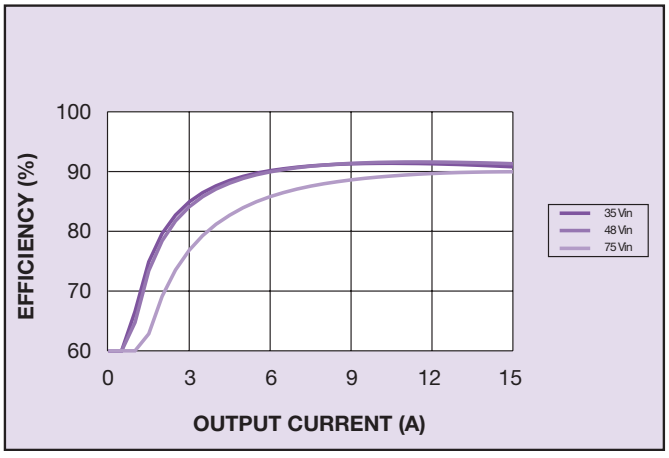


Figure 18: Efficiency vs. Load Iout1 = Iout2

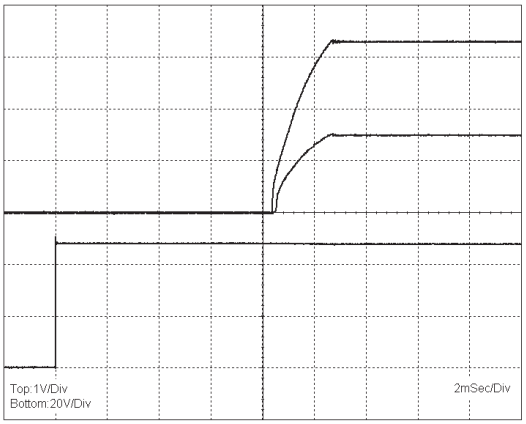


Figure 19: Typical Start-up Top (Vout1 and Vout2), Bottom (Vin)

LQD30A48-3V3-1V5 Model

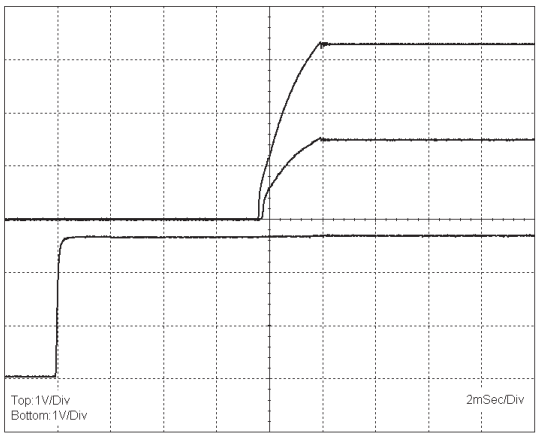


Figure 20: Bottom (Remote ON/OFF), Top (Vout1 and Vout2)

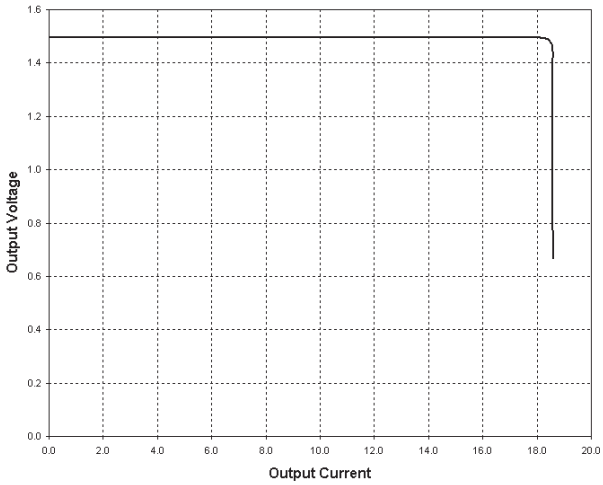


Figure 21: Current Limit characteristic (Vout1)

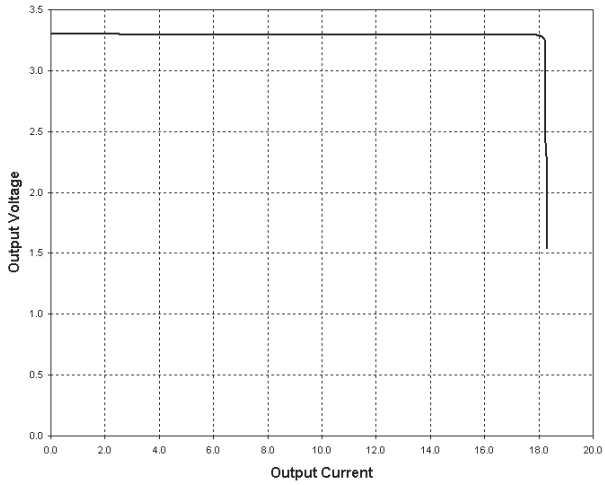


Figure 22: Current Limit characteristic (Vout2)

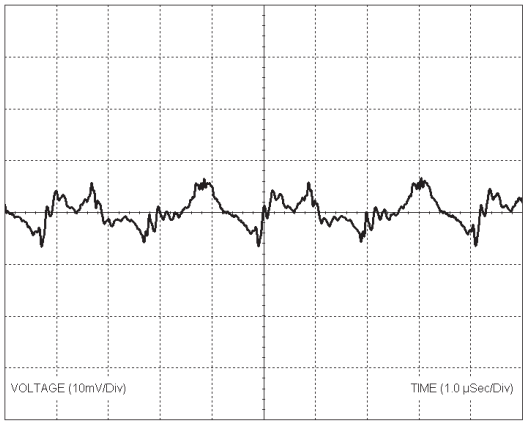


Figure 23: Output Ripple (Vout1)

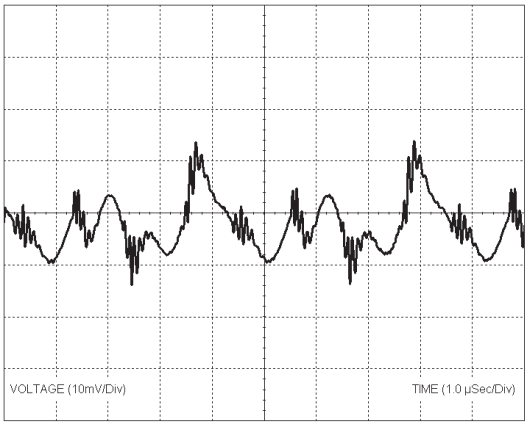


Figure 24: Output Ripple (Vout2)

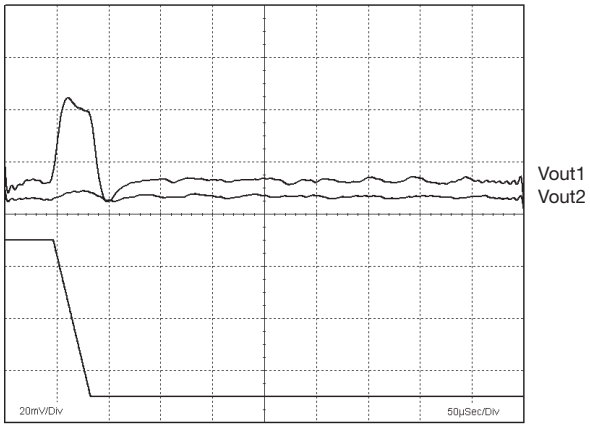


Figure 25: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout1)

LQD30A48-3V3-1V5 Model

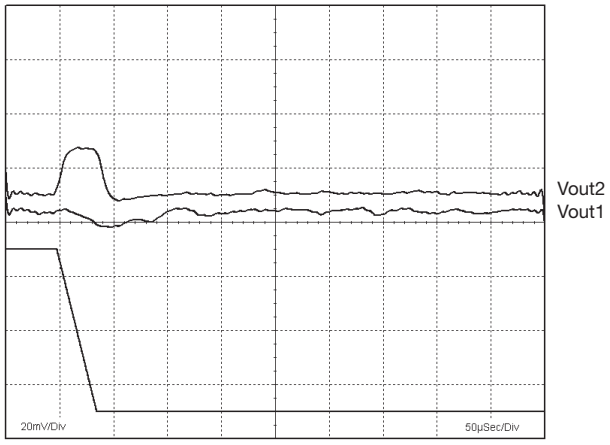


Figure 26: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout2)

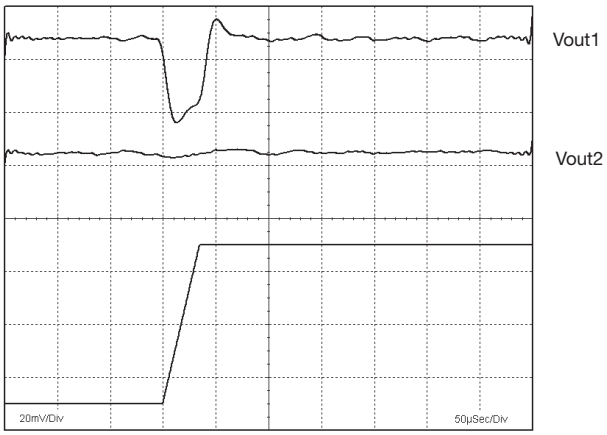


Figure 27: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout1)

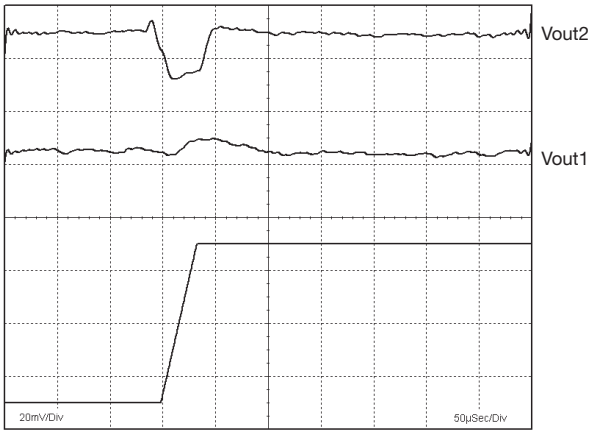


Figure 28: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout2)

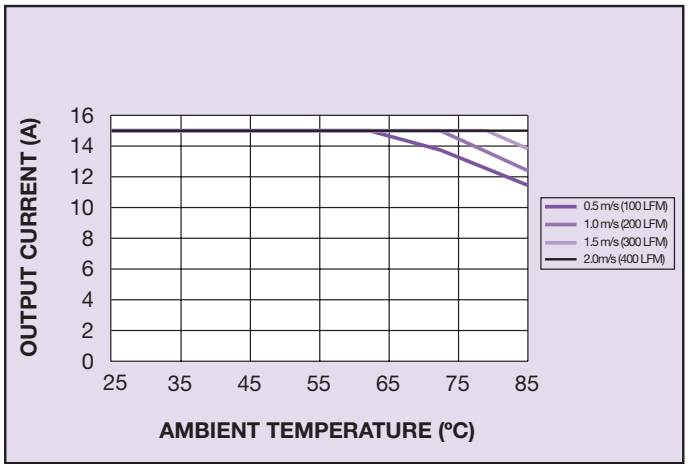


Figure 29.1: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 4 Iout1 = Iout2, Vin = 48V

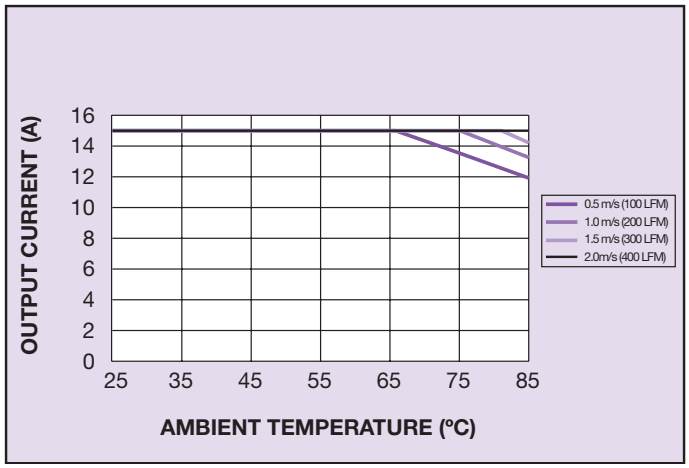


Figure 29.2: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 1 Iout1 = Iout2, Vin = 48V

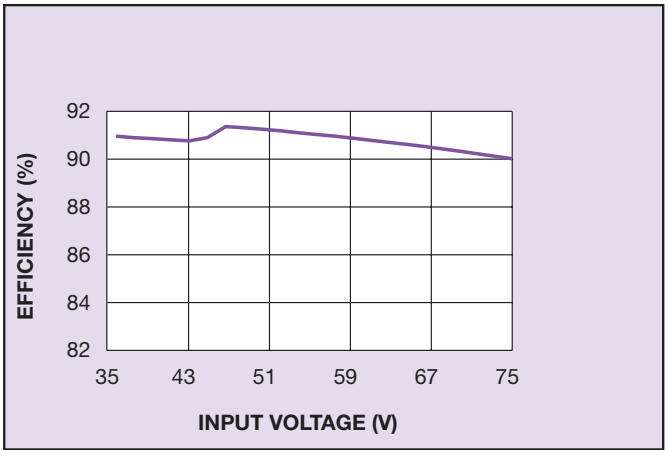


Figure 30: Efficiency vs. Line

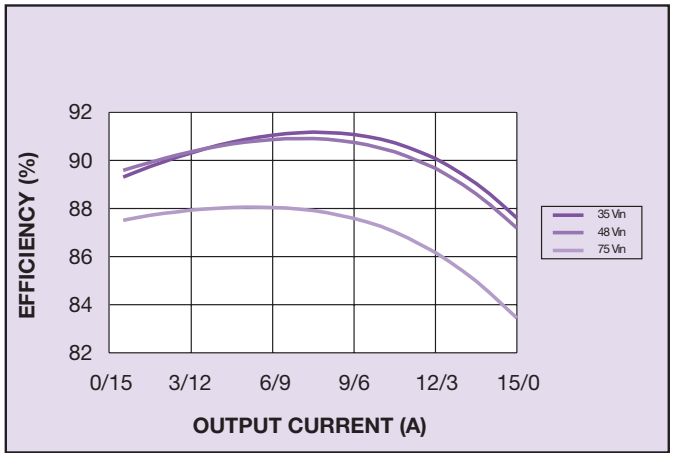


Figure 31: Efficiency vs. Crossload Vout1/Vout2

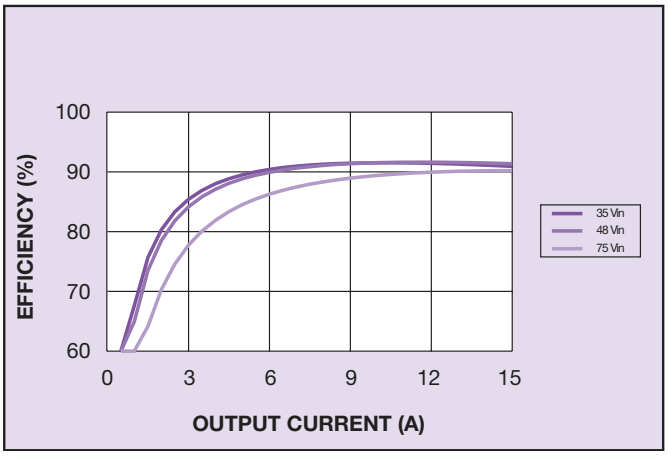


Figure 32: Efficiency vs. Load Iout1 = Iout2

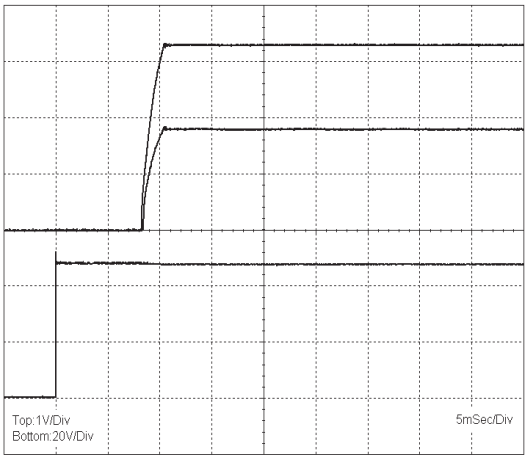


Figure 33: Typical Start-up Top (Vout1 and Vout2), Bottom (Vin)

LQ30A48D3V3-1V8 Model

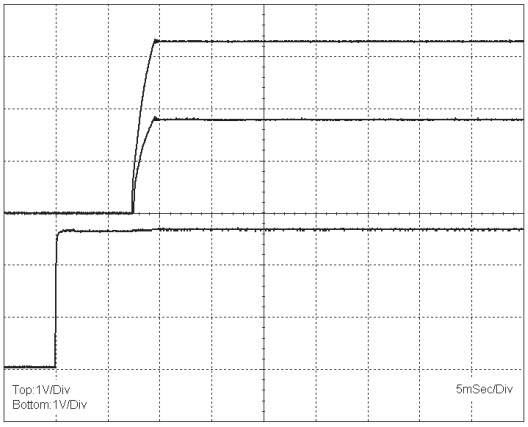


Figure 34: Bottom (Remote ON/OFF), Top (Vout1 and Vout2)

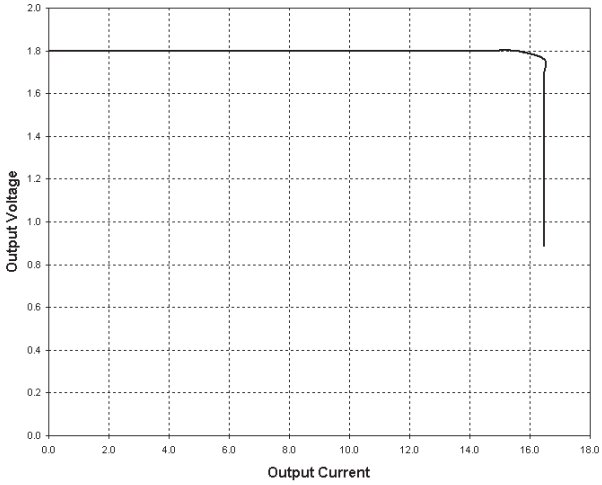


Figure 35: Current Limit Characteristic (Vout1)

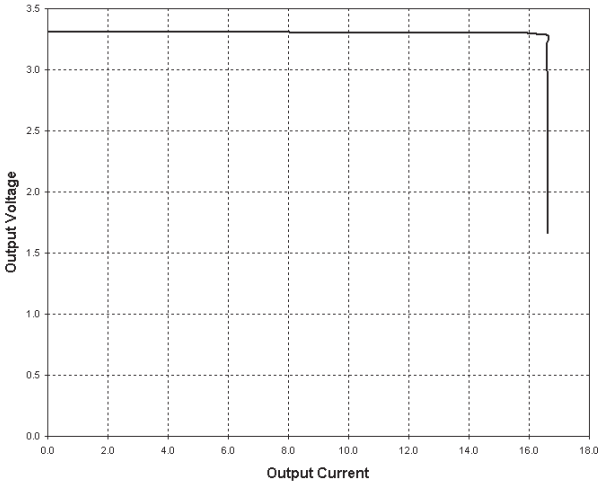


Figure 36: Current Limit Characteristic (Vout2)

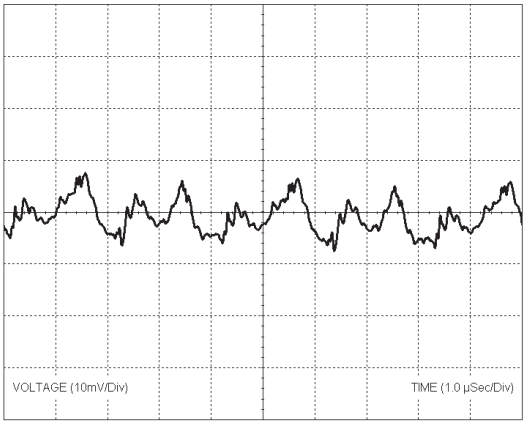


Figure 37: Output Ripple (Vout2)

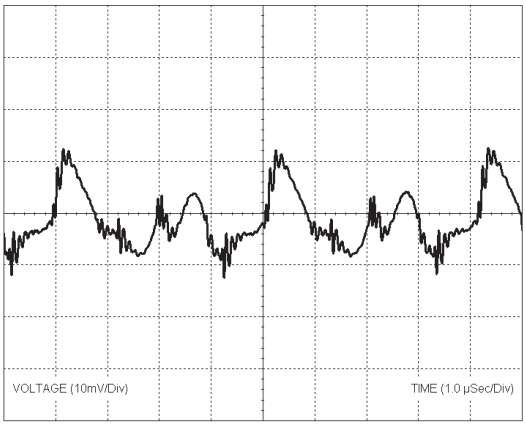


Figure 38 Output Ripple (Vout1)

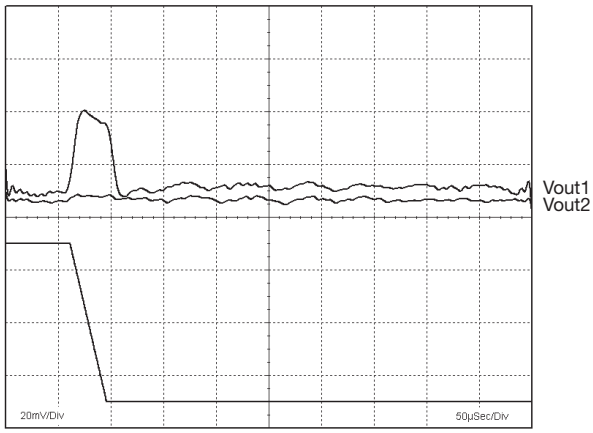


Figure 39: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout1)

LQ30A48D3V3-1V8 Model

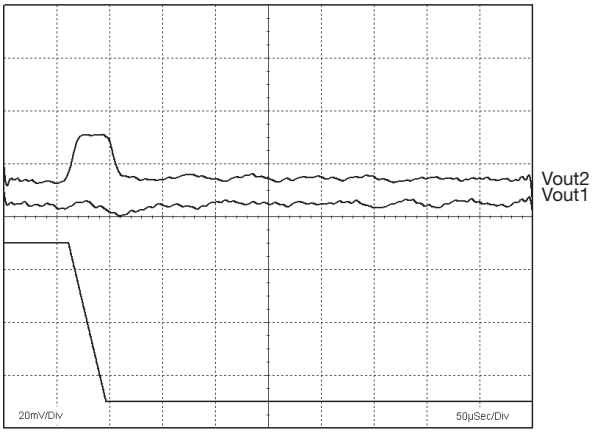


Figure 40: Typical Transient Response 75%- 50%, 100mA/µsec Step Load Change (Vout2)

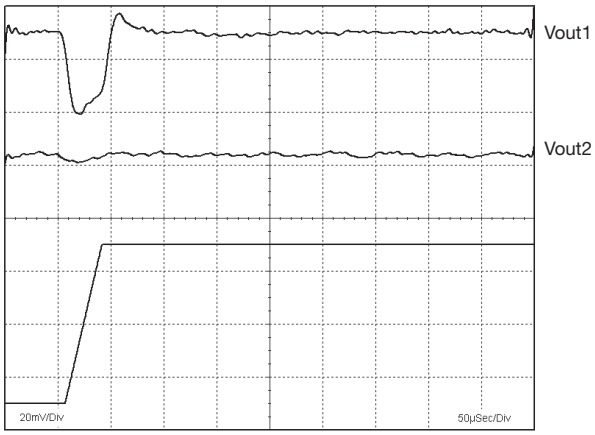


Figure 41: Typical Transient Response 50%- 75%, 100mA/µsec Step Load Change (Vout1)

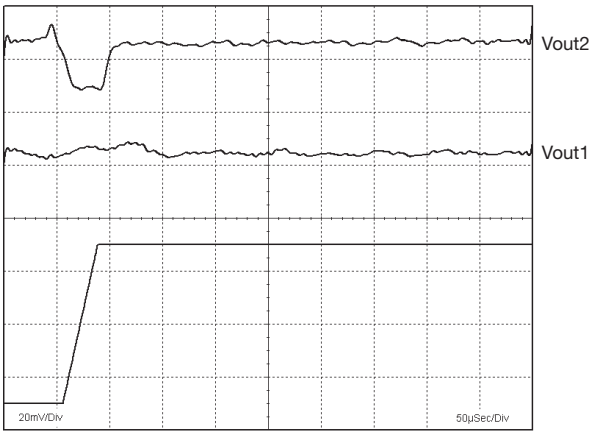


Figure 42: Typical Transient Response 50%- 75%, 100mA/µsec Step Load Change (Vout2)

LQD30A48-3V3-2V5 Model

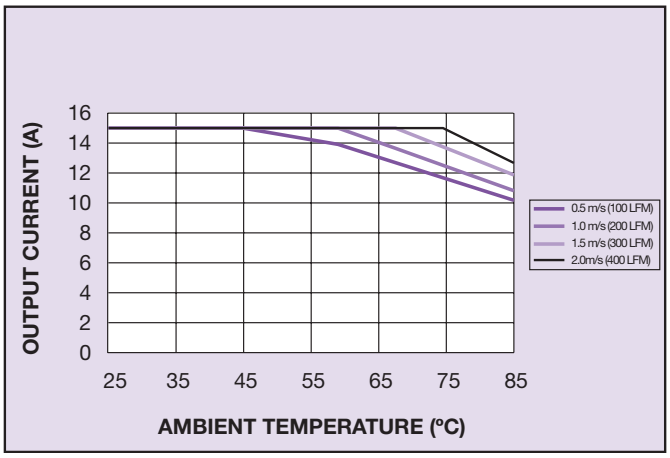


Figure 43.1: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 4 Iout1 = Iout2, Vin = 48V

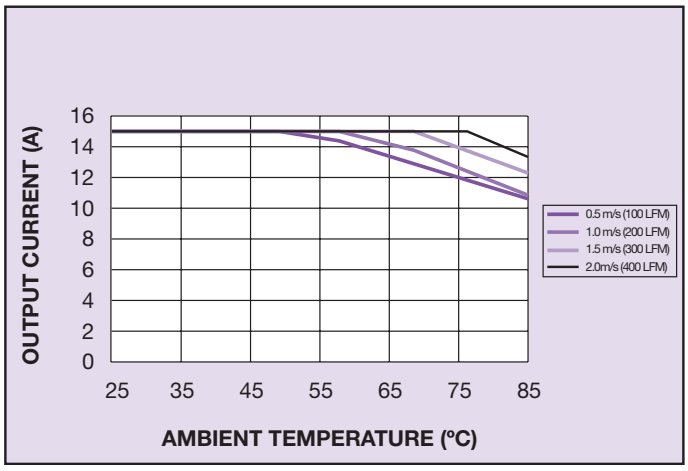


Figure 43.2: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 1 Iout1 = Iout2, Vin = 48V

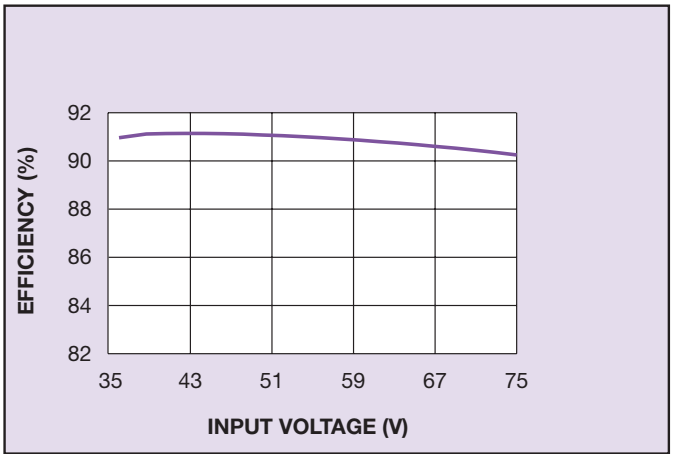


Figure 44: Efficiency vs. Line

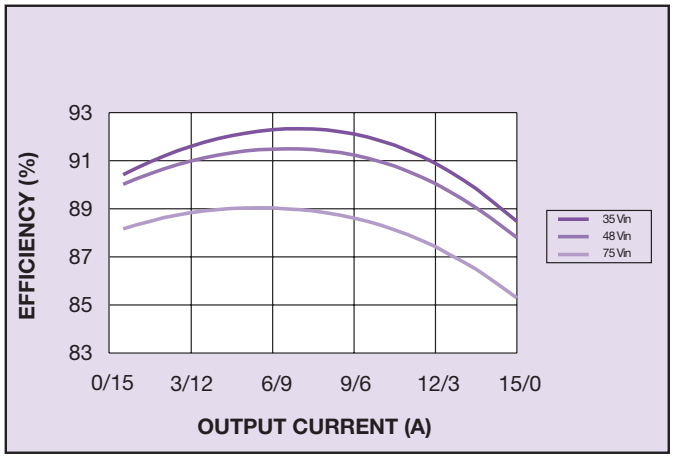


Figure 45: Efficiency vs. Crossload Vout1/Vout2

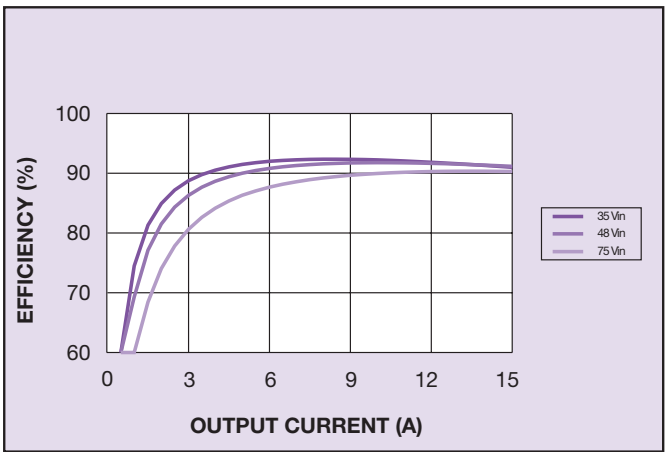


Figure 46: Efficiency vs. Load Iout1 = Iout2

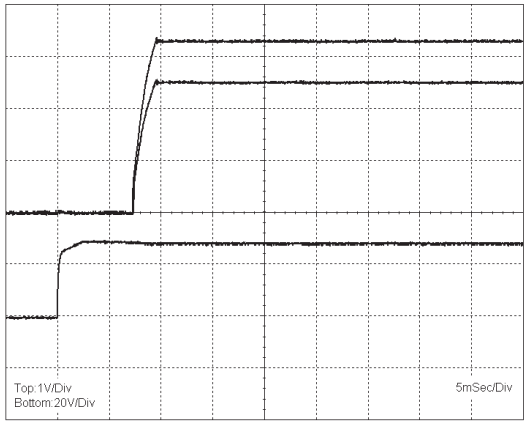


Figure 47: Typical Start-up Top (Vout1 and Vout2), Bottom (Vin)

LQD30A48-3V3-2V5 Model

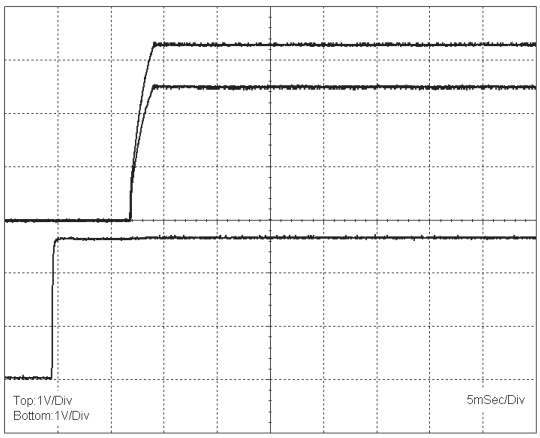


Figure 48: Bottom (Remote ON/OFF), Top (Vout1 and Vout2)

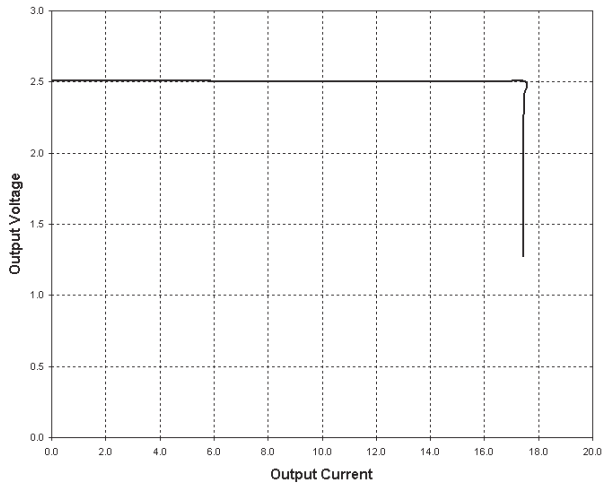


Figure 49: Current Limit characteristic (Vout1)

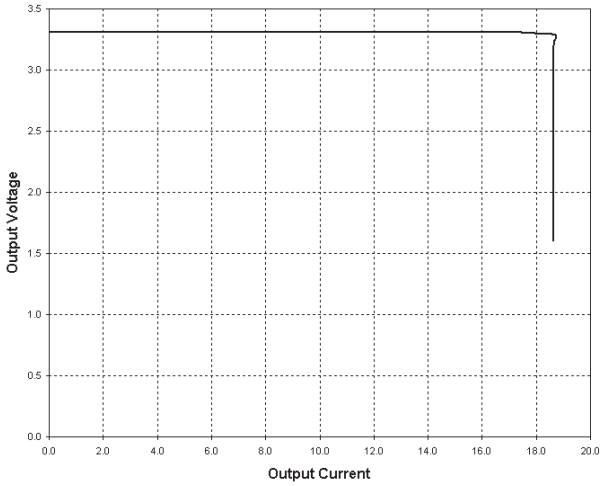


Figure 50: Current Limit characteristic (Vout2)

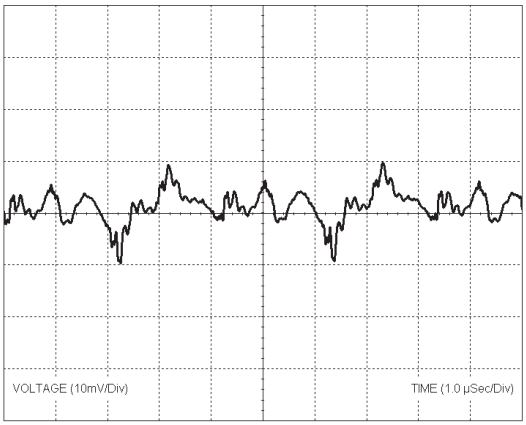


Figure 51: Output Ripple (Vout1)

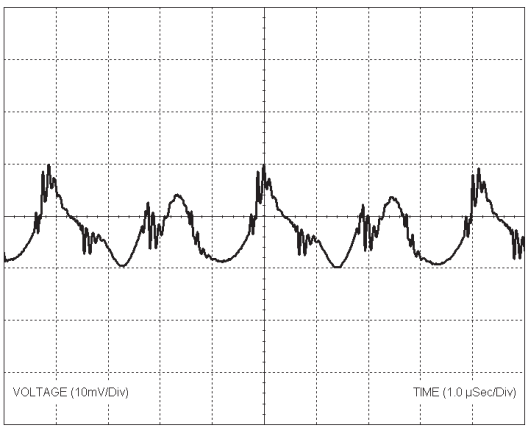


Figure 52: Output Ripple (Vout2)

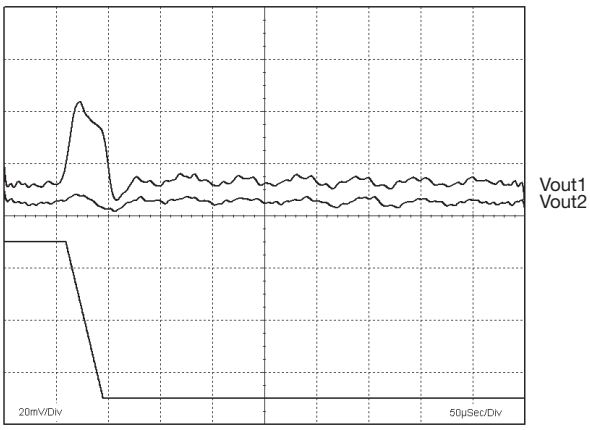


Figure 53: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout1)

LQD30A48-3V3-2V5 Model

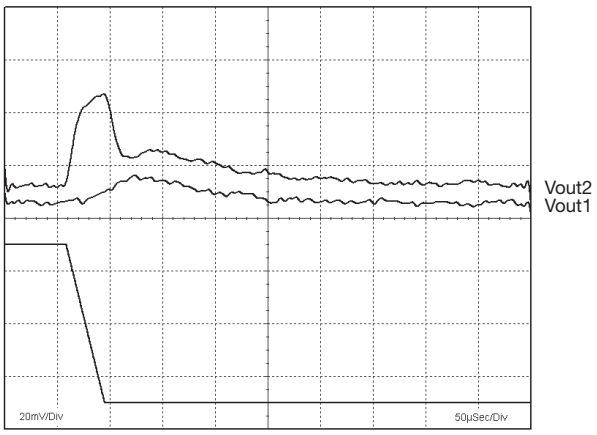


Figure 54: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout2)

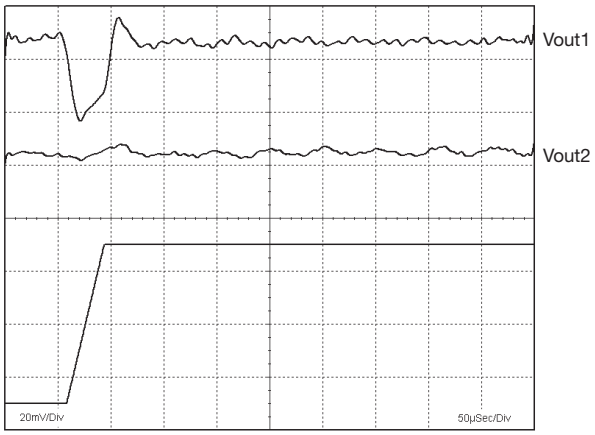


Figure 55: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout1)

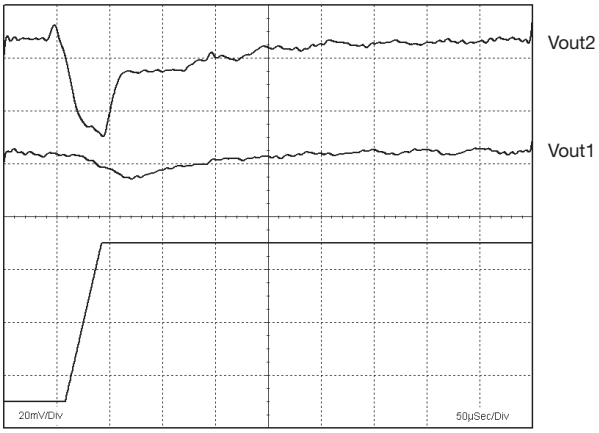


Figure 56: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout2)

LQD25A48-5V0-3V3 Model

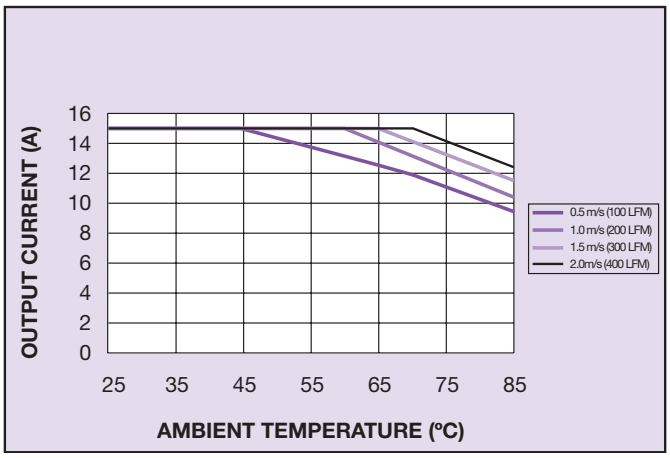


Figure 57.1: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 4 Iout2 = 67% of Iout1, Vin = 48V

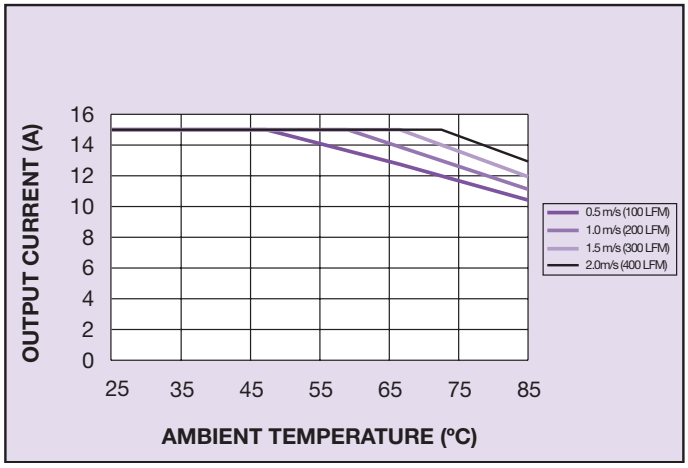


Figure 57.2: Maximum Current Per Output vs. Ambient Temperature and Airflow from Pin 3 to Pin 1 Iout2 = 67% of Iout1, Vin = 48V

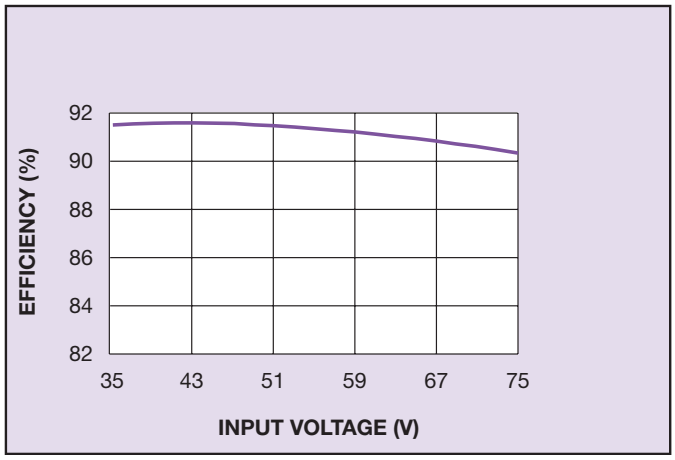


Figure 58: Efficiency vs. Line

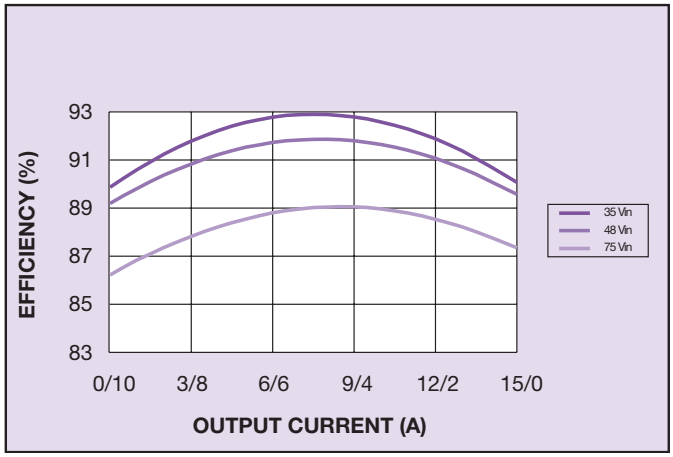


Figure 59: Efficiency vs. Crossload Vout1/Vout2

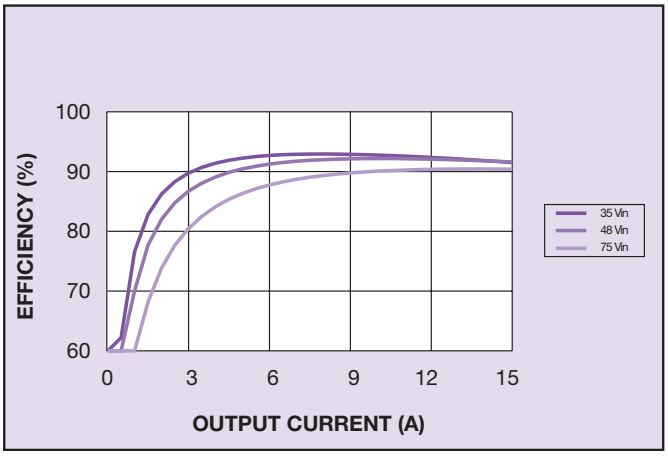


Figure 60: Efficiency vs. Load Iout2 = 67% of Iout1

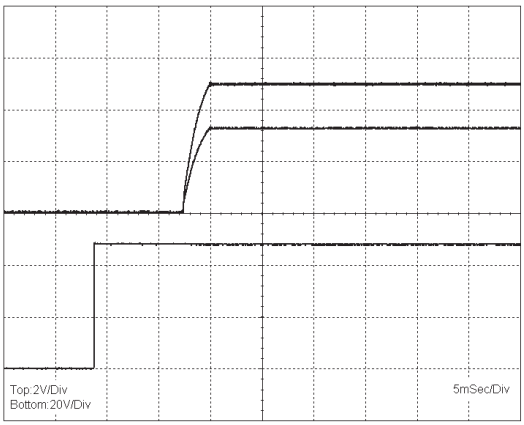


Figure 61: Typical Start-up Top (Vout1 and Vout2), Bottom (Vin)

LQD25A48-5V0-3V3 Model

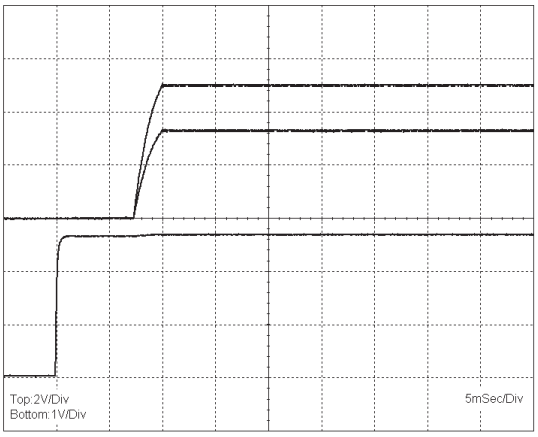


Figure 62: Bottom (Remote ON/OFF), Top (Vout1 and Vout2)

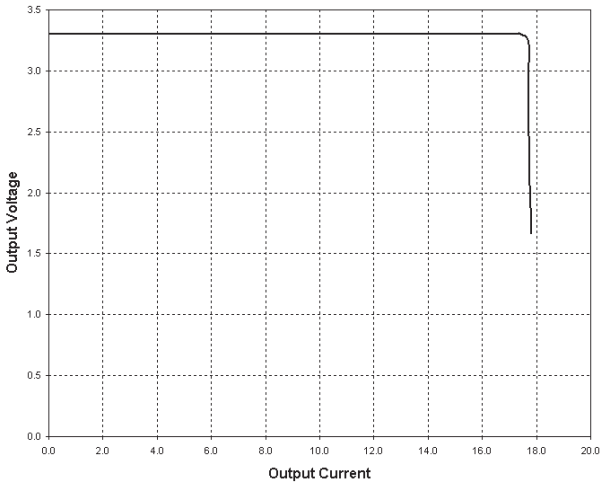


Figure 63: Current Limit characteristic (Vout1)

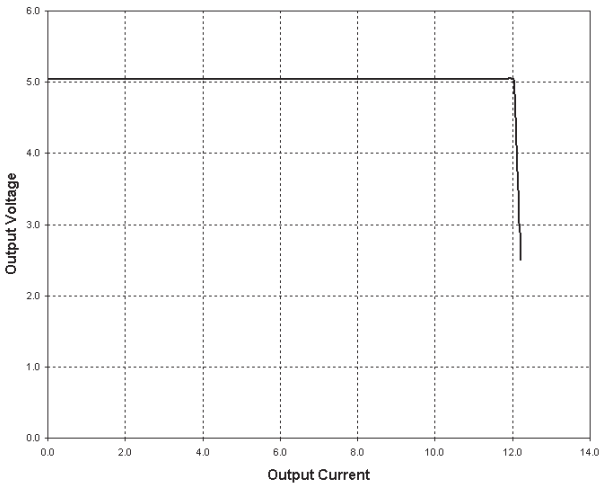


Figure 64: Current Limit characteristic (Vout2)

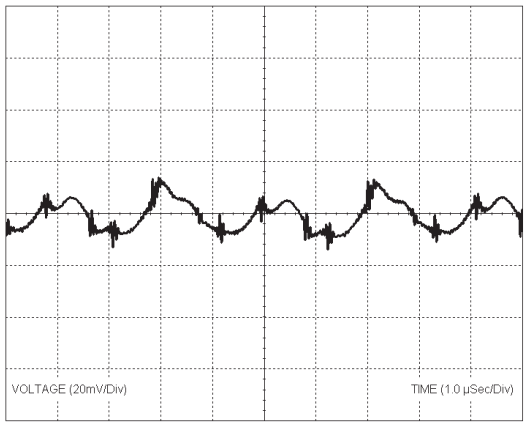


Figure 65: Output Ripple (Vout1)

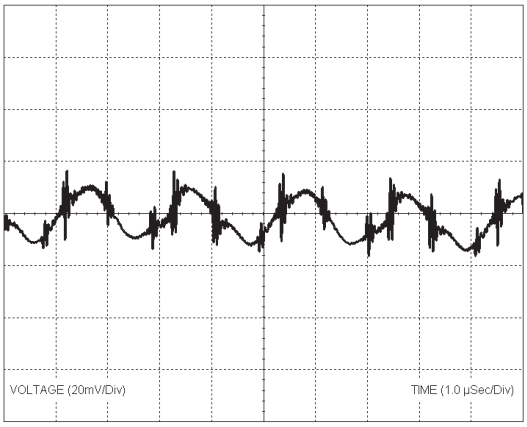


Figure 66: Output Ripple (Vout2)

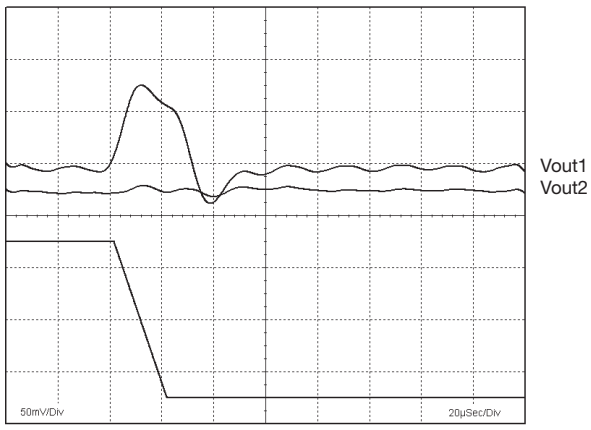


Figure 67: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout1)

LQD25A48-5V0-3V3 Model

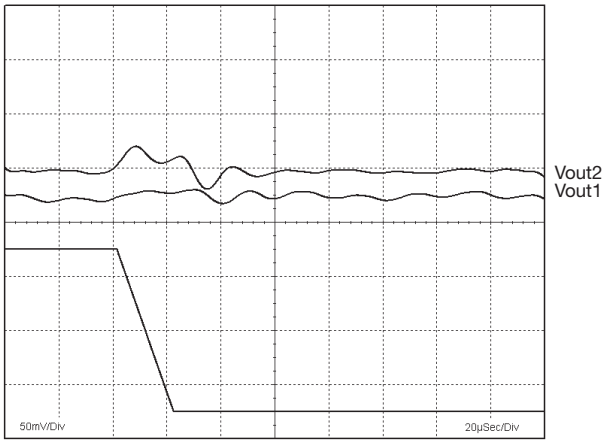
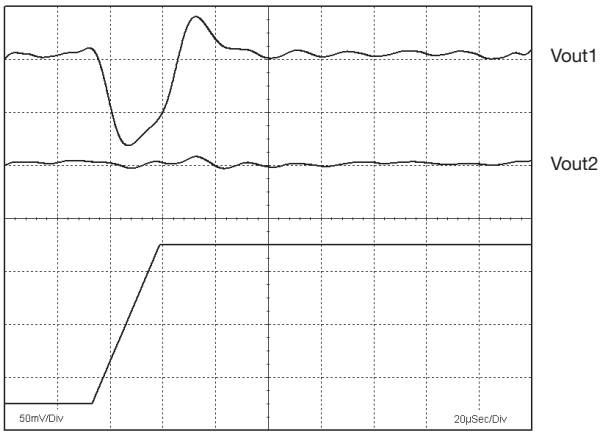


Figure 68: Typical Transient Response 75%-50%, 100mA/µsec Step Load Change (Vout2)



69: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout1)

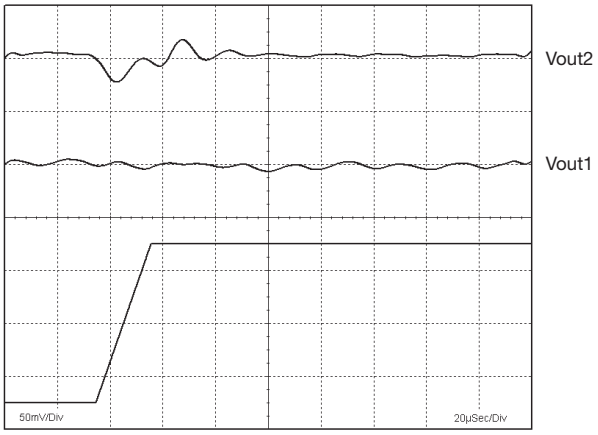
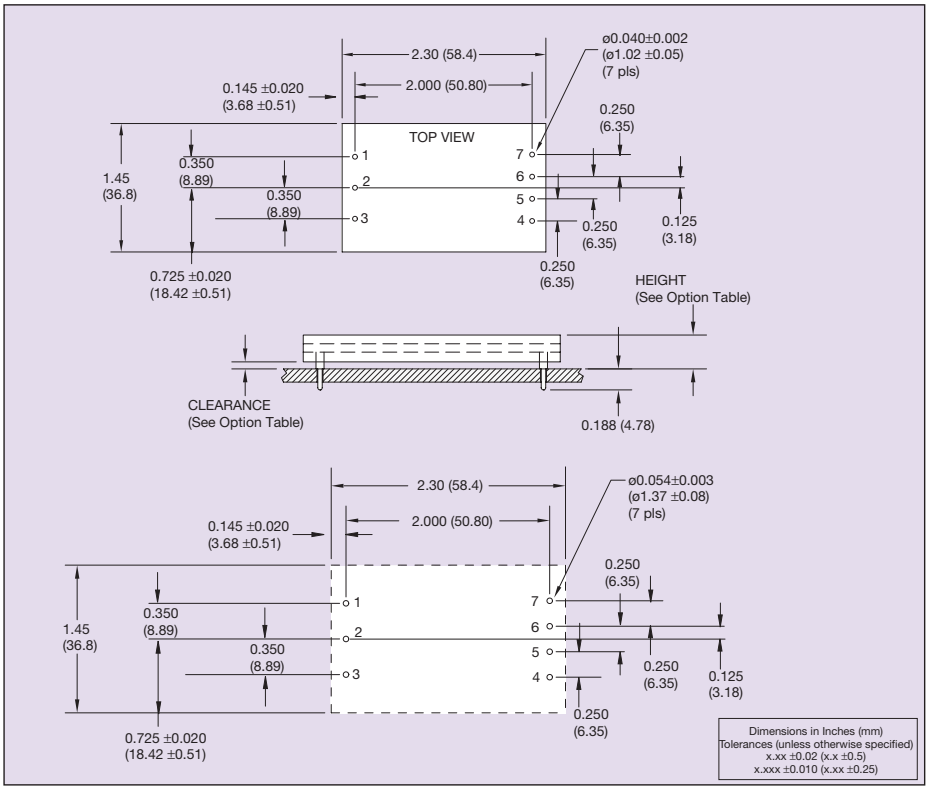


Figure 70: Typical Transient Response 50%-75%, 100mA/µsec Step Load Change (Vout2)

INPUT VOLTAGE	OUTPUT VOLTAGE		OUTPUT CURRENT		OVP		TYPICAL EFFICIENCY	MODEL NUMBER (2)
	OP1	OP2	1	2	1	2		
36-75VDC	1.2V	3.3V	15A	15A	1.5V	4.0V	90.0%	LQD30A48-3V3-1V2
36-75VDC	1.5V	3.3V	15A	15A	1.8V	4.0V	90.5%	LQD30A48-3V3-1V5
36-75VDC	1.8V	3.3V	15A	15A	2.0V	4.0V	90.5%	LQD30A48-3V3-1V8
36-75VDC	2.5V	3.3V	15A	15A	3.0V	4.0V	91.0%	LQD30A48-3V3-2V5
36-75VDC	3.3V	5.0V	15A	10A	4.0V	6.0V	91.0%	LQD25A48-5V0-3V3



Pin Connections

Pin No.	Function
1	+ Vin
2	ON/OFF
3	- Vin
4	O/P 1
5	Output Return
6	Trim
7	O/P 2

Dimension Options

Option	Clearance	Height
A	0.030 (0.76) min.	0.300 (7.62) max.
E	0.070 (1.78) min.	0.340 (8.64) max.

Figure 57: Dimensions and Pinout

Note 1

The control pin is referenced to Vin-.

Note 2

Active low Remote ON/OFF is available. Standard product is active high. When ordering active low parts, designate with the Suffix '-R' e.g. LQD30A48-3V3-1V8RA. See Application Note 137 for detailed information regarding ON/OFF control implementation.

CAUTION: Hazardous internal voltages and high temperatures. Ensure that unit is accessible only to trained personnel. The user must provide the recommended fusing in order to comply with safety approvals.

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