typhoon Eighth-Brick Series

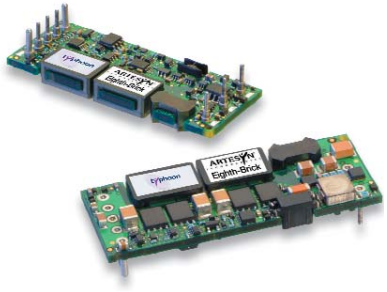
Single output

ARTESYN TECHNOLOGIES

DC/DC CONVERTERS | High Current, High Efficiency, Low Profile | 1

NEW Product

- **Ultra-high efficiency topology**
- **Industry standard eighth brick footprint (identical to quarter-brick pinout)**
- **Low profile through-hole version**
- **Low profile with 38% space savings over other quarter-brick brick converters**
- **Wide ambient temperature range, -40 °C to +85 °C**
- **80% to 110% output trim**
- **Monotonic start-up in normal and prebiased loads**
- **Basic insulation system**
- **Overvoltage and overtemperature protection**
- **Secondary side control, no optocouplers, fast transient response**
- **100 V, 100 ms input voltage transient rated**
- **Available RoHS compliant**



Patent No. 6,765,810
Other Patents Pending

2 YEAR WARRANTY

This is a new high efficiency, open-frame, low profile, single board, isolated dc-dc converter series in an industry standard eight-brick footprint that provides up to 100 W of output power. The series delivers very high output current at low voltages, and excellent useable power for today's high performance applications. The series features an input voltage range of 18 Vdc to 36 Vdc and 36 Vdc to 75 Vdc and is available with output voltages of 1.2 V, 1.5 V 1.8 V, 2.5 V, 3.3 V and 5.0 V. The output voltage is adjustable from 80% to 110% of the nominal value. The series also has a remote ON/OFF capability. Overcurrent, overvoltage and overtemperature protection features are included as standard. Full international safety approval including EN60950-1 VDE and UL/cUL60950, reduces compliance costs and time to market.

SPECIFICATIONS

All specifications are typical at nominal input, full load at 25 °C ambient unless otherwise stated

OUTPUT SPECIFICATIONS

Voltage adjustability		80% to 110%
Minimum load		0%
Overshoot	At turn-on and turn-off	None
Undershoot		None
Transient response (See Note 1)		60 mV to 150 mV typ. deviation 20 µs recovery

INPUT SPECIFICATIONS

Input voltage range	24 V nominal 48 V nominal	18-36 Vdc 36-75 Vdc
Input current	No load Remote OFF	50 mA 5 mA
Active high remote ON/OFF Logic compatibility ON OFF		 Open collector ref to -input Open circuit or >2.4 Vdc <0.4 Vdc
Undervoltage Lockout 24 Vin 48 Vin 	 Power up Power down Power up Power down	 17.5 V (typ.) 16.5 V (typ.) 35.5 V (typ.) 33.5 V (typ.)
48 Vin Start-up time (See Note 2)	Power up Remote ON/OFF	15 ms (typ.) 15 ms (typ.)

EMC CHARACTERISTICS

Immunity:		
ESD air enclosure	EN61000-4-2 8 kV/6 kV	(O/P within spec.)
Radiated field enclosure	EN61000-4-3 10 V/m	(O/P within spec.)
Conducted	EN61000-4-6 10 V	(O/P within spec.)
Input transients	100 V, 100 ms	

GENERAL SPECIFICATIONS

Basic insulation	Input/output	2250 Vdc
Switching frequency	Fixed	480 kHz
Approvals and standards	(See Note 3)	EN60950-1 VDE UL/cUL 60950
Material flammability		UL94V-0
Weight		21 g (0.73 oz)
MTBF	Telcordia Tech SR-332	4,034,120 hours

ENVIRONMENTAL SPECIFICATIONS

Thermal performance	Operating ambient. temperature	-40 °C to +85 °C
	Non-operating	-55 °C to +125 °C

PROTECTION

Shortcircuit	Continuous
Overvoltage	Non-latching
Thermal	125 °C hot spot temperature with automatic recovery

International Safety Standard Approvals

UL/cUL CAN/CSA 22.2 No. 60950-00 : UL 60950
File No. E135734/60950
VDE Certificate No. 40005017. File No. 10401-3336-0197
CB Report and Certificate to IEC60950, Certificate No. DE1-31103

DC/DC CONVERTERS | High Current, High Efficiency, Low Profile | 2

For the most current data and application support visit www.artesyn.com/powergroup/products.htm

NEW Product

OUTPUT VOLTAGE	INPUT CURRENT (MAX.) (4)	INPUT RIPPLE CURRENT (5)	OUTPUT CURRENT (MAX.)	EFFICIENCY (TYP.)	REGULATION			RIPPLE & NOISE (pk - pk)	MODEL NUMBER (7,8)
					SET POINT ACCURACY (MAX.)	LINE	LOAD		
48 Vin VALUE MODELS									
1.2 V	0.98 A	100 mA	25 A	88%	±1.5%	±0.1%	±0.2%	60 mV	LES25A48-1V2J
1.5 V	1.21 A	100 mA	25 A	89.5%	±1.5%	±0.1%	±0.2%	60 mV	LES25A48-1V5J
1.8 V	1.43 A	100 mA	25 A	90.5%	±1.5%	±0.1%	±0.2%	60 mV	LES25A48-1V8J
2.5 V	1.62 A	150 mA	20 A	90%	±1.5%	±0.1%	±0.2%	60 mV	LES20A48-2V5J
3.3 V	2.11 A	150 mA	20 A	91%	±1.5%	±0.1%	±0.2%	60 mV	LES20A48-3V3J
5.0 V	1.59 A	100 mA	10 A	92%	±1.5%	±0.1%	±0.2%	60 mV	LES10A48-5V0J
48 Vin PERFORMANCE MODELS									
1.2 V	1.98 A	150 mA	50 A	86%	±1.5%	±0.1%	±0.2%	60 mV	LES50A48-1V2J
1.5 V	1.91 A	150 mA	40 A	88.5%	±1.5%	±0.1%	±0.2%	60 mV	LES40A48-1V5J
1.8 V	2.30 A	150 mA	40 A	90%	±1.5%	±0.1%	±0.2%	60 mV	LES40A48-1V8J
2.5 V	1.99 A	200 mA	25 A	89.5%	±1.5%	±0.1%	±0.2%	60 mV	LES25A48-2V5J
3.3 V	2.65 A	200 mA	25 A	90.5%	±1.5%	±0.1%	±0.2%	60 mV	LES25A48-3V3J
5.0 V	2.30 A	150 mA	15 A	91.5%	±1.5%	±0.1%	±0.2%	60 mV	LES15A48-5V0J
48 Vin ULTRA MODELS									
2.5 V	3.20 A	150 mA	40 A	91%	±1.5%	±0.1%	±0.2%	60 mV	LES40A48-2V5J
3.3 V	3.20 A	150 mA	30 A	90.5%	±1.5%	±0.1%	±0.2%	60 mV	LES30A48-3V3J
5.0 V	3.20 A	150 mA	20 A	92%	±1.5%	±0.1%	±0.2%	60 mV	LES20A48-5V0J
24 Vin MODELS									
1.8 V	2.40 A	50 mA	20 A	91%	±1.5%	±0.1%	±0.2%	35 mV	LES20A24-1V8J
3.3 V	4.25 A	170 mA	20 A	90%	±1.5%	±0.1%	±0.2%	60 mV	LES20A24-3V3J

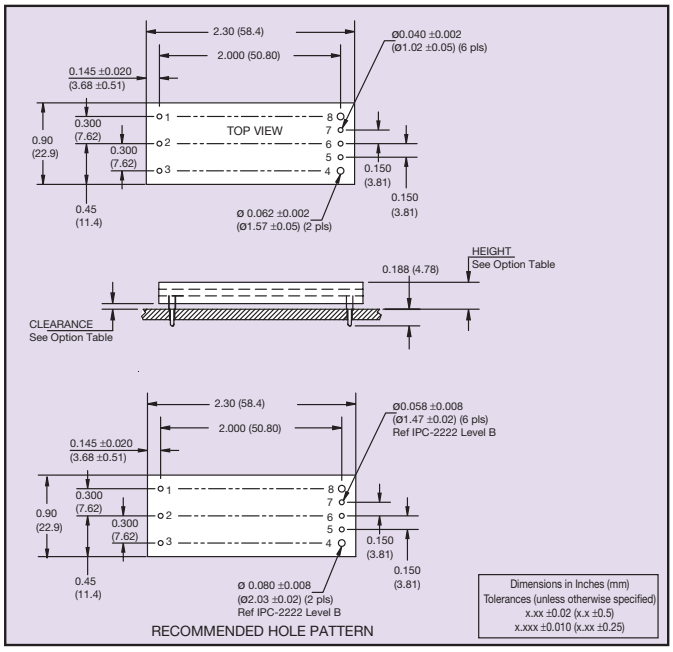
Part Number System with Options

LES50A48-1V2RANJ

- **L** = Low Profile
- **E** = 1/8 Brick
- **Number of outputs**: S = Single
- **Rated Output Current**: 10 A = 10 Amps, 15 A = 15 Amps etc.
- **Nominal Rated Input Voltage**: 24 = 24 Volts (18 Vdc to 36 Vdc range); 48 = 48 Volts (36 Vdc to 75 Vdc range)
- **Output Voltage**: 1V2 = 1.2 Volts, 1V5 = 1.5 Volts etc.
- **RoHS Compliance (7)**: J = Pb-free (RoHS 6/6 compliant)
- **Pin Length Options**: Blank = 0.188" (4.78 mm); N = 0.145" (3.68 mm); K = 0.110" (2.79 mm)
- **Body Height, Package Type and Pin Length**: A = 0.300" (7.62 mm), Through Hole, 0.188" (4.78 mm) Pins; E = 0.340" (8.64 mm), Through Hole, 0.188" (4.78 mm) Pins; S = Surface Mount
- **Remote ON/OFF Logic**: Blank = Positive; R = Negative

Notes

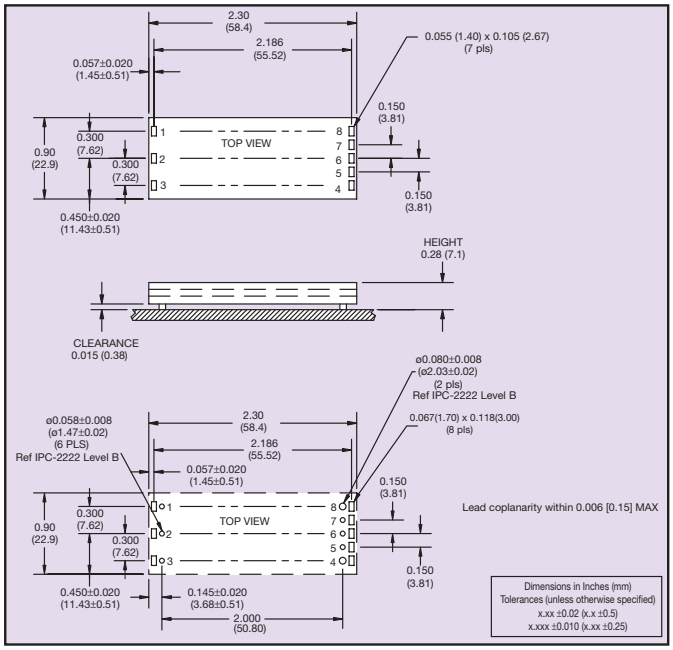
1. di/dt = 1 A/µs, Vin = 24 or 48 Vdc, Tc = 25 °C, load change = 50% to 75% Io max. and 75% to 50% Io max. Deviation varies by model. For further details see long form data sheets.
2. Start-up into resistive load.
3. This product is only for inclusion by professional installers within other equipment and must not be operated as a stand alone product.
4. Recommended input fusing is up to 10 A HRC 200 V rated fuse.
5. Peak to peak measured with no external Pi filter. Significant reduction possible with external filter. See Application Note 138 for further details.
6. Active low Remote ON/OFF is available. Standard product is Active High. When ordering active low parts, designate with the Suffix 'R' e.g. **LES50A48-1V2RAJ.**
7. TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.
8. NOTICE: Some models do not support all options. Please contact your local Artesyn representative or use the on-line model number search tool at http://www.artesyn.com/powergroup/products.htm to find a suitable alternative.



DIMENSION OPTIONS		
OPTION	CLEARANCE	HEIGHT
	±0.016 (0.41)	+0.022 (0.56) -0.030 (0.76)
A	0.030 (0.76)	0.300 (7.62)
E	0.070 (1.78)	0.340 (8.64)

PIN CONNECTIONS			
PIN NUMBER	FUNCTION	PIN NUMBER	FUNCTION
1	+Vin	5	-Sense
2	ON/OFF	6	Trim
3	-Vin	7	+Sense
4	-Vout	8	+Vout

Through-hole Mechanical Drawing, Dimension Options and Pinout Table



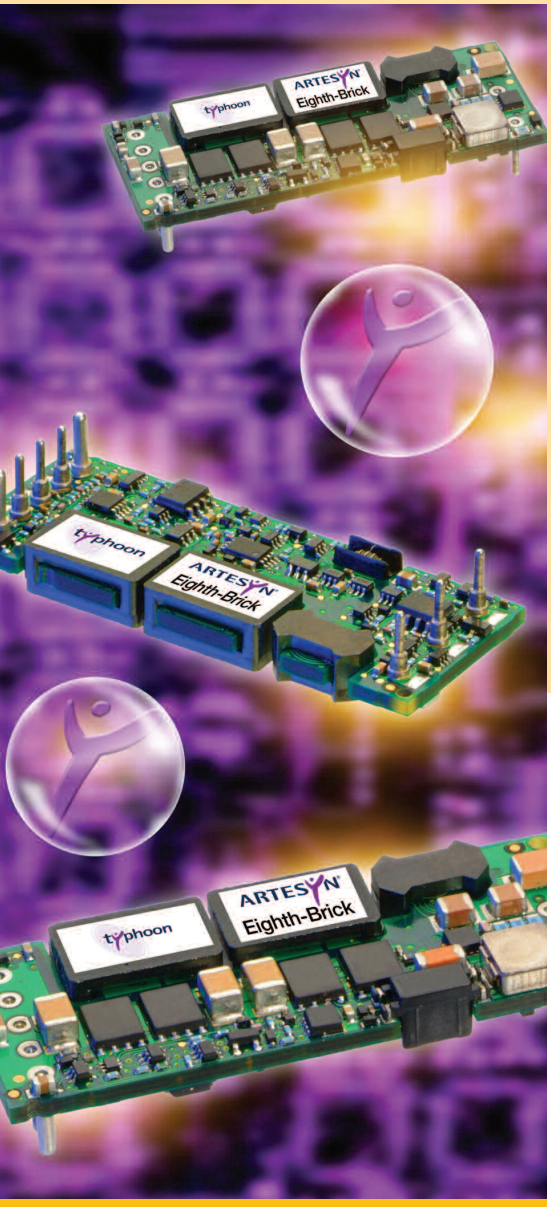
PIN CONNECTIONS			
PIN NUMBER	FUNCTION	PIN NUMBER	FUNCTION
1	+Vin	5	-Sense
2	ON/OFF	6	Trim
3	-Vin	7	+Sense
4	-Vout	8	+Vout

Surface-mount Mechanical Drawing and Pinout Table

typhoon

EIGHTH-BRICK SERIES

Single Output Ultra Products



- High efficiency topology and high output current
- Low profile, 0.300 in (7.62 mm) height
- Industry standard eighth-brick footprint (identical to quarter-brick pinout)
- 38% savings in space over industry standard quarter-brick converters
- Wide operating ambient temperature range, -40 °C to +85 °C
- 80% to 110% output trim
- Basic insulation, 2250 Vdc
- Overvoltage and overtemperature protection
- Remote ON/OFF
- Approvals to EN60950-1 VDE and UL/cUL60950
- 100 V, 100 msec input voltage transients rated
- Monotonic startup into normal and prebiased loads
- Secondary side control, no optocouplers, fast transient response
- Available RoHS compliant

The Eighth-Brick Ultra series is a new 100 W, low cost, high efficiency, open frame, isolated converter in an industry standard eighth-brick footprint and operates from a 36 Vdc to 75 Vdc 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. All Eighth-Brick converters have, as standard features, remote ON/OFF capability, adjustable output voltage trim from 80% to 110% of nominal, over-current/under-voltage protection, and full international safety approval including EN60950-1 VDE and cUL60950.

Patent No. 6,765,810
Other Patents Pending

[2 YEAR WARRANTY]

ARTESYN TECHNOLOGIES

File Name: lf_eighth_brick_100w_ultra.pdf Rev (04): 15 Nov 2005

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	Vdc	$V_{in(+)}$ - $V_{in(-)}$
Input voltage - peak/surge	$V_{in\ (peak)}$	-0.3		100	Vdc	Transients of 100 ms or less, in duration
Input voltage - remote pin	$V_{rem\ (peak)}$	-0.3		75	Vdc	Peaks of any duration
Operating temperature	T_{op}	-40		85	°C	Measured at ambient
Storage temperature	$T_{storage}$	-55		125	°C	
Output power (LES40A48-2V5J)	Pout (max)			100	W	
Output power (LES30A48-3V3J)	Pout (max)			99	W	
Output power (LES20A48-5V0J)	Pout (max)			100	W	

All specifications are typical at nominal input Vin = 48 V and full rated resistive load at 25 °C ambient unless otherwise specified.

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - operating	$V_{in\ (oper)}$	36	48	75	Vdc	
Input current - no load	I_{in}			50	mAdc	$V_{in\ (min)}$ - $V_{in\ (max)}$, enabled
Input current - Quiescent	$I_{in\ (off)}$		6		mAdc	Converter disabled
Inrush current (i^2t)	linrush		0.01		A^2s	
Inrush current ratio	I_t/I_m		22			
Input ripple rejection			50		dB	Frequency <1 kHz
Input fuse				10	A	Slow Blow/Antisurge HRC recommended 200 V Rating. See Application Note 138

Turn On/Off

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input voltage - turn on	$V_{in\ (on)}$		35.5	36	Vdc	
Input voltage - turn off	$V_{in\ (off)}$	33	33.5		Vdc	
Turn on delay - enabled, then power applied	T_{delay} (power)		15	20	ms	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)		15	20	ms	With V_{in} = $V_{in\ (nom)}$, then Remote ON/OFF asserted, time until Vo is within total error band
Rise time	T_{rise}		5	8	ms	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 Open collector or equivalent compatible						**See Notes 1 and 2**
Control pin open circuit voltage	V_{ih}		2.8	3.5	V	I_{ih} = 0 µA; 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}	-0.3		0.4	V	Converter guaranteed off when control pin is less than V_{il} (max)
Low level input current	I_{il} (max)		-0.45	-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 138
Remote sense compensation				10	%	% of Vo (nom), compensation includes trim

Reliability and Service Life

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Mean time between failure	MTBF		4,034,120		Hours	Telcordia Tech. SR-332 Tamb = 25 °C, Tcase = 20 °C rise airflow = 400 LFM, $V_{in} = V_{in}$ (nom), I_{out} = 50% I_{out} (max)

Isolation

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

Other Specifications

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Switching frequency	f_{sw}		480		kHz	Fixed frequency (all models)

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, 16 h
		IEC 680068-2-2 Bb/Bd: Dry heat	+70 °C, 16 h
		IEC 68-2-14 Nb: Rate of change	-5 °C/+45 °C, 0.5 °C/min 2 cycles, 3 h 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 5-9 Hz, 1.2 mm. Freq. range and acceleration 9-200 Hz, 10 m/s²
Shock and bump		IEC 60068-2-29 Eb: bump	100 bumps each of 6 directions, mounted on powered on test card, shock spectrum half-sine, duration

EMC Electromagnetic Compatibility

Phenomenon	Port	Standard	Test level	Notes and conditions
Immunity:				
ESD	Enclosure	EN61000-4-2	6 kV contact 8 kV air	Level 3, (output within specification) Level 3, (output within specification
Radiated field	Enclosure	EN61000-4-3	10 V/m	Level 3, (output within specification) X and Y axes
Conducted	DC power	EN61000-4-6	10 V	
Input transients	DC power	ETR 283		With recommended Class B external filter, no load, 10J (output remains within ±9%)

Standards Compliance List

Characteristic	
EN60950-1 UL/cUL 60950 VDE	3rd edition

Safety Agency Approvals

Standard	Category
UL/cUL 60950 File Number	E135734
VDE Certificate No.	DE1-31103

Material Ratings

Characteristic - Signal Name	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
LES40A48-2V5J	36-75 Vdc	2.5 V	3 V	40 A	91.0%
LES30A48-3V3J	36-75 Vdc	3.3 V	4 V	30 A	90.5%
LES20A48-5V0J	36-75 Vdc	5.0 V	6 V	20 A	92.0%

RoHS Compliance Ordering Information

RoHS 2002/95/EC

The 'J' at the end of the Partnumber indicates that the Part is Pb-free (RoHS 6/6 compliant). TSE RoHS 5/6 (non Pb-free) compliant versions may be available on special request, please contact your local sales representative for details.

ARTESYN TECHNOLOGIES

LES40A48-2V5J Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		2.29		Adc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$
Input current - maximum	$I_{in\ (max.)}$			3.20	Adc	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$, measured at converter
Input Capacitor ripple current	$I_{in\ (ripple)}$		50 150		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured without standard filter. See Application Note 138
Reflected ripple current	$I_{in\ (refl)}$		2 7.5		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured with standard filter. See Application Note 138
Input capacitance - Internal	C_{input}		2.65		µF	Internal to converter
Input capacitance - External bypass	C_{bypass}		33		µF	Recommended customer added capacitance, <0.7 Ω ESR

LES40A48-2V5J Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom)	2.46	2.50	2.54	Vdc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	V_o	2.42		2.58	Vdc	For all line, static load and temperature until end of life
Line regulation			0.01	0.1	%	$I_{out} = I_{out\ (nom)}$, $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation			0.02	0.2	%	$V_{in} = V_{in\ (nom)}$, $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation				0.02	±%/°C	$V_{in} = V_{in\ (nom)}$, $I_{out} = I_{out\ (max)}$
Output current continuous	Iout	0		40	Adc	
Output current - short circuit	I_{sc}		15		A rms	Continuous, unit auto recovers from short, V_o < 100 mV
Load transient response - peak deviation	$V_{dynamic}$		 20 90		 mV mV	Peak deviation for 50% to 75% step load, di/dt = 100 mA/µs, step load, di/dt = 1 A/µs
Load transient response - recovery	$T_{recovery}$		20		µs	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext}	0		40,000	µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	V_{p-p} V_{rms}		25 5	60 20	mV pk-pk mV rms	Measurement bandwidth 20 MHz See Application Note 138 for test set-up

LES40A48-2V5J Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage setpoint	V_{ov}	2.87		3.12	Vdc	Non-latching. See Application Note 138 for details
Overcurrent limit inception	I_{oc}	42	46	50	Adc	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 100 Watts
		80			%	Trim down (% of $V_{o\ nom}$) See Application Note 138 for details of trim equations and trim curves
Open sense voltage			2.50		Vdc	

LES40A48-2V5J Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η	89.5	91.0		%	I_{out} = 100% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$
Efficiency	η		91.5		%	I_{out} = 50% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$

LES30A48-3V3J Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		2.28		Adc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$
Input current - maximum	$I_{in\ (max.)}$			3.20	Adc	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$, measured at converter
Input Capacitor ripple current	$I_{in\ (ripple)}$		50 150		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured without standard filter. See Application Note 138
Reflected ripple current	$I_{in\ (refl)}$		2 7.5		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured with standard filter. See Application Note 138
Input capacitance - Internal	C_{input}		2.65		µF	Internal to converter
Input capacitance - External bypass	C_{bypass}		33		µF	Recommended customer added capacitance, <0.7 Ω ESR

LES30A48-3V3J Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom)	3.25	3.30	3.35	Vdc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	V_o	3.20		3.40	Vdc	For all line, static load and temperature until end of life
Line regulation			0.01	0.1	%	$I_{out} = I_{out\ (nom)}$, $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation			0.02	0.2	%	$V_{in} = V_{in\ (nom)}$, $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation				0.02	±%/°C	$V_{in} = V_{in\ (nom)}$, $I_{out} = I_{out\ (max)}$
Output current continuous	Iout	0		30	Adc	
Output current - short circuit	I_{sc}		11		A rms	Continuous, unit auto recovers from short, V_o < 100 mV
Load transient response - peak deviation	$V_{dynamic}$		 25 90		 mV mV	Peak deviation for 50% to 75% step load, di/dt = 100 mA/µs, step load, di/dt = 1 A/µs
Load transient response - recovery	$T_{recovery}$		20		µs	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext}	0		10,000	µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	V_{p-p} V_{rms}		25 5	60 20	mV pk-pk mV rms	Measurement bandwidth 20 MHz See Application Note 138 for test set-up

LES30A48-3V3J Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage setpoint	V_{ov}	3.80		4.13	Vdc	Non-latching. See Application Note 138 for details
Overcurrent limit inception	I_{oc}	31.5	34.5	37.5	Adc	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 99 Watts
		80			%	Trim down (% of $V_{o\ nom}$) See Application Note 138 for details of trim equations and trim curves
Open sense voltage			3.30		Vdc	

LES30A48-3V3J Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η	89.0	90.5		%	I_{out} = 100% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$
Efficiency	η		92.0		%	I_{out} = 50% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$

LES20A48-5V0J Model

Input Characteristics

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Input current - operating	I_{in}		2.26		Adc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$
Input current - maximum	$I_{in\ (max.)}$			3.20	Adc	$V_{in} = V_{in\ (min)}$; $I_{out} = I_{out\ (max)}$; $V_o = V_{o\ (nom)}$, measured at converter
Input Capacitor ripple current	$I_{in\ (ripple)}$		50 150		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured without standard filter. See Application Note 138
Reflected ripple current	$I_{in\ (refl)}$		2 7.5		mA RMS mA pk-pk	$I_{out} = I_{out\ (max)}$, measured with standard filter. See Application Note 138
Input capacitance - Internal	C_{input}		2.65		µF	Internal to converter
Input capacitance - External bypass	C_{bypass}		33		µF	Recommended customer added capacitance, <0.7 Ω ESR

LES20A48-5V0J Model

Electrical Characteristics - O/P

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Nominal set-point voltage	Vo (nom)	4.92	5.00	5.08	Vdc	$V_{in} = V_{in\ (nom)}$; $I_{out} = I_{out\ (nom)}$
Total regulation band	V_o	4.85		5.15	Vdc	For all line, static load and temperature until end of life
Line regulation			0.01	0.1	%	$I_{out} = I_{out\ (nom)}$, $V_{in\ (min)}$ to $V_{in\ (max)}$
Load regulation			0.02	0.2	%	$V_{in} = V_{in\ (nom)}$, $I_{out\ (min)}$ to $I_{out\ (max)}$
Temperature regulation				0.02	±%/°C	$V_{in} = V_{in\ (nom)}$, $I_{out} = I_{out\ (max)}$
Output current continuous	Iout	0		20	Adc	
Output current - short circuit	I_{sc}		7		A rms	Continuous, unit auto recovers from short, V_o < 100 mV
Load transient response - peak deviation	$V_{dynamic}$		 25 100		 mV mV	Peak deviation for 50% to 75% step load, di/dt = 100 mA/µs, step load, di/dt = 1 A/µs
Load transient response - recovery	$T_{recovery}$		20		µs	Settling time to within 1% of output set point voltage for 50% to 75% load step
External load capacitance	C_{ext}	0		10,000	µF	Higher load capacitance values may be possible. Contact Artesyn Technologies for details
Output voltage - noise	V_{p-p} V_{rms}		45 10	60 20	mV pk-pk mV rms	Measurement bandwidth 20 MHz See Application Note 138 for test set-up

LES20A48-5V0J Model

Protection and Control Features

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Overvoltage setpoint	V_{ov}	5.8		6.5	Vdc	Non-latching. See Application Note 138 for details
Overcurrent limit inception	I_{oc}	21	23	25	Adc	V_o = 90% of V_o (nom)
Output voltage trim range				110	%	Trim up (% of $V_{o\ nom}$) Limit O/P to 100 Watts
		80			%	Trim down (% of $V_{o\ nom}$) See Application Note 138 for details of trim equations and trim curves
Open sense voltage			5.0		Vdc	

LES20A48-5V0J Model

Efficiency

Characteristic	Symbol	Min	Typ	Max	Units	Notes and Conditions
Efficiency	η	91.0	92.0		%	I_{out} = 100% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$
Efficiency	η		92.5		%	I_{out} = 50% $I_{out\ (max)}$, V_{in} = $V_{in\ (nom)}$

LES40A48-2V5J Model

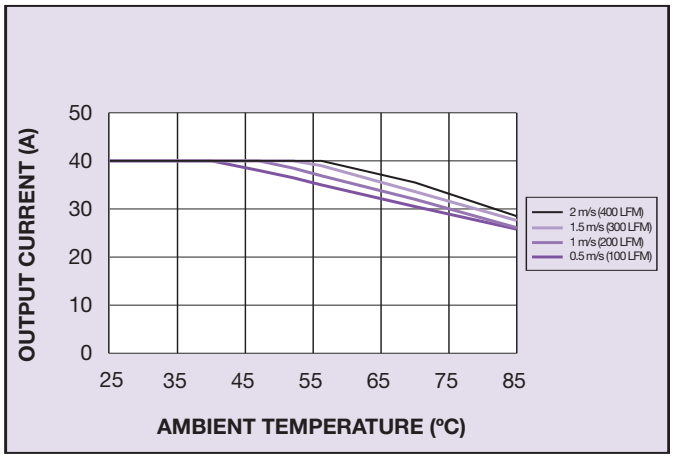


Figure 1: Derating Curve with Forced Air

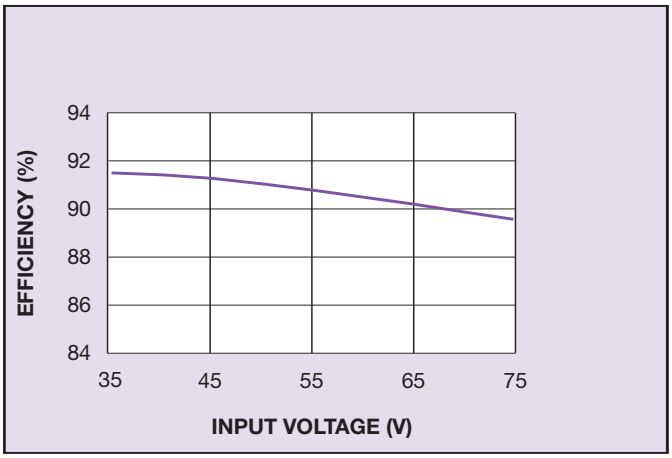


Figure 2: Efficiency vs. Line

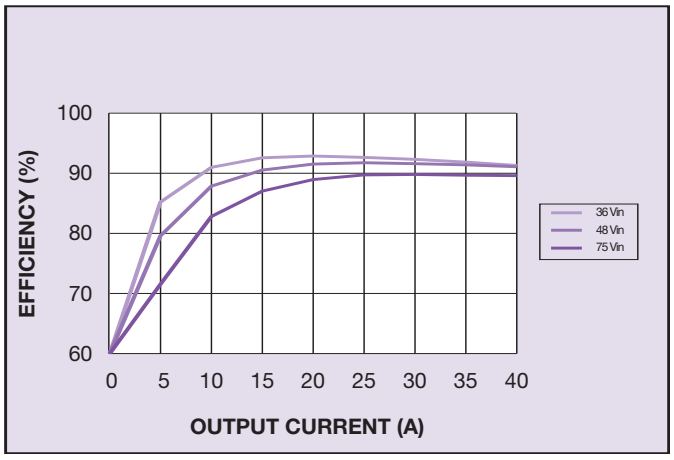


Figure 3: Efficiency vs. Load

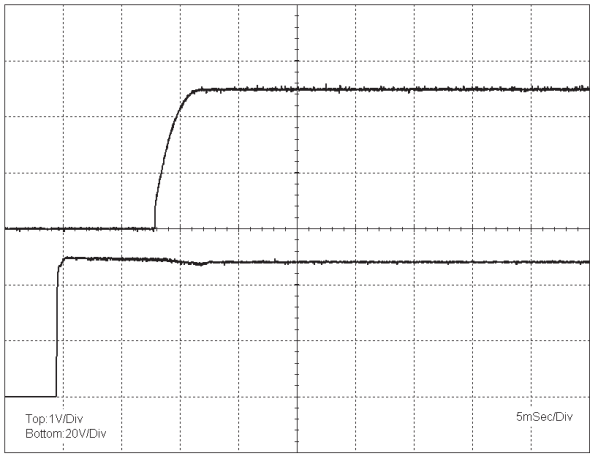


Figure 4: Turn-On Characteristic, Top (Vout), Bottom (Vin)

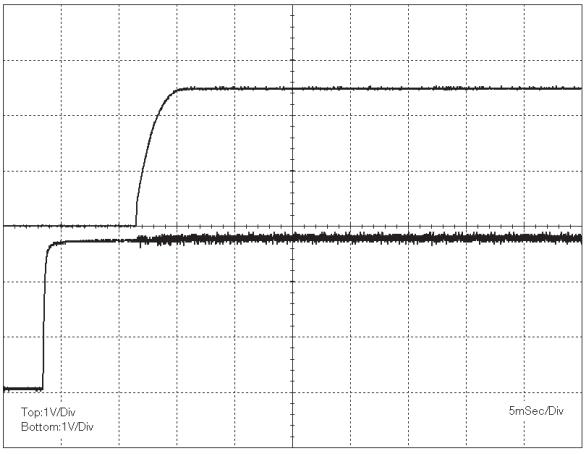


Figure 5: Control On/Off Characteristic, Top (Vout), Bottom (Remote ON/OFF)

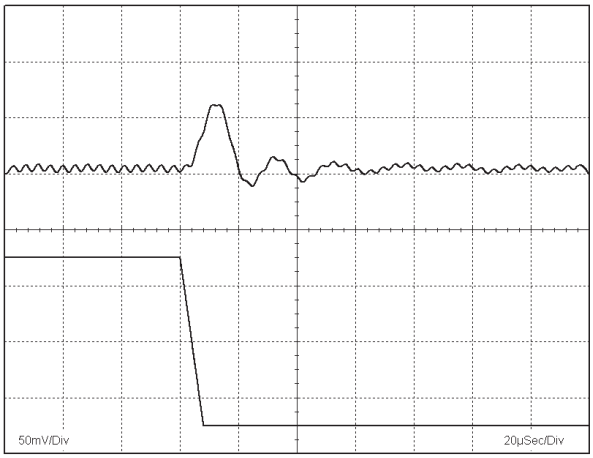


Figure 6: Typical Transient Response 75-50% Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

LES40A48-2V5J Model

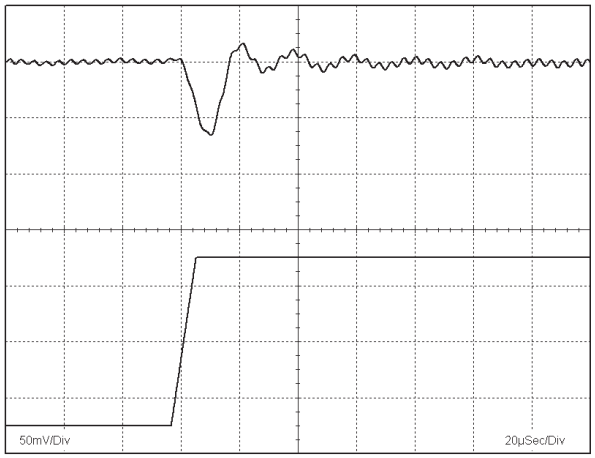


Figure 7: Typical Transient Response 50-75% Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

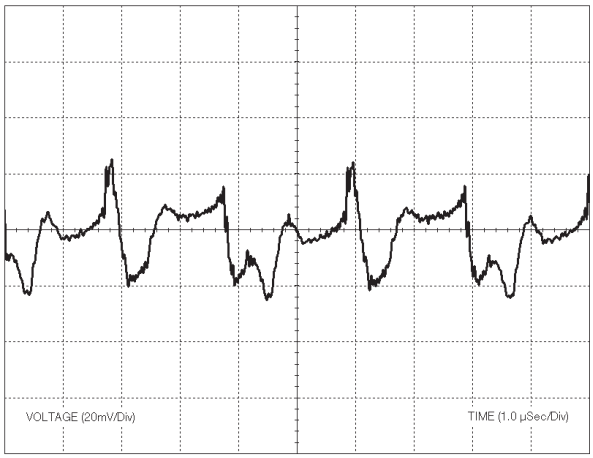


Figure 8: Typical Output Ripple and Noise Measurement

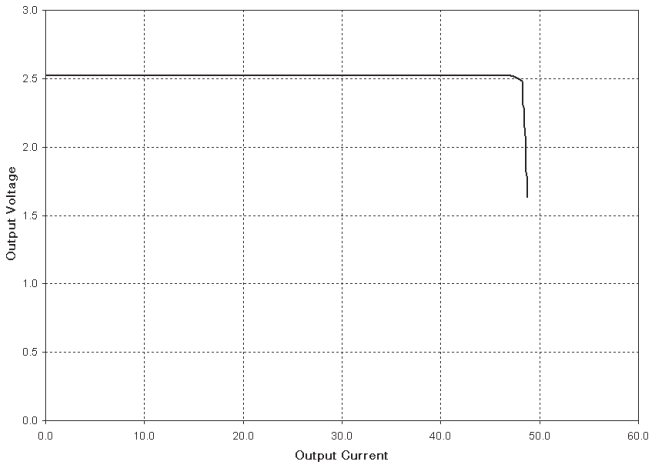


Figure 9: Current Limit Characteristic

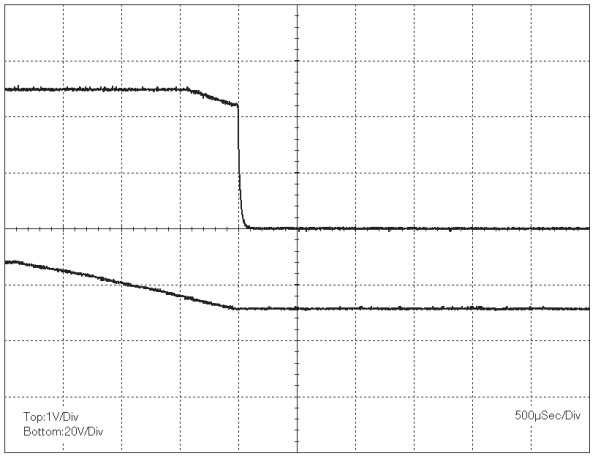


Figure 10: Turn-Off Characteristic

LES30A48-3V3J Model

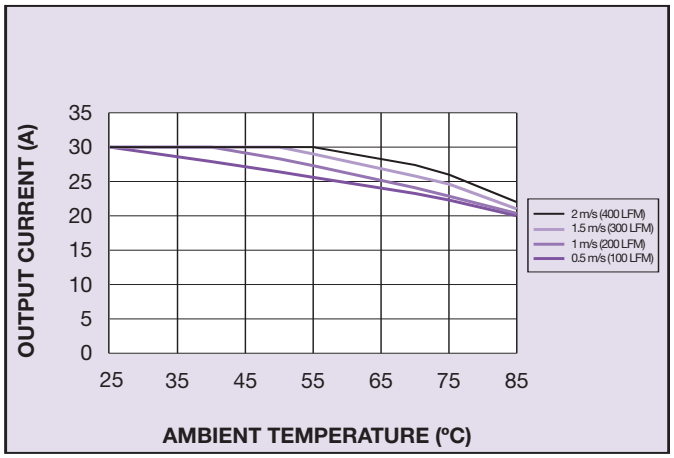


Figure 11: Derating Curve with Forced Air

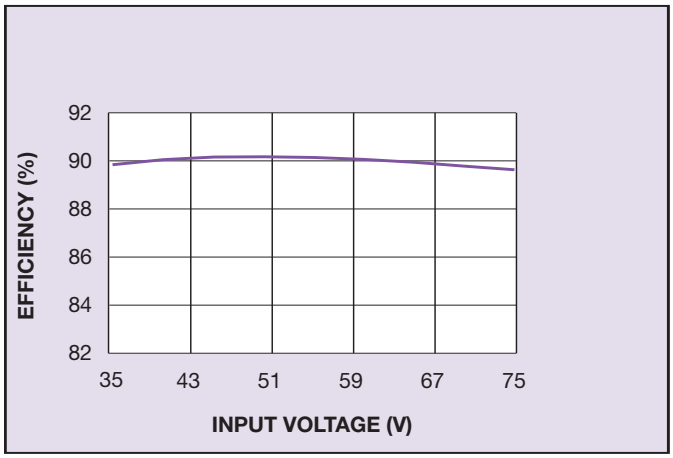


Figure 12: Efficiency vs. Line

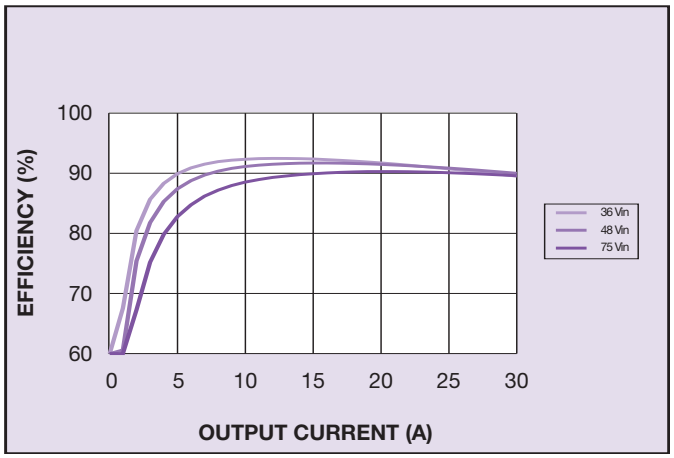


Figure 13: Efficiency vs. Load

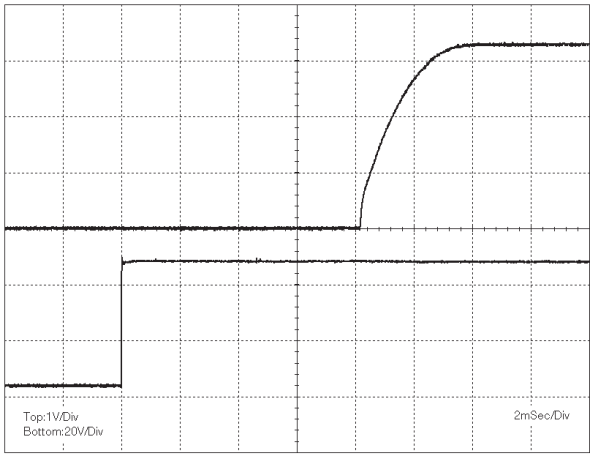


Figure 14: Turn-On Characteristic, Top (Vout), Bottom (Vin)

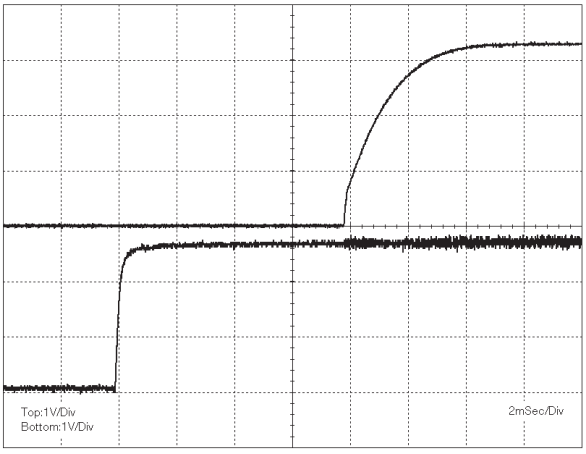


Figure 15: Control On/Off Characteristic, Top (Vout), Bottom (Remote ON/OFF)

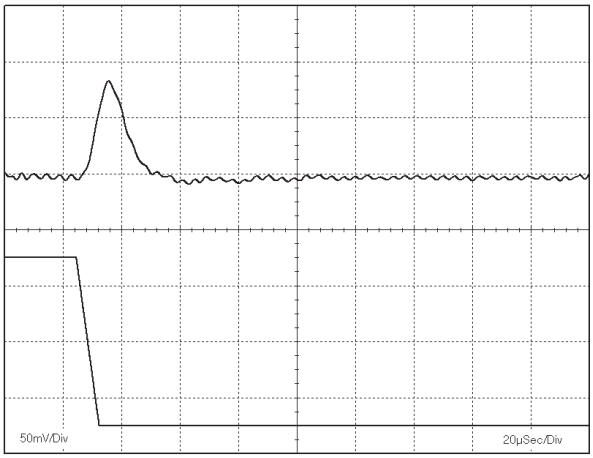


Figure 16: Typical Transient Response 75-50% Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

LES30A48-3V3J Model

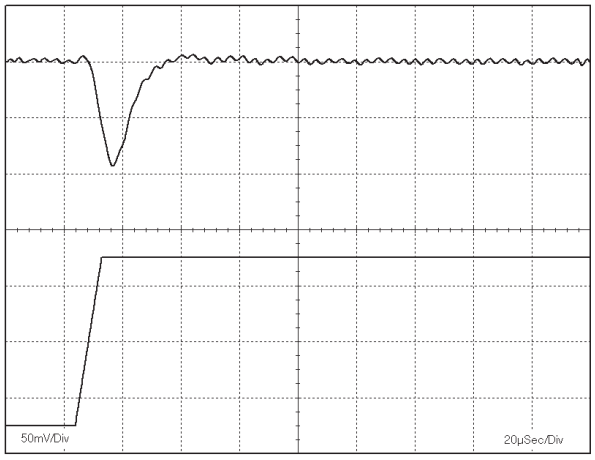


Figure 17: Typical Transient Response 50-75% Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

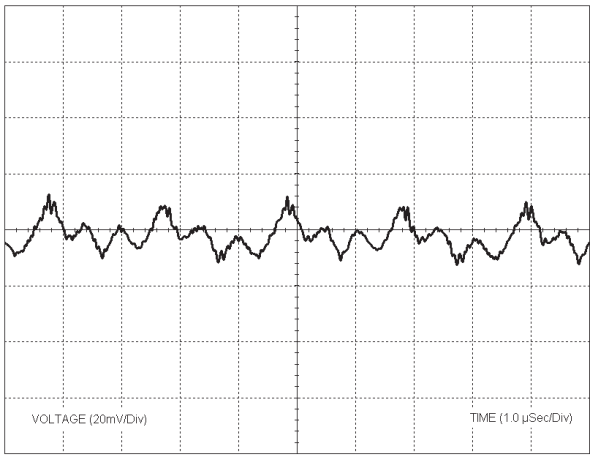


Figure 18: Typical Output Ripple and Noise Measurement

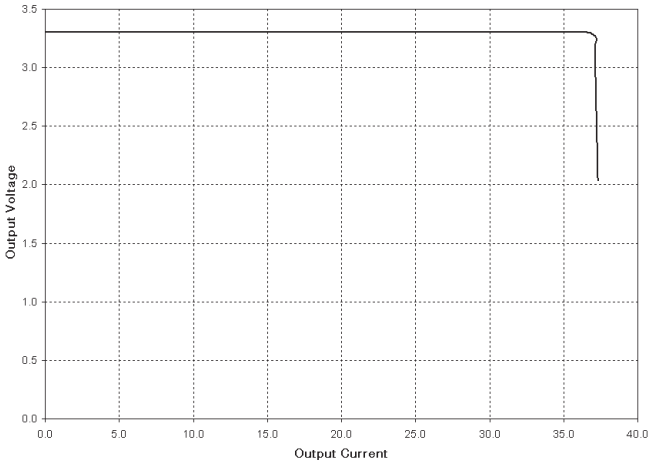


Figure 19: Current Limit Characteristic

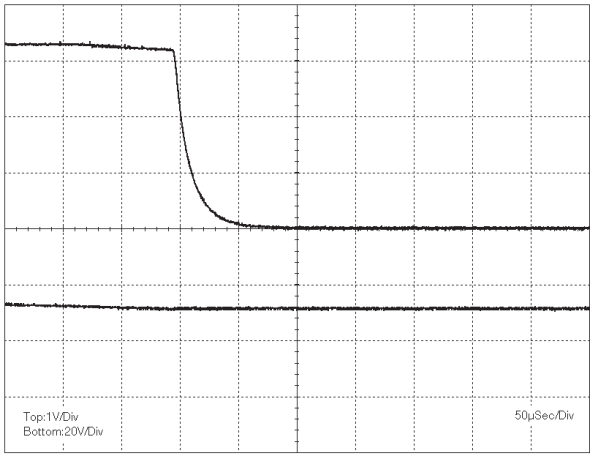


Figure 20: Turn-Off Characteristic

File Name: lf_eighth_brick_100w_ultra.pdf Rev (04): 15 Nov 2005

LES20A48-5V0J Model

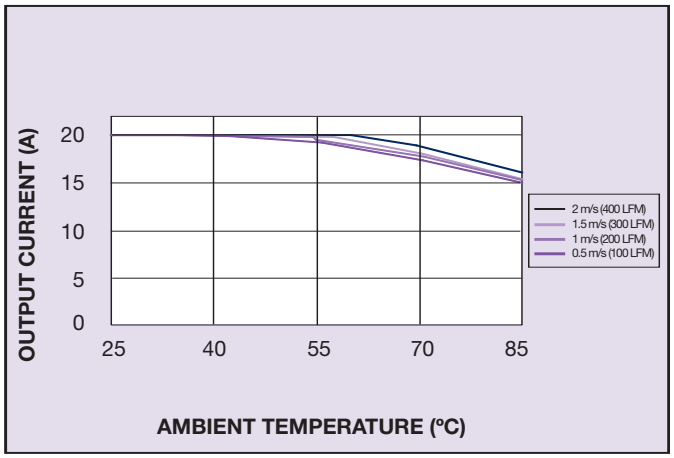


Figure 21: Derating Curve with Forced Air

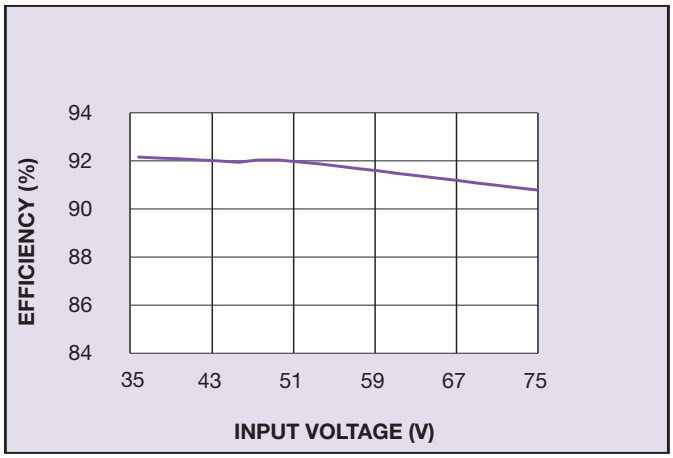


Figure 22: Efficiency vs. Line

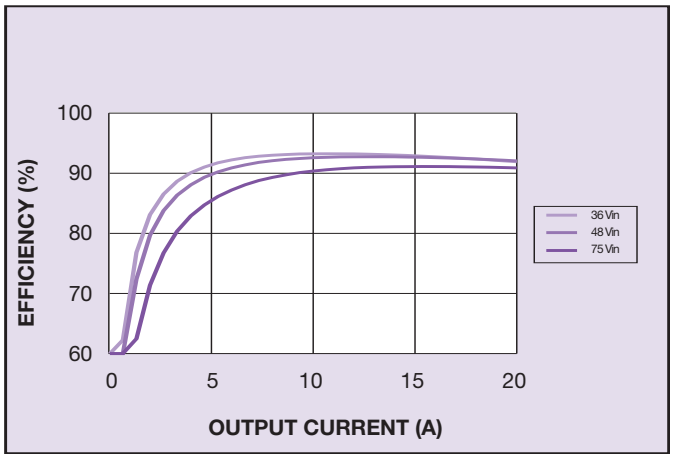


Figure 23: Efficiency vs. Load

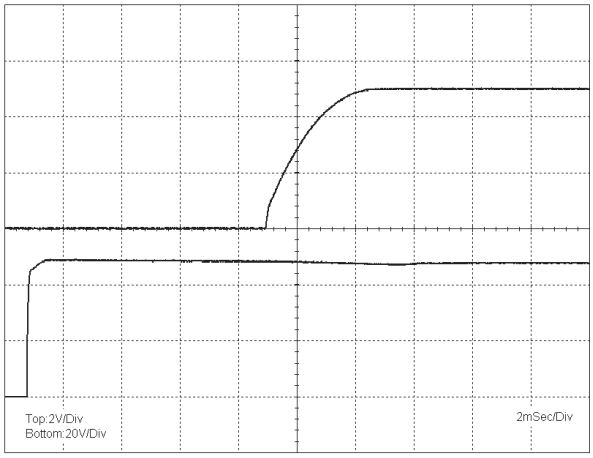


Figure 24: Turn-On Characteristic,
Top (Vout), Bottom (Vin)

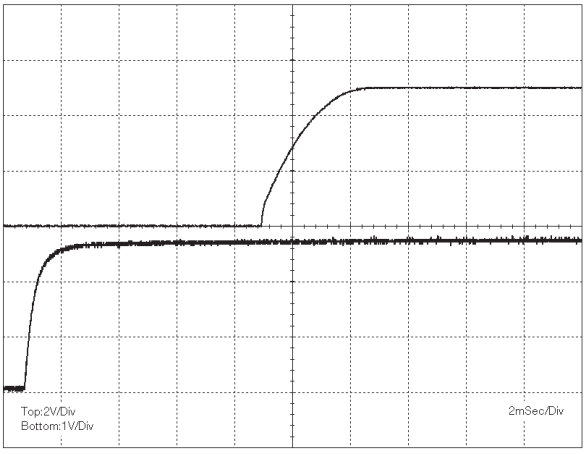


Figure 25: Control On/Off Characteristic,
Top (Vout), Bottom (Remote ON/OFF)

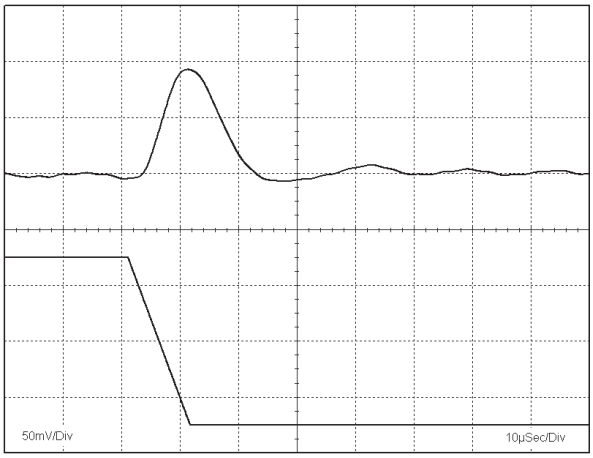


Figure 26: Typical Transient Response 75-50%
Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

LES20A48-5V0J Model

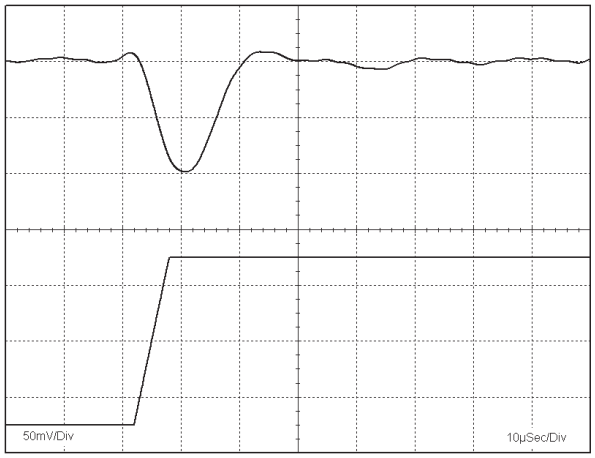


Figure 27: Typical Transient Response 50-75% Step Load Change (1 A/µs), Top (Vout) Bottom (Iout)

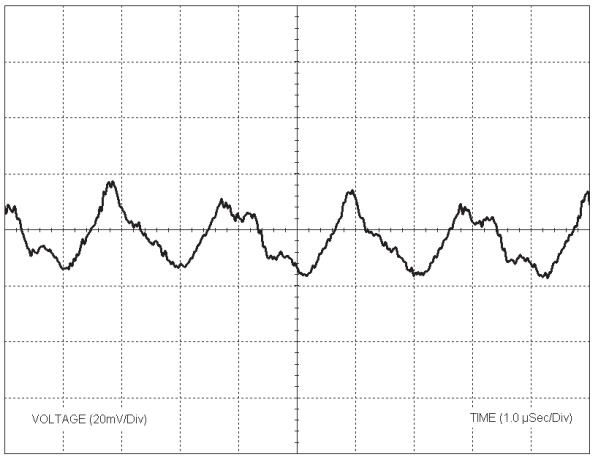


Figure 28: Typical Output Ripple and Noise Measurement

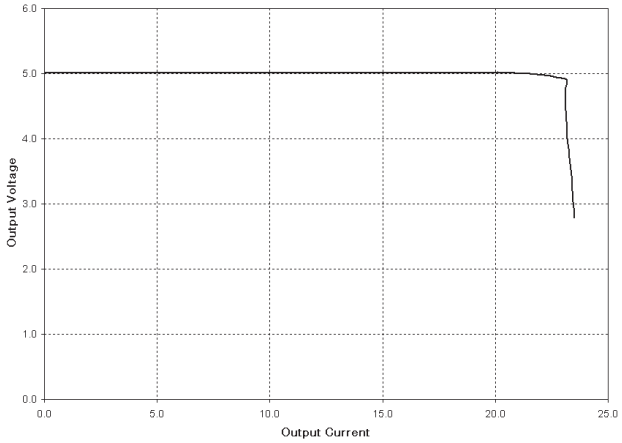


Figure 29: Current Limit Characteristic

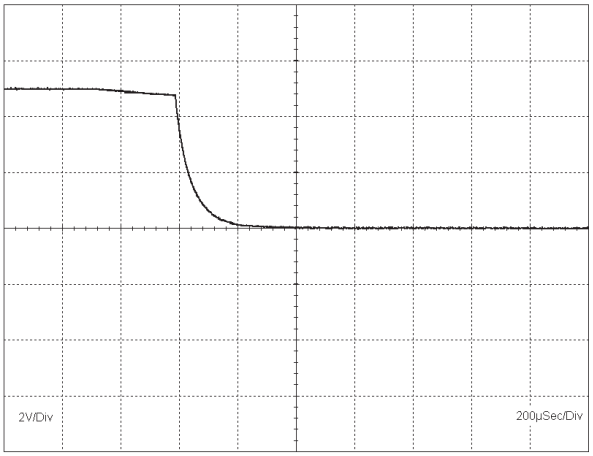
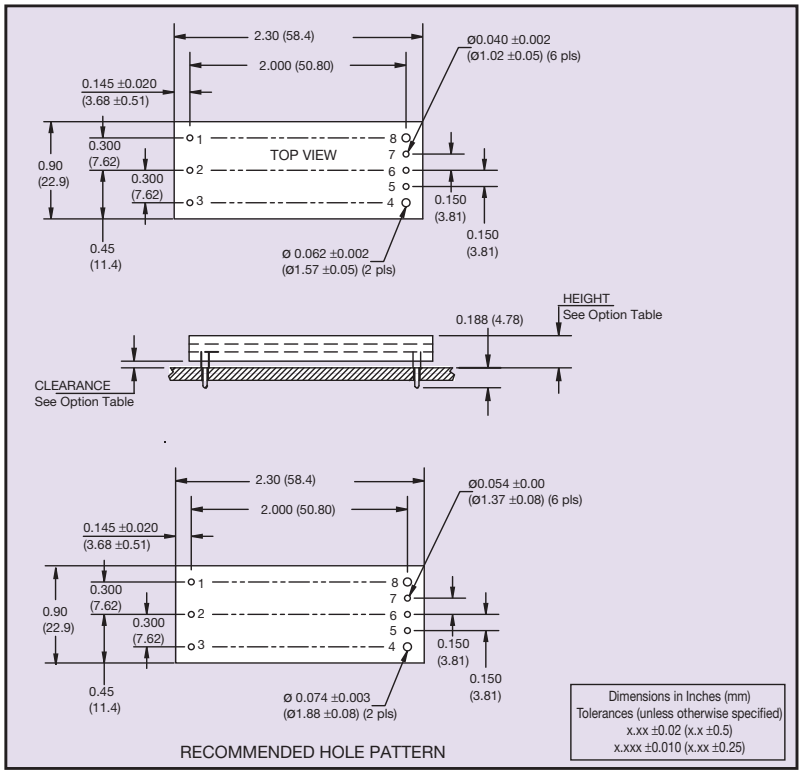


Figure 30: Turn-Off Characteristic

File Name: lf_eighth_brick_100w_ultra.pdf Rev (04): 15 Nov 2005



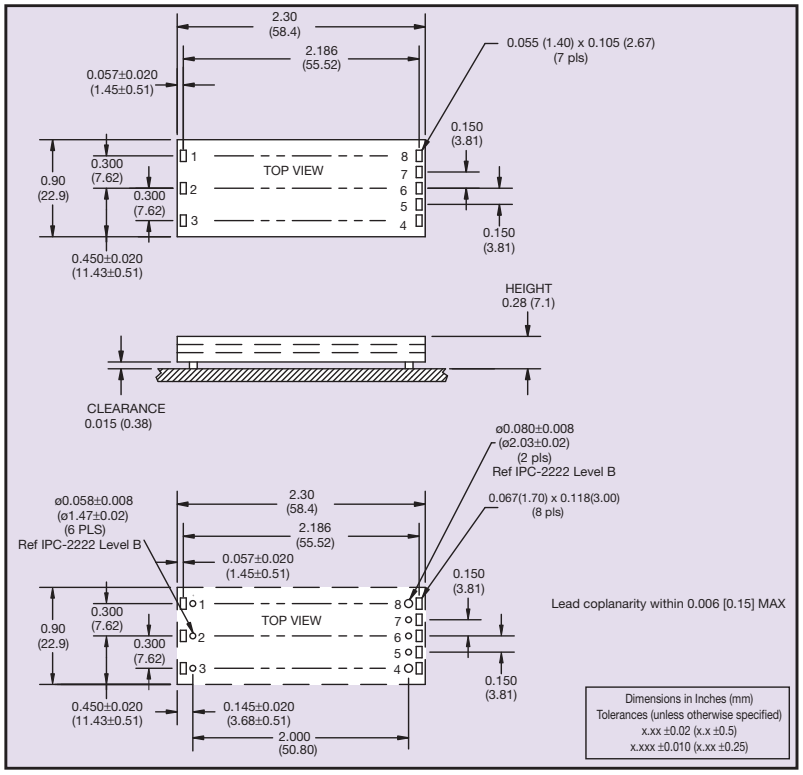
Pin Connections

Pin No.	Function
1	Vin+
2	ON/OFF
3	Vin-
4	Vout-
5	Sense-
6	Trim
7	Sense+
8	Vout+

Dimension Options

Option	Clearance	Height
	±0.016 (0.41)	+0.022 (0.56) -0.030 (0.76)
A	0.030 (0.76))	0.300 (7.62)
E	0.070 (1.78)	0.340 (8.64)

Figure 31 - Through-hole Mechanical Drawing, Dimension Options and Pinout Table



Pin Connections

Pin No.	Function
1	Vin+
2	ON/OFF
3	Vin-
4	Vout-
5	Sense-
6	Trim
7	Sense+
8	Vout+

Figure 32 - Surface-mount Mechanical Drawing and Pinout Table

Note 1

The remote ON/OFF 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. LES40A48-2V5RAJ. See Application Note 138 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.

File Name: lf_eighth_brick_100w_ultra.pdf Rev (04): 15 Nov 2005

NORTH AMERICA
e-mail: sales.us@artesyn.com

☎ 800 769 7274
☎+508 628 5600

EUROPEAN LOCATIONS
e-mail: sales.europe@artesyn.com

IRELAND
☎+353 24 93130

AUSTRIA
☎+43 1 80150

FAR EAST LOCATIONS
e-mail: sales.asia@artesyn.com

HONG KONG
☎+852 2699 2868

typhoon

File Name: lf_eighth_brick_100w_ultra.pdf Rev (04): 15 Nov 2005