



PRELIMINARY

EB30004

40W SINGLE DC/DC CONVERTER

2"x1"x0.45"

16-36 Vin 12 Vout @ 3.3 A

Key Features

- Efficiency up to 90%
- Six-sided shielding
- Output synchronous rectification
- 2:1 input voltage range
- Input-to-output isolation
- Soft start
- External synchronization
- Short circuit protection
- Thermal protection
- Industry standard pinout



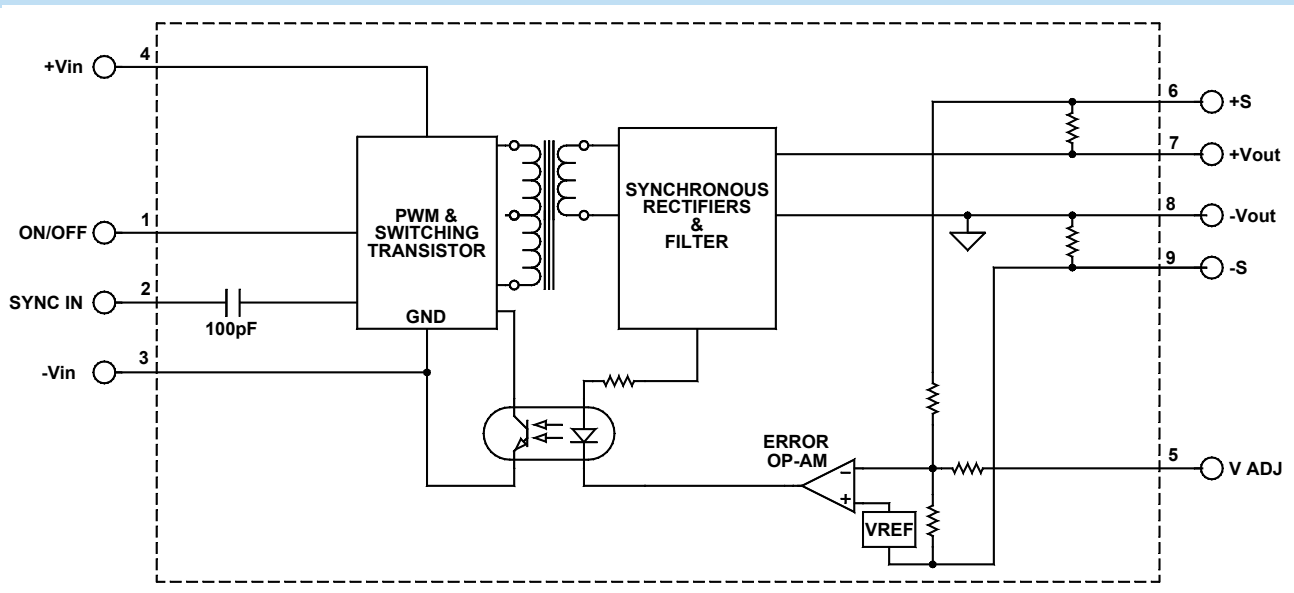
Beta Dyne is protected under various patents, including but not limited to U.S. Patent numbers: 5,777,519; 6,188,276; 6,262,901; 6,452,818; 6,473,3171.

Applications

- Electronic Data Processing (EDP)
- Instrumentation/Industrial/Medical
- Communications
- Computers
- Fiber Optics

Functional Description

The EB30004 is an isolated 40W single output DC/DC converter that accepts 16 to 36V_{IN} and provides 12V_{OUT}@3.3A. It is designed to synchronize with a 50% duty cycle, 200KHZ, AC-coupled, TTL sync input. The push-pull topology and output synchronous rectification allow for continuous operation even at low input voltage with maximum efficiency. Six sided shielding with external synchronisation minimizes EMI and RFI. Protection features allow the converter to operate in harsh environments.



Typical Block Diagram

Unless otherwise specified, all parameters are given under typical ambient temperature of +25°C with an airflow rate = 400LFM. With the given power derating, the operating range is -40°C to +125°C. Specifications subject to change without notice.

Electrical Specifications

INPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		16	24	36	Vdc
Input Startup Voltage, $24V_{IN}$		16			Vdc
Undervoltage Shutdown, $24V_{IN}$		12			Vdc
Input Filter	Capacitor				
No Load Input Current			.070		A
Input Current			1.86		A
Input Surge Current (20 μ S Spike)				10	A
Short Circuit Current Limit			125	150	% I_{IN} Max
Off State Current			150		μ A
Remote ON/OFF Control					
Supply ON	Pin 3 Open (Open circuit voltage: 10V Max.)				
Supply OFF		0		0.6	Vdc
Lofic Input Reference	TO -VIN		dynebeta9		
Logic Compatibility	TTL Open Collector or CMOS Open Drain				

OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Voltage and Current Ratings			12		
Output Voltage Accuracy			0.5	1.5	%
Output Voltage Adjustment			± 5		%
Output Current			3.33		A
Ripple & Noise	Without external capacitor		1	2	% V_{PP} of V_{OUT}
Line Regulation	Minimum V_{IN} to maximum V_{IN}		± 0.04	± 0.1	%
Load Regulation	NL to FL		0.05	0.1	%
Temperature Coefficient @ FL			0.02		%/ $^{\circ}$ C
Transient Response Time	50% FL to FL to 50% FL, See Figure 3B		25	100	μ S
Short Circuit Protection	By input current limiting				
Turn On Delay with Soft Start	See Figure 2B		30	40	mS
Output Overvoltage Protection	None,				

GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency (at full power)			90		%
Isolation Voltage (1 min.), Input to Output			1500		Vdc
Isolation Resistance			10^9		Ω
Isolation Capacitance			300		pF
Switching Frequency (F c)			80		kHz
External Sync Frequency (F e)	$F_e > F_c$ See External Synchronization , Figure 5	180	200	220	kHz

ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature Range (Ambient)	Industrial, See Figure 1	-40		+71	$^{\circ}$ C
Storage Temperature Range		-55		+125	$^{\circ}$ C
Maximum Operating Case Temperature ¹				110	$^{\circ}$ C
Derating	See Figure 1				
Cooling	See Figure 1				
Shielding Connection	-Vin				

PHYSICAL CHARACTERISTICS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×1.00×0.450 in. (50.80×25.40×11.43mm)				
Weight	1.3 oz. (37g)				

¹ When the converter enters thermal protection mode, its duty cycle is reduced momentarily and will resume after its internal temperature (PWM) drops a few degrees (°C). The converter's output behaves similar to a hiccup short circuit mode.

² The maximum input current at any given input range measured at minimum input voltage is given as $1.6 \cdot I_{NOMINAL}$. Nominal input current is the typical value measured at the input of the converter under full-load room temperature and nominal input voltage (12, 24 and 48Vdc).

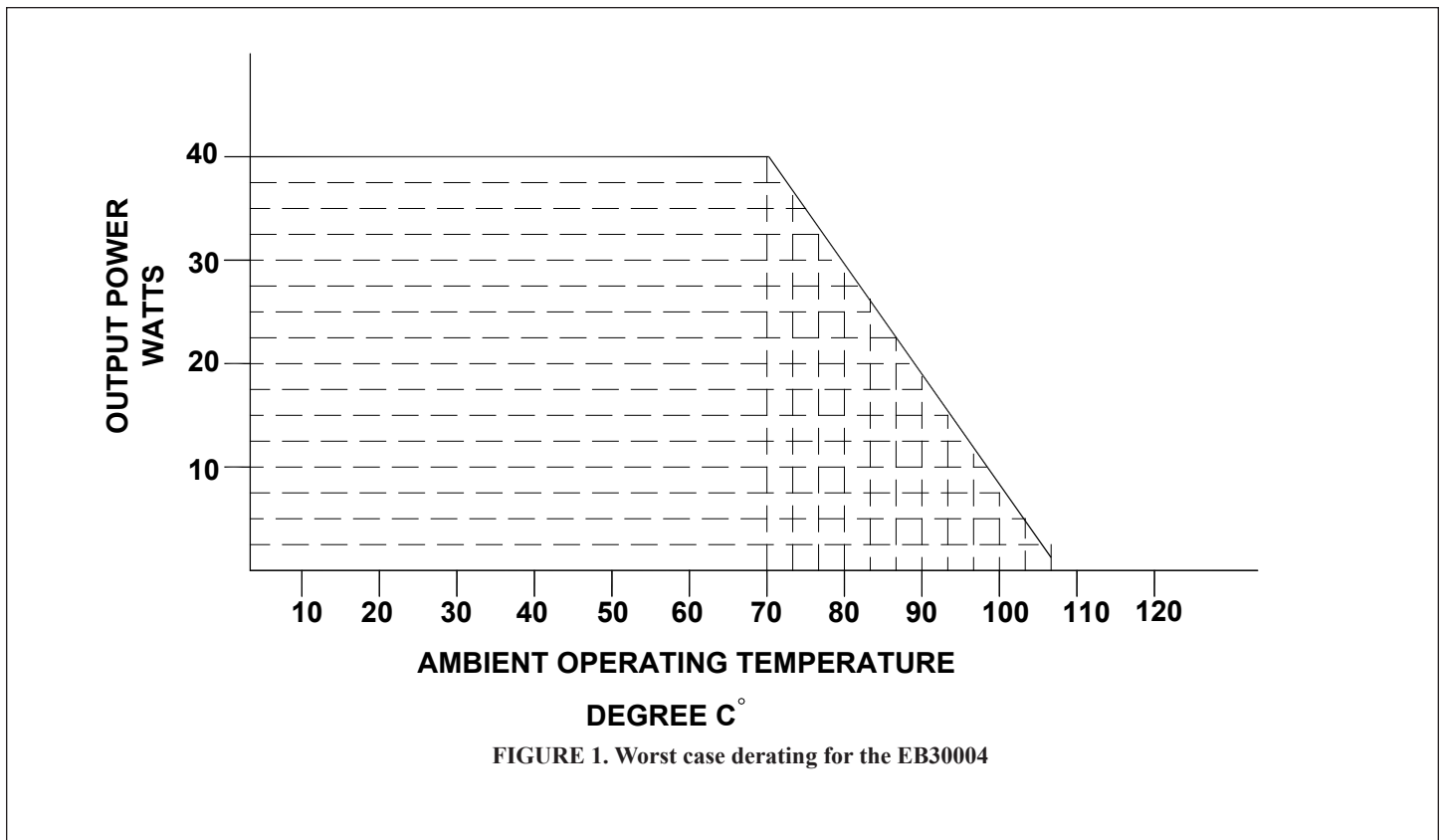
³ See Application Note DC-004: Thermal Considerations for DC/DC Converters.

MECHANICAL SPECIFICATIONS

Pin	Function
INPUTS	
1	ON/OFF
2	SYNC IN*
3	-V _{IN}
4	+V _{IN}
OUTPUTS	
6	+S
7	+V _{OUT}
8	-V _{OUT}
9	-S

DIMENSION ARE IN INCH(mm)
TOLERANCE: .XX ±0.02(.508)
.XXX ±0.01(.254)

* Optional pins,
See Ordering Guide



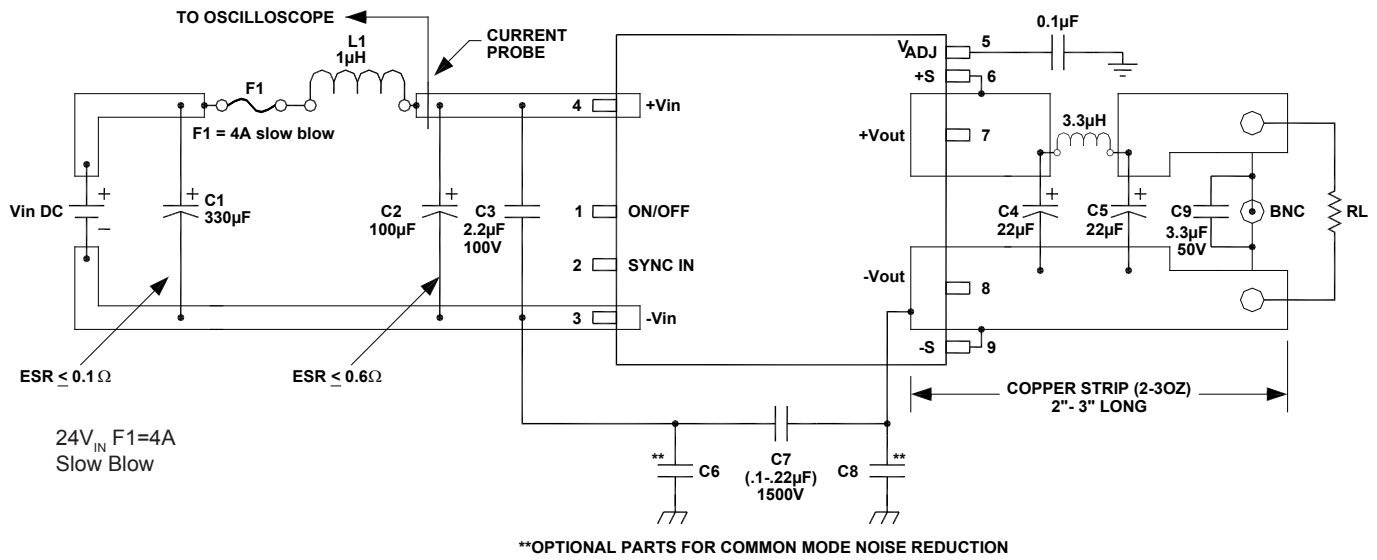


FIGURE 2A. EB30004 typical connection circuit

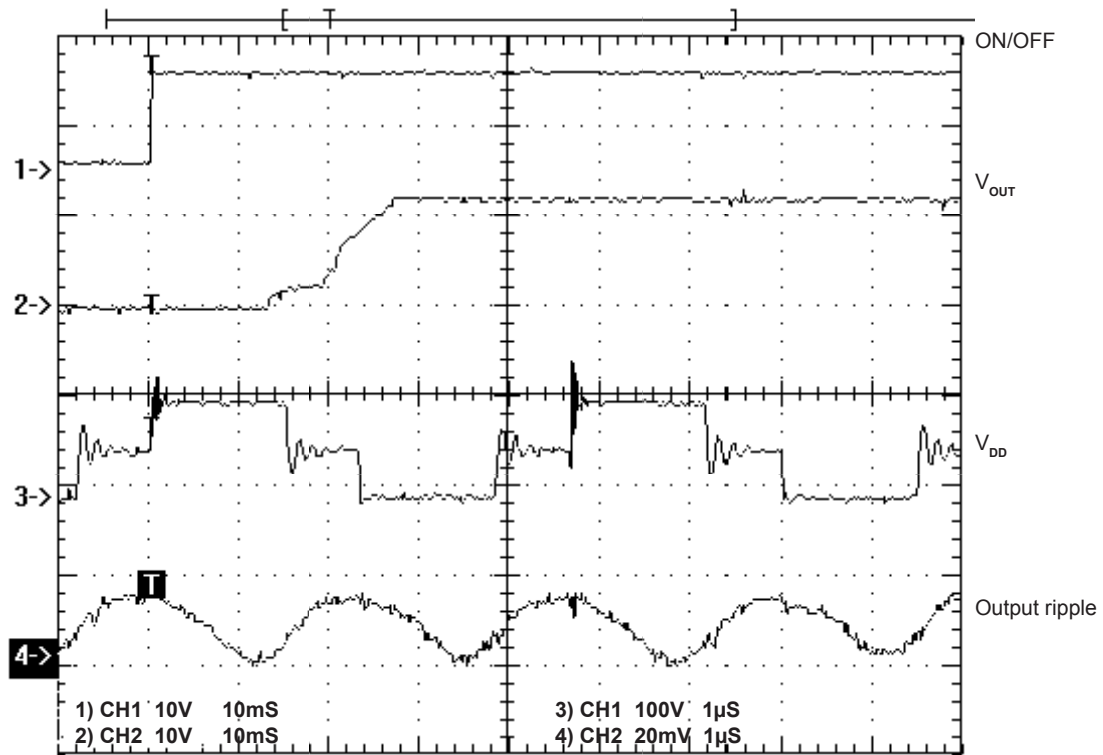


FIGURE 2B. Turn-on delay and output ripple of EB30004

EXTERNAL SYNCHRONIZATION

The converter can be synchronized to an external clock. The external clock MUST have a higher frequency than that of the converter's switching frequency. The amplitude of the external clock pulse must be 3.7 volts or greater and its duration between 15nS to 150nS for sync pulse detection.

The circuit in Figure 4 can be used to produce a 50nS to 150nS pulse from a square wave. The circuit will be turned on by the negative edge of the square wave and will stay on for approximately 50nS (depending on the $R2 \cdot C1$ time constant) (See Figure 5).

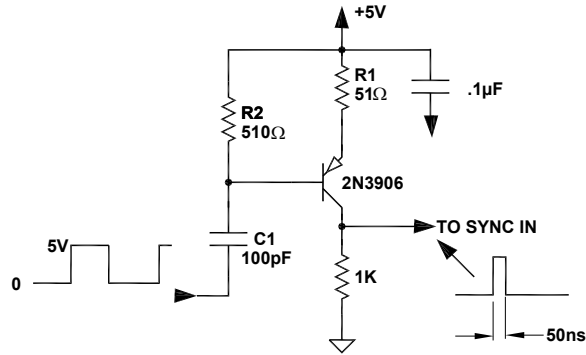


FIGURE 4. 50nS pulse generator from a square wave TTL/5V CMOS clock

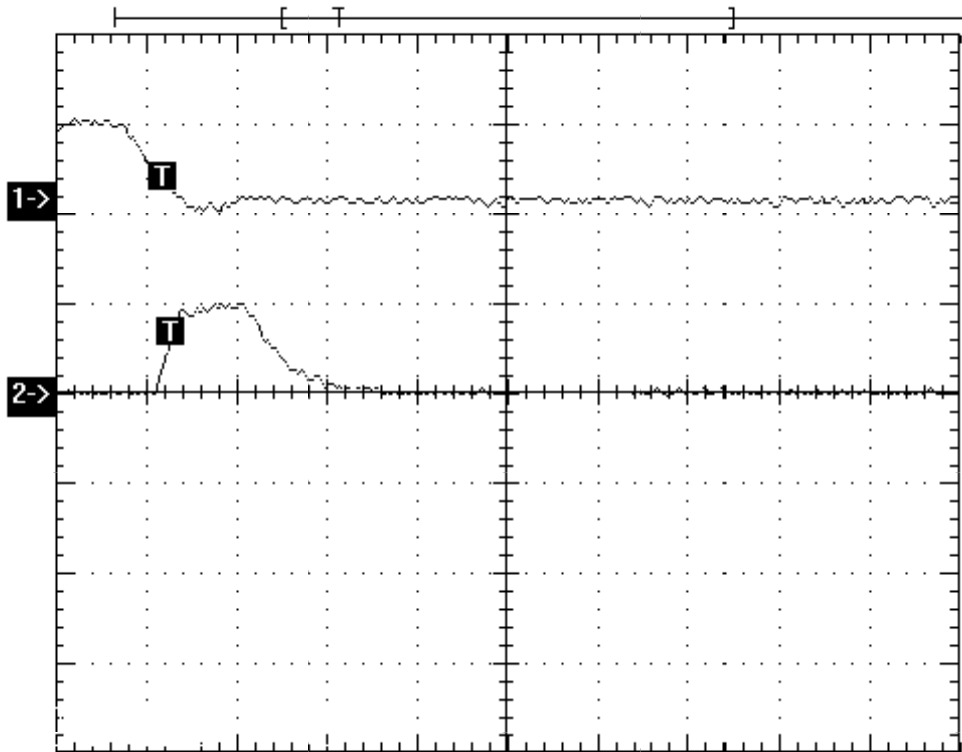


FIGURE 5. Waveforms generated from circuit in Figure 4