



# EA75

## 75W (MAX.) SINGLE DC/DC CONVERTERS

$5V_{IN}$  to  $140V_{IN}$   $2.5V_{OUT}$  to  $28V_{OUT}$

US Patents 6,262,901 B1 & 6,473,317 B1

### Key Features

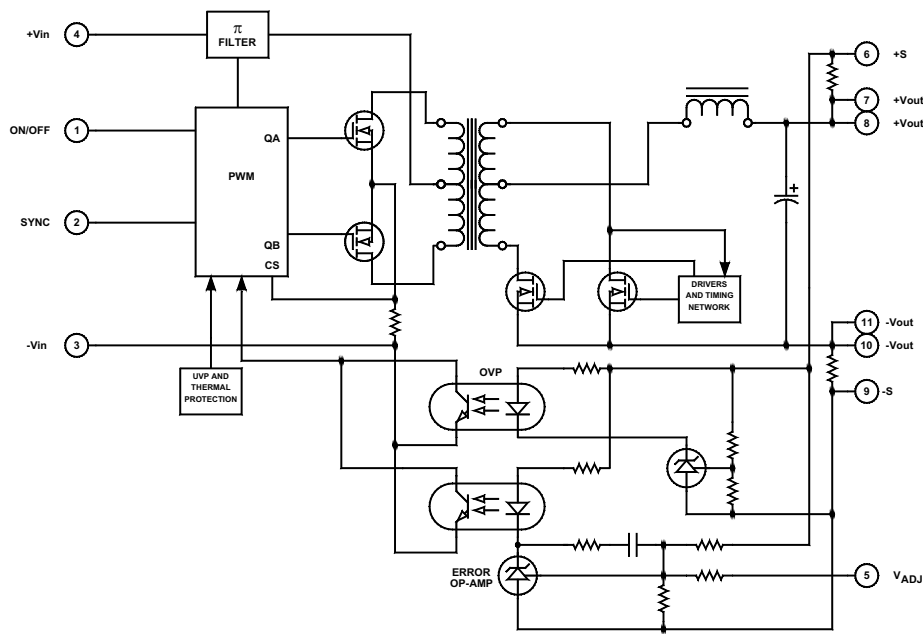
- High efficiency
- Output overvoltage protection (OVP)
- 2:1 input voltage range
- Six-sided shielding
- Soft start
- 1500Vdc input-to-output isolation
- Short circuit and thermal protection
- Adjustable output
- 300 $\mu$ A off state current
- Output synchronous rectification
- Input undervoltage protection



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; 6,473,317.

### Functional Description

The EA75 is a series of isolated, single output DC/DC converters based on patented technology for synchronous rectification and noise reduction. The converters offer a power output up to 75W, a 2:1 input voltage range from  $5V_{IN}$  to  $140V_{IN}$  and an output voltage from  $2.5V_{OUT}$  to  $28V_{OUT}$ . Other standard features include input undervoltage protection, output undervoltage protection, external synchronization, and six-sided shielding.



Typical Block Diagram

## Electrical Specifications

### INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical +25°C with nominal input voltage and under full output load conditions.

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range	See Model Selection Guide				
Input Filter					
Reverse Polarity Input Current	External series-blocking diode			12	A
Input Surge Current (20µS Spike)				10	A
No Load Input Current	See Model Selection Guide				
Full Load Input Current	See Model Selection Guide				
Short Circuit Current Limit			125		% I <sub>IN</sub>
Undervoltage Shutdown, 5V	Contact factory		4.7		Vdc
Undervoltage Shutdown, 12V			7.5		Vdc
Undervoltage Shutdown, 24V			17.5		Vdc
Undervoltage Shutdown, 48V			33		Vdc
Undervoltage Shutdown, 100V			68		Vdc
Off State Current			300		µA
Remote ON/OFF Control					
Converter ON	Open (Open circuit voltage at Pin 1: 10V Max.)				
Converter OFF		-0.6	0	0.2	Vdc
Logic Input Reference	-Input				
Logic Compatibility	TTL Open Collector or CMOS Open Drain				
Sync Input	TTL	2.5		5	Vdc
Sync Input Frequency Range		310	320	360	kHz
Sync Input Minimum Pulse Width	See Figure 4	200			nS

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage	See Model Selection Guide				
Output Current	See Model Selection Guide				
Output Voltage Accuracy			±1	±1.5	%
Output Voltage Adjustment			3	±5	%
Minimum Load		10			% of FL
Ripple & Noise			1	2	% <sub>PP</sub>
Line Regulation	Minimum V <sub>IN</sub> to maximum V <sub>IN</sub>		±1	±2	%
Load Regulation	NL to FL		±1	±2	%
Temperature Coefficient @ FL			0.02		%/°C
Transient Response Time (to within 1% of V <sub>OUT</sub> )	50% FL to FL to 50% FL, See Figure 3		50		µS
Short Circuit Protection	By input current limiting				
Output Short Circuit Duration	Continuous				

### GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency	See Model Selection Guide				
Isolation Voltage (1 min.)			1500		Vdc
Isolation Resistance			10 <sup>9</sup>		Ω
Isolation Capacitance			80		pF
Switching Frequency			150		kHz

**ENVIRONMENTAL SPECIFICATIONS**

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature, Industrial (Ambient)	See Figure 2	-40		+75	°C
Storage Temperature Range		-55		+125	°C
Thermal Resistance			2.25	2.50	°C/W <sub>DISS</sub>
Maximum Operating Case Temperature				105	°C
Thermal Turn Off, Case Temperature		90	100	105	°C
Thermal Hysteresis			10		°C
Derating	See Figure 2				
Humidity	Up to 95% non-condensing				
Cooling	Free-air convection				
EMI/RFI	Six-sided continuous shielded metal case				
MTBF	per MIL-HNBK-217F (Ground benign, +25°C)		625,000		hours

**PHYSICAL CHARACTERISTICS**

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (L×W×H)	2.00×2.00×0.50 in. (50.80×50.80×12.70mm)				
Weight	2.78 oz. (79g)				
Case Material	Coated metal				
Shielding Connection, 5, 12, 24V <sub>IN</sub>	-V <sub>IN</sub> (Pin 3)				
Shielding Connection 48,100	+V <sub>in</sub> (Pin 4)				

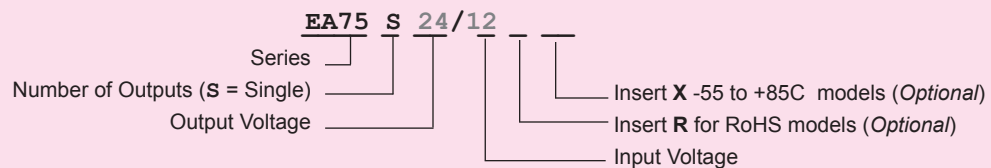
Notes 1: Measured with C1=50μF (See Fig 1)

## Model Selection Guide

MODEL NUMBER	INPUT				Reflected Ripple <sup>7</sup> (mA <sub>pp</sub> ) (see note 1)	OUTPUT		
	Voltage (Vdc)		Current (mA)			Voltage (Vdc)	Current (A)	Efficiency Full Load (%)
	Nominal	Range	No Load	Full Load				
EA75S3.3/12	12	9.5-18	100	3410	50	3.3	10	81
EA75S5/12	12	9.5-18	200	4820	30	5	10	87
EA75S6/12	12	9.0-18	306	6673	40	6	11	83
EA75S12/12	12	9.5-18	190	4520	30	12	4	89
EA75S15/12	12	9.5-18	200	4532	30	15	3.3	91
EA75S5/24	24	18-36	150	2777	40	5	12	90
EA75S8/24	24	18-36	120	2930	40	8	8	91
EA75S12/24	24	18-36	120	2777	40	12	5	92
EA75S15/24	24	18-36	120	2777	40	15	4	92
EA75S24/24	24	18-36	100	3020	40	24	2.5	82
EA75S5/48	48	36-72	10	1390	40	5	12	90
EA75S12/48	48	36-72	50	1344	40	12	5	93
EA75S15/48	48	36-72	40	1344	40	15	4	93
EA75S5/100	100	70-140	30	666	40	5	12	90
EA75S12/100	100	70-140	20	640	40	12	5	93
EA75S15/100	100	70-140	40	645	40	15	4	93

Contact factory for custom input and output voltage combinations

### ORDERING GUIDE



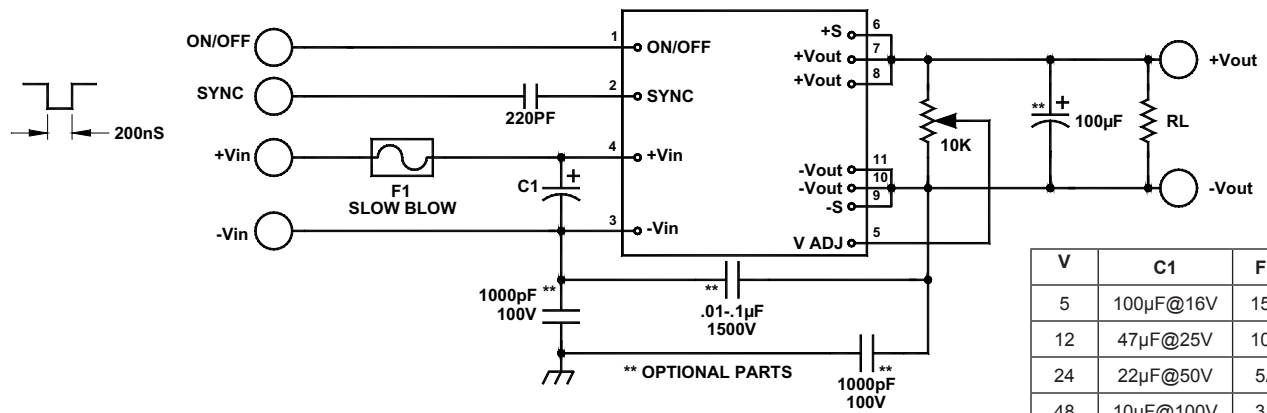


FIGURE 1. Typical connection diagram

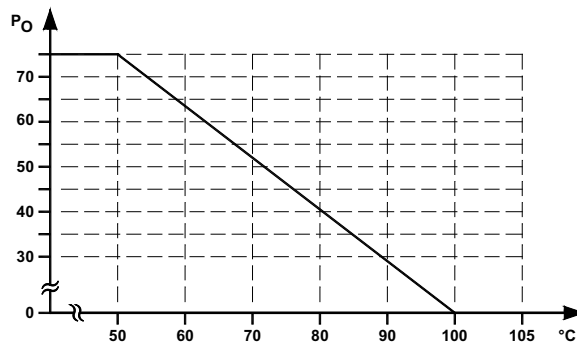
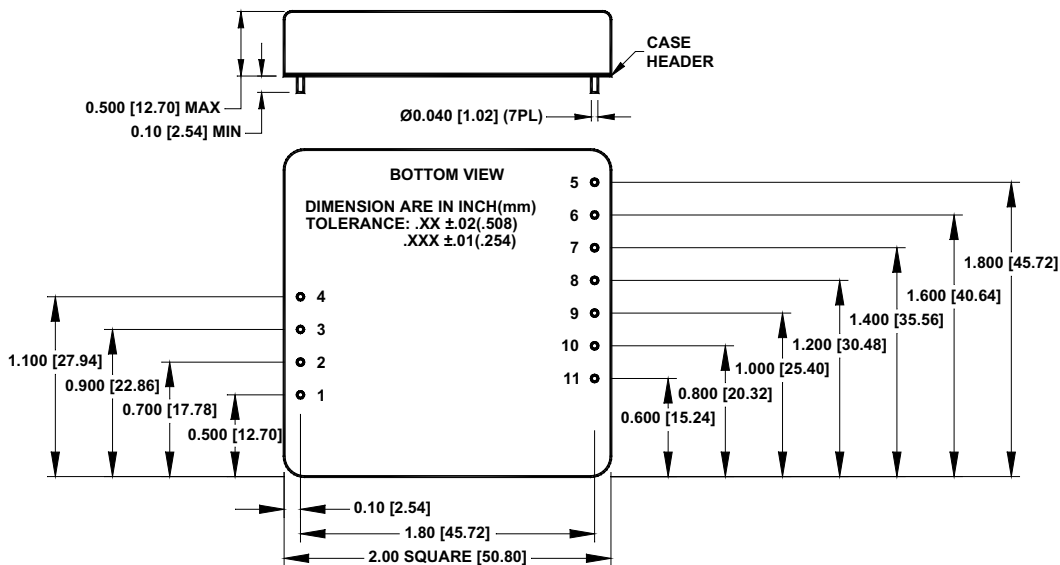


FIGURE 2. Typical derating curve of P<sub>o</sub> Max

### MECHANICAL SPECIFICATIONS



Pin	Function
<b>SINGLE</b>	
1	ON/OFF
2	SYNC
3	-V <sub>IN</sub>
4	+V <sub>IN</sub>
5	V <sub>OUT</sub> ADJ
6	+SENSE
7	+V <sub>OUT</sub>
8	+V <sub>OUT</sub>
9	-SENSE
10	-V <sub>OUT</sub>
11	-V <sub>OUT</sub>

### EXTERNAL SYNCHRONIZATION

The converter can be synchronized to an external clock by driving the SYNC pin (pin 2) directly. The driving signal frequency must be 330kHz  $\pm$ 5% (200nS to 300nS negative going pulse (See Figure 4, Waveform 1)). When the external clock is AC-coupled to the SYNC pin of the converter through a ceramic capacitor, connect

a signal Schotky diode with the cathode connected to the SYNC pin and the anode to  $-V_{IN}$  (See Figure 4). AC coupling reduces the power required for driving multiple converters and allows for continuous operation of the other synchronized converters in case the driving signal is missing or a short circuit develops at one of the sync inputs.

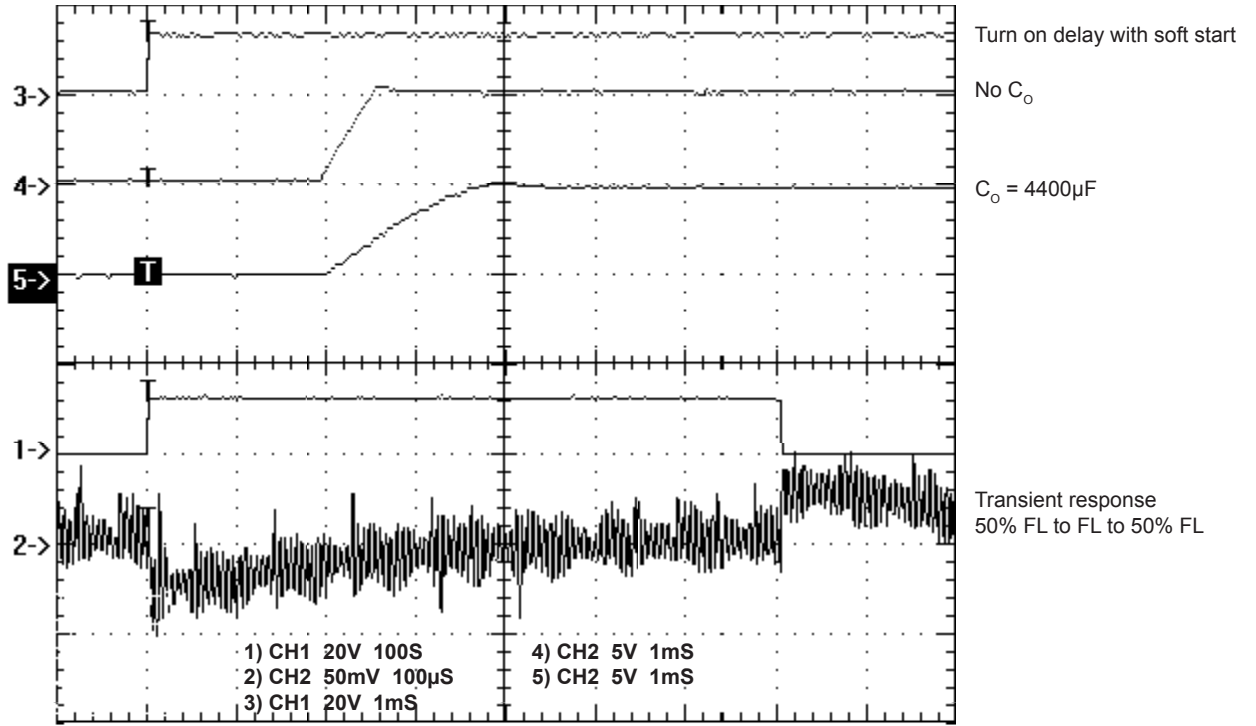


FIGURE 3. Turn on delay with soft start and transient response

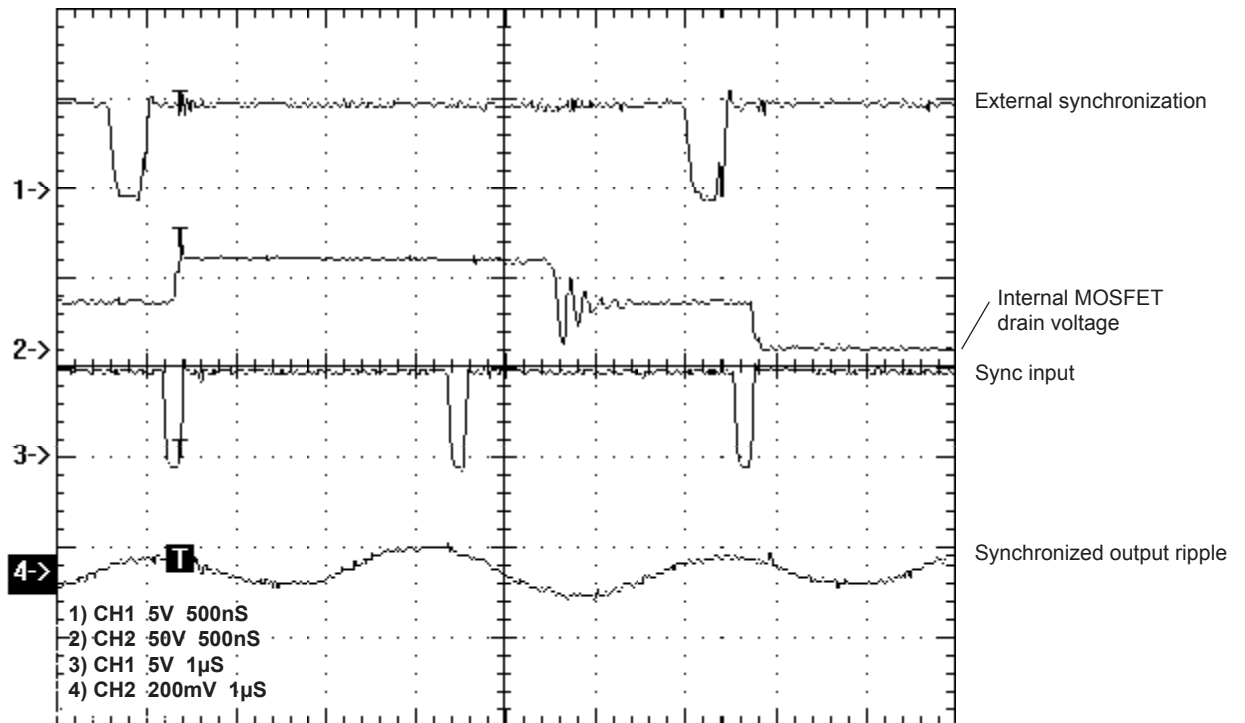


FIGURE 4. Synchronization waveforms