



Delta DCS Series DC-DC Converter

System Name: DD48-480WAA

Delta P/N: DCS-48/10A A

DC/DC Converter Specification

Specification Reviewers

Department	Name	Approval Date
DD Electronic Engineer	<i>Richard Chan</i>	2002/7/23
DD Mechanical Engineer	<i>Jane Liu</i>	2002/7/23
Project Management	<i>Jennifer Hsieh</i>	2002/7/23
Project Manager	<i>Eddy Lee</i>	2002/7/23
Product Manager	<i>Herman Chang</i>	2002/7/23



REVISION HISTORY

Date	Version	Author	Chang Note
2002/3/8	0.0	Larry Chiou	Preliminary Specification
2002/7/23	1.0	Richard Chan	Final Specification

VOCABULARY

AC	Alternating Current
ADC	Amps, Direct Current
BTS	Base Transceiver Station
°C	Temperature in degrees centigrade
dB	Decibel
DC	Direct current
EMC	Electro Magnetic Compatibility
EN	Europe Norm
FCC	Federal Communications Commission
°F	Temperature in degrees Fahrenheit
Hz	Frequency in hertz
IEC	International Electrotechnical Commission
I/O	Input / Output, bi-directional
IP	Ingress protection
ISO	International Standards Organization
Kg	Kilo grams
LED	Light emitting diode
Lbs	Pounds
mA	Milli Amps
MHz	Mega Hertz
mm	Milli meter
ms	Milli second
m/s	Meters per second
MTBF	Mean time between failure
NS	Not Specified
OVP	Over voltage protection
RH	Relative humidity
VAC	Alternating current voltage
VDC	Direct current voltage
UL	Underwriter's Laboratories

CONTENT

1. INTRODUCTION AND FEATURES	5
1-1 GENERAL DESCRIPTION	5
1-2 FEATURES	5
1-3 OUTLOOK.....	6
2. DC-DC CONVERTER SPECIFICATION	7
2-1 ELECTRONICAL SPECIFICATIONS – INPUT PARAMETERS	7
2-2. ELECTRICAL SPECIFICATIONS - OUTPUT PARAMETERS	8
2-3. PROTECTION	10
2-4. INDICATIONS AND ALARM OUTPUT	10
2-4-1 <i>LED Indications</i>	10
2-4-2 <i>Switch (module)</i>	11
2-5. MECHANICAL SPECIFICATIONS	12
2-6. ENVIRONMENTAL.....	13
2-7. SAFETY AND EMC COMPLIANCE.....	14
2-8. EXPECTED RELIABILITY – MTBF.....	15
2-9. OUTPUT CONNECTOR DESCRIPTION	15



1. PRODUCT INTRODUCTION

1-1 GENERAL DESCRIPTION

The DCS DC-DC converter is modular, pluggable, and hot swappable for ease of installation and maintenance. DCS series converters are designed to work in parallel to provide load sharing and redundancy vital for network survivability. Increasing converter capacity is easily done by simply plugging another DCS DC-DC converter into the shelf or mounting space without any service interruption or special tools.

Delta incorporates advanced switch-mode technology into its high density, modular DCS series DC-DC converters to offer higher reliability and scalability. The DCS series converter incorporates a full range of standard and optional features enabling it to fulfill a variety of applications. These converters come equipped with a user-friendly interface for easy status indication. Internal DC protection reduces the risk of module failure due to a short-circuit or high voltage condition. This feature allows the Delta DCS series converters to exceed the power demands of today and tomorrow's telecommunication networks.

1-2 FEATURES

- Module Output : -48V / 10A
- Modular Design For Scaleable, Cost Effective Expansion
- Hot Swappable and Front Access, No System Shut Down for Maintenance
- Automatic Load Share, N+1 Redundancy
- Compact Size and High Power Density
- Meets EMC CISPR 22 Class B
- UL / CUL, TUV Approvals

1-3 OUTLOOK



DC-DC Converter : DCS-48/10A A



2. DC-DC CONVERTER SPECIFICATION

2-1 ELECTRONICAL SPECIFICATIONS – INPUT PARAMETERS

Item	Specification Function	Standard Comments
2-1-1 Input voltage (DC) - Nominal voltage - Absolute maximum voltage	<ul style="list-style-type: none"> ▪ 24V ▪ 30V 	No higher voltage protection
2-1-2 Input voltage range	<ul style="list-style-type: none"> ▪ 21±1V ~ 29±1V 	
2-1-3 Input low voltage	<ul style="list-style-type: none"> ▪ 19±1V Shutdown ▪ 22±1V Auto Recovery 	
2-1-4 Input current - Nominal r.m.s. current - Maximum r.m.s. current	<ul style="list-style-type: none"> ▪ 24A ▪ 29A 	<p>At rated linear load, nominal input voltage</p> <p>At rated linear load, minimum input voltage</p>
2-1-5 Input Inlet/Receptacle - type - component spec./rating - standard	<ul style="list-style-type: none"> ▪ Terminal block ▪ 60A/600V ▪ UL approved 	
2-1-6 Input protection - type - rating - standard	<ul style="list-style-type: none"> ▪ Circuit breaker ▪ 40A,DC65V ▪ UL - approved 	With reverse-polarity-proof
2-1-7 GND wiring character	<ul style="list-style-type: none"> ▪ Resistance value<0.1Ω at current 25A 	
2-1-8 Number of Phase /Number of wire	<ul style="list-style-type: none"> ▪ DC/ 2 wire 	

2-2. ELECTRICAL SPECIFICATIONS - OUTPUT PARAMETERS

Item	Specification/Function	Standard/Comment
2-2-1 Maximum Output Power	<ul style="list-style-type: none"> ▪ 480W 	48V/10A output
2-2-2 Output Voltage - Nominal output voltage - Factory set up voltage	<ul style="list-style-type: none"> ▪ $-48\pm 7\%$ (Adjustable by potentiometer) ▪ $-48\pm 0.5V$ 	No Load
2-2-3 Maximum Output Current	<ul style="list-style-type: none"> ▪ 10A 	48V output
2-2-4 Over Current	<ul style="list-style-type: none"> ▪ Maximum $110\pm 5\%$ of rated output current 	
2-2-5 Dynamic Response - Overshoot - Recovery time	<ul style="list-style-type: none"> ▪ $\leq \pm 5\%$ of rated output voltage ▪ $< 1ms$, Recover to $\leq \pm 1\%$ of rated output voltage 	Load Change: 10%~90% with half load
2-2-6 Load Regulation	<ul style="list-style-type: none"> ▪ $\leq \pm 1\%$ ▪ $\langle \Delta \text{Spec.} \rangle :$ $\text{Equation } \frac{V - V_H}{V_H} \times 100\%$ <p>V: Maximum And Minimum Voltage; VH: Half Load Voltage</p> 	At rated output voltage, 0-100% load
2-2-7 Current Sharing	<ul style="list-style-type: none"> ▪ $\leq \pm 5\%$ of rated output current 	
2-2-8 Switching Frequency	<ul style="list-style-type: none"> ▪ $> 85Khz$ 	
2-2-9 Output Ripple	<ul style="list-style-type: none"> ▪ $< 200mV$ 	
2-2-10 Efficiency (Module only)	<ul style="list-style-type: none"> ▪ $\geq 83\%$ 	At full load and rated input voltage

Item	Specification/Function	Standard/Comment
2-2-11 Line Regulation	<ul style="list-style-type: none"> ▪ $\pm 0.3\%$ <Delta Spec. >: $\text{Equation: } \frac{V_A - V_B}{V_B} \times 100\%$ <p> V_A: Output Voltage, At Input voltage Range 20V~30V V_B: Output Voltage, At Nominal Line Input voltage, Load 0~100% </p>	At rated output Voltage, 0~ 100% Load, Input Voltage 20V~30V
2-2-12 Noise - Audio band - Wide band - Narrow band	<ul style="list-style-type: none"> ▪ $< 2\text{mV}$ <Note> $\text{dBmp} + 2.5 = 20 \text{ Log } (V/0.7746)$ <ul style="list-style-type: none"> ▪ $\leq 10 \text{ mVrms}$ (10KHz~100MHz) <ul style="list-style-type: none"> ▪ $\leq 5 \text{ mV}$ ▪ $\leq 3 \text{ mV}$ ▪ $\leq 2 \text{ mV}$ ▪ $\leq 1 \text{ mV}$ 	CCITT 3.4KHZ~150KHz 150KHZ~200KHz 200KHZ~500KHz 500KHZ~30MHz
2-2-13 Temperature Coefficient	<ul style="list-style-type: none"> ▪ $< 200\text{PPM}$ 	
2-2-14 DC Connector - Type - Standard	<ul style="list-style-type: none"> ▪ Delta Standard ▪ Meet UL/TUV 	



2-3. PROTECTION

Item	Condition	Protection
2-3-1 Output - O/P voltage abnormal - Overload - Output Short Circuit	<ul style="list-style-type: none"> ▪ $>59V \pm 1V$, ▪ $110\% \pm 5\%$ 	Shut down Derating the output voltage to almost "0" then auto-recover Derating the output voltage to almost "0" then auto-recover
2-3-2 Other Protection - Overtemperature	<ul style="list-style-type: none"> ▪ $105 \pm 5^{\circ}C$ (DD MOSFET heat sink) 	Shutdown

2-4. INDICATIONS AND ALARM OUTPUT

2-4-1 LED INDICATIONS

Item	Specification/Function	Standard/Comments
4-1 Over temperature or FAN fail - Component type - Color - Function	<ul style="list-style-type: none"> ▪ LED ▪ RED ▪ Output diode tem. Over $105^{\circ}C$ or FAN Fail 	F.F. And C.F. Light
4-2 DC output - Component type - Color - Function <ul style="list-style-type: none"> ■ On condition ■ Off condition 	<ul style="list-style-type: none"> ▪ LED ▪ Green ▪ O/P on ▪ O/P off 	
4-3 Overload - Component type - Color - Function <ul style="list-style-type: none"> ■ On condition ■ Off condition 	<ul style="list-style-type: none"> ▪ LED ▪ Red ▪ Load capacity over than $110 \pm 5\%$ ▪ Load capacity less than $100 \pm 5\%$ 	C.F Light Derating the output voltage to almost "0" then auto-recover



<p>4-4 DC LV</p> <ul style="list-style-type: none"> - component type - color - function <ul style="list-style-type: none"> ■ on condition ■ off condition 	<ul style="list-style-type: none"> ▪ LED ▪ Red ▪ I/P voltage less than 19±1V ▪ I/P voltage over than 22±1V 	C.F Light
<p>4-5 Fault</p> <ul style="list-style-type: none"> - component type - color - function <ul style="list-style-type: none"> ■ on condition ■ off condition 	<ul style="list-style-type: none"> ▪ LED ▪ Red ▪ Converter fail ▪ O/P short circuit, OTP, OVP, UVP ▪ After the abnormal 	C.F Light P.S: OVP need manual restart when abnormal condition is resolved
<p>4-6 Load capacity</p> <ul style="list-style-type: none"> - component type - color - function <ul style="list-style-type: none"> ■ on condition 	<ul style="list-style-type: none"> ▪ LED ▪ Green ▪ converter load capacity ▪ 50% load +-10% (100% load +-10%) 	

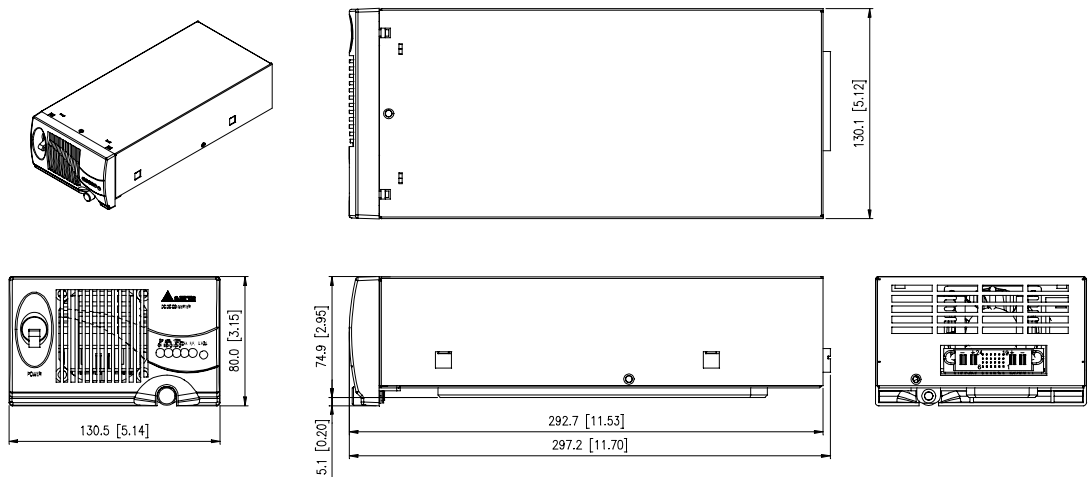
2-4-2 SWITCH (MODULE)

Item	Specification/Function	Standard/Comments
<p>4-7 Power ON/OFF switch</p> <ul style="list-style-type: none"> - Allocation - Function 	<ul style="list-style-type: none"> ▪ Front panel ▪ Converter ON. 	Circuit breaker
4-8 Relay Rating	<ul style="list-style-type: none"> ▪ 30A/120Vac 	
4-9 Relay Contact	<p>Switching</p> <ol style="list-style-type: none"> 1. Over-voltage protection (Output) 2. Low-voltage protection (Input voltage) 	



2-5. MECHANICAL SPECIFICATIONS

Item	Specification/Function	Standard/Comment
5-1 Width - Module Case - Front Panel	- 5.12" / 130.1mm - 5.14" / 130.5mm	
5-2 Height - Module Case - Front Panel	- 2.95" / 74.9mm - 3.15" / 80.0mm	
5-3 Depth - Module Case - Front Panel to Back	- 10.99" / 279.2mm - 11.7" / 297.2mm	
5-4 Weight	- 2.2 LB / 1 kg	
5-5 Marking Language	- English	
5-6 Panel Color	-PANTONE COOL GRAY 4C.	





2-6. ENVIRONMENTAL

Item	Specification/Function	Standard/Comment
6-1 Operating Temperature	- 5°C ~ +50°C	
6-2 Operating Humidity	- 0 ~ 95% Relative Humidity (Non-Condensing)	
6-3 Storage Temperature	- -40°C ~ +85°C (-40°F ~ +185°F)	
6-4 Storage Humidity	- 0 ~ 95% Relative Humidity (Non-Condensing)	
6-5 Altitude	- -152m~3048m (-500~10000 Feet)	
6-6 Vibration	- Sine Wave, 5.5 ~ 500Hz, 2G acceleration, duration: 30 minutes	
6-7 Acoustics	- < 55 dBA at 1 meter	



2-7. SAFETY AND EMC COMPLIANCE

Item	Specification/Function	Standard/Comment
7-1 Safety Mark	- UL/CUL - TUV	- IEC 950 - EN 60950
7-2 EMI/RFI	- CISPR 22 Class B	- EN55022, BS6527 Class B
7-3 EMS	- Electrostatic Discharge (ESD) - Electromagnetic Compatibility(EMC)/Radiated Susceptibility - Conducted Susceptibility	- ETS300386-2 - EN 61000-4-2 Level 4, IEC 1000-4-2, IEC 801-2 Level 4 - IEC 1000-4-3, IEC 801-3 Level 3 - IEC 1000-4-6 Level 3
7-4 Insulation Resistance	- Input to output > 2 MΩ (At 500Vdc) - Input to frame ground > 2 MΩ (At 500Vdc) - Output to frame ground > 2 MΩ (At 500Vdc)	Test Condition: - Humidity 90% R.H., Non condensing, 25°C condition - Disconnect the FG wire from the case (Input to frame ground)
7-5 Withstand voltage (High Pot)	- Input To Output 1000 Vac 1 Minute - Input to Frame Ground 500 Vac 1 Minute - Output to Frame Ground 500 Vac 1 Minute	

