DCS SERIES DC-DC Converter

Model Name: DD24-480WAA

Delta P/N: DCS-24/20A x

Specification Reviewers

Department	Name	Approval Date
Electronic Engineer	Richard Chan	2003/7/14
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Firmware Engineer		
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PM	Lorna Chen	2003/7/14
Product Manager	Herman Chang	2003/7/14

REVISION HISTORY

Date	Version	Author	Chang Note
2000/4/12	0.0	Jason Lee	Preliminary Specifications
2000/9/19	1.0	Jason Lee	Final Specification
2003/7/14	1.1	Charles Chang	P. 6,7,8 Parameter Modified

VOCABULARY

AC	Alternating Current
ADC	Amps, Direct Current
BTS	Base Transceiver Station
℃	Temperature in degrees centigrade
dB	Decibel
DC	Direct current
EMC	Electro Magnetic Compatibility
EN	Europe Norm
FCC	Federal Communications Commission
℉	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. Features, Benefits & Descriptions

Features & Benefits

. Modular, Pluggable, front access for economical scaleable expansion
. Automatic load share, N+1 redundancy
. High Efficiency
. Compact Size
. High power density

Description

Delta incorporates the advanced switch mode technology used in the ESR series rectifiers into its high density, modular DCS series DC-DC converters to offer reliability and scalability required to meet the power demands of today's and tomorrow's telecommunication networks.

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. The DCS series DC-DC converters mount laterally in a single, low profile shelf. The shelf is the height of one DC-DC converter. Up to 18 DCS in parallel.

2. Electrical Specifications - Input Parameters

Item	Specification/Function	Standard/Comments
2-1Input voltage (DC) - nominal voltage - absolute maximum voltage	▪ 48V ▪ 60V	◆ No higher voltage protection
2-2 Input voltage range	▪ 41±1V ~ 59±1V	
2-3 Input low voltage	▪ 38±1V Shutdown	
2-4 Input current - nominal r.m.s. current - maximum r.m.s. current	▪ 12A ▪ 15A	◆ At rated linear load, nominal input voltage ◆ At rated linear load, minimum input voltage
2-5 Input Inlet/Receptacle - type - component spec./rating - standard	▪ Terminal block ▪ 60A/600V ▪ UL approved	
2-6 Input protection - type - rating - standard	▪ Circuit breaker ▪ 20A,DC65V ▪ UL - approved ▪	◆ with reverse-polarity-proof
2-7 GND wiring character	▪ Resistance value<0.1Ω at current 25A	
2-9 Number of Phase /Number of wire	▪ DC/two wire	

3. Electrical Specifications - Output Parameters

Item	Specification/Function	Standard/Comment
2-10 Maximum Output Power	480W	24V/20A output
2-11 Output Voltage - Nominal output voltage Factory set up voltage	–24±3V (Adjustable by potentiometer) –24±0.5V	No Load
2-12 Maximum Output Current	20A	24V output
2-13 Over Current	102%～105% of rated output current	
2-14 Dynamic Response - Overshoot - Recovery time	≦±5% of rated output voltage <1ms, Recover to≦±1% of rated output voltage	Load Change: 10%~90%with half load
2-15 Load Regulation	≦±1% <Delta Spec.> : $Equation: \frac{V - V_H}{V_H} \times 100\%$ V: Maximum And Minimum Voltage; V_H: Half Load Voltage	At rated output voltage, 0-100% load
2-16 Current Sharing	≦±5% of rated output current	
2-17 Switching Frequency	>85Khz	
2-18 Output Ripple	<50mV	

3. Electrical Specifications - Output Parameters(Continued)

Item	Specification/Function	Standard/Comment
2-19 Efficiency (module only)	>≧84% %	At full load and Rated input voltage
2-20 Line Regulation	± 0.3 % <Delta Spec. >: $Equation: \frac{V_A - V_B}{V_B} \times 100\%$ V_A: Output Voltage, At Input voltage Range 40V～60V V_B: Output Voltage, At Nominal Line Input voltage, Load 0~100%	At rated output Voltage, 0~ 100% Load, Input Voltage 40V~60V
2-21 Noise - Audio band - Wide band - Narrow band	<1mV <Note> dBmp + 2.5 = 20 Log (V/0.7746) ≦10 mVrms (10KHz~100MHz) ≦5 mV ≦3 mV ≦2 mV ≦1 mV	CCITT 3.4KHZ~150KHz 150KHZ~200KHz 200KHZ~500KHz 500KHZ~30MHz
2-22 Temperature Coefficient	<200PPM	
2-23 DC Connector - Type - Standard	 Delta Standard Meet UL/TUV	

4. Protection

Item	Condition	Protection
3-1 Output - O/P voltage abnormal	>28V±1V,	Shut down
- Overload	102% ~ 105%,	Derating the output voltage to almost “0” then auto-recover
- Output Short Circuit		Derating the output voltage to almost “0” then auto-recover
3-2 Other Protection - Over temperature	105±5℃ (Output Diode heat sink)	Shutdown

5. Indicators & Alarm Output

LED

Item	Specification/Function	Standard/Comments
4-1 Over temperature or FAN fail - component type - color - function	LED RED Output diode tem. Over105℃ or FAN Fail	F.F. And C.F. Light
4.2 DC output - component type - color - function ■ on condition ■ off condition	 ▪ LED ▪ Green ▪ O/P on ▪ O/P off	
4.3 Overload - component type - color - function ■ on condition ■ off condition	 ▪ LED ▪ Red ▪ Load capacity over than 102% ～ 105% ▪ Load capacity less than 100±5%	C.F Light Derating the output voltage to almost “0” then auto-recover
4.4 DC LV - component type - color - function ■ on condition ■ off condition	 ▪ LED ▪ Red ▪ I/P voltage less than 38±1V ▪ I/P voltage over than 47±1V	C.F Light
4.5 Fault - component type - color - function ■ on condition ■ off condition	 ▪ LED ▪ Red ▪ Converter fail ▪ O/P short circuit, OTP, OVP, UVP ▪ After the abnormal condition resolved and restart	C.F Light P.S: OVP need manual restart when abnormal condition is resolved
4.6 Load capacity - component type - color - function ■ on condition	 LED Green converter load capacity 50% load ±10% (100% load ±10%)	

5.Indicators & Alarm Output (Continued)

Switch (module)

Item	Specification/Function	Standard/ Comments
4-6 Power ON/OFF switch - Allocation - Function	▪ Front panel ▪ Converter ON, Converter OFF	Circuit breaker
4-7 Relay Rating	▪ 30A/120Vac	
4-8 Relay Contact	Switching 1. Over-voltage protection (Output) 2. Low-voltage protection (Input voltage)	

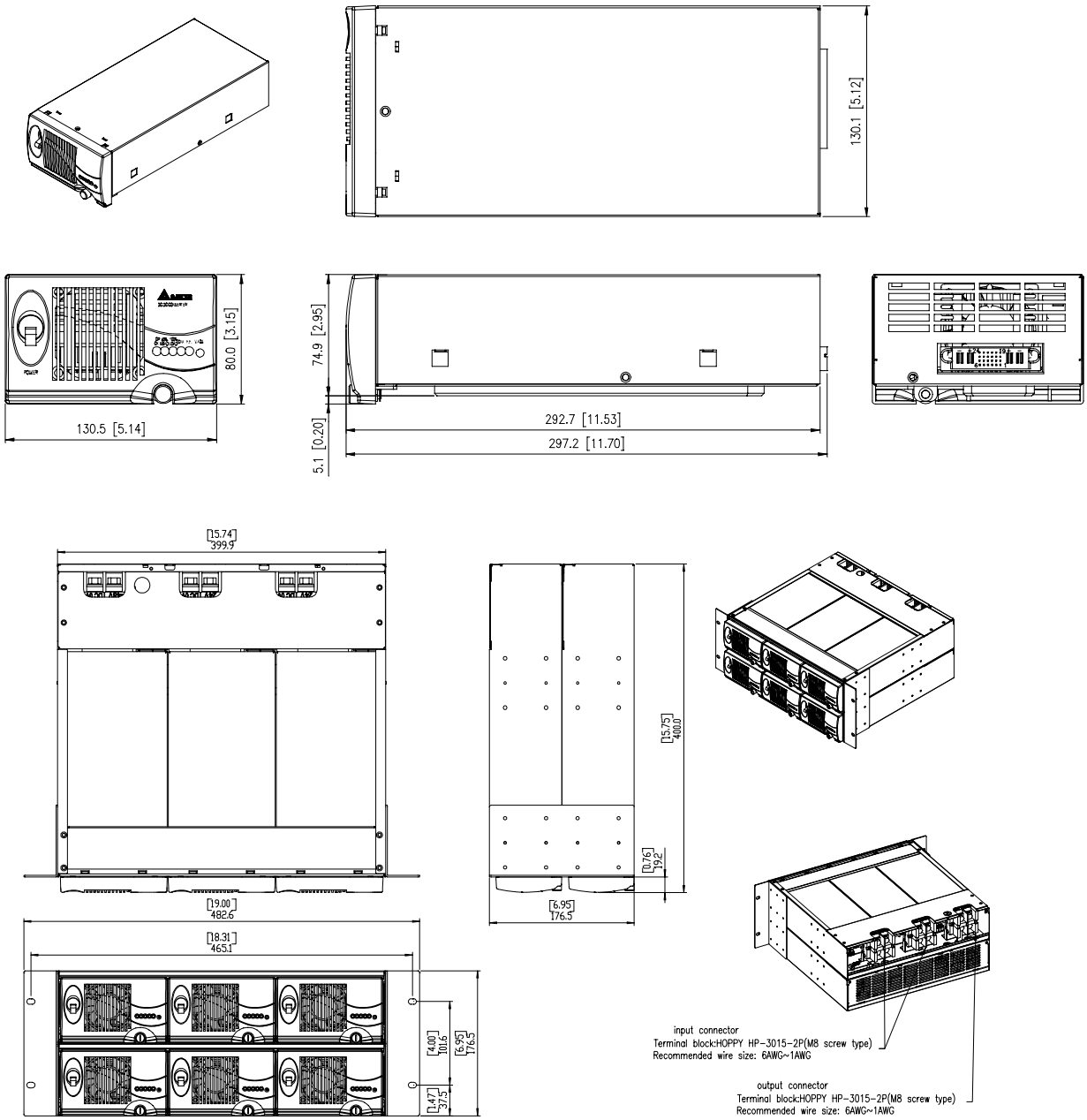
Alarm Output (shelf)

Item	Specification/Function	Standard/ Comments
4-9 Output	▪ 2 points terminal for alarm signal	
4-10 Relay Rating	▪ 48V/0.5A	
4-11 Function	▪ Normally closed, in case of failure open	
4-12 Dip switch	▪ Power on or off every slot	

6. 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.	

7. Outline Dimensions



8. Standard

Item	Specification/Function	Standard/Comment
7-1 Safety Mark	- UL/CUL	- IEC 950 - EN 60950
7-2 EMI/RFI	- - CISPR 22 Class B	- - EN55022, BS6527 Class B
7-3 EMS		
- Electrostatic Discharge (ESD)	15KV Air Discharge, 8KV Contact Discharge	ETS300386-2 EN 61000-4-2 Level 4 , IEC 1000-4-2, IEC 801-2 Level 4
- Electromagnetic Compatibility(EMC)/Radiated Susceptibility	10V/m	IEC 1000-4-3, IEC 801-3 Level 3
-		
- Conducted Susceptibility	10V/m	IEC 1000-4-6 Level 3

8. Standard (Continued)

Item	Specification/Function	Standard/Comment
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℃ condition - Disconnect the FG wire from the case (Input to frame ground)
7-5 Withstand voltage (High Pot)	- Input To Output 1750 Vac 1 Minute - Input to Frame Ground 500 Vac 1 Minute - Output to Frame Ground 500 Vac 1 Minute	
7-6 Vibration	Sine Wave, 5.5 ~ 500Hz, 2G acceleration, duration: 30 minutes	
7-7 Acoustics	< 55 dBA at 1 meter	

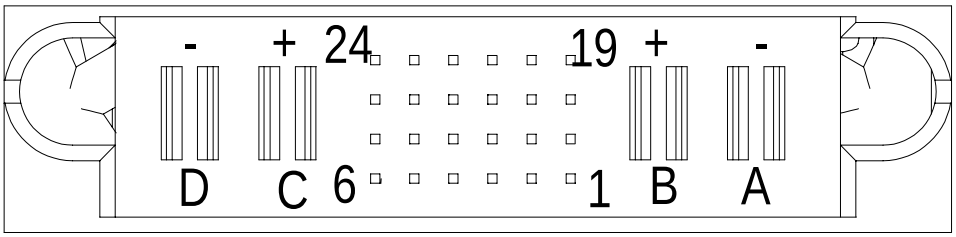
9. Environmental

Item	Specification/Function	Standard/Comment
8-1 Operating Temperature	- 5℃ ~ +55℃	
8-2 Operating Humidity	0 ~ 95% Relative Humidity (Non-Condensing)	
8-3 Storage Temperature	-40℃ ~ +85℃ (-40℉ ~ +185℉)	
8-4 Storage Humidity	0 ~ 95% Relative Humidity (Non-Condensing)	
8-5 Altitude	152m~3048m (-500~10000 Feet)	

10. Expected Reliability - MTBF

Item	MTBF	Standard/Comment
9-1 MTBF	>150K hours	At 25℃, rated load
9-2 Cooling Fan Life	> 43800 hours (5 Years)	

11. Output Connector Description



CONNECTOR P/N ASSIGNMENT

Pin No.	FUNCTION	Pin No.	FUNCTION
A	INPUT (–)	11	CFA
B	INPUT (+)	12	----------
C	OUTPUT (+)	13	----------
D	OUTPUT (–)	14	SHUNT DOWN
1	----------	15	IO
2	SHUNT DOWN	16	SHORE BUS
3	IO	17	CFA
4	SHORE BUS	18	----------
5	CFA	19	----------
6	----------	20	SHUNT DOWN
7	----------	21	IO
8	SHUNT DOWN	22	SHORE BUS
9	IO	23	CFA
10	SHORE BUS	24	----------