DELPHI SERIES

FEATURES

- High efficiency: 91.7% @ 4.2V/15A
- Size: 88x48x19mm
- Fixed frequency operation
- Input UVLO
- OTP
- Output OVP
- Output OCP
- 500V isolation and basic insulation

D48SR4R215A, DC/DC Power Modules: 44V~65Vin, 4.2V, 15Aout

The Led D48SR4R215A, 44V~65Vin input, single output, isolated DC/DC converters, are the latest offering from a world leader in power systems technology and manufacturing — Delta Electronics, Inc. This product provides up to 63 watts of power or 15A of output current. With creative design technology and optimization of component placement, these converters possess outstanding electrical and thermal performance, as well as extremely high reliability under highly stressful operating conditions. Typical efficiency of the 4.2V/15A module is greater than 91.7%.

Delta Electronics, Inc.

TECHNICAL SPECIFICATIONS

(T_A=25°C, airflow rate=300 LFM, Vin=54Vdc, nominal Vout unless otherwise noted.)

PARAMETER	NOTES and CONDITIONS	D48SR4R215A			
		Min.	Typ.	Max.	Units
ABSOLUTE MAXIMUM RATINGS					
Input Voltage					Vdc
Continuous		0		65	Vdc
Operating Ambient Temperature		-40		65	°C
Storage Temperature		-55		125	°C
Input/Output Isolation Voltage				500	Vdc
INPUT CHARACTERISTICS					
Operating Input Voltage		44	54	65	Vdc
Input Under-Voltage Lockout					
Turn-On Voltage Threshold		41.5	42.5	43.5	Vdc
Turn-Off Voltage Threshold		38.5	40	41.5	Vdc
Lockout Hysteresis Voltage		1.5	2.5	3.5	Vdc
Maximum Input Current	100% Load, 44Vin			1.8	A
No-Load Input Current	Vin=54V, Io=0A		50		mA
Inrush Current (I2t)					A2s
OUTPUT CHARACTERISTICS					
Output Voltage Set Point	Vin=54V, Io=Io.max, Tc=25°C	4.1	4.2	4.3	Vdc
Output Voltage Regulation					
Over Load	Io=Io, min to Io, max		±5	±15	mV
Over Line	Vin=44V to 65V		±5	±15	mV
Over Temperature	Tc=-40°C to 65°C		±120		mV
Total Output Voltage Range	Over sample load, line and temperature	4.0	4.2	4.4	V
Output Voltage Ripple and Noise	5Hz to 20MHz bandwidth				
Peak-to-Peak	Vin=54V, Full Load, 1µF ceramic, 10µF tantalum		100		mV
RMS	Vin=54V, Full Load, 1µF ceramic, 10µF tantalum		25		mV
Operating Output Current Range	Vin=44V to 65V	0		15	A
Operating Output Current Range					
Output Over Current Protection(hiccup mode)	Output Voltage 10% Low		125		%
DYNAMIC CHARACTERISTICS					
Output Voltage Current Transient	54Vin, 10µF Tan & 1µF Ceramic load cap, 0.1A/µs				
Positive Step Change in Output Current	75% Io.max to 50% Io.max		300		mV
Negative Step Change in Output Current	50% Io.max to 75% Io.max		300		mV
Settling Time (within 1% Vout nominal)			200		µs
Turn-On Transient					
Start-Up Time, From Input			3		mS
Output Capacitance (note1)	Full load; 5% overshoot of Vout at startup	0		3000	µF
EFFICIENCY					
100% Load	Vin=44V		91.7		%
100% Load	Vin=54V		91.3		%
60% Load	Vin=54V		91.5		%
ISOLATION CHARACTERISTICS					
Input to Output				500	Vdc
Isolation Resistance		10			MΩ
Isolation Capacitance			10		nF
FEATURE CHARACTERISTICS					
Switching Frequency			300		KHz
Output Over-Voltage Protection	Over full temp range; % of nominal Vout		125		%
GENERAL SPECIFICATIONS					
MTBF	Io=80% of Io, max; Ta=25°C, airflow rate=300FLM		3		M hours
Weight			40.6		grams
Over-Temperature Shutdown (Hot spot)	Refer to Figure 8 for Hot spot location (54Vin,80% Io, 0LFM)		135		°C
Over-Temperature Shutdown (NTC resistor)			130		°C
Note: Please attach thermocouple on NTC resistor to test OTP function, the hot spots' temperature is just for reference.					

Note1: For applications with higher output capacitive load, please contact Delta.

ELECTRICAL CHARACTERISTICS CURVES

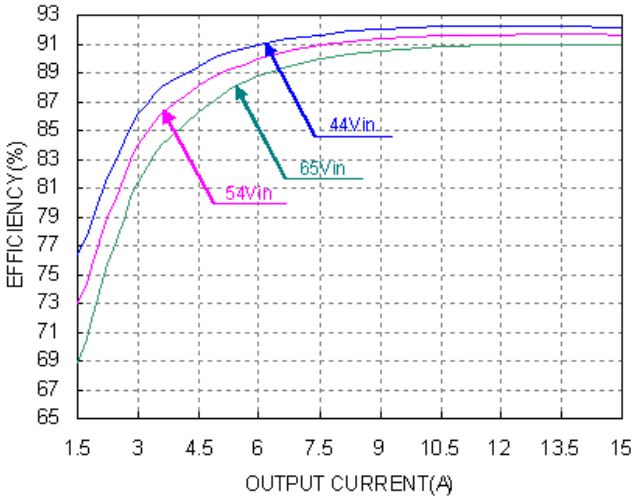


Figure 1: *Efficiency vs. load current for minimum, nominal, and maximum input voltage at 25°C*

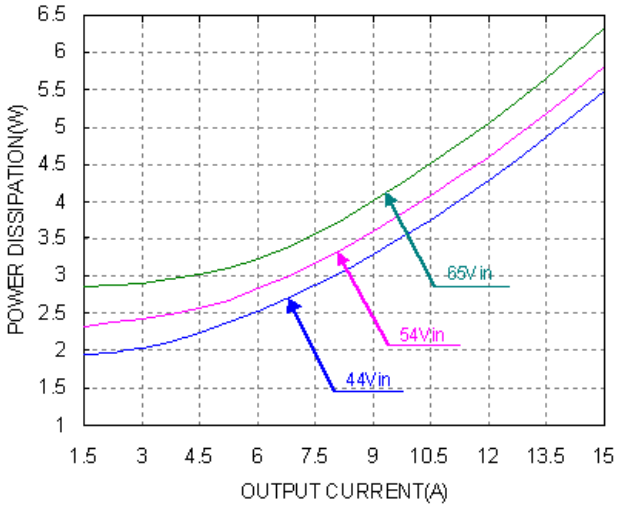


Figure 2: *Power dissipation vs. load current for minimum, nominal, and maximum input voltage at 25°C.*

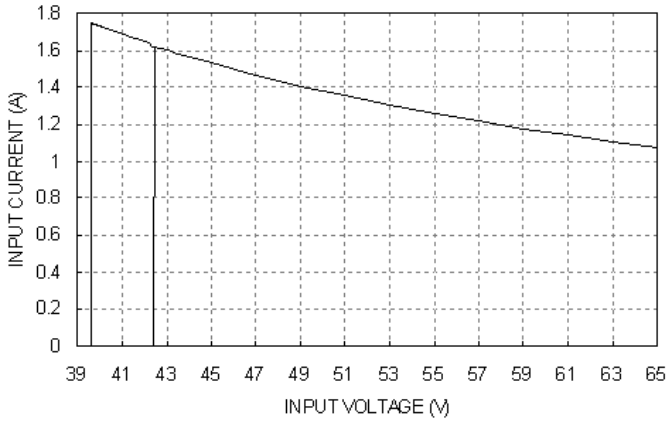


Figure 3: *Typical full load input characteristics at room temperature*

ELECTRICAL CHARACTERISTICS CURVES

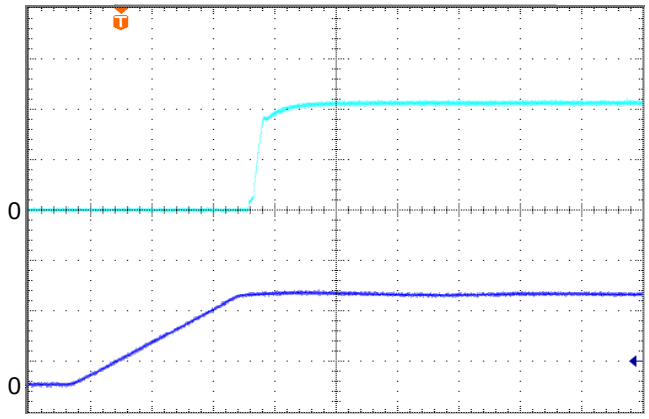


Figure 4: *Turn-on transient at full rated load current (resistive load) (2ms/div). Vin=54V. Top Trace: Vout, 2.0V/div; Bottom Trace: Vin, 30V/div*

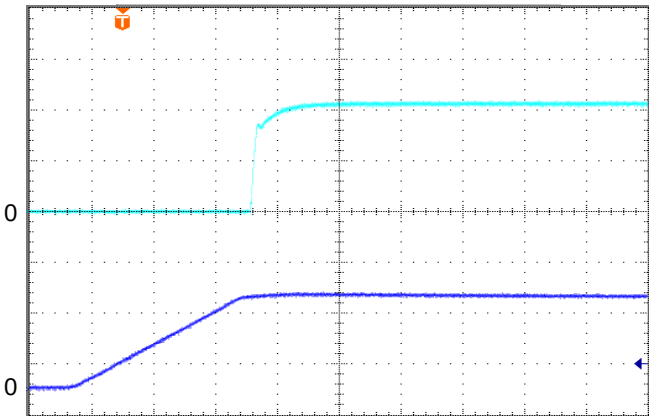


Figure 5: Turn-on transient at zero load current (2ms/div). Vin=54V. Top Trace: Vout: 2.0V/div, Bottom Trace: Vin, 30V/div

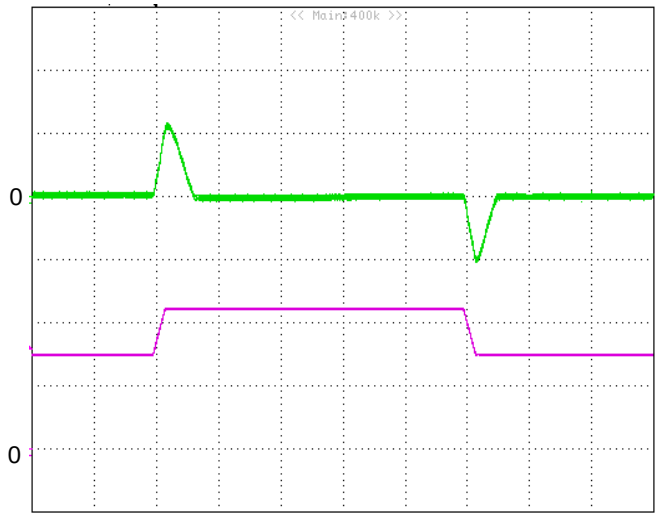


Figure 6: *Output voltage response to step-change in load current (50%-75%-50% of Io, max; di/dt = 0.1A/µs; Vin is 54V). Load cap: 10µF tantalum capacitor and 1µF ceramic capacitor. Top Trace: Vout (0.2V/div, 200us/div), Bottom Trace:Iout (5A/div). Scope measurement should be made using a BNC cable (length shorter than 20 inches). Position the load between 51 mm to 76 mm (2 inches to 3 inches) from the module*

FEATURES DESCRIPTIONS

Over-Current Protection

The module include an internal output over-current protection circuit, which will endure current limiting for an unlimited duration during output overload. If the output current exceeds the OCP set point, the module will automatically shut down, and enter hiccup mode.

For hiccup mode, the module will try to restart after shutdown. If the over current condition still exists, the module will shut down again. This restart trial will continue until the over-current condition is corrected.

Over-Voltage Protection

The modules include an internal output over-voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over-voltage set point, the module will shut down, and enter in hiccup mode.

For hiccup mode, the module will try to restart after shutdown. If the over voltage condition still exists, the module will shut down again. This restart trial will continue until the over-voltage condition is corrected.

Over-Temperature Protection

The over-temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the over-temperature threshold the module will shut down, and enter in auto-restart mode.

For auto-restart mode, the module will detect temperature after shutdown. If the over temperature condition still exists, the module will remain shutdown. This restart trial will continue until the over-temperature condition is corrected.

THERMAL CONSIDERATIONS

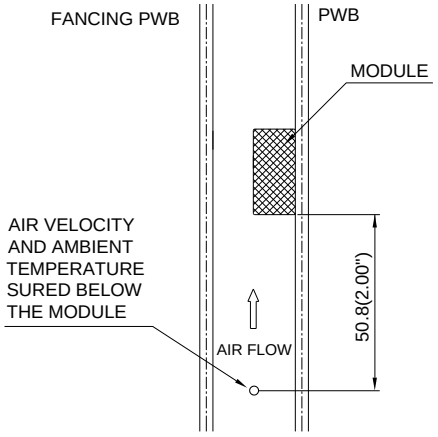
Thermal management is an important part of the system design. To ensure proper, reliable operation, sufficient cooling of the power module is needed over the entire temperature range of the module. Convection cooling is usually the dominant mode of heat transfer.

Hence, the choice of equipment to characterize the thermal performance of the power module is a wind tunnel.

Thermal Testing Setup

Delta's DC/DC power modules are characterized in heated vertical wind tunnels that simulate the thermal environments encountered in most electronics equipment. This type of equipment commonly uses vertically mounted circuit cards in cabinet racks in which the power modules are mounted.

The following figure shows the wind tunnel characterization setup. The power module is mounted on a test PWB and is vertically positioned within the wind tunnel. The space between the neighboring PWB and the top of the power module is constantly kept at 6.35mm (0.25'').



Note: Wind Tunnel Test Setup Figure Dimensions are in millimeters and (Inches)

Figure 7: *Wind tunnel test setup*

Thermal Derating

Heat can be removed by increasing airflow over the module. To enhance system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceeds the maximum module temperature, reliability of the unit may be affected.

THERMAL CURVES

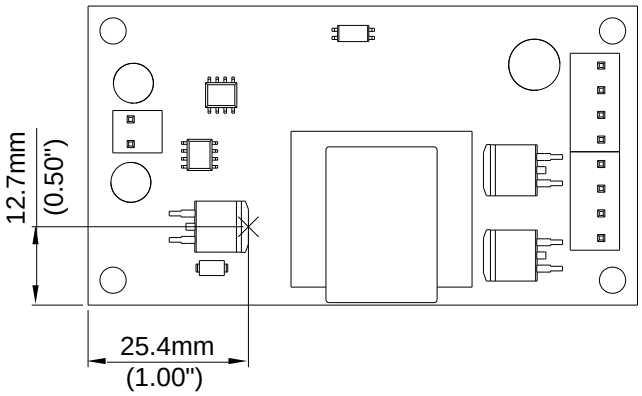


Figure 8: ** Hot spot's temperature measured point. The allowed maximum hot spot's temperature is defined at 124℃*

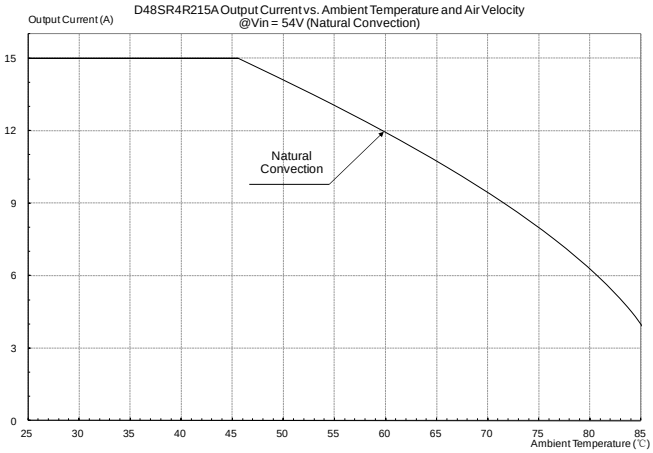
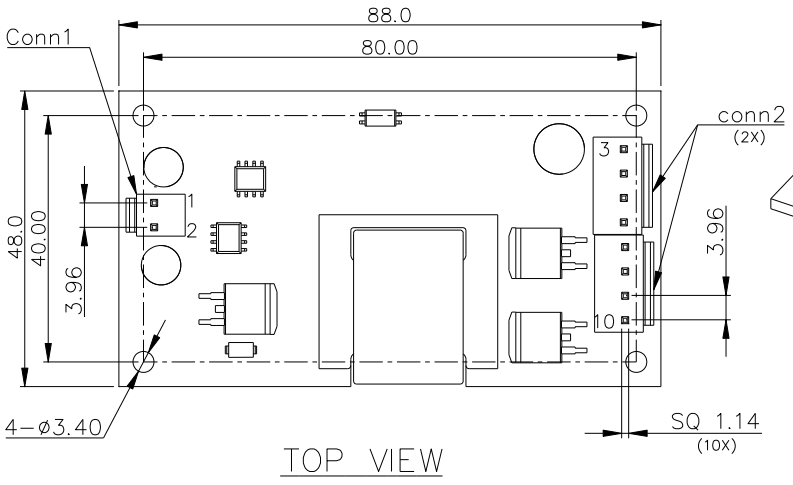
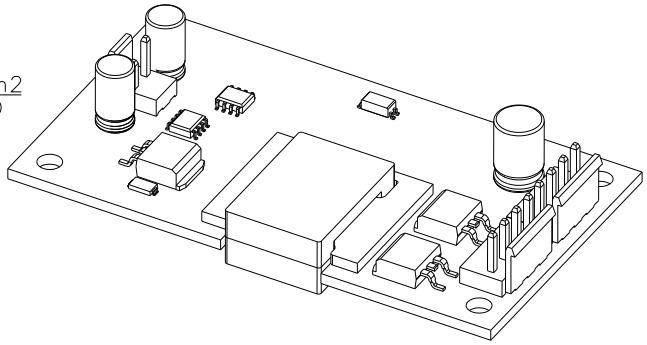


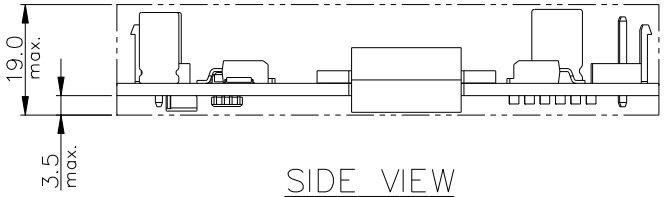
Figure 9: *Output current vs. ambient temperature and air velocity @Vin=54V (Natural convection)*

MECHANICAL DRAWING

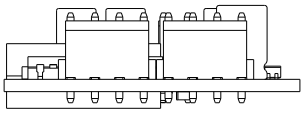


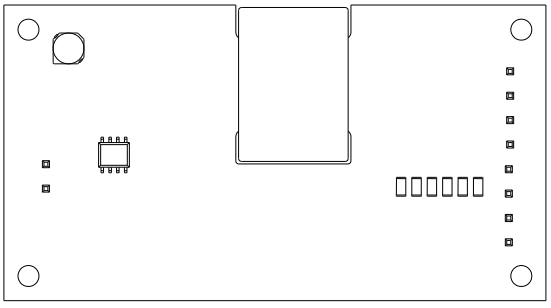
TOP VIEW





SIDE VIEW





BOTTOM VIEW

Pin#	Function
1	VIN(+)
2	VIN(−)
3	VOUT(+)
4	VOUT(+)
5	VOUT(−)
6	VOUT(−)
7	VOUT(+)
8	VOUT(+)
9	VOUT(−)
10	VOUT(−)

Conn1: JWT A3963WV2−2P or equivalent
Conn2: JWT A3963WV2−4P or equivalent

NOTES:
DIMENSIONS ARE IN MILLIMETERS AND (INCHES)
TOLERANCES: X.Xmm±0.5mm
X.XXmm±0.25mm

Note: components(except connectors) size/location etc shown on above drawings just for reference, may different from real samples.

MODEL LIST

MODEL NAME	INPUT		OUTPUT		EFF @ 100% LOAD
D48SR4R215A	44V~65V	1.8A	4.2V	15A	91.5% @ 54Vin

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WARRANTY

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