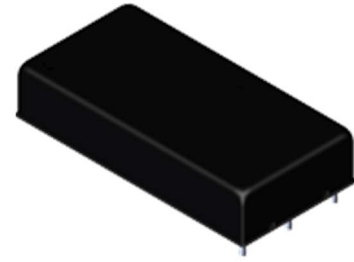


DESCRIPTION

The series of DC-DC switching power supplies in a package of 50.8x25.4x10.5 mm are capable of delivering 60 watts. They are designed for industry control application, telecom/datacom application, save space solution, networking application.

FEATURES

- High efficiency 60W power in compact size 2x1" package
- Wide operating temperature range from -40°C to +105°C
- Six-sided continuous shield
- Continuous Short Circuit Protection
- No minimum load required
- Over load protection/ Over temperature protection/ Over voltage protection
- High reliability product design



WATTAGE

Wattage: 60W

DIMENSION

Dimension: 50.8 (L) x 25.4(W) x 10.5 (H)mm

SAFETY STANDARD APPROVAL

Meet EN62368-1

ENVIRONMENTAL SPECIFICATION

Operating temperature: -40°C to +105°C

Storage temperature: -55°C to +125°C

SELECTION GUIDE

Part number	Input voltage	Output voltage	Output current @ full load	Input current @ no load	Efficiency ⁽¹⁾ (typ.)	Capacitive load ⁽²⁾ (max.)
D60-DB4-AT	9-36 VDC Nom. 24 VDC	3.3VDC	12000mA	15 mA	89%	32000uF
D60-DB4-AP		5VDC	12000mA	15 mA	91.5%	30000uF
D60-DB4-AH		12VDC	5000mA	15 mA	92%	5850uF
D60-DB4-AG		15VDC	4000mA	15 mA	92%	3900uF
D60-DB4-AA		24VDC	2500mA	15 mA	92%	2000uF
D60-2DB4-AH		±12VDC	±2500mA	15 mA	91.5%	±3900uF
D60-2DB4-AG		±15VDC	±2000mA	15 mA	91.5%	±2400uF
D60-DB4-FT	18-75 VDC Nom. 48 VDC	3.3VDC	12000mA	15 mA	89%	32000uF
D60-DB4-FP		5VDC	12000mA	15 mA	91.5%	30000uF
D60-DB4-FH		12VDC	5000mA	15 mA	92%	5850uF
D60-DB4-FG		15VDC	4000mA	15 mA	92%	3900uF
D60-DB4-FA		24VDC	2500mA	15 mA	92%	2000uF
D60-2DB4-FH		±12VDC	±2500mA	15 mA	91.5%	±3900uF
D60-2DB4-FG		±15VDC	±2000mA	15 mA	91.5%	±2400uF

1. The efficiency is test by nominal input and max. full load @25°C.
2. The capacitive load is test by minimum input and constant resistive load.
3. All specifications valid at nominal input voltage, full load and 25°C after warm-up time unless otherwise stated.
4. The product information and specifications are subject to change without prior notice.

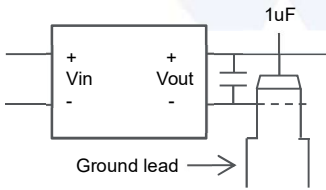
SPECIFICATION

	Parameter	Conditions	Min.	Typ.	Max.	Unit
Input	Input filter			Pi type		
	Start-up time				50	mS
	Start-up voltage (0%~100% load)	Nominal 24V Nominal 48V			9 18	VDC
	Under voltage lockout (0%~100% load)	Nominal 24V Nominal 48V		8 16		VDC
	Input surge voltage (1s)	Nominal 24V Nominal 48V			50 100	VDC
	Remote on/off	DC-DC on DC-DC off			Open or 3V < Vr < 12V Short or 0V < Vr < 1.2V	
Output	Voltage accuracy	100% Load at Nominal Vin		±1		%
	Ripple& noise ⁽¹⁾	3.3V, 5V 12V, 15V, ±12V, ±15V 24V			100 125 200	mVp-p
	Minimum load		0			%
	Line regulation (LL-HL)	Single Dual		±0.2 ±0.5		%
	Load regulation (0-100% Load)	Single Dual		±0.5 ±1.0		%
	Crossing regulation	Asymmetrical load 25%/100%		±5.0		%
Environment	Operating frequency	100% Load at Nominal Vin		250		KHz
	Operating temperature	At nominal Vin	-40		105	°C
	Storage temperature		-55		125	°C
	Max case temperature				110	°C
	Relative Humidity		5		95	%RH
	MTBF	25°C 51°C		205 84		KHours
Function	Vibration			MIL-STD-810F		
	Isolation voltage	60sec. Input to Output	1.6			KVDC
	Isolation resistance	500VDC	1000			MΩ
	Isolation capacitance				1500	pF
	Over load protection				150	%
	Short Circuit Protection				Continuous, Automatic recovery	
	Safety approvals				Meet EN62368-1	

This content is subject to change, please refer to specification for more detail.
FSP reserve the right to change the content without prior notice.

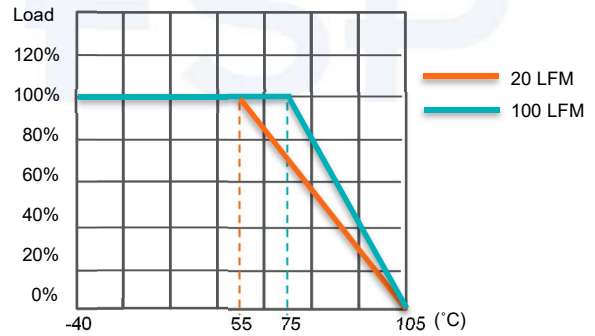
	Parameter	Conditions	Min.	Typ.	Max.	Unit
Physical	Dimension	(L x W x H)		50.80x25.40x10.50 mm		
	Weight			33		g
	Case material			Metal case		
	Potting material			Silicone (UL94V-0)		
	Cooling method			Natural convection		
EMC	EMI ⁽²⁾	EN 55032		Class A/B		
	ESD	EN61000-4-2; Air ± 8kV, Contact ± 6kV		Criteria A		
	Fast transient	EN61000-4-4, ±2kV		Criteria A		
	Surge	EN61000-4-5, ±2kV		Criteria A		
	Conducted immunity	EN61000-4-6, 10 V/rms		Criteria A		
	Magnetic field immunity	EN61000-4-8, 10 A/m		Criteria A		
1. 20MHZ BW at Vin range 0%~100% load with 1µF/50V X7R MLCC. 2. EMI class A without external circuit, and class B suggestion circuit, please contact our sales. 3. All specifications valid at nominal input voltage, full load and 25°C after warm-up time unless otherwise stated. 4. The product information and specifications are subject to change without prior notice.						

RIPPLE & NOISE

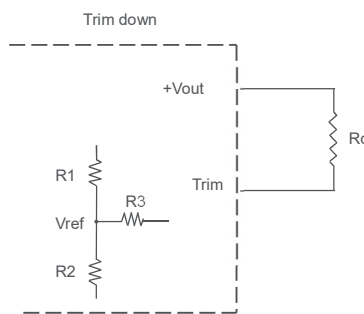
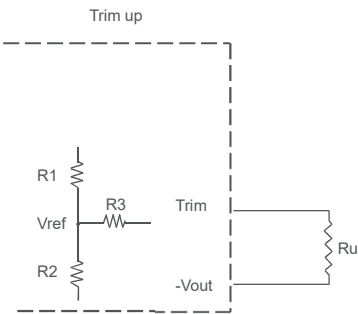


DERATING CURVE

Ambient temperature nature convection (Nominal Vin)



EXTERNAL OUTPUT VOLTAGE TRIMMING



Formula for trim resistor:

$$\text{UP: } R_u = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V'_0 - V_{ref}} \cdot R_1$$

$$\text{DOWN: } R_d = \frac{bR_1}{R_1 - b} - R_3 \quad b = \frac{V'_0 - V_{ref}}{V_{ref}} \cdot R_2$$

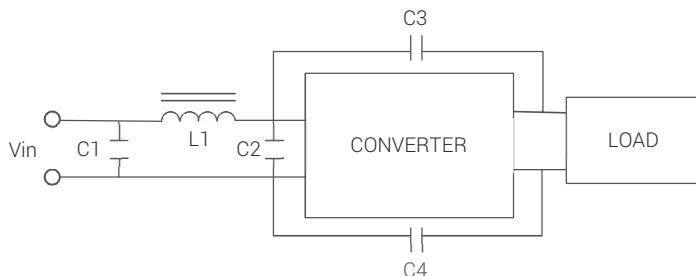
Note:

1. R_u, R_d is mean trim resistor, please check the formula.
2. a & b : user define parameter, no actual meanings
3. V'_0 is mean trim up/down voltage.
4. Value for R_1, R_2, R_3 and V_{ref} refer to the table below.

Vin	Vout	Vref	R1	R2	R3
24V	5V	2.50V	10.0KΩ	10.0KΩ	35.7KΩ
24V	12V	2.50V	38.0KΩ	10.0KΩ	68.0KΩ

EMI SOLUTION

EN55032 CLASS B

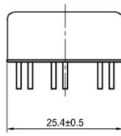
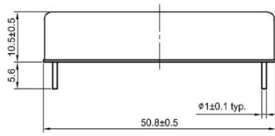


Vin	Vout	C1	L1	C2	C3	C4
24V	5V	10µF	1.5µH	10µF	2200pF	2200pF
24V	12V	10µF	1.5µH	10µF	2200pF	2200pF

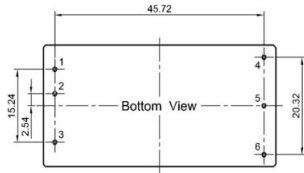
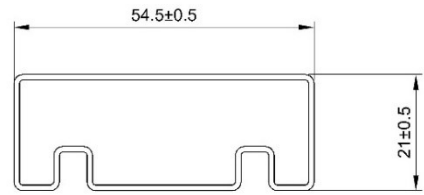
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MECHANICAL SPECIFICATION

PACKAGE



Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	-Vout	Com
6	Trim	-Vout



Projection : Third angle projection
Unit : mm
Tolerance : ±0.35mm

Unit: mm
1 tube: 18pcs
Length: 520+/- 2mm