DC-DC Converter Specification(DRAFT)

MPD4S014S

1 . Application

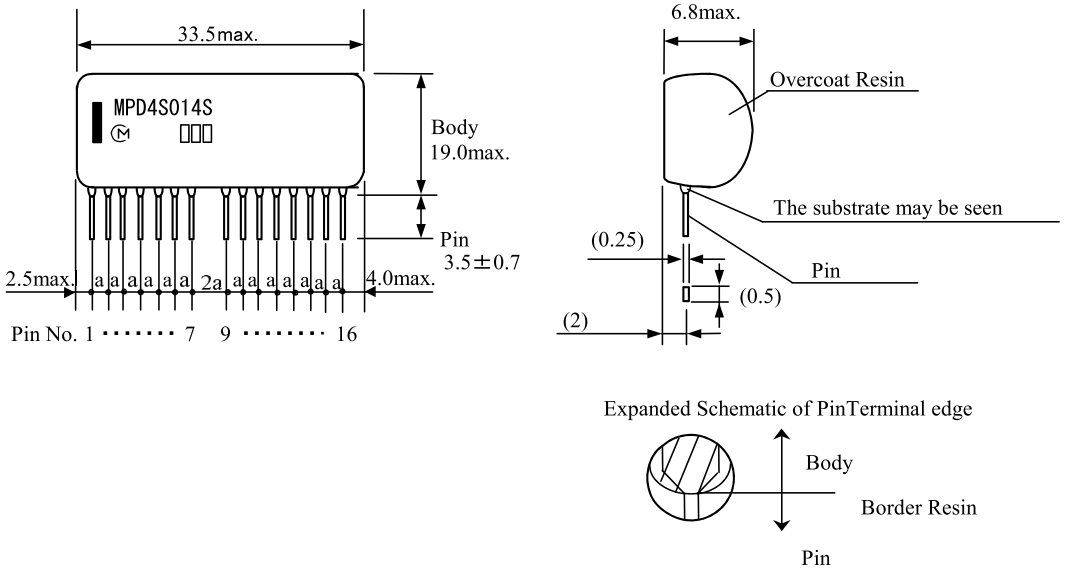
This specification applies to DC-DC Converter for consumer data-processing equipment, MPD4S014S.
For any other application, please contact us before using this product.

2 . Customer Reference

Customer Spec. Number
Customer Part Number

3 . Murata Part Number MPD4S014S

4 . Appearance, Dimensions



Markings

(1) 1 Pin Marking ▌

(2) Part No. MPD4S014S
(3) MFG ID Ⓜ
(4) Lot No. □□□

(a)(b)(c)

(a) Production Factory
(b) Production Year
(c) Production Month（1,2,3, ---- 9,O,N,D）

⚠ **Note:**

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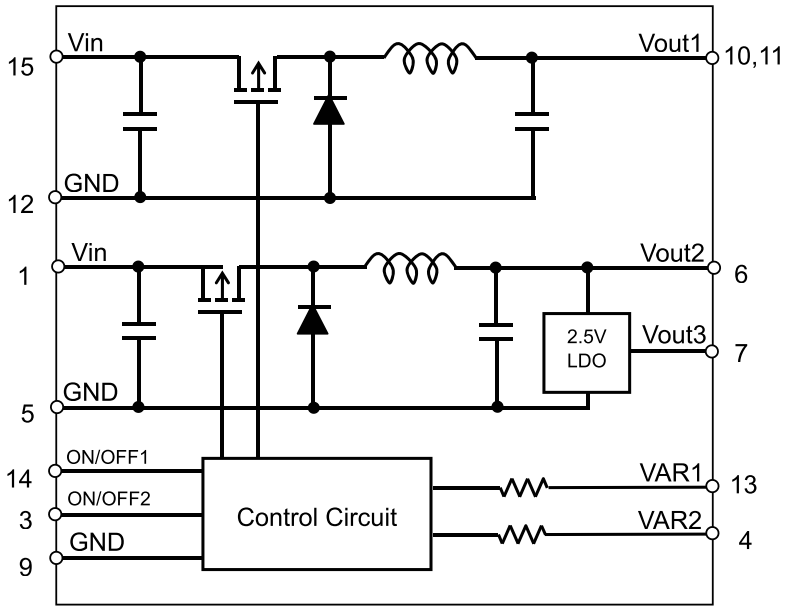
5. Pin Number and Function

Pin No.	Function	Pin No.	Function
1.	Vin	9.	GND
2.	N.C.(Internally Used)	10.	Vout1(1.0V-3.3V)
3.	ON/OFF2	11.	Vout1(1.0V-3.3V)
4.	VAR2	12.	GND
5.	GND	13.	VAR1
6.	Vout2(1.8V-3.6V)	14.	ON/OFF1
7.	Vout3(2.5V)	15.	Vin
		16.	N.C.(Internally Used)

GND terminals and Vin terminals are NOT connected inside of this device. These pins should be connected to one-another externally.
The path between your GND and GND terminals of this device, and your Vin and Vin terminals of this device should be minimized as much as possible on your product's assembly.
N.C.（Pin No.2 and No.16） are utilized internally. These pins should be left open.

6. Block Diagram



7. Absolute Ratings

7 .1	Input Voltage Range	4.5 to 13.2V
7 .2	ON/OFF Pin Input Voltage Range	-0.3V to Vin+0.3V
7 .3	Operating Ambient Temperature Range	0 to 85°C (Temperature Gradient ≤10°C/H)
7 .4	Storage Temperature Range	-40 to 125°C(Temperature Gradient ≤25°C/H)
7 .5	Operating Humidity Range	20 to 85%　(No Condensation)
7 .6	Storage Humidity Range	10 to 90%　(No Condensation)
7 .7	Maximum Wet Bulb	39°C

8. Characteristics

8 .1 Electrical Characteristics (Ta=25 °C)

Item	Symbol	Condition	Value Min.	Value Typ.	Value Max.	Unit
Input Voltage	Vin		4.5	12	13.2	V
Output Voltage Adjustable Range	Vout1	Vin=4.5-13.2V (Vin-Vo>1V)	1.0		3.3	V
	Vout2		1.8		3.6	
Output Voltage Accuracy	Vout1	RVAR1=2.285kΩ±0.5%	+1.15	+1.20	+1.25	V
		RVAR1=10.683kΩ±0.5%	+1.73	+1.80	+1.87	
	Vout2	RVAR2=1.80kΩ±0.5%	+3.20	+3.30	+3.40	
	Vout3	Vo≧2.85V(*1)	+2.375	+2.50	+2.625	
Load Current	Iout1	Vout1=1.0-1.8V	0	-	1.3	A
		Vout1=1.81-3.3V	0	-	1.1	
	Iout2 +Iout3	Current sum of Iout2 and Iout3 (*2)	0	-	1.0	
	Iout3	Vout2≧3.05V	0	-	0.3	
		3.05V>Vout2≧2.95V	0	-	0.25	
		2.95V>Vout2≧2.85V	0	-	0.20	
Continuous Load Current			See thermal derating curve in section 8.2			A
Ripple Voltage	Vrip1	Vin=12V, Iout3=0.3A Vout1=1.2V, Iout1=1.3A, Vout2=3.3V, Iout2=0.7A BW=20MHz, Cout=1μF	-	50	-	mV(p-p)
	Vrip2		-	50	-	
Efficiency	EFF	Vin=12V, Iout3=0.3A Vout1=1.2V, Iout1=1.3A, Vout2=3.3V, Iout2=0.7A	-	75	-	%
Remote ON/OFF	ON/OFF1 ON/OFF2	Vin=4.5-13.2V ON	+2.5	-	Vin	V
		Vin=4.5-13.2V OFF	0	-	+0.5	
Frequency	Freq.		-	500	-	kHz
External Output Capacitor	Cout	MLCC (ESR≦50mΩ)	0	1	47	μF
		Electrolytic, Polymer (ESR>50mΩ)	0	47	470	μF
Protection Circuit	SCP	Short circuit protection monitors output voltage. If the output voltage isn't regulated over 8msec (typ), the protection circuit assumes the output is shorted to GND and will shut down the DC-DC converter. This protection won't work as an over current protection, so the current limit of input power supply should be under 5A in order to avoid damage to this device. After correction of the abnormal condition, the DC-DC converter will restart by re-applying Vin or toggling ON/OFF pin.				

Note (1) Vout3 is powered from Vout2 via an LDO inside of this converter. Consequently Vout2 must be 2.85V or more to achieve 2.5V at the Vout3 terminal. If Vout2 < 2.85V, Vout3 will be about 0.3V lower than Vout2.

(2) Vout3 is powered from Vout2 via an LDO inside of the converter. As a result the current that can be sourced from the Vout2 terminal is dependent on Iout3. Please note that the Iout2 limit decreases as Iout3 increases, and vice versa.

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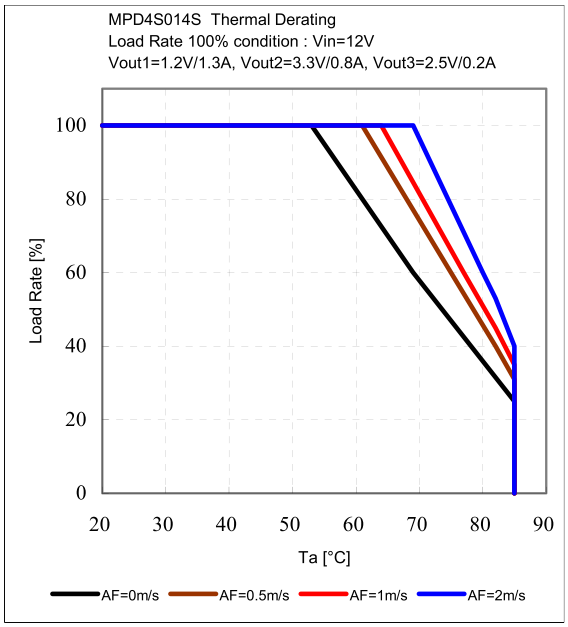
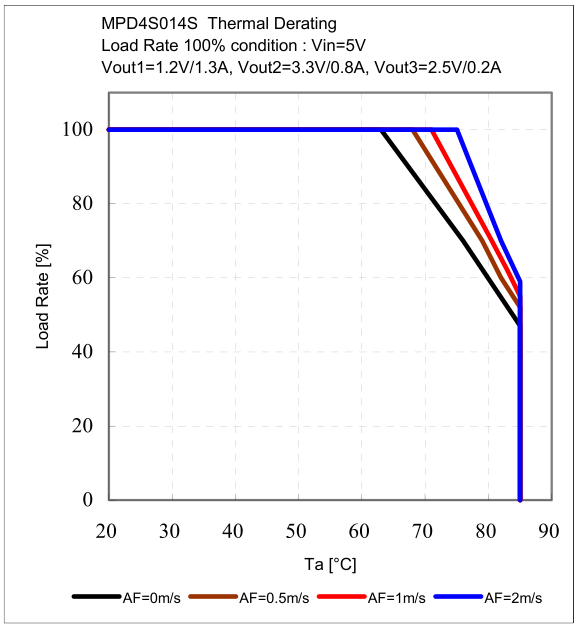
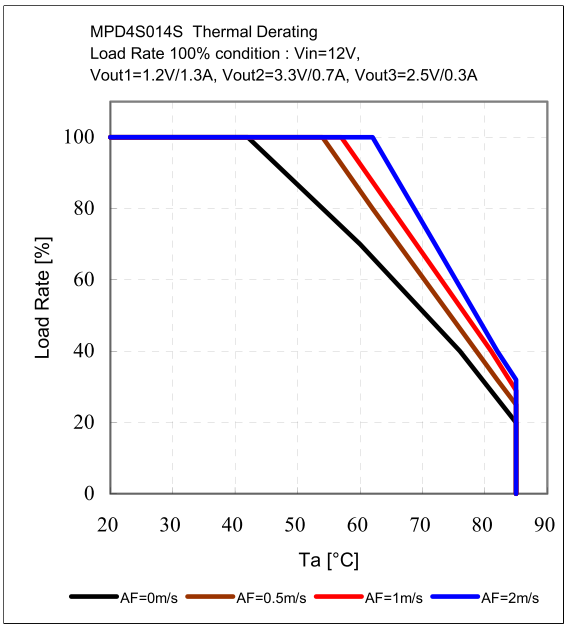
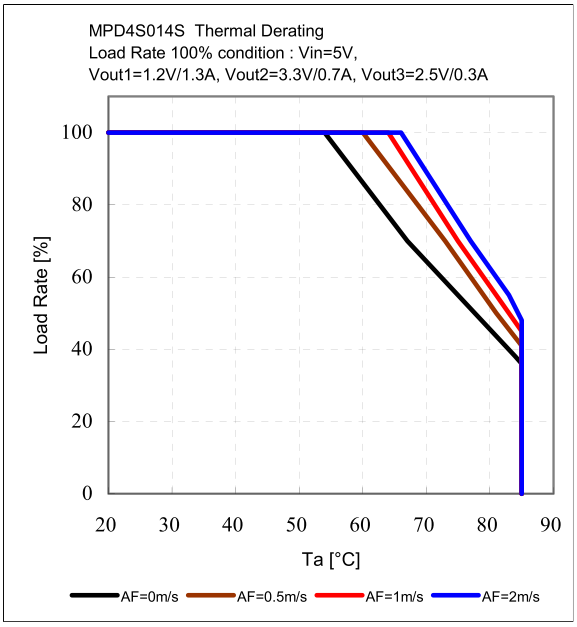
8 .2 Thermal Derating









The above thermal derating should be considered a reference only due to dependencies on a variety of conditions such as PCB layout design, output voltage settings, current balance between each output, high temperature exposure from adjacent parts, etc. For reliable operation, please ensure that the surface temperature of this product is maintained below 100°C.

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9. Output Voltage Trimming (Adjustment)

The output voltage of Vout1 and Vout2 can be adjusted by connecting a resistor between each VAR-pin (Pins 4 & 13) to a GND-pin (Pin 9 is recommended for the most accurate Vout setting).
The following equation gives the required external-resistance value to adjust the output voltage to the required Vout.

< Output Voltage Calc.>

$$RVAR1 = \frac{24}{\frac{5.782}{Vout1} - 1.7273} - 5.479 \quad [\mathrm{k}\Omega]$$

$$RVAR2 = \frac{15}{Vout2 - 1.8} - 8.197 \quad [\mathrm{k}\Omega]$$

< RVAR Calculation Example >

Vout1[V]	Calculated RVAR1[Ω]	Applied RVAR1 (example) [Ω]
1.0	440	390+47
1.2	2285	2.2k+82
1.5	5803	5.6k+200
1.8	10683	10k+680
2.5	35512	33k+2.4k
3.0	114501	110k+4.7k
3.3	961436	1M

Vout2[V]	Calculated RVAR2[Ω]	Applied RVAR2 (example) [Ω]
1.8	∞	open
2.0	66803	62k+4.7k
2.5	13232	13k+240
3.0	4303	4.3k
3.3	1803	1.8k
3.6	136	130

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