Power estimation

TEC/NOT/049

This technical note discusses the following topics:

25.1 Power estimation overview

To make an accurate estimation of power drawn by an Acra KAM-500 chassis, the configuration must be known.

25.1.1 Chassis

A chassis can hold a number of modules, each drawing current on the available power lines: 5V, ±7V and ±12V. These lines are supplied via DC/DC converters from the Power Supply Unit (PSU). The PSU is externally supplied on 28V.

25.1.2 Modules

Each module draws current on the above mentioned power lines. The current drawn by a module is found in the General specifications section of the respective data sheet. This consumption varies depending on factors such as the sampling frequency for KAD/ADC/xxx modules, the output/input rate for bus modules or the excitation driven at the output of a module. The power drawn by a module is the sum of the power used on each power supply line.

25.2 Limitations

25.2.1 Power lines

Each PSU has limited current available per power line. Therefore the sum of current used on each line must be checked against the total current available on the PSU of the chassis. The total current available per line can be found in the PSU data sheet.

25.2.2 Imbalanced power lines

When selecting modules, the current drawn between the positive and negative lines of the 7V and 12V supply should be kept as balanced as possible. If that ratio is greater than 7:1, DC/DC stability can be compromised and the total power available cannot be achieved.

NOTE: When an imbalance reaches 7:1, the voltage on the opposite line may vary within ±10%. This variation will affect other modules in the chassis, such as modules that need to draw current on this line or a KAD/BIT/101 monitoring power lines, and will generate constant errors.

25.2.3 Power available

Because of PSU internal wiring limitations, we recommend keeping the total power (P_{total}) dissipated below 56W for the KAM/PSU/012 and 81W for the KAM/PSU/012/B.

25.3 DC/DC converter efficiency charts

The following two figures represent the DC/DC converter efficiency used on the KAM/PSU/012 and KAM/PSU/012/B of the Acra KAM-500 chassis.

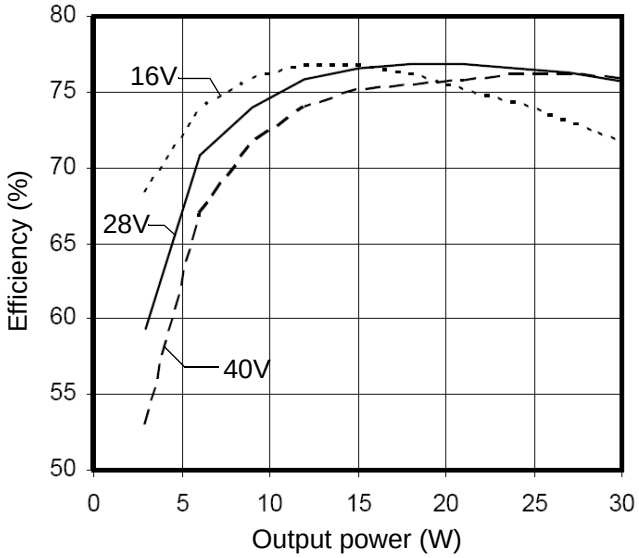

Figure 25-1: 5V DC/DC converter efficiency for the KAM/PSU/012 and KAM/PSU/012/B

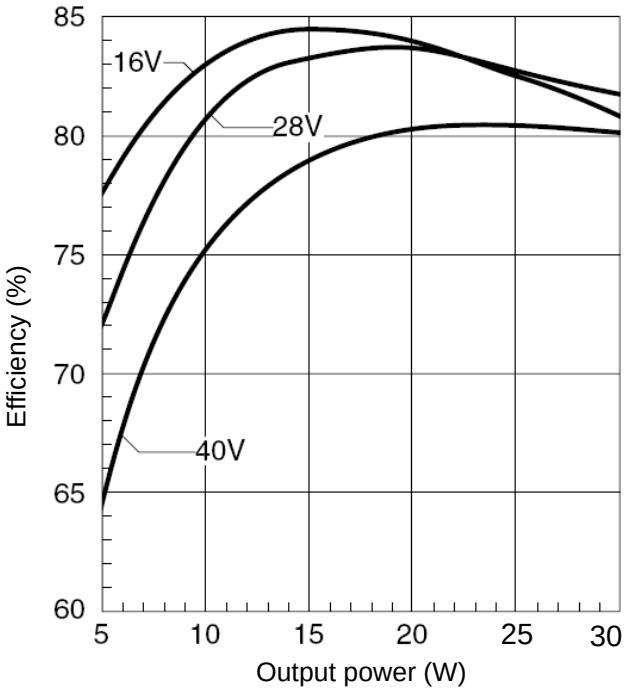

Figure 25-2: 7V/12V DC/DC converter efficiency for the KAM/PSU/012 and KAM/PSU/012/B

25.4 Example of power estimation[1]

Slot	KAM/CHS/13U	5	7	-7	12	-12	Excitation	Exc 7V	Exc -7V	Exc 12V	Exc -12V	Conditions
1	KAM/PSU/012[1]	4000	4000		2500							
2	KAD/BCU/101/B	782	0		0							
3												
4	KADDSI/003/B	264	0		32							
5												
6	KAD/ENC/106	231	0		103							
7	KAD/UAR/102	165	0		0							
8												
9												
10	KAD/ADC/106/B	170	0		95	45	6 x 3.6 mA x 2.5	0		54	0	With 3.6 mA on 6 channels and 2.5 DC/DC efficiency
11	KAD/ADC/109/B/S1	160	60	50	80	60	8 x (10V / 350R)	228	228	0	0	With 10V over 350R bridge on 8 channels
12	KAD/ADC/109/B/QB350	170	40	40	70	40	8 x 14.5 mA	116	116	0	0	With 14.5 mA over 350R bridge on 8 channels
13												
14												
15												
	External excitation				12							With 12V on a 1K load
	Current per module (mA)	1942	100	90	392	145	Current per excitation (mA)	344	344	54	0	
	Total current per line (mA)	1942	444	434	446	145						
	Total current (mA)[2]	1942	878		591							
	Power used (W)	9.71	6.146		7.092							
	Efficiency[3]	0.67	0.72		0.72							
	Power on DC/DC (W)[4]	14.493	8.5361		9.85							
	Total power on 28V (W)[5]	32.88										
	Current on 28V (A)[6]	1.1742										

1. PSU output current for KAM/PSU/012. Check the KAM/PSU/012/B datasheet for limitations on 5V, ±7V and ±12V power lines
2. Check lower than PSU output current
3. Derived from the efficiency charts (Figure 25-1 and Figure 25-2)
4. For each line, the power is divided by the DC/DC efficiency factor
5. The total power is the sum of the power consumed per DC/DC
6. This current is the total power / 28V

1. Contact Curtiss-Wright support (acra-support@curtiss-wright.com) to request a copy of the above TSR-U-023 spreadsheet.

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