Date: December 15, 2010

Sub: Ripple Current Correction Factors for Aluminum Electrolytic Capacitors

The below examples are specific to NRB-XW series products. For correction factors on other NIC product series, please consult NIC product specifications for ripple current correction factor details, or contact NIC to review your requirements [NIC technical support tpmg@niccomp.com]

Precaution: The combined value of the DC voltage and the peak AC voltage, applied to the component, shall not exceed the rated voltage.

Frequency Correction Factor

Ripple current correction factor allow use of component under circuit frequencies different than rated specifications

NRB-XW series - Ripple Current Frequency Correction Factor

RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

Voltage Rating	60 (50)Hz	120Hz	500Hz	1KHz	10KHz ~ up
200 ~ 250Vdc	0.8	1.0	1.20	1.30	1.40
400 ~ 450Vdc	0.8	1.0	1.25	1.40	1.50

The ripple current correction factor table, at left is **only applicable to NRB-XW series**, and **cannot be applied** to any other NIC product series

Example (Specific to NRB-XW series):

Specification: http://www.niccomp.com/catalog/nrbxw.pdf
NIC PN: NRB-XW151M450V18x45F
Cap = 150uF
Voltage Rating = 450VDC
RCR = **950mArms** @ **120Hz** / +105°C

Circuit Frequency	**60 Hz**	**120Hz**	**500Hz**	**1KHz**	**≥10KHz**
Ripple Current Rating (rms) @ +105°C	760mA	950mA	1188mA	1330mA	1425mA

Above table shows ripple current ratings for above component NRB-XW151M450V18x45F, when used at circuit frequencies from 60Hz to ≥10KHz

From above example, you can safely use NRB-XW151M450V18x45F (150uF / 450VDC) at ripple current of 1.425Arms at circuit frequencies ≥10KHz, with no adverse impact upon load life (endurance) performance.

If circuit operation results in component being exposed to ripple current levels exceeding the ratings shown in above table, or under pulse current or pulse voltage conditions, the component may exhibit premature wear-out or failure.

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The below examples are specific to NRB-XW series products. For correction factors on other NIC product series, please consult NIC product specifications for ripple current correction factor details, or contact NIC to review your requirements [NIC technical support tpmg@niccomp.com]

Precaution: The combined value of the DC voltage and the peak AC voltage, applied to the component, shall not exceed the rated voltage.

Temperature Correction Factor

Ripple Current Multipliers allow use of component under current levels higher than rated specifications, **with trade-off being reduced load life endurance performance.**

NRB-XW series - Ripple Current Temperature Correction Factor

RIPPLE CURRENT
TEMPERATURE CORRECTION FACTOR

Ambient Temperature	105°C	85°C	≤65°C
Multiplier	1.0	1.7	2.1

The ripple current correction factor table, at left is **only applicable to NRB-XW series**, and **cannot be applied** to any other NIC product series

Example (Specific to NRB-XW series):

Specification: http://www.niccomp.com/catalog/nrbxw.pdf
NIC PN: NRB-XW151M450V18x45F
Cap = 150uF
Voltage Rating = 450VDC
RCR = **950mArms** @ 120Hz / +105°C
Load Life Rating = 10,000 hours at +105°C

1.) Operation at +**65°C**

- If operating up to 950mA (120Hz) @ +**65°C**, the load life rating = ~160,000 hrs; >15 years
- If you opt to use above referenced component under elevated current level, please follow NRB-XW ripple current multiplier, as shown in above table.
- You can safely **run the same component at 2.0Arms** (950mA x 2.1) = 1995mA, at +**65°C**, the component can handle the higher current (with higher self heating), but the trade-off is reduction of load life down to 10,000 hours.
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2.) Same conditions apply if operating at **+85°C**

- If you opt to use above referenced component under elevated current level, please follow NRB-XW ripple current multiplier, as shown in above table.
- If operating up to 950mA (120Hz) @ **+85°C**, the load life rating = ~40,000 hours; 4.6 years
- You can safely run the same components **at 1.6A** (950mA x 1.7) = 1615mA, the component can handle the higher current (with higher self heating), but the trade-off is reduced load life down to 10,000 hours.

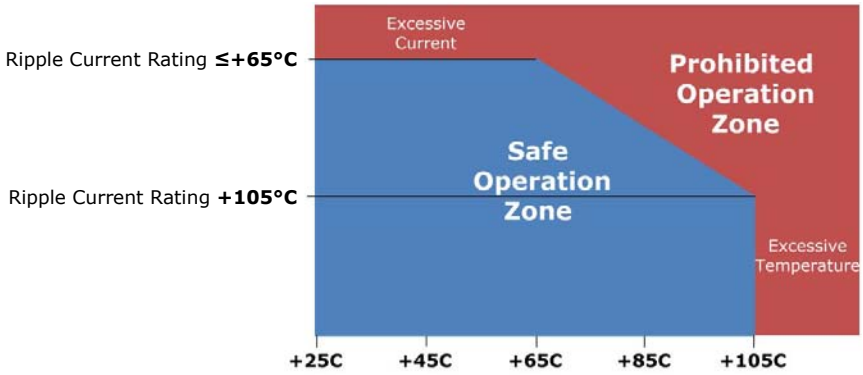
Operating Temperature	**+105°C**	**+85°C**	**+85°C**	**+65°C**	**+65°C**
Ripple Current Applied (rms)	**950mA**	**1615mA**	950mA	**1995mA**	950mA
Load Life (Endurance) Estimation	10,000 hours	10,000 hours	~40,000 hours	10,000 hours	>15 years

If circuit operation results in component being exposed to ripple current levels exceeding the ratings shown in above table, or under pulse current or pulse voltage conditions, the component may exhibit premature wear-out or failure.

Sub: Ripple Current Correction Factors for Aluminum Electrolytic Capacitors

Summary:

Illustration shows operation zones for (example) +105°C rated aluminum electrolytic capacitor product series, were ripple current correction factors over temperature is shown on product specification.



Never operate component in **red** "prohibited operation zone". If in doubt, please contact NIC to review your requirements: NIC Technical support: tpmg@niccomp.com

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