Type NHR – Slimpack, 3000 hr@150 °C, Aluminum Electrolytic

Featuring high capacitance at high voltage and temperature, Type NHR-Slimpack offers considerable size and cost advantages over series-parallel banks of wet tantalum capacitors. Their applications in down-hole tools, military, and aerospace allow for solutions that use fewer components, lower weight, lower cost and improved reliability compared with banks of wet tantalum capacitors. Their rugged construction withstands vibration up to 80g.

Highlights

- Alternative to banks of wet tantalum capacitors
- No voltage derating required at 150 °C
- Rugged, stainless steel case
- Near hermetic seal, prevents dry-out
- Just 0.5" in height, by 1.0" wide (available in 4 lengths)
- High capacitance retention at low voltage, -55 °C

Specifications

Temperature Range	–55 °C to +150 °C
Rated Voltage Range	75 Vdc to 300 Vdc
Capacitance Range	60 µF to 960 µF
Capacitance Tolerance	20%
Leakage Current	≤ 0.006 CV µA, @ 25 °C and 5 mins.
Ripple Current Multipliers	See tables below

Ripple Current Multipliers

Case Temperature

	65	85	105	125	150
0-250 Vdc	5.448	5.221	4.767	4.313	2.27
300 Vdc	4.767	4.54	4.313	3.859	2.27

Ambient Temperature, No Heatsink

	65	85	105	125	150
0-250 Vdc	2.4	2.3	2.1	1.9	1
300 Vdc	2.1	2	1.9	1.7	1

Frequency

	50 Hz	60 Hz	120 Hz	500Hz	1 KHz	20 KHz	20 kHz
0-250 Vdc	0.65	0.75	1	1.5	1.8	2.1	1.04
300 Vdc	0.65	0.7	1	1.3	1.4	1.6	1.30

Low Temperature Characteristics	Impedance ratio: Z–55 °C/Z+25 °C @ 120 Hz ≤ 3 (75 - 300 Vdc
Load Life Test	3000 h at rated voltage @ 150 °C ∆ Capacitance +/- 10% ESR 200% of limit ≤ 0.004 CV µA, @ 25 °C and 5 mins.
Shelf Life Test	500 h @ 150 °C Capacitance 100% of limit ESR 100% of limit ≤ 0.006 CV µA, @ 25 °C and 5 mins.
Vibration *Mounting: Vibration capability is dependent upon mounting*	MIL-STD-202, Meth. 204, Sine Swept. IEC 60068-2-6 JK Case = 80g All Others = 50g
Vibration Test	**Level** The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size. **Amplitude** The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent. **Frequency Range** The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz. **Sweep Time and Duration** The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.

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<table>
<tr><td>Higher Reliability</td><td>All NHR capacitors are subjected to a minimum of 100 percent of the dc rated voltage at 150 ºC for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the dc leakage, capacitance, and ESR shall be measured with respect to specified limits.</td></tr>
<tr><td>Thermal Resistance</td><td>
<table>
<tr><td rowspan="2">Large Sides Heatsinked</td><td>Case Length</td><td>1.5"</td><td>2.0"</td><td>2.5"</td><td>3.0"</td></tr>
<tr><td>Insulation</td><td>ºC/W</td><td>ºC/W</td><td>ºC/W</td><td>ºC/W</td></tr>
<tr><td rowspan="2">one</td><td>None</td><td>6.6</td><td>4.8</td><td>3.8</td><td>3.1</td></tr>
<tr><td>Polyester</td><td>7.2</td><td>5.3</td><td>4.2</td><td>3.4</td></tr>
<tr><td rowspan="2">both</td><td>None</td><td>4.4</td><td>3.1</td><td>2.4</td><td>2</td></tr>
<tr><td>Polyester</td><td>4.7</td><td>3.3</td><td>2.6</td><td>2.2</td></tr>
</table>
</td></tr>
<tr><td>ESL</td><td>≤30 nH measured 1/4" from case at 1 MHz</td></tr>
<tr><td>Typical Weight</td><td>Case JK = 30
Case JA = 39
Case JH = 48
Case JB = 57</td></tr>
<tr><td>Terminals</td><td>18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max</td></tr>
<tr><td>Case Material</td><td>Stainless Steel</td></tr>
<tr><td>Ripple Current Capability</td><td>The ripple current capability is set by the maximum permissible internal core temperature,153 ºC and a max ΔT of 30ºC.</td></tr>
<tr><td>Air Cooled</td><td>The ripple currents in the ratings tables are for 150 ºC case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.</td></tr>
<tr><td>Heatsink Cooled</td><td>Temperature rise from the internal hottest spot, the core, to ambient air is

$\Delta T = I^2(ESR)(\theta cc + \theta ca)$, recommended max ΔT of 30 ºC

where θcc is the thermal resistance from core to case and θca from case to ambient. To calculate maximum ripple capability with the NHR attached to a heatsink use the maximum core temperature and the values for θcc.</td></tr>
<tr><td>Example</td><td>As an illustration, suppose you operate an insulated NHR961M075JB0C in 135 ºC air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 ºC/W. Use a good thermal grease between the NHR and the heatsink, and the total thermal resistance is 2.7 +3. 4 or 6.1º C/W. The power which would heat the core to 150 °C is (150 - 135)/6. 1 or 2.46 W. For an ESR of 211 mΩ, 2.46 W equates to a ripple current of 3.42 A.</td></tr>
</table>

Part Numbering System

NHR	191	M	200	JB	0	C
Type	**Capacitance**	**Tolerance**	**Rated Voltage**	**Case Code**	**Insulation**	**Mounting Style**
NHR	**191** = 190 µF **102** = 1000 µF	**M**=±20%	005 = 5 Vdc 7R5 = 7.5 Vdc 200 = 200 Vdc	**JK,** L=1.5 in. **JA**, L=2.0 in **JH**, L=2.5 in **JB**, L=3.0 in. * other sizes available	**0** = bare can **1** = polyimide	**C** = two leads

Examples:
NHR191M250JB0C

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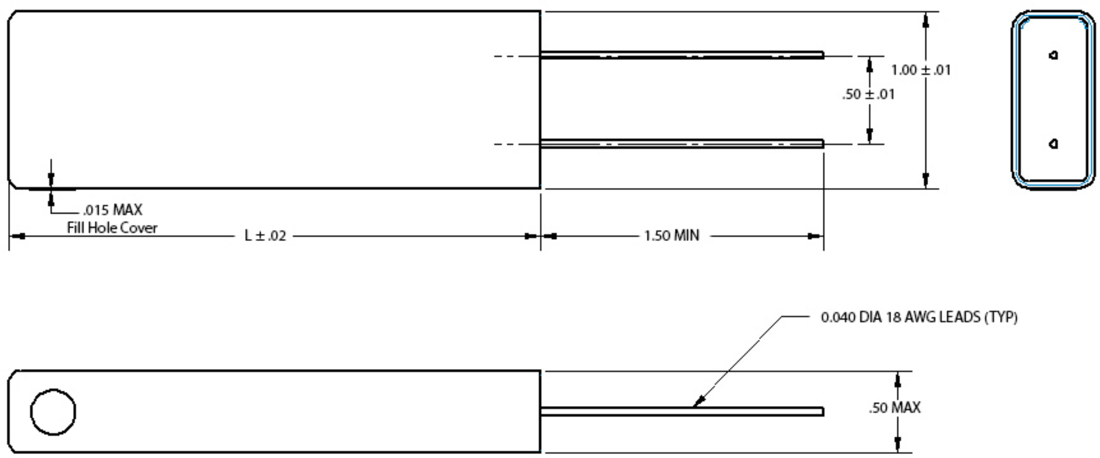
Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.



Ratings

Voltage Vdc	Cap µF	P/N	120Hz 25 ºC Cat. ESR	20KHz 25 ºC Cat. ESR	150 °C Ripple 120Hz	150 °C Ripple 20KHz	Case	Width (in)	Length (in)	Surge 25 °C Vdc
75	390	NHR391M075JK0	0.538	0.206	0.75	1.58	1X1.5	1	1.5	110
75	550	NHR551M075JA0	0.366	0.140	0.95	2.01	1X2	1	2.0	110
75	750	NHR751M075JH0	0.268	0.103	1.15	2.44	1X2.5	1	2.5	110
75	960	NHR961M075JB0	0.211	0.081	1.34	2.84	1X3	1	3.0	110
100	310	NHR311M100JK0	1.048	0.402	0.54	1.13	1X1.5	1	1.5	150
100	430	NHR431M100JA0	0.712	0.273	0.68	1.44	1X2	1	2.0	150
100	590	NHR591M100JH0	0.521	0.200	0.83	1.75	1X2.5	1	2.5	150
100	750	NHR751M100JB0	0.411	0.158	0.96	2.03	1X3	1	3.0	150
150	180	NHR181M150JK0	1.088	0.417	0.53	1.11	1X1.5	1	1.5	220
150	260	NHR261M150JA0	0.738	0.283	0.67	1.41	1X2	1	2.0	220
150	360	NHR361M150JH0	0.541	0.207	0.81	1.71	1X2.5	1	2.5	220
150	450	NHR451M150JB0	0.427	0.164	0.94	2.00	1X3	1	3.0	220
200	120	NHR121M200JK0	1.107	0.424	0.52	1.10	1X1.5	1	1.5	300
200	170	NHR171M200JA0	0.752	0.288	0.66	1.40	1X2	1	2.0	300
200	230	NHR231M200JH0	0.551	0.211	0.80	1.70	1X2.5	1	2.5	300
200	290	NHR291M200JB0	0.434	0.166	0.94	1.98	1X3	1	3.0	300
250	80	NHR800M250JK0	1.500	0.575	0.45	0.95	1X1.5	1	1.5	350
250	110	NHR111M250JA0	1.018	0.390	0.57	1.20	1X2	1	2.0	350
250	150	NHR151M250JH0	0.746	0.286	0.69	1.46	1X2.5	1	2.5	350
250	190	NHR191M250JB0	0.589	0.226	0.80	1.70	1X3	1	3.0	350
300	60	NHR600M300JK0	2.547	1.273	0.37	0.64	1X1.5	1	1.5	400
300	90	NHR900M300JA0	1.729	0.864	0.47	0.82	1X2	1	2.0	400
300	130	NHR131M300JH0	1.267	0.633	0.57	0.99	1X2.5	1	2.5	400
300	160	NHR161M300JB0	1.000	0.500	0.66	1.16	1X3	1	3.0	400

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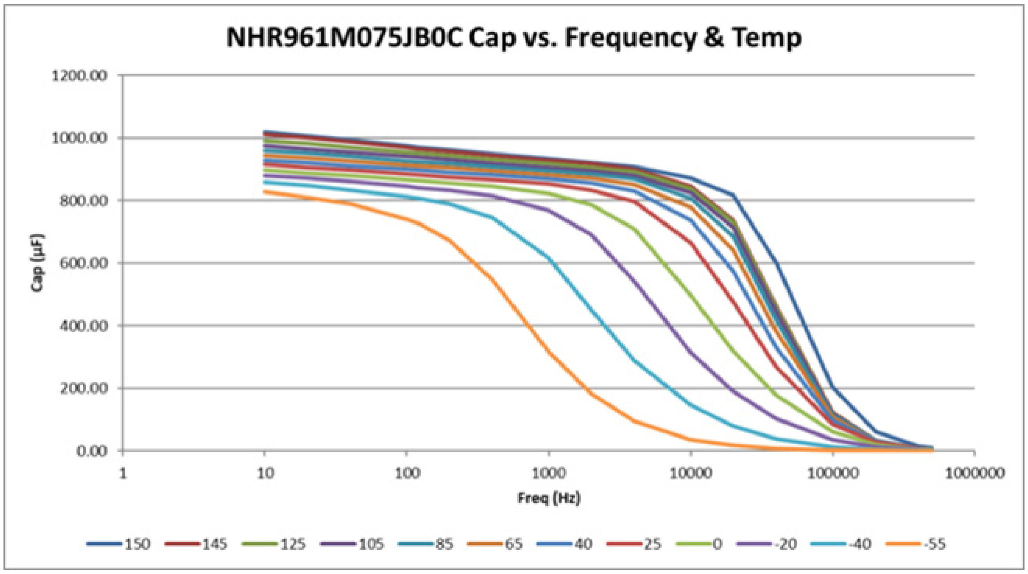
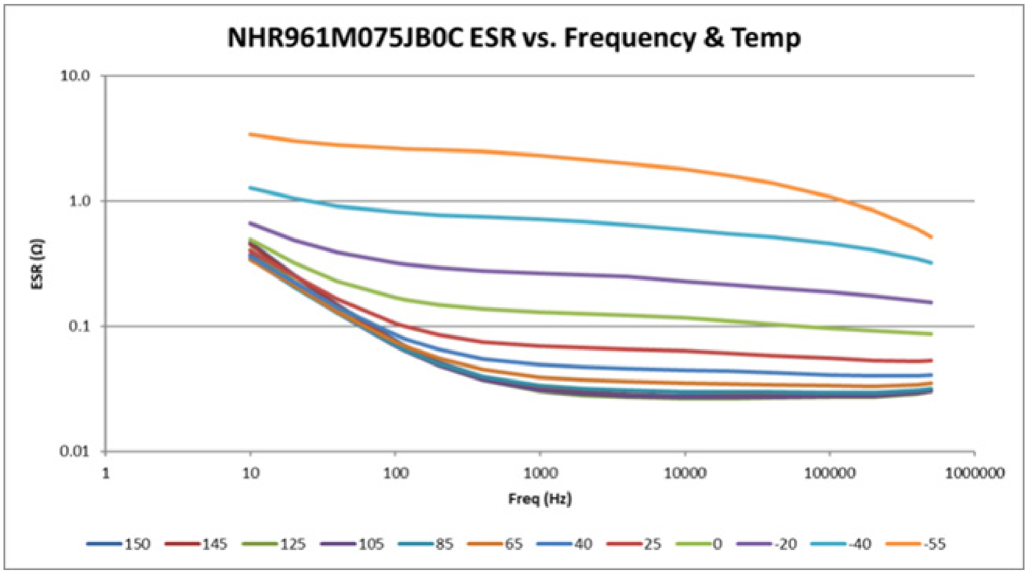
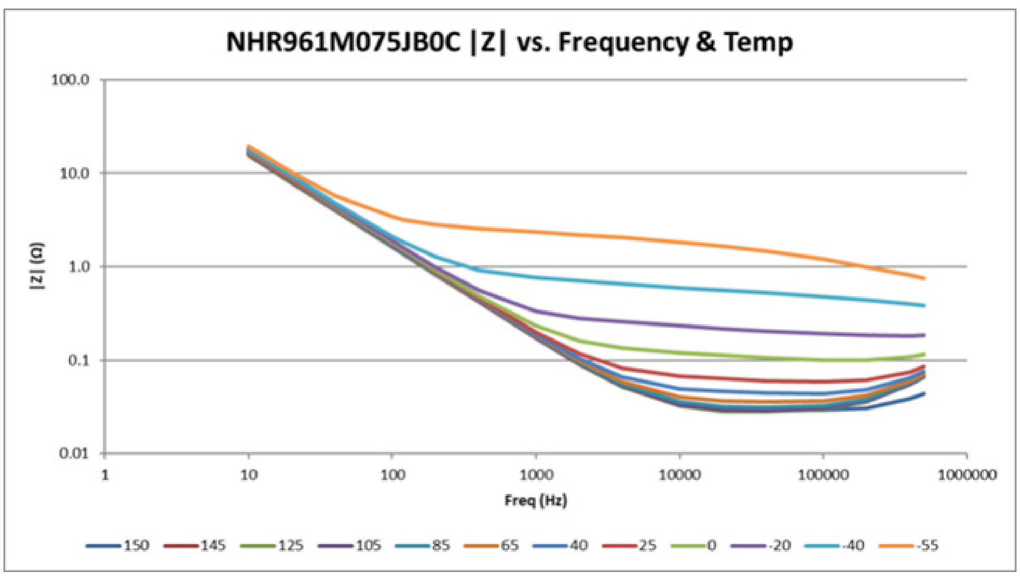
Typical Performance Curves







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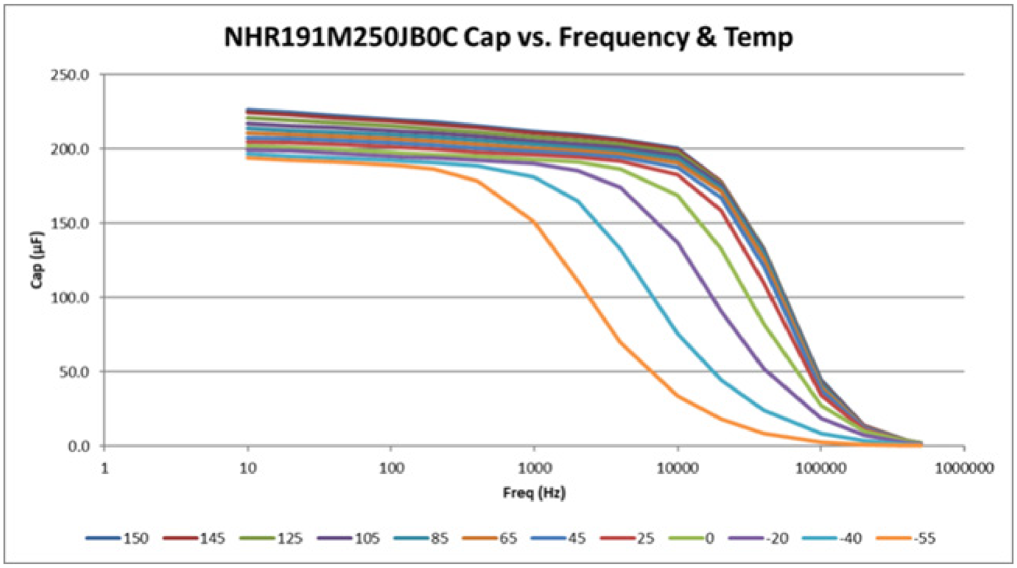

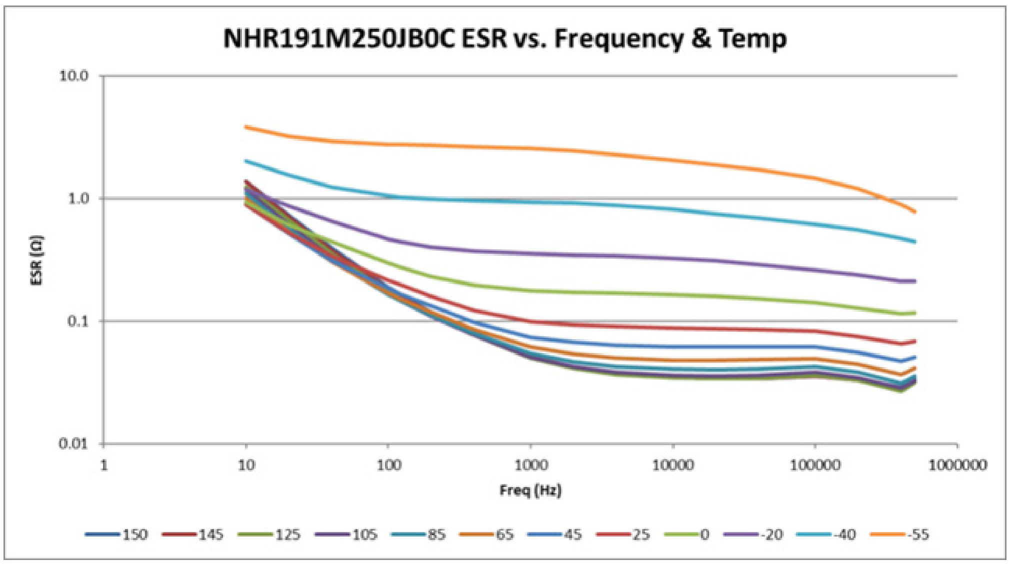

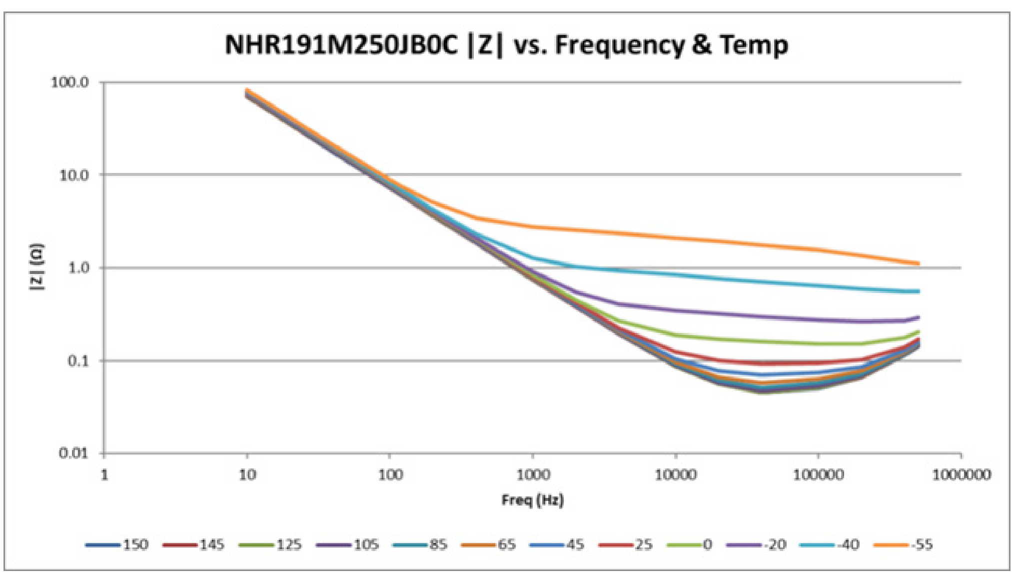

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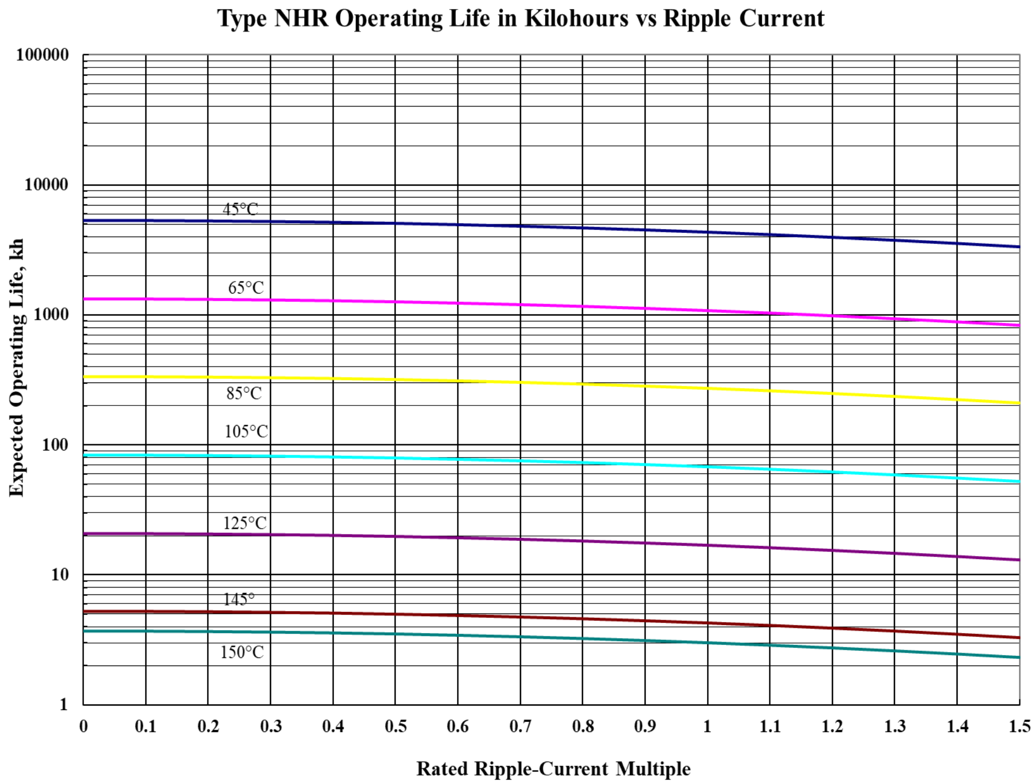

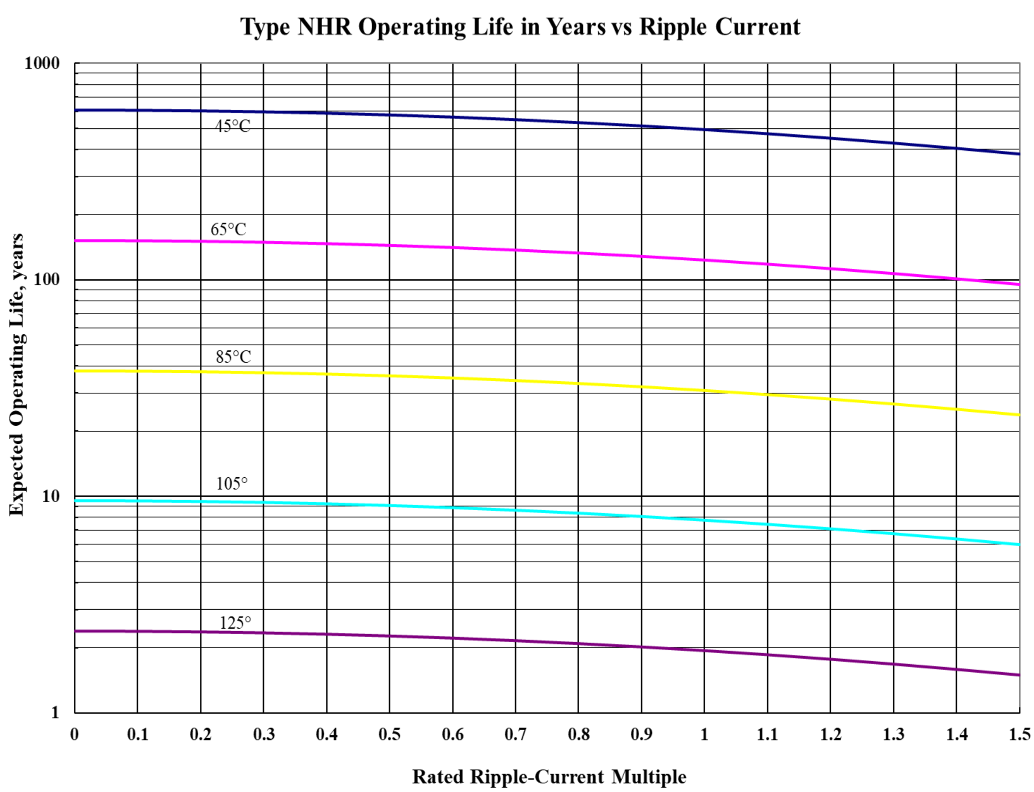

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