



Test Report: NEL-400-4.2

400W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY TEST

Safety Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 100 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 3.6 V ~ 4.4 V	I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	3.467 V ~ 4.484 V / 230 VAC	PASS
3	OUTPUT VOLTAGE TOLERANCE	V1 : -4.5 % ~ 3.0 % (Max)	I/P : 190 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -1.34 % ~ 0.49 %	PASS
4	LINE REGULATION	V1 : -0.5 % ~ 0.5 % (Max)	I/P : 190VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.03 % ~ 0.16 %	PASS
5	LOAD REGULATION	V1 : -2.5 % ~ 2.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.89 % ~ 0.93 %	PASS
7	SET UP TIME	230VAC : 2500 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 1161.521 ms	PASS
8	RISE TIME	230VAC : 50 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 4.133 ms	PASS
9	HOLD UP TIME	230VAC : 20 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 26.872 ms	PASS
10	OVER/UNDERSHOOT TEST	< ±10 %	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : ±2.857 %	PASS
11	DYNAMIC LOAD	V1 : 1000 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1). 928 mVp-p (2). 996 mVp-p	PASS

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	172V~264V	PASS
			I/P : LOW-LINE-3V= 177 V HIGH-LINE=264 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST : OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 180 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	PASS
3	EFFICIENCY	83% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	83.57 %	PASS
4	INPUT CURRENT	230V/ 4.0 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 3.346 A/ 230 VAC	PASS
5	INRUSH CURRENT	230V/ 70 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 48.734 A/ 230 VAC	PASS
6	LEAKAGE CURRENT	< 1.0 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.6673 mA N-FG : 0.6635 mA	PASS

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 140 %	I/P : 230 VAC I/P : 190 VAC O/P : TESTING Ta : 25°C	123.61 %/ 230 VAC 121.27 %/ 190 VAC Hiccup Mode	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 4.6 V ~ 5.4 V	I/P : 230 VAC I/P : 180 VAC O/P : MIN LOAD Ta : 25°C	4.69 V/ 230 VAC 4.69 V/ 180 VAC Hiccup Mode	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated 600 V / 11 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 494 V (2) 496 V (3) 488 V	PASS
2	Diode Peak Voltage	Q100 Rated 40 V / 123 A Q102 Rated 40 V / 20 8A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 21.3 V (2) 26.7 V (3) 20.8 V (1) 22.3 V (2) 23.7 V (3) 21.9 V	PASS
4	Input Capacitor Voltage	C5 Rated :180 u / 400 V 105 °C / WH Series	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Ta : 25°C	(1) 388 V (2) 386 V (3) 382 V	PASS
5	Control IC Voltage Test	U1 Rated 30 V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Ta : 25°C	(1) 21.0 V (2) 20.1 V (3) 20.5 V	PASS

SAFETY TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 3.003 mA I/P-FG : 2.898 mA O/P-FG : 2.188 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C/70% RH	I/P-O/P : >9999 MΩ I/P-FG : >9999 MΩ O/P-FG : >9999 MΩ NO DAMAGE	PASS
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C /70% RH	8 mΩ	PASS

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	TEMPERATURE RISE TEST	<p>MODEL : NEL-400-4.2</p> <p>1. ROOM AMBIENT BURN-IN : 1.0 HRS I/P : 230VAC O/P : 100% LOAD Ta=23.6 °C</p> <p>2. HIGH AMBIENT BURN-IN : 1.0 HRS I/P : 230VAC O/P : 100% LOAD Ta=56.3 °C</p> <table border="1" data-bbox="470 369 1141 985"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.6°C</th> <th>HIGH AMBIENT Ta= 56.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>31.0°C</td><td>58.1°C</td></tr> <tr><td>2</td><td>T2</td><td>26.9°C</td><td>56.1°C</td></tr> <tr><td>3</td><td>D5</td><td>35.0°C</td><td>67.2°C</td></tr> <tr><td>4</td><td>D6</td><td>35.3°C</td><td>64.0°C</td></tr> <tr><td>5</td><td>U1</td><td>27.5°C</td><td>58.0°C</td></tr> <tr><td>6</td><td>C35</td><td>26.2°C</td><td>55.3°C</td></tr> <tr><td>7</td><td>Q1</td><td>42.4°C</td><td>72.7°C</td></tr> <tr><td>8</td><td>Q2</td><td>39.8°C</td><td>72.8°C</td></tr> <tr><td>9</td><td>C36</td><td>29.0°C</td><td>56.5°C</td></tr> <tr><td>10</td><td>D30</td><td>33.4°C</td><td>59.5°C</td></tr> <tr><td>11</td><td>T1</td><td>55.1°C</td><td>82.4°C</td></tr> <tr><td>12</td><td>Q100</td><td>63.6°C</td><td>103.8°C</td></tr> <tr><td>13</td><td>Q101</td><td>68.4°C</td><td>106.4°C</td></tr> <tr><td>14</td><td>Q102</td><td>76.1°C</td><td>107.3°C</td></tr> <tr><td>15</td><td>Q110</td><td>80.5°C</td><td>121.4°C</td></tr> <tr><td>16</td><td>C110</td><td>62.6°C</td><td>99.3°C</td></tr> <tr><td>17</td><td>L100</td><td>67.6°C</td><td>82.4°C</td></tr> <tr><td>18</td><td>C165</td><td>54.2°C</td><td>88.8°C</td></tr> <tr><td>19</td><td>TSW1</td><td>36.1°C</td><td>77.7°C</td></tr> </tbody> </table>			NO	Position	ROOM AMBIENT Ta= 23.6°C	HIGH AMBIENT Ta= 56.3 °C	1	C5	31.0°C	58.1°C	2	T2	26.9°C	56.1°C	3	D5	35.0°C	67.2°C	4	D6	35.3°C	64.0°C	5	U1	27.5°C	58.0°C	6	C35	26.2°C	55.3°C	7	Q1	42.4°C	72.7°C	8	Q2	39.8°C	72.8°C	9	C36	29.0°C	56.5°C	10	D30	33.4°C	59.5°C	11	T1	55.1°C	82.4°C	12	Q100	63.6°C	103.8°C	13	Q101	68.4°C	106.4°C	14	Q102	76.1°C	107.3°C	15	Q110	80.5°C	121.4°C	16	C110	62.6°C	99.3°C	17	L100	67.6°C	82.4°C	18	C165	54.2°C	88.8°C	19	TSW1	36.1°C	77.7°C	PASS
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2.0 HOUR	I/P : 264VAC/230VAC/190VAC O/P : 100% LOAD Ta= -25°C	TEST : OK	PASS																																																																																
3	TEMPERATURE COEFFICIENT	±0.03%(0~50°C)	I/P : 230 VAC O/P : 100% LOAD	±0.015%(0~50°C)	PASS																																																																																
4	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature : -45°C ~ +90°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 5 CYCLE</p> <p>5. Input/Output condition : STATIC</p>			PASS																																																																																
5	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -25°C ~ +55°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 10 CYCLE</p> <p>5. Input/Output condition : 230VAC/FULL LOAD AC ON/OFF TEST turn on 58sec ; turn off 2sec</p>			PASS																																																																																
6	VIBRATION TEST	<p>1 Carton & 1 Set</p> <p>(1) Waveform : Sine Wave</p> <p>(2) Frequency : 10~500Hz</p> <p>(3) Sweep Time : 10min/sweep cycle</p> <p>(4) Acceleration : 4G</p> <p>(5) Test Time : 90min in each axis (X.Y.Z)</p> <p>(6) Ta : 25°C</p>			PASS																																																																																
7	CAPACITOR LIFE CYCLE	<p>NEL-400-4.2 : SUPPOSE C110 IS THE MOST CRITICAL COMPONENT</p> <p>(1) I/P : 230VAC O/P : FULL LOAD Ta=25 °C LIFE TIME (1) 93810.5 HRS</p> <p>(2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME (2) 12581 HRS</p> <p>(3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME (3) 46877.9 HRS</p> <p>(4) I/P : 230VAC O/P : 50% LOAD Ta=50 °C LIFE TIME (4) 111533.3 HRS</p>			PASS																																																																																
8	MTBF	<p>Conducted by Parts Stress Analysis Prediction</p> <p>1708.9K hrs min. Telcordia SR-332 (Bellcore) ; 220.9K hrs min. MIL-HDBK-217F (25°C)</p>			PASS																																																																																



9	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20000 hours @ TA 50°C	PASS
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SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	ZHUOKB / ZOULF	LIUWY

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