

# Quality Engineering Test Report

**SERIES: ESC-120 120W SINGLE OUTPUT CHARGER**

**SAMPLE: A. ESC-120-13.5  
13.5V / 8A**

**B. ESC-120-27  
27V /4A**

**C. ESC-120-54  
54V / 2A**

| NO | TEST ITEM                                     | TEST CONDITION / SPECIFICATION   | RESULT   | VERDICT |
|----|---|--|--|---------|
| 1  | AC INPUT VOLTAGE RANGE                        | I/P:TESTING SPEC:176~264VAC<br>O/P:FULL LOAD                               | A:117VAC~267VAC  | P       |
| 2  | LINE REGULATION                               | I/P:176~264VAC SPEC:<br>O/P:FULL LOAD A:±0.5%<br>B:±0.5%<br>C:±0.5%        | A: -0.09%~+0.04%<br>B: -0.11%~+0.07%<br>C: -0.09%~+0.07% | P       |
| 3  | LOAD REGULATION                               | I/P:230VAC SPEC:<br>O/P:MIN. TO FULL LOAD A:±2%<br>B:±1%<br>C:±0.5%        | A: -0.23%~+0.18%<br>B: -0.07%~+0.04%<br>C: -0.02%~+0.08% | P       |
| 4  | OUTPUT VOLTAGE TOLERANCE                      | I/P:176~264VAC SPEC:<br>O/P:MIN. TO FULL LOAD A:±2%<br>B:±1%<br>C:±1%      | A: +0.6%~+1.11%<br>B: -0.19%~+0.02%<br>C: -0.05%~+0.13%  | P       |
| 5  | RIPPLE&NOISE                                  | I/P:230VAC SPEC:<br>O/P:FULL LOAD A:120mVp-p<br>B:150mVp-p<br>C:400mVp-p   | A: 61mV<br>B: 37mV<br>C: 105mV                           | P       |
| 6  | AC INPUT CURRENT                              | I/P:230VAC SPEC:1.5A<br>O/P:FULL LOAD                                      | A:1.0A   | P       |
| 7  | MAX. INRUSH CURREN                            | I/P:230VAC SPEC:35A<br>O/P: FULL LOAD                                      | A:28.6A  | P       |
| 8  | O/P VOLTAGE ADJ.RANGE                         | I/P:230VAC SPEC:<br>O/P:MIN. LOAD A:12~15V<br>B:24~30V<br>C:48~56V         | A: 11.32~16.06V<br>B: 23.84~32.72V<br>C: 44.42~59.31V    | P       |
| 9  | SET UP TIME                                   | I/P:230VAC SPEC:200ms<br>O/P:FULL LOAD                                     | A:21mS   | P       |
| 10 | HOLD UP TIME                                  | I/P:230VAC SPEC:15mS<br>O/P:FULL LOAD                                      | A:42mS   | P       |
| 11 | EFFICIENCY                                    | I/P:230VAC SPEC:<br>O/P:FULL LOAD A:81%<br>B:83%<br>C:84%                  | A:81.1%<br>B:83.5%<br>C:84.68%                           | P       |
| 12 | OVER LOAD PROTECTION                          | I/P:230VAC SPEC:105%~135%<br>O/P:TESTING CURRENT LIMITING<br>AUTO RECOVERY | A:133.7%<br>B:132.5%<br>C:135.0%                         | P       |
| 13 | OVER VOLTAGE PROTECTION                       | I/P:230VAC SPEC:115%~135%<br>O/P:FULL LOAD                                 | A:127.7%<br>B:128.6%<br>C:124.8%                         | P       |
| 14 | OVER TEMPERATURE PROTECTION & FAN ON/OFF TEST | I/P:230VAC SPEC:<br>O/P:FULL LOAD RTH5>=80°C SHUT DOWN                     | A:85.6°C   | P       |
| 15 | GROUND LEAKAGE CURRENT                        | I/P:240VAC SPEC: L-FG---<3.5mA<br>N-FG---<3.5mA                            | L-FG:0.94mA<br>N-FG:0.89mA                               | P       |

| NO       | TEST ITEM  | TEST CONDITION / SPECIFICATION  | RESULT  | VERDICT  |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
|----------|--|---|---|----------|-----|------|--------|-----|--------------|--------|--------|----|-----------------|--------|--------|----|-----------------------|--------|--------|-----|-----------|--------|--------|-----|----------------------|--------|--------|----|-----------|--------|--------|----|------------------|--------|--------|-----|--------|--------|--------|---|
| 16       | INSULATION RESISTANCE  | SPEC: O/P-FG 500VDC/100M Ohms MIN.<br>I/P-O/P 500VDC/100M Ohms MIN.<br>I/P-FG 500VDC/100M Ohms MIN.   | A: O/P-FG >100M Ohms<br>I/P-O/P >100M Ohms<br>I/P-FG >100M Ohms   | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 17       | DIELECTRIC / WITHSTAND VOLTAGE                               | SPEC: I/P- O/P: 3KVAC/ 1 min.<br>(10mA CUT-OFF)<br>I/P - FG: 1.5KVAC/ 1 min.<br>(10mA CUT-OFF)<br>O/P - FG: 0.5KVAC/ 1 min.<br>(10mA CUT-OFF)   | A: I/P-O/P :0.003mA<br>I/P-FG :0.002mA<br>O/P-FG :0.002mA   | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 18       | INDICATOR  | LED: GREEN STAND BY<br>YELLOW NORMAL LOAD<br>RED FULL LOAD  | A: G:0~13.6% LOAD<br>Y:13.6%~90.62%LOAD<br>R:90.62%~100% LOAD   | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 19       | BATTERY CHANGE & DISCHARGE                                   | I/P: 230VAC O/P:NO LOAD<br>BATTERY UP:18±0.5V<br>BATTERY LOW :10±0.5V   | A: BATTERY UP:18.4V<br>BATTERY LOW :10.3V   | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 20       | BURN-IN TEST   | I/P: 230VAC O/P:FULL LOAD<br>TA:25.6°C BURN-IN DURATION : 1 hrs   | A: NON BREAK  | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 21       | ENVIRONMENT TEST (SAMPLE C:)                                 | 1.LOW TEMPERATURE TEST<br>I/P:170 VAC O/P:FULL LOAD<br>AMBIENT TEMPERATURE:-10°C  | A:AFTER 1 hrs<br>POWER ON OK  | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
|          |  | 2.HIGH AMBIENT TEMPERATURE FULL LOAD TEST<br>I/P:230VAC O/P:FULL LOAD<br>AMBIENT TEMPERATURE:31°C   | A:AFTER 13.5 hrs<br>NON BREAK   |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
|          |  | 3.ACCELERATED LIFE TEST<br>I/P:270VAC O/P:FULL LOAD<br>POWER ON :3 min POWER OFF :5 sec<br>AMBIENT TEMPERATURE:75°C<br>AMBIENT HUMIDITY:95%   | A:AFTER 5 hrs<br>NON BREAK  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 22       | TEMPERATURE RISE TEST<br>T rise OF PARTS                     | A: I/P :230VAC AFTER 1 hr BURN-IN<br>O/P :FULL LOAD TA:25.6°C   | <table border="1"> <thead> <tr> <th>POSITION</th> <th>P/N</th> <th>TEMP</th> <th>T rise</th> </tr> </thead> <tbody> <tr> <td>BD1</td> <td>BRIDGE DIODE</td> <td>65.8°C</td> <td>40.2°C</td> </tr> <tr> <td>Q1</td> <td>MAIN TRANSISTOR</td> <td>69.2°C</td> <td>43.6°C</td> </tr> <tr> <td>T1</td> <td>MAIN TRANSFORMER COIL</td> <td>74.4°C</td> <td>48.8°C</td> </tr> <tr> <td>D13</td> <td>O/P DIODE</td> <td>81.2°C</td> <td>55.6°C</td> </tr> <tr> <td>C34</td> <td>O/P FILTER CAPACITOR</td> <td>61.0°C</td> <td>35.4°C</td> </tr> <tr> <td>L1</td> <td>O/P CHOKE</td> <td>90.0°C</td> <td>64.4°C</td> </tr> <tr> <td>T1</td> <td>MAIN TRANSFORMER</td> <td>69.3°C</td> <td>43.7°C</td> </tr> <tr> <td>RTH</td> <td>THERMO</td> <td>63.6°C</td> <td>38.0°C</td> </tr> </tbody> </table> | POSITION | P/N | TEMP | T rise | BD1 | BRIDGE DIODE | 65.8°C | 40.2°C | Q1 | MAIN TRANSISTOR | 69.2°C | 43.6°C | T1 | MAIN TRANSFORMER COIL | 74.4°C | 48.8°C | D13 | O/P DIODE | 81.2°C | 55.6°C | C34 | O/P FILTER CAPACITOR | 61.0°C | 35.4°C | L1 | O/P CHOKE | 90.0°C | 64.4°C | T1 | MAIN TRANSFORMER | 69.3°C | 43.7°C | RTH | THERMO | 63.6°C | 38.0°C | P |
| POSITION | P/N  | TEMP  | T rise  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| BD1      | BRIDGE DIODE   | 65.8°C  | 40.2°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| Q1       | MAIN TRANSISTOR  | 69.2°C  | 43.6°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| T1       | MAIN TRANSFORMER COIL  | 74.4°C  | 48.8°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| D13      | O/P DIODE  | 81.2°C  | 55.6°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| C34      | O/P FILTER CAPACITOR   | 61.0°C  | 35.4°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| L1       | O/P CHOKE  | 90.0°C  | 64.4°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| T1       | MAIN TRANSFORMER   | 69.3°C  | 43.7°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| RTH      | THERMO   | 63.6°C  | 38.0°C  |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 23       | LIFE CYCLE   | C: SUPPOSE C34 IS THE MOST CRITICAL COMPONENT<br>I/P:230VAC O/P:FULL LOAD Ta:25°C Tc34:60.4°C Life: 53297 hrs<br>I/P:230VAC O/P:FULL LOAD Ta:30°C Tc34:73.8°C Life: 21053 hrs   |   | P        |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 24       | CRITICAL COMPONENT RECORD (FOR QC INSPECTION REFERENCE ONLY) | C: FUSE :4AL/250VAC<br>BRIDGE DIODE :LT PBU606<br>LINE FILTER :LF TF-096D-R1 EE-25<br>TRANSFOMER :MT TF-370-R2 EER-35<br>POWER SWITCHER :NT2625N TO-3P<br>OUTPUT DIODE :ESAD9202 TO-3P<br>OUTPUT CAPACITOR :(V) 2200uF/35V ,105°C VENT<br>INPUT CAPACITOR :RUBYCON 330uF/200V 85°C USP<br>P.C.B :ESC-120R-R1 FR-4 2 OZ DS |   |          |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| DATE     | SAMPLE   | TEST RESULT   | TEST  | APPROVAL |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |
| 980630   | ESC-120  | PASS  | H.C.LIOU  | Max Lin  |     |      |        |     |              |        |        |    |                 |        |        |    |                       |        |        |     |           |        |        |     |                      |        |        |    |           |        |        |    |                  |        |        |     |        |        |        |   |