

EN 54-4 Introduction

- **Standard Revision**

EN 54-4:1998+A1:2002+A2:2006

- **Test Item**

- PERFORMANCE TEST
- ENVIRONMENTAL TESTS
- ELECTROMAGNETIC COMPATIBILITY

➤ PERFORMANCE TEST

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Temperature is measured in accordance with the voltage range declared by manufacturer

- a. $V_{in} + 10\%$
- b. $V_{in} - 15\%$ (stricter than IEC62368-1)

Compliance checked by following conditions :

1. The surface temperature of component (e.g. transformer, BD, MOS...) shall not exceed the limits which is identical with IEC62368-1
2. Output voltage shall be within the range specified by manufacturer

Table 1 — Functional tests

| Test | Mains supply voltage | Condition of battery | Loading condition | Duration of test |
|------|----------------------|--|-------------------|--|
| 1 | $V_n + 10\%$ | Discharged ^b | I max. a | 4 h |
| 2 | $V_n - 15\%$ | Discharged ^b | I max. a | 4 h |
| 3 | $V_n - 15\%$ | Discharged ^b | I max. b | Manufacturer's specification with a minimum of 5 min |
| 4 | Disconnected | Discharging ^c | I max. b | |
| 5 | $V_n - 15\%$ | Replaced by short circuit ^d | I max. a | |
| 6 | $V_n - 15\%$ | Replaced by short circuit ^e | I max. a | |
| 7 | $V_n + 10\%$ | Disconnected | I max. b | |
| 8 | $V_n - 15\%$ | Disconnected | I max. b | |
| 9 | $V_n + 10\%$ | Fully charged ^f | I min | |

➤ Test of charger and standby power source

- a. Discharge : the battery is discharged to final voltage
- b. Charge : the charger charges the battery for 72 hours under rated voltage
- c. Repeat procedure a · record the discharge time T1
- d. Charge the battery again for 24 h at $V_n - 15\%$.
- e. Repeat procedure a · record the discharge time T2

Compliance checked by following conditions :

1. The product of T1 and I_d shall be not less than the rated capacity of the battery
2. The product of T2 and I_d shall be not less than 0.8 times rated capacity of the battery

Note : I_d is discharge current.

Environment Test

| Test item | Reference | Input voltage | Test condition |
|----------------------------|--|---------------|--|
| Cold | EN60068-2-1:1993 | Vn | temperature: $-5^{\circ}\text{C}\pm 3^{\circ}\text{C}$ |
| | | | duration: 16h |
| Damp heat, steady state | EN60068-2-78:2001 | Vn | temperature: $40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ |
| | | | humidity: 90%~95% |
| | | | duration: 4days |
| Impact | EN60068-2-75 IEC 62262 | / | impact energy: $(0.5\pm 0.04)\text{J}$ Height: 250mm |
| | | | number of impacts per point: 3 times |
| Vibration, sinusoidal | EN 60068-2-6:1995, EN 60068-2-47:2005 | / | Frequency range: 10Hz-150Hz |
| | | | Acceleration amplitude: $0.981\text{ m}\cdot\text{s}^{-2}$ ($0.1g_n$) |
| | | | number of axes: 3 |
| | | | number of sweep cycles per axis: 1 |

EN 54-4 EMC test

➤ EMC test

| Test item | Reference | EN54-4 test condition | EN55035 test condition |
|---|-----------------------|---|---|
| mains voltage variations | EN 50130-4 clause 7.3 | Vn*1.1 and Vn*0.85(temperature stability is reached) | / |
| mains supply voltage dips and interruptions | EN 61000-4-11 | Voltage reduction: 20% for 250T 30% for 25T 60% for 10T 100% for 250T | Voltage reduction: 30% for 25T 95% for 0.5T 100% for 250T |
| electrostatic discharge | EN61000-4-2 | Air discharge: $\pm 2K$, $\pm 4K$, $\pm 8K$ Contact discharge: $\pm 6K$ | Air discharge: $\pm 2K$, $\pm 4K$, $\pm 8K$ Contact discharge: $\pm 4K$ |
| radiated electromagnetic fields | EN61000-4-3 | 80 to 2700 MHz, 10 V/m , 80% AM (1kHz) 80 to 2700 MHz, 10V/m , (0.5 s ON; 0.5 s OFF) PM (1Hz) | 80 to 1000 MHz, 3 V/m, 80% AM (1kHz) 1800 MHz 2600 MHz 3500 MHz 5000 MHz |
| conducted disturbances induced by electromagnetic fields, | EN61000-4-6 | 0.15 to 100 MHz , 10 V , 80% AM(1KHz) 0.15 to 100 MHz, 10 V , (0.5 s ON; 0.5 s OFF) PM(1Hz) | 0.15 ~ 10MHz, 3V; 10-30MHz, 3-1V; 30-80MHz, 1V; 80% AM(1KHz) |
| fast transient bursts | EN61000-4-4 | ± 2 kV ,100KHz | ± 1 kV , 5KHz |
| slow high energy voltage surges | EN61000-4-5 | Line-line: $\pm 1K$ Line-ground: $\pm 2K$ | Line-line: $\pm 1K$ Line-ground: $\pm 2K$ |