

# RTEN-2300

## RELIABILITY DATA

DWG.No.SC-575-RTEN-2300-001			
QA	R & D		
APPROVED BY	APPROVED BY	CHECKED BY	DRAWN BY
H.Anbai 19.Nov.2014	S.Kitahara 19.Nov.2014	T.Horie. 19.Nov.2014	T.Arasawa 19.Nov.2014



## INDEX

	Page
1. Calculated Values of MTBF	Page-3
2. Vibration Test	Page-4
3. Heat Cycle Test	Page-5
4. Humidity Test	Page-6
5. High Temperature Resistance Test	Page-7
6. Low Temperature Storage Test	Page-8

The following data are typical values. As all units have nearly the same characteristics, the data to be considered as ability values.

**RTEN-2300**

## 1. Calculated Values of MTBF

MODEL : RTEN-2300

## (1) Calculating Method

Calculated Based on parts stress Reliability projection of MIL-HDBK-217F NOTICE2.

Individual failure rates  $\lambda_G$  is given to each part and MTBF is Calculated by the count of each part.

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\sum_{i=1}^n N_i (\lambda_G \pi_Q)_i} \times 10^6 \text{ (hours)}$$

$\lambda_{equip}$  : Total equipment failure rate (Failure /  $10^6$  Hours)

$\lambda_G$  : Generic failure rate for the i th generic part (Failure/  $10^6$  Hours)

$N_i$  : Quantity of i th generic part

$N$  : Number of different generic part categories

$\pi_Q$  : Generic quality factor for the i th generic part ( $\pi_Q=1$ )

## (2) MTBF Values

GF : Ground, Fixed

$$\underline{MTBF = 2,800,964 \text{ (Hours)}}$$

**RTEN-2300****2. Vibration Test**

MODEL: RTEN-2300 (Representation Product : RTHN-5150)

**(1) Vibration Test Class**

Frequency Variable Endurance Test

**(2) Equipment Used**

Controller VS-1000-6, Vibrator 905-FN (IMV CORP.)

**(3) The Number of D.U.T (Device Under Test)**

2 units

**(4) Test Conditions**

Frequency : 10~55Hz

Amplitude : 0.7mm, Sweep for 1 min.

Dimension and times : X, Y and Z Directions for 0.5 hours each.

**(5) The Method**

Fix the D.U.T on the fitting-stage

**(6) Test Results**

PASS

**Typical Sample Data**

Check item	Spec.		Before Test	After Test
Attenuation(dB)	Differential Mode : 25dB min.	0.2 MHz	75.15	75.10
		30 MHz	56.05	56.05
	Common Mode : 25dB min.	0.1 MHz	32.80	32.80
		10 MHz	38.70	38.20
Leakage Current (mA)	5mA max. (500V, 60Hz)	Line1	2.68	2.67
		Line2	2.68	2.67
		Line3	2.69	2.68
DC Resistance (mΩ)	6mΩ max.		2.54	2.54
Test Voltage	L-L : 2192Vdc 60sec.		OK	OK
	L-E : 2500Vac 60sec.			
Isolation Resistance(MΩ)	100MΩ min.(500Vdc 60sec.)		1.0 x 10 <sup>7</sup>	1.0 x 10 <sup>7</sup>

**RTEN-2300**

3. Heat Cycle Test

MODEL: RTEN-2300 (Representation Product : RTHN-5150)

(1)Equipment Used

TEMPERATURE CHAMBER TSA-71H-W (ESPEC CORP.)

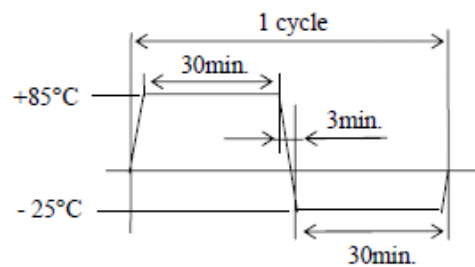
(2)The Number of D.U.T (Device Under Test)

2 units

(3)Test Conditions

Ambient Temperature : -25~+85°C

Test Cycles: 100 cycles



(4)The Method

Before the test check if there is no abnormal characteristics and put the D.U.T in the testing chamber. Then test it in the above cycles, After the test is completed leave it for 1 hour at room temperature and check it if there is no abnormal each characteristics.

(5)Test Results

PASS

Typical Sample Data

Check item	Spec.		Before Test	After Test
Attenuation(dB)	Differential Mode : 25dB min.	0.2 MHz	68.95	73.65
		30 MHz	57.70	54.75
	Common Mode : 25dB min.	0.1 MHz	33.50	31.50
		10 MHz	40.25	40.40
Leakage Current (mA)	5mA max. (500V, 60Hz)	Line1	2.69	2.63
		Line2	2.67	2.65
		Line3	2.67	2.65
DC Resistance (mΩ)	6mΩ max		2.47	2.44
Test Voltage	L-L : 2192Vdc 60sec		OK	OK
	L-E : 2500Vac 60sec			
Isolation Resistance(MΩ)	100MΩ min.(500Vdc 60sec.)		1.0 x 10 <sup>7</sup>	1.0 x 10 <sup>7</sup>

**RTEN-2300**

4. Humidity Test

MODEL: RTEN-2300 (Representation Product : RTHN-5150)

(1)Equipment Used

TEMP. & HUMID. CHAMBER PR-4KT (ESPEC CORP.)

(2)The Number of D.U.T (Device Under Test)

2 units

(3)Test Conditions

Ambient Temperature : +40°C

Test Times: 500 hours

Ambient Humidity: 90~95%RH No Dewdrop

(4)The Method

Before the test check if there is no abnormal characteristics and put the D.U.T in the testing chamber. Then test it in the above conditions. After the test is completed leave it for 1 hour at room temperature and check it if there is no abnormal each characteristics.

(5)Test Results

PASS

Typical Sample Data

Check item	Spec.		Before Test	After Test
Attenuation(dB)	Differential Mode : 25dB min.	0.2 MHz	71.45	74.75
		30 MHz	54.85	49.00
	Common Mode : 25dB min.	0.1MHz	33.40	33.50
		10 MHz	39.15	39.90
Leakage Current (mA)	5mA max. (500V, 60Hz)	Line1	2.71	2.66
		Line2	2.70	2.66
		Line3	2.69	2.66
DC Resistance (mΩ)	6mΩ max.		2.51	2.44
Test Voltage	L-L : 2192Vdc 60sec.		OK	OK
	L-E : 2500Vac 60sec.			
Isolation Resistance(MΩ)	100MΩ min.(500Vdc 60sec.)		1.0 x 10 <sup>7</sup>	1.0 x 10 <sup>7</sup>

**RTEN-2300**

## 5. High Temperature Resistance Test

MODEL: RTEN-2300 (Representation Product : RTHN-5300)

## (1)Equipment Used

TEMPERATURE CHAMBER PHH-300 (ESPEC CORP.)

## (2)The Number of D.U.T (Device Under Test)

2 units

## (3)Test Conditions

Ambient Temperature : +50°C

Test Times: 500 hours

Operating: DC 300A

## (4)The Method

Before the test check if there is no abnormal characteristics and put the D.U.T in the testing chamber. Then test it in the above conditions. After the test is completed leave it for 1 hour at room temperature and check it if there is no abnormal each characteristics.

## (5)Test Results

PASS

## Typical Sample Data

Check item	Spec.		Before Test	After Test
Attenuation(dB)	Differential Mode : 25dB min.	0.2 MHz	75.80	78.15
		30 MHz	34.25	38.60
	Common Mode : 25dB min.	0.5 MHz	34.15	34.40
		6 MHz	38.60	29.55
Leakage Current (mA)	5mA max. (500V, 60Hz)	Line1	2.72	2.65
		Line2	2.72	2.66
		Line3	2.72	2.66
DC Resistance (mΩ)	2mΩ max.		1.02	0.99
Test Voltage	L-L : 2192Vdc 60sec.		OK	OK
	L-E : 2500Vac 60sec.			
Isolation Resistance(MΩ)	100MΩ min.(500Vdc 60sec.)		1.0 x 10 <sup>7</sup>	1.0 x 10 <sup>7</sup>

**RTEN-2300**

## 6. Low Temperature Storage Test

MODEL: RTEN-2300 (Representation Product : RTHN-5150)

## (1)Equipment Used

TEMPERATURE CHAMBER PG-2FT (ESPEC CORP.)

## (2)The Number of D.U.T (Device Under Test)

2 units

## (3)Test Conditions

Ambient Temperature :  $-25^{\circ}\text{C}$ 

Test Times: 500 hours

## (4)The Method

Before the test check if there is no abnormal characteristics and put the D.U.T in the testing chamber. Then test it in the above conditions. After the test is completed leave it for 1 hour at room temperature and check it if there is no abnormal each characteristics.

## (5)Test Results

PASS

## Typical Sample Data

Check item	Spec.		Before Test	After Test
Attenuation(dB)	Differential Mode : 25dB min.	0.2 MHz	69.10	71.70
		30 MHz	54.25	63.80
	Common Mode : 25dB min.	0.1 MHz	32.85	32.90
		10 MHz	40.20	40.40
Leakage Current (mA)	5mA max. (500V, 60Hz)	Line1	2.73	2.65
		Line2	2.69	2.65
		Line3	2.69	2.65
DC Resistance (m $\Omega$ )	6m $\Omega$ max.		2.48	2.45
Test Voltage	L-L : 2192Vdc 60sec. L-E : 2500Vac 60sec.		OK	OK
Isolation Resistance(M $\Omega$ )	100M $\Omega$ min.(500Vdc 60sec.)		$1.0 \times 10^7$	$1.0 \times 10^7$