Test Report: ERDN20-24

20A Enclosed Type Redundancy Module

■ DESIGN VERIFY TEST

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

■ SAFETY & E.M.C. TEST

Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

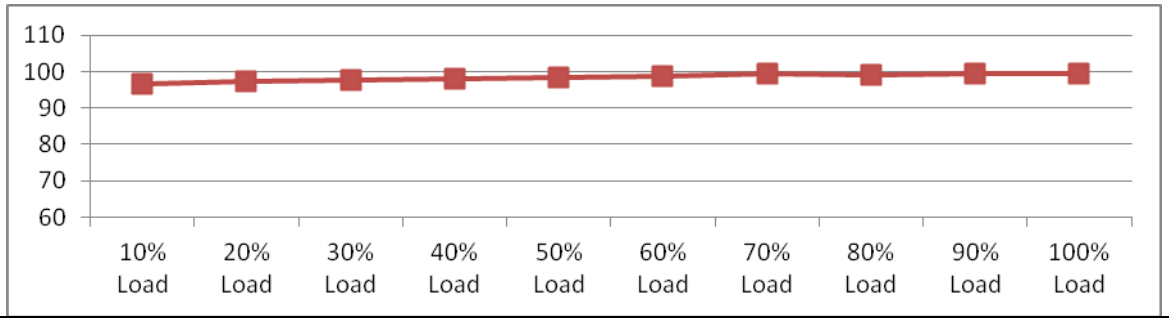
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED CURRENT	0~20A CONTINUOUS	I/P：24VDC O/P：FULL LOAD Ta：25℃	OK
2	PEAK CURRENT	30A 5Sec NO DAMAGE	I/P: 24VDC O/P：30A Ta:25℃	OK
3	CAPACITANCE	320uF	I/P：24VDC O/P：320uF Ta：25℃	OK
4	STANDBY POWER LOSSES（Typ.）	1.5W	I/P：24VDC O/P：NO LOAD Ta：25℃	0.45W

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	19VDC~29VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	17.68VDC~30.47VDC
2	RATED CURRENT	0~10Ax2 input, 0~20Ax1 input Continuous	I/P：24VDC O/P: 20A Ta:25℃	OK
3	VOLTAGE DROP (Vin-Vout) (max.)	0.2V	I/P：24VDC O/P：FULL LOAD Ta：25℃	0.07V
4	PEAK CURRENT	0~15Ax2 input, 0~30Ax1 5Sec NO DAMAGE	I/P: 24VDC O/P：30A Ta:25℃	OK
5	INPUT REVERSE CURRENT (max.)	1mA	I/P：40VDC O/P：FULL LOAD Ta：25℃	31.39uA
6	INPUT REVERSE VOLTAGE (max.)	40Vdc NO DAMAGE	I/P：40VDC O/P：FULL LOAD Ta：25℃	OK
7	EFFICIENCY(Typ.)	98%	I/P:24VDC O/P:FULL LOAD Ta:25℃	99.53 %

EFFICIENCY vs LOAD



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	<30A No damage 5 sec (max)	I/P:24VDC O/P:30A Ta:25℃	NO DAMAGE
2	SHORT PROTECTION	<30A No damage 5 sec (max)	I/P: 29VDC O/P: FULL LOAD Ta:25℃	NO DAMAGE

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RELAY	30VDC/1A RESISTIVE LOAD	I/P:24VDC O/P:FULL LOAD Ta:25℃	TEST : OK
2	REDUNDANCY	For 1+1 redundancy, and support N+1 redundancy	I/P:24VDC O/P:FULL LOAD Ta:25℃	TEST :OK
3	BOTH INPUTS VOLTANG ALARM	<18V OR >31V（±5%）	I/P:TESTING O/P:FULL LOAD Ta:25℃	TEST :OK
4	LED STATUS DISPLAY	GREEN LED OK	I/P:24VDC O/P:FULL LOAD Ta:25℃	TEST :OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Transistor Peak Voltage	Q1 VGS Rated : ±20V Q3 VGS Rated : ±20V	I/P:29VDC DC ON/OFF O/P:FULL LOAD Ta:25℃	Q1 VGS:12.2V Q3 VGS:12.4V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P/O/P-FG: 0.5KVAC/min I/P/FG-RELAY :0.5KVAC/min FG-RELAY:0.5KVAC/min	I/P/O/P-FG: 0.6 KVAC/min I/P/FG-RELAY: 0.6 KVAC/min O/P-FG:0.6 KVAC/min Ta:25℃	I/P/O/P-FG:7.75mA I/P/FG-RELAY:0.291mA FG-RELAY:0.276m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P/O/P-FG:500VDC>100MΩ I/P/FG-RELAY: 500VDC>100MΩ FG-RELAY:500VDC>100MΩ	I/P/O/P-FG: 500 VDC I/P/FG-RELAY: 500 VDC FG-RELAY: 500 VDC Ta:25℃	I/P/O/P-FG: 9999MΩ I/P/FG-RELAY: 9999MΩ FG-RELAY:9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	4 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	☑EN55032 CLASS B	I/P：24VDC O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab

2	RADIATION	☑EN55032 CLASS B	I/P：24VDC O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 AIR：15KV / Contact：8KV	I/P：24VDC O/P：FULL LOAD Ta：25℃	☑CRITERIA A ☐CRITERIA B
4	E.F.T	EN61000-4-4 ☑INDUSTRY INPUT： 2KV	I/P：24VDC O/P：FULL LOAD Ta：25℃	☑CRITERIA A ☐CRITERIA B
5	SURGE	IEC61000-4-5 ☑LIGHT INDUSTRY L-N ：1KV L,N-PE：2KV	I/P： 24VDC O/P：FULL LOAD Ta：25℃	☑CRITERIA A ☐CRITERIA B
6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL：ERDN20-48 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 48VDC O/P： FULL LOAD Ta= 24.8 ℃ 2. HIGH AMBIENT BURN-IN：2 HRS I/P： 48VDC O/P： FULL LOAD Ta= 60.3 ℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 48 VDC O/P：115% LOAD Ta：25℃	TEST：OK

NO	Position	ROOM AMBIENT Ta= 24.8 ℃	HIGH AMBIENT Ta= 60.3 ℃
1	ZNR1	39.1℃	76.3℃
2	Q1	50.8℃	90.5℃
3	Q3	42.2℃	78.8℃
4	C17	39.3℃	76.2℃
5	C15	39.4℃	76.0℃
6	C16	39.0℃	75.6℃
7	RY1	42.0℃	77.8℃
8	RY2	39.3℃	76.2℃
9	U1	43.0℃	79.3℃
10	U2	36.6℃	73.1℃
11	U4	40.0℃	75.8℃
12	D3	46.0℃	81.8℃
13	R54	40.4℃	76.4℃
14	R56	39.9℃	75.9℃
15	Q13	46.4℃	81.9℃
16	Q14	47.1℃	83.0℃
17	R48	47.3℃	83.1℃
18	C4	40.2℃	76.4℃
19	Q21	37.1℃	73.2℃
20	PCB	50.0℃	88.2℃

3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 36VDC/60VDC O/P： 100 % LOAD Ta= -45℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 ℃/95 %R.H NO DAMAGE	I/P： 6 0VDC O/P：FULL LOAD Ta= 60 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03%/℃ (0~60℃)	I/P： 48VDC O/P：FULL LOAD	± 0.011%/℃ (0~60℃)
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： STATIC	
7	THERMAL SHOCK TEST	-40~60℃	1. Thermal shock Temperature： -45℃~ +65℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：16 CYCLE 5. Input/Output condition： 15cycle:48VDC/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:48VDC/ FULL LOAD Burn In Test	
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：12min/sweep cycle (4) Acceleration：6G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C17 IS THE MOST CRITICAL COMPONENT (1) I/P： 48VDC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 48VDC O/P：FULL LOAD Ta= 60 ℃ LIFE TIME (3) I/P： 48VDC O/P：75% LOAD Ta= 60 ℃ LIFE TIME (4) I/P： 48VDC O/P：50% LOAD Ta= 60 ℃ LIFE TIME		(1) 655910 HRS (2) 52613HRS (3) 81989 HRS (4) 113563 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1853.5K hrs min. Telcordia SR-332 (Bellcore) ; 378.7K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：48VDC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 30000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

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