



# Test Report: DUPS20

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24V/20A DIN Rail Type Uninterruptible DC-UPS Module

## ■ DESIGN VERIFY TEST

DC UPS Output Test

DC UPS Input Test

Protection Test

Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

## ■ DESIGN VERIFY TEST

### DC UPS Output Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE	21 Vdc ~ 29Vdc	I/P: 24VDC O/P:FULL LOAD Ta:25°C	20.67Vdc ~ 30.13Vdc
2	DISCHARGE CURRENT RANGE	0 ~ 20A	I/P: 24VDC O/P: BATTERY Ta:25°C	TEST : OK
3	CHARGING CURRENT	2A	I/P: 24VDC O/P: CV LOAD Ta:25°C	1.99A

### DC UPS Input Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	24VDC~ 29VDC	I/P:TESTING O/P: CV LOAD Ta:25°C	21.47VDC~ 30.05 VDC
			I/P: LOW-LINE-0.2= 23.8 V HIGH-LINE+2%=29.58V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT CURRENT(TYP)	24VDC/ 20 A	I/P: 24VDC O/P:FULL LOAD Ta:25°C	TEST : OK

### PROTECTION TEST

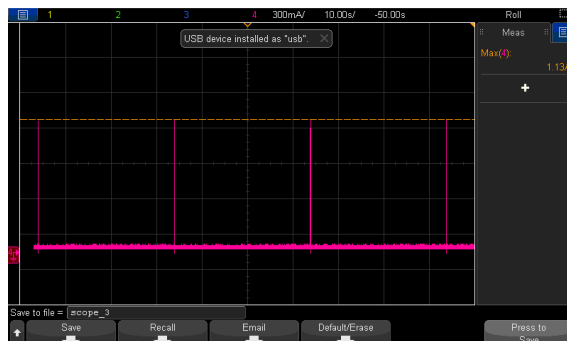
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1.	BATTERY POLARITY	Protected by internal detection, No Damage, recovers automatically after fault conduction is removed.	I/P: 24VDC O/P:FULL LOAD Ta:25°C	TEST : OK
2.	SHORT CIRCUIT	This protection only works when batteries are not connected. External fuse is recommended when batteries are connected.	I/P: 24VDC O/P:FULL LOAD Ta:25°C	TEST : OK
3.	OVER DISCHARGE CURRENT	21~23A,After 3 sec., unit will cut-off battery discharging by relay	I/P: 24VDC O/P:FULL LOAD Ta:25°C	TEST : OK 21.6A

4.	BATTERY DEEP DISCHARGE	Cut-off battery discharging by relay	I/P: 24VDC O/P: FULL LOAD Ta: 25°C	TEST : ≤ 20.67 V
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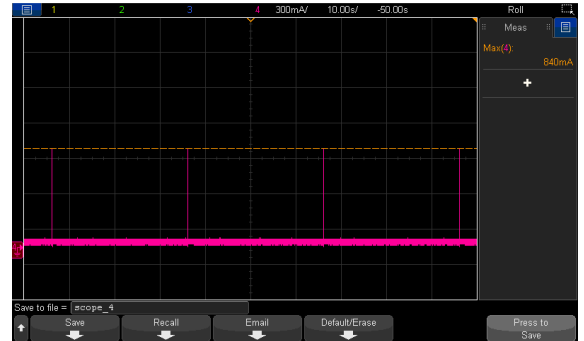
### FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1.	RELAY CONTACT RATINGS (max.)	30VDC/0.5A resistive load	I/P: 30VDC O/P: 0.5A Ta: 25°C	TEST : OK
2.	DC BUS OK	Relay contact : Short when DC voltage between 21~29V( ± 2%), relay contacts LED(Green) : DC BUS OK : light ; DC BUS fail : dark	I/P: TESTING O/P: FULL LOAD Ta: 25°C	TEST : 20.66V~29.54V
3.	BATTERY FAIL	Short when battery voltage falls below 22V(±2%) or battery failure is observed through the battery test function, relay contacts LED(Red): Battery over-discharge warning or battery broken: light; Battery OK : dark	I/P: 24VDC O/P: FULL LOAD Ta: 25°C	TEST : OK BATTERY FAIL: 22.19V BATTERY OK: 22.39V
4.	BATTERY DISCHARGE	Relay contact : Short when battery in discharge condition, relay contacts  LED(Yellow) : light : Battery discharging ; dark : Battery is not discharging or discharging current < 1.0A	I/P: TESTING O/P: FULL LOAD Ta: 25°C	TEST : Battery discharging: 1.14 A Battery is not discharging: 0.93 A
5	BATTERY TEST	Every 30 seconds unit will send out test signal through "Battery Fail" relay contact and LED indicator once the battery is fail.	I/P: 21~29V O/P: Battery Ta: 25°C I(test)=0.7~1.2A	TEST: 1.13A/ I/P =21V 0.84A/ I/P =29V

I/P =21V :



I/P =29V:



## COMPONENT STRESS TEST

N O	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 55 A/ 60V	DC ON/OFF  I/P:High-Line +2% = 29.6V VDS: O/P: (1)CV(max) (2)CV(min) (3)no load (4)Output Short Ta:25°C	VDS: (1) 11.12V (2) 8.95V (3) 30.0V (4) 32.0V
2	Input Capacitor Voltage	C1 Rated: : 100 μ / 35 V	I/P:High-Line +2% = 29.6V O/P: (1)CV(max) (2)CV(min) (3)no load (4)Output Short Ta:25°C	(1)30.8V (2)31.0V (3)30.0V (4)30.8V
3	Control IC Voltage Test	PWM IC U1 Rated : 3V ~ 30V  PWM IC U2 Rated : 4V ~ 36V  MCU IC U101 Rated : 1.7V ~ 3.6V	DC ON/OFF I/P:High-Line +2% = 29.6V O/P: (1)CV(max) (2)CV(min) (3)no load (4)Output Short Ta:25°C	U1 (1) 20.7V (2) 20.5V (3) 20.3V (4) 20.7V  U2 (1) 6.03V (2) 5.99V (3) 5.99V (4) 5.71V  U101 (1) 3.38V (2) 3.38V (3) 3.38V (4) 3.38V
4	Diode Peak Voltage	D1 Rated : 60 V 10 A	DC ON/OFF I/P:High-Line +2% = 29.6V O/P : (1)CV(max) (2)CV(min) (3)no load (4)Output Short Ta : 25°C	(1) 9.01V (2) 9.42V (3) 29.6V (4) 30.6V

## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IP/OP - Chassis : 0.5KVac ; /min IP/OP- Relay :0.5KVac/min Relay - Chassis :0.5KVac/min	IP/OP - Chassis : 0.6KVac ; /min IP/OP- Relay :0.6KVac/min Relay - Chassis :0.6KVac/min Ta:25°C	IP/OP - Chassis :0.015 mA IP/OP- Relay :0.01 mA Relay - Chassis :0.008 mA NO DAMAGE
2	ISOLATION RESISTANCE	IP/OP - Chassis : 500VDC>100MΩ IP/OP- Relay : 500VDC>100MΩ Relay - Chassis : 500VDC>100MΩ	IP/OP - Chassis : 600VDC IP/OP- Relay : 600VDC Relay - Chassis :600VDC Ta:25°C	IP/OP - Chassis :9999MΩ IP/OP- Relay : 9999MΩ Relay - Chassis : 9999MΩ NO DAMAGE

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	EN55032  CLASS B	I/P: 24VDC O/P:FULL LOAD Ta:25°C	PASS  Test by certified Lab
2	E.S.D	EN61000-4-2 CRITERIA A ( AIR:4KV/Contact:2KV ) CRITERIA B ( AIR:8KV/Contact:4KV )	I/P: 24VDC O/P:FULL LOAD Ta:25°C	PASS  Test by certified Lab
3	E.F.T	EN61000-4-4 INPUT: 2KV	I/P: 24VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
4	SURGE	IEC61000-4-5 0.5KV (DC input ports)	I/P: 24VDC O/P:FULL LOAD Ta:25°C	CRITERIA A
5	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 : DPUS20 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 29VDC O/P : FULL LOAD Ta= 24.7 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 29VDC O/P : FULL LOAD Ta= 60.5 °C		

		NO	Position	ROOM AMBIENT Ta= 24.7 °C	HIGH AMBIENT Ta= 60.5 °C
		1	R5	55.2°C	89.4°C
		2	C1	64.8°C	98.9°C
		3	C2	70.1°C	103.1°C
		4	RY2	84.7°C	114.2°C
		5	RY1	82.7°C	96.5°C
		6	D1	44.2°C	78.2°C
		7	Q1	43.5°C	80.4°C
		8	D9	78.2°C	109.7°C
		9	U101	60.8°C	92.7°C
		10	J1	77.5°C	107.5°C
		11	RG1	83.5°C	111.5°C
		12	PCB	71.6°C	103.5°C
		13	J3	51.6°C	84.5°C
		14	D2	54.3°C	87.3°C
		15	TB1	64.9°C	95.8°C
		16	U2	56.8°C	86.6°C
		17	Q101	62.0°C	94.8°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )		I/P : 29 VDC O/P : 110 * LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 28VDC O/P : 100 * LOAD Ta= -35 °C	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C/95 %R.H NO DAMAGE		I/P : 29 VDC O/P : FULL LOAD Ta= 60.3 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C(0~60°C)		I/P : 24 VDC O/P : FULL LOAD	± 0.0051 %/°C(0~60°C)
6	STORAGE TEMPERATURE TEST	-40~85°C		1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / 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	-30~60°C		1. Thermal shock Temperature : -35°C~ +65°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:24V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:24V/ FULL LOAD Burn In Test	

8	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C2 IS THE MOST CRITICAL COMPONENT (1) I/P : 29VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 29VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 29VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 29VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME	(1) 120259HRS (2) 14026HRS (3) 32000HRS (4) 56886HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1252.0K hrs min. Telcordia SR-332 (Bellcore) ; 482.1K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 24VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

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