



Test Report: VFD-250P-48

250W General type DC Input Variable Frequency Drive

■ 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	VOLTAGE RANGE(UVW)	3 ϕ 0~34VAC Three phase line-to-line 0~34V, suit for 48V class motor	I/P : 20VDC 48VDC 55VDC O/P : 0~34VAC PWM Freq.:15KHz Ta : 25°C	V@ min load 0.9~15.1VAC /0.1A @ I/P:20VDC 1.38~36.36VAC /0.1A @ I/P:48VDC 1.33~38.8VAC /0.1A @ I/P:55VDC V@ Derating load 10.5~14.66VAC /derating load @ I/P:20VDC 4.36~35.57VAC / derating load @ I/P:48VDC 9.8~38.1VAC / derating load @ I/P:55VDC
2	RATED CURRENT (A)	7.2A	I/P : 20VDC 48VDC 55VDC O/P:Rated output current PWM Freq.:15KHz Ta : 25°C	7.2A@20Vdc 7.2A@48Vdc 7.2A@55Vdc
3	MAX. CURRENT	14.4A	I/P : 48 VDC O/P : 14.4A PWM Freq.:15KHz Ta : 25°C	TEST: OK
4	EFFICIENCY(Typ.)	93%	I/P : 48 VDC O/P: Full load PWM Freq.:15KHz Ta : 25°C	Eff : 96.54%
5	DC BUS VOILTAGE	DC BUS:48V DC BUS VOLTAGE SENSOR:2.5 \pm 0.05V	I/P : 48 VDC O/P: Rated output current PWM Freq.:15KHz Ta : 25°C	48V@ DC BUS voltage sensor:2.5118V

INPUT FUNCTION TEST

N O	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED INPUT VOLTAGE	20VDC~55VDC	I/P : 19.8VDC~58VDC O/P: Full load PWM Freq.:15KHz Ta : 25°C	TEST : 16.7VDC~60.8VDC
			I/P : HIGH-LINE+3V=58 V O/P: FULL/MIN LOAD PWM Freq.:15KHz (PLEASE CHECK DERATING CURVE) ON : 30 Sec OFF : 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK

4	RATED INPUT CURRENT	48VDC/5.6 A	I/P : 48 VDC O/P: Full load PWM Freq.:15KHz Ta : 25°C	5.30A @48Vdc
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	SHORT PROTECTION	SHORT ANY TWO PHASE OUTPUT 1 HOUR NO DAMAGE Protection type : Shut down o/p voltage, re-power on to recover Inverter fault signal(Short circuit/OCP, PIN7 of CN93). TTL input: Normal: High(>3V); Abnormal: Low(<0.5V)	I/P : 58VDC I/P : 19.8VDC O/P : Short Any Two Phase Output Ta : 25°C	Test Result : O/P shut down PROTECTION TYPE : re-power on FAULT SIGNAL Normal:3.43V Abnormal:0V
2	OVER TEMPERATURE PROTECTION	Protection type : auto-recovery Built-in 10K Ω NTC for sensing IGBTs operating temperature. (TSM2A103F34D1R (Thinking Electronic), PIN2 of CN93)	I/P : 58VDC I/P : 19.8VDC O/P: Full load PWM Freq.:15KHz Ta : 25°C	Test Result : O/P shut down Protection type : Auto-Recovery
3	OVER LOAD PROTECTION	Protection type : Shut down o/p voltage, re-power on to recover Built-in 6mΩ low-side shunt resistor (each phase), (PIN4~6 of CN93)	I/P : 48 VDC O/P : max. current@rated motor speed Ta : 25°C	Test Result : 200% OK · 248.51% shut down PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
4	OVER VOLTAGE PROTECTION	When the voltage of the DC bus exceed 60V, the PWM input signal must shut down for protection.	I/P : 48 VDC O/P: Rated output current PWM Freq.:15KHz Ta : 25°C	Test Result : shut down for protection · re-power on

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1.	VCC	14.5~15.5V / 0.2A Ripple:1000mVp-p	I/P : 48 VDC O/P: Full load PWM Freq.:15KHz Ta : 25°C	15.47V /257 mVp-p

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	IGBT	Q902(High side)/Q905(Low side) Rated : 44A/100V	DC ON/OFF I/P : High-Line +3V =58 V O/P : (1)Full Load (2)Output Short (UVW) (3)0%→400% Load. (4)NO LOAD Ta:25°C	VDS(Q902) (1) 66.8V (2) 78.8V (3) 69.8V (4) 60.1V VDS(Q905) (1) 65.5V (2) 66.8V (3) 71.6V (4) 59.5V
2	Input Capacitor Voltage	C5 Rated: : 390μ /63V	I/P : High-Line +3V =58V O/P : (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta : 25°C	(1) 58.7V (2) 58.7V (3) 58.3V (4) 58.3V
3	Control IC Voltage Test	O/P IC U901 Rated: 13V~ 17.5 V	DC ON/OFF I/P : High-Line +3V =58 V O/P : (1)FULL LOAD (2) Output Short (UVW) (3) 0~200% (4)O.V.P. (5)NO LOAD Ta : 25°C	(1) 15.5V (2) 15.5V (3) 15.5V (4) 15.5V (5) 15.5V
4	TOP SWITCHING STAND BY POWER	U322 :Rated 100V	DC ON/OFF I/P : High-Line +3V =58 V O/P : (1)Full Load (2)Output Short (UVW) Ta : 25°C	(1) 59.9V (2) 59.9V

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	■ EN55032 □ EN55011 CLASS B	I/P : 48 VDC O/P : motor Ta : 25°C	Test by certified Lab
2	RADIATION	■ EN55032 □ EN55011 CLASS B	I/P : 48 VDC O/P : motor Ta : 25°C	Test by certified Lab

3	E.S.D	EN61000-4-2 ■ <u>INDUSTRY</u> AIR : 8KV / Contact : 4KV	I/P : 48 VDC O/P : motor Ta : 25°C	■ CRITERIA A □ CRITERIA B
4	E.F.T	EN61000-4-4 ■ <u>INDUSTRY</u> INPUT : 2KV	I/P : 48 VDC O/P : motor Ta : 25°C	■ CRITERIA A □ CRITERIA B
5	SURGE	IEC61000-4-5 ■ <u>LIGHT INDUSTRY</u> L-N : 1KV	I/P : 48 VDC O/P : motor Ta : 25°C	■ 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 : VFD-250P-48 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 48VDC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 48VDC O/P : FULL LOAD Ta= 50 °C																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=25.8°C</th> <th>HIGH AMBIENT Ta= 50.9 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>49.7°C</td><td>75.1°C</td></tr> <tr><td>2</td><td>C6</td><td>60.4°C</td><td>86.9°C</td></tr> <tr><td>3</td><td>C5</td><td>51.0°C</td><td>77.2°C</td></tr> <tr><td>4</td><td>C932</td><td>55.7°C</td><td>84.1°C</td></tr> <tr><td>5</td><td>C934</td><td>45.2°C</td><td>72.8°C</td></tr> <tr><td>6</td><td>L931</td><td>52.5°C</td><td>80.9°C</td></tr> <tr><td>7</td><td>U901</td><td>61.7°C</td><td>88.7°C</td></tr> <tr><td>8</td><td>Q901</td><td>72.3°C</td><td>102.8°C</td></tr> <tr><td>9</td><td>Q904</td><td>73.6°C</td><td>105.2°C</td></tr> <tr><td>10</td><td>Q902</td><td>75.9°C</td><td>105.2°C</td></tr> <tr><td>11</td><td>Q905</td><td>78.0°C</td><td>107.9°C</td></tr> <tr><td>12</td><td>Q903</td><td>80.6°C</td><td>107.7°C</td></tr> <tr><td>13</td><td>Q906</td><td>70.2°C</td><td>103.3°C</td></tr> <tr><td>14</td><td>R914</td><td>81.0°C</td><td>110.3°C</td></tr> <tr><td>15</td><td>RTH4</td><td>70.2°C</td><td>101.3°C</td></tr> <tr><td>16</td><td>R913</td><td>74.9°C</td><td>103.0°C</td></tr> <tr><td>17</td><td>U950</td><td>47.7°C</td><td>75.0°C</td></tr> <tr><td>18</td><td>U322</td><td>62.0°C</td><td>89.6°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=25.8°C	HIGH AMBIENT Ta= 50.9 °C	1	L1	49.7°C	75.1°C	2	C6	60.4°C	86.9°C	3	C5	51.0°C	77.2°C	4	C932	55.7°C	84.1°C	5	C934	45.2°C	72.8°C	6	L931	52.5°C	80.9°C	7	U901	61.7°C	88.7°C	8	Q901	72.3°C	102.8°C	9	Q904	73.6°C	105.2°C	10	Q902	75.9°C	105.2°C	11	Q905	78.0°C	107.9°C	12	Q903	80.6°C	107.7°C	13	Q906	70.2°C	103.3°C	14	R914	81.0°C	110.3°C	15	RTH4	70.2°C	101.3°C	16	R913	74.9°C	103.0°C	17	U950	47.7°C	75.0°C	18	U322	62.0°C	89.6°C
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 55VDC/20VDC O/P : 100%LOAD Ta= -35°C	TEST : OK																																																																												

3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H NO DAMAGE	I/P : 58 VDC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK
4	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	
5	THERMAL SHOCK TEST	-30~50°C	1. Thermal shock Temperature : -35°C~ +55°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:48V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:48V/ FULL LOAD Burn In Test	
6	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	
7	CAPACITOR LIFE CYCLE	SUPPOSE C932 IS THE MOST CRITICAL COMPONENT (1) I/P : 48VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 48VDC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 48VDC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 48VDC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 193335HRS (2) 27189HRS (3) 53259HRS (4) 81288HRS	
8	Ongoing Reliability Test	I/P : 48VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Yuwei	Liutt	Wangdz

2020.10.1 TAG-QA-009