Test Report: VFD-150P-48

150W 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)	3ψ 0~34VAC Three phase line-to-line 0~34V, suit for48V class motor	I/P：20VDC 48VDC 55VDC O/P：0~34VAC PWM Freq.:15KHz Ta：25℃	V@min load 0~14.9VAC /0.1A @ I/P:20VDC 0~35.8VAC /0.1A @ I/P:48VDC 0~39.7VAC /0.1A @ I/P:55VDC V@ Derating load 5.8~14.6VAC / derating load @ I/P:20VDC 5.5~35.2VAC / derating load @ I/P:48VDC 4.16~39.1VAC / derating load @ I/P:55VDC
2	RATED CURRENT (A)	4.3A	I/P：20VDC 48VDC 55VDC O/P:Rated output current PWM Freq.:15KHz Ta：25℃	4.3A@20Vdc 4.3A@48Vdc 4.3A@55Vdc
3	Max. CURRENT	8.6A	I/P：48 VDC O/P：8.6A PWM Freq.:15KHz Ta：25℃	TEST: OK
4	DRIVER EFFICIENCY(Typ.)	93%	I/P：48 VDC O/P: Full load PWM Freq.:15KHz Ta：25℃	EFF：96.67%
5	DC BUS VOILTAGE	DC BUS:48V DC BUS voltage sensor: 2.5±0.05V	I/P：48 VDC O/P: Rated output current PWM Freq.:15KHz Ta：25℃	48V@ DC BUS voltage sensor: 2.501V

INPUT FUNCTION TEST

NO	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℃	**TEST：18~58V**
			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/3.5A	I/P：48 VDC O/P: Full load PWM Freq.:15KHz Ta：25℃	3.28A@48Vdc

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 Ta：25℃	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 10KΩ 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℃	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 resisor (each phase), (PIN4~6 of CN93)	I/P：48 VDC O/P：max. current@rated motor speed Ta：25℃ PWM Freq.:15KHz Ta：25℃	Test Result：200% OK ，225.58% 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℃	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℃	15.32V / 146mV p-p

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	IGBT	Q902(High side)/Q905(Low side) Rated : 58A/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℃	Q902 Q905 VDS : VDS : (1) 72.2V (1) 73.0V (2) 73.9V (2) 73.0V (3) 71.5V (3) 72.2V (4) 65.0V (4) 64.1V
2	Input Capacitor Voltage	C6 Rated: : 330μ /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℃	(1) 62.1V (2) 61.7V (3) 61.7V (4) 61.3V
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℃	(1) 15.5V (2) 15.5V (3) 15.5V (4) 15.5V (5) 15.2V
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℃	(1) 60.2V (2) 60.2V

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℃	Test by certified Lab
2	RADIATION	■ EN55032 □ EN55011 CLASS B	I/P : 48 VDC O/P : motor Ta : 25℃	Test by certified Lab
3	E.S.D	EN61000-4-2 ■ INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 48 VDC O/P : motor Ta : 25℃	■ CRITERIA A □ CRITERIA B
4	E.F.T	EN61000-4-4 ■ INDUSTRY INPUT : 2KV	I/P : 48 VDC O/P : motor Ta : 25℃	■ CRITERIA A □ CRITERIA B

5	SURGE	IEC61000-4-5 ■ LIGHT INDUSTRY L-N：1KV	I/P：48 VDC O/P：motor 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：VFD-150P-48 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 48VDC O/P： FULL LOAD Ta= 25 ℃ 2. HIGH AMBIENT BURN-IN： 2HRS I/P： 48VDC O/P： FULL LOAD Ta= 50 ℃		

NO	Position	ROOM AMBIENT Ta=27.2℃	HIGH AMBIENT Ta= 50.0 ℃
1	L1	44.1℃	70.1℃
2	C6	47.7℃	74.2℃
3	C932	52.7℃	81.7℃
4	L931	45℃	75℃
5	C934	39.2℃	68.5℃
6	U901	53.1℃	79.9℃
7	RTH4	67.5℃	98.4℃
8	U950	44.3℃	69.9℃
9	U322	50℃	87.4℃
10	Q901	65.1℃	93.7℃
11	Q904	65.4℃	98℃
12	Q902	68.8℃	99.8℃
13	Q905	70.7℃	99.8℃
14	Q903	71.7℃	100.5℃
15	Q906	68.5℃	101℃
16	R914	66.1℃	93.3℃
17	R913	63.6℃	93.9℃

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 55VDC/20VDC O/P： 100%LOAD Ta= -35℃	TEST：OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃/95 %R.H NO DAMAGE	I/P： 58 VDC O/P：FULL LOAD Ta= 50 ℃ HUMIDITY= 95 %R.H	TEST：OK

4	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
5	THERMAL SHOCK TEST	-30~50℃	1. Thermal shock Temperature： -35℃~ +55℃ 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: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℃
7	CAPACITOR LIFE CYCLE	SUPPOSE C932 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= 50 ℃ LIFE TIME (3) I/P： 48VDC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 48VDC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 262280HRS (2) 30168HRS (3) 51803HRS (4) 75844HRS
8	Ongoing Reliability Test	I/P：48VDC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Yuwei	Liutt	Wangdz

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