



# Test Report: VFD-750C-230

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750W General type Variable Frequency Drive with PFC function

## ■ 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

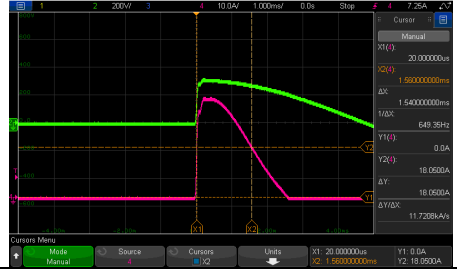
## ■ DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	VOLTAGE RANGE(UVW)	3 $\psi$ 0~240VAC  Three phase line-to-line 0~240V, suit for 200-240V class motor	I/P : 90VAC 230VAC 264VAC O/P : 0~240VAC PWM Freq.:15KHz Ta : 25°C	V@min load 0V~282.4V / 0.05A @ I/P = 90Vac 0V~282.3V / 0.05A @ I/P = 230Vac 0V~282.3V / 0.05A @ I/P = 264Vac V@ Derating load 38.5V~280.9V / derating load@ I/P = 90Vac 55.2V~281.2V / derating load @ I/P = 230Vac 55.1V~281.2V / derating load @ I/P = 264Vac
2	RATED CURRENT (A)	3A	I/P : 90VAC 230VAC 264VAC O/P : Rated output current PWM Freq.:15KHz Ta : 25°C	3A@90Vac 3A@230Vac 3A@264Vac
3	PEAK CURRENT	6A	I/P : 230 VAC O/P : 6A PWM Freq.:15KHz Ta : 25°C	TEST : OK
4	EFFICIENCY(Typ.)	93%	I/P : 230 VAC O/P : Full load PWM Freq.:15KHz Ta : 25°C	Eff : 93.6%
5	DC BUS VOLTAGE	DC BUS:380V $\pm$ 5V DC BUS VOLTAGE SENSOR:2.5 $\pm$ 0.05V	I/P : 230 VAC O/P: Rated output current PWM Freq.:15KHz Ta : 25°C	378.3V@ DC BUS VOLTAGE SENSOR : 2.506V

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED INPUT VOLTAGE	90VAC~264VAC	I/P : 87V~267V O/P : Full load PWM Freq.:15KHz Ta : 25°C	TEST : 84.9VAC~264VAC
			I/P : HIGH-LINE+10V=274V V O/P : FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON : 30 Sec OFF : 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90 VAC ~264 VAC O/P : Full load Ta : 25°C	TEST : OK

3	POWER FACTOR (Typ.)	0.93/230VAC 0.99/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : Full load Ta : 25°C	PF = 0.9702@230Vac PF = 0.9945@115Vac
4	RATED INPUT CURRENT	230V/4 A 115V/8 A	I/P : (1) 230 VAC (2) 115 VAC O/P : Full load Ta : 25°C	3.6717A @230Vac 7.4654A @115Vac
5	INRUSH CURRENT(Typ.)	230V/50A  COLD START	I/P : 230 VAC O/P : Full load Ta : 25°C	I = 36.1A/230V T50=1.54ms/230V 
6	Leakage current	<2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.548mA

## 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 : 264VAC I/P : 90VAC O/P : Short Any Two Phase Output Ta : 25°C	Test Result : O/P shut down PROTECTION TYPE : re-power on  FAULT SIGNAL Normal:3.588V Abnormal:0V
2	OVER TEMPERATURE PROTECTION	Protection type : auto-recovery Built-in temperature sensor for IGBTs operating temperature. (PIN2 of CN93)	I/P : 264VAC I/P : 90VAC O/P : Full load @rated motor speed	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 31mΩ low-side shunt resistor (each phase), (PIN4~6 of CN93)	I/P : 230 VAC O/P : max. current@rated motor speed Ta : 25°C	Test Result : 200% OK · 263.5% 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 420V, the PWM input signal must shut down for protection.	I/P : 230 VAC 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	15V / 0.1A Ripple:1000mVp-p	I/P : 230 VAC O/P: Full load PWM Freq.:15KHz Ta : 25°C	15.09V / 611mVp-p

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q21、Q22 Rated: 30A/ 650 V	I/P : High-Line +3V =267 V AC ON/OFF O/P : (1)Full Load (2)Output Short (UVW) (3)0%→400% Load. Ta:25°C	VDS (1) 480V (2) 480V (3) 472V
2	P.F.C DIODE	D24 Rated: 12A/600V	I/P : High-Line +3V =267 V AC ON/OFF O/P : (1)Full Load (2)Output Short (UVW) Ta:25°C	(1) 399V (2) 412V
3	IPM Module	U901 Rated : 20A/600V	AC ON/OFF I/P : High-Line +3V =267 V O/P : (1)Full Load (2)Output Short (UVW) (3)0%→400% Load. (4)NO LOAD Ta:25°C	VCE(High side) : (1) 406V (2) 406V (3) 402V (4) 386V  VCE(Low side): (1) 406V (2) 515V (3) 398V (4) 390V
4	Input Capacitor Voltage	C5 Rated: : 100μ /420V	I/P : High-Line +3V =267V 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) 389V (2) 377V (3) 398V (4) 389V

5	Control IC Voltage Test	PFC IC U51 Rated: 10.5V~25 V	AC ON/OFF I/P : High-Line +3V =267 V O/P : (1)FULL LOAD (2) Output Short (UVW) (3)0~200% (4)O.V.P. (5)NO LOAD Ta : 25°C	(1) 15.2V (2) 15.2V (3) 15.2V (4) 15.2V (5) 15.2V
		O/P IC U901 Rated: 10.3V~20 V	AC ON/OFF I/P : High-Line +3V =267 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) 15.4V (3) 15.3V (4) 15.3V (5) 15.3V
		PRIMARY VCC U952 Rated: 700V	AC ON/OFF I/P : High-Line +3V =267 V AC ON/OFF O/P : (1)Full Load (2)Output Short (UVW) Ta : 25°C	(1) 512V (2) 512V

## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-FG : 2KVAC/min	I/P-FG : 2.4 KVAC/min Ta : 25°C	I/P-FG : 3.33mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-FG : 500VDC>100MΩ	I/P-FG : 600 VDC Ta : 25°C	I/P-FG : 49GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta : 25°C	3mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 ■ CLASS A	I/P : 230VAC/50HZ O/P : motor Ta : 25°C	■ PASS □ FAIL
2	CONDUCTION	■ EN55032 □ EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : motor Ta : 25°C	Test by certified Lab
3	RADIATION	■ EN55032 □ EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : motor Ta : 25°C	Test by certified Lab
4	E.S.D	EN61000-4-2 ■ <u>INDUSTRY</u> AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : motor Ta : 25°C	■ CRITERIA A □ CRITERIA B
5	E.F.T	EN61000-4-4 ■ <u>INDUSTRY</u> INPUT : 2KV	I/P : 230 VAC/50HZ O/P : motor Ta : 25°C	■ CRITERIA A □ CRITERIA B
6	SURGE	IEC61000-4-5 ■ <u>LIGHT INDUSTRY</u> L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	■ CRITERIA A □ CRITERIA B
7	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-750C-230 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 40 °C		

		NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta=40 °C
		1	LF2	80.5°C	93.7°C
		2	ZNR1	69.1°C	83.2°C
		3	C1	61.8°C	77.7°C
		4	LF1	66.3°C	83.4°C
		5	T951	74.8°C	89.4°C
		6	RTH1	60.3°C	73.9°C
		7	RY1	69.6°C	82.5°C
		8	BD2	83.5°C	95.3°C
		9	BD1	69.8°C	84.3°C
		10	C2	71.9°C	89.3°C
		11	Q21	71.2°C	87.0°C
		12	R24	76.9°C	93.7°C
		13	Q22	71.2°C	86.9°C
		14	D24	78.5°C	94.4°C
		15	L2	91.1°C	107.0°C
		16	C7	69.7°C	85.8°C
		17	C6	72.4°C	88.4°C
		18	C5	69.2°C	85.3°C
		19	C968	64.2°C	82.3°C
		20	U952	73.7°C	90.4°C
		21	U903	65.2°C	81.4°C
		22	R909	72.1°C	88.7°C
		23	R907	73.0°C	88.9°C
		24	U901	75.9°C	92.2°C
		25	U951	65.2°C	81.2°C
		26	U51	75.0°C	90.0°C
		27	R22	74.8°C	90.6°C
		28	D956	70.4°C	86.6°C
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 264VAC/90VAC 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 40 °C/95 %R.H NO DAMAGE		I/P : 272 VAC O/P : FULL LOAD Ta= 40 °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	-30~40°C		1. Thermal shock Temperature : -35°C~ +45°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:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test	



6	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 : 10min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
7	CAPACITOR LIFE CYCLE	SUPPOSE C968 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 101474HRS (2) 28939HRS (3) 46365HRS (4) 62033HRS
8	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Yuwei	Liutt	Wangdz

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