



Test Report: XTR-960-24

960W AC/DC 3Ø Input Ultra Slim Industrial DIN Rail Power

■ 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

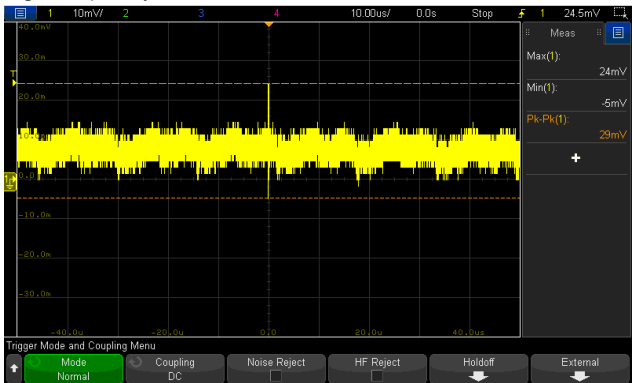
E.M.C. Test

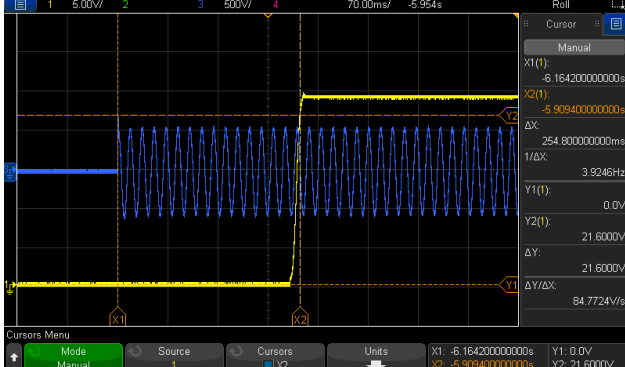
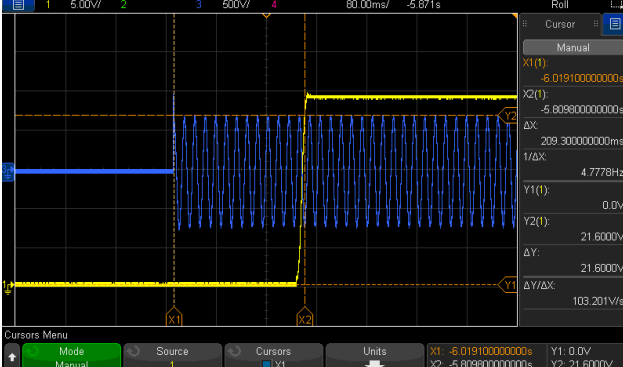
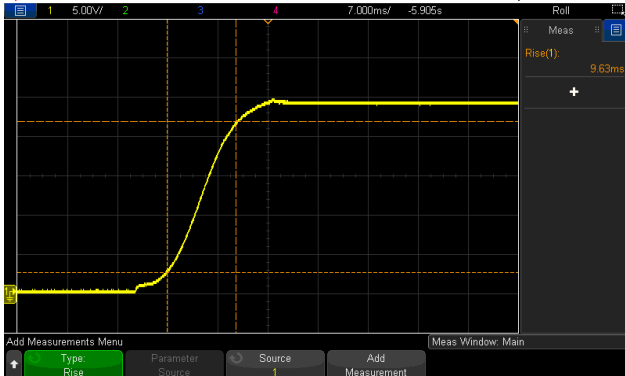
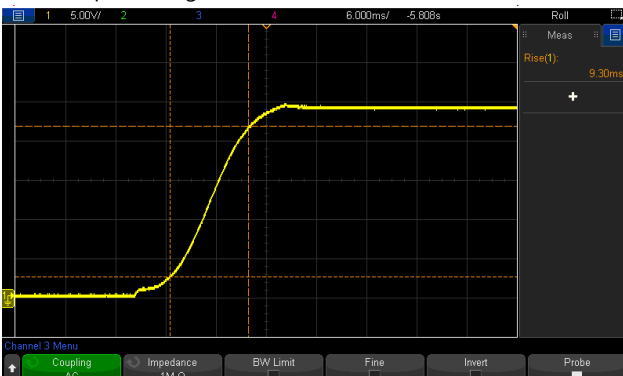
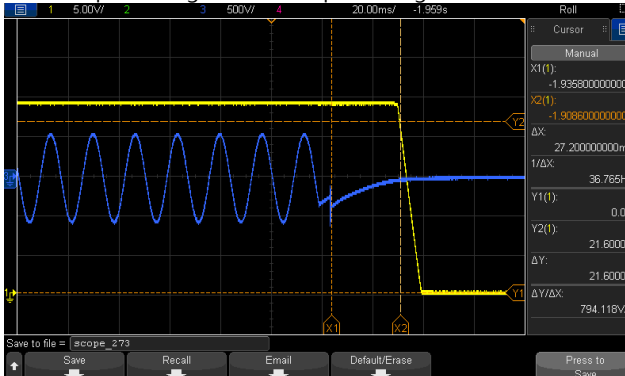
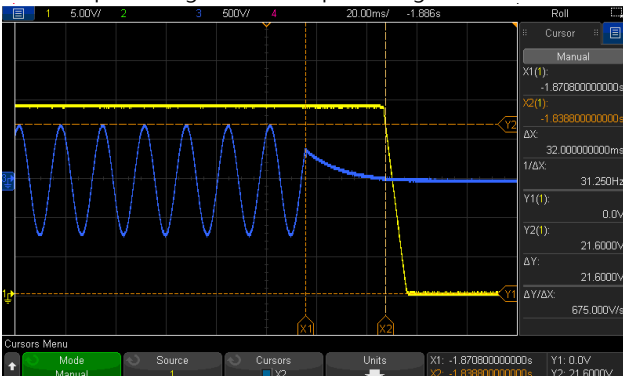
■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

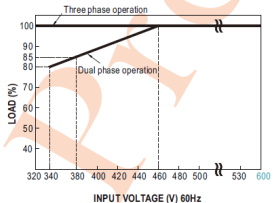
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 24V~29V	I/P : 400 VAC I/P : 500 VAC O/P : MIN LOAD Ta : 25°C	23.356V~30.079V/400VAC 23.368V~30.079V/500VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ +1%	I/P: 320VAC ~ 600VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.3625% ~0 %
3	LINE REGULATION	V1: -0.5% ~ +0.5%	I/P: 320VAC~ 600VAC O/P:FULL LOAD Ta:25°C	V1: 0 % ~ 0.013%
4	LOAD REGULATION	V1: -1% ~ +1%	I/P: 400VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.184% ~0.18 %
5	OVER/UNDERSHOOT TEST	<±5%	I/P: 400VAC O/P:FULL LOAD/NO LOAD Ta:25°C	2.1% →FULL LOAD 2.1% →NO LOAD
6	RIPPLE & NOISE (Max)	V1: 120mVp-p 180mVp-p/PEAK LOAD	I/P:400VAC O/P: FULL LOAD Ta:25°C	V1: 29mVp-p / high frequency 39mVp-p / low frequency
high frequency :				
low frequency :				
7	SET UP TIME (Max)	400VAC/800ms 500VAC/600ms	I/P : 400 VAC I/P : 500 VAC O/P : FULL LOAD Ta : 25°C	254.8ms/400VAC 209.3ms/500VAC
INPUT=400VAC/50HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage		INPUT=500VAC/60HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage		

				
8	RISE TIME (Max)	400VAC/60ms 500VAC/60ms	I/P : 400 VAC I/P : 500 VAC O/P : FULL LOAD Ta : 25°C	9.63ms/400VAC 9.30ms/500VAC
INPUT=400VAC/50HZ @ FULL LOAD CH1: Output Voltage				
				
INPUT=500VAC/60HZ @ FULL LOAD CH1: Output Voltage				
				
9	HOLD UP TIME (Typ.)	400VAC/20ms 500VAC/20ms	I/P : 400 VAC I/P : 500 VAC O/P : FULL LOAD Ta : 25°C	27.2ms/400VAC 32.0ms/500VAC
INPUT=400VAC/50HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage				
				
INPUT=500VAC/60HZ @ FULL LOAD CH1: Output Voltage CH3: AC Input Voltage				
				
10	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 400VAC O/P: (1) FULL / MIN LOAD 50%DUTY / 120HZ (2) FULL / MIN LOAD 50%DUTY / 1KHZ Ta:25°C	870mVp-p 790mVp-p

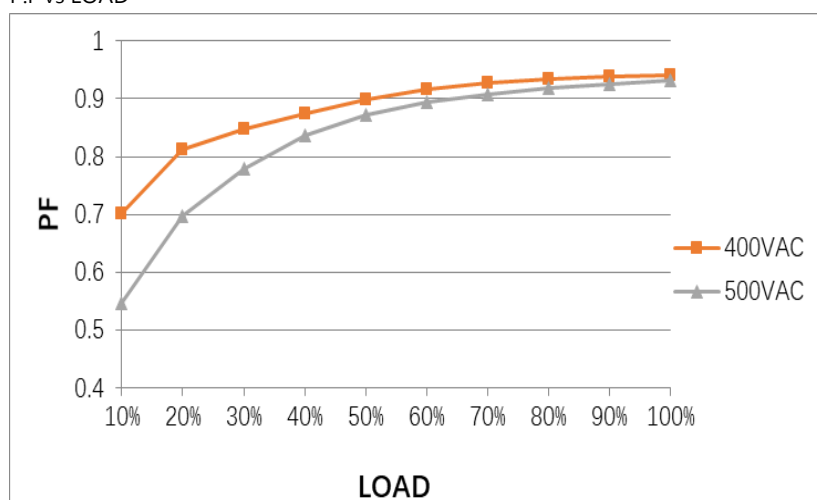
	FULL /MIN LOAD 50%DUTY / 120HZ		FULL / MIN LOAD 50%DUTY / 1KHZ	
11	PEAK LOAD 开机&循环	1) PEAK LOAD@5S 2) PEAK LOAD 循环 For example (200W model): Vin=400V, Only max 100W P_{out} = 100W T_a = 25°C P_{out} = 100W at 1000W P_{out} = 80W at 1000W P_{out} = 80W	I/P: 600VAC I/P: 400VAC I/P: 320VAC O/P: PEAK LOAD	TEST : I/P: 600VAC <u>OK</u> I/P: 400VAC <u>OK</u> I/P: 320VAC <u>OK</u>

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	INPUT VOLTAGE RANGE	Three-Phase 320VAC~600VAC (Dual phase operation possible) 450VDC~800VDC/ FULL LOAD ■ Output derating VS input voltage 	(1) I/P: TESTING O/P: FULL LOAD Dual phase DC Input : (2) I/P: DC TESTING O/P: FULL LOAD Ta:25°C	(1) 296.41Vac~600Vac/ FULL LOAD Dual phase DC Input : (2) 412.6Vdc~800Vdc/FULL LOAD						
			I/P: LOW-LINE-3V=317V HIGH-LINE+10V=610V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST: OK						
			Dual phase operation : I/P: TESTING O/P: FULL LOAD / 90% LOAD / 85% LOAD/80% LOAD	324.22Vac~600Vac/ FULL LOAD 323.00Vac~600Vac/ 90% LOAD 324.11Vac~600Vac/ 85% LOAD 324.16Vac~600Vac/ 80% LOAD						
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 320VAC~ 600VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK						
3	INPUT CURRENT (Typ.)	400V/ 2A 500V/ 1.4A	I/P : 400 VAC I/P : 500 VAC O/P : FULL LOAD	TEST: <table><tr><td></td><td>400VAC</td><td>500VAC</td></tr><tr><td>L1</td><td>1.5331A</td><td>1.2388A</td></tr></table>		400VAC	500VAC	L1	1.5331A	1.2388A
	400VAC	500VAC								
L1	1.5331A	1.2388A								

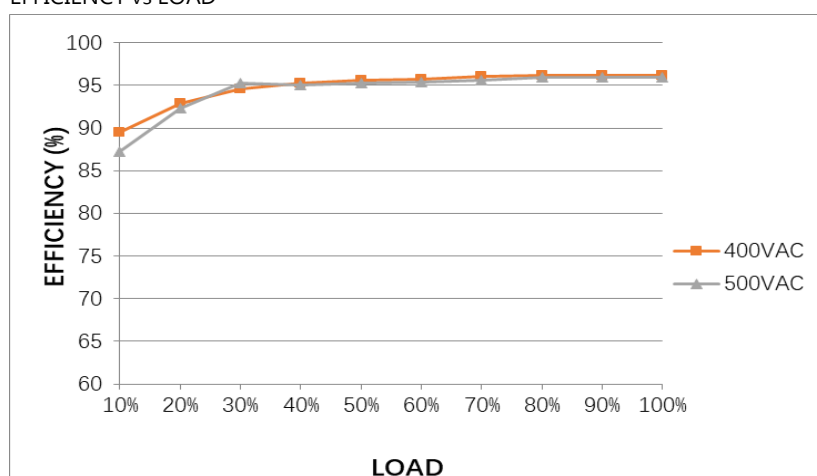
			Ta : 25°C	<table><tr><td>L2</td><td>1.5344A</td><td>1.2396A</td></tr><tr><td>L3</td><td>1.5352A</td><td>1.2399A</td></tr></table>	L2	1.5344A	1.2396A	L3	1.5352A	1.2399A						
L2	1.5344A	1.2396A														
L3	1.5352A	1.2399A														
4	LEAKAGE CURRENT	< 3.5mA / 530 VAC	I/P : 530 VAC/60Hz O/P : Min LOAD Ta : 25°C	L1,L2,L3-FG : 1.24mA(Peak)→62368												
5	NO LOAD CONSUMPTION	Remote Power OFF: 3.1W/400Vac Remote Power ON: 6.5W/400Vac	I/P : 400 VAC O/P : NO LOAD Ta : 25°C	2.5294W/400Vac→ Remote Power OFF 4.3556W/400Vac→ Remote Power ON												
6	POWER FACTOR (Typ.)	PF=0.92 /400VAC PF=0.92 /500VAC	I/P : 400 VAC I/P : 500 VAC O/P : FULL LOAD Ta : 25°C	TEST: <table><tr><td></td><td>400VAC</td><td>500VAC</td></tr><tr><td>L1</td><td>0.9373</td><td>0.9309</td></tr><tr><td>L2</td><td>0.9376</td><td>0.9313</td></tr><tr><td>L3</td><td>0.9378</td><td>0.9314</td></tr></table>		400VAC	500VAC	L1	0.9373	0.9309	L2	0.9376	0.9313	L3	0.9378	0.9314
	400VAC	500VAC														
L1	0.9373	0.9309														
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L3	0.9378	0.9314														

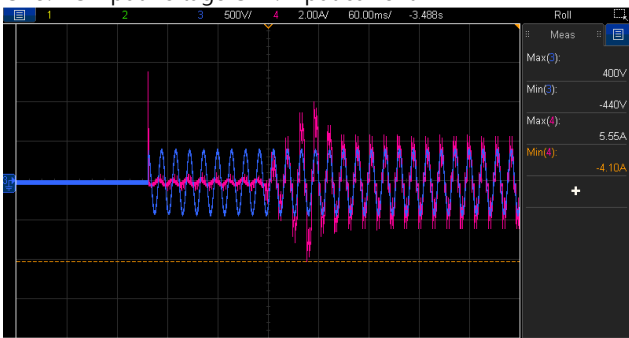
P.F vs LOAD



7	EFFICIENCY(Typ.)	95%	I/P: 400 VAC O/P:FULL LOAD Ta:25°C	95.82%
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EFFICIENCY vs LOAD



8	INRUSH CURRENT(Typ.)	500V/10A COLD START	I/P : 500 VAC O/P : FULL LOAD/PEAK LOAD Ta : 25°C	I =5.55A/ 500VAC@ FULL LOAD I =5.63A/ 500VAC@ PEAK LOAD T50= 5100us/500V@ FULL LOAD
INPUT=500VAC/50HZ @ FULL LOAD CH3: AC Input Voltage CH4: Input current  INPUT=500VAC/50HZ @ PEAK LOAD CH3: AC Input Voltage CH4: Input current 				

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 200% rated power Protection type: 105%~200% rated output power for more than 5 sec then constant current limiting without shutdown at rate current when Vo=30%~100% Hiccup mode when Vo<30% rated voltage	I/P: 600VAC I/P: 400VAC I/P: 320VAC O/P:TESTING Ta:25°C	114.36%/600VAC 113.78%/400VAC 113.56%/320VAC Protection type: 105%~200% rated output power for more than 5 sec then constant current limiting without shutdown at rate current when Vo=30%~100% Hiccup mode when Vo<30% rated voltage
2	OVER VOLTAGE PROTECTION	30V~35V Protection type: Shut down o/p voltage, re-power on to recover	I/P: 600VAC I/P: 320VAC O/P:MIN LOAD Ta:25°C	32.60V/ 600VAC 32.60V/ 320VAC Protection type: Shut down o/p voltage, re-power on to recover

3	OVER TEMPERATURE PROTECTION	Protection type: Shut down o/p voltage, recovers automatically after temperature goes down.	I/P: 600VAC I/P: 320VAC O/P: FULL LOAD	TEST: <u>OK</u> Protection type: Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE Protection type: Hiccup mode when $V_o < 30\%$ rated voltage	I/P: 600VAC I/P: 320VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE OK Protection type: Hiccup mode when $V_o < 30\%$ rated voltage
5	Protection Against Reverse Voltages from the Load	Prevent PSU damage from Back Electro magnetic Force during deceleration of motor or inductive load	I/P: 400VAC O/P: TESTING Ta: 25°C	TEST : OK

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC OK RELAY CONTACT	Relay Contact Ratings (max.): 30Vdc/1A, 30Vac/0.5A resistive load	I/P: 400VAC O/P: FULL LOAD Ta: 25°C	TEST: <u>OK</u>
2	REMOTE CONTROL	Power ON: RC+ ~ RC- open or keep 2~5Vdc Power OFF: RC+ ~ RC- short or keep <0.5Vdc	I/P: 400VAC O/P: FULL LOAD Ta: 25°C	TEST: <u>OK</u>
3	PARALLEL	Up to 3840W (3+1), please refer to Function Manual for more details	I/P: TESTING O/P: TESTING LOAD Ta: 25°C	TEST: <u>OK</u>

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q2/Q3 Rated: 68A/650V	AC ON/OFF I/P: High-Line +3V = 603V VDS: O/P: (1) Full Load (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/	Q3 VDS: (1) 479V (2) 539V (3) 475V (4) 475V (5) 479V (6) 450V (7) 535V (8) 527V Q2 VDS: (1) 483V (2) 555V (3) 479V (4) 479V (5) 479V (6) 463V (7) 543V (8) 503V

			Min. Load 90%Duty/5KHz (6) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) Peak Load Ta:25°C		
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1/Q4 Rated: 36A/1200V	AC ON/OFF I/P: High-Line +3V =603V VDS: O/P: (1)Full Load (2)Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8) Peak Load Ta:25°C	Q1 VDS: (1) 971V (2) 791V (3) 952V (4) 952V (5) 949V (6) 932V (7) 864V (8) 949V	Q4 VDS: (1) 577V (2) 626V (3) 574V (4) 579V (5) 574V (6) 574V (7) 621V (8) 579V
3	P.F.C DIODE	D1 Rated: 1200 V/5A	I/P: High-Line +3V =603 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (5) Peak Load Ta:25°C	(1) 1018V (2) 1038V (3) 1018V (4) 1010V (5) 1002V	
4	Diode Peak Voltage	Q100/Q107/Q110/Q113 Rated: 60V/200A	AC ON/OFF I/P: High-Line +3V =603 V VO=Vomax O/P: (1)Full Load (2)Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD (9) burst Mode (10) Peak Load	Q100: VO=Vomax VDS: (1) 32.1V (2) 31.1V (3) 32.1V (4) 32.1V (5) 32.1V (6) 32.1V (7) 31.1V (8) 31.2V (9) 30.9V (10) 32.0V VO=Vnormal (1) 27.8V	Q107: VO=Vomax VDS: (1) 32V (2) 39.8V (3) 32.0V (4) 32.0V (5) 32.0V (6) 32.0V (7) 31.4V (8) 31.4V (9) 31.7V (10) 32.4V VO=Vnormal (1) 28.5V
				Q110:	Q113:

			<u>VO=Vnormal</u> O/P: (1) Full Load Ta:25°C	<u>VO=Vomax</u> VDS: (1) 32.0V (2) 36.1V (3) 32.3V (4) 32.3V (5) 31.5V (6) 31.5V (7) 31.5V (8) 31.7V (9) 31.7V (10) 33.9V <u>VO=Vnormal</u> (1) 30.9V	<u>VO=Vomax</u> VDS: (1) 31.5V (2) 32.5V (3) 31.5V (4) 31.5V (5) 31.5V (6) 32.5V (7) 31.7V (8) 31.5V (9) 32.0V (10) 31.5V <u>VO=Vnormal</u> (1) 27.1V
5	Input Capacitor Voltage	C5 Rated: 220u/450V	I/P: High-Line +3V =603V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue (5) Peak Load on/off (6) Peak Load continue Ta:25°C	(1) 418V (2) 426V (3) 430V (4) 418V (5) 430V (6) 426V	
6	Control IC Voltage Test	PWM IC U2 Rated: 8.9V~15.5V PFC IC U1 Rated: 11.4V~20V IC U4 Rated : 4.5V~ 20V IC U903 Rated : 3V~ 18V O/P IC U100 Rated : 4.3V ~35V IC U101/U102 Rated : 8V~ 15V IC U104 Rated: 3V ~30V IC U105 Rated : 3.3V~36V IC U103 Rated: 3V~32V	AC ON/OFF I/P: High-Line +3V =603V O/P:(1) Full Load (2) Output Short (3) O.L.P (4) O.V.P. (5) No Load VR min (Low Line) Ta:25°C	U2 (1) 14.4V (2) 14.4V (3) 14.4V (4) 14.4V (5) 14.2V U1/U4 (1) 15.6V (2) 15.8V (3) 16.1V (4) 15.8V (5) 15.6V U903 (1) 16.2V (2) 15.9V (3) 15.9V (4) 15.6V (5) 15.6V	U100/U101/ U102/U104/ U105 (1) 12.3V (2) 12.4V (3) 12.1V (4) 12.3V (5) 11.9V U103 (1) 12.7V (2) 12.9V (3) 12.9V (4) 12.7V (5) 12.6V

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4.87KVAC/min I/P-FG :2.5KVAC/min O/P-FG:0.5KVAC/min O/P-DC OK: 0.5 KVAC/min	I/P-O/P: 5.357KVAC/min I/P-FG: 3 KVAC/min O/P-FG:0.6 KVAC/min O/P-DC OK: 0.6 KVAC/min Ta:25°C	I/P-O/P: 11.07 mA I/P-FG: 12.28 mA O/P-FG: 3.89 mA O/P-DC OK: 0.005 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25°C	I/P-O/P: 50 GΩ I/P-FG: 13115 MΩ O/P-FG: 6115 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100mΩ	40A /2min Ta:25°C	5mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P: 400VAC/50HZ O/P: FULL LOAD Ta:25°C	PASS
2	CONDUCTION	BS EN/EN55032(CISPR32) / BS EN/EN61204-3 / CNS15936 CLASS B	I/P : 400 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032(CISPR32) / BS EN/EN61204-3 / CNS15936 CLASS B	I/P : 400 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 Din rail Model : AIR : 15KV / Contact : 8KV	I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 INDUSTRY INPUT : 4KV	I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	BS EN/EN61000-4-5 INDUSTRY Line-Line : 2KV Line-Earth : 4KV	I/P : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
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 : XTR-960-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 400VAC O/P : FULL LOAD Ta= 28.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 400VAC O/P : FULL LOAD Ta= 58.8 °C																																																																																																																																		
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			NO	Position	ROOM AMBIENT Ta= 28.6°C	HIGH AMBIENT Ta= 58.8°C
			32	U4	63.7°C	99.4°C
			33	J102	71.5°C	105.9°C
			34	Q1	60.5°C	94.4°C
			35	Q4	60.6°C	94.3°C
			36	D2	58.1°C	91.9°C
			37	T2	71.2°C	108°C
			38	LF2	63.5°C	99.5°C
			39	L6	62.4°C	100.7°C
			40	L5	63.2°C	99.9°C
			41	Q3	58.2°C	92.8°C
			42	Q2	60.5°C	94.7°C
			43	LF1	72.6°C	107.2°C
			44	Q106	71.7°C	107.3°C
			45	U1	57.5°C	91.6°C
			46	Q7	54.9°C	88.3°C
			47	Q24	64.4°C	98.8°C
			48	Q11	63.9°C	97.5°C
			49	U10	47.2°C	81.2°C
			50	RY1	59.4°C	93.8°C
51	U104	57.3°C	90.9°C			
52	D901	65.1°C	99.5°C			
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)		I/P : 400 VAC O/P : 112.4% LOAD Ta : 25°C	TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 600VAC/320VAC 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 : 600 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~60°C)		I/P : 400 VAC O/P : FULL LOAD	± 0.015 %/°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:400V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:400V/ 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 C115 IS THE MOST CRITICAL COMPONENT (1) I/P : 400VAC O/P : FULL LOAD Ta= 28.6 °C LIFE TIME (2) I/P : 400VAC O/P : FULL LOAD Ta= 59.1 °C LIFE TIME (3) I/P : 400VAC O/P : 75% LOAD Ta= 59.7 °C LIFE TIME (4) I/P : 400VAC O/P : 50% LOAD Ta= 60.5 °C LIFE TIME	(1) 265623.9 HRS (2) 22836 HRS (3) 65806.3 HRS (4) 121011.4 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 936.0K hrs min. Telcordia SR-332 (Bellcore) ; 117.5K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 400VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	YUWEI	LIUTT	WANGZD

2020.10.1 TAG-QA-009