



Test Report: HVGC-1000-M

1000W Constant Power Mode LED Driver

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

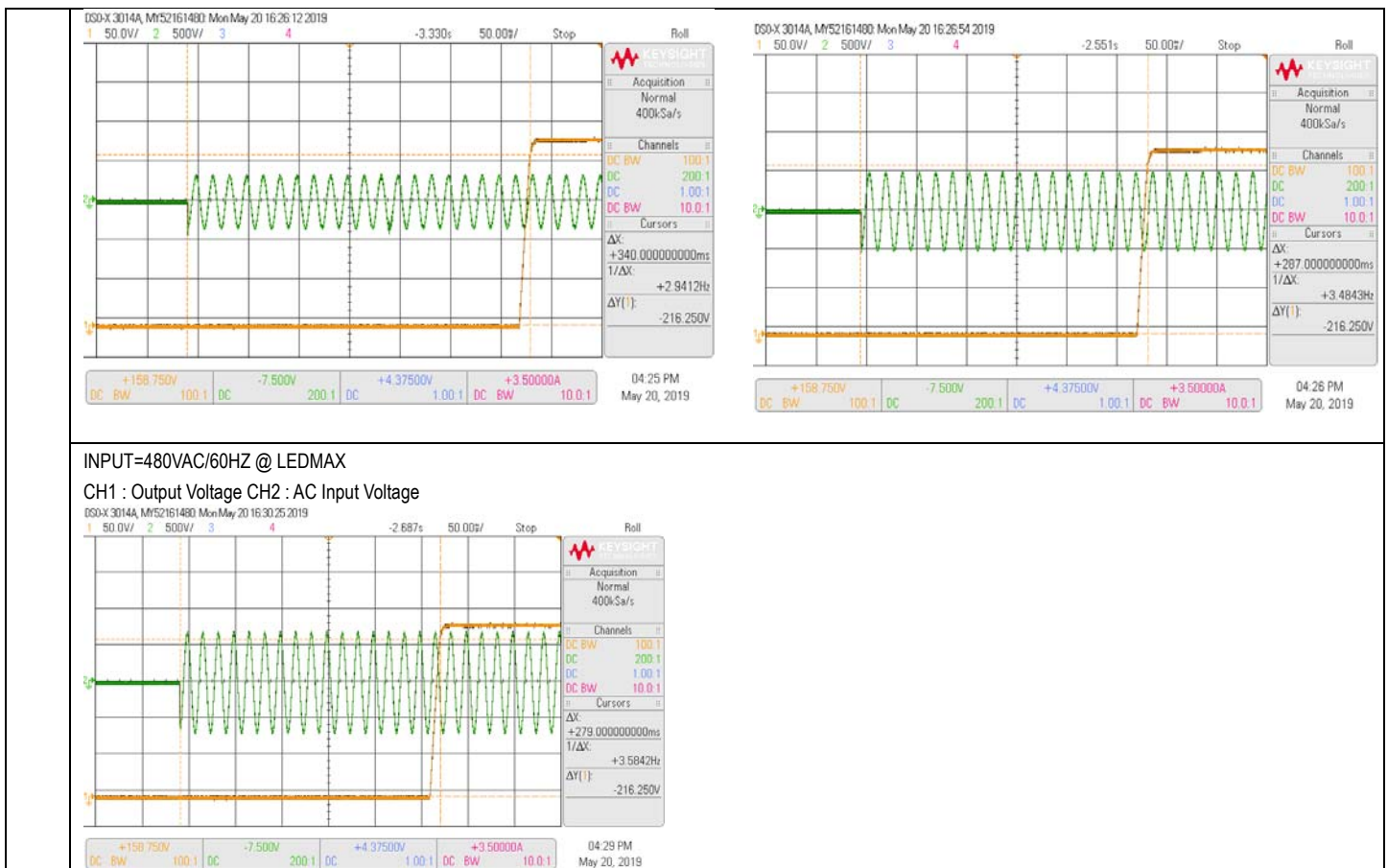
■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST

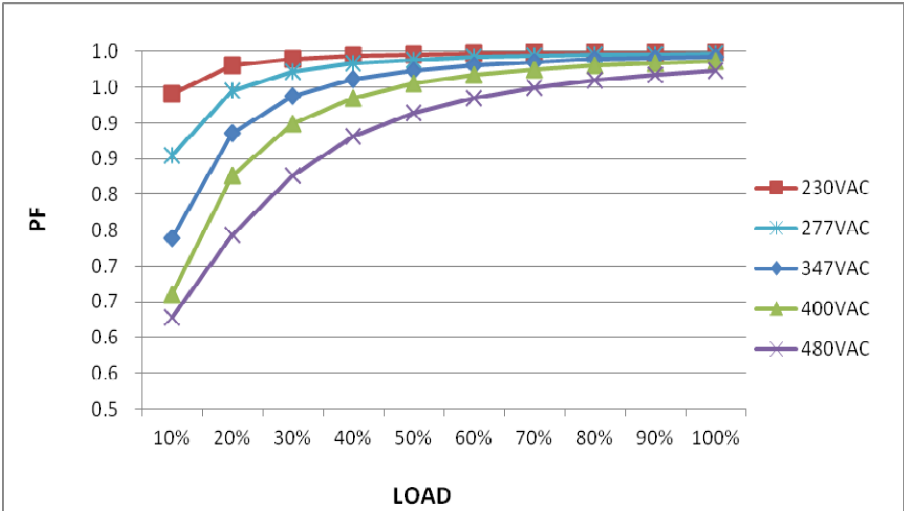
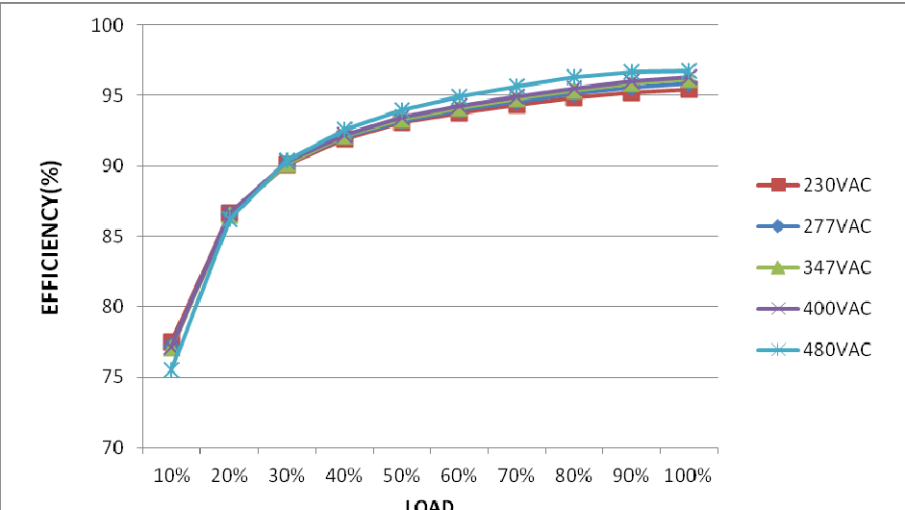
OUTPUT FUNCTION TEST

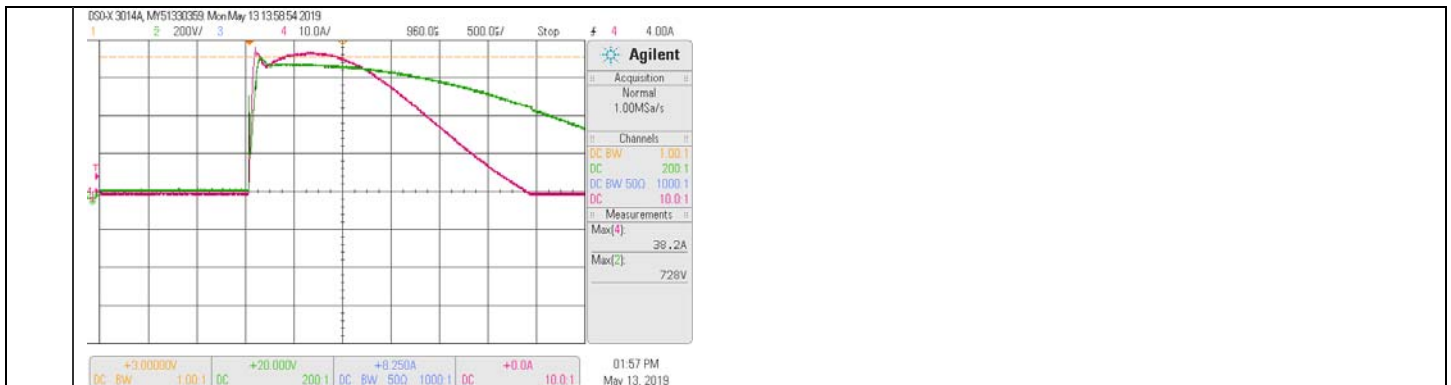
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CURRENT TOLERANCE	±5%	I/P: 347VAC I/P: 480VAC O/P: LEDmax CP: 4.2A & 5.25A Ta: 25°C	CP 4.2A: 4.198A/347VAC@LED MAX-1V 4.205A/347VAC@LED MIN 4.196A/480VAC@LED MAX-1V 4.204A/480VAC@LED MIN 0.119% CP 5.25A: 5.26A/347VAC@LED MAX-1V 5.265A/347VAC@LED MIN 5.259A/480VAC@LED MAX-1V 5.265A/480VAC@LED MIN 0.285%
2	FULL POWER CURRENT RANGE	4200~5250mA	I/P: 347VAC O/P: LEDmax CP: 4.2A & 5.25A Ta: 25°C	247.65V/4.2A/347VAC 196.58V/5.25A/347VAC
3	OPEN CIRCUIT VOLTAGE (max)	250V	I/P: 347VAC O/P: NO LOAD CP: OPEN Ta: 25°C	247.65V
4	CONSTANT CURRENT REGION	CP 4.2A: CH1: 120V~240V CP 5.25A: CH1: 95V~192V	I/P: 347VAC O/P: LEDmax CP: 4.2A & 5.25A Ta: 25°C	CP 4.2A: 0.408V~240V/347VAC CP 5.25A: 0.192V~192V/347VAC
5	CURRENT ADJ. RANGE	CH1: 2100mA~5250mA	I/P: 347VAC I/P: 480VAC O/P: CV MIN & CV MAX-1V CP: 4.2A & 5.25A Ta: 25°C	1.75mA~5.26mA/347VAC@LED MAX-1V 1.75mA~5.26mA/347VAC@LED MIN 1.75mA~5.26mA/480VAC@LED MAX-1V 1.75mA~5.26mA/480VAC@LED MIN
6	CURRENT RIPPLE	3.0% max. @rated current	I/P: 347VAC O/P: 50% LOAD CP: 4.2A & 5.25A Ta: 25°C	CP 4.2A: 1.08% CP 5.25A: 1.15%
7	AUXILIARY POWER	Nominal 12V (Tolerance: ±10%, R&N: 150mVp-p)@500mA for HVGC-1000A only	I/P: 347VAC O/P: LED MIN / LEDMAX CP: 4.2A Ta: 25°C	CP 4.2A: 11.87V/80mV
8	SET UP TIME	230VAC/ 500 ms (Max) 347VAC/ 500 ms (Max) 480VAC/ 500 ms (Max)	I/P: 230VAC I/P: 347VAC I/P: 480VAC O/P: LEDmax CP 4.2A Ta: 25°C	230VAC/340ms 347VAC/ 287ms 480VAC/279ms
INPUT=230VAC/50HZ @ LEDMAX CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=347VAC/60HZ @ LEDMAX CH1 : Output Voltage CH2 : AC Input Voltage		



INPUT FUNCTION TEST

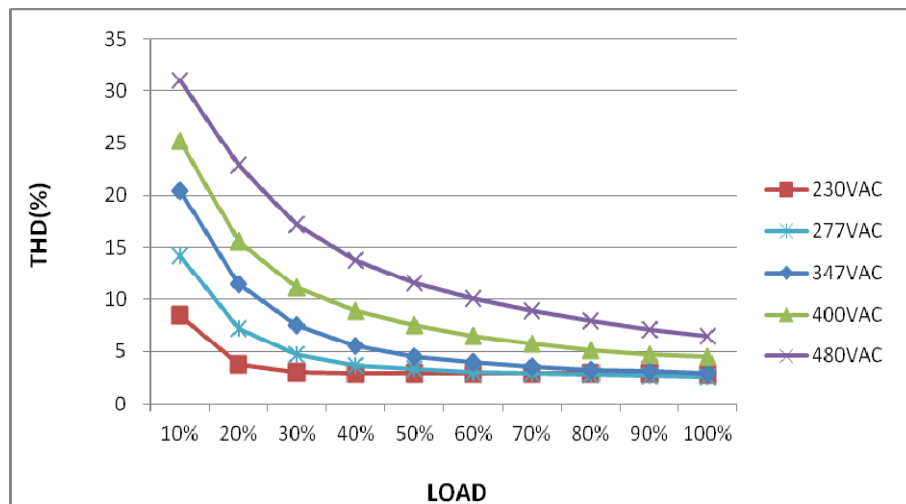
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~528 VAC	I/P:TESTING O/P:LEDmax CP 4.2A Ta:25℃	157V~528 V
			I/P: LOW-LINE-3V=177 V HIGH-LINE+10V=538 V O/P:FULL/MIN LOAD CP 4.2A (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	(1).TEST:OK (2).TEST :OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~528VAC O/P:FULL~MIN LOAD CP 4.2A Ta:25℃	TEST:OK
3	INPUT CURRENT (TYP)	347VAC/ 3.15 A 480VAC/ 2.28A	I/P: 347VAC/480VAC O/P:LEDmax CP 4.2A Ta:25℃	I =3.079A/ 347VAC I =2.21A/480VAC
4	LEAKAGE CURRENT	EN61347-1 < 0.75mA / 480VAC	I/P: 480 VAC O/P:Min LOAD Ta:25℃	L-FG: 0.4mA N-FG: 0.4mA
5	STANDBY POWER CONSUMPTION	Standby power consumption <2W for AB-Type(Dimming	I/P: 347VAC O/P:LEDMAX.	1.06W

		OFF)	CP 4.2A Dimming OFF Ta:25°C	
6	POWER FACTOR(TYP)	0.97/347VAC LEDMAX 0.95/480VAC LEDMAX 0.98/277 VAC LEDMAX 0.98/230 VAC LEDMAX 0.96/400 VAC LEDMAX	I/P: 347VAC/480VAC/277VAC/230VAC/400VAC O/P:LEDmax CP 4.2A Ta:25°C	PF=0.992/347V/100%LOAD PF= 0.973/480V/100%LOAD PF=0.997/277V/100%LOAD PF=0.998/230V/100%LOAD PF=0.989/400V/100%LOAD
P.F vs LOAD 				
7	EFFICIENCY (TYP)	96%	I/P: 347VAC O/P:LEDmax. CP 4.2A Ta:25°C	96.01%
EFFICIENCY vs LOAD 				
8	INRUSH CURRENT (TYP)	480V/ 40A COLD START (twidh=1850 usmeasured at 50% Ipeak) COLD START	I/P: 480VAC O/P:LEDmax CP 4.2A Ta:25°C	I =38.2A /480VAC T50= 1840 uS
INPUT=480VAC/ 60HZ @ LEDMAX CH2 : AC Input Voltage CH1 : Input current				



9	TOTAL HARMONIC DISTORTION	THD< 10% @ 347VAC> 80% loading	I/P : 480VVAC O/P : LEDmax 80% LOAD CP 4.2A Ta : 25°C	THD : 3.27 THD : 2.95	%347V 80% %347V 100%
---	---------------------------	--------------------------------	---	--------------------------	-------------------------

THD vs LOAD



ROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	V1: 250V~270V PROTECTION TYPE : Shut down output voltage, re-power on to recovery	I/P: 528VAC I/P: 347VAC I/P: 180VAC CP 4.2A O/P: MIN LOAD Ta: 25°C	259V / 528VAC 259V / 347VAC 259V / 180VAC PROTECTION TYPE : Shut down output voltage, re-power on to recovery
2	OVER TEMPERATURE PROTECTION	PROTECTION TYPE : Shut down output voltage, re-power on to recovery	I/P: 528 VAC I/P: 180 VAC O/P: LEDmax CP 4.2A Ta: 25°C	O.T.P. Active PROTECTION TYPE : Shut down output voltage, re-power on to recovery

3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed	I/P: 528VAC I/P: 180 VAC O/P: LEDMAX CP: 4.2A & 5.25A Ta:25°C	CP: 4.2A NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed CP: 5.25A NO DAMAGE PROTECTION TYPE : Constant current limiting, recovers automatically after fault condition is removed
---	------------------	---	---	---

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q11 Rated: 18.4A/1200V	I/P:High-Line +3V =531v AC ON/OFF CP: 4.2A&5.25A VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P:Low-Line -3V = 177V O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25°C	Q11 VDS: (1) 908V (2) 804V (3) 900V (4) 804V (5) 868V VDS: (1) 900V (2) 804V (3) 876V (4) 804 V (5) 884V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated: 18.4A/1200V	I/P:High-Line +3V =531V AC ON/OFF CP: 4.2A VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P:Low-Line -3V = 177V O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25°C	CP: 4.2A Q1 VDS: (1) 926V (2) 838V (3) 910V (4) 814V (5) 838V VDS: (1) 967V (2) 951V (3) 902V (4) 854V (5) 814V
3	P.F.C DIODE	D8 Rated: 15A/1200V	I/P:High-Line +3V =531 V AC ON/OFF CP: 4.2A O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P:Low-Line -3V = 177V	CP: 4.2A (1) 894V (2) 806V (3) 870V (4) 806V (5) 822V (1) 926V (2) 862V

			O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta: 25°C	(3) 862 V (4) 822V (5) 814V	
4	Diode Peak Voltage	Q100 Rated: 18A/600V Q101 Rated: 18A/600V Q130 Rated: 18A/600V Q131 Rated: 18A/600V D571 Rated: 1A/200V	I/P:High-Line +3V =531 V VDS: AC ON/OFF CP: 4.2A& 5.25A VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25°C	CP: 4.2A Q100 VDS: (1) 500V (2) 492V (3) 254V (4) 250V (5) 499V (6) 507V Q101 VDS: (1) 499V (2) 487V (3) 242V (4) 246V (5) 499V (6) 495V Q130 VDS: (1) 511V (2) 499V (3) 254V (4) 250V (5) 503V (6) 503V Q131 VDS: (1) 507 V (2) 499V (3) 254V (4) 250V (5) 499V (6) 499V D571 (1) 64.5 V (2) 61.3V (3) 64.5V (4) 61.3V (5) 66.1V	CP:5.25A Q100 VDS: (1) 403V (2) 403V (3) 198V (4) 194V (5) 415V (6) 399V Q101 VDS: (1) 399V (2) 399V (3) 198V (4) 190V (5) 415V (6) 399V Q130 VDS: (1) 407V (2) 403V (3) 202V (4) 198V (5) 419V (6) 403V Q131 VDS:. (1) 403V (2) 399V (3) 194V (4) 194V (5) 419V (6) 403V
5	Input Capacitor Voltage	C5 Rated: : 220 μ /450 V*2	I/P:High-Line +3V =531V CP 4.2A O/P: (1)LEDmax input on/off (2) Min load input on /Off (3)LEDmax /Min load Change (4)LEDmax continue Ta:25°C	CP: 4.2A (1) 894V (2) 830V (3) 838V (4) 806V	
6	Control IC Voltage Test	PFC IC U1 Rated 21V~11.5V(MIN.) PWM IC U2 Rated 16V~ 8.85V(MIN.) AUX IC U500 Rated	I/P:High-Line +3V =531 V AC ON/OFF CP: 4.2A O/P: (1)LEDmax (2) LEDmin (3) Output Short	CP: 4.2A U1 (1) 13.61V (2) 13.69V (3) 13.93V (4) 12.8V	

		9V~35 V(MIN.)	(4) NO LOAD VRmin.LOW LINE Ta:25℃	U2 (1) 14.49V (2) 13.69V (3) 13.77V (4) 12.8V
7	STAND BY POWER PWM Transistor (D to S) or (C to E) Peak Voltage	Q501 Rated 2.5A/1500V	I/P:High-Line +3V =531v AC ON/OFF CP: 4.2A VDS: O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short I/P:Low-Line -3V = 177V O/P: (1)LEDmax (2) LEDmax continue (3) LEDmin (4) LEDmin continue (5) Output Short Ta:25℃	CP: 4.2A Q501 VDS: (1) 1202V (2) 1114V (3) 1170V (4) 1114V (5) 1146V Q501 VDS: (1) 1178V (2) 1114V (3) 1170V (4) 1114V (5) 1178V

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	EN61347-1 I/P-O/P: 3KVAC/min I/P-FG: 2 KVAC/min<4.5mA O/P-FG:1.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8 KVAC/min Ta:25℃	I/P-O/P: 3.52mA I/P-FG: 1.73mA O/P-FG: 3.08mA 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: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25℃	I/P-O/P: 4.1GΩ I/P-FG: 7.89GΩ O/P-FG: 12.9GΩ NO DAMAGE
3	GROUNDING CONTINUITY	EN61347-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	21mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	FCC PART 15	I/P:347VAC (50HZ) O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab
2	RADIATION	FCC PART 15	I/P: 347VAC (50HZ) O/P:LEDmax Ta:25℃	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 347VAC (50HZ) O/P:LEDmax Ta:25℃	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 347VAC (50HZ) O/P:LEDmax Ta:25℃	CRITERIA A

5	SURGE	IEC61000-4-5 light industry L-N :4KV L,N-PE:8KV	I/P: 347VAC (50HZ) O/PLEDmax Ta:25°C	CRITERIA A
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 : HVGC-1000-M 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 347VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 347VAC O/P : FULL LOAD Ta= 50°C		

			NO	Position	ROOM AMBIENT Ta= 25℃	HIGH AMBIENT Ta= 50℃
			1	BD1	71.8℃	93.3℃
			2	ZNR4	65.8℃	87.5℃
			3	LF2	65.8℃	87.8℃
			4	LF1	61.7℃	83.8℃
			5	C2	63.2℃	85.1℃
			6	C6	67.0℃	90.0℃
			7	C935	75.2℃	99.1℃
			8	C11	68.2℃	90.8℃
			9	Q10	77.5℃	101.7℃
			10	Q11	76.2℃	100.0℃
			11	D8	71.9℃	94.6℃
			12	Q1	68.7℃	90.7℃
			13	L3	87.9℃	112.1℃
			14	TSW1	67.0℃	89.4℃
			15	TSW2	69.5℃	93.0℃
			16	L2	75.4℃	98.9℃
			17	C94	71.9℃	94.8℃
			18	T1	79.0℃	103.6℃
			19	T2	82.1℃	107.3℃
			20	C110	59.9℃	82.7℃
			21	Q101	66.0℃	89.3℃
			22	C105	62.0℃	84.9℃
			23	T1 core	73.6℃	97.9℃
			24	T2 core	79.5℃	104.6℃
			25	U1	63.4℃	85.6℃
			26	Q511	64.1℃	86.5℃
			27	C521	67.4℃	90.0℃
			28	Q501	76.6℃	99.3℃
			29	D501	74.4℃	96.8℃
			30	T500	76.2℃	99.1℃
			31	U500	68.9℃	90.9℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 347 VAC O/P : short Ta : 25℃		TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 528VAC/180VAC O/P : 100 % LOAD Ta= -45 ℃		TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P : 538 VAC O/P : FULL LOAD Ta= 50 ℃ HUMIDITY= 95 %R.H		TEST : OK	
5	TEMPERATURE COEFFICIENT	± 0.03 %(0℃~50℃)	I/P : 347 VAC O/P : FULL LOAD		± 0.008 %(0~50℃)	
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature : -50℃~ +125℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 200CYCLE 5. Input/Output condition : STATIC			

7	THERMAL SHOCK TEST	-40~50°C	1. Thermal shock Temperature : -45°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:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test
8	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 : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Tc= 80 °C LIFE TIME (2) I/P : 347VAC O/P : 75% LOAD Tc= 80 °C LIFE TIME (3) I/P : 347VAC O/P : 50% LOAD Tc= 80 °C LIFE TIME	(1) 56417HRS (2) 55974HRS (3) 52962HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 228.3K hrs min. Telcordia SR-332 (Bellcore) ; 68.4K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 50,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT ZENG

2018.4.30 GP-A50-F010