



Test Report: PWM-200-36KN

200W PWM OUTPUT KNX LED DRIVER

■ 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

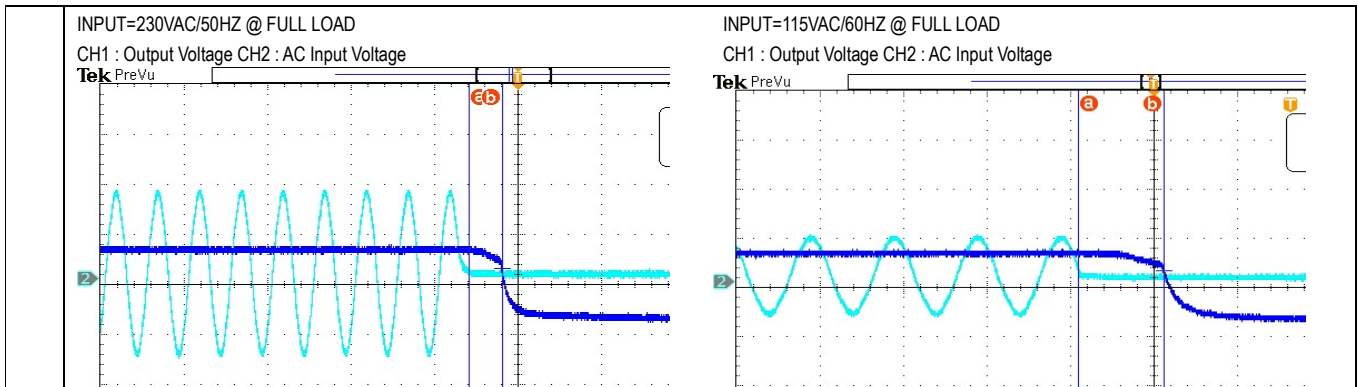
■ RELIABILITY TEST

- ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

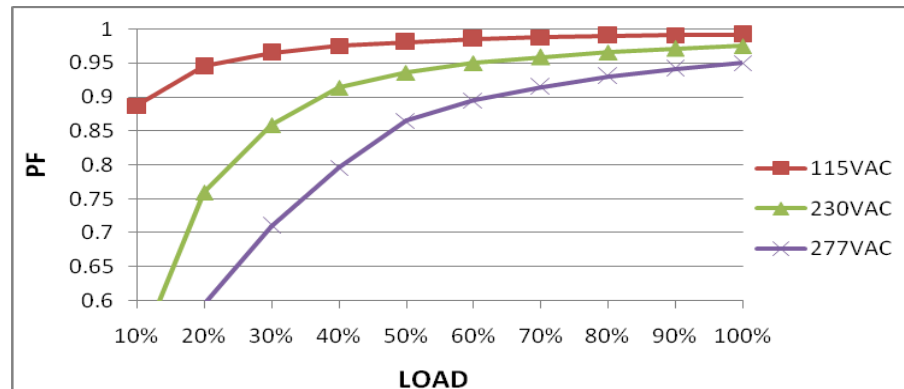
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Dimming Range	0~100%	I/P: 230 VAC O/P: 4KHz O/P: 200Hz Ta:25°C	V1: 1%~100%/3.97KHz V2: 1%~100%/200Hz
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -4% ~ +4% (Max)	I/P: 230VAC O/P:100%load Ta:25°C	V1: 0.03%~ 0.36%
3	OVER/UNDERSHOOT TEST	< +5%	I/P: 230VAC O/P:100% /0% Ta:25°C	3.33%
4	SET UP TIME(Max)	230VAC/ 500ms (Max) 115VAC/1200 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/223ms 115VAC/307ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> </div> </div>				
5	RISE TIME (Max)	230VAC/ 80ms (Max) 115VAC/ 80ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/0.021ms 115VAC/35ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> </div> </div>				
6	HOLD UP TIME (Typ.)	230VAC/10 ms (Typ) 115VAC/ 10ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/15.8ms 115VAC/20.6ms



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~305VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	97VAC ~308VAC
			I/P: LOW-LINE-3V=97VAC HIGH-LINE+10=315VAC 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:110VAC ~305VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	277 VAC/ 0.9A 230 VAC/ 1.1A 115 VAC/2.2A	I/P: 277VAC/230 VAC/115 VAC O/P:FULL LOAD Ta:25°C	I =0.79A/ 277VAC I =0.93A/ 230VAC I =1.89A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 277 VAC	I/P : 277VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.034mA N-FG : 0.032mA
5	STANDBY POWER CONSUMPTION	<0.5W	I/P : 230VAC Ta : 25°C	0.4219W
6	POWER FACTOR (Typ.)	0.94/ 277 VAC/FULL LOAD	I/P: 277 VAC/230VAC/115VAC O/P:FULL LOAD Ta:25°C	PF=0.950/277VAC
		0.96/ 230 VAC/FULL LOAD		PF= 0.975/230VAC
		0.97/ 115 VAC/FULL LOAD		PF= 0.992/115VAC

P.F vs LOAD



7	EFFICIENCY(Typ.)	94%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.49%																																												
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>115VAC (%)</th> <th>230VAC (%)</th> <th>277VAC (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>82</td><td>85</td><td>85</td></tr> <tr><td>20%</td><td>88</td><td>90</td><td>90</td></tr> <tr><td>30%</td><td>91</td><td>92</td><td>92</td></tr> <tr><td>40%</td><td>92</td><td>93</td><td>93</td></tr> <tr><td>50%</td><td>92.5</td><td>93.5</td><td>93.5</td></tr> <tr><td>60%</td><td>93</td><td>94</td><td>94</td></tr> <tr><td>70%</td><td>93</td><td>94</td><td>94</td></tr> <tr><td>80%</td><td>93</td><td>94</td><td>94</td></tr> <tr><td>90%</td><td>92.5</td><td>94</td><td>94</td></tr> <tr><td>100%</td><td>92</td><td>94</td><td>94</td></tr> </tbody> </table>					LOAD (%)	115VAC (%)	230VAC (%)	277VAC (%)	10%	82	85	85	20%	88	90	90	30%	91	92	92	40%	92	93	93	50%	92.5	93.5	93.5	60%	93	94	94	70%	93	94	94	80%	93	94	94	90%	92.5	94	94	100%	92	94	94
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8	INRUSH CURRENT(Typ.)	230V/ 65A (twidth=550 us measured at 50% Ipeak) COLD START	I/P : 230 VAC/50Hz O/P : FULL LOAD Ta : 25°C	I =57.8A/ 230VAC T50=424us/230V																																												
<p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current Tek PreVu</p>																																																
9	TOTAL HARMONIC DISTORTION	THD<20%@load,≥ 60% at 230VAC/115VAC, load,≥ 75% at 277VAC	I/P : 277VAC /230VAC/115VAC O/P : 75% LOAD/60% LOAD	THD : 16.92%/ 60% Load/230VAC THD : 14.74%/ 60% Load/115VAC THD : 16.23%/ 75% Load/277VAC																																												
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	108%~ 135%	I/P: 305VAC I/P: 230 VAC I/P: 110 VAC O/P:TESTING Ta:25°C	125.1%/305VAC 125.4%/ 230VAC 125.6%/ 100VAC PROTECTION TYPE: Hiccup mode or Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	41V~49V	I/P: 305 VAC I/P: 230 VAC I/P: 110 VAC O/P:MIN LOAD Ta:25°C	43.46V/305VAC 43.67V/ 230VAC 43.92V/ 110VAC PROTECTION TYPE: Shut down o/p voltage, re-power on to recover after fault condition is removed
3	OVER TEMPERATURE PROTECTION	Protection type : NO DAMAGE	I/P: 305VAC I/P: 230VAC I/P: 110VAC O/P:FULL LOAD	O.T.P.Active Protection type : Shut down o/p voltage, re-power on to recover after fault condition is removed
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 230VAC I/P: 110VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	PWM Power Transistor (D to S) or (C to E) Peak Voltage	Q73 Rated 11A/600V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load I/P: Low-Line -3V = 107VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	107V VDS: (1) 486V (2) 498V (3) 470V (4) 466V (5) 530V (6) 534V	308V VDS: (1) 482V (2) 538V (3) 458V (4) 474V (5) 538V (6) 550 V



200W PWM OUTPUT KNX LED DRIVER

PWM-200KNseries

2	LED DIMMING Transistor (D to S) or (C to E) Peak Voltage	Q200 Rated 110A/60V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	VDS: (1) 24V (2) 38.4V (3) 1.6V (4) 24.8V (5) 21.2V (6) 39.2V		
3	Diode Peak Voltage	Q100 Rated 100V/46A Q101 Rated 100V/46A	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)No Load Ta:25°C	Q100: VDS: (1) 84.4V (2) 9.2V (3) 81.2V (4) 86V (5) 11.6V (6) 81.2V Q101: VDS: (1) 86.8V (2) 74.8V (3) 82V (4) 84.4V (5) 16.4V (6) 80.4V		
4	Input Capacitor Voltage	C5 Rated: 100uF / 450 V	AC ON/OFF I/P: High-Line +3V =308VAC O/P: (1)Full Load input (CRH Mode) (2) Full load continue(CRH Mode) (3) Dimming off (4) OLP (100%-OLP) Ta:25°C	(1) 446V (2) 442V (3) 446V (4) 443V		
5	Control IC Voltage Test	PWM IC U2 Rated -0.3V~20V PFC IC U1 Rated -0.3V~35V AUX IC U500 Rated -0.3V~725V	AC ON/OFF I/P: High-Line +3V =308VAC O/P:(1) Full Load input (CRH Mode) (2) Output Short (3) O.L.P (4) O.V.P (5) NO LOAD VR.LOW LINE (6) Dim off(continue) Ta:25°C	U 2 (1) 17.3V (2) 17.5V (3) 17.1V (4) 1.2V (5) 17.6V (6) 0.6V	U1 (1) 17.7V (2) 17.9V (3) 17.9V (4) 18.1V (5) 18.3V (6) 0.3V	U500 (1) 562V (2) 551V (3) 553V (4) 542V (5) 547V (6) 545V
6	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated 26A/600V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load	308VAC VDS: (1) 524V (2) 532V (3) 516V (4) 520V (5) 536V (6) 536V		107VAC VDS: (1) 526V (2) 512V (3) 516V (4) 508V (5) 504V (6) 516V



			I/P: Low-Line -3V = 107VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C		
7	VCC Diode Peak Voltage	D501Rated: 2A/400V D 601Rated: 2A/400V	AC ON/OFF I/P: High-Line +3V = 308VAC O/P: (1)Full Load input (CRH Mode) (2)Output Short (3)Full load continue(CRH Mode) (4) Dimming off (5)OLP (6)0-400%Load Ta:25°C	(1) 109.5V (2) 111.2V (3) 108.5V (4) 106.4V (5) 108.7V (6) 108.3V	(1) 138.3V (2) 140.5V (3) 136.9V (4) 138.6V (5) 136.3V (6) 137.2V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min EN 60950-1	I/P-O/P: 4.125KVAC/min Ta:25°C	I/P-O/P: 2.246mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25°C	I/P-O/P: 9999MΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV	I/P : 230 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 : PWM-200-36B 1. ROOM AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 29.2°C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 55.8°C																																																																																																																		
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25	LF100	51.8°C	77.9°C																																																																																																																	
26	Q200	55.3°C	81.9°C																																																																																																																	
27	TC	59.2°C	85.8°C																																																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 123.9 % LOAD Ta : 25°C	TEST : OK																																																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/110VAC O/P : 100 % LOAD Ta=-45/35 °C	TEST : OK																																																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45°C /95 %R.H NO DAMAGE	I/P : 305VAC O/P : FULL LOAD Ta= 45°C HUMIDITY= 95 %R.H	TEST : OK																																																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.0042 %/°C(0~50°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	-40~45°C	1. Thermal shock Temperature : -45°C~ +50°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 C106 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=45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=45 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=45 °C LIFE TIME	(1) 435160HRS (2) 110308HRS (3) 143096HRS (4) 230512HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 553.6K hrs min. Telcordia SR-332 (Bellcore) ; 170K 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	WUWQ/HUANGMK	WENF	LINKX

2018.4.30 GP-A50-F010