



# Test Report: APV-8E-12

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8W Single Output Switching Power Supply

## ■ 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

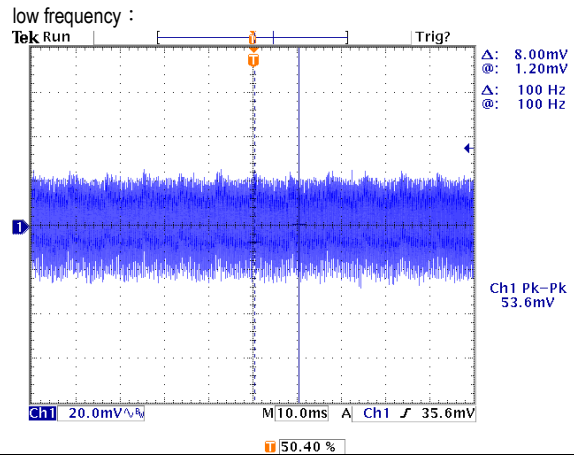
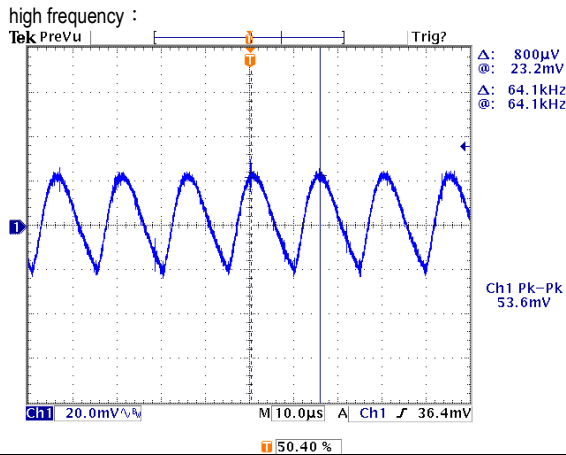
## ■ RELIABILITY TEST

Environment Test

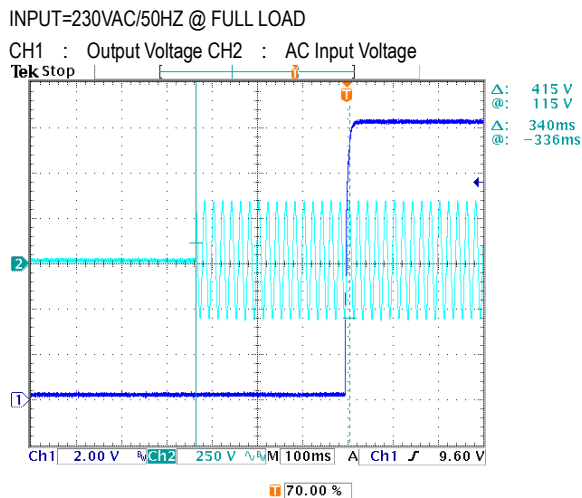
## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~5%	I/P: 180VAC /264VAC O/P: FULL/ NO LOAD Ta: 25°C	V1: -0.66%~0.75%
2	LINE REGULATION (Max)	V1: -1%~1%	I/P: 190VAC~264VAC O/P: FULL LOAD Ta: 25°C	V1: -0.08%~0%
3	LOAD REGULATION(Max)	V1: -2%~2%	I/P: 230VAC O/P: FULL ~NO LOAD Ta: 25°C	V1: -0.08%~0%
4	OVER/UNDERSHOOT TEST	< ± 5%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<5%
5	RIPPLE & NOISE(Max)	V1: 150 mVp-p	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	V1: 53.6mVp-p



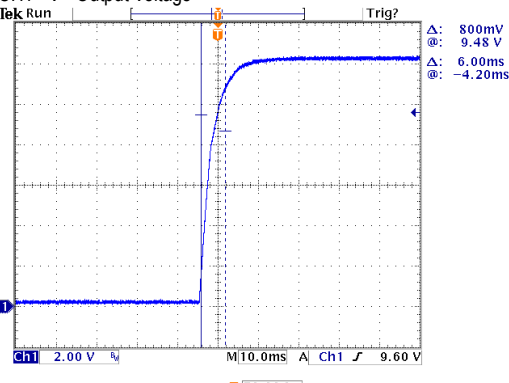
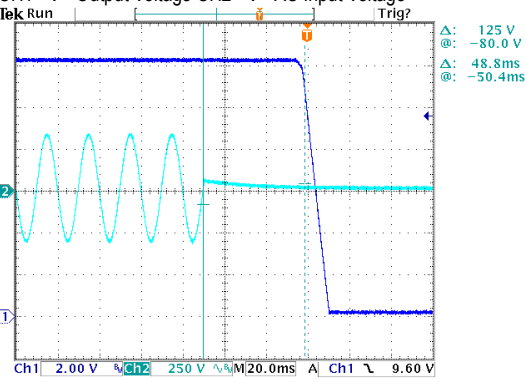
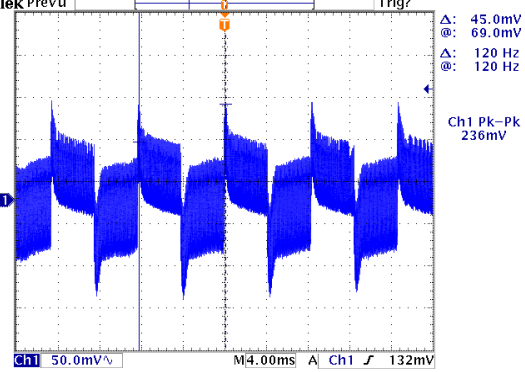
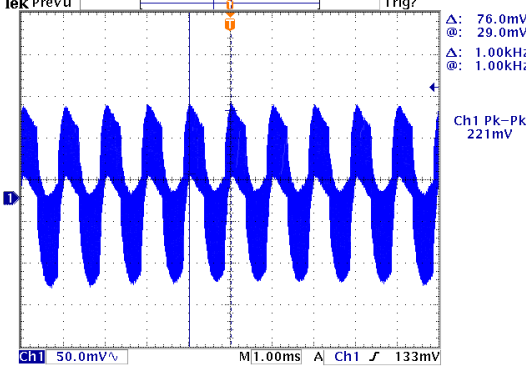
6	SET UP TIME(Max)	230VAC/ 500ms	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 340ms
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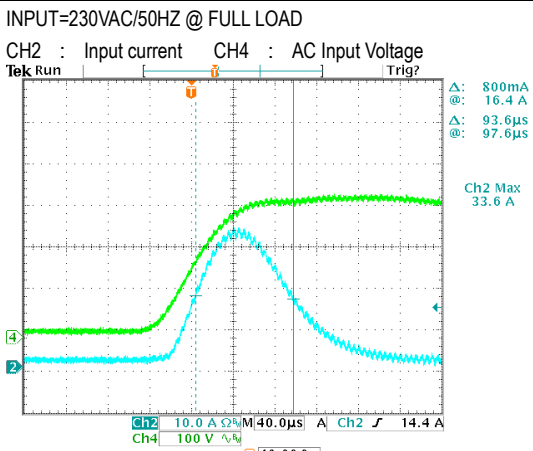


# 8W Single Output Switching Power Supply

# APV-8E series

7	RISE TIME (Max)	230VAC/ 30ms	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6.0ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>  <p>Δ: 800mV @: 9.48 V Δ: 6.00ms @: -4.20ms</p> <p>Ch1 2.00 V M 10.0ms A Ch1 9.60 V</p> <p>50.00 %</p>				
8	HOLD UP TIME(Typ)	230VAC/ 20ms	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 48.8ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 125 V @: -80.0 V Δ: 48.8ms @: -50.4ms</p> <p>Ch1 2.00 V Ch2 250 V M 20.0ms A Ch1 9.60 V</p> <p>70.00 %</p>				
9	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 236mVp-p (2) 221mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>FULL /50% LOAD 50%DUTY / 120HZ</p>  <p>Δ: 45.0mV @: 69.0mV Δ: 120 Hz @: 120 Hz</p> <p>Ch1 Pk-Pk 236mV</p> <p>Ch1 50.0mV M 4.00ms A Ch1 132mV</p> <p>50.20 %</p> </div> <div style="width: 45%;"> <p>FULL /50% LOAD 50%DUTY / 1KHZ</p>  <p>Δ: 76.0mV @: 29.0mV Δ: 1.00kHz @: 1.00kHz</p> <p>Ch1 Pk-Pk 221mV</p> <p>Ch1 50.0mV M 1.00ms A Ch1 133mV</p> <p>50.20 %</p> </div> </div>				

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~264VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	177V~267V
			I/P: (1)LOW-LINE-3V=177 V HIGH-LINE+15%=300 V O/P: FULL/NO LOAD ON: 30 Sec OFF: 30 Sec 10Min (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20Min (3)230Vac ON: 3Sec OFF: 3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 180 VAC ~264 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ)	230V/ 0.15A	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I =0.10A/ 230VAC
4	LEAKAGE CURRENT	< 0.25mA / 240 VAC	I/P: 240 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.0027 mA N-FG: 0.0028 mA
5	INRUSH CURRENT(Typ)	230V/ 70A Twidth =120 us measured at 50% Ipeak COLD START	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I = 33.6 A/ 230VAC Twidth =93.6 us
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current CH4 : AC Input Voltage</p>  <p>             Tek Run Trig?               Δ: 800mA @: 16.4 A               Δ: 93.6μs @: 97.6μs               Ch2 Max 33.6 A               Ch1 10.0 A Ω 40.0μs A Ch2 14.4 A               Ch4 100 V V/μs 40.00%           </p>				
6	NO LOAD POWER CONSUMPTION	< 0.5W	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.075W
7	EFFICIENCY(Typ)	77.5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	78.26%
8	POWER FACTOR	>0.5/ 230VAC	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	PF= 0.5481 / 230VAC

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	Above 105%	I/P: 230VAC O/P: TESTING Ta: 25°C	154.32%/ 230VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 13.8 V~ 16 V	I/P: 230VAC O/P: NO LOAD Ta: 25°C	15.08V/ 230VAC Shut off o/p voltage, clamping by zener diode
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed

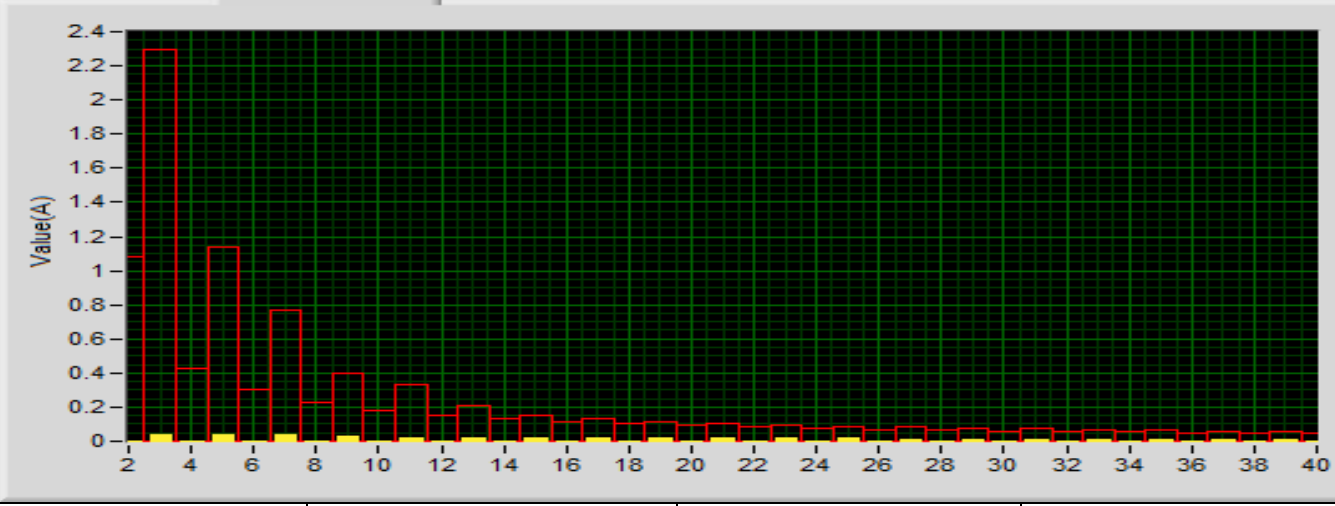
**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	U1 Rated 650V/2.5A	I/P: High-Line +3V =267V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 590V (2) 518V (3) 500V
2	Diode <b>Peak Voltage</b>	D100 Rated 100V/3A	I/P: High-Line +3V =267V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 91.6V (2) 79.6V (3) 76.4V
3	<b>Input Capacitor Voltage</b>	C5 Rated 10u/ 400V	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta: 25°C	(1) 392V (2) 346V (3) 392V
4	<b>Control IC Voltage Test</b>	U1 Rated 28V	I/P: High-Line +3V =267 V O/P: (1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta: 25°C	(1) 21.8V (2) 18.6V (3) 21.8V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75 KVAC/min	I/P-O/P: 4.2 KVAC/min Ta: 25°C	I/P-O/P: 1.388mA 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 A	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
				
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ) O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	RADIATION	EN55015	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	EN61000-4-5 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			

■ **RELIABILITY TEST**

**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL: APV-8E-12 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 26.1 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 46.7 °C  <table border="1" data-bbox="507 667 1380 1048"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.1 °C</th> <th>HIGH AMBIENT Ta=46.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>49.1°C</td><td>66.9°C</td></tr> <tr><td>2</td><td>U1</td><td>86.3°C</td><td>100.5°C</td></tr> <tr><td>3</td><td>C5</td><td>70.5°C</td><td>86.3°C</td></tr> <tr><td>4</td><td>C9</td><td>73.8°C</td><td>89.2°C</td></tr> <tr><td>5</td><td>D1</td><td>79.6°C</td><td>95.1°C</td></tr> <tr><td>6</td><td>T1</td><td>80.9°C</td><td>97.3°C</td></tr> <tr><td>7</td><td>C103</td><td>71.8°C</td><td>88.6°C</td></tr> <tr><td>8</td><td>C104</td><td>57.9°C</td><td>75.4°C</td></tr> <tr><td>9</td><td>D100</td><td>76.4°C</td><td>92.8°C</td></tr> <tr><td>10</td><td>TC</td><td>65.1°C</td><td>81.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.1 °C	HIGH AMBIENT Ta=46.7 °C	1	L1	49.1°C	66.9°C	2	U1	86.3°C	100.5°C	3	C5	70.5°C	86.3°C	4	C9	73.8°C	89.2°C	5	D1	79.6°C	95.1°C	6	T1	80.9°C	97.3°C	7	C103	71.8°C	88.6°C	8	C104	57.9°C	75.4°C	9	D100	76.4°C	92.8°C	10	TC	65.1°C	81.9°C		
NO	Position	ROOM AMBIENT Ta= 26.1 °C	HIGH AMBIENT Ta=46.7 °C																																													
1	L1	49.1°C	66.9°C																																													
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5	D1	79.6°C	95.1°C																																													
6	T1	80.9°C	97.3°C																																													
7	C103	71.8°C	88.6°C																																													
8	C104	57.9°C	75.4°C																																													
9	D100	76.4°C	92.8°C																																													
10	TC	65.1°C	81.9°C																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( Min )	I/P: 230 VAC O/P: 110 %LOAD Ta: 25°C	TEST: OK																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 264VAC/190VAC 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 45°C NO DAMAGE	I/P: 272 VAC O/P: FULL LOAD Ta= 45°C HUMIDITY= 95 %R.H	TEST: OK																																												
5	TEMPERATURE COEFFICIENT	±0.03 %/°C (0~45°C)	I/P: 230 VAC O/P: FULL LOAD	±0.017 %/°C (0~45°C)																																												
6	STORAGE TEMPERATURE TEST	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: 5 CYCLE 5. Input/Output condition: STATIC		TEST: OK																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature: -35°C ~ +50°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: 230VAC/Full Load AC ON/OFF TEST turn on 58 sec; turn off 2 sec		TEST: OK																																												



# 8W Single Output Switching Power Supply

# APV-8E series

8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10 Min/sweep cycle (4) Acceleration: 2G (5) Test Time: 60 Min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
9	CAPACITOR LIFE CYCLE	APV-8E-12: SUPPOSE C103 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) 86477 HRS (2) 28157 HRS (3) 46367 HRS (4) 99312 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 9174.1K hrs min. Telcordia SR-332 (Bellcore) ; 1431.3K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 20,000 hours @ Tc 75°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY