GWS500

RELIABLITY DATA

DWG. No. PA590-57-01		
APPD	CHK	DWG
Jeff 1/8/11		GARY

TDK-Lambda

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※ Test results are typical data. Nevertheless the following results are considered to be actual capability data because all units have nearly the same characteristics.

1. Calculated values for MTBF

MODEL : GWS500-12

1. Calculating Method

Calculated based on part count reliability projection of JEITA (RCR-9102B).
Individual failure rates l_G is given to each part and MTBF is calculated by the count of each part.

Formula :

$$MTBF = \frac{1}{\lambda equip} = \frac{1}{\sum_{i=1}^{n} Ni(\lambda_G \pi_Q)_i} \times 10^6 \text{ (HOURS)}$$

where :

$\lambda equip$	=	Total Equipment Failure Rate (Failure / 106 Hours)
λ_G	=	Generic Failure Rate For The ith Generic Part (Failure / 106 Hours)
Ni	=	Quantity of ith Generic Part
n	=	Number of Different Generic Part Categories
π_Q	=	Generic Quality Factor for the ith Generic Part (π_Q = 1)

2. MTBF Values

G_F : (GROUND, FIXED)

MTBF = 120,773 (Hours)
However MTBF Calculation for Fan isn't included

2. Component derating

MODEL : GWS500-12

(1) Calculating method

(a) Measuring Conditions

Input	:	115 , 230VAC	• Ambient temperature	:	50°C
Output	:	12V 42A(100%)	• Mounting method	:	Mounting A

(b) Semiconductors

Compared with maximum junction temperature and actual one which is calculated based on case temperature, power dissipation and thermal impedance.

(c) IC, Resistors, Capacitors, etc.

Ambient temperature, operating condition, power dissipation and so on are within derating criteria.

(d) Calculating Method of Thermal Impedance

$$\theta_{j-c} = \frac{T_{j(max)} - T_c}{P_{c(max)}} \qquad \theta_{j-a} = \frac{T_{j(max)} - T_a}{P_{c(max)}} \qquad \theta_{j-l} = \frac{T_{j(max)} - T_l}{P_{c(max)}}$$

T_c **:** Case temperature at start point of derating ; 25°C in general

T_a **:** Ambient temperature at start point of derating ; 25°C in general

T_j **:** Lead temperature at start point of derating ; 25°C in general

$P_{c(max)}$ ($P_{ch(max)}$) **:** Maximum collector(channel) dissipation

$T_{j(max)}$ ($T_{ch(max)}$) **:** Maximum junction(channel) temperature

(θ_{j-c}) (θ_{ch-c}) **:**Thermal impedance between junction(channel) and case

θ_{j-a} **:**Thermal impedance between junction and air

θ_{j-l} **:**Thermal impedance between junction and lead

(2) Component Derating List

MODEL : GWS500

Location No.	Vin = 115VAC Load = 100% Ta = 50°C
Q1 IPW60R190C6 INFINEON	Tjmax = 150°C, θ j-c = 0.83°C/W Pch(max) = 151W Pd = 2.9W, Δ Tc = 36.4°C Tc = 86.4°C Tj = Tc + ((θ j-c) × Pd) = 88.81 °C D.F. = 59.2%
Q2 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 0.83°C/W Pch(max) = 151W Pd = 2.9W, Δ Tc = 31.3°C, Tc = 81.3°C Tj = Tc + ((θ j-c) × Pd) = 93.44°C D.F. = 55.8%
Q4 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 1.2°C/W Pch(max) = 104W Pd = 2.5W, Δ Tc = 39.4°C, Tc = 89.4°C Tj = Tc + ((θ j-c) × Pd) = 92.40 °C D.F. = 61.60%
Q5 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 1.2°C/W Pch(max) = 104W Pd = 2.7W, Δ Tc = 40.2°C, Tc = 60.2°C Tj = Tc + ((θ j-c) × Pd) = 93.44°C D.F. = 62.29%
Q6 2SC2873-Y(TE12L,CF) TOSHIBA	Tjmax = 150°C, θj-c = 250°C/W, Pd(max) = 0.5W Pd = 0.054W, Δ Tc = 15.2°C, Tc = 65.2°C Tj = Tc + ((θ j-c) × Pd) = 79.80°C D.F. = 52.47%
Q7 2SA1213-Y(TE12L,CF) TOSHIBA	Tjmax = 150°C, θj-c = 250°C/W, Pd(max) = 0.5W Pd = 0.08W, Δ Tc = 9.8°C Tc = 59.8°C Tj = Tc + ((θ j-c) × Pd) = 73.32°C D.F. = 53.20%
Q10 IPP040N06N3G INFINEON	Tjmax = 175°C, θj-c = 0.8°C/W, Pd(max) = 188W Pd = 1.38W, Δ Tc = 31.8°C, Tc = 81.8°C Tj = Tc + ((θ j-c) × Pd) = 82.90°C D.F. = 47.37%
Q11 IPP040N06N3G INFINEON	Tjmax = 175°C, θ j-c = 0.8°C/W Pd(max) = 188W Pd = 2.53W, Δ Tc = 21.3°C Tc = 71.3°C Tj = Tc + ((θ j-c) × Pd) = 73.32°C D.F. = 41.90%
Q401 2SC2983 TOSHIBA	Tjmax = 150°C, θ j-c = 8.33°C/W Pd(max) = 15W Pd = 1.65W, Δ Tc = 45.9°C Tc = 95.9°C Tj = Tc + ((θ j-c) × Pd) = 109.64°C D.F. = 73.10%
Q402 2SA1162 TOSHIBA	Tjmax = 125°C, θ j-c = 667°C/W Pd(max) = 0.15W Pd = 0W, Δ Tc = 41.9°C Tc = 91.9°C Tj = Tc + ((θ j-c) × Pd) = 91.90°C D.F. = 73.52%
D1 D25XB60-7000 SHINDENGEN	Tjmax = 150°C, θ j-c = 1°C/W Pd = 9.29W, Δ Tc = 39.8°C Tc = 89.8°C Tj = Tc + ((θ j-c) × Pd) = 99.09°C D.F. = 66.06%

(2) Component Derating List

MODEL : GWS500

Location No.	Vin = 115VAC Load = 100% Ta = 50°C	
D2 IDV05S60C INFINEON	Tjmax = 175°C, θ j-c = 5°C/W Pd = 3.208W, Δ Tc = 36.5°C Tj = Tc + ((θ j-c) × Pd) = 102.54°C D.F. = 58.59%	Tc = 86.5°C
D303 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, θ j-l = 20°C/W, Pd = 0.03W, Δ Tl = 15.5°C, Tj = Tl + ((θ j-l) × Pd) = 66.10°C D.F. = 44.07%	Tl = 65.5°C
D307 CRH01(TE85L,Q) TOSHIBA	Tjmax = 150°C, θ j-a = 65°C/W Pd = 0.11W, Δ Ta = 29.8°C Tj = Ta + ((θ j-a) × Pd) = 86.95°C D.F. = 57.97%	Ta = 79.8°C
PC1 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, θ j-c = 330°C/W Pd = 0.0W, Δ Tc = 29.2°C, Tj = Tc + ((θ j-c) × Pd) = 79.20°C D.F. = 63.36%	Pd(max) = 0.12W Tc = 79.2°C
PC2 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, θ j-c = 330°C/W Pd = 0.014 W, Δ Tc = 32.9°C Tj = Tc + ((θ j-c) × Pd) = 87.52°C D.F. = 70.02%	Pd(max) = 0.12W Tc = 82.9°C
PC3 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, θ j-c = 330°C/W Pd = 0.001W, Δ Tc = 33.2°C Tj = Tc + ((θ j-c) × Pd) = 83.53°C D.F. = 66.82%	Pd(max) = 0.12W Tc = 83.2°C
A1 ICE2PCS03G INFINEON	Tjmax = 150°C, θj-a = 90°C/W, Pd = 0.24W, ΔTc = 30.1°C, Tj = Tc + ((θ j-c) × Pd) = 101.70°C D.F. = 67.80%	Tc = 80.1°C
A3 TEA1791AT/N1,118 NXP	Tjmax = 150°C, θ j-c = 95°C/W, Pd = 0.15W, Δ Tc = 31.2°C, Tj = Tc + ((θ j-c) × Pd) = 95.45°C D.F. = 63.63%	Pc(max) = 0.45W Tc = 81.2°C
A101 L6599ADTR STMICRO	Tjmax = 150°C, θ j-c = 120°C/W, Pd = 0.09W, Δ Tc = 34.9°C, Tj = Tc + ((θ j-c) × Pd) = 95.70°C D.F. = 63.80%	Pc(max) = 0.83W Tc = 84.9°C
A301 ICE3B0565JG INFINEON	Tjmax = 150°C, θ j-c = 24°C/W Pd = 0.436W, Δ Tc = 36.4°C Tj = Tc + ((θ j-c) × Pd) = 96.86 °C D.F. = 64.58%	Tc = 86.4°C
A303 BD5240G-TR ROHM	Tjmax = 150°C, θ j-c = 10°C/W, Pd = 0.00814W, Δ Tc = 15.3°C, Tj = Tc + ((θ j-c) × Pd) = 65.38°C D.F. = 43.59%	Pd(max) = 1.2W Tc = 65.3°C

(2) Component Derating List

MODEL : GWS500

Location No.	Vin = 230VAC Load = 100% Ta = 50°C
Q1 IPW60R190C6 INFINEON	Tjmax = 150°C, θ j-c = 0.83°C/W Pch(max) = 151W Pd = 1.61W, Δ Tc = 20.8°C Tc = 70.8°C Tj = Tc + ((θ j-c) × Pd) = 72.14 °C D.F. = 48.09%
Q2 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 0.83°C/W Pch(max) = 151W Pd = 1.61W, Δ Tc = 18.1°C, Tc = 68.1°C Tj = Tc + ((θ j-c) × Pd) = 91.10 °C D.F. = 46.29%
Q4 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 1.2°C/W Pch(max) = 104W Pd = 2.5W, Δ Tc = 38.1°C, Tc = 88.1°C Tj = Tc + ((θ j-c) × Pd) = 91.10 °C D.F. = 60.73%
Q5 IPP60R280C6 INFINEON	Tjmax = 150°C, θ j-c = 1.2°C/W Pch(max) = 104W Pd = 2.7W, Δ Tc = 39.1°C, Tc = 89.1°C Tj = Tc + ((θ j-c) × Pd) = 92.34°C D.F. = 61.56%
Q6 2SC2873-Y(TE12L,CF) TOSHIBA	Tjmax = 150°C, θ j-a = 250°C/W Pc(max) = 0.5W Pd = 0.0563W, Δ Ta = 13.3°C Ta = 63.3°C Tj = Ta + ((θ j-a) × Pd) = 77.38°C D.F. = 51.58%
Q7 2SA1213-Y(TE12L,CF) TOSHIBA	Tjmax = 150°C, θ j-a = 250°C/W Pc(max) = 0.5W Pd = 0.075W, Δ Ta = 7.6°C Ta = 57.6°C Tj = Ta + ((θ j-a) × Pd) = 76.35°C D.F. = 50.90%
Q10 IPP040N06N3G INFINEON	Tjmax = 175°C, θj-c = 0.8°C/W, Pd(max) = 188W Pd = 1.07W, Δ Tc = 30.7°C, Tc = 80.7°C Tj = Tc + ((θ j-c) × Pd) = 81.56°C D.F. = 46.60%
Q11 IPP040N06N3G INFINEON	Tjmax = 175°C, θ j-c = 0.8°C/W Pd(max) = 188W Pd = 2.51W, Δ Tc = 20.5°C Tc = 70.5°C Tj = Tc + ((θ j-c) × Pd) = 72.51°C D.F. = 41.43%
Q401 2SC2983 TOSHIBA	Tjmax = 150°C, θ j-c = 8.33°C/W Pd(max) = 15W Pd = 1.605W, Δ Tc = 45.1°C Tc = 95.1°C Tj = Tc + ((θ j-c) × Pd) = 108.47°C D.F. = 72.31%
Q402 2SA1162 TOSHIBA	Tjmax = 125°C, θ j-c = 667°C/W Pd(max) = 0.15W Pd = 0W, Δ Tc = 40.7°C Tc = 90.7°C Tj = Tc + ((θ j-c) × Pd) = 90.70°C D.F. = 72.56%
D1 D25XB60-7000 SHINDENGEN	Tjmax = 150°C, θ j-c = 1°C/W Pd = 4.64W, Δ Tc = 20°C Tc = 70°C Tj = Tc + ((θ j-c) × Pd) = 74.64°C D.F. = 49.76%

(2) Component Derating List

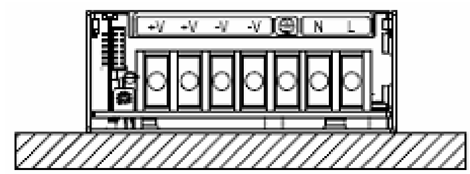
MODEL : GWS500

Location No.	Vin = 230VAC Load = 100% Ta = 50°C		
D2 IDV05S60C INFINEON	Tjmax = 175°C, Pd = 3.206W, Tj = Tc + ((θ j-c) × Pd) = 89.33°C D.F. = 51.05%	θ j-c = 5°C/W Δ Tc = 23.3°C	Tc = 73.3°C
D303 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.03W, Tj = Tl + ((θ j-l) × Pd) = 64.70°C D.F. = 43.13%	θ j-l = 20°C/W, Δ Tl = 14.1°C,	Tl = 64.1°C
D307 CRH01(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.11W, Tj = Ta + ((θ j-a) × Pd) = 85.45°C D.F. = 56.97%	θ j-a = 65°C/W Δ Ta = 28.3°C	Ta = 78.3°C
PC1 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, Pd = 0.0W, Tj = Tc + ((θ j-c) × Pd) = 78.20°C D.F. = 62.56%	θ j-c = 330°C/W Δ Tc = 28.2°C,	Pd(max) = 0.12W Tc = 78.2°C
PC2 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, Pd = 0.014 W, Tj = Tc + ((θ j-c) × Pd) = 82.82°C D.F. = 66.26%	θ j-c = 330°C/W Δ Tc = 28.2°C	Pd(max) = 0.12W Tc = 78.2°C
PC3 PS2861B-1Y-F3-A(L) NEC	Tjmax = 125°C, Pd = 0.001W, Tj = Tc + ((θ j-c) × Pd) = 78.73°C D.F. = 62.98%	θ j-c = 330°C/W Δ Tc = 28.4°C	Pd(max) = 0.12W Tc = 78.4°C
A1 ICE2PCS03G INFINEON	Tjmax = 150°C, Pd = 0.24W, Tj = Tc + ((θ j-c) × Pd) = 94.00°C D.F. = 62.67%	θj-a = 90°C/W, ΔTc = 22.4°C,	Tc = 72.4°C
A3 TEA1791AT/N1,118 NXP	Tjmax = 150°C, Pd = 0.15W, Tj = Tc + ((θ j-c) × Pd) = 94.15°C D.F. = 62.77%	θ j-c = 95°C/W, Δ Tc = 29.9°C,	Pc(max) = 0.45W Tc = 79.9°C
A101 L6599ADTR STMICRO	Tjmax = 150°C, Pd = 0.09W, Tj = Tc + ((θ j-c) × Pd) = 94.70°C D.F. = 63.13%	θ j-c = 120°C/W, Δ Tc = 33.9°C,	Pc(max) = 0.83W Tc = 83.9°C
A301 ICE3B0565JG INFINEON	Tjmax = 150°C, Pd = 0.464W, Tj = Tc + ((θ j-c) × Pd) = 95.74 °C D.F. = 63.82%	θ j-c = 24°C/W Δ Tc = 34.6°C	Tc = 84.6°C
A303 BD5240G-TR ROHM	Tjmax = 150°C, Pd = 0.00814W, Tj = Tc + ((θ j-c) × Pd) = 66.88°C D.F. = 44.59%	θ j-c = 10°C/W, Δ Tc = 16.8°C,	Pd(max) = 1.2W Tc = 66.8°C

3. Main components temperature rise ΔT list

MODEL : GWS500-12

Condition:

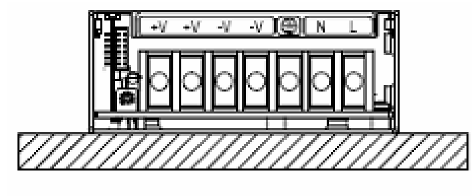
Standard Mounting Mounting Method (A)	
Input Voltage (VAC)	115
Output Voltage (VDC)	12
Output Current (A)	42

		ΔT Temperature rise (°C)	
Output Derating		Io = 100% (Ta = 50°C)	Io = 50% (Ta = 70°C)
Location No	Parts Name	Mounting (A)	Mounting (A)
L1	BALUN COIL	7.4	2.1
L2	BALUN COIL	14.1	4.4
L7	CHOKE COIL	52.3	33.9
T1	TRANS. PULSE	65.9	20.5
T301	TRANS. PULSE	34.0	18.1
D1	BRIDGE DIODE	39.8	15.5
D2	DIODE	36.5	19
Q1	MOS FET	36.4	19.7
Q2	MOS FET	31.3	16.7
Q4	MOS FET	39.4	14.2
Q5	MOS FET	40.2	14.5
Q10	MOS FET	31.8	10.1
Q11	MOS FET	21.3	7.5
A1	CHIP IC	30.1	20.1
A2	CHIP IC	36.1	14.2
A3	CHIP IC	31.2	15
A101	CHIP IC	34.9	15.7
A202	CHIP IC	6.1	6.9
A205	CHIP IC	20.0	21.7
A301	CHIP IC	36.4	18.3
A401	CHIP IC	32.4	16.2
PC3	CHIP OPTO COUPLER	33.2	13.9
C14	E. CAP	19.5	10
C41	E. CAP	12.5	4.6
C42	E. CAP	20.4	7.4
C43	E. CAP	24.4	7.7
C116	E. CAP	17.0	7.2
C308	E. CAP	26.9	11.3
C312	E. CAP	29.3	14
C502	FILM CAP	21.9	5.9

3. Main components temperature rise ΔT list

MODEL : GWS500-12

Condition:

Standard Mounting Mounting Method (A)	
Input Voltage (VAC)	230
Output Voltage (VDC)	12
Output Current (A)	42

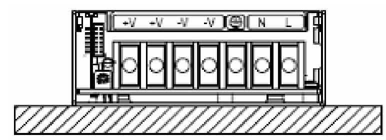
		ΔT Temperature rise (°C)	
Output Derating		Io = 100% (Ta = 50°C)	Io = 50% (Ta = 70°C)
Location No	Parts Name	Mounting (A)	Mounting (A)
L1	BALUN COIL	3.3	1.4
L2	BALUN COIL	6.3	2.5
L7	CHOKE COIL	40.6	29.6
T1	TRANS. PULSE	64.6	20.3
T301	TRANS. PULSE	32.3	17.8
D1	BRIDGE DIODE	20.0	8
D2	DIODE	23.3	12.9
Q1	MOS FET	20.8	12.1
Q2	MOS FET	18.1	10.4
Q4	MOS FET	38.1	13.9
Q5	MOS FET	39.1	14.2
Q10	MOS FET	30.7	10.1
Q11	MOS FET	20.5	7.4
A1	CHIP IC	22.4	17.4
A2	CHIP IC	34.3	14.2
A3	CHIP IC	29.9	15.3
A101	CHIP IC	33.9	15.9
A202	CHIP IC	6.1	7.2
A205	CHIP IC	19.5	22
A301	CHIP IC	34.6	21.8
A401	CHIP IC	31.1	16.4
PC3	CHIP OPTO COUPLER	28.4	14.1
C14	E. CAP	15.5	8.4
C41	E. CAP	11.6	4.9
C42	E. CAP	19.1	7.6
C43	E. CAP	23.5	7.8
C116	E. CAP	16.2	7.5
C308	E. CAP	25.3	11.3
C312	E. CAP	27.6	14.1
C502	FILM CAP	20.7	5.9

4. Electrolytic capacitor lifetime

MODEL : GWS500-12

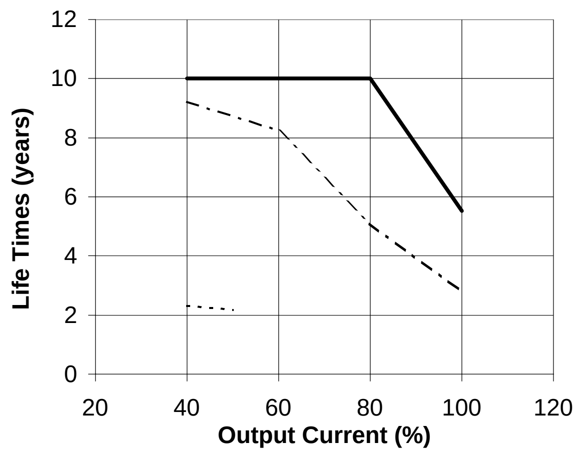
Ta = 40°C
= 50°C
= 70°C

Mounting A



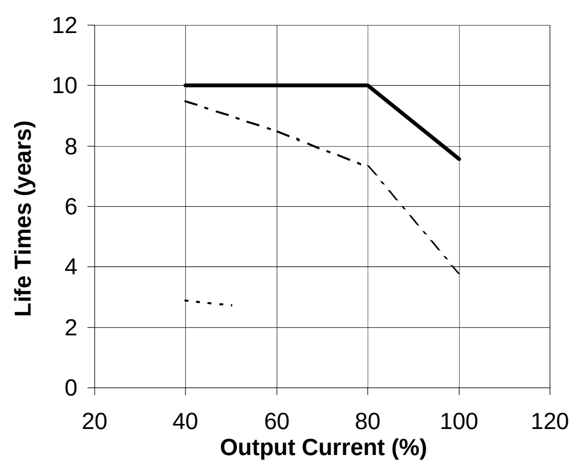
Vin = 115VAC

Load (%)	Life Time (years)		
	Ta = 40°C	Ta = 50°C	Ta = 70°C
40	10.0	9.2	2.3
60	10.0	8.3	-
80	10.0	5.1	-
100	5.5	2.8	-



Vin = 230VAC

Load (%)	Life Time (years)		
	Ta = 40°C	Ta = 50°C	Ta = 70°C
40	10.0	9.5	2.9
60	10.0	8.5	-
80	10.0	7.3	-
100	7.6	3.8	-



Note : E-cap life calculation is based on 24hrs/day operation.

5. Vibration Test

MODEL : GWS500-24

(1) Vibration Test Class

Frequency Variable Endurance Test

(2) Equipment Used

Controller	:	F-400-BM-E47 (EMIC CORP.)
Vibrator	:	905-FN (EMIC CORP.)
Serial no.	:	22964

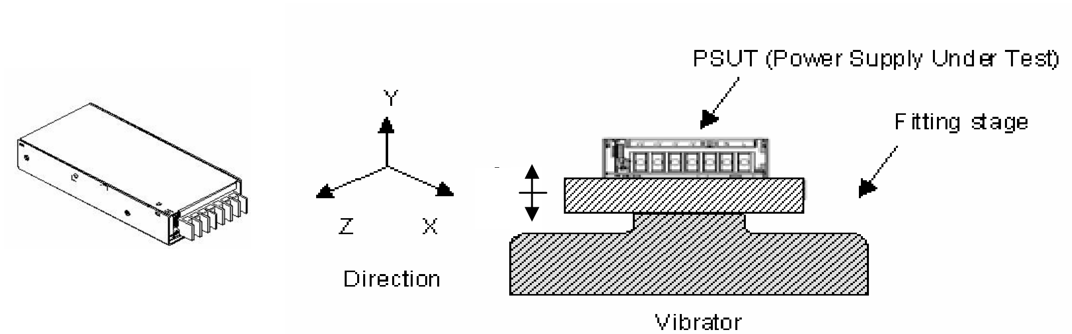
(3) The Number Of D.U.T. (Device Under Test)

1 Unit

(4) Test Conditions

Sweep Frequency	:	10 - 55Hz	Direction	:	X, Y, Z
Sweep Time	:	1 minute	Test Time	:	1 hour each axis
Acceleration	:	2G	Non-operation		
Mounting	:	A			

(5) Test Method



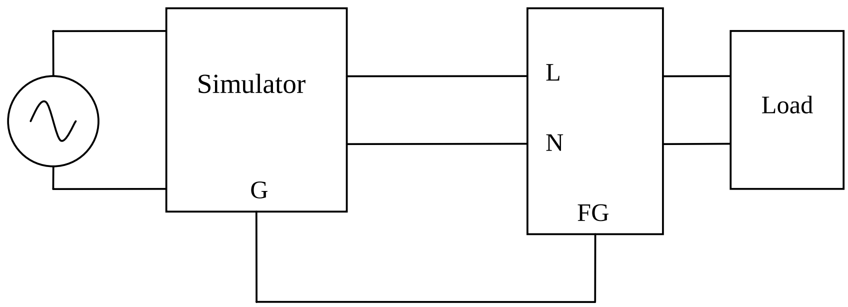
Fix the PSUT on the universal plate via two M4 tapped holes on the chassis of the power supply.
Standard mounting position as per test specification.

(6) Test results - OK

6. Noise simulate test

MODEL : GWS500-12

(1) Test circuit and equipment



Simulator : INS-400L Noise Laboratory Co.,LTD

(2) Test conditions

• Input voltage	:	115, 230VAC	• Noise level	:	0V~2.0kV
• Output voltage	:	Rated	• Phase shift	:	0° ~ 360°
• Output current	:	0%, 100%	• Polarity	:	+, -
• Ambient temperature	:	25°C	• Mode	:	Normal Common
• Pulse Width	:	0ns ~ 1000ns	• Trigger select	:	Line

(3) Acceptable conditions

1. Not to be broken.
2. No output shutdown.
3. No other out of order.

(4) Test result O K

7. Abnormal test

MODEL : GWS500

(1) Test Condition and Circuit

Input Voltage: 230Vac   Output: 12V 42A   Ta : 25°C , 70%RH

(2) Test Results

(Da: Damaged)

No.	Test Position: LOCATION	Test Position: TEST POINT	Test Mode: SHORT	Test Mode: OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.C.P.	9 O.V.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHER	NOTE
1	Q1	G - S	O											O			
		D - G	O								O			O			Da = F1,Q1,R26,Z1
		D - S	O								O			O			Da = F1
2	Q4	G - S	O											O			5V stby=Ok
		D - G	O							O				O			Da = TFR1,Q4,Q5,R15,A101
		D - S	O							O				O			Da = TFR1, Q5
3	Q10	D - S	O											O			
4	Q11	D - S	O											O			
5	D1	AC to +ve	O								O			O			Da = F1
		AC to -ve	O								O			O			Da = F1
6	D2	A - K	O								O			O			Da = F1, Q1, Q2
7	D302	A - K	O											O			
8	D304	A - K	O											O			
9	D306	A - K	O											O			
10	PC1	1 - 2	O												O		
		3 - 4	O											O			
		3		O											O		
11	PC2	1 - 2	O											O			
		3		O										O			
		3 - 4	O												O		
12	PC3	1 - 2	O											O			
		3 - 4	O											O			
		3		O										O			
13	A1	5 - 7	O							O				O			Da = A1
		1-7	O													O	Hiccup
14	A3	8-2	O											O			

No.	Test Position		Test Mode		Test Results												
	LOCATION	TEST POINT	SHORT	OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.C.P.	9 O.V.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHER	NOTE
15	A101	1 - 2	O												O		
		2 - 3	O											O			
		3 - 4	O											O			
		5 - 6	O											O			
		6 - 7	O											O			
		7 - 8	O											O			
		10- 11	O											O			
		11 - 12	O							O				O			Da = TFR1, Q4, Q5
		14 - 15	O											O			
		15 - 16	O											O			
16	A301	7,8 - 12	O								O			O			Iin = ↑, Da = F1, Q1, Q2
		3 - 12	O											O			
17	C14		O							O				O			Da = F1
				O								O					Hiccup
18	C501		O											O			
19	T1	2-4	O											O			
		17-18	O											O			
		18-19	O											O			
20	T301	4 - 5	O											O			
		1 - 2	O											O			5VSB = Hiccup
		7 - 8	O											O			Hiccup
		8 - 9	O											O			Hiccup
21	L7	1 - 2	O								O			O			Da = F1, Q1, Q2

8. Thermal shock test

MODEL : GWS500-12

(1) Equipment used

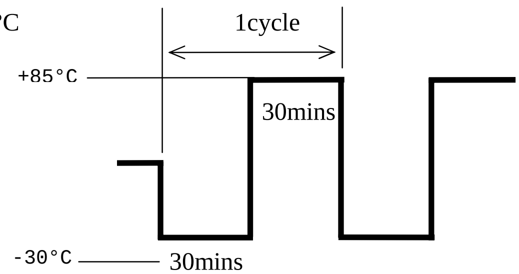
THERMAL SHOCK CHAMBER TSA-71S-A (ESPEC CORP.)

(2) The number of PSUT.(Power Supply Under Test)

1 unit

(3) Test Conditions

- Ambient temperature : -30°C ⟷ +85°C
- Test time : 30min. ~ 30min.
- Test cycle : 100 cycles
- Not operating : -



(4) Test Method

Before the test, check if there is no abnormal output and put the PSUT in the testing chamber. Then test it in above cycles. After the test is completed, leave it for 1 hour at the room temperature and check to make sure that there is no abnormal output.

(5) Test Results OK