CUS250LD

RELIABILITY DATA

DWG No. CA802-57-01/LD		
APPD	CHK	DWG
Theo 16-Jan-'13	Andrew 09-Jan.-'13	Perry 09-Jan-'13

I N D E X

Terminology used

FG .....Frame Ground

※ The above data is typical value. As all units have nearly the same characteristics, the data to be considered as ability value.

1. Calculated values of MTBF

MODEL : CUS250LD-5

(1) Calculating method

Calculated based on part count reliability projection of JEITA (RCR-9102).

Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

<Formula> :

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\sum_{i=1}^{n} N_i (\lambda_G \pi_Q)_i} \times 10^6 \text{ (Hours)}$$

λ_{equip} : Total equipment failure rate (Failure/10^6 Hours)

λ_G : Generic failure rate for the ith generic part (Failure/10^6 Hours)

N_i : 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 =158,374 (Hours)

2. Component derating

MODEL : CUS250LD-5

(1) Calculating method

(a) Measuring Conditions

Input	:	115VAC/230VAC	Ambient temperature	:	40°C
Output	:	5V, 50A(100%)	Mounting method	:	Mounting A,B,C,D,E

(b) Semiconductors

Compared with maximum junction temperature and actual one which is calculated based on maximum case temperature in mounting A~E condition, 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_l : 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

Location No.	Vin = 115VAC Load = 100% Ta = 40°C		
Q1 IPP60R199CP INFINEON	Tch(max) = 150°C, Pch =6.8W, Tch = Tc + ((θ ch-c) × Pch) =127°C D.F. = 84.7%	θ ch-c = 0.9°C/W, Δ Tc = 81°C,	Pch(max) = 139W, Tc = 121 °C
Q2,Q3 IPP60R280C6 INFINEON	Tch(max) = 150 °C, Pch =1.7 W, Tch = Tc + ((θ ch-c) × Pch) = 121°C D.F. = 80.7%	θ ch-c = 1.2°C/W, Δ Tc =79 °C,	Pch(max) = 104W, Tc =119 °C
D1 RS1005M RECTRON	Tj(max) = 150°C, Pd = 4.0W, Tj = Tc + ((θ j-c) × Pd) = 118°C D.F. = 78.7%	θ j-c = 1.2°C/W, Δ Tc =73°C,	Tc = 113°C
D2 IDH04SG60C INFINEON	Tj(max) = 150 °C, Pd = 1.3 W, Tj = Tc + ((θ j-c) × Pd) = 120°C D.F. =80.0%	θ j-c = 3.6°C/W, Δ Tc = 75°C,	Tc = 115°C
D3, D4 MUR460 MOTOROLA	Tj(max) = 150°C, Pd =0.15W, Tj = Tc + ((θ j-c) × Pd) =115 °C D.F. = 76.7%	θ j-l = 28°C/W, Δ Tc =71 °C,	Tc = 111°C
Q51,Q52 IPP041N04NG INFINEON	Tch(max) = 150 °C, Pch =2.2 W, Tch = Tc + ((θ ch-c) × Pch) = 111°C D.F. =74.0%	θ ch-c = 1.6°C/W, Δ Tc =67 °C,	Pch(max) = 94W, Tc =107°C
Q53,Q54 IPP037N08N3G INFINEON	Tch(max) = 150 °C, Pch =3.2 W, Tch = Tc + ((θ ch-c) × Pch) = 111°C D.F. =74.0%	θ ch-c = 0.7°C/W, Δ Tc =69 °C,	Pch(max) = 214W, Tc =109°C
A101 ICE2PCS03G INFINEON	Tj(max) = 150°C, Pd =0.17W, Tj = Tc + ((θ j-c) × Pd) =111 °C D.F. = 74.0%	θ j-c = 72°C/W, Δ Tc =59°C,	Tc = 99°C
A102 FA5604N-D1-TE1 FUJI ELECTRIC	Tj(max) = 150°C, Pd =0.15W, Tj = Tc + ((θ j-c) × Pd) =115 °C D.F. = 76.7%	θ j-c = 72°C/W, Δ Tc =64 °C,	Tc = 104°C
A201 AZ431BR-ATRE1 BCD	Tj(max) = 150°C, Pd =0.01W, Tj = Tc + ((θ j-c) × Pd) =98 °C D.F. = 65.3%	θ j-c = 250°C/W, Δ Tc =55 °C,	Tc = 95°C
PC101 PS2861B-1Y-F3-A(L) (LED) RENESAS	Tj(max) = 125 °C, Pd = 1 mW, ALLOWABLE Pd(max) = 15.6mW (at Tc = 99°C) D.F. =6.4 %	ΔPd/°C = -0.6mW /°C, Δ Tc = 59°C,	Pc(max) = 60 mW, Tc= 99°C
PC101 PS2861B-1Y-F3-A(L) (Transistor) RENESAS	Tj(max) = 125 °C, Pc = 4mW, ALLOWABLE Pc(max) = 31.2mW(at Tc = 99°C) D.F. = 12.8 %	ΔPc/°C = -1.2mW /°C, Δ Tc = 59 °C,	Pc(max) = 120 mW, Tc= 99°C
PC102 PS2861B-1Y-F3-A(L) (LED) RENESAS	Tj(max) = 125 °C, Pd = 0 mW, ALLOWABLE Pd(max) = 16.8mW (at Tc = 97°C) D.F. =0 %	ΔPd/°C = -0.6mW /°C, Δ Tc = 57°C,	Pc(max) = 60 mW, Tc= 97°C
PC102 PS2861B-1Y-F3-A(L) (Transistor) RENESAS	Tj(max) = 125 °C, Pc = 0mW, ALLOWABLE Pc(max) = 33.6mW(at Tc = 97°C) D.F. = 0 %	ΔPc/°C = -1.2mW /°C, Δ Tc = 57°C,	Pc(max) = 120 mW, Tc= 97°C

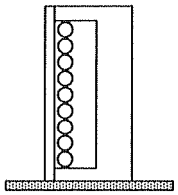
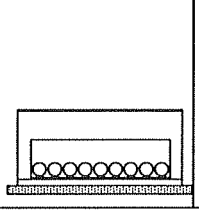
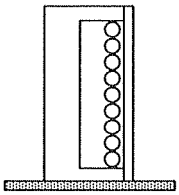
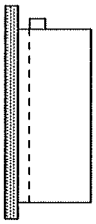
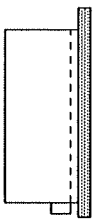
2. Component derating list

Location No.	Vin = 230VAC Load = 100% Ta = 40°C		
Q1 IPP60R199CP INFINEON	Tch(max) = 150°C, Pch =2.5W, Tch = Tc + ((θ ch-c) × Pch) =94°C D.F. = 62.7%	θ ch-c = 0.9°C/W, Δ Tc = 52°C,	Pch(max) = 139W, Tc = 92 °C
Q2,Q3 IPP60R280C6 INFINEON	Tch(max) = 150 °C, Pch =1.7 W, Tch = Tc + ((θ ch-c) × Pch) = 107°C D.F. = 71.3%	θ ch-c = 1.2°C/W, Δ Tc =65°C,	Pch(max) = 104W, Tc =105 °C
D1 RS1005M RECTRON	Tj(max) = 150°C, Pd = 2.0W, Tj = Tc + ((θ j-c) × Pd) = 94°C D.F. = 62.7%	θ j-c = 1.2°C/W, Δ Tc =52°C,	Tc = 92°C
D2 IDH04SG60C INFINEON	Tj(max) = 150 °C, Pd = 1.1 W, Tj = Tc + ((θ j-c) × Pd) = 98°C D.F. =65.3%	θ j-c = 3.6°C/W, Δ Tc = 54°C,	Tc = 94°C
D3, D4 MUR460 MOTOROLA	Tj(max) = 150°C, Pd =0.15W, Tj = Tc + ((θ j-c) × Pd) =103 °C D.F. = 68.7%	θ j-l = 28°C/W, Δ Tc =59°C,	Tc = 99°C
Q51,Q52 IPP041N04NG INFINEON	Tch(max) = 150 °C, Pch =2.2 W, Tch = Tc + ((θ ch-c) × Pch) = 101°C D.F. =67.3%	θ ch-c = 1.6°C/W, Δ Tc =57 °C,	Pch(max) = 94W, Tc =97°C
Q53,Q54 IPP037N08N3G INFINEON	Tch(max) = 150 °C, Pch =3.2 W, Tch = Tc + ((θ ch-c) × Pch) = 101°C D.F. =67.3%	θ ch-c = 0.7°C/W, Δ Tc =59 °C,	Pch(max) = 214W, Tc =99°C
A101 ICE2PCS03G INFINEON	Tj(max) = 150°C, Pd =0.17W, Tj = Tc + ((θ j-c) × Pd) =99 °C D.F. = 66.0%	θ j-c = 72°C/W, Δ Tc =47°C,	Tc = 87°C
A102 FA5604N-D1-TE1 FUJI ELECTRIC	Tj(max) = 150°C, Pd =0.15W, Tj = Tc + ((θ j-c) × Pd) =104°C D.F. = 69.3%	θ j-c = 72°C/W, Δ Tc =53 °C,	Tc = 93°C
A201 AZ431BR-ATRE1 BCD	Tj(max) = 150°C, Pd =0.01W, Tj = Tc + ((θ j-c) × Pd) =86 °C D.F. = 57.3%	θ j-c = 250°C/W, Δ Tc =43 °C,	Tc = 83°C
PC101 PS2861B-1Y-F3-A(L) (LED) RENESAS	Tj(max) = 125 °C, Pd = 1 mW, ALLOWABLE Pd(max) = 21mW (at Tc = 90°C) D.F. =4.8 %	ΔPd/°C = -0.6mW /°C, Δ Tc = 50°C,	Pc(max) = 60 mW, Tc= 90°C
PC101 PS2861B-1Y-F3-A(L) (Transistor) RENESAS	Tj(max) = 125 °C, Pc = 4mW, ALLOWABLE Pc(max) = 42mW(at Tc = 90°C) D.F. = 9.5 %	ΔPc/°C = -1.2mW /°C, Δ Tc = 50 °C,	Pc(max) = 120 mW, Tc= 90 °C
PC102 PS2861B-1Y-F3-A(L) (LED) RENESAS	Tj(max) = 125 °C, Pd = 0 mW, ALLOWABLE Pd(max) = 22mW (at Tc = 89°C) D.F. =0 %	ΔPd/°C = -0.6mW /°C, Δ Tc = 49°C,	Pc(max) = 60 mW, Tc= 89°C
PC102 PS2861B-1Y-F3-A(L) (Transistor) RENESAS	Tj(max) = 125 °C, Pc = 0mW, ALLOWABLE Pc(max) = 43mW(at Tc = 89°C) D.F. = 0 %	ΔPc/°C = -1.2mW /°C, Δ Tc = 49°C,	Pc(max) = 120 mW, Tc= 89°C

3. Main Components Temperature Rise List

MODEL : CUS250LD-5

(1) Measuring Conditions

Mounting Method Standard Mounting:A	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
					
Input Voltage	115VAC				
Output Voltage	5VDC				
Output Current	50A(100%)				

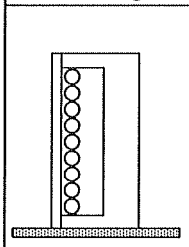
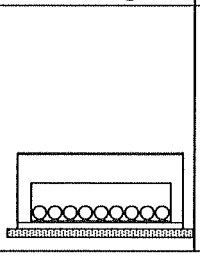
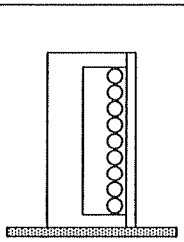
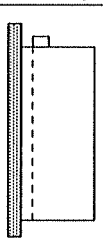
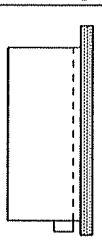
(2) Measuring Results

Output Derating		Temperature Rise (℃)				
		Io=100 %				
		Ta=40℃	Ta=40℃	Ta=40℃	Ta=40℃	Ta=40℃
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A101	CHIP IC	55	52	53	56	59
A102	CHIP IC	60	56	56	59	64
A201	CHIP IC	43	40	46	55	44
C1	E.CAP.	38	35	34	35	43
C52	E.CAP.	43	43	39	48	41
C53	E.CAP.	42	42	41	50	43
C54	E.CAP.	43	40	41	45	41
D1	BRIDGE DIODE	71	69	73	73	69
D2	S.B.D	71	67	72	73	75
D3	F.R.D	68	62	64	67	71
Q1	MOSFET	77	74	78	80	81
Q2	MOSFET	77	72	73	79	78
Q3	MOSFET	69	65	67	72	72
Q52	MOSFET	64	59	60	67	64
Q53	MOSFET	65	60	62	69	64
Q104	CHIP MOSFET	72	68	69	73	74
Q201	CHIP MOSFET	74	72	72	79	75
L3	BALUN COIL	44	52	56	63	49
L4	BALUN COIL	52	60	60	66	56
L5	CHOKE COIL	66	70	65	70	64
L51	CHOKE COIL	58	59	55	62	56
T1 WIRE	TRANSFORMER WIRE	67	65	63	68	67
T2 WIRE	TRANSFORMER WIRE	53	49	46	49	61
PC101	PHOTO COUPLER	56	54	55	57	59
PC102	PHOTO COUPLER	55	53	54	56	57

3. Main Components Temperature Rise List

MODEL : CUS250LD-5

(1) Measuring Conditions

Mounting Method Standard Mounting:A	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
					
Input Voltage	115VAC				
Output Voltage	5VDC				
Output Current	45A(90%)				

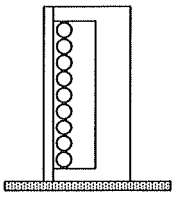
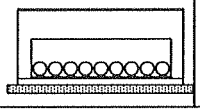
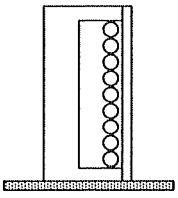
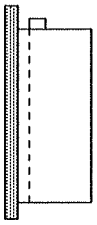
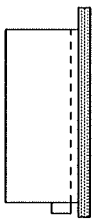
(2) Measuring Results

Output Derating		Temperature Rise (℃) Io=90 %				
		Ta=50℃	Ta=50℃	Ta=50℃	Ta=50℃	Ta=50℃
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A101	CHIP IC	53	45	49	49	56
A102	CHIP IC	57	49	51	51	60
A201	CHIP IC	40	34	42	45	40
C1	E.CAP.	39	28	33	33	44
C52	E.CAP.	36	34	34	40	36
C53	E.CAP.	37	35	37	46	40
C54	E.CAP.	38	34	37	43	38
D1	BRIDGE DIODE	63	56	62	61	62
D2	S.B.D	58	51	60	58	63
D3	F.R.D	61	54	57	56	64
Q1	MOSFET	64	55	63	62	67
Q2	MOSFET	67	58	63	64	67
Q3	MOSFET	62	53	58	59	63
Q52	MOSFET	57	50	54	55	57
Q53	MOSFET	58	50	55	57	57
Q104	CHIP MOSFET	66	59	62	63	67
Q201	CHIP MOSFET	68	62	66	68	68
L3	BALUN COIL	40	42	49	52	44
L4	BALUN COIL	46	48	52	55	51
L5	CHOKE COIL	64	60	60	64	64
L51	CHOKE COIL	52	49	48	52	52
T1 WIRE	TRANSFORMER WIRE	59	55	56	55	60
T2 WIRE	TRANSFORMER WIRE	49	43	43	42	56
PC101	PHOTO COUPLER	52	45	50	49	54
PC102	PHOTO COUPLER	52	44	49	49	53

3. Main Components Temperature Rise List

MODEL : CUS250LD-5

(1) Measuring Conditions

	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
Mounting Method Standard Mounting:A					
Input Voltage	115VAC				
Output Voltage	5VDC				
Output Current	37.5A(75%)				

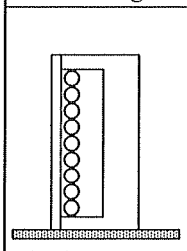
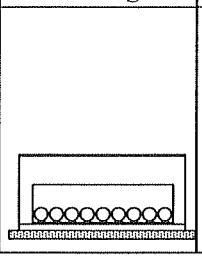
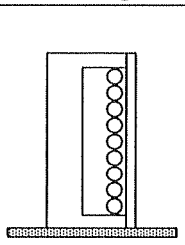
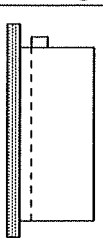
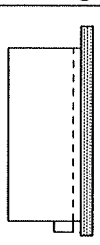
(2) Measuring Results

Output Derating		Temperature Rise (℃) Io=75 %				
		Ta=60℃	Ta=60℃	Ta=60℃	Ta=60℃	Ta=60℃
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A101	CHIP IC	45	39	44	44	40
A102	CHIP IC	49	42	47	45	44
A201	CHIP IC	32	27	36	38	25
C1	E.CAP.	33	26	28	29	29
C52	E.CAP.	27	26	29	33	22
C53	E.CAP.	28	27	31	36	24
C54	E.CAP.	30	28	32	35	24
D1	BRIDGE DIODE	53	50	55	54	47
D2	S.B.D	51	45	53	53	46
D3	F.R.D	50	45	48	47	44
Q1	MOSFET	55	49	56	55	49
Q2	MOSFET	53	48	53	52	47
Q3	MOSFET	49	44	48	47	34
Q52	MOSFET	46	41	47	46	39
Q53	MOSFET	47	41	47	47	39
Q104	CHIP MOSFET	54	50	55	54	48
Q201	CHIP MOSFET	55	52	56	57	49
L3	BALUN COIL	31	33	38	42	26
L4	BALUN COIL	36	40	44	47	33
L5	CHOKE COIL	53	53	52	59	47
L51	CHOKE COIL	40	39	40	43	35
T1 WIRE	TRANSFORMER WIRE	42	41	46	47	20
T2 WIRE	TRANSFORMER WIRE	43	36	39	38	41
PC101	PHOTO COUPLER	44	38	45	43	38
PC102	PHOTO COUPLER	44	37	44	43	37

3. Main Components Temperature Rise List

MODEL : CUS250LD-5

(1) Measuring Conditions

	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
Mounting Method Standard Mounting:A					
Input Voltage	115VAC				
Output Voltage	5VDC				
Output Current	25A(50%)				

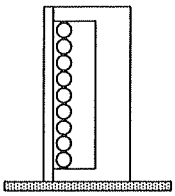
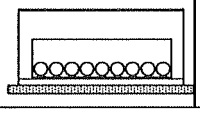
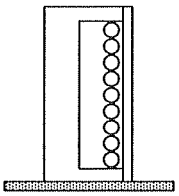
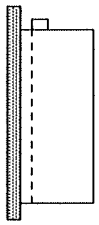
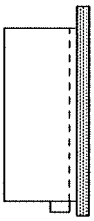
(2) Measuring Results

Output Derating		Temperature Rise (℃) Io=50 %				
		Ta=70℃	Ta=70℃	Ta=70℃	Ta=70℃	Ta=70℃
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A101	CHIP IC	34	31	34	34	32
A102	CHIP IC	38	34	37	36	36
A201	CHIP IC	22	20	26	28	19
C1	E.CAP.	24	21	22	22	23
C52	E.CAP.	18	19	21	24	16
C53	E.CAP.	19	20	22	26	17
C54	E.CAP.	20	20	22	25	17
D1	BRIDGE DIODE	37	36	40	39	34
D2	S.B.D	34	32	38	37	32
D3	F.R.D	36	34	36	36	33
Q1	MOSFET	38	35	40	39	35
Q2	MOSFET	38	36	39	39	35
Q3	MOSFET	34	32	34	34	25
Q52	MOSFET	32	30	33	33	28
Q53	MOSFET	31	29	33	33	27
Q104	CHIP MOSFET	41	39	42	42	38
Q201	CHIP MOSFET	41	40	43	44	38
L3	BALUN COIL	19	22	26	28	17
L4	BALUN COIL	24	27	30	33	24
L5	CHOKE COIL	46	47	45	52	42
L51	CHOKE COIL	29	29	29	32	26
T1 WIRE	TRANSFORMER WIRE	30	31	34	35	14
T2 WIRE	TRANSFORMER WIRE	34	30	30	31	32
PC101	PHOTO COUPLER	33	30	34	34	29
PC102	PHOTO COUPLER	33	29	34	33	29

3. Main Components Temperature Rise List

MODEL : CUS250LD-5

(1) Measuring Conditions

Mounting Method Standard Mounting:A	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
					
Input Voltage	230VAC				
Output Voltage	5VDC				
Output Current	50A(100%)				

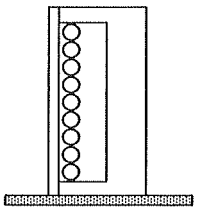
(2) Measuring Results

Output Derating		Temperature Rise (℃) Io=100 %				
		Ta=40℃	Ta=40℃	Ta=40℃	Ta=40℃	Ta=40℃
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A101	CHIP IC	47	40	46	46	44
A102	CHIP IC	53	43	52	49	50
A201	CHIP IC	37	32	42	43	31
C1	E.CAP.	31	26	29	28	28
C52	E.CAP.	39	38	39	42	32
C53	E.CAP.	38	38	39	44	33
C54	E.CAP.	38	36	37	40	30
D1	BRIDGE DIODE	50	45	52	50	44
D2	S.B.D	52	44	54	50	47
D3	F.R.D	59	51	59	55	56
Q1	MOSFET	50	43	52	49	45
Q2	MOSFET	65	57	65	63	59
Q3	MOSFET	61	54	61	59	56
Q52	MOSFET	57	50	57	55	50
Q53	MOSFET	59	52	59	58	51
Q104	CHIP MOSFET	64	57	64	62	59
Q201	CHIP MOSFET	67	62	68	68	61
L3	BALUN COIL	28	29	37	37	23
L4	BALUN COIL	32	34	40	40	27
L5	CHOKE COIL	52	48	51	53	46
L51	CHOKE COIL	52	49	50	54	45
T1 WIRE	TRANSFORMER WIRE	56	54	55	55	47
T2 WIRE	TRANSFORMER WIRE	47	37	46	43	49
PC101	PHOTO COUPLER	48	39	50	47	43
PC102	PHOTO COUPLER	47	37	49	46	42

4. Electrolytic capacitor life time

MODEL : CUS250LD-5

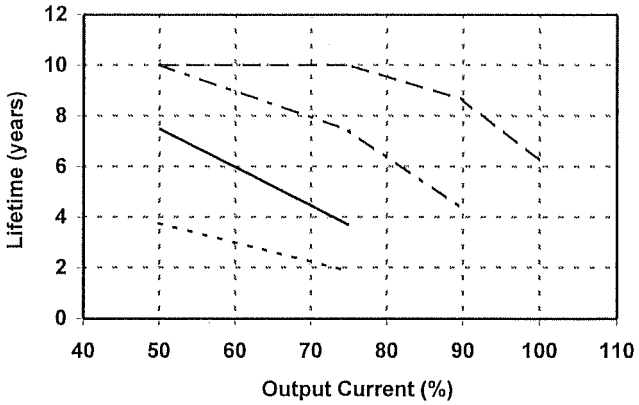
Mounting A



Conditions Ta 40°C ------
50°C -·-·-·-
60°C ——————
70°C --------

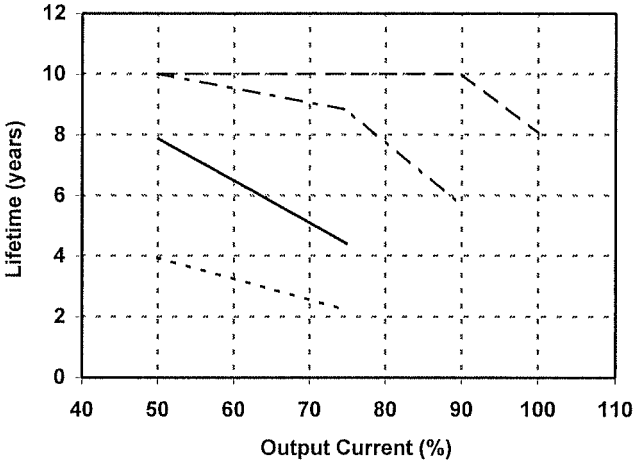
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	7.5	3.8
75	10.0	7.4	3.7	-
90	8.6	4.3	-	-
100	6.2	-	-	-



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	7.9	3.9
75	10.0	8.8	4.4	-
90	10.0	5.7	-	-
100	8.1	-	-	-



Formula:

For 105°C Elect. capacitor

$L = Lo * 2^{(105-\Delta T-Ta)/10} / (24 * 365)$ (years)

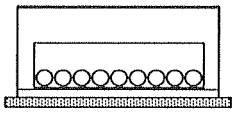
Where:

L —— Elec. Capacitor computed life (24 hours per day , 365 days operation)
Lo —— Guarantee life for Elec. capacitor
Ta —— Ambient temperature
ΔT —— Temperature rise of Elec. capacitor

4. Electrolytic capacitor life time

MODEL : CUS250LD-5

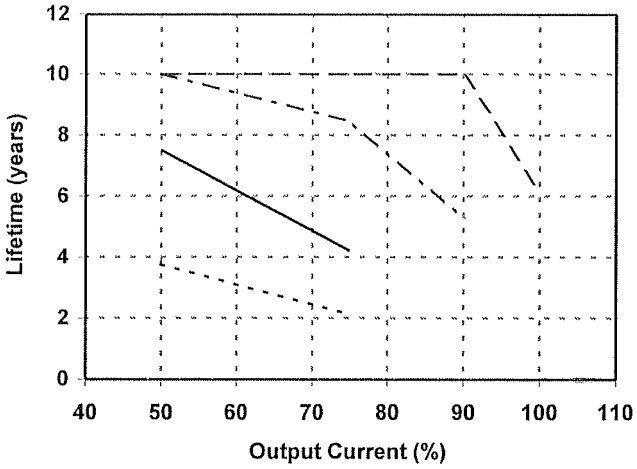
Mounting B



Conditions Ta 40°C ------
50°C -·-·-·-
60°C ——————
70°C --------

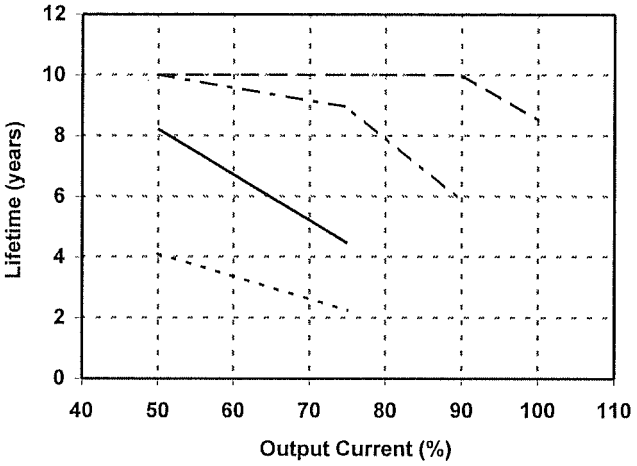
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	7.5	3.8
75	10.0	8.5	4.2	-
90	10.0	5.3	-	-
100	6.1	-	-	-



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	8.2	4.1
75	10.0	8.9	4.5	-
90	10.0	5.9	-	-
100	8.5	-	-	-



Formula:

For 105°C Elect. capacitor

$L = Lo * 2^{(105-\Delta T-Ta)/10} / (24 * 365)$ (years)

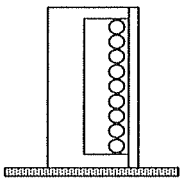
Where:

L —— Elec. Capacitor computed life (24 hours per day , 365 days operation)
Lo —— Guarantee life for Elec. capacitor
Ta —— Ambient temperature
ΔT —— Temperature rise of Elec. capacitor

4. Electrolytic capacitor life time

MODEL : CUS250LD-5

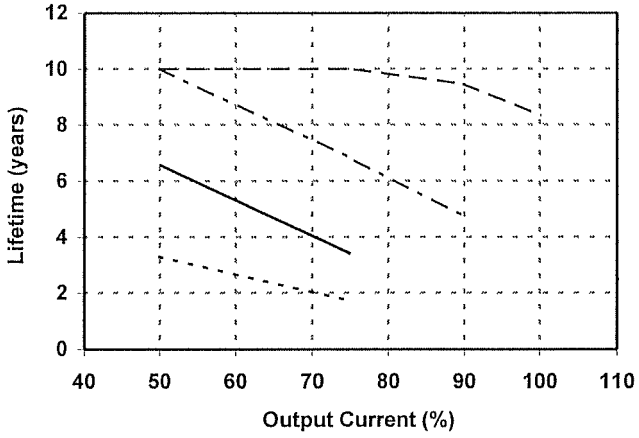
Mounting C



Conditions Ta 40°C ------
50°C -·-·-·-
60°C ——————
70°C --------

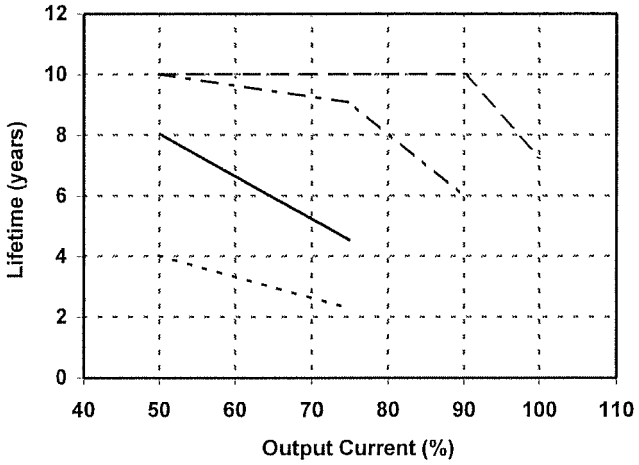
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	6.6	3.3
75	10.0	6.8	3.4	-
90	9.4	4.7	-	-
100	8.3	-	-	-



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	8.1	4.0
75	10.0	9.1	4.5	-
90	10.0	6.0	-	-
100	7.3	-	-	-



Formula:

For 105°C Elect. capacitor

$L = Lo * 2^{(105-\Delta T-Ta)/10} / (24 * 365)$ (years)

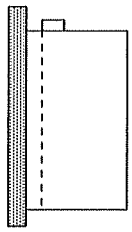
Where:

L —— Elec. Capacitor computed life (24 hours per day , 365 days operation)
Lo —— Guarantee life for Elec. capacitor
Ta —— Ambient temperature
ΔT —— Temperature rise of Elec. capacitor

4. Electrolytic capacitor life time

MODEL : CUS250LD-5

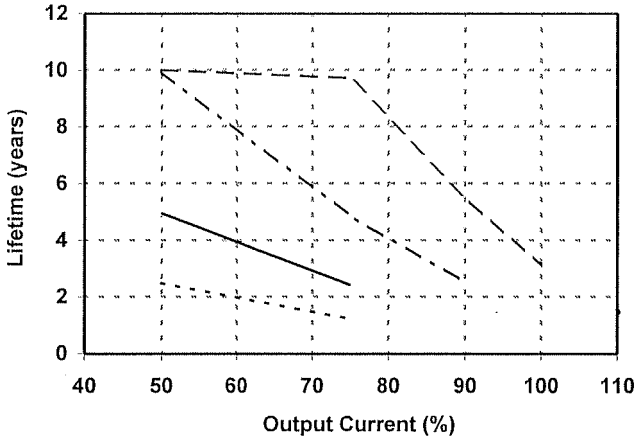
Mounting D



Conditions Ta 40°C ------
50°C -·-·-·-
60°C ——————
70°C --------

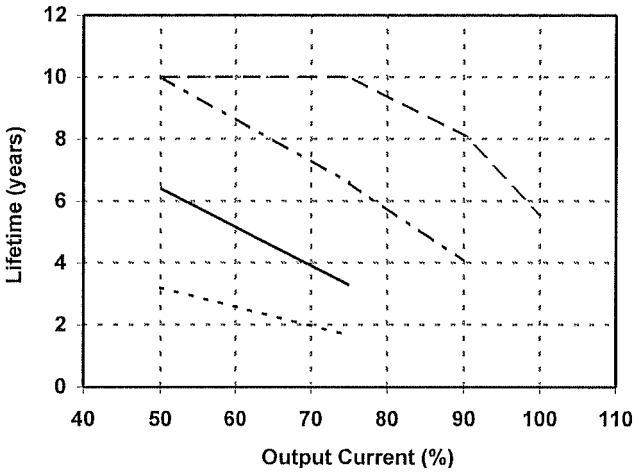
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	9.9	5.0	2.5
75	9.7	4.9	2.4	-
90	5.5	2.5	-	-
100	3.1	-	-	-



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	6.4	3.2
75	10.0	6.6	3.3	-
90	8.1	4.1	-	-
100	5.6	-	-	-



Formula:

For 105°C Elect. capacitor

$L = Lo * 2^{(105-\Delta T-Ta)/10} / (24 * 365)$ (years)

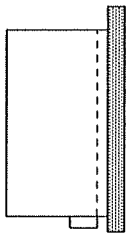
Where:

L —— Elec. Capacitor computed life (24 hours per day , 365 days operation)
Lo —— Guarantee life for Elec. capacitor
Ta —— Ambient temperature
ΔT —— Temperature rise of Elec. capacitor

4. Electrolytic capacitor life time

MODEL : CUS250LD-5

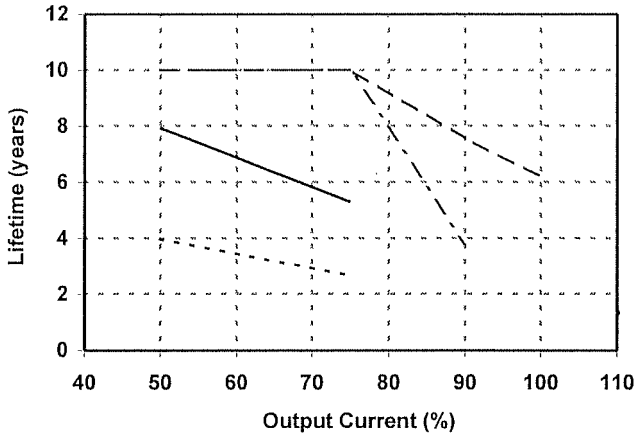
Mounting E



Conditions Ta 40°C ------
50°C -·-·-·-
60°C ——————
70°C --------

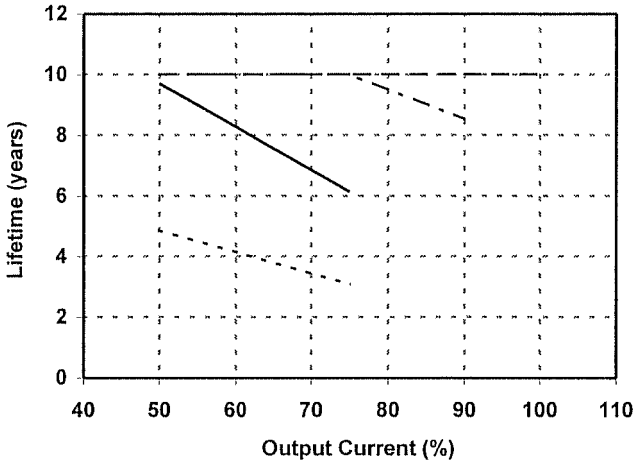
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	7.9	4.0
75	10.0	10.0	5.3	-
90	7.6	3.8	-	-
100	6.2	-	-	-



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
50	10.0	10.0	9.7	4.9
75	10.0	10.0	6.1	-
90	10.0	8.5	-	-
100	10.0	-	-	-



Formula:

For 105°C Elect. capacitor

$L = Lo * 2^{(105-\Delta T-Ta)/10} / (24 * 365)$ (years)

Where:

L —— Elec. Capacitor computed life (24 hours per day , 365 days operation)
Lo —— Guarantee life for Elec. capacitor
Ta —— Ambient temperature
ΔT —— Temperature rise of Elec. capacitor

5. Vibration Test

MODEL : CUS250LD-5

(1) Vibration Test Class

Frequency Variable Endurance Test

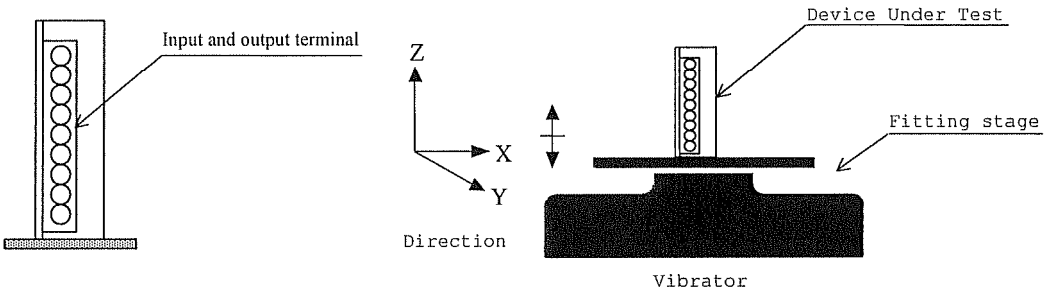
(2) Equipment Used

- Controller : DP550 (DP CORP. USA)
- Vibrator : V870 (LDS CORP. UK)

(3) Test Conditions

- Sweep frequency 10 ~ 55Hz
- Sweep time 1.0 min.
- Acceleration Constant 19.6m/s^2 (2G)
- Direction X, Y, Z.
- Test time 1 hour each

(4) Test Method



(5) Test Results

O K

Vin : 115VAC

Iout : 100%

Check item		Output Voltage (V)	Ripple Voltage (mVp-p)	D.U.T.State
Before Test		4.998	55	————
After Test	X	4.997	56	OK
	Y	4.997	56	OK
	Z	4.997	57	OK

6. Shock test

MODEL : CUS250LD-5

(1) Shock Test Class

- 196.1m/s^2 (20G) (JIS-C-0040-1987)

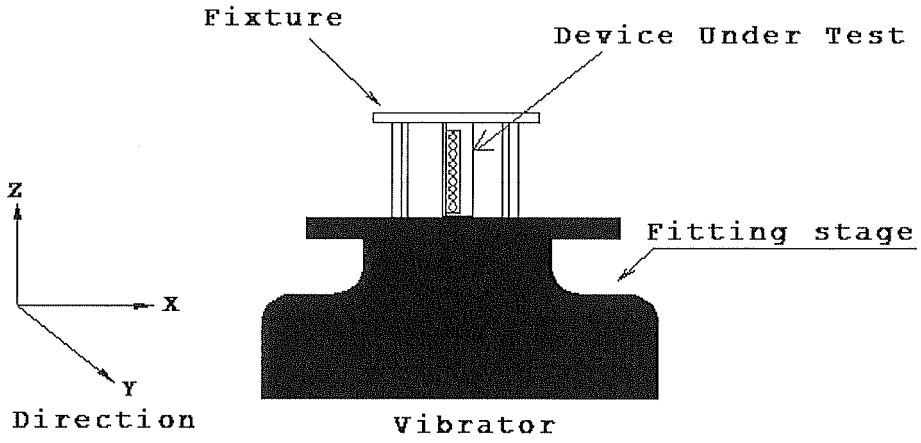
(2) Equipment Used

- Equipment : S-015(Northwest machine)

(3) Test Conditions

- Acceleration Constant 196.1m/s^2 (20G)
- Direction X, Y, Z.
- Test time 3 times

(4) Test Method



(5) Test Results

O K

Vin : 115VAC

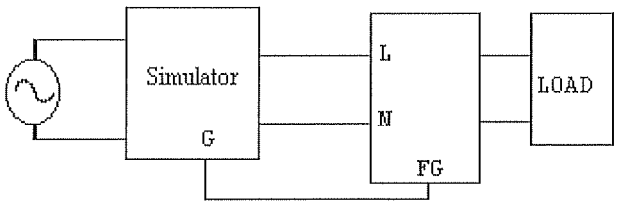
Iout : 100%

Check item		Output Voltage (V)	Ripple Voltage (mVp-p)	D.U.T.State
Before Test		4.998	55	————
After Test	X	4.997	56	OK
	Y	4.997	57	OK
	Z	4.997	57	OK

7. Noise simulate test

MODEL : CUS250LD-5

(1) Test circuit and equipment



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

(2) Test conditions

• Input voltage	:	115VAC/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	:	50ns ~ 1000ns	• Trigger select	:	Line

(3) Acceptable conditions

1. Not to be broken.
2. Not to be shut down output.
3. No other out of orders.

(4) Test result

O K

8. Thermal shock test

MODEL : CUS250LD-5

(1) Equipment used

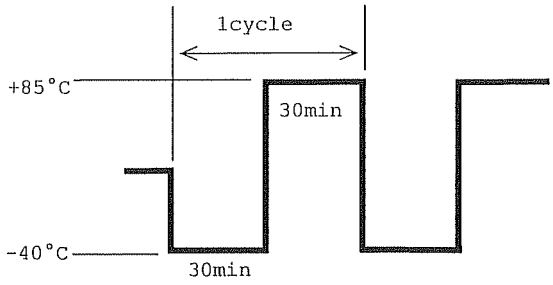
THERMAL SHOCK CHAMBER TSA-101S-W (ESPEC CORP.)

(2) The number of D.U.T.(Device Under Test)

1 unit

(3) Test Conditions

- Ambient temperature : -40°C ⟷ 85°C
- Test time : Refer to drawing
- Test cycle : 100 cycles
- Not operating : NO



(4) Test Method

Before testing, check if there is no abnormal output, then put the D.U.T. in testing chamber, and test it according to the above cycle. 100 cycles later, leave it for 1 hour at the room temperature, then check if there is no abnormal output.

(5) Test Results

O K

Vin : 115VAC			5V			
Io : 100%			From		To	
Ripple&Noise		mV	50		50	
Line regulation	Full load	mV	1		1	
Load regulation	Vin:115V	mV	18		18	
Efficiency	Pin	W	285.93		285.93	
	Vout	V	5.034	88.02%	5.034	88.02%
	Iout	A	50		50	
Solder condition • etc.			———		OK	

CUS250LD

SPECIFICATIONS

CA802-01-01/LD-A

	ITEMS / MODEL		CUS250LD-3	CUS250LD-4	CUS250LD-5	CUS250LD-12	CUS250LD-24
1	Nominal Output Voltage	V	3.3	4.2	5	12	24
2	Maximum Output Current	A	50	50	50	21	10.5
3	Maximum Output Power	W	165	210	250	252	252
4	Efficiency (Typ) (115/230VAC) (* 1)	%	86/88	87/89	88/90	88/90	88/90
5	Input Voltage Range (* 2,11)	–	85 ~ 265VAC (47-63Hz) or 120 ~ 370VDC (Withstand 300VAC Surge for 5 seconds)				
6	Input Current (Typ) (115/230VAC) (* 1)	A	2.0/1.0	2.4/1.2	2.8 / 1.4	2.8 / 1.4	2.8 / 1.4
7	Inrush Current (Typ) (* 3)	–	20A at 115VAC, 40A at 230VAC, Ta=25°C, Cold Start				
8	PFHC	–	Designed to meet IEC61000-3-2				
9	Power Factor (Typ) (115/230VAC) (* 1)	–	0.98 / 0.95				
10	Output Voltage Range	V	2.97 - 3.63	3.78 - 4.62	4.5 - 5.5	10.8 - 13.2	21.6 - 26.4
11	Ripple and Noise (* 1, 4)	mV	120	120	120	120	150
12	Line Regulation (* 5, 6)	mV	20	20	20	48	96
13	Load Regulation (* 5, 7)	mV	40	40	40	96	192
14	Temperature Coefficient	–	Less than 0.02%/°C				
15	Over Current Protection (* 8)		>105%				
16	Over Voltage Protection (* 9)	V	4.00 - 5.25	5.00 - 6.50	5.75 - 7.50	13.8 - 16.2	27.6 - 32.4
17	Hold-Up Time (Typ) (* 1)	ms	20				
18	Leakage current (* 10)	–	Less than 0.75mA at 240VAC				
19	Parallel Operation	–	—				
20	Series Operation	–	Possible				
21	Operating Temperature (* 11)	–	- 25 to + 70 °C (Refer to Output Derating Curve)				
22	Operating Humidity	–	30 to 90 %RH (No dewdrop)				
23	Storage Temperature	–	- 30 to +75°C				
24	Storage Humidity	–	10 to 90 %RH (No dewdrop)				
25	Cooling	–	Convection cooling				
26	Withstand Voltage	–	Input - Output : 3.0kVAC (20mA), Input - FG : 2.0kVAC (20mA) Output - FG : 500VAC (100mA) for 1min.				
27	Isolation Resistance	–	More than 100MΩ at Ta=25°C and 70%RH, Output-FG: 500VDC				
28	Vibration	–	At no operating, 10 - 55Hz (sweep for 1min) 19.6m/s^2 Constant, X, Y, Z 1hour each				
29	Shock	–	Less than 196.1m/s^2				
30	Safety	–	Aproved by UL60950-1, CSA60950-1(cTUVus), EN60950-1				
31	EMI	–	Designed to meet EN55022-B, CISPR22-B				
32	Immunity	–	Designed to meet EN61000-4-2(Level 2,3), -3(Level 3), -4(Level 3), -5(Level 3,4), -6(Level 3), -8(Level 4), -11				
33	Weight (Typ)	g	700				
34	Size (LxWxH)	mm	198 x 102 x 30 (Refer to Outline Drawing)				

*** Read instruction manual carefully , before using the power supply unit.**

= NOTES=

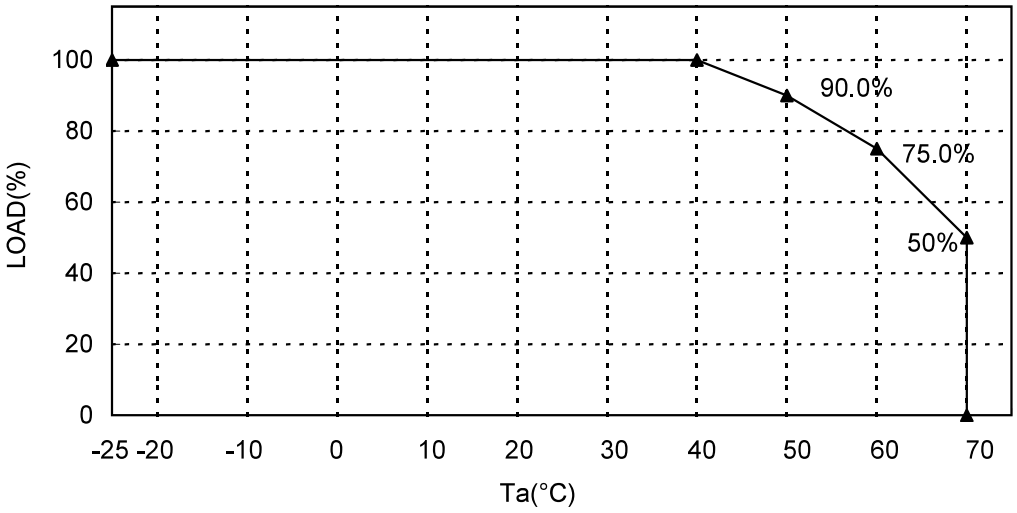
* 1 : At 115VAC/230VAC, Ta=25°C, nominal output voltage and maximum output power.
* 2 : For cases where conformance to various safety specs (UL, CSA, EN) are required, to be described as 100-240VAC, 50 / 60Hz on name plate.
* 3 : Not applicable for the in-rush current to Noise Filter for less than 0.2ms.
* 4 : Ripple & noise are measured at 20MHz by using a 12" twisted pair of load wires terminated with a 0.1uF and 47uF capacitor.
* 5 : Measured line & load regulation at output terminal.
* 6 : 85 - 265VAC, constant load.
* 7 : No load - Full load (Maximum power), constant input voltage.
* 8 : Current limiting (hiccup) with automatic recovery. Avoid to operate at overload or dead short for more than 30seconds.
* 9 : OVP circuit will shutdown output, manual reset (Re power on).
*10 :Measured by each measuring method of UL, CSA, EN (at 60Hz), Ta =25°C.
*11: Refer to output derating curve (CA802-01-02/LD_) for details of output derating versus ambient temperature, input voltage and mounting method.
Load (%) is percent of maximum output power or maximum output current.
Do not exceed its derating of Maximum Load.

CUS250LD

OUTPUT DERATING

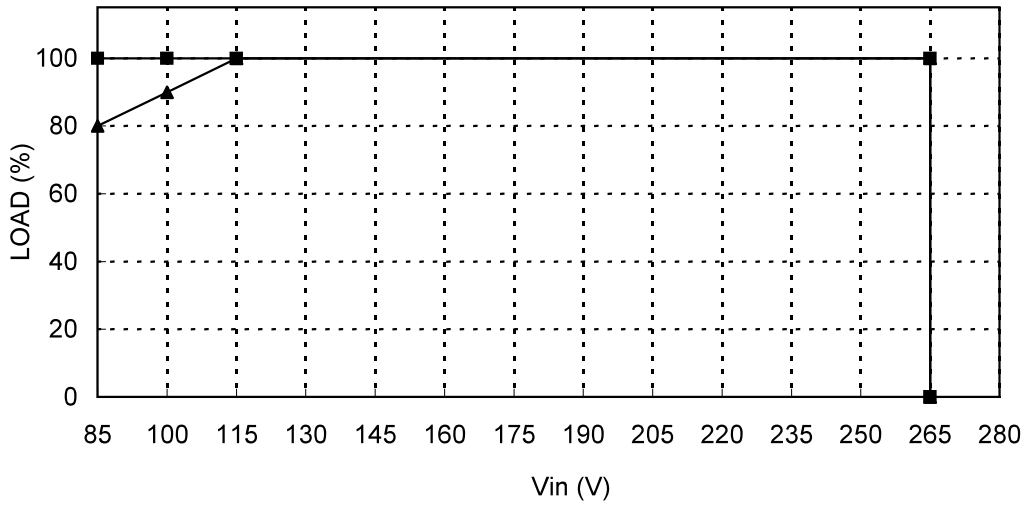
CA802-01-02/LD

OUTPUT DERATING VS AMBIENT TEMPERATURE



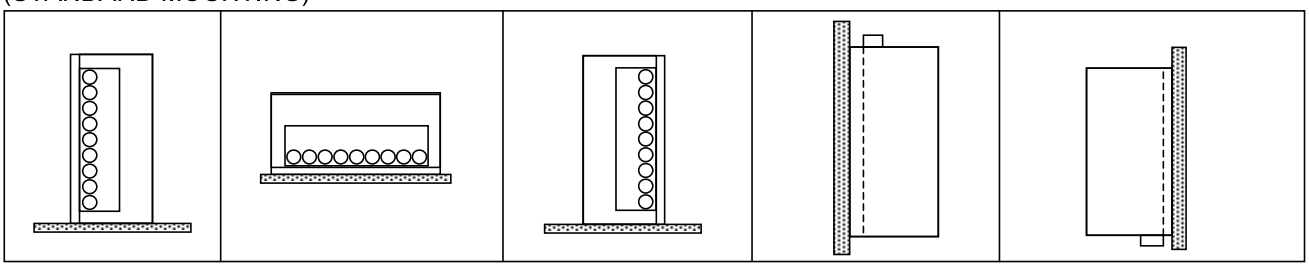
OUTPUT DERATING VS INPUT VOLTAGE

■ :CUS250LD-3 , ▲ :CUS250LD-4, 5, 12, 24



MOUNTING A | MOUNTING B | MOUNTING C | MOUNTING D | MOUNTING E

(STANDARD MOUNTING)



INHIBIT