GXE600

RELIABILITY DATA

信頼性データ

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* 試験結果は、代表データでありますが、全ての製品はほぼ同等な特性を示します。
従いまして、以下の結果は参考値とお考え願います。
Test results are typical data. Nevertheless the following results are considered to be reference data because all units have nearly the same characteristics.

評価負荷条件 Load conditions

Output voltage : 24V, 48V

* 入力電圧が100VACの場合、下記の通り出力ディレーティングが必要です。
Output derating is needed when input voltage is 100VAC.

Vin	Iout : Full load	24V	48V
100 ≦ Vin ＜ 170VAC	83%	20.8A	10.4A
170 ≦ Vin ≦ 265VAC	100%	25.0A	12.5A

Standby supply : 5V 1A (Full load)

1. MTBF計算値 Calculated Values of MTBF

(1) 部品ストレス解析法MTBF Parts stress reliability prediction MTBF

MODEL : GXE600-24

算出方法 Calculating Method

Telcordiaの部品ストレス解析法(*1)で算出されています。
故障率λssiは、それぞれの部品ごとに電気ストレスと動作温度によって決定されます。
Calculated based on parts stress reliability prediction of Telcordia (*1).
Individual failure rate λssi is calculated by the electric stress and temperature rise of the each part.

*1: Telcordia document “Reliability Prediction Procedure for Electronic Equipment”
(Document number SR-332,Issue3)

<算出式>

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\pi_E \sum_{i=1}^{m} (N_i \cdot \lambda_{ssi})} \times 10^9 \text{ 時間 (Hours)}$$

$$\lambda_{ssi} = \lambda_{Gi} \cdot \pi_{Qi} \cdot \pi_{Si} \cdot \pi_{Ti}$$

λ_{equip} : 全機器故障率（FITs） Total equipment failure rate (FITs = Failures in10^9 Hours)

λ_{Gi} : i 番目の部品に対する基礎故障率 Generic failure rate for the ith part

π_{Qi} : i 番目の部品に対する品質ファクタ Quality factor for the ith part

π_{Si} : i 番目の部品に対するストレスファクタ Stress factor for the ith part

π_{Ti} : i 番目の部品に対する温度ファクタ Temperature factor for the ith part

m : 異なる部品の数 Number of different part types

N_i : i 番目の部品の個数 Quantity of ith part type

π_E : 機器の環境ファクタ Equipment environmental factor

MTBF値 MTBF Values

条件 Conditions

- 入力電圧 : 200VAC
  Input voltage
- スタンバイ電圧、電流 : 5VDC, Full load
  Standby voltage & current
- 環境ファクタ : G_F (Ground, Fixed)
  Environmental factor
- 出力電圧、電流 : 24VDC, Full load
  Output voltage & current
- 取付方法 : 標準取付A
  Mounting method : Standard mounting A

SR-332, Issue3

MTBF(Ta=25℃) ≒ 511,677 時間 (Hours)
MTBF(Ta=40℃) ≒ 273,828 時間 (Hours)
MTBF(Ta=50℃) ≒ 174,967 時間 (Hours)

(2) 部品点数法MTBF Part count reliability prediction MTBF

MODEL : GXE600-24

算出方法 Calculating Method

JEITA (RCR-9102B) の部品点数法で算出されています。
それぞれの部品ごとに、部品故障率λ_Gが与えられ、各々の点数によって決定されます。
Calculated based on part count reliability prediction of JEITA (RCR-9102B).
Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

<算出式>

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

λ_{equip} : 全機器故障率 (故障数 / 10^6時間)
Total equipment failure rate (Failure / 10^6Hours)

λ_G : i 番目の同属部品に対する故障率 (故障数 / 10^6時間)
Generic failure rate for the ith generic part (Failure / 10^6Hours)

n_i : i 番目の同属部品の個数
Quantity of ith generic part

n : 異なった同属部品のカテゴリーの数
Number of different generic part categories

π_Q : i 番目の同属部品に対する品質ファクタ (π_Q=1)
Generic quality factor for the ith generic part (π_Q=1)

MTBF値 MTBF Values

G_F : 地上、固定 (Ground, Fixed)

RCR-9102B

MTBF ≒ 51,428 時間 (Hours)

2. 部品ディレーティング Components Derating

MODEL : GXE600-24

(1) 算出方法 Calculating Method

(a) 測定方法 Measuring method

・取付方法 :標準取付 : A Mounting method Standard mounting : A	・周囲温度 :50℃ Ambient temperature
・入力電圧 :100 , 200VAC Input voltage	・出力電圧、電流 :24V, Full load Output voltage & current
・スタンバイ電圧、電流 :5V, Full load Standby voltage & current	

(b) 半導体 Semiconductors

ケース温度、消費電力、熱抵抗より使用状態の接合点温度を求め最大定格接合点温度との比較を求めました。
Compared with maximum junction temperature and actual one which is calculated based on case temperature, power dissipation and thermal impedance.

(c) IC、抵抗、コンデンサ等 IC, Resistors, Capacitors, etc.

周囲温度、使用状態、消費電力など、個々の値は設計基準内に入っています。
Ambient temperature, operating condition, power dissipation and so on are within derating criteria.

(d) 熱抵抗算出方法 Calculating method of thermal impedance

$$\theta j-c=\frac{Tj(max)-Tc}{Pj(max)} \qquad \theta j-a=\frac{Tj(max)-Ta}{Pj(max)}$$

Tc : ディレーティングの始まるケース温度 一般に25ºC
Case Temperature at Start Point of Derating ; 25ºC in General

Ta : ディレーティングの始まる周囲温度 一般に25ºC
Ambient Temperature at Start Point of Derating ; 25ºC in General

Pj(max) (Pch(max)) : 最大接合点(チャネル)損失
Maximum Junction (channel) Dissipation

Tj(max) (Tch(max)) : 最大接合点(チャネル)温度
Maximum Junction (channel) Temperature

θj-c (θch-c) : 接合点(チャネル)からケースまでの熱抵抗
Thermal Impedance between Junction (channel) and Case

θj-a (θch-a) : 接合点(チャネル)から周囲までの熱抵抗
Thermal Impedance between Junction (channel) and Ambient

(2) 部品ディレーティング表 Components Derating List

部品番号 Location No.	Vin = 100VAC Iout = Full load Standby = Full load Ta = 50°C		
Q1 STP40N65M2 STMICRO	Tch (max) = 150 °C Pch = 5.2 W Tch = Tc + ((θch-c) × Pch) = 119.6 °C D.F. = 79.8 %	θch-c = 0.5 °C/W ΔTc = 67 °C	Tc = 117 °C
Q2 STP40N65M2 STMICRO	Tch (max) = 150 °C Pch = 5.2 W Tch = Tc + ((θch-c) × Pch) = 115.6 °C D.F. = 77.1 %	θch-c = 0.5 °C/W ΔTc = 63 °C	Tc = 113 °C
Q3 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 1.5 W Tch = Tc + ((θch-c) × Pch) = 97.2 °C D.F. = 64.8 %	θch-c = 2.78 °C/W ΔTc = 43 °C	Tc = 93 °C
Q4 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch= 1.6 W Tch = Tc + ((θch-c) × Pch) = 100.5 °C D.F. = 67.0 %	θch-c = 2.78 °C/W ΔTc = 46 °C	Tc = 96 °C
Q5 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 1.4 W Tch = Tc + ((θch-c) × Pch) = 97.9 °C D.F. = 65.3 %	θch-c = 2.78 °C/W ΔTc = 44 °C	Tc = 94 °C
Q6 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 1.5 W Tch = Tc + ((θch-c) × Pch) = 101.2 °C D.F. = 67.5 %	θch-c = 2.78 °C/W ΔTc = 47 °C	Tc = 97 °C
Q51, Q52 IPP076N15N5 INFINEON	Tj (max) = 175 °C Pj = 1.2 W Tj = Tc + ((θj-c) × Pj) = 97.9 °C D.F. = 56.0 %	θj-c = 0.7 °C/W ΔTc = 47 °C	Tc = 97 °C
Q53, Q54 IPP076N15N5 INFINEON	Tj (max) = 175 °C Pj = 1.2 W Tj = Tc + ((θj-c) × Pj) = 96.9 °C D.F. = 55.4 %	θj-c = 0.7 °C/W ΔTc = 46 °C	Tc = 96 °C
Q107 TK31V60W TOSHIBA	Tch (max) = 150 °C Pch = 1.6W Tch = Tc + ((θch-c) × Pch) = 99.9 °C D.F. = 66.6%	θch-c = 0.52 °C/W ΔTc = 49 °C	Tc = 99 °C
D1 D25XB60 SHINDENGEN	Tj (max) = 150 °C Pd = 1.7W Tj = Tc + ((θj-c) × Pd) = 106.7 °C D.F. = 71.2 %	θj-c = 1.0 °C/W ΔTc = 55 °C	Tc = 105 °C
D2 SCS306AHGC9 ROHM	Tj (max) = 175 °C Pd = 1.0 W Tj = Tc + ((θj-c) × Pd) = 107.2 °C D.F. = 61.3 %	θj-c = 3.2 °C/W ΔTc = 54 °C	Tc = 104 °C
D3 SCS306AHGC9 ROHM	Tj (max) = 175 °C Pd = 1.0 W Tj = Tc + ((θj-c) × Pd) = 108.2 °C D.F. = 61.9 %	θj-c = 3.2 °C/W ΔTc = 55 °C	Tc = 105 °C

部品番号 Location No.	Vin = 100VAC　Iout = Full load　Standby = Full load　Ta = 50°C		
A1 BM2P061EK ROHM	Tj (max) = 150 °C Pj = 0.5 W Tj = Tc + ((θj-c) × Pj) = 110.0 °C D.F. = 73.4 %	θj-c = 26 °C/W ΔTc = 47 °C	Tc = 97 °C
A829 TLV62150ARGTT TI	Tj (max) = 125 °C Pj = 0.5 W Tj = Tc + ((θj-c) × Pj) = 87.3 °C D.F. = 69.9 %	θj-c = 4.5 °C/W ΔTc = 35 °C	Tc = 85 °C
PC601 TLP785F TOSHIBA	Tj (max) = 125 °C Pd = 3.8 mW Tj = Ta + ((θj-a) × Pd) = 76.6 °C D.F. = 61.3 %	θj-a = 416.7 °C/W ΔTa = 25 °C	Ta = 75 °C
PD501 SML-A12M8TT86 ROHM	If =2.4 mA Allowable If (max) = 17.4mA (at Ta=79.0°C) D.F. = 13.8%	ΔTc = 29 °C	Tc = 79 °C

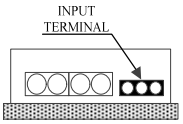
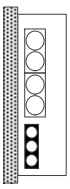
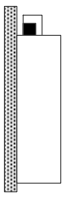
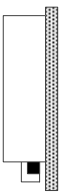
部品番号 Location No.	Vin = 200VAC　Iout = Full load　Standby = Full load　Ta = 50°C		
Q1 STP40N65M2 STMICRO	Tch (max) = 150 °C Pch = 3.5 W Tch = Tc + ((θch-c) × Pch) = 94.8 °C D.F. = 63.2 %	θch-c = 0.5 °C/W ΔTc = 43 °C	Tc = 93 °C
Q2 STP40N65M2 STMICRO	Tch (max) = 150 °C Pch = 3.5 W Tch = Tc + ((θch-c) × Pch) = 91.8 °C D.F. = 61.2 %	θch-c = 0.5 °C/W ΔTc = 40°C	Tc = 90 °C
Q3 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 1.6 W Tch = Tc + ((θch-c) × Pch) = 99.5 °C D.F. = 66.4 %	θch-c = 2.78 °C/W ΔTc = 45 °C	Tc = 95 °C
Q4 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch= 1.9 W Tch = Tc + ((θch-c) × Pch) = 103.3 °C D.F. = 68.9 %	θch-c = 2.78 °C/W ΔTc = 48 °C	Tc = 98 °C
Q5 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 1.9 W Tch = Tc + ((θch-c) × Pch) = 103.3 °C D.F. = 68.9 %	θch-c = 2.78 °C/W ΔTc = 48 °C	Tc = 98 °C
Q6 TK20A60W5 TOSHIBA	Tch (max) = 150 °C Pch = 2.0 W Tch = Tc + ((θch-c) × Pch) = 104.6 °C D.F. = 69.8 %	θch-c = 2.78 °C/W ΔTc = 49 °C	Tc = 99 °C
Q51, Q52 IPP076N15N5 INFINEON	Tj (max) = 175 °C Pj = 1.4 W Tj = Tc + ((θj-c) × Pj) = 107.0 °C D.F. = 61.2 %	θj-c = 0.7 °C/W ΔTc = 56 °C	Tc = 106 °C
Q53, Q54 IPP076N15N5 INFINEON	Tj (max) = 175 °C Pj = 1.4 W Tj = Tc + ((θj-c) × Pj) = 107.0 °C D.F. = 61.2 %	θj-c = 0.7 °C/W ΔTc = 56 °C	Tc = 106 °C
Q107 TK31V60W TOSHIBA	Tch (max) = 150 °C Pch = 1.6W Tch = Tc + ((θch-c) × Pch) = 87.9 °C D.F. = 58.6%	θch-c = 0.52 °C/W ΔTc = 37 °C	Tc = 87 °C
D1 D25XB60 SHINDENGEN	Tj (max) = 150 °C Pd = 0.4W Tj = Tc + ((θj-c) × Pd) = 86.4 °C D.F. = 57.6 %	θj-c = 1.0 °C/W ΔTc = 36 °C	Tc = 86 °C
D2 SCS306AHGC9 ROHM	Tj (max) = 175 °C Pd = 2.0 W Tj = Tc + ((θj-c) × Pd) = 94.4 °C D.F. = 54.0 %	θj-c = 3.2 °C/W ΔTc = 38 °C	Tc = 88 °C
D3 SCS306AHGC9 ROHM	Tj (max) = 175 °C Pd = 2.0 W Tj = Tc + ((θj-c) × Pd) = 95.4 °C D.F. = 54.6 %	θj-c = 3.2 °C/W ΔTc = 39 °C	Tc = 89 °C

部品番号 Location No.	Vin = 200VAC　Iout = Full load　Standby = Full load　Ta = 50°C		
A1 BM2P061EK ROHM	Tj (max) = 150 °C Pj = 0.5 W Tj = Tc + ((θj-c) × Pj) = 108.0 °C D.F. = 72.0 %	θj-c = 26 °C/W ΔTc = 45 °C	 Tc = 95 °C
A829 TLV62150ARGTT TI	Tj (max) = 125 °C Pj = 0.5 W Tj = Tc + ((θj-c) × Pj) = 87.3 °C D.F. = 69.9 %	θj-c = 4.5 °C/W ΔTc = 35 °C	 Tc = 85 °C
PC601 TLP785F TOSHIBA	Tj (max) = 125 °C Pd = 3.8 mW Tj = Ta + ((θj-a) × Pd) = 74.6 °C D.F. = 59.7 %	θj-a = 416.7 °C/W ΔTa = 23 °C	 Ta = 73 °C
PD501 SML-A12M8TT86 ROHM	 If = 2.4 mA Allowable If (max) = 17.8mA (at Ta=78.0°C) D.F. = 13.5%	 ΔTc = 28 °C	 Tc = 78 °C

3. 主要部品温度上昇値 Main Components Temperature Rise △T List

MODEL : GXE600-24

(1) 測定条件 Measuring Conditions

	Mounting A	Mounting B	Mounting C	Mounting D
取付方法 Mounting Method (標準取付 : A) (Standard Mounting : A)				
入力電圧 Vin Input Voltage	100VAC			
出力電圧 Vout Output Voltage	24VDC			
出力電流 Iout Output Current	Full load			
スタンバイ電圧、電流 Standby Voltage & Current	5VDC , Full load			

(2) 測定結果 Measuring Results

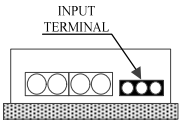
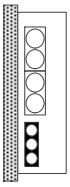
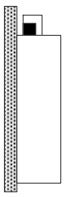
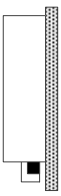
		ΔT Temperature Rise (℃)			
出力ディレーティング Output Derating		Iout = Full load			
		Ta = 50℃	Ta = 50℃	Ta = 45℃	Ta = 50℃
部品番号	部品名	取付方向	取付方向	取付方向	取付方向
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D
Q1	MOS FET	67	64	63	66
Q2	MOS FET	63	60	58	62
Q3	MOS FET	43	33	34	47
Q4	MOS FET	46	39	39	46
Q5	MOS FET	44	35	36	49
Q6	MOS FET	47	40	40	47
Q51	MOS FET	47	42	47	33
Q52	MOS FET	45	42	46	32
Q53	MOS FET	46	43	45	33
Q54	MOS FET	46	44	47	33
Q107	MOS FET	49	45	44	57
D1	BRIDGE DIODE	55	50	51	51
D2	S.B.D.	54	50	50	52
D3	S.B.D.	55	51	51	54
D605	S.B.D.	50	53	45	54
A1	IPD	47	49	43	57
A302	IC	27	25	25	36
A801	IC	34	45	33	30
A826	IC	27	39	26	25
A829	IC	35	45	27	33
T1	TRANS	64	58	63	58
T2	TRANS	36	33	30	40
T3	CURRENT TRANS	33	32	24	35

出力ディレーティング Output Derating		ΔT Temperature Rise (℃) Iout = Full load			
		Ta = 50℃	Ta = 50℃	Ta = 45℃	Ta = 50℃
部品番号	部品名	取付方向	取付方向	取付方向	取付方向
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D
T4	TRANS	37	41	37	38
T5	TRANS	39	40	36	42
L1	BALUN	60	51	60	53
L2	BALUN	60	51	59	52
L3	CHOKE COIL	61	53	53	53
L4	CHOKE COIL	61	53	51	60
L23	CHOKE COIL	44	38	51	37
L51	CHOKE COIL	55	46	57	45
L816	CHOKE COIL	33	43	26	31
C10	E.CAP.	25	22	20	30
C11	E.CAP.	27	22	22	33
C12	E.CAP.	27	24	23	34
C13	E.CAP.	30	24	25	37
C14	E.CAP.	28	22	23	36
C21	E.CAP.	16	20	12	35
C51	E.CAP.	22	19	31	14
C52	E.CAP.	26	20	32	17
C53	E.CAP.	27	26	27	20
C54	E.CAP.	23	19	32	16
C61	E.CAP.	22	27	18	26
C63	E.CAP.	20	28	17	27
PC601	PHOTO COUPLER	25	29	21	36
PD501	LED	29	26	33	26

3. 主要部品温度上昇値 Main Components Temperature Rise △T List

MODEL : GXE600-24

(1) 測定条件 Measuring Conditions

	Mounting A	Mounting B	Mounting C	Mounting D
取付方法 Mounting Method (標準取付 : A) (Standard Mounting : A)				
入力電圧 Vin Input Voltage	200VAC			
出力電圧 Vout Output Voltage	24VDC			
出力電流 Iout Output Current	Full load			
スタンバイ電圧、電流 Standby Voltage & Current	5VDC , Full load			

(2) 測定結果 Measuring Results

		ΔT Temperature Rise (℃)			
出力ディレーティング Output Derating		Iout = Full load			
		Ta = 50℃	Ta = 50℃	Ta = 45℃	Ta = 50℃
部品番号	部品名	取付方向	取付方向	取付方向	取付方向
Location No.	Part name	Mounting A	Mounting B	Mounting C	Mounting D
Q1	MOS FET	43	40	40	43
Q2	MOS FET	40	38	37	40
Q3	MOS FET	45	34	37	54
Q4	MOS FET	48	38	42	52
Q5	MOS FET	48	37	39	56
Q6	MOS FET	49	39	43	53
Q51	MOS FET	56	49	55	40
Q52	MOS FET	55	48	55	39
Q53	MOS FET	56	50	53	40
Q54	MOS FET	55	51	55	39
Q107	MOS FET	37	33	33	44
D1	BRIDGE DIODE	36	31	32	34
D2	S.B.D.	38	34	35	37
D3	S.B.D.	39	35	35	39
D605	S.B.D.	48	50	43	54
A1	IPD	45	45	41	56
A302	IC	25	22	22	33
A801	IC	36	48	35	33
A826	IC	28	41	27	27
A829	IC	35	44	27	36
T1	TRANS	75	66	74	70
T2	TRANS	35	30	28	41
T3	CURRENT TRANS	33	31	24	39

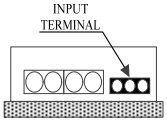
出力ディレーティング Output Derating		ΔT Temperature Rise (℃) Iout = Full load			
		Ta = 50℃	Ta = 50℃	Ta = 45℃	Ta = 50℃
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B	取付方向 Mounting C	取付方向 Mounting D
T4	TRANS	36	39	36	41
T5	TRANS	39	39	36	45
L1	BALUN	33	25	34	27
L2	BALUN	36	27	34	30
L3	CHOKE COIL	45	37	38	40
L4	CHOKE COIL	44	37	36	46
L23	CHOKE COIL	28	22	31	22
L51	CHOKE COIL	62	51	64	53
L816	CHOKE COIL	33	41	25	34
C10	E.CAP.	21	18	17	29
C11	E.CAP.	22	17	18	29
C12	E.CAP.	24	18	19	31
C13	E.CAP.	24	18	19	31
C14	E.CAP.	23	17	18	30
C21	E.CAP.	15	18	13	35
C51	E.CAP.	25	20	33	14
C52	E.CAP.	29	20	33	19
C53	E.CAP.	28	27	29	21
C54	E.CAP.	25	18	33	16
C61	E.CAP.	23	28	19	27
C63	E.CAP.	20	24	18	27
PC601	PHOTO COUPLER	23	26	19	35
PD501	LED	28	30	34	25

4. 電解コンデンサ推定寿命計算値 Electrolytic Capacitor Lifetime

MODEL ： GXE600

空冷条件：自然空冷 **Cooling condition：Convection cooling**

取付方向 **A**
Mounting A

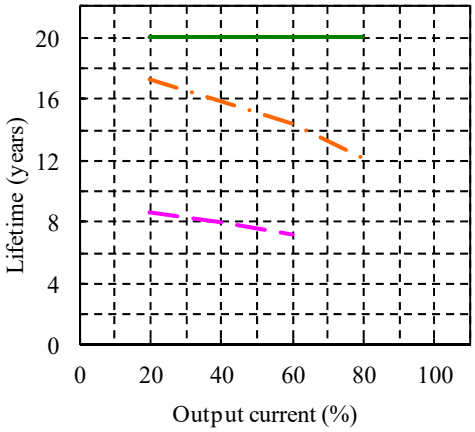


Conditions Ta 40°C :
50°C :
60°C :

24V

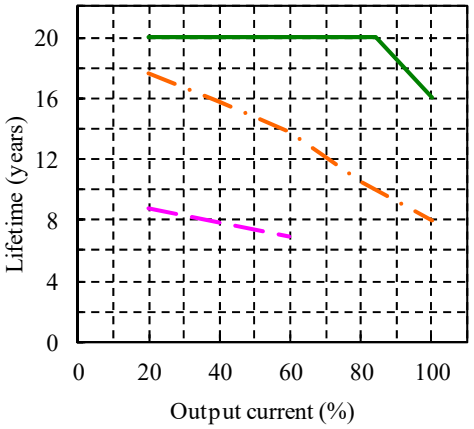
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	17.2	8.6
40%	20.0	15.8	7.9
60%	20.0	14.4	7.2
80%	20.0	12.2	-
100%	-	-	-



Vin = 200VAC

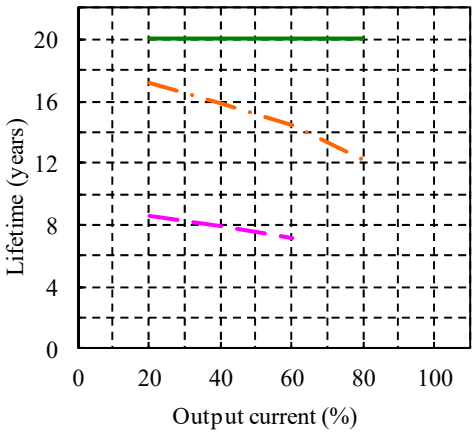
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	17.6	8.8
40%	20.0	15.8	7.9
60%	20.0	13.8	6.9
80%	20.0	10.5	-
100%	16.1	8.0	-



48V

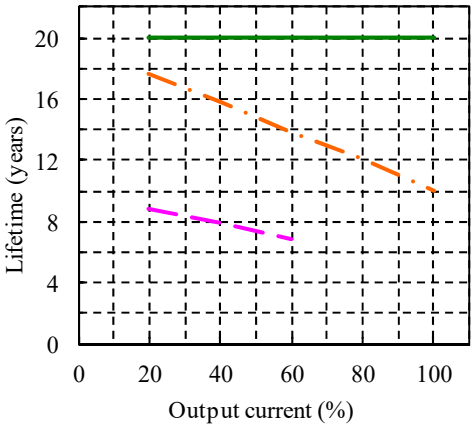
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	17.2	8.6
40%	20.0	15.8	7.9
60%	20.0	14.4	7.2
80%	20.0	12.2	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	17.6	8.8
40%	20.0	15.8	7.9
60%	20.0	13.8	6.9
80%	20.0	12.1	-
100%	20.0	10.1	-



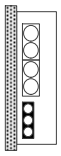
上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

MODEL ： GXE600

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 **B**

Mounting B



Conditions　Ta　40°C ：

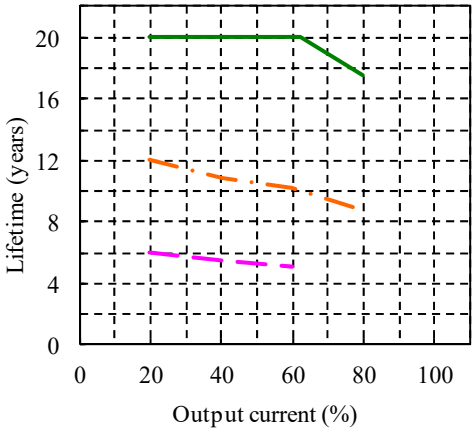
50°C ：

60°C ：

24V

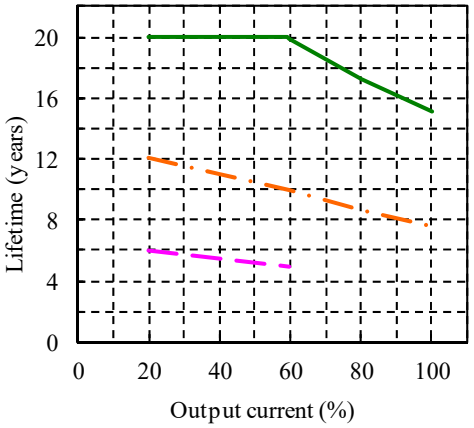
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.1	6.0
40%	20.0	10.9	5.4
60%	20.0	10.2	5.1
80%	17.6	8.8	-
100%	-	-	-



Vin = 200VAC

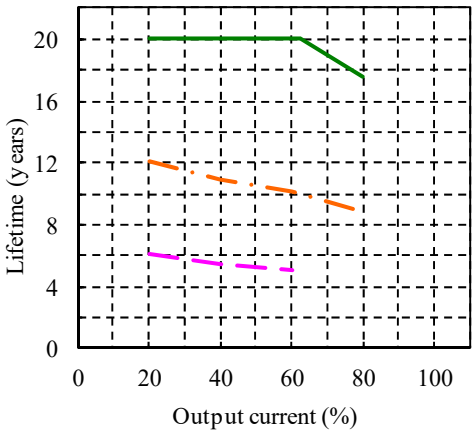
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.1	6.0
40%	20.0	11.0	5.5
60%	19.9	10.0	5.0
80%	17.2	8.6	-
100%	15.1	7.5	-



48V

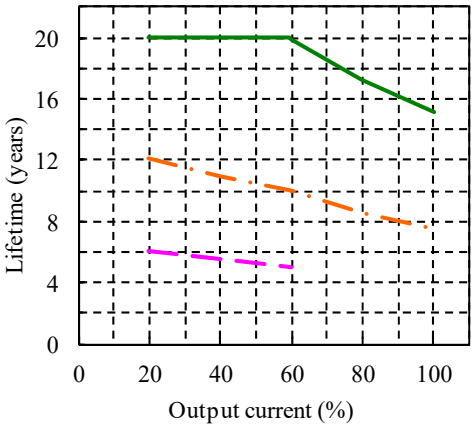
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.1	6.0
40%	20.0	10.9	5.4
60%	20.0	10.2	5.1
80%	17.6	8.8	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.1	6.0
40%	20.0	11.0	5.5
60%	19.9	10.0	5.0
80%	17.2	8.6	-
100%	15.1	7.5	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

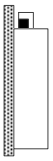
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

MODEL ： GXE600

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 C

Mounting C



Conditions　Ta　40°C ：

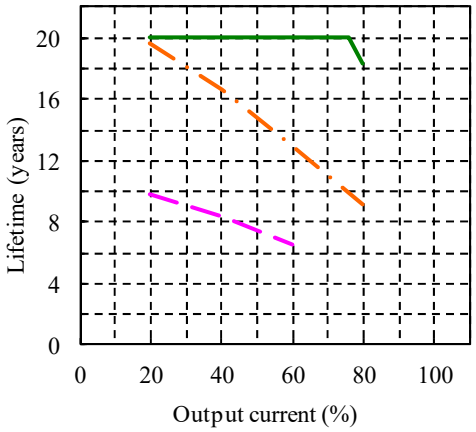
50°C ：

60°C ：

24V

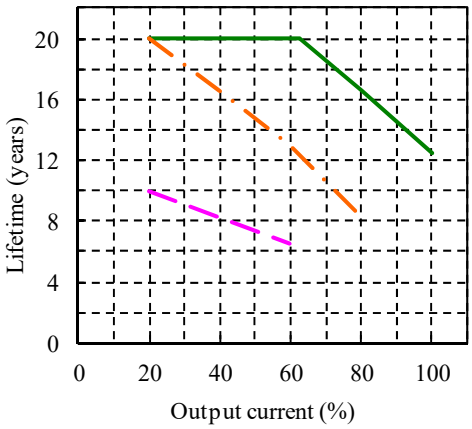
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	19.6	9.8
40%	20.0	16.6	8.3
60%	20.0	13.0	6.5
80%	18.3	9.2	-
100%	-	-	-



Vin = 200VAC

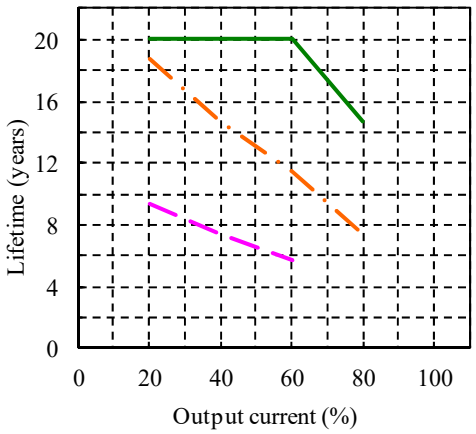
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	20.0	10.0
40%	20.0	16.5	8.3
60%	20.0	13.0	6.5
80%	16.5	8.3	-
100%	12.5	-	-



48V

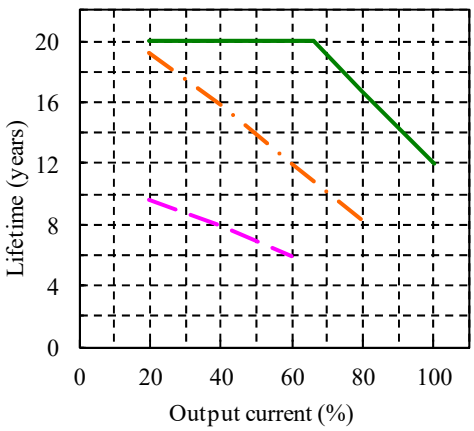
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	18.8	9.4
40%	20.0	14.7	7.4
60%	20.0	11.4	5.7
80%	14.7	7.4	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	19.2	9.6
40%	20.0	15.8	7.9
60%	20.0	12.0	6.0
80%	16.7	8.3	-
100%	12.0	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

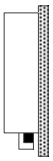
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

MODEL ： GXE600

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 **D**

Mounting D



Conditions　Ta　40°C ：

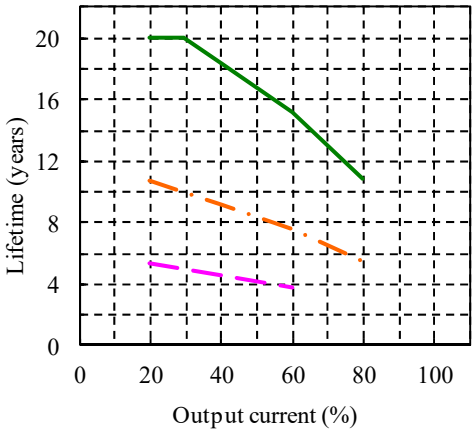
50°C ：

60°C ：

24V

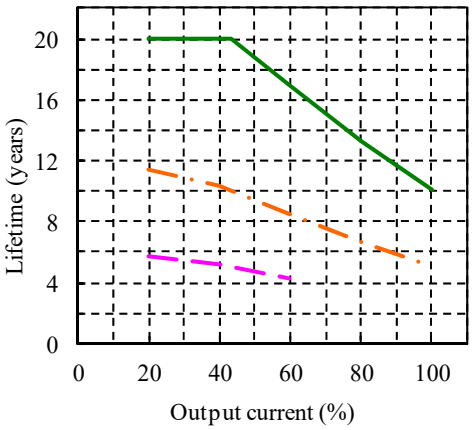
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	10.7	5.4
40%	18.4	9.2	4.6
60%	15.2	7.6	3.8
80%	10.9	5.5	-
100%	-	-	-



Vin = 200VAC

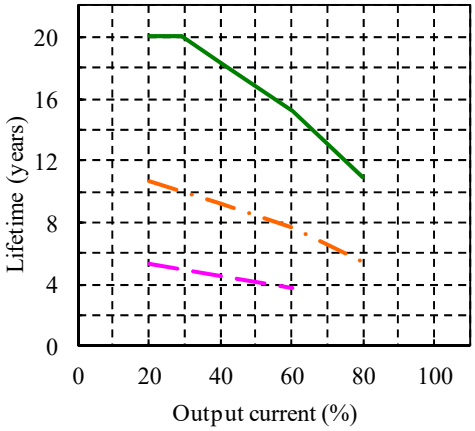
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	11.4	5.7
40%	20.0	10.3	5.2
60%	17.0	8.5	4.3
80%	13.3	6.6	-
100%	10.1	5.1	-



48V

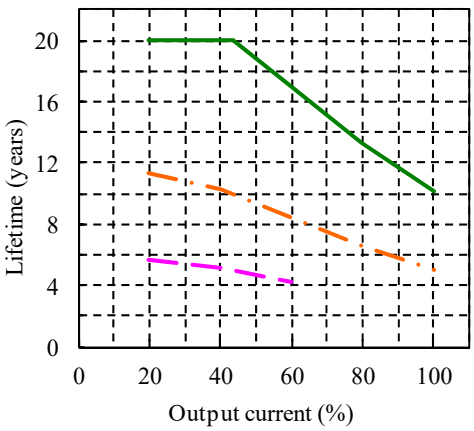
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	10.7	5.4
40%	18.4	9.2	4.6
60%	15.2	7.6	3.8
80%	10.9	5.5	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	11.4	5.7
40%	20.0	10.3	5.2
60%	17.0	8.5	4.3
80%	13.3	6.6	-
100%	10.1	5.1	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

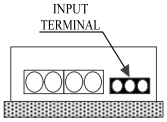
MODEL ： GXE600/A

カバー付きタイプオプション　　**With cover type (Option model)**

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 **A**

Mounting A



Conditions　Ta　40°C ：

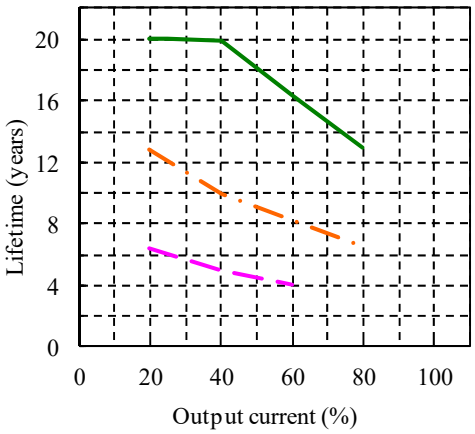
50°C ：

60°C ：

24V

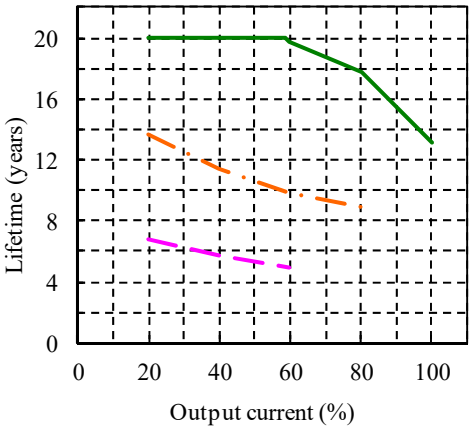
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.8	6.4
40%	19.9	10.0	5.0
60%	16.4	8.2	4.1
80%	13.0	6.5	-
100%	-	-	-



Vin = 200VAC

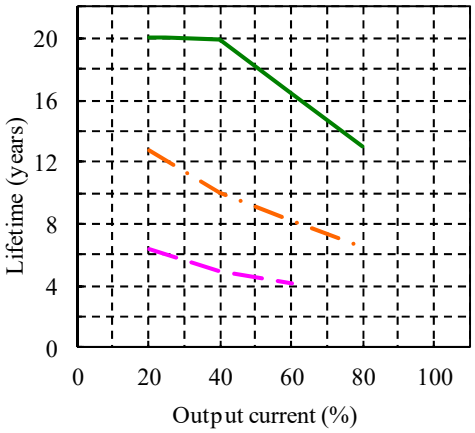
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	13.6	6.8
40%	20.0	11.4	5.7
60%	19.8	9.9	4.9
80%	17.7	8.9	-
100%	13.1	-	-



48V

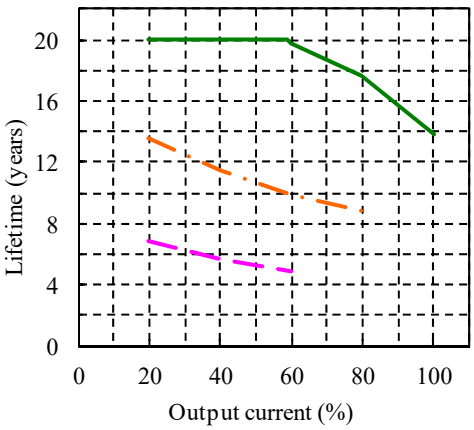
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.8	6.4
40%	19.9	10.0	5.0
60%	16.4	8.2	4.1
80%	13.0	6.5	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	13.6	6.8
40%	20.0	11.4	5.7
60%	19.8	9.9	4.9
80%	17.7	8.9	-
100%	13.9	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

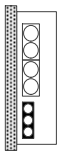
MODEL ： GXE600/A

カバー付きタイプオプション　**With cover type (Option model)**

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 **B**

Mounting B



Conditions　Ta　40°C ：

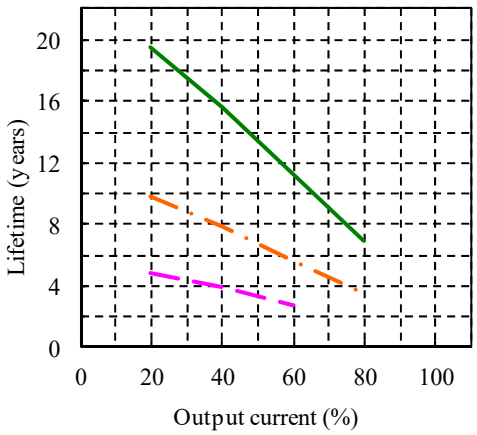
50°C ：

60°C ：

24V

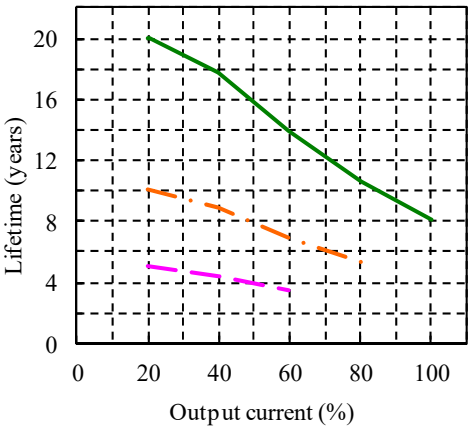
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	19.5	9.8	4.9
40%	15.6	7.8	3.9
60%	11.2	5.6	2.8
80%	6.9	3.5	-
100%	-	-	-



Vin = 200VAC

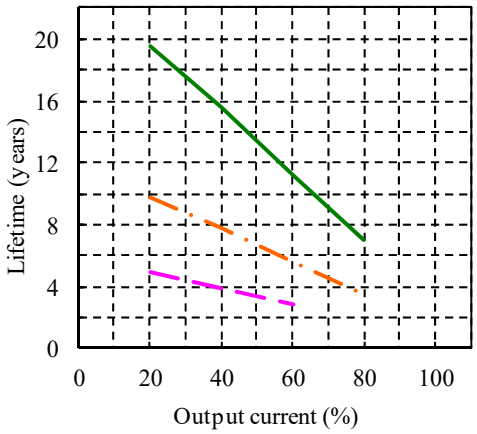
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	10.0	5.0
40%	17.7	8.9	4.4
60%	13.9	6.9	3.5
80%	10.7	5.3	-
100%	8.1	-	-



48V

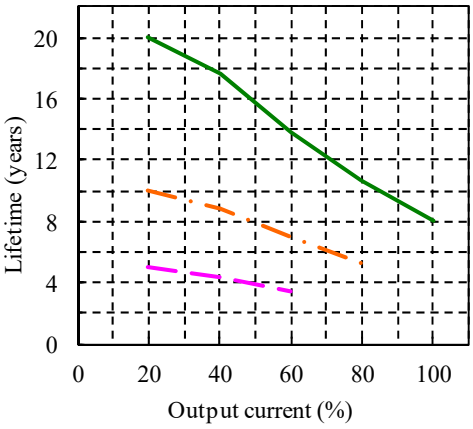
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	19.5	9.8	4.9
40%	15.6	7.8	3.9
60%	11.2	5.6	2.8
80%	6.9	3.5	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	10.0	5.0
40%	17.7	8.9	4.4
60%	13.9	6.9	3.5
80%	10.7	5.3	-
100%	8.1	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

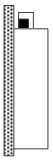
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

MODEL ： GXE600/A

カバー付きタイプオプション　　**With cover type (Option model)**

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 C
Mounting C

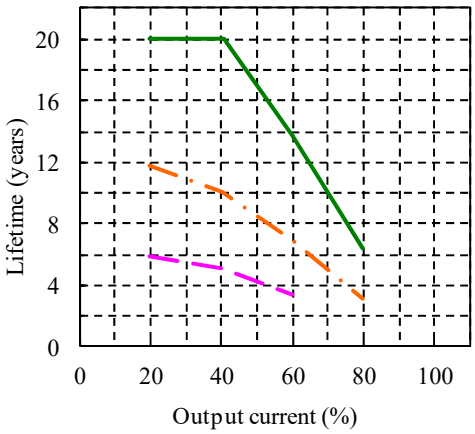


Conditions　Ta　40°C ：
50°C ：
60°C ：

24V

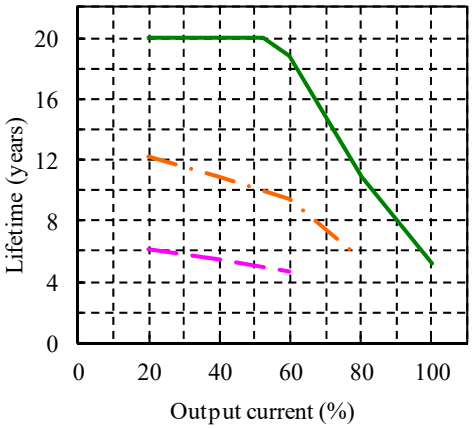
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	11.8	5.9
40%	20.0	10.1	5.0
60%	13.8	6.9	3.4
80%	6.4	3.2	-
100%	-	-	-



Vin = 200VAC

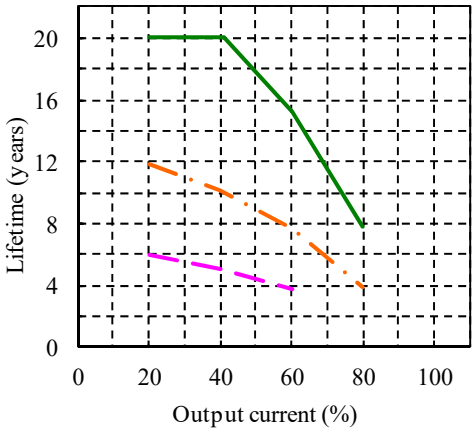
Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.3	6.1
40%	20.0	10.9	5.4
60%	18.8	9.4	4.7
80%	10.9	5.4	-
100%	5.3	-	-



48V

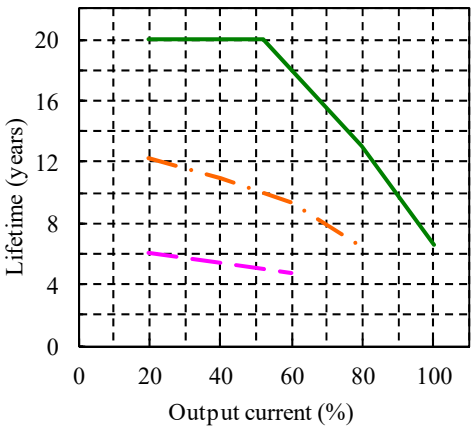
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	11.8	5.9
40%	20.0	10.1	5.0
60%	15.2	7.6	3.8
80%	7.7	3.9	-
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	40°C	50°C	60°C
20%	20.0	12.3	6.1
40%	20.0	10.9	5.4
60%	20.0	9.4	4.7
80%	13.0	6.5	-
100%	6.6	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

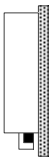
MODEL ： GXE600/A

カバー付きタイプオプション　**With cover type (Option model)**

空冷条件：自然空冷　**Cooling condition：Convection cooling**

取付方向 **D**

Mounting D



Conditions　Ta　30°C ： - - - - - -

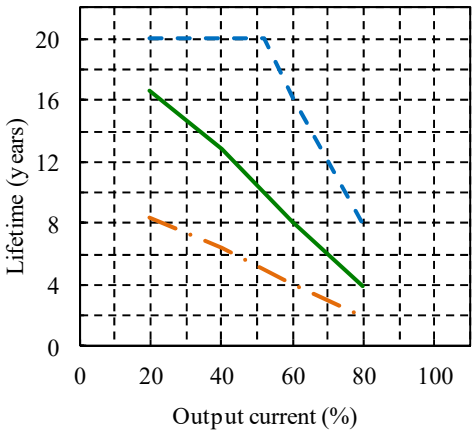
40°C ： ——

50°C ： -·-·-·-

24V

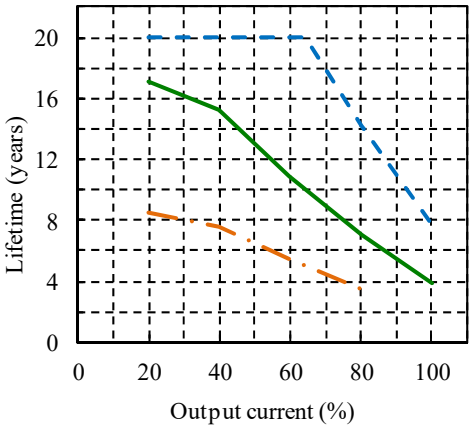
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	30°C	40°C	50°C
20%	20.0	16.6	8.3
40%	20.0	12.8	6.4
60%	16.2	8.1	4.1
80%	7.9	4.0	2.0
100%	-	-	-



Vin = 200VAC

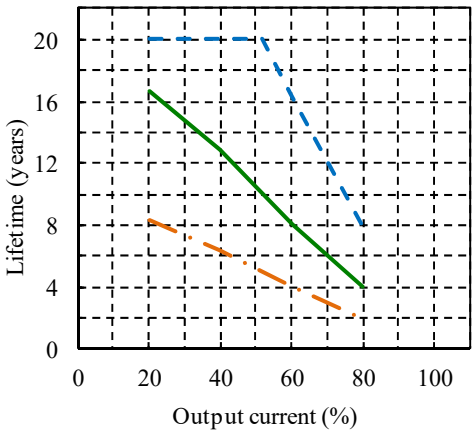
Load \ Ta	Lifetime (years)		
	30°C	40°C	50°C
20%	20.0	17.1	8.6
40%	20.0	15.2	7.6
60%	20.0	10.9	5.4
80%	14.1	7.1	3.5
100%	7.7	3.9	-



48V

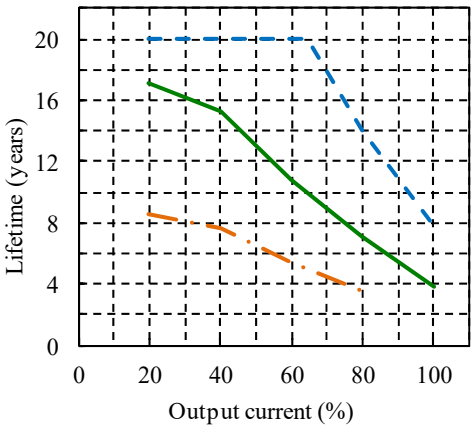
Vin = 100VAC

Load \ Ta	Lifetime (years)		
	30°C	40°C	50°C
20%	20.0	16.6	8.3
40%	16.2	12.8	6.4
60%	16.2	8.1	4.1
80%	7.9	4.0	2.0
100%	-	-	-



Vin = 200VAC

Load \ Ta	Lifetime (years)		
	30°C	40°C	50°C
20%	20.0	17.1	8.6
40%	20.0	15.2	7.6
60%	20.0	10.9	5.4
80%	14.1	7.1	3.5
100%	7.7	3.9	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ｺﾞﾑの劣化等の影響を含めておりません。

The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

5. アブノーマル試験 Abnormal Test

MODEL : GXE600-48

(1) 試験条件 Test Conditions

Input : 265VAC Output : 48V, Full load Standby : 5V, Full load Ta : 25°C

(2) 試験結果 Test Results

(Da : Damaged)

No.	Test position		Test mode		Test result													
					a	b	c	d	e	f	g	h	i	j	k	l		
	部品No.	試験端子	ショート	オープン	発火	発煙	破裂	異臭	赤熱	破損	ヒューズ断	OVP	OCP	出力断	変化なし	その他		記事
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse blown			No output	No change	Others		Note
1	Q1	D-S	○								○			○				Da:F1
2		D-G	○							○	○			○				Da:F1,Q1
3		G-S	○													○		入力電力増加 Input power increase
4		D		○												○		入力電力増加 Input power increase
5		S		○												○		入力電力増加 Input power increase
6		G		○						○	○			○				Da:F1,Q1
7	Q2	D-S	○								○			○				Da:F1
8		D-G	○							○	○			○				Da:F1,Q2
9		G-S	○													○		入力電力増加 Input power increase
10		D		○												○		入力電力増加 Input power increase
11		S		○												○		入力電力増加 Input power increase
12		G		○						○	○			○				Da:F1,Q2
13	Q3	D-S	○										○	○				
14		D-G	○							○			○	○				Da:Q3
15		G-S	○													○		出力電圧低下 Output voltage decrease
16		D		○												○		出力電圧低下 Output voltage decrease
17		S		○						○				○				Da:Q3,R117,R118,A501
18		G		○									○	○				
19	Q4	D-S	○										○	○				
20		D-G	○							○			○	○				Da:Q4
21		G-S	○													○		出力電圧低下 Output voltage decrease
22		D		○												○		出力電圧低下 Output voltage decrease
23		S		○						○				○				Da:Q4,R120,R121A501
24		G		○									○	○				

(Da : Damaged)

No.	Test position		Test mode		Test result												
					a	b	c	d	e	f	g	h	i	j	k	l	
	部品No. Location No.	試験端子 Test point	ショート Short	オープン Open	発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	赤熱 Red hot	破損 Damaged	ヒューズ断 Fuse blown	OVP	OCP	出力断 No output	変化なし No change	その他 Others	記事 Note
25	Q5	D-S	○										○	○			
26		D-G	○							○			○	○			Da:Q5
27		G-S	○													○	出力電圧低下 Output voltage decrease
28		D		○												○	出力電圧低下 Output voltage decrease
29		S		○						○				○			Da:Q5,R123,R124,A502
30		G		○									○	○			
31	Q6	D-S	○										○	○			
32		D-G	○							○			○	○			Da:Q6
33		G-S	○													○	出力電圧低下 Output voltage decrease
34		D		○												○	出力電圧低下 Output voltage decrease
35		S		○						○				○			Da:Q6,R126,R127,A502
36		G		○									○	○			
37	Q51	D-S	○							○			○	○			Da:Q53
38		D-G	○							○			○	○			Da:Q51
39		G-S	○										○	○			
40		D		○												○	出力電圧低下 Output voltage decrease
41		S		○						○			○	○			Da:Q51
42		G		○						○			○	○			Da:Q53
43	Q53	D-S	○							○			○	○			Da:Q51
44		D-G	○							○			○	○			Da:Q53
45		G-S	○										○	○			
46		D		○												○	出力電圧低下 Output voltage decrease
47		S		○						○			○	○			Da:Q53
48		G		○						○			○	○			Da:Q51
49	Q107	D-S	○												○		
50		D-G	○												○		
51		G-S	○							○				○			Da:TFR1
52		D		○						○				○			Da:TFR1
53		S		○						○				○			Da:TFR1
54		G		○						○				○			Da:TFR1
55	D1	AC-AC	○								○			○			Da:F1
56		DC-DC	○								○			○			Da:F1
57		AC-DC	○								○			○			Da:F1
58		AC		○											○		
59		DC (+)		○											○		
60		DC (-)		○											○		
61	D2	A-K	○								○			○			Da:F1
62		A/K		○						○	○			○			Da:F1, Q1
63	D605	A-K	○							○	○			○			Da:F3,A1,R233
64		A/K		○										○			

(Da : Damaged)

No.	Test position		Test mode		Test result												記事 Note
					a	b	c	d	e	f	g	h	i	j	k	l	
	部品No. Location No.	試験端子 Test point	ショート Short	オープン Open	発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	赤熱 Red hot	破損 Damaged	ヒューズ断 Fuse blown	OVP	OCP	出力断 No output	変化なし No change	その他 Others	
65	T1	1-2	○										○	○			
66		3-4	○										○	○			
67		4-5	○										○	○			
68		3-5	○										○	○			
69		1/2		○										○			
70		3		○												○	出力電圧低下 Output voltage decrease
71		4		○												○	出力電圧低下 Output voltage decrease
72		5		○										○			
73	T2	1-2	○							○	○			○			Da:F3,A1,R233
74		2-3	○							○	○			○			Da:F3,A1,R233
75		1-3	○											○			
76		3-4	○								○			○			Da:F3
77		4-5	○											○			
78		6-7	○							○	○			○			Da:F3,A1,R233
79		9-10	○											○			
80		1/3		○										○			
81		2		○											○		
82		4/5		○						○				○			Da:TFR1
83		6/7		○										○			
84		9/10		○										○			
85	T3	1-2	○												○		
86		3-4	○												○		
87		1/2		○						○			○	○			Da:Q3,Q4
88		3/4		○											○		
89	T4	1-2	○													○	出力電圧低下 Output voltage decrease
90		3-4	○													○	出力電圧低下 Output voltage decrease
91		5-6	○													○	出力電圧低下 Output voltage decrease
92		7-8	○													○	出力電圧低下 Output voltage decrease
93		1/2		○												○	出力電圧低下 Output voltage decrease
94		3/4		○											○		
95		5/6		○											○		
96		7/8		○												○	出力電圧低下 Output voltage decrease
97	C51		○										○	○			
98				○											○		
99	C919		○													○	Standby supply : 出力断 Standby supply : No output
100				○											○		

6. 振動試験 Vibration Test

MODEL : GXE600-48

(1) 振動試験種類 Vibration Test Class

掃引振動数耐久試験 Frequency variable endurance test

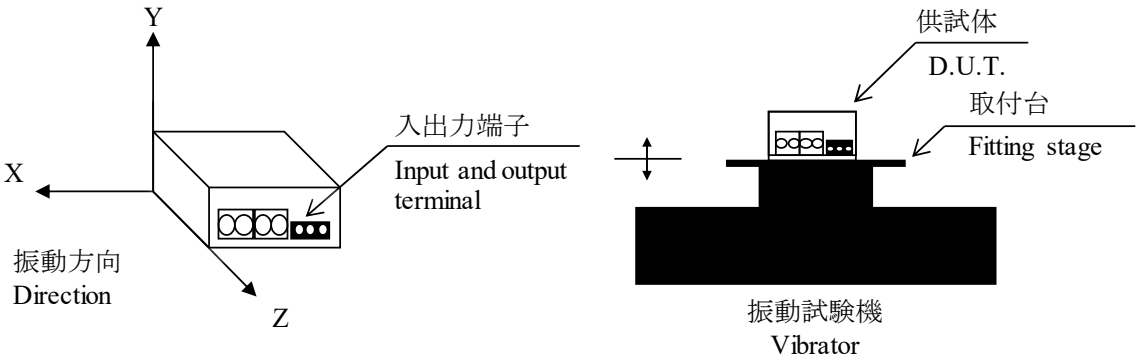
(2) 使用振動試験装置 Equipment Used

IMV CORP. EM2201

(3) 試験条件 Test Conditions

- 周波数範囲 Sweep frequency : 10 - 55Hz
- 掃引時間 Sweep time : 1.0分間 1.0min
- 加速度 Acceleration : 一定 19.6m/s^2 (2G) Constant
- 振動方向 Direction : X, Y, Z
- 試験時間 Sweep count : 各方向共 1時間 1 hour each

(4) 試験方法 Test Method



(5) 判定条件 Acceptable Conditions

1. 破損しない事
   Not to be broken.
2. 試験後の出力に異常がない事
   No abnormal output after test.

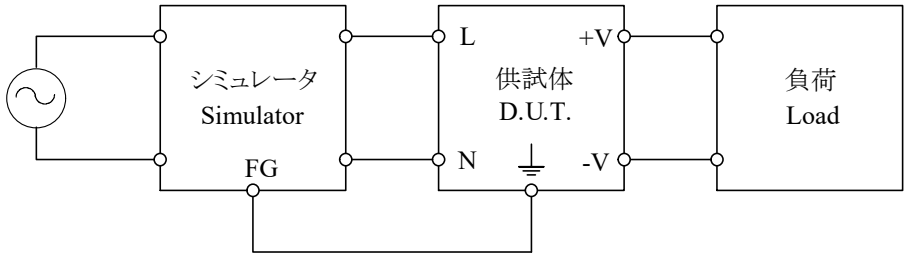
(6) 試験結果 Test Results

合格 OK

7. ノイズシミュレート試験 Noise Simulate Test

MODEL : GXE600-48

(1) 試験回路及び測定器 Test Circuit and Equipment



シミュレータ :INS-AX2-450TH （ノイズ研究所）
Simulator (Noise Laboratory Co.,LTD)

(2) 試験条件 Test Conditions

- 入力電圧 Input voltage : 100、230VAC
- 出力電圧 Output voltage : 定格 Nominal
- 出力電流 Output current : 0%、Full load
- スタンバイ電圧 Standby voltage : 5VDC
- スタンバイ電流 Standby current : 0%、Full load
- 周囲温度 Ambient temperature : 25°C
- ノイズ電圧 Noise level : 0 - 2kV
- 位相 Phase : 0 - 360 deg
- 極性 Polarity : ＋、－
- 印加モード Mode : コモン、ディファレンシャル Common, Differential
- パルス幅 Pulse width : 50 - 1000ns
- トリガ選択 Trigger select : Line

※GXEの各種機能は、工場出荷時の設定です。詳細は取扱説明書をご参照ください。
The various functions of the GXE are factory default settings. Refer to Instruction Manual.

(3) 判定条件 Acceptable Conditions

1. 試験中、5%を超える出力電圧の変動のない事
   The regulation of output voltage must not exceed 5% of initial value during test.

2. 試験後の出力電圧は初期値から変動していない事
   The output voltage must be within the regulation of specification after the test.

3. 発煙・発火のない事
   Smoke and fire are not allowed.

(4) 試験結果 Test Results

合格 OK

8. 熱衝撃試験 Thermal Shock Test

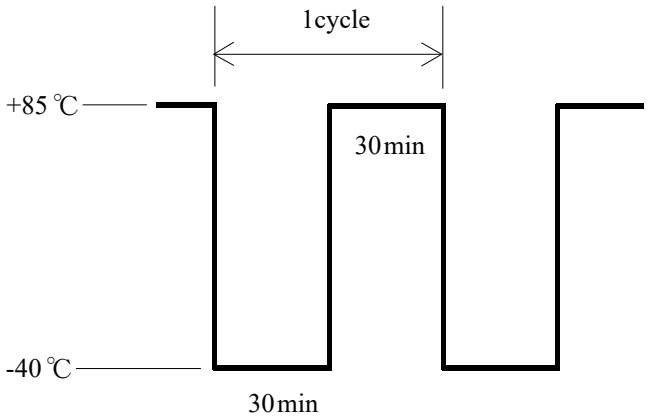
MODEL : GXE600-48

(1) 使用冷熱衝撃装置 Equipment Used (Thermal Shock Chamber)

ESPEC(株) 製　　TSA-73EH
ESPEC CORP.

(2) 試験条件 Test Conditions

- 電源周囲温度　　: -40°C ⇔ 85°C
  Ambient Temperature
- 試験時間　　: 図参照
  Test Time　　Refer to Dwg.
- 試験サイクル　　: 700 サイクル
  Test Cycle　　700 Cycles
- 非動作
  Not Operating



(3) 試験方法　Test Method

初期測定の後、供試品を試験槽に入れ、上記サイクルで試験を行う。700サイクル後に、供試品を常温常湿下に1時間放置し、出力に異常がない事を確認する。
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. 700 cycles later, leave it for 1 hour at the room temperature, then check if there is no abnormal output.

(4) 判定条件 Acceptable Conditions

試験後の出力に異常がない事
No abnormal output after test.

(5) 試験結果 Test Results

合格 **OK**