COSEL

TEST DATA OF MODULE E4

(AME series)

Regulated DC Power Supply
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Model	MODULE E4
Item	Line Regulation
Object	+3.3V32A

Temperature   25°C
Testing Circuitry   Figure A

1. Graph

```
--- ⊟ --- Load 50%
—— △ —— Load 100%
```


Note:
  Hatched line shows the input voltage range.

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	3.356	3.350
90	3.355	3.350
100	3.356	3.350
115	3.356	3.350
150	3.356	3.350
200	3.356	3.350
230	3.356	3.350
264	3.356	3.350
--	-	-

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Model	MODULE E4
Item	Load Regulation
Object	+3.3V32A

Temperature   25°C
Testing Circuitry   Figure A

1. Graph

     —△—   Input Volt.   100V
     - - -□- - -   Input Volt.   200V
     —·—○—·—   Input Volt.   230V

Load Current [A]

Note: Hatched line shows the range of the rated
load current.

2. Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	3.361	3.361	3.361
6.4	3.359	3.359	3.359
12.8	3.357	3.357	3.357
19.2	3.355	3.355	3.355
25.6	3.353	3.353	3.353
32.0	3.350	3.350	3.350
35.2	3.349	3.349	3.349
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	MODULE E4
Item	Dynamic Load Response
Object	+3.3V32A

Temperature	25° C
Testing Circuitry	Figure A

Input Volt.   100 V   Response   t1=t2=50us. Typ

Cycle   1000 ms

Load Current   t1   t2

Min. Load (0A) ←→

Load 100% (32A)

100 mV/div

2 ms/div   2 ms/div

Min. Load (0A) ←→

Load 50% (16A)

100 mV/div

2 ms/div   2 ms/div

— 3 —

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Model	MODULE E4
Item	Ripple Voltage (by Load Current)
Object	+3.3V32A

Temperature   25°C
Testing Circuitry   Figure B

1. Graph

	Input Volt.	100 V
—△—	Input Volt.	100 V
—·—○—·—	Input Volt.	230 V

Ripple Voltage [mV] vs Load Current [A]
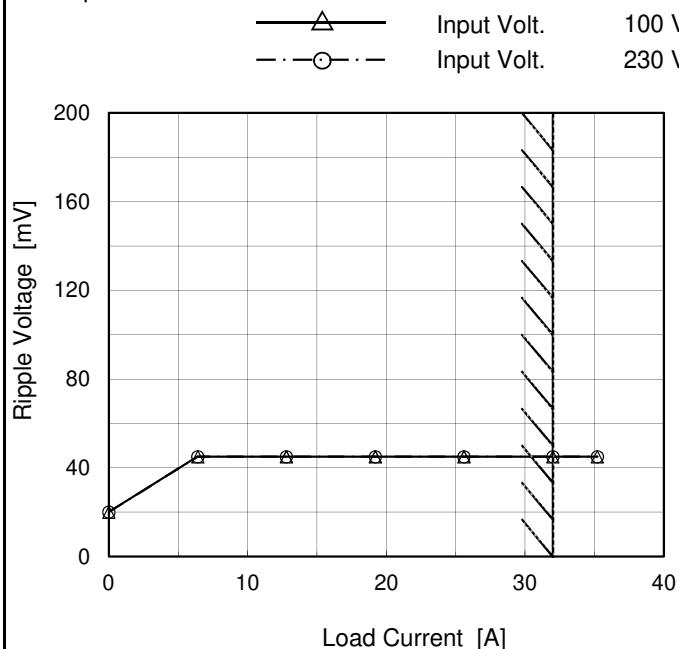
2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100[V]	Input Volt. 230[V]
0.0	20	20
6.4	45	45
12.8	45	45
19.2	45	45
25.6	45	45
32.0	45	45
35.2	45	45
--	--	--
--	--	--
--	--	--
--	--	--

Note:
   Measured by 20MHz Oscilloscope.

   Ripple Voltage is shown as p-p in the figure below.

   Hatched line shows the range of the rated
   load current.

T1: Due to AC Input Line
T2: Due to Switching

Ripple [mVp-p]

T2

T1

Fig. Complex Ripple Wave Form

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Model	MODULE E4
Item	Ripple Noise
Object	+3.3V32A

Temperature   25°C
Testing Circuitry   Figure B

1. Graph

Ripple-Noise [mV] vs Load Current [A]

Input Volt.   100 V
Input Volt.   230 V

2. Values

Load Current [A]	Ripple Noise [mV]	
	Input Volt. 100[V]	Input Volt. 230[V]
0.0	35	35
6.4	55	60
12.8	55	60
19.2	55	60
25.6	55	60
32.0	55	60
35.2	55	60
--	--	--
--	--	--
--	--	--
--	--	--

Note:
    Measured by 20MHz Oscilloscope.

    Ripple Noise is shown as p-p in the figure below.

    Hatched line shows the range of the rated
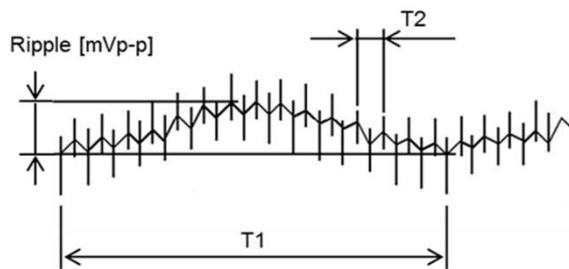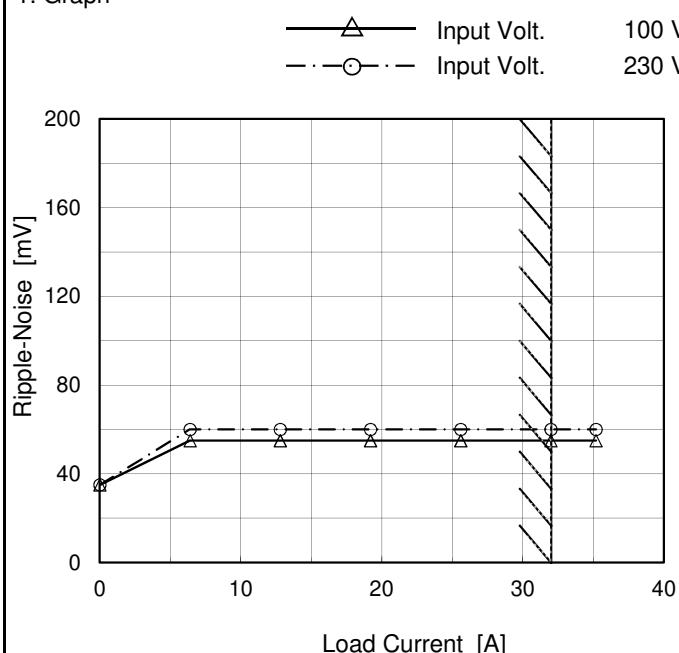   load current.
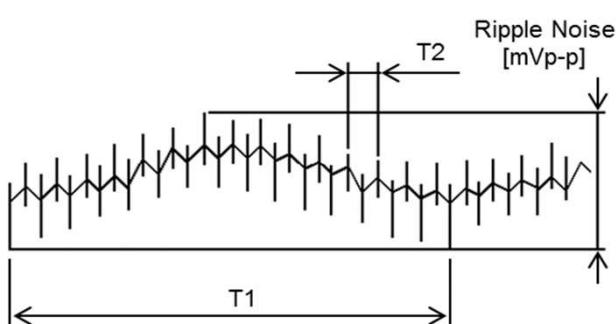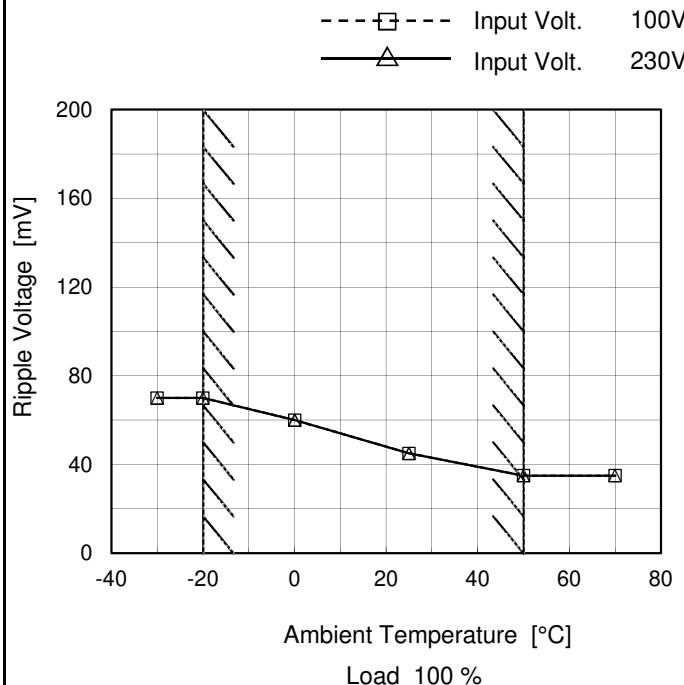
T1: Due to AC Input Line
T2: Due to Switching

Fig. Complex Ripple Wave Form

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Model	MODULE E4
Item	Ripple Voltage (by Ambient Temp.)
Object	+3.3V32A

Testing Circuitry   Figure B

1. Graph

- - -□- - -   Input Volt.   100V
——△——   Input Volt.   230V

Ambient Temperature [°C]

Load   100 %

Note:
Measured by 20MHz Oscilloscope.

Hatched line shows the range of the rated operating temperature.

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
-30	70	70
-20	70	70
0	60	60
25	45	45
50	35	35
70	35	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Model	MODULE E4
Item	Ambient Temperature Drift
Object	+3.3V32A

Testing Circuitry   Figure A

1. Graph

⎯⎯△⎯⎯ Input Volt.   100V
--- ⊟ --- Input Volt.   200V
—·—○—·— Input Volt.   230V

Output Voltage [V] vs Ambient Temperature [°C]

Load 100%

Note:
Hatched line shows the range of the rated operating temperature.
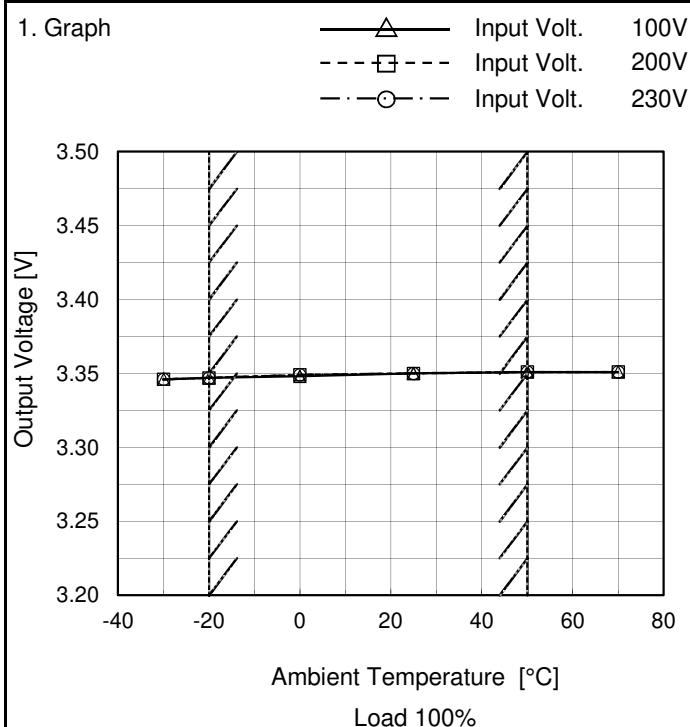
2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-30	3.346	3.346	3.346
-20	3.347	3.347	3.347
0	3.348	3.349	3.349
25	3.350	3.350	3.350
50	3.351	3.351	3.351
70	3.351	3.351	3.351
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	MODULE E4
Item	Output Voltage Accuracy
Object	+3.3V32A

Testing Circuitry   Figure A

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and
input voltage varied at random in the range as specified below.

Temperature   : -20 - 50°C

Input Voltage : 85 - 264V

Load Current   : 0 - 32A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$
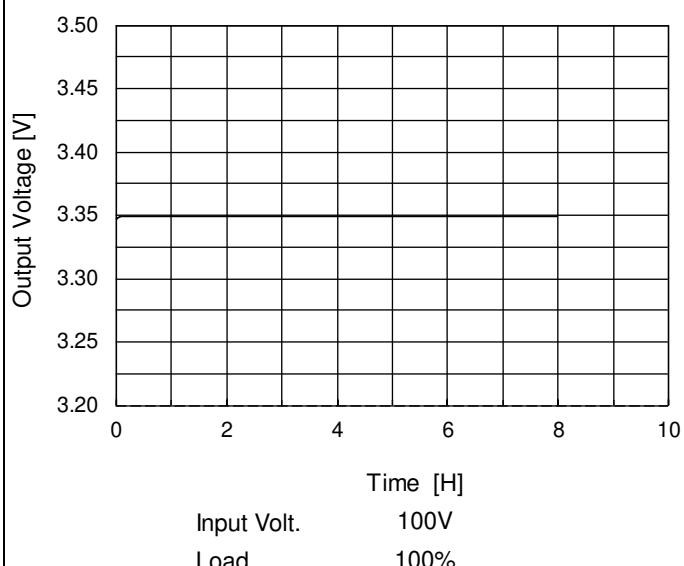
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	264	0	3.372	±8	±0.2
Minimum Voltage	-20	85	32	3.356		

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Model	MODULE E4
Item	Time Lapse Drift
Object	+3.3V32A

Temperature 25°C
Testing Circuitry Figure A

1. Graph

Input Volt. 100V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	3.347
0.5	3.349
1.0	3.349
2.0	3.349
3.0	3.350
4.0	3.349
5.0	3.349
6.0	3.349
7.0	3.349
8.0	3.349

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Model	MODULE E4
Item	Overcurrent Protection
Object	+3.3V32A

Temperature 25°C
Testing Circuitry Figure A

1. Graph

Input Volt. 100V
Input Volt. 200V
Input Volt. 230V

Output Voltage [V]

Load Current [A]

Note:
Hatched line shows the range of the rated load current.

Hiccup mode activates when the output voltage is below 1.65V.

2. Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
3.14	40.70	40.60	40.66
2.97	41.40	41.36	41.39
2.64	42.24	42.24	42.23
2.31	43.68	43.14	43.14
1.98	44.16	44.15	44.15
1.65	45.18	45.20	45.20
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	MODULE E4
Item	Overvoltage Protection
Object	+3.3V32A

Testing Circuitry   Figure A

1. Graph

```
————△———— Input Volt.    100V
- - -☐- - - Input Volt.    230V
```


Ambient Temperature [°C]

Load 0%

Note:
   Hatched line shows the range of the rated operating temperature.
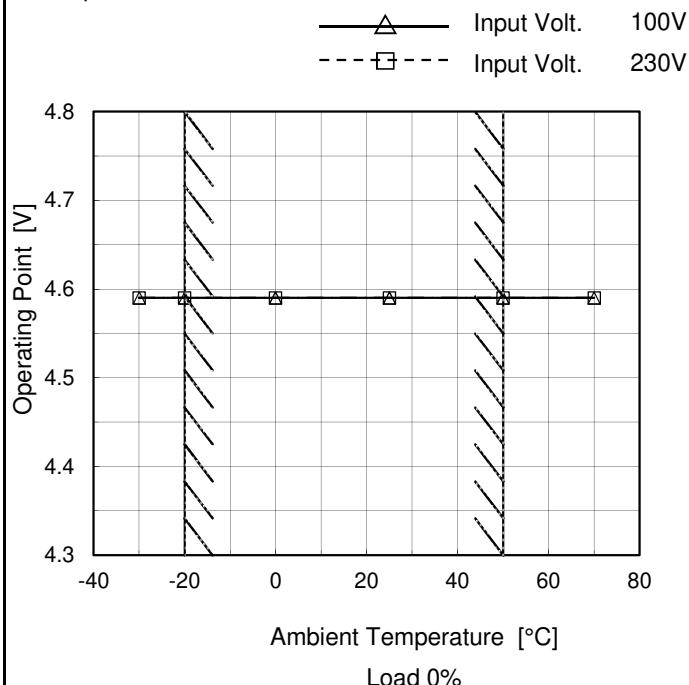
2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-30	4.59	4.59
-20	4.59	4.59
0	4.59	4.59
25	4.59	4.59
50	4.59	4.59
70	4.59	4.59
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Figure A

Date Acquisition/Control Unit

150mm

Figure B

C1 = 22 μF

(Electrolytic capacitor)

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