100 W Power Supply for LED Lighting

Reference Guide

RD034-RGUIDE-01

TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION

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1. Introduction

This reference document describes the specifications, usage, and efficiency characteristics of the 100 W Power Supply for LED Lighting (hereinafter referred to as "this power supply"). This power supply targeting LED Lights is a constant current power supply compatible with AC90 V to 264 V input. It converts input AC power to DC1.04 A (typical) output via PFC circuitry and flyback circuitry, and it can supply power up to 100 W. This reference guide provides various design information including reference design, and contributes to reduction of effort required in designing according to actual specifications.

Our DTMOS series-products suitable for switching power supply applications are used in PFC circuits and flyback circuit switching elements, and therefore the loss (steady-state loss caused by on-resistance and switching loss generated by switching operation) generated in MOSFET is suppressed, which helps in achieving a conversion efficiency of 90 %. A MOSFET with insulating package does not require the insertion of an insulating sheet when mounting the heat sink, thus improves convenience when assembling the board. General purpose PFC Inductors, flyback transformers, input/output capacitors, etc. are used and housed in a size of 180 mm x 57 mm x 40 mm. Therefore, these components contribute to greater flexibility in designing applications.

2. Specifications

2.1. Power Supply Specifications

Table 2.1 lists the I/O characteristics of this power supply.

Table 2.1 Specifications of Power Supply for 100W LED Lighting

Parameter	Conditions	Minimum	Typical	Maximum	Unit
Input Characteristics					
AC input voltage (rms)		90		264	V
AC input current (rms)	Vin = 90 V, Pout = 100 W			1.4	A
AC input frequency		47		63	Hz
Output Characteristics					
Output voltage				110	V
Output current		0.99	1.04	1.09	A
Output power		50		100	W

2.2. External View of Power Supply

Fig. 2.1 shows the external view of this power supply.

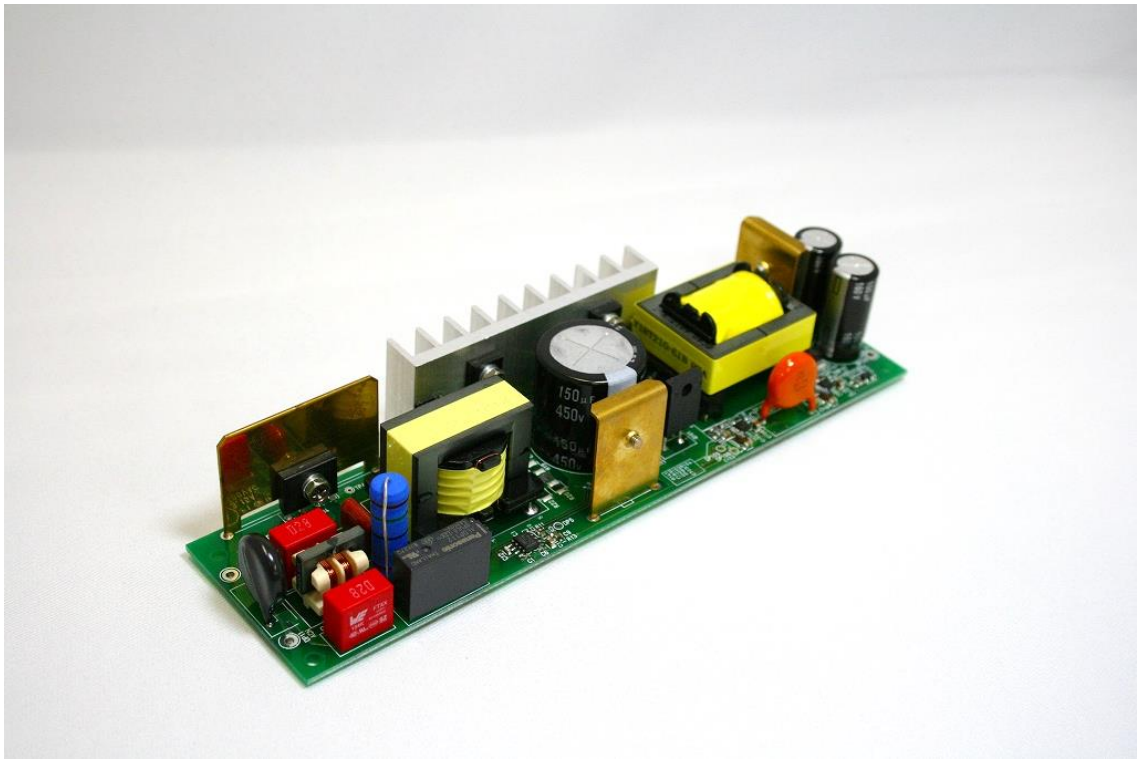

Fig. 2.1 External View of 100 W Power Supply for LED Lighting

Dimensions 180 mm x 57 mm x 40 mm (including heat sink)

2.3. Block Diagram

Fig. 2.2 shows the block diagram to explain the function operation.
Refer to RD034-SCHEMATIC-01 for actual schematics and RD034-BOM-01 for bill of materials.

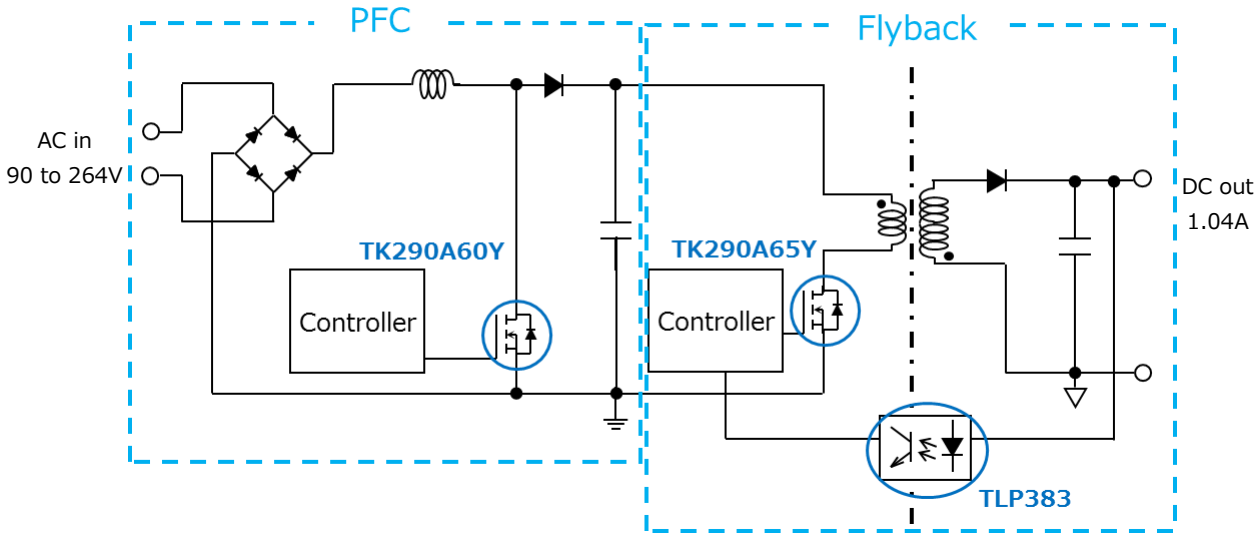

Fig. 2.2 Block Diagram

2.4. PCB Component Layout

Fig. 2.3 and Fig. 2.4 show the layout of components on the PCB of this power supply.

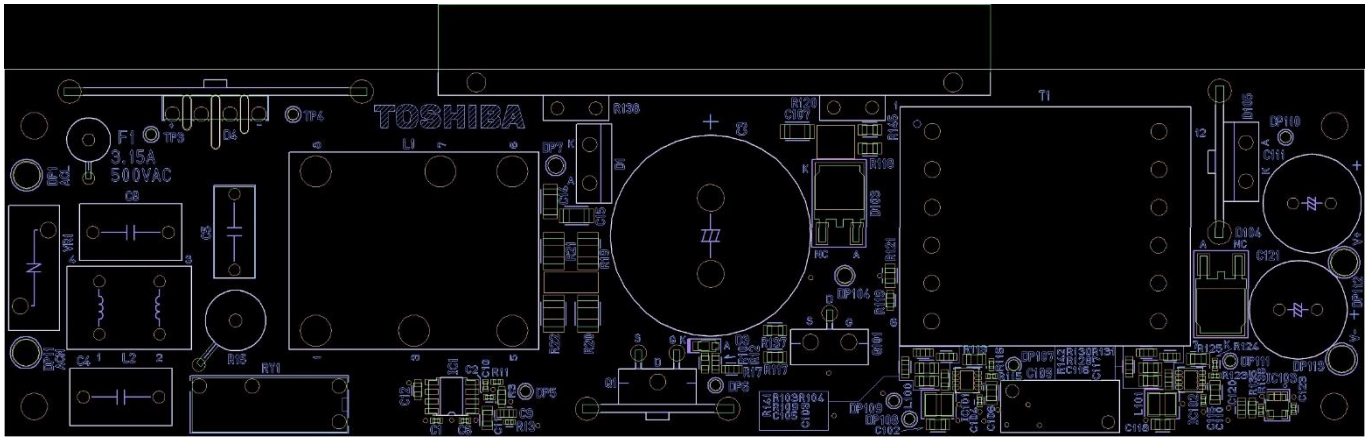

Fig. 2.3 PCB Component Layout (Front Side)

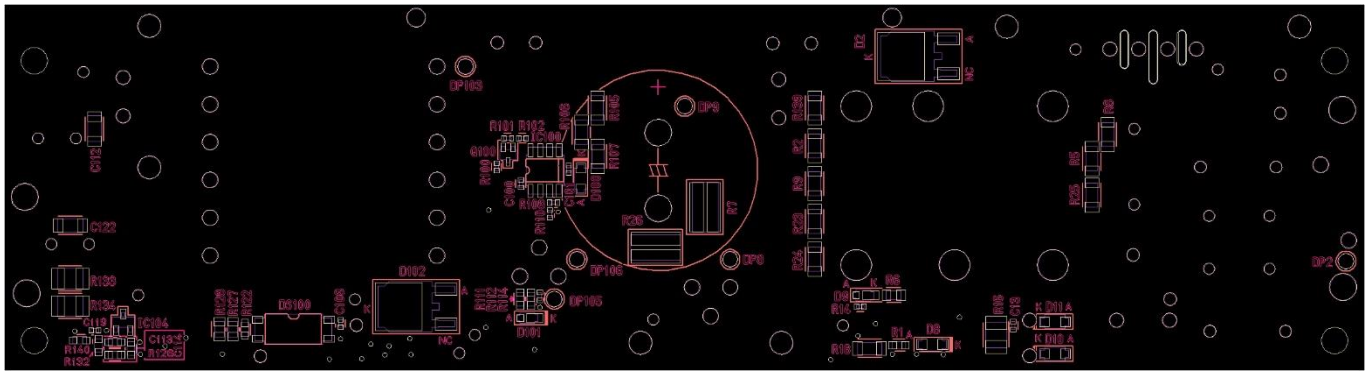

Fig. 2.4 PCB Component Layout (Back Side)

2.5. PCB Pattern

PCB-design data for this power supply compatible with various EDA (Electronic Design Automation) tools is provided in design files. Please refer to them for more information.

Fig. 2.5 shows Layer1 of the PCB.

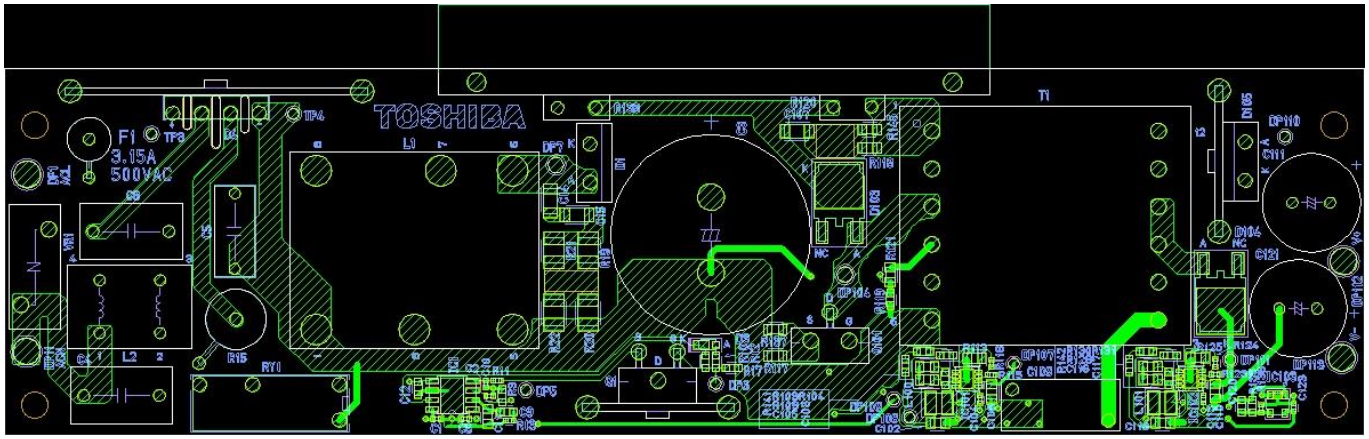

Fig. 2.5 Layer1

Fig. 2.6 shows Layer2 of the PCB.

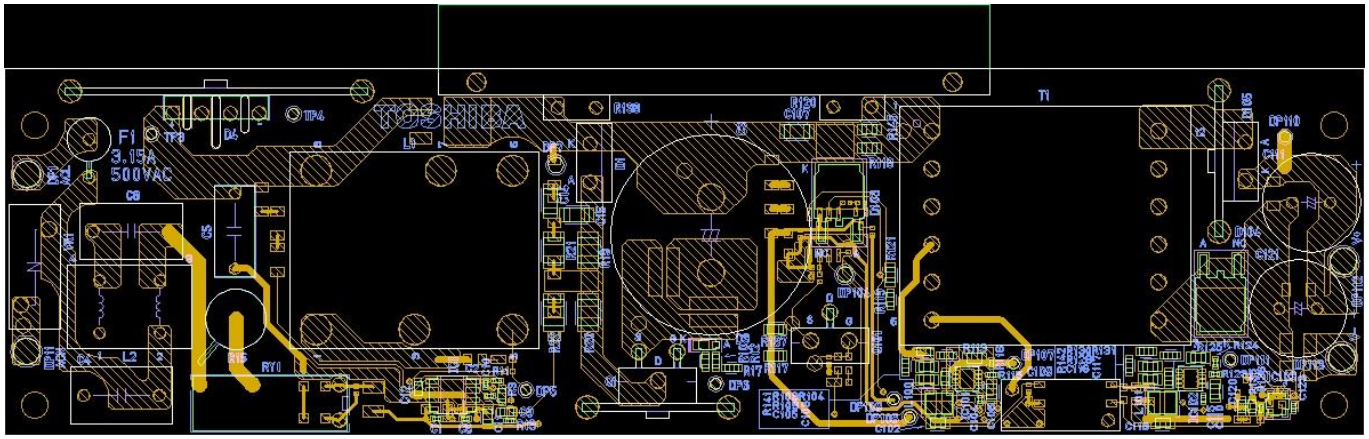

Fig. 2.6 Layer2

3. Operating Procedure

This section explains the operation procedure of this power supply.

3.1. Connecting to External Devices

Fig. 3.1 External connection terminal

The area enclosed in red shows the input terminals. Connect an AC stabilized power supply to the Input (Live) and Input (Neutral) terminals.

The area enclosed in blue shows the output terminals. Connect the load unit to Output (+) and Output (-) terminals.

Supplies, loads, cables, leads, and connectors to be connected must satisfy Table 2.1 Power Supply Specifications.2.1Power Supply Specifications

Fig. 3.1 External connection terminals

3.2. Start and Stop Procedures

Before starting the power supply, check that all of the following pin voltages are 0 V.
Input (+) terminal, Input (-) terminal, Output (+) terminal, Output (-) terminal

[Startup Procedure]

1. Set the load unit to constant-power mode so that the load power is between 50 W and 100 W.
2. Turn on the AC stabilized power supply.

[Stop Procedure]

Shut off the AC stabilized power supply.

3.3. Precautions for Evaluation (To Prevent Electric Shock, Burn Injury, etc.)

Fig. 3.2 Primary and Secondary Areas

In addition, semiconductors, transformers, etc. of this power supply generate heat according to the load current. Fig. 3.3 shows the components and areas of high heat generation with red broken line frames. Do not touch these areas while the power is on, as there is a risk of burns.Fig. 3.3 Parts and Area of High Heating

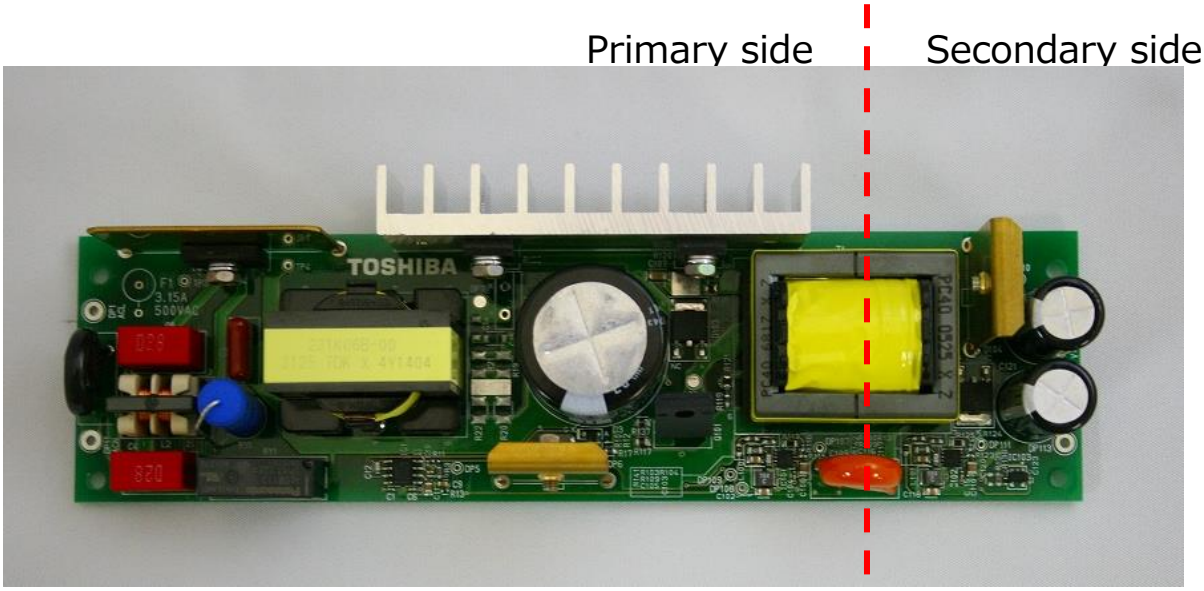

Fig. 3.2 Primary and Secondary Areas

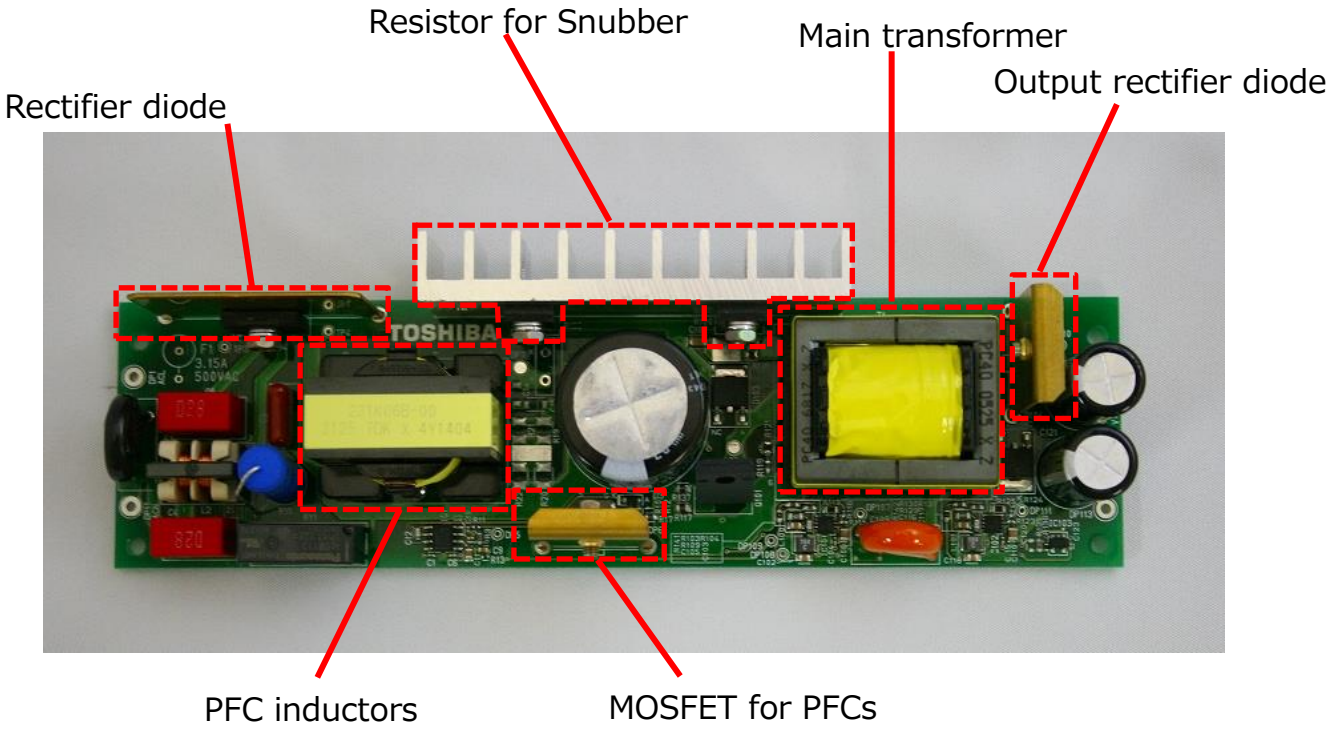

Fig. 3.3 Parts and Area of High Heating Generation

4. Power Characteristics

The power supply efficiency measurement results of this power supply are described below.

4.1. Efficiency

Fig. 4.1 Efficiency (Iout = 1.04 A, VinAC = 115 V, VinAC = 230 V)

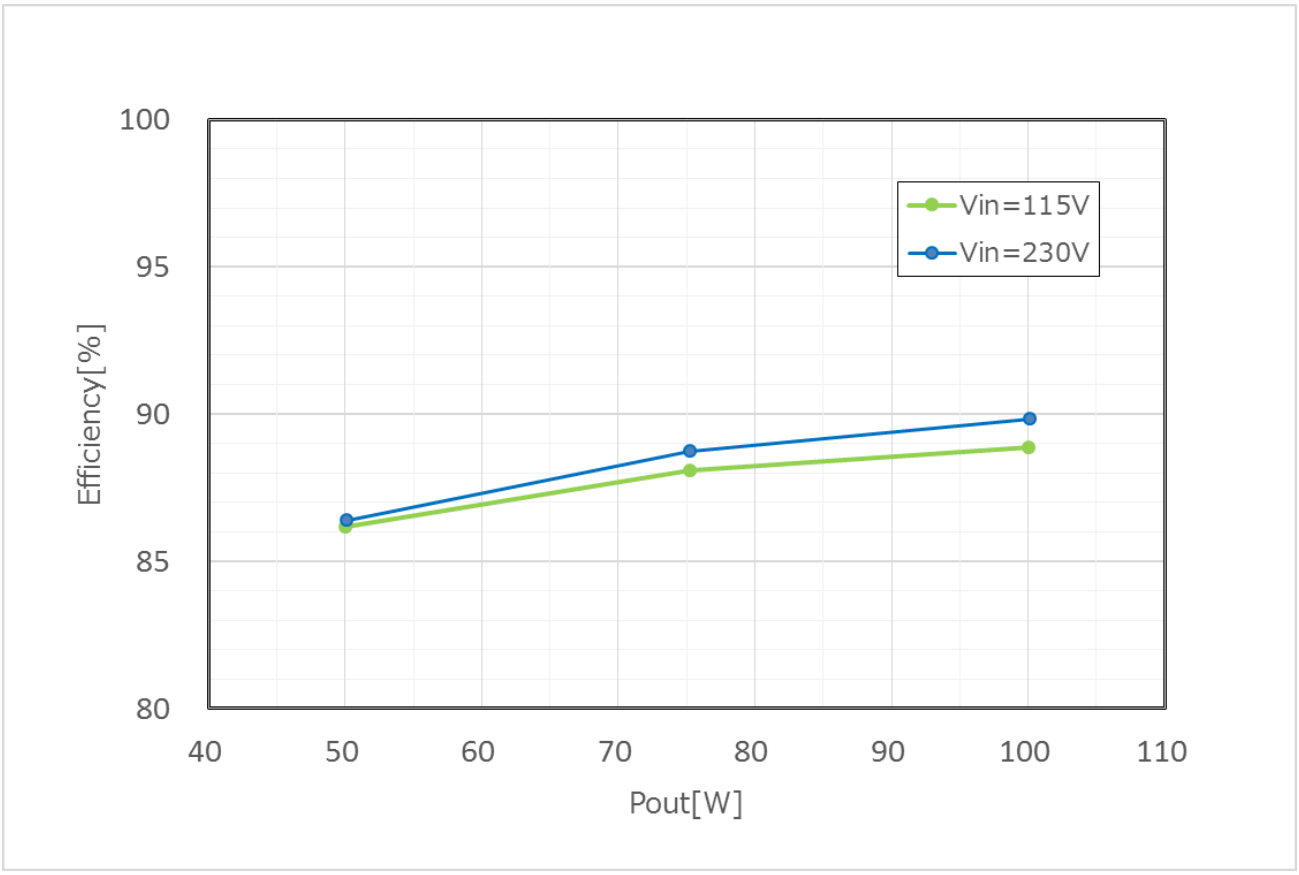

Fig. 4.1 Efficiency (Iout = 1.04 A, VinAC = 115 V, VinAC = 230 V)

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