

MESSRS : All the companies

Product Drawing

CUSTOMER'S PRODUCT NAME:

TDK PRODUCT NAME: DC/DC CONVERTER UNIT ALD-414012PJ126

***Notice**

Product Drawing is not contract. This is only technical data.

This technical data may change internal description without any notice.

When you design final product please request us specification through our sales or distributors.

After you receive the specification, the contract is effective on signature of the specification.



TDK-Lambda Corporation

| PREPARED BY | APPROVED BY | AUTHORIZED BY |
|------------------------------------|--------------------------------------|-------------------------------------|
| <i>K.Oshima Feb./23th/2010</i> | <i>K.Yamaishi Feb./23th/2010</i> | <i>H.Masuoka Feb./23th/2010</i> |

| | |
|----------|------------|
| DWG. No. | CTR-3576-C |
|----------|------------|

Precautionary Notes Regarding the Use of This Converter

When using this product, give due consideration to the precautionary notes described below and ensure a safe design. Inappropriate use may result in electric shock, injury or fire.



Caution

- This product is designed for the driving LED backlight system.
Do not use it with any other load.
- Store this product under the conditions defined in the specification document.
- Do not store this product in an environment where dust, dirt or corrosive gas (salt, acid, base, etc.) is present.
- This product is designed for use with general electronic equipment.
If it is to be used with medical equipment that directly affects human life or for the control of transportation equipment to which passengers entrust their lives, provide thorough fail-safe measures.
- Avoid using this product under high temperatures or high humidity or in an environment in which dust, dirt or any corrosive gas (salt, acid, base, etc.) is present.
Also, be careful not to allow the formation of dew condensation. It may result in damage or electric shock.
- If the product does not have a built-in protective circuit (circuit breaker, fuse, etc.), it is recommended that a fuse be used at the input stage to prevent the generation of smoke or fire in the event of a malfunction.
Even when the product has a built-in protective circuit (circuit breaker, fuse, etc.), the circuit may not function properly due to inappropriate operating conditions or power-supply capacity.
It is recommended that an appropriate protective circuit (circuit breaker, fuse, etc.) be provided separately from the built-in circuit.
- Use the product only within the specified input voltage, output power, output voltage and operating temperature ranges. Exceeding these values may result in damage, etc.
- Provide a measure for the prevention of surge voltage due to lightning, etc.
Abnormal voltage may result in damage, etc.
- This product is not designed to provide resistance to radiation.
- Ripples could be superimposed on the voltage and the current in the input source connected to the inverter, depending on the impedance in the input source, wiring, etc.
When you select an input source, please check waveforms, etc on the final set.

Handling Precautions

- Do not stack multiple products on top of one another.
- Do not allow the product to come in contact with tools, etc.
- Do not apply excessive stress during installation.
It may cause chipping and cracking, resulting in damage, etc.
- Please do not use the product, when dropping it, since there is a possibility of the parts damage.

| | | | |
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This product is conformity to RoHS directive.(*)

(*Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead,cadmium,hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

1. Range of Application

This specification applies to all the companies.

2. Product Name

The product name is DC-DC converter unit ALD-414012PJ126.

3. Contents

| Item | Attached view | Page |
|---------------------------------------|---------------|------|
| 1.Appearance,Structure and Dimensions | | |
| Outline | refer to [1] | 3,4 |
| Pin configuration | refer to [1] | 5 |
| 2.Characteristics | | |
| Absolute Maximum Ratings | refer to [2] | 6 |
| 3.Electrical Characteristics | refer to [3] | 7 |
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| 5.Reliability Test | refer to [5] | 9 |
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•The specifications may be changed without any notice.
 •When placing orders,please confirm "Specifications" or "Product Drawing" through TDK,TDK-lambda sales or distributors.

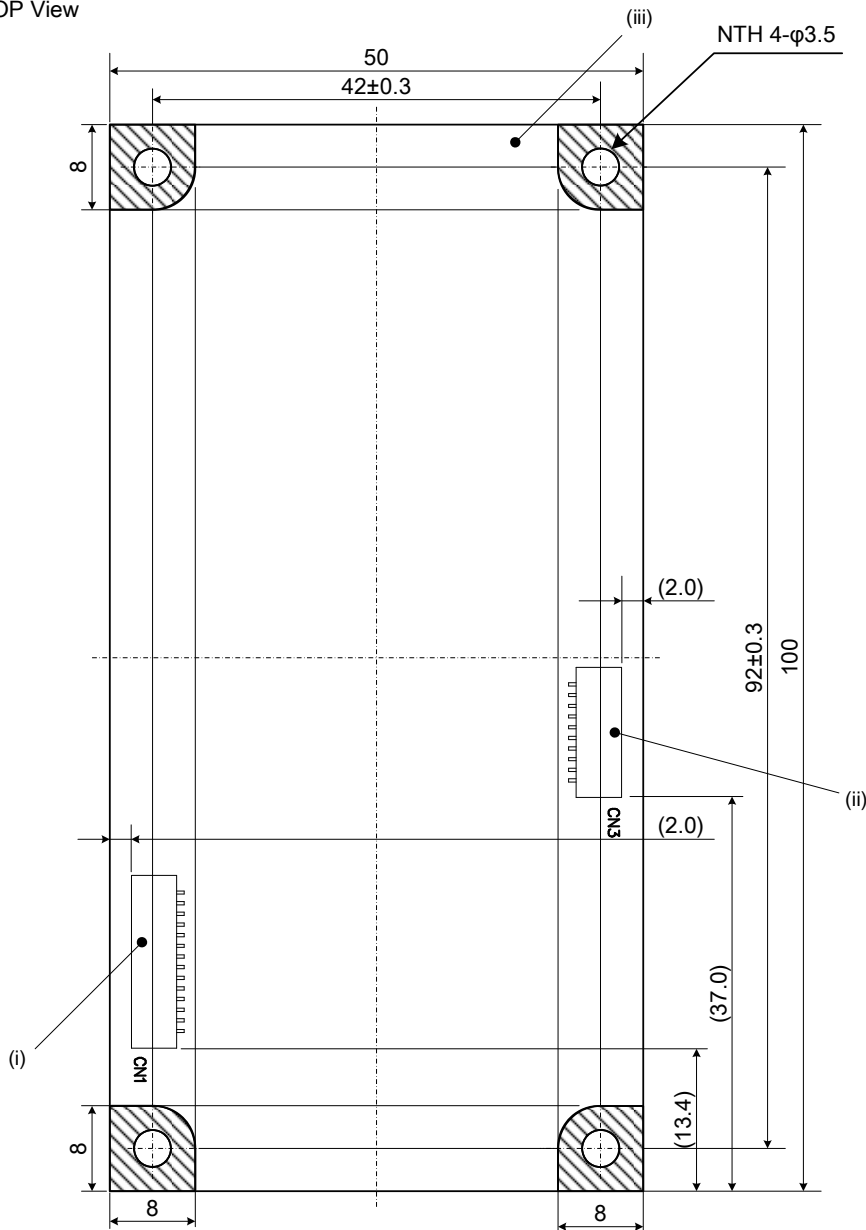
<Product Summary>

- *This product is DC-DC converter that is designed for LED driver.
- *This product has PWM DC dimming(Apply external DC power source or resistance), Analog dimming(Apply external DC power source) and remote on/off function.
- *This product has alarm function for safety operation. When load open is happened, this product limit the output voltage and output alarm voltage.
- *This product has alarm function for LED open detection. If any strings are open,CN1-14pin outputs around 5V. When all strings are connected normally, CN1-14pin outputs around 0V.

[1]Appearance, Structure and Dimensions

1-1. Outline

TOP View

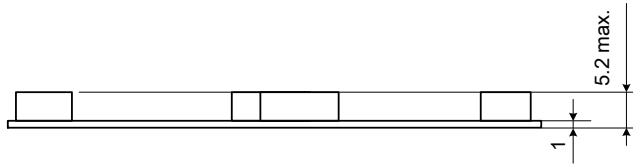


any parts and pattering inhibit area except GND pattern.

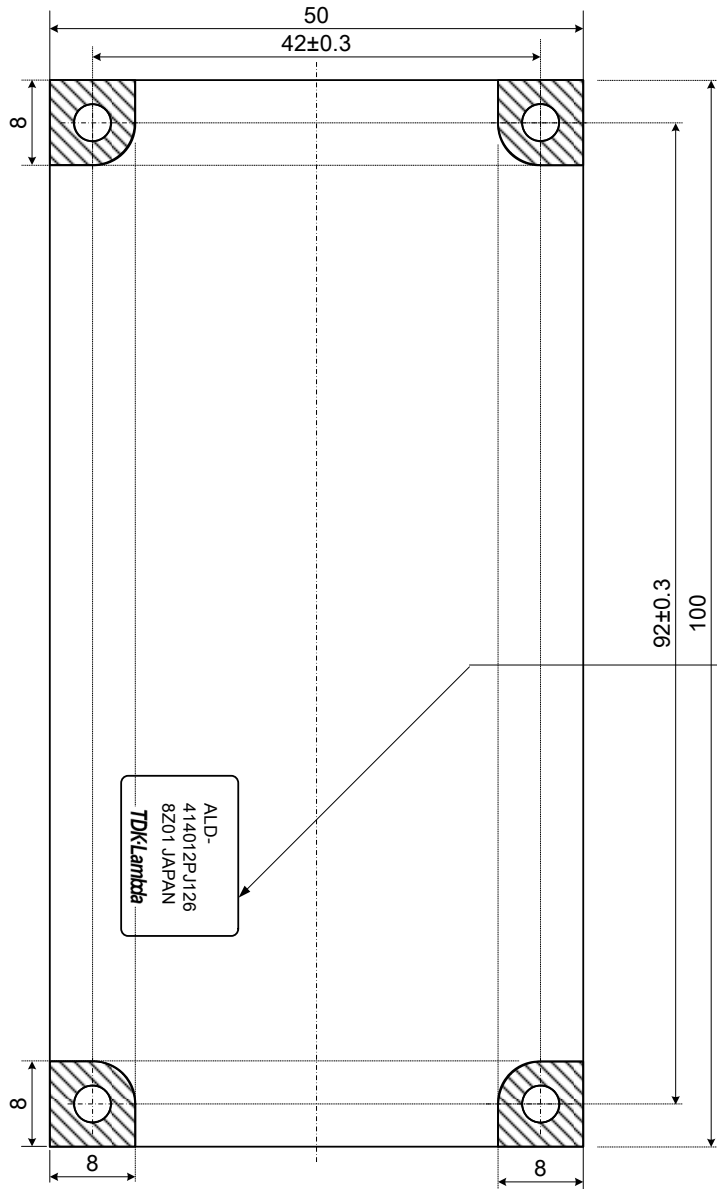
Tolerance is $\pm 0.5\text{mm}$ unless otherwise specified.
 Unit in mm
 Mass:22g max.

| | | | |
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SIDE View



BOTTOM View



When LED driver is fixing, please confirm screw head and plate form is located within above hatching area include any tolerances. Please don't contact conduction materials against PCB surface directly because this PCB is both side patterning.

| No. | Part Description | Item/Material | Qty. | Remark | corresponding connector |
|-------|--------------------------|-----------------------|------|-----------------|-------------------------|
| (i) | Input Connector: CN1 | SM14B-SRSS-TB(LF)(SN) | 1 | JST | SHR-14V-S-B |
| (ii) | Output Connector: CN3 | SM10B-SRSS-TB(LF)(SN) | 1 | JST | SHR-10V-S-B |
| (iii) | Print Circuit Board: PCB | FR-4 | 1 | UL94V-0 t=1.0mm | - |

*CN2 is not installed.

| | | | |
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1-2. Pin Configuration

*CN2 is not installed.

CN1:Input Connector

| Pin No. | Symbol | Remark |
|---------|---------|-----------------------------------------------------------------------------------------------------------------|
| CN1-1 | Vin | Input Voltage |
| CN1-2 | | |
| CN1-3 | | |
| CN1-4 | | |
| CN1-5 | | |
| CN1-6 | GND | GND |
| CN1-7 | | |
| CN1-8 | | |
| CN1-9 | | |
| CN1-10 | | |
| CN1-11 | Vrmt | OFF:0-0.4(V) or OPEN / ON:2.5-Vin(V) |
| CN1-12 | Vbr/Rbr | PWM Dimming MIN. Brightness : 2.5(V) or 50(k Ω) PWM Dimming MAX. Brightness : 0(V) or 0(k Ω) |
| CN1-13 | ADIM | Analog Dimming MIN. Brightness : 2.5(V) Analog Dimming MAX. Brightness : 0(V) |
| CN1-14 | Vst | Normal : 0(V) / Abnormal : 5(V) |

CN3:Output Connector

| Pin No. | Symbol | Remark |
|---------|--------|--------------------|
| CN3-1 | LED_C4 | CH4 - Cathode Side |
| CN3-2 | LED_A4 | CH4 - Anode Side |
| CN3-3 | LED_A3 | CH3 - Anode Side |
| CN3-4 | LED_C3 | CH3 - Cathode Side |
| CN3-5 | LED_C2 | CH2 - Cathode Side |
| CN3-6 | LED_A2 | CH2 - Anode Side |
| CN3-7 | LED_A1 | CH1 - Anode Side |
| CN3-8 | LED_C1 | CH1 - Cathode Side |
| CN3-9 | NC | no connection |
| CN3-10 | NC | |

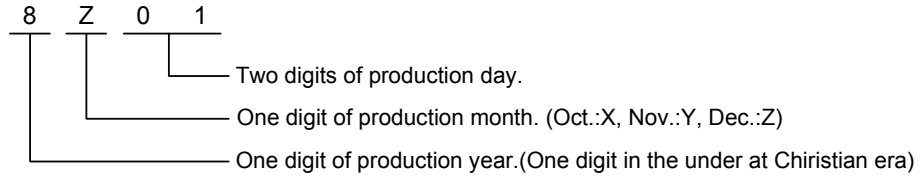
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*1-1 Marking

Product name, Lot No., Country of origin

1) Marking is attached on bottom side by the label.

2) Example (Dec. 1st, 2008)



3) Country of origin code (JAPAN, CHINA, MALAYSIA)

*1-2 For proper operation of circuit protection(IC Protector), Please use minimum of 6A capacity power supply for input.

*1-3 This product has two of 2.5A IC protector inside. Please confirm input current within 5A_{o-p} in any conditions.

*1-4 When rising time of input voltage is very slow, flicker may occur in start-up.

[2] Absolute Maximum Ratings

| Item | Symbol | Specification | Unit | Remark |
|-----------------------------|----------------------------------|-----------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Voltage | V _{in} | 0~13.2 | V | Ratings: 10.8~13.2V DC |
| | V _{rmt} | 0~V _{in} | | |
| | V _{br} /R _{br} | 0~5 | | |
| | ADIM | 0~3 | | |
| | V _{st} | This terminal is output terminal. Don't apply external voltage. | | |
| Load Voltage | V _{out1~4} | 12.8(at V _{in} =10.8V) ~44 | V | Minimum load Voltage > V _{in} +2V Please use it with heat radiated on the worst condition (input voltage, load voltage, mounting instruction, and temperature) when the following standards are used and, that the Q7 transistor package surface temperature becomes 120°C or less. |
| Operating Temperature Range | T _a | -30~85 | degC | |
| Storage Temperature Range | T _s | -40~85 | degC | |
| Humidity Limit | RH | 95 | %RH | A maximum wet-bulb temperature is 38 degC. No dew. |

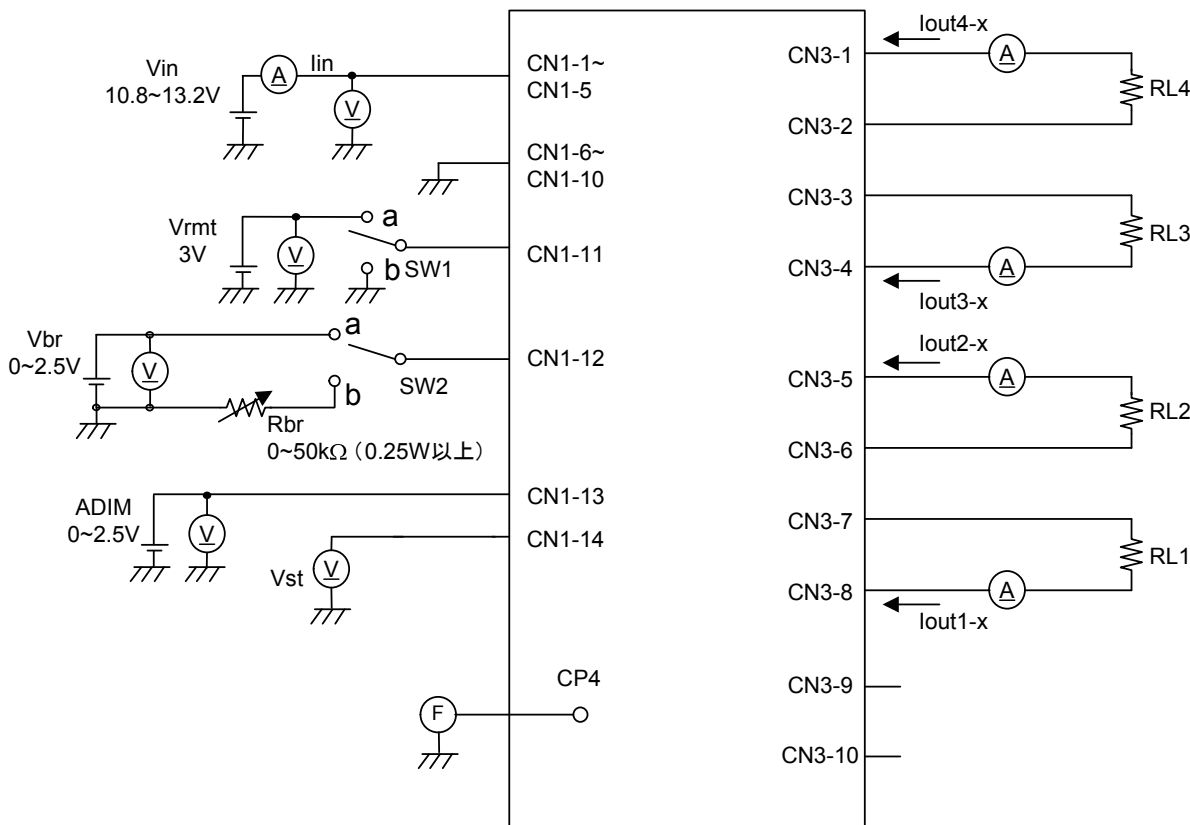
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[3] Electrical Characteristics

| Item | Symbol | Condition | | | | | | Specification | | | Unit |
|-------------------------------------|---------------------|-----------|-----------|---------|--------|---------|----------|---------------|------|------|------|
| | | Ta(degC) | Vin(V) | Vrmt(V) | Vbr(V) | ADIM(V) | RL1,2(Ω) | MIN. | TYP. | MAX. | |
| Input Current1 | lin1 | 25±10 | 12±0.1 | 3±0.05 | 0 | 0 | 180 | 0.95 | 1.3 | 1.6 | A |
| | | -30~85 | 10.8~13.2 | | | | | 0.8 | 1.3 | 2.0 | |
| Input Current2 | lin2 | 25±10 | 12±0.1 | 0 | 0 | 0 | 180 | - | - | 1 | mA |
| Output Current1 | lout1-1- lout4-1 | 25±10 | 12±0.1 | 3±0.05 | 0 | 0 | 180 | 112 | 140 | 168 | mA |
| | | -30~85 | 10.8~13.2 | | | | | 100 | 140 | 180 | |
| Output Current2 (PWM Dimming) | lout1-2- lout4-2 | 25±10 | 12±0.1 | 3±0.05 | 2.5 | 0 | 180 | 10 | 20 | 30 | mA |
| Output Current3 (Analog Dimming) | lout1-3- lout4-3 | 25±10 | 12±0.1 | 3±0.05 | 0 | 2.5 | 870 | 4 | 20 | 40 | mA |
| PWM Burst Frequency | F | 25±10 | 12±0.1 | 3±0.05 | 2.5 | 0 | 180 | 160 | 200 | 240 | Hz |
| Alarm Output *3-1 | Vst1 | 25±10 | 12±0.1 | 3±0.05 | 0 | 0 | 180 | - | 0.1 | 0.5 | V |
| | Vst2 | 25±10 | 12±0.1 | 3±0.05 | 0 | 0 | ∞ | 4.75 | 5.0 | 5.25 | V |

*3-1 This converter has alarm output function. If converter detects OVP or any strings open, Vst terminal outputs around 5V. If a string open condition occurs, other strings keep on working.

[4] Measurement Circuit



*Please refer to 1-1 Pin configuration in detail.

RL1~4: Equivalent Load (above 15W)

| | | | |
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*4-1. SW1 function

| | |
|------|----------------|
| SW1 | ON/OFF control |
| a | Operating |
| b | Not operating |
| open | Not operating |

*4-2. SW2 function

| | |
|-----|----------------------------------|
| SW2 | PWM Dimming |
| a | *PWM DC Dimming Vbr=0~2.5V |
| b | *PWM Volume Dimming VR=0~50kΩ |

* Vbr=0V: maximum brightness
Rbr=0Ω: maximum brightness

*4-3. Measurement Equipment

- (V) : DC Voltage Meter
(ADVANTEST R6452A or equivalent)
- (A) : DC Current Meter
(ADVANTEST R6452A or equivalent)
- (F) : Frequency Counter
(ADVANTEST R6452A or equivalent)

*4-4. Protection Circuit Behaviour

| Load Condition | Alarm output (CN1-14)*1 | Latch up |
|------------------|-------------------------|-------------|
| normal | 0.5V max. | No Latch up |
| any strings open | 4.5V min. | No Latch up |
| all strings open | 4.5V min. | No Latch up |

*4-5 . Notice of the alarm output

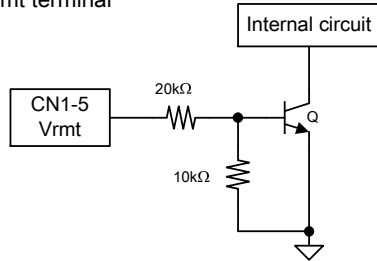
The alarm output might be generated at the transition state of ON/OFF by Vbrmt or Vin.

*1. In steady state alarm output keeps under 0.5V.
If any strings open or all strings open condition occurs, alarm output goes high around 5V.

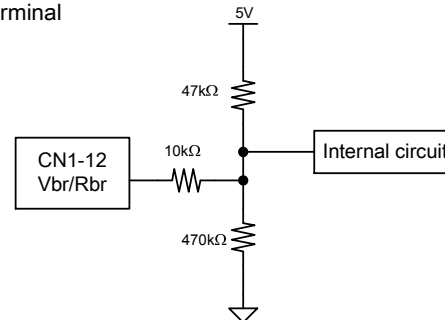
*2 This converter does not shutdown in any conditions.

*4-6 . Internal circuit connection (It is not a guaranteed value)

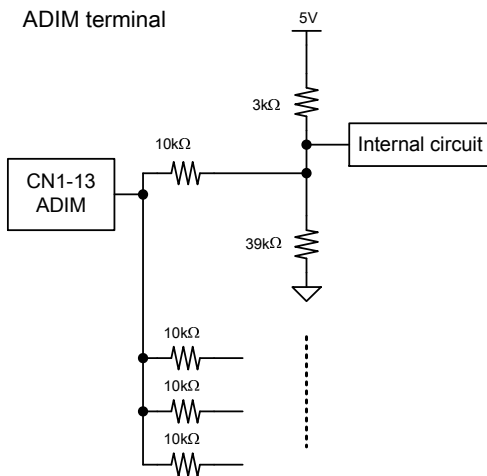
Vbrmt terminal



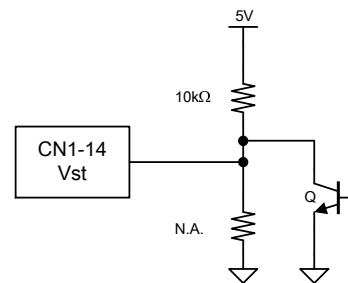
Vbr/Rbr terminal



ADIM terminal



Vst terminal



*4-7. In PWM or Analog Dimming operation, please confirm the LCD panel before use. Flickering may occur due to ripple noise is on Dimming pin(CN1-12 / CN1-13).

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[5] Reliability Test

This product is satisfied following reliability test.

| Item | Condition | Judgement Standard |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| High Temperature Continuous Operation | 85degC 500hrs. | Electrical and apperance should be in the spec. |
| Heat Shock | -40degC <-> 85degC 30min./each 100cycles | |
| Humidity Environment Off and on Operation | 60degC 90%R.H. On 1hr / Off 3hrs. 100cycles. | |
| Vibration | 5~10Hz Amplitude 10mm 10~200Hz Accerarated Verocity 21.6m/s ² (2.2G) Log Sweep :10min. X,Y,Z direction 60min/each total 3hrs. | |
| Shock | 588m/s ² (60G) 11ms Half-sine wave once each axis X,Y,Z,-X,-Y,-Z total 6times | |

[6] Others

6-1. Test Conditions

Unless otherwise specified test environment is determined as temperature is (20±15)degC and humidity is (65±20)%RH.

6-2. Warranty

One year after shippment. Defective products are exchanged during the warranted term free of charge.

6-3. Others

Our company and customer are to discuss changes, problems, and modifications when needed.

| | | | |
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