

UR129

November,28 2018

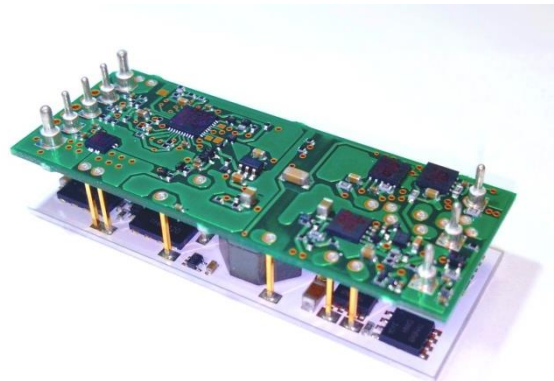
Description

UR129 is an isolated DC / DC converter module for 48V system intermediate bus. The 1/8 brick size is the global standard external shape of the telecommunications equipment industry.

Features

- Outputs 50V 5A 250W
- Outline: 1 / 8 Brick
58.4mm×22.76mm×12.7mm (W×D×H)
- Weight 26g
- All-in-one
- Design free
- High Efficiency 93% typ. ($V_{IN}=48V, I_o=5A$)
- Smaller size achieved by high-frequency switching technology
- Security measure
Over Current Protection
Over Voltage Protection
Thermal Shut Down

Appearance



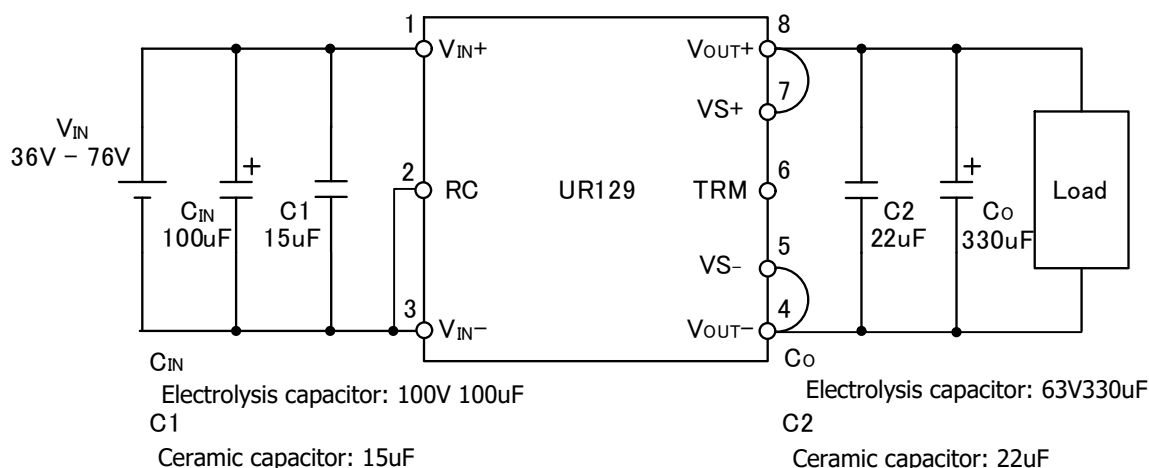
Main specifications

Input voltage range	DC 36 to 76 V
Conversion frequency	200kHz

RoHS directive correspondence

Judgment based on EU Directive 2002/95 / EC, and excluding non-regulated items, lead, cadmium, mercury, hexavalent chromium, and PBB and PBDE of specified brominated flame retardants meet the prescribed standards Indicates a thing.

Standard application



Standard connection diagram

- Be sure to ground yourself when handling the module. Use a wrist strap to ground the human body, and insert a 1MΩ resistor near the human body to prevent electric shock.
- At the input side, attach an electrolytic capacitor of about $C_{IN} = 100\mu F$ and a ceramic capacitor of about $C1 = 15\mu F$.
- At the output side, attach an electrolytic capacitor of about $C_O = 330\mu F$ and a ceramic capacitor of about $C2 = 22\mu F$. (When used below $-20^\circ C$, attach an electrolytic capacitor of $330\mu F \times 2$ or more)
 * C_{in} is equivalent to 100ZLJ100M10X20 made by Rubycon (100V100uF),
 It is recommended to use a capacitor of Rubicon 63ZLH330M10X23 or equivalent (63V330uF).
- Output ripple may be greatly amplified due to wiring and so on, so it is recommended to check the operation on the set.

UR129

November,28 2018

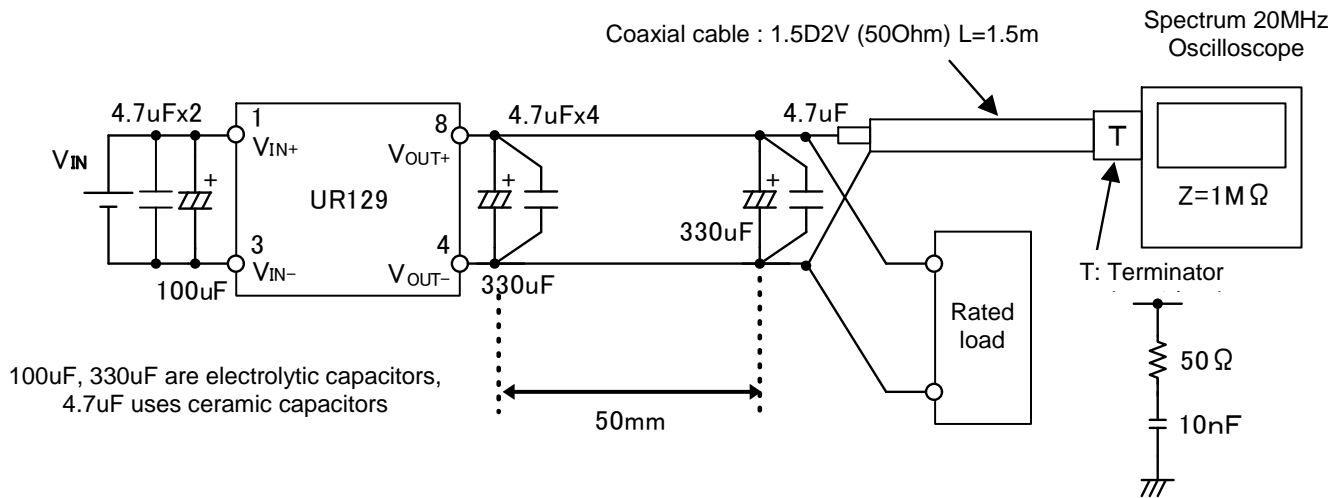
Specifications (Ta = 25 ° C unless otherwise specified)

Item		Acceptance criteria			Unit	Remarks
		MIN.	TYP.	MAX.		
Input voltage range		36	48	76	V	
Input current		-	5.6	-	A	at V _{IN} = 48V I _O = 5A
Efficiency ⁽¹⁾		-	93	-	%	at V _{IN} = 48V I _O = 5A
Rated output voltage		-	50	-	V	
Output current ⁽⁴⁾		0	-	5	A	
Maximum output power		-	-	250	W	I _O = 5Amax
Output Voltage Initial Setting ⁽⁴⁾		49.5	-	50.5	V	at V _{IN} = 48V I _O = 5A
Voltage fluctuation ⁽²⁾		-	-	1.9	V	
Static input fluctuation		-	-	450	mV	V _{IN} = 40V to 76V
Static load fluctuation		-	-	400	mV	V _{IN} = 40V to 76V
Output Ripple Noise Voltage ⁽³⁾		-	-	500	mV _{P-P}	
Voltage variable range		45	-	55	V	
Output over current protection		5.25	-	-	A	
Output over voltage protection		56	-	67	V	
Operating temperature range		-40	-	100	°C	Aluminum base plates
		-40	-	85	°C	Ambient temperature
Operating humidity range		10	-	90	%	No condensation
Storage temperature range		-55	-	125	°C	
Storage humidity range		5	-	95	%	No condensation
Vibration resistance		Frequency: 10-55Hz Acceleration: 49.0 m/s ² Period: 3 minutes Vibration direction: X, Y, Z Vibration time: 1 hour each				Non-operating
Shock resistance		Falling from the 50mm height to the concrete surface, The number of drops is five times on each side.				Non-operating No failure
Withstand voltage	Input-output	DC1500V 1 minute or AC500V 1 minute Cut-off Current 10mA, DC500V 50MΩ min				
	Input-Baseplate	DC1500V 1 minute or AC500V 1 minute Cut-off Current 10mA, DC500V 50MΩ min				
	Output-Baseplate	AC500V 1 Minute Cut-Off Current 10mA, DC500V 50MΩ min				
Safety standard		UL60950-1,C-UL(CSA60950-1) Acquisition				
Operating life		10 Year				According to JEITA RCR-9102B
Product mass		-	26	-	g	
Product externals	W × D × H	58.4×22.76×12.7			mm	See External Dimensions for details

⁽¹⁾ Aluminum base plate temperature 25°C⁽²⁾ Values are for all input voltage, resistive load condition and temperature range.⁽³⁾ For ripple measurement, refer to ripple measurement circuit.⁽⁴⁾ When the input voltage range is 36V to 40V, there is an upper limit of the output variable range.
Refer to output-voltage variable term.

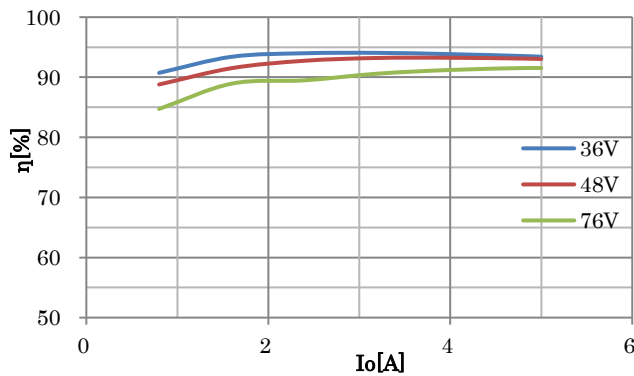
UR129

November,28 2018

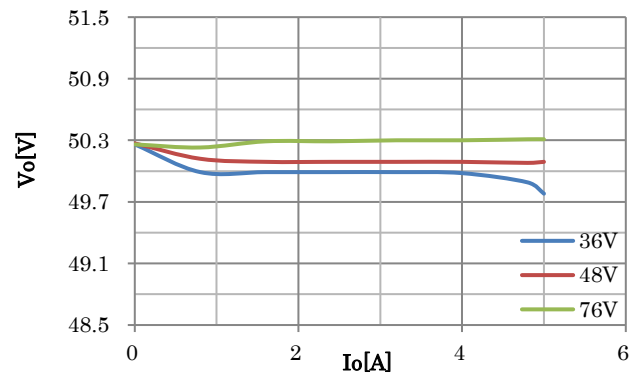


Ripple Measurement Circuit

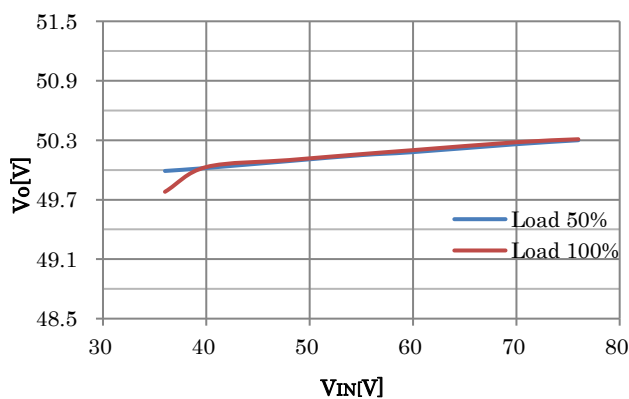
Typical characteristics
Efficiency



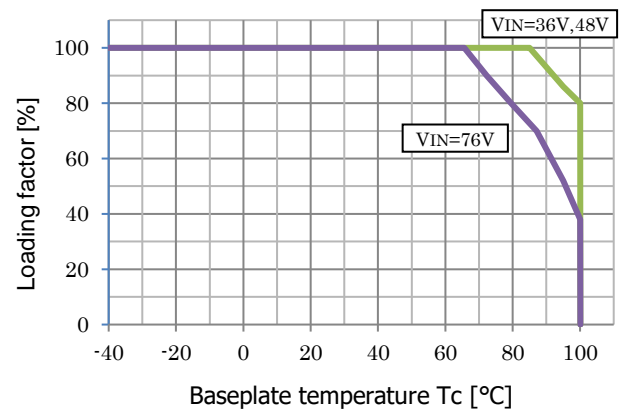
Load regulation



Line regulation



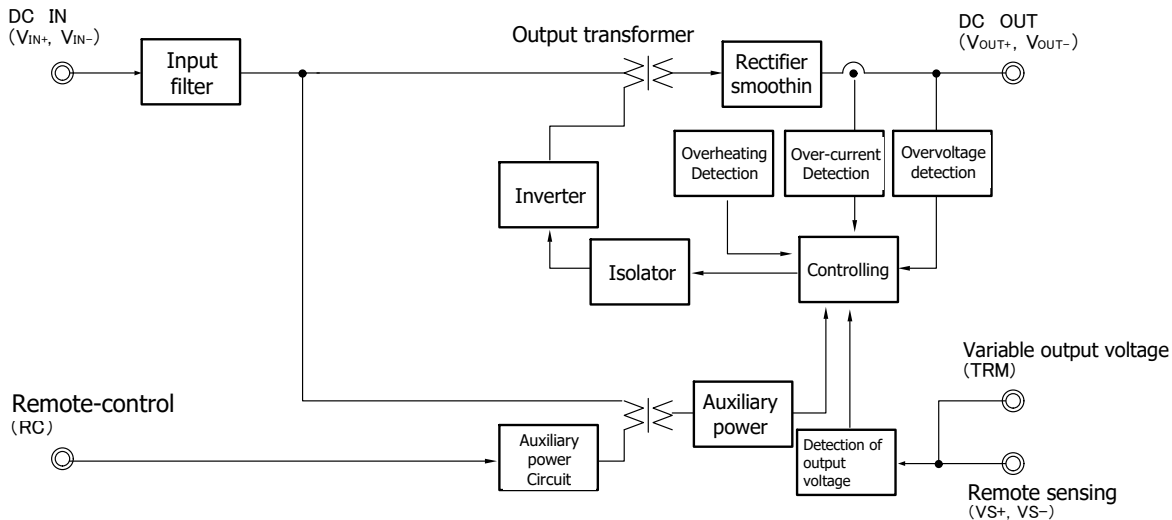
Temperature derating



UR129

November,28 2018

Block diagram



Terminal layout

Terminal number	Symbol	Functioning
1	V _{IN+}	+ Input-terminal
2	RC	Remote-control
3	V _{IN-}	– Input-terminal
4	V _{OUT-}	– Output-terminal
5	V _{S-}	– Remote sensing
6	TRM	Output Voltage Variable Terminal
7	V _{S+}	+ Remote sensing
8	V _{OUT+}	+ Output-terminal

Terminal function

1. V_{IN+}
DC / DC converter positive input terminal. Supply 36 to 76 VDC between this terminal and the VIN- terminal.
2. RC
This DC / DC converter operates by connecting this terminal to VIN-.
This DC / DC converter stops when 5V is supplied to this terminal or when it is opened.
3. V_{IN-}
This is the negative input terminal for the DC / DC converter.
Supply 36 to 76 VDC between this terminal and the VIN + terminal.
4. V_{OUT-}
This is the negative terminal of the DC/DC converter.
Outputs are taken from this terminal and the Vout+ terminal.
5. V_{S-}
Remote sensing terminal on the negative pole.
Voltage between VS+ and VS-terminals is converted to a constant voltage.
6. TRM
Output Voltage Adjustment Terminal.
Voltage between VS+ and VS-terminals is converted to a constant voltage.
7. V_{S+}
Positive remote sensing terminal. Voltage between VS+ and VS-terminals is converted to a constant voltage.
8. V_{OUT+}
Positive terminal of DC/DC converter. Take the outputs from this terminal and Vout-terminal.

UR129

November,28 2018

Input fuse

UR129 has no built-in fuse. To improve the safety of the equipment, mount a normal blow type fuse. Attach the fuse to the Vin (+) side when the Vin (-) side is grounded, and to the Vin (-) side when the Vin (+) side is grounded.

Input Fuse Recommended Current Rating: 15A

Input capacitor

Connect the following capacitor between VIN + and VIN- pins to prevent the input line inductance from affecting the DC-DC converter.

TC = -40 to +100°C 100μF or more

If the input ends of the DC-DC converter are directly turned on or off using switches or other means, surge voltages may be generated due to the effect of the input line's Inductance, etc., and DC-DC converters may fail. In such cases, increase the capacity value above to absorb surge.

Output capacitor

For stable operation of the DC-DC converter and reduction of output ripple noise, connect the following hybrid electrolytic capacitor between VOUT + and VOUT- terminals within 50mm from the output end.

TC = -20 to + 100 °C 330μ F or more

TC = -40 to + 100 °C 330μ F × 2 or more

Maximum capacity: 1200μ F

A ripple current flows through the electrolytic capacitor. When selecting an electrolytic capacitor, check the allowable ripple current value before selecting components. Check the actual ripple current value with the actual device.

Over Current Protection (OCP)

Although a built-in over current protection circuit is used, avoid using a short circuit or over current. When the over current protection circuit operates, the output is cut off. After that, it will return automatically after about 5 seconds.

Over Voltage Protection (OVP)

Built-in over voltage protection function (OVP). When OVP operates, the output is shut off. UR129 is a latch stop type OVP. When this function is activated, the output can be returned by re-inputting or resetting the ON / OFF terminal (RC terminal).

Thermal Shut Down (TSD)

Built-in thermal shut down function (TSD). When the base plate temperature exceeds 110 °C, the TSD function operates and shuts off the output. The output shut-off state by TSD is released by lowering the base plate temperature.

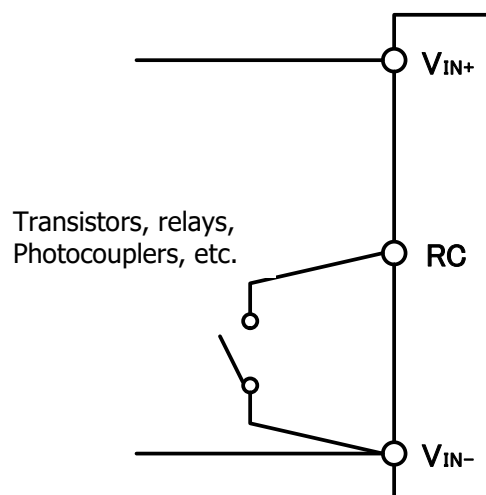
For details of each protection circuit operation and its conditions, see page 8, Table of each protection function and its conditions.

Remote-control

By controlling between the RC terminal and the VIN- terminal, output ON / OFF control can be performed.

Between RC and VIN-	Output voltage
L Levels (0 to 1.5V) or short	ON
H Levels (4V to 7V) or open	OFF

When RC is at L level, the outflow current is up to 6mA . When the RC is opened, an 5V occurs at the RC terminal.



When not using the remote control function, short the RC terminal and the VIN- terminal.

Remote sensing

There is a remote sensing function that compensates for the voltage drop caused by wiring from the output terminal of the DC-DC converter to the load terminal. If the remote sensing function is not required, short the VS + and VOUT + terminals and the VS- and VOUT- terminals with the shortest distance. Use shielded wires, twisted pair wires, parallel patterns, etc. for the remote sensing wires to reduce the effects of noise. Use the voltage at the power output terminal within the output voltage variable range.

UR129

November,28 2018

Variable output voltage

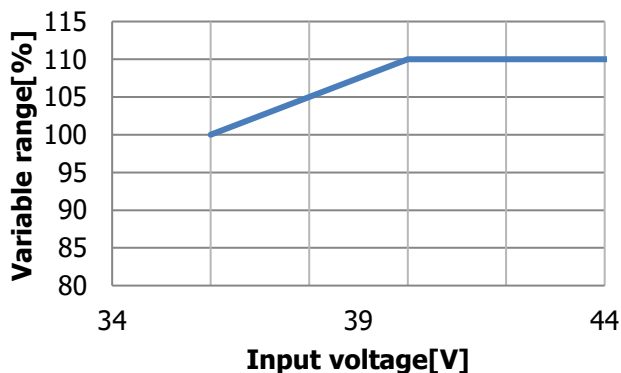
The output voltage can be changed within the following range by externally connecting a resistor and a variable resistor using the TRM pin. Note, however, that raising the output voltage beyond the following range may activate the over voltage protection function. When not adjusting the output voltage, leave the TRM terminal open.

Output variable range:-10% to +10% of the rated output voltage

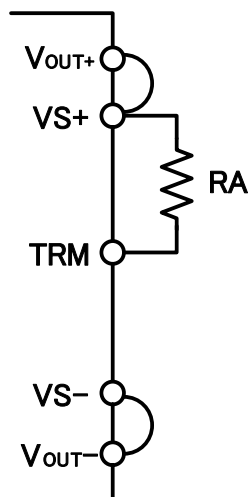
When using it simultaneously with the remote sensing function, make sure that the sum of the voltage drop due to the wiring from the output terminal to the load terminal and the variable output voltage does not exceed the variable output range.

Also, when the output voltage is variable, use the output power and output current of the DC-DC converter within the maximum output value.

* When the input voltage range is 36V to 40V, the upper limit of the output variable range is as shown in the figure.



When setting the output voltage high



Connections diagram

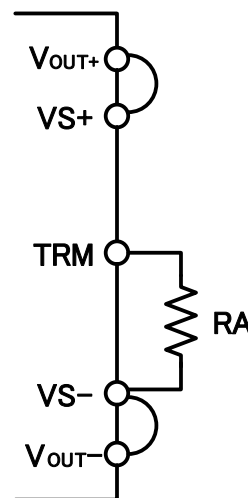
$$RA = \frac{5.4 \times V_o \times (1 + \Delta)}{1.65 \times \Delta} - \frac{5.4}{\Delta} - 11 \quad [\text{k}\Omega]$$

$$\Delta = \frac{V_{\text{set}} - V_o}{V_o}$$

V_o : Rated output voltage

V_{set} : Set Voltage

When setting the output voltage to a low level



Connections diagram

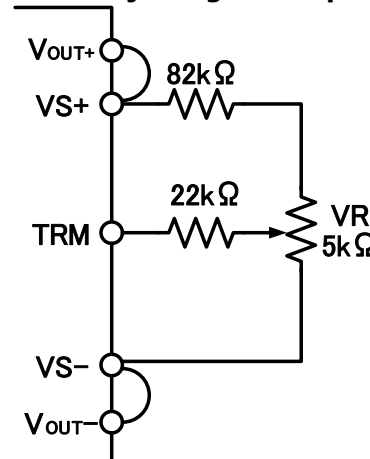
$$RA = \frac{5.4}{\Delta} - 11 \quad [\text{k}\Omega]$$

$$\Delta = \frac{V_o - V_{\text{set}}}{V_o}$$

V_o : Rated output voltage

V_{set} : Set Voltage

When adjusting the output voltage



Connections diagram

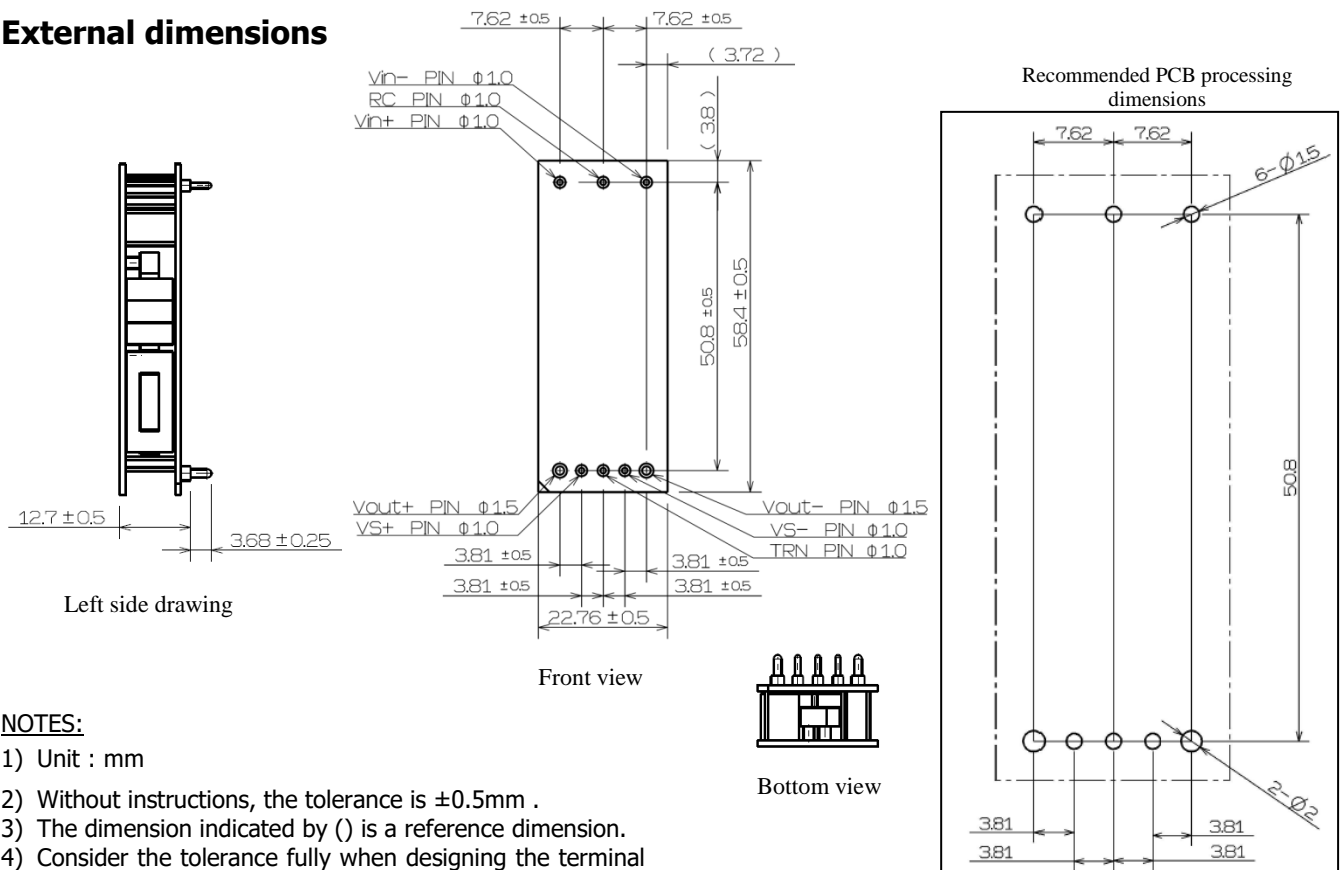
Safety standard

When conducting pressure resistance tests for acceptance inspections, etc., increase the voltage gradually, without putting the test voltage into the test from the beginning. Also, lower the voltage gradually when cutting off. In particular, for pressure-resistant testing equipment with timers, a number of times the applied voltage may be generated as soon as the switches are terminated.

There is no basic insulation, double insulation or reinforced insulation in any combination between the input, output and base plate of this device. When the input voltage exceeds 60V DC, if the above insulation is required, please satisfy with the structure of the final product.

Use an external fuse (15A) certified to safety standards for input.

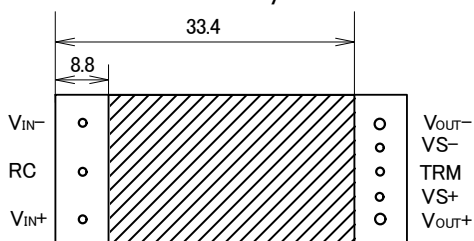
External dimensions



Board mounting method

- Pattern Wiring Prohibited Area

Avoidance of the diagonal part of the diagram should be avoided when implementing power modules. Wiring on the shaded area may cause insulation failure.



- Board mount holes

Please determine the size of the holes of the printed circuit board by referring to the recommended printed circuit board processing dimension diagram and the size below.

Terminals names	Board mount holes
V _{IN+} , RC, V _{IN-} , VS-, TRM, VS+	φ 1 . 5
V _{OUT+} 、V _{OUT-}	φ 2 . 0

- **Conductive Heat Release by Aluminum Base Plate**
When using the aluminum base plate for conduction and heat dissipation from the aluminum base plate to the equipment housing, etc., be careful not to apply unbalanced load or stress to the aluminum base plate.

UR129

November,28 2018

Each protection function and its conditions

Protection function	Stop condition	Stop state	Reversion method
OVP	Output Voltage: 56V or more	Latch Stop	RC ON/OFF and power re-supply
OCP	Output current: 5.25A or more	5s Stopped	Automatic return
High-speed OCP (When an excessive current flows instantaneously due to a load short circuit, etc.)	Base plate temperature: 110°C or less	5s Stopped	Automatic return
	Base plate temperature: 110°C or more	Latch Stop	RC ON / OFF Power on again (Please re-enter at 100 °C or less)
TSD	Base plate temperature: 110°C or more	Stop	Automatic recovery at 100°C or below

UR129

November,28 2018

Precautions for use

Pay attention to the precautions as it may cause a loss of reliability depending on the storage environment and the handling method for characteristic inspection.

Precautions for storage

- The storage environment is preferably room temperature (5 to 35 ° C) and room humidity (40 to 75%), and avoid locations with high temperature, high humidity, and large changes in temperature and humidity.
- Avoiding direct sunlight in a place that does not generate harmful gases such as corrosive gases and is free of any dust.
- For products that have been stored for a long period of time, check the soldering property and lead rust before using them.

Characteristics Analysis and Precautions for Handling

- When conducting characterization inspections such as incoming inspections, pay careful attention to the application of surge voltage from the measuring instrument, short between terminals, and incorrect connection. Also, do not measure it above the rating.
- Do not use the product in an overloaded condition, as this may cause a breakdown.

Attaching method

- Ensure that the temperature of the power supply does not exceed the temperature range indicated by the Derating Characteristics so that sufficient cooling effects can be obtained.
- When using heat-dissipating silicone grease to conduct and radiate heat from the aluminum base plate, apply an appropriate amount evenly. If applied more than necessary, excessive stress will be applied.
- Silicone grease for heat radiation that has been left for a long time will cause the heat radiation effect to deteriorate due to cracks and cause cracks when screws are fixed.
- Be careful not to let foreign matter get into the heat dissipation silicone grease. If foreign matter enters, heat dissipation may be impaired, and if an insulating plate is used, the insulating plate may be damaged, resulting in poor insulation.
- We recommend the following heat-dissipating silicone grease and its equivalents.

Product name Type	Manufacturer's name
G747	Shin-Etsu Chemical Co., Ltd.
YG6260	Momentive Performance Materials Japan LLC
SC102	Toray Dow Corning Silicone Co., Ltd.

Soldering method

- When soldering, be sure to work in as short a time as possible within the following conditions.
 - 260±5°C 15sec.
 - 450±5°C 5sec. (Soldering iron)

Handling Precautions for Prevention of Static Damage

- When handling modules, take care of human body earth. Use a wrist strap or the like for the human body grounding, and place a 1MΩ resistor close to the human body to prevent electric shock.
- Place a conducting table mat, floor mat, etc. on the platform handling the module, and take the earth.
- When using a measuring instrument such as a curve tracer, also take a ground.
- When soldering, ground the tip of the soldering iron or dip tank to prevent leakage voltage of the soldering iron or dip tank from being applied to the module.
- Use our shipped containers for the modules, or use electrostatic containers, aluminum foil, and other materials to take anti-static measures.

UR129

November,28 2018

Forward-Looking Statements

- The content specified herein is subject to change without notice due to improvements and other reasons. Before using the product, confirm that the information is up to date.
- The operation examples and circuit examples described in this document are shown for reference in use, and our company or a third party may infringe on industrial property, intellectual property, or other infringement rights caused by these. Does not take any responsibility.
- We are committed to improving quality and reliability. However, we cannot avoid defects and failures in semiconductor products at a certain probability. The user is responsible for designing and confirming the safety of the equipment and system to prevent accidents that may cause injury, fire, or social damage as a result of the failure of the product.
- The products specified in this document are intended for use in general electronic equipment (home appliances, office equipment, communication terminals, measuring instruments, etc.).
We recommend that you consult with our sales representative and enter the specifications for use in equipment that requires high reliability (such as transportation equipment and its control, traffic signal control, fire and fire prevention equipment, and various types of safety equipment). Also, if you require a long service life, please contact our sales representative.
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