

DC-DC Converter Specification

MPDTY311S,MPDTY312S

1 . Application

This specification applies to DC-DC Converter for telecommunication equipment / data-communication equipment, MPDTY311S/312S.

For any other application, please contact us before using this product.

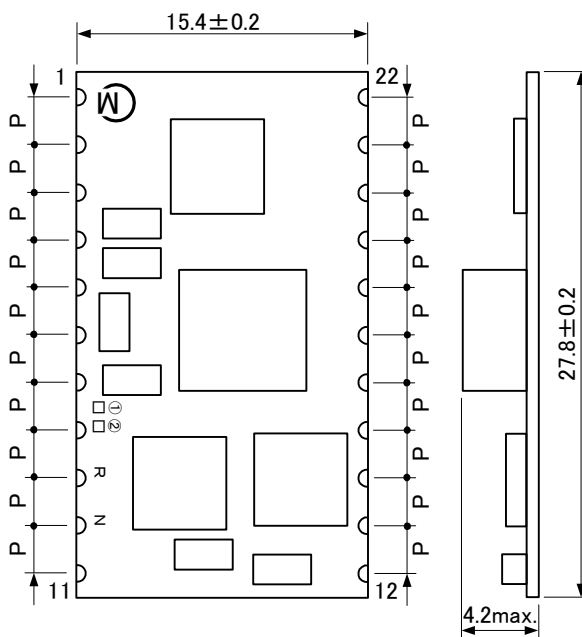
2 . Customer Reference

Customer Spec. Number
Customer Part Number

3 . Murata Part Number

MPDTY311S / MPDTY312S


4 . Appearance, Dimensions



()...reference value [unit : mm]
 $P=2.54 \pm 0.2\text{mm}$
 Tolerance is not accumulated.

⚠ Note:

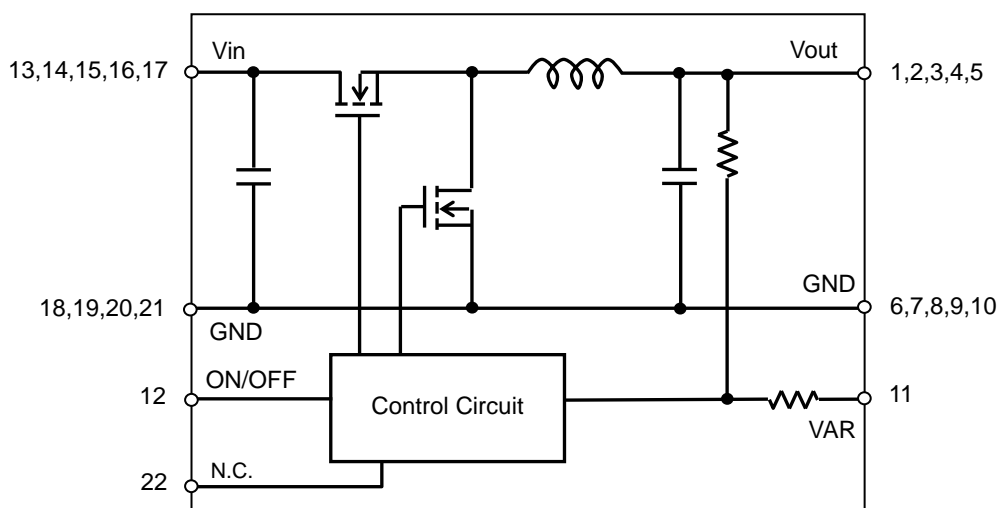
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Marking (1) Pin No.1 Marking / MFG ID 
 (2) Part No. RN:MPDTY311S
 QU:MPDTY312S
 (3) Lot No. ①②
 ① Production Year
 ② Production Month (1,2,3,...9,O,N,D)

5. Pin Number and Function

Pin No.	Signal	Function
1,2,3,4,5	Vout	Output
6,7,8,9,10, 18,19,20,21	GND	GND
11	VAR	Output voltage adjustment
12	ON/OFF	Remote ON/OFF
13,14,15,16,17	Vin	Input
22	N.C.	This pin must be left open.

6. Block Diagram



7. Rating

- | | |
|---------------------------------|---|
| 7.1 Input Voltage Range | 4.5V ~ 5.5V(MPDTY311S)
3.0V ~ 3.6V(MPDTY312S) |
| 7.2 Operating Temperature Range | -40 °C ~ +85 °C |
| 7.3 Storage Temperature Range | -45 °C ~ +90 °C |
| 7.4 Operating Humidity Range | 20% ~ 85%(No water condenses in any cases.)
Maximum wet-bulb temperature 39 °C |
| 7.5 Storage Humidity Range | 10% ~ 90%(No water condenses in any cases.)
Maximum wet-bulb temperature 39 °C |

8. Absolute Rating

- | | |
|----------------------------------|------------------|
| 8.1 VAR,ON/OFF Pin Voltage Range | -0.3V ~ Vin+0.3V |
|----------------------------------|------------------|

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9. Characteristics

9.1 Electrical Characteristics (Ta=25 °C)

Item	Symbol	P/N	Condition	Value			Unit	
				Min.	Typ.	Max.		
Input Voltage	Vin	311S		4.5	5.0	5.5	V	
		312S		3.0	3.3	3.6		
UVLO Threshold	UVLO	311S		4.0	4.3	4.5	V	
		312S		2.7	2.9	3.0		
Output Voltage Adjustable Range	Vout	311S		0.8	-	3.3	V	
		312S		0.8	-	2.5		
Output Voltage Accuracy	Vout-0.8	311S	Vin = 4.5~5.5 V, Iout = 0~16 A VAR = Open, ON/OFF = Open	0.776	0.80	0.824	V	
	Vout-3.3		Vin = 4.5~5.5V, Iout = 0~16 A VAR = 560 Ω, ON/OFF = Open	3.201	3.30	3.399		
	Vout-0.8	312S	Vin = 3.0~3.6V, Iout = 0~16A VAR = Open, ON/OFF = Open	0.776	0.80	0.824	V	
	Vout-3.3		Vin = 3.0~3.6V, Iout = 0~16A VAR = 510Ω, ON/OFF = Open	2.425	2.50	2.575		
	Iout			0	-	16	A	
Ripple Voltage	Vripl	311S	Vin = 5 V, Iout = 16 A, BW = 20 MHz	-	15	50	mV(p_p)	
		312S	Vin = 3.3V, Iout = 16A, BW = 20MHz	-	15	50		
Ripple Noise Voltage	Vnoise	311S	Vin = 5 V, Iout = 16 A, BW = 100 MHz	-	-	90	%	
		312S	Vin = 3.3V, Iout = 16A, BW = 100MHz	-	-	90		
Efficiency	η	311S	Vin = 5 V, Vout = 3.3 V, Iout = 16A, Ta = 25 °C	88	92	-	%	
		312S	Vin = 3.3V, Vout = 2.5V, Iout = 16A, Ta = 25 °C	87.5	91.5	-		
Operating Frequency	Frq			-	600	-	kHz	
ON/OFF pin High Voltage	VIH		ON/OFF pin is pulled up to Vin inside of the DC-DC Converter. If ON/OFF pin is left open, the DC-DC Converter shall be "ON". This pin will be pulled down to GND inside the DC-DC Converter when OCP or OTP events occur. Please do NOT connect this pin to Vin with low impedance line, so as not to damage the converter.					
ON/OFF pin Low Voltage	VIL		If ON/OFF pin is pulled down to GND, the DC-DC Converter shall be "OFF".	OFF	0	-	0.3	V
Short Circuit Protection	SCP		If output is shorted to GND, DC-DC Converter shall be operated in a hiccup mode. After the short circuit event has cleared, the output is automatically brought back into regulation.					
Over Temperature Protection	OTP		If OTP event is occurred, DC-DC Converter shall be shut down. After the OTP event has cleared, the output is automatically brought back into regulation.	-	115	-	°C	
Additional Output Capacitor	Cout		When input voltage is ideal voltage source	0	-	1000	μF	
Rising Overshoot	Vover			-	-	+10	%	
Output Delay	Td		Output Voltage 0-10% (remote on)	0.1	-	8	msec	
Output Rise Time	Tr		Output Voltage 10-90%	1	-	10	msec	

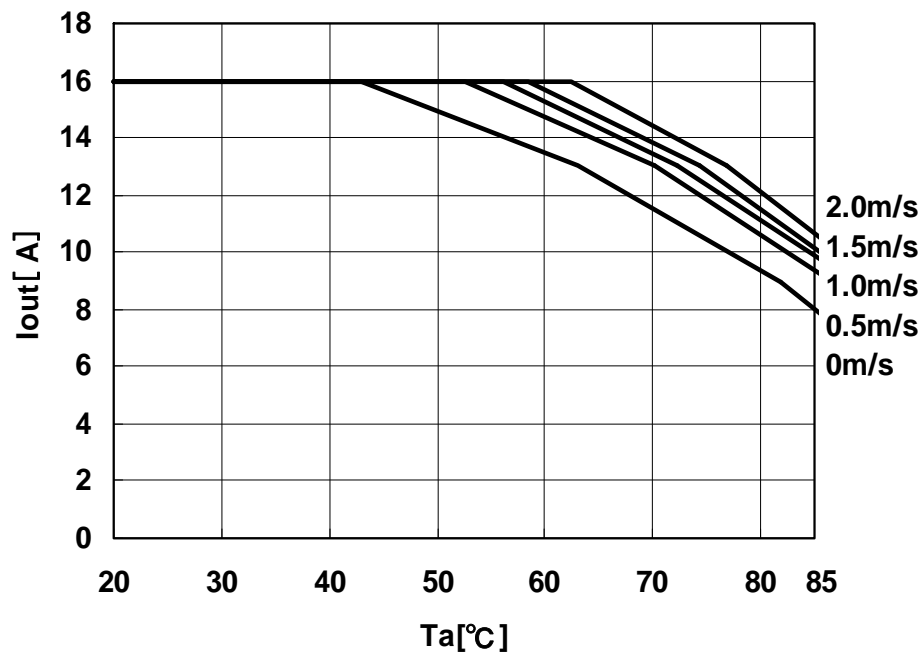
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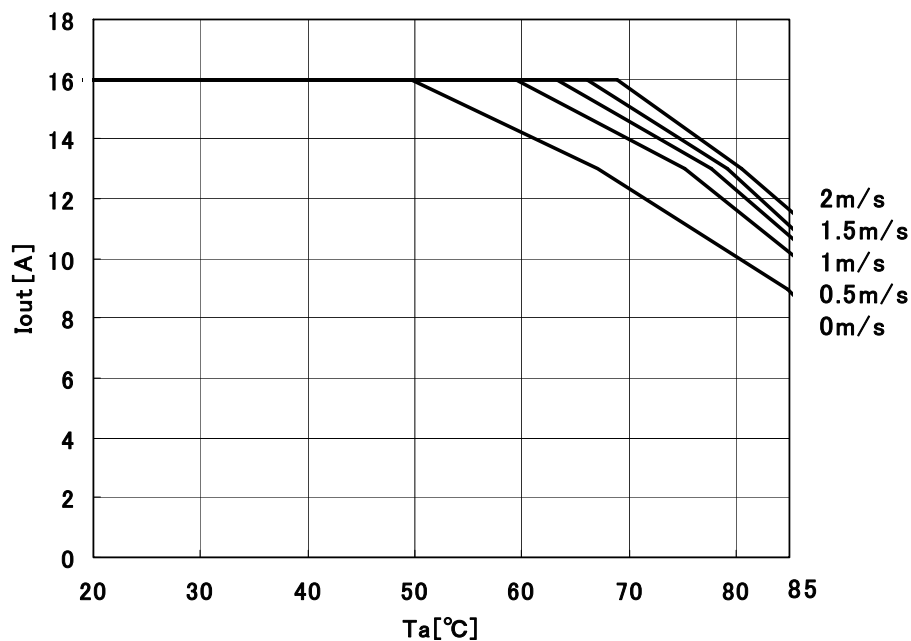
9.2 Output Current Derating

When using this product at the ambient air temperature of 45 °C more, it is used by the following temperature derating.

Thermal Derating (MPDTY311S)



Thermal Derating(MPDTY312S)



⚠ Note:

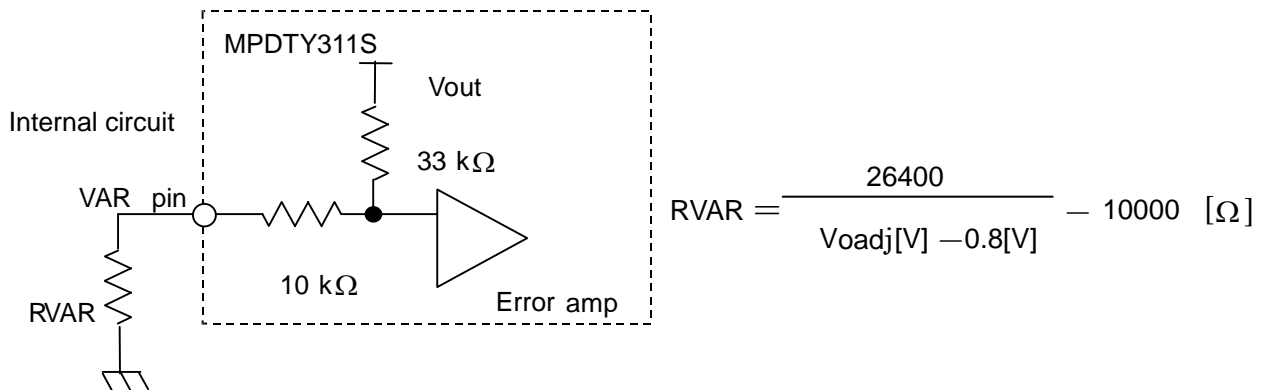
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10. Output Voltage Adjustment

10.1 MPDTY311S

The output voltage can be adjusted ranging from 0.8 V to 3.3 V by connecting resistors between VAR-pin(11pin) to GND-pin.

The following equation gives the required external-resistor value to adjust the output voltage to V_{oadj} . It is strictly recommended to evaluate the characteristics of DC-DC Converter at your board conditions.



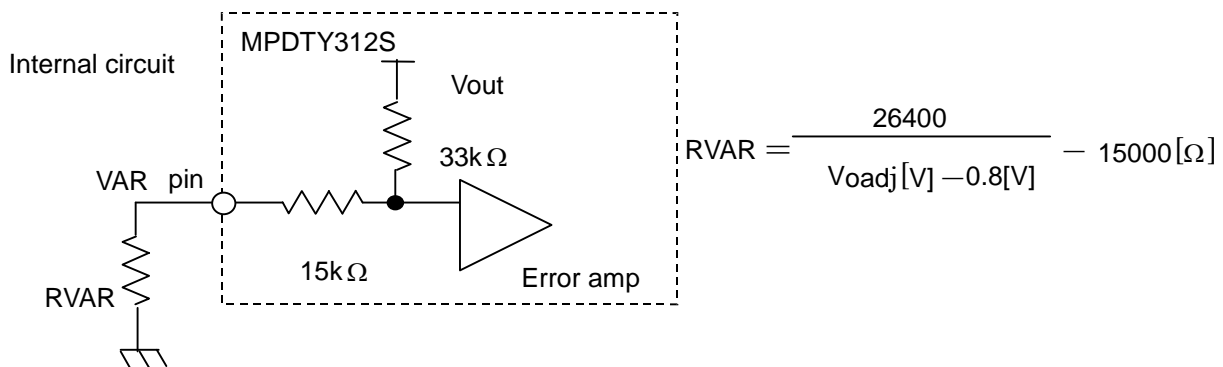
< RVAR calculation example >

Voadj [V]	Calculated RVAR[Ω]	RVAR example[Ω]
3.3	560	560
2.5	5529.4	5.1 k+430
2.0	12000	12 k
1.8	16400	16 k+390
1.5	27714.3	27 k+680
1.2	56000	56 k
1.0	122000	120 k+2 k
0.8	∞	Open

10.2 MPDTY312S

The output voltage can be adjusted ranging from 0.8V to 2.5V by connecting resistors between VAR-pin(11pin) to GND-pin.

The following equation gives the required external-resistor value to adjust the output voltage to V_{oadj} . It is strictly recommended to evaluate the characteristics of DC-DC Converter at your board conditions.



< RVAR calculation example >

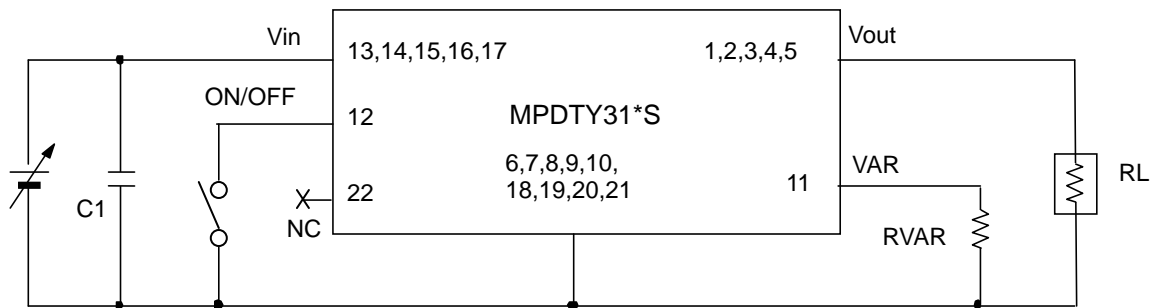
Voadj [V]	Calculated RVAR[Ω]	RVAR example[Ω]
2.5	529.4	510
2.0	7000	6.8k+200
1.8	11400	11k+390
1.5	22714	22k+680
1.2	51000	51k
1.0	117000	100k+18k
0.8	∞	Open

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11 Test Circuit

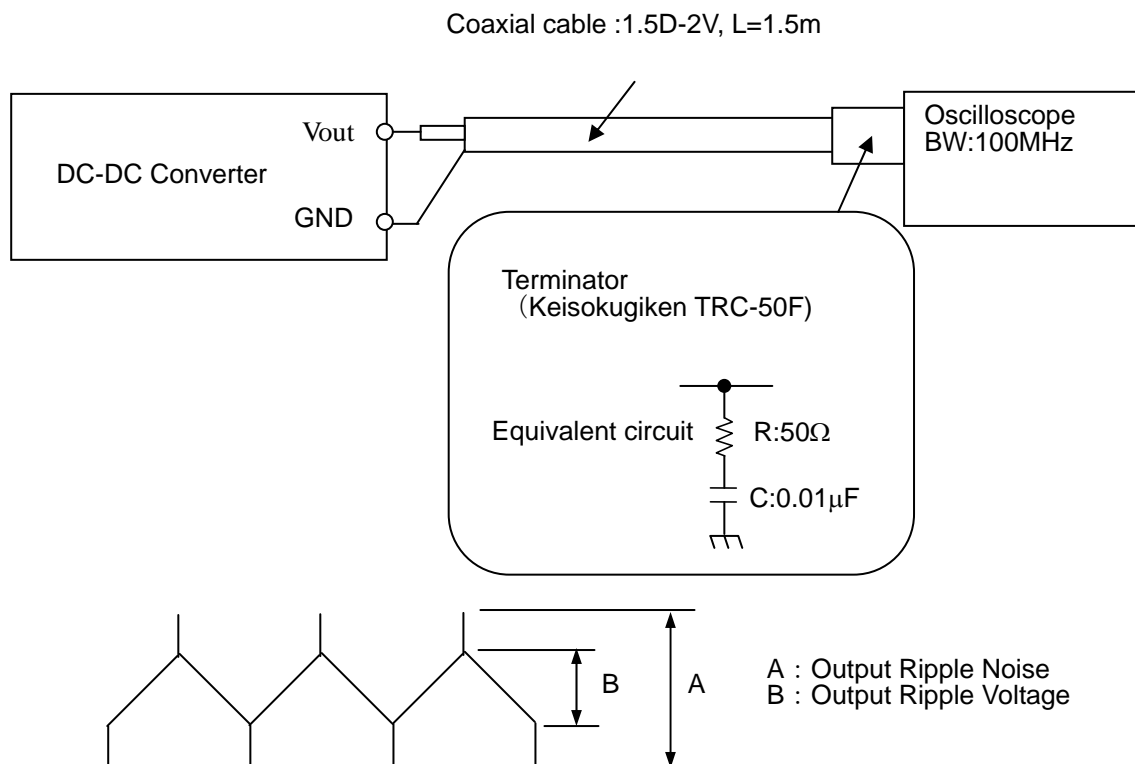
In the following test circuit, the initial values under item 9 should be met.



C1:100 μ F/6.3V (Ceramic Capacitor)

※ Pin 22 must be left open and should not be connected other pins.

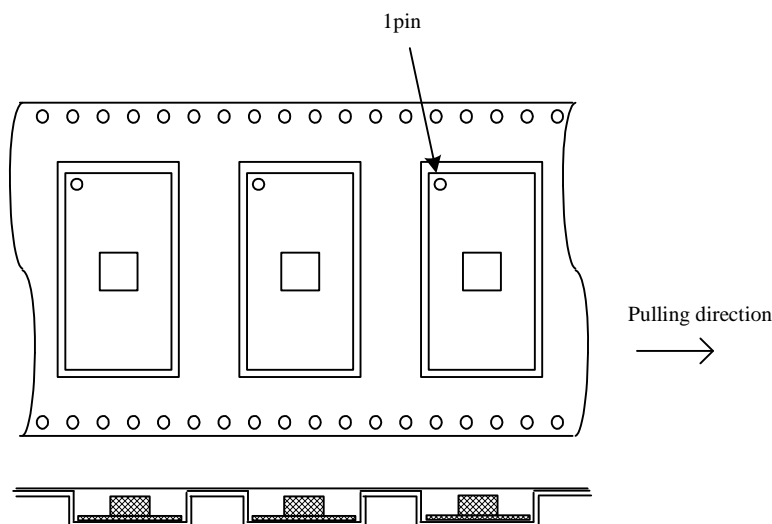
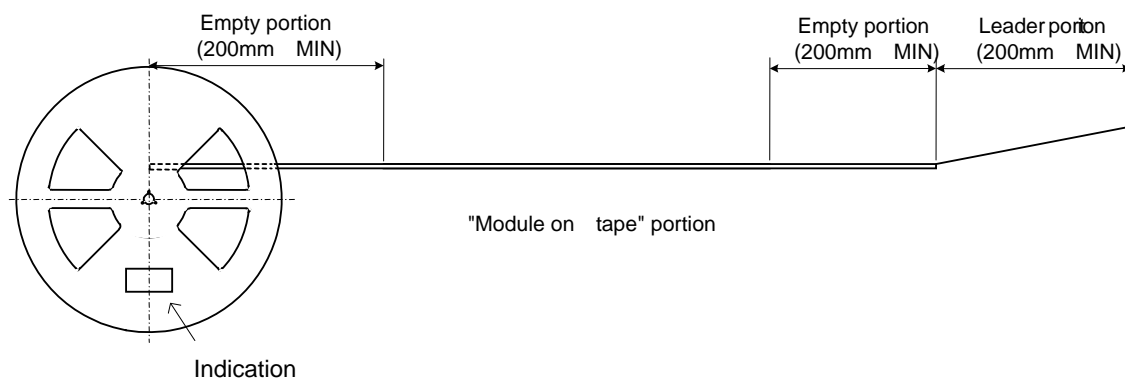
Ripple Noise Measurement Circuit



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12. 3 Taping Specification



The module is located such as parts in upper side and PCB in lower side.

12. 4 Note

1. The adhesive strength of the protective tape must be within 0.1-1N.
2. Each reel contains 300pcs.
3. The deficiency per reel is 0 piece.
4. The reel shows customer part number, Murata part number and quantity.
5. The color of reel is not designated.

⚠ Note:

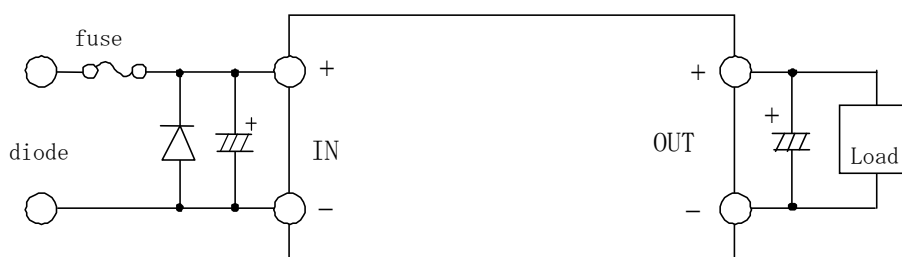
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13. Production factory

Komatsu Murata Mfg.Co.,Ltd.
 Kanazu Murata Mfg.Co.,Ltd.
 Wakura Murata Mfg.Co.,Ltd.

14. ⚠ Caution

1. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.
2. This DC-DC Converter has no inrush protect circuit. If any inrush current is applied to this product(ex. using mechanical switch), it may be damaged by surge voltage.
3. Please connect the input terminal by right polarity. If you connect opposite polarity, it may break the DC-DC Converter. In the case of destruction of the DC-DC Converter inside, over input current may flow. Please add diode and fuse as following to protect them.



※ Please select diode and fuse after confirming the operation.

4. Limitation of Application

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

- ① Aircraft equipment.
- ② Aerospace equipment.
- ③ Undersea equipment.
- ④ Power plant control equipment.
- ⑤ Medical equipment.
- ⑥ Transportation equipment (vehicles, trains, ships, etc.).
- ⑦ Traffic signal equipment.
- ⑧ Disaster prevention /crime prevention equipment.
- ⑨ Data-processing equipment.
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above.

15. Notice

15. 1. Soldering

15. 1. 1 Flux

Please solder the products with Rosin Flux which contains of 0.2wt%. or less chlorine.
 Please do not use high activity acid flux and water soluble flux because they may erode metal or glass portion of the products and may cause defective or low quality products.

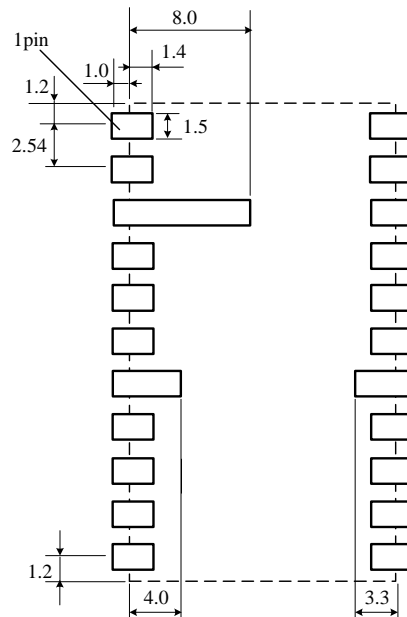
15. 1. 2 Solder

Please use the solder H60, H63 (in JIS Z 3282) or the equivalent type.
 Please use the same type solder as stated above when you use solder paste.

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15. 1. 3 Recommendable Solder Land Pattern



There are wiring coppers or through-hole via at the bottom side of the DC-DC Converter. When you design your PCBs, please be careful not to short the circuit of the DC-DC Converter or PCBs.

15. 1. 4 Recommendable Condition of Soldering

This product is RoHS compatible. The following profile is recommended for the reflow of this product using Pb-free solder paste (Sn-Ag-Cu).

Method : Full convection reflow soldering

Reflow Soldering Profile

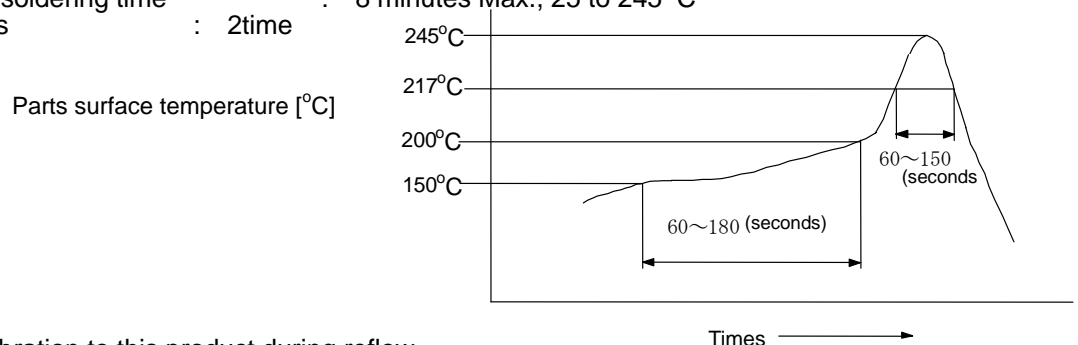
JEDEC IPC/JEDEC J-STD-020C

Table 5-2 Classification Reflow Profile

Pb-Free Assembly Large Body

Profile details

Soldering temperature	: 245°C +0/-5°C
Soldering time	: 20 to 40 seconds, 240 to 245°C
Heating time	: 60 to 150 seconds, over 217°C
Preheating time	: 60 to 180 seconds, 150 to 200°C
Programming rate	: 3°C / sec. Max., 217 to 245°C
Descending rate	: 6°C / sec. Max.
Total soldering time	: 8 minutes Max., 25 to 245°C
Times	: 2time



- ※ Do not add vibration to this product during reflow.
Please carefully regulate temperature control as mounted parts may come off from this product if left under the high temperature for an extended time.

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15. 2 Cleaning

15. 2. 1 Please use no-clean type flux and do not wash this product.

15. 3 Storage

15. 3. 1 You should storage this product under MSL2 at the recommendable condition of soldering, which is described at 15-1-4. So this product can be stored without baking a half year at below 30 °C 60%R.H. In case you store them over the limit, please bake this product before soldering. If these are unpacked condition, please bake them at 125 °C±5 °C /24hour. If these are packed in a tape, please bake them before soldering at 40°C±5°C/5%/192 hour.
Avoid damp heated places or such places where there are large temperature changes, because water may condense on the products, the characteristics may be reduced in quality, and/or be degraded in the solderability.
If you store the products for a long time (more than 1 year), the products may be degraded in solderability and may be rusty. Please confirm solderability for the products regularly.

15. 3. 2 Please do not store the products in the places such as in a dusty place, in a place exposed directly to sea breeze, in an atmosphere containing corrosive gas (Cl₂,NH₃,SO₂,NOX and so on).

15. 4 Operational Environment and Operational Conditions

15. 4. 1 Operational Environment

The products are not waterproof, chemical-proof or rust-proof.
In order to prevent leakage of electricity and abnormal temperature increase of the products, do not use the products under the following circumstances:

- (1) in an atmosphere containing corrosive gas (Cl₂, NH₃, SO₂, NOX and so on).
- (2) in a dusty place.
- (3) in a place exposed to direct sunlight.
- (4) in such a place where water splashes or in such a humid place where water condenses.
- (5) in a place exposed to sea breeze.
- (6) in any other places similar to the above (1)through (5).

15. 4. 2 Operational Conditions

Please use the products within specified values (power supply, temperature, input, output and load condition, and so on). Input voltage drop for line impedance, so please make sure that input voltage is included in specified values.

If you use the products over the specified values, it may break the products, reduce the quality, and even if the products can endure the condition for short time, it may cause degradation of the reliability.

15. 4. 3 Note prior to use

If you apply high static electricity, over rated voltage or reverse voltage to the products, it may cause defects in the products or degrade the reliability.

Please avoid the following items:

- (1) over rating power supply, reverse power supply or not-enough connection of 0 V(DC) line.
- (2) electrostatic discharge by production line and/or operator.
- (3) electrified product by electrostatic induction.

Do not give an excessive mechanical shock..

If you drop the products on the floor, etc., it may occur a crack to the core of inductors and monolithic ceramic capacitors.

Do not give a strong shock such as a drop in handling.

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15. 5 Transportation

If you transport the products, please pack them so that the package will not be damaged by mechanical vibration or mechanical shock, and please educate and guide a carrier to prevent rough handling.

If you transport the products to overseas (in particular, by sea), it is expected that the transportation environment will be the worst, so please pack the products, in the package designed on the consideration of mechanical strength, vibration-resistant and humidity-resistant. The package of the products which Murata sells in Japan, may not resist over seas transport.

Please consult us if you are to use the Murata package of the products sold in Japan for transport to overseas.

16. Note

1. Murata recommends that customers ensure that the evaluation and testing of these devices are completed with this product actually assembled on their product.
2. All the items and parameters in this product specification have been prescribed on the premise that Murata's product is used for the purpose, under the condition and in the environment mutually agreed upon.

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