

DC-DC Converter DATA Sheet

MYBSC0128CABT / MYBSC0128CAZT

Feature:

1/16th Brick type
 Vin 36Vdc-75Vdc
 Vout 12Vdc
 I out 8.3Adc
 100W

Application:

Telecommunication equipments, Big data storage devices, Process equipments, Measurement instruments, Broadcasting equipments, Robots, CPU and FPGA mounted equipments etc.

1. Appearance

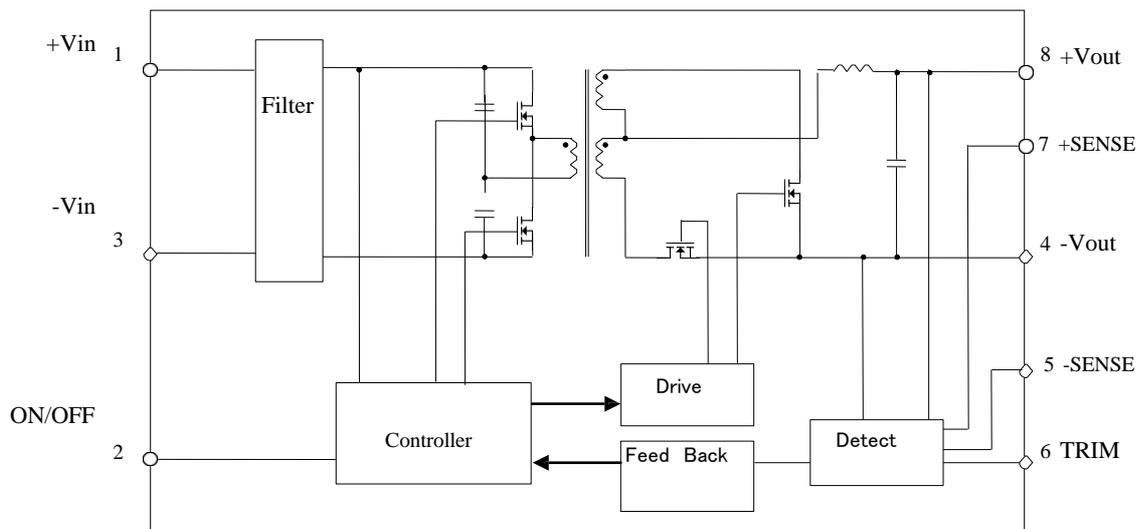
MYBSC0128CABT



MYBSC0128CAZT



2. Block diagram



3. Environmental Condition

Operating Temperature Range	-40°C ~ +85°C(Temperature gradient $\leq 10^{\circ}\text{C}/\text{H}$)
Storage Temperature Range	-40°C ~ +85°C(Temperature gradient $\leq 25^{\circ}\text{C}/\text{H}$)
Operating Humidity Range	Relative Humidity 5% ~90% (No water condenses in any cases.) within absolute Humidity 0.044kg/kg D.A.max
Storage Humidity Range	5% ~95% (No water condenses in any cases.)

Note:

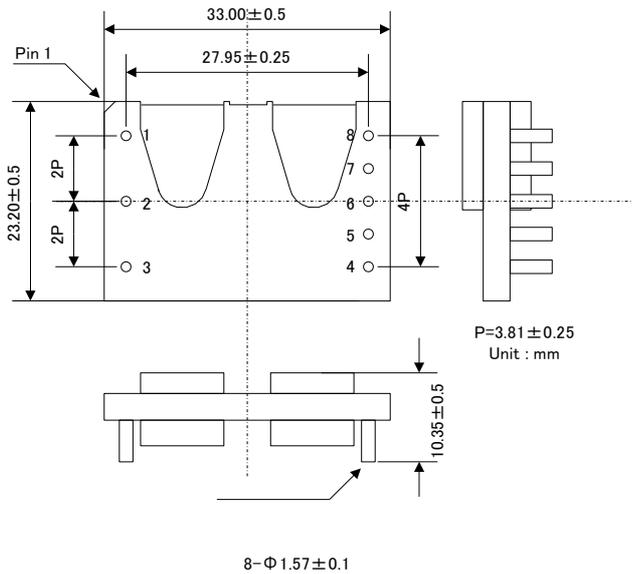
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4. Appearance, Dimensions

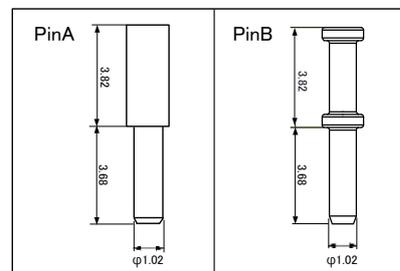
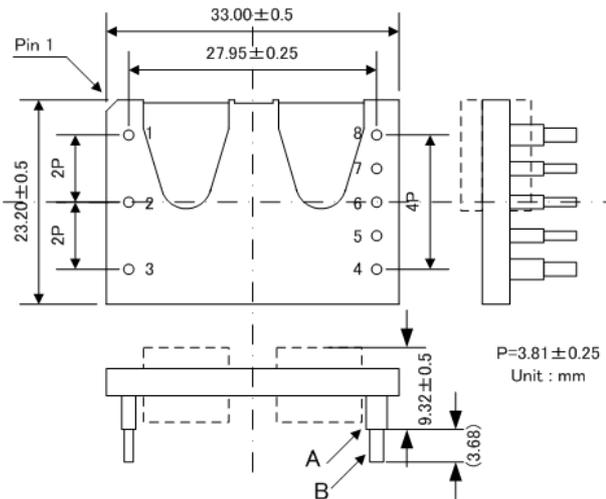
4.1. Weight : 15.2g typical

4.2. Dimension

MYBSC0128CABT

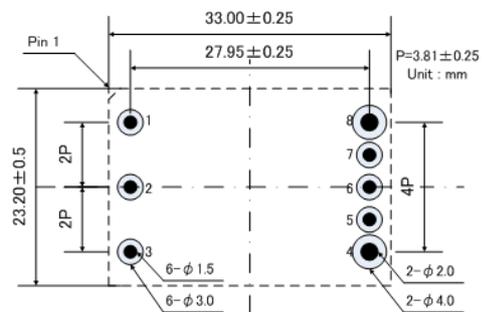
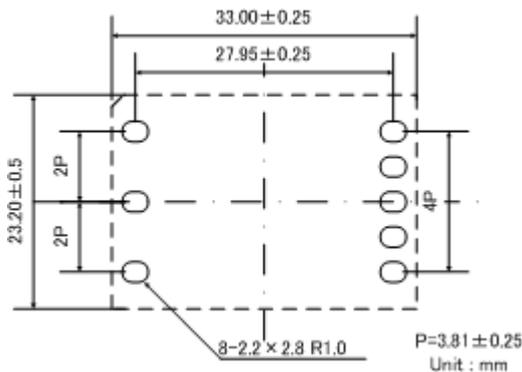


MYBSC0128CAZT



*Pins 1, 2, 3, 5, 6 and 7 use either Pin A or Pin B.

4.3. Recommendable soldering land pattern



Pin	Pin diameter	Hole diameter	Land diameter
1,2,3,5,6,7	$\phi 1.02$	$\phi 1.5$	$\phi 3.0$
4,8	$\phi 1.57$	$\phi 2.0$	$\phi 4.0$

5. Terminal pin number and Function

Pin No.	Signal	Function
1	Vin(+)	Positive Input Voltage
2	ON/OFF	Remote ON/OFF
3	Vin(-)	Negative Input Voltage
4	Vout(-)	Negative output Voltage
5	SENSE(-)	Negative Remote Sense
6	TRIM	Output Voltage Adjustment
7	SENSE(+)	Positive Remote Sense
8	Vout(+)	Positive output Voltage

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6. Electrical Characteristics

6.1. Absolute Maximum Ratings

Item	Unit	Absolute Rating	Remarks
Minimum Input Voltage	Vdc	0	
Maximum Input Voltage	Continuous	Vdc	60
	100msec	Vdc	100
ON/OFF terminal Control Voltage	Maximum	Vdc	7
	Minimum	Vdc	0

Input voltage shall not be applied over the absolute maximum voltage

If it exceeded the absolute Maximum Rating, the product characteristics will be deteriorate or damaged.

Even if it works under such circumstances, the life time will be significantly shortened.

This product is designed to operate within the maximum operating voltage ratings.

6.2. Electrical Characteristics standard (Ta=25°C)

6.2.1 Input Characteristics

Item	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input Voltage Range	Vin	Continuous	36	48	60	Vdc
		100msecMax.	60		75	Vdc
Turn-on Input Voltage	-	Vin=increasing	32	-	36	Vdc
Input Voltage difference of Turn-on and Turn-off	-		2.0	-	-	Vdc
Galvanic Isolation Voltage	-	Voltage applied for 1 minute Cutoff Current:1mA Ta=25°C±10°C /60%±15%RH	1500	-	-	Vdc

6.2.2. Specific Characteristics (Ta=25°C with temperature derated.)

Test circuit is mentioned in section 6.5.

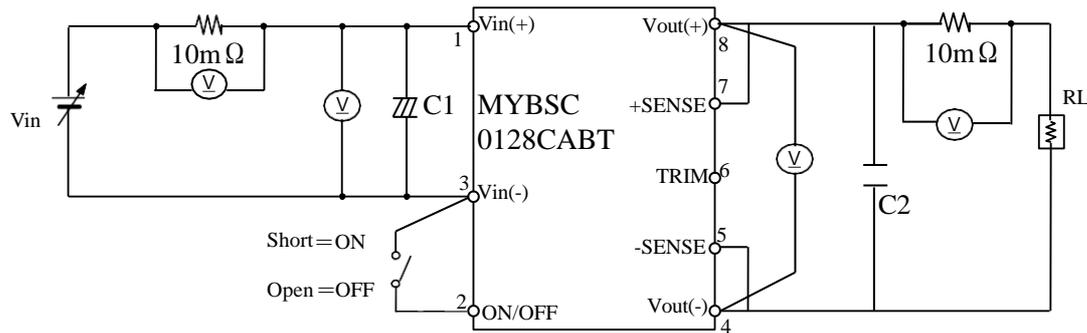
Item	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Output Voltage	Vout	Vin =Min ~ Max Iout =Min ~ Max	11.64	12	12.36	Vdc
Output Voltage Adjustable Range	Vout(adj)		-10	-	+10	%
Output Current	Iout		0	-	8.3	A
Ripple Noise Voltage	Vripl		-	-	300	mV(p-p)
Efficiency	η	Vin = 48V Iout =8.3A Ta =25degC	-	92.5	-	%
ON/OFF pin Control Voltage	Von		0	-	0.7	Vdc
	Voff		2.0	-		Vdc
RC start up delay time	trc	Vin =Min ~ Max Iout =Min ~ Max RC connected with -Vin	-	5	-	ms
Setting point of Over Voltage Protection	OVP	Vin =Min ~ Max	15.6	-	-	Vdc
Setting point of Over Current Protection	OCP	Vin =Min ~ Max	8.55	-	-	A
Setting point of Temperature Protection	OTP	Vin =Min ~ Max.	-	140	-	°C
External Output Capacitance	Cout	Ceramic capacitor	300	-	1000	μ F

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6.3. Test Circuit

In the following test circuit, the initial values in section 6 should be met.

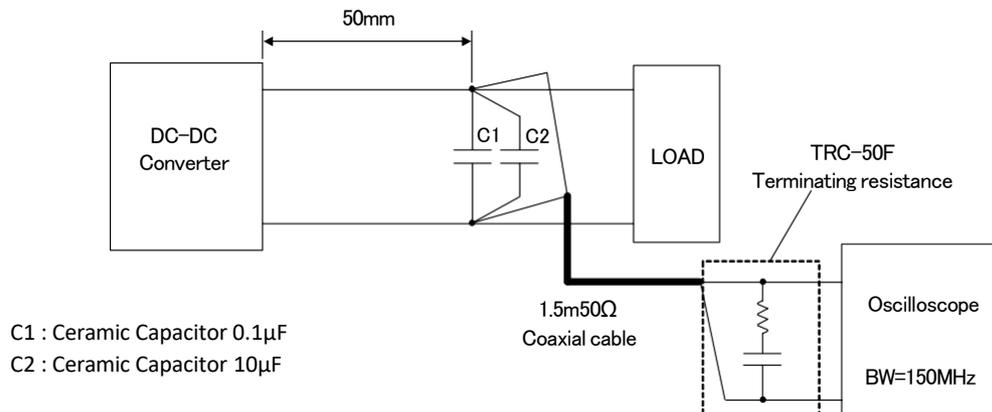


- C1 : Low Impedance Electrolytic Capacitor 100 μ F
 C2 : Ceramic Capacitor 300 μ F ~ 1000 μ F
 RL : Electronic Load Device :Model ELL355 KEISOKUGIKEN equivalent
 Vin : DC Power Supply : Model HP6675A HP equivalent
 : Digital Multi-meter :Model HP34401A HP equivalent

※Other than above condition, DC-DC converter may operate abnormally.

It should be fully confirmed on your board before use.

※Ripple Noise Test



6.4. Protection Circuit

6.4.1. Over Voltage Protection(OVP)

Output voltage goes over OVP specified voltage in 6.2.2., typically 4msec after it, it will be in hiccup mode.

After abnormal condition is removed, it automatically returns to normal operation.

It might go over OVP specified voltage with some reasons of input voltage sudden change or output load sudden change. In this case, OVP does not work until typically 4msec go by. Please evaluate it on your application.

6.4.2. Over Current Protection(OCP)

Output current goes over OCP specified current, it will be into hiccup mode typically 1msec after OCP starts to work. After abnormal condition is removed, it automatically returns to normal operation.

6.4.3. Over Temperature Protection

When temperature around main switch goes over approximately 140 degree C, OTP suddenly work to stop operation. After the temperature at that point goes back below OTP temperature, it automatically return to normal operation.

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7. Control Pins

7.1. To Adjust Output Voltage

- When the nominal output voltage is used. Please do not connect TRIM-pin(Terminal pin No.6).
- It is able to increase the output voltage ($V_{o,adj}$) in range between 100% and 110% of nominal output voltage ($V_{o,nom}$), when resistors connected between TRIM-pin(Terminal pin No.6) to SENSE(+)-pin (Terminal pin No.7). (V_{out} -Up Control).

$$R_{adj-up} = \left[\frac{5.1 \times V_{o,nom} (100\% + \Delta(\%))}{1.225 \times \Delta(\%)} - \frac{5.1 \times 100(\%)}{\Delta(\%)} - 10.22 \right] [\text{k}\Omega]$$

$$\Delta = \left| \frac{V_{o,adj} - V_{o,nom}}{V_{o,nom}} \right| \times 100(\%)$$

- It is able to decrease the output voltage ($V_{o,adj}$) in range between 90% and 100% of the nominal output voltage ($V_{o,nom}$), when resistors connected between TRIM-pin(Terminal No.6) to SENSE(-)-pin (Terminal No.5). (V_{out} -Down control)

$$R_{adj-down} = \left[\frac{5.1 \times 100(\%)}{\Delta(\%)} - 10.22 \right] [\text{k}\Omega]$$

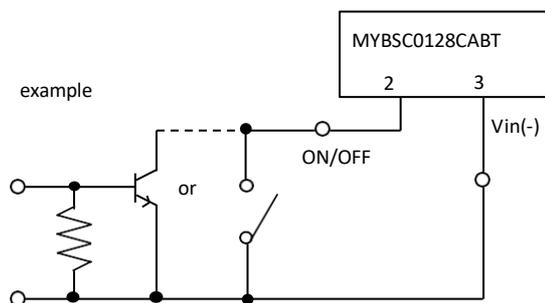
$$\Delta = \left| \frac{V_{o,nom} - V_{o,adj}}{V_{o,nom}} \right| \times 100(\%)$$

After calculating external resistance, please adjust the resistance value for adequate $V_{o,adj}$ on your board. Also when output voltage has to be changed, Please re-calculate the resistance and re-evaluate it on board.

7.2. ON/OFF Control

- ON Control:
ON/OFF Pin (Terminal No.2) should be connected to $V_{in}(-)$ Pin (Terminal No.3), or keeps less than 0.7V.
- OFF Control:
ON/OFF Pin (Terminal No.2) should be opened, or the current from ON/OFF Pin (Terminal No.2) to $V_{in}(-)$ Pin (Terminal No.3) is controlled less than 30 μ A.

When ON/OFF pin is open, The voltage of maximum 5V appears on the ON/OFF pin.



7.3. External input capacitor

When an inductance or a switch device is connected to Input line, or when the transient response of input power supply is bad, the load response of DC-DC converter may not be normally operated or/and DC-DC converter may cause unusual oscillation, please connect an external input capacitor.

7.4. Output voltage remote sense

It equips the remote sense function which corrects a voltage drop caused by distance between the power supply output terminal and the load terminal. A voltage drop by the line drop can be corrected by connecting Pin No.5 and Pin No.7 to the load terminal. When use a remote sense, please use a shielding wire, a twist line, a side by side pattern and so on to line of remote sense line, to minimize the influence of the noise. A Output Voltage range able to Remote Sense Range is within +/-5%. And also use within the output adjustable range.

When it is not necessary, please connect terminal No.4 and No.5, and also No.7 and No.8 terminal.

If you use an output voltage remote sense, please evaluate the characteristics of DC-DC converter on your board conditions.

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8. Reliability

8.1. Reliability Test Items.

Item	Test Condition	Criteria
Humidity	+40°C±2°C, 90 ~ 95%RH, 100 hours	No damage in appearance and no deviation of electrical characteristics Specified in section 6.2.2. 2 hours after the test.
Thermal Shock	-40°C to +85°C, 5 cycles	
Mechanical Vibration	10 to 55Hz, max. 1.5mm amplitude, 1 hour for each of X, Y, Z directions.	
Mechanical Shock	20G, 1 time for each of X, Y, Z directions.	

8.2. Soldering Heat Resistance

Immerse the part of lead where it is to be soldered on a motherboard in a solder bath of 260+/-5 degree C for 3+/-0.5sec. Then tested products are left for 2 hours.

There is no damage in appearance and no deviation from electrical characteristics in 6.2.2.

8.3. Lead Pin Strength

Strain a lead pin by gradual-increasingly 5.0N along axial direction; withstand for 5sec.

No damage on a lead pin.

8.4. Solderability of lead pins

The lead pins will be immersed in the Isopropyl Alcohol (JIS K 1522) with Rosin (JIS K5902) solution (the concentration of Rosin will be allowed 10wt% to 35wt%, and normally approximately). 25wt% will be used without any specific requirement.)

Then the lead pins will be immersed 1 to 1.5mm from the lead end in the solder Sn96.5/Ag3/Cu0.5 melted at the temperature of 250degree C +/-5degree C for 5+/-1 seconds, and pulled up completely.

The solder will adhere to over 75% of immersed area.

9. Safety Standard

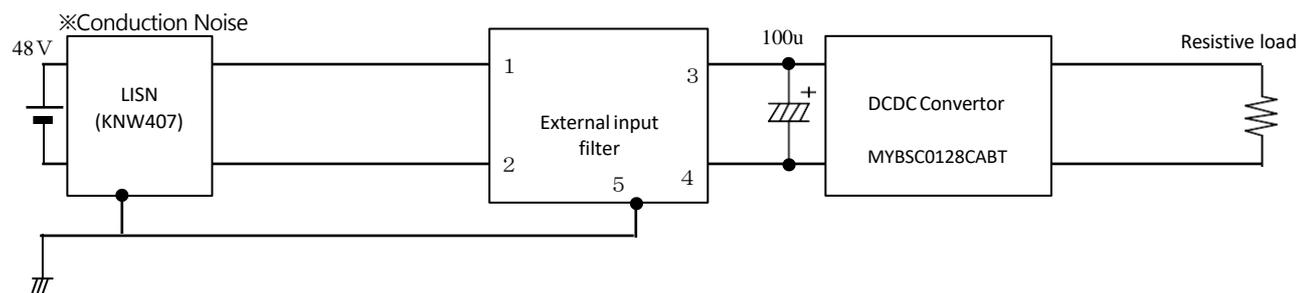
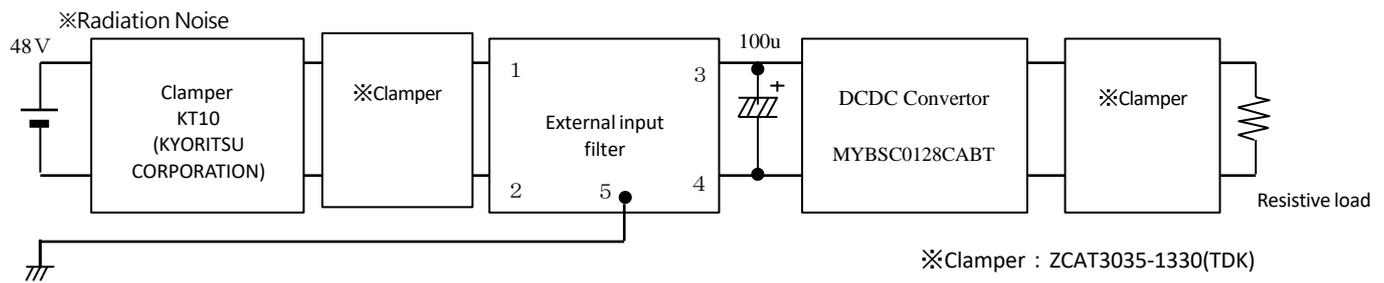
Recognized UL60950, Compliant to IEC 60950.

CE Mark is shown on a package box.

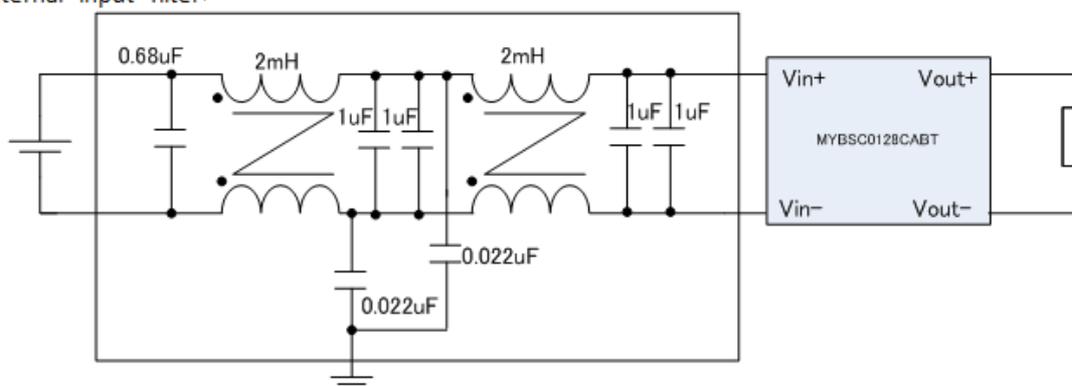
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10. EMI Standard
Compliant to VCCI Class A
The circuitry is as below.



※External input filter



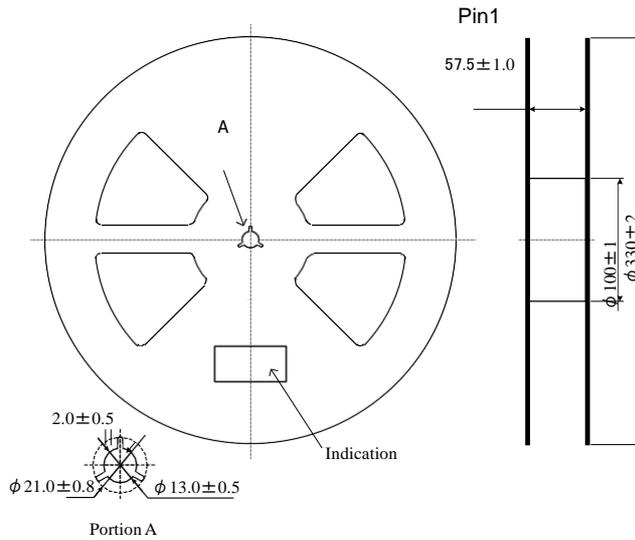
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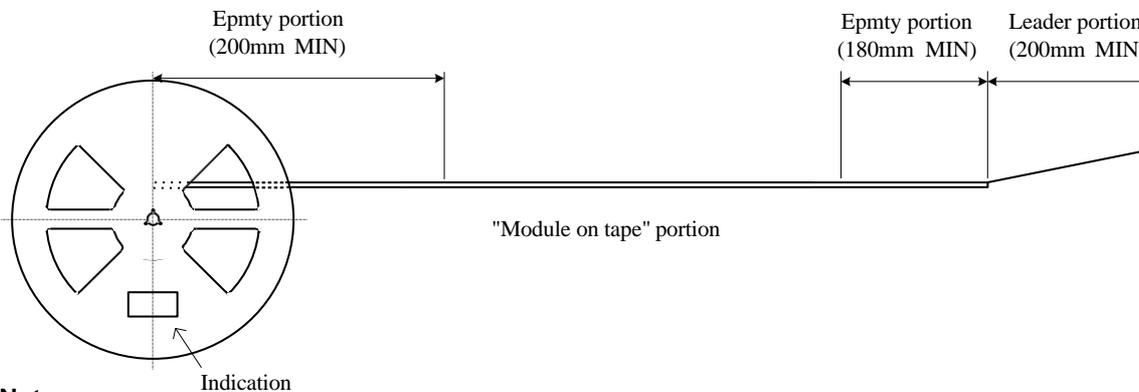
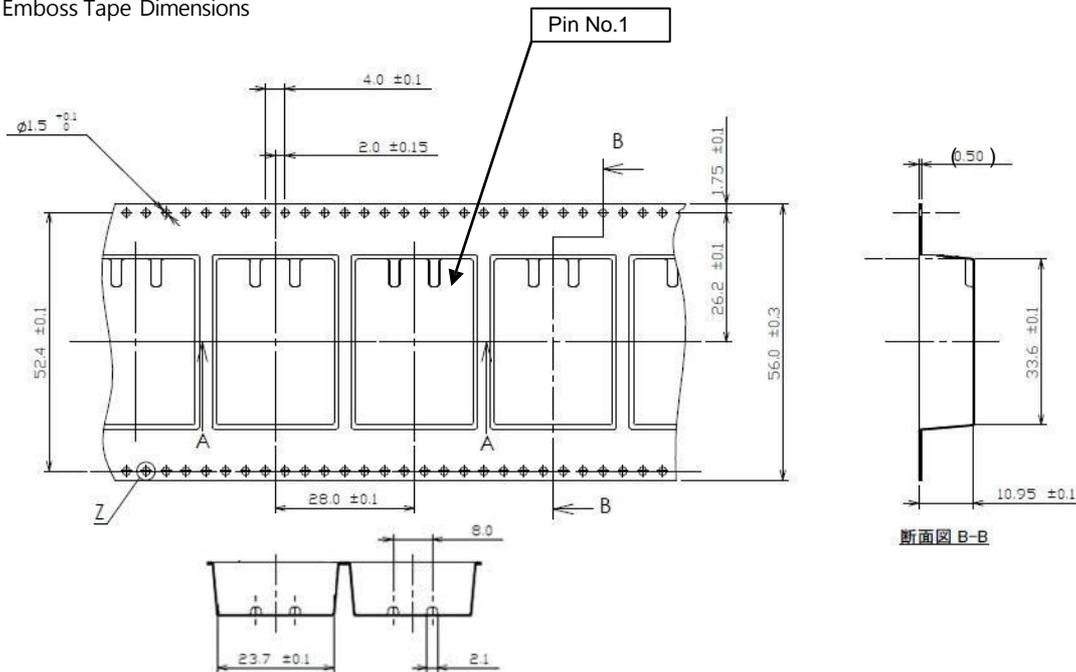
11. Packaging Specification

11. 1. Packaging Specification for MYBSC0128CABT(SMD type)

11. 1. 1. Reel Dimension



11. 1. 2. Emboss Tape Dimensions



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11. 1. 3. Taping Specification

1. The adhesive strength of the protective tape must be within 0.1-1.3N.
2. Each reel contains 140 pcs.
3. Moisture-proof packaging, because of MSL 3.
4. The deficiency per reel is 0 piece.
5. The reel shows customer part number or/and Murata part number and quantity.
6. The color of reel is not designated.

※Marking on the box and reel

1. MURATA Parts Number
2. Quantity
3. Inspection No.
4. ROHS—Y < * >

11.2. Packaging Specification for MYBSC0128CAZT (Thru-hole insert pin type)

Please contact us for detail of this packaging,

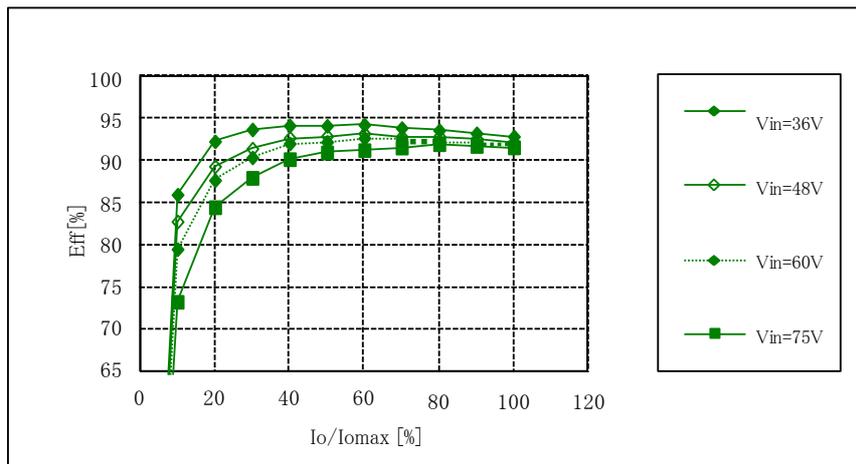
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12. Electrical data

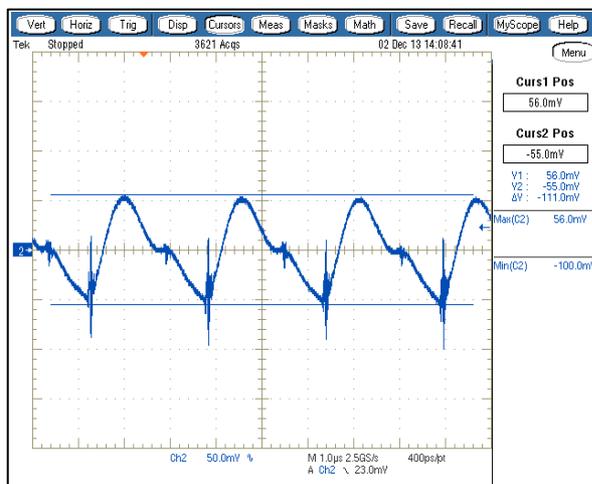
12.1. Efficiency

Vout=12V Ioutmax=8.3A Ta=25°C



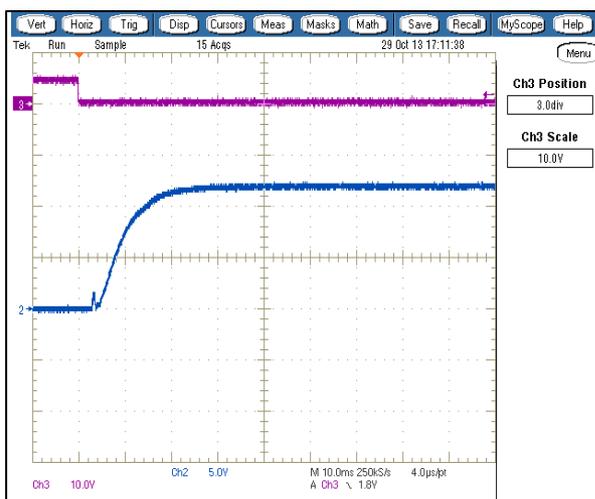
12.2. Output Ripple Spike

Vin=48Vdc Full Load Ta=25°C



12.3. Remote Control

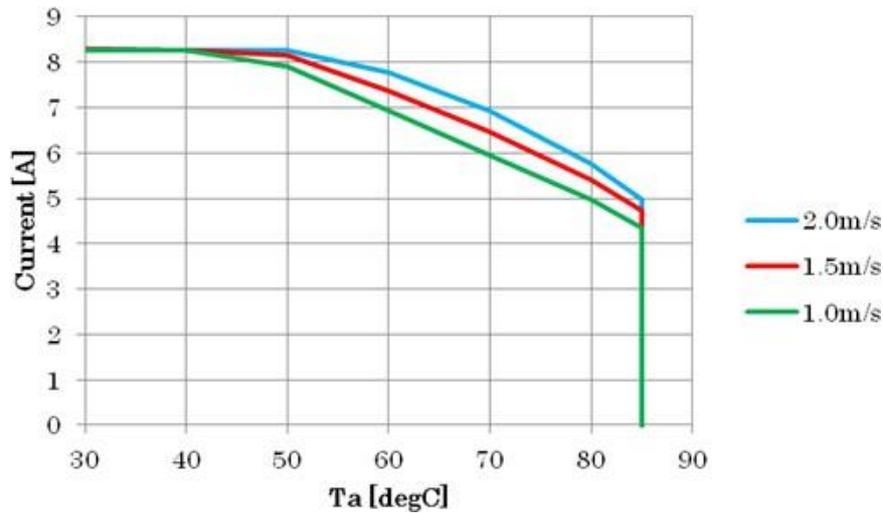
Vin=48Vdc Full Load Ta=25°C



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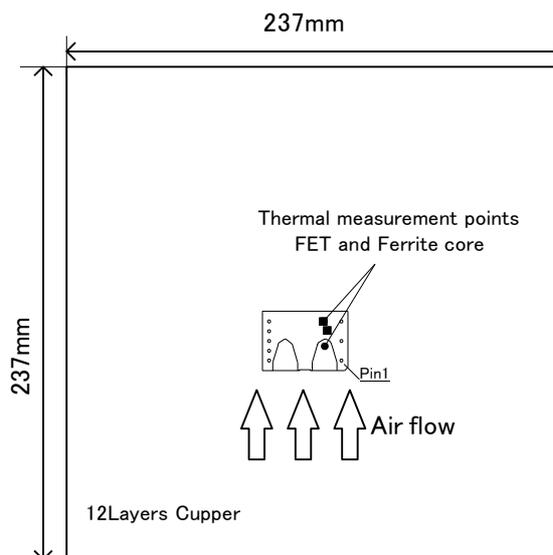
12.4. Temperature De-rating <For Reference Only>



Test Condition

- Input Voltage : 48Vdc , Air flow : 2.0m/s, 1.5m/s, 1.0m/s
- Size of Mounted Evaluation board : 237x237 , 12 Copper layers,
- Output voltage : 12V (TRIM pin is Open).

Temperature de-rating curve is plotted that temperature at above 3points should be 119degree C.

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13. Notice

13.1. Soldering

13.1.1. Flux

Please solder the product with Rosin Flux, which contains chlorine 0.2wt% or less.
Please do NOT use acid flux or water-soluble flux, which could corrode metals and glass of the product.

13.1.2. Solder

Please use the solder Sn-3Ag-0.5Cu or the equivalent type.

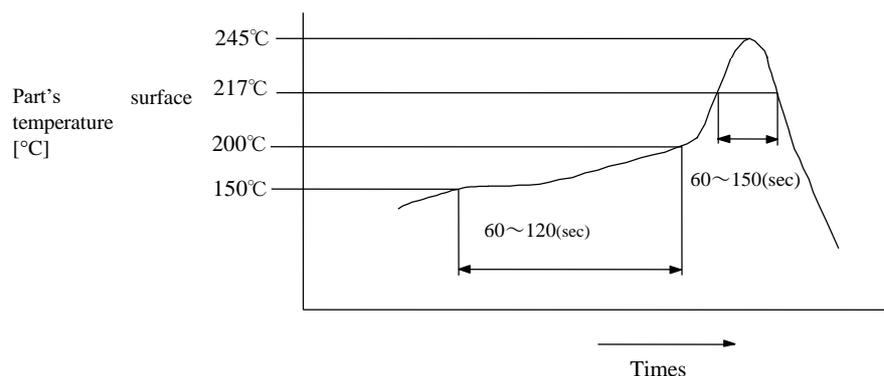
13.1.3. Recommendable soldering condition

①Reflow Solder

Reflow Soldering Profile : JEDEC IPC/JEDE J-STD-020D
Table 5-2 Classification Reflow Profiles Pb-Free Assembly Large Body

Profile details

Soldering temperature	245°C+0/-5°C
Soldering time	30 seconds, 240°C ~ 245°C
Heating time	60 ~ 150 seconds, 217°C min
Preheating time	60 ~ 120seconds, 150°C ~ 200°C
Programming rate	3°C/sec. Max., 217°C ~ 245°C
Descending rate	6°C/sec.Max
Total soldering time	8 minutes Max., 25°C ~ 245°C
Time	1time



(Caution)

Do not vibrate for the products during reflow soldering.

And also please do not expose it in high temperature for long time, because mounted parts may come off. If the products are mounted on backside of the board, please use glue to hold them..

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②Condition of Iron Soldering

Preheating	120±10°C 30 minutes max
Iron temperature	350°C max
Soldering time	3 seconds max

(Caution1)

Do not strongly push the ferrite core around the ferrite core on the DC-DC converters. It will cause bad influence to DCDC converter characteristics.

13.2. Cleaning

Please do not clean or wash the products.

13.3. Storage

13.3.1.

Please store the products in room where the temperature/humidity is stable and direct sunlight is protected, Please use the products within 6 months after the delivery.

Please consider to handle the products of MSL 3 which is capable within 168 hours for soldering after the package opened.

After the package is opened, if the products are stored longer than 168 hours without soldering, please store them in 10%RH or less, and 35 degree C or less of atmosphere.

In case that the products are not stored such atmosphere, please bake at 125 degree C for 24 hours before they are used. However please do it after take them out from packaging material. Because the material of the package will be thermally distorted on this baking temperature.

If baking should be done with keeping them in the package, please bake them 40 degree C for 192 hours or 60 degree C for 168 hours.

Please avoid storing the products in the place where water condensation may be occurred. It is easy to water condensation in heated dump air in which large temperature changes may condense water. Otherwise, the quality of characteristics may be reduced, and also the solderability may be degraded.

13.3.2.

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, NO_x and so on).

13.4. Operational Environment and Operational Conditions

13.4.1. Operational Environment

The products are not waterproof, chemical-proof or rustproof.

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, NO_x 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)

13.4.2. Operational Conditions

Please use the products within specified values (power supply, temperature, input, output and load condition, and so on). Please make sure that input voltage is in specified values. Input voltage may be changed by line impedance change etc.

If the product is used out of the specified values, the product may be broken, the quality is reduced, and even if the products can endure the condition for short time, it may cause degradation of the reliability.

13.4.3. Note prior to use

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

Please avoid the following items:

- (1) Apply voltage over rated voltage, reversed voltage or not-enough connection to 0V(DC) line in characteristic test.
- (2) electrostatic discharge by production line and/or operator
- (3) electrified product by electrostatic induction

Do not give an excessive mechanical shock. If the products are dropped to the floor hit to something etc., it may occur a crack on mounted components, removal of mounted components or deterioration of electrical performance..

Do not bend this product more than 0.1mm.

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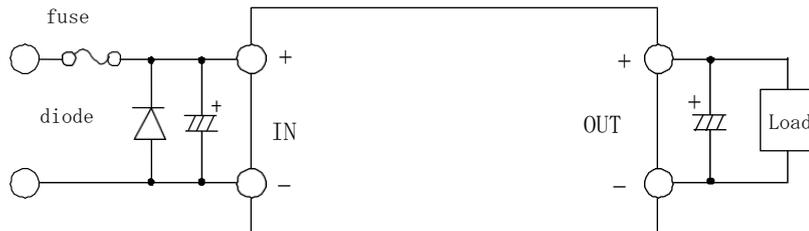
13.5. Transportation

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

If the products are transported to overseas (in particular, by sea), it is expected that the transportation environment is not good. Please pack the products in the package designed on the consideration of mechanical strength, vibration-resistant and humidity-resistant. The package of the products sold in Japan may not be suitable to oversea transportation. Please confirm us if it is suitable or not.

14. Request to customers

- 14.1. Be sure to provide an appropriate fail-safe function on your product to prevent a second damage caused by the abnormal function or the failure of our product.
- 14.2. Please connect the input terminals with adequate polarity. If polarity is wrong, it may break the DC-DC converter.
- 14.3. In the case of destruction of the DC-DC converter inside, a large input current may flow. Please add a diode and fuse as follow.



※Please confirm to select a diode and fuse etc. on your application..

14.4. 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.

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



Note

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.
3. We consider it not appropriate to include other terms and conditions for transaction warranty in product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability cause, we will not be able to accept such terms and conditions unless they are based on the governmental regulation or they are stated in a separate contract agreement.

Note:

1. This datasheet is downloaded from the website of Murata Manufacturing Co., Ltd. Therefore, it's specifications are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering.
2. This datasheet has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.