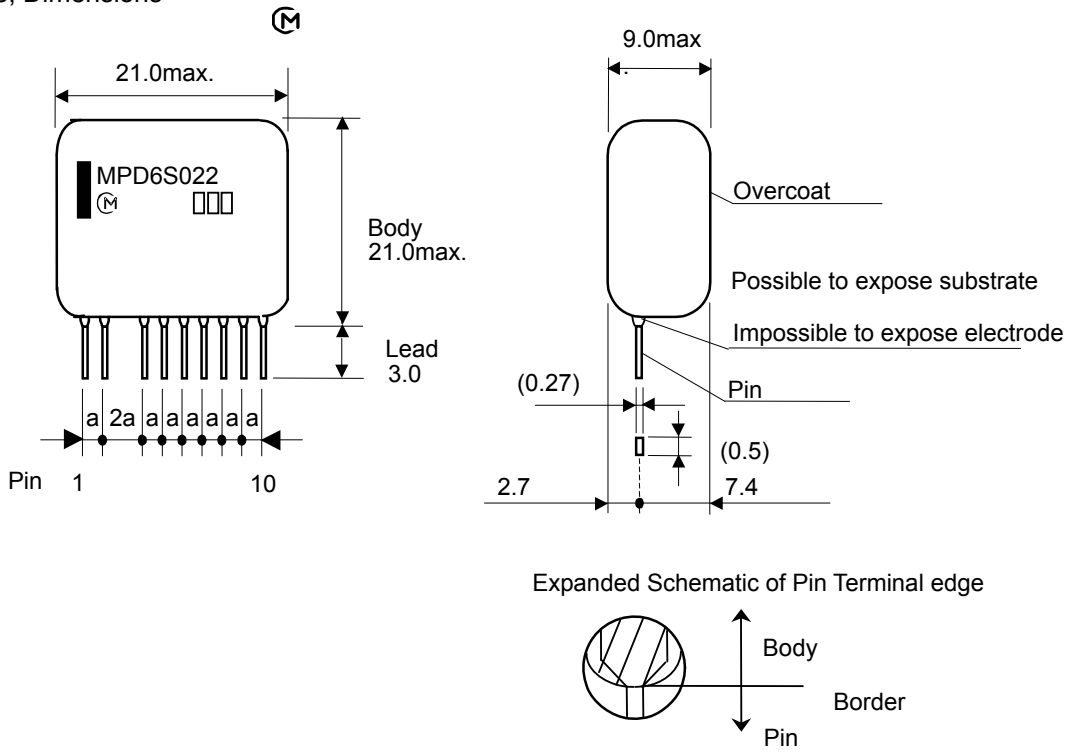
DC-DC Converter Specification
MPD6S022S

1 . Application
This specification applies to DC-DC Converter for telecommunication / data-communication equipment, MPD6S022S.
For any other application, please contact us before using this product.

2 . Customer Reference
Customer Spec. Number
Customer Part Number

3 . Murata Part Number MPD6S022S

4 . Appearance, Dimensions



Expanded Schematic of Pin Terminal edge

Pin No.	Signal	Pin No.	Signal
1.	VIN	6.	GND
2.	ON/OFF	7.	GND
3.	No Pin	8.	Adjust
4.	N.C.（Internally used）	9.	VOUT
5.	N.C.（Internally used）	10.	VOUT

The path between the your GND and GND terminals of this device, and your VOUT and VOUT terminals of this device should be minimized as much as possible on your product's assembly.
N.C.（Pin No.4 and No.5）is utilized internally. This pin should be left open.

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Marking

(1)Pin No.1 Side Marking 

(2) Marking of the Product MPD6S022S

(3) Manufacturer ID Ⓜ

(4) Lot No. □□□
①②③
①Production Factory ID
②Production Year
③Production Month（1，2，3,……、9,O,N,D)

5. Rating

5 .1	Input Voltage Range	+3.0V ~ +5.5V
5 .2	Operating Temperature Range	0°C ~ +70°C (Temperature gradient 10°C /H)
5 .3	Storage Temperature Range	-40°C ~ +85°C (Temperature gradient 25°C /H)
5 .4	Operating Humidity Range	10% ~ 85% (No water condenses in any cases)
5 .5	Storage Humidity Range	5% ~ 90% (No water condenses in any cases)

6. Electrical Characteristics (Ta= 25°C)

6.1 Electrical Characteristics (Test condition is specified at item 7)

Item	Symbol	Condition		Value Min.	Value Typ.	Value Max.	Unit
Input Voltage	VIN	————————————		3.0	5.0	5.5	V
Output voltage	VOUT	VIN=3.0～5.5V, (VIN- VOUT=1.0V)	R1＝0Ω	1.067	1.100	1.133	V
			R1＝131.5kΩ	3.200	3.300	3.400	
			R1＝OPEN	—	3.600	—	
Load Current	IOUT	VIN= 3.0～5.5V		0.0	—	3.0	A
Ripple Voltage	Vrip	VIN= 5.0V, VOUT=3.3V, IOUT=1.0A		—	—	100	mV(p -p)
Efficiency	EFF	VIN=5.0V, VOUT=3.3V, IOUT=1.0A		—	96	—	%
Remote Voltage	Von/off	VIN= 3.0～5.5V	ON	2.5	—	VIN	V
			OFF	0	—	0.5	
				OPEN			
Internal pull down resistance of Remote	Ron/off	0 ≤ Von/off ≤ VIN		—	220	—	kΩ
Frequency	Freq.	VIN= 3.0～5.5V		—	250	—	kHz
Protection Circuit	SCP	Short-circuit breaking. DC-DC converter should be recovered by opening the shorted output and RESET Remote. After correction of the abnormal condition, the DC-DC converter will restart by toggling ON/OFF pin.					

*Output Voltage Calc.

VOUT1 = 5.782 / （ 1.606 + 20 / (5.479 + R1) ） R1 [kΩ]

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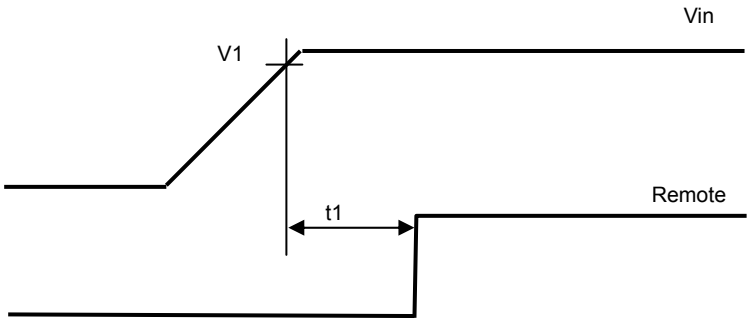
6.2 Output Sequence Spec.

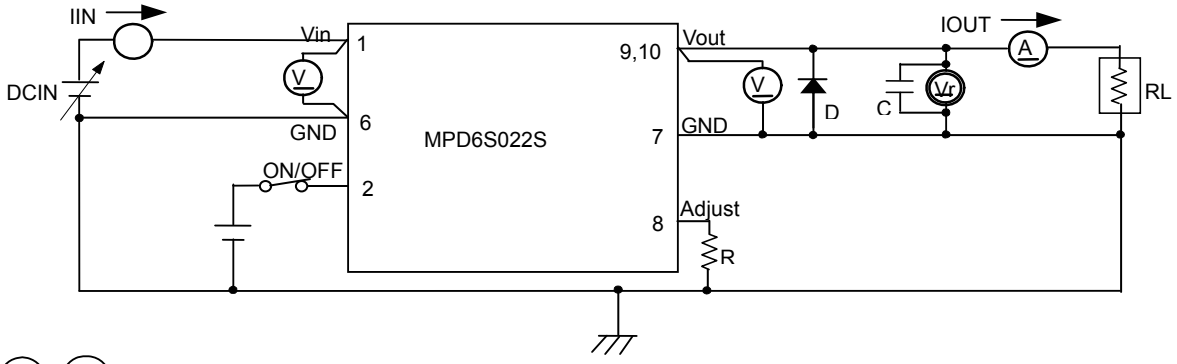
DC-DC Converter should be met below Sequence.

t1≥ 0ms ， V1=VOUT* + 1.0V　　(VOUT*：Set-Up Output Voltage)



When the above sequence isn't followed, there is a possibility of not start-up.

7. Test Circuit



V A : Digital Multi meter　HP34401A equivalent　(Agilent Technologies)

Vr : Ripple Voltmeter　RM－101 equivalent　(Keisokugiken)

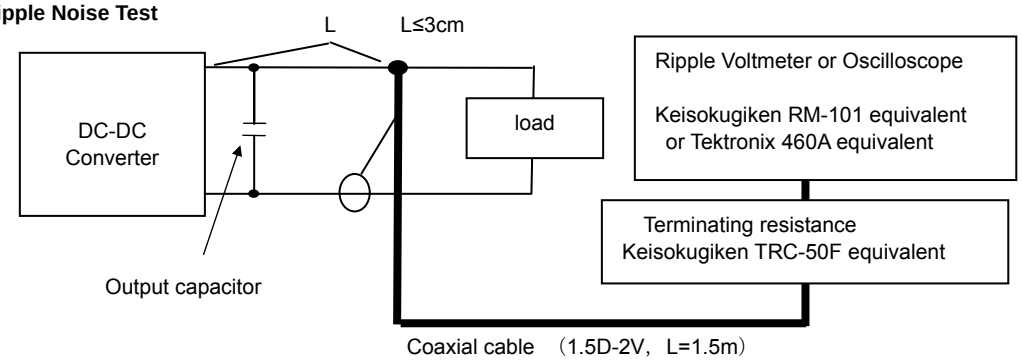
RL : Electronic Load Device　EUL－150αXL equivalent　(Fujitsu access)

: DC Power Supply　HP6621A equivalent　(Agilent Technologies)

C1 : Ceramic Capacitor　0.1μF
D1 : Shottoky Diode

Please do not connect a mass capacitor to the output line of the DC-DC converter.

Ripple Noise Test



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8. Mechanical Tests

8.1 Soldering Heat Resistance

Immerse the parts up to 2 ～ 2.5 mm from the bottom in a solder bath of 260°C ±5°C for 10±1 seconds. The parts should be no damage in appearance.Measure the parts after 2 hours and the initial values under item 7 should be met. (JIS-C-0050)

8.2 Lead Strength

8.2.1 Pull Strength

Fasten the parts and pull the lead gradually in a radial direction with 5.0N load, keep the load for 5 seconds. The parts should not be damaged thereafter.

8.2.2 Bend Strength

Fasten the parts and apply 2.5N gradually in radial direction and bend the lead 90°, straighten the lead, apply 2.5N again to the lead and bend it in an opposite direction at 90°and straighten it back again. The lead should not be damaged thereafter.

8.3 Solder-ability of Leads

8.3.1 Lead Free Solder

The lead terminal will be immersed in the isopropyl alcohol (JIS-K-1522) with Rosin (JIS-K-5902) solution (the concentration of Rosin will be allowed 10wt%~35wt%, and normally approx. 25wt% will be used without any specific requirement.). Then the lead terminal leaving 1~1.5mm from the edge of Body will be immersed in the solder (Sn-3Ag-0.5Cu) solution at the temperature of 250°C ±5°C for 5±1 seconds, and pulled up completely. The solder will adhere to over 90% of the lead terminal.

8.3.2 Eutectic Solder

The lead terminal will be immersed in the isopropyl alcohol (JIS-K-1522) with Rosin (JIS-K-5902) solution (the concentration of Rosin will be allowed 10wt%~35wt%, and normally approx. 25wt% will be used without any specific requirement.). Then the lead terminal leaving 1~1.5mm from the edge of Body will be immersed in the solder H63A (JIS-Z-3282) solution at the temperature of 230°C ±5°C for 5±1 seconds, and pulled up completely. The solder will adhere to over 90% of the lead terminal.

9. Reliability Tests

9.1 High Temperature Storage Test

Parts are subjected to a temperature +70±2°C for 240±8 hours. Return the parts to room temperature (+25°C) for 24 hours and measure. The measured value should be met item 7.

9.2 Low Temperature Storage Test

Parts are subjected to a temperature –40±3°C with 240±8 hours. Return the parts to room temperature (+25°C) for 24 hours and measure. The measured value should be met item 7.

9.3 High Humidity Storage Test

Parts are subjected to a temperature +40±2°C with 90~95% for 240±8 hours. Return the parts to room temperature (+25°C) for 24 hours and measure. The value under item 7 should be met.

9.4 High Temperature Loading Test

Parts are subjected to a temperature +60±2°C at rated loading (Vin=5.0V,Iout=max.)for 100±4 hours. Return the parts to room temperature (+25°C) for 24 hours and measure. The measured value should be met item 7.

9.5 Vibration Test

After parts are fixed on substrate, vibrate the parts at 10Hz-55Hz-10Hz, vibration width 1.5mm in 1 minute. Repeat the above in 3 different directions, which are a right angle to each other for 2 hours, total 6 hours.
There should be no damage in appearance and the measured values should be met item 7.

9.6 Thermal Cycle test

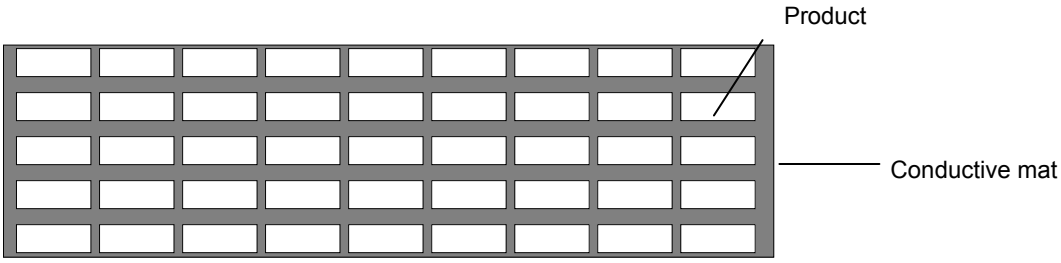
Parts are subjected to 40 cycles of the following. The parts are placed in room temperature (+25°C) for 2 hours and are measured. The values under item 7 should be met.

Step	Condition	time
1	-20°C ±3°C	30 minutes
2	Room Temp.	10~15 minutes
3	+85°C ±2°C	30 minutes
4	Room Temp.	10~15 minutes

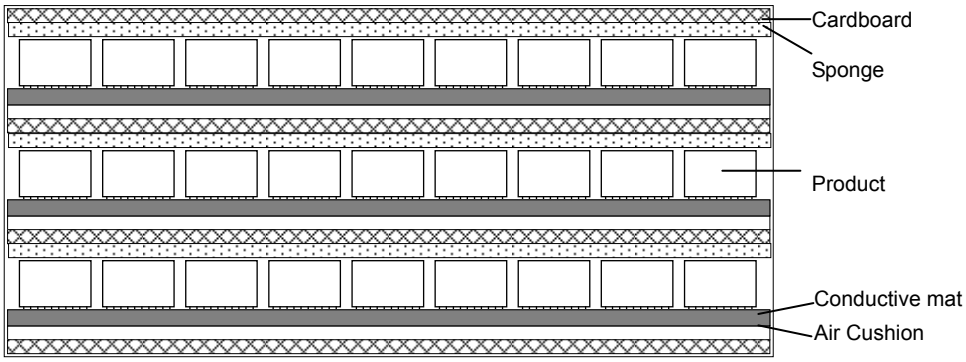
10 . Packaging specification

10 .1 Packing form

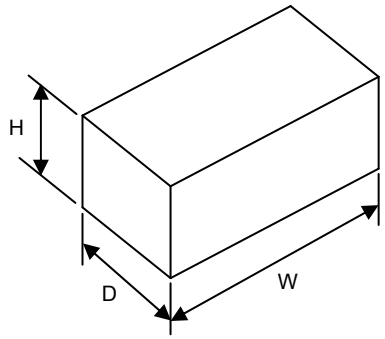
(1)The products are putted on the conductive mat in a row as below. (9lines×5pcs.)



(2)Above packed products are them piled up three-tier.



10 .2 Packaging form

Item	Specification
Packaging form typical classification	Box
Dimensions of packaging form (typ.)  	W = 245 (mm) D = 78 (mm) H = 104 (mm)
The number of products in packaging form	135 (p c s)
Mass of one product	4.3typ. (g)
Remark : If the products have fraction, may not follow this specification.	

11 Production factory

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

12 Material of depleting OZONE

This product has not been manufactured with any OZONE depleting chemical controlled under the Montreal Protocol.

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. Please connect the input terminal by right polarity. If you connect this by mistake, it may break the DC-DC converter. In the case of destruction of the DC-DC converter inside, over input current may flow, and so DC-DC converter maybe occurred abnormal temperature rise, or your product may be damaged. Please add diode and fuse as following to protect them.

Standard of fuse : current rating 5A
Please select diode and fuse after confirming the operation.

3. 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
   ⑨Any other application of similar complexity and/or reliability requirements to the applications listed above.

15 Notice

15.1 Soldering

15.1.1 Flux

Please solder the products with no-cleaning type Rosin Flux which leaves little residue and low activity. Do not use cleaning type flux, in case that you wash the products afrer using cleaning type flux, they may damage mounting parts on the products and may cause defective or low quality products.

15.1.2 Solder

15.1.2.1 Lead Free Solder

Please use the solder Sn-3Ag-0.5Cu.

15.1.2.2 Eutectic Solder

Please use the solder H60, H63 (in JIS Z 3282) or the equivalent type.

15.1.3 Condition of soldering

15.1.3.1 Lead Free Solder

Please solder under the following condition.

・Flow soldering Preheating : 120±10°C, 60～120 seconds
Soldering : 260±5°C
Time within : 10 seconds
・Condition of iron soldering : under 350°C, 5 seconds at maximum
(Only iron less than 30W should be used.)

15.1.3.2 Eutectic Solder

Please solder under the following condition.

・Flow soldering Preheating : 120±10°C 60～120 seconds
Soldering : 230±5°C
Time within : 5 seconds
・Condition of iron soldering : under 300°C, 3 seconds at maximum
(Only iron less than 30W should be used.)

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15.2 Cleaning

Please do not wash the products.

15.3 Storage

15.3.1 Please store the products in room where the temperature / humidity is stable direct sunlight cannot come in and use the products within 6 months after delivery. 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 solder-ability. If you store the products for a long time (more than 1 year), use caution because the products may be degraded in the solder-ability and / or rusty. Please confirm solder-ability and characteristics 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 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, 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 0V(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.Do not add excessive stress in handling.

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.

⚠ 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 clause, 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.

This product contains no lead, cadmium, mercury, hexavalent chromium, PBB and PBDE specified in EU DIRECTIVE 2002/95/EC (commonly RoHS directive) exclusive of a few exemptions stated in it and a low level of impurities existed in a physical world.