

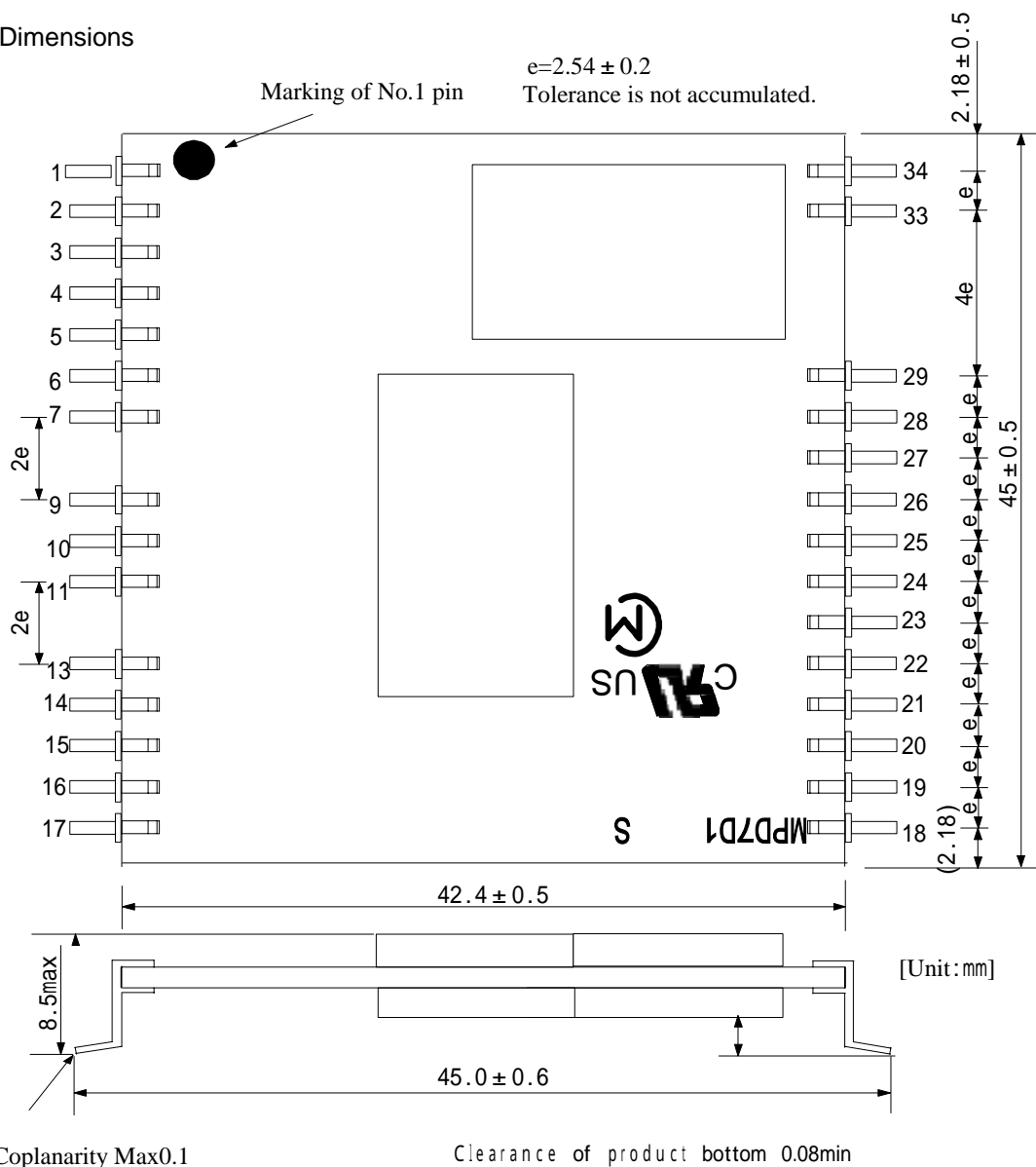
# DC-DC Converter Application Manual

## MPD7D137S, MPD7D138S

### 1. Features

- 80W High Power, Low Profile, Small size 45.0×45.0×8.0 mm typ. SMD.
- High efficiency & High power density achieved via Murata proprietary synchronous rectifier circuit.
- Wide Input Voltage Range (36 to 75V)
- Parallel Operation is available
- Wide operational temperature ( -40°C to +85°C )  
(See the Thermal Derating)
- Input-Output Isolation Voltage (1.5kVdc)
- Remote ON/OFF, Over Current Limit Inception, Low Voltage Protection, Over Voltage Protection are built in.
- EMI in accordance with VCCI,Class A (Needs External Filter Circuit)
- Recognized UL60950, CE Marking


### 2. Appearance, Dimensions

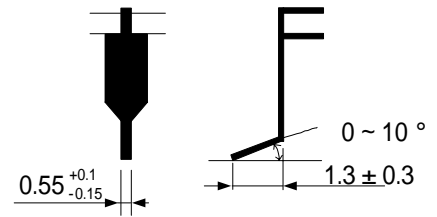


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## Marking

- (1) MFG ID 
- (2) Lot No.  
 Production factory Mark  
 Production Year  
 Production Month ( 1,2,3,...9,O,N,D )  
 Product Modification number(No marking now)
- (3) Product Number  
 Part number of underlined MPD7D13S

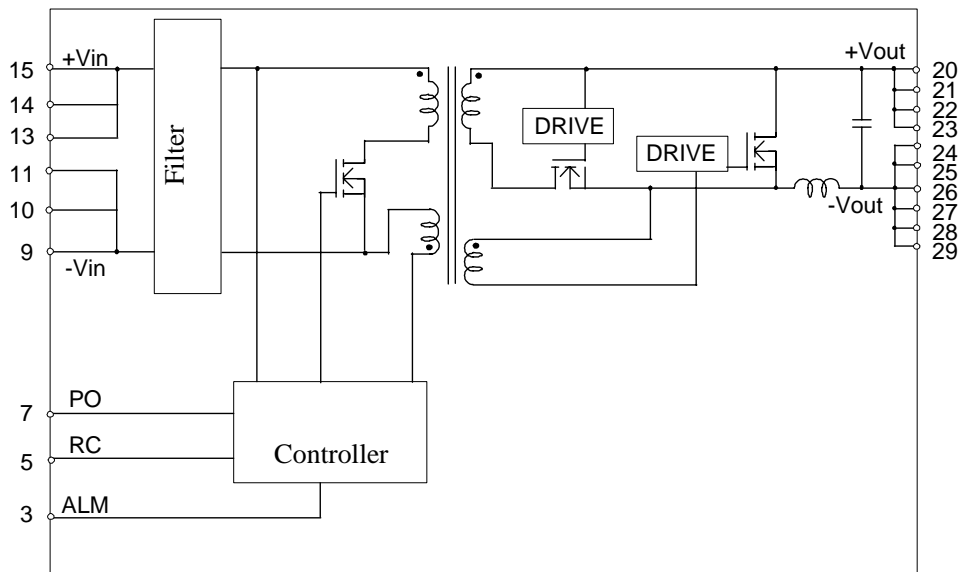


Lead in detail

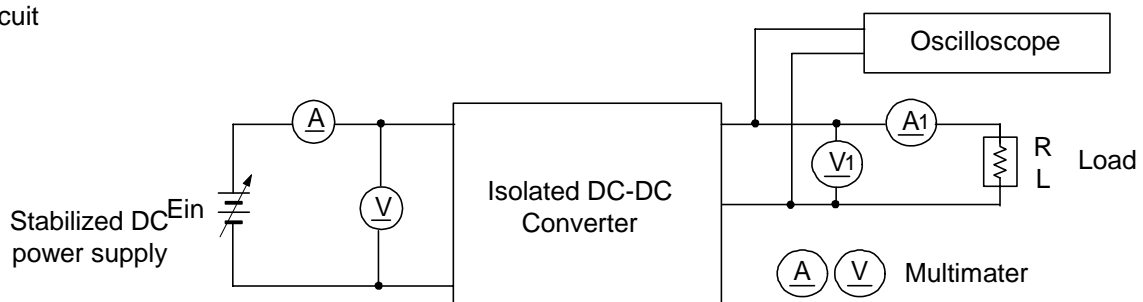
## Pin Number and Function

Pin No.	Symbol	Function
1,2,16,17,18,19,33,34	NC	
3	ALM	Alarm output to stop all in abnormality *1
4,6	NC	
5	RC	Remote ON/OFF
7	PO	Parallel operation. *2
9,10,11	-Vin	(-)Input
13,14,15	+Vin	(+)Input
20,21,22,23	+Vout	(+)Output
24,25,26,27,28,29	-Vout	(-)Output

## 3. Block Diagram



## 4. Test Circuit



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## 5. Characteristics

## 5.1. Electrical Characteristics (Ta=-40°C ~ +85°C, thermal derated)

Part Number		MPD7D137S				
Item	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input Voltage Range	Vin		36	48	75	V
Turn-on Input Voltage		Vin = Increasing	32	-	36	V
Input Voltage difference of Turn-on and Turn-off		PO pin : Open or Connected to PO pin of other DC-DC Converter	2.0	-	-	V
Galvanic Isolation Voltage		Input time : 1 minute	1500	-	-	Vdc
Nominal Output Voltage	Vout		-	3.3	-	V
Output Voltage Tolerance	Vo tol	Vin=36~75V, Io=0~15A Ta=-40~+85°C	-3.0	-	+5.0	%Vo
Output Current	Iout	Thermal derated	0	-	24	A
Ripple Voltage	Vrpl	Refer to Test Circuit	-	-	50	mV(pp)
Ripple Noise Voltage	Vnoise		-	-	125	mV(pp)
Efficiency	EFF	at rated Vin, Io, Ta=25°C	-	92	-	%
Over Current Protection	OCP		25.2	-	-	A
Over Voltage Protection	OVP	Vin=36 to 75V, Load=50 to 100% Output halts in latch-up mode after mask time 0.5msec (typ) to avoid malfunction by noise and transient change. Input turn off and on to reset.	3.96	-	-	V
Low Voltage Protection	LVP	Output halts in latch-up mode after mask time 500msec (typ) to avoid malfunction by noise and transient change. Input turn off and on to reset.	-	-	2.97	V

## Caution

The above electrical characteristics are guaranteed with the condition that the impedance of the input voltage source is sufficiently low as shown in section 4. Connecting an input inductance or using an input power supply with output inductance may cause an unstable operation of this device. Please check the proper operation of this device with the peripheral circuits on your system.

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## 5.2. Electrical Characteristics (Ta=-40°C ~ +85°C, thermal derated)

Part Number		MPD7D138S				
Item	Symbol	Condition	Value			Unit
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Input Voltage Range	Vin		36	48	75	V
Turn-on Input Voltage		Vin = Increasing	32	-	36	V
Input Voltage difference of Turn-on and Turn-off		PO pin : Open or Connected to PO pin of other DC-DC Converter	2.0	-	-	V
Galvanic Isolation Voltage		Input time : 1 minute	1500	-	-	Vdc
Nominal Output Voltage	Vout		-	5.0	-	V
Output Voltage Tolerance	Vo tol	Vin=36~75V, Io=0~10A Ta=-40~+85°C	-3.0	-	+5.0	%Vo
Output Current	Iout	Thermal derated	0	-	16	A
Ripple Voltage	Vrpl	Refer to Test Circuit	-	-	50	mV(pp)
Ripple Noise Voltage	Vnoise		-	-	125	mV(pp)
Efficiency	EFF	at rated Vin, Io, Ta=25°C	-	93	-	%
Over Current Protection	OCP		16.8	-	-	A
Over Voltage Protection	OVP	Vin=36 to 75V, Load=50 to 100% Output halts in latch-up mode after mask time 0.5msec (typ) to avoid malfunction by noise and transient change. Input turn off and on to reset.	6.0	-	-	V
Low Voltage Protection	LVP	Output halts in latch-up mode after mask time 500msec (typ) to avoid malfunction by noise and transient change. Input turn off and on to reset.	-	-	4.5	V

**Caution**

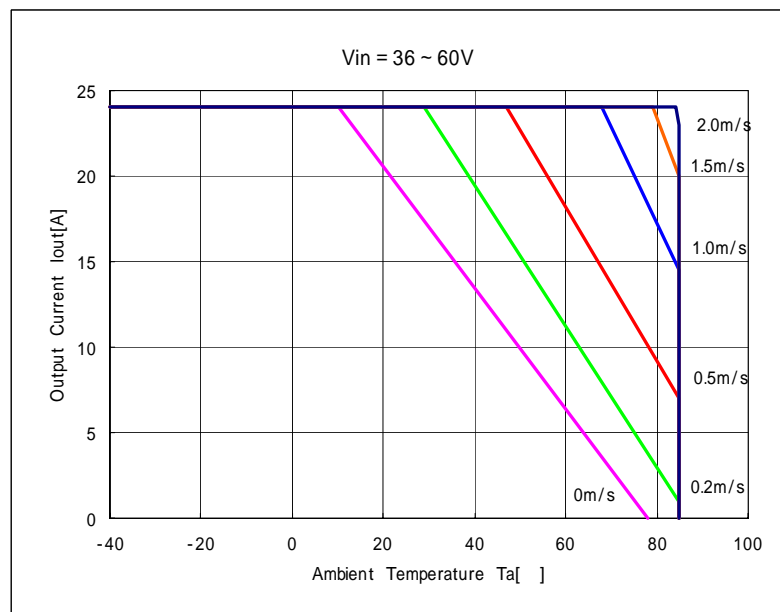
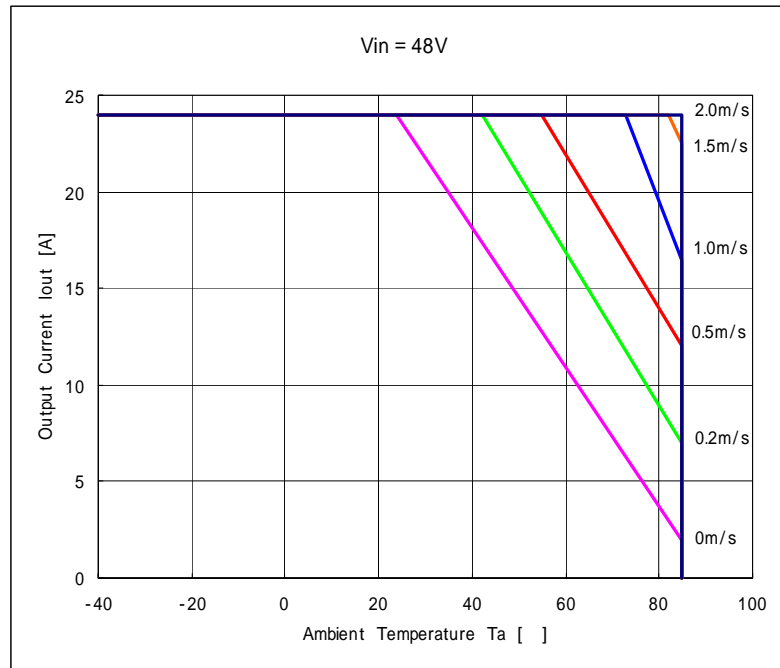
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## 5.3. Thermal Derating

## MPD7D137S

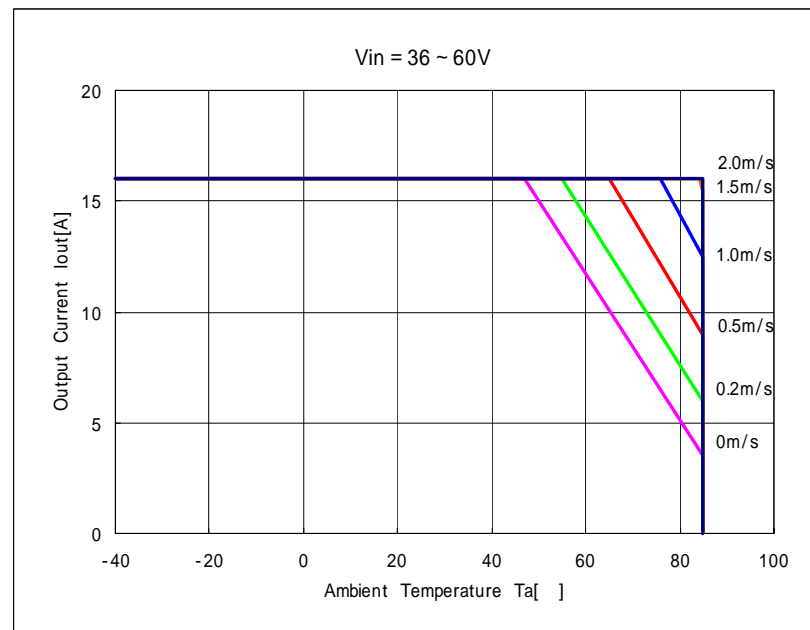
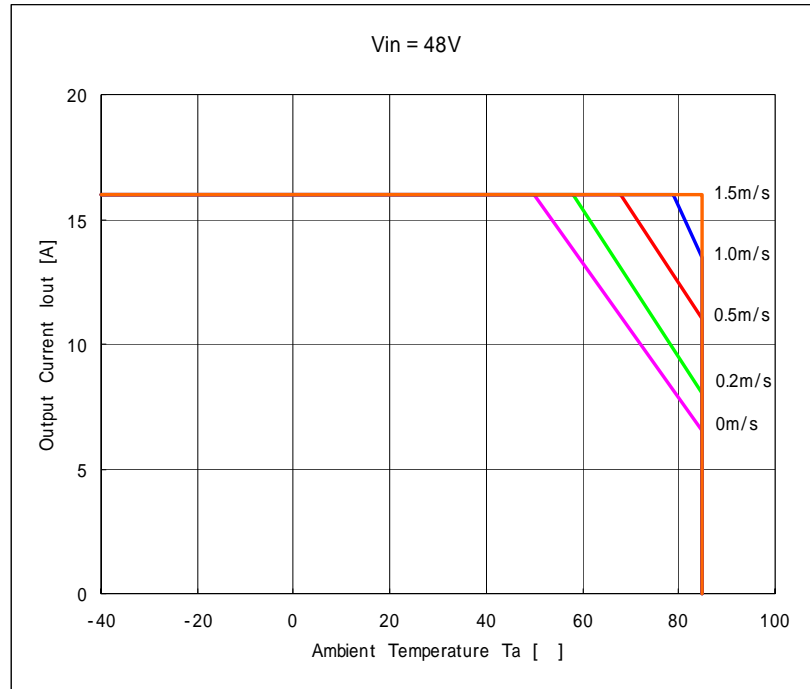


The above derating limits apply to this product soldered directly to 101.6\*101.6mm 6layer PCB. Any adjacent parts of high temperature may cause overheating.

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## MPD7D138S



The above derating limits apply to this product soldered directly to 101.6\*101.6mm 6layer PCB. Any adjacent parts of high temperature may cause overheating.

## [Note]

We would like to emphasize the data is based on our experimental measurement.  
Please measure ambient temperature around a DC-DC Converter on your applications.

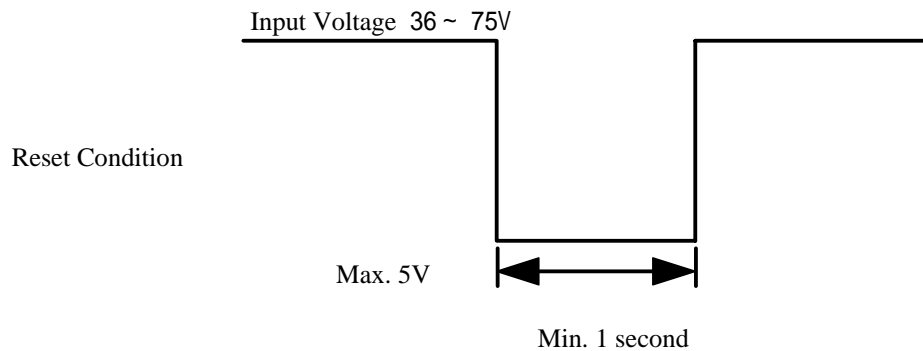
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## 6. Pin Description

### 6.1. Reset Condition

In order to reset all function, the input Voltage is set under 5V for Min.1 second.



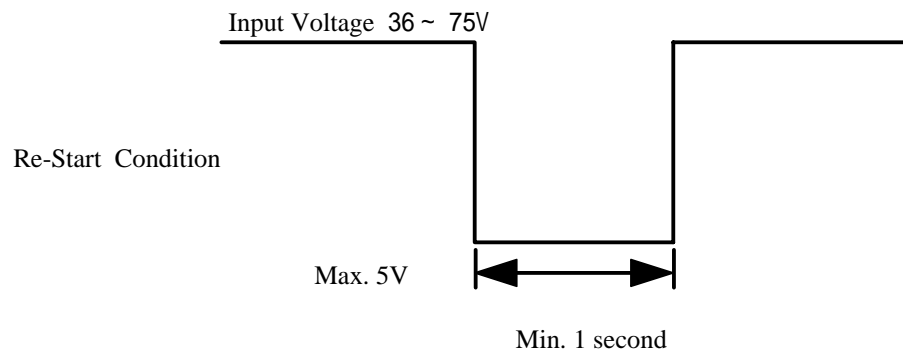
### 6.2. Over Voltage Protection

Output halts in latch-up mode after 0.5msec(typ) mask time while Output Voltage is over the value of over voltage protection specified in 9.1. clause with failure of controller circuit.

Output will re-start after input turns off for Min. 1 second with input voltage less than 5V.

Output voltage might exceed the point at over voltage protection under the specific condition of transient change of input voltage or output load, in this condition over voltage protection wait its start until the mask time.

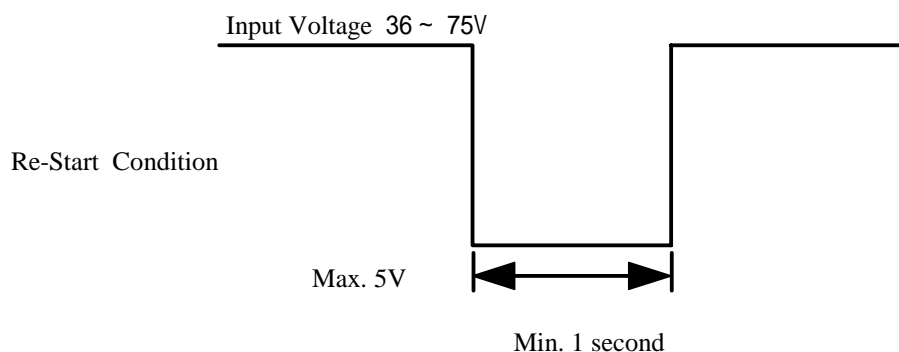
It is recommended to evaluate your appliance installed with DC-DC converter.



### 6.3. Low Voltage Protection

Output halts in latch-up mode after 500msec(typ) mask time while output voltage is below the value of low voltage protection specified in 9.1.clause with failure of controller circuit or over load condition.

Output will re-start after input turns off for Min.1 second with input voltage less than 5V.



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#### 6.4. Remote ON/OFF Control

Start and halt is possible with a control signal.

While the control signal stops output from DC-DC converter, alarm output does not send any signal.

Start : RC is open or connected to-Vin.

Halt : RC is connected to +Vin.

#### 6.5. Alarm Output

ALM pin is down to the same voltage level of-Vin pin and sends an alarm signal. (open-drain output)

Sink current in ALM pin is Max.10mA.

It is possible to halt all of the connected DC-DC converters when any one is halted with over voltage protection or low voltage protection, with connecting all ALM pins for the application of parallel/multiple operation with plural DC-DC converters.

The maximum number connecting DC-DC converters is 10pcs for the purpose of halting all DC-DC converters connected with ALM pin each other.

Please contact us when more than 10pcs..

#### 6.6. Synchronous Turn-on/off

It is possible to avoid the unevenness of turn-on timing with unifying the various Turn-on input voltage to a certain voltage which one DC-DC converter has, and with connecting PO pins each other for the application of parallel/multiple operation of plural DC-DC converters.

It is necessary to connect PO pins for parallel operation.

The maximum number connecting DC-DC converters is 10pcs for the purpose of synchronous turn-on/off with connecting PO pins.

Please contact us when more than 10pcs.

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## 7. Typical Characteristics Data

## 7.1. MPD7D137S

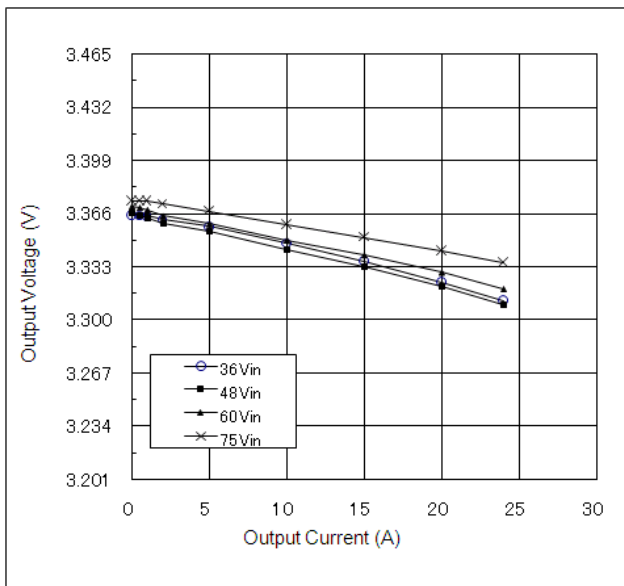


Fig.7-1-1. Output Voltage v.s. Output Current

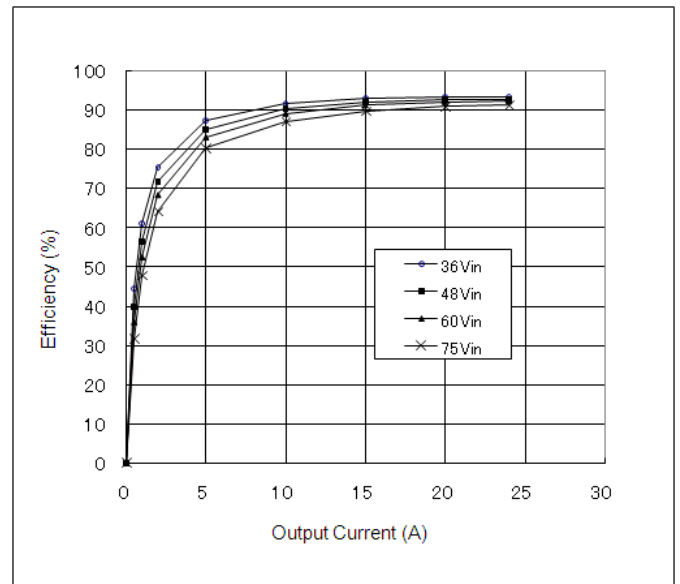


Fig.7-1-2. Efficiency v.s. Output Current

## 7.2. MPD7D138S

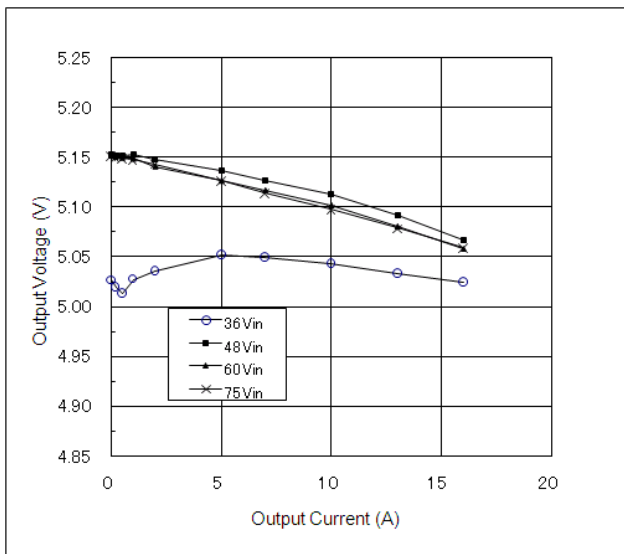


Fig.7-2-1. Output Voltage v.s. Output Current

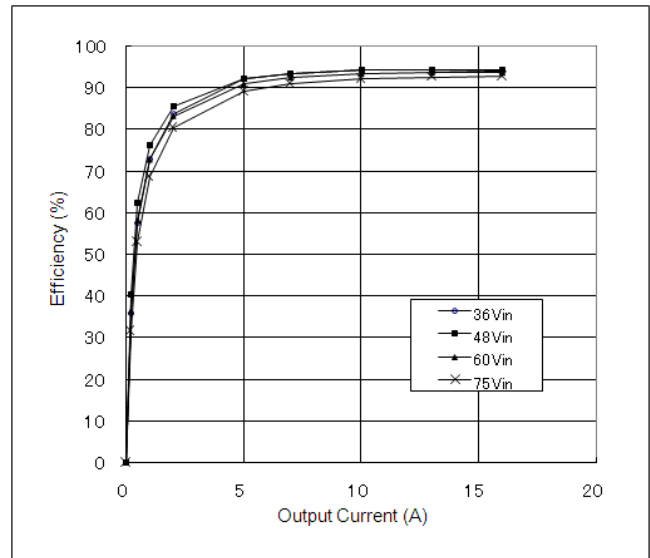


Fig.7-2-2. Efficiency v.s. Output Current

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## 8.1. Recommended Soldering Conditions

### Reflow Soldering

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

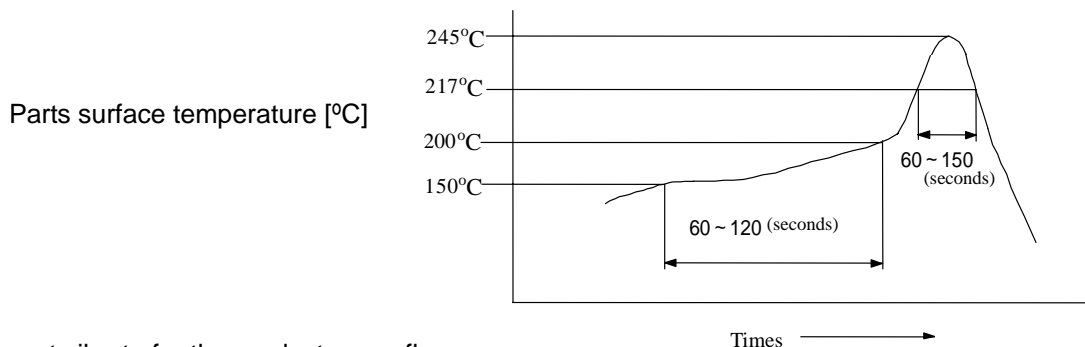
Method : Full convection reflow soldering

### Reflow Soldering Profile

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

### Profile details

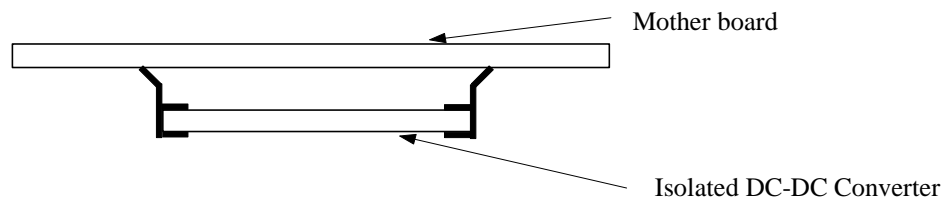
Soldering temperature : 245°C+0/-5°C  
Soldering time : 30 seconds, 240 to 245°C  
Heating time : 60 to 150 seconds, over 217°C  
Preheating time : 60 to 120 seconds, 150 to 200°C  
Programming rate : 3°C/ sec. Max., 217 to 245°C  
Descending rate : 6°C/ sec. Max.  
Total soldering time : 8 minutes Max.,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



Do not vibrate for the products on reflow.

Please need to take care temperature control because mounted parts may come off if the product are left under the high temperature.

Do not reflow DC-DC converter as follows, because DC-DC converter may fall down from a substrate during reflowing.



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## 9. Notice

### Input / Output capacitor

Both input-side and output side, please make the wiring loop between plus and minus as small as possible. The influence of a leakage inductance can be reduced. Please make the power line pattern as wide and short as possible.

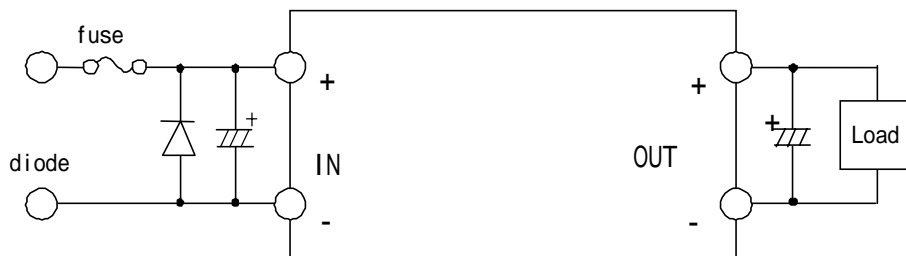
This product should not be operated in parallel or in series.

Please do not use a connector or a socket to connect this product to your product. The electric characteristics may be deteriorated by the influence of contact resistance.

Be sure to provide an appropriate fail-safe function on your product to prevent secondary damage that may be caused due to abnormal functional or failure of this product.

Inrush current protection is not a feature of this product.

Please connect the input terminals with the correct polarity. If an error in polarity connection is made this product may be damaged. If this product is damaged internally, an elevated input current may flow, and so this product may exhibit an abnormal temperature rise, or your product may be damaged. Please add a diode and fuse per the following diagram to protect them.



Please select diode and fuse after confirming the operation of your product.



### Note

1. Please contact our main sales office or nearby sales office 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 or this products for any other applications that described in the above.

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

2. This catalog is indicated in March 2009. About the written contents, since changing without a preliminary announcement for improvement and supply are sometimes stopped, please confirm in case of ordering. If written contents are unknown, please ask to our main sales office or nearby sales office.
3. Types and specification in this catalog are referenced for your information only. Please confirm detailed specifications by approving our individual drawing and specification sheet.

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