

**YPM600-48/72/96-12 : Isolated DC/DC Converters**  
 36 – 75V/50 – 100V/60 – 120V Input Range, Maximum Power : 600W

Data Sheet  
 May. 31, 2011

## YPM600-48/72/96-12 : Isolated DC/DC converters

### Features

- Screw type pin
- High efficiency, typ. 92% at full load
- 1500Vdc input to output isolation
- Output over voltage protection
- Input over voltage protection
- Input under voltage protection
- Over temperature protection
- Over current protection
- Short circuit protection
- Remote control
- RoHS directive



### Applications

- Server, storage, network, and communications infrastructure
- Instrumentation / Equipments
- Electric vehicle

YPM600 series are a high efficiency, isolated dc-dc power modules providing up to 600W, which makes it an ideal choice for high current and high power applications. The series feature an input voltage range of 36-75V, 50-100V, 60-120V and an output power of 12V/50A.

### YPM600-48-12 Absolute Maximum Ratings

Parameter	Min.	Typ.	Max.	Unit	Notes
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Input voltage continuous	0	-	80	Vdc	
Operating temp. (Baseplate temp.)	-40	-	95	°C	
Storage temperature	-40	-	125	°C	
I/O isolation voltage	-	1500	-	VDC	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

## YPM600-48-12 Electrical Specifications

Ta=25°C, Vin=48Vdc unless otherwise noted.

### Input Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating voltage range	Vin	36	48	75	Vdc
Input under voltage lockout					
Turn-on threshold		-	32.8	-	Vdc
Turn-off threshold		-	30.5	-	Vdc
Input over-voltage protection					
Turn-on threshold		-	78	-	Vdc
Turn-off threshold		-	83	-	Vdc
Disabled input current (Remote on/off control, module disabled)		-	9	-	mA
No load input current (Io = 0, Module enabled)		-	426	-	mA
Maximum Input current (Vin = Vin,min, Io = Io,max)	Iin	-	18.6	-	A
Input reflected ripple current (Io = Io,max)		-	0.2	-	A

### Output Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
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Output voltage set point	$V_o$	-	12	-	V
Output regulation; - Line regulation( $V_{in}=V_{in,min}$ to $V_{in,max}$ ) - Load regulation( $I_o=I_o,min$ to $I_o,max$ )		-	-	$\pm 0.5$	%
Output current	$I_o$	0	-	50	A
Output current limit(Automatic recovery)		105	-	-	%
Output ripple and noise, ( $I_o = I_o,max$ , $1\mu F$ ceramic + $15\mu F$ tantalum, Bandwidth : 20MHz)		-	-	120	mV
Efficiency ( $V_{in} = 48V$ , 100% Load)		-	91.2	-	%
Dynamic load response (Load change from $I_o = 50\%$ to $75\%$ , $75\%$ to $50\%$ of $I_o,max$ , Slew rate = $0.2A/\mu s$ )		-	$\pm 594$	-	mV
Recovery time(within 1% of $V_o,nom$ ) (Load change from $I_o = 50\%$ to $75\%$ , $75\%$ to $50\%$ of $I_o,max$ , Slew rate = $0.2A/\mu s$ )		-	92		$\mu s$
Output Over-voltage Protection		-	125	-	%
Start-up time ( $I_o=I_o,max$ , $V_{in} : on$ )		-	49.6	-	ms
Turn-on overshoot		-	0	2	%

## General Specifications

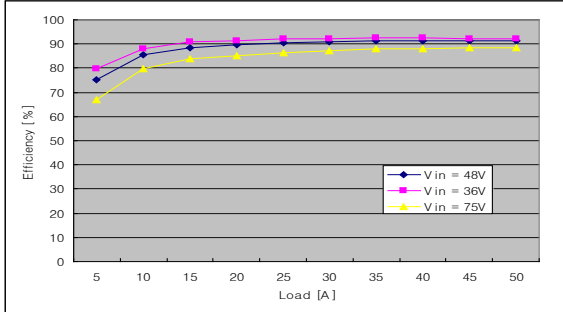
Parameter	Symbol	Min	Typ	Max	Unit
Switching Frequency		-	330	-	KHz
Remote control pin voltage On Off		Short $V_{in}$ - or 0 to 0.5Vdc Open or 4.5 to 15Vdc			Vdc Vdc
Over-temperature protection (Baseplate)		-	100	-	$^{\circ}C$
Over-temperature accuracy		-	$\pm 3$	-	$^{\circ}C$
Dimensions		186.5 x 75 x 18.75			mm
Weight		-		-	g

## Characteristic Curves

**YPM600-48/72/96-12 : Isolated DC/DC Converters**  
 36 – 75V/50 – 100V/60 – 120V Input Range, Maximum Power : 600W

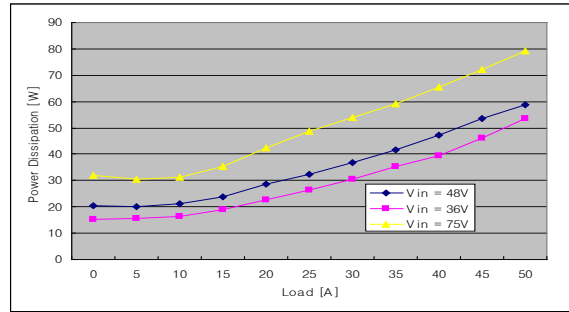
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**Efficiency**



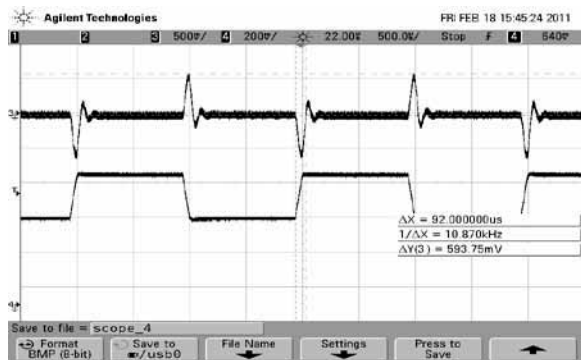
[Fig. 1] Efficiency for 36V, 48V, 75V input voltage at 25°C

**Power Dissipation**



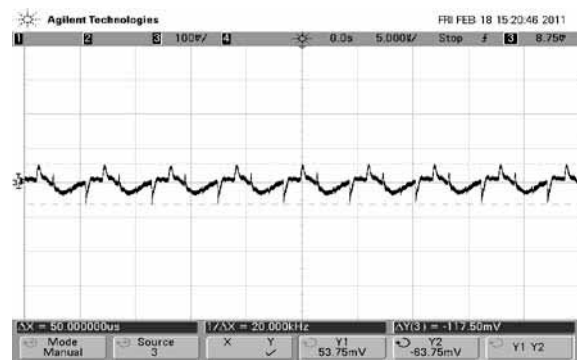
[Fig. 2] Power dissipation for 36V, 48V, 75V input voltage at 25°C

**Output Load Transient Response**



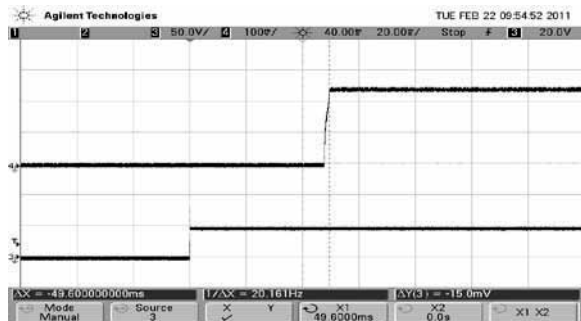
[Fig. 3] Load step: 50%-75-50% of I<sub>o</sub>, di/dt= 0.2A/us (CH3: 500mV/div, CH4: 10A/div, 0.5ms/div)

**Output Ripple/Noise**



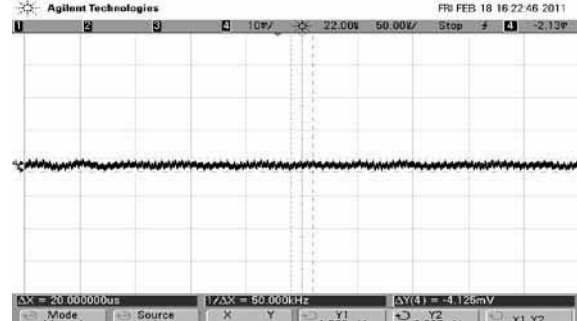
[Fig. 4] Output ripple & Noise (100mV/div)

**Start-up from Input Voltage**



[Fig.5] Ch4: Vo, Ch3: Input voltage(20ms/div)

**Input Reflect Ripple Current**



[Fig.6] Input reflect ripple current (0.5A/div)

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**YPM600-72-12 Absolute Maximum Ratings**

Parameter	Min.	Typ.	Max.	Unit	Notes
Input voltage continuous	0	-	100	Vdc	
Operating temp. (Baseplate temp.)	-40	-	95	°C	
Storage temperature	-40	-	125	°C	
I/O isolation voltage	-	1500	-	VDC	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

**YPM600-72-12 Electrical Specifications**

Ta=25°C, Vin=72Vdc unless otherwise noted.

**Input Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating voltage range	Vin	50	72	100	Vdc
Input under voltage lockout					
Turn-on threshold		-	45.5	-	Vdc
Turn-off threshold		-	43.5	-	Vdc
Input over-voltage protection					
Turn-on threshold		-	97	-	Vdc
Turn-off threshold		-	104	-	Vdc
Disabled input current (Remote on/off control, module disabled)		-	9	-	mA
No load input current (Io = 0, Module enabled)			247		mA
Maximum Input current (Vin = Vin,min, Io = Io,max)	Iin	-	13.2	-	A
Input reflected ripple current (Io = Io,max)		-	0.6	-	A

**Output Characteristics**

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Parameter	Symbol	Min	Typ	Max	Unit
Output voltage set point	$V_o$	-	12	-	V
Output regulation; - Line regulation( $V_{in}=V_{in,min}$ to $V_{in,max}$ ) - Load regulation( $I_o=I_o,min$ to $I_o,max$ )		-	-	$\pm 0.5$	%
Output current	$I_o$	0	-	50	A
Output current limit(Automatic recovery)		105	-	-	%
Output ripple and noise, ( $I_o = I_o,max$ , $1\mu F$ ceramic + $15\mu F$ tantalum, Bandwidth : 20MHz)		-	-	120	mV
Efficiency ( $V_{in} = 48V$ , 100% Load)		-	92.1	-	%
Dynamic load response (Load change from $I_o = 50\%$ to $75\%$ , $75\%$ to $50\%$ of $I_o,max$ , Slew rate = $0.1A/\mu s$ )		-	537	-	mV
Recovery time(within 1% of $V_o,nom$ ) (Load change from $I_o = 50\%$ to $75\%$ , $75\%$ to $50\%$ of $I_o,max$ , Slew rate = $0.1A/\mu s$ )		-	156		$\mu s$
Output Over-voltage Protection		-	125	-	%
Start-up time ( $I_o=I_o,max$ , $V_{in} : on$ )		-	50	-	ms
Turn-on overshoot		-	0	2	%

## General Specifications

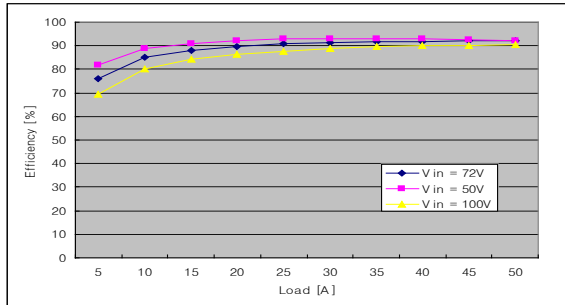
Parameter	Symbol	Min	Typ	Max	Unit
Switching Frequency		-	165	-	KHz
Remote control pin voltage On Off		Short $V_{in-}$ or 0 to 0.5Vdc Open or 4.5 to 15Vdc			Vdc Vdc
Over-temperature protection (Baseplate)		-	100	-	$^{\circ}C$
Over-temperature accuracy		-	$\pm 3$	-	$^{\circ}C$
Dimensions		186.5 x 75 x 18.75			mm
Weight		-	-	-	g

## Characteristic Curves

**YPM600-48/72/96-12 : Isolated DC/DC Converters**  
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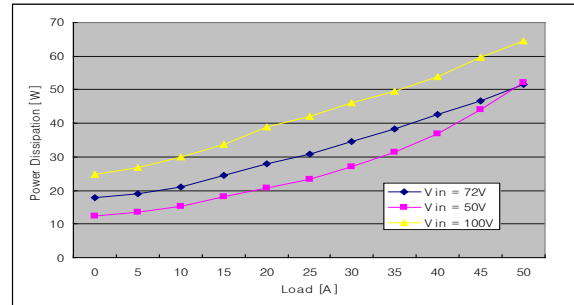
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**Efficiency**



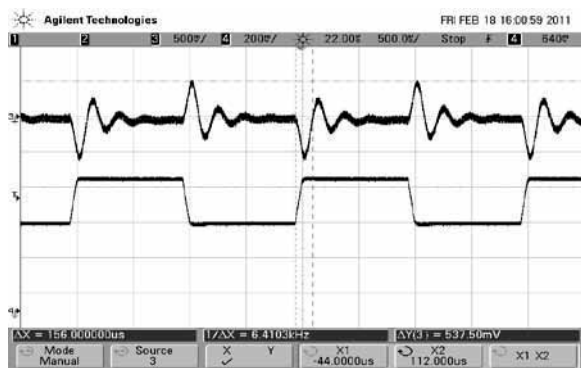
[Fig.7] Efficiency for 36V, 48V, 75V input voltage at 25 °C

**Power Dissipation**



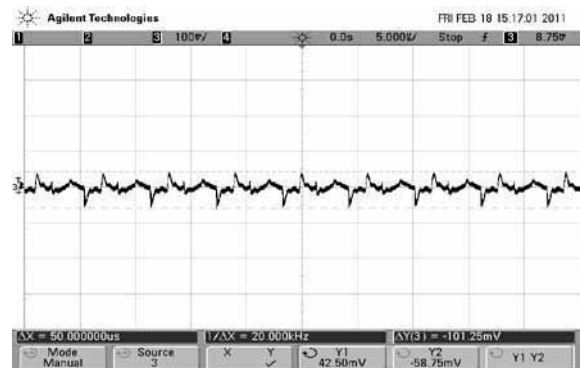
[Fig.8] Power dissipation for 36V, 48V, 75V input voltage at 25 °C

**Output Load Transient Response**



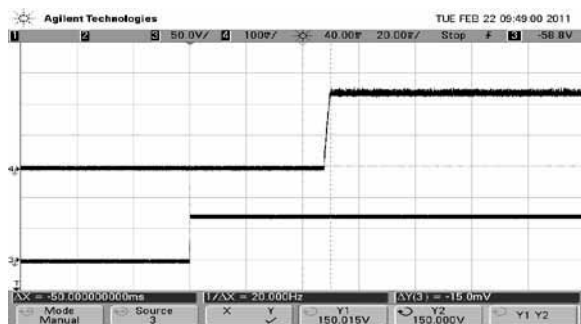
[Fig. 9] Load step: 50%-75-50% of I<sub>o</sub>, di/dt= 0.2A/us (CH3: 500mV/div, CH4: 10A/div, 0.5ms/div)

**Ripple/Noise**



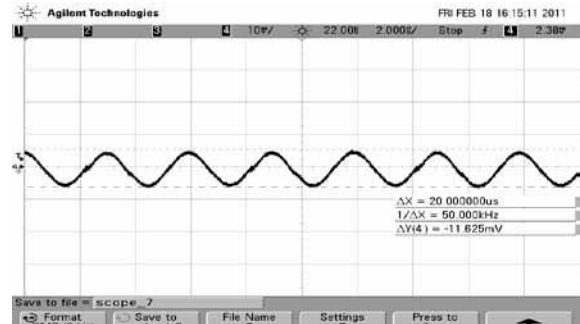
[Fig. 10] Output ripple & noise (100mV/div)

**Start-up from Input Voltage**



[Fig.11] Ch4: V<sub>o</sub>, Ch3: Input voltage(20ms/div)

**Input Reflect Ripple Current**



[Fig.12] Input reflect ripple current(0.5A/div)

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**YPM600-96-12 Absolute Maximum Ratings**

Parameter	Min.	Typ.	Max.	Unit	Notes
Input voltage continuous	0	-	120	Vdc	
Operating temp. (Baseplate temp.)	-40	-	95	°C	
Storage temperature	-40	-	125	°C	
I/O isolation voltage	-	1500	-	VDC	

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

**YPM600-96-12 Electrical Specifications**

Ta=25°C, Vin=96Vdc unless otherwise noted.

**Input Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating voltage range	Vin	60	96	120	Vdc
Input under voltage lockout					
Turn-on threshold		-	56.3	-	Vdc
Turn-off threshold		-	53.5	-	Vdc
Input over-voltage protection					
Turn-on threshold		-		-	Vdc
Turn-off threshold		-		-	Vdc
Disabled input current (Remote on/off control, module disabled)		-	9	-	mA
No load input current (Io = 0, Module enabled)			200		mA
Maximum Input current (Vin = Vin,min, Io = Io,max)	Iin	-	6.34	-	A
Input reflected ripple current (Io = Io,max)		-	1	-	A



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**Output Characteristics**

Parameter	Symbol	Min	Typ	Max	Unit
Output voltage set point	$V_o$	-	12	-	V
Output regulation; - Line regulation( $V_{in}=V_{in,min}$ to $V_{in,max}$ ) - Load regulation( $I_o=I_o,min$ to $I_o,max$ )		-	-	$\pm 0.5$	%
Output current	$I_o$	0	-	50	A
Output current limit(Automatic recovery)		105	-	-	%
Output ripple and noise, ( $I_o = I_o,max$ , 1 $\mu$ F ceramic + 15 $\mu$ F tantalum, Bandwidth : 20MHz)		-	-	120	mV
Efficiency ( $V_{in} = 48V$ , 100% Load)		-	91.9	-	%
Dynamic load response (Load change from $I_o = 50\%$ to 75% , 75% to 50% of $I_o,max$ , Slew rate = 0.2A/ $\mu$ s)		-	594		mV
Recovery time(within 1% of $V_o,nom$ ) (Load change from $I_o = 50\%$ to 75% , 75% to 50% of $I_o,max$ , Slew rate = 0.2A/ $\mu$ s)		-	92		$\mu$ s
Output Over-voltage Protection		-	125	-	%
Start-up time ( $I_o=I_o,max$ , $V_{in}$ : on)		-	49.6	-	ms
Turn-on overshoot		-	0	-	%

**General Specifications**

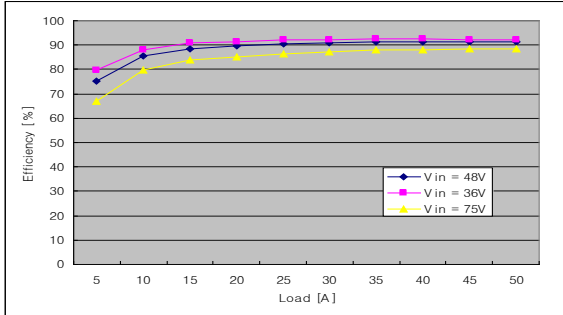
Parameter	Symbol	Min	Typ	Max	Unit
Switching Frequency		-	165	-	KHz
Remote control pin voltage On Off		Short $V_{in}$ - or 0 to 0.5Vdc Open or 4.5 to 15Vdc			Vdc Vdc
Over-temperature protection (Baseplate)		-	100	-	$^{\circ}$ C
Over-temperature accuracy		-	$\pm 3$	-	$^{\circ}$ C
Dimensions		186.7 x 75 x 18.75			mm
Weight		-		-	g

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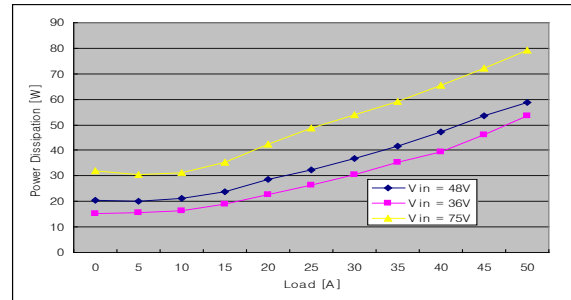
**Characteristic Curves**

**Efficiency**



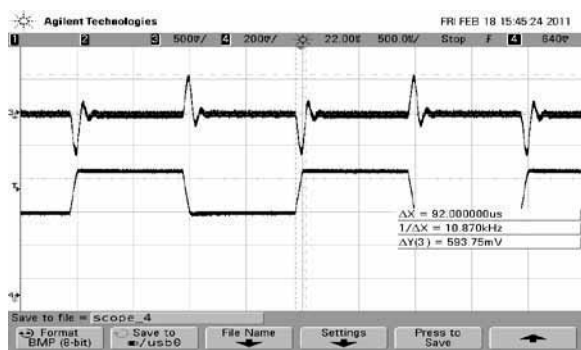
[Fig.13] Efficiency for 36V, 48V, 75V input voltage at 25 °C

**Power Dissipation**



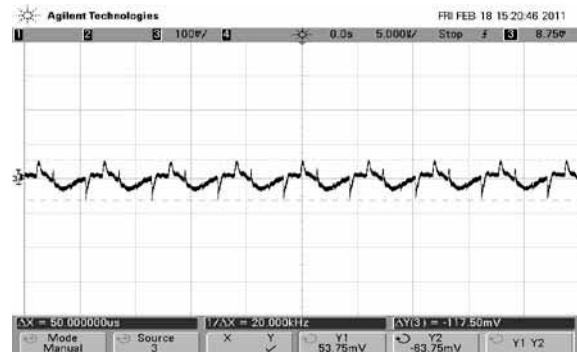
[Fig.14] Power dissipation for 36V, 48V, 75V input voltage at 25 °C

**Output Load Transient Response**



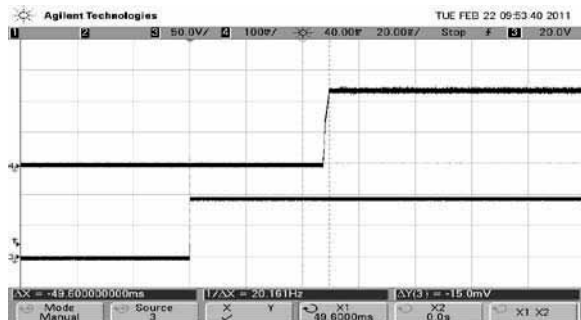
[Fig. 15] Load step: 50%-75-50% of Io, di/dt= 0.2A/us (CH3: 500mV, CH4: 10A/div, 0.5ms/div)

**Ripple/Noise**



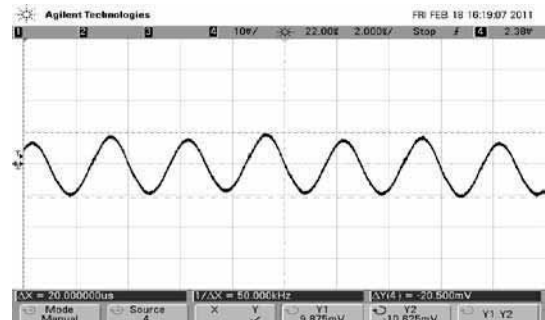
[Fig. 16] Ripple & Noise (100mV/div)

**Start-up from Input Voltage**



[Fig.17] Ch4: Vo, Ch3: Input voltage(20ms/div)

**Input Reflect Ripple Current**



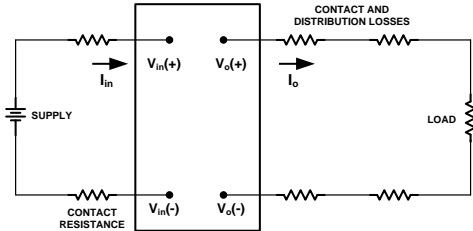
[Fig.18] Input reflect ripple current (0.5A/div)

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**TEST Configurations**

**Output Voltage and Efficiency**



\*All measurements are taken at the module terminals when socketing, place Kelvin connections at module terminals to avoid measurement errors due to socket contact resistance.

**Efficiency**

$$\eta = \left( \frac{[V_o(+)-V_o(-)] \times I_o}{[V_{in}(+)-V_{in}(-)] \times I_{in}} \right) \times 100\%$$

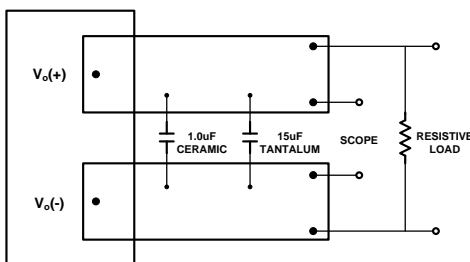
**Thermal Considerations**

This products has wide operating temperature range from -40°C to +95°C at baseplate.

However, it should be required a enough air flow for more reliable operation. Output derating curve provide designers with a quantity of a current under the desired ambient temperature and velocity of airflow.

**Output load transient response / ripple & noise Test**

Output load transient response and ripple&noise are measured in figure. And the probe ground should be less than 1/2 inch and oscilloscope is set up 20MHz bandwidth to measure exact data.



**Protection Functions**

**Input under-voltage Lockout(UVLO)**

At input voltages below the input under-voltage lockout limit, the module operation is disabled. The module will begin to operate once the input voltage is raised above the under-voltage lockout turn-on threshold.

**Input Over-Voltage Protection**

At input voltages over the input over-voltage lockout limit, the module operation is disabled. The module will begin to operate once the input voltage is downed under the over-voltage lockout turn-on threshold.

**Output Over Voltage Protection(OVP)**

To provide protection in output over voltage, the Unit is equipped with internal protection circuitry. The module automatically recovers when over voltage condition is removed.

**Over current Protection(OCP)**

To provide protection in output overload condition, the unit is equipped with internal current-limiting circuitry. At the point of current-limit inception, the unit enters hiccup mode. Also the module automatically recovers when over current condition is removed.

**Over Temperature Shut down(OTP)**

The converters are equipped with precision thermal-shutdown circuitry. If the internal temperature of the converter rises up to the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor, the unit will self start.

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## Pin Functions

### Remote On/Off Control (CNT)

Two remote on/off options are available. Positive logic turns module on during a logic high voltage on the ON/Off pin, and off during a logic low.

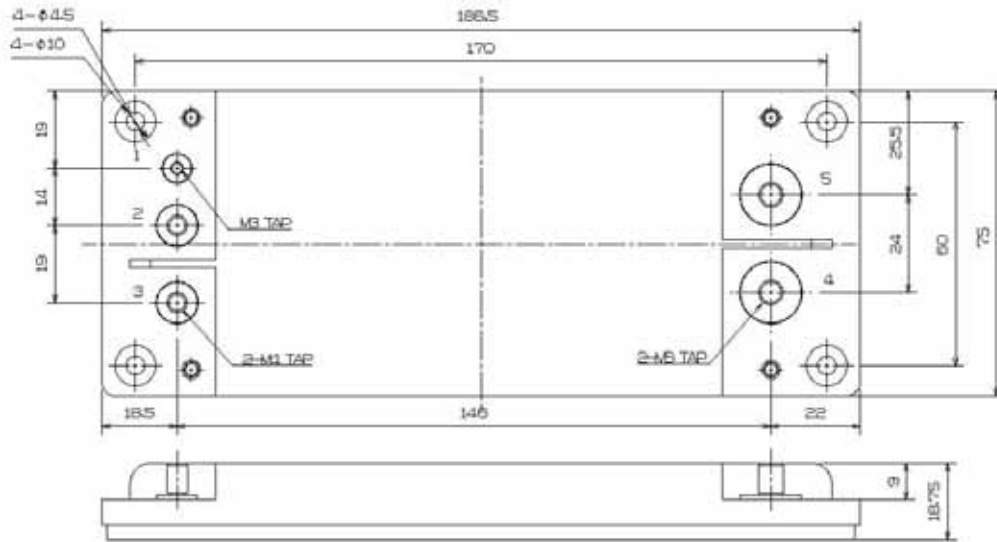
Our module is set up negative logic with default.

If you want positive logic, contact our company.

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**Mechanical Specification**



NOTES

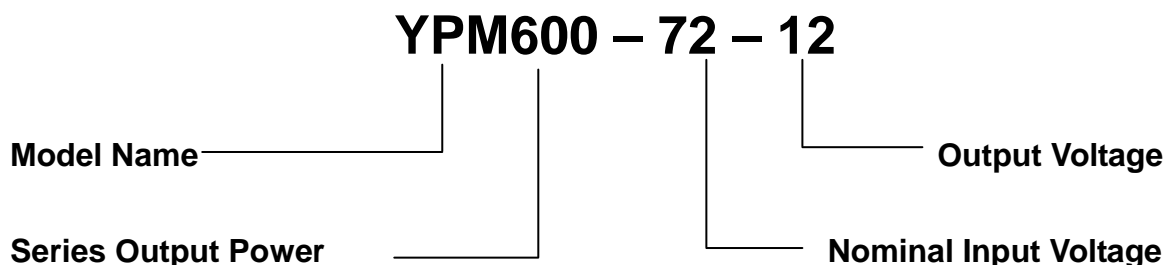
1. Case : Aluminium base plate
2. Screw pin material (1-5) : Phosphor bronze / Gold flash
3. For screw pin attachment , apply routing torque of max ?Nm
4. Cover material : PBT
5. Weight : Typical ?g
6. All dimensions in [mm]

**Pin Assignments**

PIN	Function
1	CNT
2	-Vin
3	+Vin
4	+Vout
5	-Vout

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May. 31, 2011**Ordering Information**

Input	Output	Maximum Power	Ripple & Noise Max.	Efficiency Typ.	Model Number
36~75V	12 V@50A	600W	120mVp-p	91.2%	YPM600-48-12
50~100V	12V@50A	600W	120mVp-p	92.1%	YPM600-72-12
60~120V	12V@50A	600W	120mVp-p	91.9%	YPM600-96-12

**Part Number Structure**

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