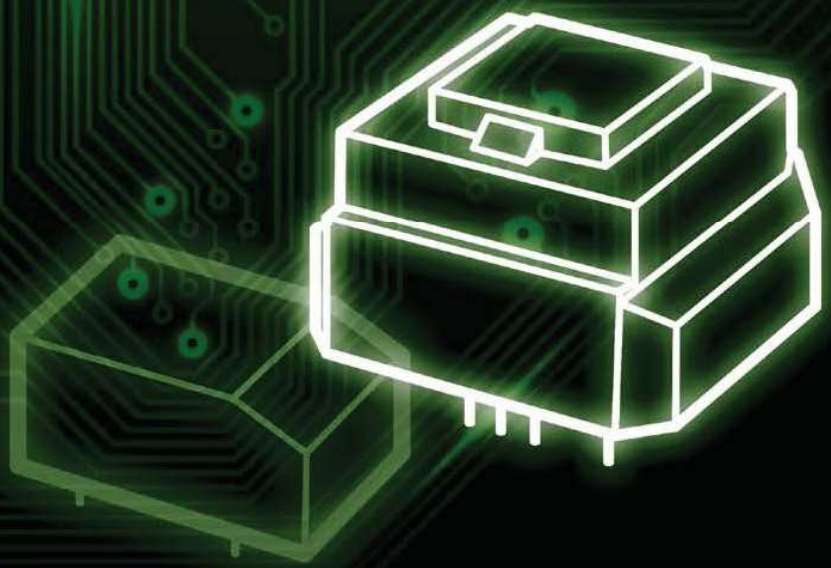
TAMURA

ELECTRONICS COMPONENTS

POWER MODULE



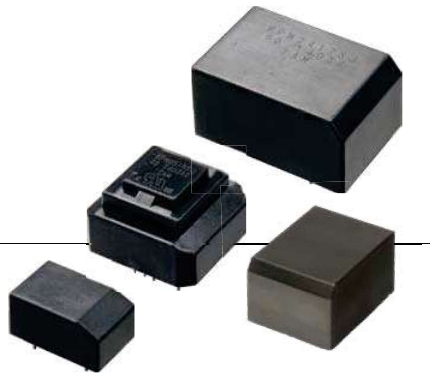
CONTENTS

Five Improvements by Power Supply Modules

Stand-by Power

Noise Reduction

Availability



Compact Form-Factor

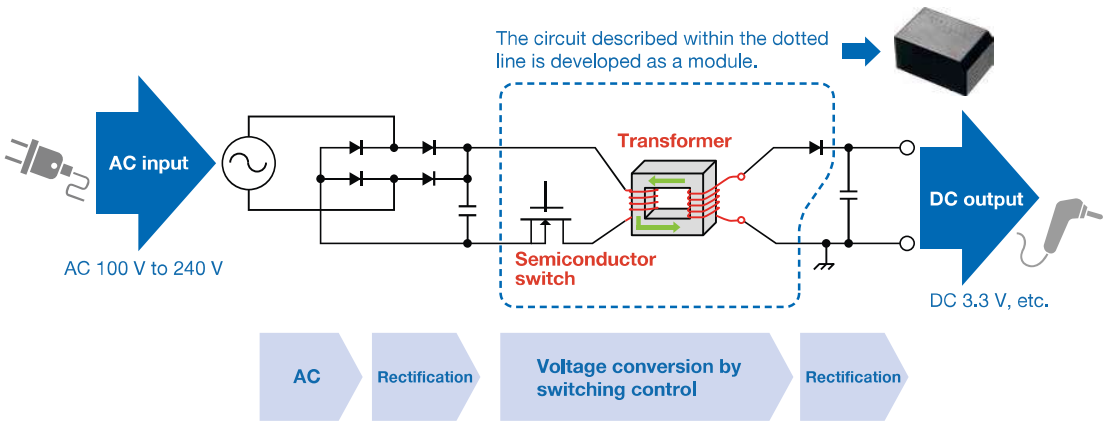
Facilitates Circuit Design

Switching power supply and power modules

Currently, a switching power supply is widely used to convert commercial AC power supplied to general households (AC 100 V in Japan) into DC power.

A switching power supply converts voltage by rapidly flipping a semiconductor switch on and off (about 100,000 times per second). As for its features, it offers high conversion efficiency and allows size and weight reduction. It is used in AC adapters for cellphones, smartphones, notebook PCs, etc.

Tamura has developed power modules that function as circuits of switching power supply, as described in "Voltage conversion by switching control" within the dotted line in the figure below. The integration of key devices—transformers, control circuits, and semiconductor switches—into a single package allows easy design of power supplies with a small number of components.



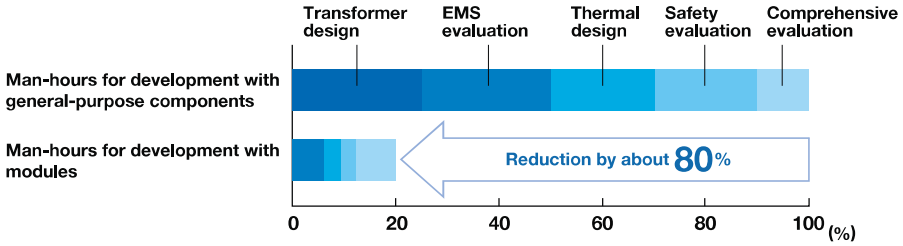
Features of power modules

Easy design of power supplies with high efficiency and low standby power consumption!

Tamura's power modules employ circuit technologies that incorporate know-how of original technologies Tamura has developed to achieve low standby power consumption and high efficiency.
This facilitates the design of high-performance power supplies that can significantly reduce standby power consumption under no load and maintain high efficiency across the entire load range from low load to rated load.

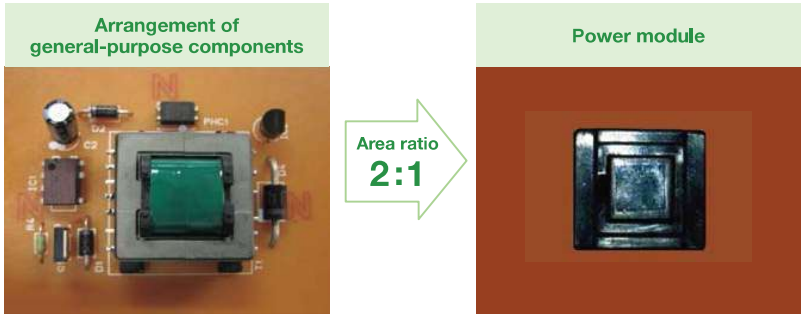
Significant reduction in man-hours for design and evaluation!

You can greatly simplify very important processes in power supply development—transformer design, thermal design, safety standard compliance, open and short circuit testing, and EMS evaluation.
It is possible to reduce development man-hours required before mass production of power supplies by about 80%, thereby reducing development cost and time.



Reduction in mounting area

As the key components are housed in the modules, mounting area can be reduced to about half of that for an arrangement of general-purpose components.

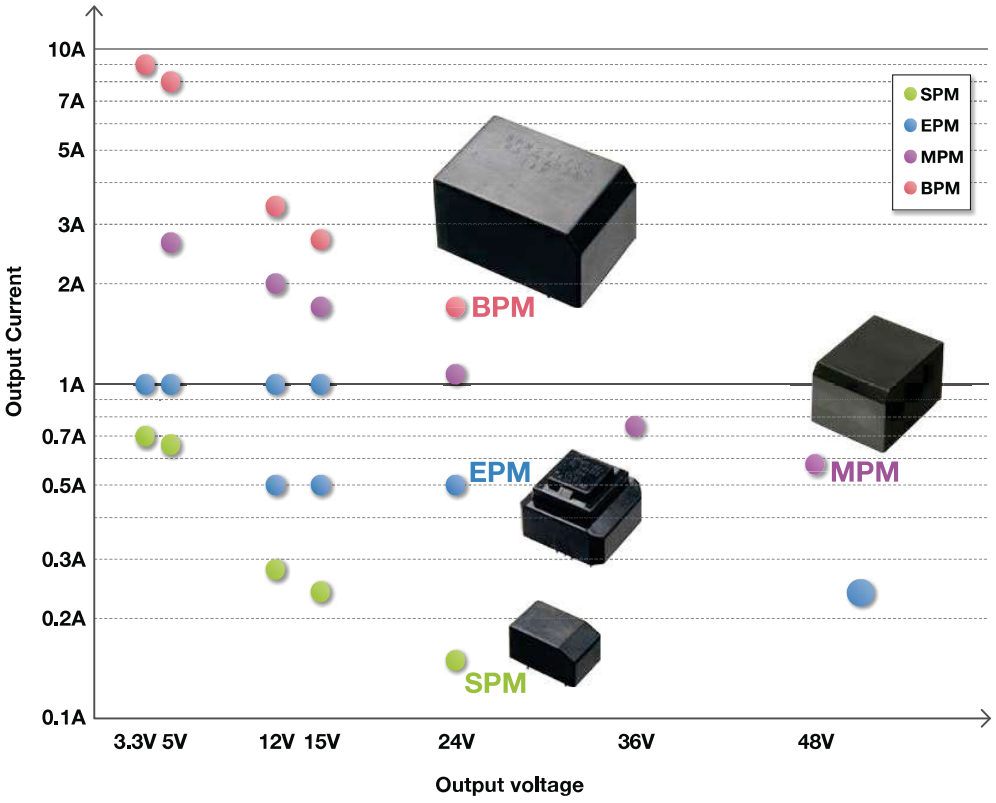


(By comparison with Tamura's discrete products)

Explanation of the Outline

With our original circuit technology, Tamura's power modules has the capability of design resource reduction, ultra-low standby power consumption and high efficiency.
And also have made it possible to have low standby power & high efficiency at low power external components.
Will contribute design time and development cost reduction.

Output Current / Output voltage



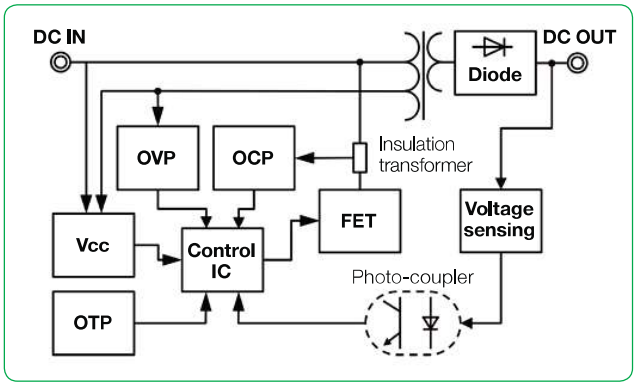
Product Lineup

Series	SPM Series	EPM Series	MPM Series	BPM Series
Class	4W	15W	25W	40W
Product				

Explanation of the Outline

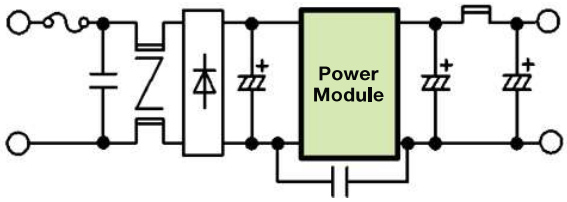
Outline

Tamura's power module s are energy-saving switching power supply modules with switching transformer, IC control, circuit control and a built-in (FET) switching component.
By attaching an external input noise filter, input rectifier diode, output smoothing capacitor a high-efficiency and high performance switching power supply with low standby power can easily be created with the EPM.



Internal parts and functions

- Insulation Transformer
- Isolated Transformer FET
- IC control
- Output rectifier diode
- Photo-coupler
- Output voltage detection circuit
- Primary side control circuit
- Over voltage protection
- Over current protection
- Heating protection circuit



Switching Power Supply can be easily created

Applications

Industrial equipment, Information processing equipment, AV equipment, Consumer electronics, Standby power, Small power, etc.

Features

- Capable of high efficiency from quasi resonant operation
- Low standby power consumption because of the combination of behavior and burst frequency reduction
- Corresponding world wide input and PFC output voltage (Vin:DC110V 450V)
- Reinforced insulation between primary and secondary (AC3000V 1 minute gurantee)
- Capable of low noise for Tamura's unique structure
- Correspondence of various safety standard (Information equipment, AV equipment, Industrial equipment, Home appliance)
- Various built-in protection function (Over-current protection, Over-voltage protection, Overheat protection)

List of Products , SPM Series

SPM Series

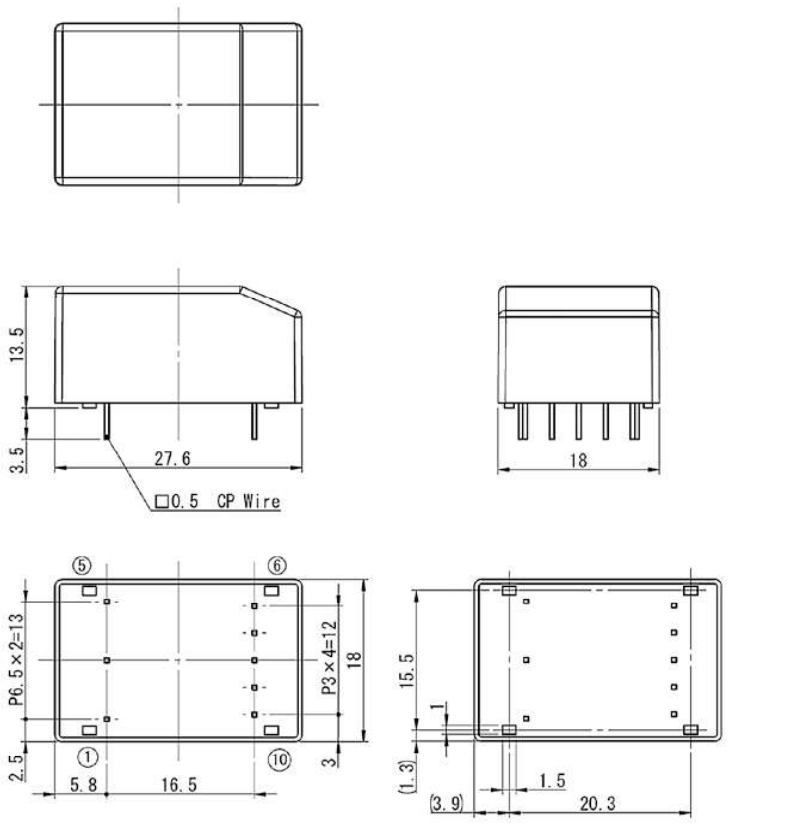
RoHS

Item		Model				
		SPM0307SJ	SPM0507SJ	SPM1203SJ	SPM1502SJ	SPM2402SJ
Rated Output Voltage / Rated Load		3.3V / 0.7A	5V / 0.66A	12V / 0.28A	15V / 0.22A	24V / 0.14A
Output voltage tolerance (10~100% Load)		±10%	±7.5%	±6%	+5% / -6%	
Output voltage tolerance (0~10% Load)		+15% / -10%	+12% / -10%	±10%	±10%	
Input Voltage Range		DC110-390V	DC110-420V			
Efficiency (DC140V, Rated load, Ta=25°C)		70%(typ)	76%(typ)	80%(typ)	82%(typ)	
No-load power (DC140V, Ta=25°C)		15mW(typ)	17mW(typ)	17mW(typ)	20mW(typ)	
Ripple		150mVp-p	150mVp-p	250mVp-p	400mVp-p	
Ripple & Noise		200mVp-p	200mVp-p	300mVp-p	500mVp-p	
Protection	Over Current Protection	Auto recovery				
	Over Temperature Protection	Auto recovery				
Insulation	Insulation Voltage	AC3000V 1min Cut off current = 2mA				
	Insulation Resistance	DC500V 100MΩmin				
Environment	Ambient Temperature (Operating)	-20 ~ +95°C (+75 ~ +95°C : stand for derating)				
	Ambient Humidity (Operating)	20 ~ 95%RH (Nil condensation)				
	Ambient Temperature (Storage)	-25 ~ +100°C				
	Ambient Humidity (Storage)	5 ~ 95%RH (Nil condensation)				
	Vibration	10 ~ 55Hz 49.0m/s^2 3min cycle X,Y,Z direction each once				
	Shock	196.1m/s^2 11ms X,Y,Z direction each once				

Under development

External Dimensions / Pin assignment

External Dimensions



Note :1. The dimensional tolerance without directions is ± 0.5mm.

Pin assignment

Primary side			Secondary side		
Pin No.	**Name**	**Description**	**Pin No.**	**Name**	**Description**
1	**Vin(-)**	Input (-)	**6**	**N.C.**	N.C.(unable to connect to other circuits)
2	**-**	No pin	**7**	**N.C.**	N.C.(unable to connect to other circuits)
3	**Drain**	Noise adjustment	**8**	**W1**	Secondary winding terminal
4	**-**	No pin	**9**	**Vo**	Output (+)
5	**Vin(+)**	Input (-)	**10**	**GND**	Output (-)

List of Products , EPM Series

EPM Series

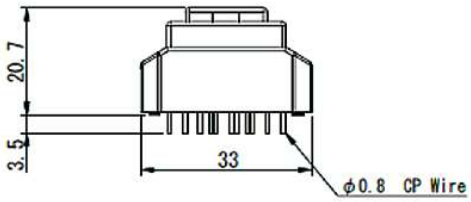
RoHS

Item		Model						
		EPM0310SJ	EPM0510SJ	EPM1205SJ	EPM1210SJ	EPM1505SJ	EPM1510SJ	EPM2405SJ
Rated Output Voltage / Rated Load		3.3V / 1.0A	5V / 1.0A	12V / 0.5A	12V / 1.0A	15V / 0.5A	15V / 1.0A	24V / 0.5A
Output voltage tolerance		±5%						
Input Voltage Range		DC110 - 450V						
Efficiency (DC140V, Rated load, Ta=25°C)		78%(typ)	80%(typ)	85%(typ)	88%(typ)	88%(typ)	90%(typ)	90%(typ)
No-load power (DC140V, Ta=25°C)		15mW(typ)	17mW(typ)	19mW(typ)	23mW(typ)	25mW(typ)	23mW(typ)	28mW(typ)
Line Regulation		50mV	50mV	50mV	100mV	100mV	100mV	100mV
Load Regulation		100mV	100mV	200mV	250mV	250mV	250mV	250mV
Ripple		60mV	60mV	120mV	120mV	150mV	150mV	240mV
Ripple & Noise		100mV	100mV	150mV	150mV	200mV	200mV	300mV
Protection	Over Current Protection	Auto recovery						
	Over Voltage Protection	Lutch off						
	Over Temperature Protection	Lutch off						
Insulation	Insulation Voltage	AC3000V 1min Cut off current = 2mA						
	Insulation Resistance	DC500V 100MΩmin						
Environment	Ambient Temperature (Operating)	-20 ~ +80°C (+60 ~ +80°C : stand for derating)						
	Ambient Humidity (Operating)	20 ~ 95%RH (Nil condensation)						
	Ambient Temperature (Storage)	-25 ~ +85°C						
	Ambient Humidity (Storage)	5 ~ 95%RH (Nil condensation)						
	Vibration	10 ~ 55Hz 49.0m/s^2 3min cycle X,Y,Z direction each once						
	Shock	196.1m/s^2 11ms X,Y,Z direction each once						

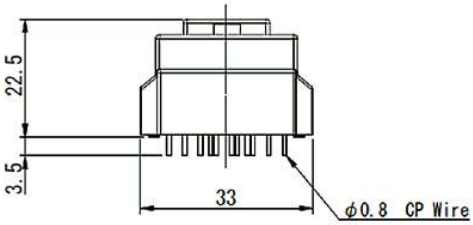
External Dimensions / Pin assignment

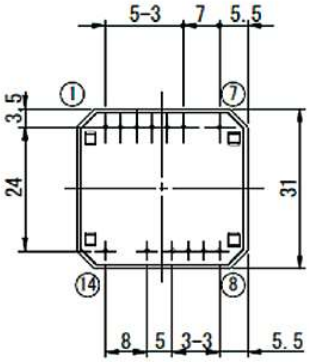
External Dimensions

EF19S, EF19D

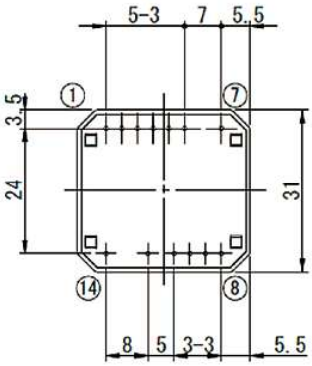


EF22S, EF22D





FE19S ①~③ : With no pin



FE22S ①~③ : With no pin

Pin assignment

FE19S, FE22S

Primary side			Secondary side		
Pin No.	Name	Description	Pin No.	Name	Description
8	FB	N.C.(unable to connect to other circuits)	1	-	No pin
9	VccW	N.C.(unable to connect to other circuits)	2	-	No pin
10	-DCIN	Input (-)	3	-	No pin
11	Vcc	Start-up time adjustment	4	SecW	N.C.(unable to connect to other circuits)
12	+DCIN	Input (+)	5	+DCOUT	Output (+)
13	-	No pin	6	N.C.	N.C.(unable to connect to other circuits)
14	Drain	Noise adjustment	7	-DCOUT	Output (-)

FE19D, FE22D

Primary side			Secondary side		
Pin No.	Name	Description	Pin No.	Name	Description
8	FB	N.C.(unable to connect to other circuits)	1	SecW2-1	N.C.(unable to connect to other circuits)
9	VccW	N.C.(unable to connect to other circuits)	2	+DCOUT2	Output2 (+)
10	-DCIN	Input (-)	3	SecW2-2	Relay (③-④pin short)
11	Vcc	Start-up time adjustment	4	SecW	
12	+DCIN	Input (+)	5	+DCOUT	Output1 (+)
13	-	No pin	6	Adjust	Output voltagea adjustment
14	Drain	Noise adjustment	7	-DCOUT	Output (-)

List of Products , MPM Series

MPM Series

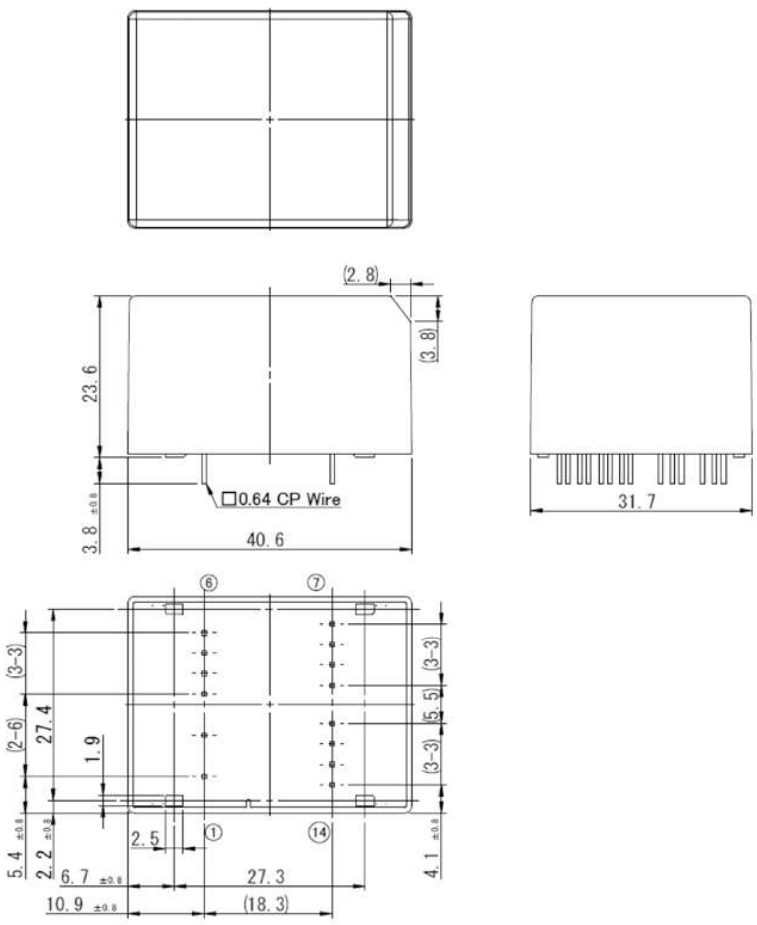
RoHS

Item		Model					
		MPM0527SJ	MPM1220SJ	MPM1517SJ	MPM2411SJ	MPM3608SJ	MPM4806SJ
Rated Output Voltage / Rated Load		5V / 2.7A	12V / 2.0A	15V / 1.7A	24V / 1.1A	36V / 0.75A	48V / 0.58A
Output voltage tolerance		±5%					
Input Voltage Range		DC100 ~ 420V					
Efficiency (DC140V, Rated load, Ta=25°C)		T.B.D	86% (TYP)	T.B.D	T.B.D	90% (TYP)	T.B.D
No-load power (DC140V, Ta=25°C)		50mW or less	50mW or less	50mW or less	50mW or less	75mW or less	75mW or less
Line Regulation		T.B.D	100mV	T.B.D	T.B.D	100mV	T.B.D
Load Regulation		T.B.D	250mV	T.B.D	T.B.D	250mV	T.B.D
Ripple		60mV	120mV	150mV	240mV	360mV	480mV
Ripple&Noise		100mV	150mV	180mV	300mV	430mV	570mV
Protection	Over Current Protection	Auto recovery					
	Over Voltage Protection	Lutch off					
	Over Temperature Protection	Lutch off					
Insulation	Insulation Voltage	AC3000V 1min Cut off current=2mA					
	Insulation Resistance	DC500V 100MΩmin					
Environment	Ambient Temperature (Operating)	-20 ~ +80℃ (50 ~ +80℃ : stand for derating)					
	Ambient Humidity (Operating)	20 ~ 95% RH (Nil condensation)					
	Ambient Temperature (Storage)	-25 ~ +85℃					
	Ambient Humidity (Storage)	5 ~ 95% RH (Nil condensation)					
	Vibration	10 ~ 55Hz 49.0m/s^2 3min cycle X,Y,Z direction each once					
	Shock	196.1m/s^2 11ms X,Y,Z direction each once					

*While it's development, without announcing beforehand, so there is a case that the specification changes.

External Dimensions / Pin assignment

External Dimensions



Note :1.The dimensional tolerance without directions is ± 0.5mm.

Pin assignment

Primary side			Secondary side		
Pin No.	Name	Description	Pin No.	Name	Description
1	Vin(+)	DC volt input terminal (+)	7	REF	Output voltage adjustment terminal
2	Drain	Terminal for noise adjustment	8	RC(-)	Output voltage detection terminal (-)
3	Vin(-)	DC volt input terminal (-)	9	GND	Output terminal (-)
4	Vcc	Terminal for start-up time adjustment	10	GND	Output terminal (-)
5	VccW	N.C. (Unable to connect to other circuits)	11	GND	Output terminal (-)
6	N.C.	N.C. (Unable to connect to other circuits)	12	Vo	Output1 terminal (-)
			13	Vo	Output1 terminal (+)
			14	RC(+)	Output voltage detection terminal (+)

List of Products , BPM Series

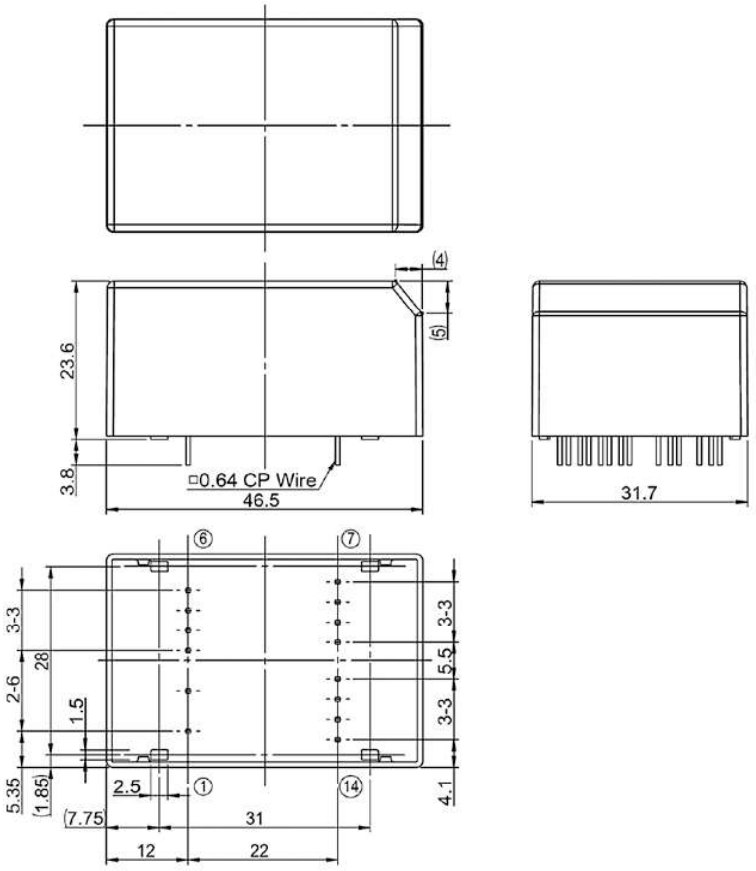
BPM Series

RoHS

Item		Model				
		BPM0390SJ	BPM0580SJ	BPM1234SJ	BPM1527SJ	BPM2417SJ
Rated Output Voltage / Rated Load		3.3V / 9.0A	5V / 8.0A	12V / 3.4A	15V / 2.7A	24V / 1.7A
Output voltage tolerance		±5%				
Input Voltage Range		DC100 ~ 420V				
Efficiency (DC140V, Rated load, Ta=25°C)			87%(typ)	91%(typ)	93%(typ)	90%(typ)
No-load power (DC140V, Ta=25°C)			25mW(typ)	23mW(typ)	25mW(typ)	24mW(typ)
Line Regulation			50mV	100mV	100mV	100mV
Load Regulation			100mV	250mV	250mV	250mV
Ripple			60mV	120mV	120mV	240mV
Ripple & Noise			100mV	150mV	150mV	300mV
Protection	Over Current Protection	Auto recovery				
	Over Voltage Protection	Lutch off				
	Over Temperature Protection	Lutch off				
Insulation	Insulation Voltage	AC3000V 1min Cut off current = 2mA				
	Insulation Resistance	DC500V 100MΩmin				
Environment	Ambient Temperature (Operating)	-20 ~ +80°C (+50 ~ +80°C : stand for derating)				
	Ambient Humidity (Operating)	20 ~ 95%RH (Nil condensation)				
	Ambient Temperature (Storage)	-25 ~ +85°C				
	Ambient Humidity (Storage)	5 ~ 95%RH (Nil condensation)				
	Vibration	10 ~ 55Hz 49.0m/s^2 3min cycle X,Y,Z direction each once				
	Shock	196.1m/s^2 11ms X,Y,Z direction each once				

External Dimensions / Pin assignment

External Dimensions



Note :1.The dimensional tolerance without directions is ± 0.5mm.

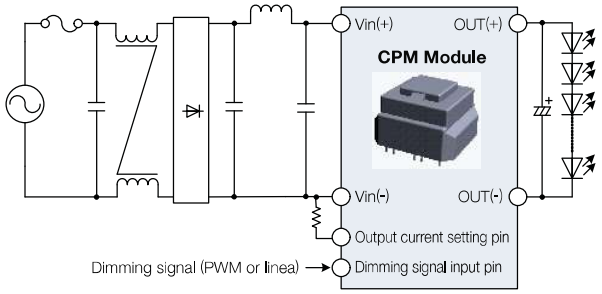
Pin assignment

Primary side			Secondary side		
Pin No.	Name	Description	Pin No.	Name	Description
1	Vin(+)	Input (+)	7	REF	Output adjustment
2	Drain	Noise adjustment	8	RC(-)	Output detection (-)
3	Vin(-)	Input (-)	9	GND	Output (GMD)
4	Vcc	Start-up time adjustment	10	GND	Output (GMD)
5	VccW	Control pin	11	GND	Output (GMD)
6	N.C.	N.C.(unable to connect to other circuits)	12	Vout(+)	Output (+)
			13	Vout(+)	Output (+)
			14	RC(+)	Output detection (+)

List of Products , CPM series / Constant Current type , LED driver

CPM Series

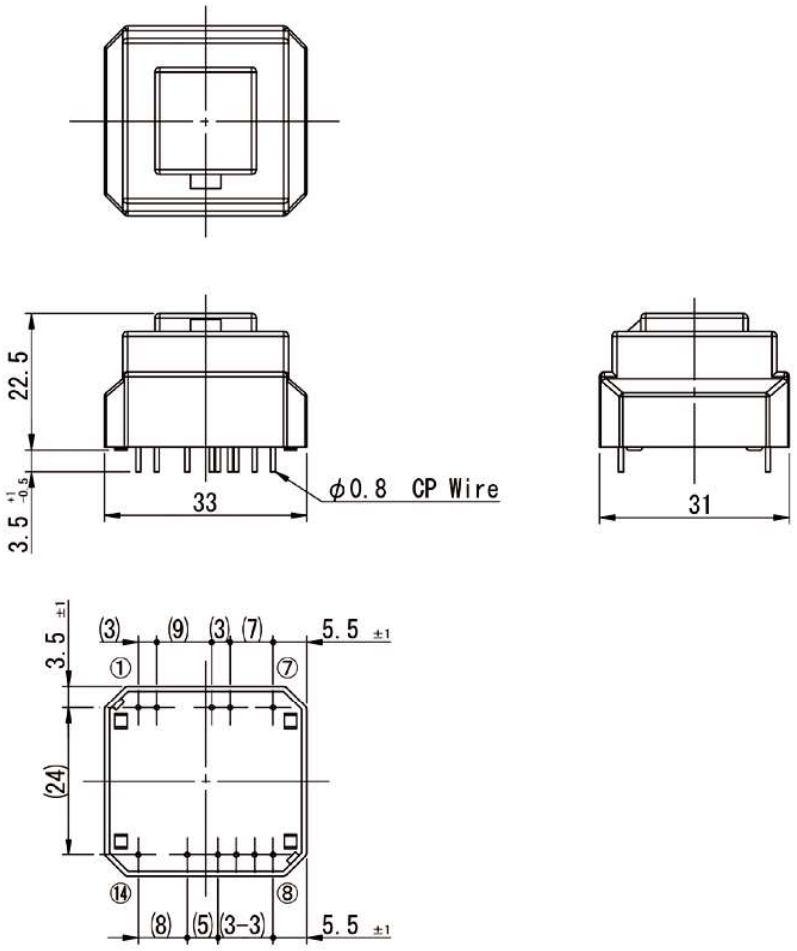
RoHS



Item		Model	
		CPM3417RA	CPM6018RA
Input	Voltage range	AC90 - 264V / 47 - 63Hz	
Output	Max load power	17W max	18W max
	Voltage range	DC17V-34V * It's restricted by the current set value.	DC30V-60V * It's restricted by the current set value.
	Current setting range	0.4A-0.5A * Externally adjusted by connecting resistors	0.3A-0.38A * Externally adjusted by connecting resistors
	Current accuracy	±10%	
Efficiency		84%typ * At the rated input voltage and 17W output power and at Ta = 25°C	86%typ * At the rated input voltage and 18W output power and at Ta = 25°C
Power factor		85% or more * At the rated input voltage and 17W output power and at Ta = 25°C	85% or more * At the rated input voltage and 18W output power and at Ta = 25°C
Dimming range		5 - 100% * PWM : 1kHz 0 - 5V LINEAR : 0.74V - 2.45V at Ta = 25°C	
Output short-circuit protection		Automatic recovery	
Overvoltage protection		Automatic recovery	
Overheat protection		Automatic recovery	
Insulation voltage		AC 3000V/1 minute (cut-off current = 2mA)	
Operating temperature range		–20°C to 70°C* Derated depending on the load conditions	
Operating humidity range		20% to 95% RH (There must be no condensation)	

External Dimensions / Pin assignment

External Dimensions



Pin assignment

Primary side			Secondary side		
Pin No.	Name	Description	Pin No.	Name	Description
1	**OVP(A)**	OVP detection terminal (A)	3	**-**	No terminal
2	**OVP(K)**	OVP detection terminal (K)	4	**-**	No terminal
8	**DIM**	Dimming signal input terminal	5	**Io(-)**	Output terminal (-)
9	**VccW**	N.C. (Unable to connect to other circuits)	6	**Io(+)**	Output terminal (+)
10	**Vin(-)**	Input terminal (-)	7	**SecW**	N.C. (Unable to connect to other circuits)
11	**Iset**	Constant current setting terminal			
12	**Vin(+)**	Input terminal (+)			
13	**-**	No pin			
14	**Drain**	N.C. (Unable to connect to other circuits)			

Important notice

- The content of this manual is subject to change without prior notice for the purpose of improvements, etc. Ensure that you are in possession of the most up-to-date information when using this product.

- The operation examples and circuit examples shown in this manual are for reference purposes only, and Tamura Corporation disclaims all responsibility for any violations of industrial property rights, intellectual property rights and any other rights owned by Tamura Corporation or third parties that these may entail.

- The circuit examples and part constants listed in these specifications are provided as reference for the verification of characteristics. You are to perform design, verification, and judgment at your own responsibility, taking into account the various conditions.

- TAMURA Corporation constantly strives to improve quality and reliability, but malfunction or failures are bound to occur with some probability in power products. To ensure that failures do not cause accidents resulting in injury or death, fire accidents, social damage, and so on, you are to thoroughly verify the safety of their designs in devices and/or systems.

- This product is intended for use in consumer electronics (electric home appliances, business equipment, information equipment, communication terminal equipment, measuring devices, and so on.) If considering use of this product in equipment or devices that require high reliability (medical devices, transportation equipment, traffic signal control equipment, fire and crime prevention equipment, aeronautics and space devices, nuclear power control, fuel control, in-vehicle equipment, safety devices, and so on), please consult a TAMURA sales representative in advance. Do not use this product for such applications without written permission from TAMURA Corporation.

- This product is intended for use in environments where consumer electronics are commonly used. It is not designed for use in special environments such as listed below, and if such use is considered, you are to perform thorough safety and reliability checks at your own responsibility.
  - Use in liquids such as water, oil, chemical solutions, or organic solvents, and use in locations where the product will be exposed to such liquids
  - Use that involves exposure to direct sunlight, outdoor exposure, or dusty conditions
  - Use in locations where corrosive gases such as salt air, C12, H2S, NH3, SO2, or NO2, are present
  - Use in environments with strong static electricity or electromagnetic radiation
  - Use that involves placing inflammable material next to the product
  - Use of this product either sealed with a resin filling or coated with resin
  - Use of water or a water soluble detergent for flux cleaning
  - Use in locations where condensation is liable to occur

- This product is not designed to resist radiation.

- This product is not designed to be connected in series or parallel. Do no operate this product in a series, parallel, or N+1 redundant configuration.

- The content of this manual may not be transferred or copied without prior written permission.

Important notice

- Do not use or otherwise make available the TAMURA products or the technology described in this document for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of mass destruction weapons (e.g. nuclear, chemical, or biological weapons or missile technology products). When exporting and re-exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations including, without limitation, Japan -Foreign Exchange and Foreign Trade Control Law and U.S.- Export Administration Regulations. The TAMURA products and related technology should not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.

- Please contact your TAMURA sales office for details as to environmental matters such as the RoHS compatibility of Product. Please use TAMURA products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive.
  TAMURA assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.

- TAMURA assumes no liability for damages or losses incurred by you or third parties as a result of unauthorized use of TAMURA products.

- This document and any information herein may not be reproduced in whole or in part without prior written permission from TAMURA.

HEAD OFFICE
1-19-43, Higashi-Oizumi, Nerima-ku, Tokyo, 178-8511 Japan

SAKADO OFFICE
5-5-30 Chiyoda Sakado-shi Saitama 350-0214 Japan
Tel : 049-284-5711 Fax : 049-284-5715

OSAKA SALES OFFICE
Esaka-Sanshoubill 3-27-27 Tarumi-cho Suita-shi Osaka 564-0062 Japan
Tel : 06-6380-2300 Fax : 06-6385-8371

NAGOYA SALES OFFICE
3-1803, Kamiyashiro, Meito-ku, Nagoya-shi, Aichi, 465-0025 Japan
Tel : 052-701-1210 Fax : 052-701-1295

TAMURA CORPORATION OF CHINA LIMITED
13F, Block A, International Shopping Centre Shanghai No.527
Huaihai Zhong Road, Shanghai, China
Tel : 86-21-6387-9388 Fax : 86-21-6387-9268

TAMURA ELECTRONICS(S.Z.)CO.,LTD.
3014, Ban Xue Gang Street, Ban Tian Community,
Ban Tian Subdistrict, Long Gang District,
Shen Zhen City, China
Tel : 86-755-8950-2603 Fax : 86-755-8950-2325

TAMURA CORPORATION OF KOREA
#514, Hyundai I-Valley 223-12, Sangdaewon 1-dong, Jungwon-gu,
Seongnam-si, Gyeonggi-do, 462-714, Korea
Tel : 82-2-489-5354 Fax : 82-2-489-5360

TAMURA ELECTRONICS(M)SDN.BHD.
Lot No.1, Jalan SS 8/6, Sungai Way Free Industrial Zone,
47300 Petaling Jaya, Selangor, Malaysia
Tel : 60-3-7680-9000 Fax : 60-3-7876-3300

TAMURA CORPORATION OF AMERICA
1040 South Andreasen Drive, Ste.100 Escondido, CA 92029 U.S.A.
Tel : 1-951-699-1270 Fax : 1-951-676-9482

TAMURA EUROPE LIMITED.
Clark Avenue Porte Marsh Industrial Estate Calne Wiltshire
SN11 9BS United Kingdom
TEL : 44(0)-1380-731-700 FAX : 44(0)-1380-731-703

2016.9.TR