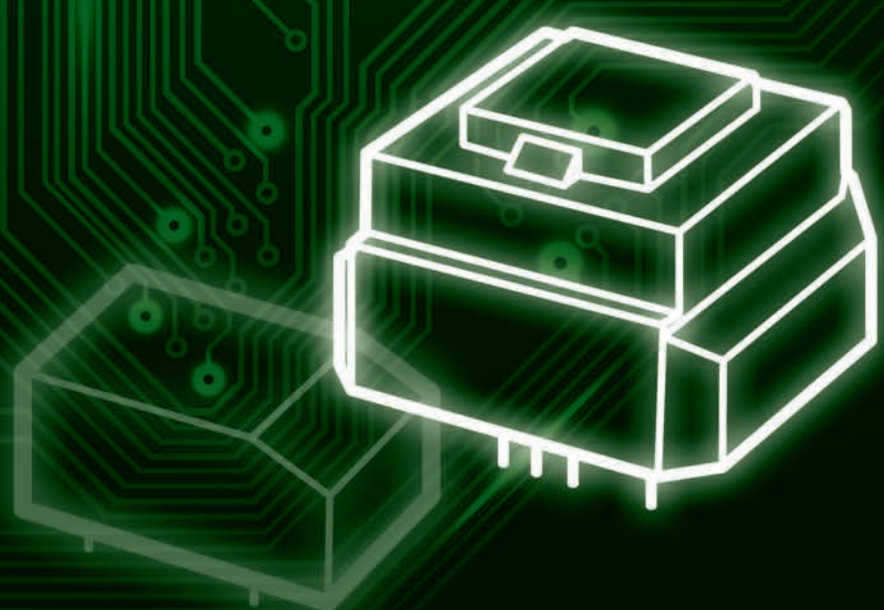
TAMURA

ELECTRONICS COMPONENTS

POWER MODULE



CONTENTS

Five Improvements by Power Supply Modules

Stand-by Power

Noise Reduction

Availability

Compact Form-Factor

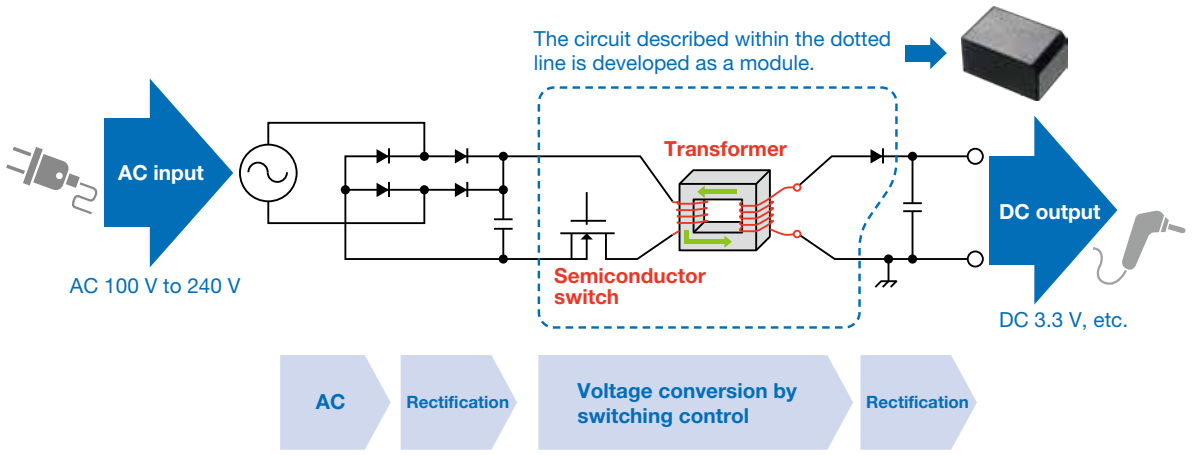
Facilitates Circuit Design

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.



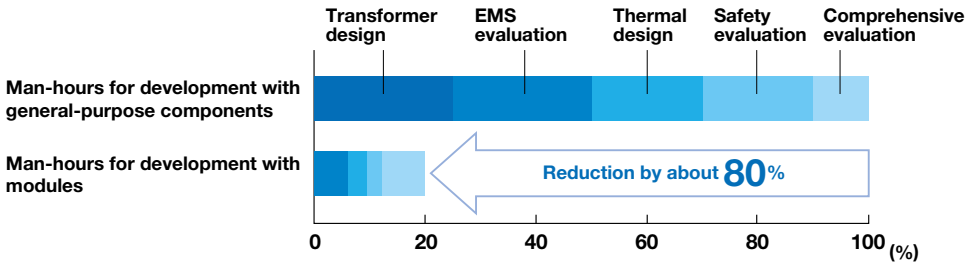
Features of power modules

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.

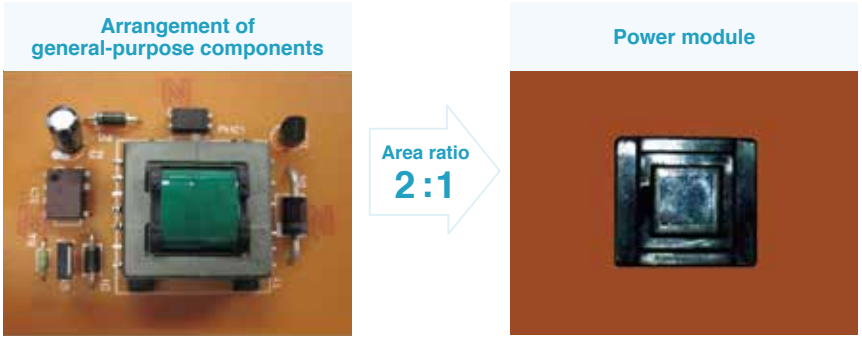
Significant reduction in man-hours for design and evaluation!

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.

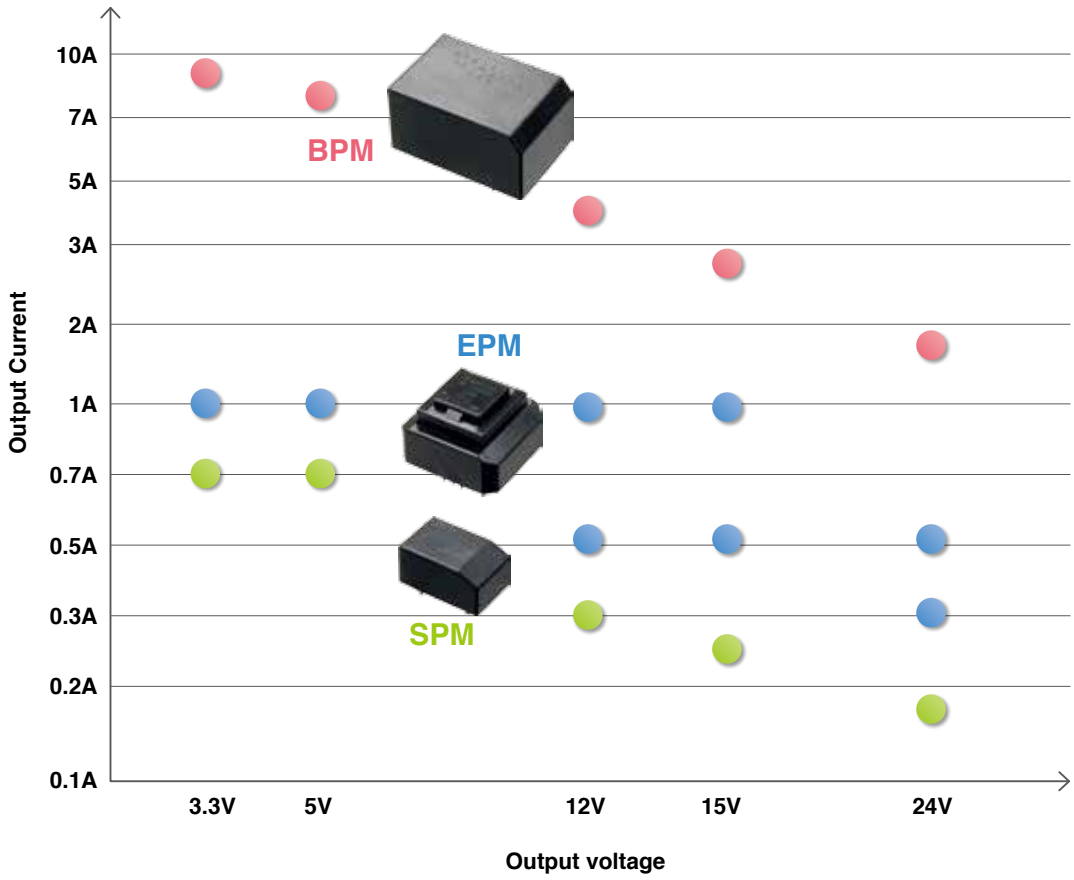


(By comparison with Tamura's discrete products)

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



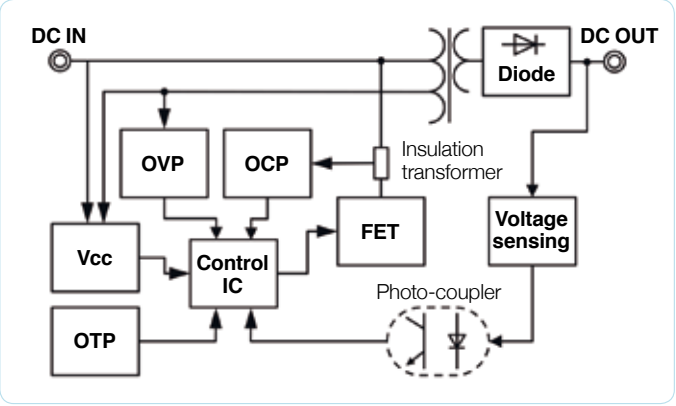
Product Lineup

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

Explanation of the Outline

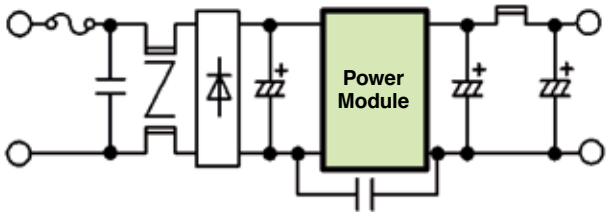
Outline

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

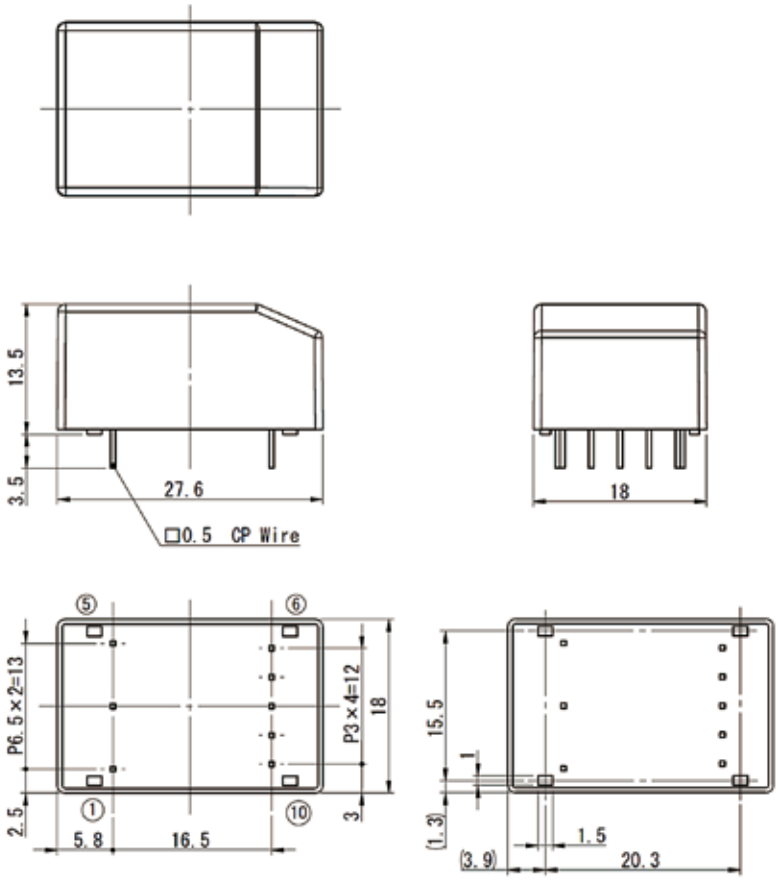
RoHS

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°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/s2 3min cycle X,Y,Z direction each once				
	Shock	196.1m/s2 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

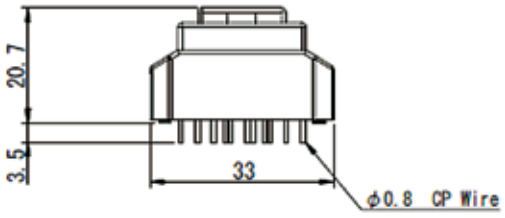
RoHS

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°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/s2 3min cycle X,Y,Z direction each once						
	Shock	196.1m/s2 11ms X,Y,Z direction each once						

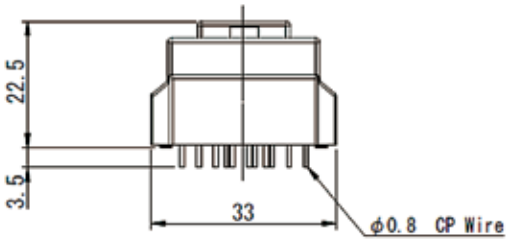
External Dimensions / Pin assignment

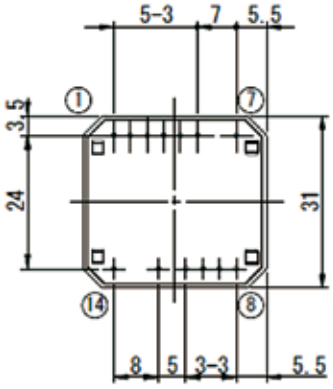
External Dimensions

EF19S, EF19D

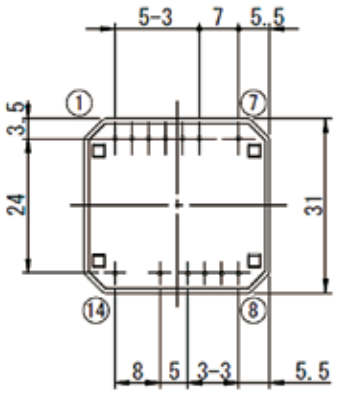


EF22S, EF22D





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 (③-④ pin 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 , BPM Series

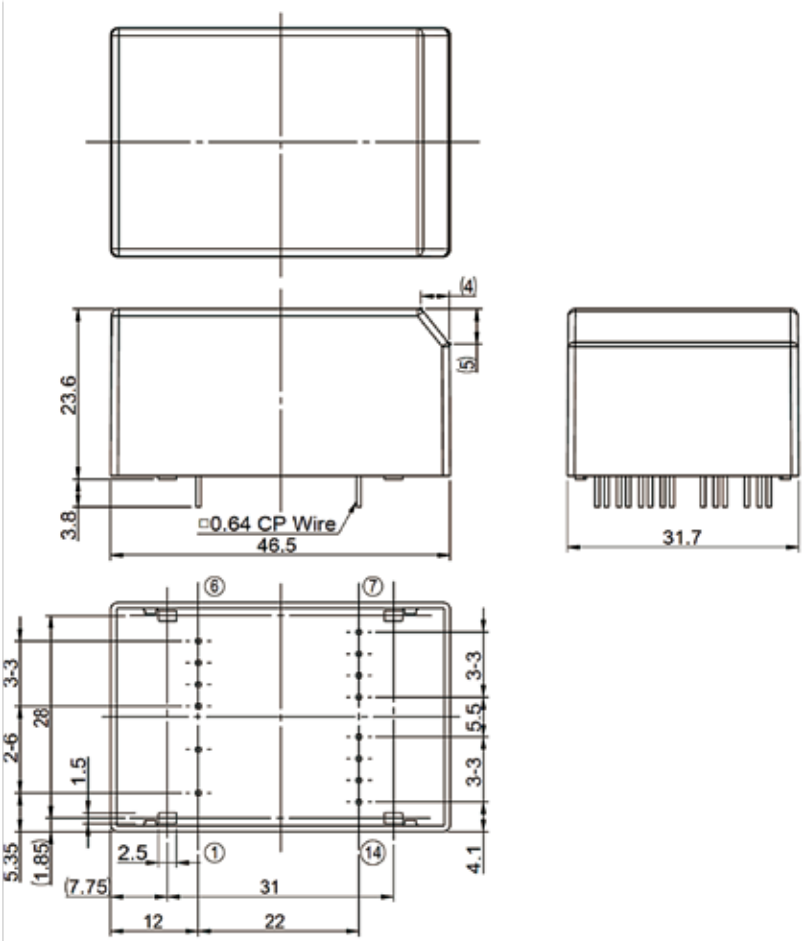
BPM Series

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°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/s2 3min cycle X,Y,Z direction each once				
	Shock	196.1m/s2 11ms X,Y,Z direction each once				

External Dimensions / Pin assignment

External Dimensions

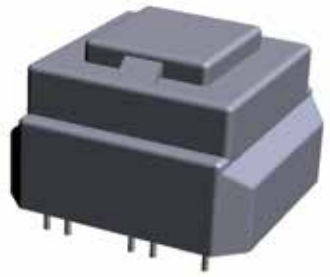


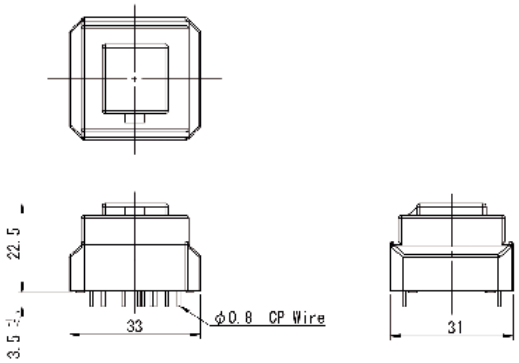
Note :1.The dimensional tolerance without directions is ± 0.5mm.

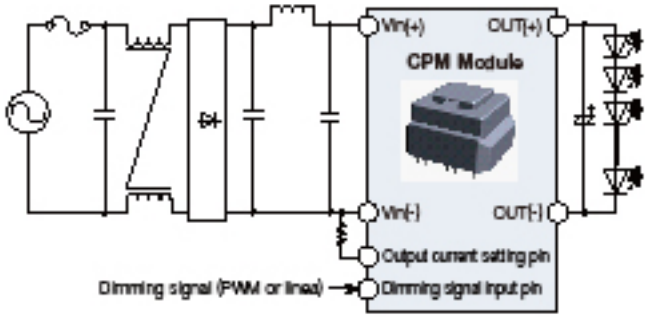
Pin assignment

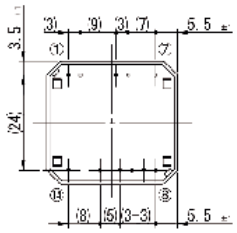
Primary side			Secondary side		
Pin No.	**Name**	**Description**	**Pin No.**	**Name**	Description
1	Vin**(+)**	Input (+)	**7**	**REF**	Output adjustment
2	Drain	Noise adjustment	**8**	**RC**(-)	Output detection(-)
3	Vin(-)	Input (-)	**9**	**GND**	Output (GMD)
4	Vcc	Start-up time adjustment	**10**	GND	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(+)

Constant Current Module / CPM series









Model		CPM6418RA	
[I/O Conditions]			
Input	Voltage range	AC 85V to 264V	
	Rated voltage	AC 100/240V	
	Frequency	50/60 Hz (47Hz to 63Hz)	
Output	Max. load power	18W max.	
	Voltage range	DC 34V to 64V	
	Current setting range	0.28A to 0.38A *Externally adjusted by connecting resistors	
	Current accuracy	±6% (at Ta = 25ºC and 0.38A)	
[Electrical Performance (Ambient temperature = 25ºC)]			
Efficiency		86% typ. (reference value)	At the rated input voltage and 18W output power
Power factor		90% or more	At the rated input voltage and 18W output power
Dimming range		5% to 100%	PWM: 1kHz, 0 to 5V LINEAR: 0.74V to 2.45V
[Protection Function]			
Output short-circuit protection		Automatic recovery	
Overvoltage protection		Automatic recovery	
Overheat protection		Automatic recovery	
[Insulation Performance]			
Insulation voltage		AC 3000V/1 minute (cut-off current = 2mA)	
Insulation resistance		DC500V/100MΩ or more	
[Environmental Conditions]			
Operating temperature range		-20°C to +60°C *Derated depending on the load conditions	
Operating humidity range		20% to 95% RH (There must be no condensation)	
Operating humidity range		-25°C to +85°C	
Storage humidity range		5% to 95% RH (There must be no condensation)	

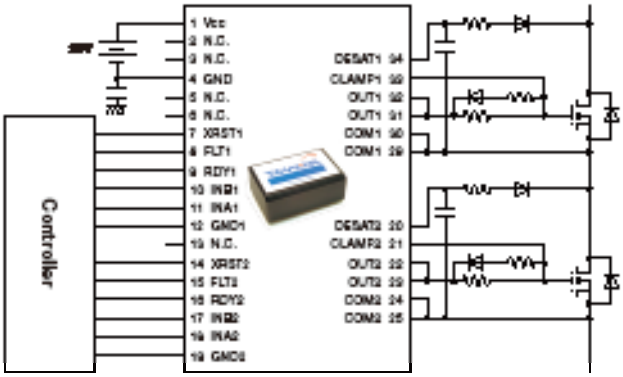
Gate Driver Module / 2DM Series

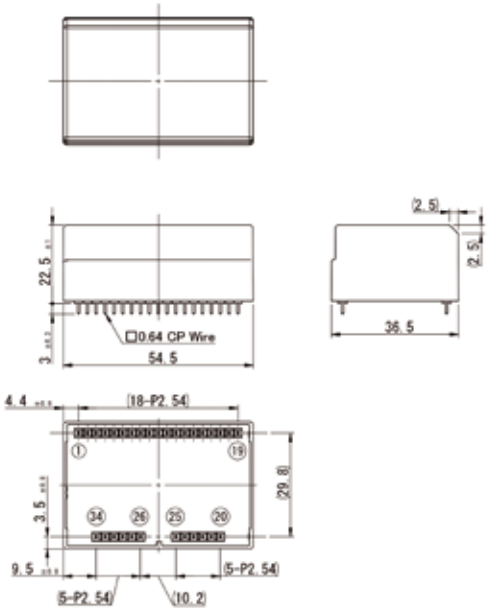
New Product

Gate Driver Module integrates the functions required for the SiC MOSFET and IGBT gate drivers.
This product is a next-generation drive module that emphasizes common mode noise preventive measures in particular.

Features

- Low common mode noise (parasitic capacitance: 15pF TYP)
- Fast response (100ns TYP)
- All in one (built-in DC-DC converter/drive circuit)
- Insulation withstand voltage: AC2500V rms





Model		2DM180506CM	2DM150806CM	2DM150606CM
[I/O Conditions]				
Input	Voltage range (Built-in DC/DC)	DC13V to DC28V/DC24V		
	Input signal voltage	5V		
Output	Number of drive circuits	2		
	Maximum output power	3W (per circuit)		
	OUT terminal voltage (H)	+17V to +19V	+14V to +16V	+14V to +16V
	OUT terminal voltage (L)	-4V to -6V	-7V to -9V	-5V to -7V
	Switching frequency	0 to 200kHz		
	Drive capacity	2600nC/50kHz 650nC/200kHz (When the output power per circuit is equivalent to 3W)		
	Maximum allowable current	18A peak (guaranteed by design)		
[Electrical Performance]				
Signal response speed		100nsec. (typ.)		
[Protection Function]				
Mirror clamp detection circuit		Operation at OUT terminal voltage + 2V typ.; -3A peak (guaranteed by design)		
Short-circuit (DESAT) protection		Provided with a fault output terminal; Recovery by turning on the reset input again.		
[Insulation Performance]				
Signal transmission method (isolation circuit)		Magnetic signal transmission		
Insulation withstand voltage		AC2500V/minute Note: Between primary and secondary; Between drive circuits		
[Environmental Conditions]				
Operating temperature range		-30°C to +85°C; Maximum output power at 85°C: Approximately 1W (per circuit) Note: Temperature derating may occur depending on the drive conditions.		
Operating humidity range		20% to 95% RH (No condensing)		

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