

100-200VAC Input/12W Output

Isolated AC/DC Converter

BP5728

Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
6pin Input Voltage	V_D	800	V
2pin Input Voltage	V_{FB}	-0.2 to +6	V
3pin Input Voltage	V_{DD}	24	V
3pin Input Current	I_{DD}	8	mA
Allowable Loss	P_D	0.64	W
Max Surface Temperature	T_{cmax}	105	°C
Operating Temperature Range	T_{opr}	-25 to +80	°C
Storage Temperature Range	T_{stg}	-25 to +105	°C

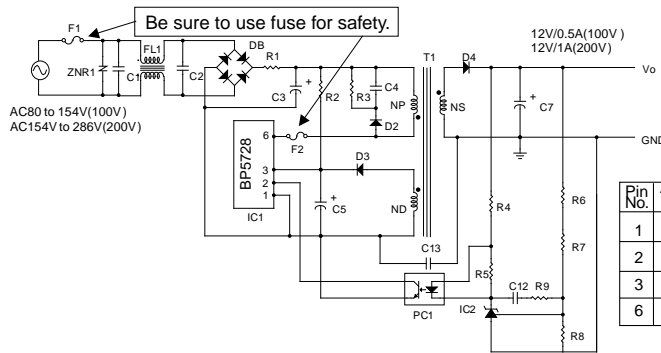
Electrical Characteristics

($V_{DD}=15V, V_d=15V, I_{FB}=0.1mA, SW1=R1, T_a=25°C$, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_{DD}	8.9	12	20	V	—
Output frequency	f_o	59	65	71	kHz	$I_{FB}=0.5mA$
Turn on voltage	$V_{DD\ on}$	15.5	16.5	17.5	V	$V_{DD}=0 \rightarrow 17.5V$
Turn off voltage	$V_{DD\ off}$	7.7	8.3	8.9	V	$V_{DD}=17.5 \rightarrow 0V$
Maximum Duty	Duty MAX	68	75	82	%	$I_{FB}=0.5mA$
Zero-Duty I_{FB}	I_{oz}	0.85	1.15	1.45	mA	$I_{FB}=0 \rightarrow 1.55mA$

Parameter	Symbol	V_{DD}	Min.	Typ.	Max.	Unit	Conditions
Over drain current protection	I_{dopc}	10V	217	247	281	mA	$V_D=0 \rightarrow 15V$ $SW1=R2$
		15V	269	302	338		
		20V	314	349	388		

Application Circuit (In case of 12V output)



Pin No.	Terminal name	Terminal function
1	COM	Common terminal at primary side
2	FB	Feed back terminal
3	V_{DD}	Power supply terminal for internal drive
6	V_o	Drain terminal for built-in FET

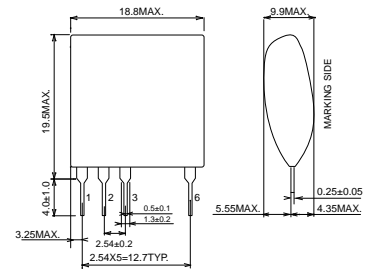
Operating Principle

- When turned on : C5 is charged by R2 when the power is on, and the switching starts when the voltage at V_{DD} pin reaches the voltage threshold (17.5V max.)
- During operation : V_{DD} is supplied via Nd and FB current flows to PC1 once V_o exceeds the threshold voltage. Once PC1 turns ON a current I_{oz} flows through the transistor. Also, FB current runs to Pin 2 of BP5728 when V_o exceeds the designed voltage and the constant voltage control is executed.
- In overcurrent conditions : The input current will increase if the output power increases, and the overcurrent protection circuit will turn ON once the Drain current exceeds the specified value (I_{dopc}).

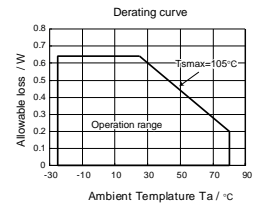
External Component Specifications

C1, C2 : Noise reduction capacitors	Rated at 300VAC or higher	IC2 : Shunt regulator	$V_{ref}=2.495V$
C3 : Input smoothing capacitor	0.1 to 0.22 μF	FL1 : Noise reduction filter	Use if necessary
C4 : Noise reduction capacitor	22 μF / 450V	R1 : Resistor	0 Ω
C5 : V_{DD} smoothing capacitor	2200pF / 1kV	R2 : Resistor	750k Ω 0.5W / 600V
C7 : Output capacitor	10 μF / 50V	R3 : Resistor	200k Ω / 3W
C12 : Phase compensation capacitor	470 μF / 35V low impedance	R4 : Resistor	51 Ω / 0.125W
C13 : Noise reduction capacitor	0.1 μF / 50V	R5 : Resistor	1k Ω / 0.1W
D2 : Rectifier diode	2200pF / AC250V	R6 : Resistor	15k Ω / 0.1W
D3 : Rectifier diode	FRD 800V / 0.5A	R7 : Resistor	3k Ω / 0.1W
D4 : Rectifier diode	80V / 0.1A	R8 : Resistor	4.7k Ω / 0.1W
DB : Diode bridge	SBD 90V / 3A	R9 : Resistor	1k Ω / 0.1W
F1, F2 : Fuse	800V / 1A	PC1 : Photo coupler	PC817
IC1 : BP5728	Use for safety BP5728	T1 : Switching transformer	SRW25ES-47V015(TDK)
		ZNR1 : Varistor	A varistor is required to protect against lightning surges and static electricity.

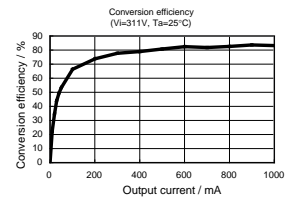
Dimensions (Unit : mm)



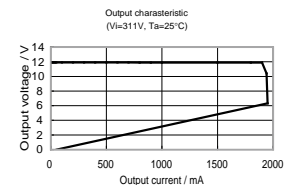
Derating Curve



Conversion Efficiency (In case of 12V output)



Load regulation (In case of 12V output)



Power Module Usage Precautions

Safety Precautions

- 1) The products are designed and manufactured for use in ordinary electronic equipment (i.e. AV/OA/telecommunication/amusement equipment, home appliances). Please consult with the Company's (ROHM) sales staff if intended for use in devices requiring high reliability (e.g. medical/transport/aircraft/spacecraft equipment, nuclear power/fuel controllers, automotive/safety devices) and whose malfunction may result in injury or death. In this case, failsafe measures must be taken, including the following:
 - [a] Installation of protection circuits in order to improve system safety
 - [b] Incorporation of redundant circuits in the case of single-circuit failure
- 2) The products are designed for use under normal conditions. Application in special environments can cause a deterioration in product performance. Therefore, verification and confirmation of product performance, prior to use, is recommended. The following environments are considered to be 'special':
 - [a] Outdoors, exposed to direct sunlight or dust
 - [b] In contact with liquids, such as water, oils, chemicals, or organic solvents
 - [c] In areas where exposure to the sea air or corrosive gases (i.e. Cl₂, H₂S, NH₃, SO₂, NO₂) can occur
 - [d] In places where the products may be in contact with static electricity or electromagnetic waves
 - [e] In proximity to heat-producing items, plastic cords, or flammable materials
 - [f] In contact with sealing or coating products, such as resin
 - [g] In contact with unclean solder or exposed to water or water-soluble cleaning agents used after soldering
 - [h] In areas where dew condensation occurs
- 3) The products are not designed to be radiation resistant
- 4) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
- 5) The Company should be notified of any product safety issues. Moreover, product safety issues should be periodically monitored by the customer.

Application Notes

- 1) A sufficient margin must be allowed if changes are made to the peripheral circuit due to variations in the inherent tolerances of the external components as well as transient and static characteristics. In addition, please be aware that the Company has not conducted investigations on whether or not particular changes in the example application circuits would result in patent infringement.
- 2) The application examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods. Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

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