

MIP0210SY

Silicon MOS IC

■ Features

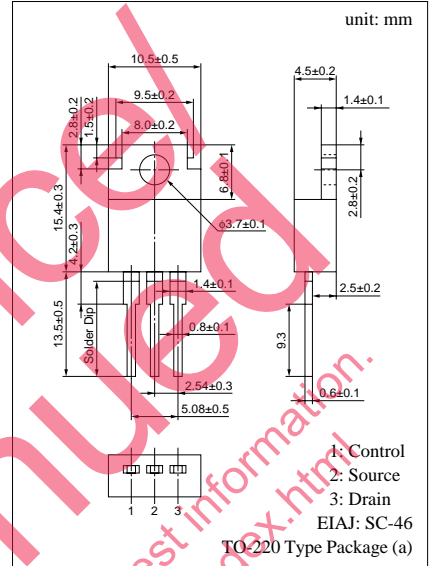
- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuits
- Allowing to input worldwide mains (AC 85 to 274V)
- A pulse-by-pulse overcurrent protection circuit and a timer auto-restart circuit are integrated.

■ Applications

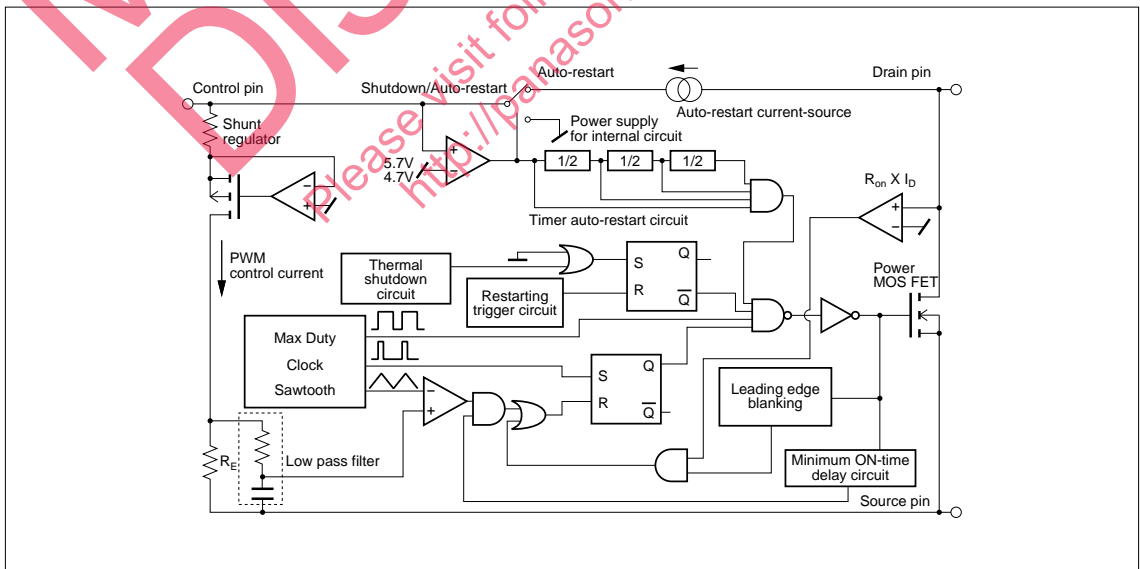
- Switching power supply (to 7W)
- AC adaptor
- Battery charger

■ Absolute Maximum Ratings (Ta = 25 ± 3°C)

Parameter	Symbol	Ratings	Unit
Drain voltage	V _D	700	V
Control voltage	V _C	8	V
Output current	I _D	I _{LIMIT MAX}	A
Control current	I _C	0.1	mA
Channel temperature	T _{ch}	150	°C
Storage temperature	T _{stg}	-55 to +150	°C



■ Block Diagram



■ Electrical Characteristics ($T_C = 25 \pm 2^\circ\text{C}$)

	Parameter	Symbol	Conditions	min	typ	max	Unit
Control functions	Output frequency	f_{OSC}	$I_C = 2\text{mA}$	90	100	110	kHz
	Maximum duty cycle	MAXDC	$I_C = 2\text{mA}$	64	67	70	%
	Minimum duty cycle	MINDC	$I_C = 10\text{mA}$			3	%
Auto-restart	Control pin charging current	I_C	$V_C = 0$	-2.4	-1.9	-1.2	mA
			$V_C = 5\text{V}$	-2	-1.5	-0.8	
	Auto-restart threshold voltage	$V_{C(\text{on})}$		5	5.7	6.3	V
	Lockout threshold voltage	$V_{C(\text{off})}$		4	4.7	5.3	V
	Auto-restart hysteresis voltage	ΔV_C		0.5	1	1.5	V
	Auto-restart duty cycle	$T_{\text{SW}}/T_{\text{TIM}}$			5	8	%
Circuit protection	Auto-restart frequency	f_{TIM}			1.2		Hz
	Self-protection current limit	I_{LIMIT}		0.23	0.29	0.35	A
	Leading edge blanking delay	$t_{\text{on(BLK)}}$	$I_C = 3\text{mA}$		0.25		μs
	Current limit delay	$t_{\text{d(OCL)}}$	$I_C = 3\text{mA}$		0.1		μs
	Thermal shutdown temperature	T_{OTP}	$I_C = 3\text{mA}$	130	140	150	$^\circ\text{C}$
	Power-up reset threshold voltage	$V_{C\text{reset}}$		2.3	3.3	4.2	V
Output	ON-state resistance	$R_{\text{DS(on)}}$	$I_D = 50\text{mA}$		31	36	Ω
	OFF-state current	I_{DSS}	$V_{\text{DS}} = 650\text{V}$, Output MOS FET disabled		0.01	0.25	mA
	Breakdown voltage	V_{DSS}	$I_D = 0.25\text{mA}$, Output MOS FET disabled	700			V
	Rise time	t_r			0.1	0.2	μs
	Fall time	t_f			0.1	0.2	μs
Power Supply voltage	Drain supply voltage	$V_{\text{D(MIN)}}$		36			V
	Shunt regulator voltage	V_C	$I_C = 3\text{mA}$	5.5	5.8	6.1	V
	Control supply/discharge current	I_{CD1}	Output MOS FET enabled	0.7	1.4	1.8	mA
		I_{CD2}	Output MOS FET disabled	0.5	0.8	1.1	mA

Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
- (2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products, and no license is granted under any intellectual property right or other right owned by our company or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.
- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
 - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.

Precautions on the Sales of IPDs

- 1) The sale and/or the export of IPD products to any customer or customers located in any country other than Japan is expressly prohibited by the Agreement made and executed by and between Power Integrations, Inc. and Matsushita Electric Industrial Co., Ltd.
- 2) IPD products purchased from Matsushita Electric Industrial Co., Ltd., or its authorized agents, hereinafter referred to as MATSUSHITA, shall be used only for production purposes by those parties who have duly purchased IPD products. Those who have purchased IPD products shall not use such IPD products in unmodified form for re-sale, loan, or sample shipment for evaluation purposes to any other parties.
- 3) If a party who has duly purchased IPD products subcontracts its production to any other parties, including its subsidiaries or any other third parties inside and/or out of Japan, and the IPD products are consigned to such subcontracting parties thereat, such party is obligated to monitor and control the quantity of IPD products to prevent any of the aforementioned re-sale, loan or sample shipments from taking place.
- 4) In the event that any actual or threatened breach or violation of any of the above mentioned 1, 2, or 3, has occurred or is about to occur, MATSUSHITA will hold all shipments of IPD products and may request the party alleged to be responsible for such occurrence for necessary.
Note) The products of MIP501 to MIP517, MIP704 to MIP709, MIP713, MIP805, and MIP9E01 to MIP9E02 are excluded from above-mentioned precautions, 1) to 3).

Attached table "IPD availability by customer"

Parts No.	Able to supply	Disable to supply	Application
MIP13□□ MIP17□ MIP2□□□ MIP14□□ MIP18□ MIP3□□□□ MIP15□□ MIP01□□ MIP4□□□□ MIP16□□ MIP02□□ MIP9A□□	· Domestic Japanese companies · Japanese companies in Asia (50% or more owned)	· European and American companies · Local Asian companies · Other local companies	· For power supply · For DC-DC converter
MIP10□□ MIP811/812 MIP11□□ MIP814/815/816 MIP803/804/806 MIP82□		· European and American companies* · Local Asian companies* · Other local companies*	· For power supply · For EL drive
MIP5□□□ MIP9E□□□ MIP7□□ MIP805	· No restrictions in terms of contract	· No restrictions in terms of contract	· For lamp driver/ electronic accessories · For EL driver · For power supply

Note: *Sales of the IPD products (MIP10□, MIP11□, MIP803/804/806, MIP811 to MIP816, and MIP82□) could be treated as exception of the above-mentioned precautions 1) to 3) subject to the prior consent of Power Integrations, Inc.
If you have any inquiries about sales, contact Corporate Marketing & Sales Division, Semiconductor company, Matsushita Electric Industrial Co.