

MIP170, MIP172, MIP173, MIP174, MIP175, MIP176

Silicon MOS IC

■ Features

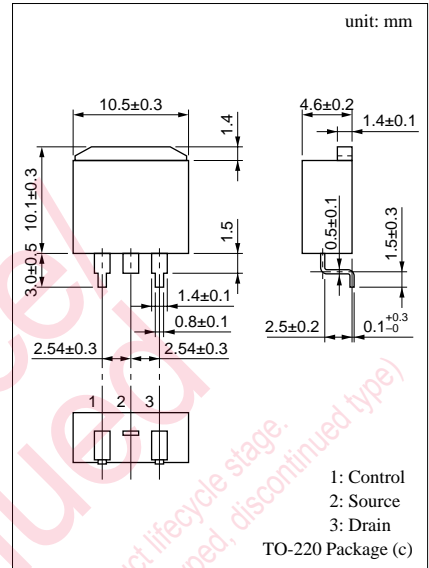
- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuits
- Allowing to input worldwide mains (AC 85 to 274V)
- An over voltage protection circuit for the secondary side, a pulse-by-pulse overcurrent protection circuit and a timer auto-restart circuit are integrated.

■ Applications

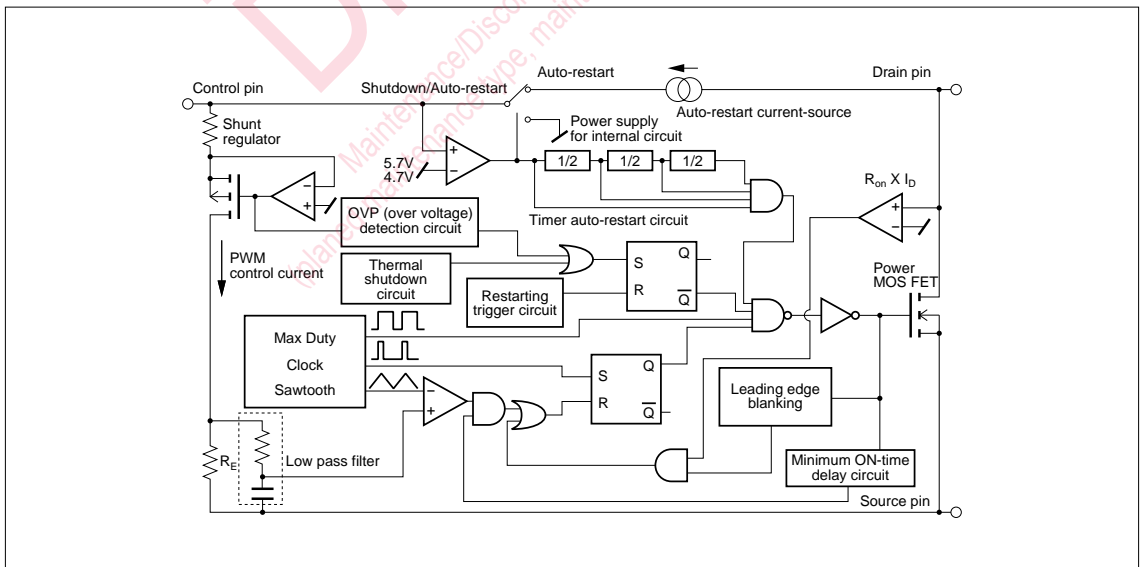
- Switching power supply (to 65W)
- AC adaptor
- Battery charger

■ 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	A
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	%
	Auto-restart frequency	f_{TIM}			1.2	2	Hz
Circuit protection	Self-protection current limit	I_{LIMIT}	MIP170	0.415	0.5	0.585	A
			MIP172	0.75	0.9	1.05	
			MIP173	1.12	1.35	1.57	
			MIP174	1.35	1.62	1.89	
			MIP175	1.88	2.25	2.63	
			MIP176	2.4	2.8	3.2	
	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	$^\circ\text{C}$
	Latched shutdown trigger current	I_{OVP}		25	45	75	mA
	Power-up reset threshold voltage	$V_{C \text{ reset}}$		2.3	3.3	4.2	V
Output	ON-state resistance	$R_{\text{DS(on)}}$	$I_D = 0.1\text{A}$		15	18	Ω
			$I_D = 0.2\text{A}$		8.5	10	
			$I_D = 0.3\text{A}$		5.8	6.7	
			$I_D = 0.5\text{A}$		4.5	5.5	
			$I_D = 0.8\text{A}$		3	3.8	
			$I_D = 0.8\text{A}$		2.6	3.3	
	OFF-state current	I_{DSS}	$V_{\text{DS}} = 650\text{V}, I_C = 3\text{mA}$ latch mode		0.01	0.25	mA
	Breakdown voltage	V_{DSS}	$I_C = 3\text{mA}, I_D = 0.25\text{mA}$ latch mode	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
			Output MOS FET disabled	0.5	0.8	1.1	mA

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Attached table "IPD availability by customer"

Parts No.		Companies/areas to which products can be sold	Companies/areas to which products cannot be sold	Application	
MIP13□ MIP14□ MIP15□ MIP16□	MIP17□ MIP18□ MIP01□□ MIP02□□	MIP2□□□ MIP3□□□ MIP4□□□ MIP9A□□	· Japanese companies in Japan · Japanese companies in Asia (50% or more owned) · Asian companies in Asia	· Companies in European and American countries · Asian companies in Asia · Other local companies	· For power supply · For DC-DC converter
MIP10□ MIP11□ MIP803/804/806 MIP9E□□	MIP811/812 MIP814/815/816 MIP82□ MIP55□	· Japanese companies in Japan · Japanese companies in Asia (50% or more owned) · Asian companies in Asia	· Companies in European and American countries · Other local companies	· For power supply · For EL driver · For LED lighting driver	
MIP50□ MIP51□	MIP7□□	· No restrictions in terms of contract	· No restrictions in terms of contract	· For lamp driver/ car electronics accessories	

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