

MIP0221SY, MIP0222SY, MIP0223SY, MIP0224SY, MIP0225SY, MIP0226SY, MIP0227SY

Silicon MOS IC

■ Features

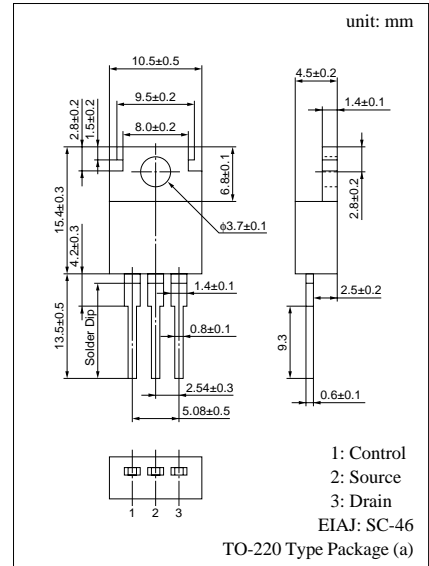
- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuits
- Allowing to input worldwide mains (AC 85 to 274V)
- A pulse-by-pulse overcurrent protection circuit and a timer auto-restart circuit are integrated.

■ Applications

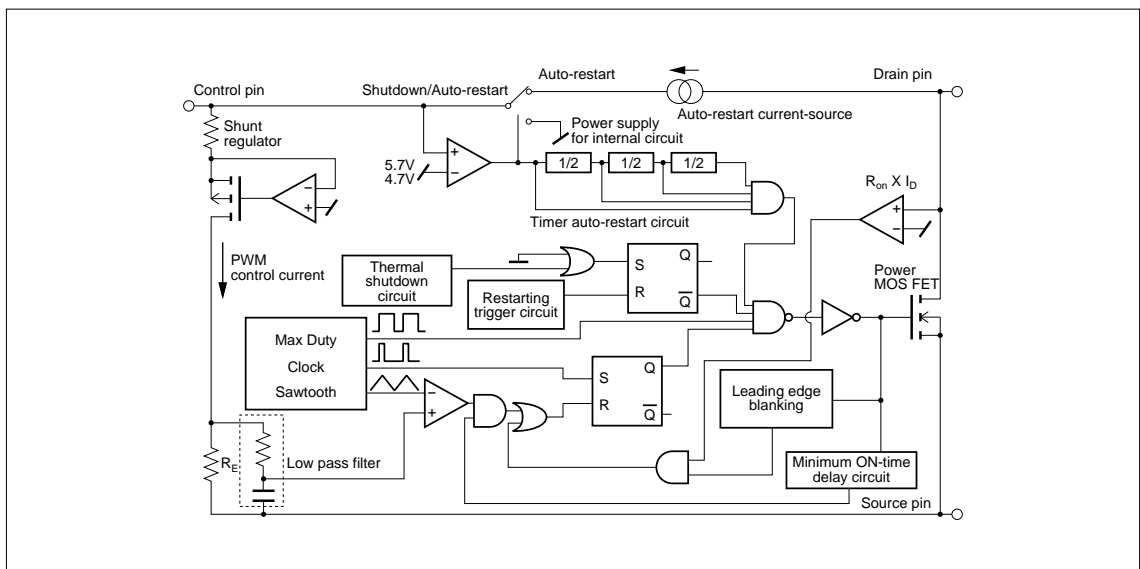
- Switching power supply (to 90W)
- AC adaptor
- Battery charger

■ Absolute Maximum Ratings ( $T_a = 25 \pm 3^\circ\text{C}$ )

Parameter	Symbol	Rated	Unit	
Drain voltage	$V_D$	700	V	
Control voltage	$V_C$	8	V	
Output current	$I_D$	MIP0221SY	0.3	A
		MIP0222SY	0.585	
		MIP0223SY	1.15	
		MIP0224SY	1.72	
		MIP0225SY	2.4	
		MIP0226SY	2.9	
		MIP0227SY	3.5	
Control current	$I_C$	0.1	mA	
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	



■ Block Diagram



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

	Parameter	Symbol	Conditions	min	typ	max	Unit	
Control functions	Output frequency	$f_{\text{OSC}}$	$I_C = 2\text{mA}$	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	$\Delta V_C$		0.5	1	1.5	V	
	Auto-restart duty cycle	$T_{\text{SW}}/T_{\text{TIM}}$			5	8	%	
	Auto-restart frequency	$f_{\text{TIM}}$			1.2		Hz	
Circuit protection	Self-protection current limit	$I_{\text{LIMIT}}$	MIP0221SY		0.23	0.25	0.28	A
			MIP0222SY		0.45	0.5	0.55	
			MIP0223SY		0.9	1	1.1	
			MIP0224SY		1.35	1.5	1.65	
			MIP0225SY		1.8	2	2.2	
			MIP0226SY		2.25	2.5	2.75	
			MIP0227SY		2.7	3	3.3	
	Leading edge blanking delay	$t_{\text{on(BLK)}}$	$I_C = 3\text{mA}$		0.25		$\mu\text{s}$	
	Current limit delay	$t_{\text{d(OCL)}}$	$I_C = 3\text{mA}$		0.1		$\mu\text{s}$	
	Thermal shutdown temperature	$T_{\text{OTP}}$	$I_C = 3\text{mA}$	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	$R_{\text{DS(on)}}$	$I_D = 0.025\text{A}$		31.2	36	$\Omega$
$I_D = 0.1\text{A}$					15	18		
$I_D = 0.2\text{A}$					8.5	10		
$I_D = 0.3\text{A}$					5.8	6.7		
$I_D = 0.3\text{A}$					4	5		
$I_D = 0.3\text{A}$					3.3	4		
$I_D = 0.3\text{A}$					2.6	3		
OFF-state current		$I_{\text{DSS}}$	$V_{\text{DS}} = 650\text{V}$ , Output MOS FET disabled		0.01	0.25	mA	
Breakdown voltage		$V_{\text{DSS}}$	$I_D = 0.25\text{mA}$ , Output MOS FET disabled	700			V	
Rise time		$t_r$			0.1	0.2	$\mu\text{s}$	
Fall time	$t_f$			0.1	0.2	$\mu\text{s}$		
Power supply voltage	Drain supply voltage	$V_{\text{D(MIN)}}$		36			V	
	Shunt regulator voltage	$V_C$	$I_C = 3\text{mA}$	5.4	5.7	6.1	V	
	Control supply/discharge current	$I_{\text{CD1}}$	Output MOS FET enabled	0.7	1.4	1.8	mA	
		$I_{\text{CD2}}$	Output MOS FET disabled	0.5	0.8	1.1	mA	