

MIP0221SC, MIP0222SC, MIP0223SC, MIP0224SC

Silicon MOS IC

■ Features

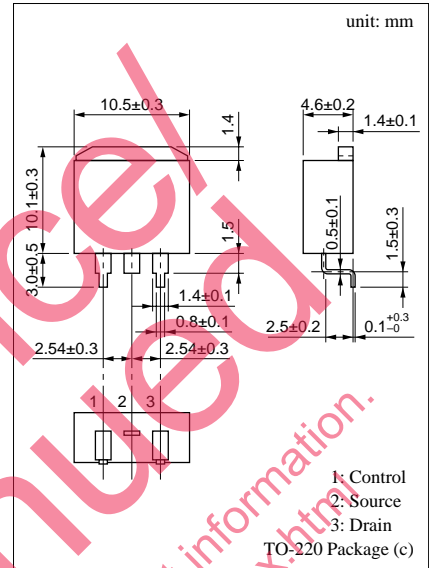
- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuits
- Allowing to input worldwide mains (AC 85 to 274V)
- A pulse-by-pulse overcurrent protection circuit and a timer auto-restart circuit are integrated.

■ Applications

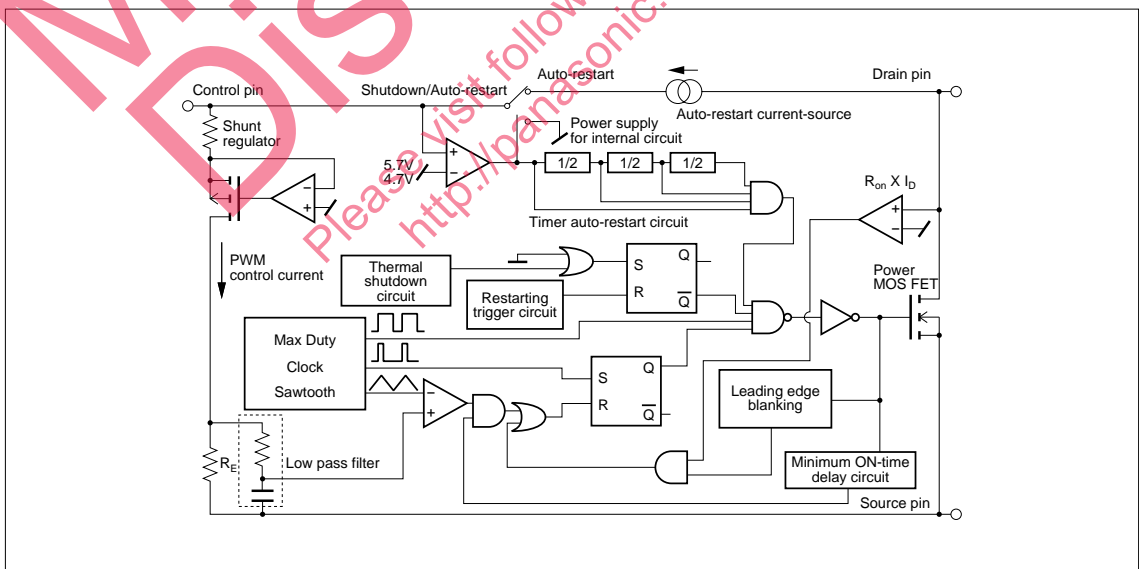
- Switching power supply (to 30W)
- AC adaptor
- Battery charger

■ 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	MIP0221SC	0.3
		MIP0222SC	0.585
		MIP0223SC	1.15
		MIP0224SC	1.72
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	%
	Auto-restart frequency	f_{TIM}			1.2	Hz	
Circuit protection	Self-protection current limit	I_{LIMIT}	MIP0221SC	0.23	0.25	0.28	A
			MIP0222SC	0.45	0.5	0.55	
			MIP0223SC	0.9	1	1.1	
			MIP0224SC	1.35	1.5	1.65	
	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	$R_{\text{DS(on)}}$	MIP0221SC $I_D = 0.025\text{A}$		31.2	36	Ω
			MIP0222SC $I_D = 0.1\text{A}$		15	18	
			MIP0223SC $I_D = 0.2\text{A}$		8.5	10	
			MIP0224SC $I_D = 0.3\text{A}$		5.8	6.7	
	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	$I_C = 3\text{mA}$	5.4	5.7	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