

# MIP0221SC, MIP0222SC, MIP0223SC, MIP0224SC

## Silicon MOS IC

### ■ Features

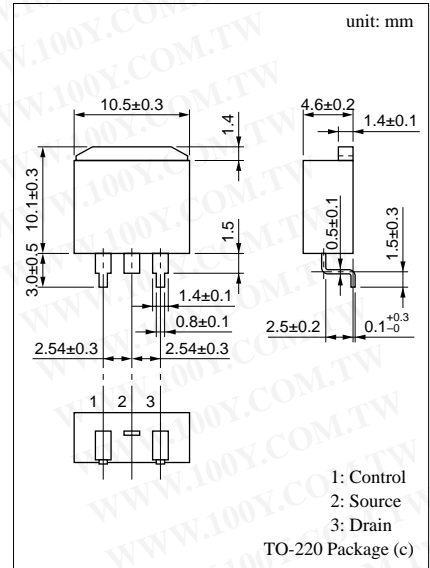
- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuits
- Allowing to input worldwide mains (AC 85 to 274V)
- A pulse-by-pulse overcurrent protection circuit and a timer auto-restart circuit are integrated.

### ■ Applications

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

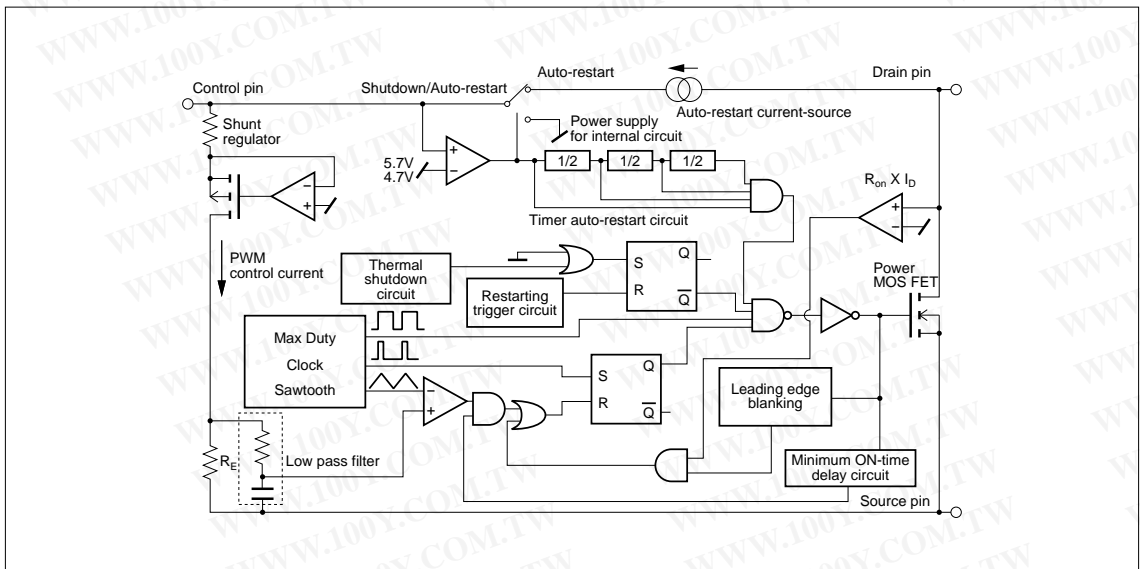
### ■ Absolute Maximum Ratings (Ta = 25 ± 3°C)

Parameter	Symbol	Ratings	Unit
Drain voltage	V <sub>D</sub>	700	V
Control voltage	V <sub>C</sub>	8	V
Output current	I <sub>D</sub>	MIP0221SC	0.3
		MIP0222SC	0.585
		MIP0223SC	1.15
		MIP0224SC	1.72
Control current	I <sub>C</sub>	0.1	mA
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C



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### ■ 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	$I_{\text{LIMIT}}$	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		$\mu\text{s}$	
	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		
	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	
			Output MOS FET disabled	0.5	0.8	1.1	mA	

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