MIP0221SC, MIP0222SC, MIP0223SC, MIP0224SC
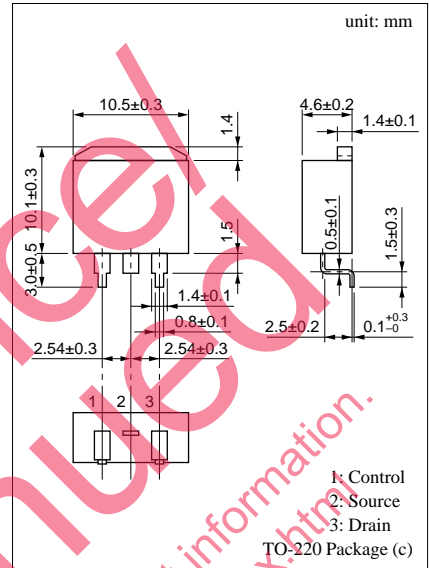
Silicon MOS IC

■ 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.
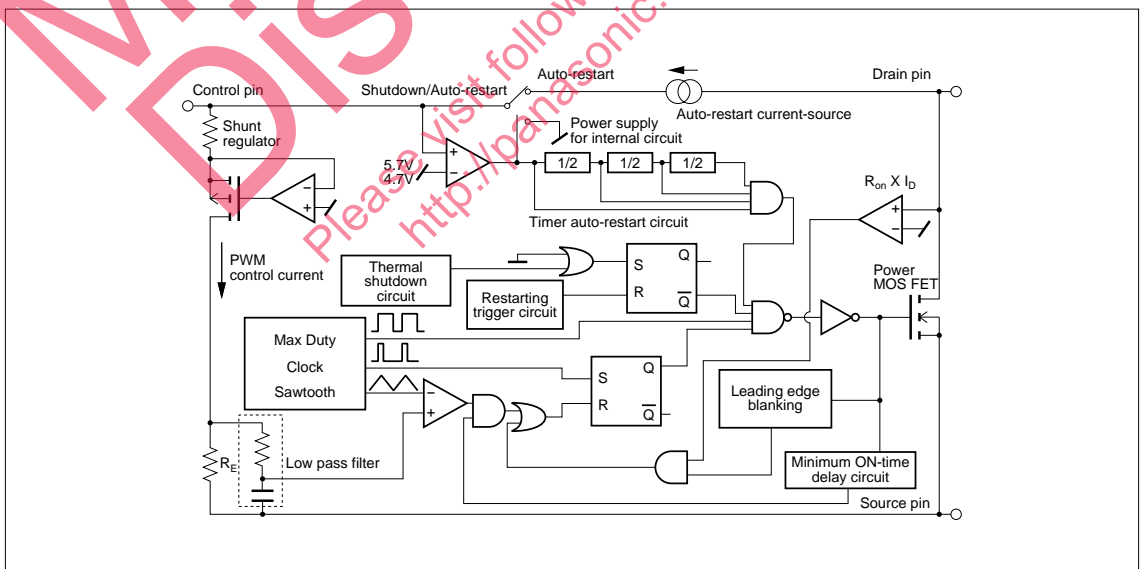
■ Applications
● Switching power supply (to 30W)
● AC adaptor
● Battery charger

unit: mm

1: Control
2: Source
3: Drain
TO-220 Package (c)

■ 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	A
		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 $(T_C = 25 \pm 2°C)$

	Parameter		Symbol	Conditions	min	typ	max	Unit
Control functions	Output frequency		f_{OSC}	$I_C = 2mA$	90	100	110	kHz
	Maximum duty cycle		MAXDC	$I_C = 2mA$	64	67	70	%
	Minimum duty cycle		MINDC	$I_C = 10mA$			3	%
Auto-restart	Control pin charging current		I_C	$V_C = 0$	−2.4	−1.9	−1.2	mA
				$V_C = 5V$	−2	−1.5	−0.8	
	Auto-restart threshold voltage		$V_{C(on)}$		5	5.7	6.3	V
	Lockout threshold voltage		$V_{C(off)}$		4	4.7	5.3	V
	Auto-restart hysteresis voltage		ΔV_C		0.5	1	1.5	V
	Auto-restart duty cycle		T_{SW}/T_{TIM}			5	8	%
	Auto-restart frequency		f_{TIM}			1.2		Hz
Circuit protection	Self-protection current limit	MIP0221SC	I_{LIMIT}		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		$t_{on(BLK)}$	$I_C = 3mA$		0.25		μs
	Current limit delay		$t_{d(OCL)}$	$I_C = 3mA$		0.1		μs
	Thermal shutdown temperature		T_{OTP}	$I_C = 3mA$	130	140	150	°C
	Power-up reset threshold voltage		$V_{C\,reset}$		2.3	3.3	4.2	V
Output	ON-state resistance	MIP0221SC	$R_{DS(on)}$	$I_D = 0.025A$		31.2	36	Ω
		MIP0222SC		$I_D = 0.1A$		15	18	
		MIP0223SC		$I_D = 0.2A$		8.5	10	
		MIP0224SC		$I_D = 0.3A$		5.8	6.7	
	OFF-state current		I_{DSS}	$V_{DS} = 650V$, Output MOS FET disabled		0.01	0.25	mA
	Breakdown voltage		V_{DSS}	$I_D = 0.25mA$, 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		$V_{D(MIN)}$		36			V
	Shunt regulator voltage		V_C	$I_C = 3mA$	5.4	5.7	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