

# MIP160, MIP162, MIP163, MIP164, MIP165, MIP166

Silicon MOS IC

## ■ Features

- Single chip IC with high breakdown voltage power MOS FET and CMOS control circuit
- Worldwide input (85 to 274VAC) possible
- Over-voltage protection at secondary section, pulse by pulse over-current protection, and intermittent operation timer at overload

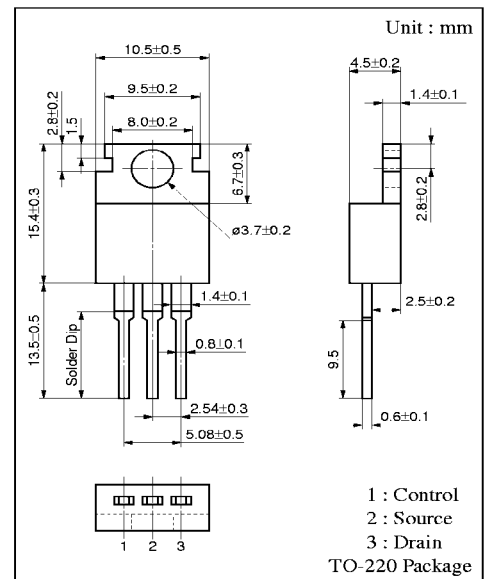
## ■ Applications

- Switching mode regulator (5 to 40W)
- AC adapter
- Battery charger

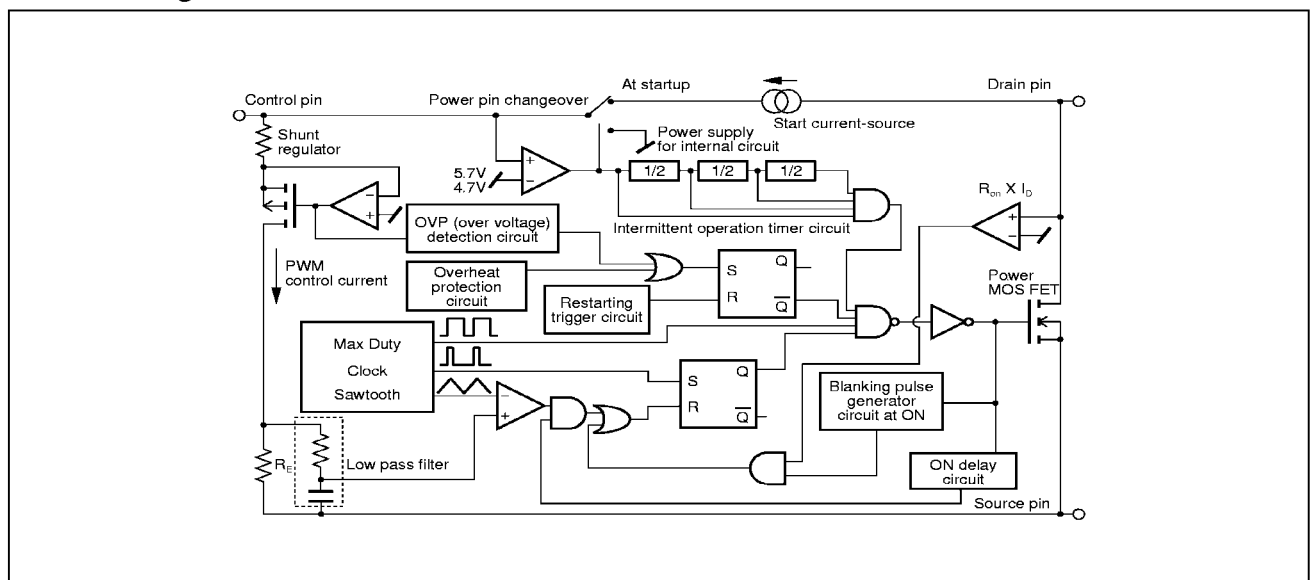
## ■ Absolute Maximum Ratings (Ta= 25°C)

Parameter	Symbol	Rating	Unit
Drain voltage	V <sub>D</sub>	700	V
Control voltage	V <sub>C</sub>	8	V
Output current	I <sub>D</sub>	I <sub>LIMIT</sub>	A
Control current	I <sub>C</sub>	0.1	A
Allowable power dissipation	P <sub>D</sub>	1.7/12.5 * 1	W
Operating ambient temperature	T <sub>opr</sub>	- 20 to + 85	°C
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	- 55 to +150	°C

\* 1 : T<sub>C</sub>= 25°C



## ■ Block Diagram



### ■ Electrical Characteristics (T<sub>c</sub>= 25± 2°C)

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Control function	Output frequency	f <sub>osc</sub>	I <sub>C</sub> = 4mA	90	100	110	kHz
	Maximum duty cycle	MAXDC	I <sub>C</sub> = 2mA	64	67	70	%
	Minimum duty cycle	MINDC	I <sub>C</sub> =10mA	1	2	3	%
Start up	Control pin charge current	I <sub>C</sub>	V <sub>C</sub> = 0V	-2.4	-1.9	-1.2	mA
			V <sub>C</sub> = 5V	2.0	1.5	0.8	
	Control pin voltage at startup	V <sub>C(ON)</sub>		5.0	5.7	6.3	V
	Control pin voltage at stop	V <sub>C(OFF)</sub>		4.0	4.7	5.3	V
	Start/stop hysteresis voltage	ΔV <sub>C</sub>		0.5	1.0	1.5	V
	Intermittent operation time-ratio	T <sub>SW</sub> /T <sub>TIM</sub>			5	8	%
	Intermittent operation frequency	f <sub>TIM</sub>		0.5	1.2	2.0	Hz
Protection function	Over current protection/detection	I <sub>LIMIT</sub>	MIP160	0.415	0.5	0.585	A
			MIP162	0.75	0.9	1.05	
			MIP163	1.12	1.35	1.57	
			MIP164	1.35	1.62	1.89	
			MIP165	1.88	2.25	2.63	
			MIP166	2.4	2.8	3.2	
	Blanking width at ON	t <sub>on(BLK)</sub>	I <sub>C</sub> = 4mA		0.25		μs
	Over current protection delay time	t <sub>d(OCL)</sub>	I <sub>C</sub> = 4mA		0.1		μs
	Over current protection temperature	T <sub>OIP</sub>	I <sub>C</sub> = 4mA	130	140	150	°C
	Over voltage protection/detection current	I <sub>ovp</sub>		25	45	75	mA
Latch reset voltage	V <sub>C reset</sub>		2.3	3.3	4.2	V	
Output	ON resistance	R <sub>DS(ON)</sub>	0.1A		15	18	Ω
			0.3A		8.5	10	
			0.3A		5.8	6.7	
			0.5A		4.5	5.5	
			0.8A		3.0	3.8	
			1.0A		2.6	3.3	
	Drain pin leak current at OFF	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, I <sub>C</sub> = 4mA latch mode		0.5	0.9	mA
	Drain breakdown voltage	V <sub>DSS</sub>	I <sub>C</sub> = 4mA, I <sub>D</sub> = 0.25mA latch mode	700			V
	Rise time	t <sub>r</sub>			0.1	0.2	μs
	Fall time	t <sub>f</sub>			0.1	0.2	μs
Supply voltage	Minimum drain voltage	V <sub>D(MIN)</sub>		36			V
	Shunt regulator voltage	V <sub>C</sub>	I <sub>C</sub> = 4mA	5.5	5.8	6.1	V
	Control pin discharge current	I <sub>CD1</sub>	at output MOS operation	0.7	1.4	1.8	mA
		I <sub>CD2</sub>	at output MOS stop	0.5	0.8	1.1	mA