MIP2K40MS

Silicon MOS FET type integrated circuit

■ Features

- Built-in jitter function
- Built-in charge protection circuit
  Built-in overheating, loadshorting and overvoltage protection circuits

■ Applications

- Chargers (for DSC, etc.)
- AC adapter

■ Package

- Code
  DIP7-A1
- Pin Name

1. VDD	5. DRAIN
2. FB	6. —
3. CL	7. SOURCE
4. VCC	8. SOURCE

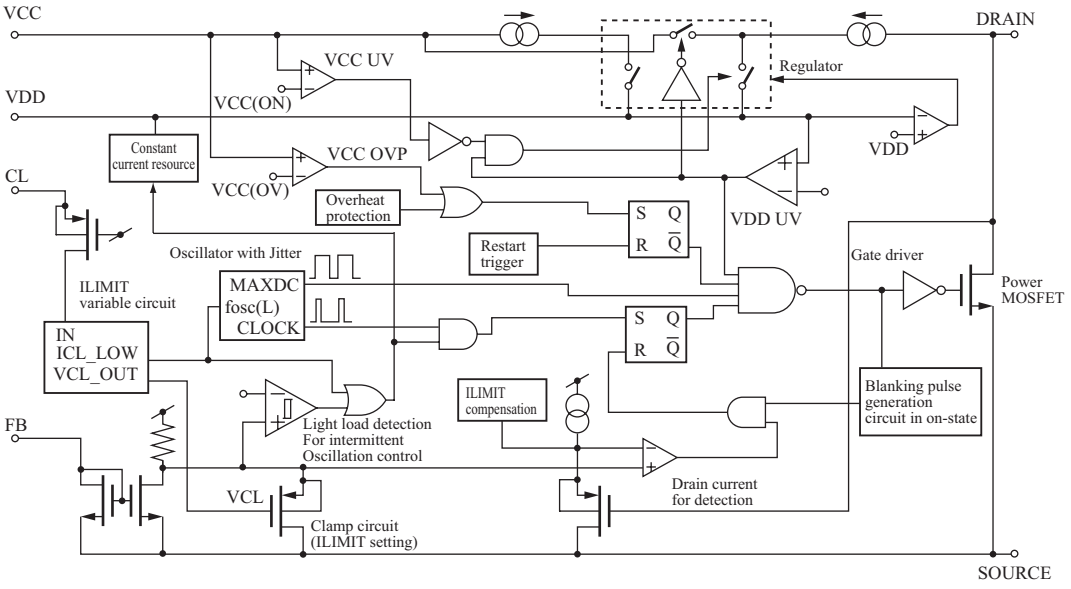
■ Marking Symbol: MIP2K4

■ Absolute Maximum Ratings $T_a = 25°C \pm 3°C$

Parameter	Symbol	Rating	Unit
DRAIN voltage	VD	– 0.3 to +700	V
VCC voltage	VCC	– 0.3 to +45	V
VDD voltage	VDD	– 0.3 to +8	V
Feedback voltage	VFB	– 0.3 to +8	V
Feedback current	IFB	500	μA
CL pin voltage	VCL	– 0.3 to +8	V
CL pin current	ICL	150	μA
Output peak current *	IDP	2.2	A
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Note) *: The guarantee within the following pulse width.
Leading edgε blanking delay + Current limit delay ton(BLK) + td(OCL)

■ Block Diagram



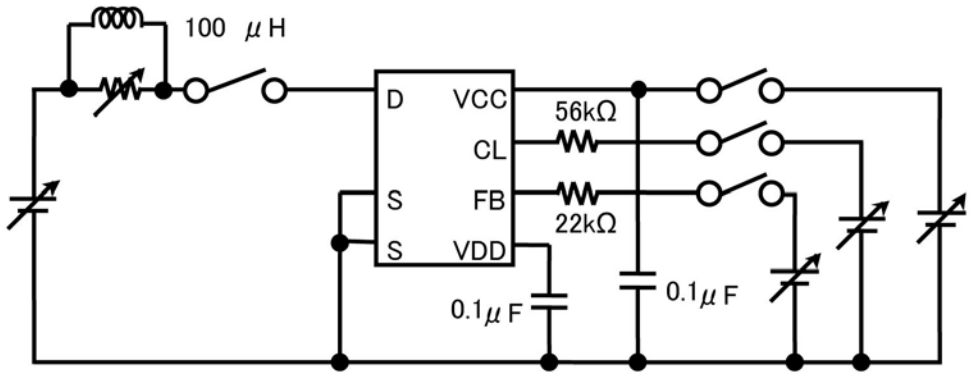
■ Electrical Characteristics T_C = 25°C±2°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Control functions						
Output frequency	fosc	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA	90	100	110	kHz
	fosc(L)	VCC = 15 V, VD = 5 V, IFB: Open, ICL < ICL1	9	12	15	kHz
Jitter frequency deviation	Δf	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA		5.5		kHz
Jitter frequency modulation rate	fM	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA		260		Hz
Maximum duty cycle	MAXDC	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA	45	47.5	50	%
VDD voltage	VDD	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA	5.4	5.9	6.4	V
UV lockout threshold voltage	VUV	VD = 5 V, IFB = 20 µA, ICL = 50 µA	4.6	5.1	5.6	V
VCC start voltage	VCC(ON)	VD = 5 V, IFB = 20 µA, ICL = 50 µA	5.9	6.9	7.9	V
VCC charge stop threshold voltage	VCC1	VD = 40 V, FB: Open, CL: Open	10	11	12	V
Feedback threshold voltage	IFB1	ON → OFF VCC = 15 V, VD = 5 V, ICL = 50 µA	78	130	182	µA
Feedback hysteresis current	IFBHYS	VCC = 15 V, VD = 5 V, ICL = 50 µA		6		µA
FB pin current at heavy load	IFB0	ICC0 → ICC VCC = 15 V, VD = 5 V, ICL = 50 µA	10	15	20	µA
FB pin voltage	VFB	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA	0.7	1.0	1.3	V
Supply current	ICC	VCC = 15 V, VD = 5 V, IFB = 20 µA, ICL = 50 µA	0.27	0.47	0.57	mA
Supply current at light load	ICC(OFF)	VCC = 15 V, VD = 5 V, IFB = IFB1 + 5 µA, ICL = 50 µA	0.28	0.35	0.43	mA
Supply current at heavy load	ICC0	VCC = 15 V, VD = 5 V, IFB: Open, ICL = 50 µA	0.48	0.63	0.78	mA
VDD charging current	Ich1	VDD = 0 V, VD = 40 V, FB: Open, CL: Open	–9	–6	–4	mA
	Ich2	VDD = 4 V, VD = 40 V, FB: Open, CL: Open	–4.5	–2.3	–1	mA
CL pin voltage	VCL	VCC = 15 V, VD = 5 V, FB: Open, ICL = ICL1	2.0	2.3	2.6	V
Dropped fosc CL pin current *2	ICL1	fosc → fosc(L) VCC = 15 V, VD = 5 V, FB: Open	16.5	22	27.5	µA
CL pin hysteresis current *2	ICLHYS	VCC = 15 V, VD = 5 V, FB: Open		1.5		µA

■ Electrical Characteristics (continued) T_C = 25°C±2°C

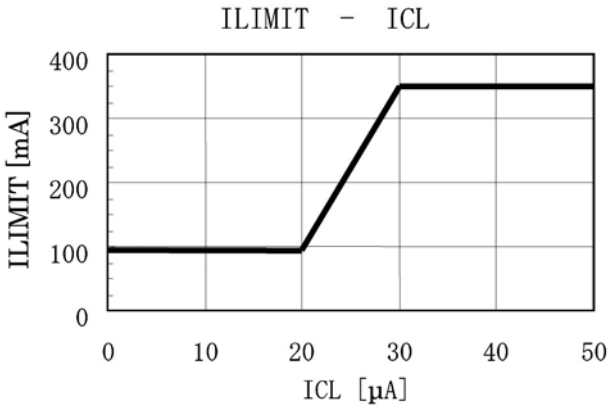
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Circuit protections						
Self protection current limit *1, 3	ILIMIT	VCC = 15 V, FB: Open, ICL = 50 µA, DUTY = 30%	0.63	0.70	0.77	A
ILIMIT modified coefficient *1, 3	R_slope	VCC = 15 V, FB: Open, ICL = 50 µA		44		mA/µs
Minimum ILIMIT	ILIMITmin	Ton = 3 µs, VCC = 15 V, FB: Open, ICL = 0 µA	110	190	270	mA
Drain current at light load	ID(OFF)	Ton = 3 µs, VCC = 15 V, IFB = IFB1 + IFBHYS, ICL = 50 µA	50	140	230	mA
Leading edge blanking delay	ton(BLK)	VCC = 15 V, FB: Open, ICL = 50 µA	280	350	420	ns
Current limit delay	td(OCL)		100	150	200	ns
Over voltage protection	VCC(OV)	VD = 5 V, FB: Open, ICL = 50 µA	21	23.5	26	V
Thermal shutdown temperature	TOTP		130	140	150	°C
Output						
Power up reset threshold voltage	VDDreset		1.8	2.6	3.5	V
ON state resistance	RDS(ON)	ID = 100 mA		7	9.5	Ω
OFF state current	IDSS	VCC = 26 V, VD = 650 V, FB: Open, CL: Open		10	20	µA
Breakdown voltage	VDSS	VCC = 26 V, ID = 100 µA, FB: Open, CL: Open	700			V
Rise time *4	tr	VCC = 15 V, VD = 5 V, FB: Open, ICL = 50 µA		100		ns
Fall time *4	tf	VCC = 15 V, VD = 5 V, FB: Open, ICL = 50 µA		50		ns
Supply voltage characteristics						
Drain supply voltage	VD(MIN)	VCC: Open, FB: Open, CL: Open	50			V

Note) 1. Measurement circuit

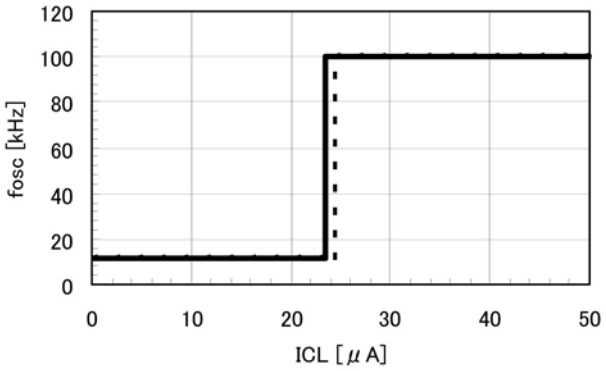


■ Electrical Characteristics (continued) T_C = 25°C±2°C

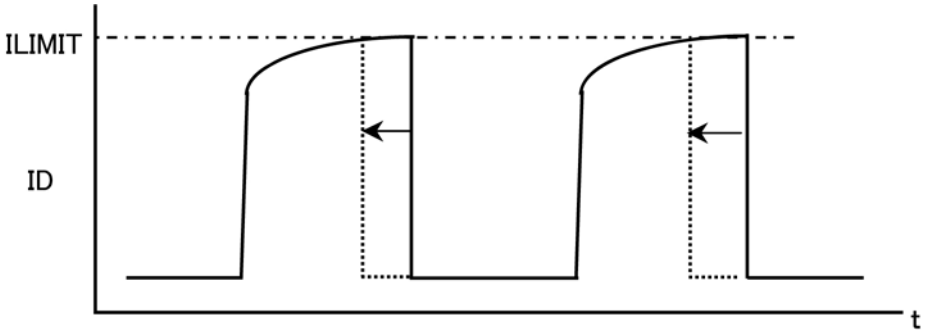
2. *1: ILIMIT vs. ICL Typical characteristic



*2: fosc vs. ICL Typical characteristic

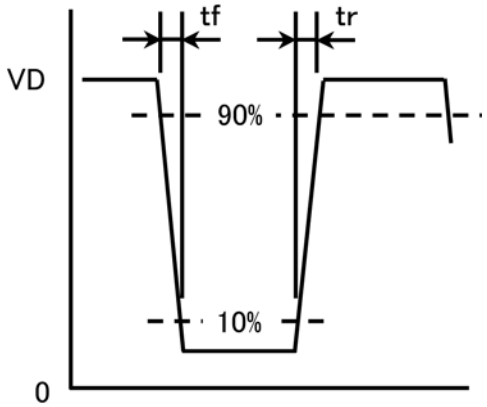


*3: ILIMIT Measurement



R_slope ; {(ILIMIT at Duty=30%) – (ILIMIT at Duty=10%)} / {(Ton at Duty=30%) – (Ton at Duty=10%)}

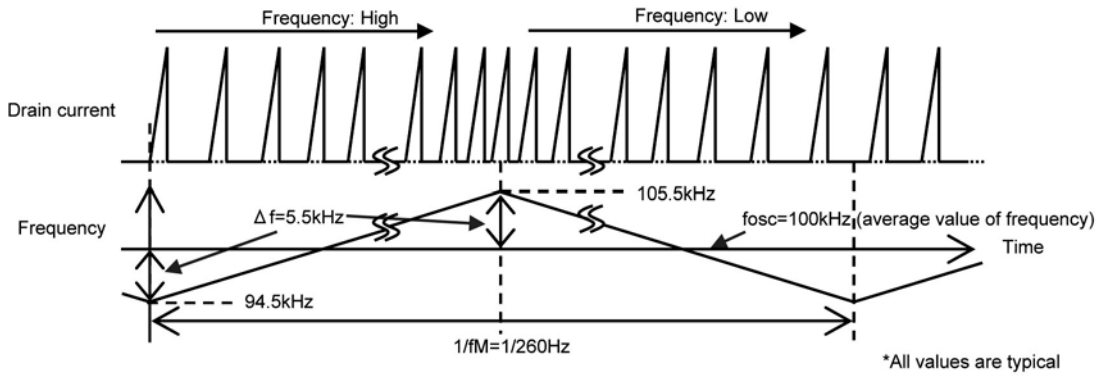
*4: tr, tf Measurement



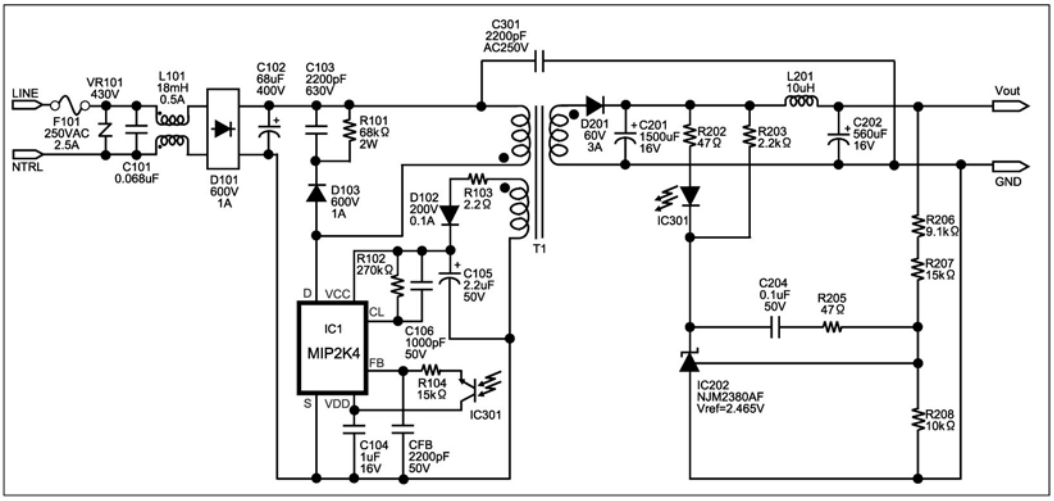
■ Frequency jitter function

By frequency jitter function, frequency jitter variation(Δf) changes periodically, by frequency of frequency jitter modulation factor (fM) as shown below.

fosc = 100 kHz (typ.), Δf = 5.5 kHz (typ.), fM = 260 Hz (typ.)

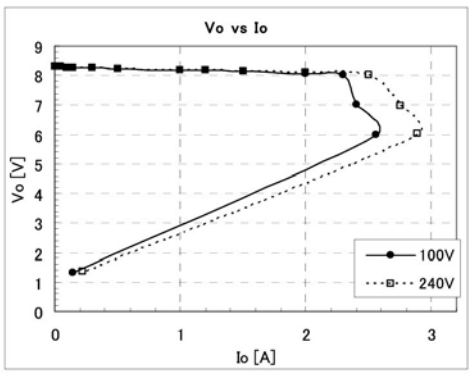


■ Adapter circuit sample (MIP2K4)

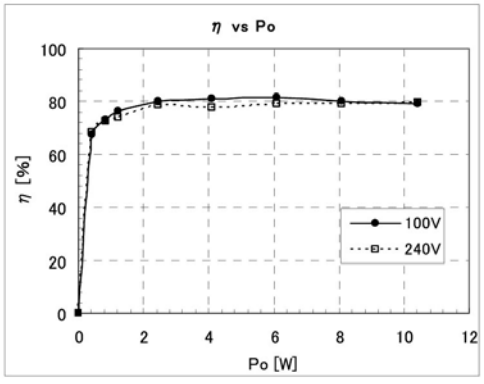


■ Electric characteristics (MIP2K4 : Worldwide input, 8.3V/1.5A output)

VI characteristics of adapter circuit



Power efficiency



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