

MIP2K30MS

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

■ Absolute Maximum Ratings $T_a = 25^{\circ}\text{C} \pm 3^{\circ}\text{C}$

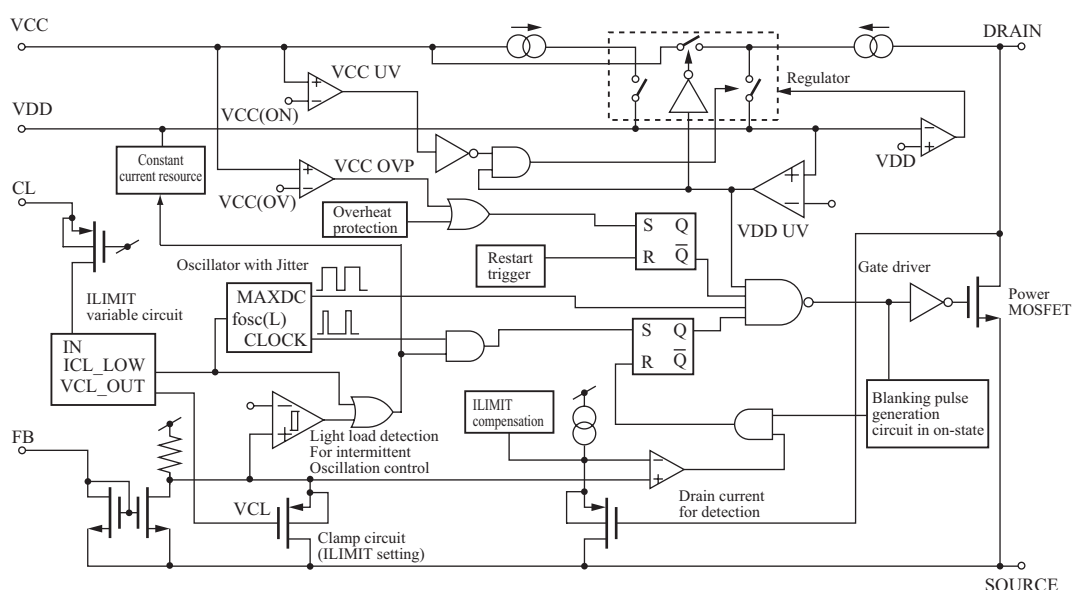
Parameter	Symbol	Rating	Unit
DRAIN voltage	VD	− 0.3 to +700	V
VCC voltage	VCC	− 0.3 to +45	V
VDD voltage	VDD	− 0.3 to +8	V
Feedback voltage	VFB	− 0.3 to +8	V
Feedback current	IFB	500	μA
CL pin voltage	VCL	− 0.3 to +8	V
CL pin current	ICL	150	μA
Output peak current *	IDP	1.5	A
Channel temperature	Tch	150	°C
Storage temperature	Tstg	−55 to +150	°C

Note) *: The guarantee within the following pulse width.

Leading edge: blanking delay + Current limit delay $t_{on}(\text{BLK}) + t_d(\text{OCL})$

■ Marking Symbol: MIP2K3

■ Block Diagram



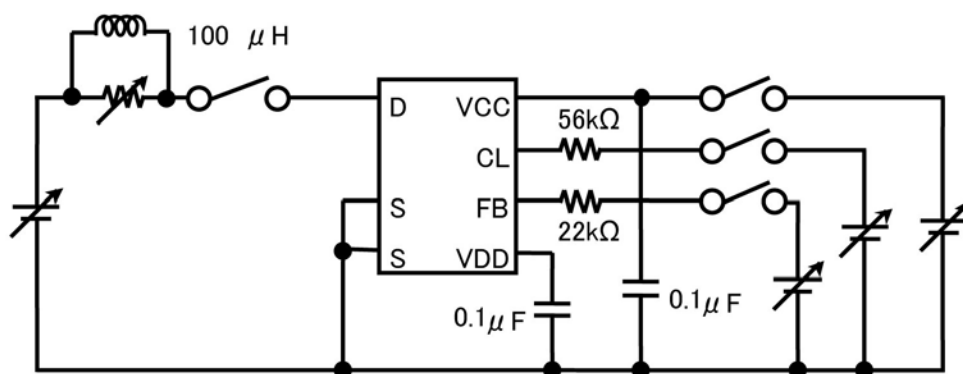
■ Electrical Characteristics $T_C = 25^\circ\text{C} \pm 2^\circ\text{C}$

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 \rightarrow OFF VCC = 15 V, VD = 5 V, ICL = 50 μA	24.6	41	57.4	μA
Feedback hysteresis current	IFBHYS	VCC = 15 V, VD = 5 V, ICL = 50 μA		2		μA
FB pin current at heavy load	IFB0	ICC0 \rightarrow ICC VCC = 15 V, VD = 5 V, ICL = 50 μA	6	9.5	13	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	0.25	0.40	0.50	mA
Supply current at light load	ICC(OFF)	VCC = 15 V, VD = 5 V, IFB = IFB1 + 5 μA , ICL = 50 μA	0.26	0.36	0.46	mA
Supply current at heavy load	ICC0	VCC = 15 V, VD = 5 V, IFB: Open, ICL = 50 μA	0.45	0.60	0.75	mA
VDD charging current	Ich1	VDD = 0 V, VD = 40 V, FB: Open, CL: Open	-7.5	-5.5	-3.5	mA
	Ich2	VDD = 4 V, VD = 40 V, FB: Open, CL: Open	-3.0	-2.0	-1.0	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 \rightarrow 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) $T_C = 25^\circ\text{C} \pm 2^\circ\text{C}$

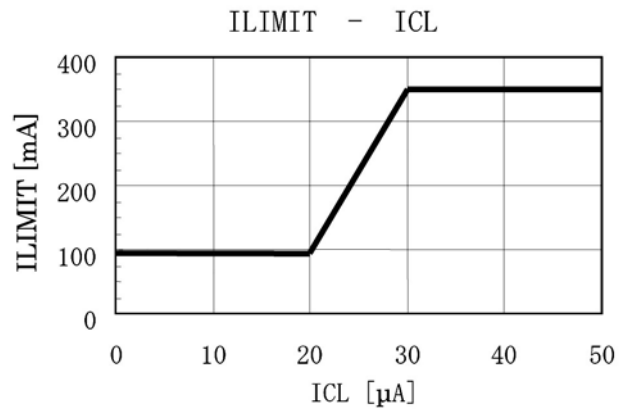
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Circuit protections						
Self protection current limit ^{*1, 3}	ILIMIT	VCC = 15 V, FB: Open, ICL = 50 μA , DUTY = 30%	0.45	0.50	0.55	A
ILIMIT modified coefficient ^{*1, 3}	R_slope	VCC = 15 V, FB: Open, ICL = 50 μA		40		mA/ μs
Minimum ILIMIT	ILIMITmin	Ton = 3 μs , VCC = 15 V, FB: Open, ICL = 0 μA	52	115	178	mA
Drain current at light load	ID(OFF)	Ton = 3 μs , VCC = 15 V, IFB = IFB1 + IFBHYS, ICL = 50 μA	45	110	165	mA
Leading edge blanking delay	ton(BLK)	VCC = 15 V, FB: Open, ICL = 50 μA	230	290	350	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	$^\circ\text{C}$
Output						
Power up reset threshold voltage	VDDreset		1.8	2.6	3.5	V
ON state resistance	RDS(ON)	ID = 100 mA		10	13	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		25		ns
Supply voltage characteristics						
Drain supply voltage	VD(MIN)	VCC: Open, FB: Open, CL: Open	50			V

Note) 1. Measurement circuit

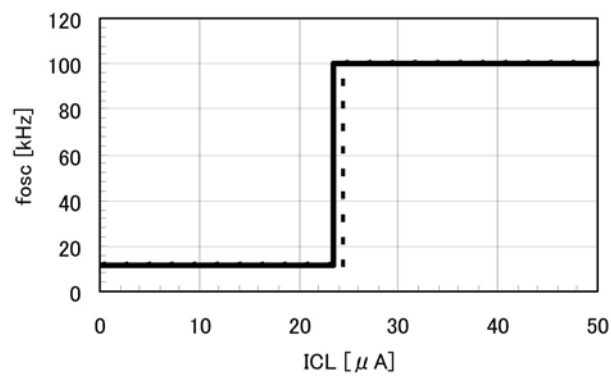


■ Electrical Characteristics (continued) $T_C = 25^\circ\text{C} \pm 2^\circ\text{C}$

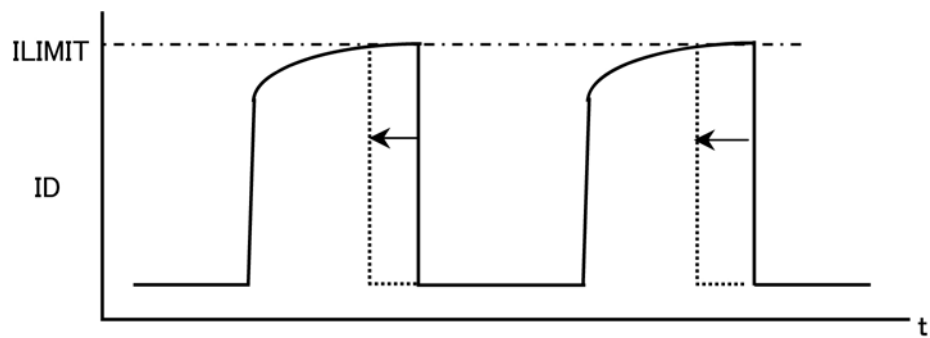
2. *1: ILIMIT vs. ICL Typical characteristic



*2: fosc vs. ICL Typical characteristic

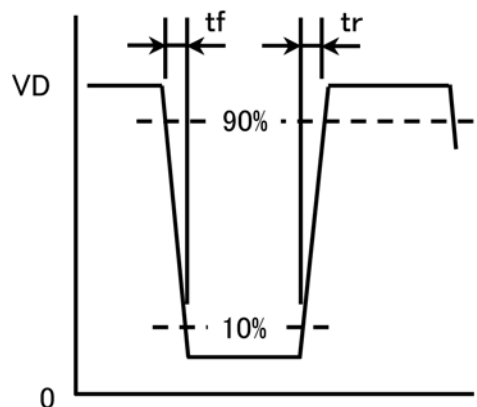


*3: ILIMIT Measurement



$$R_{\text{slope}} ; \{(\text{ILIMIT at Duty}=30\%) - (\text{ILIMIT at Duty}=10\%)\} / \{(\text{Ton at Duty}=30\%) - (\text{Ton at Duty}=10\%)\}$$

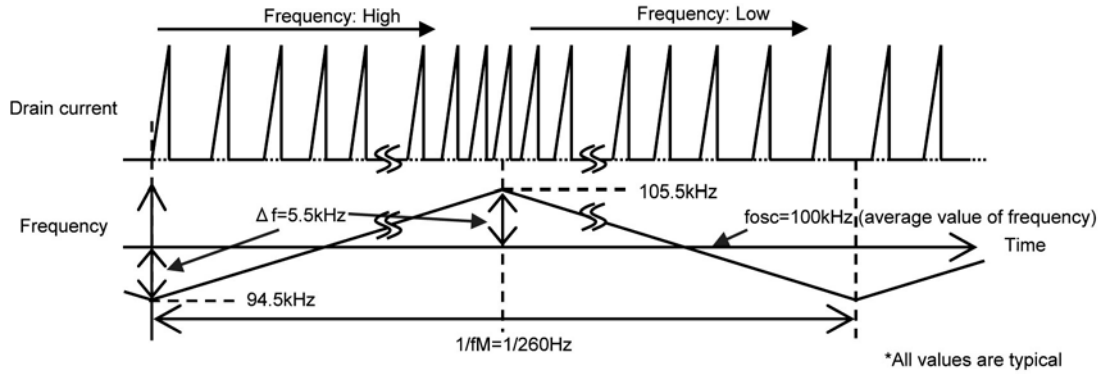
*4: tr, tf Measurement



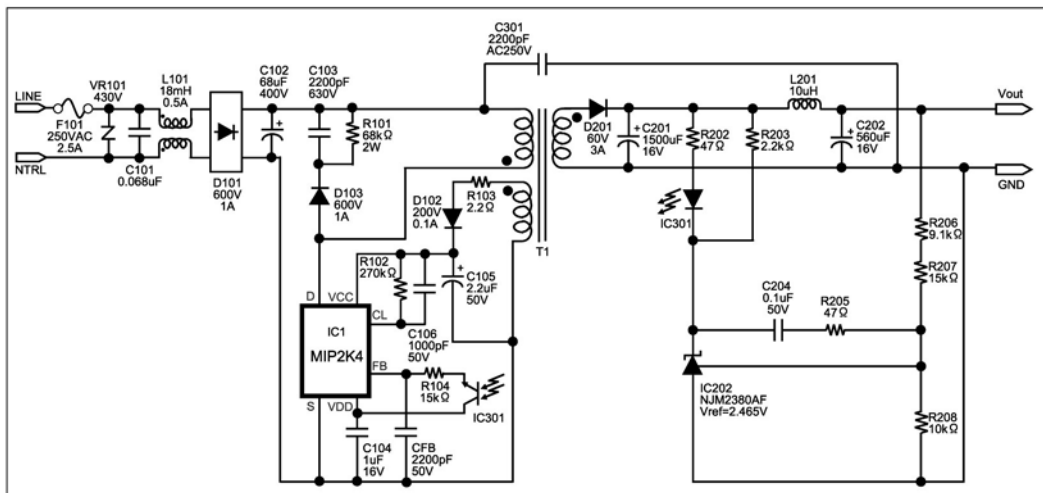
Frequency jitter function

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

$f_{osc} = 100 \text{ kHz (typ.)}$, $\Delta f = 5.5 \text{ kHz (typ.)}$, $f_M = 260 \text{ Hz (typ.)}$

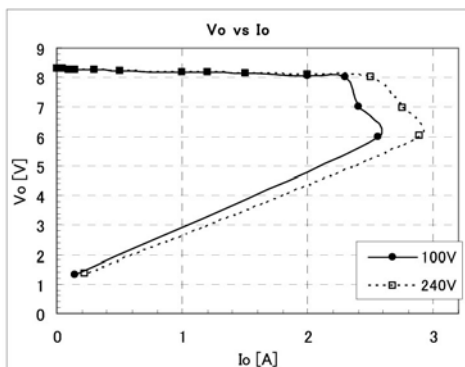


Adapter circuit sample (MIP2K4)

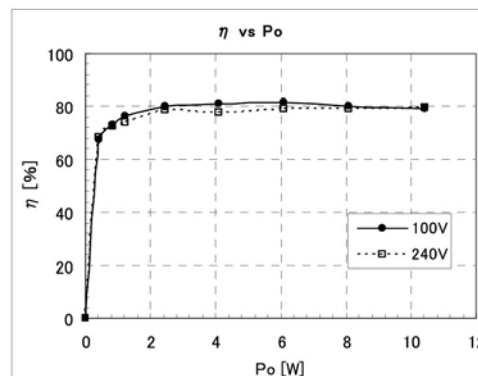


Electric characteristics (MIP2K4 : Worldwide input, 8.3V/1.5A output)

VI characteristics of adapter circuit



Power efficiency



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- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
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Note) The products of MIP50**, MIP51**, and MIP7** are excluded from above-mentioned precautions, 1) to 3).

Attached table "IPD availability by customer"

Parts No.			Companies/areas to which products can be sold	Companies/areas to which products cannot be sold	Application
MIP01** MIP2** MIP9A**	MIP02** MIP3** MIP9L**	MIP1** MIP4**	<ul style="list-style-type: none"> • Japanese companies in Japan • Japanese companies in Asia (50% or more owned) 	<ul style="list-style-type: none"> • Companies in European and American countries • Asian companies in Asia • Other local companies 	<ul style="list-style-type: none"> • For power supply • For DC-DC converter
MIP00** MIP55** MIP816/826	MIP52** MIP56** MIP9E**	MIP53** MIP803/804	<ul style="list-style-type: none"> • Japanese companies in Japan • Japanese companies in Asia (50% or more owned) • Asian companies in Asia 	<ul style="list-style-type: none"> • Companies in European and American countries • Other local companies 	<ul style="list-style-type: none"> • For power supply • For EL driver • For LED lighting driver
MIP50**	MIP51**	MIP7**	<ul style="list-style-type: none"> • No restrictions in terms of contract 	<ul style="list-style-type: none"> • No restrictions in terms of contract 	<ul style="list-style-type: none"> • For lamp driver/ car electronics accessories

Note) For details, contact our sales division.