## **MIP514**

## Silicon MOSFET type Integrated Circuit

#### ■ Features

- Built-in five protection functions (over-current, over-voltage, load-short-circuit, over heat, ESD)
- Both DC and AC power suply are available

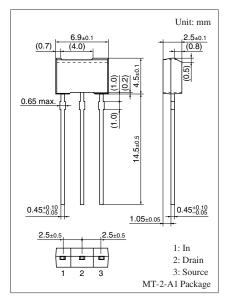
#### ■ Applications

- Lamp, solenoid drive
- Motor drive

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

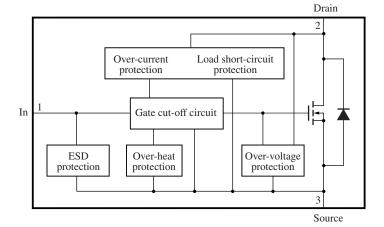
Parameter	Symbol	Rating	Unit
Output voltage	$V_{DS}$	- 0.5 to +45	V
Output current	$I_{O}$	2.0	A
Input voltage	$V_{IN}$	- 0.5 to +6.0	V
Input current	$I_{\rm IN}$	±5	mA
Drain clamp energy endurance	E <sub>CLP</sub>	28	mJ
Power dissipation *	$P_{\mathrm{D}}$	1.0	W
Operating ambient temperature	$T_{opr}$	-40 to +85	°C
Channel temperature	$T_{ch}$	150	°C
Storage temperature	Teta	-55 to +150	°C

Note) \*: Mounting on the PCB (100 mm  $\times$  100 mm, glass epoxy substrate) ( $T_a = 25$ °C).



Marking Symbol: MIP514

#### ■ Block Diagram



Publication date: April 2002 SLB00046AED 1

### ■ Electrical Characteristics $T_C = 25$ °C $\pm 3$ °C

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
On-state resistance	R <sub>DS(ON)</sub>	$V_{IN} = 5 \text{ V}, I_{DS} = 1 \text{ A}$		0.3	0.45	Ω
Drain-source voltage	V <sub>DS(ON)</sub>	$V_{IN} = 5 \text{ V}, I_{DS} = 1 \text{ A}$		0.3	0.45	V
Drain clamp voltage	V <sub>DS(CLP)</sub>	$V_{IN} = 0 \text{ V}, I_{DS} = 3 \text{ mA}$	45	57		V
Drain-off current 1	I <sub>DS(OFF)1</sub>	$V_{IN} = 0 \text{ V}, V_{DS} = 12 \text{ V}$		0.01	5	μΑ
Drain-off current 2	I <sub>DS(OFF)2</sub>	$V_{IN} = 0 \text{ V}, V_{DS} = 25 \text{ V}$		0.02	8	
Drain-off current 3	I <sub>DS(OFF)3</sub>	$V_{IN} = 0 \text{ V}, V_{DS} = 40 \text{ V}$		0.08	10	
Input threshold voltage	V <sub>TH(IN)</sub>	$V_{DS} = 5 \text{ V}, I_{DS} = 1 \text{ mA}$	1.2	1.8	3.0	V
High-level input voltage	V <sub>IN(H)</sub>	$I_{DS} = 1 A$	4			V
Low-level input voltage	V <sub>IN(L)</sub>	$I_{DS} = 1 \text{ mA}$			0.8	V
Input current (normal)	I <sub>IN(ON)</sub>	$V_{IN} = 5 \text{ V}, V_{DS} = 0 \text{ V}$		0.2	0.5	mA
Input current (act on protection) *	I <sub>IN(PROT)</sub>	V <sub>IN</sub> = 5 V		0.45	1.00	mA
Over current protection limit (short circuit load protection limit)	I <sub>OCP</sub> (V <sub>SHT</sub> )	$V_{IN} = 5 \text{ V}$	2.5 (1.2)	4 (1.6)		A (V)

- Note) 1. At on-state when drain voltage exceeds the "Short circuit load protection voltage", output current begin to oscillate.
  - 2. When drain voltage exceeds the "drain clamp voltage" output MOS turn on, so drain voltage are clamped before the drain-source junction become breakdown.
  - 3. \*: State of short circuit load protection and over heat protection (designed guarantee).

#### ■ Electrical Characteristics (Reference value: Non guarantee value)

Parameter	Symbol	Conditions	Min	Тур	Max	Unit
Cutoff temperature at overheat	$T_{SHD}$	$V_{IN} = 5 \text{ V}$		140		°C
Turn-on time	t <sub>ON</sub>	$V_{DD} = 30 \text{ V}, R_{L} = 30 \Omega$		6		μs
Turn-off time	t <sub>OFF</sub>	$I_{DS} = 1 \text{ A}, V_{IN} = 5 \text{ V}$		15		

Note) If the chip temperature exceeds the "over heat protection temperature", output current is shut down. And if the chip cool down, the protection will operate automatically again.

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