MIP514

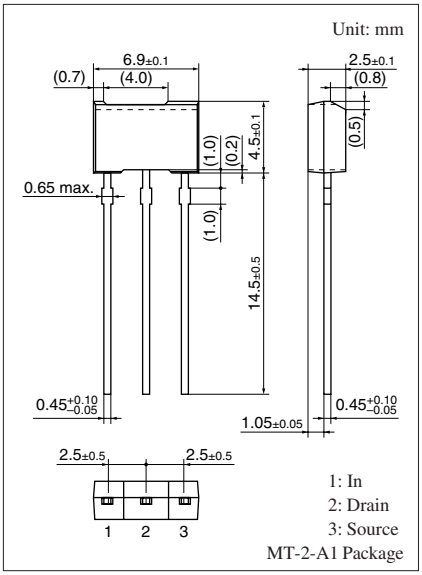
Silicon MOSFET type Integrated Circuit

■ 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



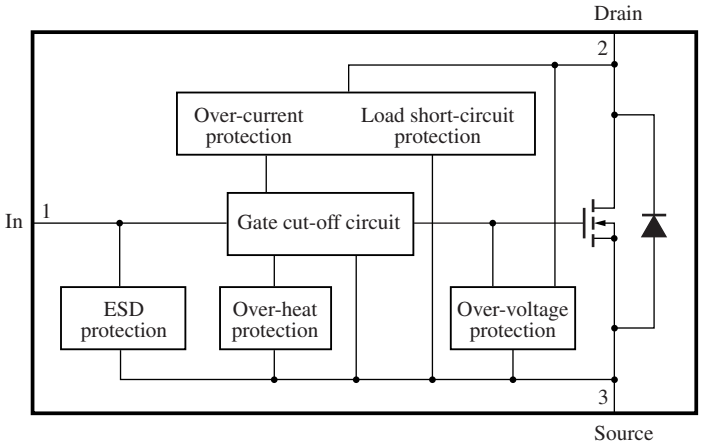
Marking Symbol: MIP514

■ 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_{IN}	±5	mA
Drain clamp energy endurance	E_{CLP}	28	mJ
Power dissipation *	P_D	1.0	W
Operating ambient temperature	T_{opr}	−40 to +85	°C
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	−55 to +150	°C

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

■ Block Diagram



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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
On-state resistance	$R_{DS(ON)}$	V_{IN} = 5 V, I_{DS} = 1 A		0.3	0.45	Ω
Drain-source voltage	$V_{DS(ON)}$	V_{IN} = 5 V, I_{DS} = 1 A		0.3	0.45	V
Drain clamp voltage	$V_{DS(CLP)}$	V_{IN} = 0 V, I_{DS} = 3 mA	45	57		V
Drain-off current 1	$I_{DS(OFF)1}$	V_{IN} = 0 V, V_{DS} = 12 V		0.01	5	μA
Drain-off current 2	$I_{DS(OFF)2}$	V_{IN} = 0 V, V_{DS} = 25 V		0.02	8	
Drain-off current 3	$I_{DS(OFF)3}$	V_{IN} = 0 V, V_{DS} = 40 V		0.08	10	
Input threshold voltage	$V_{TH(IN)}$	V_{DS} = 5 V, I_{DS} = 1 mA	1.2	1.8	3.0	V
High-level input voltage	$V_{IN(H)}$	I_{DS} = 1 A	4			V
Low-level input voltage	$V_{IN(L)}$	I_{DS} = 1 mA			0.8	V
Input current (normal)	$I_{IN(ON)}$	V_{IN} = 5 V, V_{DS} = 0 V		0.2	0.5	mA
Input current (act on protection) *	$I_{IN(PROT)}$	V_{IN} = 5 V		0.45	1.00	mA
Over current protection limit (short circuit load protection limit)	I_{OCP} (V_{SHT})	V_{IN} = 5 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	Typ	Max	Unit
Cutoff temperature at overheat	T_{SHD}	V_{IN} = 5 V		140		°C
Turn-on time	t_{ON}	V_{DD} = 30 V, R_L = 30 Ω		6		μs
Turn-off time	t_{OFF}	I_{DS} = 1 A, V_{IN} = 5 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.

Request for your special attention and precautions in using the technical information and semiconductors described in this book

(1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this book and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.

(2) The technical information described in this book is limited to showing representative characteristics and applied circuits examples of the products. It neither warrants non-infringement of intellectual property right or any other rights owned by our company or a third party, nor grants any license.

(3) We are not liable for the infringement of rights owned by a third party arising out of the use of the product or technologies as described in this book.

(4) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
- Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
- Any applications other than the standard applications intended.

(5) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.

(6) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage, and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.

(7) When using products for which damp-proof packing is required, observe the conditions (including shelf life and amount of time let standing of unsealed items) agreed upon when specification sheets are individually exchanged.

(8) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.