

# F5018

FUJI Intelligent Power MOSFET

## Intelligent Power MOSFET

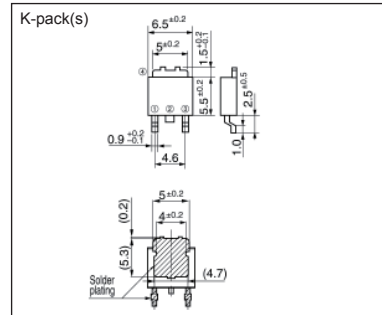
### ■ Features

- Over temperature protection
- Short circuit protection
- Low on-resistance
- High speed switching

### ■ Applications

- Solenoid driver
- Lamp driver
- Replacements for fuse and relay

### ■ Outline drawings [mm]



### ■ Connection



### ■ Maximum ratings and characteristics

#### ● Absolute maximum ratings (at Tc=25°C, unless otherwise specified)

Description	Symbol	Characteristics	Unit	Remarks
Drain-source voltage	V <sub>DS</sub>	40	V	DC
Gate-source voltage	V <sub>GS</sub>	DC-0.3~7.0	V	DC
Continuous drain current	I <sub>D</sub>	8	A	Tc=25°C
Maximum power dissipation	P <sub>D</sub>	15	W	Tc=25°C
Operating junction temperature	T <sub>j</sub>	150	°C	—
Storage temperature range	T <sub>stg</sub>	-55 ~ 150	°C	—
Single pulse inductive load switch-off energy dissipation	E <sub>CL</sub>	100	mJ	T <sub>j</sub> =150°C, L=5mH, I <sub>D</sub> =8A Single pulse, dv/dt≤10V/μs

#### ● Electrical characteristics (at Tc=25°C unless otherwise specified)

Description	Symbol	Conditions	min.	typ.	max.	Unit
Drain-source clamp voltage	V <sub>DS</sub>	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V	40	—	60	V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =10mA, V <sub>DS</sub> =13V	1.0	—	2.8	V
Operation gate voltage	V <sub>GS(p)</sub>	—	3.0	—	7.0	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	—	—	1.0	mA
Gate-source leakage current	I <sub>GS(n)</sub> *	V <sub>GS</sub> =5V	—	—	500	μA
	I <sub>GS(un)**</sub>		—	—	800	μA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =5A, V <sub>GS</sub> =5V	—	—	140	mΩ
Turn-on time	t <sub>on</sub>	V <sub>DS</sub> =13V, R <sub>i</sub> =2.6Ω, V <sub>GS</sub> =5V	—	—	200	μs
Turn-off time	t <sub>off</sub>	V <sub>DS</sub> =13V, R <sub>i</sub> =2.6Ω, V <sub>GS</sub> =5V	—	—	200	μs
Over-temperature protection	T <sub>trip</sub>	V <sub>CC</sub> =13V, V <sub>GS</sub> =5V	150	—	—	°C
Short circuit protection	I <sub>OC</sub>	V <sub>CC</sub> =13V, V <sub>GS</sub> =5V	12	—	—	A

Note \* : Under normal operation

Note \*\* : Under self protection

#### ● Electrical characteristics (at Tc=-40~105°C, unless otherwise specified)

Description	Symbol	Conditions	min.	typ.	max.	Unit
Drain-source clamp voltage	V <sub>DS</sub>	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V	38	—	62	V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =10mA, V <sub>DS</sub> =13V	1.0	—	3.0	V
Operation gate voltage (protection circuit operates)	V <sub>GS(p)</sub>	—	3.0	—	6.7	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =13V, V <sub>GS</sub> =0V	—	—	170	μA
		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	—	—	1.6	mA
Gate-source leakage current	I <sub>GS(n)</sub>	V <sub>GS</sub> =5V*	—	—	600	μA
		V <sub>GS</sub> =5V, T <sub>j</sub> >150°C**	—	—	940	μA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =5A, V <sub>GS</sub> =5V	—	—	205	mΩ
Turn-on time	t <sub>on</sub>	V <sub>DS</sub> =13V, I <sub>D</sub> =5A, V <sub>GS</sub> =5V	—	—	240	μs
Turn-off time	t <sub>off</sub>	V <sub>DS</sub> =13V, I <sub>D</sub> =5A, V <sub>GS</sub> =5V	—	—	220	μs
Short circuit protection	I <sub>OC</sub>	V <sub>GS</sub> =5V	8.4	—	—	A

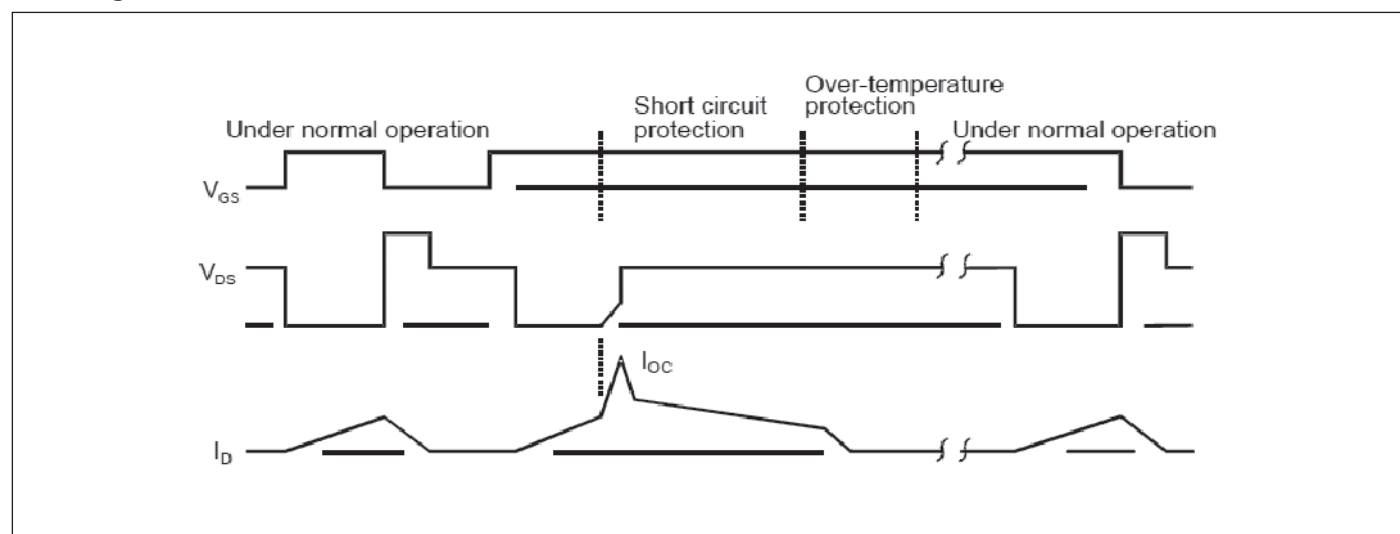
Note \* : Under normal operation

Note \*\* : Under self protection (Short circuit ~ Short circuit protection ~ Over-temperature protection)

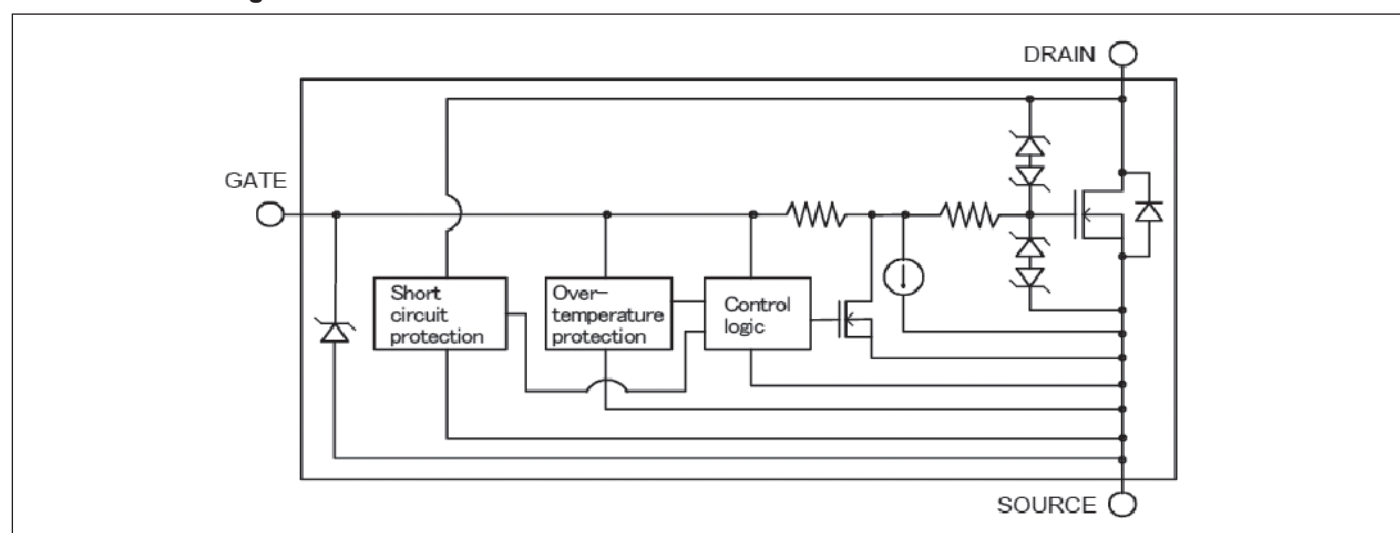
### ● Thermal resistance

Description	Symbol	Test conditions	min.	typ.	max.	Unit
Thermal resistance	R <sub>th(j-c)</sub>	Junction-case	—	—	8.3	°C/W
	R <sub>th(j-a)</sub>	Junction-ambient	—	—	125	°C/W

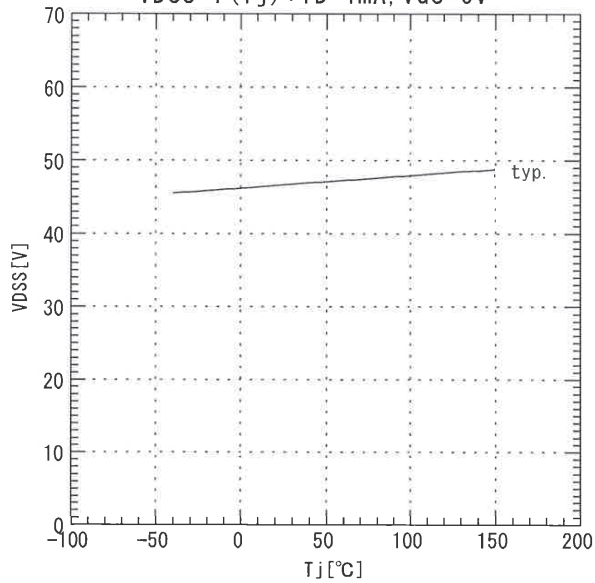
## ■ Timing chart



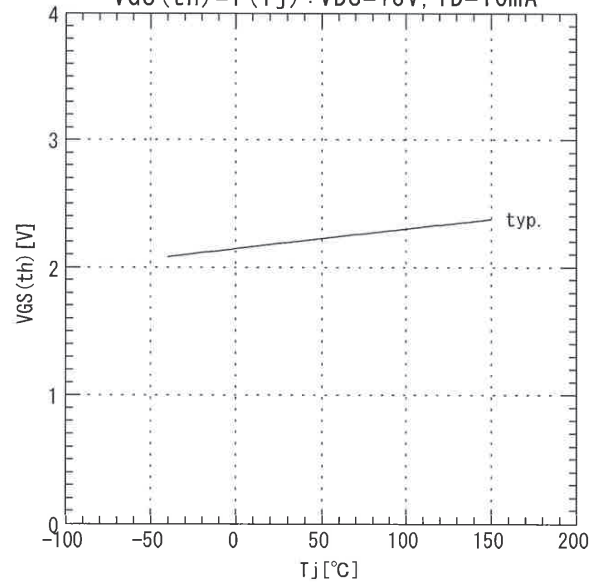
## ■ Circuit block diagram



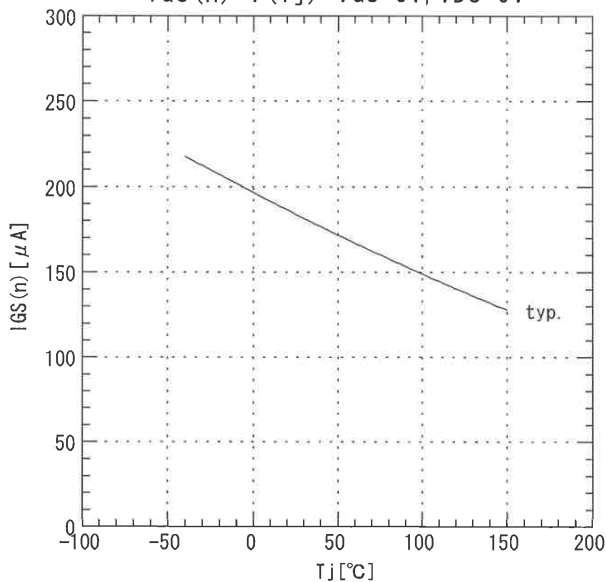
Drain-source clamp voltage  
 $V_{DS} = f(T_j) : I_D = 1\text{mA}, V_{GS} = 0\text{V}$



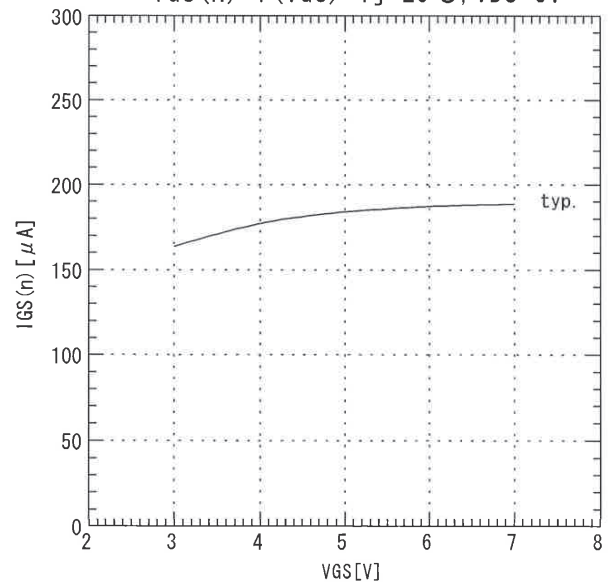
Gate threshold voltage  
 $V_{GS(th)} = f(T_j) : V_{DS} = 13\text{V}, I_D = 10\text{mA}$



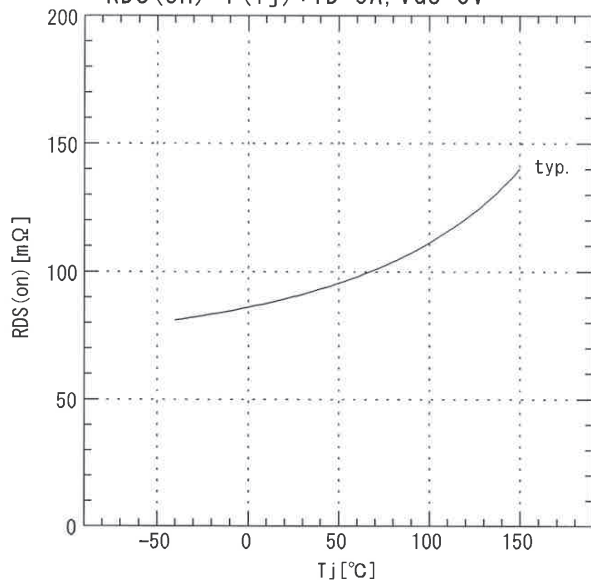
Gate-source leakage current  
 $I_{GS(n)} = f(T_j) : V_{GS} = 5\text{V}, V_{DS} = 0\text{V}$



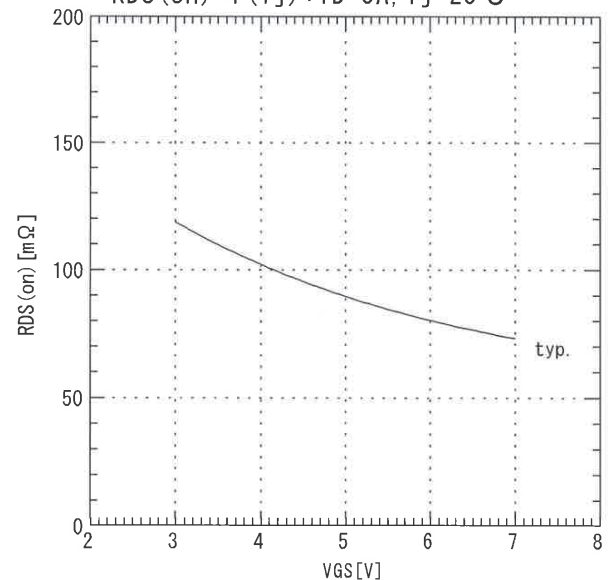
Gate-source leakage current  
 $I_{GS(n)} = f(V_{GS}) : T_j = 25^\circ\text{C}, V_{DS} = 0\text{V}$

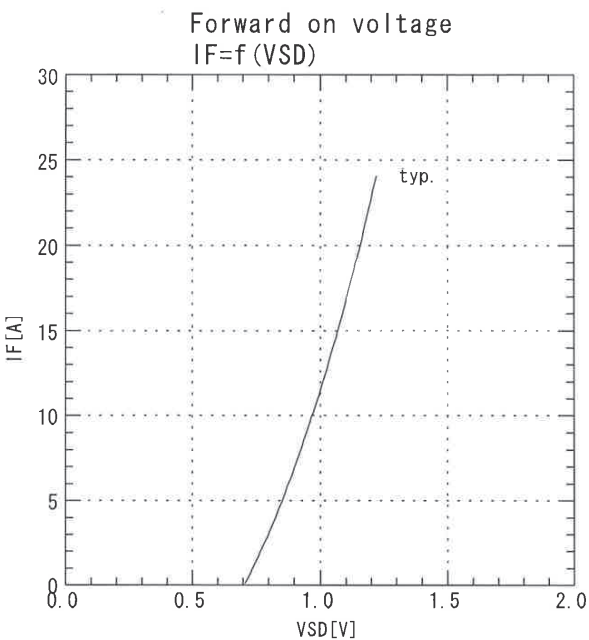
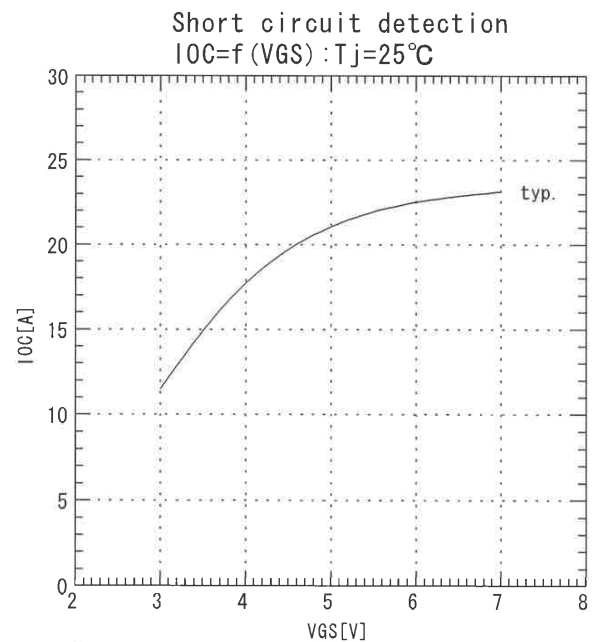
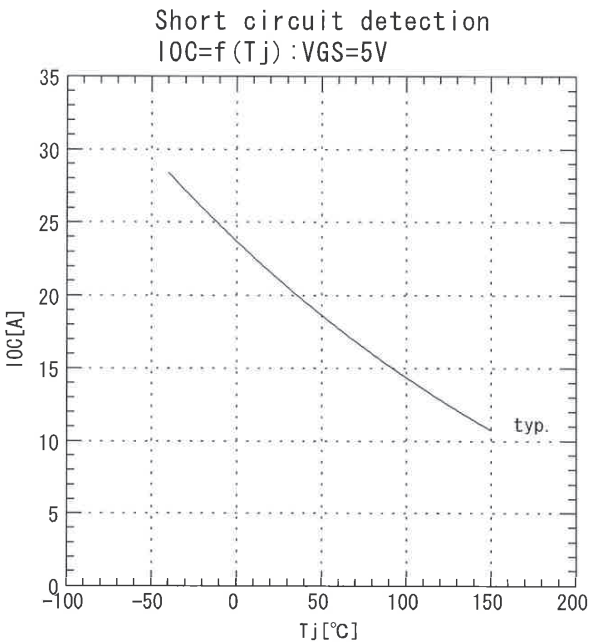
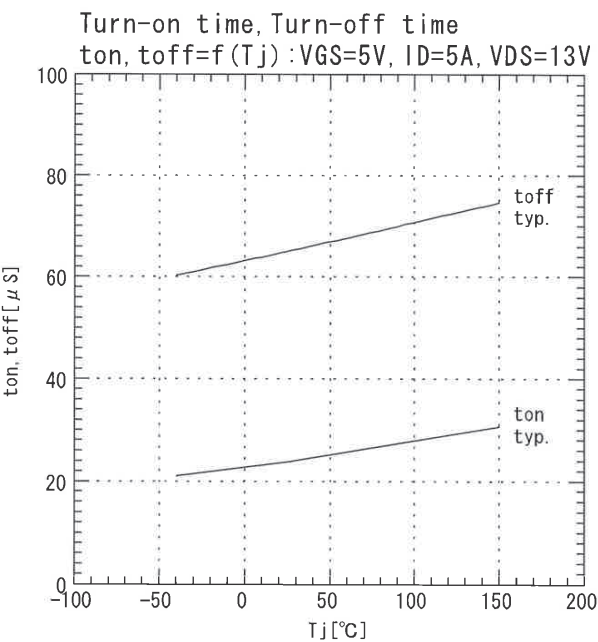
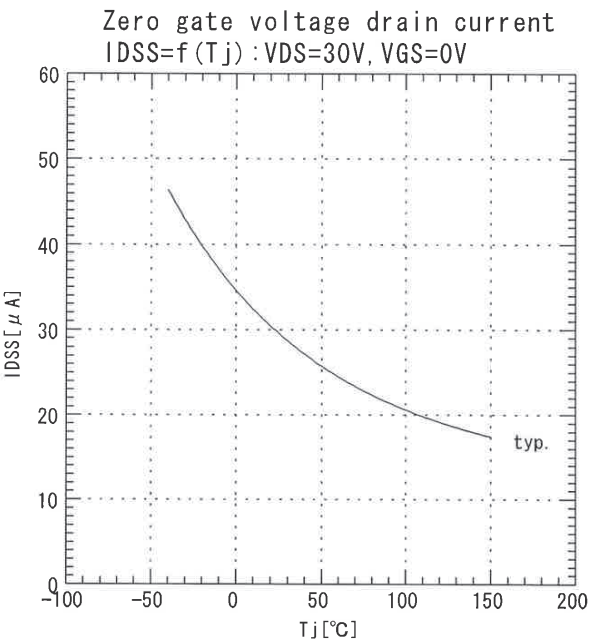


Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5\text{A}, V_{GS} = 5\text{V}$



Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5\text{A}, T_j = 25^\circ\text{C}$





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