

# F5019

FUJI Intelligent Power MOSFET

## Intelligent Power MOSFET

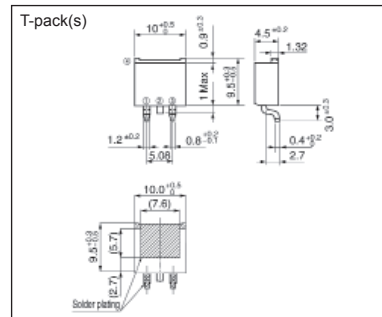
### ■ Features

- 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>DSS</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>	12	A	T <sub>c</sub> =25°C
Maximum power dissipation	P <sub>D</sub>	30	W	T <sub>c</sub> =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>DSS</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>L</sub> =2.6Ω, V <sub>GS</sub> =5V	-	-	200	μs
Turn-off time	t <sub>off</sub>		-	-	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>loc</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>DSS</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>		-	-	220	μs
Short circuit protection	I <sub>loc</sub>	V <sub>GS</sub> =5V	8.4	-	-	A

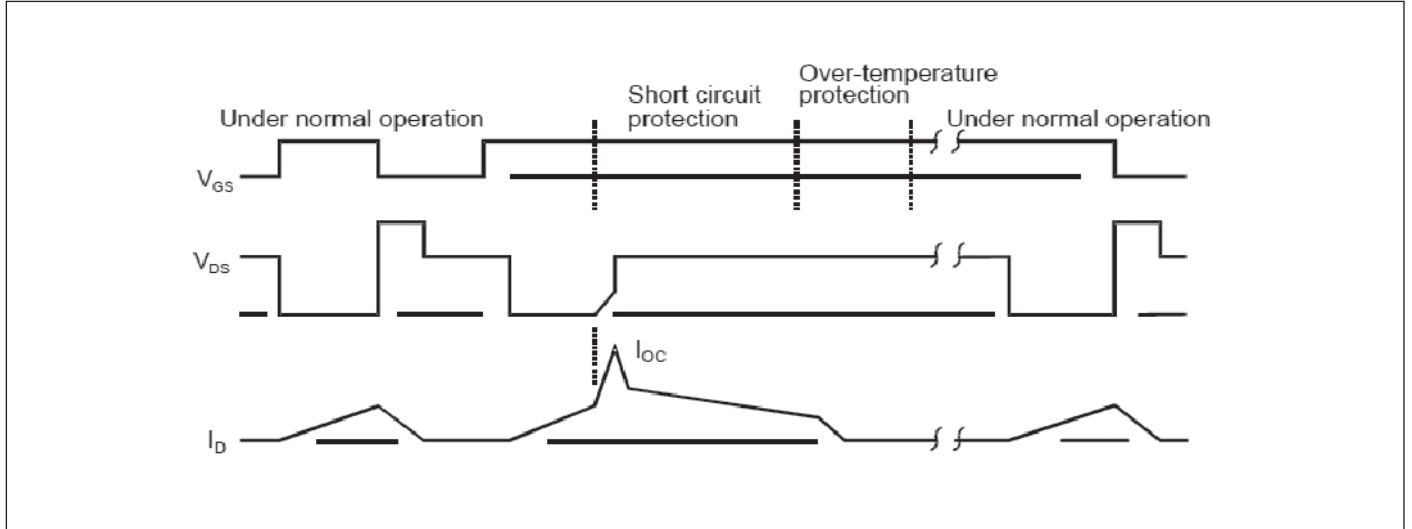
Note \* : Under normal operation

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

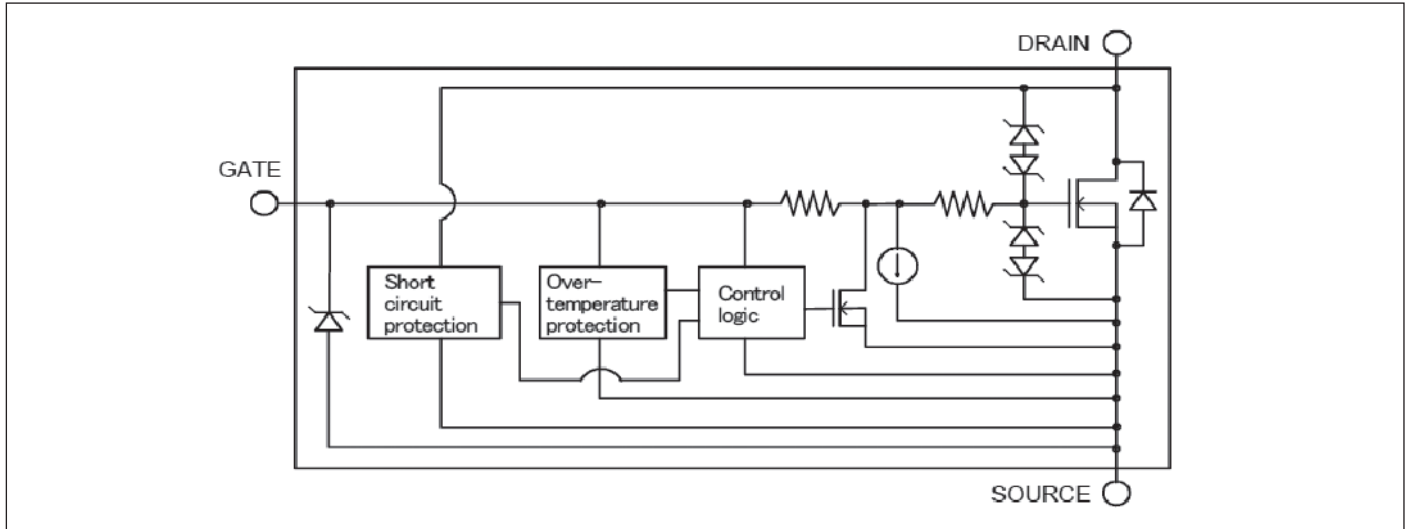
### ● Thermal resistance

Description	Symbol	Test conditions	min.	typ.	max.	Unit
Thermal resistance	R <sub>th(j-c)</sub>	Junction-case	-	-	4.2	°C/W
	R <sub>th(j-a)</sub>	Junction-ambient	-	-	100	°C/W

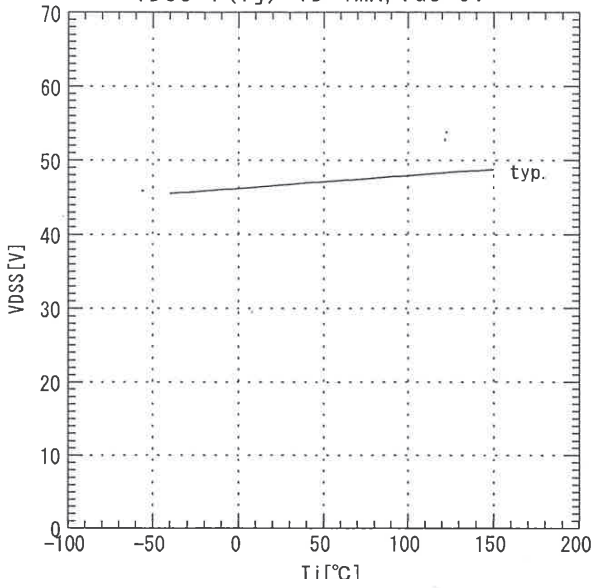
■ Timing chart



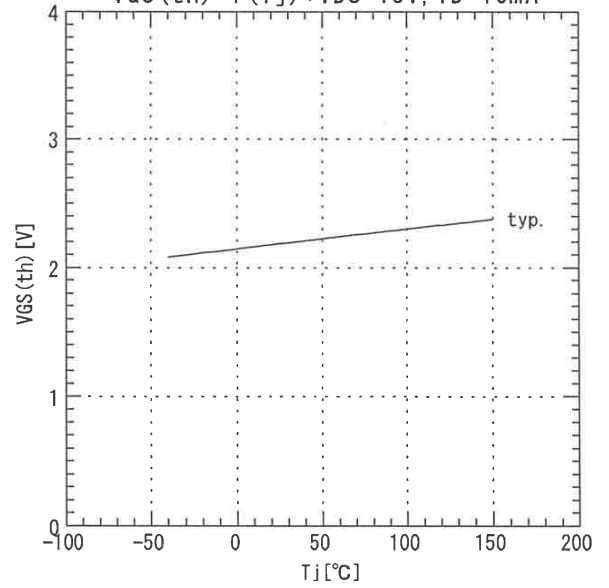
■ Circuit block diagram



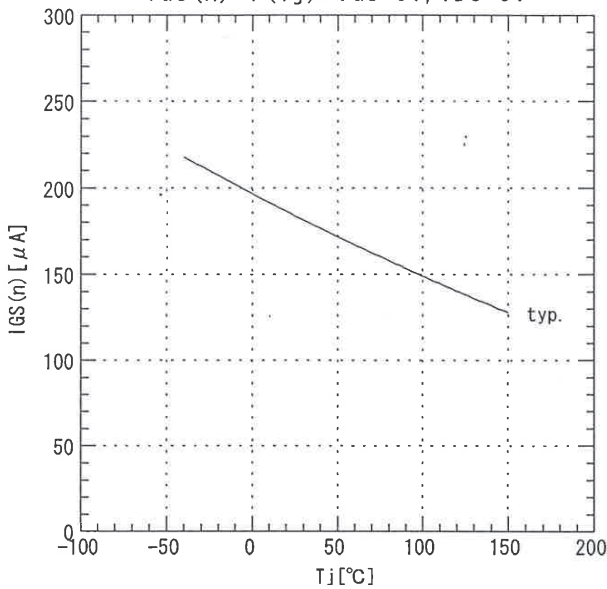
Drain-source clamp voltage  
 $V_{DSS} = f(T_j) : I_D = 1\text{mA}, V_{GS} = 0\text{V}$



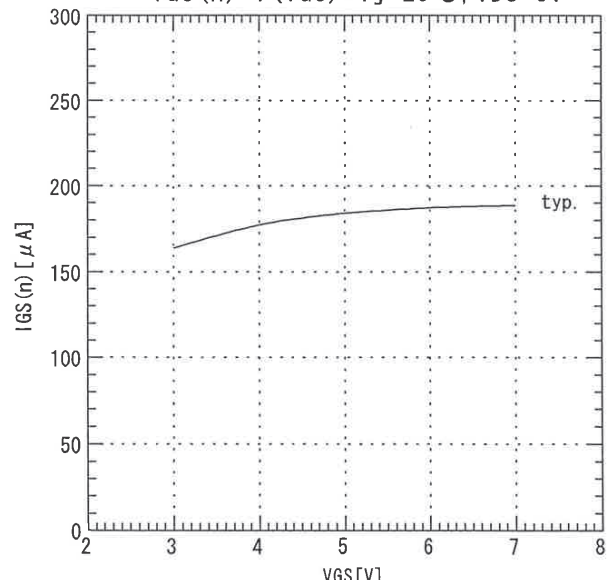
Gate threshold voltage  
 $V_{GS(th)} = f(T_j) : V_{DS} = 13\text{V}, I_D = 10\text{mA}$



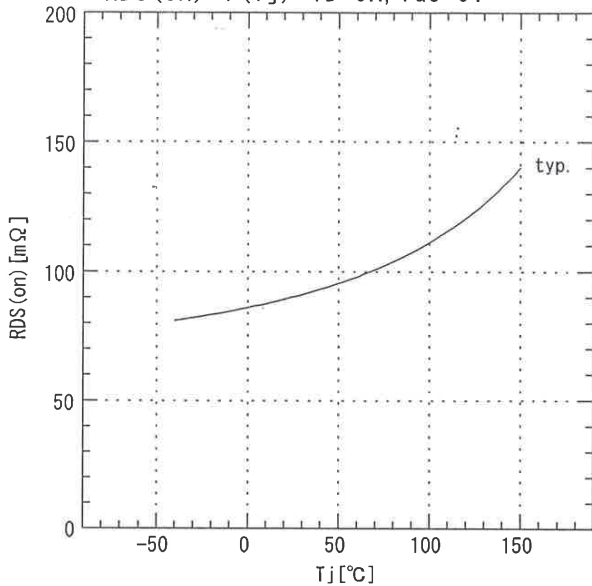
Gate-source leakage current  
 $I_{GS(n)} = f(T_j) : V_{GS} = 5\text{V}, V_{DS} = 0\text{V}$



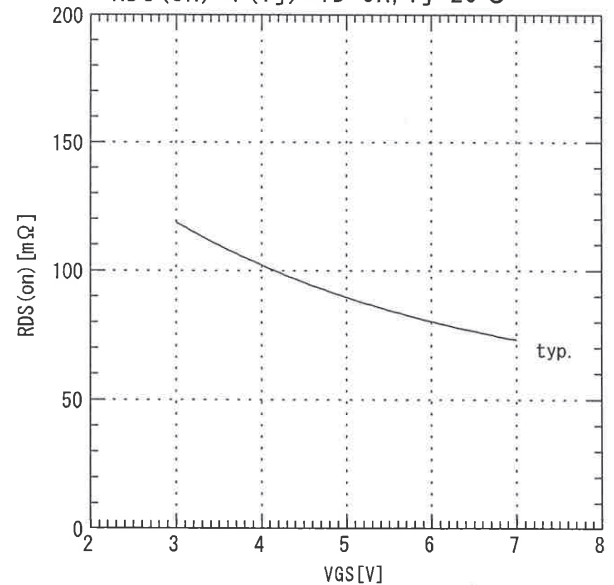
Gate-source leakage current  
 $I_{GS(n)} = f(V_{GS}) : T_j = 25^\circ\text{C}, V_{DS} = 0\text{V}$



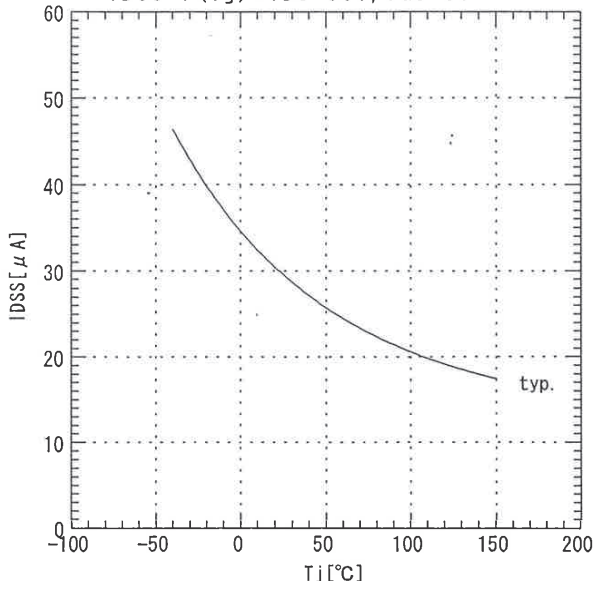
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5\text{A}, V_{GS} = 5\text{V}$



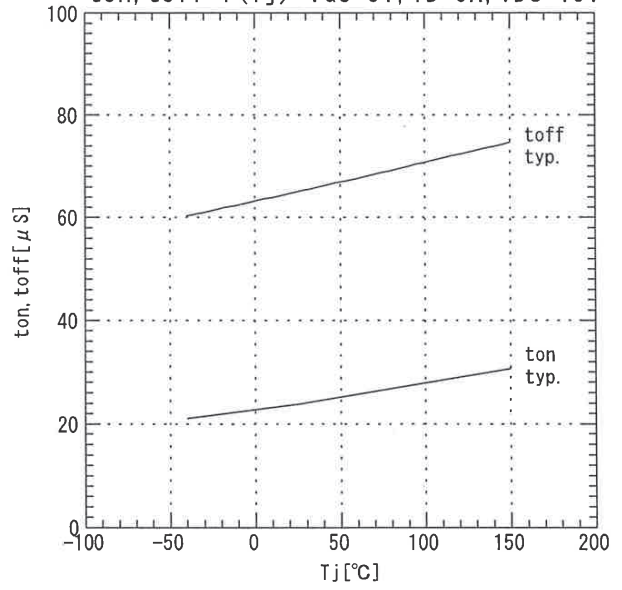
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5\text{A}, T_j = 25^\circ\text{C}$



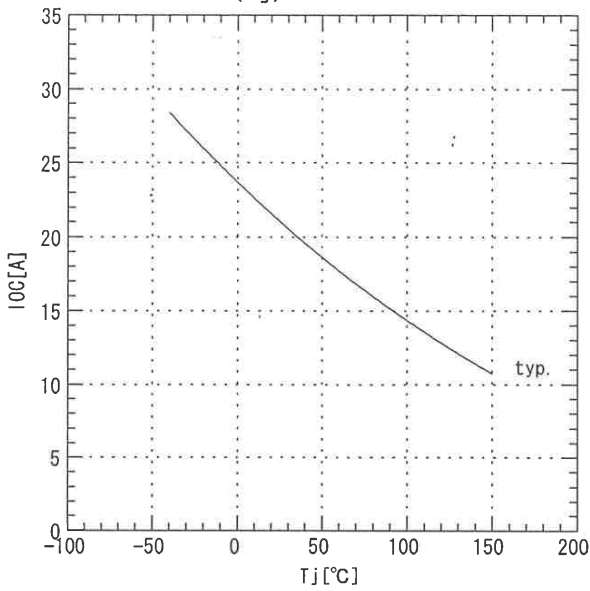
Zero gate voltage drain current  
 $I_{DSS}=f(T_j) : V_{DS}=30V, V_{GS}=0V$



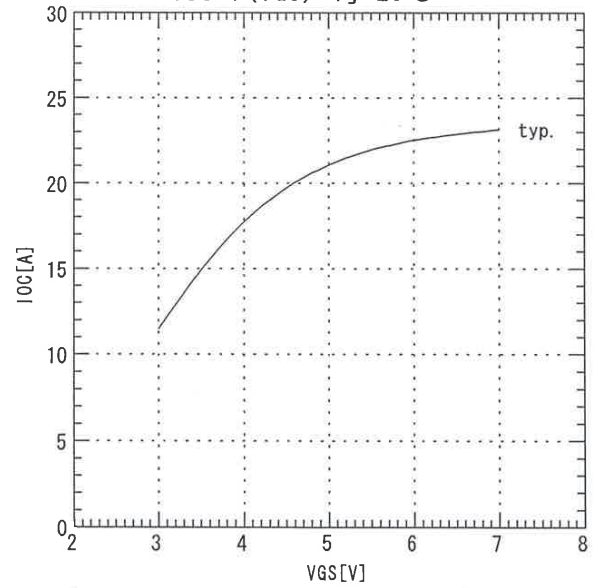
Turn-on time, Turn-off time  
 $t_{on}, t_{off}=f(T_j) : V_{GS}=5V, I_D=5A, V_{DS}=13V$



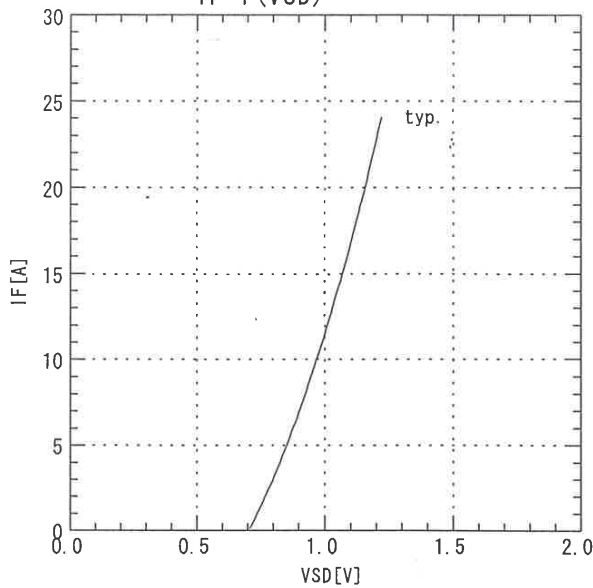
Short circuit detection  
 $I_{OC}=f(T_j) : V_{GS}=5V$



Short circuit detection  
 $I_{OC}=f(V_{GS}) : T_j=25^{\circ}C$



Forward on voltage  
 $I_F=f(V_{SD})$



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