

# F5048

FUJI Intelligent Power MOSFET

## Intelligent Power MOSFET

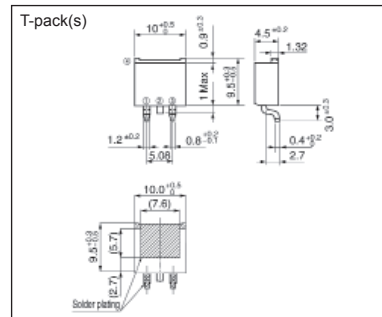
### ■ Features

- 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>	80	V	DC
Gate-source voltage	V <sub>GS</sub>	-0.3~7.0	V	DC
Continuous drain current	I <sub>D</sub>	15(27)	A	DC. The in-rush current capability up to 27A
Maximum power dissipation	P <sub>D</sub>	43	W	—
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>o</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	80	—	100	V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =10mA, V <sub>DS</sub> =14V	1.1	—	2.9	V
Operation gate voltage (protection circuit operates)	V <sub>GS(p)</sub>	—	3.0	—	7.0	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0~1.5V	—	—	15	μA
Gate-source leakage current	I <sub>GS(n)*</sub>	V <sub>GS</sub> =5V	—	—	250	μA
	I <sub>GS(un)**</sub>	V <sub>GS</sub> =5V, T <sub>j</sub> >150°C	—	—	350	μA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	125	mΩ
Turn-on time	t <sub>on</sub>	V <sub>DS</sub> =14V, I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	100	μs
Turn-off time	t <sub>off</sub>	V <sub>DS</sub> =14V, I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	100	μs
Over-temperature protection	T <sub>rip</sub>	V <sub>GS</sub> =5V	150	—	—	°C
Short circuit protection	I <sub>OC</sub>	V <sub>GS</sub> =5V	13	—	—	A
Short circuit current limiting	I <sub>OC(lim)</sub>	V <sub>GS</sub> =5V, V <sub>DS</sub> =14V	27	—	—	A

Note \* : Under normal operation

Note \*\* : Under self protection (Short circuit ~ Short circuit protection ~ Over-temperature 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	77	—	104	V
Gate threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =10mA, V <sub>DS</sub> =14V	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> =16V, V <sub>GS</sub> =0V	—	—	25	μA
Gate-source leakage current	I <sub>GS(n)*</sub>	V <sub>GS</sub> =5V	—	—	300	μA
	I <sub>GS(un)**</sub>	V <sub>GS</sub> =5V, T <sub>j</sub> >150°C	—	—	350	μA
Drain-source on-state resistance	R <sub>DS(on)</sub>	I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	210	mΩ
Turn-on time	t <sub>on</sub>	V <sub>DS</sub> =14V, I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	110	μs
Turn-off time	t <sub>off</sub>	V <sub>DS</sub> =14V, I <sub>D</sub> =8A, V <sub>GS</sub> =5V	—	—	110	μs
Short circuit protection	I <sub>OC</sub>	V <sub>GS</sub> =5V	8	—	—	A
Short circuit current limiting	I <sub>OC(lim)</sub>	V <sub>GS</sub> =5V, V <sub>DS</sub> =14V	19	—	—	A

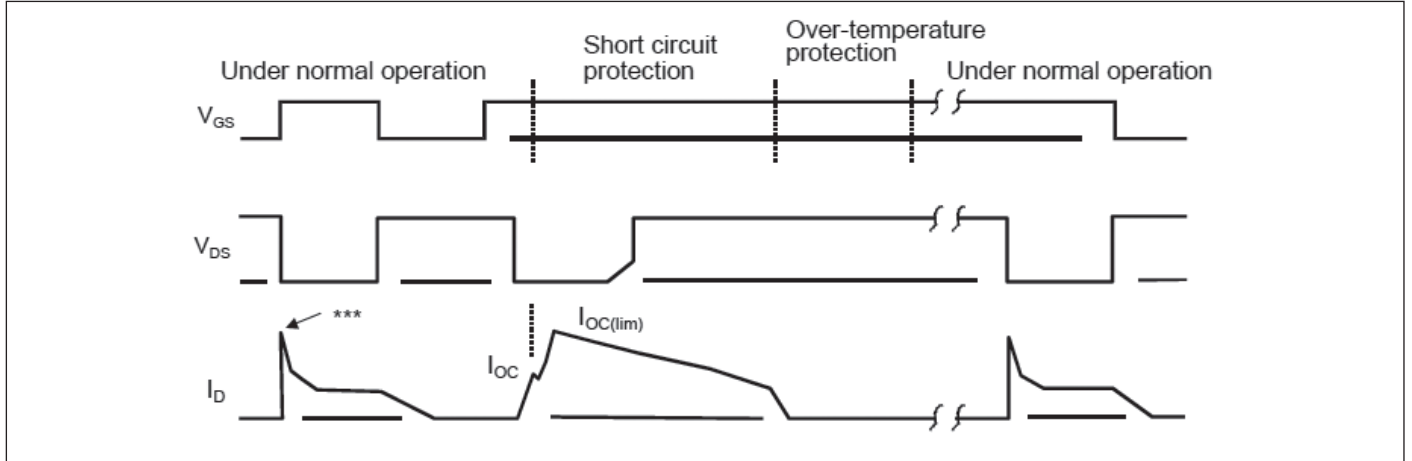
Note \* : Under normal operation

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

### ● Thermal resistance

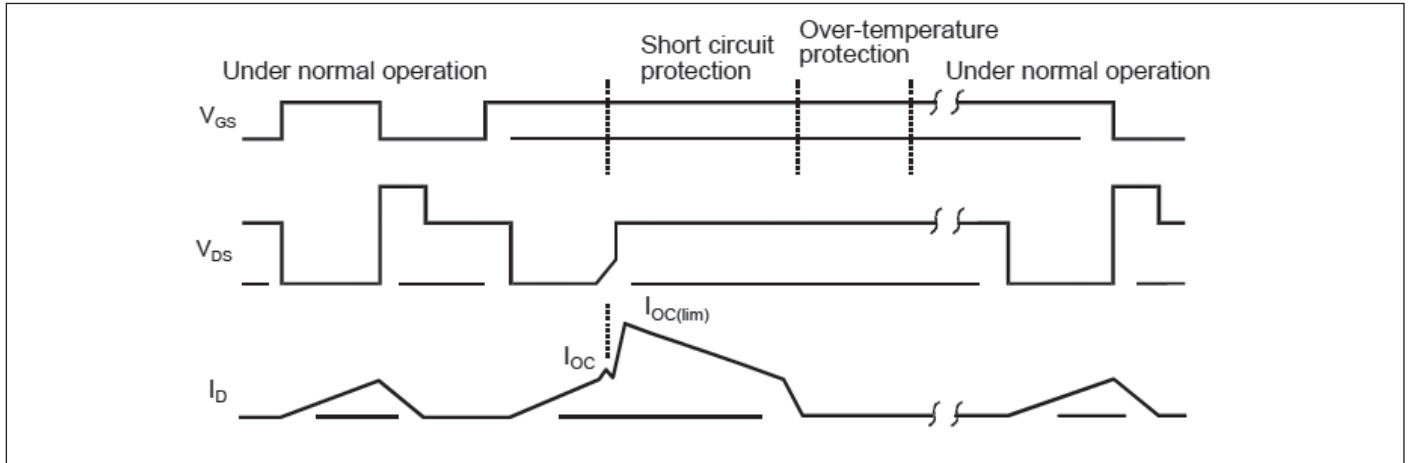
Description	Symbol	Test conditions	min.	typ.	max.	Unit
Thermal resistance	R <sub>th(j-c)</sub>	Junction-case	—	—	2.9	°C/W

■ For incandescent lamp control

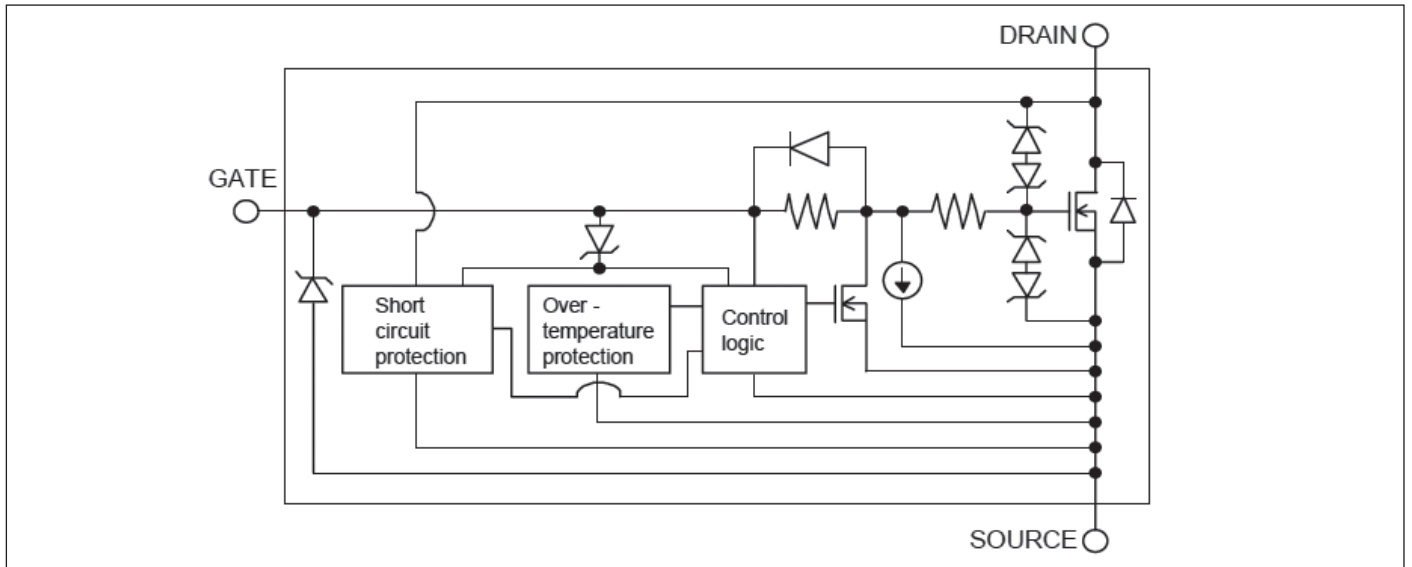


Note \*\*\*: F5048 is able to control the in-rush current up to 27A( $T_c=25^\circ C$ ), up to 33A( $T_c=40^\circ C$ )

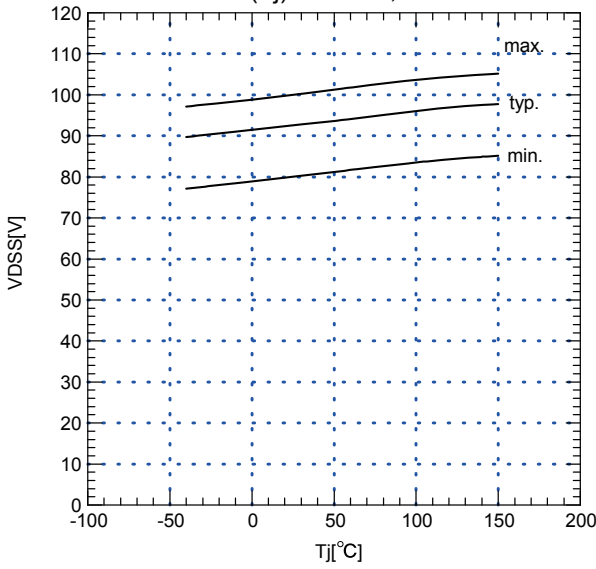
■ For inductive load



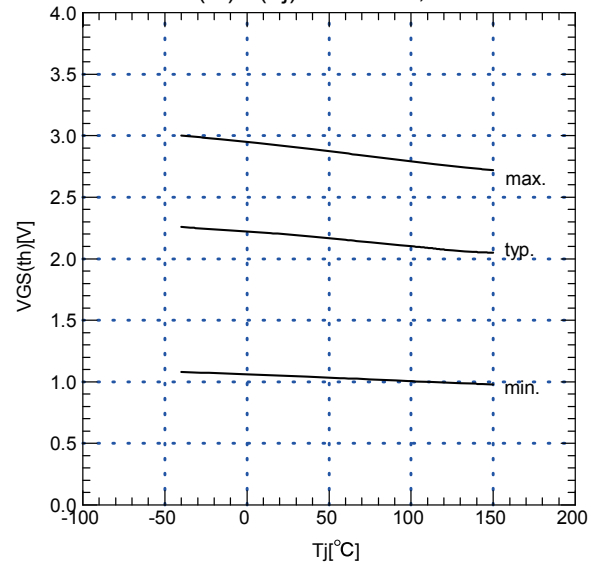
■ Circuit block diagram



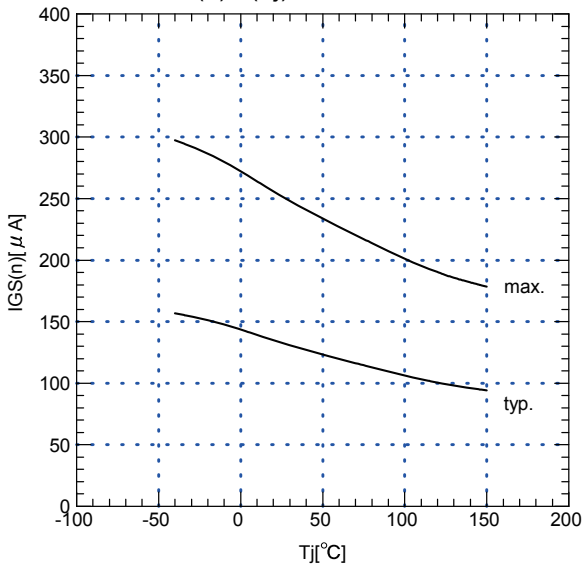
Drain-source clamp voltage  
 $V_{DSS}=f(T_j): I_D=1mA, V_{GS}=0V$



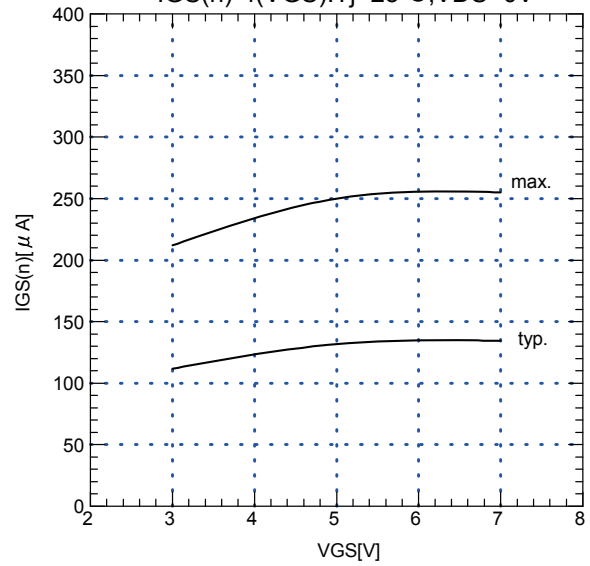
Gate threshold voltage  
 $V_{GS(th)}=f(T_j): V_{DS}=14V, I_D=10mA$



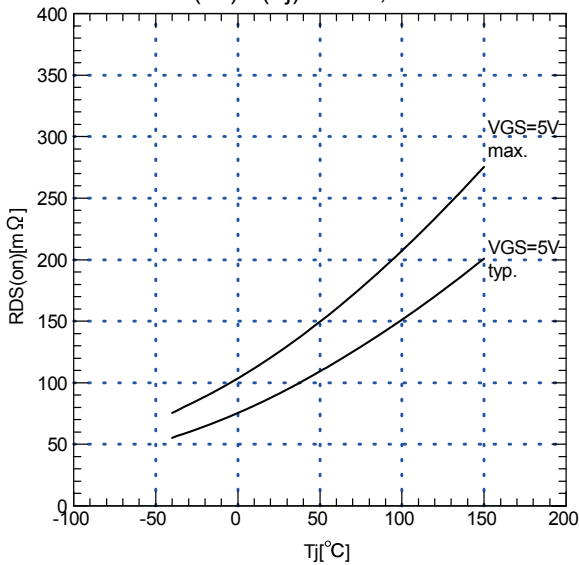
Gate-source leakage current  
 $I_{GS(n)}=f(T_j): V_{GS}=5V, V_{DS}=0V$



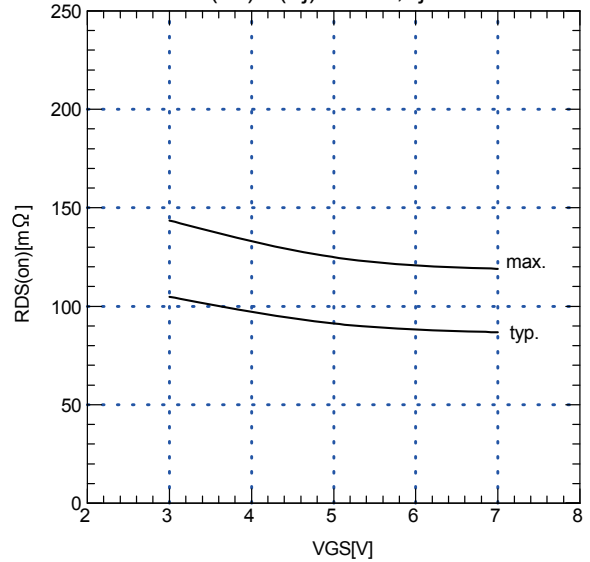
Gate-source leakage current  
 $I_{GS(n)}=f(V_{GS}): T_j=25°C, V_{DS}=0V$



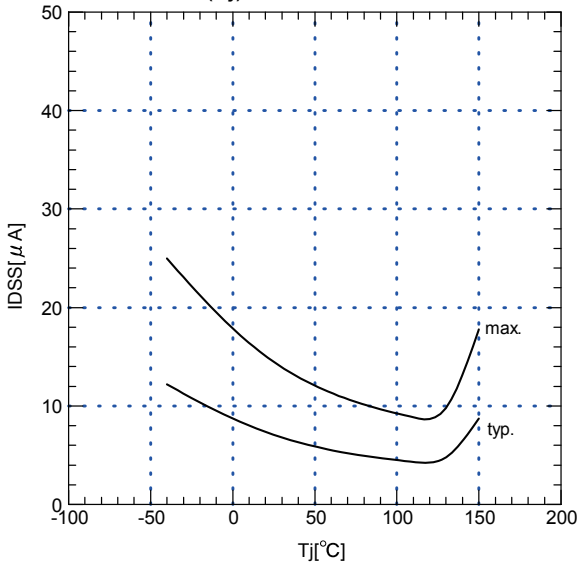
Drain-source on-state resistance  
 $R_{DS(on)}=f(T_j): I_D=8A, V_{GS}=5V$



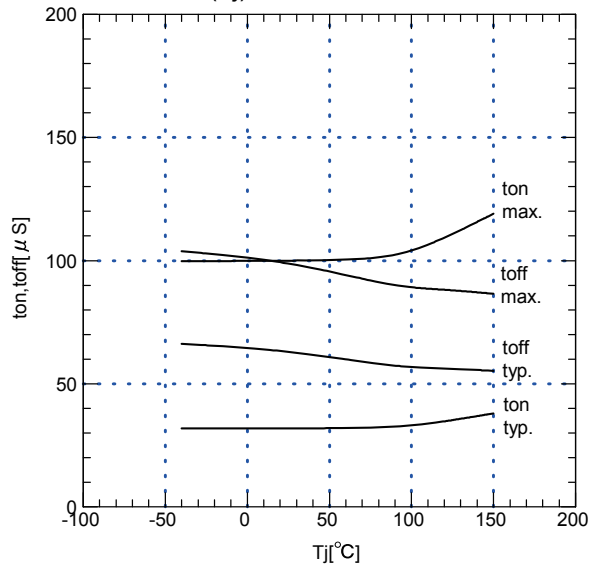
Drain-source on-state resistance  
 $R_{DS(on)}=f(T_j): I_D=8A, T_j=25°C$



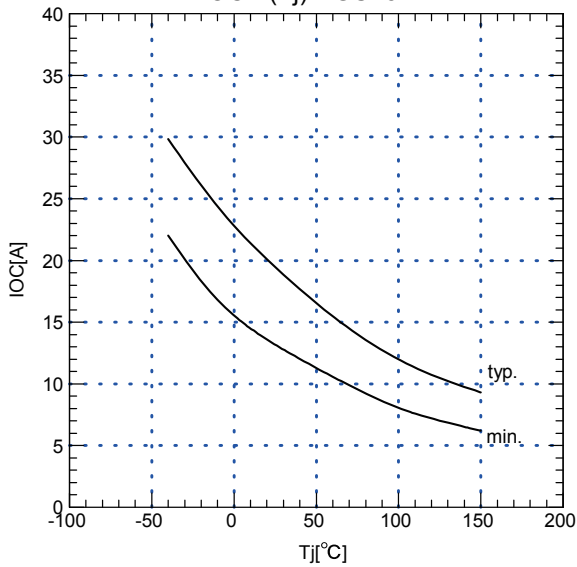
Zero gate voltage drain current  
 $IDSS=f(Tj):VDS=16V,VGS=0V$



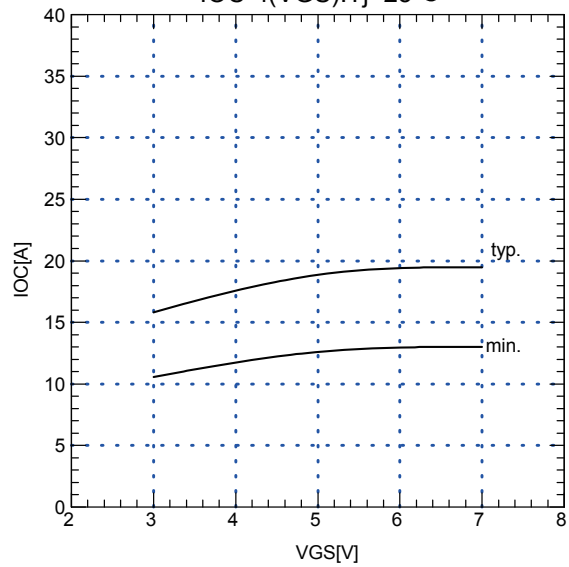
Turn-on time, Turn-off time  
 $ton, toff=f(Tj):VDS=14V, ID=8A, VGS=5V$



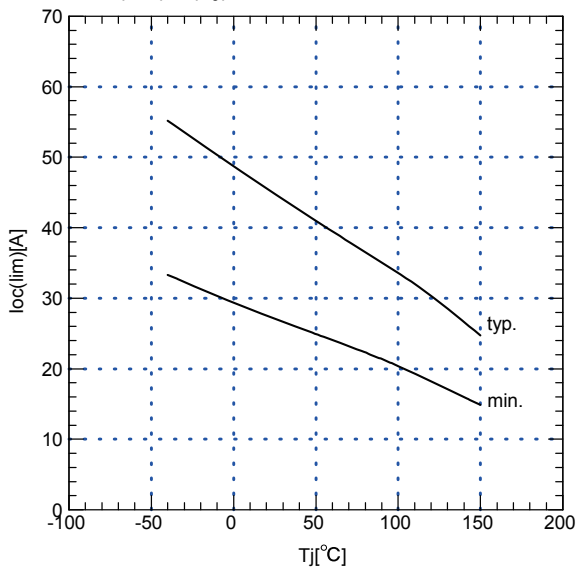
Short circuit protection  
 $IOC=f(Tj):VGS=5V$



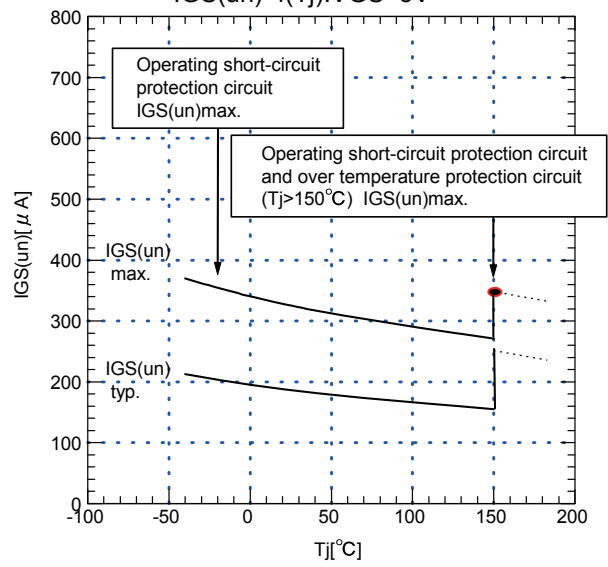
Short circuit protection  
 $IOC=f(VGS):Tj=25°C$



Current limit under short circuit protection  
 $Ioc(lim)=f(Tj):VGS=5V$



Gate-source leakage current  
 $IGS(un)=f(Tj):VGS=5V$



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