

# SPECIFICATION

Device Name : Intelligent Power MOSFET

Type Name : F5018-S

Spec. No. : **MS5 F3728**

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Fuji Electric Co., Ltd.  
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	July-31-1996	N. Yagawa	<i>[Signature]</i>	DWG. NO.	MS5 F3728
CHECKED	July-27-1996	S. Furukata			

# Revised Records

Date	Classi- fication	Ind.	Content	Applied date	Drawn	Checked	Approved
July-31-1996	enactment	—	—	Issued date	—	S. Furukata	<i>[Signature]</i>
Feb-25-1999	change	a	6/13 page Outview Lot. No. 4→5 figures	Feb-25-1999	S. Kiuchi	S. Furukata	S. Furukata

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1. Scope  
This specifies Fuji Intelligent Power MOSFET F 5 0 1 8 - S
2. Construction  
Self-Isolation Structure  
Output Part; N-channel enhancement mode power MOSFET
3. Application  
For switching
4. Outview  
K pack (EIAJ SC-63) S-type. (See to 6/13 page)
5. Absolute maximum ratings (at  $T_j=25^\circ\text{C}$ , unless otherwise specified.)

Description	Symbol	Characteristics	Unit	Conditions
Drain-source voltage	$V_{DSS}$	4 0	V	DC
Gate-source voltage	$V_{GSS}$	DC - 0.3 ~ 7.0	V	DC
Continuous drain current	$I_D$	8	A	$T_c = 25^\circ\text{C}$
Maximum power dissipation	$P_D$	1 5	W	$T_c = 25^\circ\text{C}$
Operating junction temperature	$T_J$	1 5 0	$^\circ\text{C}$	—————
Storage temperature range	$T_{stg}$	- 5 5 ~ 1 5 0	$^\circ\text{C}$	—————

6. Electrical characteristics (at  $T_j=25^\circ\text{C}$ , unless otherwise specified.)

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Drain-source clamp voltage	$V_{DSS}$	$I_D = 1 \text{ mA}$ $V_{GS} = 0 \text{ V}$	4 0		6 0	V
Gate threshold voltage	$V_{GS(th)}$	$I_D = 10 \text{ mA}$ $V_{DS} = 13 \text{ V}$	1. 0		2. 8	V
Operation gate voltage	$V_{GS(p)}$		3. 5		7. 0	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 30 \text{ V}$ $V_{GS} = 0 \text{ V}$			1. 0	mA
Gate-source leakage current	$I_{GS(n)}$	*			5 0 0	$\mu\text{A}$
	$I_{GS(un)}$	**			8 0 0	$\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$	$I_D = 5 \text{ A}$ $V_{GS} = 5 \text{ V}$			1 4 0	m $\Omega$
Forward on voltage	$V_{SD}$	$I_F = 24 \text{ A}$			2. 0	V

\* Under normal operation      \*\* Under self protection

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Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Turn-on time	$t_{on}$	$V_{DS} = 13\text{ V}$ $R_L = 2.6\ \Omega$			200	$\mu\text{S}$
Turn-off time	$t_{off}$	$V_{GS} = 5\text{ V}$			200	$\mu\text{S}$
Over-temperature protection	$T_{trip}$	$V_{GS} = 5\text{ V}$	150		210	$^{\circ}\text{C}$
Short circuit protection	$I_{oc}$	$V_{GS} = 5\text{ V}$	12		32	A
Single pulse inductive load switch-off energy dissipation	$E_{CL}$	$I_D = 8\text{ A}$ $T_J = 150\text{ }^{\circ}\text{C}$	100			mJ

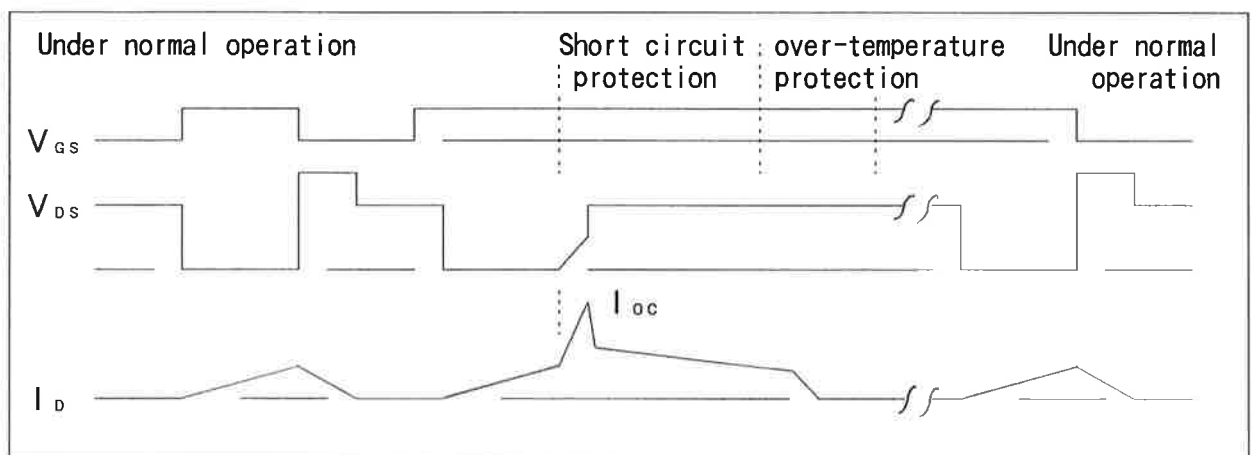
### 7. Thermal resistance

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Junction-case			8.3	$^{\circ}\text{C}/\text{W}$
	$R_{th(j-a)}$	Junction-ambient			125	$^{\circ}\text{C}/\text{W}$

### 8. Electrostatic discharge

Description	Conditions	Characteristics			Unit
		Min.	Typ.	Max.	
Drain-source	150 pF, 150 $\Omega$	$\pm 15$			kV
Gate-source		$\pm 0.5$			kV

### 9. Timing chart



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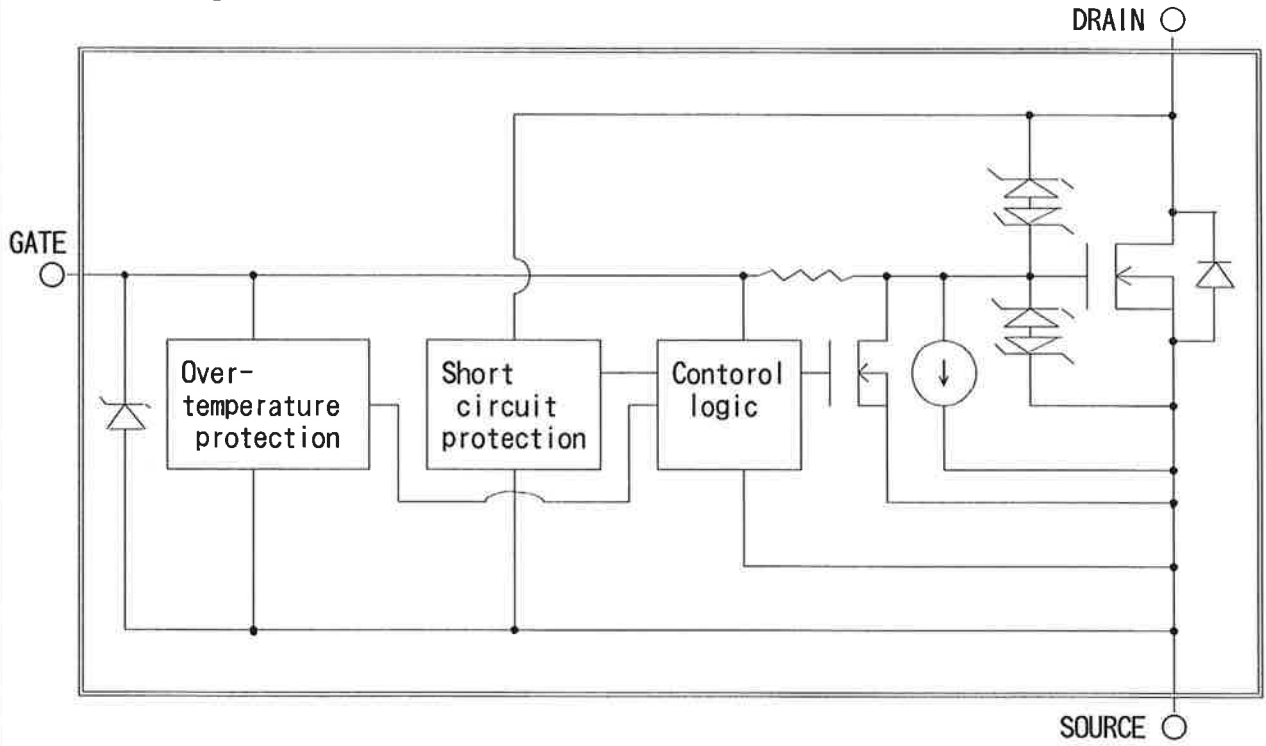
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1 0. Block diagram



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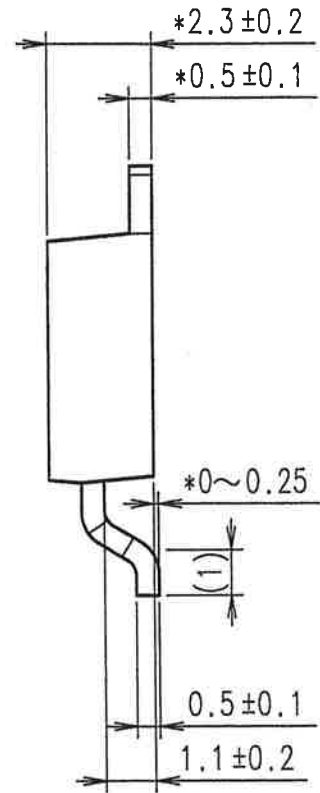
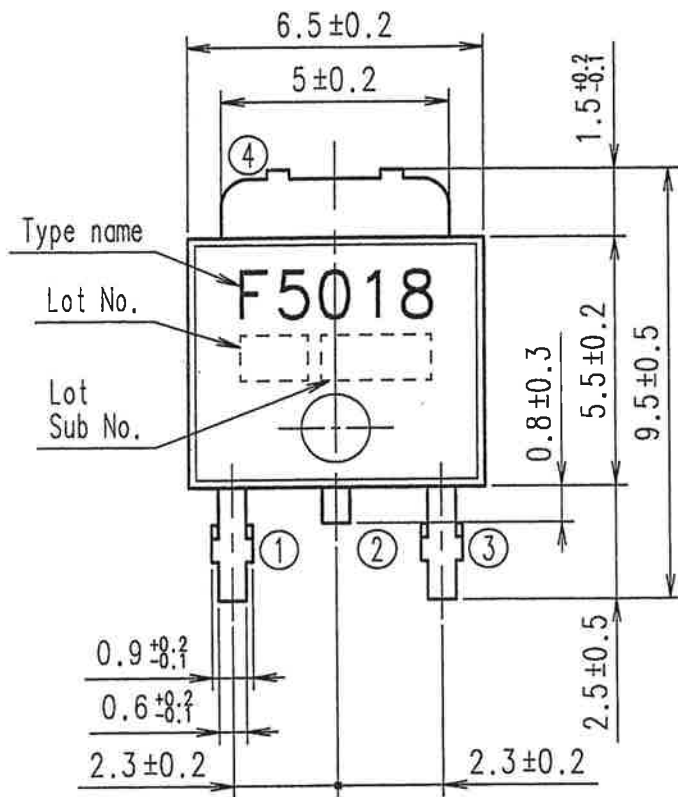
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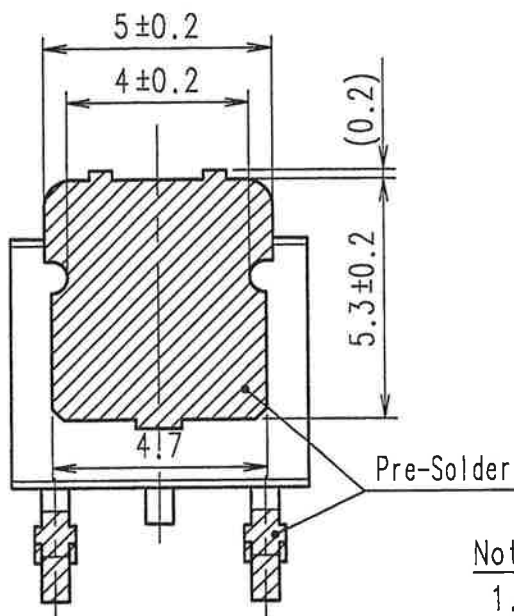
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# FUJI INTELLIGENT POWER MOS FET

## Type: F5018-S



### BOTTOM VIEW



### CONNECTION

- ① GATE
- ②④ DRAIN
- ③ SOURCE

JEDEC: TO-252  
EIAJ: SC-63

#### Notes

1. ( ) : REFERENCE DIMENSIONS.
2. \* : DO NOT INCLUDE SOLDER.

DIMENSIONS ARE IN MILLIMETERS. (a)

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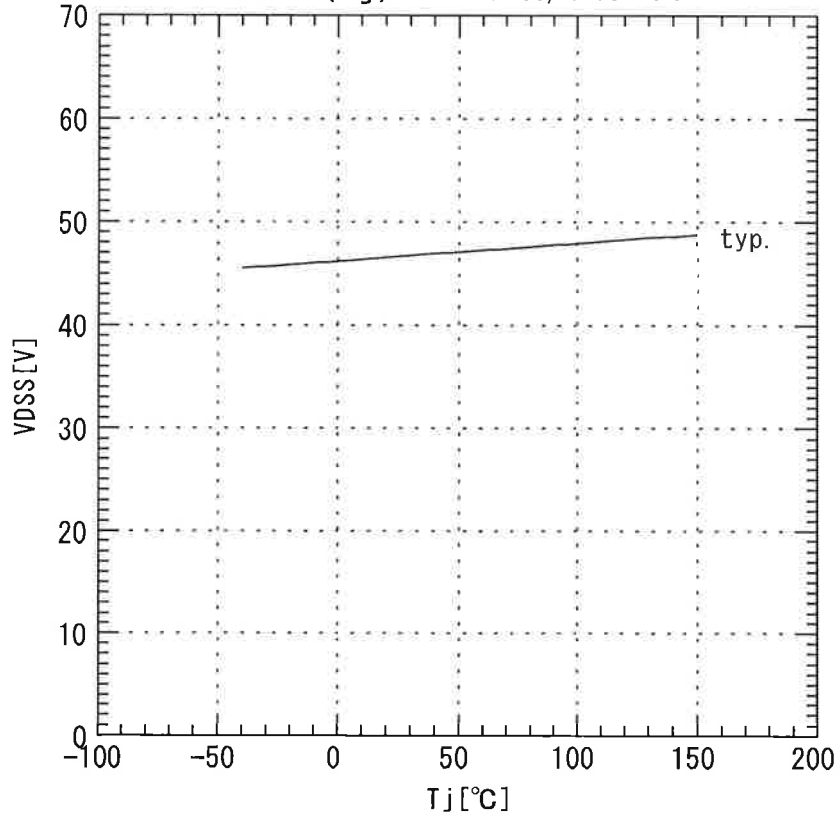
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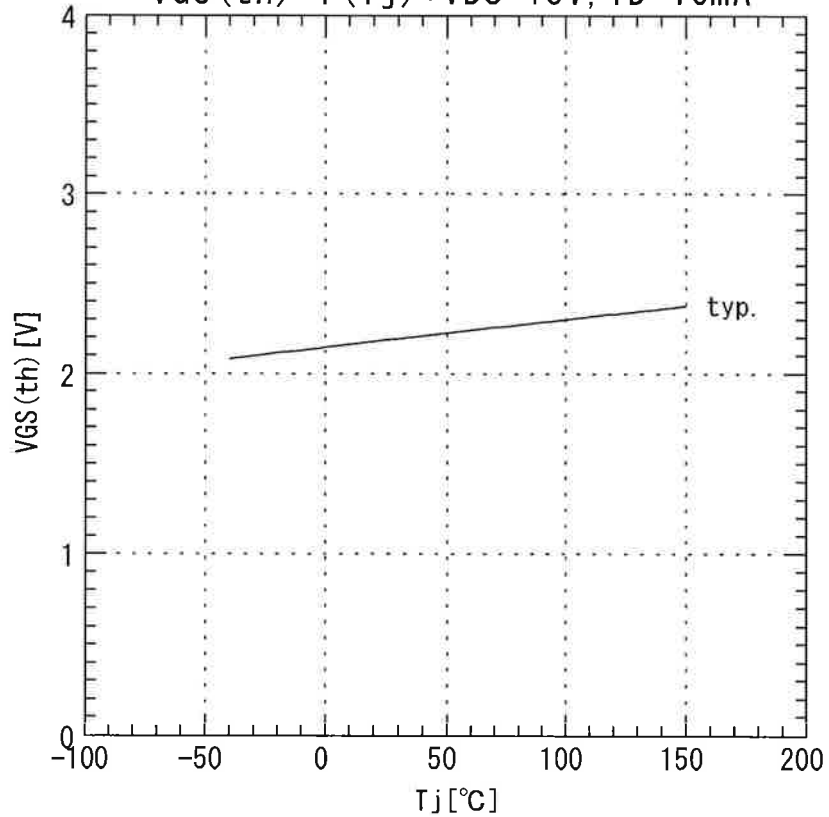
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Drain-source clamp voltage  
 $V_{DSS}=f(T_j) : I_D=1\text{mA}, V_{GS}=0\text{V}$



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



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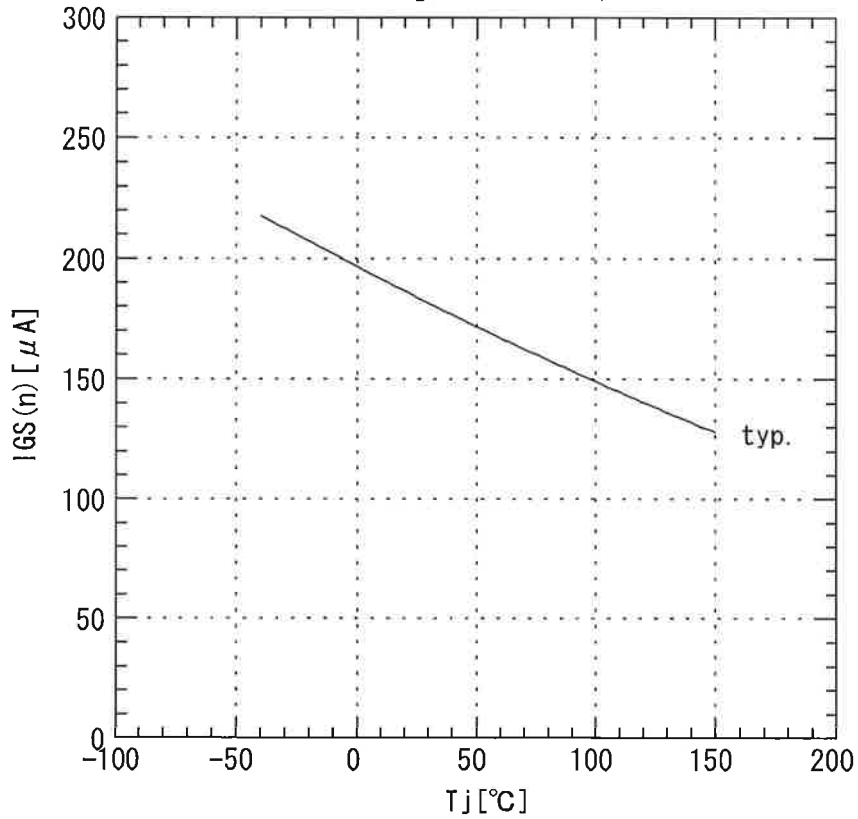
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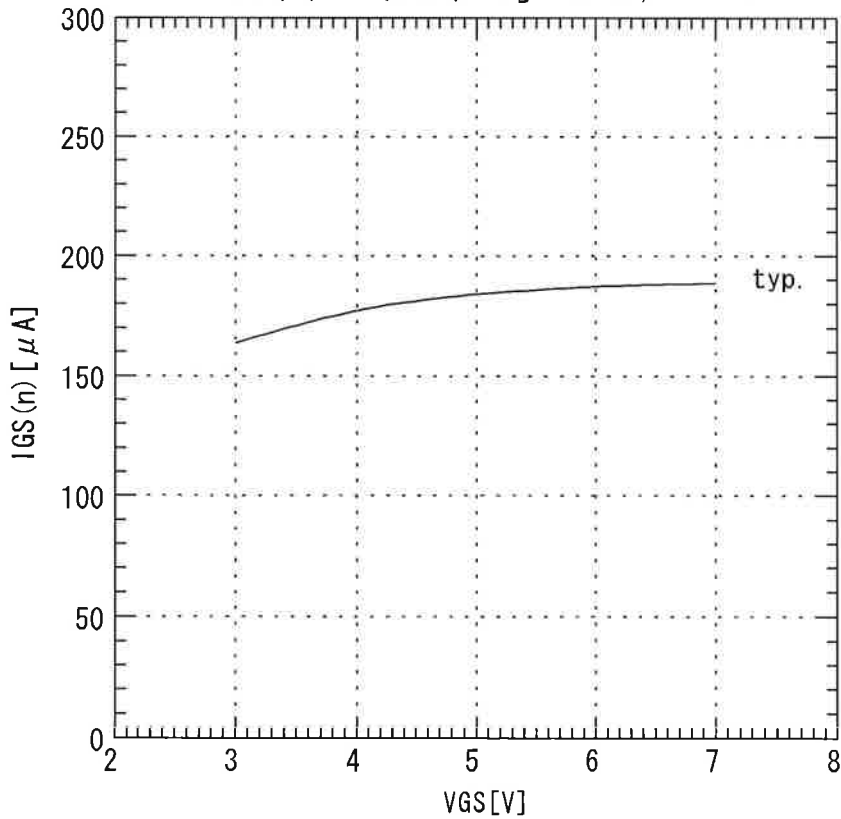
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### Gate-source leakage current $I_{GS}(n) = f(T_j) : V_{GS} = 5V, V_{DS} = 0V$



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



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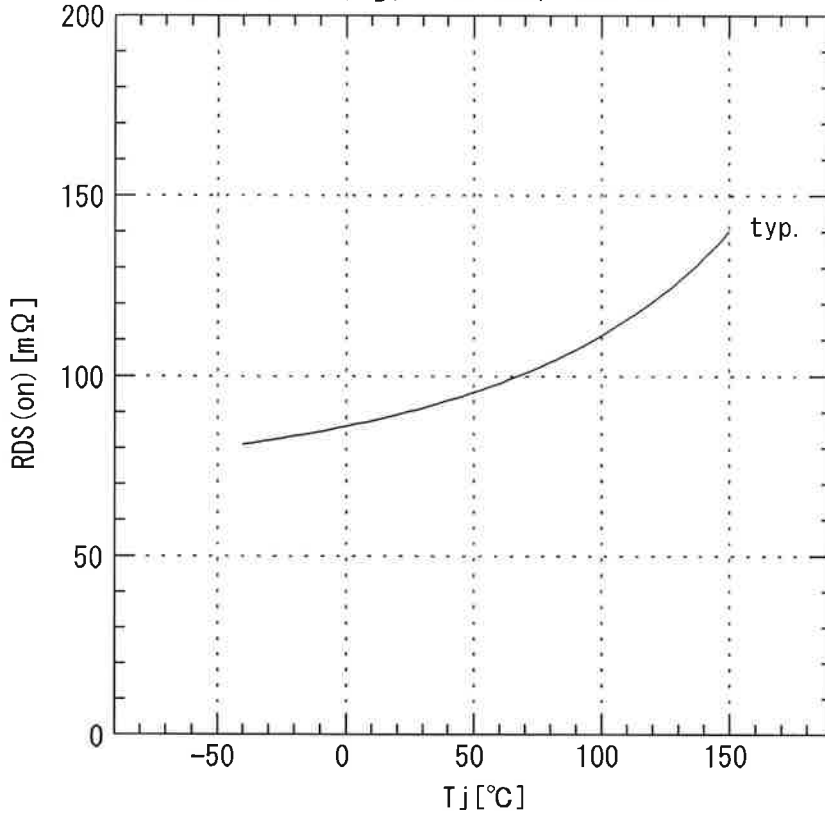
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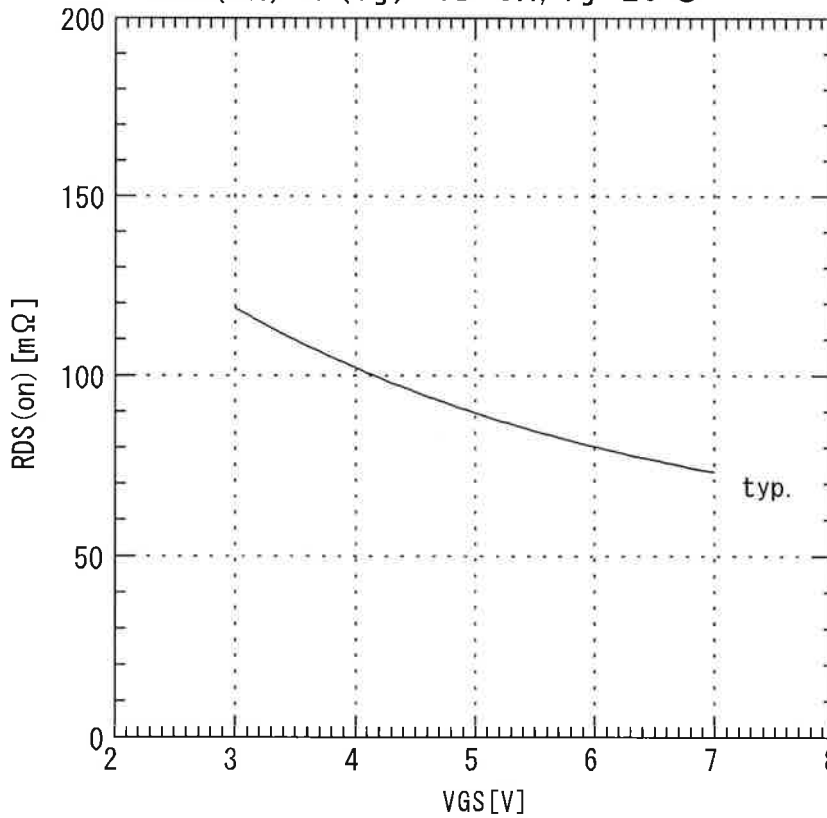


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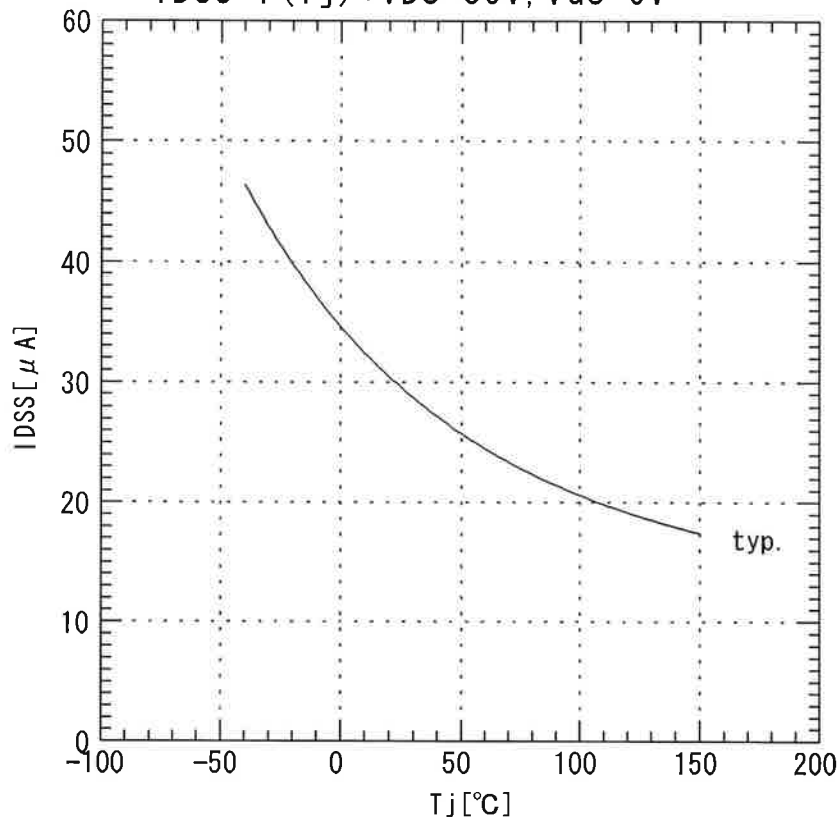
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5A, V_{GS} = 5V$



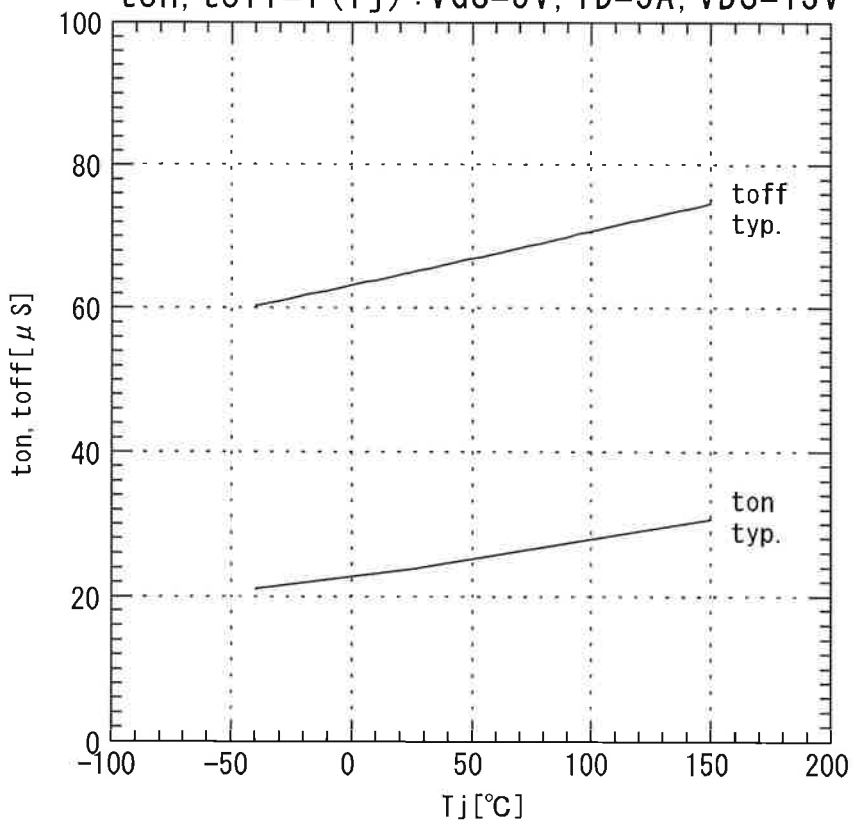
Drain-source on-state resistance  
 $R_{DS(on)} = f(T_j) : I_D = 5A, T_j = 25^\circ C$



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



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

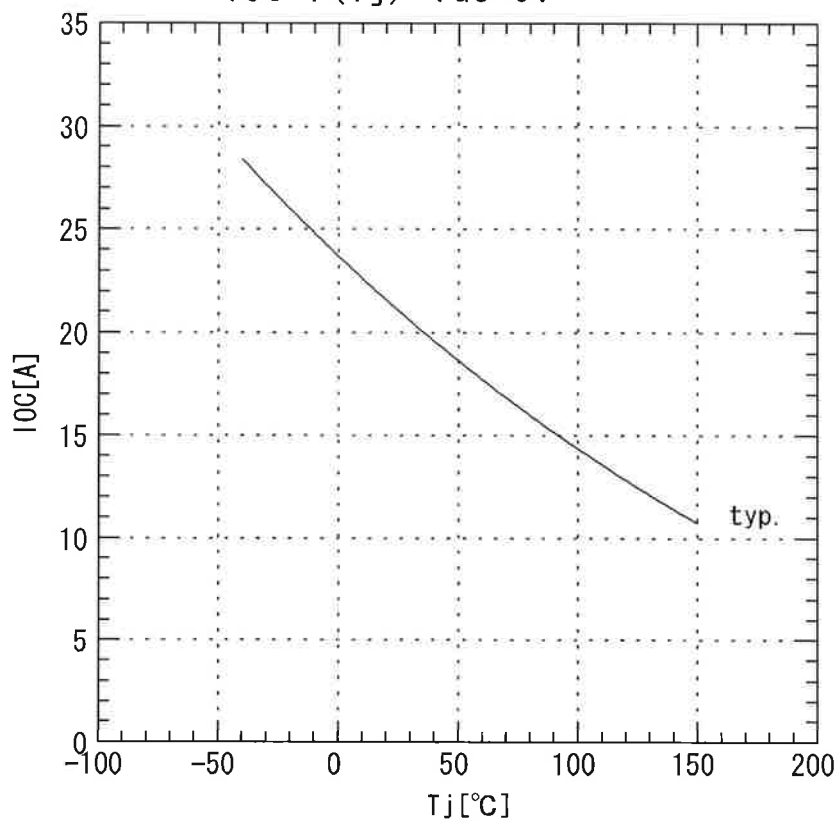


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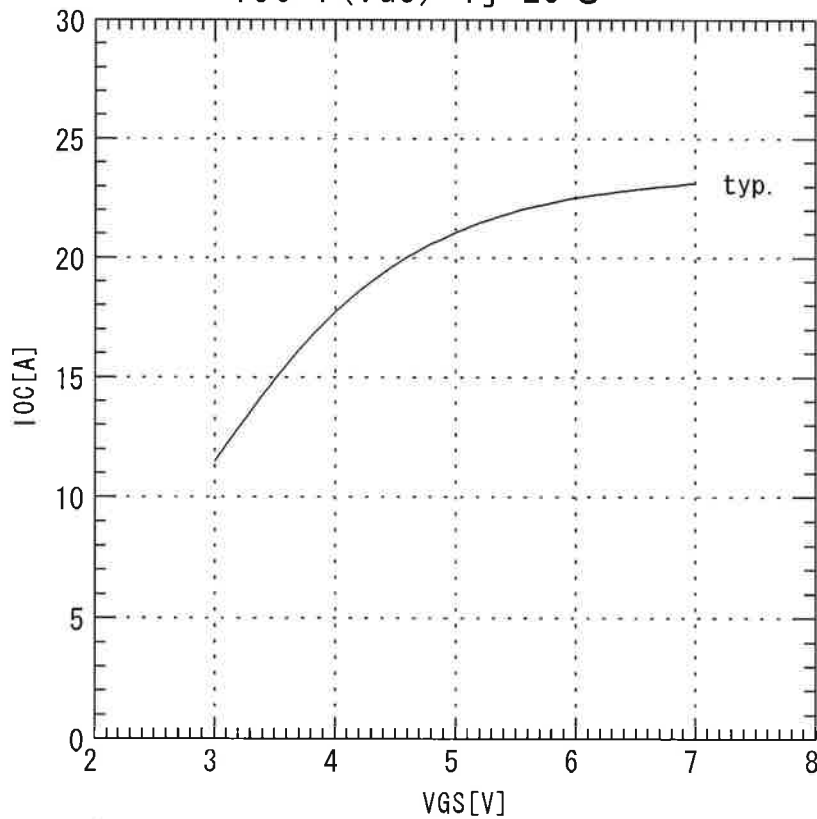
### Short circuit detection

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



### Short circuit detection

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



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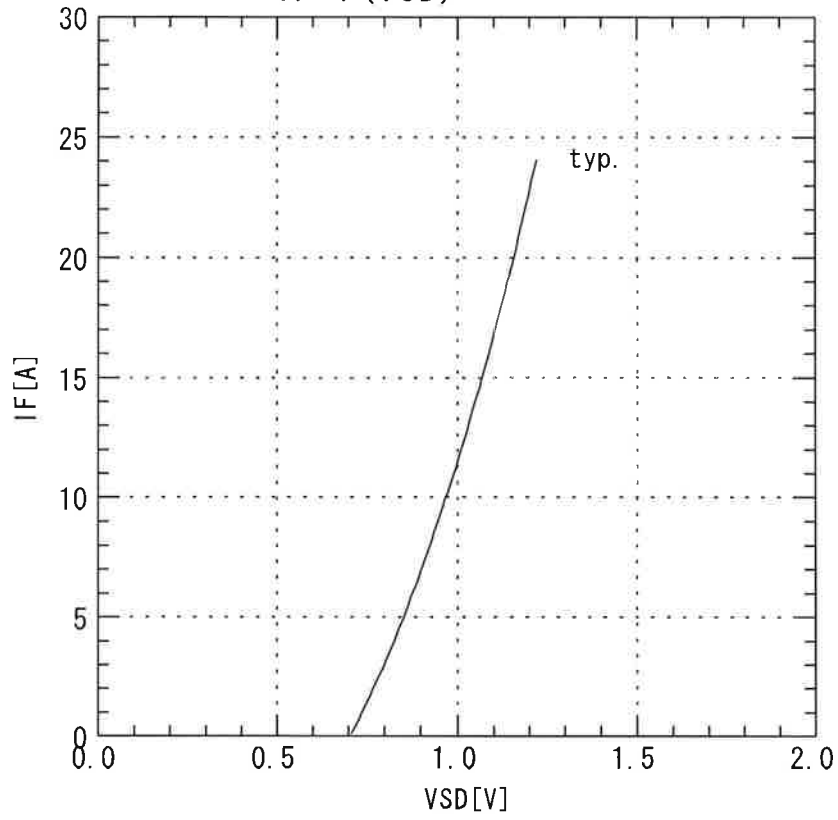
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### Forward on voltage $IF=f(VSD)$



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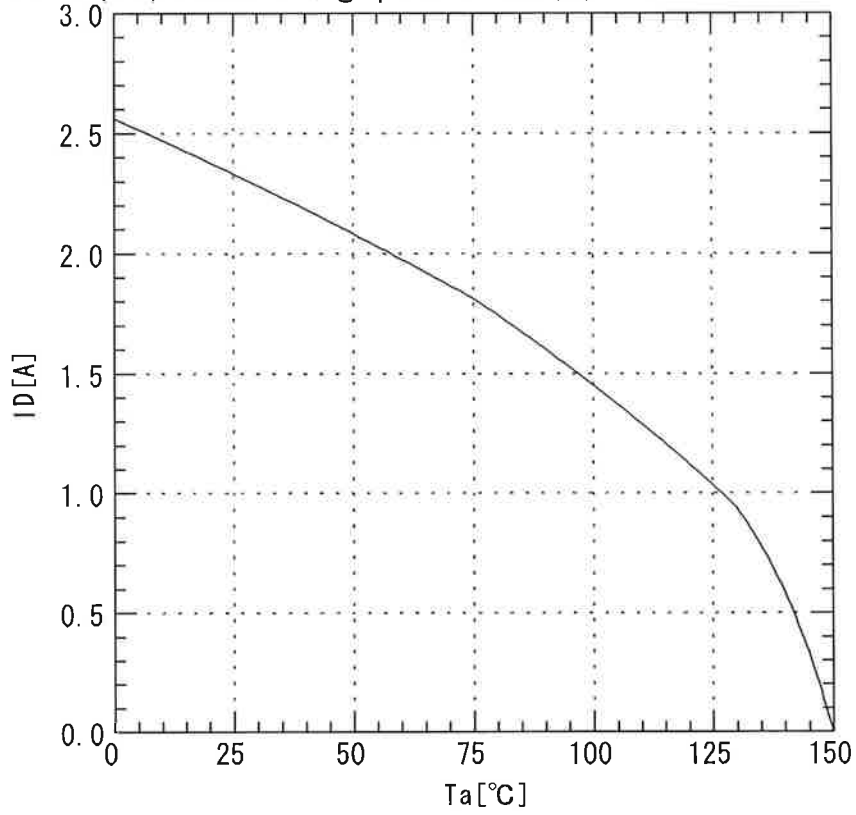
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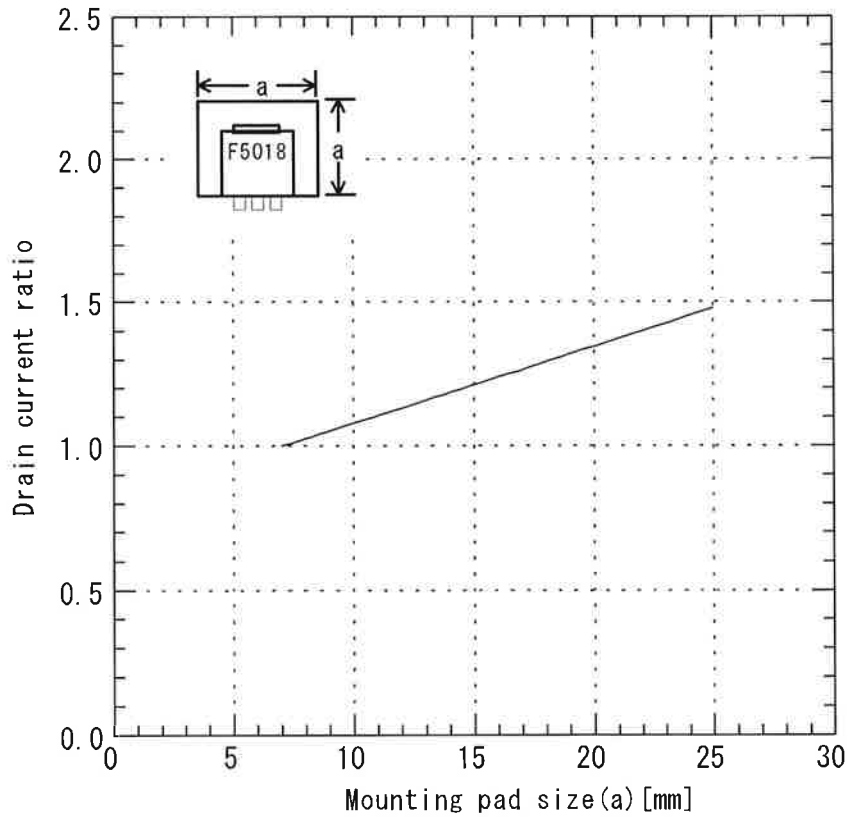
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Continuous drain current VS Ambient temperature  
 $I_D = f(T_a)$ : Mounting pad size (a) = 7mm



Mounting pad size VS Drain current ratio  
 Drain current ratio = f(Mounting pad size)



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