

SPECIFICATION

Device Name : Intelligent Power MOSFET

Type Name : F5023

Spec. No. : **MS5F4431**

Fuji Electric Co.,Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED	Fuji Electric Co.,Ltd.	
DRAWN	Oct-22-1998	R. Tsugawa	<i>S. Furukawa</i>	ORIG. NO.	MS5F4431 1/10
CHECKED	Oct-22-1998	S. Kuroki			

Revised Records

[illegible]

Fuji Electric Co., Ltd.

DRS. NO.

MS5 F4431

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- 1.Scope** This specifies Fuji Intelligent power MOSFET F5023
- 2.Construction** Self-isolation structure
Output part: N-channel enhancement mode power MOSFET
- 3.Application** For switching
- 4.Outview** TO-220 (EIAJ SC-48) (See to 6/10)

5.Absolute maximum ratings (at $T_c=25^{\circ}\text{C}$, unless otherwise specified.)

Description	Symbol	Characteristics	Unit	Conditions
Drain-Source Voltage	V_{DS}	40	V	DC
Gate-Source Voltage	V_{GS}	DC-0.3~7.0	V	DC
Continuous Drain Current	I_D	12	A	
Maximum Power Dissipation	P_D	30	W	
Operating junction temperature	T_j	150	$^{\circ}\text{C}$	
Storage temperature range	T_{stg}	-55 ~ 150	$^{\circ}\text{C}$	

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

Description	Symbol	Conditions	Characteristics			Unit
			min.	typ.	max.	
Drain-Source clamp Voltage	V_{DS}	$I_D=1\text{mA}$ $V_{GS}=0\text{V}$	40		60	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	$V_{GS(p)}$		3.0		7.0	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30\text{V}$ $V_{GS}=0\text{V}$ $V_{DS}=13\text{V}$ $V_{GS}=0\text{V}$			100 1.0	μA mA
Gate-Source Leakage Current	$I_{GS(n)}$ $I_{GS(s)}$	$V_{GS}=5\text{V}$	** ***		500 800	μA
Drain-Source On-State Resistance	$R_{DS(on)}$	$I_D=5\text{A}$ $V_{GS}=5\text{V}$			140	m Ω

** Under normal operation *** Under self protection

Description	Symbol	Conditions	Characteristics			Unit
			min.	typ.	max.	
Turn-On Time	t_{on}	$V_{DS}=13V$ $I_D=5A$			200	μS
Turn-Off Time	t_{off}	$V_{GS}=5V$			200	μS
Over-Temperature Protection	T_{irp}	$V_{GS}=5V$	150			$^{\circ}C$
Short Circuit Protection	I_{oc}	$V_{GS}=5V$	12			A
Single Pulse Inductive Load Switch -Off Energy Dissipation	E_{CL}	$T_j=150^{\circ}C$ $V_{GS}=5V$	100			mJ

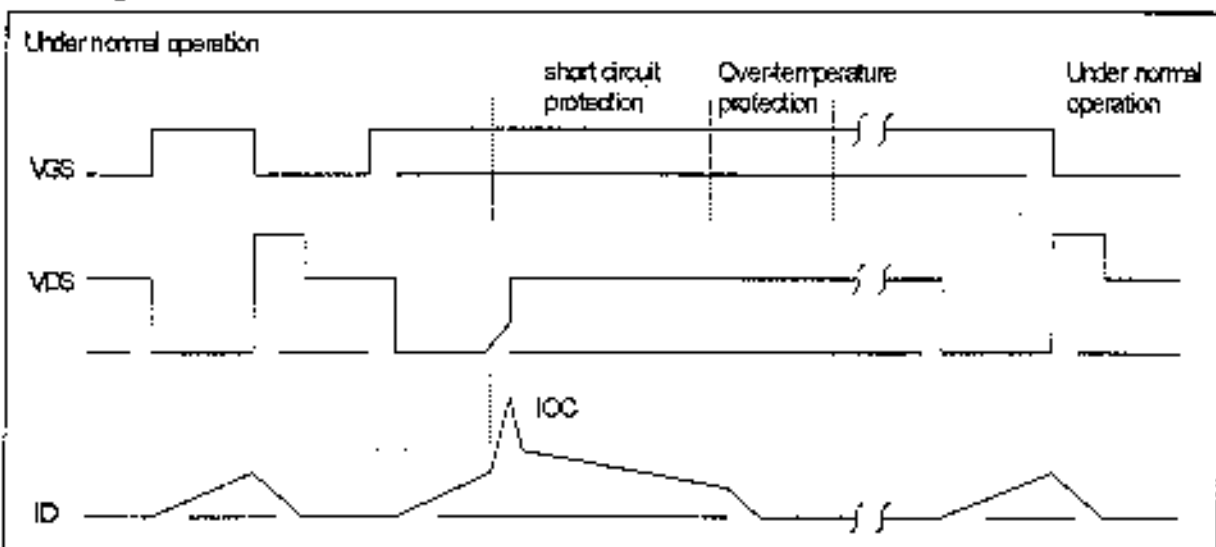
7.Thermal resistance

Description	Symbol	Conditions	Characteristics			Unit
			min.	typ.	max.	
Thermal Resistance	$R_{th(j-a)}$	Junction-Ambient			75	$^{\circ}C/W$

8.Electrostatic discharge

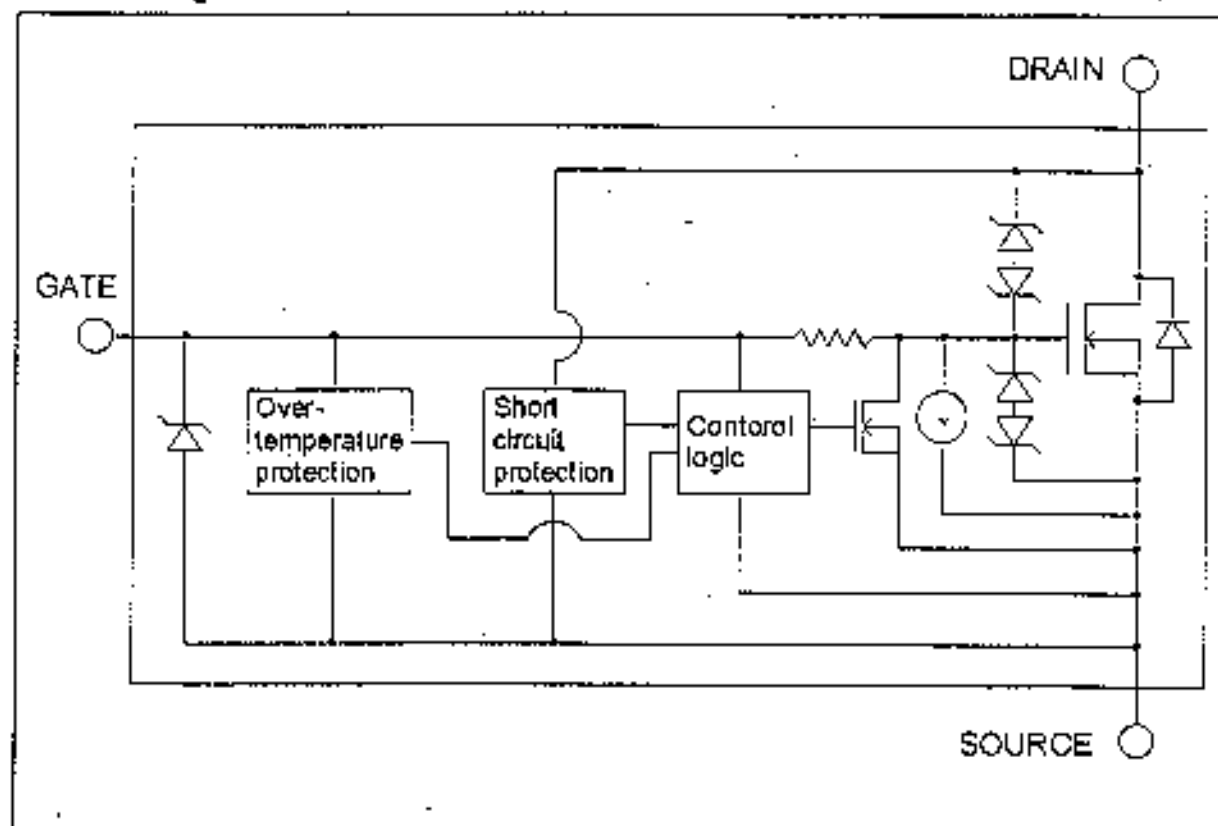
Description	Conditions	Characteristics			Unit
		min.	typ.	max.	
Drain-Source	150pF, 150 Ω	± 15			kV
Gate-Source		± 0.5			kV

9.Timing chart

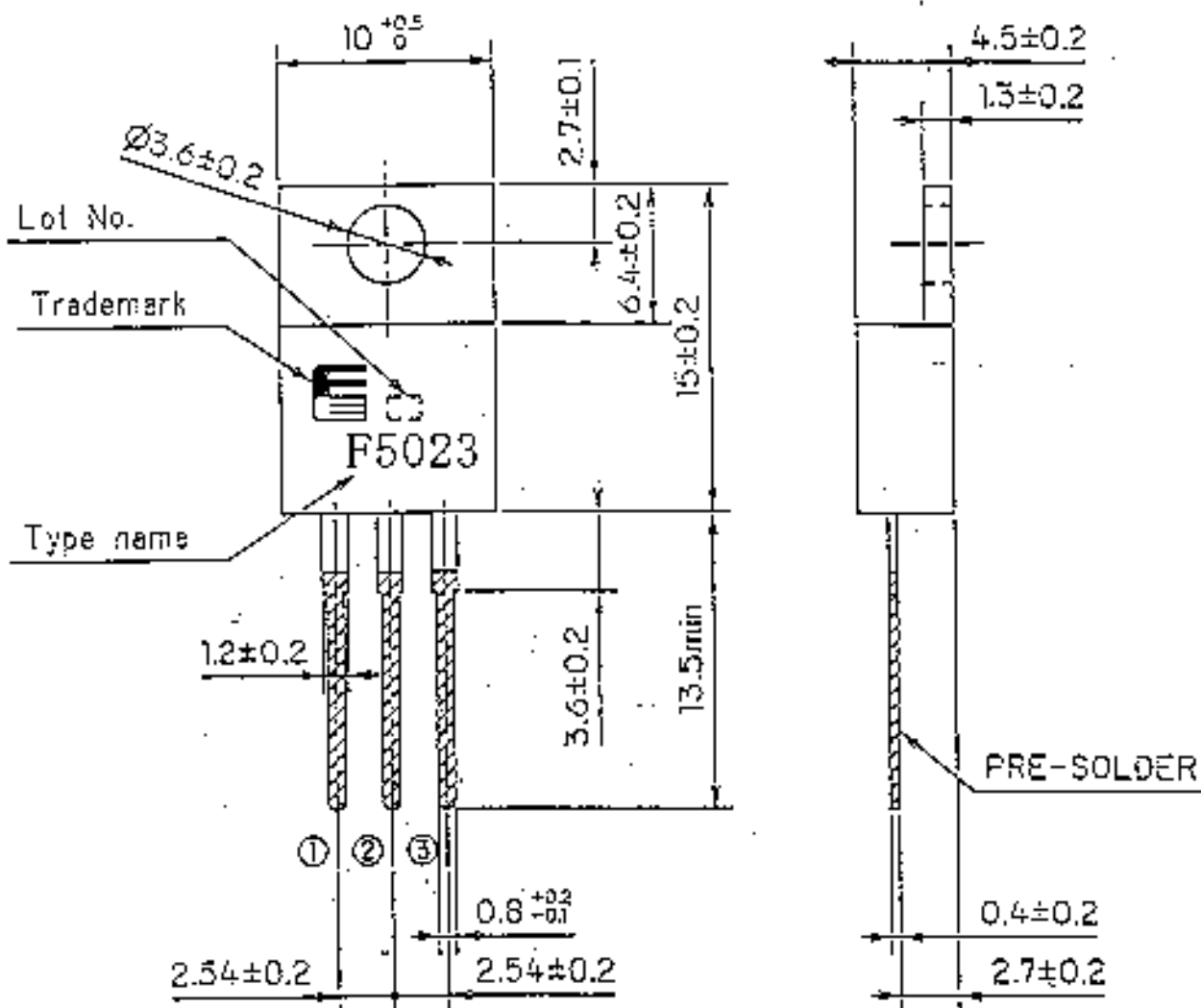


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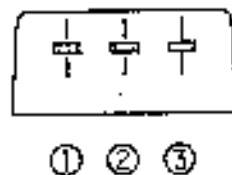
10. Block diagram



MOSFET Type:F5023



CONNECTION



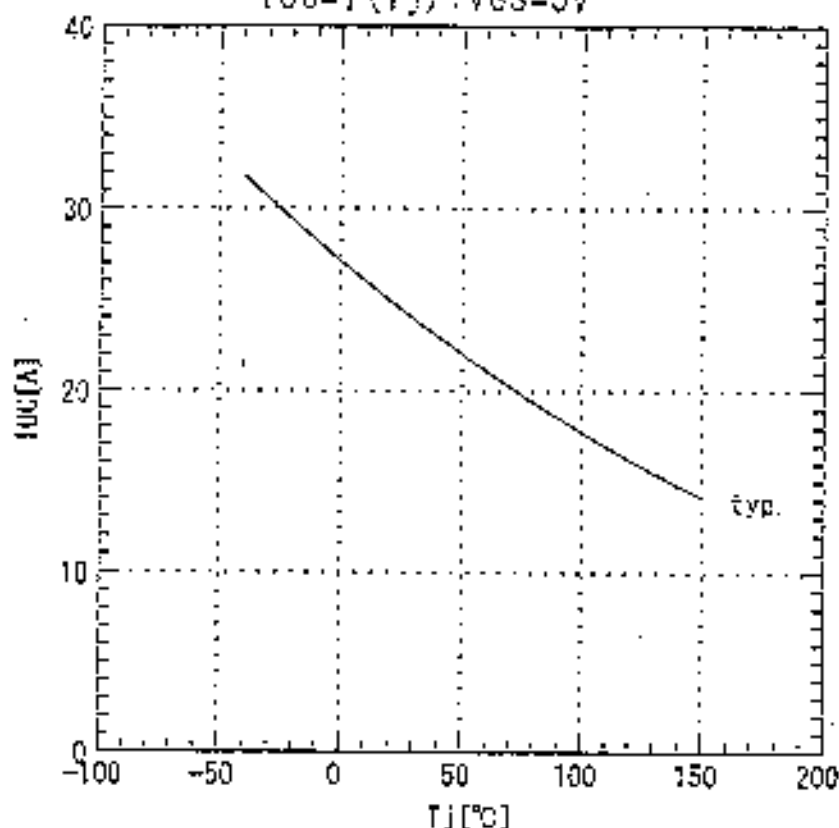
- ① GATE
- ② DRAIN
- ③ SOURCE

JEDEC : TO-220AB

DIMENSIONS ARE IN MILLIMETERS.

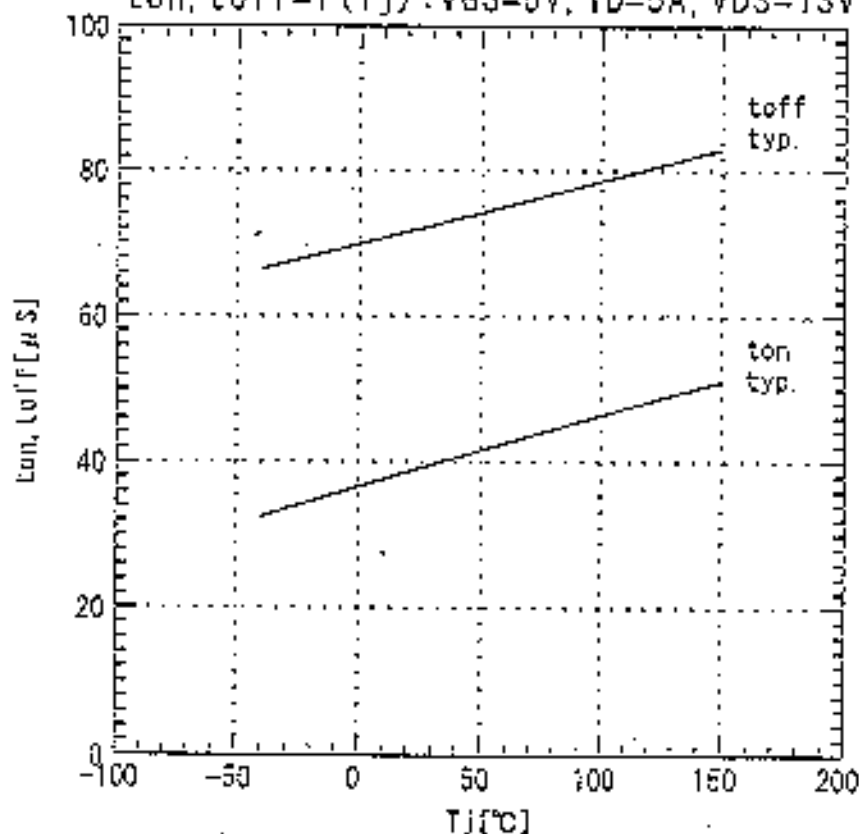
Over-current detection

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

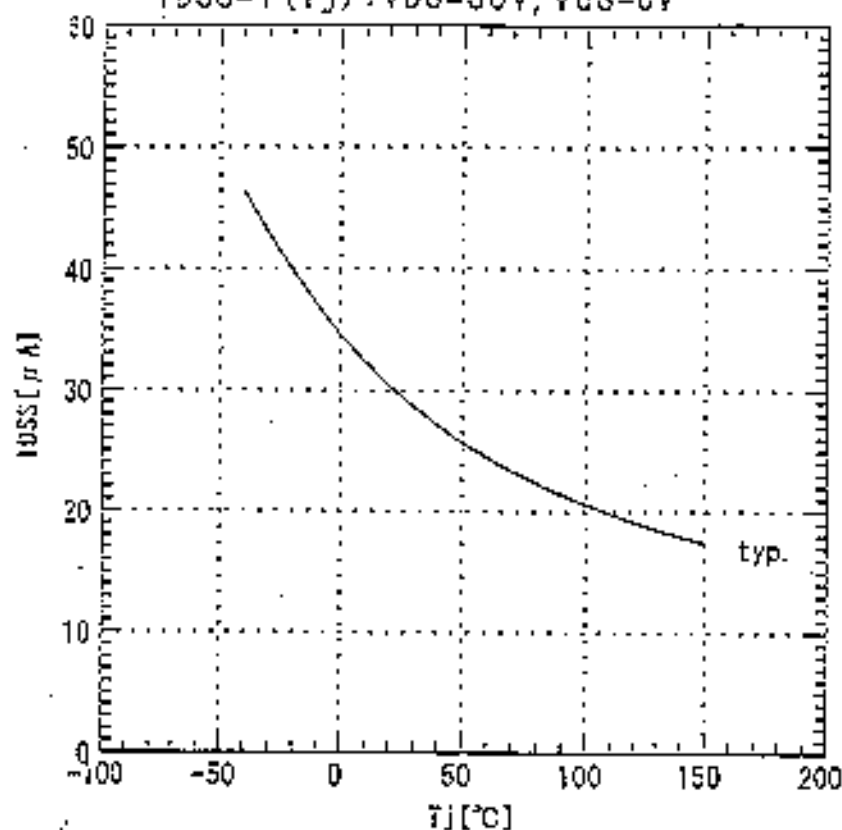


Turn-on time, Turn-off time

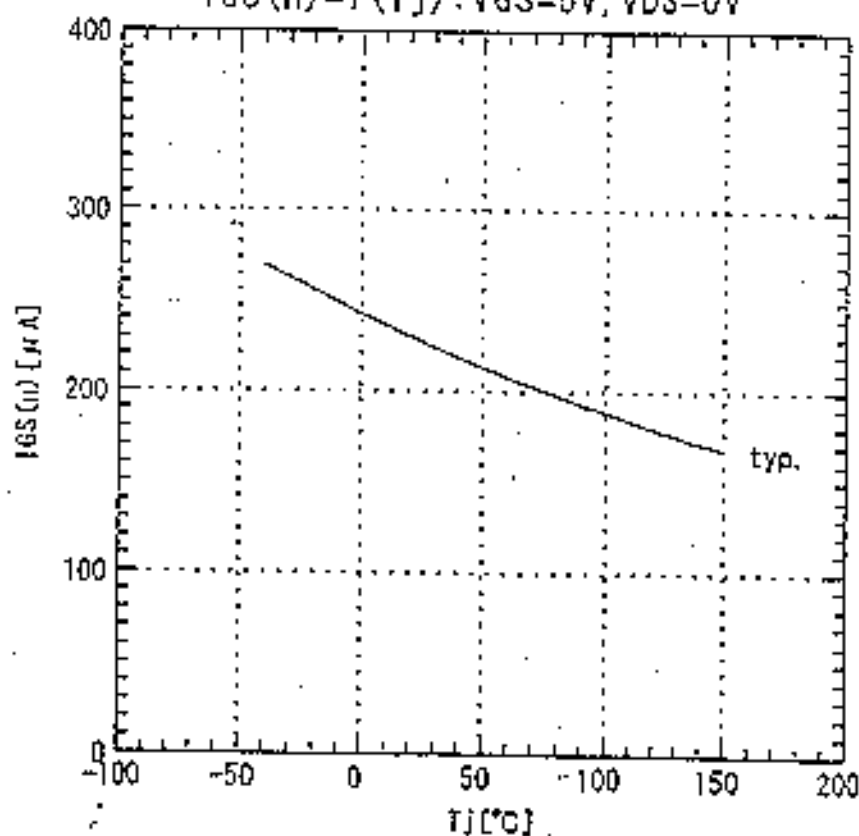
$$t_{on}, t_{off}=f(T_j):V_{GS}=5V, I_D=5A, V_{DS}=13V$$



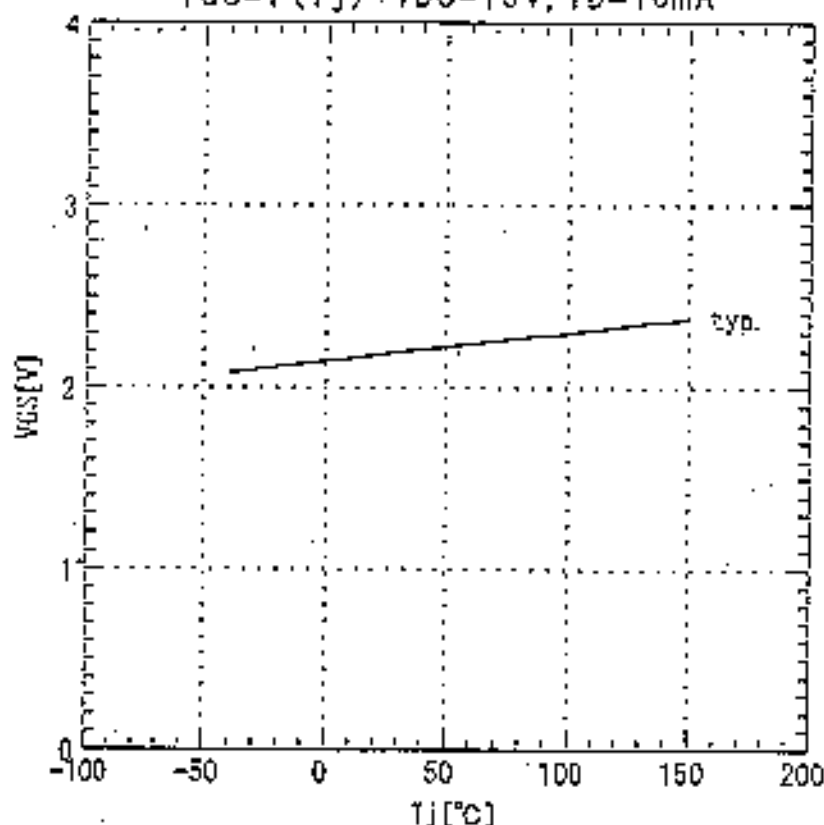
Zero gate voltage drain current
 $I_{DSS} = f(T_j) : V_{DS} = 30V, V_{GS} = 0V$



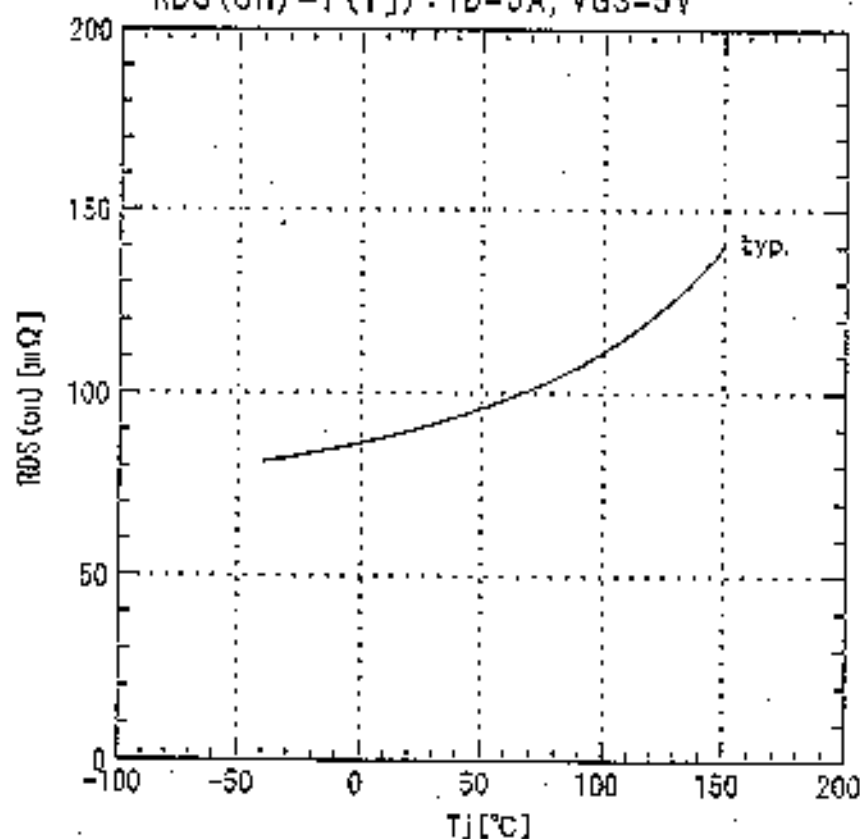
Gate-source leakage current
 $I_{GS}(n) = f(T_j) : V_{GS} = 5V, V_{DS} = 0V$



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

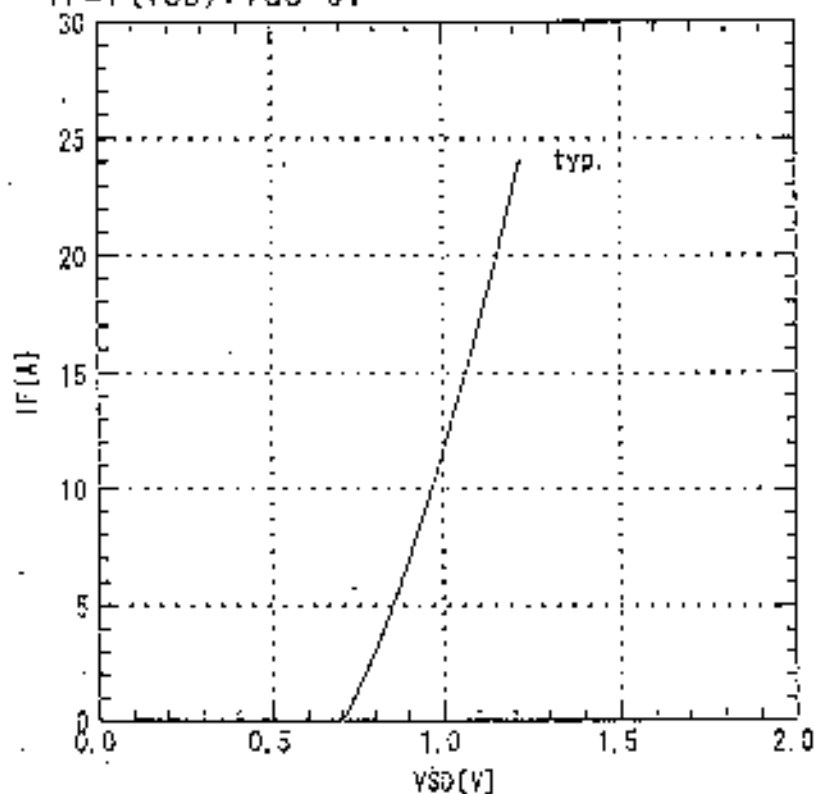


Drain-source on-state resistance
 $R_{DS(on)} = f(T_J) : I_D = 5A, V_{GS} = 5V$



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Forward characteristic of reverse of diode
 $I_F = f(V_{SD}) : V_{GS} = 0V$



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H04-004-03