

# SPECIFICATION

DEVICE NAME : Power MOSFET

TYPE NAME : 2SK1390-R

SPEC. No. :

Fuji Electric Co.,Ltd.

This Specification is subject to change without notice.

	DATE	NAME	APPROVED	Fuji Electric Co.,Ltd.		
DRAWN				DWG.NO.	1/10	
CHECKED						

1. Scope  
This specifies Fuji power MOSFET 2SK1390-R
2. Construction N-channel enhancement mode power MOSFET
3. Application for switching
4. Outview TO-3PF Outview See to 4/10 page
5. Absolute maximum ratings at  $T_c=25^\circ\text{C}$  (unless otherwise specified)

Description	Symbol	Characteristics	Unit	Remarks
Drain-source voltage	$V_{DS}$	60	V	
Drain-gate voltage	$V_{DGR}$	60	V	$R_{GS} = 20\text{K}\Omega$
Continuous Drain current	$I_D$	$\pm 50$	A	
Pulsed drain current	$I_{Dpulso}$	$\pm 200$	A	
Gate-source voltage	$V_{GS}$	$\pm 20$	V	
Maximum power dissipation	$P_D$	80	W	
Operating and storage temperature range	$T_{ch}$	150	$^\circ\text{C}$	
	$T_{sto}$	-55 ~ +150	$^\circ\text{C}$	

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

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	$BV_{DSS}$	$I_D = 1\text{mA}$ $V_{GS} = 0\text{V}$	60			V
Gate threshold voltage	$V_{GS(th)}$	$I_D = 1\text{mA}$ $V_{DS} = V_{GS}$	1.0	1.5	2.5	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 60\text{V}$ $V_{GS} = 0\text{V}$	$T_{ch} = 25^\circ\text{C}$	10	500	$\mu\text{A}$
	$I_{DSS}$		$T_{ch} = 125^\circ\text{C}$	0.2	1.0	mA
Gate-source leakage current	$I_{GSS}$	$V_{GS} = \pm 20\text{V}$ $V_{DS} = 0\text{V}$		10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D = 25\text{A}$	$V_{GS} = 4\text{V}$	0.022	0.040	$\Omega$
			$V_{GS} = 10\text{V}$	0.015	0.025	

Dynamic ratings

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Forward transconductance	$g_{fs}$	$I_D = 25A$ $V_{DS} = 25V$	20	36		S
Input capacitance	$C_{iss}$	$V_{DS} = 25V$ $V_{GS} = 0V$ $f = 1MHz$		2600	3900	pF
Output capacitance	$C_{oss}$			800	1200	pF
Reverse transfer capacitance	$C_{rss}$			400	600	pF
Turn-on time	$t_{d(on)}$	$V_{CC} = 30V$ $V_{GS} = 10V$ $I_D = 50A$ $R_{GS} = 25\Omega$		20	30	ns
	$t_r$			130	200	ns
Turn-off time	$t_{d(off)}$			400	600	ns
	$t_f$			170	250	ns

Reverse diode

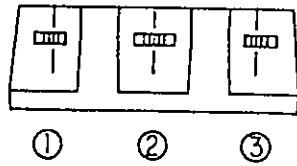
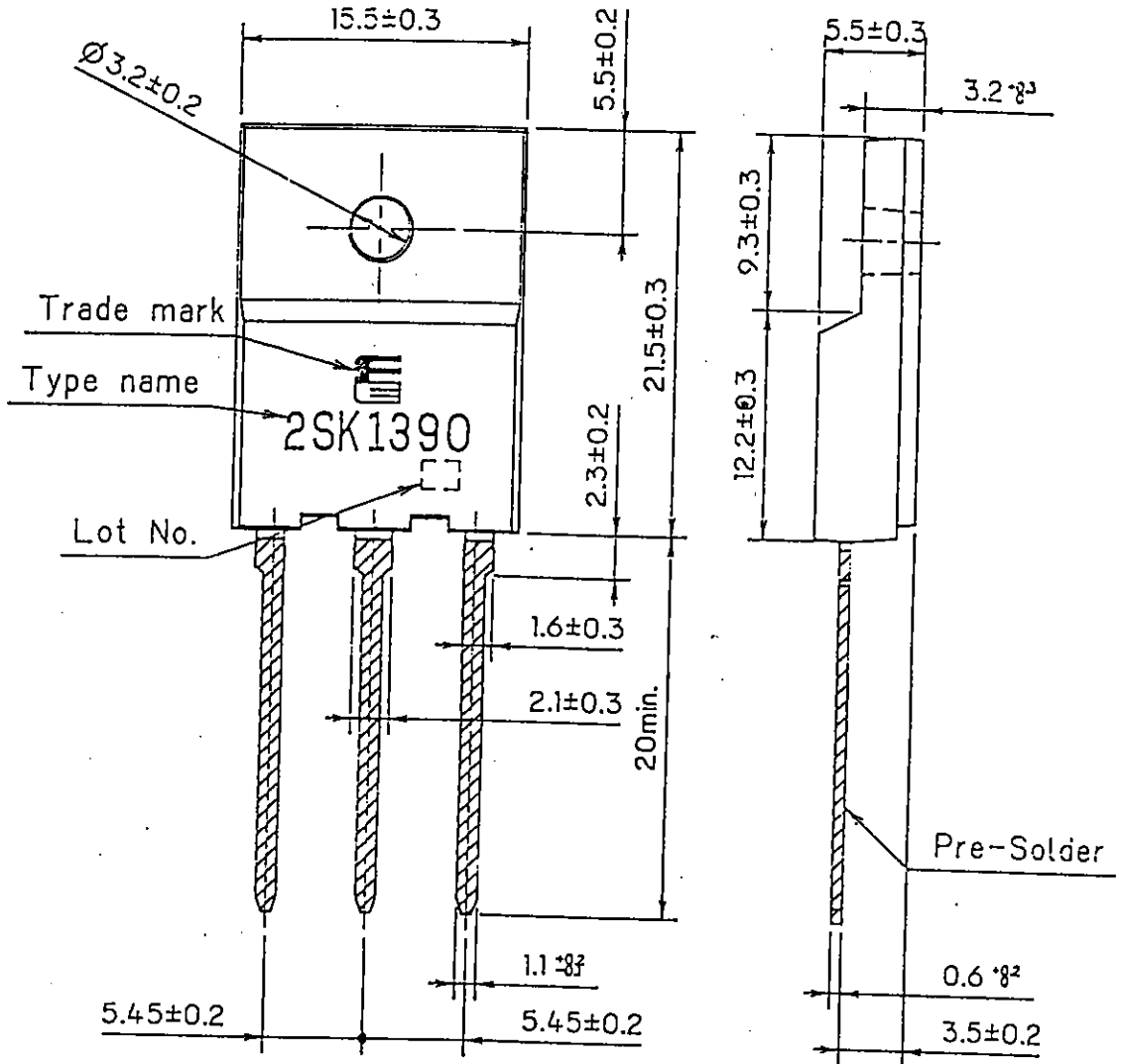
Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Diode forward on-voltage	$V_{SD}$	$I_F = 2 \times I_{DR}$ $V_{GS} = 0V, T_{ch} = 25^\circ C$		1.35	2.00	V
Reverse recovery time	$t_{rr}$	$I_F = I_{DR}$ $V_{GS} = 0V$ $-di_F/dt = 100A/\mu s$ $T_{ch} = 25^\circ C$		100		ns
Reverse recovery charge	$Q_{rr}$			0.5		$\mu C$

7. Thermal resistance

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th_{ch-c}}$				1.56	$^\circ C/W$
	$R_{th_{ch-a}}$				30.0	$^\circ C/W$

FUJI POWER MOSFET

TYPE : 2SK1390-R



CONNECTION

- ① GATE
- ② DRAIN
- ③ SOURCE

DIMENSIONS ARE IN MILLIMETERS.

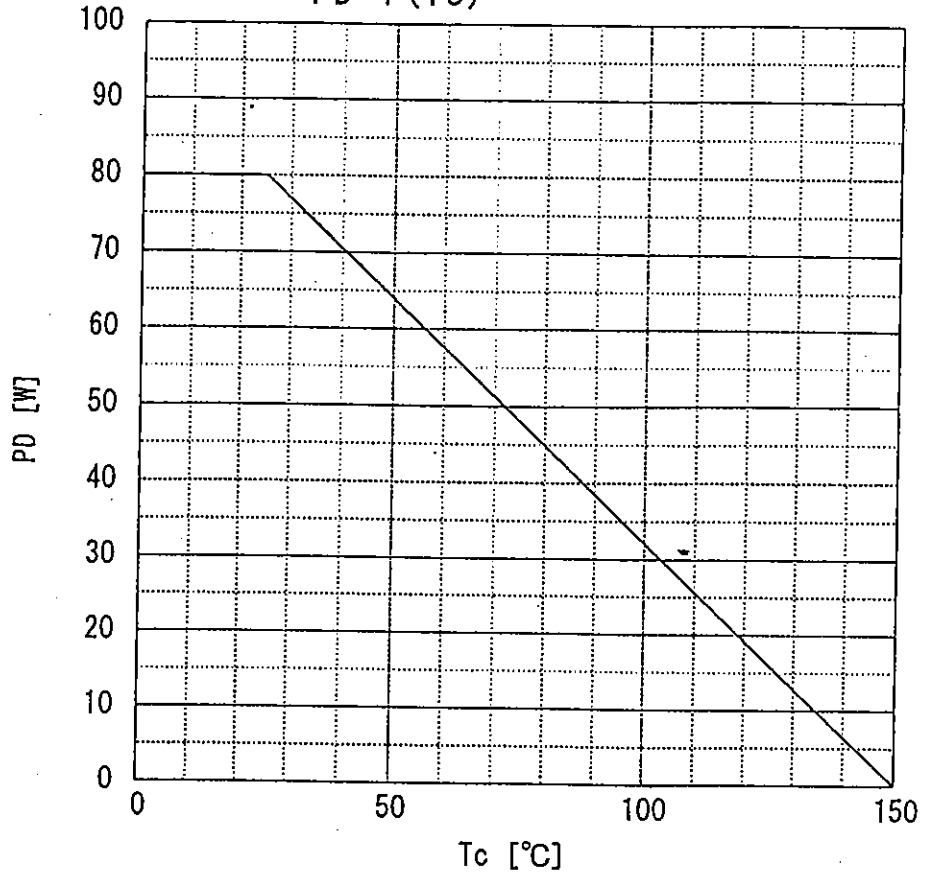
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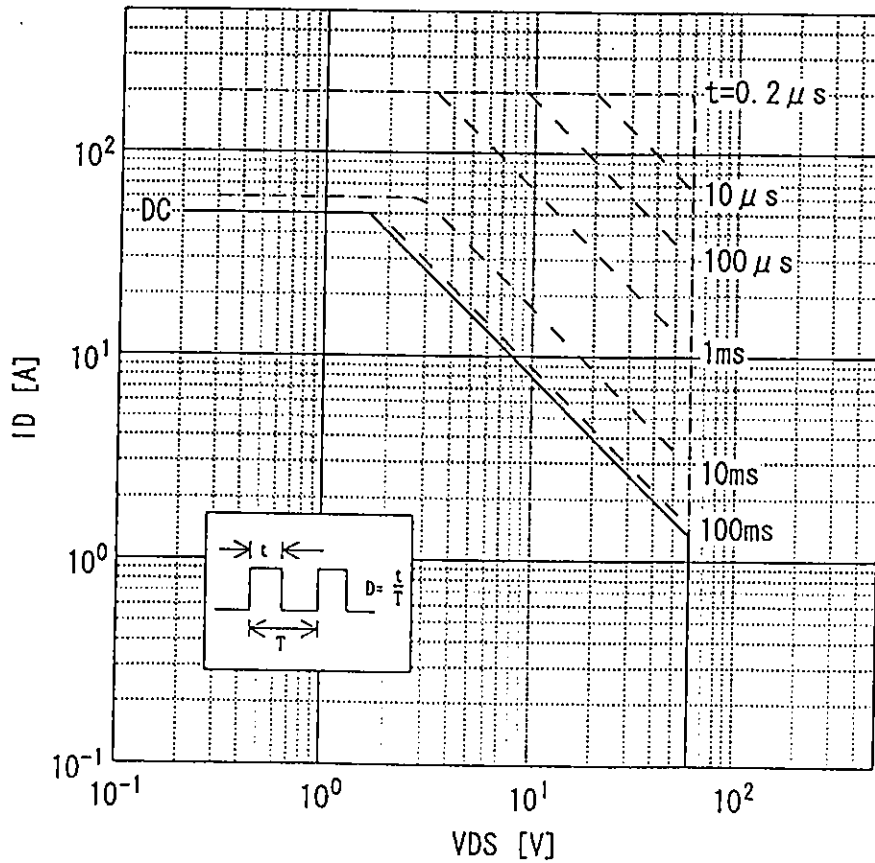
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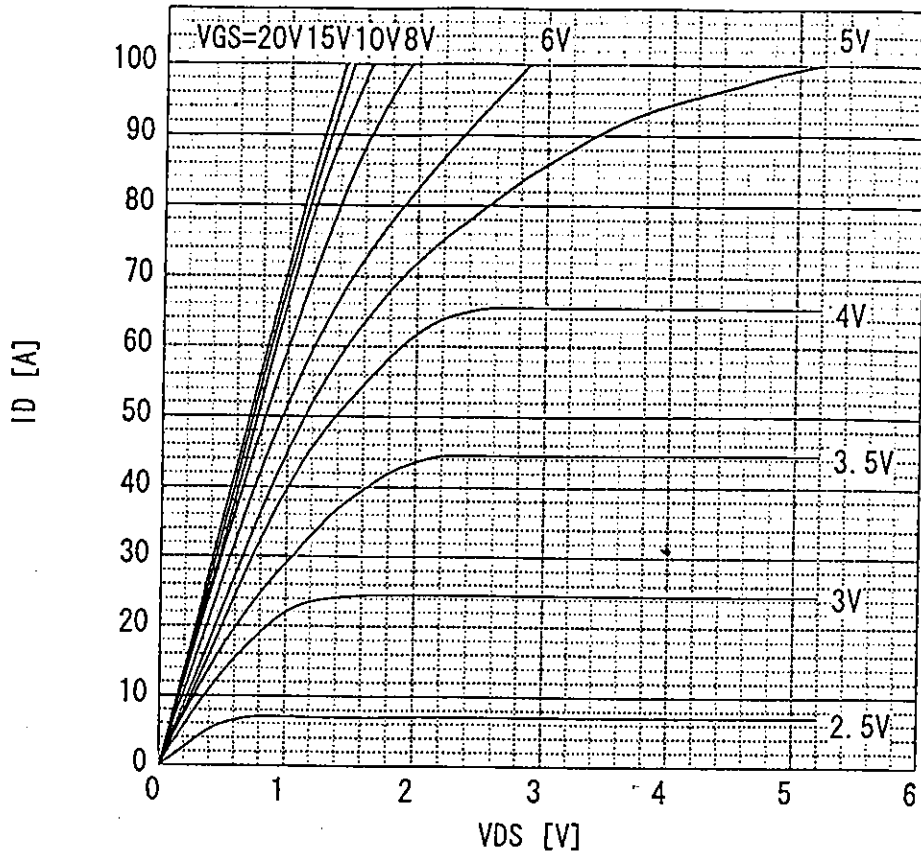
Power Dissipation  
 $PD=f(T_c)$



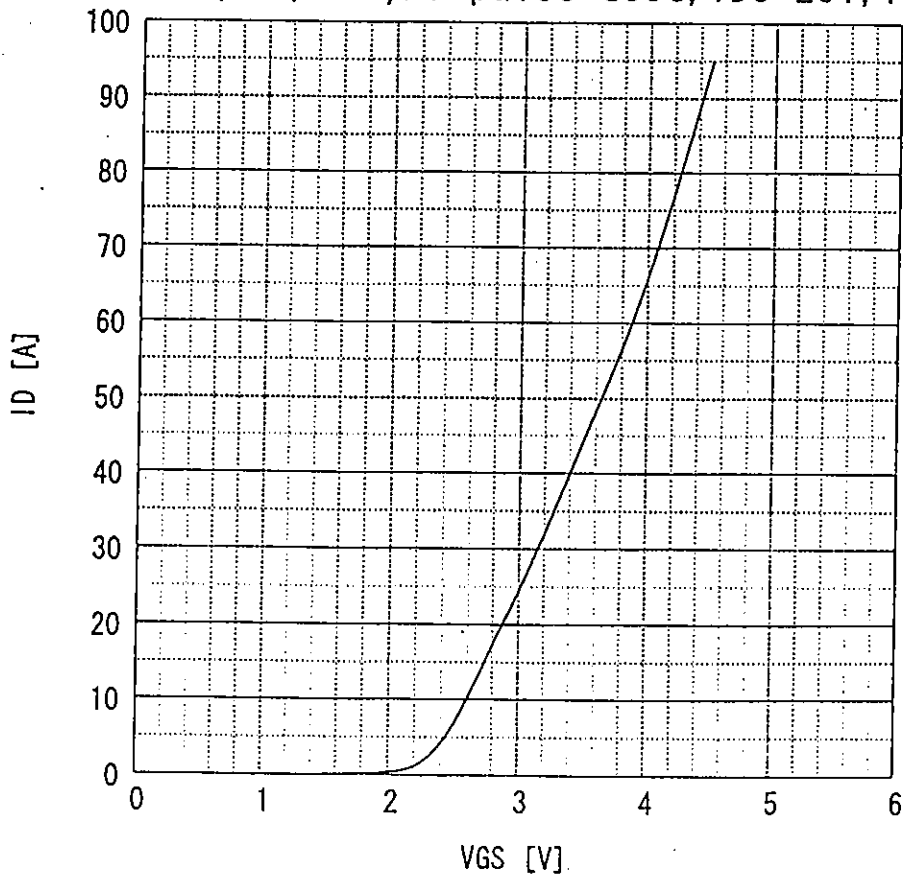
Safe operating area  
 $ID=f(V_{DS}) : D=0.01, T_c=25^\circ C$



Typical output characteristics  
 $I_D = f(V_{DS}) : 80 \mu s$  pulse test,  $T_c = 25^\circ C$

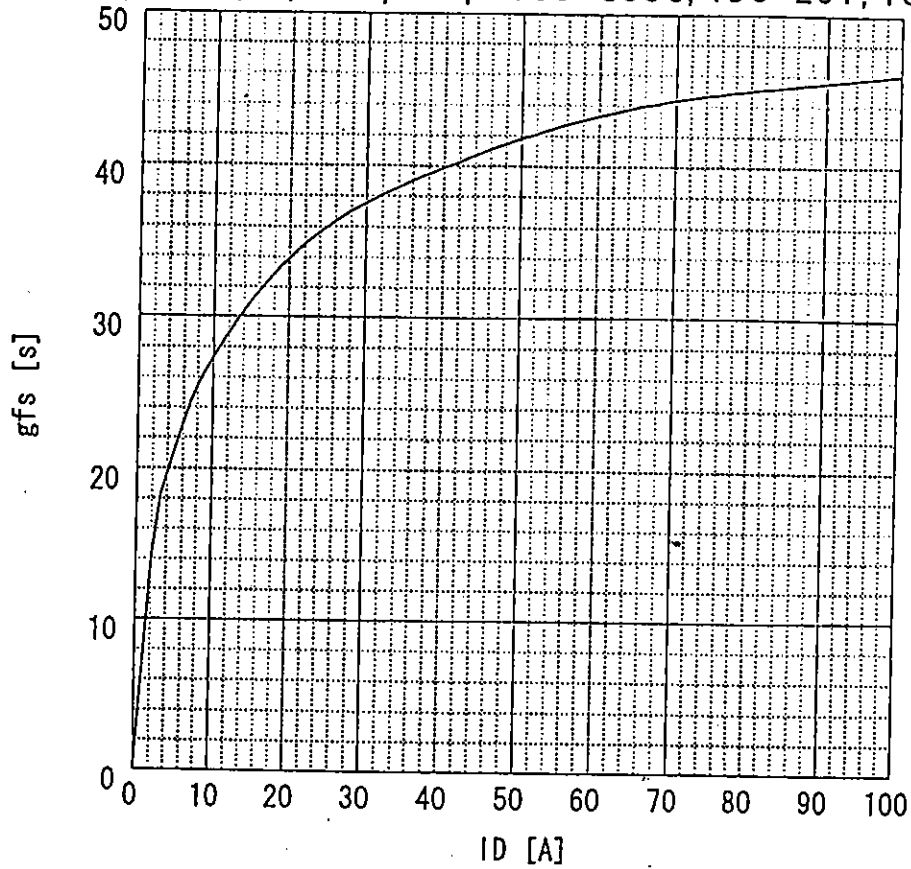


Typical transfer characteristic  
 $I_D = f(V_{GS}) : 80 \mu s$  pulse test,  $V_{DS} = 25V$ ,  $T_{ch} = 25^\circ C$



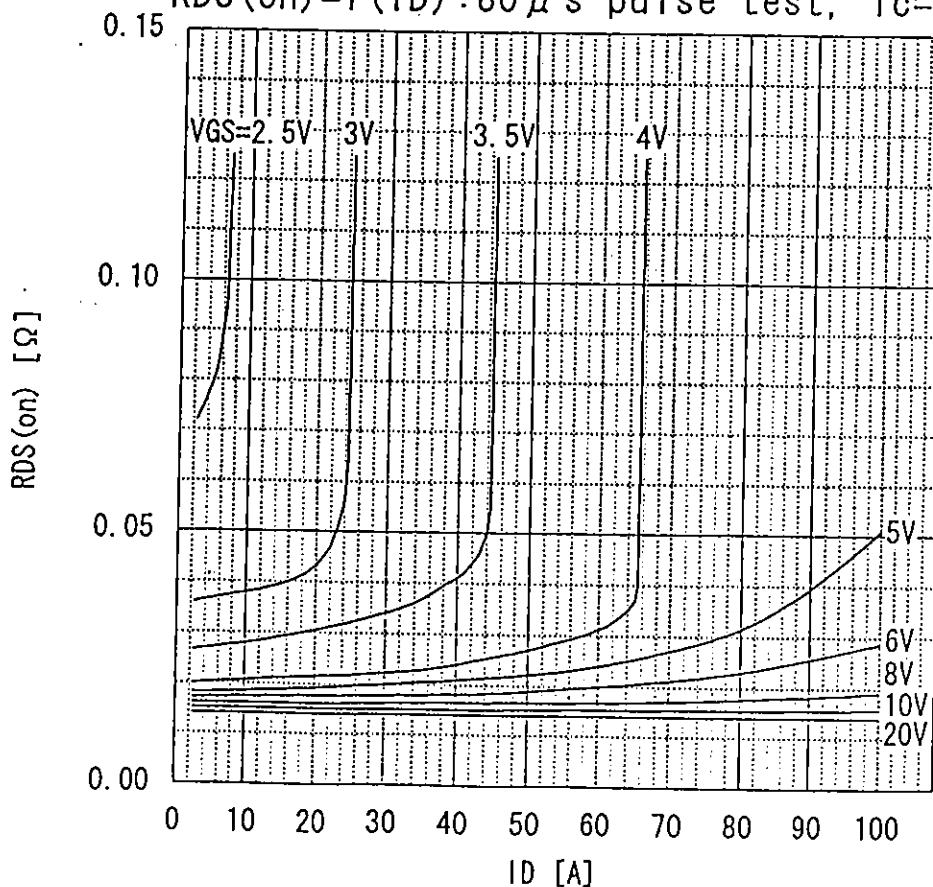
Typical forward transconductance

$g_{fs} = f(I_D)$ : 80  $\mu$ s pulse test,  $V_{DS} = 25V$ ,  $T_{ch} = 25^\circ C$

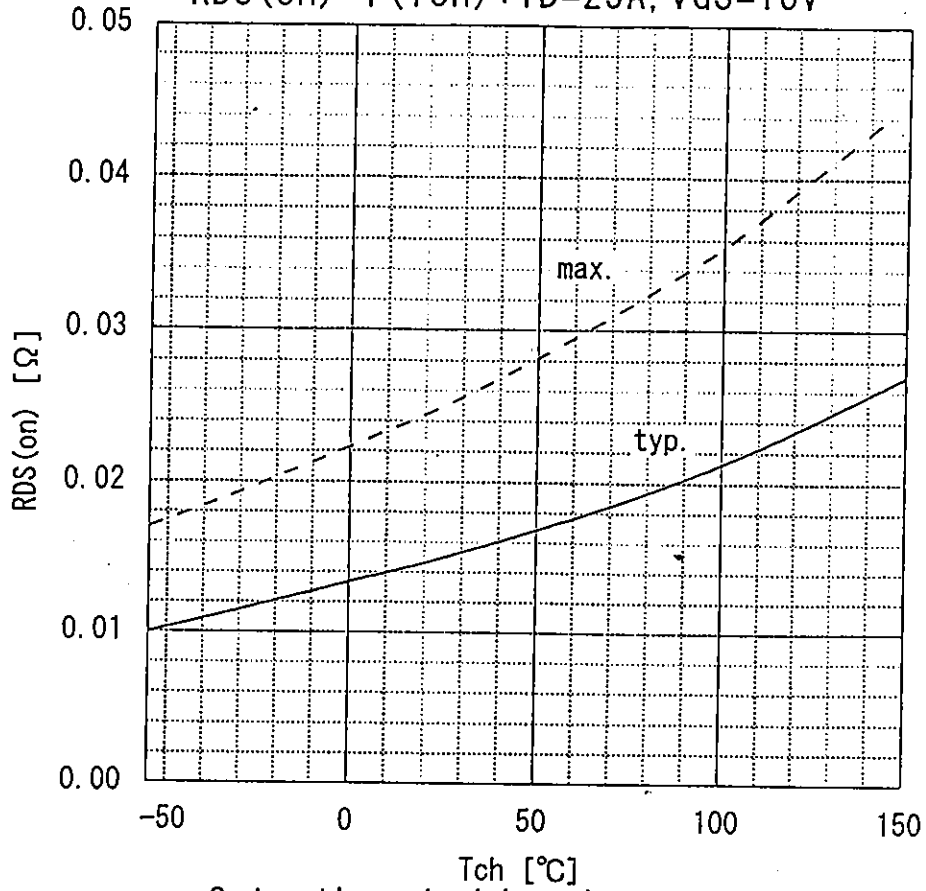


Typical drain-source on-state resistance

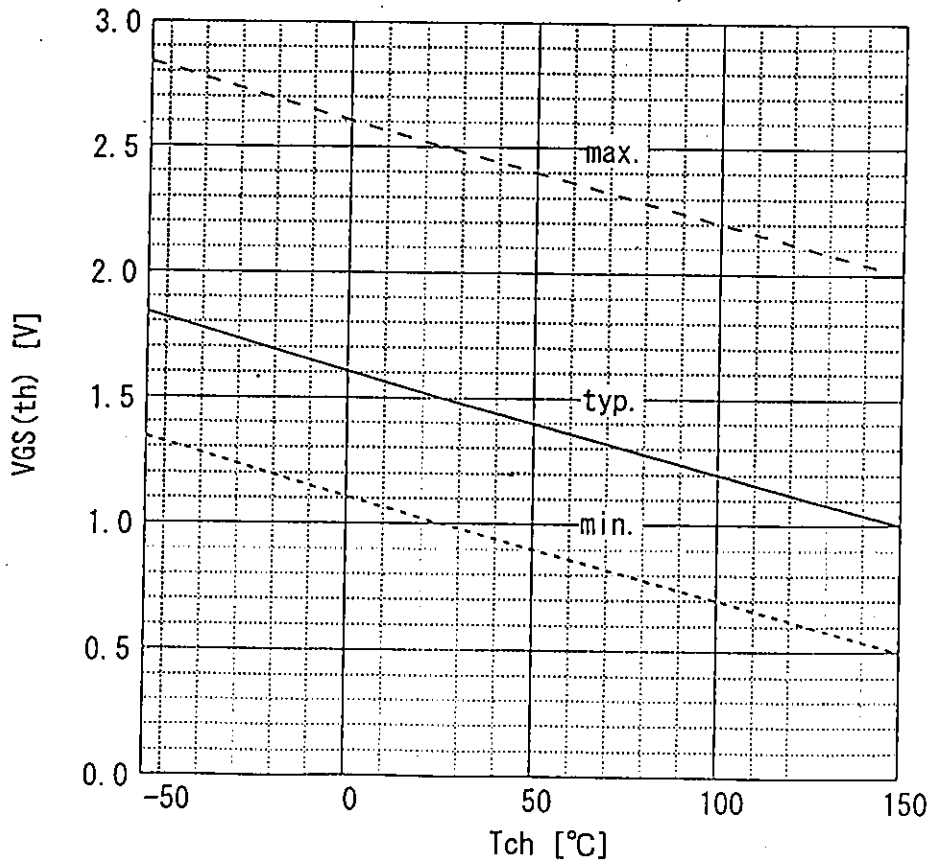
$R_{DS(on)} = f(I_D)$ : 80  $\mu$ s pulse test,  $T_c = 25^\circ C$



Drain-source on-state resistance  
 $R_{DS(on)} = f(T_{ch}) : I_D = 25A, V_{GS} = 10V$

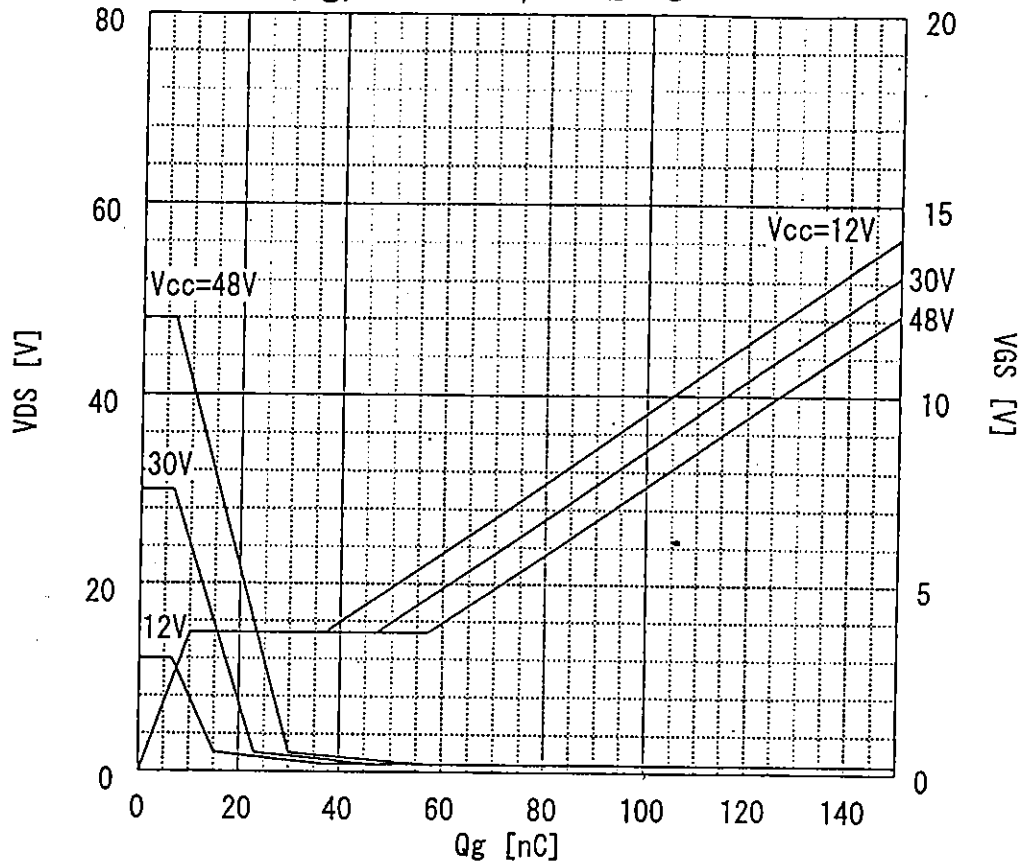


Gate threshold voltage  
 $V_{GS(th)} = f(T_{ch}) : I_D = 1mA, V_{DS} = V_{GS}$

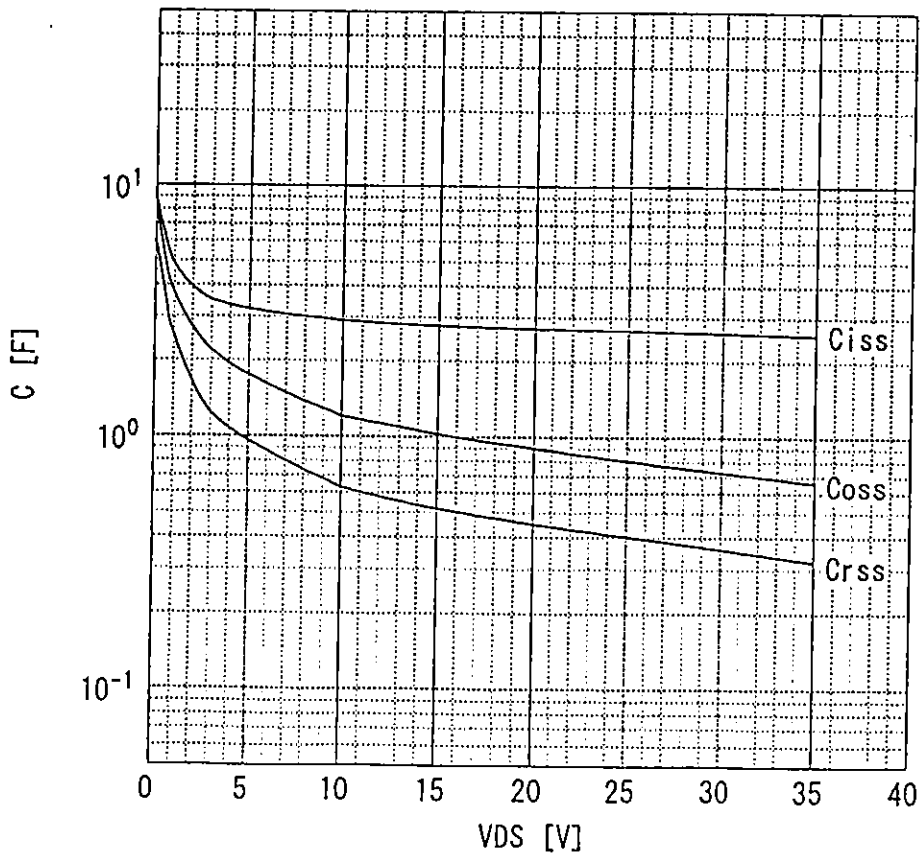




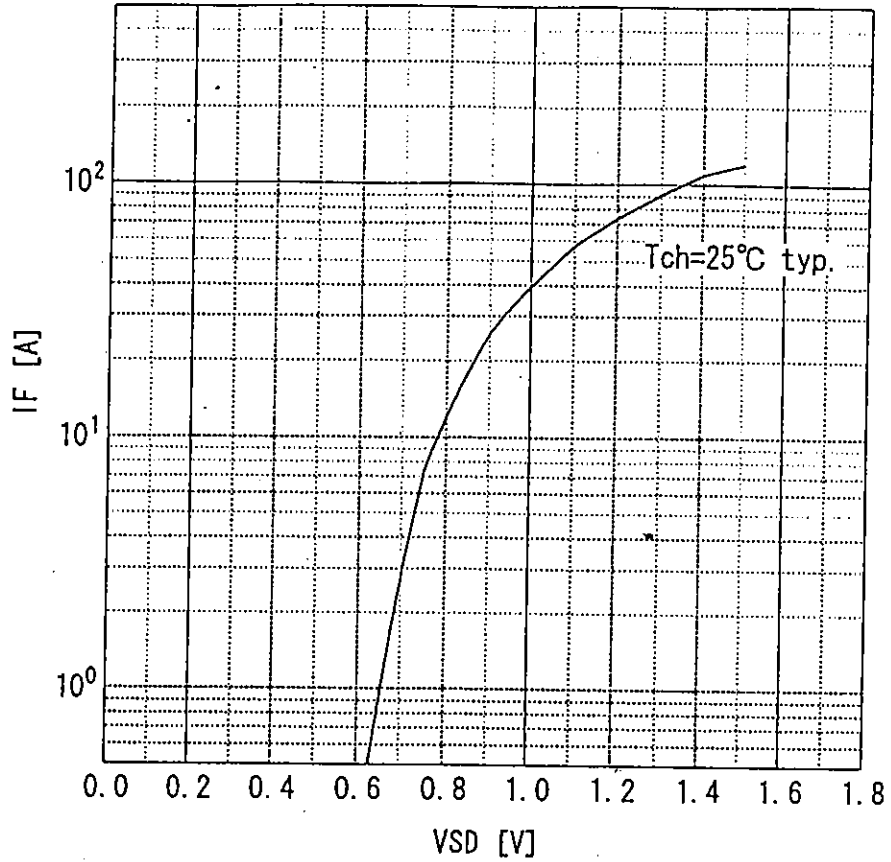
Typical gate charge characteristic  
 $V_{GS} = f(Q_g) : I_D = 50A, T_c = 25^\circ C$



Typical capacitances  
 $C = f(V_{DS}) : V_{GS} = 0V, f = 1MHz$



Forward characteristic of reverse of diode  
 $I_F = f(V_{SD}) : 80 \mu s$  pulses test,  $V_{GS} = 0V$



Transient thermal impedande  
 $Z_{thch} = f(t)$  parameter:  $D = t/T$

