

10V Drive Nch MOS FET

2SK3050

●Structure

Silicon N-channel MOSFET

●Features

- 1) Low on-resistance.
- 2) Fast switching speed.
- 3) Wide SOA (safe operating area).
- 4) Gate-source voltage (V_{GS}) guaranteed to be $\pm 30V$.
- 5) Drive circuits can be simple.
- 6) Parallel use is easy.

●Applications

Switching

●Packaging specifications

	Package	Taping
	Code	TL
Type	Basic ordering unit (pieces)	2500
2SK3050		○

●Absolute maximum ratings ($T_a=25^\circ\text{C}$)

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DS}	600	V
Gate-source voltage		V_{GS}	± 30	V
Drain current	Continuous	I_D	2	A
	Pulsed	I_{DP} *1	6	A
Reverse drain current	Continuous	I_{DR}	2	A
	Pulsed	I_{DRP} *1	6	A
Source current (Body Diode)	Continuous	I_S	2	A
	Pulsed	I_{SP} *1	6	A
Avalanche Current		I_{AS} *2	2	A
Avalanche Energy		E_{AS} *2	21	mJ
Total power dissipation ($T_c=25^\circ\text{C}$)		P_D	20	W
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature		T_{stg}	-55 to +150	$^\circ\text{C}$

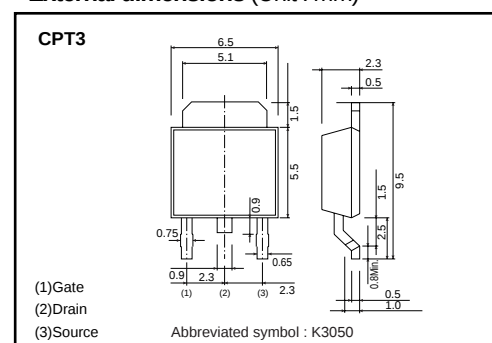
*1 $P_w \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*2 $L = 10\text{mH}$, $V_{DS} = 50V$, $R_G = 25\Omega$, 1Pulse, $T_{ch} = 25^\circ\text{C}$

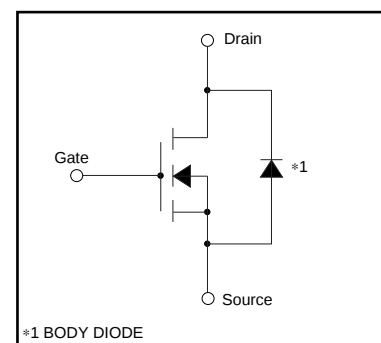
●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to case	$R_{th(ch-c)}$	6.25	$^\circ\text{C/W}$

●External dimensions (Unit : mm)



●Inner circuit



Transistors

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	—	—	± 100	nA	$V_{GS}=\pm 30V$, $V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	600	—	—	V	$I_D=1mA$, $V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	—	—	100	μA	$V_{DS}=600V$, $V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	2.0	—	4.0	V	$V_{DS}=10V$, $I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	—	4.4	5.5	Ω	$I_D=1A$, $V_{GS}=10V$
Forward transfer admittance	$ Y_{fs} ^*$	0.5	1.0	—	S	$I_D=1A$, $V_{DS}=10V$
Input capacitance	C_{iss}	—	280	—	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	—	48	—	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	—	16	—	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	—	12	—	ns	$I_D=1A$, $V_{DD} \approx 300V$
Rise time	t_r^*	—	17	—	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	—	29	—	ns	$R_L=300\Omega$
Fall time	t_f^*	—	105	—	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	—	12.8	25.6	nC	$V_{DD}=300V$
Gate-source charge	Q_{gs}^*	—	3.3	—	nC	$V_{GS}=10V$
Gate-drain charge	Q_{gd}^*	—	5.5	—	nC	$I_D=2A$

* Pulsed

●Body diode characteristics (Source-drain) (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}	—	—	2.0	V	$I_S=2A$, $V_{GS}=0V$
Reverse recovery time	t_{rr}^*	—	460	—	ns	$I_{DR}=2A$, $V_{GS}=0V$
Reverse recovery charge	Q_{rr}^*	—	2.0	—	μC	$di/dt=100A/\mu s$

* Pulsed

Transistors

●Electrical characteristic curves

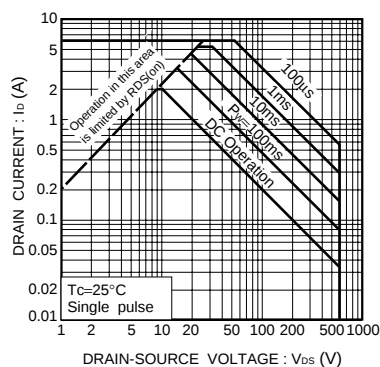


Fig.1 Maximum safe operating area

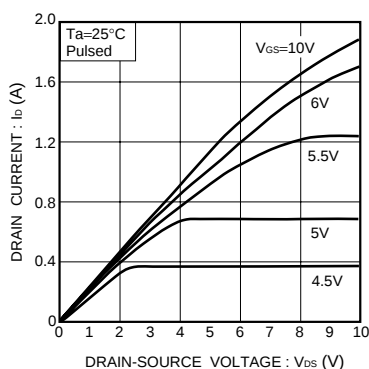


Fig.2 Typical output characteristics

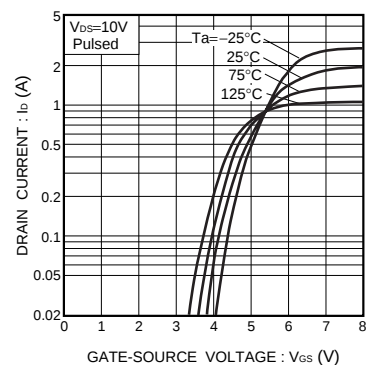


Fig.3 Typical transfer characteristics

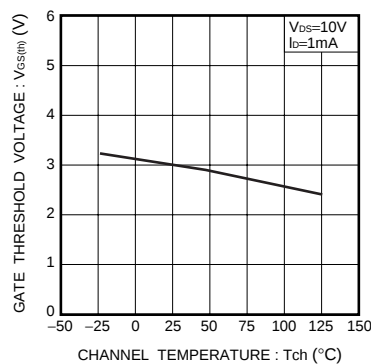


Fig.4 Gate threshold voltage vs. channel temperature

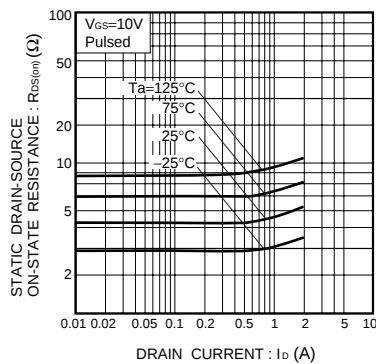


Fig.5 Static drain-source on-state resistance vs. drain current

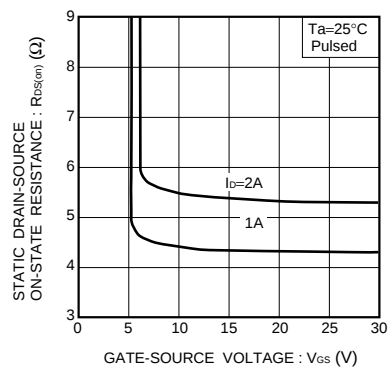


Fig.6 Static drain-source on-state resistance vs. gate-source voltage

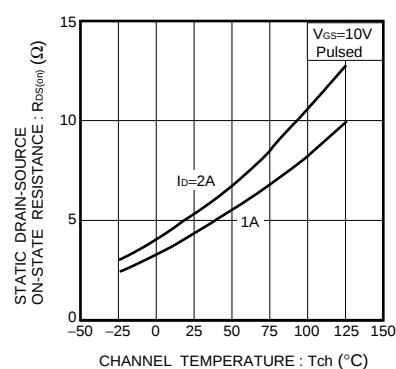


Fig.7 Static drain-source on-state resistance vs. channel temperature

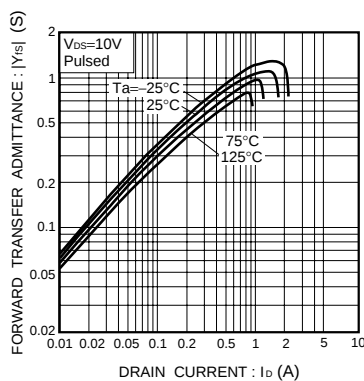


Fig.8 Forward transfer admittance vs. drain current

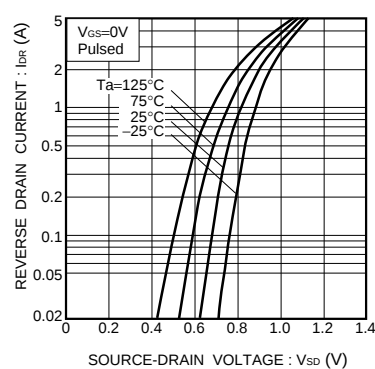


Fig.9 Reverse drain current vs. source-drain voltage (I)

Transistors

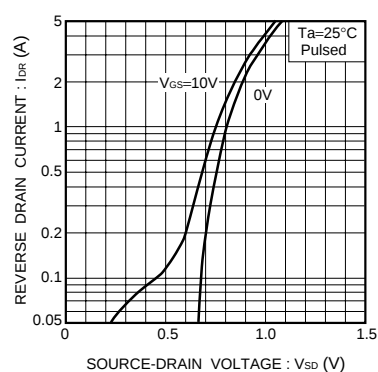


Fig.10 Reverse drain current vs. source-drain voltage (II)

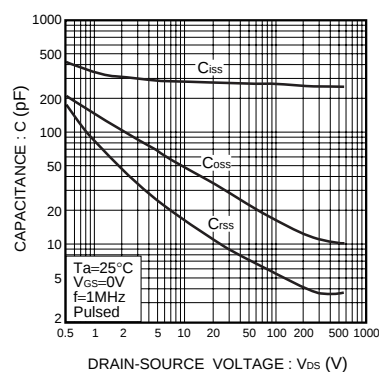


Fig.11 Typical capacitance vs. drain-source voltage

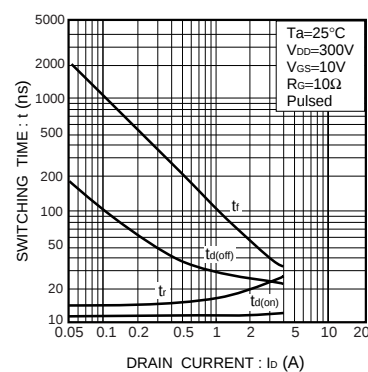


Fig.12 Switching characteristics

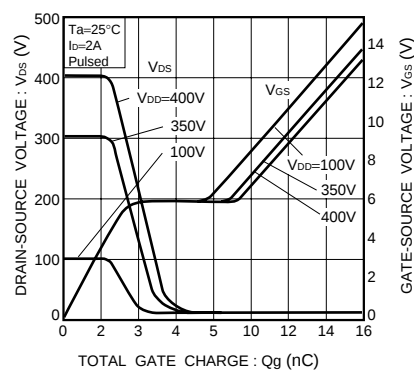


Fig.13 Dynamic input characteristics

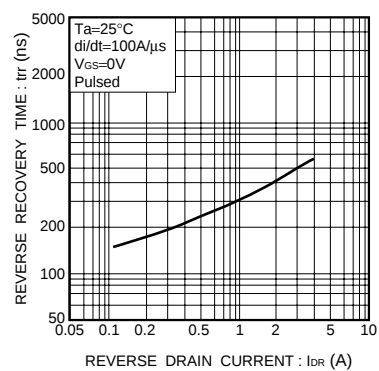


Fig.14 Reverse recovery time vs. reverse drain current

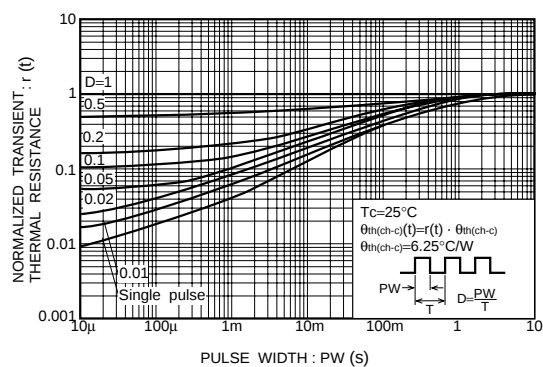


Fig.15 Normalized transient thermal resistance vs. pulse width

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● Switching characteristics measurement circuit

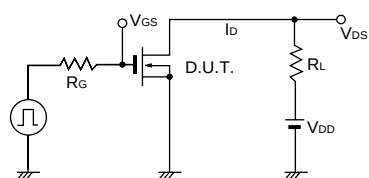


Fig.16 Switching time measurement circuit

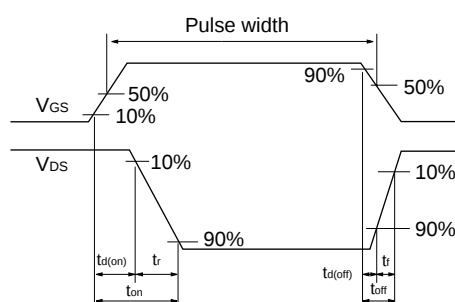


Fig.17 Switching time waveforms

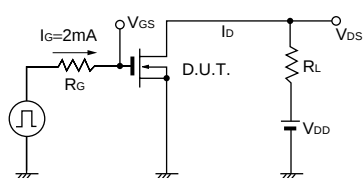


Fig.18 Gate charge measurement circuit

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