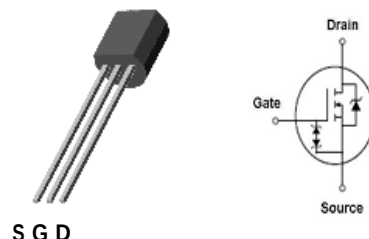


High Speed Switching Application

Features

- ESD rating: 1000V (HBM)
- Low On-Resistance: $R_{DS(on)} < 3\Omega$ @ $V_{GS} = 10V$
- High power and current handling capability
- Very fast switching
- Halogen free and RoHS compliant device



S G D

TO-92

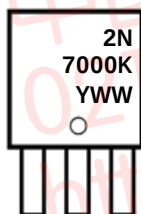
Applications

- High speed line driver

Ordering Information

Part Number	Marking Code	Package	Packaging
2N7000K	2N7000K	TO-92	Tape

Marking Information



Column 1,2 : Device Code
Column 3 : Production Information
e.g.) YWW
-. YWW : Date Code(year,week)

Absolute Maximum Ratings ($T_{amb}=25^{\circ}C$, Unless otherwise specified)

Characteristic	Symbol	Ratings	Unit
Drain-Source voltage	V_{DS}	60	V
Gate-Source voltage	V_{GS}	± 20	V
Maximum drain current (Note 1)	I_D	500	mA
Pulsed drain current (Note 1)	I_{DP}	2	A
Power dissipation (Note 2)	P_D	625	mW
Operating junction temperature	T_j	150	$^{\circ}C$
Storage temperature range	T_{stg}	-55 ~ 150	$^{\circ}C$
Thermal resistance junction to ambient (Note 2)	$R_{th(j-a)}$	400	$^{\circ}C/W$

Note 1) Limited only maximum junction temperature

Note 2) Device mounted on FR-4 board with recommended pad layout.

Electrical Characteristics ($T_{amb}=25^{\circ}\text{C}$, Unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-Source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0$	60	-	-	V
Gate-Source breakdown voltage	BV_{GSS}	$I_G=250\mu\text{A}$, $V_{DS}=0$	± 20	-	-	V
Gate-Threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$	1	-	2.5	V
Zero Gate voltage drain current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0$	-	-	1	μA
Gate-body leakage	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$	-	-	± 10	μA
Drain-Source on-resistance (Note 3)	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=0.5\text{A}$	-	-	3	Ω
		$V_{GS}=5\text{V}$, $I_D=0.05\text{A}$	-	-	3.5	
Forward trans-conductance (Note 3)	g_{fs}	$V_{DS}=10\text{V}$, $I_D=0.2\text{A}$	0.08	-	-	S
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0$, $f=1\text{MHz}$	-	30	50	pF
Output capacitance	C_{oss}		-	7	-	
Reverse Transfer capacitance	C_{rss}		-	4	-	
Turn-on delay time (Note 3, 4)	$t_{d(on)}$	$V_{DD}=30\text{V}$, $I_D=0.2\text{A}$, $V_{GS}=10\text{V}$, $R_G=10\Omega$	-	2	-	ns
Rise time (Note 3, 4)	t_r		-	15	-	
Turn-off delay time (Note 3, 4)	$t_{d(off)}$		-	8	-	
Fall time (Note 3, 4)	t_f		-	11	-	
Total gate charge (Note 3, 4)	Q_g	$V_{DS}=10\text{V}$, $I_D=0.25\text{A}$, $V_{GS}=4.5\text{V}$	-	0.6	0.8	nC
Gate-Source charge (Note 3, 4)	Q_{gs}		-	0.2	-	
Gate-Drain charge (Note 3, 4)	Q_{gd}		-	0.2	-	
Diode forward voltage (Note 3)	V_{SD}	$V_{GS}=0\text{V}$, $I_S=0.2\text{A}$	-	-	1.3	V

Note 3) Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

Note 4) Essentially independent of operating temperature typical characteristics.

Electrical Characteristics Curves

Fig. 1 $I_D - V_{DS}$

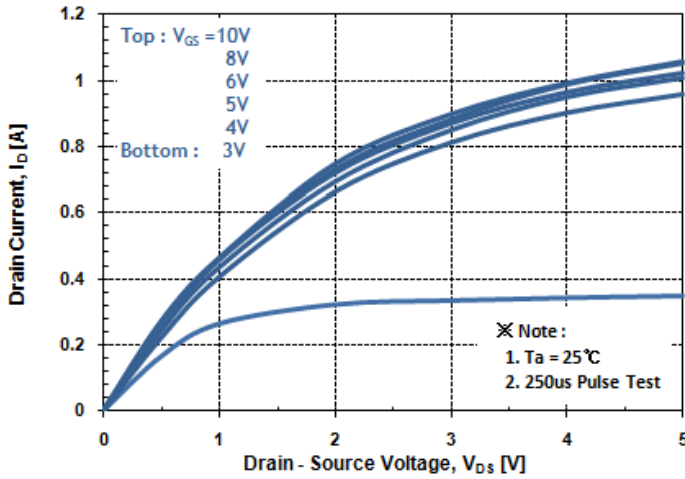


Fig. 2 $I_D - V_{GS}$

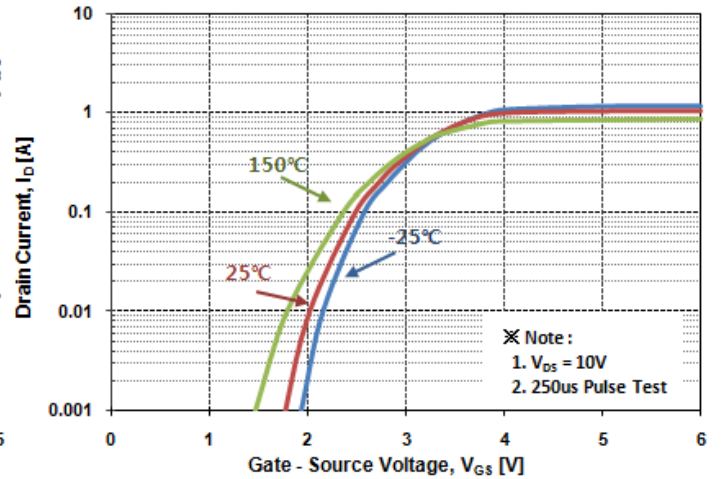


Fig. 3 $R_{DS(ON)} - I_D$

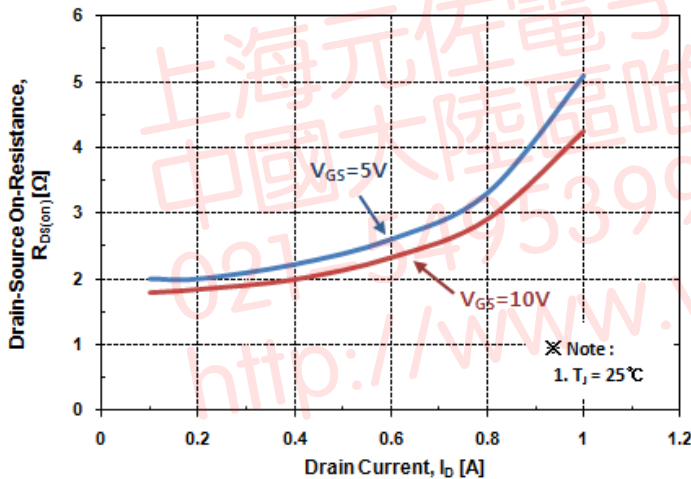


Fig. 4 $I_S - V_{SD}$

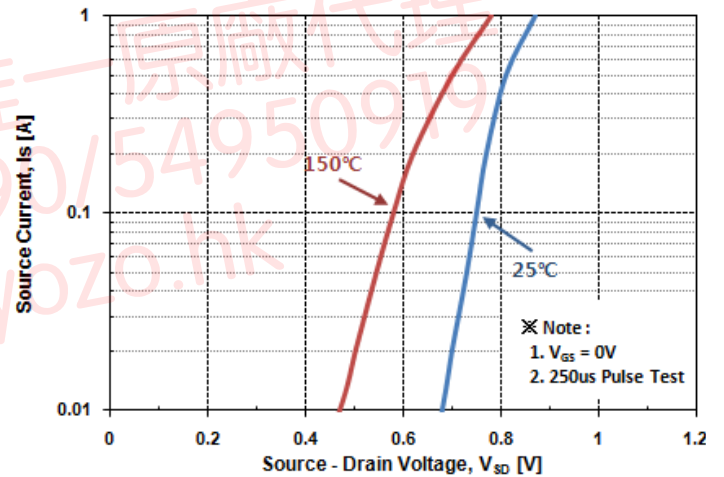


Fig. 5 Capacitance - V_{DS}

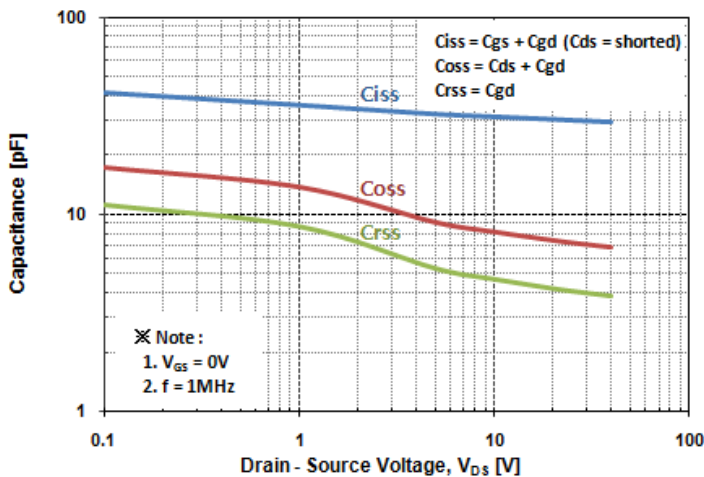


Fig. 6 $V_{GS} - Q_G$

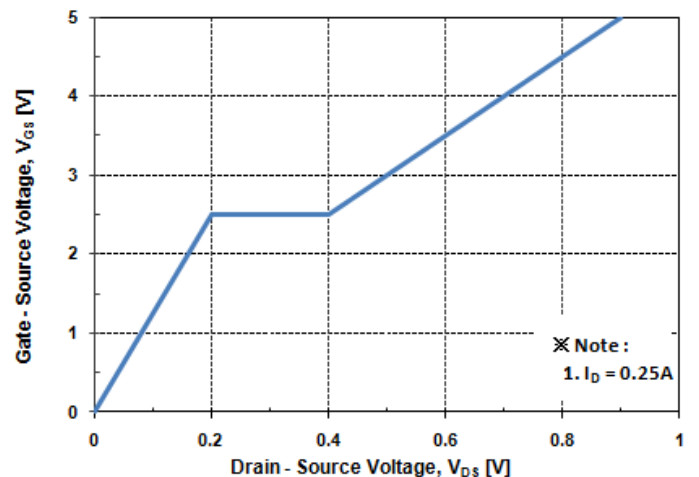


Fig. 7 $V_{DSS} - T_J$

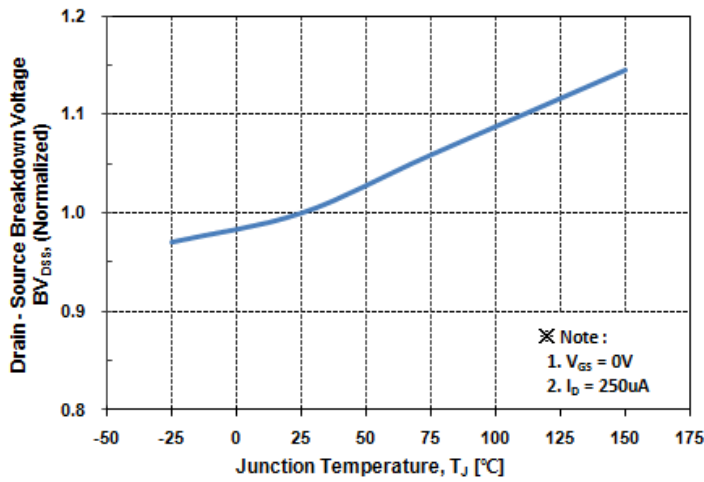


Fig. 8 $R_{DS(on)} - T_J$

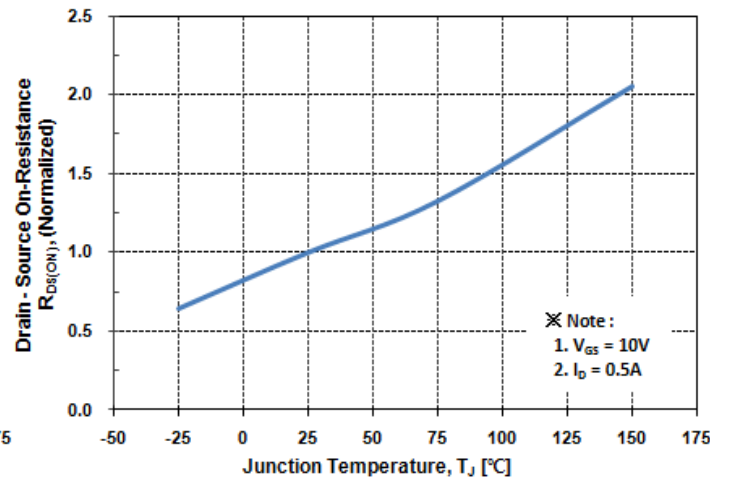


Fig. 9 $I_D - T_C$

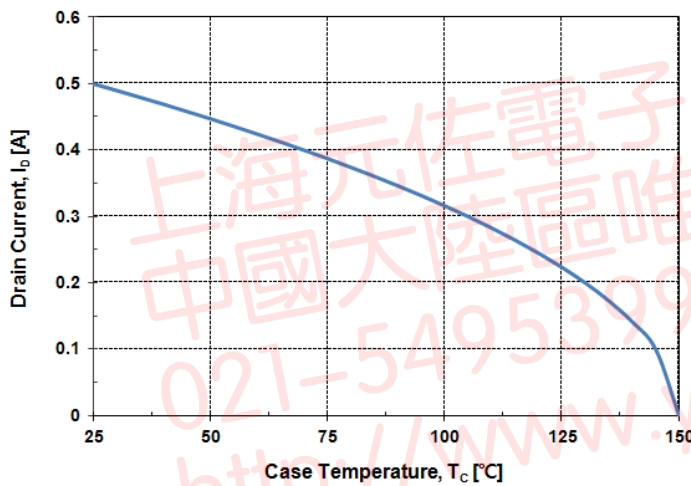
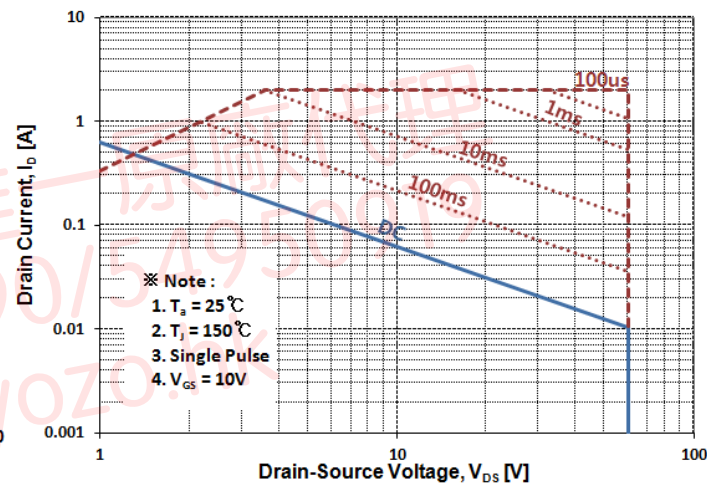
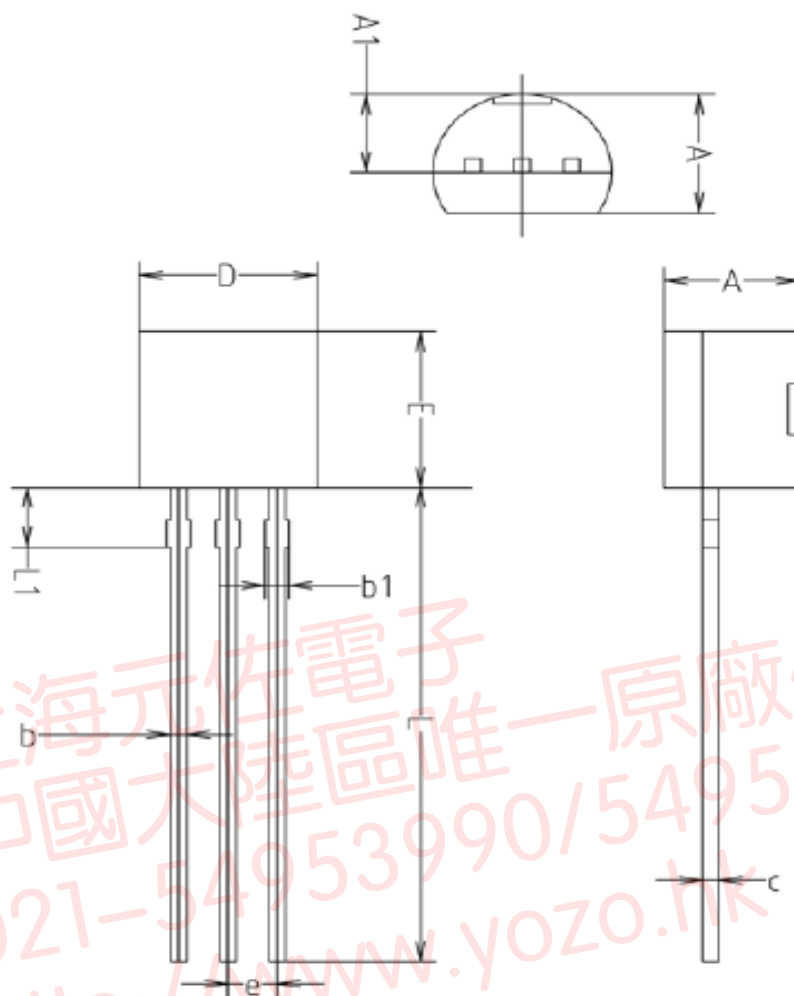


Fig. 10 Safe Operating Area



Package Outline Dimensions



SYMBOL	MILLIMETERS(mm)		
	MINIMUM	NOMINAL	MAXIMUM
A	3.40	3.50	3.66
A1	2.46	2.51	2.59
b	0.39	0.44	0.53
b1	0.39	—	0.63
c	0.35	0.42	0.47
D	4.48	4.60	4.70
E	4.48	4.60	4.70
e	1.17	1.27	1.37
L	13.70	14.00	14.77
L1	1.55	1.70	2.15