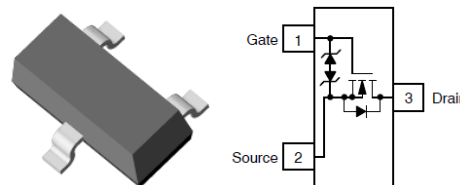


High Speed Switching Application

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
- RoHS compliant device



Applications

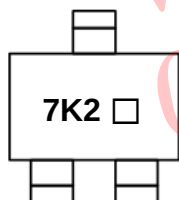
- High speed line driver

SOT-23

Ordering Information

Part Number	Marking Code	Package	Packaging
2N7002K	7K2 □	SOT-23	Tape & Reel

Marking Information



7K2 = Specific Device Code

□ = Year & Week Code Marking

Absolute Maximum Ratings (T_{amb}=25°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	300	mA
Pulsed drain current (Note 1)	I_{DP}	800	mA
Power dissipation (Note 2)	P_D	350	mW
Operating junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55 ~ 150	°C
Thermal resistance junction to ambient (Note 2)	$R_{th(j-a)}$	350	°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}	$V_{GS}=\pm 5\text{V}$, $V_{DS}=0\text{V}$	-	-	± 100	nA
		$V_{GS}=\pm 10\text{V}$, $V_{DS}=0\text{V}$			± 150	nA
		$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 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

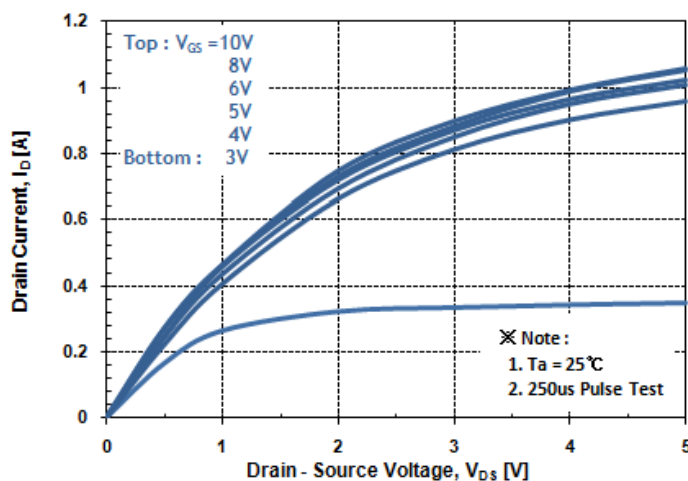
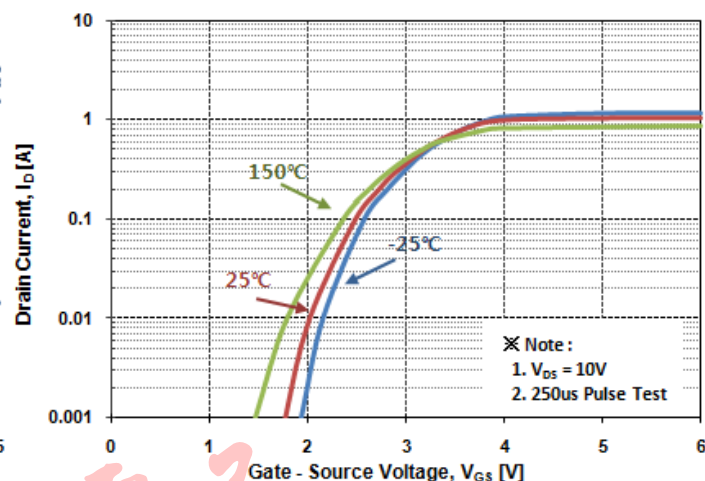
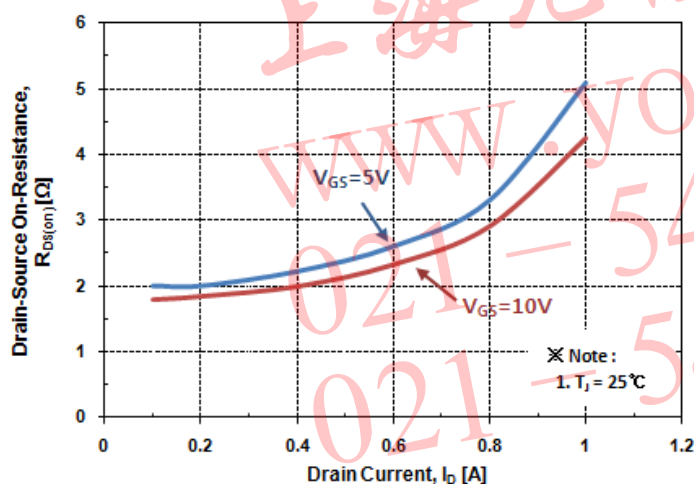
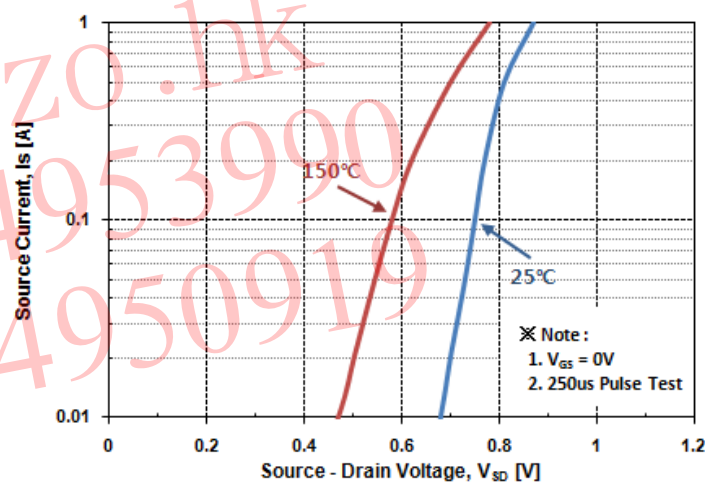
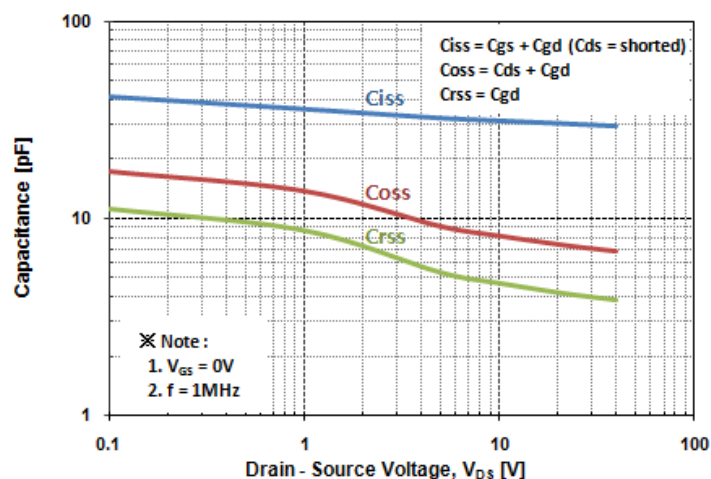
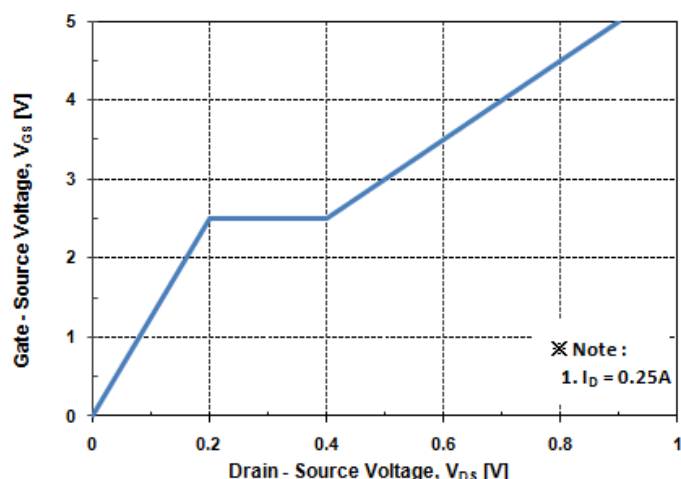
Fig. 1 $I_D - V_{DS}$ Fig. 2 $I_D - V_{GS}$ Fig. 3 $R_{DS(ON)} - I_D$ Fig. 4 $I_S - V_{SD}$ Fig. 5 Capacitance - V_{DS} Fig. 6 $V_{GS} - Q_G$ 

Fig. 7 $V_{DSS} - T_J$

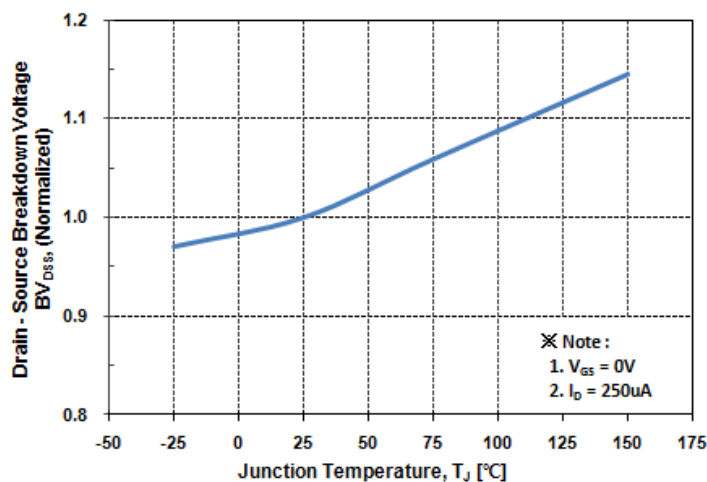


Fig. 8 $R_{DS(on)} - T_J$

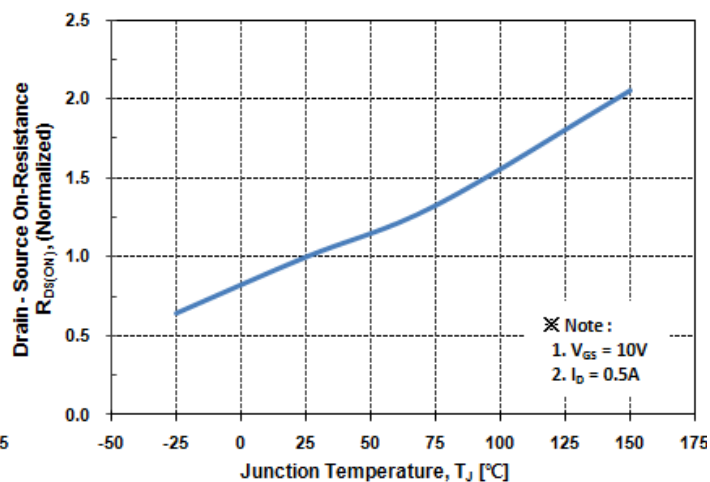


Fig. 9 $I_D - T_C$

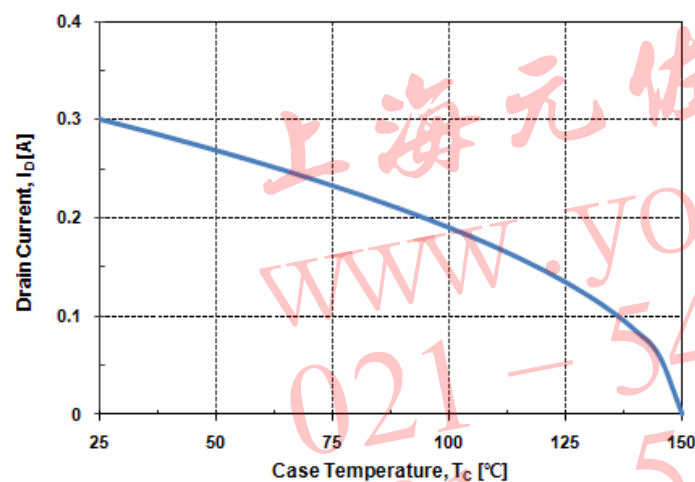


Fig. 10 Safe Operating Area

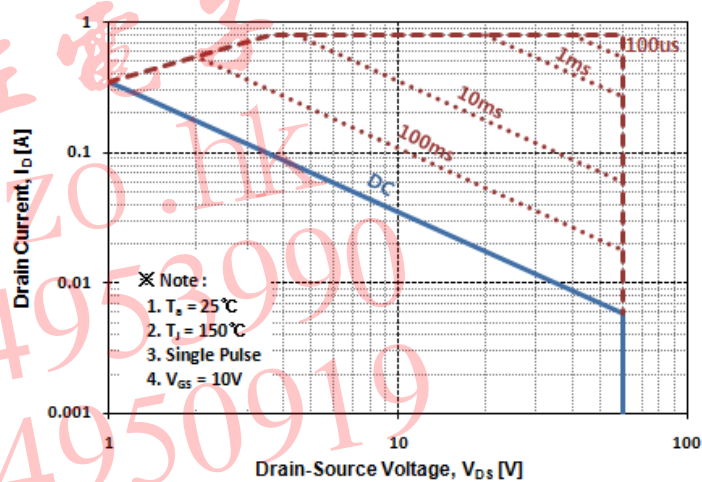
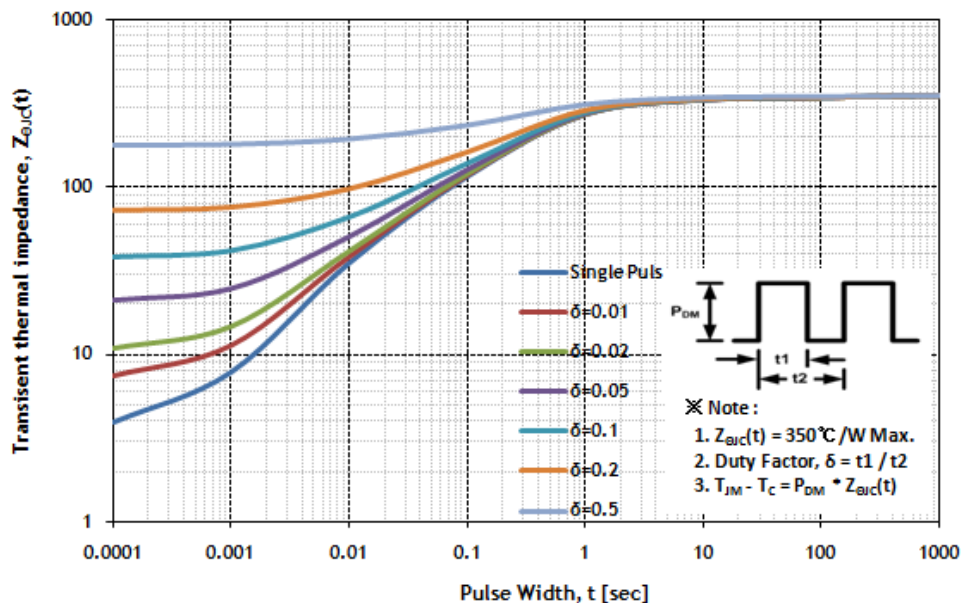
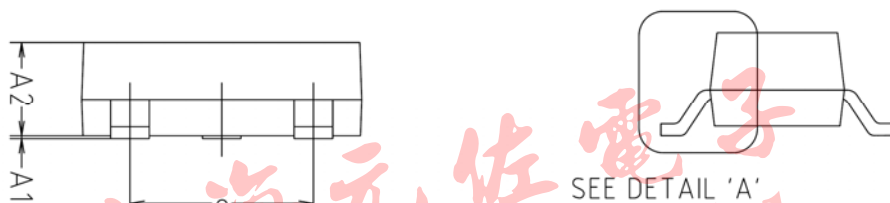
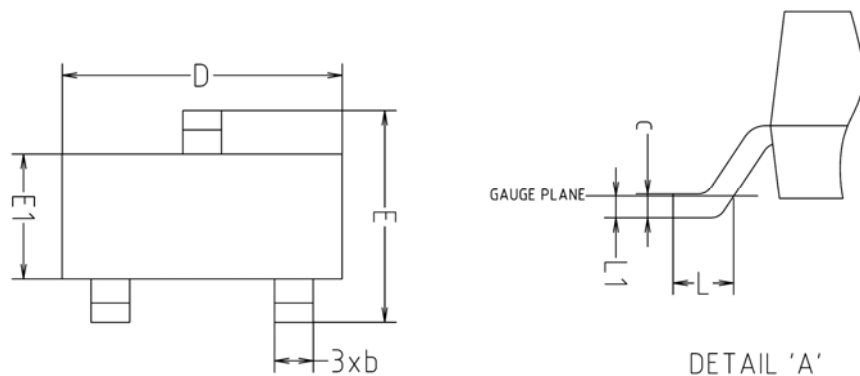


Fig. 11 Transient Thermal Impedance



Package Outline Dimensions



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A1	0.00	-	0.10	
A2	0.82	-	1.02	
b	0.39	0.42	0.45	
c	0.09	0.12	0.15	
D	2.80	2.90	3.00	
E	2.20	2.40	2.60	
E1	1.20	1.30	1.40	
e	1.90BSC			
L	0.20	-	-	
L1	0.12BSC			

※ Recommend PCB solder land (Unit: mm)

