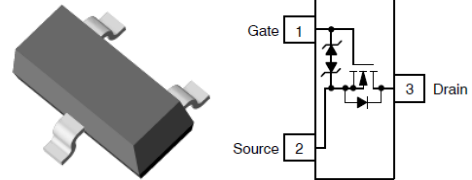


## High Speed Switching Application

### 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

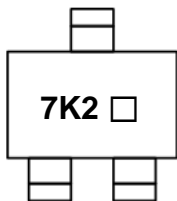
- High speed line driver

**SOT-23**

### Ordering Information

Part Number	Marking Code	Package	Packaging
<b>2N7002K</b>	<b>7K2</b> □	<b>SOT-23</b>	<b>Tape &amp; Reel</b>

### Marking Information


**7K2 = Specific Device Code**
**□ = Year & Week Code Marking**

### 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	$V_{GS}$	$\pm 20$	V
Maximum drain current <sup>(Note 1)</sup>	$I_D$	300	mA
Pulsed drain current <sup>(Note 1)</sup>	$I_{DP}$	800	mA
Power dissipation <sup>(Note 2)</sup>	$P_D$	350	mW
Operating junction temperature	$T_j$	150	$^{\circ}C$
Storage temperature range	$T_{stg}$	-55 ~ 150	$^{\circ}C$
Thermal resistance junction to ambient <sup>(Note 2)</sup>	$R_{th(j-a)}$	350	$^{\circ}C/W$

Note 1) Limited only maximum junction temperature

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

## Electrical Characteristics (T<sub>amb</sub>=25°C, Unless otherwise specified)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-Source breakdown voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	60	-	-	V
Gate-Source breakdown voltage	BV <sub>GSS</sub>	I <sub>G</sub> =250μA, V <sub>DS</sub> =0	±20	-	-	V
Gate-Threshold voltage	V <sub>GS(th)</sub>	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	1	-	2.5	V
Zero Gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0	-	-	1	μA
Gate-body leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±5V, V <sub>DS</sub> =0V	-	-	±100	nA
		V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	-	-	±150	nA
		V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±10	μA
Drain-Source on-resistance (Note 3)	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A	-	-	3	Ω
		V <sub>GS</sub> =5V, I <sub>D</sub> =0.05A	-	-	3.5	
Forward trans-conductance (Note 3)	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =0.2A	0.08	-	-	S
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1MHz	-	30	50	pF
Output capacitance	C <sub>oss</sub>		-	7	-	
Reverse Transfer capacitance	C <sub>rss</sub>		-	4	-	
Turn-on delay time (Note 3, 4)	t <sub>d(on)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =0.2A, V <sub>GS</sub> =10V, R <sub>G</sub> =10Ω	-	2	-	ns
Rise time (Note 3, 4)	t <sub>r</sub>		-	15	-	
Turn-off delay time (Note 3, 4)	t <sub>d(off)</sub>		-	8	-	
Fall time (Note 3, 4)	t <sub>f</sub>		-	11	-	
Total gate charge (Note 3, 4)	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =0.25A, V <sub>GS</sub> =4.5V	-	0.6	0.8	nC
Gate-Source charge (Note 3, 4)	Q <sub>gs</sub>		-	0.2	-	
Gate-Drain charge (Note 3, 4)	Q <sub>gd</sub>		-	0.2	-	
Diode forward voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =0.2A	-	-	1.3	V

Note 3) Pulse test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

Note 4) Essentially independent of operating temperature typical characteristics.

## Electrical Characteristics Curves

Fig. 1  $I_D - V_{DS}$

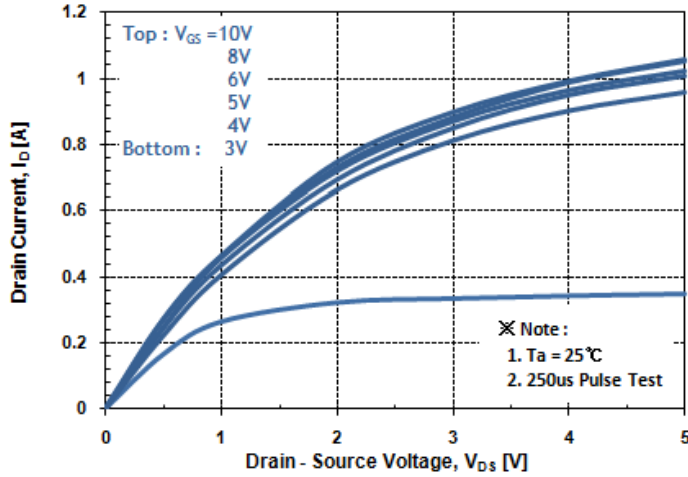


Fig. 2  $I_D - V_{GS}$

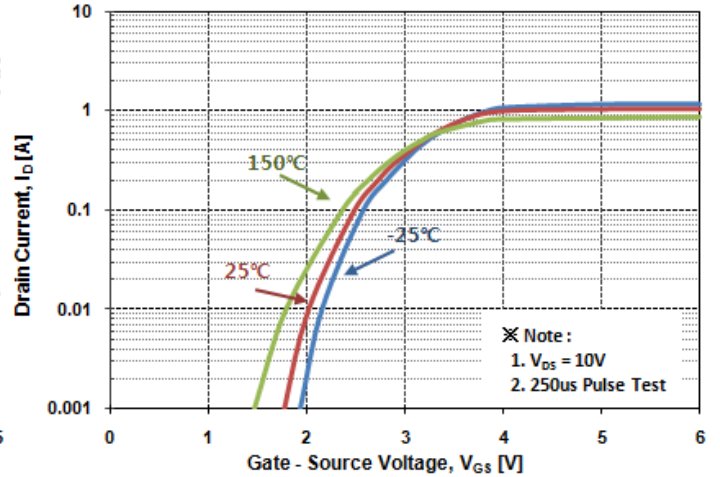


Fig. 3  $R_{DS(ON)} - I_D$

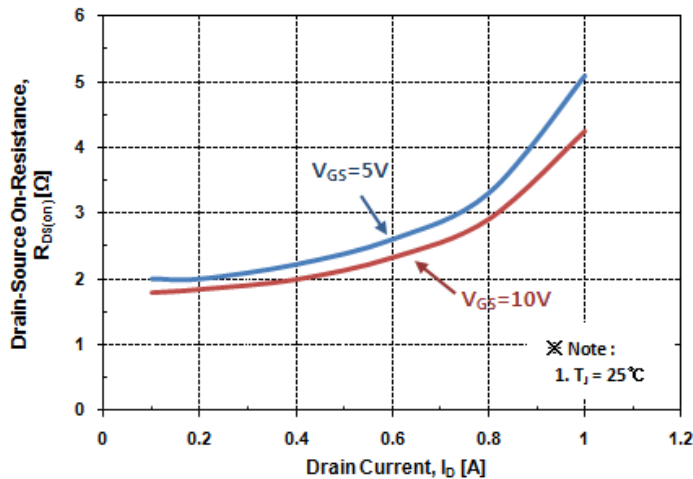


Fig. 4  $I_S - V_{SD}$

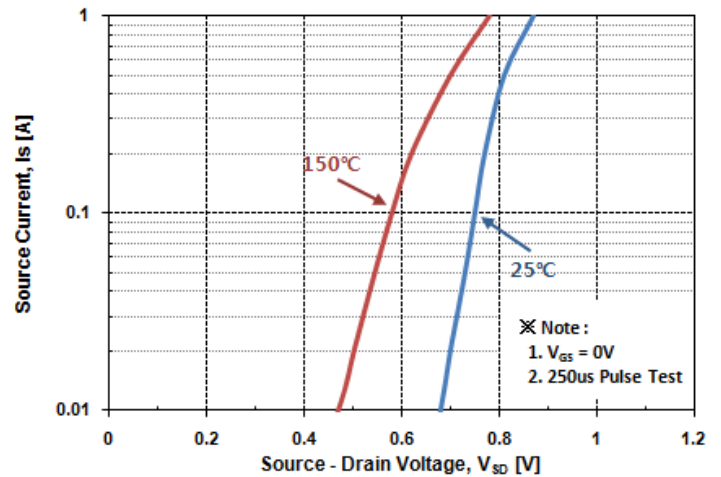


Fig. 5 Capacitance -  $V_{DS}$

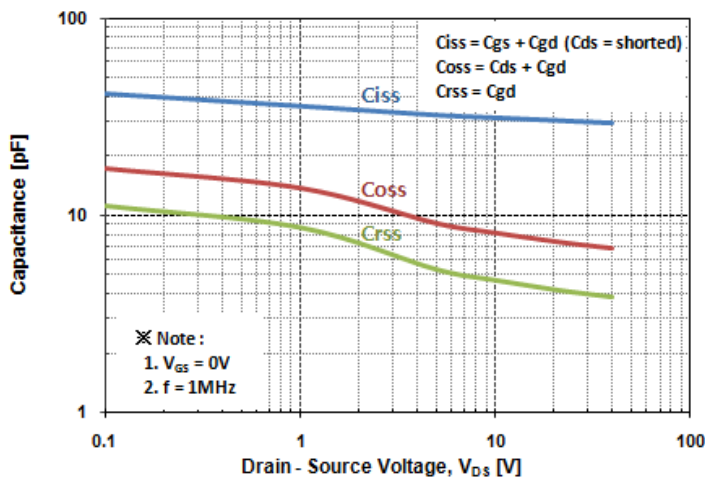


Fig. 6  $V_{GS} - Q_G$

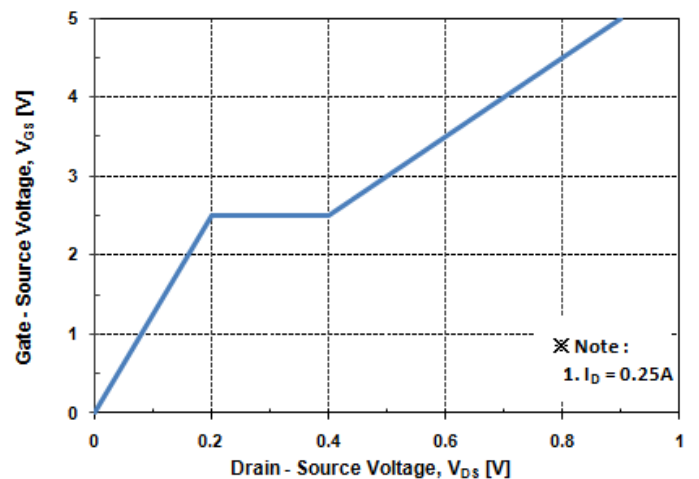


Fig. 7  $V_{DSS} - T_J$

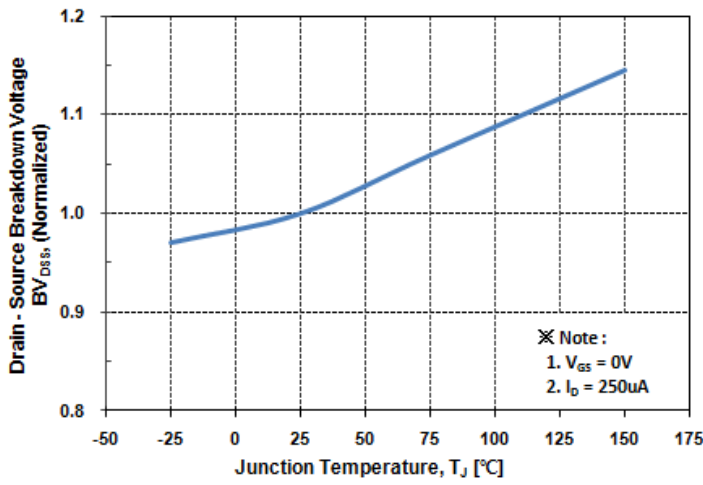


Fig. 8  $R_{DS(on)} - T_J$

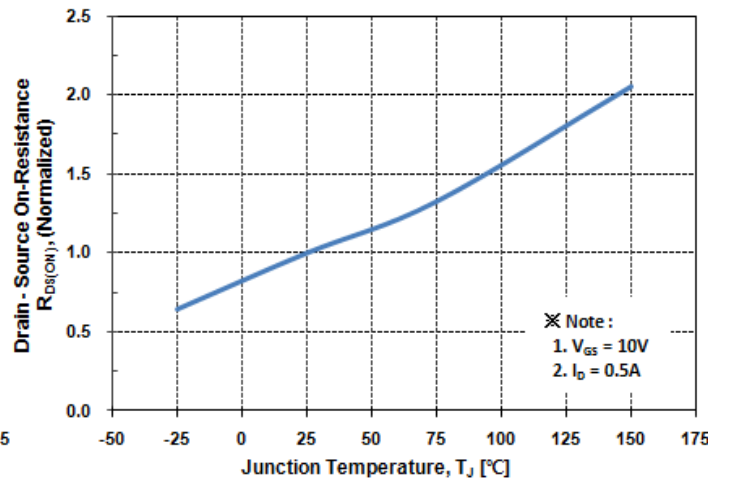


Fig. 9  $I_D - T_C$

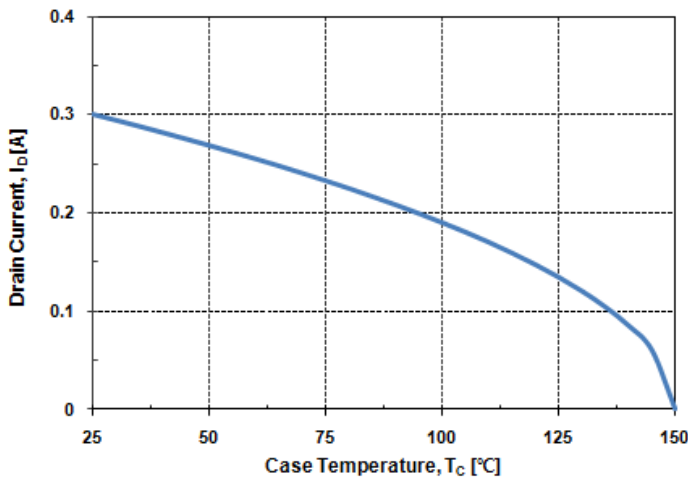


Fig. 10 Safe Operating Area

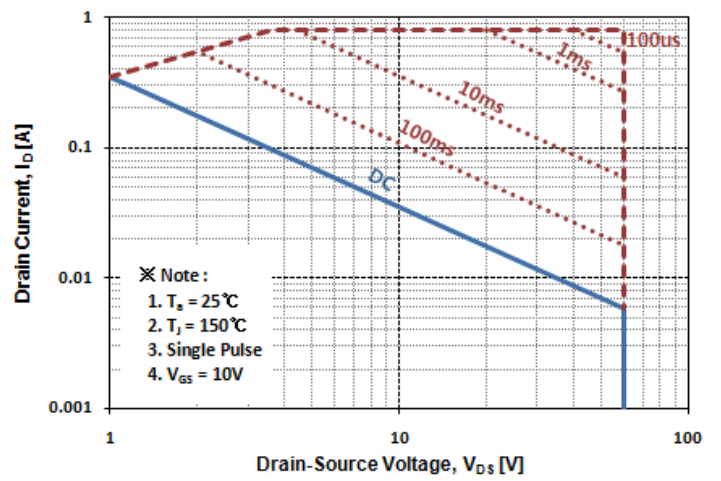
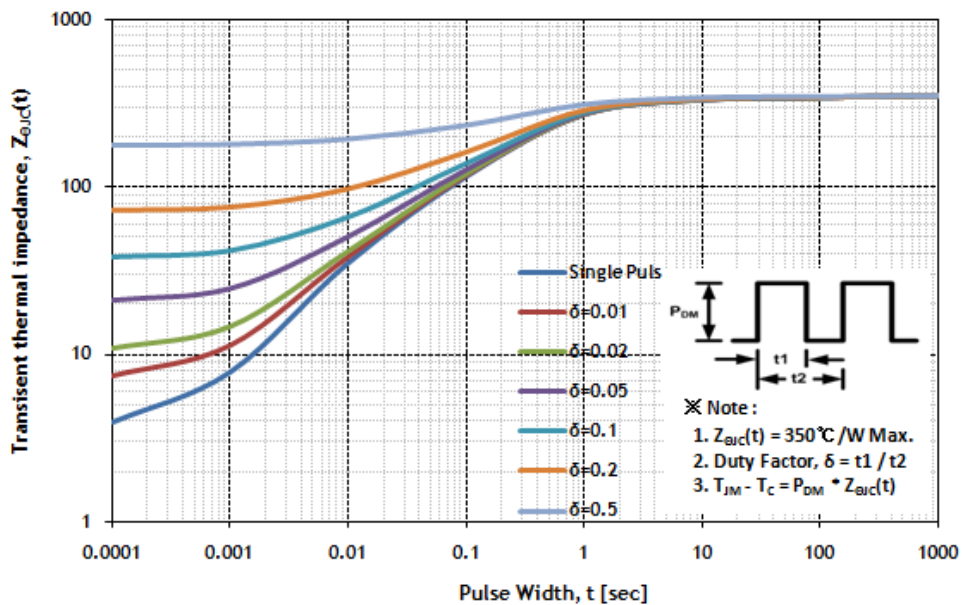
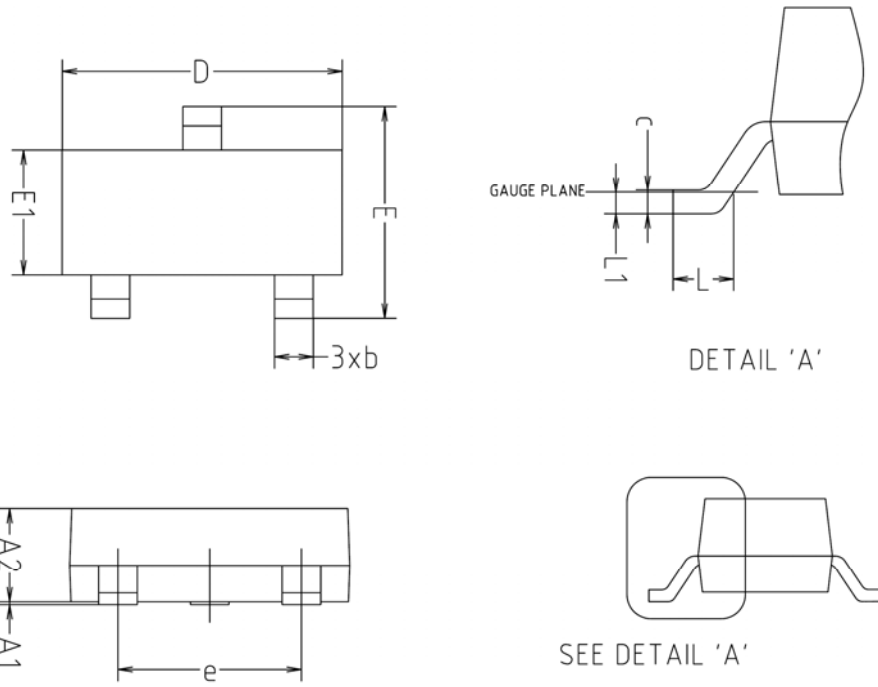


Fig. 11 Transient Thermal Impedance

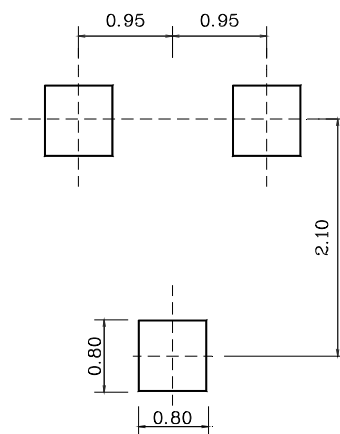


Package Outline Dimensions



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)



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