

### N-Ch Small Signal Trench MOSFET 2N7002KB

This Small Signal Trench MOSFET has low on resistance, low gate charge and ESD Protected characteristics. It is mainly suitable for Battery Operated Systems and Direct logic-level Interface applications.

#### FEATURES

- $V_{DSS}=60V, I_D=0.3A$
- Drain-Source ON Resistance :  
 $R_{DS(ON)}(Max)=2.2\Omega @V_{GS}=10V$
- ESD Protected: 2KV

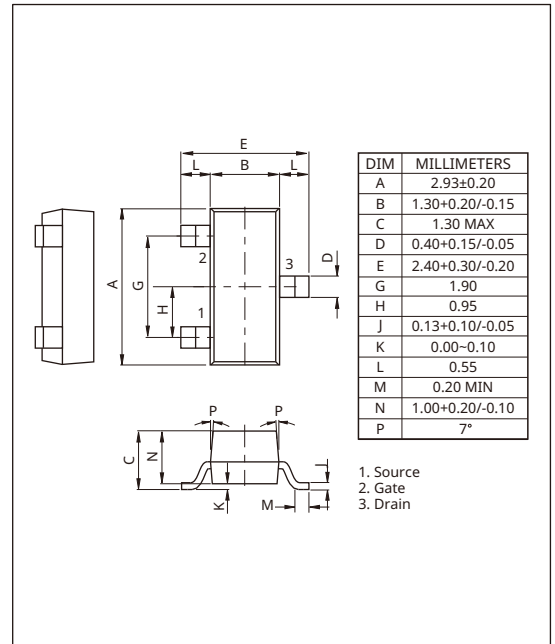
#### APPLICATION

- Battery Operated Systems
- Direct logic-level Interface
- Voltage controlled small signal switch

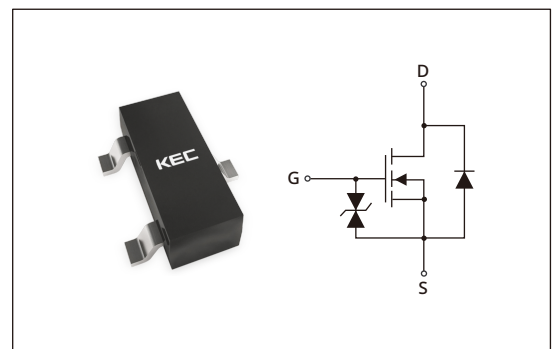
#### ORDERING INFORMATION

PART NUMBER	QTY PER BOX	BOX SIZE
2N7002KB-RTK/HP	9,000pcs	185X185X40mm

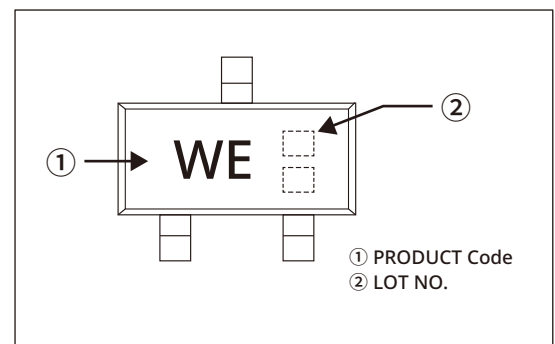
#### PACKAGE DIMENSION(SOT-23)



#### PIN CONFIGURATION



#### MARKING CODE



# PRODUCT DATASHEET

## N-Ch Small Signal Trench MOSFET - 2N7002KB

### MAXIMUM RATING ( $T_J=25^{\circ}\text{C}$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	60	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	@ $T_A = 25^{\circ}\text{C}$ (Note 1, 2)	$I_D$	0.3*	A
	Pulsed (Note 1, 3)	$I_{DP}$	1.0*	
Drain Power Dissipation	@ $T_A = 25^{\circ}\text{C}$ (Note 2)	$P_D$	400	mW
Maximum Junction Temperature		$T_J$	150	$^{\circ}\text{C}$
Operation and Storage Temperature Range		$T_{opr}, T_{stg}$	-55~150	$^{\circ}\text{C}$
<b>Thermal Characteristics</b>				
Thermal Resistance, Junction-to-Ambient	@ $T_A = 25^{\circ}\text{C}$ (Note 2)	$R_{thJA}$	310	$^{\circ}\text{C}/\text{W}$

\* : Drain current limited by maximum junction temperature

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### ELECTRICAL CHARACTERISTICS(T<sub>j</sub>= 25 °C)

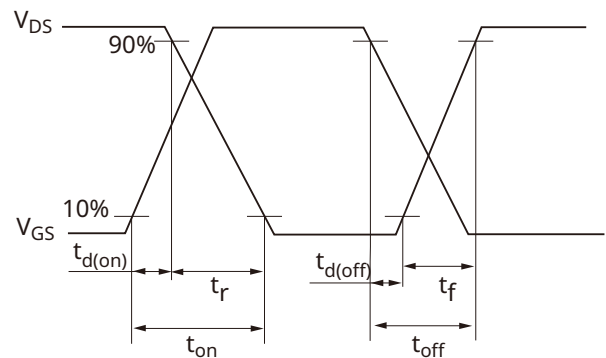
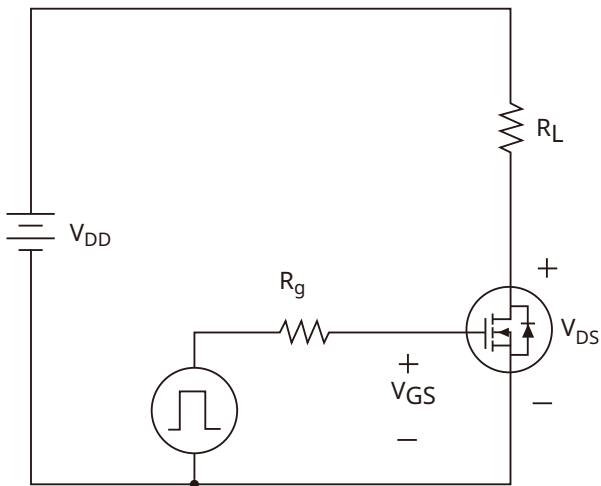
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	60	-	-	V
Drain Cut-off Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	10	$\mu A$
Gate Threshold Voltage	$V_{th}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	-	2.5	V
Gate Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=0.3A$	-	1.7	2.2	$\Omega$
		$V_{GS}=4.5V, I_D=0.2A$	-	2.1	2.9	$\Omega$
<b>Dynamic</b>						
Turn-on Delay time	$t_{d(on)}$	$V_{DD}=30V, I_D=0.2A$ $V_{GS}=10V, R_G=25\Omega$ (Note 3)	-	5	-	ns
Turn-on Rise time	$t_r$		-	5	-	
Turn-off Delay time	$t_{d(off)}$		-	40	-	
Turn-off Fall time	$t_f$		-	6	-	
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	15	-	pF
Output Capacitance	$C_{oss}$		-	3.2	-	
Reverse Transfer Capacitance	$C_{rss}$		-	1.2	-	
<b>Source-Drain Diode Ratings</b>						
Continuous Source Current	$I_S$	$V_{GS} < V_{th}$	-	-	0.25	A
Diode Forward Voltage	$V_{SD}$	$I_S=0.25A, V_{GS}=0V$	-	-	1.2	V

Note 1) Max. current is limited by junction temperature

Note 2) Surface mounted on 1 in<sup>2</sup> FR-4 board with 1oz

Note 3) Pulse Test (Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ )

### SWITCHING TIME TEST CIRCUIT



# PRODUCT DATASHEET

## N-Ch Small Signal Trench MOSFET - 2N7002KB

Fig1.  $I_D - V_{DS}$

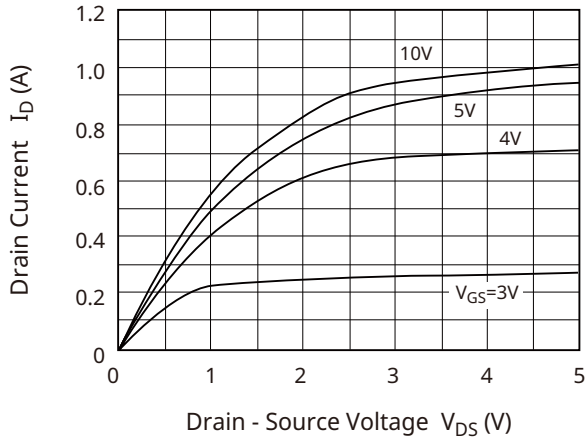


Fig2.  $I_D - V_{GS}$

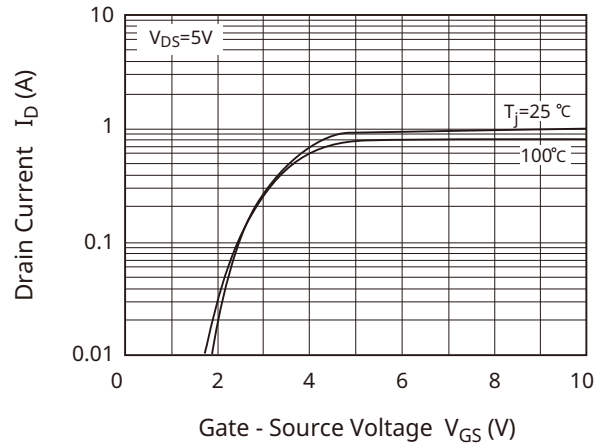


Fig3.  $R_{DS(ON)} - I_D$

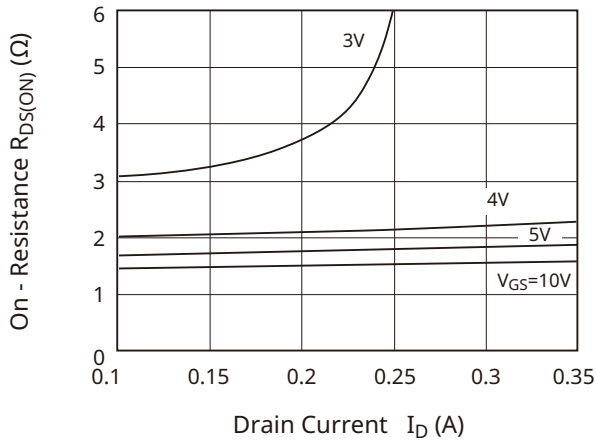


Fig4.  $R_{DS(ON)} - V_{GS}$

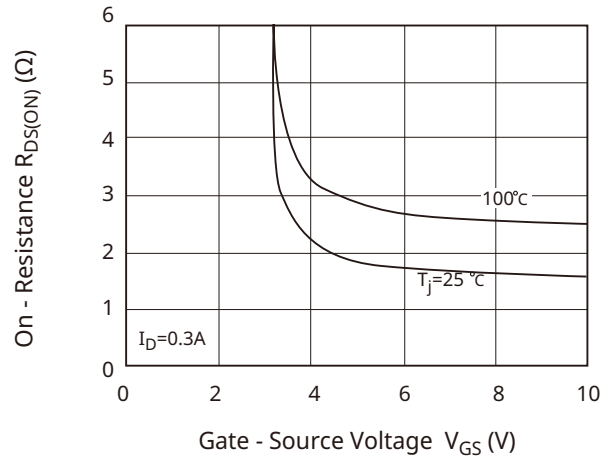


Fig5.  $R_{DS(ON)} - T_j$

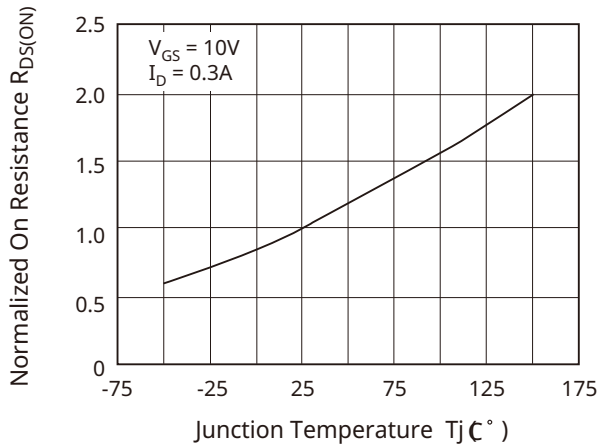
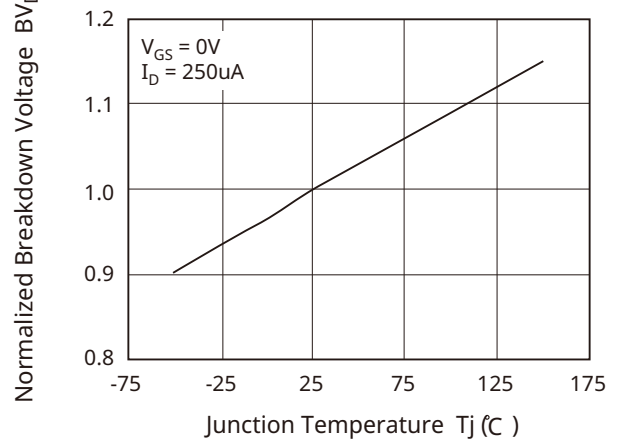


Fig6.  $BV_{DSS} - T_j$



# PRODUCT DATASHEET

## N-Ch Small Signal Trench MOSFET - 2N7002KB

Fig7.  $V_{th} - T_j$

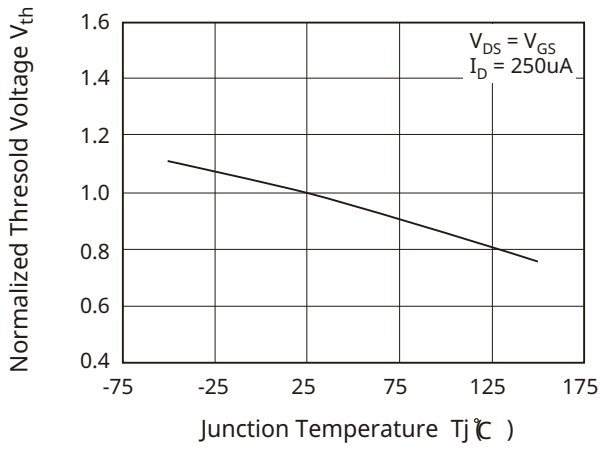


Fig8.  $I_S - V_{SD}$

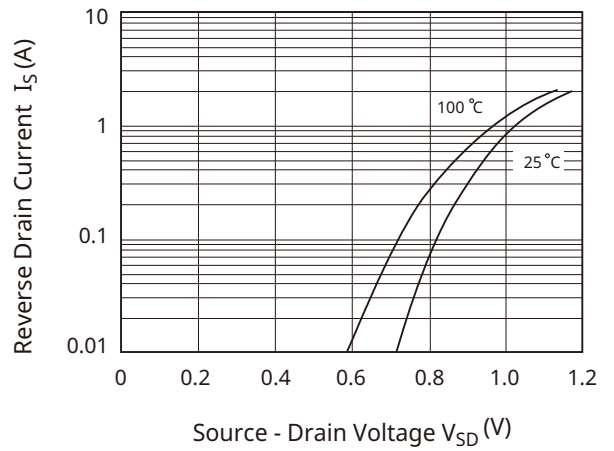


Fig9. C -  $V_{DS}$

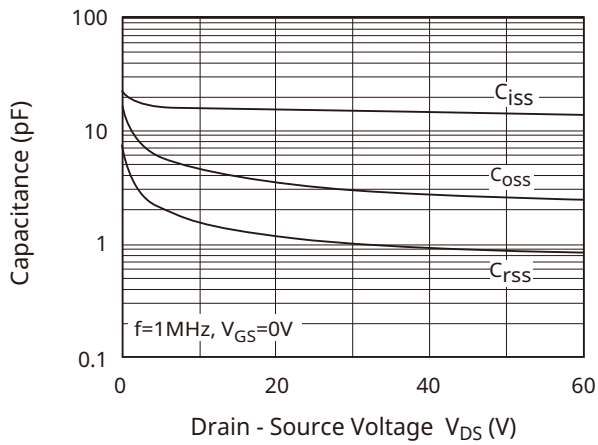
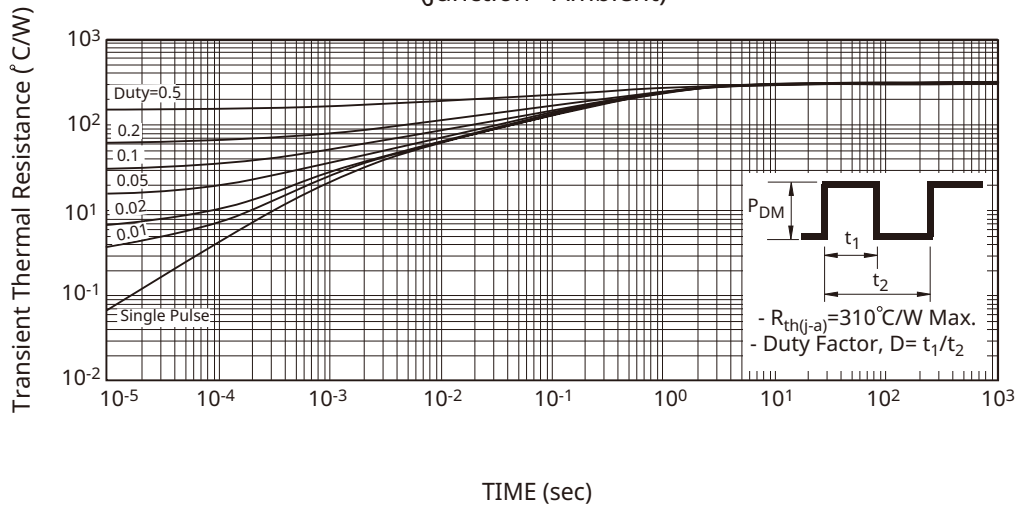
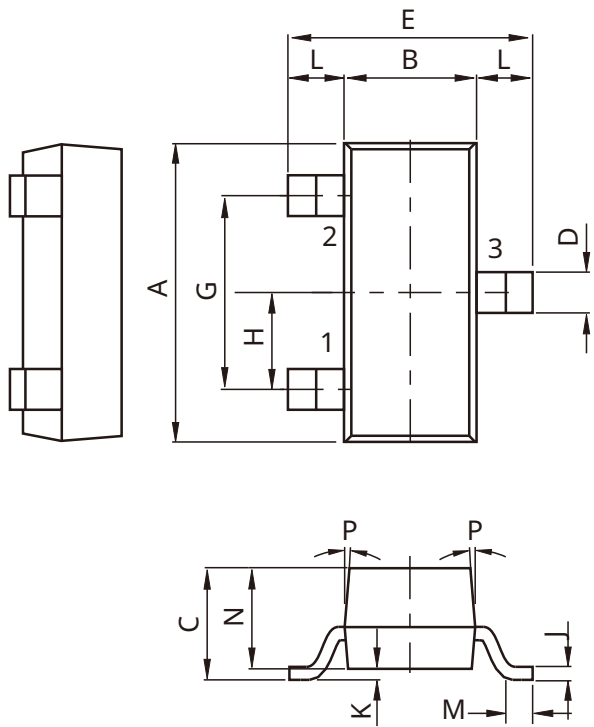


Fig10. Transient Thermal Response Curve  
(Junction - Ambient)



**PRODUCT DATASHEET**  
**N-Ch Small Signal Trench MOSFET - 2N7002KB**

**PACKAGE INFORMATION(SOT-23)**

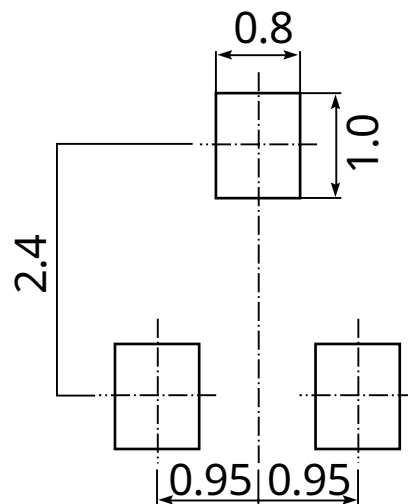


DIM	MILLIMETERS
A	2.93±0.20
B	1.30+0.20/-0.15
C	1.30 MAX
D	0.40+0.15/-0.05
E	2.40+0.30/-0.20
G	1.90
H	0.95
J	0.13+0.10/-0.05
K	0.00~0.10
L	0.55
M	0.20 MIN
N	1.00+0.20/-0.10
P	7°

- 1. Source
- 2. Gate
- 3. Drain

**RECOMMENDED PAD DIMENSION**

(Unit:mm)



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