

### Features

- Low on-resistance.
- ESD Protected Gate Up to 2KV HBM
- High-speed switching.
- Drive circuits can be simple.
- Parallel use is easy.

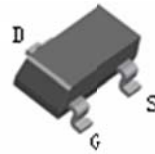


### Typical Applications

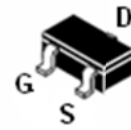
- N-channel enhancement mode effect transistor.
- Switching application.

### Mechanical Data

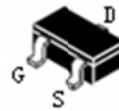
- Case: SOT-23, SOT-323, SOT-523, DFN1006-3.
- Molding Compound, UL Flammability Classification Rating 94V-0.
- Terminals: Matte Tin Plated Leads, Solderable Per MIL-STD-202, Method 208.



2N7002H  
SOT-23



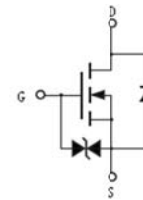
2N7002HW  
SOT-323



2N7002HT  
SOT-523



2N7002HL  
DFN1006-3



### Ordering Information

Part Number	Package	Shipping	Marking Code
2N7002H□	SOT-23	3000/Tape&Reel	7002K
2N7002HW□	SOT-323	3000/Tape&Reel	RKS
2N7002HT□	SOT-523	3000/Tape&Reel	7002K
2N7002HL□	DFN1006-3	10000/Tape&Reel	72

□: none is for Lead Free package;  
“G” is for Halogen Free package.

### Maximum Ratings (@T<sub>A</sub>=25°C unless otherwise specified)

Parameter	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	60	V
Gate -Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	300	mA
Pulsed Drain Current <sup>(NOTE4)</sup>	I <sub>DM</sub>	800	mA
Power Dissipation	P <sub>D</sub>	SOT-23	0.35
		SOT-323	0.25
		SOT-523	0.15
		DFN1006-3	0.15

**Thermal Characteristics**

Parameter		Symbol	Limits	Unit
Thermal Resistance Junction to Ambient Air	SOT-23	$R_{\theta JA}$	357	°C/W
	SOT-323		500	
	SOT-523		833	
	DFN1006-3		833	
Operating Junction Temperature Range		$T_j$	150	°C
Storage Temperature Range		$T_{STG}$	-55 to +150	°C

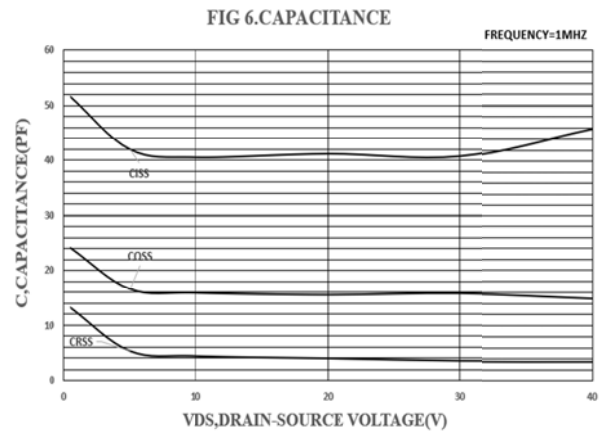
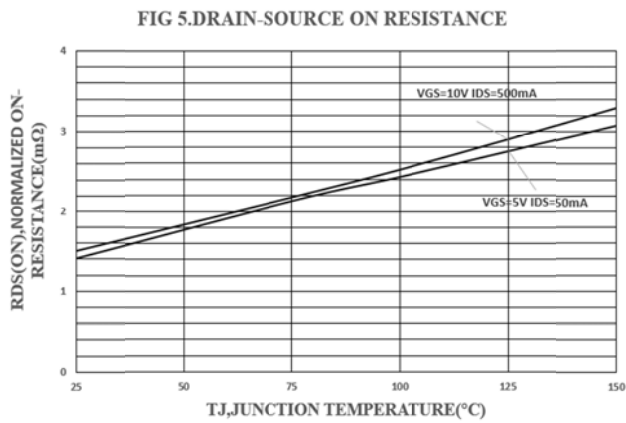
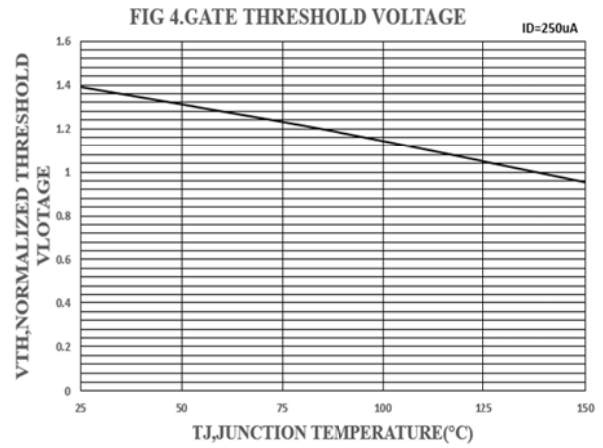
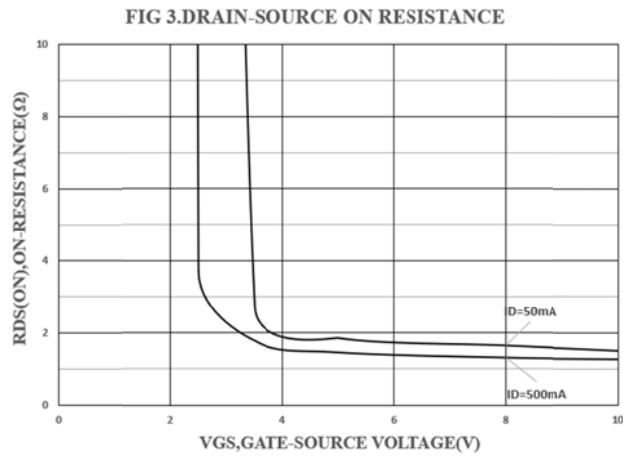
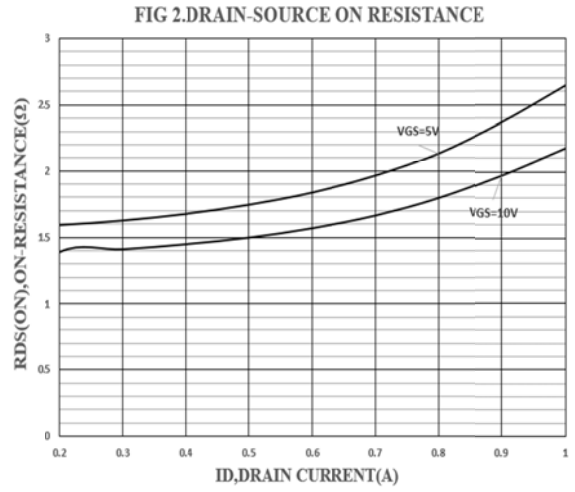
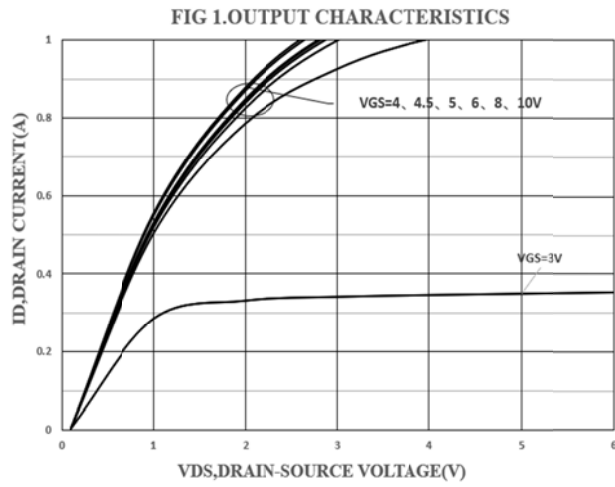
**Electrical Characteristics (@ $T_A=25^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test conditions	MIN	TYP	MAX	UNIT
<b>OFF Characteristics</b>						
$V_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$
$I_{GSS}$	Gate-body Leakage	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>ON Characteristics</b> <sup>(NOTE2)</sup>						
$R_{DS(ON)}$	Static Drain-Source On-resistance	$V_{GS}=5V, I_D=0.05A$	-	1.5	3	$\Omega$
		$V_{GS}=10V, I_D=0.5A$	-	1.45	2.5	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.5	V
<b>Dynamic Characteristics</b> <sup>(NOTE3)</sup>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	41	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=20V$	-	15	-	
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	4	-	
<b>Switching Characteristics</b> <sup>(NOTE3)</sup>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=30V, I_D=0.2A$ $V_{GS}=10V, R_G=25\Omega$ $R_L=150\Omega$	-	6	-	nS
$t_r$	Turn-on Rise Time		-	5	-	
$t_{d(off)}$	Turn-Off Delay Time		-	25	-	
$t_f$	Turn-Off Fall Time		-	15	-	
<b>Source-Drain Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage <sup>(NOTE1)</sup>	$I_S=0.3A, V_{GS}=0V$	-	0.85	1.2	V
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	-	-	0.3	A

NOTE:

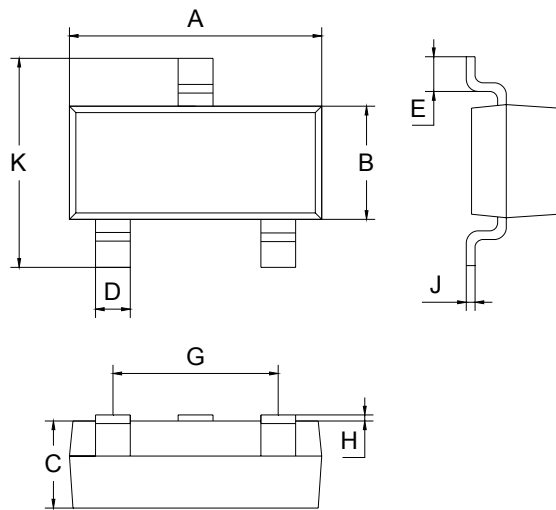
- Surface Mounted on FR4 Board,  $t \leq 10$  sec
- Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production.
- Pulse width limited by maximum junction temperature.

Ratings and Characteristic Curves ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)



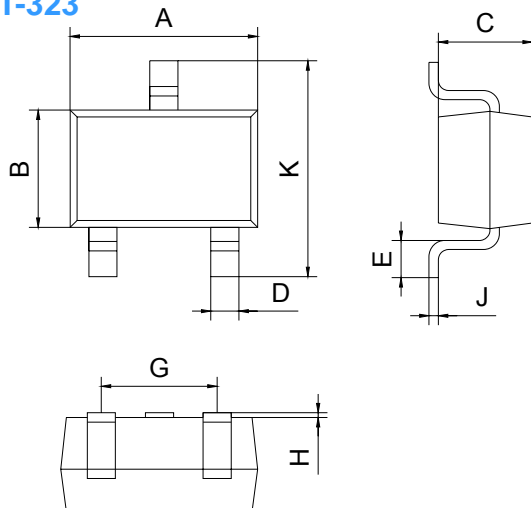
### Package Outline Dimensions (unit:mm)

#### SOT-23



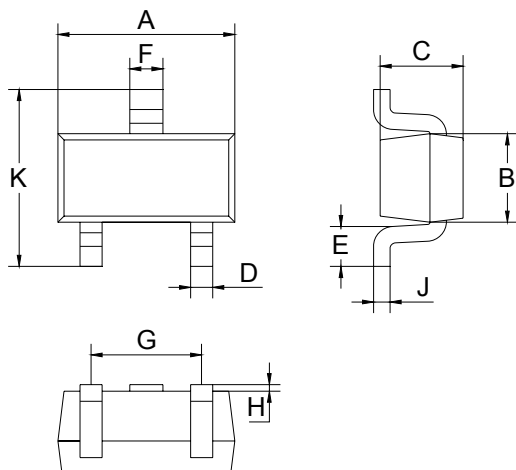
SOT-23		
Dim	Min	Max
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60

#### SOT-323



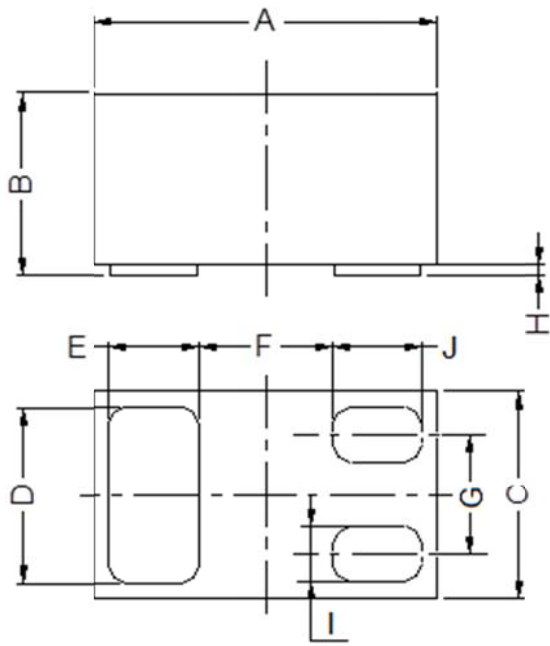
SOT-323		
Dim	Min	Max
A	2.00	2.20
B	1.15	1.35
C	0.90	1.10
D	0.15	0.35
E	0.25	0.40
G	1.20	1.40
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

#### SOT-523



SOT-523		
Dim	Min	Max
A	1.50	1.70
B	0.75	0.85
C	0.60	0.80
D	0.15	0.30
E	0.30	0.40
F	0.25	0.40
G	0.90	1.10
H	0.02	0.10
J	0.08	0.18
K	1.45	1.75

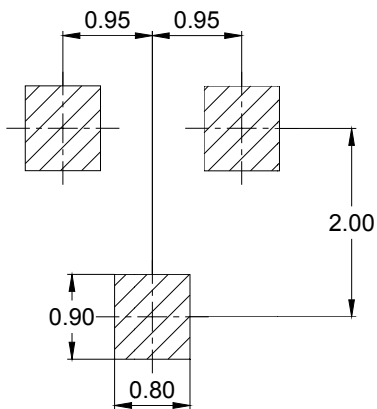
DFN1006-3



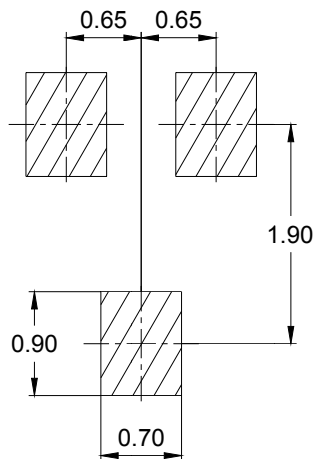
DFN1006-3			
Dim	Min	Typ	Max
A	0.95	1.00	1.075
B	0.47	0.50	0.53
C	0.55	0.60	0.675
D	0.45	0.50	0.55
E/J	0.20	0.25	0.30
F	-	0.40	-
G	-	0.35	-
H	0	0.03	0.05
I	0.10	0.15	0.20
All Dimensions in mm			

Mounting Pad Layout(unit:mm)

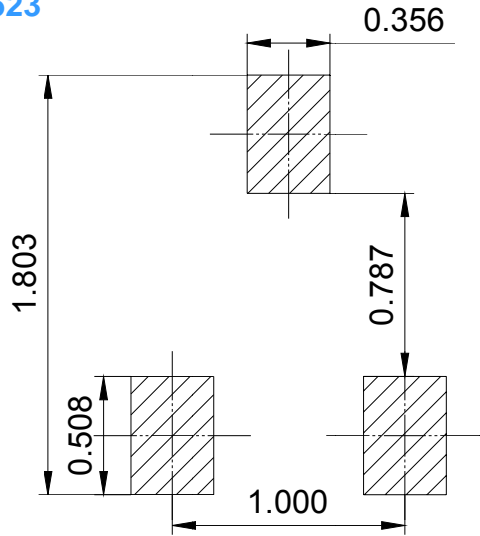
SOT-23



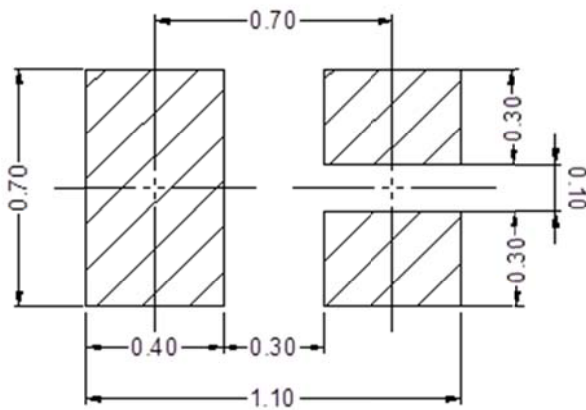
SOT-323



SOT-523



DFN1006-3



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