

Features

- Advanced trench cell design
- Extremely low threshold voltage

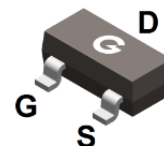
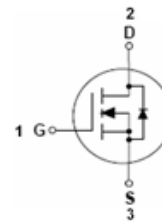
HF

Typical Applications

- N-channel enhancement mode effect transistor

Mechanical Data

- Case: SOT-23
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin-Plated Leads, Solderability-per MIL-STD-202, Method 208



SOT-23

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
2N7002V	SOT-23	3000 pcs / Tape & Reel	7002V

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	60	V
Gate-to-Source Voltage	V _{GSS}	±30	V
Continuous Drain Current (T _C = 25°C) *1	I _D	300	mA
Continuous Drain Current (T _A = 25°C) *1	I _D	250	mA
Continuous Drain Current (T _A = 70°C) *1		200	mA
Pulsed Drain Current (t _p = 10μs, T _A = 25°C)	I _{DM}	2000	mA
Single Pulse Avalanche Energy *3	E _{AS}	0.11	mJ
Power Dissipation *1	P _D	0.35	W
Operating Junction Temperature Range	T _J	-55 to +150	°C
Storage Temperature Range	T _{STG}	-55 to +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case*1	R _{θJC}	-	217	230	°C/W
Thermal Resistance Junction-to-Air *1	R _{θJA}	-	319	357	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60V, V _{GS} = 0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±30V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *2	V _{GS} = 10V, I _D = 0.5A	-	0.9	3	Ω
		V _{GS} = 4.5V, I _D = 0.075A	-	1	3.5	
V _{GS(TH)}	Static Drain-Source On-resistance	V _{DS} = V _{GS} , I _D = 250μA	1	1.5	2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	51	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz	-	35	-	pF
C _{OSS}	Output Capacitance		-	7	-	
C _{RSS}	Reverse Transfer Capacitance		-	3	-	
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time *4	V _{DD} = 30V V _{GS} = 10V R _G = 25Ω I _D = 0.2A	-	3.6	-	ns
t _r	Turn-on Rise Time *4		-	3.3	-	
t _{d(off)}	Turn-Off Delay Time *4		-	20	-	
t _f	Turn-Off Fall Time *4		-	11	-	
Q _G	Total Gate-Charge	V _{DD} = 10V V _{GS} = 4.5V I _D = 0.2A	-	0.41	-	nC
Q _{GS}	Gate to Source Charge		-	0.15	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	0.2	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _S = 0.3A, V _{GS} = 0V	-	1.09	1.5	V

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 30V, V_{GS} = 15V, L = 0.1mH$
- Guaranteed by design, not subject to production

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

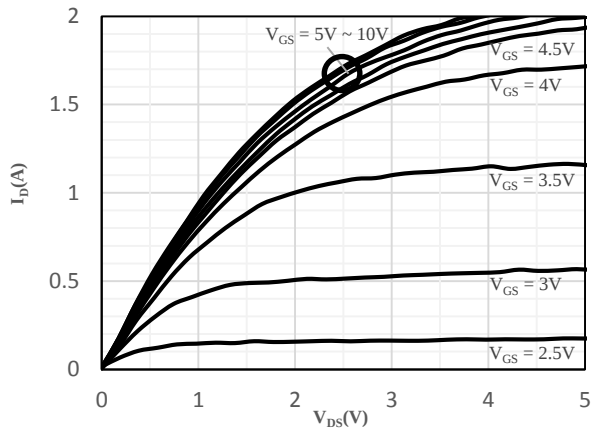


Fig 1 Typical Output Characteristics

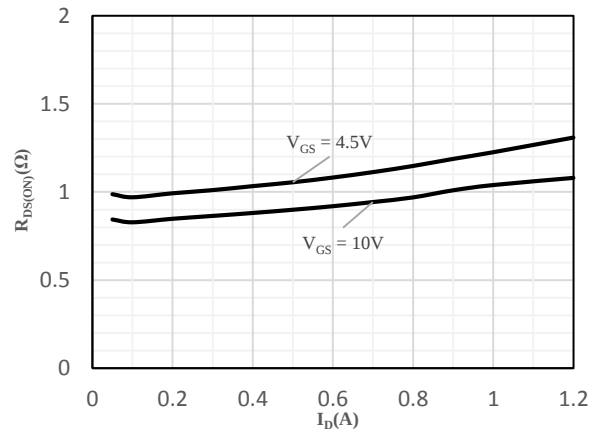


Fig 2 On-Resistance vs. Drain Current
and Gate Voltage

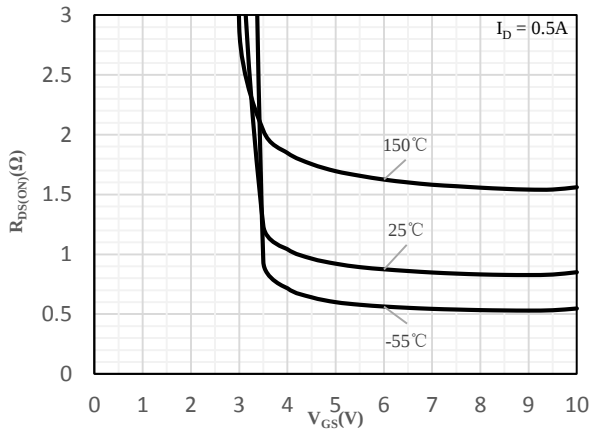


Fig 3 On-Resistance vs. Gate-Source Voltage

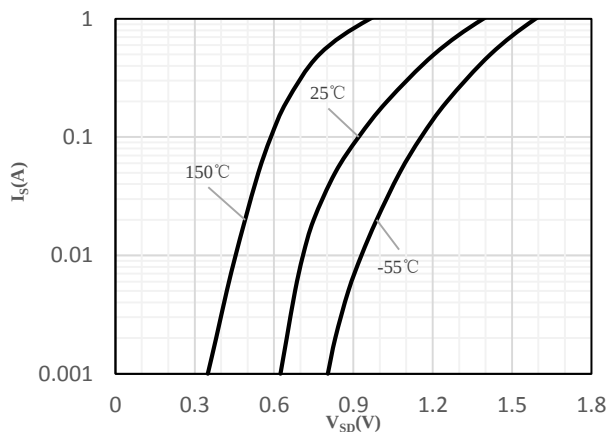


Fig 4 Body-Diode Characteristics

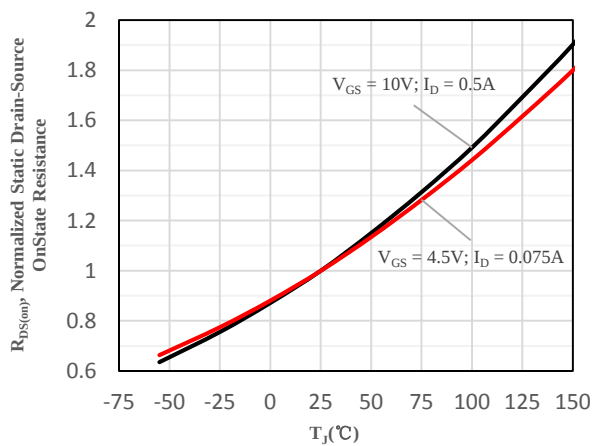


Fig 5 Normalized On-Resistance vs. Junction
Temperature

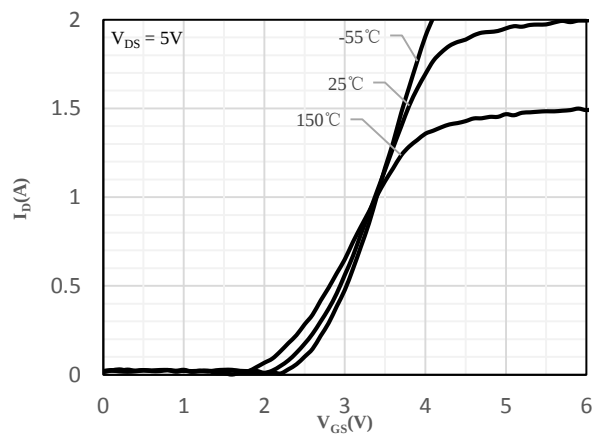


Fig 6 Transfer Characteristics

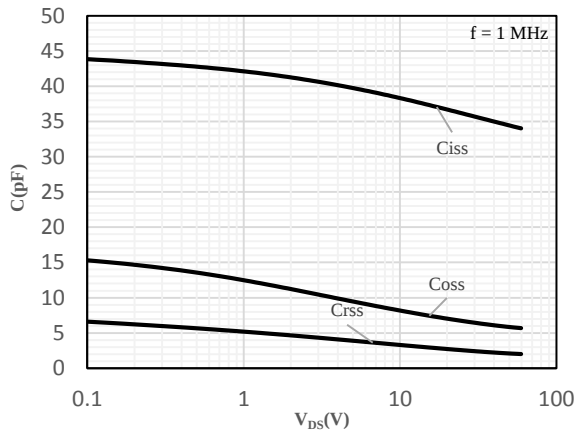


Fig 7 Capacitance Characteristics

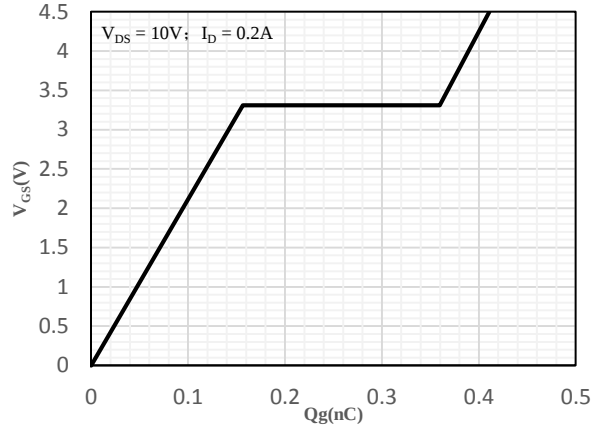


Fig 8 Gate-Charge Characteristics

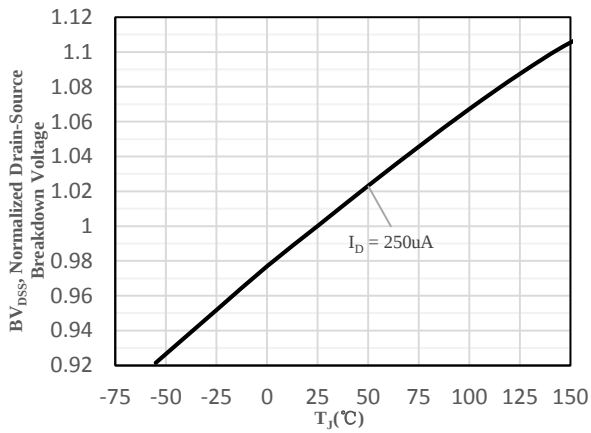


Fig 9 Normalized Breakdown Voltage
vs. Junction Temperature

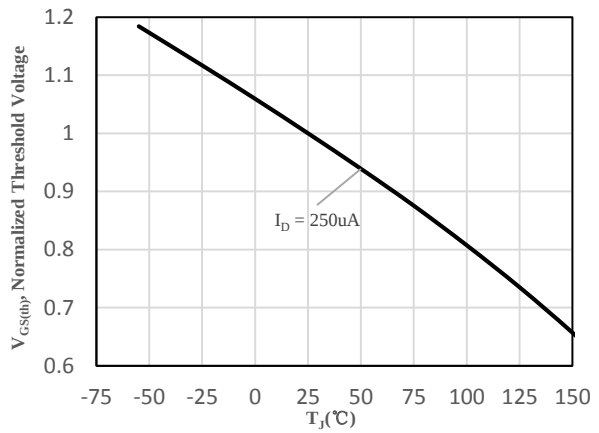


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

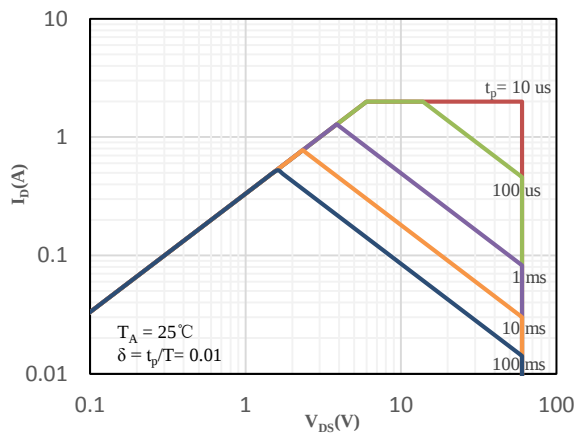


Fig 11 Safe Operation Area

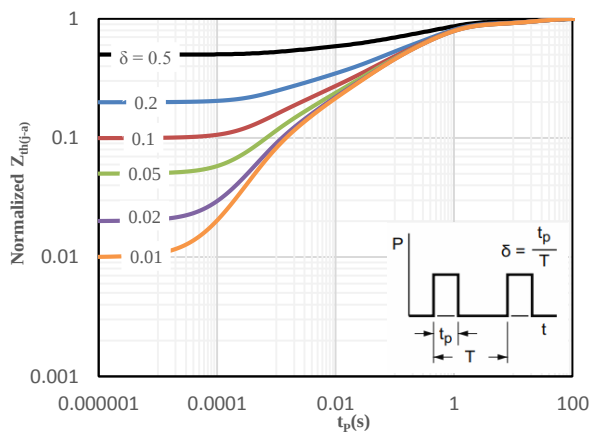
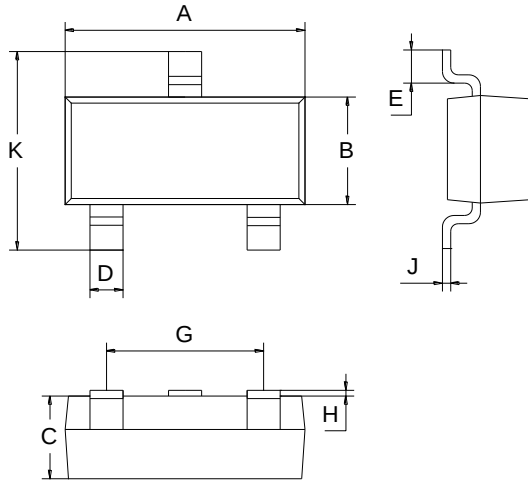


Fig 12 Normalized Maximum transient thermal
impedance

Package Outline Dimensions (Unit: mm)

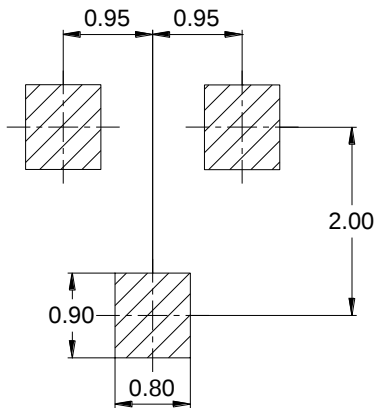
SOT-23



SOT-23		
Dimension	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

Mounting Pad Layout (Unit: mm)

SOT-23



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